Keesler AFB
JOINT LAND USE STUDY

Background Report

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This study was prepared under contract with the Gulf Regional Planning Commission, Mississippi, with financial support from the Office of Economic Adjustment, Department of Defense, the Mississippi Development Authority and the City of Biloxi. The content reflects the views of the Gulf Regional Planning Commission and does not necessarily reflect the views of the Office of Economic Adjustment, the Mississippi Development Authority or the City of Biloxi.

KEESLER AIR FORCE BASE
Joint Land Use Study

Background Report

Prepared for:

City of Biloxi
Department of Community Development
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Biloxi, MS 39530

Submitted by:

Gulf Regional Planning Commission
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August 2017

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Acknowledgements

The Joint Land Use Study was completed with the involvement of a number of individuals and agencies in the community. Special thanks should be paid to the Gulf Regional Planning Commission, which administrated the JLUS, particularly Elaine Wilkinson and Ashley Skellie.

Three committees guided the JLUS process and developed the Joint Land Use Study – the Policy Committee, Advisory Committee and Technical Committee.

Policy Committee

The Policy Committee (PC) served an active and important role in providing policy direction during the development of Keesler Air Force Base (AFB) Joint Land Use Study (JLUS). The Policy Committee was comprised of the following individuals:

Colonel Frank Amodeo, Commander, 403rd Wing (2016 – Jan 2017)
Keesler AFB

Colonel Michele Edmondson, Commander, 81st Training Wing (April 2016 – June 2017)
Keesler AFB

Andrew "FoFo" Gilich, Mayor
City of Biloxi

Felix Gines, *Council Member, Ward 2*
City of Biloxi

Kenny Glavan, *Council Member, Ward 6*
City of Biloxi

Colonel Jennie Johnson, *Commander, 403rd Wing (May 2016 – August 2017)*
Keesler AFB

Clay Jones, *City Manager*
City of D'Iberville

Tom King, *Southern District Commissioner*
Mississippi Department of Transportation

Cliff Kirkland, *Office of Innovation and Development Officer*
City of Biloxi

George Lawrence, *Council Member, Ward 1*
City of Biloxi

Colonel Debra Lovette, *Commander, 81st Training Wing (June 2017 – August 2017)*
Keesler AFB

Colonel Michael Manion, *Commander, 403rd Wing (January 2017 – May 2017)*
Keesler AFB

Beverly Martin, *Board of Supervisors President*
Harrison County

Rusty Quave, *Mayor*
City of D'Iberville

Pamela Ulrich, *County Administrator*
Harrison County

Elaine Wilkinson, *Executive Director*
Gulf Regional Planning Commission

Policy Committee (continued)

Ex Officio Members

Jeanette M. Musil, *Project Manager*
Office of Economic Adjustment

Sara Watson, *Bureau Manager*
Mississippi Development Authority

Advisory Committee

The Advisory Committee (AC) served a key role in the development of the Keesler AFB JLUS, providing the overall advisory support, review, and guidance of the study. The Advisory Committee was comprised of the following individuals:

Paul Barnes, *GIS Director*
Harrison County

Pat Bonck, *Zoning Director*
Harrison County

Dr. Wayne Clark, *81st Mission Support Group Deputy Director*
Keesler Air Force Base

Marcia Crawford, *Director Community Development & Information*
Harrison County Development Commission

Colonel Danny Davis, *Commander, 81st Mission Support Group (June 2016 – August 2017)*
Keesler AFB

Tasha Golson, *81st Infrastructure Support Division Deputy Director*
Keesler AFB

Mark Malone, *81st Infrastructure Support Division Director*
Keesler Air Force Base

Joy Saucier, *Community Development Specialist*
Mississippi Power Company

Ed Shambra, *Executive Planner*
City of Biloxi

Colonel Susan Airola-Skully, *Commander, 81st Mission Support Group (April 2016 – June 2016*
Keesler AFB

Jeff Taylor, *Economic Development Director*
City of D'Iberville

Elaine Wilkinson, *Executive Director*
Gulf Regional Planning Commission

Technical Committee

The Technical Committee (TC) provided guidance and recommendations on technical issues. The TC was comprised of the following individuals:

Paul Barnes, *GIS Director*
Harrison County

Pat Bonck, *Zoning Director*
Harrison County

Arthur McMillan, *Superintendent*
Biloxi Public School Board

Eric Nolan, *Arborist*
City of Biloxi

Tommy Booth, *Aeronautics Director*
Mississippi Department of Transportation

Joe Bosco, *Account Executive*
Mississippi Power Company

Kelly Castleberry, *District Engineer*
Mississippi Department of Transportation

Susan Chamberlain, *Base Operations Support Community Planner*
Keesler AFB

Marcia Crawford, *Director Community Development & Information*
Harrison County Development Commission

Mark Creech, *Special Projects Director*
Biloxi Housing Authority

Jerry Creel, *Community Development Director*
City of Biloxi

Cindy Feranda, *Planning and Zoning Director*
City of D'Iberville

Frank Genzer, *Member*
Mississippi Gulf Coast Chamber of Commerce Coast Centurion Association

Tasha Golson, *81st Infrastructure Support Division Deputy Director*
Keesler AFB

Lieutenant General Clark Griffith, *Member*
Harrison County Military Team

Ken Holland, *Senior Planner GIS*
Gulf Regional Planning Commission

Walt Ord, *Lieutenant Colonel*
Keesler Air Force Base

Hank Rogers, *Community Development Director*
City of D'Iberville

Joy Saucier, *Community Development Specialist*
Mississippi Power Company

Rachel Seymour, *Director and Operations Manager*
Biloxi Bay Chamber of Commerce / Military Affairs Committee

Ed Shambra, *Executive Planner*
City of Biloxi

Robert Smith, *Engineer*
City of Biloxi

John D. Snow, *Commissioner*
City of Biloxi, Community Development and Planning Commission

Joseph Spires, *Engineer*
Harrison County

David Taylor, *Planning Director*
Gulf Regional Planning Commission

Jeff Taylor, *Economic Development Director*
City of D'Iberville

Kenneth Yarrow, *Planning Manager*
Gulf Regional Planning Commission

City of Biloxi

Ed Shambra, *Executive Planner*
Project Sponsor Representative

Gulf Regional Planning Commission

Elaine Wilkinson, *Executive Director*
Project Manager

JLUS Consultant

Mike Hrapla
Project Manager

Celeste Werner, AICP
Deputy Project Manager

Patrick Small, AICP
Lead Planner

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Acronyms

A

AAO	Airport Overlay District
AC	Advisory Committee
AETC	Air Education and Training Command
AFB	Air Force Base
AFI	Air Force Instruction
AFPD	Air Force Policy Directive
AGL	Above Ground Level
AICUZ	Air Installation Compatible Use Zone
ANO	Airport Noise Overlay
APZ	Accident Potential Zone
AQ	Air Quality
AT/ FP	Anti-Terrorism / Force Protection

B

BASH	Bird Air Strike Hazard

C

C	Commercial
CC	Climate Consideration
COMM	Communication / Coordination
CTA	Coast Transit Authority
CZ	Clear Zone
CZMA	Coastal Zone Management Act

D

DNL	Day Night Average A-weighted Sound Level
DoD	Department of Defense
DSS	Dust / Smoke / Steam

E

e.g.	For Example
EMOS	Existing Military Operation Surface
EPA	Environmental Protection Agency

F

FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FSI	Frequency Spectrum Impedance / Interference
FY	Fiscal Year

G

GRPC	Gulf Regional Planning Commission

H

HCDC	Harrison County Development Commission

I

I-10	Interstate I-10
I-110	Interstate I-110
ICEMAP	Installation Complex Encroachment Management Action Plan
IE	Infrastructure Extension

J

JLUS	Joint Land Use Study

L

LAS	Land / Air Spaces
LDO	Land Development Ordinance
LG	Light and Glare
LU	Land Use

M

MDA	Mississippi Development Authority
MMCC	Mississippi Military Communities Council
MPO	Metropolitan Planning Organization
MS	Mississippi

N

NGO	Non-governmental Organization
NOAA	National Oceanic and Atmospheric Administration
NOI	Noise

O

OEA	Office of Economic Adjustment

P

PC	Policy Committee
PT	Public Trespassing

R

RC	Roadway Capacity

S

SA	Safety Zones

T

TOD	Transit oriented development

U

U.S.	United States
USAHAS	United States Avian Hazard Advisory System

V

VFR	Visual Flight Rules
VO	Vertical Obstruction

W

WF	Waterfront

Please see the next page.

Introduction 1

Inside Chapter 1...

Military installations are critical to local economies, generating thousands of jobs and millions of dollars in economic activity and tax revenue annually. Just as these installations are important to the surrounding region, the local community is critical to the success of installations. This mutual dependence has brought about the need for compatibility between installations and their communities. Across the United States (U.S.) incompatible development, also known as "encroachment," has been a factor in the loss of military training operations and the realignment of mission critical components to other military installations. The loss of military missions and the closure of military installations have had a major negative economic impact on communities that are or were the home of these installations. To protect the missions of local military installations and the economic and social health of the host communities, encroachment must be addressed through collaboration and joint planning. The uniqueness of each installation requires distinctive approaches for each community. Keesler Air Force Base's (AFB) geographic and economic characteristics make it an integral focus of community development.

Keesler AFB is situated in the City of Biloxi, in Harrison County, Mississippi, approximately 165 miles south of the state capital, Jackson, Mississippi, and 88 miles east of New Orleans, Louisiana. The installation occupies approximately 1,719 acres of land in the City of Biloxi and Jackson County. The installation comprises the Air Force Base in Biloxi, three privatized housing areas in Biloxi proximate to the base, one former housing site – currently vacant in Biloxi, and one privatized housing area in unincorporated Jackson County east of Biloxi. Keesler AFB is critical to local and regional economies, generating approximately $657 million in economic impact annually.

The area around Keesler AFB continues to experience economic growth and development. Several jurisdictions surrounding Keesler AFB participated as partners in this JLUS including the cities of Biloxi and D'Iberville, and Harrison County.

This JLUS is a proactive approach to mitigate existing compatibility issues and prevent their development by strengthening coordination between local communities, agencies, the public, and Keesler AFB. The JLUS provides an organized communication effort between the cities of Biloxi and D'Iberville, Harrison County, Keesler AFB, and other stakeholder entities that own or manage land or resources in the region to ensure that future regional growth is not only compatible with all Keesler AFB mission activities, but respects the goals and aspirations of the host communities.

The Keesler AFB JLUS advocates for coordinated land use planning, policy and regulation, conservation and natural resource management, infrastructure investments, and other common issues affecting the study area communities and the military. This Study seeks to avoid conflicts previously experienced by the U.S. military and local communities by engaging the military and local decision-makers in a collaborative planning process.

1.1. What is a Joint Land Use Study?

A JLUS is a planning process accomplished through the collaborative efforts of stakeholders in a defined study area to identify compatible land uses and growth management guidelines within, and adjacent to, an active military installation. These stakeholders include local community, state, and federal officials, residents, business owners, federal resource agencies and landholders, nongovernmental organizations, and the military. The process is intended to establish and encourage a working relationship among military installations and proximate communities to prevent and / or reduce encroachment issues associated with future mission expansion and local growth. While one of the primary funders is the Department of Defense (DoD), Office of Economic Adjustment (OEA), this JLUS is produced by and for local communities and was also primarily funded by the Mississippi Development Authority. The project sponsor and grant administrator for the Keesler AFB JLUS is the City of Biloxi; the project is managed by the Gulf Regional Planning Commission.

JLUS Goals and Objectives

The goal of the Keesler AFB JLUS is to protect the viability of current and future operations, while simultaneously guiding community growth, sustaining the environmental and economic health of the region, and protecting public health, safety, and welfare.

To help meet this goal, three primary guiding principles provide the foundation for the JLUS effort:

- Understanding. Convene community and military representatives to identify, confirm, and understand compatibility issues and concerns in an open forum, considering both the community and military perspectives and needs. This includes increasing public awareness, education, and opportunities for input organized in a cohesive outreach program.

- **Collaboration.** Encourage cooperative land use and resource planning between Keesler AFB and surrounding communities so that future community growth and development are compatible with the Keesler AFB missions and operations, while seeking ways to reduce operational impacts on land within the JLUS Study Area.
- **Actions.** Provide a set of mutually supported tools, activities, and procedures from which local jurisdictions, agencies, and Keesler AFB can select, prepare, and approve / adopt in order to implement recommendations developed during the JLUS process. The actions include both operational measures to mitigate installation impacts on surrounding communities and local government and agency approaches to reduce community impacts on military operations. These tools help decision makers resolve compatibility issues and prioritize projects within their annual budgeting cycles.

1.2. Why Prepare a Joint Land Use Study?

Although military installations and nearby communities are separated by a defined property boundary, they often share natural and manmade resources such as land use, airspace, water, and infrastructure. Operational areas such as flight patterns and specialized airspace expand the military influence area footprint beyond defined property boundaries. Despite the many positive interactions among local jurisdictions, agencies, and the military, and because so many resources are shared, the activities or actions of one entity can create unintended impacts on another, resulting in conflicts. As communities develop and expand in response to growth and market demands, land use approvals can potentially locate incompatible development closer to military installations and operational areas. The result can generate new, or exacerbate existing, land use and other compatibility issues, which can negatively affect community safety, economic development, and sustainment of military activities and readiness. This threat to military readiness is currently one of the military's greatest concerns.

Collaboration and joint planning among military installations, local jurisdictions, and agencies protect the long-term viability of existing and future military missions. Working together also enhances local economies and industries before compatibility becomes an issue. Recognizing the close relationship that should exist between installations and adjacent communities, the OEA implemented the JLUS program to mitigate existing and future conflicts and enhance communication and coordination among all affected stakeholders. This program aims to preserve the sustainability of local communities while protecting current and future research, development, acquisition, testing, and missions at Keesler AFB.

1.3. Public Outreach

The JLUS process was designed to create a locally relevant document that builds consensus and garners stakeholder support. To achieve the JLUS goals and objectives, the Keesler AFB JLUS process included a public outreach program providing a variety of participation opportunities for interested parties.

Stakeholders

An early step in any planning process is stakeholder identification. Informing and involving stakeholders early is instrumental to identifying, understanding, and resolving their most important issues through the development of integrated strategies and measures. Stakeholders include individuals, groups, organizations, and governmental entities interested in, affected by, or affecting the outcome of the JLUS document. Stakeholders identified for the Keesler AFB include:

- Jurisdictions (cities of Biloxi and D'Iberville and Harrison County)
- DoD officials (including OEA representatives) and military installation personnel
- Local, county, regional, and state planning, regulatory, and land management agencies

- State and federal regulatory agencies
- The public (including residents, businesses, and landowners)
- Environmental advocacy organizations
- Non-Governmental Organizations (NGOs)
- Other special interest groups (including local educational institutions and school districts)

Policy Committee and Technical Advisory Groups

The development of the Keesler AFB JLUS was guided by two committees and one subcommittee, comprising community leaders, Keesler AFB personnel, federal and state agencies, resource agencies, local governments, and other stakeholders.

JLUS Policy Committee. The Policy Committee (PC) consisted of officials from participating jurisdictions, military installation leadership, and representatives from other interested and affected agencies. The PC was responsible for the overall direction of the JLUS, preparation and approval of the study design, policy recommendations, and draft and final JLUS documents.

JLUS Advisory Committee. Membership of the Advisory Committee (AC) included representatives from local jurisdictions, agencies, and Keesler AFB with technical expertise in one or more of the compatibility factor issue areas. The AC was responsible for identifying and studying technical issues. The AC assisted in data gathering, provided technical input, and reviewed the JLUS issues and recommendations. The AC identified and addressed technical issues, provided feedback on report development, and assisted in the development and evaluation of implementation strategies and tools.

JLUS Technical Committee. The need to include additional technical members was necessary to ensure that all issues have adequate representation through technical and local knowledge. These additional members who comprised the Technical Committee (TC) also assisted with and provided information for the development of strategies relative to their expertise and experience.

The responsibilities and list of participants for the JLUS sponsor, project manager, PC, AC, and Technical Subcommittees are identified in Tables 1-1 through 1-5, respectively.

Table 1-1 JLUS Sponsor Responsibilities and Participants

Responsibilities	Participants
■ Accountability ■ Grant Management ■ Financial Contribution	■ Office of Economic Adjustment ■ City of Biloxi ■ Mississippi Development Authority

Table 1-2 JLUS Project Manager Responsibilities and Participants

Responsibilities	Participants
■ Accountability ■ Project Management	■ Gulf Regional Planning Commission

Table 1-3 JLUS Policy Committee Responsibilities and Participants

Responsibilities	Participants
■ Policy Direction ■ Study Oversight ■ Monitoring ■ JLUS Report Adoption	■ City of Biloxi ■ City D'Iberville ■ Harrison County ■ Keesler Air Force Base ■ Mississippi Development Authority

Table 1-4 JLUS Advisory Committee Responsibilities and Participants

Responsibilities	Participants
■ Synthesize materials, reports, and recommendations from Technical Subcommittees Schedule / Agendas / Presentations for Policy Committee	■ Gulf Regional Planning Commission ■ City of Biloxi ■ City of D'Iberville ■ Harrison County ■ Harrison County Development Commission ■ Keesler Air Force Base

Table 1-5 JLUS Technical Committee Responsibilities and Participants

Responsibilities	Participants
■ Technical Issues ■ Alternatives ■ Report Development ■ Recommendations	■ Biloxi Chamber of Commerce ■ Biloxi Housing Authority ■ Biloxi Planning Commission ■ Biloxi Public School District ■ City of Biloxi ■ City of D'Iberville ■ Gulf Coast Housing Initiative / Back Bay Mission ■ Harrison County Development Commission ■ Keesler Air Force Base ■ Mississippi Coast Chamber of Commerce ■ Mississippi Department of Environmental Quality ■ Mississippi Department of Marine Resources ■ Mississippi Power ■ Mississippi Department of Transportation ■ North Biloxi Chamber of Commerce ■ Southern Mississippi Planning and Development District

Committee meetings were held throughout the process to ensure that the JLUS identified and appropriately addressed local issues:

- Project Kick-Off / PC / AC / TC Meeting #1 (May 3, 2016). The project Kick-Off Meeting was held as a joint meeting with members of the PC, AC and TC in conjunction with the Tiger Team interviews. The purpose of this meeting was to outline the JLUS process and goals, educate all stakeholders about the Keesler AFB JLUS and their roles and responsibilities in the process. Additional topics discussed included an overview of JLUS compatibility factors, review of preliminary issues, review of lessons learned from other JLUS projects, and identification of any additional compatibility issues. Meeting attendees participated in an interactive survey with results provided in real time and had an opportunity to ask questions about the JLUS.
- AC / TC Meeting #2 (August 23, 2016). The second AC / TC Meeting provided an update to the JLUS. During the meeting, an overview of the first public workshop was provided, as well as an overview of preliminary compatibility issues and findings summary. The meeting continued with a discussion of missing data needs that the technical committee could potentially provide.
- PC Meeting #2 (August 24, 2016). The second PC Meeting provided an update to the JLUS. During the meeting, an overview of the first public workshop was provided, as well as an update on the Technical Committee meeting, both of which occurred the day before. In addition to these updates, an overview of preliminary compatibility issues was summarized.
- AC / TC Meeting #3 (November 21, 2016). The third AC / TC Meeting provided an update of the JLUS progress, a review of the key compatibility issues in Background Report Chapter 5, preliminary strategy discussion regarding military influence areas and key approaches, and a discussion of next steps.

- **AC / TC Meeting #4 (February 24, 2017).** The fourth AC / TC Meeting provided an update of the JLUS progress and focused on the review of preliminary strategies to address the compatibility issues. The AC and TC reviewed each of the strategies and provided recommendations for changes to the preliminary strategies that would be made prior to electronic distribution to committee members for a more in-depth review. The meeting closed with a discussion of next steps.
- **PC Meeting #3 (April 21, 2017).** The third PC meeting provided members with a project status update and update of the Technical Committee organization meetings conducted earlier in the week. Additionally, the committee discussed the issues and strategies developed for the JLUS and next steps for the project.
- **PC Meeting #4 (September 12, 2017).** This meeting was conducted to review comment received during the Public Draft Review period and obtain consensus that the project has successfully addressed all issues before moving forward with a final version.

Participants completing the interactive survey at the combined Committee Kick-Off Meeting conducted May 3, 2016

Public Workshops

In addition to the PC and AC meetings, a series of public workshops were held throughout the development of the JLUS. These workshops provided an opportunity for the exchange of information with the greater community, assisted in identifying the issues to be addressed in the JLUS, and provided input on the proposed strategies. Each workshop included a traditional presentation and a facilitated exercise providing a "hands on" interactive opportunity for the public to participate in the development of the plan. A brief summary of these meetings is provided below.

- **Public Workshop #1 (August 23, 2016 and August 25, 2016).**
  Public Workshop #1 was held in two locations on two different dates. The purpose of the meeting was to provide the public information on the JLUS. During the meeting an overview of the JLUS planning process was provided; opportunities for public involvement were discussed; an overview of Keesler AFB was given; and compatibility factors were discussed. The public participated in a survey with results presented to the audience in real-time to gauge attendees' understanding of Keesler AFB and to provide insight into potential compatibility issues. Each survey was tailored to the respective meeting area.

Participants at Public Meeting #1 in the City of Biloxi conducted August 26, 2016

- **Public Workshop #2 (April 19, 2017 and April 20, 2017).** The second set of public workshops provided an update of the JLUS project and the Keesler AFB military mission footprint was reviewed. Attendees participated in an active exercise to identify the importance of each compatibility issues by placing dots next to issues on wall mounted sheets. The issues identified to date reflected input received from the Policy Committee, Advisory Committee, Technical Committee, stakeholder interviews, and public input from the first set of public workshops. The results of the issues exercise were compiled. Public Workshop #2 in Biloxi was held in conjunction with the City of Biloxi Planning Commission meeting.
- **Public Workshop #3 (August 2, 2017 and August 3, 2017).** The third set of public workshops presented the JLUS findings and draft recommendations to the public. The workshop consisted of a formal presentation detailing the findings and recommendations followed by a Question and Answer session for the attendees to provide input on the draft recommendations.

Public Outreach Materials

JLUS Fact Sheet / Compatibility Factors Brochure. At the beginning of the JLUS project, a Fact Sheet, or JLUS Update, was developed describing the JLUS program, objectives, methods for the public to provide input into the process, overview of the 25 compatibility factors that were analyzed throughout the project, and the proposed Keesler AFB JLUS Study Area. This Fact Sheet was made available at the workshops for review by interested members of the public and posted on the website for download.


Keesler AFB
JOINT LAND USE STUDY

Project Overview / Compatibility Factors • Fact Sheet #1

What is a Joint Land Use Study?

A Joint Land Use Study (JLUS) is a cooperative land use planning effort conducted as a joint venture between an active military installation, surrounding jurisdictions, state and federal agencies, and other affected stakeholders. The Keesler Air Force Base (AFB) JLUS is funded by a grant from the Department of Defense's Office of Economic Adjustment (OEA). The JLUS effort is intended to directly benefit both Keesler AFB and the surrounding region by:

- Protecting the health and safety of surrounding residents and workers;
- Preserving long-term land use compatibility between Keesler AFB and the surrounding communities;
- Promoting community planning; and
- Encouraging cooperation between the military installation and community officials

JLUS Objectives

The goal of a JLUS is to achieve a balance between preserving, sustaining and supporting the evolving mission needs of a military installation and protecting opportunities for community growth, economic viability and quality of life through a proactive, transparent and collaborative process. Joint Land Use programs have three core objectives:

UNDERSTANDING. Convening communities, agency representatives, and Keesler AFB to promote awareness and shared knowledge of the economic, physical and mutually beneficial relationship between Keesler AFB and its neighbors, taking into consideration community and military viewpoints and needs.

COLLABORATION. Encouraging cooperative land use and resource planning between the military, local jurisdictions and stakeholders to cultivate a consistent approach to community growth and development while safeguarding military operations and mission readiness in support of national defense objectives.

ACTIONS. Providing a set of recommended tools, activities, and procedures that local jurisdictions, agencies, and Keesler AFB can use to implement the recommendations developed during the JLUS process.

Who Will Guide the JLUS Development?

Three committees (comprising city, county, military, and other stakeholders), together with the public under the Gulf Regional Planning Commission (GRPC), will guide the development of the JLUS with each group having a critical role:

Policy Committee (PC). The PC is made up of elected officials of impacted communities and is responsible for leading the direction of the JLUS and monitoring the implementation and adoption of policies and strategies.

Advisory Committee (AC). The AC is made up of representatives in affected jurisdictions, key stakeholders, and installation representatives who will guide the consultant in setting the schedule, agenda and presentations for the Policy Committee (PC). They will meet regularly to synthesize the materials, reports and recommendations of the various technical subcommittees.

Technical Subcommittees (TS). The TS is made up of representatives from various local agencies and the planning and development community who possess the technical knowledge needed to address various encroachment and compatibility issues and to guide and assist the JLUS process. The TS identifies and addresses technical issues, provides feedback on report development, and assists in the development and evaluation of implementation strategies and tools.

Public. The public is strongly encouraged to be involved in the development of the JLUS by providing input and guidance to the process, by informing PC representatives of their concerns and recommendations, by submitting comments and feedback online at through the project website, and by attending public workshops.

Why is It Important to Partner With Keesler AFB?

Established in 1941, Keesler AFB is the Air Force's Electronics Training Center of Excellence and responsible for training and educating over 20,000 airmen annually in electronic and computer systems, air weapons control and air traffic control, as well as cyber systems operations and cyber security. The base is home 81st Training Wing, which hosts the 2nd Air Force, 403rd Wing including the 53rd Weather Reconnaissance Squadron, 815th Airlift Squadron, and the 85th Engineering Installation Squadron.

As the largest Gulf Coast employer, Keesler AFB employs over 10,000 military and civilian employees and contributed over $1.6 billion annually to the economy in 2014. Employees at Keesler AFB invest in community outreach and support, participating in community causes and educational programs throughout surrounding areas.

It is important to partner with Keesler AFB on relevant and long range planning projects to ensure viability and sustainability of the of the military training mission and economic impact that the base provides now and into the future. The JLUS process strives to deepen the understanding of and enhance the mutual benefit shared between Keesler AFB and the Gulf Coast region.

What is Compatibility?

Compatibility, in relationship to military readiness, can be defined as the balance and / or compromise between community and military needs and interests. The goal of compatibility planning is to promote an environment where both entities can coexist successfully. Study area data on existing conditions obtained from the PC, AC, TS, and public workshops will be analyzed to identify current and future compatibility issues. This analysis will also identify the influence of regulatory measures on land use decisions and will consider existing and projected development trends within the study area. The JLUS will study the following set of 25 potential compatibility factors to determine all pertinent issues.

Stay up-to-date on the Keesler AFB JLUS at www.keeslerjlus.com

Fact Sheet #1 – JLUS Project Overview / Compatibility Factors

These Fact Sheets served as an informational brochure describing each compatibility factor considered for JLUS development. While not every factor may apply to the Keesler AFB JLUS, this list provided an effective tool to conduct a comprehensive evaluation of compatibility factors within the study area.

Strategy Tools Brochure. JLUS strategies incorporate a variety of actions that local governments, military installations, agencies, and other stakeholders can take to promote compatible land use planning. This brochure provided an overview of strategy types that can be applied to address study area compatibility issues.

Website. A project website was developed to provide stakeholders, the public, and media representatives with access to project information. The website was maintained for the entire duration of the project to make information easily accessible. Information contained on the website included program points of contact, schedules, relevant documents and maps, public meeting information, and downloadable comment forms. The project website is located at www.keeslerjlus.com.

Keesler JLUS Website

1.4. JLUS Study Area

The Keesler AFB JLUS Study Area was designed to address land near the installation that may impact or may be impacted by current or future military operations. Figure 1-1 shows the extent of this area, which encompassed Keesler AFB, the cities of Biloxi and D'Iberville, and Harrison County.

The delineation of the study area boundaries was determined based on the evaluation of the proximity of areas adjacent to Keesler AFB and the anticipated magnitude of impacts associated with various military mission operations.

1.5. JLUS Background Report Organization

The following is a brief overview of the organization of the Keesler AFB JLUS Background Report, including the contents of each chapter.

Chapter 1: Introduction. Chapter 1 provides an introduction and overview of the Keesler AFB JLUS. This chapter describes the working relationships among stakeholders, background and intent of the JLUS, the JLUS Study Area, objectives to guide development of the JLUS, stakeholders involved in developing the JLUS, public outreach methods, implementation premise, and the document organization.

Chapter 2: Community Profile. This chapter identifies the local jurisdictions within the study area and includes an overview of the regional growth potential as well as a profile of the jurisdictions within the study area, highlighting population, housing, and transportation characteristics.

Chapter 3: Military Profile. This chapter introduces Keesler AFB and discusses installation missions, strategic and economic importance of Keesler AFB, importance of mission sustainment, facility and operations, and the installation's role in national defense. This chapter also includes an overview of the installation's settings, including a history to provide the military baseline context for the JLUS.

This chapter also defines the footprint of each of the military operating areas (e.g., airspace, noise contours, accident potential zones, height hazard area) that occur in the Study Area to foster an understanding of how the military operations could potentially impact, or be impacted by, the surrounding communities.

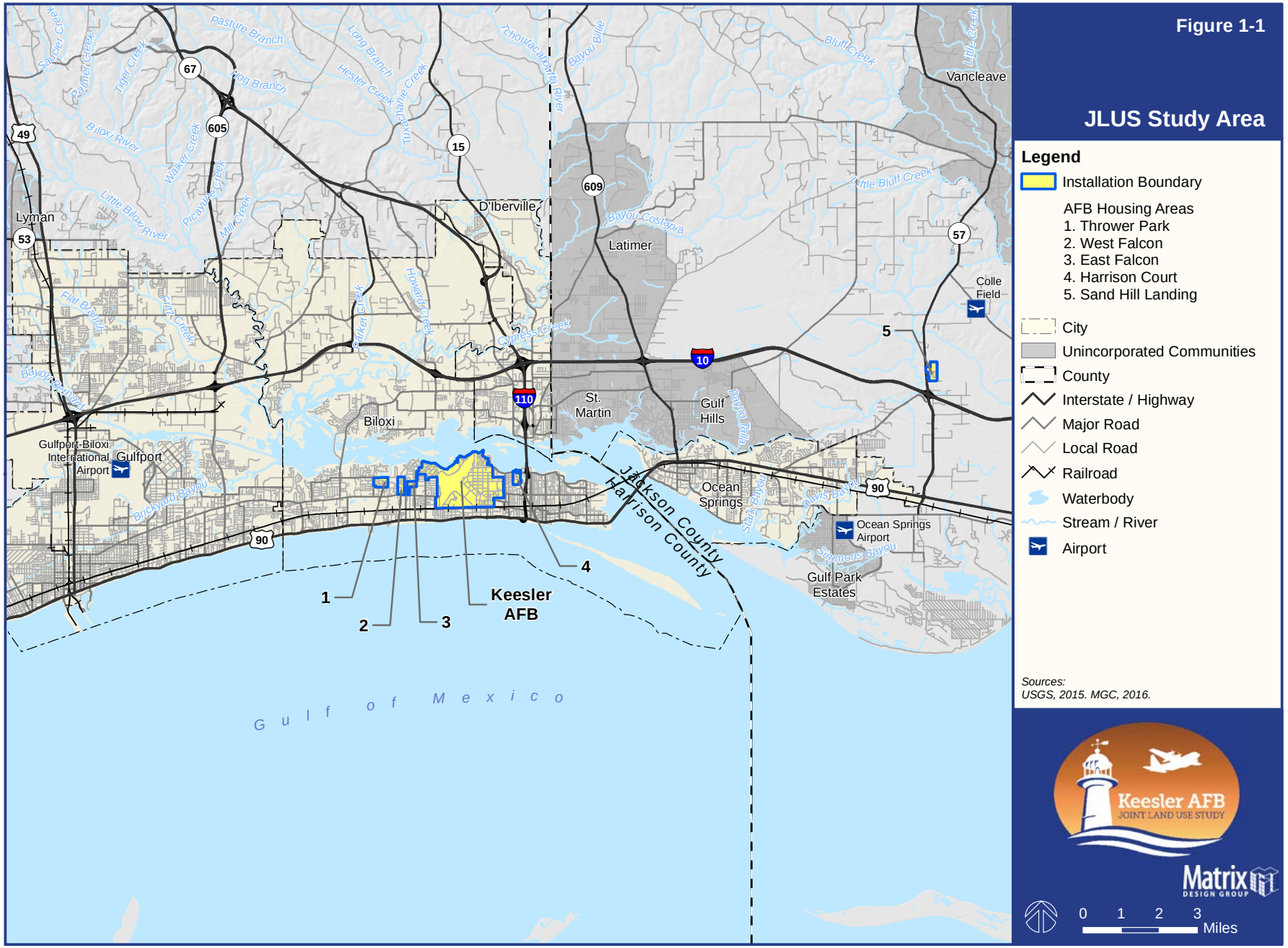


Figure 1-1
JLUS Study Area
Legend
Installation Boundary
AFB Housing Areas
1. Thrower Park
2. West Falcon
3. East Falcon
4. Harrison Court
5. Sand Hill Landing
City
Unincorporated Communities
County
Interstate / Highway
Major Road
Local Road
Railroad
Waterbody
Stream / River
Airport
Sources:
USGS, 2015. MGC, 2016.
Keesler AFB
JOINT LAND USE STUDY
Matrix DESIGN GROUP
0 1 2 3
Miles
Gulf of Mexico
Jackson County
Harrison County
Keesler AFB
Biloxi
Gulfport
Gulfport-Biloxi International Airport
D'Iberville
Lyman
Latimer
St. Martin
Gulf Hills
Ocean Springs
Ocean Springs Airport
Gulf Park Estates
Vancleave
Colle Field
Pasture Branch
Long Branch
Hester Creek
Tuxpharlie Creek
Tchoutacabouffa River
Bayou Bilue
Bluff Creek
Little Creek
Biloxi River
Walker Creek
Picayune Creek
Hill Creek
Little Biloxi River
Bayou Costapia
Little Bluff Creek
Flat Branch
Fritz Creek
Parker Creek
Howard Creek
Cypress Creek
Bayou Fallow
Brickyard Bayou
Davis Bayou
Shark Bayou
Simmons Bayou
49
67
605
15
609
57
53
10
110
90
1
2
3
4
5

Chapter 4: Existing Compatibility Tools. This chapter provides an overview of existing relevant plans, programs, and studies at the federal, state, and local levels that provide tools to address compatibility issues in the JLUS Study Area. The purpose of this chapter is to filter the tools readily available to stakeholders and assess whether the tool is adequate or in need of modification or development to achieve compatibility planning objectives.

Chapter 5: Compatibility Assessment. This chapter presents the issues identified by the PC, AC, TC, the public, and JLUS team and provides an assessment of issues based on existing tools to address compatibility and feedback collected throughout the planning process. This chapter enumerates the compatibility issues and categorizes them into the 25 compatibility factors listed in the following graphic:

COMPATIBILITY FACTORS

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

Community Profiles 2

Inside Chapter 2...

2.1. Introduction

This chapter provides a profile about the communities within the Keesler AFB Joint Land Use Study (JLUS) Study Area. These profiles provide a summary of the history and trends that influence the growth and land use planning of each jurisdiction. This chapter also provides general setting information about the JLUS Study Area.

Capturing and describing certain demographic and economic characteristics of the participating JLUS communities provides a baseline context to support the development of feasible compatibility strategies. The goal is to provide information that enables stakeholders to understand population and development trends that have the potential to affect the future missions and operations at Keesler AFB. Further, this chapter is designed to foster an understanding by the military about the types of activities occurring "outside the fence" when considering future missions and operations.

2.2. Regional Overview

The Keesler Air Force Base (AFB) JLUS Study Area includes the City of Biloxi, the City of D'Iberville, and Harrison County. Keesler AFB is located within the city limits of Biloxi in south Mississippi. The JLUS Study Area is approximately 165 miles south of the Mississippi capital, Jackson, and 88 miles east of New Orleans, Louisiana. The City of D'Iberville is located approximately 0.7 miles northeast of Keesler AFB. Harrison County encompasses Keesler AFB, the cities of Biloxi and of D'Iberville within the JLUS Study Area, and the cities of Gulfport, Long Beach, and Pass Christian (outside the JLUS Study Area). Harrison County and the cities of Biloxi and D'Iberville are a part of the Gulfport-Biloxi-Pascagoula Metropolitan Statistical Area, which had a population of approximately 370,700 in 2010.

The Gulf Regional Planning Commission has developed regional existing land use and future land use maps through coordination with local jurisdictions. These maps document the existing and future land use conditions in the JLUS Study Area. The future land use map was used to plan future transportation improvements in the Mississippi Gulf Coast Area Transportation Study, 2040 Long-Range Transportation Plan to support regional growth. The regional existing and future land use maps are provided in Figures 2-1 and 2-2.

Community Profiles

Harrison County

Harrison County was first settled in 1699 when Pierre Le Moyne, Sieur d'Iberville established a French colony in the City of Biloxi. Harrison County was created from reapportioned land from Hancock County, located west of Harrison County, after Hancock County experienced an increase in population during the 1800s. Harrison County was established in 1841 and was named after the ninth United States (U.S.) President, General William Henry Harrison. In 2010, Harrison County had a population of 187,105, making it the second most populous county in the state.

Harrison County includes a total area of 976 square miles in southern Mississippi, of which 574 square miles is land and 402 square miles is water. The county has five incorporated jurisdictions: Biloxi, D'Iberville, Gulfport, Long Beach, and Pass Christian. Approximately 83 percent of the county is unincorporated, which includes the communities of DeLisle, Henderson Point, Lizana, Pineville, and Saucier. The county is situated on the Mississippi Sound, which borders Harrison County on the south. Harrison County is also bordered by Stone County to the north, Hancock County to the west, and Jackson County to the east.

The county is known for its stretch of beach on the Gulf Coast and its waterfront casinos and entertainment. In the 1950s, 13 miles of the Gulf were raised above the mean sea level, creating a buffer for the Gulf of Mexico and largest man-made beach in the U.S. that has since drawn tourists to the Gulf region.

The county is home to part of the De Soto National Forest, the largest national forest in Mississippi. The forest, which is located in the northwest portion of Harrison County, was established as a national forest in 1936. The county has historically been regarded for its longleaf yellow pine trees, many of which were deforested by the lumber industry in the early 1900s.

Transportation infrastructure in Harrison County includes Interstate 10 (I-10) and Interstate 110 (I-110) as well as U.S. Highways 49 and 90. Interstate 10 stretches through the southern end of Harrison County and intersects with I-110, which is located on the eastern side of the county and runs north and south. United States Highway 49 expands north to south through the middle of the county. United States Highway 90 runs east to west through the southernmost part of the county along the coast. The CSX Railroad Company rail line also runs along the southern part of the county, approximately a fourth of a mile north of U.S. Highway 90. The Gulfport – Biloxi International Airport is located in Gulfport, Mississippi and serves as a major airport for the Mississippi Gulf Coast.

The Harrison County Board of Supervisors serves as the governing body and is composed of five members elected from each of the five districts. The County also has a Planning Commission as part of the Zoning Department. The Planning Commission approves conditional use permits, changes to non-conforming uses, planned unit developments, and variances. The Planning Commission also makes recommendations to the City Council regarding amendments to the zoning ordinance and site plans for special use districts.

Source: http://co.harrison.ms.us/

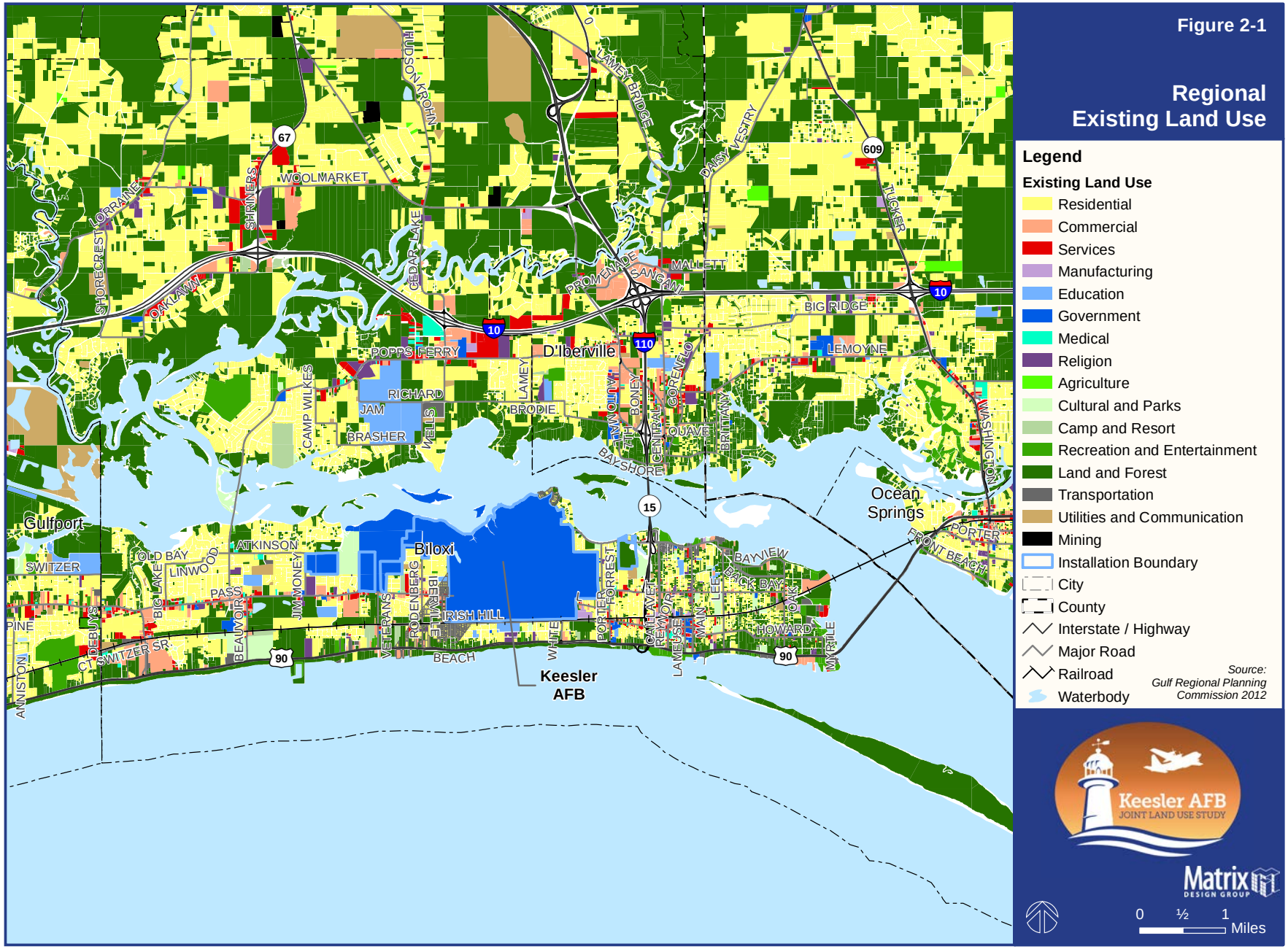


Figure 2-1
Regional
Existing Land Use
Legend
Existing Land Use
Residential
Commercial
Services
Manufacturing
Education
Government
Medical
Religion
Agriculture
Cultural and Parks
Camp and Resort
Recreation and Entertainment
Land and Forest
Transportation
Utilities and Communication
Mining
Installation Boundary
City
County
Interstate / Highway
Major Road
Railroad
Waterbody
Source:
Gulf Regional Planning
Commission 2012
Keesler AFB
JOINT LAND USE STUDY
Matrix
DESIGN GROUP
0 ½ 1
Miles
Gulfport
Biloxi
D'Iberville
Ocean
Springs
Keesler
AFB
WOOLMARKET
POPPS FERRY
BRASHER
RICHARD
JAM
BRODIE
LAMEY
BIG RIDGE
LEMOYNE
MALLETT
SANGANI
PROMENADE
OAK LAWN
SHORECREST
LORRAINE
SHRINERS
CEDAR LAKE
HUDSON KROHN
LAMEY BRIDGE
DAISY VESTRY
TUCKER
CAMP WILKES
WELLS
BONEY
CENTRAL
QUAVE
BRITTANY
WASHINGTON
BAYSHORE
ATKINSON
OLD BAY
SWITZER
LINWOOD
PASS
BIG LAKE
JIM MONEY
BEAUMOIR
VETERANS
RODENBERG
IRISH HILL
BEACH
WHITE
PORTER
FORREST
CAILLAVET
LAMEUSE
LEE
BAYVIEW
OAK
HOWARD
MYRTLE
FRONT BEACH
PORTER
PINE
DEBUYS
ANNISTON
SWITZER SR
67
609
10
110
15
90

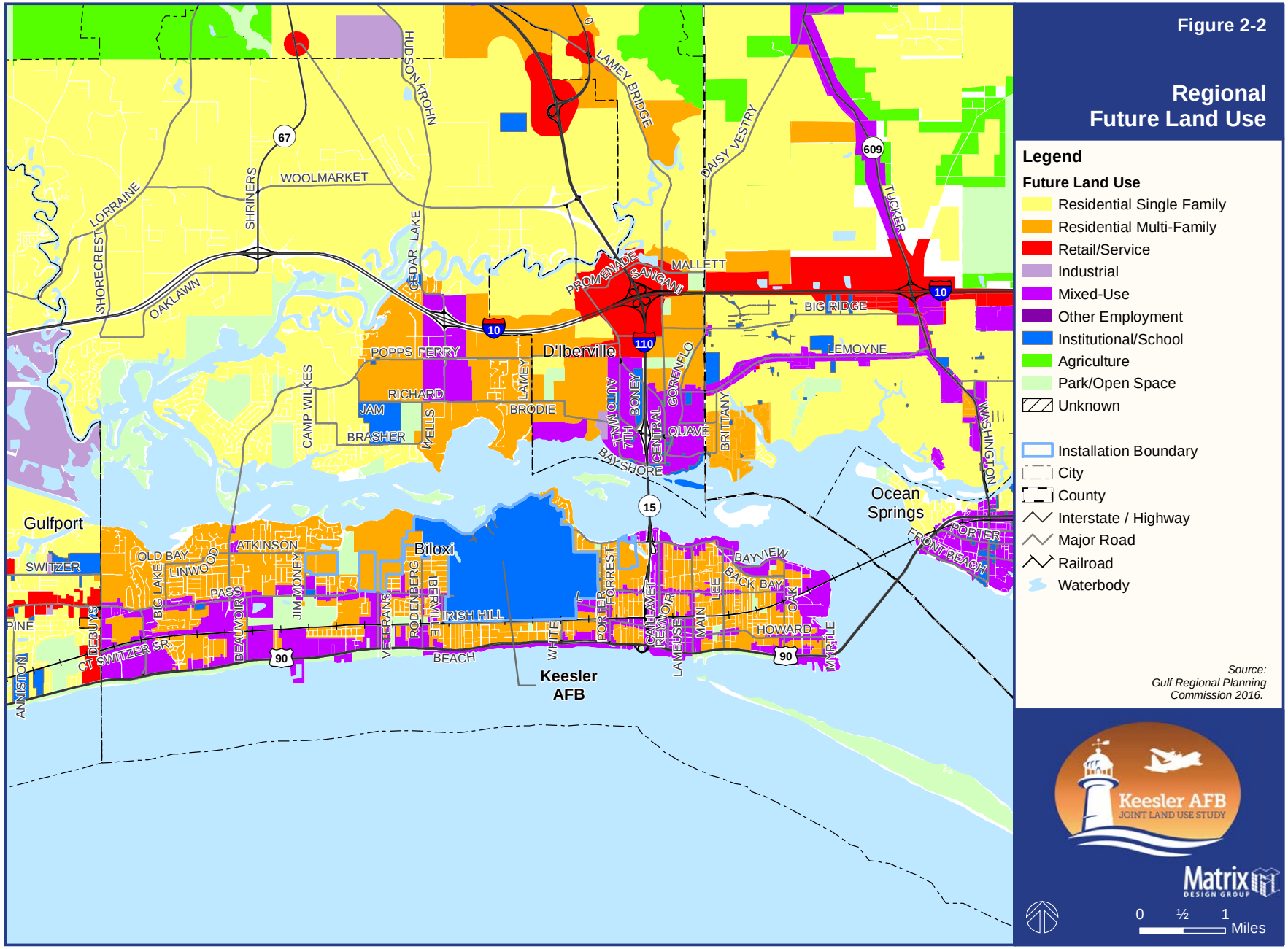


Figure 2-2
Regional Future Land Use
Legend
Future Land Use
Residential Single Family
Residential Multi-Family
Retail/Service
Industrial
Mixed-Use
Other Employment
Institutional/School
Agriculture
Park/Open Space
Unknown
Installation Boundary
City
County
Interstate / Highway
Major Road
Railroad
Waterbody
Source: Gulf Regional Planning Commission 2016.
Keesler AFB JOINT LAND USE STUDY
Matrix DESIGN GROUP
0 ½ 1 Miles
Gulfport
Biloxi
D'Iberville
Ocean Springs
Keesler AFB
WOOLMARKET
LORRAINE
SHORECREST
OAKLAWN
SHRINERS
HUDSON KROHN
CEDAR LAKE
LAMEY BRIDGE
DAISY VESTRY
TUCKER
MALLETT
PROMENADE
CANGAN
BIG RIDGE
LEMOYNE
POPPS FERRY
RICHARD
JAM
BRASHER
CAMP WILKES
WELLS
LAMEY
BRODIE
AUTOMALL
BONEY
CENTRAL
CORENFLO
QUAVE
BRITTANY
WASHINGTON
BAYSHORE
SWITZER
OLD BAY
LINWOOD
ATKINSON
BIG LAKE
PASS
BEAUVOIR
JIM MONEY
VETERANS
RODENBERG
IBERVILLE
IRISH HILL
BEACH
WHITE
PORTER
FORREST
CAILLAVET
REMOUR
LAMEUSE
MAIN
LEE
BAYVIEW
BACK BAY
OAK
HOWARD
MYRTLE
PORTER
FRONT BEACH
PINE
DEBUYS
SWITZER SR
ANNISTON
67
609
10
110
15
90

Harrison County Courthouse

City of Biloxi

The City of Biloxi is located in Harrison County, along the Mississippi Sound. Biloxi is intersected by the Back Bay of Biloxi, which runs east to west. The city is bordered by the City of Gulfport to the west, the Cities of D'Iberville and Ocean Springs to the east, unincorporated Harrison County to the north, and the Mississippi Sound to the south. The city is approximately 46.5 square miles, 82 percent of which is land and 18 percent of which is water. The 2010 population for Biloxi was 44,054, making Biloxi the fifth largest city in Mississippi, although before Hurricane Katrina Biloxi was the third largest city in Mississippi.

The City of Biloxi is named after the Biloxi Native Americans who inhabited the Mississippi coast before the French settled in the region. The French landed in present-day Biloxi in 1699 after receiving orders from the French Minister of Marine to locate the mouth of the Mississippi River. This expedition was led by Pierre Le Moyne Sieur d'Iberville. Although British and Spanish settlement followed the French settlement, the Biloxi area continued to maintain the French influence throughout the colonial period.

Biloxi was incorporated in 1838. In its early establishment, the city was a resort town, bringing in tourists to enjoy the coast during the summer. The City of Biloxi was involved in the Civil War when Mississippi seceded from the United States. The Biloxi Rifles were a part of the 3rd Mississippi Infantry CSA, which consisted of Natives from the Mississippi Gulf Coast. During and after the war, the seafood industry emerged in Biloxi with the first fish cannery opening in 1881. By 1900, Biloxi became the Seafood Capital of the World, with more than 40 seafood factories and two cannery districts.

Today, Biloxi is known for Keesler AFB, which was established in 1941, and casinos, which boomed after the State of Mississippi legalized dockside gaming in 1990. The city has been recovering since Hurricane Katrina, building more casinos along the east part of the coastline, east of downtown, which has helped the restoration of the city. The Biloxi Lighthouse, which was constructed in 1848, became a symbol of Biloxi's resilience after withstanding Hurricane Katrina. The lighthouse is also one the first cast-iron lighthouses in the South.

The Biloxi Lighthouse is a historical landmark in Biloxi, which has now become a symbol for the city's resilience after Hurricane Katrina.

In 1999, the City of Biloxi annexed the Woolmarket area and in 2004, the City annexed an additional 850 acres that were located east of Biloxi and north of D'Iberville. In 2010, the City annexed an additional 2.5 square miles along Highway 67.

Transportation infrastructure in Biloxi includes I-10 and I-110, as well as U.S. Highway 90. Interstate 10 stretches through the southern end of Biloxi and intersects with I-110, which is located on the eastern side of the city and runs north and south, although the interchange is located in D'Iberville. United States Highway 90 runs east to west through the southernmost part of the city along the coast. The CSX rail line also runs east-west through the southern part of the city, north of U.S. Highway 90.

The City of Biloxi operates under a mayor–council government system. The city is served by a seven-member city council elected from each of the seven wards every four years. The City has a Planning Commission made up of 15 Biloxi citizens who are appointed by the Mayor. The Planning Commission has both recommendation authority and decision authority. The Planning Commission may approve applications for major subdivision preliminary plats and make recommendations to the City Council regarding amendments to the zoning ordinance and map; planned developments; conditional use permits; property, right-of-way, and easement dedication acceptances; and right-of-way easement vacations or abandonments.

The City of Biloxi, along with the City of Gulfport, is the seat of Harrison County. The County offices are split between the two cities. For example, the Harrison County Chancery Clerk is located in Biloxi, while the Sheriff's Department and Justice Courts are located in Gulfport. The city is home to the Mississippi Department of Marine Resources headquarters and the South Regional Office of the Mississippi Department of Environmental Quality.

Higher Education

The Mississippi Gulf Coast Community College offers courses through four campuses on the Mississippi Gulf Coast. These campuses include the Keesler Center, which is located on Keesler Air Force Base. The branch provides accelerated courses and three degrees - Associate of Arts, Associate of Applied Science, and Community College of the Air Force Associate. The branch serves the active military as well as their dependents, retired military and their dependents, and Keesler AFB civilian workers.

Legacy of Community Partnership with Keesler AFB

The City of Biloxi and Keesler AFB have had a lasting relationship. Through the City of Biloxi's support, Keesler AFB has become a prominent Air Force Base on the Gulf of Mexico.

The City's and the installation's relationship stems back to the early 1900s when the U.S. Government issued the United States Naval Reserve land to the City of Biloxi. The City of Biloxi expanded the Naval Reserve Park and later gave a portion of the land to the Coast Guard. In the 1930s the City of Biloxi gave part of this land to the Veteran's Administration hospital, and later built an airport. This airport, along with over 1,500 acres of land, was leased from the City of Biloxi to the U.S. Government for a technical training school to support World War II training. In 1941, the City of Biloxi Chamber of Commerce pledged over a third of the cost required to acquire land for the new technical and training school in Biloxi, and in that spring Biloxi was selected as Army Air Corps school site. Later, the City leased the Naval Reserve Park, 685 acres, to the U.S. Government for the aviation school.

As the installation became more established, the City of Biloxi and the installation worked together to establish necessary infrastructure for on base military operations and residency. For example, in 1941, a new cable line was put down on Howard Avenue, beginning at Fayard Street and extending to the installation, to provide permanent telephone facilities at Keesler. In that same year, Biloxi residents approved a waterworks bond issue to build a sewer system and to conduct waterworks improvements for the installation.

Within the next couple of years, the City and the installation continued to work together to continue improvements for the installation. In 1942, land that was once leased by the City of Biloxi was sold to the U.S. Government to lay cable down to transmit electricity to Keesler. In that same year, the City of Biloxi also created an ordinance that immediately closed and vacated portions of 19 streets that were part of federal land to add to the installation.

In 1949, the City transferred Keesler AFB land to the U.S. Government, making it federal land and no longer a part of the city's jurisdiction. There is a clause in the property title which states that if the land ceases at any time to be used for permanent active military establishment, ownership of the land will revert back to the City of Biloxi. As the installation developed, the City of Biloxi supported the installation, selling the federal government tracts of land that were needed for infrastructure improvements on the installation, such as when the City sold land to the U.S. Government to construct and operate an electrical reduction plant for the installation. While the City sold land to the federal government as needed, it also bought land for installation-related improvements. One such example occurred in 1983 when the City acquired private land west of White Avenue to widen and improve White Avenue from U.S. Highway 90 to Keesler AFB.

As the installation became more prominent in the community, the City of Biloxi worked to maintain the relationship that the community had with Keesler AFB. The City created Resolution 825 in 1941, which sought federal financial assistance for the construction and repair of public schools in Biloxi to relieve congestion in schools brought on by federal programs, such as Keesler AFB. The resolution was a proactive measure to provide quality services to residents in the city, which included families of military personnel at the installation. The City demonstrated its concern for the education of school age residents again in 1983 when it requested that Congress support the funding of "highly impacted school districts", which included the Biloxi Municipal Separate School District, as dependents of personnel on Keesler AFB attended school there.

In an effort to provide public safety, the City of Biloxi's Fire Department entered an agreement with the U.S. Secretary of the Air Force for mutual aid in Fire Protection in 1980. This Mutual Aid Agreement allows the City of Biloxi's Fire Department to dispatch anywhere within the designated Keesler AFB Fire Department jurisdiction upon request, and vice versa.

Over time, the City has made considerable efforts to ensure that the installation has the resources to thrive, from supporting infrastructure improvements within the city to proclaiming Keesler Appreciation Week. One of the most recent efforts is the role that the City of Biloxi has taken to support the development of the proposed Division Street Gate for Keesler AFB. The City created a resolution in 1986, endorsing the development of the Division Street Gate and most recently, approved grant money for the project. This project is further discussed in the following subsection.

Source: http://weblink.mccinnovations.com/

Improvements for Biloxi

Division Street Gate

To address traffic flow from Keesler AFB, there is a proposed plan that includes the development of a Division Street Entry Gate at the installation. The gate will be located on Division Street, perpendicular to Forest Avenue. The new gate will replace the White Avenue Gate as the main gate, and will alleviate traffic along White Avenue. In addition, the new gate will boost the economic impact along Division Street, which already has businesses lined along it and provides direct access from I-110.

On August 2, 2016, the City of Biloxi City Council approved a $5 million grant from the State of Mississippi to begin the design of the Division Street Gate.

Sources: http://www.biloxi.ms.us/, http://www.mgccc.edu; http://www.sunherald.com/

Restore Biloxi

Restore Biloxi is an infrastructure restoration program to repair and restore infrastructure in Biloxi that was affected by Hurricane Katrina. The program is funded by the Federal Emergency Management Agency (FEMA) and managed by the Mississippi Emergency Management Agency (MEMA). The overall Program Manager is the City of Biloxi. The program totals over $355 million. Restore Biloxi is an ongoing effort between the City of Biloxi, the Mississippi Emergency Management Agency, the Federal Emergency Management Agency, Mississippi Department of Transportation (MDOT), Mississippi Department of Environmental Quality (MDEQ), Mississippi Department of Health (MDoH), selected Design Consultants, Harrison County Utility Authority, and local residents and businesses of Biloxi.

Projects include the repair or replacement of 426,000 linear feet of sewer main, 485,000 linear feet of water main, 73 pumping stations, 329,000 linear feet of storm drainage, and 100 miles of roadway that were damaged during Hurricane Katrina. As of 2015, there were 20 projects, ten of which have been completed, six of which were under construction, two to be bid, one that has a bid under evaluation, and one that has a notice to proceed pending. Projects under construction are budgeted at $153.2 million and completed projects are budgeted at $25.2 million.

Source: http://restorebiloxi.com/

City of D'Iberville

The City of D'Iberville is named after Pierre Le Moyne, Sieur d'Iberville who landed on the Gulf Coast in 1699 from France. The city is bordered by the Back Bay of Biloxi on the south, unincorporated Harrison County on the north, the City of Biloxi on the west, and Jackson County on the east. The City of D'Iberville is a part of Harrison County.

Current D'Iberville land was not officially settled during Sieur d'Iberville's exploration, although many settlers created homesteads in the area which became known as the Back Bay. In 1901, a wooden pedestrian bridge was created to connect D'Iberville to Biloxi, increasing commerce between the two cities. In 1927, the Biloxi Back Bay Bridge was constructed for vehicles.

By the 1960s, D'Iberville had become a bedroom community, with residents commuting to other cities for work. During this time, shopping centers and subdivisions were developed. The City of D'Iberville was a part of unincorporated Harrison County until 1988, when residents decided to incorporate. At incorporation, the city was 4.8 square miles. In 2004, the City annexed approximately 2.5 square miles north of its northern boundary, bringing the total area to 7.2 square miles. In 2010, the City of D'Iberville annexed an additional 2.5 square miles, with annexations occurring again in 2013 and 2014. Most recently, the City annexed 3.5 square miles, which brought the population of the city up to 11,500.

Since Hurricane Katrina, the City of D'Iberville has been working to boost its economy. There are plans for waterfront commercial, residential, and mixed-use development throughout the city. Recently, the Promenade commercial development was built, as well as a new City Hall and Visitor's Center.

The City seal has an image of a cross and boulder, which has become the icon for the community. A cross and boulder was found on the bank of the Back Bay, which is believed to have been placed by a Spanish settler near a chapel that he built for his wife, which was later bought by the Catholic Church. This land is believed to be the place where Pierre Le Moyne, Sieur d'Iberville first landed during his exploration of the North Bay.

Transportation infrastructure in D'Iberville includes I-10 and I-110. Interstate 10 runs east to west through the middle of D'Iberville. It intersects with I-110, which runs north to south through the middle of the city. Heading north, past the I-10 and I-110 interchange, I-110 turns into Mississippi Highway 15, of which approximately 750 feet is located in D'Iberville.

The City of D'Iberville operates under a Council-Manager government system. The City Manager is appointed by the City and the Mayor is elected at large. The city is served by a five member city council, one for each of the four districts and one councilman-at-large. The City has a Planning Commission which recommends the approval of variances, conditional use permits, site plan reviews, rezonings and amendments to the zoning ordinance to the City Council. There are currently seven appointed commissioners, with two commissioners for each ward, except for Ward 2, which has one commissioner.

Source: http://diberville.ms.us/

The new D'Iberville City Hall replaced the previous City Hall after Hurricane Katrina

Regional Climate Impacts

The JLUS Study Area encompasses land area proximate to the Gulf of Mexico, and like many cities and counties that are located on the coast is susceptible to the effects of storms. Coastal cities can have a chain reaction, affecting inland jurisdictions as well. Hurricane season for the Gulf Coast occurs June through November.

Harrison County is one of three counties in Mississippi that border the Gulf Coast, making cities and census designated places in the county susceptible to climate variability impacts. The elevation in the county ranges from sea level to 250 feet above sea level. Within the county are multiple hydrological features, such as the Biloxi River, Little Biloxi River, Tchoutacabouffa River, and the Wolf River. Many of these hydrological systems are interconnected, increasing the effects of flooding throughout the county.

Within the 2008 Harrison County Hazard Mitigation Plan, hurricanes and tropical storms were identified as a significant hazard, citing 36 hurricanes and 33 tropical storms that have come within 75 miles of the county from 1851 to 2007. With 26 miles of sand beach in the county, coastal erosion is another hazard identified as significant to address in the plan. Historically, the county has experienced unpredictable shifts in coastal erosion and growth, which has resulted in changes in the shoreline. Flooding is another prominent natural hazard, which has resulted in freshwater flood events from 1993 to 2007. Other climatic impacts include storm surge and wave action.

Harrison County adopted the 2008 Hazard Mitigation plan, which outlines mitigation strategies, in the form of policies or projects that reduce hazard risks. The plan identifies implementation mechanisms as well as the agency or department responsible for implementation.

According to the 2013-2014 City of Biloxi Hazard Mitigation Plan, coastal storms and storm surge are classified as critical natural hazards with a high probability of occurrence. Flooding is also classified as a critical hazard, but with a medium probability of occurrence. Coastal storms, such as hurricanes

and tropical storms, are one of the most dangerous natural hazards to Biloxi due to its geographic location.

The City of Biloxi adopted the 2013-2014 Hazard Mitigation Plan, which includes mitigation strategies for reducing vulnerabilities to natural and man-made hazards. The city currently utilizes building and zoning codes for mitigating storm hazards, but identifies other strategies for mitigation. Each action identifies the priority status, estimated timeframe, potential funding, and responsible agency for implementation.

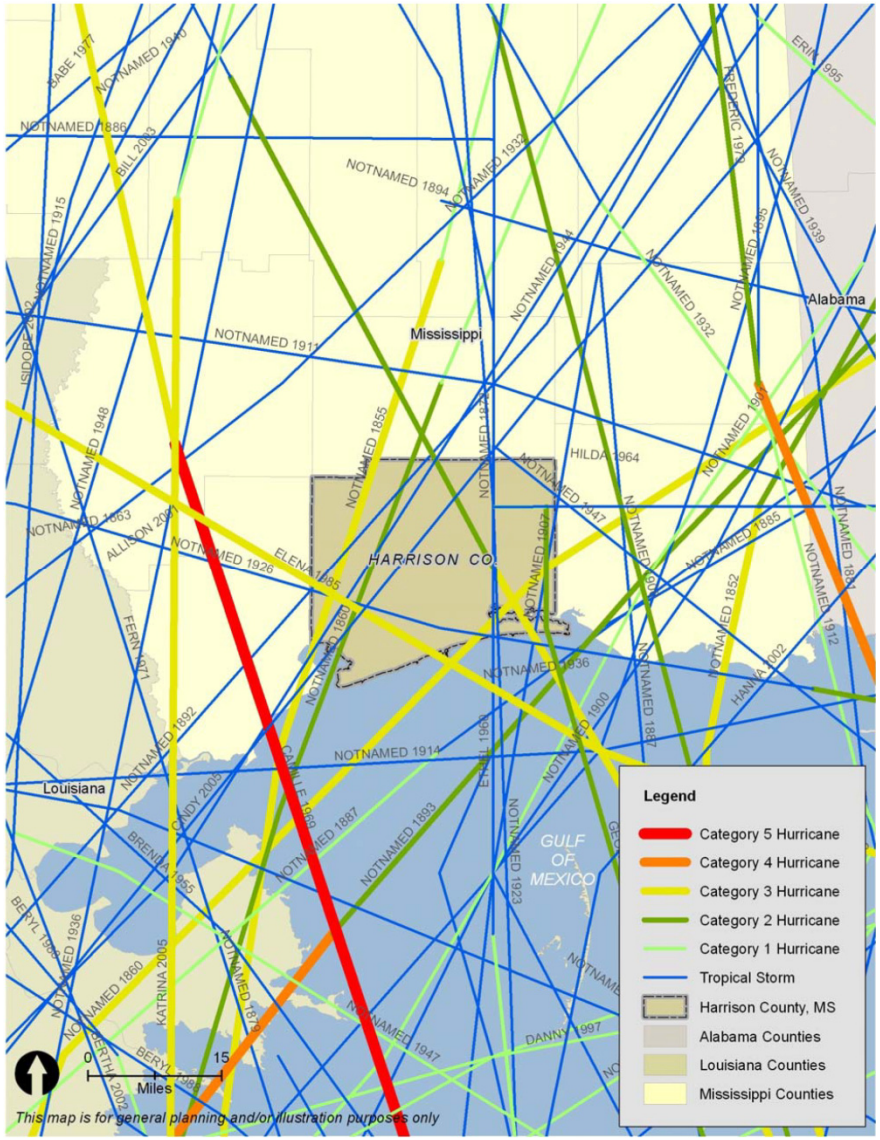
While D'Iberville does not directly border the Gulf of Mexico and has a buffer from the Biloxi peninsula, its location on the Back Bay of Biloxi still creates vulnerabilities from storms.

These coastal cities and county have historically been impacted by tropical storms and Hurricanes. Table 2-1 shows the tropical storms and hurricanes that have made landfall on the Mississippi Gulf Coast over the last 100 years. The following map shows storm tracks within 75 miles of Harrison County. Both the table and map show the susceptibility that the Study Area has to tropical storms and hurricanes.

Table 2-1 Hurricanes and Tropical Storms on the Gulf Coast, 1901 - 2005

Date	Hurricane / Tropical Storm	Hurricane Category
1901	Hurricane of 1901	Category 4
1906	Hurricane of 1906	Category 3
1916	Hurricane of 1916	Category 3
1926	Hurricane of 1926	Category 4
1946	Hurricane of 1946	-
1969	Hurricane Camille	Category 5
1979	Hurricane Frederick	Category 3
1985	Hurricane Elena	Category 3
1998	Hurricane Georges	-
2005	Hurricane Katrina	Category 3

Source: 2013-2014 City of Biloxi Hazard Mitigation Plan



Historical Storm Tracks within 75 Miles of Harrison County

Source: Harrison County Multi-Jurisdictional Hazard Mitigation Plan, August 2008

The Hurricane of 1946 and Hurricane Georges were both tropical depressions when it landed in Mississippi; therefore, there is no category listed for these tropical storms. Hurricane Camille has historically been the highest categorized hurricane in the Gulf Coast and the second most intense hurricane to hit the U.S. in terms of pressure and wind speed, which was 190 mph. The greatest storm surge during Hurricane Camille occurred at Pass Christian with a surge of 24.6 feet, which at the time was the highest recorded (Hurricane Katrina surpassed this record in 2005). Storm surge caused flooding and damage to U.S. Highway 90 and flooding at the Back Bay housing at Keesler AFB. The damage caused by Hurricane Camille at Keesler AFB is estimated at $4,844,600, including $345,000 in indirect losses.

The effects of Hurricane Camille on communities motivated the implementation of the Saffir-Simpson Hurricane Wind Scale after residents felt that the current hurricane warning were insufficient in notifying them of the scale and intensity of the storm. The Saffir-Simpson Hurricane Wind Scale rates hurricanes from 1 to 5 depending on the hurricane's sustained wind speed and potential for property damage. The previous table displays the Saffir-Simpson Hurricane Wind Scale rating for past hurricanes.

Although Hurricane Katrina was less intense on the Saffir-Simpson scale with wind speeds at 130 mph, it caused a higher degree of storm surge at 27.8 feet at Pass Christian. Destruction occurred along the immediate coast in Hancock and Harrison Counties. Cities in Harrison County experienced an estimated 25 foot storm surge from Hurricane Katrina.

Although infrastructure improvements can be repaired, low lying areas nearby the coast have the potential to be inundated, such as roadways, which may create long term effects on the accessibility of the region overall. Figure 2-3 shows the potential for inundation from storm surge, and areas within the 100 and 500 year flood zones.

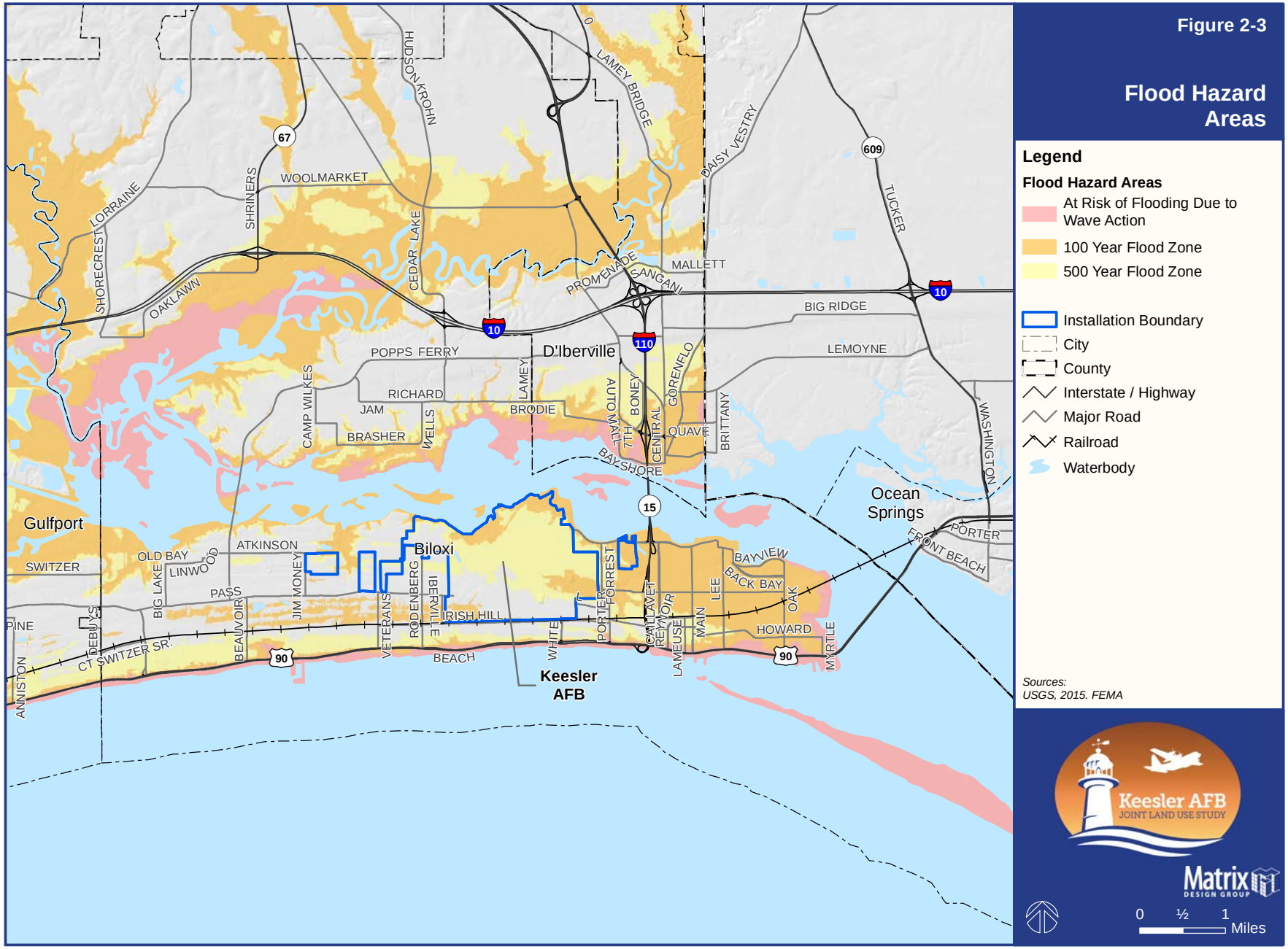


Figure 2-3
Flood Hazard Areas
Legend
Flood Hazard Areas
At Risk of Flooding Due to Wave Action
100 Year Flood Zone
500 Year Flood Zone
Installation Boundary
City
County
Interstate / Highway
Major Road
Railroad
Waterbody
Sources:
USGS, 2015. FEMA
Keesler AFB
JOINT LAND USE STUDY
Matrix DESIGN GROUP
0 ½ 1 Miles
Gulfport
Biloxi
D'Iberville
Ocean Springs
Keesler AFB
WOOLMARKET
LORRAINE
SHORECREST
OAKLAWN
SHRINERS
HUDSON KROHN
CEDAR LAKE
LAMEY BRIDGE
DAISY VESTRY
TUCKER
MALLETT
PROMENADE
SANGANI
BIG RIDGE
LEMOYNE
POPPS FERRY
RICHARD
JAM
BRASHER
CAMP WILKES
WELLS
LAMEY
BRODIE
AUTO MALL
BONEY
GORENFLO
CENTRAL
QUAVE
BRITTANY
WASHINGTON
BAYSHORE
ATKINSON
OLD BAY
LINWOOD
SWITZER
BIG LAKE
PASS
PINE
DEBUYS
CT SWITZER SR.
BEAUVOIR
JIM MONEY
VETERANS
RODENBERG
IBERVILLE
IRISH HILL
BEACH
WHITE
PORTER
FORREST
CAILLAVET
REYNOIR
LAMEUSE
MAIN
LEE
BAYVIEW
BACK BAY
OAK
HOWARD
MYRTLE
FRONT BEACH
PORTER
ANNISTON
67
609
10
110
15
90

Effects of storms, such as Hurricane Katrina, have prolific impacts on communities. As described in the City of Biloxi section, much of the infrastructure in the City of Biloxi was in need of repair after Hurricane Katrina. The City of Biloxi was able to begin a restoration program, Restore Biloxi; however, that program is still ongoing, which shows the extent of the damage that Hurricane Katrina caused and the long term effects.

During Hurricane Katrina, U.S. Highway 90 sustained damages in some sections while other sections were buried in sand. In addition, the Biloxi Back Bay Bridge was destroyed, blocking off access to Jackson County. Furthermore, the storm left multiple buildings damaged and vacant throughout the coast. Some homes and businesses are still vacant today, demonstrating how the rebuilding and economic recovery in the Gulf Coast has been a slow process. The total damages to the Mississippi Gulf Coast were at least $25 billion.

Part of the economic recovery in Biloxi is to reestablish the gaming industry in downtown Biloxi. Prior to Hurricane Katrina, dockside casino development was authorized on off-shore moorings making them susceptible to impacts from storm surge and high winds. This was evidenced in Hurricane Katrina when all 13 casinos operating on the Gulf Coast were severely damaged or destroyed, most of which broke free of their moorings and drifted offsite. The outcome of the hurricane was a legislative amendment known as House Bill 45, in 2005, which allowed the construction of casinos up to 800 feet on shore, and in some locations, up to the southern boundary of the U.S. Highway 90 right-of-way in Harrison and Hancock Counties, but does not mandate that casinos be constructed on shore. After Hurricane Katrina, this House Bill allowed casinos to rebuild in a safer environment, while setting precedence for new casinos to be developed inland in the future. This piece of legislation put many employees back to work shortly after the storm, allowing Biloxi to regenerate economic development. Casinos in both Biloxi and D'Iberville continue to be built today.

This was and still is a significant piece of legislation as the gaming industry has been one of the top economic drivers in the Study Area as further discussed in Section 2.4 Economic Overview of this chapter.

Sources: http://www.nhc.noaa.gov/; http://www.city-data.com/; https://coast.noaa.gov/

2.3. Study Area Growth Trends

The following section provides a profile of the Study Area's population growth, housing trends, and median home values. This information assists in understanding the regional context and growth potential for the JLUS Study Area.

Population

Population data is based on the 2010 data provided by the U.S. Census. Population numbers show the growth or decline in a geographical area. Population is a major factor for the economy of the JLUS Study Area and ultimately supports employment and housing opportunities. The following information provides a comparison of the changes in population in the Keesler AFB JLUS Study Area from 2000 to 2010.

The population figures represent the permanent population in the JLUS Study Area, and do not consider the temporary population surges associated with the tourism industry and transient workers. Table 2-2 shows the 2000 and 2010 census totals and percent change in populations of the state and of the jurisdictions within the JLUS Study Area.

Table 2-2 Study Area Population, 2000-2010

Jurisdiction	2000	2010	Number Change	Percent Change
State of Mississippi	2,844,658	2,967,297	122,639	4.3%
Harrison County*	189,601	187,105	-2,496	-1.3%
City of Biloxi	50,644	44,054	6,590	-13%
City of D'Iberville	7,608	9,486	1,878	24.7%

**Harrison County population includes Biloxi, D'Iberville, Gulfport, Long Beach, and Pass Christian, and unincorporated Harrison County*

Source: U.S. Census Bureau 2000, 2010

The populations in both Harrison County and the City of Biloxi decreased slightly from 2000 to 2010. Part of this trend is due to an out-migration that Biloxi and other coastal communities, such as Gulfport, Long Beach, and Pass Christian in Harrison County, experienced during and after Hurricane Katrina. Although there was a migration out of these areas, many people returned and rebuilt after the storm. The decrease in population for Harrison County may also be attributed to the annexation of the county growth area by Biloxi and D'Iberville. The decrease in population for Biloxi and Harrison County contrasts with the population growth in Mississippi and the City of D'Iberville. The increase in population in D'Iberville is partially attributed to the annexation of a growth area in Harrison County. According to the Trip Reduction and Ride Share Program for Keesler AFB many military and civilian personal live in Biloxi and Woolmarket, which is located northwest of Keesler AFB and St. Martin, which is located northeast of the installation in western Jackson County.

Figure 2-4 illustrates the population densities in the JLUS Study Area in 2000, and Figure 2-5 shows the change in densities in 2010. These figures are both presented to show the change in growth and density within the JLUS Study Area. A comparison of the two maps confirms that one of the greatest changes in population density within the Study Area between 2000 and 2010 occurred in the City of Biloxi and D'Iberville, where population density decreased along the coast. A study conducted by the U.S. Census Bureau showed that the Gulfport – Biloxi region lost 41,000 people from August to January due to Hurricane Katrina. In addition, Keesler AFB also experienced a decrease in population. One exception was the increase in population density in the new French Market District of D'Iberville post-Hurricane Katrina. Growth areas for the City of Biloxi are concentrated north of the Back Bay.

Source: Trip Reduction and Ride Share Program for Keesler Air Force Base Future Population Projections

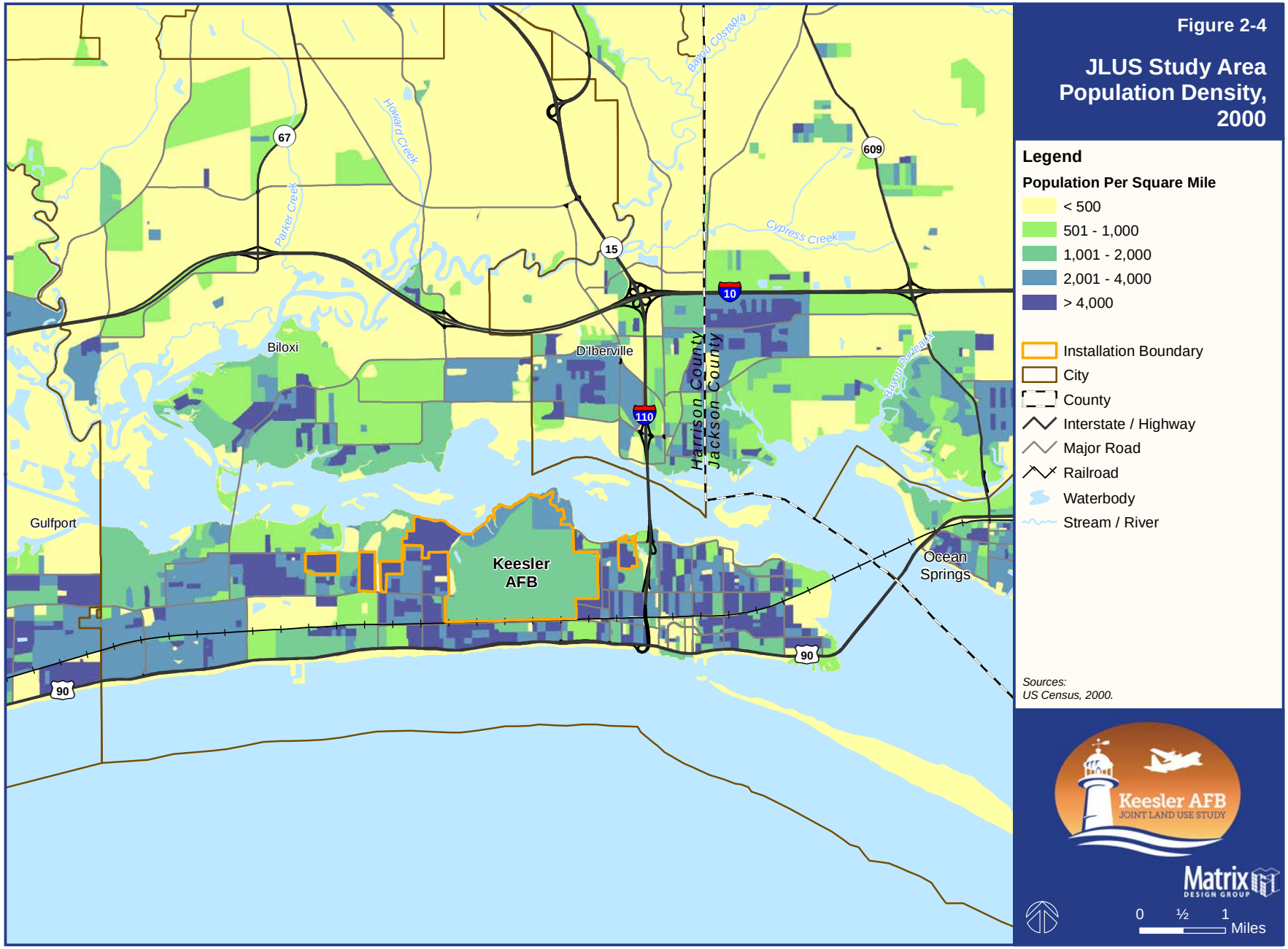


Figure 2-4
JLUS Study Area Population Density, 2000
Legend
Population Per Square Mile
< 500
501 - 1,000
1,001 - 2,000
2,001 - 4,000
> 4,000
Installation Boundary
City
County
Interstate / Highway
Major Road
Railroad
Waterbody
Stream / River
Sources:
US Census, 2000.
Keesler AFB
JOINT LAND USE STUDY
Matrix DESIGN GROUP
0 ½ 1 Miles
Biloxi
D'Iberville
Gulfport
Ocean Springs
Keesler AFB
Harrison County
Jackson County
Howard Creek
Parker Creek
Bayou Costapia
Cypress Creek
Bayou Portedaux
67
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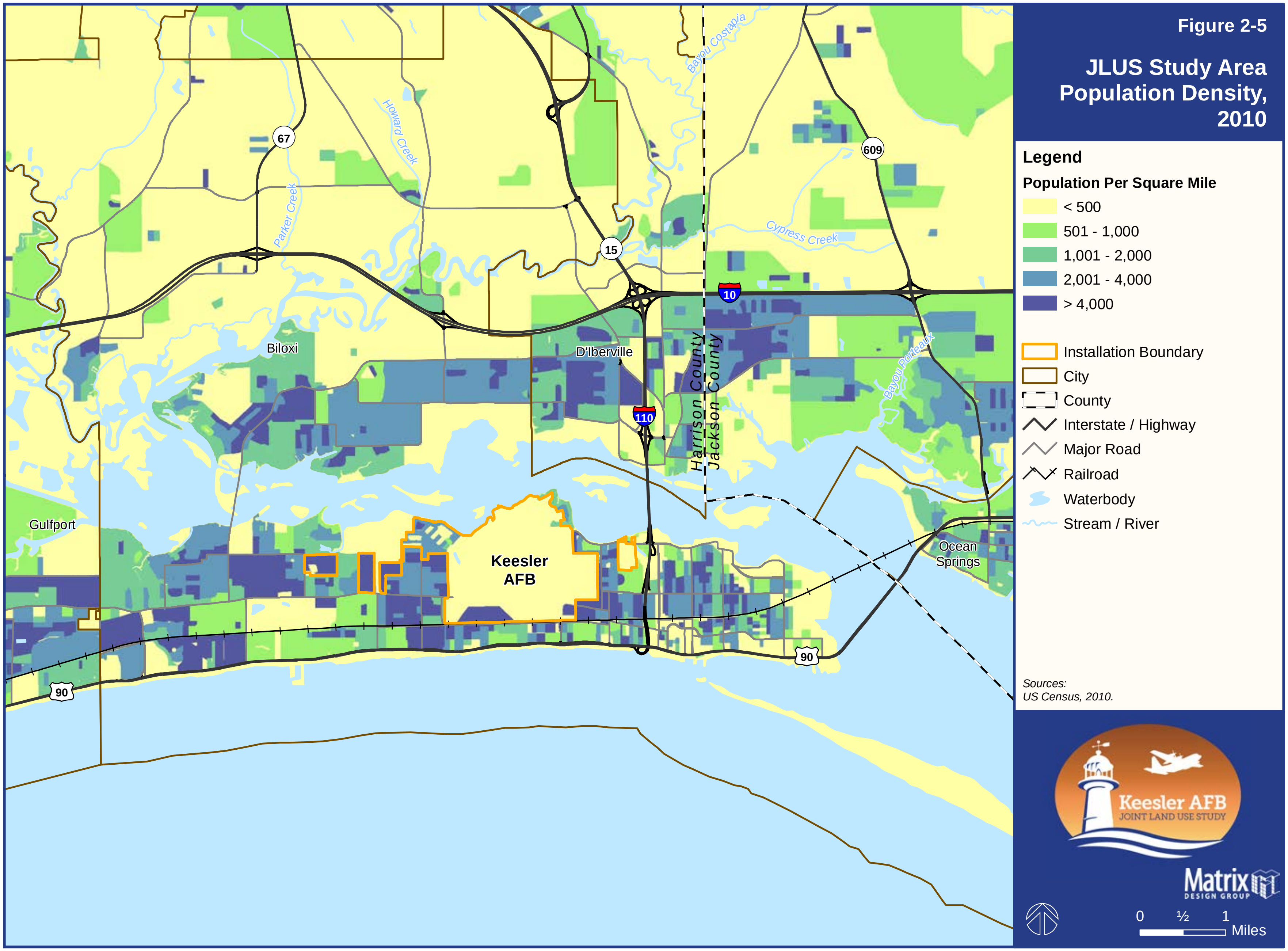
Figure 2-5
JLUS Study Area Population Density, 2010
Legend
Population Per Square Mile
< 500
501 - 1,000
1,001 - 2,000
2,001 - 4,000
> 4,000
Installation Boundary
City
County
Interstate / Highway
Major Road
Railroad
Waterbody
Stream / River
Sources:
US Census, 2010.
Keesler AFB
JOINT LAND USE STUDY
Matrix
DESIGN GROUP
0 ½ 1
Miles
Biloxi
D'Iberville
Gulfport
Keesler AFB
Ocean Springs
Harrison County
Jackson County
Howard Creek
Parker Creek
Bayou Costapia
Cypress Creek
Bayou Porteaux
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Future Population Projections

Future population growth is based on the expected growth associated with the tourism industry in the cities of Biloxi and D'Iberville. Keesler AFB also supports a large concentration of jobs, with approximately 4,000 military personnel, and is the largest employer in Biloxi. Table 2-3 indicates the forecasted population between 2013 and 2040 for cities and the county within the JLUS Study Area. Figure 2-6 is a graphical display of Table 2-3.

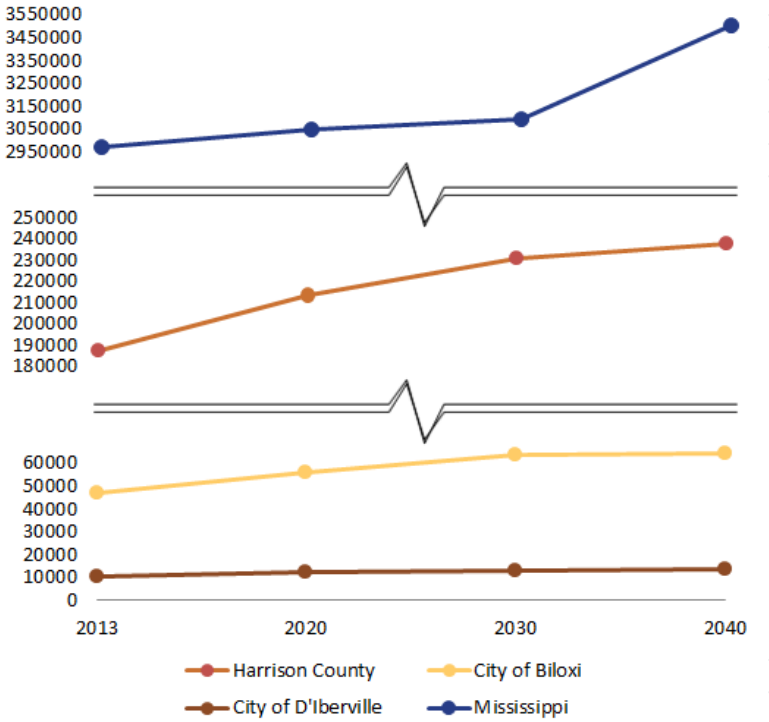
Table 2-3 Population Projections, 2013 – 2040

Jurisdiction	2013	2020	2030	2040	Percent Change
Mississippi	2,976,872	3,044,812	3,092,410	3,500,000	17.6%
Harrison County*	187,104	213,275	230,514	237,607	27.0%
City of Biloxi	47,161	55,863	63,664	64,298	36.3%
City of D'Iberville	10,386	12,044	13,036	13,713	32.0%

**Harrison County population includes Biloxi, D'Iberville, Gulfport, Long Beach, and Pass Christian, and unincorporated Harrison County*

Sources: U.S. Census 2009 – 2013 American Community Survey 5-Year Estimates, U.S. Census Population Projections; 240 Mississippi Unified Long-Range Transportation Infrastructure Plan; Mississippi Gulf Coast Area Transportation Study 2040 Long-Range Transportation Plan

Figure 2-6 Population Projections, 2013 – 2040



**Harrison County population includes Biloxi, D'Iberville, Gulfport, Long Beach, and Pass Christian, and unincorporated Harrison County*

Source: U.S. Census 2009 – 2013 American Community Survey 5-Year Estimates, U.S. Census Population Projections; 240 Mississippi Unified Long-Range Transportation Infrastructure Plan; Mississippi Gulf Coast Area Transportation Study 2040 Long-Range Transportation Plan

Although Harrison County has experienced a decrease in population in the past, population projections indicate that its population will increase by 27 percent by 2040. This is a greater increase than Mississippi, which is also experiencing an increase in population and is projected to increase by almost 18 percent by 2040. It is also anticipated that the City of Biloxi's population will also increase (by 36 percent) despite having decreased in the past ten

years. The City of D'Iberville is also anticipated to increase, but at a slower rate than the other jurisdictions with a 32 percent increase.

These projected populations are not exact, but are meant to help cities and counties develop land use priorities to reduce impacts of future growth.

Housing Trends

Housing trends are an important indicator of economic activity and vitality because they demonstrate population growth or decline relative to new residential construction. These trends also represent market decisions relative to home ownership versus rental properties. Housing trends indicate potential future development and the types of residential and commercial uses in a region. The following information portrays housing market trends, median monthly gross rents, percentage of basic allowance for housing (BAH), and median home values within the JLUS Study Area. The BAH is a Department of Defense (DoD) program to provide fair housing allowances to service members by helping members cover the costs of housing in the private sector when government quarters are not available near their duty location. The allowance is set based on geographic duty location, pay grade, and dependent status.

The City of D'Iberville has had the greatest increase in total housing out of the jurisdictions in the JLUS Study Area. The percent increase is approximately four times greater than that of the state. According the Trip Reduction and Ride Share Program for Keesler Air Force Base2.6 percent of military and civilian personnel lived in D'Iberville in 2011. Harrison County also saw an increase in housing units, which is consistent with the overall increase in housing for the State of Mississippi. The City of Biloxi is the only jurisdiction within the JLUS Study Area that experienced a decrease in housing units from 2000 to 2010, losing almost four percent of its housing. This could be due to the losses from Hurricane Katrina, which affected 6,000, or 20 percent of, homes and businesses, some of which have been since rebuilt. The total housing units for the JLUS Study Area are shown in Table 2-4.

Table 2-4 JLUS Study Area Total Housing Units, 2000-2010

Jurisdiction	2000	2010	Number Change	Percent Change
Mississippi	1,161,953	1,274,719	112,766	9.7%
Harrison County	79,636	85,181	5,545	7.0%
City of Biloxi	22,115	21,278	837	-3.8%
City of D'Iberville	3,088	4,298	1,210	39.2%

**Harrison County total housing units include Biloxi, D'Iberville, Gulfport, Long Beach, and Pass Christian, and unincorporated Harrison County*

Source: U.S. Census Bureau, Total Housing Unit, 2000, 2010

An increasing number of potential renters leads to a higher demand for rental units. A demand-driven rise in cost of rent affects both the local economy and the housing market. Understanding trends in rent costs can account for certain housing trends. Table 2-5 shows the change in median monthly gross rents for communities in the JLUS Study Area and the state from 2000 to 2010. Figure 2-7 is an illustration of the differences between housing rents from 2000 to 2010 as well as the differences between jurisdictions.

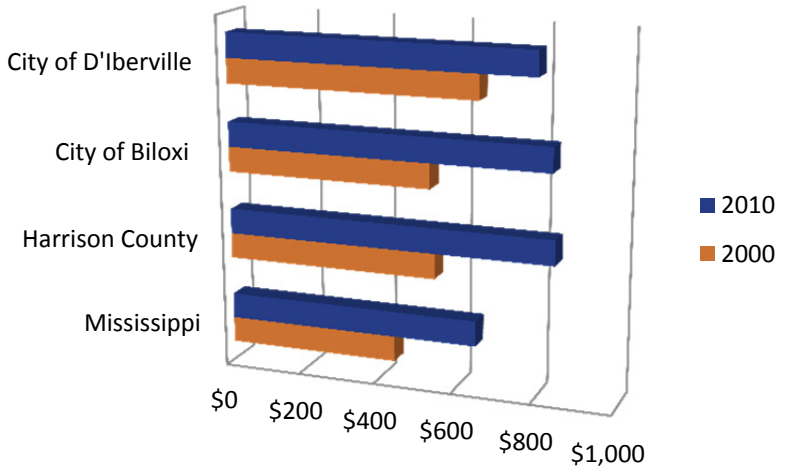
Table 2-5 Median Monthly Gross Rent in Surrounding Jurisdictions, 2000 – 2010

Jurisdiction	2000	2010	Number Change	Percent Change
Mississippi	$439	$648	209	47.6%
Harrison County	$543	$844	301	55.4%
City of Biloxi	$531	$835	304	57.3%
City of D'Iberville	$653	$796	143	21.9%

**Harrison County rent data includes Biloxi, D'Iberville, Gulfport, Long Beach, and Pass Christian, and unincorporated Harrison County*

Source: U.S. Census Bureau, Median Gross Rent (Dollars) 2000, 2010

Figure 2-7 Median Monthly Gross Rent in Surrounding Jurisdictions, 2000 – 2010



**Harrison County rent data includes Biloxi, D'Iberville, Gulfport, Long Beach, and Pass Christian, and unincorporated Harrison County*

Source: U.S. Census Bureau, Median Gross Rent (Dollars) 2000, 2010

For all jurisdictions, the median rent increased between 2000 and 2010. The greatest increase in rent is Biloxi which experienced a decrease in housing units during the same timeframe. The rent in D'Iberville was the greatest out of the jurisdictions in 2000, which was approximately 49 percent higher than the state as a whole. In 2010, D'Iberville had the lowest rent out of the jurisdictions, but was still greater than Mississippi as a whole.

Table 2-6 lists the 2016 BAH associated with the ranks for the Keesler AFB area. The BAH is a stipend given to military personnel who choose to live off base or cannot be accommodated in on-base housing, and is designed to augment the costs of living associated with private sector housing, including home or apartment rent, utilities, and renter's insurance.

While BAH rates for Keesler AFB military personal vary by rank and dependent status, the rate for E1, the lowest rank in the U.S. Air Force, ranges from $882 (single) to $1,098 (with dependents). The BAH rates for E1 are more than the median monthly rents in each jurisdiction, excluding utilities, insurance, and other home costs, indicating that housing is affordable for all ranks. Although rents are currently affordable for military personnel, the trends in gross rents show that rents have the potential to surpass the lower ranking, single BAH rates. This could in turn affect military housing on base.

Figure 2-8 shows each jurisdiction's gross mean rent for 2010 as a percentage of the 2016 BAH rate for E1 ranking singles. This chart indicates that rents are overall lower than the lowest BAH rate. The mean gross rent for Mississippi as a whole is $648, which is approximately 73 percent of the allotted BAH rate for E1 without dependents. Harrison County is still affordable for military personnel, although the county's mean gross rent in 2010 was $844, which is almost 96 percent of the BAH rate for E1 without dependents.

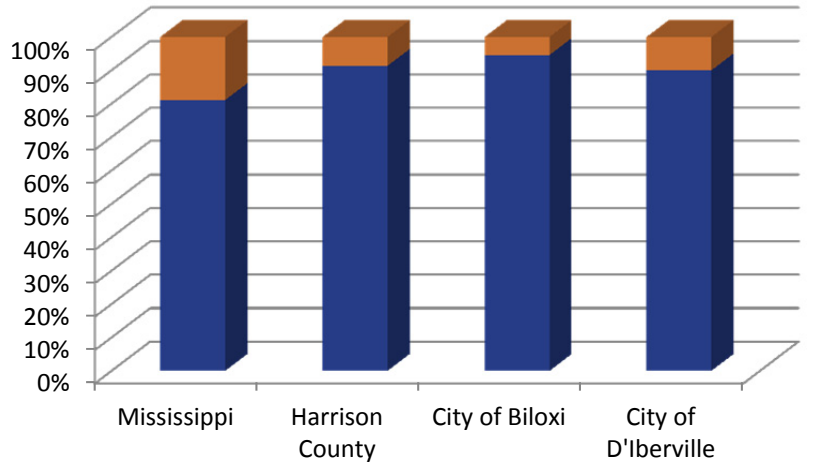
Source: http://www.keeslerfamilyhousing.com/

Table 2-6 2016 Basic Allowance for Housing Rates for the Biloxi Area

Rank	BAH Rate (with dependents)	BAH Rate (without dependents)
Enlisted Rates		
E1	$1,098.00	$882.00
E2	$1,098.00	$882.00
E3	$1,098.00	$882.00
E4	$1,098.00	$882.00
E5	$1,164.00	$978.00
E6	$1,254.00	$1,035.00
E7	$1,284.00	$1,101.00
E8	$1,314.00	$1,185.00
E9	$1,407.00	$1,206.00
Warrant Officer Rates		
W1	$1,257.00	$1,074.00
W2	$1,296.00	$1,182.00
W3	$1,338.00	$1,212.00
W4	$1,437.00	$1,257.00
W5	$1,554.00	$1,287.00
Officer Rates		
O1E	$1,287.00	$1,164.00
O2E	$1,329.00	$1,203.00
O3E	$1,455.00	$1,251.00
O1	$1,179.00	$1,029.00
O2	$1,251.00	$1,143.00
O3	$1,335.00	$1,218.00
O4	$1,599.00	$1,281.00
O5	$1,791.00	$1,344.00
O6	$1,806.00	$1,356.00
O7	$1824.00	$1365.00

Source: http://www.keeslerhousing.com/

Figure 2-8 2010 Rent as a Percentage of 2016 BAH Rates



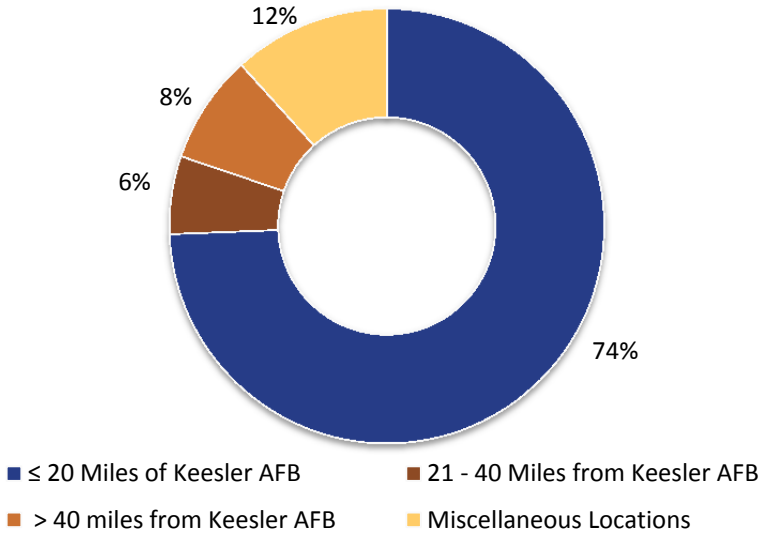
**Harrison County rent data includes Biloxi, D'Iberville, Gulfport, Long Beach, and Pass Christian, and unincorporated Harrison County*

Sources: U.S. Census Bureau, Median Gross Rent (Dollars) 2000, 2010; http://www.keeslerhousing.com/

Keesler AFB provides five privatized housing communities, owned and managed by Hunt Companies, Inc. The communities are Bay Ridge, East Falcon Park, Sand Hill Landing, Thrower Park, and West Falcon Park. Four of the communities are located in Biloxi and Sand Hill Landing is located in Vancleave, directly north of I-10 and directly east of Mississippi Highway 57, approximately 25 miles from Keesler AFB. Together, the privatized housing provides over 1,000 single family and duplex units that can accommodate approximately 5,000 base residents. Figure 2-9 shows where both military and civilian employees live in relation to Keesler AFB. Where employees live is an indicator of where available housing is located.

Source: http://www.keeslerfamilyhousing.com/

Figure 2-9 Where Military and Civilian Employees Live in Relation to Keesler AFB, 2011



Source: Trip Reduction and Ride Share Program for Keesler Air Force Base, 2011

Almost three fourths of military and civilian employees live within 20 miles of Keesler AFB. These locations include Biloxi, Ocean Springs, D'Iberville, Vancleave, Orange Grove, Woolmarket, East and Central Gulfport, and the installation itself. The second highest was the Miscellaneous Locations category. This category is for those who reside in areas outside of the Mississippi, Alabama, and Coastal Louisiana area. In the Trip Reduction and Ride Share Program for Keesler Air Force Base study, it is assumed that these locations are where military personnel or civilian staff may have permanent homes, while also having temporary quarters closer to the installation. The third highest distance category is greater than 40 miles. This distance includes Mobile, New Orleans, Baton Rouge, the Hattiesburg Area, the Jackson Area, and the Meridian Area. The distance with the least amount of employees is 21-40 miles from Keesler AFB. This distance includes Gautier, Saucier / Wortham, Long Beach, Pass Christian, Diamondhead, Pascagoula, and Bay St. Louis.

Housing Value Trends

Table 2-7 provides the median housing value trends in the Study Area from 2000 to 2010. For all jurisdictions, median housing values increased from 2000 to 2010. The greatest increase was in the City of Biloxi, which increased by almost 70 percent. Harrison County, the City of Biloxi, and the City of D'Iberville all had a greater increase in housing values than Mississippi, which also experienced an increase in housing value, albeit at a lesser percent change than the other jurisdictions. Figure 2-10 illustrates the difference between housing values from 2000 to 2010 for the JLUS Study Area jurisdictions.

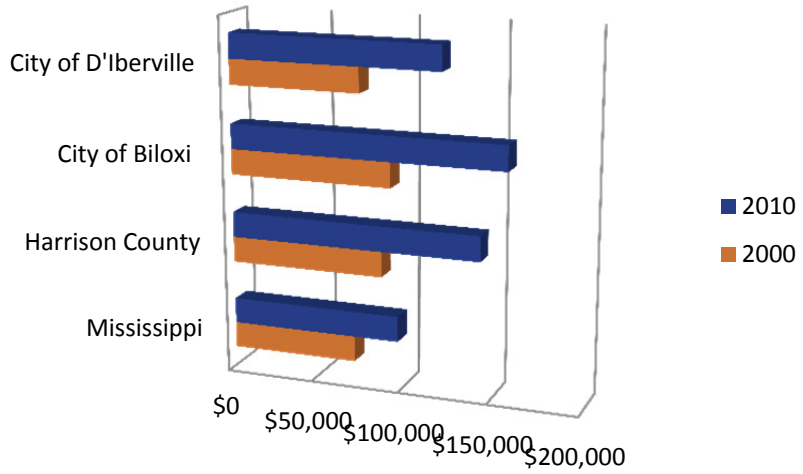
Table 2-7 Median Housing Values, 2000 - 2010

Jurisdiction	2000	2010	Number Change	Percent Change
Mississippi	$71,400	$96,500	25,100	35.2%
Harrison County*	$87,200	$142,700	55,500	63.6%
City of Biloxi	$92,600	$157,300	64,700	69.9%
City of D'Iberville	$75,100	$121,000	45,900	61.1%

**Harrison County data includes Biloxi, D'Iberville, Gulfport, Long Beach, and Pass Christian, and unincorporated Harrison County*

Source: U.S. Census Bureau, Median Value (Dollars) 2000, 2010

Figure 2-10 Median Housing Values, 2000 - 2010



**Harrison County data includes Biloxi, D'Iberville, Gulfport, Long Beach, and Pass Christian, and unincorporated Harrison County*

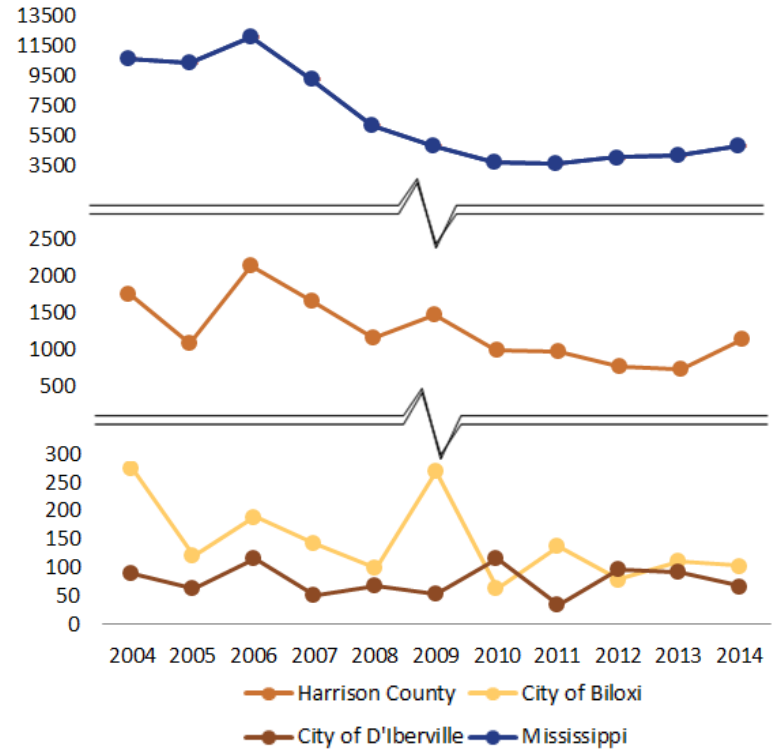
Source: U.S. Census Bureau, Median Value (Dollars) 2000, 2010

Building Permits

An analysis of the number of building permits issued can be a good indicator of the growth of a community. Records since 2004 show how the construction of housing in the JLUS Study Area responded to growth and economic recession during the last decade.

Figure 2-11 shows the trend in the issuance of building permits for new single family housing units from 2004-2014. This graph shows how the construction of single-family homes in the City of Biloxi, the City of D'Iberville, Harrison County, and the state responded to the effects of Hurricane Katrina in 2005 and the economic recession from 2007-2010. The chart indicates that the issuance of housing permits was impacted by both events for all jurisdictions. Mississippi and Harrison County experienced a peak in permit activity in 2006, the year after Hurricane Katrina. After Katrina, the jurisdictions experienced a decline in the issuance of permits. One factor that contributed to this decline was the high cost of wind insurance and the loss of insurers that were willing to provide the insurance to homes in the southernmost counties of Mississippi located on the coast, including Harrison County. The County experienced another peak in 2009, during the recession. Since the end of the recession, single-family permit activity has remained steady for all jurisdictions.

Figure 2-11 Single-Family Building Permits, 2004-2014



**Harrison County permits include Biloxi, D'Iberville, Gulfport, Long Beach, and Pass Christian, and unincorporated Harrison County*

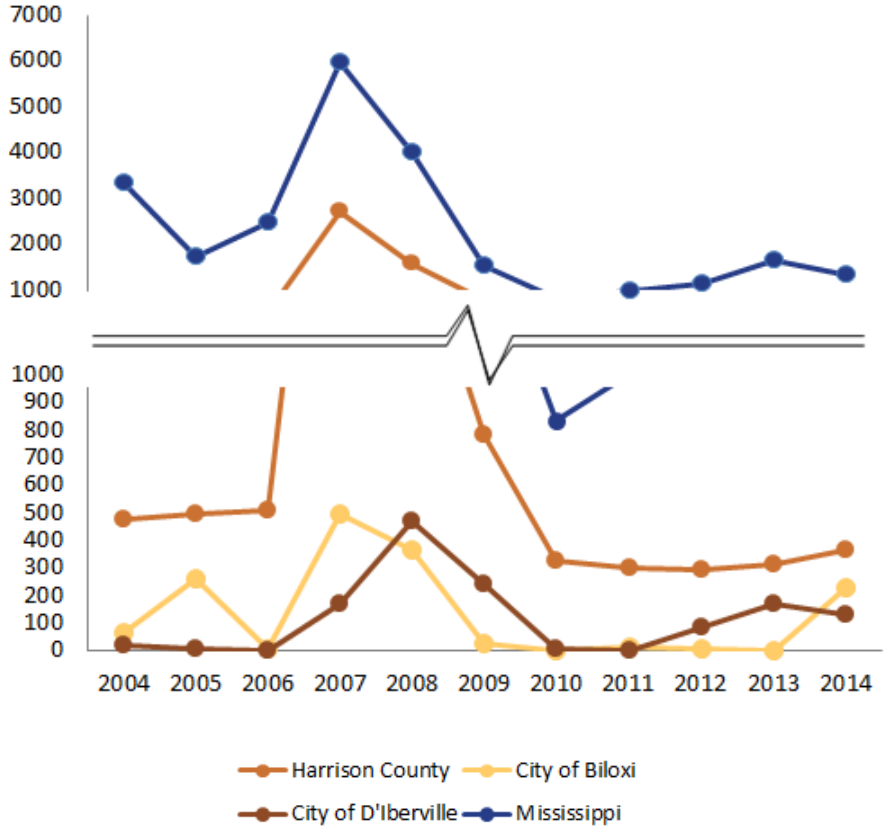
Source: SOCDS Building Permits Database, 2004 – 2014

Multi-family housing (housing with two or more units) is another component of housing type and availability in the Study Area. The majority of renter households live in multi-family housing, so the availability of these units is essential to more mobile residents within the Study Area. Because military personnel at Keesler AFB may need to obtain affordable short- to mid-term housing off-base, it is important to ensure that there is adequate housing stock to meet the needs of the civilian residents as well as military personnel for communities within the JLUS Study Area. Multi-family permit issuance is also an indicator of housing availability for military personnel who are single or who have small families.

Figure 2-12 illustrates the trend in multi-family building permits at the city, county, and state levels from 2004-2014. The numbers in the figure reflect the total multi-family units constructed under building permits for a given year.

Permit issuance for multi-family housing from 2004 to 2014 had similar trends to that of single-family housing, although some of the trends are more sporadic. All jurisdictions in the Study Area, except for D'Iberville, experienced an increase in multi-family permit activity in 2007, two years after Hurricane Katrina and the start of the recession. After Hurricane Katrina, there was a surge in multi-family housing development due to developers taking advantage of special tax incentives offered by the State of Mississippi. These tax incentives were retired from 2010 to 2012. Since the recession, the jurisdictions have generally plateaued in the issuance of multi-family permits. Multi-family housing units appear to be generally on the rise within the JLUS Study Area, except for the state, which has remained generally low and experienced a decrease in permit activity in 2014.

Figure 2-12 Multi-Family Building Permits, 2004-2014



**Harrison County permits include Biloxi, D'Iberville, Gulfport, Long Beach, and Pass Christian, and unincorporated Harrison County.*

Source: SOCDS Building Permits Database, 2004 – 2014

2.4. Economic Overview

The primary economic activity throughout the JLUS Study Area is largely centered on the gaming industry that has been prevalent in the area since the early 1990s. The gaming industry has continued to be an important economic driver in the area, even after the impacts from Hurricane Katrina. Table 2-8 shows the local labor force in 2014. Unemployment is below the state average for Harrison County and the Cities of Biloxi and D'Iberville.

Table 2-8 Labor Force, 2000 – 2014

Jurisdiction	Labor Force	Armed Forces	Employed	Unemployed	Percent Unemployed
Mississippi	1,346,038	10,936	1,198,828	147,210	6.3%
Harrison County*	92,041	5,891	83,107	8,934	5.9%
City of Biloxi	20,745	3,521	18,720	2,025	5.7%
City of D'Iberville	5,178	240	4,818	360	4.6%

**Harrison County data includes Biloxi, D'Iberville, Gulfport, Long Beach, and Pass Christian and unincorporated Harrison County*

Source: Selected Economic Characteristics, American Community Survey 5-Year Estimates, 2000-2014

Mississippi

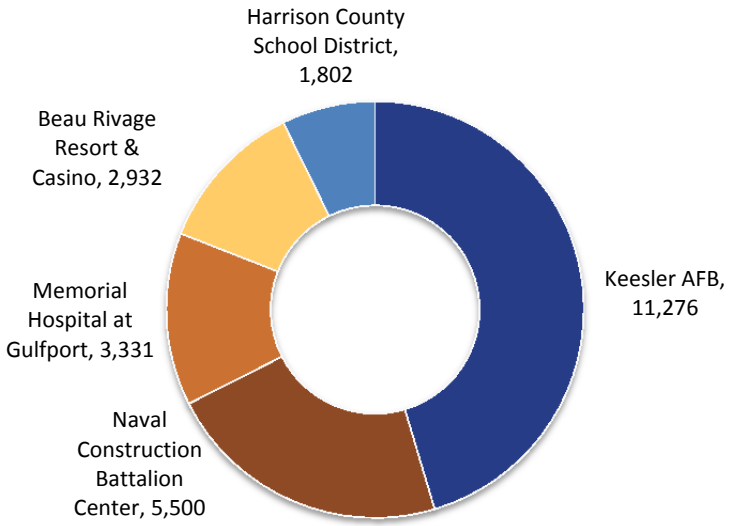
Mississippi has one of the nation's lowest per capita income rates and one of the lowest living costs. For much of the state's early years, Mississippi was highly dependent on the cotton industry. Today, agriculture is still a significant employment sector, although no longer the largest. Mississippi's greatest industries in terms of employment are educational services, health care and social assistance, followed by the manufacturing industry and retail.

Source: Selected Economic Characteristics, American Community Survey 5-Year Estimates, Mississippi, 2014

Harrison County

Harrison County is the center for employment in the region. The major employers in Harrison County are Keesler AFB, Naval Construction Battalion Center, and Memorial Hospital. In total Harrison County's largest employers are in the government industries, including Keesler AFB, the Harrison County School District, and the Naval Construction Battalion Center. Figure 2-13 shows the employee breakdown of the top five employers in Harrison County.

Figure 2-13 Top Five Employers and Number of Employees in Harrison County, 2015



**Harrison County data includes Biloxi, D'Iberville, Gulfport, Long Beach, and Pass Christian, and unincorporated Harrison County*

Source: http://mscoast.org/

Harrison County is making an effort to diversify its economy by creating industrial parks in unincorporated land. Following Hurricane Katrina, the demand for industrial space in Harrison County increased and the vacancy rates of the parks decreased by approximately 20 percent. The Harrison

County Development Commission recently opened a new industrial park in Saucier near Highway 49.

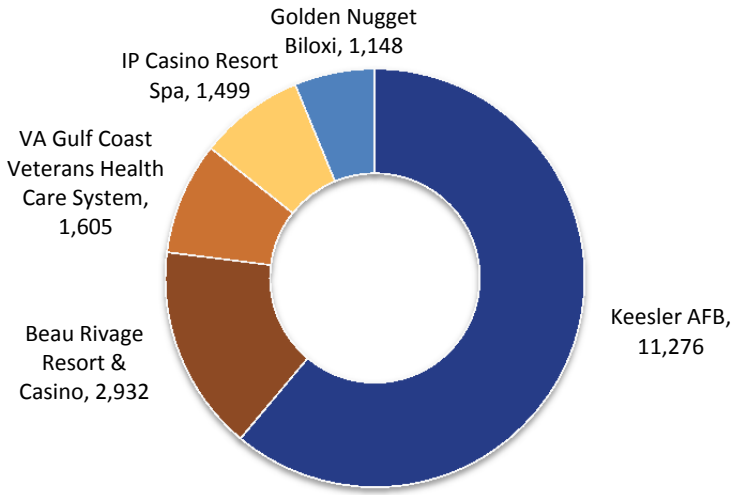
Although most development in the county is concentrated along the waterfront and transportation routes, Harrison County is now experiencing growth areas further north of I-10.

Source: http://mscoast.org/; 2030 Harrison County Comprehensive Plan

City of Biloxi

The City of Biloxi's economy is largely driven by the gaming industry and Keesler AFB. The largest employer in Biloxi in 2015 was Keesler AFB, employing over half of the city's workforce. The second leading industry was the gaming industry, employing 47 percent of the workforce and bringing in over $800 million in gaming revenue in 2010. Figure 2-14 shows the employee breakdown of the top five employers in the City of Biloxi.

Figure 2-14 Top Five Employers and Number of Employees in the City of Biloxi, 2015



Source: http://mscoast.org/

Tourism in Biloxi, and for most of the Gulf Coast region, is a large contributor to the economy. The largest tourist draw in Biloxi has been casino gaming. In 2014, 15.3 million tourists visited casinos on the Mississippi Gulf Coast, bringing in a gross revenue of over $1.5 billion. While the casino gaming industry is a draw, the beaches and water recreation have also been highly attractive commodities in Biloxi. In addition, the MGM Park is home to an AA minor-league baseball team, the Biloxi Shuckers, as well as special events.

Like most coastal cities, Biloxi was impacted by Hurricane Katrina in 2005. Many developments that were set for construction prior to Katrina were never brought to fruition. One such example was a 26 story high rise condo tower that was approved right before Katrina struck and was never built afterwards. East Biloxi was particularly affected and the process to rebuild was slow due to floodplain construction constraints and high insurance costs. Since then, Biloxi has had a resurgence in development. The State legislature's approval to build casinos on land, rather than on barges, led the reconstruction efforts in the city.

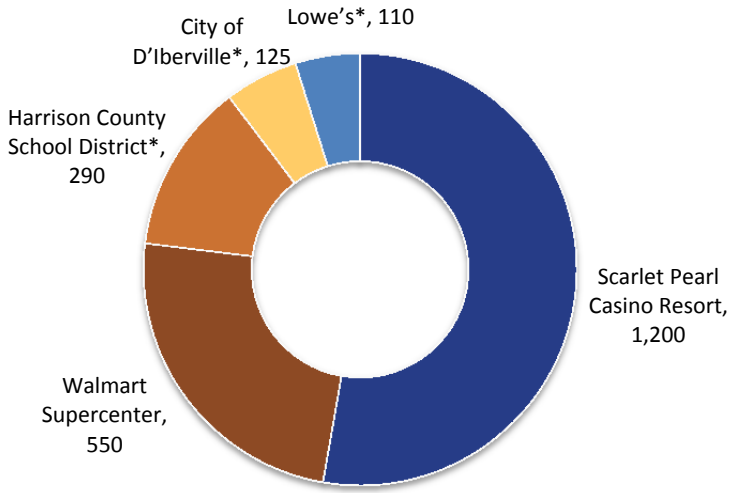
Source: City of Biloxi Comprehensive Plan; Harrison County Development Commission

The Beau Rivage Resort and Casino is the second largest employer in the City of Biloxi.

City of D'Iberville

The City of D'Iberville is growing in commercial industries and local businesses. Presently, its largest industry is retail, employing approximately 20 percent of its workforce and generating almost $200 million. The second greatest industry is accommodation and food services. Figure 2-15 shows the employee breakdown of the top five employers in the City of D'Iberville.

Figure 2-15 Top Five Employers and Number of Employees in the City of D'Iberville, 2015



**Number indicates data from 2012*

Sources: http://diberville.ms.us; Gulf Regional Planning Commission 2013 Community Overview: City of D'Iberville

The city is continuing to grow, with many planned developments for the future. One of the most successful developments is the Promenade Shopping Center, which opened in 2009 and consists of 700,000 square feet of commercial space. Additionally, the City is looking to add a new shopping center west of I-110 and south of I-10. The shopping center, called Gulf Coast Galleria, is intended to be a contemporary shopping destination on the Gulf Coast and will include a hotel, shopping stores, and a dining and entertainment complex. The city also acquired its first casino, the Scarlet Pearl Casino Resort, in late 2015. The new casino employs approximately 1,200 people. There are plans underway to redevelop the Old Town into a mixed-use development called the French Market. This will help revitalize the area after the impacts from Hurricane Katrina and will bring in more jobs to the city.

Source: http://diberville.ms.us/

2.5. Current Development Overview within the Study Area

Land uses throughout the JLUS Study Area range from open space in unincorporated Harrison County, to the residential and urban population center in the City of Biloxi. This section discusses the setting in the immediate vicinity of Keesler AFB.

Aerial view of Keesler AFB

North

Keesler AFB is bordered to the north by the Back Bay of Biloxi. The Back Bay is an active commercial shipping channel supporting industry on Bayou Bernard. The Back Bay of Biloxi includes barge traffic and provides opportunities for recreation, such as boating and fishing. Also north of the base is the Oak Park neighborhood, which is a single family residential neighborhood. This neighborhood has upscale waterfront properties with docks. On the north side of the Back Bay, which is over a half a mile wide, is the remaining part of the City of Biloxi, which extend north almost five miles. This includes single family and multifamily housing, as well as the Biloxi High School. Additionally, D'Iberville is located north of the installation, east of Biloxi. The city extends almost five miles north from the Back Bay of Biloxi.

Interstate 10, which runs east to west, is located north of Keesler AFB, approximately a mile and a half north of the Back Bay.

East

East of Keesler AFB is mainly single family residential in Biloxi. Past I-110, on the east, are casinos and hotels. This area in Biloxi continues to be developed, which is evidenced by the new MGM stadium. Although the gaming industry is expanding, gaming cannot go west of the I-110. United States Highway 90 continues through Biloxi and extends north east on the Biloxi Bay Bridge into Ocean Springs.

South

Directly south of Keesler AFB are single family residences in Biloxi, as well as Biloxi Junior High School, the Old Biloxi Cemetery, and churches. Irish Hill Drive and the CSX line run east to west, abutting the south end of the installation. United States Highway 90 is a main thoroughfare that runs west to east along the southern part of Biloxi, by the coastline. Directly south of the interstate is the stretch of beach, which has restaurants located along the waterfront. Much of the restaurants and attractions along the beach were destroyed by Katrina and have since been restored. Further south, past the beach is the Mississippi Sound, which leads into the Gulf of Mexico.

West

West of Keesler AFB is a mix of single family residential and commercial development in Biloxi. Popp's Ferry Bridge connects the southern end of Biloxi to the northern end across the Back Bay.

2.6. Projected Study Area Growth

City of Biloxi

Today, growth areas in Biloxi include Woolmarket, which is located north of the Back Bay, north of I-10 and east of Mississippi Highway 67. This area, which was annexed by the City of Biloxi in 1999, has historically been agricultural and forested land. Seventy-six percent of undeveloped land that does not have environmental constraints associated with it, such as floodplain, wetlands, and steep slopes are located in the Woolmarket area. This area is slated for an increase in low-density residential development.

The Woolmarket Regional Activity Center is also being proposed in the area at I-10 and Mississippi Highway 67. These uses will include high intensity commercial and residential development. Another growth area in Biloxi is the Cedar Lake Regional Activity Center, which is located at I-10 at Cedar Lake road. This will be a mixed-use development area, including commercial, institutional and high-density residential areas.

Source: City of Biloxi Comprehensive Plan 2008

City of D'Iberville

Northeast of the installation lies the City of D'Iberville, intersected by 1-10 and I-110. D'Iberville has plans to develop the waterfront into commercial and mixed-use in the proposed French Market District, which was once the Old Town. The French Market District is proposed to be a transit oriented development (TOD), melding Coast Transit Authority (CTA) services, diverse housing types, and commercial development. The CTA transit center on Central Avenue and Rodriguez Street supports businesses in the district and provides connectivity between D'Iberville and Biloxi. Housing opportunities in the French Market District will include affordable rentals. The district considers growth in the area and can accommodate a diverse population including those who train or work at Keesler AFB. This redevelopment of the Old Town would act as a town center. The square is proposed on Central Avenue and Rodriguez Street.

Source: City of D'Iberville Comprehensive Plan 2010

2.7. Transportation

The Mississippi Department of Transportation (MDOT) is responsible for maintaining the state roadways and transportation infrastructure in the State of Mississippi. The Mississippi Department of Transportation updated Mississippi's Unified Long-Range Transportation Infrastructure Plan 2040 in May 2015.

Highways

There are two major interstates that pass through the JLUS Study Area. To the east of Keesler AFB is I-110, which connects to U.S. Highway 90 from the south and runs north into D'Iberville. This interstate connects to I-10. This interstate also acts as a hurricane evacuation route. After the I-110 and I-10 interchange, I-110 becomes Mississippi Highway 15, which continues northward.

Interstate 10 runs directionally east to west, in D'Iberville and connects to Interstate 110. Interstate 10 extends past this region and as far west as Los Angeles, California and as far east as Jacksonville, Florida.

The main highway that runs through Biloxi and approximately a fourth of a mile south of Keesler AFB is U.S. Highway 90, also known as Beach Boulevard. This highway runs east to west along the beach. It passes through Biloxi and eastward to Ocean Springs and Pascagoula through the Biloxi Bay Bridge.

The Biloxi Bay Bridge is a two-way, 1.6 mile bridge connecting Biloxi to Ocean Springs, which continues U.S. Highway 90 east of Biloxi. This bridge was reconstructed after it was destroyed during Hurricane Katrina, and was reopened in 2008.

The Biloxi Bay Bridge connects Biloxi to Ocean Springs

Regional Transportation Improvements

The Metropolitan Transportation Plan and the Transportation Improvement Program (TIP) both identify improvements to the transportation system within the Metropolitan Planning Area (MPA).

The Mississippi Gulf Coast Transportation Study 2040 Long-Range Transportation Plan identifies a vision and plan of action for transportation needs. One such improvement includes Popp's Ferry Road. Popp's Ferry Bridge is a two-lane bi-directional bridge in Biloxi spanning the Back Bay approximately three miles west of Keesler AFB. The bridge is planned for replacement and the plans to extend Popp's Ferry Road to U.S. Highway 90 have been approved. The road will be a four lane divided road and will be federal funded through MDOT with a match coming from the City of Biloxi through a grant from the Mississippi Department of Environmental Quality. The environmental impact statement has been approved for this project and is projected for fiscal year (FY) 2018.

In addition to this extension, Popp's Ferry Road is being widened to a four lane divided road between Cedar Lake Road and the City of D'Iberville's boundary line. The widening project is projected to be completed by 2016 and is being funded by MDOT funds, which are administered through Gulf Regional Planning Commission. Funding for the Popp's Ferry Road improvements are included in the Mississippi Gulf Coast Transportation Study 2040 Long-Range Transportation Plan. Popp's Ferry Road improvements are not a part of any Capital Improvement Projects (CIP), but are a part of the TIP, which addresses short-term transportation priorities. These projects are generally funded 80% by federal fund and 20% by local funds. Improvements to the bridge and Popp's Ferry Road would support more commuting to and from D'Iberville.

Additionally, improvements to transportation include the development of a pedestrian bridge located east of I-110 that would go over U.S. Highway 90 and connect to MGM Field.

Another regional project is the Harrison County East-West Multimodal Corridor. This project would include the construction of roads to connect road segments along the CSX rail corridor. This would improve connectivity for vehicles and express transit.

Sources: Mississippi Gulf Coast Area Transportation Study 2040 Long-Range Transportation Plan; http://www.grpc.com/; Mississippi Gulf Coast Metropolitan Planning Organization Transportation Improvement Program FY 2015 - 2019

Public Transit

The CTA provides public transportation through bus services for the coastal counties of Mississippi, which includes Harrison County, Hancock County, and Jackson County. The CTA provides 10 different bus routes, one of which takes passengers near Keesler AFB, called Keesler Route 24.

Other services provided by CTA include paratransit services, which is an ADA compliant curb-to-curb service. It also provides Coast Commuter program for carpool and van services. The CTA is most known for their Trolley buses that

travel down Beachcomber Route on U.S. Highway 90. The transit authority has also begun operating a fleet of hybrid electric buses.

The CTA is a non-profit provider and is independently managed by a Board of Commissioners. The Board of Commissioners has representation from the coastal communities including the City of Biloxi, City of Gulfport, City of D'Iberville, Harrison County, and Jackson County.

Source: http://coasttransit.com/

Rail

The CSX Railroad Company rail runs through Mississippi along the coast. CSX operates and maintains approximately 130 miles of track in Mississippi and has three ports, which include Gulfport, Pascagoula, and Port Bienville. This rail line runs directly south of the Keesler AFB fenceline and nearby Keesler AFB's White Avenue Gate, which is the primary entrance into the base.

The Amtrak rail passenger service is currently being considered for service along the Gulf Coast on the CSX rail line. Amtrak provided passenger services through the Gulf Coast in the 1990s through the 2000s, but terminated services east of New Orleans after Hurricane Katrina in 2005. The Southern Rail Commission (SRC) was tasked to determine the feasibility of an Amtrak line extension. The Gulf Coast Rail Working Group is charged with evaluating economic impacts of the service, including ridership, cost, and infrastructure upgrades. The working group, which includes the SRC, was a provision from the federal bill Fixing America's Surface Transportation Act, a five year plan worth $305 billion to improve infrastructure throughout the U.S. The Gulf Coast Rail Working Group, including representatives from Louisiana, Mississippi, and Alabama, were appointed by the Federal Railroad Administration. As the passenger service is further delineated, Keesler Air Force Base will become a key stakeholder, with the installation being a potential market for ridership.

There are currently two extensions that are being considered: an extension of The City of New Orleans line to Mobile, and an extension of the New Orleans lines to Orlando with 16 stops along the way. The rail lines are owned by CSX, but would be leased to Amtrak.

The Gulf Coast Rail Working Group is currently creating a report with Amtrak, CSX, and the Federal Railroad Administration to determine the logistics of returning the passenger service to the area. The report will then be presented to Congress. The deadline to complete this report is September 2016.

Sources: https://www.csx.com/; http://www.southernrailcommission.org/; Report for the Southern Rail Commission on Potential Gulf Coast Service Restoration Options

Air

The Gulfport-Biloxi International Airport (GPT) is located approximately 11 miles west of Keesler AFB in Gulfport, Mississippi. The airport provides military, private, commercial, and cargo services for the region.

Gulfport-Biloxi International Airport is currently served by three major airlines: American Airlines, Delta, and United. The airlines provide direct flights to neighboring cities such as Atlanta, Dallas / Fort Worth, and Houston as well as connection to other cities in the U.S. and worldwide. The airport serves over 730,000 passengers a year.

The terminal is open every day of the week from 4:30 a.m. until the last commercial arrival. The airport has two runways, Runway 14 / 32 and Runway 18 / 36. Runway 14 / 32 is 9,002 feet in length and 150 feet in width. Runway 18 / 36 is 4,935 feet in length and 150 feet in width. In 2015, GPT averaged 141 flights per day. The distribution of flight activity is as follows:

- 50% military
- 19% transient general aviation
- 15% air taxi
- 9% commercial
- 7% local general aviation

The airport was established in 1942 to train flights crews for World War II (WWII) and was converted to the City of Gulfport in 1949. The Air National Guard Training Center was established at GPT in 1954 as the Air National Guard Field Training Site and was renamed to the Combat Readiness Training Center (CRTC) in 1990. The CRTC conducts regular deployments and has almost 200 full-time military and civilian employees at GPT. The CRTC has two tenant Mississippi Air National Guard units on base – the 225th Air Control Squadron (ACS) and the 209th Civil Engineer Squadron (CES).

Sources: http://www.flygpt.com/; http://airnav.com/; http://www.globalsecurity.org/

Stennis International Airport (KHSA) is located approximately 40 miles west of Keesler AFB in Kiln, Mississippi in Hancock County. The airport has one runway, Runway 18 / 36. Runway 18 / 36 is 8,497 feet in length and 150 feet in width. In 2015, HSA averaged 174 flights per day. Today the airport is used for general aviation and some military use. The distribution of flight activity is as follows:

- 65% transient general aviation
- 25% local general aviation
- 10% military

Previously named Hancock County Airport, the airport was used as a training airfield, supporting the Gulfport Army Airfield during WWII.

Source: http://airnav.com/

Ocean Springs Airport (5R2) is approximately 15 miles east of Keesler AFB in Ocean Springs, Mississippi in Jackson County. The airport has one runway, Runway 18 / 36. Runway 18 / 36 is 3,600 feet in length and 50 feet in width. In 2015, Ocean Springs Airport averaged 83 flights per month. The distribution of flight activity is as follows:

- 88% local general aviation
- 12% transient general aviation

Source: http://airnav.com/

Diamondhead Airport (66Y) is approximately 35 miles west of Keesler AFB in Diamondhead, Mississippi in Hancock County. The airport has one runway, Runway 18 / 36. Runway 18 / 36 is 3,800 feet in length and 75 feet in width. In 2015, Diamondhead Airport averaged 62 flights per month. The distribution of flight activity is as follows:

- 80% local general aviation
- 20% transient general aviation

Source: http://airnav.com/

Please see the next page.

Military Profile 3

Inside Chapter 3...

3.1. Introduction

This chapter provides an overview of the military operational profile including an overview of the history and current operations at Keesler Air Force Base (AFB).

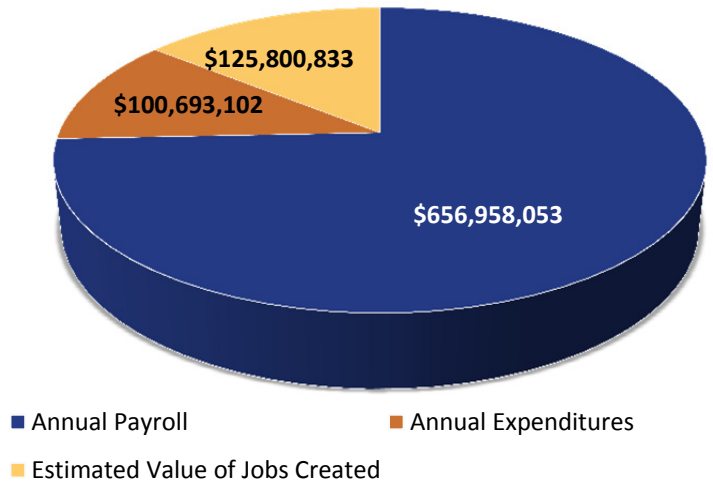
Identifying and describing the various activities performed on the installation and in the surrounding airspace provides valuable insight into the importance of Keesler AFB. The purpose of providing this information is to enable stakeholders to make informed decisions about future development and economic growth within communities and institutions near Keesler AFB and that could potentially impact the viability and future role of the Base.

3.2. Regional Economic Benefit

The Keesler JLUS Study Area comprises the City of Biloxi, the City of D'Iberville, Harrison County and other surrounding jurisdictions that are impacted by and have the potential to impact the Keesler AFB operating area. Keesler AFB is a significant economic engine for the surrounding regional area and is the largest employers in Biloxi, Mississippi (MS) and Harrison County.

In Fiscal Year 2015 (FY 15), Keesler AFB had an estimated economic impact of $883 million. Figure 3-1 and Table 3-1 show the breakdown of the total economic impact of Keesler AFB in the region. In FY 15, Keesler AFB directly employed 8,284 military personnel, which includes active duty as well as the student and reservist population and 3,501 civilian personnel, which includes Base Exchange and commissary, contractors, and civil services. The total payroll associated with these jobs is almost $657 million. It is estimated that 3,539 jobs are created indirectly in the surrounding communities in support of Keesler AFB, valued at $125,800,833.

Figure 3-1. Keesler AFB Economic Impact, FY 15



Source: Keesler Air Force Base Fiscal Year 2015 Economic Impact Analysis

In addition to the $657 million payroll created by Keesler AFB, the Base has over $100 million in direct annual expenditures. These expenditures cover categories such as construction, Base Exchange, school impact aid / tuition assistance, health care, lodging, and services.

Table 3-1 Keesler AFB Payroll, FY 15

Payroll	Manpower	Payroll
Military/Student Personnel	8,284	$463,643,452
Civil Service	1,362	$111,195,568
Non-Tax Funded	365	$9,388,094
BX and Commissary	251	$6,062,278
Contract	1,079	$66,242,486
Other	444	$426,175
Total	11,785	$656,958,053

Source: Keesler Air Force Base Fiscal Year 2015 Economic Impact Analysis

3.3. Keesler AFB History

The land occupied by Keesler AFB has military history dating back to the 1800s. In the early 1800s, the land was a part of the United States Naval Reserve (USNR). In 1906, the federal government issued the land to the City of Biloxi, which named the property Naval Reserve Park. The City expanded the park by acquiring neighboring land and in 1925, the City gave a section of the land to the Coast Guard. In the 1930s, Biloxi provided part of the land to the Veteran's Administration hospital. Within this decade, the City also built an airport.

Keesler AFB was first established when Biloxi leased the airport and 1,563 acres to the United States for a technical training school. This school, then called the Army Air Corps Station, was intended to support World War II (WWII) training. In June of 1941, the War Department activated Army Air Corps Station No. 8, Aviation Mechanics School in Biloxi. Two months later, the Army Air Corps Station was renamed as Keesler Army Airfield, after Second Lieutenant (2d LT) Samuel Reeves Keesler, Jr. who died while serving in France during World War I (WWI). Lieutenant Keesler was from

Greenwood, MS and was assigned to the 24th Aero Squadron, United States (U.S.) Army Air Service.

Technical training at Keesler Army Airfield began in mid-July of 1941. The training school received its first B-24 aircraft in 1942 after the Army Air Forces directed the school to focus on training for B-24 aircraft mechanics. Women and international students, from 50 counties, began training at Keesler Army Airfield in 1943. In addition, Tuskegee Airmen, the first Black aviators in the U.S. armed forces, were stationed at Keesler Army Airfield by 1943.

Although initially focused on training for B-24 maintenance, training expanded to focus on other aircraft, radio operations, and air-sea rescue. In 1947, the United States Air Force (USAF) became a branch of the armed services, re-designating Keesler Army Airfield to an Air Force base in 1948. In 1949, Keesler AFB became known as the "Electronic Training Center of the Air Force" after switching the training focus to radar, radio, and electronics maintenance and repair. During this year, the City of Biloxi sold the Keesler land to the United States.

Through the 1950s Keesler AFB gained many more training programs, including a training program for ballistic missiles, control tower operations, and radio maintenance. In the 1960s Keesler AFB had lost many airborne training programs as well as the aircraft required for these programs, though it was still the largest training base through the 1970s.

The 81st Training Wing (81st TRW) was activated at Keesler AFB in 1993. The 81st Training Wing was originally established as the 81st Fighter Wing in 1948 at Wheeler AFB in the, then, Hawaii Territory. The 2nd Air Force was also activated at Keesler AFB in 1993. This mission was modified prior to their arrival to Keesler AFB to develop training curriculum for the Air Education and Training Command (AETC). The 2nd Air Force was originally formed as the Northwest Air District in 1940 at McChord Field, Washington. The 403rd Wing was activated at Keesler in 1994, although it had been at Keesler AFB since 1983 as the Tactical Airlift Wing. It was previously established as Troop Carrier Wing in 1949 at the Portland Municipal Airport in Oregon. The 85th Engineering Installation Squadron (EIS) was activated at Keesler AFB in 1970 and has been on Keesler AFB since then.

At the turn of the 21st Century, Keeler AFB was still one of the largest technical training wings in the USAF. Since its inception, the 81st TW has trained thousands of airmen, Air Force officers, and military personnel from the Navy, Army, Marine Corps, Coast Guard, and other countries. The training wing has also trained civilian and military members in technical skills.

Keesler AFB was greatly affected by Hurricane Katrina in 2005. The storm created $950 million in damages throughout the installation. Military family housing, the medical center, and the central energy plant were some of the most affected assets. Almost 60 percent of the military family housing units were damaged beyond repair. Shortly after the storm passed, repairs to the installation began, including the construction of military housing, restoration to the Sablich Center, reconstruction of the Base Exchange and the commissary onto higher ground, and the restoration of the golf course. The Base has since recovered from most of the effects from Hurricane Katrina.

Source: http://www.keesler.af.mil/

3.4. Installation Setting

Keesler AFB is situated on the Mississippi coast approximately 90 miles east of New Orleans, Louisiana and 60 miles west of Mobile, Alabama. The installation is located in the City of Biloxi, Mississippi and includes pockets of privatized housing separate from the Base operational area within the City of Biloxi and Jackson County. These collective areas comprise 1,719 acres. Figure 3-2 shows the installation setting.

Keesler AFB is located north of U.S. Highway 90, surrounded by urban developed areas of the City of Biloxi to the west, south, and east. These built-out areas contain established residential neighborhoods consisting of

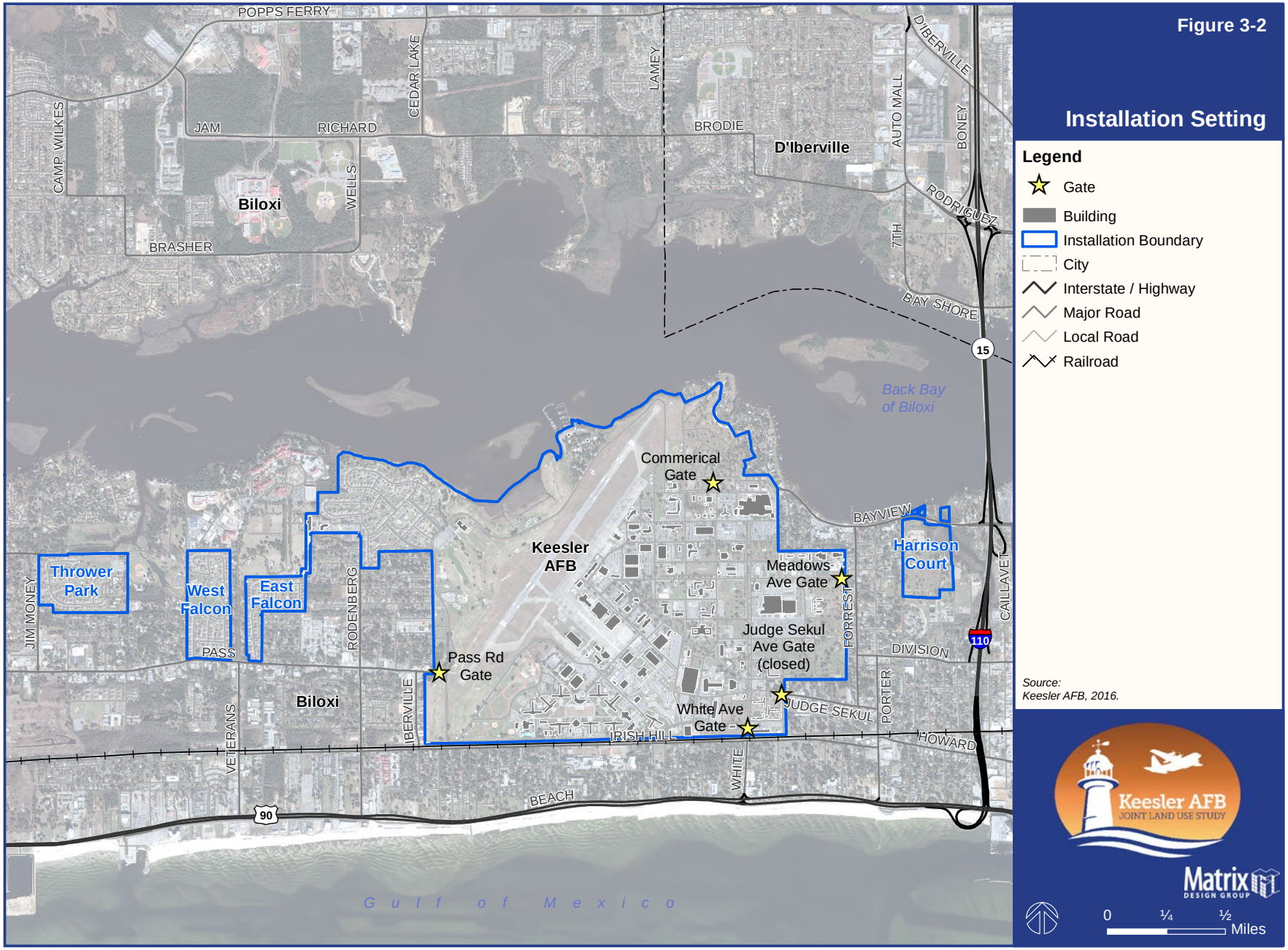


Figure 3-2

Installation Setting

Legend

- Gate
- Building
- Installation Boundary
- City
- Interstate / Highway
- Major Road
- Local Road
- Railroad

Source: Keesler AFB, 2016.

Keesler AFB JOINT LAND USE STUDY

Matrix DESIGN GROUP

0 ¼ ½ Miles

predominantly single family homes with pockets of neighborhood commercial development along collector streets such as Pass Road and Iberville Drive to the west. Abutting the southern perimeter of the installation is the CSX Transportation rail line, which separates the installation from the residential area on the south side of Irish Hill Drive. The Biloxi Junior High School and the Old Biloxi Cemetery are also located on Irish Hill Drive immediately south of the installation. Immediately north of Keesler AFB is the Back Bay of Biloxi – an 8.1 square mile estuary fed from the Biloxi and Tchoutacabouffa rivers. Across the Back Bay of Biloxi, to the north, are the cities of Biloxi and D'Iberville.

The installation comprises training, administration and housing facilities, runway and airfield facilities, the Keesler Medical Center, and Base support and recreation facilities, including a marina and golf course.

Housing at Keesler AFB consists of:

- Temporary lodging for visitors
- Dormitories for unaccompanied housing
- Privatized military housing communities managed by Hunt Military Communities:
    - Bay Ridge housing community located west of the airfield consisting of 330 homes
    - East Falcon Park located in the City of Biloxi west of Keesler AFB
    - West Falcon Park located in the City of Biloxi west of East Falcon Park. East and West Falcon Park collectively contain 340 homes
    - Thrower Park located in the City of Biloxi east of West Falcon Park consisting of 230 homes
    - Sand Hill Landing located in the community of Vancleave in Jackson County consisting of 160 homes (this area is not part of the JLUS Study)

One additional area in the City of Biloxi, east of Keesler AFB and south of Bayview Avenue – Harrison Court, is also part of Keesler AFB and contained privatized housing prior to Hurricane Katrina. The homes were not rebuilt and the site is currently vacant.

Sources: http://www.keesler.af.mil/; http://www.keeslerfamilyhousing.com/

Gateway signage to Keesler Air Force Base

3.5. Local Communities Working Together

As a community presence, Keesler AFB contributes to more than just the local economy. Keesler AFB recognizes that in a city, continued support of the local population and government officials is invaluable. Keesler AFB understands the value of volunteering and engaging with the community. In 2014, the installation reported 139,312 of community volunteer hours. The following are examples of programs and organizations that the installation partners with:

Chambers of Commerce

The Base actively interacts with the Chambers of Commerce for the City of Biloxi, the City of Ocean Springs, the City of D'Iberville, the Biloxi Bay Area, and the Mississippi Gulf Coast. There is Keesler AFB presence at many of the Chamber of Commerce meetings, including board meetings, for Ocean Springs, D'Iberville, and the Back Bay. Keesler AFB representatives attend such meetings to update community leaders on base related activity.

In addition to having Keesler AFB representation at the Chamber meetings, the Biloxi Chamber of Commerce, the Biloxi Bay Area Chamber of Commerce, and the Mississippi Gulf Coast Chamber of Commerce also coordinate key activities with Keesler AFB on a regular basis:

Biloxi Chamber of Commerce

The Biloxi Chamber of Commerce is membership organization, composed of businesses throughout Biloxi. The Biloxi Chamber of Commerce has a Military Affairs Committee, which was created to enhance the relationship between the city and the military. The Chamber, through the Military Affairs Committee, hosts many events in conjunction with Keesler AFB:

- The Commanders Luncheon is hosted annually with Keesler AFB leadership to inform the Base of new opportunities to support the military.
- Hails and Farewells are held to welcome or say goodbye to incoming and departing commanders at Keesler AFB. The business community is invited to this event.
- The Military Spouses Tour introduces new military spouses to services, local sights, and activities that are provided throughout the Mississippi Gulf Coast. These tours are held quarterly and are intended to welcome newcomers to the region.
- Morning Call is a breakfast event that is held quarterly. Each breakfast is sponsored and hosted by one business and features a speaker. Keesler AFB hosts one of the Morning Calls every year.

Source: http://biloxi.org/military-affairs/

Biloxi Bay Area Chamber of Commerce

The Biloxi Bay Area Chamber of Commerce is comprised of 1,000 members. The chamber has a Military / Veterans Affairs Committee, which hosts and sponsors various projects related to the military. The following are examples of ongoing projects:

- As a Veterans Day observance, the Biloxi Bay Area Chamber of Commerce sponsors an annual Schooner Cruise for new Commanders at Keesler AFB.
- The Biloxi Bay Area Chamber of Commerce is a co-sponsor for the annual National Veterans Day Parade.
- As part of the Scope Warrior conference, an annual strategic planning conference, the Biloxi Bay Chamber of Commerce hosts a fish fry for participants of the conference.
- The Biloxi Bay Area Chamber vs. Keesler AFB Don Wylie Memorial Golf Tournament is an annual tournament held at the Bay Breeze Golf Course at Keesler AFB. The tournament raises funds for the Military & Veterans Affairs committee to honor military members.

- The Chamber provides sponsorship for attendees of Salute to the Military.

Source: https://biloxibayareachamber.org/board-of-directors-committees/militaryveterans-affairs/

Mississippi Gulf Coast Chamber of Commerce

The Mississippi Gulf Coast Chamber of Commerce is made up of businesses throughout the Gulf Coast and is the only accredited chamber in Mississippi. The chamber has a partnership with the Chamber of Commerce for Biloxi, Gulfport, Long Beach, and Pass Christian. The following are examples of how the Mississippi Gulf Coast Chamber of Commerce works with Keesler AFB:

- The Coast Centurion Association, a part of the chamber, supports the Armed Forces across the Gulf Coast. The association is made up of community leaders and military personnel, who are all dedicated to the Gulf Coast's military presence.
- Salute to the Military is an annual event that highlights military installations and its commanders along the Gulf Coast. The event is intended to demonstrate local businesses' support for the military.

Sources: http://mscoastchamber.com/coast-centurions-association/; http://mscoastchamber.com/mississippi-gulf-coast-chamber-of-commerce-inc/

Direct Community Outreach

Keesler AFB participates in many local events throughout the Gulf Coast:

- The Honorary Commanders are composed of leaders throughout the neighboring jurisdictions and leaders at Keesler AFB. The program is a year-long partnership between the Base and community leaders, promoting strong ties between the leadership by encouraging discussions on how the two will grow together in the future. As an honorary commander, civic leaders are able to tour the Base and learn about the various missions at Keesler AFB. The current honorary commanders were inducted in February of 2016 at Keesler AFB.
- Through the 81st Medical Group, the Keesler Hospital supports the National Disaster Medical System (NDMS) as a Federal Coordinating System. The NDMS uses both Federal and non-Federal medical resources to respond to natural and man-made disasters. The Keesler Hospital is one of three Air Force medical facilities designated as a coordinating center. The center provides national and regional emergency management for recovery efforts during times of natural disaster. The center has played an active role in natural disasters, such as Hurricane Camille and Hurricane Katrina. During Hurricane Katrina, the center installed a shelter for the hospital in order to continue medical services during the storm.
- Keesler AFB has a Blood Donor Center on the installation, which is one of three Air Force blood donor centers in the U.S. The center is a part of the Armed Services Blood Program, a health agency that coordinates blood programs for the Army, Navy, and Air Force. The center conducts blood drives almost every Monday in the Triangle.
- STEM outreach is conducted through STEM Diversity Outreach Day, which is an annual event that began in 2015 at Keesler AFB. The event consists of gathering Mississippi Gulf Coast high school Reserve Officer's Training Corps (ROTC) units and science students to participate in activities that support the STEM categories. In 2015, the event drew nearly 300 students from 10 high schools.

  In the past, the 2nd AF has hosted Pathways to Blue, a diversity outreach program intended to recruit talented, diverse cadets for Air Force careers. A focus was placed on careers that emphasize STEM specialties. In 2015, the event drew 100 Air Force ROTC cadets from five universities in the region.

- Keesler AFB is active with providing Base tours. In 2015, Keesler AFB conducted 27 tours of the Base. These tours target certain audiences such as Gulf Coast Leadership, Mississippi Gulf Coast Community College, Honorary Commanders Program, and College, Senior and Junior High School ROTC groups representing the tri-state area.

- Every year, personnel from Keesler AFB represent the Base at the Air Force Marathon, which has been hosted at Wright-Patterson AFB in Ohio since 1997. In 2014, five Keesler AFB Airmen participated in the run and pledged to each raise $500 for the Air Force Enlisted Village, a nonprofit organization that provides housing to surviving spouses of Air Force enlisted members.
- Keesler AFB has hosted the Mississippi Special Olympics for the last 30 years on the installation. The Mississippi Special Olympics is an annual event, providing athletic competition for Olympic-style sports for those with intellectual disabilities. The event draws in approximately 900 athletes and coaches and approximately 3,000 volunteers to the installation annually. During the weekend event, each athlete is sponsored by two student Airmen who ensure that the athletes are being properly fed, rested, and medically attended to. The athletes also stay in the dorms on the Base with their sponsor Airmen throughout the weekend.
- The Base is involved in many local celebrations. Keesler AFB participates in local Mardi Gras parades every year. In 2016, the Keesler Honor Guard led the North Bay Area Mardi Gras Parade. For the Jeff Davis Elementary School Mardi Gras Parade, base leadership participated as Grand Marshalls for the event. Other events that Keesler AFB participates in are the Biloxi Seafood Festival, Christmas on the Water, and Blessing of the Fleet.
- Keesler AFB has a strong presence in Veterans Day observance events. Some examples of events in which the Base participates in are the Gulf Coast's Annual Veterans Day Parade, in which the 81st Training Group's Drum and Bugle Corps, Honor Guard, and 81st Training Wing leadership has historically been a part of. There is a strong military retiree population in the surrounding community; in Mississippi alone, there are almost 14,000 retirees.
- Memorial Day ceremonies are held every year on base and in the community. In Biloxi, the Memorial Day Ceremony is held at the Biloxi National Cemetery. Keesler AFB personnel will participate by playing taps during the ceremony and attending the ceremony alongside local veterans and family members.
- Keesler AFB has been involved with greening efforts throughout the Gulf Coast, such as participating in Keep America Beautiful efforts after Hurricane Katrina.
- Volunteers from the Base have assisted in cleaning the beach and have also volunteered with replanting seagrass on the beach in an effort to restore damaged habitat during times of storms.

In addition to these community outreach activities, the Base also has an online list of volunteer opportunities for military personnel. Such volunteering opportunities include assisting in local social events and escorting residents to various events or outings.

Sources: http://www.keesler.af.mil/; http://www.keesler.af.mil/; http://ndms.fhpr.osd.mil/; http://www.specialolympicsms.org/; http://www.keesler.af.mil/News/Commentaries/Display/tabid/1005/Article/753332/the-spirit-of-special-olympics.aspx; http://www.keesler.af.mil/News/ArticleDisplay/tabid/966/Article/652167/keesler-participates-in-mardi-gras-festivities.aspx; http://www.prnewswire.com/news-releases/keep-america-beautiful-continues-gulf-coast-greening-efforts-with-great-american-cleanup-event-in-gulfport-miss-51660587.html; http://www.keesler.af.mil/AboutUs/FactSheets/VolunteerOpportunities.aspx

3.6. Military Operations

Primary operations at Keesler AFB include electronics training, weather reconnaissance, tactical airlift support, disaster response, medical care and training, management of Air Force training, electronic communications installation, and training for various disciplines for other branches of the Armed Forces. Operations are conducted to execute missions by the host units and tenant organizations. The following are the host units and tenant organizations and activities that operate at Keesler AFB:

Host Units

81st Training Wing

The 81st TRW has the largest Technical Training Group in the Air Force and is the Air Force's "Center of Excellence" for computer and electronics training. The mission is to "train Airmen across the spectrum of warfighting skills and deliver overwhelming combat power for the Air Force." The unit trains over 30,000 students a year, many who come from basic military training. The 81st TRW provides 500 courses in technical, medical, and airmanship skills. The Wing has three Groups: the 81st Training Group, the 81st Medical Group, and the 81st Mission Support Group.

81st Training Group

The 81st Training Group (TRG) is the largest electronic training group in the Air Force, training over 30,000 Officer, Airmen, and civilian employees across various military branches, including the Keesler Marine Corps Detachment, which provides combat ready, entry level and career level Marines that are highly trained within their Military Occupational Specialty to the Marine Air-Ground Force, Supporting Establishments, and Joint Operational Units. Training in the 81st TRG includes personnel, information management, air traffic control, finance, manpower, communications-electronics maintenance, computer operation, maintenance and programming, weather, meteorology, aircraft warning and control systems and radio operations. Other locations provide training for tactical air control, postal operations, satellite-wideband equipment maintenance and visual information. Keesler AFB has graduated over 2.2 million students since 1942.

81st Medical Group

The 81st Medical Group (MDG) operates the Keesler Medical Facility, which is the second largest in the Air Force. The primary mission of the 81st Medical Group is to maintain medical readiness for worldwide contingencies. The 81st Medical Group has the third largest deployment in the Air Force Medical Service, averaging 200 personnel annually. The Keesler AFB hospital offers approximately 60 services and education programs. It also has 52 training affiliations with 34 institutions / organization to train medical physicians, technicians, and nurses. The 81st MDG partners with the Veterans Affairs (VA) Gulf Coast Veterans Health Care system to provide health care for veterans throughout the region.

Source: http://www.keesler.af.mil/Units/81stTrainingWing.aspx

81st Mission Support Group

The 81st Mission Support Group (MSG) is the largest support organization for Keesler AFB. The Mission Support group is responsible for the operation and management of administrative, personnel, civil engineering, transportation, morale and welfare, recreational, communications, supply, base security, and contracting services. The group comprises the 81st Contracting Squadron, the 81st Security Squadron, the 81st Communications Squadron, the 81st Logistics Readiness Squadron, the 81st Infrastructure Readiness Squadron, and the 81st Support Squadron.

2nd Air Force

The 2nd Air Force mission is to "train, develop, and inspire Airmen to deliver airpower for America." The 2nd Air Forces manages the curriculum for active training courses throughout its four resident training wings, which are Keesler AFB, Goodfellow AFB, Lackland AFB, and Sheppard AFB. It also has a training group at Vandenberg AFB as well as 92 field units globally. These courses are taught to more than 150,000 students a year throughout the Air Education Training Command. The 2nd Air Force has four main divisions: Technical Training Operations, Mission Support, Joint Expeditionary Training, and Staff Judge Advocate.

Source: http://www.keesler.af.mil/Units/2ndAirForce.aspx

Tenant Organizations

Several military tenant organizations are stationed at Keesler AFB:

403rd Wing

The 403rd Wing is an Air Force Reserve tenant unit at Keesler AFB. The Wing provides two missions: tactical airlift support and aerial weather reconnaissance, which supports the Department of Commerce (DoC). The Wing has two flying units, the 53rd Weather Reconnaissance Squadron and the 815th Airlift Squadron (AS). The Wing currently flies 20 C-130J aircraft and is the only Air Force Reserve Command in Mississippi.

The 53rd Weather Reconnaissance Squadron is also known as the "Hurricane Hunters." The squadron is responsible for organizing, equipping, training, and performing all hurricane weather reconnaissance. The unit provides surveillance of tropical storms and hurricanes in the Atlantic Ocean, Caribbean Sea, the Gulf of Mexico, and the central Pacific Ocean for the National Hurricane Center, located in Miami. In addition, the unit also provides surveillance for winter storms off the east and west coast of the U.S.

The 815th Airlift Squadron is also known as the "Flying Jennies". This squadron is responsible for the tactical airlift to combat forces as well as providing humanitarian relief during disasters. During times of peace, the mission of the 815th AS is "to recruit, organize and train to deploy, redeploy and employ air and ground forces to any area of the world and provide them with logistical support". During times of war, the missions is "to support the theater commander with the capability to resupply the forces, provide for their airlift requirements and employment operations within the combat zone or forward areas, and when requested, to provide aeromedical/refugee evacuation and augment strategic airlift forces".

The 36th Aeromedical Evacuation Squadron is responsible for aeromedical evacuation of wounded airmen, sailors, soldiers, and Marines and for providing medical attention to the wounded on their flight to a medical facility. The motto for the squadron is "Triumph through adversity."

85th Engineering Installation Squadron

The 85th Engineering Installation Squadron is a part of the 688th Cyberspace Wing, which is the Air Force's only active-duty engineering installation squadron. There are almost 200 Air Force Space Command airmen and civilians who design, engineer, and install communications and information systems that are unique to expeditionary forces. The 85th EIS is also the only organization in the Department of Defense (DoD) to provide specialized engineering services, which includes electromagnetic hazard and interference investigations, and High Altitude Electromagnetic Pulse (HEMP) protection. The squadron can deploy and deliver services within 72 hours anywhere in the world. The 85th EIS motto is "With Pride, Worldwide!"

Mathies Noncommissioned Officers Academy

Mathies Noncommissioned Officers (NCO) Academy provides leadership training to noncommissioned officers from installations throughout the Air Force. The NCO Academy provides such training through the Intermediate Leadership Experience (ILE) course. The NCO Academy is required for promotion to staff sergeant.

Center for Naval Aviation Technical Unit

The Center for Naval Aviation Technical Unit is an aviation technical school operated by the Navy. The mission of the unit is "to develop, deliver, and support aviation training necessary to meet validated Fleet requirements through a continuum of professional and personal growth for Sailors and Marines".

Source: http://www.netc.navy.mil/centers/cnatt/

Aircraft Types and Operations

Aviation activities at Keesler AFB are conducted by the 403rd Wing, a tenant at the Base, and a limited number of transient aircraft. Flight operation data was collected in 2009. Table 3.2 shows the number of aircraft operations by each category. Since the last Air Installation Compatible Use Zone (AICUZ) Study, the 45 Airlift Squadron is no longer a tenant at Keesler AFB, therefore, the total number of average daily operations is nonexistent for the 45 AS today.

Table 3-2 Keesler AFB Daily Average Aircraft Operation, 2009

Operation	403 WG		Transient	Total Operations
	53 WRS	815 AS		
Arrivals / Departures	7.11	18.00	1.93	27.04
Closed Patterns	22.79	8.00	2.24	33.03
Total	29.90	26.00	4.17	60.07

Source: 2010 AICUZ Study for Keesler Air Force Base

Aircraft operations use the single concrete and asphalt runway, Runway 3 / 21. The runway is oriented north-south and is 7,630 feet in length and 150 feet in width. Runway 3 is used approximately 30 percent of the time and Runway 21 is used approximately 70 percent of the time.

Maintenance engine run-ups are performed on aircraft by the flying units. Approximately 0.06 percent of the run-ups occur at night, between 10:00 p.m. and 7:00 a.m. and approximately 99.94 percent of the run-ups occur during the day, between 7:00 a.m. and 10:00 p.m.

Aircraft operations at Keesler AFB use the following flight patterns:

- Straight-out departure
- Straight-in approach
- Precisions and non-precisions instrument approaches
- Overhead traffic patterns
- Rectangular traffic patterns
- Beam approaches

Transient Aircraft Operations

Numerous military transient aircraft arrive and depart from Keesler AFB annually. Military aircraft of any type may visit the installation provided that they are of adequate size to land and depart from the runway. In 2009, military transient aircraft averaged four operations a day. General aviation is also allowed in the flight routes, although they are not able to land on the runway. Transient aircraft data that is displayed on Table 3-2 includes both military and civilian aircraft.

Source: 2010 AICUZ Study for Keesler Air Force Base

Potential Future Operations

Although there are no current planned additional missions at Keesler AFB, the installation is one of eight candidates being evaluated for a Battlefield Airman training mission. Currently there are eight installations conducting Battlefield Airman training, which the Air Force is looking to consolidate to three or four to improve training efficiency.

OVERVIEW OF KEY AIRCRAFT AT KEESLER AFB

C-130J

The C-130J is the newest generation of the C-130 Hercules. This aircraft performs the tactical portion of the airlift mission and is the prime transport for air dropping troops and equipment for the 815th Airlift Squadron.

Length: 97 ft., 9 in.
Height: 38 ft., 10 in.
Wingspan: 132 ft., 7 in.
Speed: 417 mph
Ceiling: 28,000 ft.
Range: 1,600 nm

Crew: 3 (two pilots, one loadmaster)

Armament: None

WC-130J Hercules

The WC-130J Hercules is a high-wing, medium-range aircraft used in weather reconnaissance missions. This aircraft is a C-130J configured with weather instrumentation and is used for weather data collection for the 53rd Weather Reconnaissance Squadron.

Length: 97 ft., 9 in.
Height: 38 ft., 10 in.
Wingspan: 132 ft., 7 in.
Speed: 417 mph
Ceiling: 28,000 ft.
Range: 1,600 nm

Crew: 5 (pilot, co-pilot, navigator, aerial reconnaissance weather officer, and weather reconnaissance loadmaster)

Armament: None

Source: http://www.403wg.afrc.af.mil

3.7. Military Footprint

Several elements are associated with the primary operations at Keesler AFB. These elements are either tangible, meaning that they are either physically seen and / or heard, or intangible, meaning that they exist within space without being seen or heard. One example of a tangible element is noise associated with aircraft activity; one example of an intangible element is the flight path taken by an aircraft. A person can see a plane in the sky and see it moving, but cannot necessarily see the path it has taken or see where it will continue. These tangible and intangible elements comprise the military footprint. Oftentimes, the footprint is not contained within the confines of the military installation; noise, for example, does not stop at the fence line. The military footprint can potentially affect areas adjacent to or near the installation. Conversely, activities occurring in communities near or adjacent to a military installation can potentially affect the military footprint. Elements associated with the Keesler AFB include:

- Runway Class Airspace
- Approach and Departure Flight Tracks
- Imaginary Surfaces
- FAA Part 77 Obstruction Evaluation Area
- Existing Military Operations Surface
- Aircraft Noise Contours
- Aircraft Safety Zones
- Bird / Wildlife Air Strike Hazard (BASH)

Maintaining and sustaining these elements plays a significant role in the long-term viability of Keesler AFB and continued mission readiness.

Footprint Elements Relevant to Keesler Air Force Base Operations

The maximum potential for structure height, noise levels, and aircraft accidents are three factors that are controlled to the extent practicable through the following footprint elements:

Runway Class Airspace

Keesler AFB is approximately 11 miles east of Gulfport-Biloxi International Airport. This airport is surrounded by and has the authority over the Class D airspace, which intersects the Class D airspace surrounding and under the authority of Keesler AFB. There is an area of controlled Class E airspace that radiates from the Gulfport-Biloxi International Airport and Keesler AFB over the Gulf of Mexico extending from the surface to 18,000 feet. Another Class E airspace surrounds both Keesler AFB and Gulfport-Biloxi International Airport and extends from 700 feet above the surface to 18,000 feet. Although generally circular around the two airports, the airspace has a rectangular area that juts off of the airspace over the Gulf of Mexico. This extension of the Class E airspace that is oriented to the Keesler AFB runway and is present to protect arrival and departure flight tracks. The airspace surrounding the Keesler AFB airfield is depicted on Figure 3-3.

Keesler AFB Class D Airspace encompasses an area within a five-mile radius, except where it intersects with the Gulfport-Biloxi International Airport Class D airspace, of the center of the airfield that extends upward to 2,500 feet mean sea level (MSL). Use of Class D airspace requires the use of two-way communication with Air Traffic Control, which must be established prior to entering Class D airspace. No transponder is required. A transponder is an electronic devise that responds to a radio-frequency interrogating. This is used by air traffic control (ATC) to identify aircraft on a radar scope. Aircraft flying under Visual Flight Rules (VFR) in Class D airspace must have three miles of visibility, and fly at an altitude at least 500 feet below, 1,000 feet above, and 2,000 feet laterally from clouds.

Figure 3-3

Runway Class Airspace

Legend

- Class D Air Space Surface to 2600 ft AGL
- Class E Airspace 700 ft AGL to FL 180
- Class E Airspace Surface to FL 180
- Installation Boundary
- City
- Unincorporated Communities
- County
- Interstate / Highway
- Major Road
- Railroad
- Waterbody
- Stream / River
- Runway

Source:
Keesler AFB, 2016.

0 1 2 Miles

Approach and Departure Flight Tracks

Flight tracks are prescribed flying routes. Prescribed flight tracks or routes are typically implemented by all airfields / airports within a set area to ensure predictable flight operations. These routes act as surface highways and establish consistent routes for all active aircraft. The flying routes are designed to coordinate airspace use with other aircraft that is not affiliated with Keesler AFB including aircraft associated with civilian airports within the Gulf Coast region.

The following figures illustrate the flight tracks associated with aircraft operations for Keesler AFB. Figures 3-4 and 3-5 show the arrival and departure tracks for Keesler AFB. These flight tracks generally traverse the Gulf of Mexico and the Back Bay and over less developed areas in Biloxi and D'Iberville. The departure flight tracks generally traverse the Gulf of Mexico, Biloxi, and Gulfport.

Figure 3-6 shows the closed pattern flight tracks for Keesler AFB. Closed pattern tracks are flown for the purpose of maximizing touch and go / takeoff and landing sequences. Closed pattern flights consist of a takeoff / departure and an approach / landing. The closed pattern tracks mainly traverse the Gulf of Mexico, the Back Bay, Biloxi, and D'Iberville. There are also beam approaches that cross Biloxi and D'Iberville.

A flight operation consists of either a single operation (either a takeoff or a landing) or two operations (takeoff and landing). Thus, flight tracks are created using these flight operations and other information gathered from air traffic controllers and pilots, and other variables such as weather and the presence of development and incorporated communities.

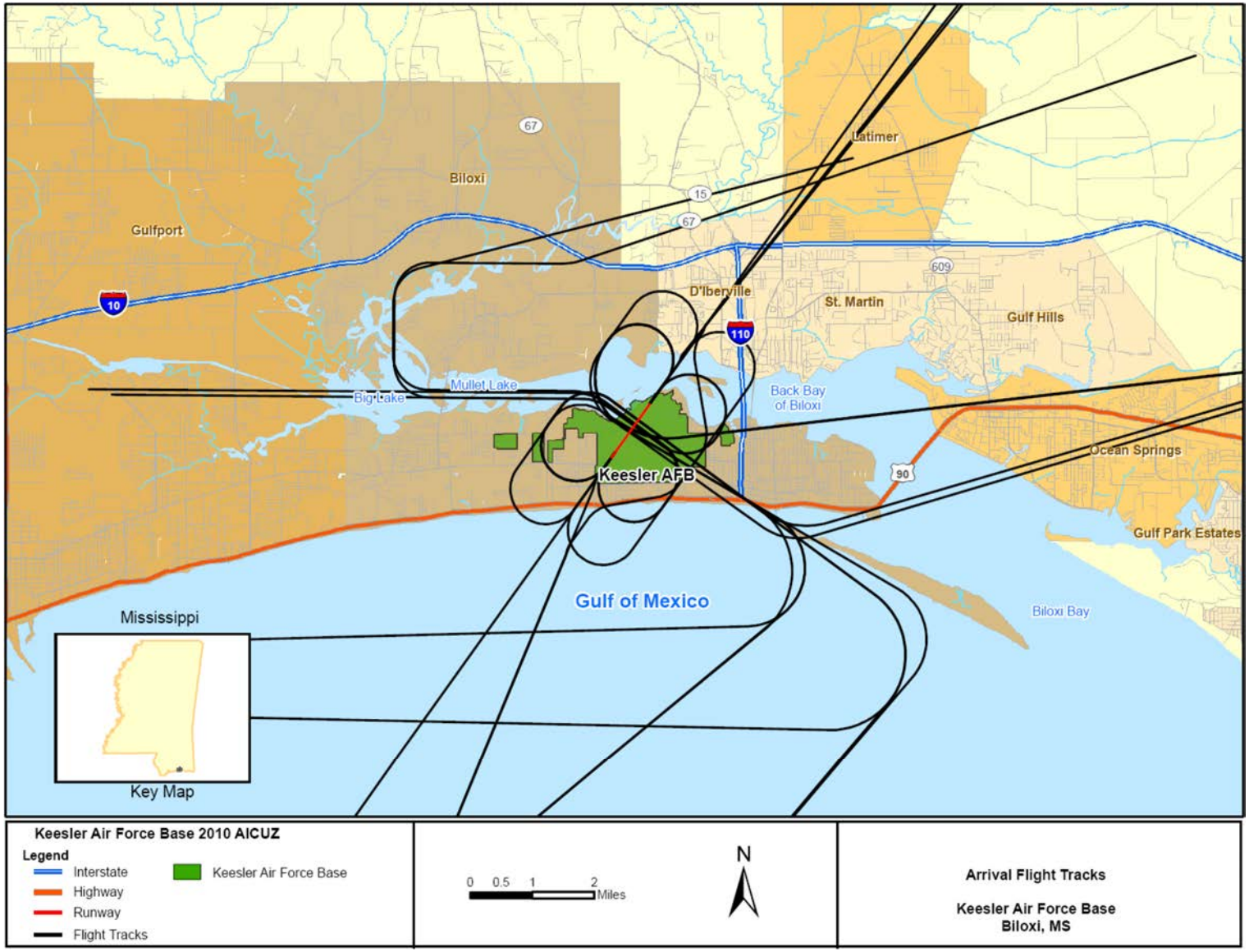
Typically, when flight tracks are developed they attempt to avoid being established over urban development to reduce impacts and risk to the general public and commercial or general aviation activities. The flight patterns specific to Keesler AFB result from the following considerations:

- Takeoff patterns routed to avoid noise-sensitive areas as much as possible;
- Criteria governing the speed, rate of climb, and turning radius for each type of aircraft;
- Efforts to control and schedule missions to keep noise levels low, especially at night; and
- Coordination with the FAA to minimize conflict with civil aircraft operations.

The following flight patterns are conducted at Keesler AFB:

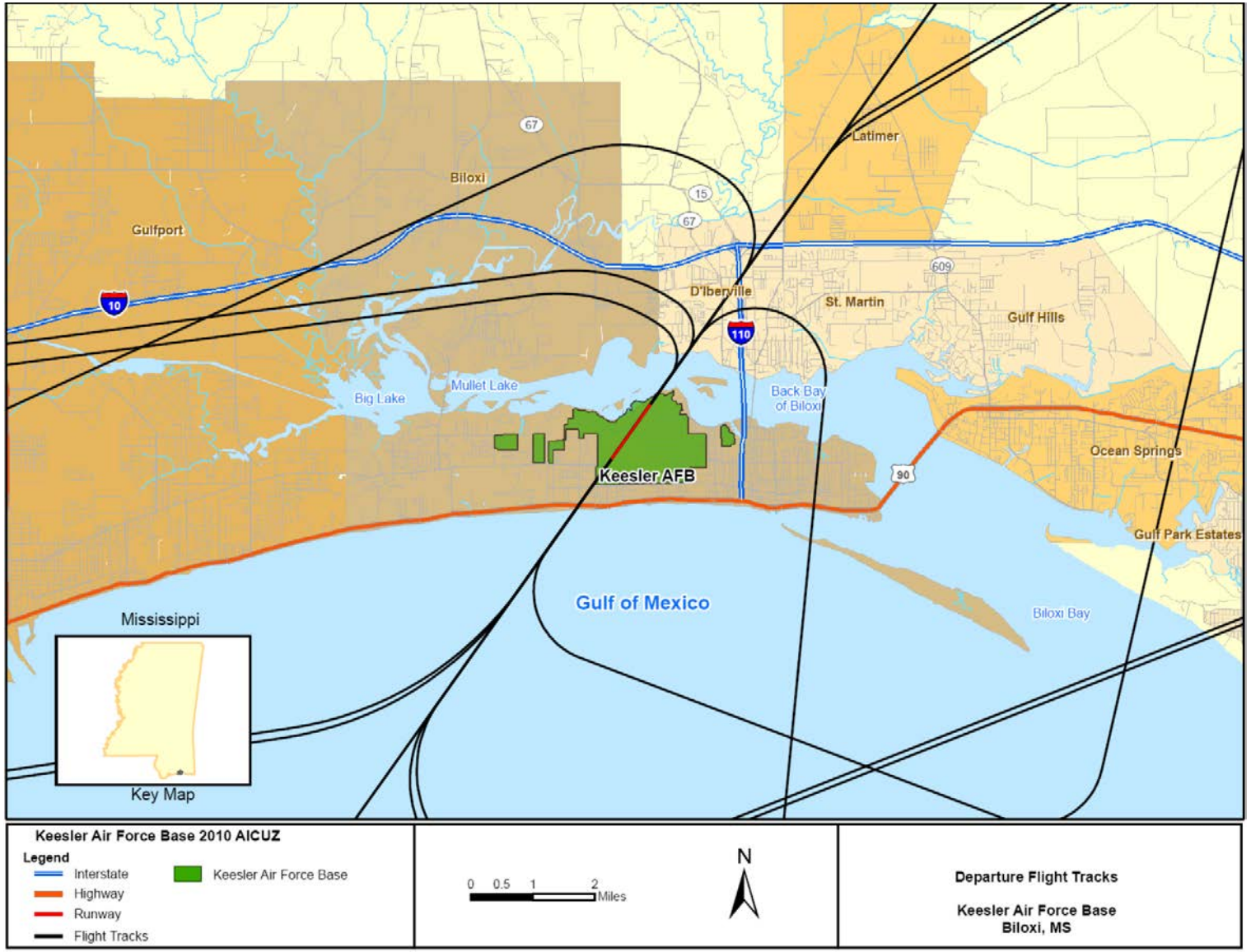
- Straight-out departure;
- Straight-in approach;
- Precision and non-precision instrument approaches;
- Overhead traffic patterns at about 1,500 feet above ground level (AGL), 2,000 feet AGL for Keesler AFB C-21s and fighter–type aircraft;
- Rectangular traffic patterns at 1,000 feet AGL, 1,500 feet AGL for Keesler AFB C-21 aircraft; and
- Beam approaches in which aircraft perpendicularly crosses the runway at 500 feet AGL and maneuvers to land.

Figure 3-4. Keesler AFB Military Footprint: Arrival Flight Tracks



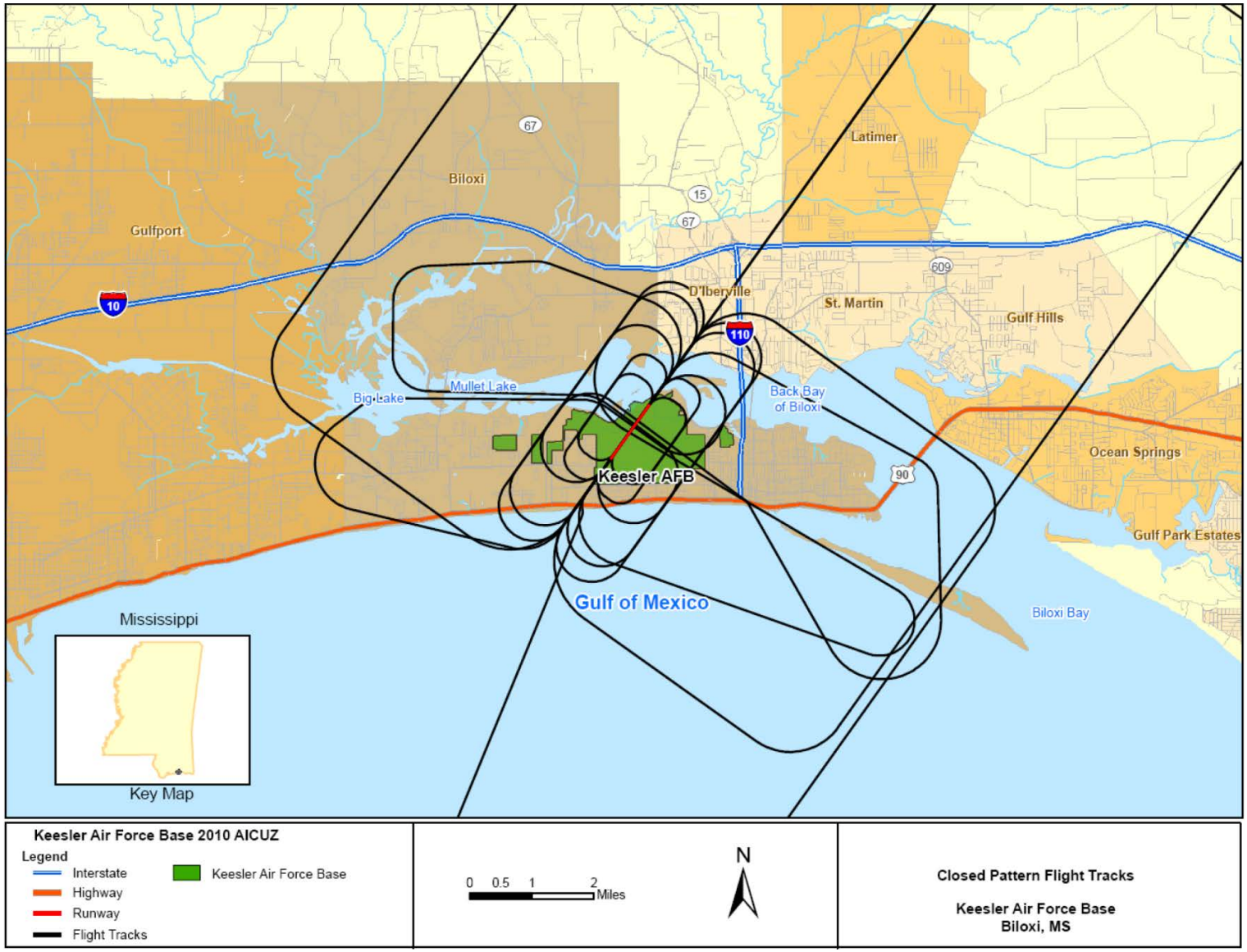
Source: 2010 Keesler Air Force Base Air Installation Compatible Use Zone Study

Figure 3-5. Keesler AFB Military Footprint: Departure Flight Tracks



Source: 2010 Keesler Air Force Base Air Installation Compatible Use Zone Study

Figure 3-6. Keesler AFB Military Footprint: Closed Pattern Flight Tracks



Source: 2010 Keesler Air Force Base Air Installation Compatible Use Zone Study

Imaginary Surfaces

The DoD has identified certain imaginary surfaces around military use runways to determine how structures and facilities are evaluated and identify if they pose a vertical obstruction relative to the airspace around a runway. The imaginary surfaces of an active runway are used to define the required airspace that must remain free of vertical obstructions in the vicinity of aviation operations to ensure safe flight approaches, departures, and patterns. The various imaginary surfaces build upon one another and are designed to guide the height of structures so there are no vertical obstructions to air navigation and operations, either natural or man-made.

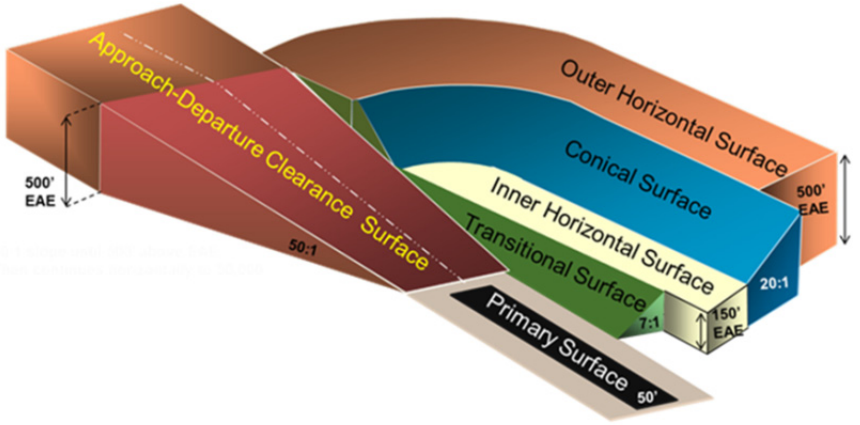
Figure 3-7 illustrates a three-dimensional cross-section of the imaginary surfaces. This figure shows the slope of the potential heights of structures that should be followed to prevent the obstruction of navigable airspace.

The extent or size of an imaginary surface depends on the type of runway. Military runways are categorized as either Class A or Class B based on the type of aircraft that use the runways. Class A runways are for smaller or lighter aircraft. Class B runways are the category for the majority of military aircraft. Keesler AFB runway is classified as a Class B runway.

The definition of imaginary surfaces per the DoD criteria are described below and illustrated on Figure 3-8.

- The Runway End is the defining location to begin or end the primary surface. This is generally the normal threshold for a runway. Keesler AFB has displaced thresholds. These displaced thresholds are defined as the end of the runway.
- The Established Elevation of the Airfield is the highest point on any usable landing surface. The established airfield elevation (EAE) at Keesler AFB is 33 feet above MSL.
- The Centerline at the Threshold is the beginning height of the sloped portion of the approach-departure surface. The centerline elevation at Runway 03 is 23 feel MSL. The centerline elevation at the threshold of Runway 21 is 17 feet MSL.
- The Approach-Departure Clearance Surface is symmetrical about the runway centerline and begins as an inclined plane (glide angle) 200 feet beyond the displaced threshold, and extends for 25,000 feet from the runway. The slope of the approach-departure clearance surface is 50:1 along the extended runway centerline until it reaches an elevation of 500 feet above the established airfield elevation. It continues horizontally at this elevation to a point 25,000 feet from the start of the glide angle. The width of the surface is 2,000 feet at the runway end and flares uniformly to a width of 16,000 feet at 25,000 feet from the runway.

Figure 3-7. Imaginary Surface Cross Section



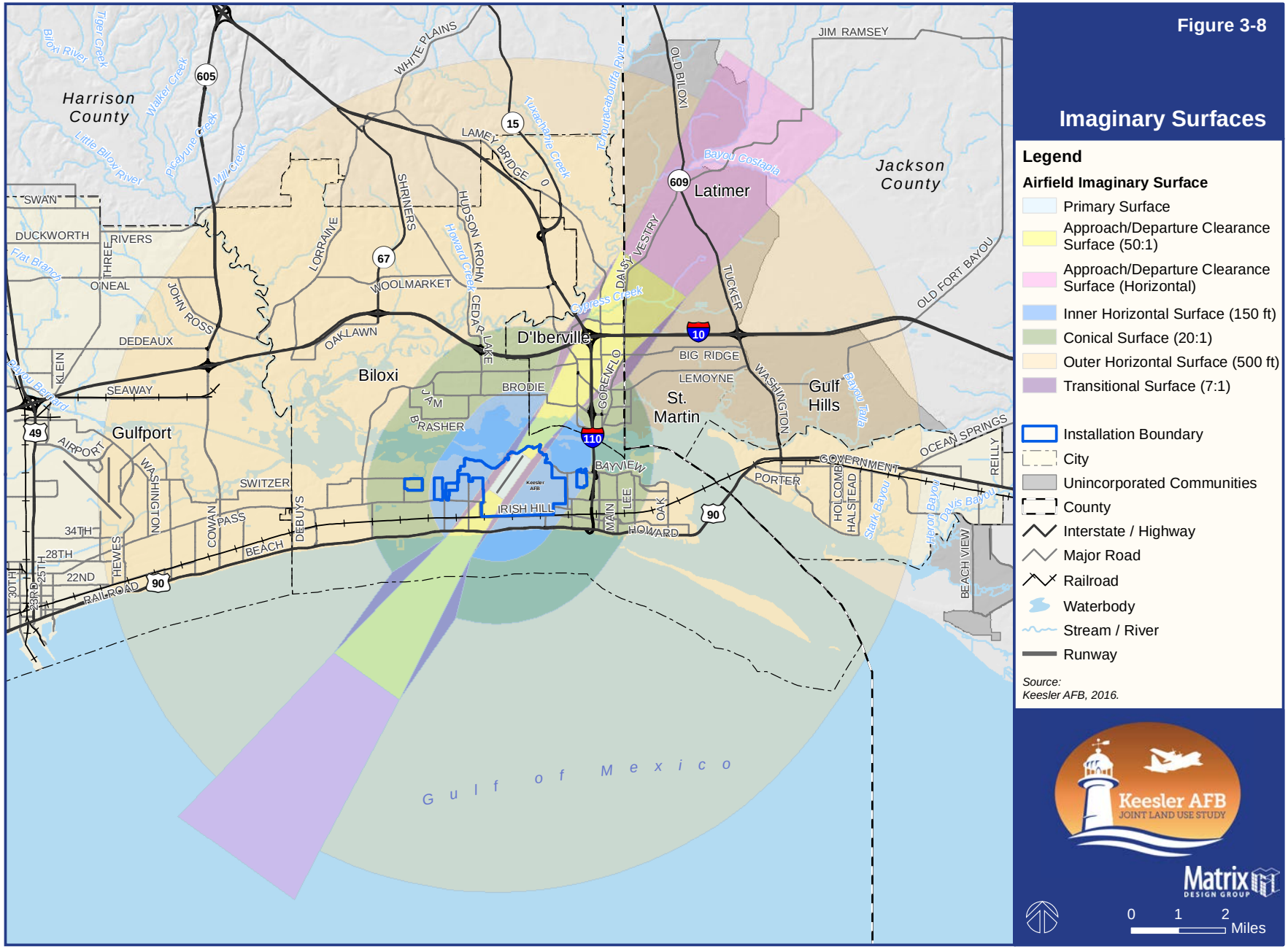


Figure 3-8
Imaginary Surfaces
Legend
Airfield Imaginary Surface
Primary Surface
Approach/Departure Clearance Surface (50:1)
Approach/Departure Clearance Surface (Horizontal)
Inner Horizontal Surface (150 ft)
Conical Surface (20:1)
Outer Horizontal Surface (500 ft)
Transitional Surface (7:1)
Installation Boundary
City
Unincorporated Communities
County
Interstate / Highway
Major Road
Railroad
Waterbody
Stream / River
Runway
Source:
Keesler AFB, 2016.
Harrison County
Jackson County
Biloxi
Gulfport
D'Iberville
Latimer
St. Martin
Gulf Hills
Ocean Springs
Keesler AFB
Gulf of Mexico
0 1 2 Miles

- The Primary Surface is an area in the immediate vicinity of the landing or takeoff area, forming a large rectangle around the entire active runway area. It extends 200 feet in length past the end of the runway, which is the displaced threshold at Keesler AFB. The primary surface associated with the Keesler AFB runways is 2,000 feet wide, which means that the surface measures 1,000 feet wide on either side of the runway centerline.
- The Inner Horizontal Surface is an oval-shaped area that surrounds the runway at a height of 150 feet above the established airfield elevation. It measures a total of 15,000 feet wide, including the area above the runway. It extends 7,500 feet out from the centerline of the runway and forms a half-circle at the runway ends.
- The Conical Surface is an oval-shaped area 7,000 feet wide, connecting the outside edge of the Inner Horizontal Surface to the inside edge of the Outer Horizontal Surface. It slopes from the Inner Horizontal Surface to the Outer Horizontal Surface at a ratio of 20:1, meaning that it extends 20 horizontal feet for every one vertical foot.
- The Outer Horizontal Surface is an oval-shaped area that measures 30,000 feet in width out from the farthest edge of the conical surface. The height of the Outer Horizontal Surface is 500 feet above the established airfield elevation.
- Transitional Surfaces connect the primary surfaces, the first 200 feet of the clear zone surfaces, and the approach clearance surfaces to the inner horizontal surface, conical surface, outer horizontal surface or other transition surfaces. This connection is sloped at a ratio of 7:1, meaning that it extends seven horizontal feet for every one vertical foot.

Additionally, Keesler AFB adheres to the following imaginary surface area:

- Displaced Thresholds are the functional runway end; no landing is allowed before the displaced threshold. At Runway 03, the south end of the runway, the displaced threshold is located 1,599 feet from the end of the runway pavement. At Runway 21, the north end of the runway, the displaced threshold is located 1,000 feet from the end of the runway pavement.

FAA Part 77 Obstruction Evaluation Area

In addition to the imaginary surfaces established by the DoD, the Federal Aviation Administration (FAA) has also established guidance to reduce the potential for accidents surrounding an airfield. Associated with the imaginary surfaces of an active airfield and in relation to flight operations from an airport (military or civilian), vertical obstructions are assessed through compliance with the Code of Federal Regulation (CFR) Title 14 Part 77, which establishes standards and notification requirements for objects affecting navigable airspace. A key reference used for compatibility planning is the following:

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

Figure 3-9 illustrates the Part 77 footprint based on the elevation of the runway.

Commonly referred to as Part 77 compliance, this regulation provides details to evaluate the potential for a vertical obstruction based on the elevation of the airfield, the height and resulting elevation of the new structure or facility, and the location of the structure or facility in relation to the airfield in question. The guidance and process for obstruction evaluation is more fully detailed in Chapter 4, Existing Tools under federal tools.

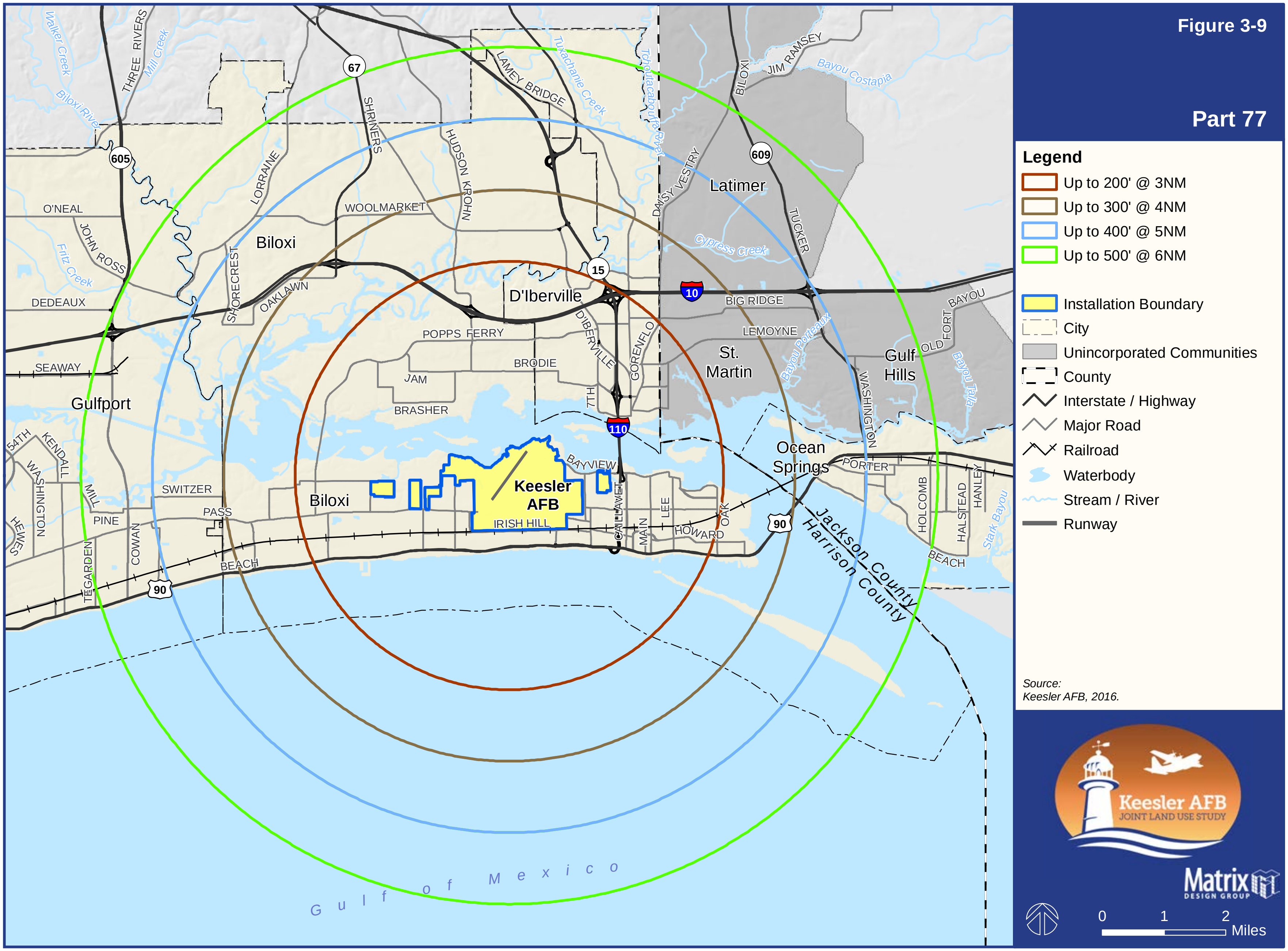


Figure 3-9
Part 77
Legend
Up to 200' @ 3NM
Up to 300' @ 4NM
Up to 400' @ 5NM
Up to 500' @ 6NM
Installation Boundary
City
Unincorporated Communities
County
Interstate / Highway
Major Road
Railroad
Waterbody
Stream / River
Runway
Source:
Keesler AFB, 2016.
Keesler AFB
JOINT LAND USE STUDY
Matrix
DESIGN GROUP
0
1
2
Miles
Keesler AFB
Biloxi
D'Iberville
Gulfport
Latimer
St. Martin
Gulf Hills
Ocean Springs
Jackson County
Harrison County
Gulf of Mexico

Existing Military Operations Surface

The Existing Military Operations Surface (EMOS) is unique to Keesler AFB and created to support training missions at Keesler AFB by developing airspace criteria. This surface corresponds to the airspace surface aircrew safety requirements required for the tactical training patterns of the 403rd Wing, is unique to Keesler AFB and is in addition to the surfaces defined by UFC 3-260-01 Airfield and Heliport Planning and Design. It is used to identify height thresholds for structures in the navigable airspace. The EMOS Area is a flat surface that extends from the thresholds of the runway along the projection of the centerline, both southwest and northeast for 1-3/4 nautical miles. The area consists of the following three elements:

- A surface 110 feet above MSL, extending ½ nautical mile from each side and perpendicular to the centerline projection;
- A sloping surface on each side of the centerline projection beginning at an elevation of 110 feet above MSL at ½ nautical mile, measured perpendicular to the centerline projection and extending upward to an elevation of 250 feet above MSL at a distance of one nautical mile, measured perpendicular to the centerline projection; and
- A sloping surface on each side of the centerline projection beginning at an elevation of 250 feet above MSL at one nautical mile, measured perpendicular to said centerline projection, and extending upward on the same slope as described in the second item for one nautical mile, measured perpendicular to said centerline projection for a terminating point at two nautical miles from said centerline projection.

The EMOS defines airspace criteria that are needed for the safe continuance of the existing tactical air mission. Figure 3-10 shows the EMOS for Keesler AFB based on data provided by the City of Biloxi. This map is a graphical interpretation of the EMOS developed from the definition provided by Keesler AFB and contains deviations from the EMOS definition.

Airfield Noise Contours

Aircraft noise is one of the most common intrusive factors associated with airfield operations. Generally, aircraft approaching and departing an airfield generate the greatest noise due to greater engine thrust and proximity. Whether or not the noise from the aircraft is considered to be a nuisance depends on the land use receiving the noise. Noise associated with aircraft is usually considered a nuisance where land uses are incompatible with the aircraft activity.

To obtain a more accurate picture regarding the actual levels of noise inside and outside the Keesler AFB fence line, the AICUZ uses the NOISEMAP program to produce noise contours indicating noise exposure level from aircraft operations. Data regarding flight frequency, aircraft type, flight altitude, and flight tracks was collected and entered into the NOISEMAP modeling program to generate noise contours. The modeling program develops a sound profile and a corresponding noise contour based on the data input. Given the factors that went into modeling the noise contours at Keesler AFB, the NOISEMAP modeling program produced four DNL-based noise contours associated with the aircraft activities occurring at Keesler AFB. Day-night average sound level (DNL) noise zones are provided in increments of five decibels (dB) between 65 dB and 85 dB.

The dB rating means that that measured sound does not exceed the edge of the contour; e.g., noise occurring at 66 A-weighted decibel (dBA) is on the inside of the 65 dBA contour, whereas noise occurring at 63 dBA is on the outside of the 65 dBA contour. Because the sound profile is attributed to transportation / military operation, an A-weighted DNL is applied. The A-weighting serves to minimize higher and lower frequencies to more truly match the sound that the human ear would hear. The contour information is shown on Figure 3-11.

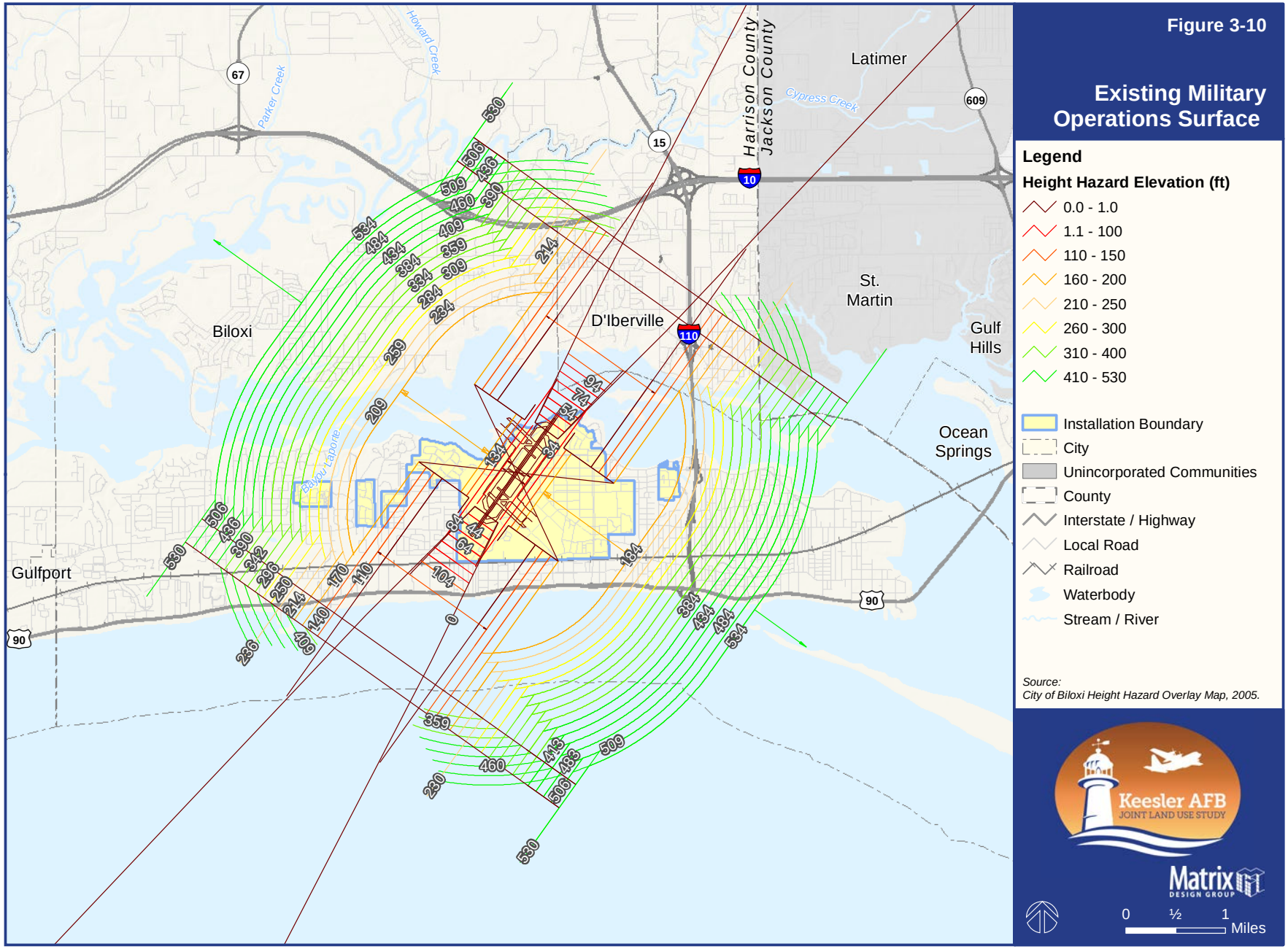


Figure 3-10
Existing Military Operations Surface
Legend
Height Hazard Elevation (ft)
0.0 - 1.0
1.1 - 100
110 - 150
160 - 200
210 - 250
260 - 300
310 - 400
410 - 530
Installation Boundary
City
Unincorporated Communities
County
Interstate / Highway
Local Road
Railroad
Waterbody
Stream / River
Source:
City of Biloxi Height Hazard Overlay Map, 2005.
Biloxi
Gulfport
D'Iberville
Latimer
St. Martin
Gulf Hills
Ocean Springs
Harrison County
Jackson County
Howard Creek
Parker Creek
Cypress Creek
Bayou Laporte
Keesler AFB
JOINT LAND USE STUDY
Matrix
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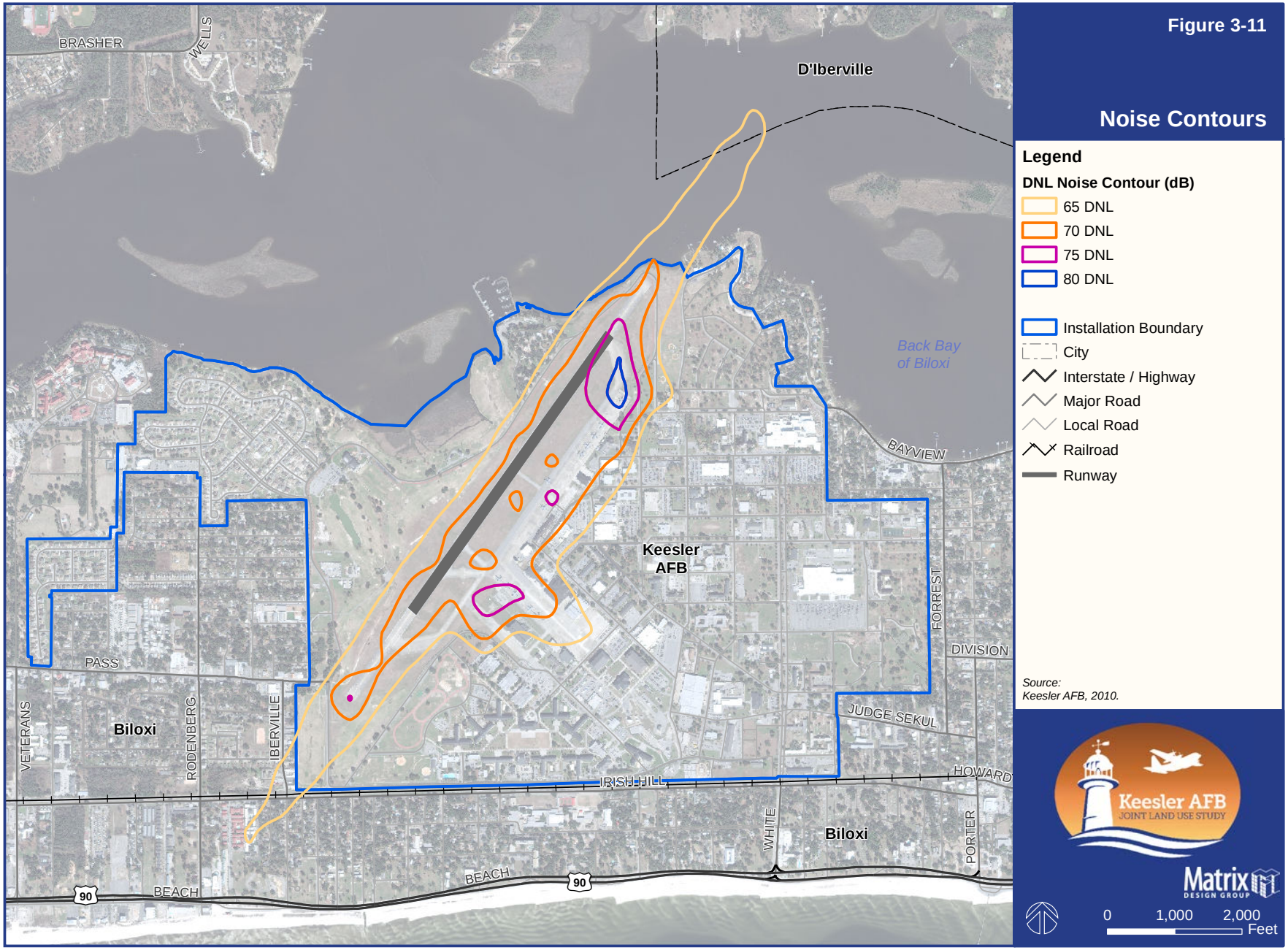
Figure 3-11
Noise Contours
Legend
DNL Noise Contour (dB)
65 DNL
70 DNL
75 DNL
80 DNL
Installation Boundary
City
Interstate / Highway
Major Road
Local Road
Railroad
Runway
Source:
Keesler AFB, 2010.
Keesler AFB
JOINT LAND USE STUDY
Matrix DESIGN GROUP
0
1,000
2,000
Feet
D'Iberville
Back Bay of Biloxi
Keesler AFB
Biloxi
Biloxi
BRASHER
WELLS
BAYVIEW
FORREST
DIVISION
JUDGE SEKUL
HOWARD
IRISH HILL
PASS
VETERANS
RODENBERG
IBERVILLE
WHITE
PORTER
BEACH
BEACH
90
90

The noise contours associated with Keesler AFB flight activities extend out from Keesler AFB in a general northeast-southwest direction conforming to the runway orientation. The 80 dBA DNL, 75 dBA DNL, and 70 dBA DNL noise contours are contained within Keesler AFB. The 65 dBA DNL noise contour extends north into the Back Bay and south into the City of Biloxi.

Aircraft Safety Zones

The DoD has defined several areas where aircraft accidents are more likely to occur based on historical data and incidents associated with airfields, including aircraft mishaps. These areas are known as airfield safety zones. Safety zones are typically rectangular areas approximately 3,000 feet wide and 15,000 feet long and are located at the ends of all military airfield runways. Keesler AFB defines the starting point for the safety zones as the displaced threshold at the end of the runway. The safety zones are illustrated on Figure 3-12.

The higher accident incident rates in these areas are due to several variables including the altitude and speed of the aircraft, adverse weather conditions, and natural and man-made obstructions near an airfield. Natural obstructions to navigable airspace include objects, such as overgrown trees, while man-made obstructions include utility poles and other tall structures. To limit some of the controllable variables, like man-made obstructions, the DoD has recommended restrictions on allowable development within the airfield safety zones based on the location of the zone in relation to the runway.

The three individual areas that comprise the safety zone for military airfields are the:

- Clear Zone (CZ)
- Accident Potential Zone I (APZ I)
- Accident Potential Zone II (APZ II)

The Clear Zone is the area that begins at the end of each displaced threshold and measures 3,000 feet long and 3,000 feet wide, or 1,500 feet on each side of the runway centerline. The center point of the zone corresponds to the centerline of the runway. This is the area where an aircraft accident is most likely to occur due to aircraft flying at slower speeds and lower altitudes. It is recommended that development of any type be prohibited in these areas. At Keesler AFB, the CZs at the southern and northern end of Runway 3 / 21 extend into the City of Biloxi.

Also contained in the CZ is the frangibility zone. Within this zone, all structures must be constructed to be frangible, or to breakaway or fall over when struck by an airborne aircraft and to withstand winds speeds of up to 70 miles per hour (mph). The frangibility zone is 250 feet from the runway centerline and extends 3,000 feet from the ends of the runway thresholds and within 200 feet of taxiway centerlines.

Accident Potential Zone I is the area that begins at the end of the CZ. It is 5,000 feet long, measured on the extended centerline, beginning at the outer boundary of the clear zone. The width of APZ I is 3,000 feet. The potential for an accident in the APZ I is less than that of the CZ, so some development is permitted, but is limited to specific types of development with low occupancy levels. At Keesler AFB, the APZ I area at the southern end of Runway 3 / 21 extends into the City of Biloxi and the APZ I at the northern end of Runway 3 / 21 extends into the City of D'Iberville.

Accident Potential Zone II is the area that starts at the end of the APZ I. It is 7,000 feet long, measured on the extended centerline, beginning at the outer boundary of APZ I. The width of APZ II is 3,000 feet. The potential for an accident in APZ II is less than that of the CZ and the APZ I. Recommended development is still restricted, but APZ II standards are less restrictive than the CZ and the APZ I. The APZ II at the southern end of Runway 3 / 21 is in the Mississippi Sound and the APZ II at the northern end of the runway is in the City of D'Iberville.

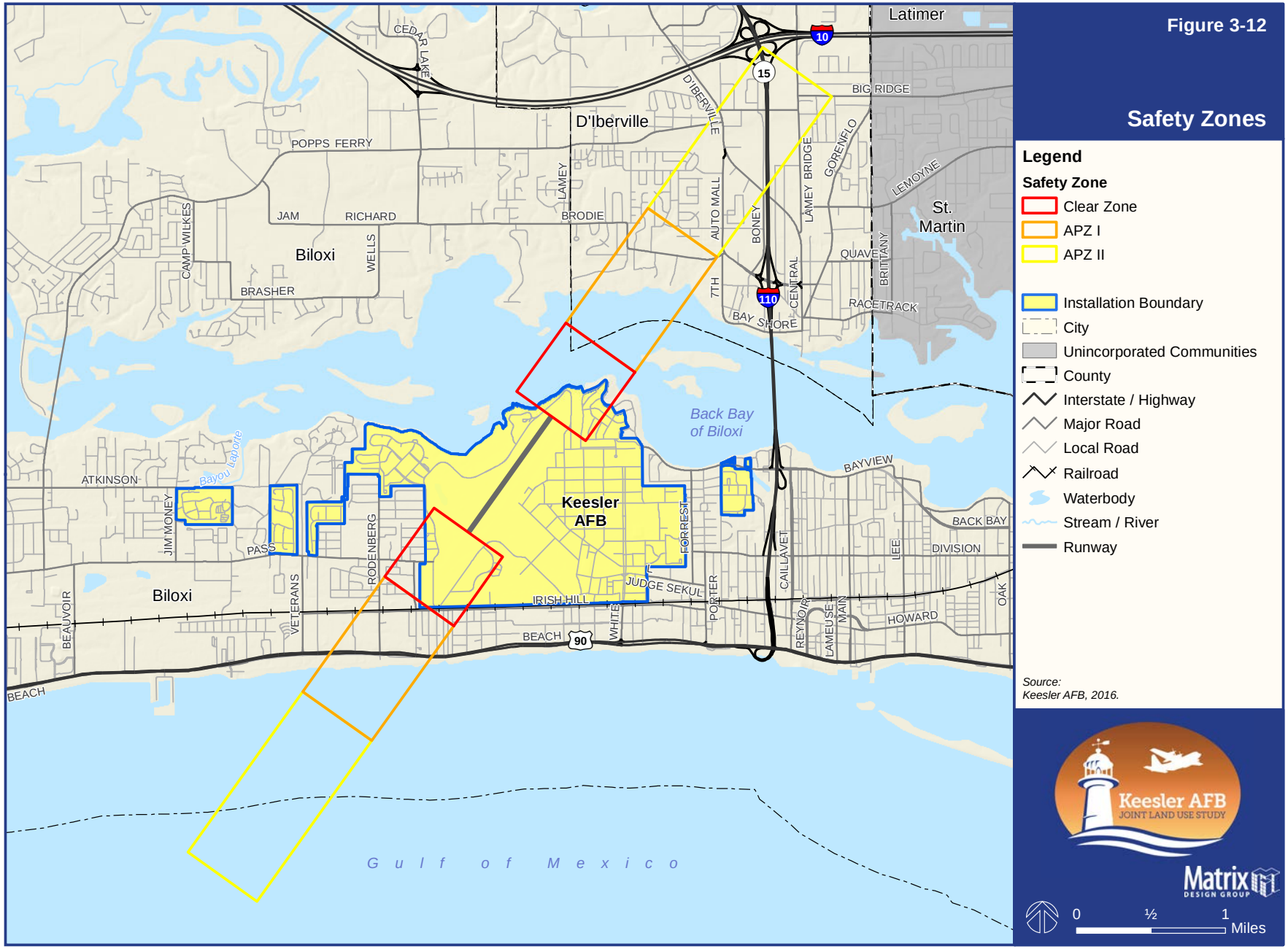
Figure 3-12
Safety Zones
Legend
Safety Zone
Clear Zone
APZ I
APZ II
Installation Boundary
City
Unincorporated Communities
County
Interstate / Highway
Major Road
Local Road
Railroad
Waterbody
Stream / River
Runway
Source:
Keesler AFB, 2016.
Keesler AFB
JOINT LAND USE STUDY
Matrix DESIGN GROUP
0
½
1
Miles
Keesler AFB
Biloxi
D'Iberville
Latimer
St. Martin
Back Bay of Biloxi
Gulf of Mexico
CEDAR LAKE
POPPS FERRY
JAM
RICHARD
BRASHER
CAMP WILKES
WELLS
LAMEY
BRODIE
D'IBERVILLE
AUTO MALL
BONEY
7TH
CENTRAL
LAMEY BRIDGE
GORENFLO
BIG RIDGE
LEMOYNE
QUAVE
BRITTANY
RACETRACK
BAY SHORE
ATKINSON
Bayou Laborde
JIM MONEY
PASS
RODENBERG
VETERANS
BEAUVOIR
IRISH HILL
JUDGE SEKUL
WHITE
FORREST
PORTER
CAILLAVET
REYNOIR
LAMEUSE
MAIN
BAYVIEW
BACK BAY
DIVISION
LEE
OAK
HOWARD
BEACH
90
10
15
110

Statistically, 68 percent of USAF accidents occur along the runway or within the CZ, APZ I, or APZ II. While the potential for accidents is statistically relevant, the decreased potential within APZ I and II does not warrant property acquisition by the USAF. Accordingly, land use planning and controls are strongly encouraged in these areas for the protection of the public. Within these zones, there are recommendations on land use types, residential densities, nonresidential intensities, and heights of structures.

Bird / Wildlife Air Strike Hazard

Birds and wildlife can represent a significant hazard to military training and flight operations. Certain types of land uses, such as standing water, attract birds and wildlife. The concern associated with BASH is the significant amount of damage a BASH incident can cost the federal government. According to the DoD Partners in Flight Program, strikes involving military aircraft cost approximately $75 million in damage every year. This amount does not consider the potential impacts that damage to aircraft may have on operations or the training schedule.

Airports, due to the nature of their operations, typically have large, open, grassy areas where various wildlife congregate. Additionally, some land uses, like golf courses, are often situated near airports because they can easily meet the height and density restrictions imposed by aircraft activity. Unfortunately, golf courses also have large, open, grassy areas and oftentimes also feature water – another wildlife attractant. Given the ramifications that can occur as a result of a bird and / or wildlife strike, the FAA set forth recommendations for managing these types and other types of bird and wildlife attractants near airports.

The primary recommendation made by the FAA is to create and manage a minimum horizontal separation distance between an airfield and wildlife attractants. The minimum separation distance extends five miles out from the entire perimeter of the airfield operations areas based on the statistical probability of bird and wildlife strikes occurring. These areas include paved and unpaved areas associated with aircraft movement including runways, taxiway, and aprons. This area was determined to be significant by the FAA as aircraft are more likely to strike birds and wildlife due to descending altitudes and decreasing aircraft speed. This area cannot be physically seen similar to the previously mentioned imaginary surfaces. In contrast to the imaginary surfaces, the area measuring five miles out from the air operations area does not include a height aspect since it deals with the management of terrestrial features like land use and water features. Figure 3-13 illustrates the five-mile area for potential for BASH incidents in the vicinity of the Keesler AFB airfield.

Since 1985, Keesler AFB has experienced 508 strikes. Approximately one third of these strikes were doves, nine percent were swallows, and approximately four percent were killdeer. The remaining strikes were generally from other various birds and bats. In 2015, Keesler AFB experienced 17 bird air strikes. Hazards within the Keesler AFB JLUS Study Area that can attract birds and other wildlife include four golf courses – Royal Gulf Hills Golf Course, Sunkist Golf Course, Gulf Hills Golf Course, and Great Southern Golf Club. Other water features that may attract birds are the Back Bay of Biloxi, the Mississippi Sound, and the Pond at Hiller Park. Keesler AFB last updated its BASH Plan in December 2016 and is currently in review for 2017.

Source: http://www.usahas.com/

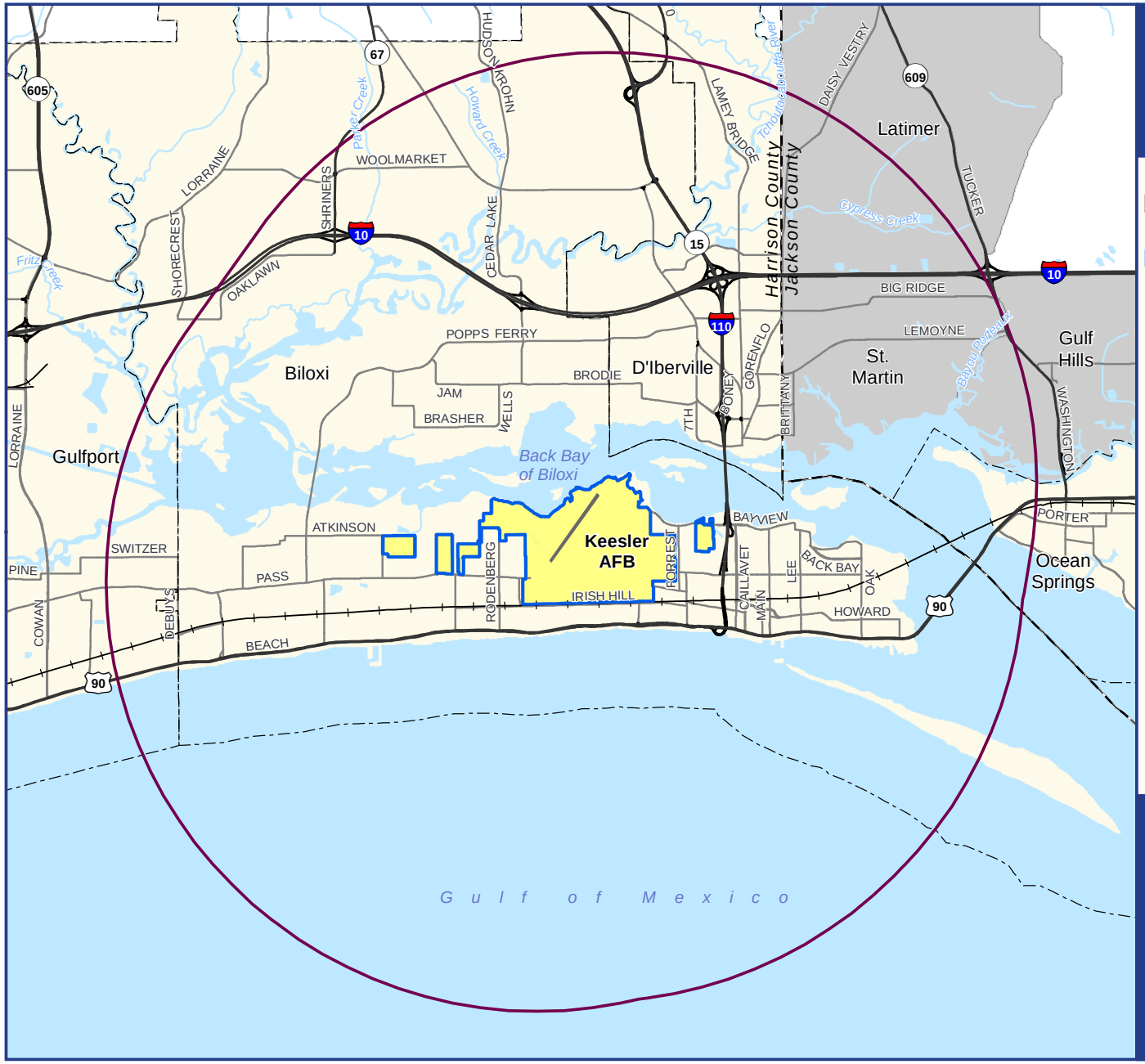

Figure 3-13

BASH Relevancy Area

Legend

- 5-mile BASH Relevancy Area
- Installation Boundary
- City
- Unincorporated Communities
- County
- Interstate / Highway
- Major Road
- Railroad
- Waterbody
- Stream / River
- Runway

Source:
Keesler AFB, 2016.

Keesler AFB JOINT LAND USE STUDY

Matrix DESIGN GROUP

0 1 2 Miles

Please see the next page.

Compatibility Tools 4

Inside Chapter 4...

4.1. Introduction

This section provides an overview of governmental plans and programs (tools) that are currently used or may be applied either directly or indirectly to address compatibility planning and issues identified within the Keesler AFB Joint Land Use Study (JLUS) Study Area.

There are three types of planning tools that are evaluated: permanent, semi-permanent, and conditional. Permanent planning tools include acquisition programs, either fee simple purchase of property or the purchase of development rights. Semi-permanent tools include regulations such as zoning or adopted legislation. Examples of conditional tools include comprehensive plans, memorandums of understanding, intergovernmental agreements, and other policy documents that can be modified.

An overview of relevant federal, state, and local plans and regional planning entities is included.

4.2. Federal Plans and Programs

Federal policy, laws, and programs have evolved to impact almost every aspect of land use. A broad range of federal plans, programs, and actions impact Keesler AFB both directly and indirectly; however, depending on the subject area, opportunities for vertical integration and cross jurisdictional collaboration vary widely. Federal programs and policies are carried out by the various arms of the federal government, although, in some cases these tools also authorize state, county, regional or local governmental agencies to implement related policies, programs and regulations.

The following federal programs and policies were evaluated to assist in determining where areas of improvement could enable better land use compatibility planning at the local level. This list is not an exhaustive accounting of all relevant federal laws or programs, but rather an identification of those considered to be most relevant for assessing compatibility issues and potential strategies stakeholders might employ to avoid or mitigate conflicts.

Air Force Instruction 32-7063 Air Installations Compatible Use Zones (AICUZ) Program

Air Force Instruction 32-7063 was updated in 2015 to implement the Air Installations Compatible Use Zones (AICUZ) and Air Force Directive (AFPD) 90-20, Encroachment Management. The Instruction applies to all Air Force installations with active runways. The Instruction identifies the requirements to implement and maintain the AICUZ program and implements AFPD by identifying the requirements for compatible land use and development to preserve operational capability. The Instruction provides land use tables, which sets land use compatibility guidelines within the Clear Zones and Accident Potential Zones as well as for Noise Zones. The procedures were created to develop, implement, and maintain compatible land uses that are in compliance with all federal, state, and local requirements.

Air Force Instruction 90-2001 Encroachment Management

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

Bird / Wildlife Aircraft Strike Hazard (BASH) Program

The Bird / Wildlife Aircraft Strike Hazard (BASH) program is a Department of Defense (DoD) Partners in Flight program created to help implement and improve aviation safety programs. The BASH program is consistent with the Federal Aviation Administration (FAA) Wildlife Hazard Mitigation Program requirements to assess and mitigate threats to wildlife from aircraft. Thus, the BASH program is designed to minimize wildlife and bird strike damage to military aircraft by controlling bird habitat near airports, alerting aircrew and operations personnel of hazards, and providing increased levels of flight safety, especially during the critical phases of flight, such as take-off and landing operations. Specifically, the program is designed to:

- Designate a Bird Hazard Warning Group (BHWG) and outline the members' responsibilities.
- Establish procedures to identify high hazard situations and establish aircraft and airfield operating procedures to avoid these situations.
- Ensure that all permanent and transient aircrews are aware of bird hazards and the procedures for avoidance.
- Develop guidelines to decrease the attractiveness of the airfield to birds and disperse the number of birds on the airfield.

Keesler AFB maintains a BASH Plan to minimize the threat of bird strikes to aircraft and protect local wildlife. Keesler AFB last updated its BASH Plan in December 2016 and is currently in review for 2017.

Clean Air Act (CAA)

The Clean Air Act (CAA) is the comprehensive federal law that regulates air emissions from stationary and mobile sources in order to control air pollution. Under the CAA, the Environmental Protection Agency (EPA) establishes limits to six criteria pollutants through the National Ambient Air Quality Standards (NAAQS). Standards are established to protect public health and public welfare. The CAA also gives the EPA the authority to limit emissions of air pollutants originating from sources such as chemical plants, utilities, and steel mills. Individual states may have more stringent air pollution laws, but they may not have weaker pollution limits than those set by EPA. Under the law, states have to develop State Implementation Plans (SIPs) that outline how each state will control air pollution under the CAA.

Clean Water Act (CWA)

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

Coastal Zone Management Act of 1972 (CZMA)

The Coastal Zone Management Act (CZMA) of 1972 (16 U.S.C. § 1451, et seq., as amended) encourages states, in cooperation with federal and local agencies, to develop land and water use programs in coastal zones. The CZMA was initially created in 1972 and is administered by the National Oceanic and Atmospheric Administration (NOAA) Office of Ocean and Coastal Resource Management. The CZMA provides a procedure for states to review federal actions for consistency with their own approved coastal management program. It also provides approved states with matching federal funding to administer their programs. The CZMA provides programs and assistance to address a wide range of issues including climate variability, energy facility siting, water quality, and habitat protection. Public access to the shore is also a primary CZMA objective.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)

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

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

This law has relevance as a potential JLUS tool through the Superfund environmental program, established to address hazardous waste sites. Hazardous waste is sometimes present in or around military installations, particularly where munition and ordnance are stored and used for training purposes. If not disposed of properly, hazardous waste could be potentially harmful to the installation tenants and surrounding communities. While the Superfund cleanup process may be complex, it protects communities and the environment from further contamination.

Department of Defense Conservation Partnering Initiative

In 2003, the National Defense Authorization Act (NDAA) gave the DoD authority to enter into agreements with eligible entities to address incompatible development or habitat protection. Eligible entities may be a state, political subdivision of a state (e.g., counties, cities, or soil and water conservation districts), or a private entity with a main purpose or goal to conserve, restore, or preserve land and natural resources. This authorization has been codified as 10 United States Code (USC) § 2684a (as amended in 2012), “Agreements to limit encroachment and other constraints on military

training, testing, and operations". This authority allows the DoD Services to use their Operation and Maintenance funds and/or Office of the Secretary of Defense (OSD) REPI funds to acquire real property interests, such as conservation easements or development rights to address current and potential encroachment or compatibility threats to an installation's mission.

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

Department of Defense (DoD) Energy Siting Clearinghouse

Section 358 of the 2011 National Defense Authorization Act sanctioned the study of the effects of new construction and obstructions on military installations and operations. The Energy Siting Clearinghouse serves to coordinate the DoD review of existing applications for energy projects. Several key elements of Section 358 include designation of a senior official and lead organization to conduct the review of energy project applications, a specific timeframe for completion of a hazard assessment associated with an application (30 days), specific criteria for DoD objections to projects, and a requirement to provide an annual status report to Congress. This legislation facilitates procedural certainty and a predictable process that promotes compatibility between energy independence and military capability.

Department of Defense Operational Noise Manual

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

Department of Defense (DoD) Readiness and Environmental Protection Initiative (REPI)

The Readiness and Environmental Protection Initiative (REPI) program enables DoD to work with state and local governments, Nongovernment Organizations (NGOs), and willing landowners to limit encroachment and incompatible land use through land acquisition by the establishment of conservation easements, land trusts, or the purchase of property. The program provides funding to support these land acquisition efforts to preserve the land around military installations, wildlife habitats, and local communities.

The REPI program 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. Also available is the REPI Program Guide for Buffer Partnerships which establishes policy, assigns responsibilities, and prescribes procedures for executing REPI program buffer partnerships.

Department of Housing and Urban Development Noise Regulation

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

1. A requirement that noise exposure and sources of noise be given adequate consideration as an integral part of urban environment in connection with all HUD programs, which provide financial support to planning;
2. A withholding of HUD assistance for the construction of new dwelling units on sites (which have or are projected to have unacceptable noise exposure), or are in runway Clear Zones or incompatible uses in Accident Potential Zones;

3. Encouragement of modernization efforts for existing buildings in noise environments; and
4. Grants and allowances to state and local governments to provide acoustical privacy in multifamily dwellings through building design and acoustical treatment.

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

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

Endangered Species Act

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

Environmental Protection Agency Climate Change Adaptation Plan

The EPA Climate Change Adaptation Plan uses expert judgment, combined with information from peer reviewed scientific literature on the impacts of climate change, to identify potential environmental vulnerabilities. It presents priority actions that the Agency will take to begin integrating climate adaptation planning into its activities.

Federal Aviation Act

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

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

Another important outcome of the Act is FAA Regulation Title 14 Part 77, commonly known as Part 77, which provides the basis for evaluation of vertical obstruction compatibility. This regulation determines compatibility

based on the height of proposed structures or natural features relative to their distance from the ends of a runway. Using a distance formula from this regulation, local jurisdictions can easily assess the height restrictions near airfields. Additional information on Part 77 is located on the FAA Internet site at http://www.faa.gov/. The height standards to determine obstructions within navigable airspace established by Part 77 can be found in Section 3.7.

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

Federal Aviation Administration Modernization and Reform Act of 2012

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

Federal Aviation Administration Small Unmanned Aircraft Rule

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

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

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

Federal Emergency Management Agency (FEMA)

The Federal Emergency Management Agency (FEMA), created in 1979, is an agency of the U.S. Department of Homeland Security. The mission of the agency is to support citizens and first responders in preparing, protecting, responding, recovering, and mitigating man-made and natural hazards. FEMA is responsible for coordinating government-wide relief efforts, including, intergovernmental coordination during disasters, encouraging insurance, and providing federal assistance programs for disaster related losses.

Through the National Flood Insurance Program, FEMA makes flood insurance available to communities that adopt and enforce a floodplain management ordinance. Flood risk areas are depicted on the Flood Insurance Rate Map (FIRM), which can influence where and how structure may be built.

The intent of this program is to reduce flood damages throughout a community through floodplain management.

Source: http://www.fema.gov/

Integrated Cultural Resources Management Plan (CRMP)

Department of Defense Instruction 4715.3 and Air Force Instruction (AFI) 32 7065 require installations to develop an Integrated Cultural Resources Management Plan (ICRMP) as an internal compliance and management tool integrating the entirety of the cultural resources program with ongoing mission activities. As a component of the installation master plan, the ICRMP is the Base Commander's decision document for conducting cultural resources management actions and specific compliance procedures. It also allows for ready identification of potential conflicts between the U.S. Air Force (USAF) mission and cultural resources, and identifies compliance actions necessary to maintain the availability of mission essential properties and acreage.

National Environmental Policy Act (NEPA)

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

All projects receiving federal funding require NEPA compliance and documentation. The National Environmental Policy Act is applicable to all federal agencies, including the military. Not all federal actions require a full Environmental Impact Statement (EIS), and actions that may not cause a significant impact result in the preparation of an Environmental Assessment (EA). An EIS is a report that describes and assesses the potential environmental effects of a particular action or project in which the federal government is involved. An EIS for a proposed project outlines in detail the proposed actions, alternative actions, and their probable environmental ramifications. An EA is similar to an EIS but prepared for proposed projects that are more concise and do not require the same level of scrutiny and detail as an EIS.

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

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

National Historic Preservation Act (NHPA)

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

National Pollutant Discharge Elimination System (NPDES)

Per the CWA, the National Pollutant Discharge Elimination System (NPDES) permit program controls water pollution by regulating point sources that discharge pollutants into U.S. waters. Point sources are discrete conveyances such as pipes or man-made ditches. According to the law, individual homes that are connected to a municipal system, use a septic system, or do not have a surface discharge do not need an NPDES permit; however, industrial, municipal, and other facilities must obtain permits if they discharge directly to surface waters.

Noise Control Act of 1972

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

Concurrently, military installations were experiencing impacts related to encroaching urban development located adjacent to their boundaries and the resulting complaints from military flight operation noise. The DoD responded by establishing the AICUZ program which was subsequently adopted by the Air Force as AFI 32-7063.

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

Partners in Flight Program

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

Safe Drinking Water Act (SDWA)

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

Telecommunications Act of 1996 and the Federal Communications Commission (FCC)

The Telecommunications Act of 1996 was the first comprehensive update to a federal telecommunication law in over 60 years and was in large part intended to open up the marketplace to greater competition. Changes in the means through which information is produced, accessed, stored, and shared made the federal government response imperative. The increasing use and development of personal mobile phones, satellite transmission, high speed fiber optics, and other related factors are often pushing demand beyond the system capacity.

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

The Sikes Act

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

United States Avian Hazard Advisory System (USAHAS)

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

United States Fish and Wildlife Service (USFWS)

The ESA is administered by the USFWS and the Commerce Department's National Marine Fisheries Service (NMFS). The USFWS has primary responsibility for terrestrial and freshwater organisms, while the responsibilities of NMFS are mainly marine wildlife, such as whales, and anadromous fish, such as salmon. Under the ESA, species may be listed as either endangered or threatened. "Endangered" means a species is in danger of extinction throughout all or a significant portion of its range. "Threatened" means a species is likely to become endangered within the foreseeable future.

When a species is proposed for listing as endangered or threatened under the ESA, USFWS must consider whether there are areas of habitat believed to be essential to the species' conservation. Those areas may be proposed for designation as "critical habitat." A critical habitat designation does not necessarily restrict further development; it is a reminder to federal agencies that they must make special efforts to protect the important characteristics of these areas.

Only activities that involve a federal permit, license, or funding, and are likely to destroy or adversely modify the area of critical habitat will be affected. If this is the case, USFWS will work with the federal agency and, where appropriate, private or other landowners to amend their project to allow it to proceed without adversely affecting the critical habitat.

4.3. Keesler AFB Plans and Programs

The Keesler AFB tools provide guidance for land uses and development activities on and adjacent to the installation. These tools govern land use decisions that occur inside the fence line or within the boundary of the military mission footprint in relation to the military mission or proposed military mission.

These tools also provide guidance and establish measures for standard operating procedures during certain events, such as a bird air strike hazard conditions and / or the parameters for conducting missions within the range of the complex. There are various installation tools that are instrumental in assisting and guiding land use decisions in regards to base operations.

Air Installation Compatible Use Zones Study

The U.S. DoD initiated the AICUZ program to assist government entities and communities in anticipating, identifying, and promoting compatible land use and development near military installations with aircraft activity. The AICUZ

program involves coordinating the efforts of installation commanders and local community leaders and other government agencies to encourage compatible development of land in proximity to military airfields. It also serves to protect the health, safety, and welfare of civilians and military personnel by encouraging land development that is compatible with aircraft operations, while protecting the public investment in the installation. This program recommends compatibility measures and land uses that are compatible with specific elements of military airfields, including elevated sound levels, accident potential zones, and obstruction clearance criteria.

The AICUZ program has two objectives. The first is to assist local, regional, state and federal officials in protecting and promoting the public health, safety, and welfare by promoting compatible development within the AICUZ area of influence. The second is to protect Air Force operational capability from the effects of land use that are incompatible with aircraft operations.

Noise Zone Profile

Noise is the cornerstone of the AICUZ Study. The noise generated by military aircraft operations and the effects of that noise on local communities are presented in a variety of ways in the study (e.g., written text, graphically, etc.). To fully appreciate the findings and recommendations presented in the AICUZ Study, it is beneficial to provide an understanding of how military aircraft noise is measured, evaluated, and graphically illustrated. Day night average sound level (DNL) is a measure of noise commonly used surrounding a military installation. The main sources of noise at airfields are flight operations, which include take-offs, landings, touch-and-go operations, and engine maintenance run-ups. The Air Force considers how its operations impact the local community by calculating the DNL. The DNL averages the noise levels of all aircraft operations that occur within a 24-hour period. The DNL is depicted as a contour around a noise source connecting points of equal value, usually in 5-dB increments.

Safety Zones

As part of the AICUZ program, and to aid in land use planning surrounding military bases, the DoD established safety zones. These are defined as Clear Zones (CZ), Accident Potential Zone I (APZ I), and Accident Potential Zone II (APZ II). These zones are determined by using a statistical analysis of all DoD aircraft accidents. APZs follow departure, arrival, and pattern flight tracks and are based on historical data. The CZ is a square area that extends directly beyond the displaced threshold and outward along the extended runway centerline.

The 2010 Keesler AFB AICUZ Study is an update to the Keesler AFB AICUZ Study completed in 1994. It reaffirms the Air Force policy of promoting public health, safety, and general welfare in areas proximate to Air Force installations.

This study identifies changes in flight operations that have occurred since the 1994 study, and provides current noise zones and compatible use guidelines for land areas adjacent to the installation. It is provided as a tool to assist local communities in future planning and zoning activities. Changes that required an update of the AICUZ study include:

- Conversion to the C-130J aircraft and the addition of associated operations by the 403rd Wing;
- Elimination of the C-130H aircraft and related operations by the 403rd Wing;
- Elimination of the C-12 operations by the 81st Training Wing;
- Elimination of the C-21 operations by the 45;
- Increase in the number of based C-21 and C-130 aircraft operations;

- Change in aircraft flight tracks to correspond with changes in flying operations; and
- Technical improvements to the NOISEMAP computer modeling program.

The 2010 Keesler AFB noise contours decreased to the northeast and southwest of the installation in comparison to the 1994 noise contours modeled for the installation.

Background Paper on Airfield Safety Zones and Noise Zones

The Background Paper on Airfield Safety Zones and Noise Zones was developed by Keesler AFB to provide the definitions of airfield safety zones and noise contours. These definitions were provided by the installation since the areas around airports are exposed to potential aircraft accidents. This is a land use issue in which local governments may adopt compatible land uses to minimize population and structure density in the areas with the highest potential for accidents. In addition, noise is associated with aircraft operations, which can affect a community. The background paper states that there are currently two areas within Biloxi that are subject to noise levels of Day-Night Average Sound Level (DNL) 65 – 69 decibels (dB).

Bird Aircraft Strike Hazard (BASH) Plan

Keesler AFB last updated its Bird Aircraft Strike Hazard (BASH) Plan in December 2016 and is currently in review for 2017. The purpose of the plan is to reduce the amount of bird and wildlife strike hazards in the vicinity of the installation. The plan takes into consideration both resident and seasonal bird populations. The design standards for the Keesler AFB BASH plan are similar to the design standards identified in the Bird / Wildlife Hazard Program section in Section 4.2:

- Establish a Bird Hazard Working Group and designate responsibility to its members.
- Establish procedures to identify high hazard situations and to aid supervisors and aircrews in altering/discontinuing flying operations when required.
- Establish aircraft and airfield operating procedures to avoid high-hazard situations.
- Provide for disseminating information to all assigned and transient aircrews on bird hazards and procedure for bird avoidance.
- Establish guidelines to decrease airfield attractiveness to birds.
- Provide guidelines for dispersing birds when they occur on the airfield.
- Establish training for all members concerning responsibility and actions.

Integrated Natural Resources Management Plan (INRMP)

The Integrated Natural Resources Management Plan (INRMP) was created to ensure that long range habitat protection and natural resource management occurs at the installation and supports mission readiness. The INRMP outlines various natural resources including, when applicable, threatened and endangered species and important habitat, management of noxious weeds, grasslands and wildland fire, wildlife and riparian management, water resources and water rights, inter-agency responsibilities and coordination efforts, and the overall management plan for natural resources at Keesler AFB to ensure no loss of capability for training exercises. The INRMP serves as a planning tool for future activities at Keesler AFB and as a road map for the stewardship of natural resources found on the base.

Installation Development Plan (IDP)

The Keesler AFB Installation Development Plan (IDP) is a long-term plan, guiding the installation towards a planning vision that supports the campus, resilient infrastructure, sustainable development, and strong community partnerships. The IDP provides guidance for development at the installation over the next 20 to 30 years by providing a base overview; identifying planning constraints, installation capacity opportunities, and sustainability development indicators; and by including planning goals and objectives.

Minor planning constraints that are identified by the IDP include airfield clearances, antiterrorism, BASH, installation restoration program, and wetlands and floodplains. There were no major planning constraints identified in the IDP. The IDP established five goals, each with its own objectives to accomplish the goals. The goals are as follows:

- Leverage robust and resilient infrastructure.
- Enrich our dynamic campuses and high quality of life.
- Promote innovative, sustainable development and environmental stewardship.
- Support a flying mission and remain poised to support contingency ground air operations.
- Forge strong community partnerships.

Source: Installation Development Plan Keesler Air Force Base, Mississippi, April 2015

Integrated Cultural Resources Management Plan (ICRMP)

DoD Instruction 4715.3 and Air Force Instruction (AFI) 32-7065 require installations to develop an Integrated Cultural Resources Management Plan (ICRMP) as an internal compliance and management tool integrating the entirety of the cultural resources program with ongoing mission activities. As a component of the installation master plan, the ICRMP is the base commander's decision document for conducting cultural resources management actions and specific compliance procedures. It also allows for ready identification of potential conflicts between the U.S. Air Force mission and cultural resources, and identifies compliance actions necessary to maintain the availability of mission-essential properties and acreage.

Keesler AFB Instruction 13-204 IC-1

Keesler AFB Instruction 13-204 IC-1 provides procedures to authorize the limited use of Small Unmanned Aircraft Systems (SUAS) on Keesler AFB. SUAS are defined by having a weight between 0.5 lbs. and 55 lbs. The instruction allows SUAS for governmental and commercial use, and prohibits recreational use. Any SUAS operations must be requested through a form and must be coordinated with the 81st Operations Support Flight (81 OSF). SUAS operations that occur outside of base perimeter, but within the Keesler AFB Delta Airspace, are asked to voluntarily complete the request form. The 81 Training Wing Commander (TRW/CC) is the approval authority for any SUAS operations on the installation.

The procedures in this instruction are supplementary to AFI 13-204V3, Airfield Operations Procedures and Programs, Small Unmanned Aircraft Systems policy.

Keesler Air Force Base Area Joint Land Use Study (JLUS) 1998

The 1998 Joint Land Use Study (JLUS) was created under contract with the City of Biloxi to address incompatible land use development that could impact Keesler AFB's operations and that could create potential health, safety, and welfare for the general public. The JLUS includes policies that are recommended for neighboring jurisdictions to incorporate into their comprehensive plans. The JLUS also provides two options that surrounding jurisdictions can take regarding incompatible development nearby the installation - one is to remain with the status quo and the other is to amend zoning ordinances to consider encroachment issues, such as building height restrictions, noise attenuation, and population density based land use regulations. It is recommended that the cities, Biloxi and D'Iberville, acknowledge such encroachment issues through local police powers, such as zoning. The result of this effort was that the City of Biloxi adopted a height hazard ordinance and an Airfield Noise Overlay District.

Mutual Aid Agreements

Keesler AFB fire department has mutual aid agreements with the fire departments of Harrison County, Biloxi, D'Iberville, and Gulfport to coordinate fire protection services.

Natural Disaster Medical System Federal Coordinating Center

The Natural Disaster Medical System (NDMS) was established in 1983 as a partnership between the DoD, Department of Veterans Affairs, Department of Health and Services, FEMA, state and local governments, and the private sector to create a nationwide medical response system that provides resources during national and man-made disasters. The mission of a Federal Coordinating Center (FCC) is to receive, organize, and transport inpatients to a NDMS. The FCC, a federal facility, is located in a metropolitan area in the U.S. within five miles of the NDMS, and is responsible for coordinating planning, training, and operations for NDMS Patient Reception Areas (PRA).

The Keesler Hospital, which is coordinated through the 81st Medical Group, is a Federal Coordinating Center for the NDMS. This center has provided resources during major natural disasters, such as Hurricane Camille in 1969 and Hurricane Katrina in 2005.

Public Affairs Operating Instructions 35-5

Operating Instructions 35-5, created in 2012, outlines procedures for the Public Affairs staff at Keesler AFB to follow when a noise complaint is received due to low flying aircraft as a result of flying operations at Keesler AFB. The instructions apply to all personnel in the Office of Public Affairs.

Waivers

Waivers must be submitted for any project on an Air Force base that creates an obstruction or intrusion to the airfield and airspace. According to AFI 32-7063, there are uses within the CZs that are prohibited and are not able to be waivered, including:

- Uses that release into the air any substance which would impair visibility or otherwise interfere with the operation of aircraft, e.g. steam, dust, and smoke;
- Uses that produce light emissions, either direct or indirect (reflective), which would interfere with pilot vision;
- Uses that would attract birds or waterfowl, such as the operation of sanitary landfills, maintenance of feeding stations, or growing of certain vegetation;
- Uses that produce electromagnetic emissions which would interfere with aircraft computer/communication systems or navigational equipment; and
- Explosive facilities or activities.

Keesler AFB utilizes waivers for such land uses. The Base must review existing waivers and plans to eliminate obstructions on an annual basis and then must submit the review to Air Education and Training Command (AETC) every other year to "approve requests to close and amend airfield waivers." The latest Keesler AFB Annual Review of Waivers was conducted in October 2016 and is currently in coordination for 2017. In 2016, there were 41 waivers listed, 19 permissible deviations, and 6 exceptions to the airfield and airspace criteria.

White Paper on Height Hazard Airspace Criteria and Illustrative Map

The White Paper on Height Hazard Airspace Criteria was created to provide local jurisdictions an approximate illustration of the airfield surface areas at Keesler AFB, to communicate definitions and criteria for the airfield surface areas, and to provide examples for determining controlling surface area heights. The definitions provided in the white paper are consistent with the AICUZ, Unified Facility Criteria for Airfield and Heliport Planning and Design, and FAA Part 77. These are listed in Chapter 3 of the Background Report, under the Military Footprint, Imaginary Surfaces section. The white paper includes a height hazard map for illustrative purposes. The Existing Military Operations Surface is an airfield surface area which is supported by installation and Airfield Instructions including KAFI13-204, AFTTP 3-3.C-130J (paragraph 4.6.4 and Table 4.2), AFI11-202V3, AFI11-2C-130JV3 and AFTTP 3-3.C-130J, as well as the General Aeronautics 60:1 Rule.

4.4. State of Mississippi Plans and Programs

The state tools listed in this section authorize or mandate local counties and cities to provide for the protection of the State's valuable industries including the DoD. In addition, the State's tools require communities and developers to protect and preserve the State's natural resources, including land and water, by establishing further regulatory measures to ensure the natural environment is preserved and protected from excess consumptive practices.

Mississippi Coastal Zone Management Program

In response to the 1972 Coastal Zone Management Act (CZMA), Mississippi established the Coastal Program through Section 57-15-6 of the Mississippi Code in 1972, which was approved by the National Oceanic and Atmospheric Administration (NOAA). The Coastal Program established guidelines and procedures to regulate development within coastal areas.

Source: http://www.dmr.ms.gov/

Mississippi Code § 17-1

The following sections in the Mississippi Code explain municipal governing authority for zoning, comprehensive plans, and subdivisions regulations.

Zones § 17-1-7

State Law grants authority to the governing authorities of jurisdictions to create zones within the municipality or county in order to impose restrictions with regards to agricultural lands and farm buildings, to regulate and restrict the erection, reconstruction, alteration, repair or use of buildings, structures or land within the defined zones, in accordance with the specific regulations prescribed by the zone.

Comprehensive Plan § 17-1-11

Mississippi Code § 17-1-11 allows the governing authority of each municipality or county to prepare, adopt, and carry out a comprehensive plan in order to promote coordinated physical development that is representative of the existing and future needs of the jurisdiction. The governing authority may also individually or jointly establish a local planning commission with authority to develop a comprehensive plan, a zoning ordinance and map, subdivision regulations, building or setback lines, and to make recommendations to the jurisdiction on the enforcement of and amendments to all of the aforementioned items. Mississippi Code states that a comprehensive plan must, at a minimum, include:

- Goals and objectives for long-range development of the entire jurisdiction, and must address residential, commercial and industrial development, parks, open space and recreation, street or road improvements, public schools, and community facilities;
- Background information and definitions of land use categories;
- Population and economic growth projections for the area covered by the plan;
- A transportation plan map depicting the functional classifications of all existing and proposed roadways covered within the land use plan, as well as alternate transportation systems as applicable; and
- A community facilities plan to be used as the basis for a capital improvement plan for housing, schools, parks and recreation, public buildings and facilities, and infrastructure.

Mississippi Code does not require municipalities or counties to develop and adopt comprehensive plans.

Subdivision Regulations § 17-1-23

Mississippi Code provides authority to the governing authorities of the affected jurisdiction to impose terms on new subdivision proposals, such as necessary provisions for easements on properties. State Law also enables the county board of supervisors to reject subdivision plats that have not been approved by the board. Any person desiring to subdivide a tract of land within the corporate limits of a municipality is to submit a map and plat of proposed subdivision.

Source: Mississippi State Code, 2015

2040 Mississippi Unified Long-Range Transportation Infrastructure Plan

The Mississippi Unified Long-Range Transportation Infrastructure Plan was created through the Mississippi Department of Transportation. The plan, created in 2015, identifies the state's most critical transportation needs for the present and future, compares funding for such projects, and recommends strategies for the implementation of projects. The plan recognizes that Biloxi has extensive transportation systems for rail and public transit.

Mississippi Development Authority

The Mississippi Development Authority (MDA) is an economic and community development agency for the State of Mississippi. The MDA works to retain and expand existing industries and businesses in Mississippi as well as attract new businesses to the state in order to foster a strong state economy. The agency also provides technical assistance to entrepreneurs and small business owners, manages the state's energy programs, and promotes the state as a destination location.

As part of the Mississippi Development Authority, the State of Mississippi has a Mississippi Military Communities Council (MMCC), which was officially formed in 1997 through an executive order signed by Governor Kirk Fordice. The council promotes the military missions in Mississippi at the federal level, while also advising the State governor and legislature on federal actions that have the potential to affect the military missions in the state.

Mississippi Department of Transportation Statewide Transportation Improvement Program 2015 – 2019

The Mississippi Department of Transportation Statewide Improvement Program (STIP) provides a framework for the development of the state of Mississippi's transportation system. The plan is developed as a five-year list of planned transportation improvement projects, and its expenditures. STIPs are generally updated every two years. The STIP includes transportation projects in Biloxi, such as improvements to Popps Ferry Bridge and Popps Ferry Road.

Mississippi Indicia of Reasonableness

As part of a Mississippi Supreme Court Case, No. 2001-AN-01508-SCT, regarding the determination of reasonableness for a proposed annexation, the state court developed a list of indicia of reasonableness to be used when evaluating a petition for annexation. In order for a petition for an annexation to be approved, the jurisdiction must follow these criteria.

Rules of the Secretary of State for the Administration, Control and Leasing of Public Trust Tidelands

The intent of the rules for Public Trust Tidelands is to ensure the benefit of public trust tidelands for Mississippi residents ensure public access to the tidelands; administer, manage, protect, enhance, and restore the tidelands, and ensure that occupants of the tidelands provide "adequate compensation for the privilege of such occupancy."

Rule 4, Management Policies and Evaluation Criteria, establishes policies for approving or denying applications to lease public trust tidelands. One such evaluation criteria states,

> *The ability of Keesler Air Force Base to conduct its mission is a vital public interest to the State of Mississippi and the Mississippi Gulf Coast. It is the policy of the Secretary of State to protect the base from any action that could diminish its ability to conduct its mission. No*

lease will be granted if associated structures and/or activities would encroach on the designated air space or threaten the viability of the base. The Secretary of State may consult with military, federal, state and local officials, as appropriate, to make that determination.

According to the Mississippi Secretary of State, the "inland boundary is the line of mean high tide and the seaward boundary is the State boundary, three miles south of the barrier islands." Establishing management policies for tidelands is important as Keesler AFB safety zones extend into bodies of water.

Source: https://www.sos.ms.gov/

4.5. Regional Plans and Programs

Biloxi Housing Authority

The Biloxi Housing Authority provides public housing to low-income families. The mission of the authority is to increase the availability of safe and affordable housing, ensure equal opportunity in housing, promote self-sufficiency and asset development, and improve quality of life and economic viability in low-income communities.

Source: http://site.biloxihousing.tenmast.com/

Mississippi Gulf Coast Chamber of Commerce Coast Centurion Association

The Coast Centurion Association is a part of the Mississippi Gulf Coast Chamber of Commerce. The Centurions, founded in 1995, support the Armed Forces across the Gulf Coast and are dedicated to the retention of military installations and military presence on the coast, which includes Keesler AFB. The association is made up of community leaders and military personnel who are all dedicated to the Gulf Coast's military presence.

Source: http://mscoastchamber.com/

Gulf Regional Planning Commission

The Gulf Regional Planning Commission (GRPC) provides general planning support to twelve cities and three coastal counties in Mississippi: Gulfport, Biloxi, Waveland, Bay St. Louis, Diamondhead, Pass Christian, Long Beach, Ocean Springs, D'Iberville, Gautier, Pascagoula, Moss Point, Hancock County, Harrison County, and Jackson County. The commission develops comprehensive plans, land use / mitigation studies, and the long range transportation plan for the Gulf region. The GRPC is administered by an appointed Board of Commissions from the coast, which meets monthly.

Since 1973, the GRPC has served as the Mississippi Gulf Coast Metropolitan Planning Organization (MPO) for the urban areas of Gulfport-Biloxi and Pascagoula-Moss Point. The Transportation Policy Committee and the Technical Coordinating Committee of the GRPC meet quarterly for MPO business.

Source: http://www.grpc.com/

Biloxi Bay Area Chamber of Commerce Military / Veterans Affairs Committee

The Military / Veterans Affairs Committee is a committee within the Biloxi Bay Area Chamber of Commerce. The committee hosts and sponsors various projects and events with and for Keesler AFB. The Biloxi Bay Area Chamber of Commerce is comprised of businesses in the Biloxi Bay Area with the mission to enhance and promote Biloxi.

Source: https://biloxibayareachamber.org/

Biloxi Chamber of Commerce Military Affairs Committee

The Military Affairs Committee is a committee within the Biloxi Chamber of Commerce, an organization made up of businesses throughout the city. The committee was created to enhance the relationship between Biloxi and the military through event support. The Military Affairs Committee hosts many events in conjunction with Keesler AFB. The Biloxi Chamber of Commerce also

took part in bringing a military installation to the city in the early 1940s, which would later become Keesler AFB.

Source: http://biloxi.org/military-affairs/

Harrison County Development Commission

The Harrison County Development Commission (HCDC) is the one-stop for economic development inquiries in Harrison County. In addition, HCDC established the Harrison County Military Team, which was initially created to support the protection of military installations on the Gulf and now works, along with the Mississippi Military Communities Council, to strategically engage military influencers and decision-makers in attracting and retaining military missions in South Mississippi. HCDC also produces the annual Salute to the Military report, which recognizes the economic and community impacts the military has in South Mississippi.

Plan for Opportunity, Regional Sustainability Plan for the Mississippi Gulf Coast

Plan for Opportunity is a comprehensive sustainability plan created in 2013 through the GRPC and the Mississippi Gulf Coast Sustainable Communities Initiative. The plan was created for the Mississippi Gulf Coast, which includes the counties of Hancock, Harrison, and Jackson. Over a hundred organizations, agencies, and groups and thousands of individuals on the coast participated in the creation of the Sustainability Plan.

The purpose of the plan is to guide the economic growth and development, housing, employment, and transportation opportunities to foster a sustainable region into the future. The plan is guided by six Livability Principles:

- Provide more transportation choices;
- Promote equitable, affordable housing;
- Enhance economic competitiveness;
- Support existing communities;
- Coordinate and leverage federal policies and investment; and
- Value communities and neighborhoods.

The plan resulted in a list of 63 total priority actions, as well as strategies and recommendations, to make the region more sustainable.

As part of the plan, the GRPC created a future regional land use plan using scenario planning. The scenario planning process identifies existing conditions and current plans, and analyzes alternatives scenarios to determine a preferred scenario. Scenario planning is included for Growth, Water, Economy, Housing, Transportation, and Resilience.

Source: http://www.gulfcoastplan.org/

Clean Air Committee

The Clean Air Committee was created by the GRPC and Mississippi Department of Environmental Quality. The purpose of the committee is to develop a plan that would guide the region in staying in attainment with air quality standards. The committee has also agreed to participate in the EPA Ozone Advance Program, a program that encourages the reduction of ozone and fine particulates.

Mississippi Gulf Coast Ozone Advance Program Path Forward Plan

The Path Forward Plan, created in 2014 by the Gulf Regional Planning Commission (GRPC) and the Mississippi Department of Environmental Quality(MDEQ), is a result of the Ozone Advance Program. Through the Ozone Advance Program, an EPA program, participants must develop a plan for improving air quality. The Path Forward Plan identifies the current state of pollution as well as strategies for reducing air pollution. Strategies include traffic flow improvements, community education, and alternative fuels and transportation.

4.6. Local Jurisdictions Plans and Programs

The planning tools used by the study area jurisdictions were analyzed and categorized as permanent, semi-permanent, or conditional. In Mississippi authority to regulate land use is delegated by the state to counties and municipalities. The nature of a jurisdiction's authority to regulate local land use depends on that jurisdiction's local government.

The following planning tools are discussed for each jurisdiction in the JLUS Study Area:

- Comprehensive plan;
- Zoning (including lighting and height);
- Subdivision regulations;
- Building codes; and
- Other (additional tools, as applicable).

Table 4-1 provides a summary of the existing planning tools by jurisdiction and their ability to address military compatibility.

In Mississippi, counties and municipalities have land use and zoning authority. The governing authorities for counties and municipalities have been enabled through state code to prepare and adopt a comprehensive plan, zoning ordinance, and subdivision regulations. Neither counties nor municipalities are required by the State of Mississippi to adopt comprehensive plans or zoning ordinances, but are permitted to at the discretion of the governing authority.

The primary tools used by the municipal governments in the Keesler AFB JLUS Study Area are the comprehensive plan, and zoning ordinances.

City of Biloxi

The City of Biloxi is located on the southern end of Harrison County and is one of the County's County Seats. The city spans 46.5 square miles, of which 18 percent is water.

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

- City of Biloxi Comprehensive Plan
- City of Biloxi Land Development Ordinance
- City of Biloxi Subdivision Standards
- City of Biloxi Building Code
- Annexation
- City of Biloxi Flood Damage Prevention Ordinance

City of Biloxi Comprehensive Plan

The City of Biloxi Comprehensive Plan was adopted in 2009. The long-term plan provides a vision for the city and guidance for land use decision making. The plan includes goals, objectives, and actions to fulfill the vision that is has for the city.

The following action was found to be compatible with military operations:

- "Maintain height restriction for development around Keesler Air Force Base to prevent negative impacts to its operations."

The following keys issues related to Keesler AFB were identified in the plan:

- "East-west connections across the City and the County are limited by waterways and federal land restrictions (primarily Keesler Air Force Base)."

Table 4-1 City and County Planning Tools

Jurisdiction	Comprehensive Plan	Zoning Code Height Restrictions	Zoning Code Density	Zoning Code Sound Attenuation	Zoning Code Outdoor Lighting	Airport Overlays	Subdivision Regulations	Special Area Plans	Building Codes	Annexation (Sphere of Influence)	Other Tools (Flood Control Ordinance)	Other Tools (Real Estate Disclosure)
City of Biloxi										*		
City of D'Iberville				*						*		
Harrison County			*	*								

Legend:

- = The tool exists but does not address land use issue(s) related to Military Compatibility.
- = The tool exists but only partially addresses land use issue(s) related to Military Compatibility.
- = The tool exists and addresses land use issue(s) related to Military Compatibility.
- = The tool exists, but does not affect land use issue(s) related to Military Compatibility as adopted.
- = The jurisdiction does not employ this tool.

\+ = Each Special Area plan is unique

* = Not applicable to the jurisdiction

- "There is a pressing need for housing in the region as a result of Hurricane Katrina and locating housing in East Biloxi near major employers (e.g., casinos, Keesler AFB) provides significant advantages. However, housing is the land use that is most vulnerable to catastrophic storm damage because of the threat to the personal safety and property of residents and this issue must be addressed in locating and designing new housing in East Biloxi."
- "Keesler Air Force Base and the Back Bay of Biloxi are physical barriers that restrict vehicular connections from West Biloxi to East and North Biloxi. Improving transportation corridors within West Biloxi and connections from West Biloxi to inland routes is crucial to timely evacuation during storm events as well as easing peak hour congestion."
- "Determine suitable location for a future employment / light industrial center linked to the aerospace, Keesler AFB, and shipbuilding industries."

Throughout the Comprehensive Plan, Keesler AFB is mainly acknowledged when discussing land use issues throughout the city. There are no goals or policies that specifically relate to Keesler AFB even through the plan acknowledges the economic importance of the installation.

City of Biloxi Land Development Ordinance

The Land Development Code for the City of Biloxi was adopted in 2010. The zoning ordinance establishes 31 zoning districts, one of which is the Planned Development – Gaming Establishment District. This district provides regulations for casino development, including hotels, restaurants, night clubs, and entertainment establishments that are associated with gaming. This district may only be established to overlay a Waterfront (WF) base zoning district. The only explicit dimensional standard is that the district area must be a minimum of three acres. All other dimensions, such as height and square footage of the building, are to be established in a Planned Development Master Plan.

The zoning ordinance also establishes four airport overlay districts: Airport Airspace Overlay, Airport Noise Overlay 1, Airport Noise Overlay 2, Airport Noise Overlay 3. The Airport Overlay District (AAO) controls potential hazards to aircraft operations that use the navigable airspace near the airport at Keesler AFB. Structures within this overlay district must comply with FAA Regulation Part 77, as described in Section 4.2 of this chapter, and must not exceed the existing military operations surface. In addition, structures within this overlay may not create an interference with navigational signals or radio communications between aircraft at Keesler AFB and the control tower, create glare, make it difficult for pilots to distinguish airport lights, or otherwise endanger or interfere with aircraft operations at the installation.

Airport Noise Overlay 1 (ANO-1) applies to the areas outside of Airport Noise Overlay 3 (ANO-3) and that are exposed to a yearly DNL of 65 – 70 dB. Airport Noise Overlay 2 (ANO-2) applies to areas outside of ANO-3 and are exposed to a yearly DNL of 70 – 65 dB. ANO-3 applies to an approximate one square mile area southwest of Keesler AFB. Buildings that are constructed within these Airport Noise Overlays must be constructed in a way that reduces exterior-to-interior noise level reduction. The standards outlined in the ordinance are inconsistent with the Air Force noise standards, which are addressed in the Compatibility Assessment in Background Report Chapter 5.

Although the Development Ordinance provides standards for Airport Noise Overlays, there are no safety standards identified for accident potential zones or clear zones for Keesler AFB. The Development Ordinance should include such standards especially since parts of the city lie within the Keesler AFB CZs and APZs.

City of Biloxi Subdivision Standards

Article 23-7, Subdivision Standards, of the Biloxi Land Development Ordinance, adopted in 2010, provides standards for the layout of subdivisions within Biloxi. The regulations outline requirements for subdivision development, including design, street standards, and standards for other

infrastructure. Subdivisions must be submitted for review through a Site Plan and/or Preliminary Plat.

While subdivision regulation typically define the standards, procedures, and other requirements for land division, it can also help to prevent or limit future encroachment into an installation by specifying allowable types of infrastructure improvements associated with subdivisions, such as street lights. According to the ordinance, the developer of the site plan is responsible for street improvements, such as streetlights, which must comply with the City' Street Lighting Plan.

In addition, subdivisions can also regulated density for subdivisions; however there are no standards regarding subdivisions in relation to Keesler AFB or military operations. Subdivisions are primarily a concern in areas within the Clear Zones or Accident Potential Zones due to recommended development densities. Some parts of Biloxi are located within the Keesler AFB safety zones, including residential and commercial land uses. Higher densities within residential districts proximate to Keesler AFB may produce both highly sensitive noise receptors and safety concerns affecting compatibility. The ordinance could be improved by including information regarding the airfields and provisions for new development.

City of Biloxi Building Code

The Building Codes regulate construction practices to maintain structural integrity and safety. The City of Biloxi has adopted the 2010 Building Code. Provisions regarding sound transmission from the exterior to the interior are no longer included in International Building Code as of 2010. Exterior to interior sound transmission is the primary component in a Building Code that would be related to military compatibility.

Annexation

The City of Biloxi has processes and standards for annexation. The standards are based off the indicia of reasonableness of annexation, which was established by the Mississippi Supreme Court. These are listed under the Mississippi tools. Because there are no future plans to annex land, and the area around Keesler AFB is already incorporated into a municipality, annexation does not present any encroachment issues for Keesler AFB.

City of Biloxi Flood Damage Prevention Ordinance

The City of Biloxi's Flood Damage Prevention Ordinance is Chapter 8 of the Biloxi Code of Ordinances, adopted in 2006, and was created in accordance with Mississippi Code, Title 17, Chapter 1. The purpose of the ordinance is to provide standards for the construction of buildings in flood zones to prevent or mitigate damage from flooding and wave action. As stated in Article 3: Flood Hazard Prevention Standards, buildings that are not in compliance with construction standards, may not have alterations done unless it does not increase the non-conformity of the structure.

The ordinance incorporates the 100 year flood zones from the 2009 FEMA DFIRM Zone Map, which it adopted in 2009. This map replaced the previous Flood Map, which was adopted before Hurricane Katrina.

There are no specific provisions in the ordinance related to compatibility with Keesler AFB, although the intent of the ordinance is only to address damage and disruption to property. This is beneficial to Keesler AFB as it would help the installation reestablish normal operations after flood related damage.

City of D'Iberville

The City of D'Iberville is located in Harrison County and is bordered by the Back Bay of Biloxi on the south, unincorporated Harrison County on the north, the City of Biloxi on the west, and Jackson County on the east. The city spans 7.2 square miles, of which almost four percent is water.

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

- City of D'Iberville Comprehensive Plan
- City of D'Iberville Zoning Ordinance
- City of D'Iberville Subdivision Regulations
- City of D'Iberville Building Code
- City of D'Iberville Flood Damage Prevention Ordinance

City of D'Iberville 20 Year Comprehensive Plan

The City of D'Iberville 20 Year Comprehensive Plan was updated in 2015 from the 2010 Comprehensive Plan. The Plan is a long range land use development plan, focusing on present and future land uses throughout the city. As a part of the existing and future land use evaluation, the following regarding Keesler AFB is recognized:

- Although the air base is approximately one mile from D'Iberville, height restrictions and noise impacts from the base could pose limitations on certain development within D'Iberville. As development proposals arise, city officials should evaluate the proposal for compliance with height limitations and the impact noise from the base would have on the development.

Although the Comprehensive Plan acknowledges height limitations and noise impacts due to Keesler AFB, the City of D'Iberville's Comprehensive Plan does not include specific policy that would protect Keesler AFB and mission critical activities from encroachment.

City of D'Iberville Zoning Ordinance

The City of D'Iberville Zoning Ordinance was adopted in 2012 and revised in 2014 and 2015. Under General Regulations, the ordinance includes conflicting regulations per maximum heights of buildings within the city. As state below, Section 5.3 would in fact allow a higher structure within the runway end and clear zones than allowed for in waterfront development. The following regulations are not compatible with military operations:

- Section 4.18.5: "Each of the following dimensional requirements shall apply to each use in the Waterfront District, except as specifically provided for in this Ordinance."
- A. Maximum Building Height: "110 feet, except as provided in Section 5.3."
- Section 5.3: General Regulations: "Buildings and structures located in the Runway End and Clear Zone, the Runway Airspace Plan and Profile, and the Runway Airspace Imaginary Surfaces for Keesler Air Force Base shall not exceed one hundred seventy feet (170') in height as established by the United States Department of Defense."

Outdoor lighting, or nighttime illumination as it is referred as in the Zoning Code, is not limited to parking lots, but Article 8: Off-Street Parking and Loading states:

- "All lighting fixtures used to illuminate parking area shall be arranged so that the source of light does not shine directly into adjacent residential properties and does not interfere with traffic."

There are no land use standards for noise zones related to Keesler AFB in the zoning ordinance because the Keesler AFB noise contours do not extend into D'Iberville; however, the lack of land use standards related to density for development in safety zones is a concern and should be addressed.

City of D'Iberville Subdivision Regulations

The City of D'Iberville Subdivisions Standards were adopted in 2010 and amended in 2012. The regulations apply to land that is split into two or more lots, consisting of less than 10 acres per lot. Subdivisions must be submitted for review to the Planning Commission through a Preliminary and Final Plat.

There are no regulations that directly relate to Keesler AFB or military operations. Subdivisions are primarily a concern in areas within the Keesler AFB safety zones due to recommended development densities. Because some

parts of D'Iberville are located within APZ I and APZ II, the ordinance could be improved by including information regarding the airfields and provisions for new development.

City of D'Iberville Building Code

The Building Codes regulate construction practices to maintain structural integrity and safety. The City of D'Iberville has adopted the 2012 International Building Code. Provisions regarding sound transmission from the exterior to the interior are no longer included in International Building Code as of 2010. Exterior to interior sound transmission is the primary component in a Building Code that would be related to military compatibility.

Annexation

The City of D'Iberville has processes and criteria to annex land. General guidance that determines future annexations are a need for expansion, path of growth, potential health hazards, financial ability, need for planning and zoning, need for municipal services, natural barriers, past performances, economic or social impact upon those within the proposed annexation area (PPA), impact of annexation upon the minority voting strength, and the fair share factor. Although the city has annexation processes, they do not affect compatibility with Keesler AFB as the annexation areas are far out from the installation and the city has no plans to annex additional land.

City of D'Iberville Flood Damage Prevention Ordinance

The City of D'Iberville adopted the Flood Damage Prevention Ordinance in 2009. The ordinance provides descriptions of provisions, administration of the ordinance, provisions for flood hazard reduction, and variance procedures. Compliance with this ordinance and its standards is important to maintain a relatively safe and nonobtrusive environment in the event of a flood. For buildings that are not compliant, it is stated in Article 5: Provisions for Flood Hazard Reduction that alterations may not be done unless the alterations do not increase non-conformity or replace the non-conformity. Although there are no direct standards related to Keesler AFB or military operations, the ordinance is particularly relevant when considering mobility in and out of Keesler AFB during a flooding event.

Harrison County

Harrison County is located in southern Mississippi, with the southern end positioned on the coast. The county extends over 976 square miles, of which 41 percent is water. The cities of Biloxi and Gulfport are the county seats.

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

- Harrison County Comprehensive Plan
- Harrison County Zoning Ordinance
- Harrison County Land Subdivision Design Sequence
- Harrison County Scenic Byway Management Plan for State Highway 67
- Annexation
- Harrison County Flood Damage Prevention Ordinance

2030 Harrison County Comprehensive Plan

The 2030 Harrison County Comprehensive Plan was adopted in 2008 for unincorporated Harrison County. The land use plan puts into effect goals, policies, and strategies for a framework of about 20 years. The plan takes into consideration the population for Keesler AFB, the level of employment at Keesler AFB, the installation's population, this population's risk to natural hazards, and transit services offered to the base. There are no goals or strategies that directly support the installation or address encroachment issues.

Harrison County Zoning Ordinance

The Harrison County Zoning Ordinance was adopted in 2000 and amended through 2008. The zoning ordinance divides the land within the county in 11 districts and provides development regulations for these districts.

The zoning ordinance also establishes an Airport District as a Special Use District, in which any construction or improvements to buildings must comply with FAA regulations.

There appears to be no existing or future impact from Keesler AFB related to safety and noise that would mandate the County stipulated standards within their zoning ordinance.

Harrison County Land Subdivision Design Sequence

Harrison County's Land Subdivision Design Sequence outlines the steps needed to be taken for the approval of a subdivision. For the process, Sketch Plats must be submitted to the Harrison County Engineer for review, which then gets recommended to the Board of Supervisors for final approval. The Land Subdivision Design Sequence document lists the items that are to be illustrated on the Sketch Plat and Construction Plans after approval.

As concern for subdivisions is generally limited to safety zones, there is little concern for subdivisions in Harrison County as all unincorporated areas of the county are not within the Keesler AFB safety zones.

Harrison County Building Code

The Building Codes regulate construction practices to maintain structural integrity and safety. Harrison County has adopted the 2012 International Building Code. Provisions regarding sound transmission from the exterior to the interior are no longer included in International Building Code as of 2010. Exterior to interior sound transmission is the primary component in a Building Code that would be related to military compatibility.

Special Area Plan – Harrison County Scenic Byway Management Plan for State Highway 67

The Harrison County Scenic Byway Management Plan for State Highway 67 provides goals and strategies for preserving the scenic aspect of the corridor. Such goals include the conservation of easements and the discouragement of adjacent uses that disrupt the views. The plan also cites the Harrison County Outdoor Advertising Ordinance, which states the maximum heights billboard signs, which ranges from a maximum of 30 to 50 feet depending on the zoning district.

These goals and billboard height limitations suggest low development around the corridor, which may be compatible with Keesler AFB flying operations as some Keesler AFB flight routes go over State Highway 67.

Annexation

The 2030 Comprehensive Plan describes annexations that jurisdictions have conducted in the past. The following action in the Comprehensive Plan pertains to annexation:

- "Work toward establishing shared access to current and future annexation studies to increase communication among governmental units involved or impacted by proposed land divisions."

Currently, there are no plans for surrounding jurisdictions to annex Harrison County land.

Harrison County Flood Damage Prevention Ordinance

The Harrison County Flood Damage Prevention Ordinance was adopted in 2014 in accordance with Mississippi Code, Title 17, Chapter 1. The purpose of the ordinance is to minimize public and private losses due to flood conditions. As stated in Article 5: Provisions for Flood Hazard Reduction, alterations to a building that is not compliant with the building provisions can only be done if such alterations meet requirements of a new construction.

Compliance with the ordinance is important to maintain a relatively safe and nonobtrusive environment in the event of a flood. This is particularly relevant when considering mobility in and out of Keesler AFB during a flood.

Harrison County Sand Beach Authority

The Harrison County Sand Beach Authority manages and sets regulations for the 26 miles of sand beach within the county. Amongst managing and maintain the beach as a recreational component in the region, the Sand Beach Authority also manages sand erosion. The county prepared a San Beach Master Plan in 2008 to address issues that may impact the sand beach over the next 20 years. The maintenance and management of the sand beach is relevant as parts of the beach fall within APZ I.

Source: Sand Beach Master Plan, Harrison County Mississippi, 2008

4.7. Other Tools and Resources

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

Guides

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

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

State Policy Options: A Report of the National Conference of State Legislatures Task Force on Military and Veterans Affairs (January 2012)

This report provides state legislators and staff information about the range of policy options available to them to sustain their neighboring military installations and the associated testing and training operations. It is designed to encourage a greater understanding of the roles that state legislators, local government officials, land conservation organizations, and the military play in managing development near military bases and protecting natural resources and the health and safety of citizens. This report can be accessed at the following address: http://www.ncsl.org/documents/environ/NCSL_State_Policy_Options_020112_FINAL.pdf.

Collaborative Land Use Planning: A Guide for Military Installations and Local Governments, International City / County Management Association and the Metropolitan Institute at Virginia Tech

This guide provides essential observations about land use policy and procedures, discusses critical questions, and suggests model practices for military commanders to build stronger relationships with local policymakers and planning officials. This guide can be accessed at the following address: https://www.fedcenter.gov/_kd/Items/actions.cfm?action=Show&item_id=7667&destination=ShowItem.

Working with Local Governments: A Practical Guide for Installations, (May 2012), International City / County Management Association and the National Association of Counties

This guide provides a primer on how local governments operate and what installation personnel can do to engage state and local governments in dialogue on compatibility issues. The guide can be accessed from the following address: https://www.fedcenter.gov/_kd/Items/actions.cfm?action=Show&item_id=6203&destination=ShowItem.

Commander's Guide to Community Involvement (August 2012), Range Commanders Council Sustainability Group

This guide provides tools for proactively addressing compatibility concerns focusing on outreach, land use, urban sprawl and other sustainability areas. The guide includes the latest trends and approaches in community involvement best practices and highlights case studies. This guide can be accessed from the following address: http://www.repi.mil/Portals/44/Documents/Primers/Primer_CommunityInvolvement.pdf.

Installation-Community Partnerships: A New Paradigm for Collaborating in the 21st Century, Journal of Defense Communities

The article explores the changes that are prompting military and community leaders to take a closer look at partnerships, and provides a template for assessing the success of a prospective collaboration. Two case studies are presented — the arrangement under which the city of Monterey, California, provides all facility maintenance at the Presidio of Monterey; and the enhanced use lease at Nellis Air Force Base that resulted in the city of North Las Vegas building a $25 million fitness center for the Air Force. This article can be accessed from the following address: http://www.defensecommunities.org/wp-content/uploads/2012/07/P4_BAH_Journal_final.pdf.

Strengthening National Defense: Countering Encroachment through Military-Community Collaboration (2009), National Academy of Public Administration

This report discusses the significant and growing challenges to military readiness created by nearby civilian community growth and proposes recommendations for increased collaboration among key stakeholders—local and state governments, non-profit organizations, the Military Services and installations, and other federal agencies—in order to creatively and effectively address these complex and critical issues. This report can accessed from the following address: https://ciaonet.org/attachments/26009/uploads.

Compatibility Assessment 5

Inside Chapter 5. . .

Compatibility Assessment

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

A number of factors assist in determining whether community and military plans, programs, and activities are compatible with joint land uses such as community activities and military installations. For this Joint Land Use Study (JLUS), 25 compatibility factors were used to identify, determine, and establish a set of key JLUS compatibility issues. These compatibility factors are listed on this page.

An action undertaken by either the military or community that minimizes, hinders or presents an obstacle to the action of the other is characterized as an issue. Issues arising on the part of either or both the military and community are grouped according to the relevant factor and listed in this chapter. For each identified issue, a compatibility assessment is provided discussing the nature and cause or source of the issue followed by applicable existing tools currently used or that may be used to mitigate encroachment or prevent the emergence of encroachment in the future including an assessment of their effectiveness.

COMPATIBILITY FACTORS

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

Methodology and Evaluation

The methodology for the Keesler AFB JLUS consisted of a comprehensive and inclusive discovery process to identify key stakeholder issues associated with the compatibility factors. At the initial Policy Committee (PC), Advisory Committee (AC), and Technical Subcommittee workshops and public forums, stakeholders were asked to identify the location and type of issue in conjunction with compatibility factors they thought existed today or could occur in the future. As a part of the evaluation phase, the PC, AC, Technical Subcommittee, and the public examined and prioritized the extent of existing and potential future compatibility issues that could impact land within or near the Study Area. Other factors and associated issues were analyzed based on available information and similarity with other community JLUS experiences around the country.

The selection and inclusion of strategies is directly and indirectly affected by the evaluation of issues. Issues were prioritized into four different categories with an associated timeframe to determine the timeframe for initiating strategies by the primary and partner agencies. These strategies are provided in the JLUS Report Chapter 6 Implementation Plan.

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

- This chapter provides a technical background on the factors and issues discussed based on available information. The intent is to provide an adequate context for awareness, education, and development of JLUS recommendations. It is not designed or intended to be utilized as an exhaustive technical evaluation of existing or future conditions within the Study Area.
- Of the 25 compatibility factors considered, 7 were determined to be inapplicable to this JLUS and not addressed in the compatibility assessment in this chapter:
    - Cultural Resources
    - Energy Development
    - Frequency Spectrum Capacity
    - Housing Availability
    - Scarce Natural Resources
    - Vibration
    - Water Quality / Quantity
- Each issue is evaluated based on an applicable set of existing tools. These existing tools are meant to illustrate what is currently in place that can be used to mitigate the compatibility issue. Though existing tools may not always directly aid compatibility, they provide a foundation to help create strategies for future implementation.

Please see the next page.

Air Quality (AQ)

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

Key Terms

Attainment Area. An attainment area is a geographic area that meets the National Ambient Air Quality Standards (NAAQS) for a criteria pollutant.

Criteria Pollutants. The criteria pollutants are the six principle pollutants harmful to public health and the environment for which the Environmental Protection Agency (EPA) has set NAAQS. The pollutants are: carbon monoxide (CO), lead, nitrogen dioxide (NO2), ozone (O3), particulate matter (PM), and sulfur dioxide (SO2).

National Ambient Air Quality Standards. The NAAQS are standards for outdoor air pollutants established by the EPA under authority of the Clean Air Act (CAA).

Nonattainment Area. A nonattainment area is a geographic area where air pollution levels persistently exceed NAAQS, or that contributes to ambient air quality in a nearby area that fails to meet standards. Designating an area as nonattainment is a formal rulemaking process made by the EPA, typically only after air quality standards have been exceeded for several consecutive years.

Ozone. Ozone is a pungent, colorless, toxic gas with direct health effects on humans, including respiratory and eye irritation and possible changes in lung functions. Ozone is created when hydrocarbon and nitrogen oxides released from vehicles and industrial sources react in the presence of sunlight. Because O3 requires sunlight to form, it occurs in concentrations considered serious primarily between the months of April and October.

Particulate Matter. Particulate matter consists of fine metal, smoke, soot, and dust particles suspended in the air. Particulate matter is measured by two sized: Coarse particles (PM10), or particles between 2.5 and 10 micrometers in diameter in size, and fine particles (PM2.5), or particles less than 2.5 micrometers in diameter.

Technical Background

A number of factors can influence air quality in a region. These factors include a variety of sources and types of pollutants, topographic conditions, weather, and other factors. Community sources of dust, car emissions, and air pollutants can also create adverse impacts on the environment and can potentially limit Keesler AFB operations. Permits and funding for important infrastructure projects can be delayed or denied in non-attainment areas, or projects may be subject to mitigation measures that increase the capital cost of projects.

Under the Clean Air Act (CAA), the EPA established National Ambient Air Quality Standards (NAAQS) for air pollutants. The NAAQS have been set for the six criteria air pollutants. Air quality control regions (AQCR) are classified either “attainment” or “nonattainment,” according to whether the concentrations of criteria pollutants exceed the NAAQS or not. Nonattainment designation categories are Marginal, Moderate, Serious, Severe, and Extreme.

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Regional Air Quality

Though Harrison County is in attainment for six air quality criteria pollutants and Keesler AFB is in compliance with its Title V Air Quality Operating Permit, future development has the potential to affect regional air quality.

In Mississippi, authority has been delegated to the Mississippi Department of Environmental Quality (MDEQ) to ensure that the state maintains or moves into attainment with all NAAQS. Emissions for the Gulf Coast region are calculated on a county-by-county basis; however, the Gulf Regional Planning Commission and MDEQ formed the regional Clean Air Committee, to develop a regional action plan called the Path Forward Plan, which identifies methods to reduce ozone in the Gulf Region since regional attainment and nonattainment values for each county can affect the region as whole.

Attainment is based on an 8-hour design value from the four highest scoring days averaged over a three-year period measured from April to October. In 2015, the ozone NAAQS was revised from 75 ppb to 70 ppb. Based on 2015 design values, the tri-county area of Hancock, Harrison and Jackson counties were in attainment for the six criteria pollutants regulated by the Clean Air Act, which include ozone, sulfur dioxide, carbon monoxide, lead, particulate matter, and nitrogen dioxide. Although in attainment for all pollutants, Harrison County, inclusive of Keesler AFB, and Jackson and Hancock counties were close to nonattainment for ozone with design values of 67, 68 and 64 parts per billion (ppb) respectively. Through the planning, education and implementation efforts of the Gulf Regional Planning Commission and Clean Air Committee, the Gulf Coast tri-county region continues to be in attainment for ozone.

Preliminary 2016 design values for ozone have been established for Hancock, Harrison and Jackson counties at 63, 67, and 67 ppb, respectively. The counties continue to be in attainment for the EPAs numbers for ozone. Table 5-1 shows the ozone levels for Hancock, Harrison and Jackson counties from 2014 to 2016.

Table 5-1 Gulf Region Air Quality 3-Year Average by County

Year	Hancock County Ozone Design Values (ppb)	Harrison County Ozone Design Values (ppb)	Jackson County Ozone Design Values (ppb)
Current Standard (est. 2015)	70	70	70
2014	66	69	71
2015	64	67	68
2016	63	67	67

Source: Mississippi Department of Environmental Quality 2015 Air Quality Data Summary; MDEQ Environmental News Vol. 13 Issue 9, November 2016

Ozone is a secondary pollutant as it is formed by the combination of two other chemicals – nitrogen oxides (NOx) and volatile organic compounds (VOCs). The combination of these chemicals is generally the result of emissions from the combustion of fossil fuels from sources such as vehicles, power plants, and industrial boilers. Even at low levels, ozone can impact the respiratory system.

According to the Mississippi Department of Environmental Quality (MDEQ), implications of a nonattainment status for these pollutants include potential economic development constrictions, such as limited industrial growth, longer permitting process, and potential constraints for transportation improvements. Additionally, if in a nonattainment zone, Keesler AFB could have restrictions on its emissions as part of a regional strategy to come into attainment, which could affect military operations.

While the tri-county area is currently an attainment area, the Clean Air Committee should continue to meet, to understand sources of emissions and monitor ozone levels to ensure future development from Harrison County does not increase regional emissions above attainment levels.

Compatibility

In 2015, Keesler AFB had a permitted Hazardous Air Pollutants (HAPs) limit of three tons per year and emitted 0.57 tons per year. Keesler AFB was most recently issued a renewal of Part 70 Title V Permit No. 1020-00006 by MDEQ through the Environmental Permits Division on April 30, 2010 and is currently operating under this permit. This permit requires sources of pollutants to obtain an operating permit and sets out air requirements relevant to the source of pollution as well as methods to demonstrate compliance. Although Keesler AFB is still operating under this permit, the installation is in the process of converting to a Synthetic Minor Operating Permit (SMOP) through MDEQ. This type of permit is issued to existing stationary sources of pollution that create annual emissions lower than the Title V threshold. The source of pollution must self-impose federally enforceable limits to prevent potential air emissions from exceeding the thresholds for a Title V major source.

At the federal level, Air Force Instruction 32-7040, Air Quality Compliance and Resource Management identifies requirements to "manage Air Force resource assets in order to maximize their military value and optimize their economic, ecologic, and community value, while attaining and maintaining compliance with the Clean Air Act" as well as with local air quality regulations. The AFI acknowledges state operating permits, and describes that an installation can apply for a SMOP instead of a Title V permit if the installation can bring itself under Title V emission thresholds without "negatively impacting the mission." The AFI was last updated in 2014 and certified current as of October 2016.

At the State level, as required in Section 110 of the CAA, each state must submit a State Implementation Plan (SIP) to the EPA detailing how they accomplish implementation, maintenance and enforcement of NAAQS. A SIP details how the state plans to limit air pollution from industrial, mobile, and any other source of pollution in order to protect human health and the environment. The Mississippi SIP includes regulations for preventing and controlling air pollution, regulations for permitting construction and operation of air emissions equipment, regulation to prevent the excessive build-up of air pollution, and regulations to implement a program to prevent the deterioration of air quality.

Findings

- Harrison County is part of the regional assessment for air quality in the Gulf Coast region along with Hancock and Jackson counties.
- All three counties are currently in attainment with the six air quality pollutants, but close to nonattainment for ozone.
- Keesler AFB operated under Title V, but is in the process of converting to a Synthetic Minor Operating Permit (SMOP).
- There are state and regional plans in place to control air pollution.
- Future development within Harrison County should be monitored by the Clean Air Committee to ensure that regional air quality emissions remain in attainment.

Please see the next page.

Anti-Terrorism / Force Protection (AT / FP)

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

The Department of Defense (DoD) AT / FP standards require all DoD components to adhere to design / planning criteria and minimum construction standards to mitigate vulnerabilities and threats to an installation and its occupants. Important aspects of these criteria and standards include minimum standoff distances or required separation between buildings and roadways and parking lots and buildings and trash enclosures. Additional AT / FP considerations include clearances on both sides of an installation perimeter fence to ensure visibility for security monitoring and reducing direct line-of-sight into installations.

Key Terms

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

Fence Line. Fence lines in this section refer to the perimeter fence surrounding Keesler AFB. Fence lines are ideally offset and internal from a property line on a military installation if possible.

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

ISSUE AT-1	**Waterfront Access to Keesler AFB** Keesler AFB is accessible via the Back Bay of Biloxi. High levels of waterway traffic create a jurisdictional concern when boaters approach the Keesler AFB shoreline.

The Back Bay of Biloxi is an 8.1 square mile estuary that attracts water recreation, such as fishing and boating. Although the Back Bay provides recreational opportunities for the community, it also provides access to Keesler AFB.

Waterside security is critical for Keesler AFB, ensuring that there is adequate security through signage or patrolling the shoreline is important for maintaining security on base. The access by unauthorized parties onto the installation could create risks to military personnel as well as disturbance to military operations.

Compatibility Assessment

The Back Bay of Biloxi is patrolled by the State of Mississippi Department of Marine Resources (MDMR) to ensure that boats do not dock or anchor in the water bordering Keesler AFB. Security Forces at Keesler AFB and MDMR communicate to exchange information regarding Keesler shoreline security.

In addition, the Harrison County Sherriff's Department periodically patrols the Back Bay. Both of these efforts are crucial to maintaining a secure border since Keesler AFB jurisdiction does not extend over the waters of the Back Bay, and therefore does not have any enforcement authority in the Back Bay.

Security forces at Keesler AFB purchases 15 buoys and will place the buoys, with signage along the shoreline identifying areas where boaters are restricted from entering, docking or anchoring.

The demarcated areas will be designated as a No Anchorage Exclusion Zone and will be enforced by Keesler AFB Security Forces, MDMR and Harrison County Sheriff's Department. This area will extend from east to west along the Keesler AFB shoreline and extend 150 feet into the Back Bay of Biloxi.

Security Forces will have exclusive jurisdiction over the area and will be able to execute law enforcement actions within the No Anchorage Exclusion Zone. During increased security measures, the area will be designated as a controlled/restricted area, meaning all non-DoD personnel will be removed from the area.

Findings

- The shoreline of Keesler AFB on the Back Bay of Biloxi is unmarked as a restricted area, which increases the risk profile for unauthorized access.

ISSUE AT-2	**CSX Transportation Rail Proximity**
	The CSX Transportation Rail located south of Keesler AFB carries hazardous cargo and could create a fence line breach if derailed.

A CSX rail line is located directly south of the Keesler AFB fence line, running parallel to the installation between Keesler AFB and Irish Hill Drive. The line connects two ports in Gulfport and Pascagoula and the Port Bienville Industrial Park in Hancock County via the Port Bienville Shortline Railroad. The CSX railroad has a capacity to run up to 26 trains per day, though approximately only 15 trains operate daily, trading off the transport of additional cars for total number of trains.

The CSX line is an important asset for the distribution of goods throughout the region, carrying approximately 60 percent of freight shipped from New Orleans to the East Coast CSX including various commodities from agricultural products to coal and chemicals.

Because the rail line is located directly south of the Keesler AFB perimeter fence, any potential derailments could create security concerns if the fence is damaged creating a perimeter breach and exposure to the installation. An unsecure fence line could create opportunities for unauthorized persons to enter the base. Additionally, the contents of the cargo, which may be hazardous, could spill into the installation and create a risk if exposed to personnel or equipment. In the case of a perimeter breach, installation security personnel must monitor the breach until it is repaired, requiring the dedication of security staff resources.

The CSX rail line also crosses White Avenue near the White Avenue gate into Keesler AFB. High levels of traffic on White Avenue positioned to enter or exit the installation can result in vehicle stacking on or near the railroad tracks, creating a potential hazard when trains approach. This could increase risk to military personnel and civilians if a train related incident occurred. This issue is also discussed under Issue RC-1.

Junction of CSX Railroad and Intersection of White Avenue / Irish Hill Drive near Keesler AFB fence line and White Avenue Gate. Source: Google, May 2013

Compatibility Assessment

Unified Facilities Criteria (UFC) 4-022-01 provides guidelines for entry control points at military installations. This guidance was developed and revised as recently as 2005 making the current configuration of the White Avenue gate an existing condition. To address compliance with current entry design requirements, Keesler AFB and the City of Biloxi are partnering to construct a new main gate at the terminus of Division Street and Keesler AFB on the east side of the installation. The Division Street Gate would replace the White Avenue Gate as the primary access to Keesler AFB. While directing traffic away from White Avenue and the CSX rail line would reduce the interface between vehicles and trains traversing the rail line, and the potential for rail-related incidences, there is still a concern for a perimeter breach in the event of a rail incident.

Findings

- The CSX rail line is located directly south and parallel to Keesler AFB with trains running along this line daily.
- In addition to commodities, these trains also carry hazardous cargo.
- Potential derailments could compromise the security of the Keesler AFB fence line and the safety of military personnel and civilians, as well as expose the installation to hazardous materials.
- The safety of rail at the crossing of White Street is also affected by vehicular traffic stacking near the rail tracks outside the White Avenue Gate.

Please see the next page.

Climate Consideration (CC)

Climate consideration examines the gradual shift of global weather patterns and temperatures resulting from natural factors and human activities (e.g. burning fossil fuels) that produce long-term impacts on atmospheric conditions. The results of climate variability, i.e. ozone depletion and inefficiencies in land use, can present operational and planning challenges for the military and communities as resources are depleted and environments are altered.

Key Terms

Climate Variability. Climate variability refers to any significant change in the measures of climate lasting for an extended period of time. In other words, climate variability includes major changes in temperature, precipitation, or wind patterns, among other effects, that occur over several decades or longer.

ISSUE CC-1	**Potential for Flooding to Impact Keesler Air Force Base Missions** Increased frequency and severity of weather events, such as storm surge can create flooding at Keesler AFB and affect mission operations.

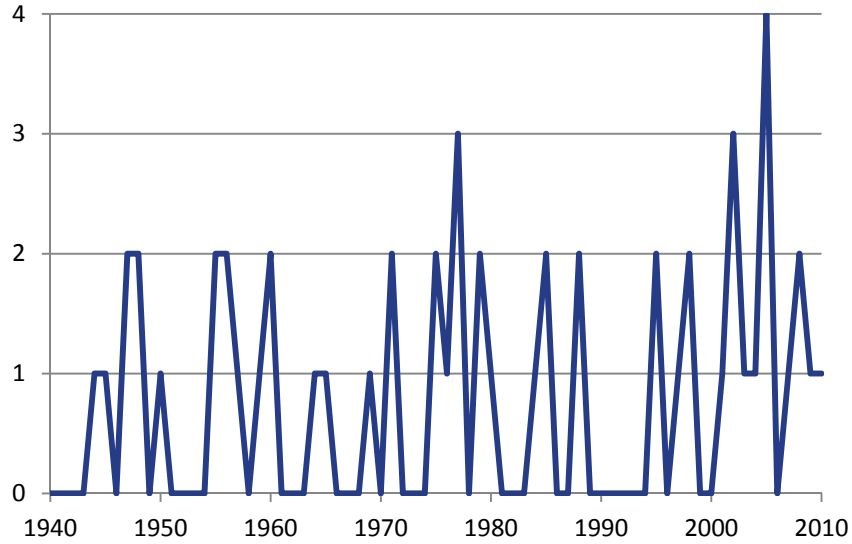
Due to Keesler AFB's geographical location in coastal Mississippi, the installation is vulnerable to both coastal and localized flooding. Coastal flooding is a function of storm surge, while localized storms can produce flash floods and riverine flooding. Coastal and localized flooding has the potential to affect operations at Keesler AFB.

Coastal Flooding

Coastal flooding in relation to storm surge can occur during hurricanes and tropical storms. Keesler AFB is situated between two bodies of water – the Gulf of Mexico to the south of the installation and the Back Bay of Biloxi where the installation has a shoreline. Due to its location between and proximity to these bodies of water, Keesler AFB is susceptible to the effects of hurricanes and tropical storms that frequent the Gulf of Mexico.

Figure 5-1 shows the number of tropical storms and hurricanes that have come within 150 miles of Biloxi since 1940. Although this is a large distance surrounding Biloxi, the figure indicates the general frequency of storm events affecting the region. As the chart indicates, there are fluctuations in the occurrence of storms, although Biloxi hit its peak in 2005 when four tropical storms or hurricanes occurred. The frequency of these weather events can lead to flooding with the increase in rain and storm surge associated with these types of natural events.

Figure 5-1. Number of Tropical Storms and Hurricanes within 150 Miles of Biloxi, 1940-2010



Source: http://www.homefacts.com/; 2013-2017 City of Biloxi Hazard Mitigation Plan

Storm surge can also be affected when bodies of water have high flow days. From 2000 to 2009, the average number of high flow days per year was 20 days. According to the Natural Resources Defense Council (NRDC), high flow days are classified as the average number of days a year that are greater than the 95th percentile relative to a reference period from 1961-1990. Days above the flood stage per year decreased in the 1-10 day range for this period. The flood stage is the level above a body of water's natural banks at which structures begin to be affected by flooding. These effects on the community are further discussed in CC-3.

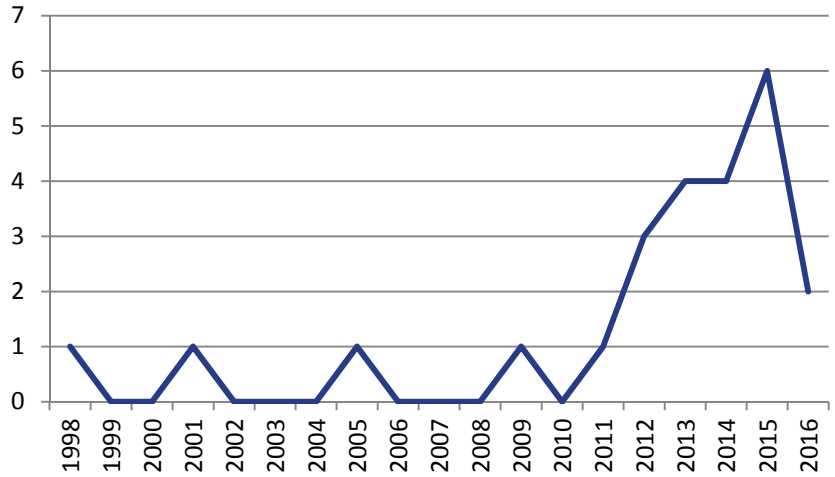
In addition to storm surge, riverine flooding can also affect the installation and the surrounding community. Riverine flooding occurs when there is an excessive rainfall and water runoff volume within the watershed of a river or stream. Keesler AFB and surrounding communities are located along the Back Bay of Biloxi fed by the Tchoutacabouffa River, making the installation susceptible to flooding generated by riverine flooding.

As shown on Figure 5-2, there are many locations on the installation that are within the 500 and 100 Year Flood Zone as defined by the Federal Emergency Management Agency (FEMA), which account for all types of natural flooding. There are particular vulnerabilities on portions of the installation that border the Back Bay of Biloxi. For example, the north end of the runway is within the 100 Year Flood Zone. The 500 Year Flood Zone encompasses the majority of the runway, facilities, and housing. Flooding at any of these locations can result in damage to real property though proactive installation planning and revised construction practices have reduced the potential. There are no locations within the installation that are at immediate risk to flooding due to wave action, which is associated with storm surge.

Localized Flooding

Although Biloxi has a history of storms, this is not the only source of flooding in the city. According to the Biloxi Hazard Mitigation Plan, flooding in Biloxi may also occur with heavy rainfall, such as flash floods. This type of flood results from heavy and localized rainfall over a short period of time. Seasonal rainfall, that is not associated with a hurricane or tropical storm, can create flooding events when storm drainage conveyances cannot manage the quantity of runoff generated from impervious surfaces. Figure 5-3 shows the history of flash floods in Harrison County since 1998. Since 1998, four flash floods were reported countywide, four additional flash floods were reported in Biloxi, and two were reported on Keesler AFB.

Figure 5-3. Number of Flash Floods in Harrison County, 1998-2016



Source: http://www.ncdc.noaa.gov/stormevents/

Flooding can prevent access to the installation and travel within the installation, preventing military and civilian personnel from reaching their destination on Keesler AFB and / or reaching safety. Flooding can also create an overall delay in the ability to perform operations at the installation, such as training and medical functions.

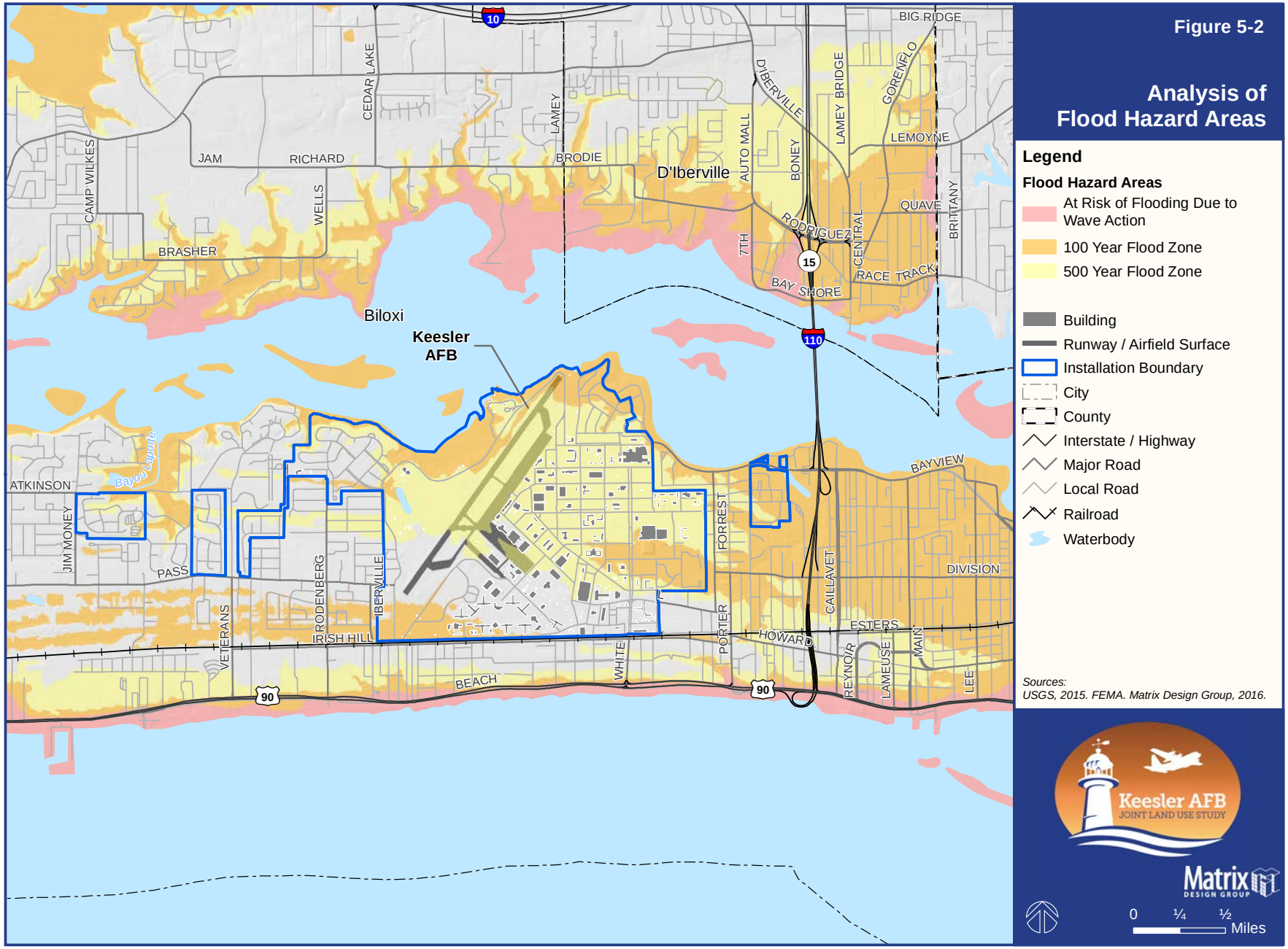


Figure 5-2
Analysis of Flood Hazard Areas
Legend
Flood Hazard Areas
At Risk of Flooding Due to Wave Action
100 Year Flood Zone
500 Year Flood Zone
Building
Runway / Airfield Surface
Installation Boundary
City
County
Interstate / Highway
Major Road
Local Road
Railroad
Waterbody
Sources:
USGS, 2015. FEMA. Matrix Design Group, 2016.
Biloxi
Keesler AFB
D'Iberville
BIG RIDGE
LEMOYNE
QUAVE
BRITTANY
RACE TRACK
BAY SHORE
BAYVIEW
DIVISION
ESTERS
HOWARD
BEACH
IRISH HILL
ATKINSON
PASS
BRASHER
JAM
RICHARD
BRODIE
CEDAR LAKE
LAMEY
WELLS
CAMP WILKES
AUTO MALL
BONEY
LAMEY BRIDGE
GORENFLO
7TH
RODRIGUEZ
CENTRAL
FORREST
PORTER
CAILLAVET
WHITE
REYNOIR
LAMEUSE
MAIN
LEE
VETERANS
RODENBERG
IBERVILLE
JIM MONEY
Bayou Laporte
10
15
110
90
0 ¼ ½ Miles

Due to the short term effects of flooding, it is unlikely that flooding from a storm would have a long term impact on the flying mission at Keesler AFB, especially since Stennis International Airport is also utilized for Keesler AFB military operations. Although flooding does occur around Stennis International Airport along the Jourdan River, the frequency of flooding event is not as great as on Keesler AFB; however, there are low-lying areas at the south end of the airport that have the potential to flood.

After flooding events, it is possible that damage on the installation could render portions of the installation temporarily inoperable, thus reducing the overall days that the installation is in use. It is also a possibility that operations and personnel can be reassigned to other installations or temporarily suspended due to damage occurring on the installation.

Flooding also has many effects on the community including general accessibility. Flooding can create barriers on roadways, constraining transportation corridors, such as U.S. Highway 90. This is an issue for the entire community, but also those who need access to Keesler AFB for work or treatment at the Keesler Medical Facility. Though the Keesler Medical Center has capability to run on emergency generators, impacts from inundation have the potential to affect operations at the facility, which can affect veterans, retirees, and other community members who rely on the facility for essential medical care.

Protecting the installation and surrounding communities from flooding could help to mitigate disruption to operations at Keesler AFB and ensure the safety of military personnel and civilians on base. Actions must be taken at the installation as well as the community to ensure that all stakeholders are prepared for flooding events as the effects of flooding on the installation and in the community, can affect one another.

Sources: Harrison County Hazard Mitigation Plan 2008; City of Biloxi Hazard Mitigation Plan 2013-2017

Compatibility Assessment

Both the cities of Biloxi and D'Iberville have Flood Damage Prevention ordinances, which were last updated in 2006 and 2009 respectively, for building construction within flood hazard areas based on the FEMA floodplain maps. These ordinances and floodplain maps help to mitigate the destruction and debris that can impact accessibility to Keesler AFB during flood events.

Keesler AFB has adopted standards for preparing for flooding events, having experienced firsthand how weather events can affect the base during Hurricane Katrina in 2005. Additionally, through an executive order, Environmental Management (CEV) on Keesler AFB reviews on base projects to ensure that new development and substantial renovations are constructed above the 500-year floodplain. During this hurricane, approximately half of the installation experienced flooding due to storm surge from the Back Bay of Biloxi, which approached 30 feet above normal levels. Hurricane Katrina left the installation with more than $950 million in damages, impacting housing, the Keesler Medical Center, the central energy plant, and numerous other facilities.

After Hurricane Katrina, the installation took steps to mitigate the effects that storms can have on the installation. To comply with the Federal Flood Risk Management Standard, required by the President's Climate Action Plan and Executive Order 13690, Keesler AFB addressed increased risk from weather events, including flooding. Such improvements after Hurricane Katrina included raising and / or replacing buildings to higher ground, or deciding not to rebuild in place in certain flood zones, and mitigating key facilities on base. One such example was the housing on the east side of the installation and at Harrison Court. Improvements to housing on base included rebuilding with a finished floor elevation of 18 feet above sea level (ASL) – two feet higher than FEMA's recommendation; elevating most housing, except for ADA homes, to two stories; and constructing homes to withstand windspeeds up to 140 miles per hour (mph). Additionally, the Base Exchange / Commissary was rebuilt with 2 to 3 feet of freeboard, a

factor of safety expressed in feet above flood level, and the Medical Center relocated essential operations and services from the facilities' lower floors.

Within three weeks of Hurricane Katrina, some training courses were reinstated at Keesler AFB and within three months, the installation was hosting more trainees than it had prior to the hurricane. Keesler AFB was resilient in the aftermath of Hurricane Katrina and recognizes the importance of re-establishing operations after future storms to limit the destruction of property and disruption to military operations. Today, Keesler AFB continues to use the same flood prevention construction guidelines that were employed after Hurricane Katrina. The installation also implements measures to maintain the safety of military personal and their dependents during storm events. The Keesler AFB website provides evacuation guidelines, evacuation routes, weather updates, hurricane preparation resources, and recovery information.

Sources: http://www.keesler.af.mil/News/KeeslerAFB ICEMAP; http://www.keesler.af.mil/AboutUs/HurricaneSeason2016.aspx

Flooding at the Bay Breeze Golf Course during Hurricane Katrina

Findings

- Keesler AFB is vulnerable to both coastal and localized flooding.
- The frequency of tropical storms and hurricanes as well as flash floods contributes to flooding.
- Floods can affect the safety of military personnel as well as the installation's ability to conduct operations on a short-term basis.
- Floods at Keesler AFB can impact access throughout the community.
- Keesler AFB has made many improvements to buildings and facilities after Hurricane Katrina to prepare for future storms that could cause flooding on base.
- Environmental Management on Keesler AFB implements an executive order, which requires that new development and substantial renovations are constructed above the 500-year floodplain.

ISSUE CC-2	**Potential for Climate Variability to Impact Keesler Air Force Base** Keesler AFB is vulnerable to long-term impacts from climate variability including an increase in risk and severity of flooding and storm surge events.

The effects of climate variability on the physical environment can cause increased risk and severity of flooding and storm surge events. The vulnerability that Biloxi faces is a function of its proximity to the coast and elevation. The elevation of the installation ranges from sea level along the marshes of the Back Bay of Biloxi, to 30 feet above mean sea level (MSL) at the southwest area of the base.

Increases in sea surface elevation have a direct correlation with inundation which can result in increased frequency of flooding events. Areas most susceptible on the installation are the lowest areas including the Bayridge

housing subdivision, the Keesler AFB Marina and the north end of the runway. Low lying areas east of the airfield at the terminus of Keegan Bayou could be susceptible to long-term flooding. If not planned for, a loss of land at the installation could diminish capacity for future operations. Flooding at the north end of the installation could also cut off access on Ploesti Drive, between the west and east sides of the installation.

Figure 5-4 shows the areas around Keesler AFB that are currently vulnerable to shallow coastal flooding. Shallow flooding areas are generally prominent along the shoreline, on the north side of the Base, but do not affect military operational facilities. As with inundation, the area surrounding the Keegan Bayou may be susceptible to inland impacts from shallow coastal flooding.

Figure 5-4. Shallow Coastal Flooding and Flood Frequency

Source: https://coast.noaa.gov/slr/

Compatibility Assessment

Executive Order 13693, Planning for Federal Sustainability in the Next Decade, states that federal facilities should continue to "support preparations for the impacts of climate change."

Through Executive Order 11988, Floodplains Management, all military installations are required to provide actions to reduce flood losses. At the installation level, Keesler AFB has adopted more stringent construction requirement that exceed the minimum standards promulgated by FEMA.

Although these practices are in place, Keesler AFB does not have a plan that focuses on the future impacts of climate variability on the installation and its mission.

Sources: http://www.nwrc.usgs.gov/; 2013 Integrated Natural Resources Management Plan for Keesler Air Force Base, Mississippi

Findings

- Keesler AFB is located in an area that is vulnerable to inundation.
- Keesler AFB has stringent construction requirements for new buildings exceeding FEMA standards.
- Keesler AFB does not have a long range plan to prepare for the long term effects that climate variability can have on the installation missions.

ISSUE CC-3	**Potential for Climate Variability to Impact Surrounding Jurisdictions Outside of Keesler AFB** The community is vulnerable to long-term impacts from inundation due to climate variability including loss of access to Keesler Medical Center.

Inundation can have a long term effect on the community surrounding Keesler AFB. Increased development in the community creates a proliferation of impervious surfaces, which increases runoff into the municipal stormwater drainage system. This could contribute to flooding if the stormwater conveyance system cannot manage the amount of runoff during heavy rainfall events.

One positive contributor to combatting the impacts from inundation and subsidence is vegetation. The natural environment can act as a buffer for flood waters by storing water in trees and plant roots and slowing the speed at which flood waters enter upland areas by controlling the quantity of water dispersal across the floodplain.

One area susceptible to potential future flooding is the Keegan Bayou, which flows from the Back Bay of Biloxi as far as Division Street. However, Keesler AFB and the City of Biloxi are currently planning street improvements to accommodate traffic for a new main gate at Division Street. These improvements include stormwater drainage appurtenances which are designed to handle anticipated stormwater flows.

Sources: https://www.nrdc.org/resources; http://riskfinder.climatecentral.org/place; http://www.srh.noaa.gov/lmrfc

Compatibility Assessment

The City of Biloxi has adopted a Hazard Mitigation Floodplain Management Plan which discusses the vulnerability of Biloxi regarding long term inundation. Additionally, the City is conducting a specific local Climate Study to consider the impacts of climate variability. Findings of this study will be incorporated in the next iteration of the Hazard Mitigation Plan.

The City of Biloxi is implementing the Restore Biloxi program, which includes the restructuring of some of the storm drains in the city. Improvements to the storm drainage system would help manage a greater quantity of storm water that could mitigate future impacts of flooding.

Harrison County has adopted a multi-jurisdictional Hazard Mitigation Plan and included the participation of the cities of Biloxi and D'Iberville, as well as Keesler AFB; however, the action plan does not specifically address climate variability.

Findings

- Communities around Keesler AFB are susceptible to long-term flooding hazards.
- Biloxi is conducting a Climate study, which will consider the risks of climate variability on the community.
- The Harrison County Hazard Mitigation Plan does not have actions specific to long term inundation.

Communication / Coordination (COM)

Communication / coordination refers to the programs and plans that promote interagency coordination. Interagency communication serves the general welfare by promoting a more comprehensive planning process inclusive of all affected stakeholders. Interagency coordination also seeks to develop and include mutually beneficial policies for both communities and the military in local planning documents, such as comprehensive plans.

ISSUE COM-1	**Enhanced Communication between the City of D'Iberville and Keesler Air Force Base** Need for enhanced and consistent communication and information sharing between the City of D'Iberville and Keesler AFB for mutual planning purposes.

While Keesler AFB and the City of D'Iberville engage in informal and personal communication on certain matters, there is no formal agreement establishing delineated points-of-contact or the roles and responsibilities for each agency. The absence of formal communication protocol between the City and Keesler AFB can create an unreliable communication network from which to address planning issues and concerns that may arise regarding development review.

Currently, the City's and installation's relationship is informal as it is based on personal relationships and is not required per city code. As a result, institutional knowledge may not get passed on to successors if there are changes in City staff. Additionally, because there are no regulations codified for communication or coordination between the City and the installation, there is the potential for the City, or new staff, to not understand the issues relevant to Keesler AFB or when to consult with the Base when there is potential for a compatibility issue. Furthermore, informal communication is discretionary. Due the informal nature of the relationship, there is potential for the installation to not receive information regarding development in D'Iberville relevant to the installation's safety zones or heights, such as what new developments are being planned or when public hearings are being held for development that could adversely impact the installation's air mission.

Compatibility Assessment

D'Iberville has provisions in the Zoning Code to adhere to height restrictions; however, there are no regulations regarding the requirement of coordination with Keesler AFB. Within the code, there are no requirements for the City to coordinate with the Base at any point of the development process.

Findings

- The City of D'Iberville and Keesler AFB informally communicate and coordinate on development relevant to the installation.
- Lack of formalized communication can lead to discretionary communication with the installation and loss of knowledge if and when City staff changes.
- Informal communication between the two entities could affect Keesler AFB's flying mission if communication regarding safety zones and heights is not properly conveyed.

ISSUE COM-2	**Public Notification of Properties Located within the Clear Zones** Need for notification to property owners when purchasing or selling property located within the airfield Clear Zone.

Property Condition Disclosures are issued by the State of Mississippi and are regulated by the Mississippi Real Estate Commission. Property Condition Disclosures require property owners to disclose conditions about a home that negatively affects its value. These disclosures are standard across the state, thus there are no regulations related to property located within a military safety zone. At Keesler AFB, there are residential and commercial properties in the south CZ and residential properties in the north CZ. A lack of proper notification of such information in these areas can affect the ability for a home owner to get a mortgage due to the associated high risk of the property, limiting the ability to sell a home.

Property Condition Disclosures are required for property that consists of one to four dwelling units; therefore, such disclosures do not apply to commercial properties. Lack of commercial property disclosures may also affect the property value and limit the owner's ability to sell commercial property within the Keesler AFB CZs.

Compatibility Assessment

The 2010 Keesler AFB AICUZ recommends that local communities require real estate disclosures for properties that are exposed to noise; however, there is no mention of real estate disclosures for properties located within safety zones.

Findings

- The Mississippi Real Estate Commission regulates Property Condition Disclosures, which are standard across the state.
- There are no regulations for disclosing information specific to the location of a property within a military clear zone.
- Without property disclosures, property owners within the CZ may be affected by the ability to obtain a mortgage which can affect the marketability of a property.

ISSUE COM-3	**Coordinated Law Enforcement Response at Keesler AFB Bayridge Housing Subdivision and Marina** Need for enhanced coordination between the City of Biloxi and Keesler AFB law enforcement to respond to issues at Keesler AFB Bayridge housing subdivision and the Keesler AFB Marina to avoid duplication of service and ensure lines of authority.

Keesler AFB provides housing to military personal and their dependents on military owned property interspersed in the Biloxi. One such housing community is the Bayridge subdivision, a neighborhood located in the northeastern portion of Keesler AFB, abutting the Back Bay of Biloxi. Despite its location within the Keesler AFB fence line, the installation has Memorandums of Agreement (MOA) and Memorandums of Understanding (MOU) with the police and fire departments for the City of Biloxi for emergency response.

Though the jurisdictions and Keesler AFB security generally coordinate when responding to public safety incidences at the Bayridge housing, there have been instances when multiple units respond to the same call. When multiple jurisdictions respond to a single incidence, it limits the emergency response resources throughout the city and county, which can increase response times for the community.

In addition to Bayridge housing, the City of Biloxi Police Department has jurisdiction of the water side of the Marina. Keesler AFB Security Operations have jurisdiction over the parts of the Marina on land, but no jurisdiction over the water side parts of the Marina. If and when Keesler AFB discovers incidences before local jurisdictions do on the water side of the Marina, they are not able to respond although they may be closer to the incident than the City's Police Department. In addition, because it does not fall under Keesler AFB's jurisdiction there is potential for incidences to not be communicated to the installation. Improper or lack of communication of such incidences with Keesler AFB Security Operations could result in security risks to personnel and operations on the installation.

Compatibility Assessment

Currently, there are no plans that examine alternatives for emergency response at Bayridge Military Housing Community and the Marina.

Findings

- The law enforcement at Keesler AFB has shared jurisdiction with the City of Biloxi over the Bayridge Military Housing Community.
- Although the Marina is a part of the installation, the water side of the Marina falls under the jurisdiction of the City of Biloxi.
- Communication between jurisdictions and Keesler AFB can alleviate confusion during emergency responses at Bayridge Military Housing Community and could provide a fluid exchange of information regarding incidences occurring on the Marina.

Please see the next page.

Dust / Smoke / Steam (DSS)

Dust results from the suspension of particulate matter in the air. Dust (and smoke) can be created by fire (controlled or prescribed burns, agricultural burning, and artillery exercises), ground disturbance (agricultural activities, military operations, grading), industrial activities, or other similar processes. Dust, smoke and steam are compatibility issues if sufficient in quantity to impact flight operations (such as reduced visibility or cause equipment damage).

Key Terms

Particulate Matter. Particulate matter (PM) consists of fine metal, smoke, soot, and dust particles suspended in the air. Particulate Matter is measured by two sizes: coarse particles (PM10), or particles between 2.5 and 10 micrometers in diameter in size, and fine particles (PM2.5), or particles less than 2.5 micrometers in diameter.

Technical Background

Particles of dust and other materials found in the air are referred to as particulate matter. The term PM-10 refers to particulate matter less than ten microns in size. At certain concentrations, this particulate matter can be harmful to humans and animals if inhaled causing strain on the heart and lungs, which provide oxygen to the body. PM10 can be caused by many activities, including driving on unpaved roads and surfaces, wind erosion from unpaved vacant lots, disruption of land from vehicle maneuvers, explosions, aircraft operations, and other earth-moving activities, such as construction, demolition, and grading. Its primary source is typically the exhaust emitted by vehicles, wood burning, and industrial processes.

ISSUE DSS-1	**Smoke from Keesler Medical Center Generators** Monthly testing of the Keesler Medical Center generators creates smoke which impacts the adjacent Oak Park neighborhood residents.

The Keesler Medical Center, located in the northeastern sector of Keesler AFB, utilizes four diesel generators as a backup power supply. The Central Energy Plant (CEP) was previously located in the basement of the facility, but during Hurricane Katrina, flooding damaged the diesel generators. This damage impacted the Keesler Medical Center's mission during and after the hurricane, prompting a rebuild of the Central Energy Plan outside of the hospital to plan for future flooding events.

As part of the maintenance routine for the generators, they are tested once a month concurrently. On a quarterly basis, the generators must also undergo a day long test. Both types of tests are conducted during day time hours.

The CEP is located approximately 190 feet from the installation fence line and approximately 280 feet from the nearest resident, located north of the CEP. Because the generators are diesel powered, smoke is emitted from the generators during testing. There are also diesel fumes that accompany the smoke during generator testing. The smoke is a disturbance to the residents in the Oak Park neighborhood that reside on the north side of the Keesler AFB fence line.

Diesel exhaust is a combination of gases and particulates that are produced during diesel fuel combustion. Particles emitted are called diesel particulate matter (DPM) and comprise of solid elemental carbon (EC) combined with organic carbon (OC), which included polycyclic aromatic hydrocarbons

(PAH). Although the CEP buffers the generators to locations north of the generators, there is potential for the smoke to disperse outside of the Keesler AFB fence line through weather factors, such as wind. Exposure to the exhaust can lead to health risks.

Source: https://www.osha.gov/

Compatibility Assessment

According to UFC 4-510-01 Design: Military Medical Facilities, engine generator sets for Military Medical Facilities must be powered by diesel fuel. Due to this criterion, Keesler Medical Center must use diesel generators, which are the cause of the smoke.

The Environmental Protection Agency regulates emissions from non-road diesel engines. Diesel engines are regulated by four tiers, each with its own set of emission standards to ensure the mitigation of overall pollutants from diesel engine operations. The emission standards are provided for carbon monoxide (CO), hydrocarbons (HC), non-methane hydrocarbons (NMHC), nitrogen oxide (NOx), and PM by the power of the engine. The installation has conducted tests, which conclude that the fumes and smoke emitted from the CEP are compliant with EPA requirements.

Due to the nature of the tests, the neighborhood is notified by the Public Affairs Office, via email, of the day and time that the generators will be tested. The email notifications are provided to residents of the Oak Park Neighborhood, as well as Biloxi City Councilmen, City of Biloxi Public Affairs, and the Biloxi Police Department. Notifications are sent out once the Public Affairs Office for the 81st Training Wing is notified of the tests, which is generally three to four days from the testing.

Another issue regarding the Keesler Medical Center diesel generators is discussed in Noise Issue NOI-1 in this chapter.

Findings

- Keesler Medical Center employs backup generators situated outside and proximate to the Oak Park residential neighborhood.
- Generator testing creates smoke that disturbs residents in the Oak Park neighborhood and may cause health risks.
- Keesler AFB must comply with UFC 4-510-01 for the type of generators for Military Medical Facilities.
- The smoke that is emitted from the generators is compliant with EPA standards.

Frequency Spectrum Impedance / Interference (FSI)

Frequency spectrum is the entire range of electromagnetic frequencies used for communications and other transmissions, which includes communication channels for radio, cellular phones, and television. In the performance of typical operations, the military relies on a range of frequencies for communications and support systems. Similarly, public and private users rely on a range of frequencies in the use of cellular telephones and other wireless devices on a daily basis.

Key Terms

Impedance. Impedance is the interruption of electronic signals due to the existence of a structure or object between the source of the signal and its destination (receptor). Certain structures have the potential to block, or impede, the transmission of signals from antennas, satellite dishes, or other transmission / reception devices affected by line-of-sight requirements.

Interference. Interference is the inability to effectively distribute or receive a particular frequency because of similar frequency competition. As the use of the frequency spectrum increases (such as the rapid increase in cellular phone technology over the last decade) and as development expands near military installations and operational areas, the potential for frequency spectrum interference increases.

Technical Background

The Department of Defense's (DoD) use of frequency spectrum allows for safe operations and the effective delivery of weapons on target without interference. The need for the DoD's frequency spectrum testing and evaluation is constantly increasing, while the spectrum available for DoD use is decreasing. The National Telecommunications Industry Association (NTIA) Office of Spectrum Management (OSM) explains that:

> *'…almost every agency of the Federal Government uses the spectrum in performing mandated missions. The DoD uses the spectrum extensively for tactical uses and non-tactical uses. In the United States tactical uses are generally limited to a number of specific testing sites and training facilities, but DoD's non-tactical applications are extensive and include aircraft command and control, mobile communication in and around military bases, and air fields and long distance communications using satellites.'*

Frequency interference is related to other transmission sources and can result from a number of factors, including:

- Using a new transmission frequency that is near an existing frequency;
- Reducing the distance between two antennas transmitting on a similar frequency;
- Increasing the power of a similar transmission signal;
- Using poorly adjusted transmission devices that transmit outside their assigned frequency or produce an electromagnetic signal that interferes with a signal transmission; and
- Existing electronic sources and uses created by portable systems affecting entire communities utilizing Wi-Fi broadband systems and industrial sources that produce electronic noise by-product.

The military relies on a range of frequencies for communications and support systems. Since 1993, Congress has been selling federal spectrum bands for reallocation to the private sector, promoting the development of new telecommunications technologies, products and services. The expanding public and commercial use of the frequency spectrum from wireless transmitters to consumer electronics can encroach on the military's

use of the frequency spectrum. Increasing community and DoD demands for this important resource can create conflicts for all users.

ISSUE FSI-1	**Expansion of Wi-Fi and Wireless Communication on Keesler Air Force Base** The expansion of wireless communication capability at Keesler AFB has the potential to impact surrounding communities.

Some operations at Keesler AFB require the use of frequency spectrum for communications and transmission of information to carry out mission activities. Keesler AFB currently utilizes Wi-Fi and wireless communication on base and is looking to expand these capabilities in the future. With the influx of wireless communication on the installation there is potential for surrounding communities to experience signal losses with wireless communication devices.

Compatibility Assessment

Keesler AFB 81st Communication Squadron prepared a Spectrum Analysis Report in 2016 to identify the potential for spectrum to enter into and travel outside the base. Understanding how much of the installation's spectrum is traveling outside of the base helps to understand how the base's current wireless communication and Wi-Fi capacity are affecting the community. The 81st Communication Squadron works to address residential frequency concerns on a frequent basis.

While the installation can work to reduce impacts to areas outside of their fence line, the Federal Communication Commission works to regulate non-governmental radio, televisions, wire, satellite, and cable communications throughout the nation. This commission licenses non-Federal use of the frequency spectrum through a public process.

Infrastructure Extensions (IE)

Infrastructure refers to public facilities and services such as sewers, water, electric, and roadways that are required to support existing and proposed development.

Public facilities and services should be appropriate for the type of urban or rural development they serve, but also limited to the existing and planned needs and requirements of the area. For example, the provision of a safe transportation system, including all modes of transportation (automobile, mass transit, railway, highway, bicycle, pedestrian, air, water, etc.), is an important infrastructure component. Adequate transportation infrastructure contributes to local, regional, and state accessibility.

Infrastructure plays an important role in land use compatibility. Infrastructure can enhance the operations of an installation and community by providing needed services, such as sanitary sewer treatment and transportation systems. Conversely, infrastructure can create encroachment issues if expanded without consideration of the consequences of future development. The extension or expansion of community infrastructure to a military installation or areas proximate to an installation has the potential to induce growth, potentially resulting in incompatible uses and conflicts between a military mission and communities. Within comprehensive planning, infrastructure extensions can serve as a mechanism to guide development into appropriate areas, protect sensitive land uses, and improve opportunities for compatibility between community land uses and military missions.

Key Terms

Infrastructure. The word infrastructure, in this section, refers to public facilities and services, such as sewers, water, electric, and roadways that are required to support existing and proposed development.

ISSUE IE-1	**Infrastructure Development and Planning**
	The development of the new Division Street main gate for Keesler AFB has the potential to impact the surrounding neighborhood.

The main gate at Keesler AFB—White Avenue Gate is located on the south end of the installation at the northern terminus of White Avenue. This gate, like all other entry gates into Keesler AFB, predates the current Department of Defense (DoD) design requirements including adequate vehicle queuing area on the installation prior to the vehicle inspection area. As a result, traffic stacks outside the gate, which affects the surrounding community. This is most pronounced during the morning hours when staff is arriving to begin their workday.

Compatibility Assessment

To address these issues, Keesler AFB and the City of Biloxi have partnered to develop a new main gate at Division Street that would provide sufficient vehicle queuing on the installation, thus reducing the congestion at the intersection of White Avenue and Irish Hill Drive and the safety issues with traffic at the CSX railroad crossing immediately outside the gate.

The compliant Division Street Gate, which will be located directly west of the intersection of Division Street and Forrest Avenue, is currently planned for Fiscal Year 2017 (FY 2017). The new gate will include the extension and rehabilitation of Division Street from the I-110 to Forrest Avenue with road improvements along Division Street provided by the City of Biloxi.

Division Street will form a new gateway to Keesler AFB. Improvements are proposed to Division Street between the I-110 exit and Keesler AFB to accommodate the anticipated increases in vehicular traffic. These improvements include updating Division Street into a wider boulevard that

will include four lanes of traffic, a center lane for turning bays, and landscaped medians. Additional proposed improvements include replacing underground infrastructure, moving utilities, widening the road to more than 100 feet, and realigning the street as to not affect community properties fronting Division Street. Division Street will also gain new lighting, landscaping, and signage. The extension and overall design improvements to the street will provide ease of traffic into the installation for both personal and commercial vehicles.

Division Street is part of the existing community fabric of Biloxi and an established neighborhood. Along Division Street are a number of community services that provide housing and health assistance to the community and serve Biloxi's veteran and retiree population. Among these is the Back Bay Mission and affiliated Gulf Coast Housing Initiative – an NGO that formed after Hurricane Katrina to provide community services to the homeless and low-income population, the Coastal Family Health Center, Flowing Rivers of Life Ministry, and Mississippi Center for Justice public interest law firm. Division Street is also home to local businesses that cater to the community including a local grocery store, seafood market and deli, convenience store, medical office, auto repair shop, contracting office, veterinarian, and appliance store. Also located on Division Street are single-family residences.

Improvements to the street, such as widening the road to 100 feet, will impact properties on Division Street since the proposed road width exceeds the width existing right-of-way width. While the impact of the Division Street improvements on the surrounding community will be considered, there is concern that the needs of these community services, businesses, and residences along Division Street are also considered and that the improvements support the continuation of these uses.

Findings

- The City of Biloxi and Keesler AFB are partnering to create the Division Street Gate, which will be compliant with current DoD design requirements.
- The project will include improvements to Division Street to create a gateway to Keesler AFB.
- The widening of Division Street will affect existing properties fronting Division Street.

Land / Air / Sea Spaces (LAS)

The military manages or uses land and air space to accomplish testing, training, and operational missions. These resources must be available and of a sufficient size, cohesiveness, and quality to accommodate effective training and testing. Military and civilian air and sea operations can compete for limited air and sea space, especially when the usage areas are in close proximity to each other. Use of this shared resource can impact future growth in operations for all users.

The land, air, and sea spaces used by the military can be owned by the DoD, designated for DoD use by a federal or state agency, provided through easements or other agreements with public or private entities, or maintained as a historic usage right. Public and private requests to share or assume some of these resources may have a negative impact on military training and test objectives.

Key Terms

Controlled Airspace. Controlled airspace is airspace of defined dimensions within which ATC services are provided. The level of control varies with different classes of airspace. Controlled airspace usually imposes higher weather minimums than are applicable in uncontrolled airspace. Class D airspace encompasses Keesler AFB.

General Aviation. General aviation is defined as aviation activity that is not commercial or military. This term typically covers all civil aviation operations other than scheduled air services and non-scheduled air transport operations for hire.

Unmanned Aerial Vehicle (UAV). Unmanned Aerial Vehicle (UAV) is an aircraft without a human pilot on board and is sometimes referred to as an unmanned aircraft system (UAS).

ISSUE LAS-1	**Shared Airspace with Recreational Aviation**
	Seaplane and helicopter tours and other recreation activities that utilize airspace along the Gulf of Mexico coastline, such as parasailing and unmanned aerial vehicles, can potentially cross the Keesler AFB approach flight paths which increases the risk for mishaps.

As part of the tourism industry on the Gulf Coast, there are companies that offer helicopter rides throughout Biloxi and companies that provide seaplane tours over the Gulf Coast. Additionally, other recreation activities, such as parasailing and recreational use of unmanned aerial vehicles (UAVs), including such activities on the beach, have the potential to conflict with military flight operations.

Although seaplane and helicopter tours and parasailing currently do not share the airspace over Keesler AFB, there is potential for aviation tourism to impact areas where military flight operations occur. Sharing airspace could generate more practice opportunities for traffic control at Keesler AFB; however, there is also potential for the increase in traffic to create inflight conflict due to crossing flight paths. For low altitude flights, there may be competition between Keesler AFB training, such as beam approaches and commercial tourism aviation operations. This could potentially result in scheduling impacts, midair collision avoidance maneuvering, or, in a worst case scenario, aircraft mishaps.

The recreational use of UAVs has increased dramatically as they have become cheaper, smaller, and easier to operate. By 2020, the FAA anticipates the number of UAVs used in U.S. airspace to reach 30,000 and as of December 2015, over 406,000 people have registered their UAVs in the FAA registry. Unmanned aerial vehicle use nearby military installations with flight operations can create safety risks to personnel and aircraft if not utilized with care.

Although the FAA prohibits the use of UAVs over restricted airspace including national parks, military bases, and within a five-mile radius of medium and large airports, pilots and air traffic controllers in the U.S. reported approximately 150 incidents in 2014 in which UAVs flew too close to airports or aircraft. Technology can be utilized to limit the range of UAVs using geofencing, which uses Global Positioning System (GPS) or Radio Frequency (RF) identification to create a geographic boundary that location-aware devices know to avoid; however, few manufacturers have incorporated this technology in the UAV firmware as it is not required.

The preservation of recreational activities is a concern based on the military accomplishing its aviation mission and the community's desire to expand recreational aviation as a means of economic development.

Compatibility Assessment

Controlled airspace has been established in the Gulf Coast region to manage air traffic. The Keesler AFB Class D airspace extends in a five mile radius except where it intersects with the Gulfport-Biloxi International Airport (GPT) Class D airspace.

Sharing airspace has the potential to be compatible with the appropriate coordination between the private enterprise and the military. Currently, general aviation is able to use Keesler AFB flight routes in the airspace over Keesler AFB although general aviation may not land on the installation.

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

The FAA released rules for commercial UAV operations in August 2016. It sets a weight limit of 55 pounds, speed limit of 100 miles per hour, and height limit of 500 feet. Operators must keep the UAV in sight and avoid hazards, such as restricted airspace, airports, and other planes. It also requires UAV operators obtain certification. Private recreational UAV use remains regulated under the FAA Modernization and Reform Act of 2012.

Recreational activities on along the beach are influenced by beach vendors. Vendors must receive a vending permit through the Harrison County Sand Beach Authority.

Findings

- There is demand for airspace from tourism and recreation in Biloxi and throughout the Gulf Coast region.
- The FAA had adopted regulations for the recreational use of UAVs.
- Shared airspace can be compatible with Keesler AFB if coordinated with the installation.
- Beach vendors of recreational experiences are permitted through the Harrison County Sand Beach Authority.

ISSUE LAS-2	**Sand Beach Authority Awareness of Flight Restrictions** While the Harrison County Sand Beach Authority is responsible for the permitting of vendors on Sand Beach, there may be a lack of awareness of the flight restrictions proximate to Keesler AFB.

The Harrison County Sand Beach Authority provides various permits for the use of Sand Beach, including vending permits. Vendors are acknowledged as important aspects to the beach-going experience as they supply recreational equipment to visitors. While vendors receive their approval to provide recreational experiences to visitors through the Sand Beach Authority, there is a concern that the Sand Beach Authority does not have an awareness of the flight restrictions due to the beach's proximity to Keesler AFB. Without awareness of this restriction, there is potential for the Sand Beach Authority to permit vendors that sell or rent equipment that conflict with the Keesler AFB air space, such as UAVs. This could potentially result in scheduling impacts, midair collision avoidance maneuvering, or, in a worst case scenario, aircraft mishaps.

Compatibility Assessment

The Sand Beach Authority allows beach vending through the Vendor/Event Permit. Applicants must fill out the application which includes questions the type of business the applicant is applying for; however there are no listed business restrictions for the beach on the permit application.

Findings

- Beach vendors are permitted through the Harrison County Sand Beach Authority.
- The Sand Beach Authority issues a Vendor / Event permit which identifies the type of business or activity applied for.
- There are no listed business restrictions on the permit application.

Please see the next page.

Land Use (LU)

The basis of land use planning and regulation relates to the government's role in protecting the public's health, safety, and welfare. Local jurisdictions' general plans and zoning ordinances can be the most effective tools for preventing or resolving land use compatibility issues. These tools ensure the separation of land uses that are incompatible in character. Land use separation also applies where the use of one property may adversely impact the use of another. For instance, industrial uses are often separated from residential uses to avoid impacts from noise, odors, and lighting.

Key Terms

Land Use Planning. Land use planning stems from the Supreme Court decision of Euclid vs. Ambler which enabled jurisdictions to regulate land use through zoning land in order to protect the public's health, safety, morals, and welfare. Zoning is a land use regulation tool used by local jurisdictions that generally controls use, density, intensity, building heights, and setbacks on a parcel or lot. Most states enacted enabling legislation for local jurisdictions to also create and adopt general or comprehensive plans which are land use documents that broadly establish a vision, goals, policies, and implementation activities for a jurisdiction over a long range period of time, typically ten to twenty years, to promote compatible land use, guide growth and logical development.

Local jurisdictions' general plans and zoning ordinances are the most effective tools to avoid and resolve land use compatibility issues. These tools ensure similar and compatible land uses are properly located and can co-exist while separating land uses that differ significantly in use and potential nuisance.

Sensitive Land Uses. In terms of compatibility assessment, sensitive land uses are uses that are susceptible to, and effected by, nuisances such as noise, dust and air pollution. Sensitive land uses typically include residential areas, hospitals, convalescent homes and facilities, schools, libraries, churches, recreational areas, and other similar land uses.

Technical Background

Land use planning around military installations is similar to the process for evaluating other types of land uses. For instance, local jurisdictions consider compatibility factors such as noise when locating residential developments near commercial or industrial uses. As the land between local municipalities is developed—or the land between a local municipality and the perimeter of a military installation is developed both entities are affected. New residents, tenants, or building owners are typically not fully aware of the implications of locating in close proximity to an active military installation and / or training area.

Among the most pressing factors causing incompatibility with installations containing a military airfield are the proximate areas of encroaching development, as well as off-installation light pollution from that development which may impact the military operations. The development of land uses incompatible with the installations military operations threatens that installation's mission success and its continued existence.

ISSUE LU-1	**Potential for Incompatible Land Uses in Northern Accident Potential Zones** The City of D'Iberville does not have Comprehensive Plan policies or land development regulations to manage development within the Accident Potential Zones associated with the Keesler AFB airfield.

The City of D'Iberville is located in line with the runway at Keesler AFB, positioning parts of the city within Keesler AFB's APZ I and APZ II. The City of D'Iberville does not have land use regulations related to densities within Keesler AFB safety zones in their 2015 Comprehensive Plan or their 2012 Zoning Ordinance. Without guidance from a comprehensive plan or zoning regulations for densities, the City does not have a formalized method to restrict the scale of new development in Keesler AFB's safety zones. This

could lead to the development of residences, hotels, and other structures that attract high densities of people in D'Iberville, subjecting them to safety risks relative to aircraft operations from Keesler AFB.

APZ I mainly traverses the Back Bay, although the northern portion of the APZ is located over the City of D'Iberville. Existing land uses within this area are residential as well as some vacant land. The vacant land has the potential to be developed as an incompatible use as much of the vacant land located south of Brodie Road is zoned Waterfront District. The Waterfront District also has the potential to be incompatible if developed residentially as suggested in the 2015 Comprehensive Plan. This is not compliant with the density recommendations outlined in the Keesler AFB AICUZ Study, which recommend no residential development in the safety zones other than single-family detached dwellings at a maximum density of 2 units per acre in APZ II.

Current land uses in APZ II consist of vacant land, Commercial, Single-Family Residential, and Institutional, which includes D'Iberville Middle School. Although already present, there are Single-Family Residential land uses located west of Auto Mall Parkway that have densities greater than 2 dwelling units per acre, which is the recommended maximum density for single family residential units in APZ 11, making this use incompatible with the recommendations for APZ II. The Institutional land use is also not compliant with the AICUZ Study safety recommendations. In addition, although the vacant land is currently compliant with safety zones as there is no development, this land has the potential to be developed as a incompatible use as some of the vacant land is zoned Commercial. Commercial land uses could include hotels casinos, which are classified as Transient Lodging in the AICUZ Study and are not recommended in any of the safety zones. The area in APZ II is generally zoned Commercial, Single-Family Residential, and Interstate District, with some Multi-Family Residential.

Compatibility Assessment

There are no plans or policies related to development in Keesler AFB safety zones in D'Iberville.

Findings

- There are existing incompatible land uses in APZ I and APZ II within the City of D'Iberville.
- Without any regulations, there is the potential for incompatible land uses in these areas.
- There are no city regulations that could prevent the development of such land uses.

ISSUE LU-2

Lack of Safety Zones in Municipal Land Use Code

There are no safety zones in the City of Biloxi's Land Use Code.

Presently, the City of Biloxi does not have regulations in place for the development of land uses within Keesler AFB safety zones in the Land Development Ordinance.

The safety zones for Keesler AFB are identified in the 2010 Keesler AFB AICUZ Study. Within Biloxi, both CZs and APZ I extend into Biloxi, generally in areas that are already developed. To the northeast of the installation is the Oak Park neighborhood, which has multiple residences within the CZ. On the south end of the installation there are residential, commercial, and institutional uses, including an elementary school playground in the CZ. In addition, there are residential, commercial, institutional, and hotel land uses within the south APZ I. Residential uses in APZ I consist of both single-family and multi-family uses and institutional uses consisting of two churches.

Commercial uses, such as restaurants, and hotel uses are generally located along U.S. Highway 90 along the beach in APZ I.

Within the next 15 years, the City of Biloxi is projected to grow by approximately 50 percent in population, generating a need for more housing and amenities. Without regulations to discourage incompatible land uses in safety zones, there is the potential for additional incompatible land uses to be developed in the safety zones. This can increase the amount of residents that are vulnerable to aircraft mishaps, which can increase risks for residents and occupants in safety zones. In addition, intensified incompatible development can compromise flight operations at Keesler AFB if a mishap were to occur in the safety zones.

Compatibility Assessment

Within the Land Development Ordinance, the City of Biloxi has an Airport Airspace Overlay District. This overlay focuses on heights for development and does not incorporate Air Force land use guidelines, which include recommendations for development types, densities and intensities in safety zones.

The Keesler AFB AICUZ Study is updated every two years to reflect updates to operations on the installation. The AICUZ Study recommends that local communities, including the City of Biloxi, modify existing zoning ordinances to support compatible land uses in the AICUZ Study. The AICUZ Study includes a compatible land use table from which the City of Biloxi can guide development. Air Force land use compatibility guidelines within the safety zones are shown in Table 5-2. This table lists land uses that, if located within Keesler AFB safety zones (CZ, APZ I, APZ II) could create safety concerns for residents and the military.

Findings

- There are incompatible land uses in Keesler AFB safety zones.
- The City of Biloxi does not have a formal method of limiting densities and intensities in Keesler AFB safety zones.

Table 5-2 Recommended Land Uses for Airfield Safety Zones

Land Use		Suggested Land Use Compatibility[1]			
SLUCM No.	Land Use Name	Clear Zone	APZ I	APZ II	Density
10	Residential				
11	Household units				
11.11	Single units: detached	N	N	Y[2]	Maximum density of 2 Du/Ac
11.12	Single units: semi-detached	N	N	N	
11.13	Single units: attached row	N	N	N	
11.21	Two units: side-by-side	N	N	N	
11.22	Two units: one above the other	N	N	N	
11.31	Apartments: walk-up	N	N	N	
11.32	Apartment: elevator	N	N	N	
12	Group quarters	N	N	N	
13	Residential hotels	N	N	N	
14	Mobile home parks or courts	N	N	N	
15	Transient lodgings	N	N	N	
16	Other residential	N	N	N	
20	Manufacturing[3]				
21	Food and kindred products; manufacturing	N	N	Y	Maximum FAR 0.56 in APZ II
22	Textile mill products; manufacturing	N	N	Y	Maximum FAR 0.56 in APZ II
23	Apparel and other finished products; products made from fabrics, leather and similar materials; manufacturing	N	N	N	
24	Lumber and wood products (except furniture); manufacturing	N	Y	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II
25	Furniture and fixtures; manufacturing	N	Y	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II

Table 5-2 Recommended Land Uses for Airfield Safety Zones (continued)

Land Use		Suggested Land Use Compatibility[1]			
SLUCM No.	Land Use Name	Clear Zone	APZ I	APZ II	Density
26	Paper and allied products; manufacturing	N	Y	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II
27	Printing, publishing, and allied industries	N	Y	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II
28	Chemicals and allied products; manufacturing	N	N	N	
29	Petroleum refining and related industries	N	N	N	
30	Manufacturing[3] (continued)				
31	Rubber and miscellaneous plastic products; manufacturing	N	N	N	
32	Stone, clay, and glass products; manufacturing	N	N	Y	Maximum FAR 0.56 in APZ II
33	Primary metal products; manufacturing	N	N	Y	Maximum FAR 0.56 in APZ II
34	Fabricated metal products; manufacturing	N	N	Y	Maximum FAR 0.56 in APZ II
35	Professional, scientific, and controlling instruments; photographic and optical goods; watches and clocks	N	N	N	
39	Miscellaneous manufacturing	N	Y	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II
40	Transportation, communication, and utilities[3,4]				
41	Railroad, rapid rail transit, and street railway transportation	N	Y[6]	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II
42	Motor vehicle transportation	N	Y[6]	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II
43	Aircraft transportation	N	Y[6]	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II
44	Marine craft transportation	N	Y[6]	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II
45	Highway and street right-of-way	Y[5]	Y[6]	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II
46	Automobile parking	N	Y[6]	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II

Table 5-2 Recommended Land Uses for Airfield Safety Zones (continued)

Land Use		Suggested Land Use Compatibility[1]			
SLUCM No.	Land Use Name	Clear Zone	APZ I	APZ II	Density
47	Communication	N	Y[6]	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II
48	Utilities[7]	N	Y[6]	Y[6]	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II
48.5	Solid waste disposal (landfills, incinerators, etc.)	N	N	N	
49	Other transportation, communication, and utilities ***	N	Y[6]	Y	See note 6 below
50	Trade				
51	Wholesale trade	N	Y	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II
52	Retail trade – building materials, hardware and farm equipment	N	Y	Y	See note 8 below
53	Retail trade – including discount clubs, home improvement stores, electronics superstores, etc.	N	N	Y	Maximum FAR 0.16 in APZ II
53.	Shopping centers-Neighborhood, Community, Regional, Super-regional[9]	N	N	N	
54	Retail trade - food	N	N	Y	Maximum FAR 0.24 in APZ II
55	Retail trade – automotive, marine craft, aircraft, and accessories	N	Y	Y	Maximum FAR 0.14 in APZ I & 0.28 in APZ II
56	Retail trade – apparel and accessories	N	N	Y	Maximum FAR 0.28 in APZ II
57	Retail trade – furniture, home furnishings and equipment	N	N	Y	Maximum FAR 0.28 in APZ II
58	Retail trade – eating and drinking establishments	N	N	N	
59	Other retail trade	N	N	Y	Maximum FAR 0.16 in APZ II
60	Services[10]				
61	Finance, insurance and real estate services	N	N	Y	Maximum FAR 0.22 in APZ II
62	Personal services	N	N	Y	Office uses only. Maximum FAR 0.22 in APZ II
62.4	Cemeteries	N	Y[11]	Y[11]	

Table 5-2 Recommended Land Uses for Airfield Safety Zones (continued)

Land Use		Suggested Land Use Compatibility[1]			
SLUCM No.	Land Use Name	Clear Zone	APZ I	APZ II	Density
63	Business services (credit reporting; mail, stenographic, reproduction; advertising)	N	N	Y	Maximum FAR 0.22 in APZ II
63.7	Warehousing and storage services[(12)]	N	Y	Y	Maximum FAR 1.0 in APZ I; 2.0 in APZ II
64	Repair services	N	Y	Y	Maximum FAR 0.11 in APZ I; 0.22 in APZ II
65	Professional services	N	N	Y	Maximum FAR 0.22 in APZ II
65.1	Hospitals, nursing homes	N	N	N	
65.1	Other medical facilities	N	N	N	
66	Contract construction services	N	Y	Y	Maximum FAR 0.11 in APZ I; 0.22 in APZ II
67	Government services	N	N	Y	Maximum FAR 0.24 in APZ II
68	Educational services	N	N	N	
68.1	Child care services, child development centers, and nurseries	N	N	N	
69	Miscellaneous services	N	N	Y	Maximum FAR 0.22 in APZ II
69.1	Religious activities (including places of worship)	N	N	N	
70	Cultural, entertainment and recreational				
71	Cultural activities	N	N	N	
71.2	Nature exhibits	N	Y[13]	Y[13]	
72	Public Assembly	N	N	N	
72.1	Auditoriums, concert halls	N	N	N	
72.11	Outdoor music shells, amphitheaters	N	N	N	
72.2	Outdoor sports arenas, spectator sports	N	N	N	

Table 5-2 Recommended Land Uses for Airfield Safety Zones (continued)

Land Use		Suggested Land Use Compatibility[1]			
SLUCM No.	Land Use Name	Clear Zone	APZ I	APZ II	Density
73	Amusements – fairgrounds, miniature golf, driving ranges; amusement parks, etc.	N	N	Y[20]	
74	Recreational activities (including golf courses, riding stables, water recreation)	N	Y[13]	Y[13]	Maximum FAR 0.11 in APZ I; 0.22 in APZ II
75	Resorts and group camps	N	N	N	
76	Parks	N	Y[13]	Y[13]	Maximum FAR 0.11 in APZ I; 0.22 in APZ II
79	Other cultural, entertainment and recreation	N	Y[11]	Y[11]	Maximum FAR 0.11 in APZ I; 0.22 in APZ II
80	Resource production and extraction				
81	Agriculture (except livestock)	Y[4]	Y[14]	Y[14]	
81.5-81.7	Agriculture-Livestock farming, including grazing and feedlots	N	Y[14]	Y[14]	
82	Agriculture related activities	N	Y[15]	Y[15]	Maximum FAR 0.28 in APZ I; 0.56 in APZ II; no activity which produces smoke, glare, or involves explosives
83	Forestry activities[16]	N	Y	Y	Maximum FAR 0.28 in APZ I; 0.56 in APZ II; no activity which produces smoke, glare, or involves explosives
84	Fishing activities[17]	N[17]	Y	Y	Maximum FAR 0.28 in APZ I; 0.56 in APZ II; no activity which produces smoke, glare, or involves explosives
85	Mining activities[18]	N	Y[18]	Y[18]	Maximum FAR 0.28 in APZ I; 0.56 in APZ II; no activity which produces smoke, glare, or involves explosives
89	Other resource production or extraction	N	Y	Y	Maximum FAR 0.28 in APZ I; 0.56 in APZ II; no activity which produces smoke, glare, or involves explosives
90	Other				
91	Undeveloped land	Y	Y	Y	

Table 5-2 Recommended Land Uses for Airfield Safety Zones (continued)

Land Use		Suggested Land Use Compatibility[1]			
SLUCM No.	Land Use Name	Clear Zone	APZ I	APZ II	Density
93	Water areas[19]	N[19]	N[19]	N[19]	

Source: Air Force Instruction AFI 32-7063, Rev. December 2015

Key to Table:
SLUCM - Standard Land Use Coding Manual, US Department of Transportation.

Notes:

1. *A "Yes": (Y) or a "No" (N) designation for compatible land use is to be used only for general comparison. Within each, uses exist where further evaluation may be needed in each category as to whether it is clearly compatible, normally compatible, or not compatible due to the variation of the densities of people and structures. In order to assist air installations and local governments, general suggestions as to FARs are provided as a guide to density in some categories. In general, land use restrictions that limit occupants, including employees, of commercial, service, or industrial buildings or structures to 25 an acre in APZ I and 50 an acre in APZ II are considered to be low density. Outside events should normally be limited to assemblies of not more than 25 people an acre in APZ I and 50 people an acre in APZ II. Recommended FARs are calculated using standard parking generation rates for various land uses, vehicle occupancy rates, and desired density in APZ I and II. For APZ I, the formula is FAR = 25 people an acre / (Average Vehicle Occupancy x Average Parking Rate x (43560/1000)). The formula for APZ II is FAR = 50/ (Average Vehicle Occupancy x Average Parking Rate x (43560/1000)).*
2. *The suggested maximum density for detached single-family housing is two Du / Ac. In a planned unit development (PUD) of single-family detached units, where clustered housing development results in large open areas, this density could possibly be increased slightly provided the amount of surface area covered by structures does not exceed 20 percent of the PUD total area. PUD encourages clustered development that leaves large open areas.*
3. *Other factors to be considered: labor intensity, structural coverage, explosive characteristics, air pollution, electronic interference with aircraft, height of structures, and potential glare to pilots.*
4. *No structures (except airfield lighting and navigational aids necessary for the safe operation of the airfield when there are no other siting options), buildings, or above-ground utility and communications lines should normally be located in Clear Zone areas on or off the air installation. The Clear Zone is subject to the most severe restrictions.*
5. *Roads within the graded portion of the Clear Zone are prohibited. All roads within the Clear Zone are discouraged, but if required, they should not be wider than two lanes and the rights-of-way should be fenced (frangible) and not include sidewalks or bicycle trails. Nothing associated with these roads should violate obstacle clearance criteria.*
6. *No above ground passenger terminals and no above ground power transmission or distribution lines. Prohibited power lines include high-voltage transmission lines and distribution lines that provide power to cities, towns, or regional power for unincorporated areas.*
7. *Development of renewable energy resources, including solar and geothermal facilities and wind turbines, may impact military operations through hazards to flight or electromagnetic interference. Each new development should to be analyzed for compatibility issues on a case-by-case basis that considers both the proposal and potentially affected mission.*
8. *Within SLUCM Code 52, maximum FARs for lumberyards (SLUCM Code 521) are 0.20 in APZ-I and 0.40 in APZ-11; the maximum FARs for hardware, paint, and farm equipment stores, (SLUCM Code 525), are 0.12 in APZ I and 0.24 in APZ II.*
9. *A shopping center is an integrated group of commercial establishments that is planned, developed, owned, or managed as a unit. Shopping center types include strip, neighborhood, community, regional, and super-regional facilities anchored by small businesses, a supermarket or drug store, discount retailer, department store, or several department stores, respectively.*
10. *Ancillary uses such as meeting places, auditoriums, etc. are not recommended.*
11. *No chapels or houses of worship are allowed within APZ I or APZ II.*

12. *Big box home improvement stores are not included as part of this category.*
13. *Facilities must be low intensity, and provide no playgrounds, etc. Facilities such as club houses, meeting places, auditoriums, large classes, etc., are not recommended.*
14. *Activities that attract concentrations of birds creating a hazard to aircraft operations should be excluded.*
15. *Factors to be considered: labor intensity, structural coverage, explosive characteristics, and air pollution.*
16. *Lumber and timber products removed due to establishment, expansion, or maintenance of Clear Zone lands owned in fee will be disposed of in accordance with applicable DoD guidance.*
17. *Controlled hunting and fishing may be permitted for the purpose of wildlife management.*
18. *Surface mining operations that could create retention ponds that may attract waterfowl and present bird/wildlife aircraft strike hazards (BASH), or operations that produce dust or light emissions that could affect pilot vision are not compatible.*
19. *Naturally occurring water features (e.g., rivers, lakes, streams, wetlands) are pre-existing, nonconforming land uses. Naturally occurring water features that attract waterfowl present a potential BASH. Actions to expand naturally occurring water features or construction of new water features should not be encouraged. If construction of new features is necessary for storm water retention, such features should be designed so that they do not attract waterfowl.*
20. *Amusement centers, family entertainment centers or amusement parks designed or operated at a scale that could attract or result in concentrations of people, including employees and visitors, greater than 50 people per acre at any given time are incompatible in APZ II.*

ISSUE LU-3

Encroachment of Keesler AFB Natural Gas Line

A High Pressure Natural Gas Line runs 12 miles from the City of Gulfport through the City of Biloxi to Keesler AFB, traversing private properties including a single-family residence. Keesler AFB has no control over the easement to ensure it remains free of encroachments.

Keesler AFB utilizes natural gas, which is derived from a commercial vender. The natural gas is carried to the installation through a 12.5 mile gas line extending from within the City of Gulfport through the City of Biloxi, into Keesler AFB. The Air Force owns a utility easement for the natural gas pipeline to Keesler AFB, which is a 30-foot wide along the length of the pipeline.

The easement, which has been present since the 1950s, traverses a single-family residential property; part of a home is built over the easement. The placement of the structure over the easement can create safety risks to residents as natural gas can cause accidents that, although low in probability, could generate high risks. In addition, Keesler AFB is liable for the repair and maintenance of the pipeline, giving the installation access to the pipeline, even parts of the easement that traverses private residential property. Although the easement traverses residential property, the placement does not restrict the availability of natural gas to the installation.

Due to the permitted easement on residential property, there is potential for future encroachment onto the easement, further exacerbating safety risks to residents.

Compatibility Assessment

Although Keesler AFB has ownership over the easement, the installation has no control over encroachment on the easement. Currently, the City of Biloxi does not provide disclosures for homes or other structures that are located on utility easements. Due to this, property owners or tenants may not be aware that they are exposed to potential risks due to natural gas or that regular maintenance is required to pipelines on their property.

The natural gas pipeline regularly undergoes condition assessments and leak detection survey to ensure the integrity of the pipeline. This is a preventive measure, although there is still potential for failures with the pipeline. Easements are able to be rerouted; however, rerouting this particular easement would require the removal of all structures over the easement. Keesler AFB has considered the privatization of the easement, but has not yet had the opportunity to do so.

Findings

- The natural gas pipeline that serves Keesler AFB is routed through residential properties.
- Regular maintenance is conducted on the pipeline.
- There are no regulations for the placement of utility easements on residential property.
- There are no disclosures related to utility easements on private property.

Please see the next page.

Light and Glare (LG)

This factor refers to man-made lighting (street lights, airfield lighting, building lights) and glare (direct or reflected light) that disrupts vision. Light sources from commercial, industrial, recreational, and residential uses at night can cause excessive glare and illumination, impacting the use of military night vision devices and air operations. Conversely, high intensity light sources generated from a military area (such as ramp lighting) may have a negative impact on the adjacent community.

Key Terms

Glare. The presence of excessively bright light, such as direct or reflected sunlight, or artificial light, such as sport field and stadium lights at night. Glare reduces visibility and can completely impair vision when very intense.

Light Pollution. This type of pollution is created by the artificial brightening of sky caused by development, including street lights and other man-made sources. This has a disruptive effect on the natural cycles and inhibits the observation of stars and planets and can render night vision devices ineffective.

Night Vision Device. An optical instrument that allows images to be produced in varying levels of light approaching darkness. These devices are often used by military and law enforcement agencies.

Technical Background

In measuring light pollution, the proximity to a community has a significant effect on the amount of light pollution that saturates the sky. Proximity twice as close to a community makes its sky glow appear approximately six times brighter.

Sky glow from communities typically diminishes in the later hours of the night, when businesses close and some lights are turned off. It follows that, as development continues to progress outward from a community, the area and amount of light pollution can increase. Increased light pollution can cause an increase in the amount of sky glow, and ultimately create compatibility issues with military missions.

The impacts of the use of outdoor lighting on the dark skies are primarily determined by two principal factors – the amount of developed land (density) and the distance of the developed land from the installation. The relationship between density and distance is best demonstrated using an estimate of urban sky glow called Walker's Law. The relationship captured through the use of this formula was developed based on measurements of sky glow for a number of cities in California. The following formula is used to estimate sky glow at an observing site looking at a zenith angle of 45 degrees toward an urban source:

I=C x P x R^(n)

Where:

I = Percent increase of the night sky brightness above the natural background, at 45°down from directly overhead (facing the community, directly overhead is roughly 1/4 of this value),

P = Population of the community,

R = Distance, in kilometers, from the observing site to the center of the community,

"C" = 0.01 for "R" values between 10 and 50 km, and

"n" = -2.5 for "R" values between 10 and 50 km

According to the National Oceanic and Atmospheric Administration (NOAA), the assumed radius of a community is a function of its population, ranging from 2.5 km to 24 km. Walker's law applies if the installation is outside the

city radius. If located inside the community radius, the sky glow increases in a linear manner toward the center by another factor of 2.5.

Consider the following examples:

Scenario 1: A 100-acre development located two kilometers from the installation with a density of six units per acre (assuming 2.5 persons per household) would impact the sky background by over 260 percent (nearly 663 percent with NOAA factor).

Scenario 2: A 100-acre development located 20 kilometers from the installation with a density of six units per acre (assuming 2.5 persons per household) would impact the sky background by approximately less than 1 percent (just over 2 percent with NOAA factor).

If the density was decreased to one unit per acre the resulting scenarios would result in the following increased sky glow:

Scenario 1: Approximately 44 percent (almost 111 percent with NOAA factor).

Scenario 2: Approximately less than 1 percent (still less than 1 percent with NOAA factor).

In general, the following trends are demonstrated:

- The more dense the urban development, the greater the potential for light intrusion.
- The closer development is to the installation, the greater the potential for light intrusion.

ISSUE LG-1	**Reflective Building Materials Causing Glint and Glare** Extensive use of highly-reflective building materials such as colored glass on commercial developments can create glint and glare which can affect pilot visibility and is of concern on aircraft approaches.

Building materials have the potential to create glint and glare, which can impact pilots' visibility. Building materials are particularly of concern for buildings that are within Keesler AFB lines of sight. Casinos and resort hotels are prolific in Biloxi and beginning to increase in the City of D'Iberville. These types of buildings often have large expanses of glass windows and other types of building materials that may be chosen for aesthetics.

Compatibility Assessment

Approach and Departure corridors for Keesler AFB in D'Iberville have areas within the Waterfront and Commercial Zoning Districts, both of which can lead to the development of buildings that utilize various materials, which could be reflective or create glare. The City of D'Iberville Zoning Ordinance states under Article 12L Architectural Standards that the design and materials for the construction of a building are subject to the approval of the Development Review Committee, although materials specifically related to glare is not specified in the ordinance.

Within the southern Approach and Departure corridors for Keesler AFB in the City of Biloxi is land within the Commercial Business Zoning District. The City of Biloxi only regulates architecture within the established Architectural / Historic Overlay District. Uses which may contribute to pilot glint and glare are not restricted within the Keesler AFB Approach and Departure corridors.

Findings

- Casino and hotel resorts exist in Keesler AFB's runway approach and departure corridors.
- Local jurisdictions do not specifically regulate building materials relative to the flight mission at Keesler AFB.

ISSUE LG-2	**Reflective Materials from Solar Farms**
	Reflective panels on large-scale solar farm developments can create glint and glare which can affect pilot visibility and is of concern on aircraft approaches. A solar farm is proposed approximately five miles north of Keesler AFB.

Glare produced by sunlight reflected from untreated solar photovoltaic panels can cause blinding conditions and other secondary visual problems like temporary after-image or retinal burn.

Reflectivity refers to light that is reflected off of surfaces. The potential impacts of reflectivity are glint and glare which can cause a brief loss of vision. The primary concern with this issue is if this loss of vision occurs when operating vehicles or other machines in the area including aircraft. This temporary vision impairment can increase the risk profile in this area for accidents. Solar energy facilities could cause substantial amounts of glare depending on their type, location, angle and direction, resulting in a reduction of a pilot's view, even at a very high altitude.

The amount of reflectivity varies greatly among solar technologies with concentrated solar power technologies being highly reflective and photo voltaic (PV) being primarily absorptive. Because solar energy projects introduce new visual surfaces to the airport setting where reflectivity could result in glare that causes flash blindness episodes on pilots or air traffic controllers, reflectivity requires study during project siting and design. The amount of analysis will depend on site-specific conditions.

There is a 57-acre solar farm considered north of I-10 in Biloxi. The solar farm would be part of an energy project for the city, which would harness solar energy for powering the city's fleet of vehicles. While this proposal is still in its infancy, it underscores the need for a collaborative approach with Keesler AFB.

Compatibility Assessment

To avoid potential mission impacts, the Air Force collaborates with federal regulatory agencies, state and local governments, and the business community to communicate concerns early in the planning and development process and achieve compatible solutions. The siting of solar farms in proximity to military installations is subject to review by the DoD Energy Siting Clearinghouse. The main responsibility of the DoD Energy Siting Clearinghouse is to comprehensively review and evaluate proposed energy projects and their possible effects on DoD operations. For solar projects, factors that would need to be submitted to the Clearinghouse are the heights of the solar panels, the layout of the solar project, the solar array acreage, and the overall nature of the project. All proposed projects within military training routes or airspace must undergo the formal review process, which would determine whether or not the project would obstruct the navigable airspace based on various factors. With this process in place, it is unlikely that a project would be approved that would greatly impact the mission of the Air Force at Keesler AFB.

On the local level, the City of Biloxi has an Airport Overlay District, which is identified as the Height Hazard Overlay. Within this district, uses cannot create glare for pilots at Keesler AFB during takeoffs or landings. Glare related use, such as solar farms, related to aviation are not addressed for other parts of the city.

Solar use in D'Iberville is regulated as an accessory use and is restricted in height. Solar farms and the effects of the materials on aviation are not addressed in the Zoning Ordinance.

Findings

- A solar farm is being considered proximate to Keesler AFB.
- Local jurisdictions do not have ordinances that regulate solar farms.

ISSUE LG-3	**Ambient Lighting Surrounding Keesler Air Force Base**
	Ambient lighting from sources surrounding Keesler AFB including electronic billboards can affect pilot visibility and the performance of night vision equipment.

Light pollution, the upward and outward distribution of light, either directly from fixtures, such as uplighting without terminus on buildings, or from reflection off the ground or other surfaces, can interfere with military mission activities such as night time training activities and can temporarily impair pilot's vision, causing pilot confusion with night vision instrumentation or equipment. This is especially an issue during takeoffs and landings. It is important that pilots train at night to simulate real combat scenarios.

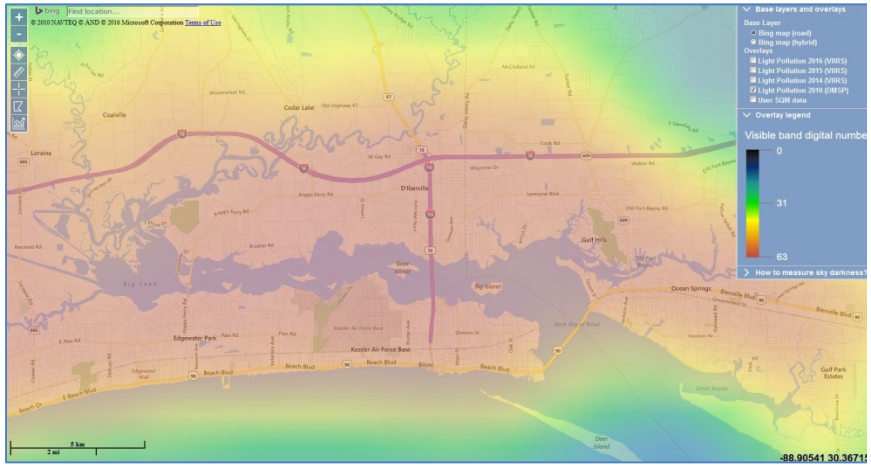
Although pilots are able to do night training despite intensifying urban development around Keesler AFB, the overall ambient light in the area has impacted effectiveness of night training equipment. The base has even conducted training at Stennis due to ambient lighting around Keesler AFB.

Urban development around Keesler AFB has intensified the amount of nighttime ambient light in the surrounding area as evidenced in the following 2010 and 2016 satellite imagery. The sophistication of satellite imagery improves the precision of the 2016 imagery compared to the 2010 imagery, but there is also increased intensity at certain locations. Between 2010 and 2016, ambient nighttime lighting levels have intensified in various locations in both Biloxi and D'Iberville. In Biloxi, ambient lighting has increased at Keesler AFB as well as along the waterfront, the downtown area, and Woolmarket. In D'Iberville, ambient lighting has increased along the I-110 stretch.

Unshielded lighting systems, lighting systems that are not planned with minimizing sky glow, or excess or wasteful light emission and LED billboards can contribute to an increased amount of ambient light in the sky. This increase in ambient light in the sky can degrade the natural environment for stargazers, observatory operations, and night time flying operations or nighttime training. Adverse light impacts can be experienced both on-installation and off-installation – generated from the community affecting military operations and experienced by the community generated from the installation.

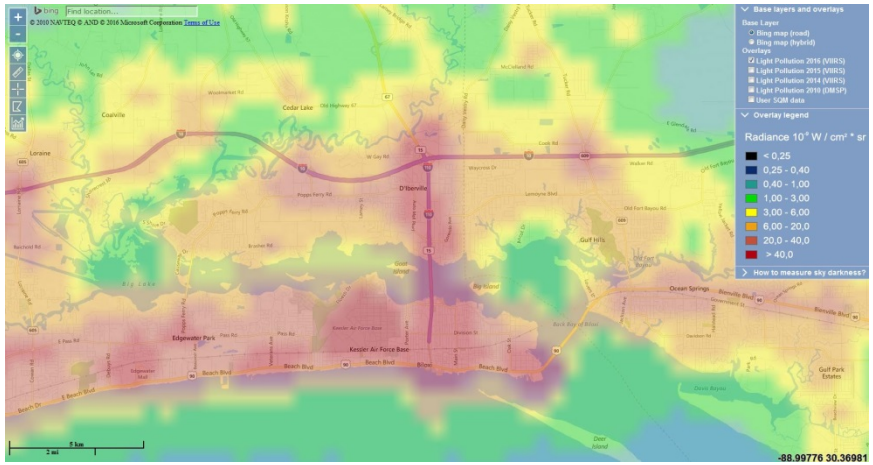
There are many factors that contribute to excess nighttime light that can interfere with nighttime training and night vision equipment. The types of exterior lights used, their distance from the installation, and the times at which they are left on all play an important role in how much ambient light impacts activity at the installation. The amount of ambient light experienced on the ground is a function of:

- intensity of nearby light sources (up to 20 miles away);
- distance from the sources;
- spectra of the light sources (blue light decays faster in the atmosphere);
- density of the cloud deck;
- height of the cloud; and
- relative humidity.



2010 Light Pollution surrounding Keesler AFB

Source: http://www.lightpollutionmap.info Data Earth Observation Group, NOAA National Geophysical Data Center



2016 Light Pollution surrounding Keesler AFB

Source: http://www.lightpollutionmap.info Data Earth Observation Group, NOAA National Geophysical Data Center

Compatibility Assessment

Though the Air Force does not have recommended lighting standards to reduce the impact of community lighting on night training, shielded downward facing lighting that reduces sky glow and improves the overall ambient light conditions are considered effective measures. Local jurisdictions can employ lighting regulations and dark skies ordinances to reduce the upward impact of night lighting and lighting intensity of Light Emitting Diode (LED) billboards.

The City of Biloxi has an ordinance for signs, which states that flashings signs, therefore LED billboards, although allowed in the city, cannot flash, which could create further distraction to pilots. In addition, billboards, including LED billboards, are not allowed along freeways.

The City of D'Iberville also has an ordinance for signs and billboards, although there are no specifications for lighting on billboards. In general, signs that exhibit confusing lighting that may affect visibility are not allowed in the city. This could include LED billboards that flash or include similar movements that could confuse aircraft pilots.

In addition to municipal ordinances, the International Dark-Sky Association (IDA) is an organization dedicated to the education and promotion of dark skies and dark sky preservation. The IDA has worked with communities around the world to develop methods for reducing light pollution. IDA-approved light fixtures are typically more expensive than less efficient fixtures during initial purchase, which is one reason people chose not to install them; however, energy costs could be recovered as early as one year after installation.

Findings

- The community around Keesler AFB is mainly developed, creating ambient lighting.
- Surrounding jurisdictions have ordinances in place that address nighttime lighting.

ISSUE LG-4	**Light Emissions from Event Sources**
	Light emissions from fireworks and laser shows have the potential to disrupt Keesler AFB flight operations.

Unique sources of light, including fireworks and laser shows, can be hazardous to pilots and flight operations at Keesler AFB. As a city with a large tourism base, the Biloxi often hosts events throughout the city, such as at the MGM Stadium. Due to the events that occur at the stadium, there are occasionally displays of fireworks that occur during nighttime. The MGM stadium is home to the Biloxi Shuckers baseball team, whose season is from the beginning of April to the beginning of September. In addition, the stadium hosts college games from February to March and high school games in March. During these seasons, the frequency of fireworks may increase. Fireworks displays also occur during city wide events such as Fourth of July celebrations.

In addition to fireworks, some casino resorts will conduct laser shows from the buildings. The concentrated beam of light emitted from lasers can, at a minimum, be temporarily blinding.

Compatibility Assessment

The City of Biloxi has an ordinance for the "Illumination of Outdoor Sports Fields and Performance Areas", which states that all light fixtures shall have glare control, such as through shields, and that the lighting is directed so that it falls within the main playing or performing area. In addition, lighting for games or events cannot continue after an hour past the end of the event. This does not specify lighting through lasers.

The City also has an ordinance for fireworks, which states that the discharge of fireworks is generally not allowed within the City of Biloxi unless granted permission by the mayor and notified to the city council. A permit would authorize the use of fireworks for display.

The use of fireworks in D'Iberville is also prohibited unless first authorized by the city manager and then approved by both the city manager and the city council as stated in the Code of Ordinances.

There are currently no policies in place that address the use of lasers on buildings in Biloxi or D'Iberville.

Findings

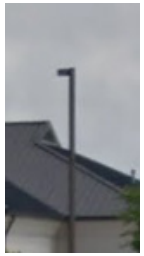
- The City of Biloxi Code of Ordinances regulates the use of fireworks in Biloxi.
- The City of D'Iberville Code of Ordinances regulates the use of fireworks in D'Iberville.
- There are no regulations for the use of lasers in local jurisdictions.

ISSUE LG-5

Keesler Air Force Base Outdoor Lighting

Lighting from Keesler AFB along Irish Hill Drive illuminates outside the installation creating light pollution in the community.

Light systems that are unshielded and / or lighting systems that are not planned with considerations for minimizing sky glow or excess light emissions on the installation can contribute to an increased amount of ambient light in the sky. Lighting from the installation particularly affects the community that is located on Irish Hill Drive, which is directly south of the installation.



Within the installation there are at least four types of lighting that are situated near the perimeter of the installation. On the south perimeter of the installation, Ploesti Drive is lined with street lights that are not shielded. There are over 30 of these lights that extend from the west end of the installation, along Ploesti Drive up to where Ploesti Drive turns into M Street. These light poles have a height that is greater than the fence, but are generally pedestrian scaled. These light poles are located about 50 to 70 feet from the Keesler AFB fenceline. There is a project scheduled for May 2017 that will replace these existing lights with LED fixtures.

In addition to the lights that are located along Ploesti Drive, there are parking lots that are located on the south end of the installation that have light poles that are taller in height. These lights are shielded downward, directed on the parking lot. The closest of these lights to the Keesler AFB fenceline are positioned about 80 feet from the fenceline.

There are light fixtures located on three basketball courts and three volleyball courts on Ploesti Drive that are unshielded. These lights are about the same height as the parking lot lights, are affixed with two lights for each pole, and are angled upwards. Each court has about six light poles, totaling 12 lights per court. The closest of these lights to the Keesler AFB fenceline is positioned about 200 feet from the fenceline.

Also along Ploesti Drive are two softball fields that have unshielded flood lights. There are about 16 of these light poles surrounding both fields. Each light pole is affixed with four flood lights, totaling over 60 lights. The closest of these lights to the Keesler AFB fenceline is positioned about 200 feet from the fenceline. Keesler AFB has realigned the lights on the softball fields.

Although there are many instances of unshielded lighting on the installation that can affect the community along Irish Hill Drive, there is also unshielded lighting along Irish Hill Drive in Biloxi that also has the potential to affect residents. This lighting is located along Irish Hill Drive, both on the north and south side of the street. There are types of lighting on both sides of the street that are not shielded.

In addition there is some unshielded lighting at the Biloxi Junior High School that lights the tennis courts and field adjacent to Irish Hill Drive.

Compatibility Assessment

The Department of Defense's Unified Facilities Criteria (UFC) 3-530-01 is the instruction manual for DoD installations regarding interior and exterior lighting systems. This UFC establishes guidelines and instructions for the DoD to renovate, construct, budget, and maintain the lighting systems on its installations. The utmost goal and priorities for both the exterior and interior lighting systems is:

Design exterior and interior lighting systems to minimize energy consumption, reduce maintenance costs, improve lighting quality on DoD Installations, at the lowest life cycle cost.

Some renovations that the DoD requires includes but is not limited to timers for lights, utilizing fully cutoff fixtures, and using LED lighting fixtures to reduce energy consumption and wasteful light emission.

Any renovations or additions regarding lighting systems is required to comply with the guidelines established in the UFC 3-530-01 Interior and Exterior Lighting Systems and Controls.

Findings

- Unified Facility Criteria has instructions for lighting that reduce excessive light emissions.
- Keesler AFB has a project scheduled for May of 2017 to replace the existing lights with LED fixtures.
- Keesler AFB has realigned the lights that are located on the softball fields.

ISSUE LG-6

Lighting for Proposed Parking Lot for Keesler Air Force Base Medical Center

A new parking lot is proposed on the north end of Keesler AFB for the Keesler Medical Center, creating potential lighting concerns for the adjacent Oak Park neighborhood.

The installation is planning to add a new parking lot to the base for the Keesler Medical Center located on the north end of the installation. The addition of the parking lot will include pole lighting, which will have to meet UFC 3-530-01 Interior and Exterior Lighting Systems and Controls.

Regardless of the criteria, the lighting may impact Oak Park neighborhood, which is located adjacent to the installation on the north end.

Compatibility Assessment

The Department of Defense's Unified Facilities Criteria (UFC) 3-530-01 Interior and Exterior Lighting Systems and Controls has requirements for parking lot lighting. According to the UFC, lighting must be fully shielded to control glare and the trespassing of light onto areas that are not parking lots. In addition, lights must be automatically reduced by a minimum of 30% from midnight or within one hour of normal closing, until 6 a.m., or normal opening. Lights should also be automatically reduced when there is no activity detected for a time no longer than 15 minutes. The criterion also describes lighting that should be used to minimize light trespass on property neighboring the parking lot, which would be the Oak Park neighborhood in this scenario.

Findings

- The addition of a new parking lot would require pole lighting.
- Unified Facility Criteria has guidelines for parking lot lighting, which would reduce the amount of light trespassing onto neighboring property.

Noise (NOI)

Sound that reaches unwanted levels is referred to as noise. The central issue with noise is the impact, or perceived impact, on people, animals (wild and domestic), and general land use compatibility. Exposure to high noise levels can have a significant impact on human activity, health, and safety. The decibel (dB) scale is used to quantify sound intensity. To understand the relevance of decibels, a normal conversation often occurs at 60 dB, while an ambulance siren from 100 feet away is approximately 100 dB. Noise associated with military operations (arrival/departure of military aircraft, firing of weapons, etc.) may create noises in higher dB ranges.

Key Terms

Ambient Noise. Ambient noise is the total noise associated with an existing environment (built or natural) and usually comprised of sounds from many sources, both near and far.

Attenuation. Attenuation is a reduction in the level of sound resulting from an object's distance from the noise source or absorption by the surrounding topography, the atmosphere, barriers, construction techniques and materials, and other factors. Sound attenuation in buildings can be achieved through the use of special construction practices that reduce the amount of noise that penetrates the windows, doors, and walls of a building. Sound attenuation measures may be incorporated during initial construction for new buildings or as additional construction for existing buildings.

A-weighted decibel. The A-weighted decibel (dBA) is the most commonly weighted sound filter used to measure perceived loudness versus actual sound intensity. The human ear responds differently to frequencies. For example, the human hearing system perceives mid-frequency sounds as louder than low and high frequency sounds. To accommodate this condition when measuring sound levels, filters need to be installed into sound meters. The results are a more accurate measurement of sound for the human hearing system.

C-weighted Day-Night Average Sound Level. The C-weighted Day-Night Average Sound Level (CDNL) noise metric is used for demolition and large caliber weapons to assess the low-frequency energy produced from such activities. The CDNL is an annual average noise dose from range operations and is intended for long-term land use planning.

Day-Night Average Sound Level. Day-night average sound level (DNL) represents an average sound exposure over a 24-hour period. During the nighttime period (10:00 p.m. to 7:00 a.m.), averages are artificially increased by 10 dB. This weighting reflects the added intrusiveness and the greater disturbance potential of nighttime noise events attributable to the fact that community background noise typically decreases by 10 dB at night.

Decibel. A decibel (dB) is the physical unit commonly used to describe noise levels. It is a unit for describing the amplitude of sound, as heard by the human ear.

Noise Contour. Noise contours consist of noise impact lines constructed by connecting points of equal noise level measured in dB and identify areas on a map that fall within that particular dB noise contour.

Noise-Sensitive Uses. Noise-sensitive uses are locations and uses typically more sensitive to noise, including residential areas, hospitals, convalescent homes and facilities, schools, libraries, churches, recreational areas, and other similar land uses.

NOISEMAP Program. The Department of Defense (DoD) noise models are based on NOISEMAP technology, using linear acoustics and an integrated formulation to determine the impact of noise.

Technical Background

Sound is defined as the mechanical energy transmitted by pressure waves in a compressible medium, such as air. More simply stated, sound is what we hear. As sounds reach unwanted levels, this is referred to as noise.

The central issue of noise is the impact, or perceived impact, on people, animals (wild and domestic), and general land use compatibility. Exposure to high noise levels can have a negative impact on human activity, health, and safety.

Due to the technical nature of this compatibility factor and its importance to the JLUS process, this section provides a discussion of the characteristics of sound and the modeling process used to evaluate noise impacts.

Characteristics of Sound

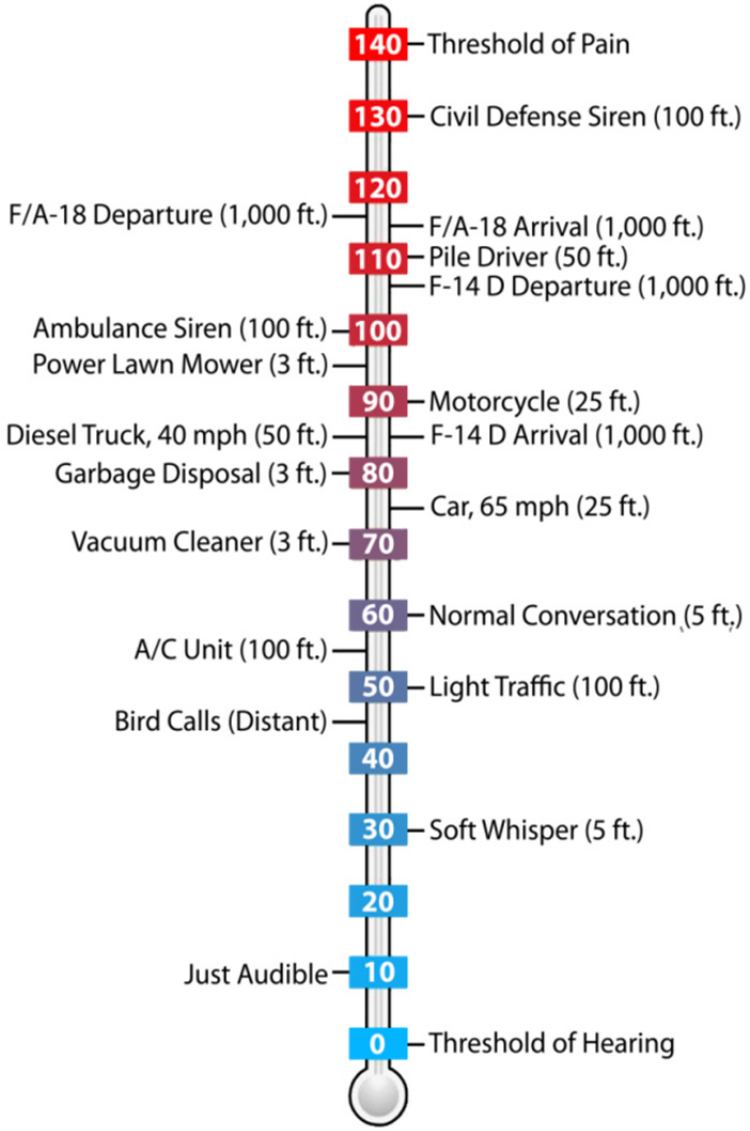
It is important to understand that there is no single perfect way to measure sound due to variations used by different entities when conducting sound studies or sound modeling. Sound is characterized by various parameters that include the oscillation rate of sound waves (frequency), the speed of propagation, and the pressure level or energy content (amplitude). The sound pressure level has become the most common descriptor used to characterize the loudness of an ambient sound level. The decibel (dB) scale is used to quantify sound intensity. Because sound pressure can vary by over one trillion times within the range of human hearing, a logarithmic loudness scale, i.e., the dB scale, is used to present sound intensity levels in a convenient format.

The human ear is not equally sensitive to all frequencies within the entire spectrum, so noise measurements are weighted more heavily within those frequencies of maximum human sensitivity in a process called “A-weighting” (dBA). The human ear can detect changes in sound levels of approximately 3-dBA under normal conditions. Changes of 1 to 3-dBA are typically noticeable under controlled conditions, while changes of less than 1-dBA are only discernible under controlled, extremely quiet conditions.

A change of 5-dBA is typically noticeable to the average person in an outdoor environment. Figure 5-5 summarizes typical A-weighted sound levels for a range of indoor and outdoor activities.

Environmental noise fluctuates over time. While some noise fluctuations are minor, others can be substantial. These fluctuations include regular and random patterns, how fast the noise fluctuates, and the amount of variation. Weather patterns can have a strong effect on how far sound travels and how loud it is. Certain weather events can change the consistency of the air and either cause sound to travel further and be louder or reduce the distance traveled and the level at which the sound can be heard. Temperature and wind velocity are prime examples of factors that can affect sound travel. Sound tends to travel further in cold temperatures. Specific combinations of temperature and wind direction can create atmospheric refraction. Atmospheric refraction occurs when atmospheric conditions bend and/or focus sound waves towards some areas and away from others. When describing noise impacts, it is common to look at the average noise levels over an entire average day.

Figure 5-5. Sound Levels Comparison in dB



ISSUE NOI-1	**Noise from Keesler Medical Center Generators** Monthly testing of the Keesler Medical Center generators creates noise which impacts residents in the adjacent Oak Park neighborhood.

The Keesler Medical Center, which is located at the north end of Keesler AFB, utilizes diesel generators as a backup power supply for the facility. As part of the maintenance routine for the generators, they are tested once a month. The test is conducted on generators concurrently. On a quarterly basis, the generators must also undergo a day long test. Both types of tests are conducted during day time hours. The testing of the generators creates noise, which is audible by residents in the Oak Park neighborhood adjacent to the installation. There have been complaints from neighbors regarding the noise generated by the testing of the generators.

The diesel generators were once located in the basement of the Keesler Medical Center, dampening the sound that is emitted outside the facility during testing. Due to the flooding the occurred during Hurricane Katrina, the generators were relocated above ground level and to the immediate north of the Keesler Medical Center in close proximity to the northern fence line of Keesler AFB.

Compatibility Assessment

After Hurricane Katrina, the installation established construction standards to ensure that new construction at Keesler AFB can withstand more robust hurricanes and storms in the future. As a part of these standards, the Keesler Medical Center generators were relocated from the basement of the Keesler Medical Center to outside of the building where they would not be below ground subject to flooding.

Because the noise can now travel from the location of the generators, the installation has since installed baffles on the generators to reduce noise. Although installed, noise from tests can still be heard in the adjacent

Oak Park neighborhood. The installation uses the quarterly town hall meetings, email, and social media to communicate to Oak Park residents when monthly and quarterly test runs will be conducted.

The testing of the generators must be compliant with Air Force Instruction (AFI) 32-1062 Electrical Systems, Power Plant and Generators, which includes operation and maintenance requirements for power systems. In addition to following this instruction, medical facilities must also comply with UFC 4-510-01 Design: Military Medical Facilities, which details policies and procedures for programming, planning, design, and construction of Military Medical Facilities. This includes policies for engine generator sets. According to the UFC, engine generator sets for Military Medical Facilities must be powered by diesel fuel. For the location of generators, it is stated that generator sets must be located "in the central energy plant serving the Military Medical Facility, provided that the plant is located sufficiently close to the structure to minimize line losses and prevent excessive cable runs." In addition, the UFC suggests locating generator sets at a higher elevation "in coastal regions subject to storm surge."

In addition to the DoD standards for generators, the Keesler Medical Facility also follows the National Fire Protection Association standards, NFPA 110 Standard for Emergency and Standby Systems. NFPA 110 provides installation, maintenance, operation, and testing requirements for emergency or standby power supply systems (EPSS).

Due to the nature of operations at Keesler AFB, the Public Affairs Office for the 81st Training Wing follows the Public Affair Operating Instructions 35-5, which outlines procedures for noise complaints that are generated from aircraft and procedures for non-aircraft noise complaints. These procedures follow the same notification and feedback steps as for aircraft complaints, which are to call the complainant back and inform them of any steps taken and information discovered regarding the noise. These actions are recorded in the Public Affairs activities log. This action is used to track complaints and to ensure that appropriate measures are taken for each complaint.

The neighborhood is notified by the Public Affairs Office, via email, of the day and time that the generators will be tested. The email notifications are provided to residents of the Oak Park Neighborhood, as well as Biloxi City Councilmen, City of Biloxi Public Affairs, and the Biloxi Police Department. Notifications are sent out once the Public Affairs Office for the 81st Training Wing is notified of the tests, which is generally three to four days from the testing.

Source: http://www.nfpa.org/

Findings

- Generator testing creates noise that has resulted in noise complaints from residents in the Oak Park neighborhood.
- Keesler AFB must comply with AFI 32-1062 for the operation and maintenance of generators.
- Keesler AFB must comply with UFC 4-510-01 for the type and location of generators for Military Medical Facilities.
- Keesler AFB Public Affairs Office for the 81st Training Wing has procedures in place for addressing and documenting noise complaints.
- Keesler AFB Public Affairs Office for the 81st Training Wing releases notifications when the generators are scheduled to be tested.

ISSUE NOI-2	**Noise from Chiller on Keesler Air Force Base** The chiller for Arnold Hall is located outside the building approximately 40 feet from adjacent residences in the Oak Park neighborhood. When operational, the chiller creates noise which impacts the adjacent neighborhood residents.

There is a chiller at Arnold Hall on Keesler AFB, which is located near the northeast installation perimeter and the Oak Park neighborhood. The chiller is positioned approximately 40 feet from residences in the Oak Park neighborhood on Lafayette Street. When turned on, the chiller creates noise that is audible to residents. There have been complaints from neighbors regarding this noise.

Compatibility Assessment

Due to the age of the chiller and the noise that it generates, the installation is planning to replace the chiller at Arnold Hall. The replacement of the chiller will decrease the level of noise that is produced when operational.

Findings

- The age of the chiller is a factor in the noise level that residents in the Oak Park neighborhood experience.
- The installation received complaints from residents in the Oak Park neighborhood regarding the chiller noise and responded by initiating the replacement of the chiller.

ISSUE NOI-3	**Emergency Sirens from Keesler Medical Center Ambulances** The required testing of Keesler Medical Center ambulance sirens at the beginning of every shift change at 5:30 a.m. and 5:30 p.m. creates noise which impacts the adjacent residential neighbors in the Oak Park neighborhood.

The Keesler Medical Center is located on the north end of the installation, which is approximately 600 feet from the Oak Park neighborhood. Keesler Medical Center provides healthcare to patients throughout the Mississippi Gulf Coast, including Keesler AFB personnel, their dependents, and veterans. In 2013, the Keesler Medical Facility served 26,500 patients in the region.

Due to the range of patients that are cared for at the center, ambulances deploy from the Keesler Medical Center frequently. To ensure the ambulances perform as designed, the ambulance sirens are tested at the beginning of every shift change, which occurs at 5:30 a.m. and 5:30 p.m. every day. Due to the operations of the ambulances, the residents in the Oak Park neighborhood are exposed to the noise from siren testing.

Compatibility Assessment

Keesler Medical Group Instruction 44-158 requires that ambulance crews ensure that emergency vehicles, including ambulances, are ready for use at each shift change. The ambulance crews utilize checklist AF1800 to conduct their examination of the emergency vehicles, which includes checking sirens and lights amongst other steps.

Additionally, the Air Force Occupational Safety and Health Standard 91-8 Safety, Medical Facilities states that sirens may be considered for use by the operator of the ambulance as a "request for other vehicles to yield right-of-way." This standard allows the ambulances to utilize their sirens while commuting to and from the Medical Center.

Source: https://webapp1.dlib.indiana.edu/

Findings

- Sirens used on ambulances create noise that is audible to the adjacent residential neighborhood.
- Sirens are used to request vehicles to yield.

ISSUE NOI-4

Noise from Commercial Truck Traffic

Commercial truck traffic using the temporary commercial gate on Bayview Street creates noise which impacts the adjacent residential neighbors in the Oak Park neighborhood.

The Bayview Street Gate at Keesler AFB is an old installation gate that provided access into the installation from Bayview Street within the Oak Park neighborhood. The gate was reopened during base reconstruction after Hurricane Katrina in 2005 for commercial truck and construction equipment access. During this time, the White Avenue Gate served as a commercial gate as well; however, it was not used during reconstruction due to the high level of traffic in the area.

Although the Bayview Street Gate was opened for the reconstruction after Hurricane Katrina, the gate is still used by commercial trucks today and is the only commercial entrance into Keesler AFB. In 2012, there were 122 trucks that accessed the installation through the Bayview Street Gate generating noise through the Oak Park neighborhood, which can be disruptive to the residents.

Compatibility Assessment

Keesler AFB and the City of Biloxi are currently in the process of establishing a new main gate for Keesler AFB at the terminus of Division Street on the east side of the installation. The Division Street gate will be able to accommodate commercial traffic and serve as the only commercial gate into Keesler AFB. This will alleviate traffic and noise that is currently travelling through the Oak Park neighborhood.

For more information regarding the development of the Division Street Gate, see Issue IE-1 in this chapter.

Findings

- Commercial truck using the Bayview Street Gate travels through the Oak Park neighborhood, creating traffic and noise for residents.
- The development of Division Street Gate will replace the commercial use of Bayview Street Gate.

ISSUE NOI-5

City of Biloxi Airport Noise Overlay Districts

The City of Biloxi Airport Noise Overlay Districts do not incorporate the latest comprehensive land use guidance. The Districts are not identified on the Zoning Map for the public to reference.

The City of Biloxi has an Airport Noise Overlay (ANO) District, which provides noise level reduction for buildings in three different overlay districts. Within the noise overlay, noise level reduction (NLR) standards for building uses are provided; which deviate from the Air Force noise level reduction recommendations promulgated in AFI 32-7063. Uses in the City code are

aggregated into general categories that are not inclusive of all the uses addressed in AFI 32-7036 and the Air Force guidance contains recommendations for different types of uses within the same generalized category in the city code.

In addition to inconsistencies between the ANO District and Air Force land use recommendations, the ANO District is not shown on the City of Biloxi's Official Zoning Map though required on the map per the City Land Development Ordinance. Without a map of the overlay, residents, the development community, and prospective property buyers may not be aware of areas subject to aircraft noise, which can affect their decision to purchase, reside, or develop in certain areas of the city.

Compatibility Assessment

The following table, Table 5-3, shows how the ANO standards compare to the guidelines recommended by the Air Force.

Table 5-3 Biloxi Airport Noise Overlay District Compliance with DoD Recommendations

Building Use	Biloxi Airport Noise Overlay District	
	ANO-1 (65-70)	ANO-2 (70-75)
Residential	■	■
Visitor accommodation	■	■
Residential or visitor accommodation (in portions of a building 110 feet above ground elevation)	■	■
Offices	■	■
Any other commercial use, in portions of buildings that accommodate the public	■	■

■ = Standards comply

■ = Standards are less stringent

Residential and Visitor Accommodation

Within the AFI for land use compatibility in the 65-69 DNL noise contours, residential uses including visitor accommodations and nursing homes are considered incompatible and discouraged, but if determined necessary, a 25 dB noise level reduction is recommended in the building construction. Residential uses including visitor accommodations are considered incompatible and strongly discouraged within the 70-74 DNL noise contours, but if determined necessary, a 30 dB noise level reduction is recommended in the building construction. While the code requires the prescribed noise level reduction consistent with these uses in the ANO-1 (65-69 dB) and ANO-2 (70-75 dB) Overlay Districts, mitigation is recommended only where a need can be demonstrated and not simply a condition of development. The Air Force land use guidance also does not discriminate against noise impacts relative to height, so the omission of noise standards for portions of residential and visitor accommodation buildings 110 feet above ground elevation is inconsistent with the Air Force land use guidance.

Offices

Within the city's ANO-2 Overlay District, office buildings must have a noise level reduction of 25 dB. This conforms to the Air Force recommendation for noise level reduction of 25 dB for office uses.

Any Other Commercial Use, in Portions of Buildings that Accommodate the Public

Within the city's ANO-2 Overlay District, commercial uses with public accommodations must have a noise level reduction of 25 dB. This conforms to the Air Force recommendation for noise level reduction of 25 dB for commercial uses.

Other Uses

The Air Force land use compatibility guidance includes additional uses that are not within the categories covered in the any of the overlay districts. Uses including hospitals and other medical facilities, education facilities, child care facilities, cultural activities and auditoriums are recommended to

achieve a 25 dB noise level reduction in the building construction within the 65-69 dB noise contours. The ANO-1 Overlay District does not require any noise level reduction in the construction of buildings for these uses.

Professional and scientific manufacturing, communication and transportation facilities, government services, places of worship, outdoor recreation facilities, resorts and group camps, parks and cultural facilities (not specifically listed in the Air Force guidance) are recommended to achieve a 25 dB noise level reduction in the building construction within the 70-74 dB noise contours. Uses including hospitals and other medical facilities, education facilities, child care facilities, cultural activities and auditoriums are recommended to achieve a 30 dB noise level reduction in the building construction within the 70-74 dB noise contours. The ANO-2 Overlay District does not require any noise level reduction in the construction of buildings for these uses.

Findings

- The Airport Noise Overlay districts are not shown on the City's zoning map.
- The Biloxi Airport Noise Overlay district noise level reduction standards conform to the Air Force recommended land use guidance for some but not all of the uses in AFI 32-7063.

ISSUE NOI-6	**Incompatible Development in Noise Contours** Noise from activities at Keesler AFB has the potential to affect noise sensitive land uses surrounding the installation. Noise sensitive land uses and greater intensities in development within the Keesler AFB noise contours have the potential to impact mission-critical training.

Noise associated with aircraft is generally considered a nuisance where land uses are incompatible with the aircraft activity. Residential and other noise sensitive uses under aircraft approach and departure corridors are most likely to consider the noise associated with aircraft operations and training to be an annoyance.

Keesler AFB is an active air base with aviation operations and training. The 403rd Wing averages approximately 60 operations a day. Currently, there are existing land uses and zoning districts in Biloxi within the 65-69 dB noise contours that are not compatible with the Air Force land use recommendations. Furthermore, there are future land uses within Biloxi that would not be compatible with these recommendations.

Compatibility Assessment

Air Force Instruction 32-7063 is a tool that the Air Force uses to help local jurisdictions understand the mission requirements for certain types of military training exercises and provides recommended land use guidelines for land use planning around active military airfields. It should be noted that the land use recommendations in the Keesler AFB Air Installation Compatible Use Zones (AICUZ) Study was based on similar guidance from DoD Instruction 4165.57, Air Installation Compatible Use Zones; however, AFI 32-7063 provides more current recommendations having been updated most recently in December 2015. Table 5-4 shows the land use noise recommendations per the Air Force Guidance. A key and notes are provided at the end of the table.

Table 5-4 Recommended Land Uses Under Aircraft Noise Contours

Land Use		Suggested Land Use Compatibility				
SLUCM No.	**Land Use Name**	**DNL 65-69**	**DNL 70-74**	**DNL 75-79**	**DNL 80-84**	**DNL 85+**
10	Residential					
11	Household units	N[1]	N[1]	N	N	N
11.11	Single units: detached	N[1]	N[1]	N	N	N
11.12	Single units: semidetached	N[1]	N[1]	N	N	N
11.13	Single units: attached row	N[1]	N[1]	N	N	N
11.21	Two units: side-by-side	N[1]	N[1]	N	N	N
11.22	Two units: one above the other	N[1]	N[1]	N	N	N
11.31	Apartments: walk-up	N[1]	N[1]	N	N	N
11.32	Apartments: elevator	N[1]	N[1]	N	N	N
12	Group quarters	N[1]	N[1]	N	N	N
13	Residential hotels	N[1]	N[1]	N	N	N
14	Mobile home parks or courts	N	N	N	N	N
15	Transient lodgings	N[1]	N[1]	N[1]	N	N
16	Other residential	N[1]	N[1]	N	N	N
20	Manufacturing					
21	Food and kindred products; manufacturing	Y	Y[2]	Y[3]	Y[4]	N
22	Textile mill products; manufacturing	Y	Y[2]	Y[3]	Y[4]	N
23	Apparel and other finished products; products made from fabrics, leather, and similar materials; manufacturing	Y	Y[2]	Y[3]	Y[4]	N
24	Lumber and wood products (except furniture); manufacturing	Y	Y[2]	Y[3]	Y[4]	N
25	Furniture and fixtures; manufacturing	Y	Y[2]	Y[3]	Y[4]	N

Table 5-4 Recommended Land Uses Under Aircraft Noise Contours (continued)

Land Use		Suggested Land Use Compatibility				
SLUCM No.	**Land Use Name**	**DNL 65-69**	**DNL 70-74**	**DNL 75-79**	**DNL 80-84**	**DNL 85+**
26	Paper and allied products; manufacturing	Y	Y[2]	Y[3]	Y[4]	N
27	Printing, publishing, and allied industries	Y	Y[2]	Y[3]	Y[4]	N
28	Chemicals and allied products; manufacturing	Y	Y[2]	Y[3]	Y[4]	N
29	Petroleum refining and related industries	Y	Y[2]	Y[3]	Y[4]	N
30	Manufacturing (continued)					
31	Rubber and misc. plastic products; manufacturing	Y	Y[2]	Y[3]	Y[4]	N
32	Stone, clay and glass products; manufacturing	Y	Y[2]	Y[3]	Y[4]	N
33	Primary metal products; manufacturing	Y	Y[2]	Y[3]	Y[4]	N
34	Fabricated metal products; manufacturing	Y	Y[2]	Y[3]	Y[4]	N
35	Professional scientific, and controlling instruments; photographic and optical goods; watches and clocks	Y	25	30	N	N
39	Miscellaneous manufacturing	Y	Y[2]	Y[3]	Y[4]	N
40	Transportation, communication and utilities					
41	Railroad, rapid rail transit, and street railway transportation	Y	Y[2]	Y[3]	Y[4]	N
42	Motor vehicle transportation	Y	Y[2]	Y[3]	Y[4]	N
43	Aircraft transportation	Y	Y[2]	Y[3]	Y[4]	N
44	Marine craft transportation	Y	Y[2]	Y[3]	Y[4]	N
45	Highway and street right-of-way	Y	Y	Y	Y	N
46	Automobile parking	Y	Y	Y	Y	N
47	Communication	Y	25[5]	30[5]	N	N
48	Utilities	Y	Y[2]	Y[3]	Y[4]	N
49	Other transportation, communication and utilities	Y	25[5]	30[5]	N	N

Table 5-4 Recommended Land Uses Under Aircraft Noise Contours (continued)

Land Use		Suggested Land Use Compatibility				
SLUCM No.	Land Use Name	DNL 65-69	DNL 70-74	DNL 75-79	DNL 80-84	DNL 85+
50	Trade					
51	Wholesale trade	Y	Y[2]	Y[3]	Y[4]	N
52	Retail trade – building materials, hardware and farm equipment	Y	25	30	Y[4]	N
53	Retail trade – including shopping centers, discount clubs, home improvement stores, electronics superstores, etc.	Y	25	30	N	N
54	Retail trade – food	Y	25	30	N	N
55	Retail trade – automotive, marine craft, aircraft and accessories	Y	25	30	N	N
56	Retail trade – apparel and accessories	Y	25	30	N	N
57	Retail trade – furniture, home, furnishings and equipment	Y	25	30	N	N
58	Retail trade – eating and drinking establishments	Y	25	30	N	N
59	Other retail trade	Y	25	30	N	N
60	Services					
61	Finance, insurance and real estate services	Y	25	30	N	N
62	Personal services	Y	25	30	N	N
62.4	Cemeteries	Y	Y[2]	Y[3]	Y[4,11]	Y[6,11]
63	Business services	Y	25	30	N	N
63.7	Warehousing and storage	Y	Y[2]	Y[3]	Y[4]	N
64	Repair services	Y	Y[2]	Y[3]	Y[4]	N
65	Professional services	Y	25	30	N	N
65.1	Hospitals, other medical facilities	25	30	N	N	N
65.16	Nursing homes	N[1]	N[1]	N	N	N
66	Contract construction services	Y	25	30	N	N

Table 5-4 Recommended Land Uses Under Aircraft Noise Contours (continued)

Land Use		Suggested Land Use Compatibility				
SLUCM No.	**Land Use Name**	**DNL 65-69**	**DNL 70-74**	**DNL 75-79**	**DNL 80-84**	**DNL 85+**
67	Government services	Y[1]	25	30	N	N
68	Educational services	25	30	N	N	N
68.1	Child care services, child development centers, and nurseries	25	30	N	N	N
69	Miscellaneous services	Y	25	30	N	N
69.1	Religious activities (including places of worship)	Y	25	30	N	N
70	Cultural, entertainment and recreational					
71	Cultural activities	25	30	N	N	N
71.2	Nature exhibits	Y[1]	N	N	N	N
72	Public assembly	Y	N	N	N	N
72.1	Auditoriums, concert halls	25	30	N	N	N
72.11	Outdoor music shells, amphitheaters	N	N	N	N	N
72.2	Outdoor sports arenas, spectator sports	Y[7]	Y[7]	N	N	N
73	Amusements	Y	Y	N	N	N
74	Recreational activities (including golf courses, riding stables, water recreation)	Y	25	30	N	N
75	Resorts and group camps	Y	25	N	N	N
76	Parks	Y	25	N	N	N
79	Other cultural, entertainment and recreation	Y	25	N	N	N
80	Resource production and extraction					
81	Agriculture (except livestock)	Y[8]	Y[9]	Y[10]	Y[10,11]	Y[10,11]
81.5-81.7	Agriculture-Livestock farming including grazing and feedlots	Y[8]	Y[9]	N	N	N
82	Agriculture related activities	Y[8]	Y[9]	Y[10]	Y[10,11]	Y[10,11]

Table 5-4 Recommended Land Uses Under Aircraft Noise Contours (continued)

Land Use		Suggested Land Use Compatibility				
SLUCM No.	**Land Use Name**	**DNL 65-69**	**DNL 70-74**	**DNL 75-79**	**DNL 80-84**	**DNL 85+**
83	Forestry activities	Y[8]	Y[9]	Y[10]	Y[10,11]	Y[10,11]
84	Fishing activities	Y	Y	Y	Y	Y
85	Mining activities	Y	Y	Y	Y	Y
89	Other resource production or extraction	Y	Y	Y	Y	Y

Source: Air Force Instruction AFI32-7063, Rev. December 2015.

Key:

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

Y (Yes) – Land use and *related structures compatible without restrictions.*

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

Y^x – Yes with restrictions. The land use and related structures generally are compatible. However, see note(s) indicated by the superscript.

N^x – No with exceptions. The land use and related structures are generally incompatible. However, see note(s) indicated by the superscript.

25, 30, or 35 – The numbers refer to noise level reduction (NLR) levels. NLR (outdoor to indoor) is achieved through the incorporation of noise attenuation into the design and construction of a structure. Land use and related structures are generally compatible; however, measures to achieve NLR of 25, 30, or 35 must be incorporated into design and construction of structures. However, measures to achieve an overall noise reduction do not necessarily solve noise difficulties outside the structure and additional evaluation is warranted. Also, see notes indicated by superscripts where they appear with one of these numbers.

DNL – Day-Night Average Sound Level.

Ldn – Mathematical symbol for DNL.

1. General

a. Although local conditions regarding the need for housing may require residential use in these zones, residential use is discouraged in DNL 65-69 and strongly discouraged in DNL 70-74. The absence of viable alternative development options should be determined and an evaluation should be conducted locally prior to local approvals indicating that a demonstrated community need for the residential use would not be met if development were prohibited in these zones. Existing residential development is considered as pre-existing, incompatible land uses.

b. Where the community determines that these uses must be allowed, measures to achieve outdoor to indoor NLR of at least 25 decibels (dB) in DNL 65-69 and 30 dB in DNL 70-74 should be incorporated into building codes and be considered in individual approvals; for transient housing, an NLR of at least 35 dB should be incorporated in DNL 75-79.

c. Normal permanent construction can be expected to provide an NLR of 20 dB, thus the reduction requirements are often stated as 5, 10, or 15 dB over standard construction and normally assume mechanical ventilation, upgraded sound transmission class ratings in windows and doors, and closed windows year round. Additional consideration should be given to modifying NLR levels based on peak noise levels or vibrations.

d. NLR criteria will not eliminate outdoor noise problems. However, building location, site planning, design, and use of berms and barriers can help mitigate outdoor noise exposure particularly from ground level sources. Measures that reduce noise at a site should be used wherever practical in preference to measures that only protect interior spaces.

Table 5-4 Recommended Land Uses Under Aircraft Noise Contours (continued)

Land Use		Suggested Land Use Compatibility				
SLUCM No.	**Land Use Name**	**DNL 65-69**	**DNL 70-74**	**DNL 75-79**	**DNL 80-84**	**DNL 85+**

2. Measures to achieve NLR of 25 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas, or where the normal noise level is low.

3. Measures to achieve NLR of 30 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas, or where the normal noise level is low.

4. Measures to achieve NLR of 35 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas, or where the normal noise level is low.

5. If project or proposed development is noise sensitive, use indicated NLR; if not, land use is compatible without NLR.

6. Buildings are not permitted.

7. Land use is compatible provided special sound reinforcement systems are installed.

8. Residential buildings require an NLR of 25 dB.

9. Residential buildings require an NLR of 30 dB.

10. Residential buildings are not permitted.

11. Land use that involves outdoor activities is not recommended, but if the community allows such activities, hearing protection devices should be worn when noise sources are present. Long-term exposure (multiple hours per day over many years) to high noise levels can cause hearing loss in some unprotected individuals.

The following is a summary of land use compatibility within the 65-69 dB noise zone:

- Residential buildings are discouraged in the 65-69 dB DNL noise contours; however, they may be acceptable when no other development options are available, provided NLR measures achieve a 25 dB reduction in outdoor to indoor noise. Mobile homes are considered incompatible in all noise contours.
- Commercial uses are compatible within the 65-69 DNL dB noise contour.
- Healthcare uses, such as hospitals and medical facilities and education facilities including childcare services, are conditionally compatible within the 65 – 75 dB DNL noise contours provided they achieve NLR in the design and construction of buildings.
- The compatibility of cultural, entertainment and recreation uses varies depending on type of use and whether there are indoor versus outdoor elements. Most of these uses are compatible or conditionally compatible within the 65-69 dB DNL noise contour with the exception of outdoor amphitheaters, which are incompatible in all noise contours.

- Light and heavy industrial manufacturing uses are compatible within the 65-69 dB DNL noise contour.
- Agricultural uses (without livestock) are conditionally compatible in all noise contours provided any associated residential uses incorporate NLR measures in the building.

Existing Land Use for the City of Biloxi

Figure 5-6 illustrates the City of Biloxi's existing land use compatibility with the land uses recommended in AFI 32-7063. Table 5-5 shows the breakdown of existing land use and acreage within each noise contour and identifies whether or not the land use is compatible with the recommendations. The analysis of existing land use is based upon data provided by Harrison County and Keesler AFB in GIS.

In total, there are 5.06 acres of existing land uses in the 65-69 dB DNL noise contour that are incompatible with the Air Force land use recommendations.

Table 5-5 City of Biloxi Existing Land Use Acreage within Noise Contour

Existing Land Use	65-69 dB DNL	Compatibility
Commercial	1.24	Yes
Government	0.02	Yes w/ Exceptions
Land and Forest	0.69	Yes w/ Exceptions
Religion	0.32	Yes
Residential	5.06	No
Services	0.17	Yes w/Exceptions
Utilities and Communication	0.29	Yes

Source: Harrison County ELU GIS

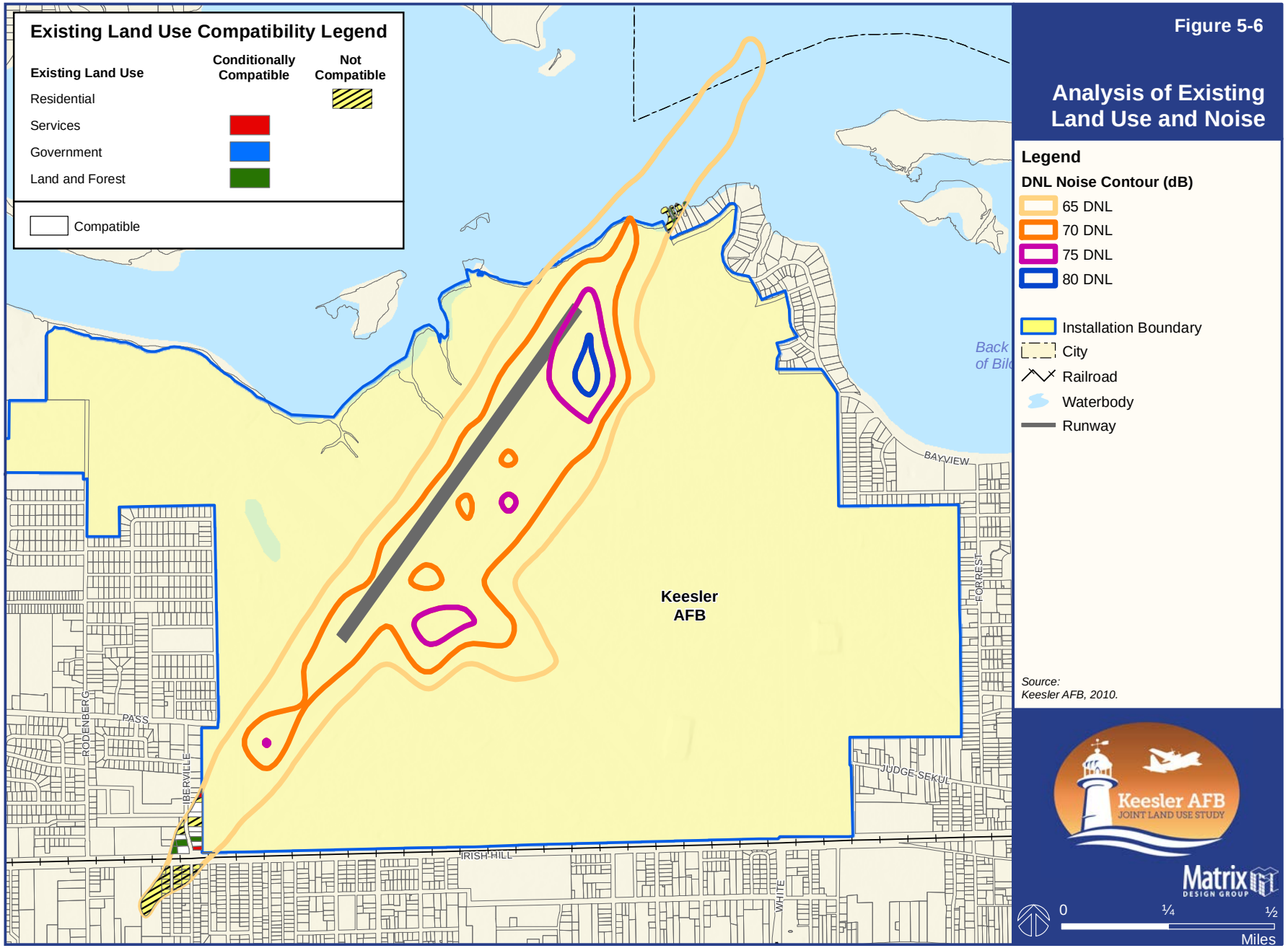
The only incompatible land use currently in the 65-69 dB DNL noise contour is Residential. There are 5.06 acres of residential uses located southwest of the installation that are located in this noise contour comprising both single-family residential and multi-family residential uses – apartments and mobile homes. Single-family residential use is discouraged in the Air Force recommendations, but if this use must be permitted, it should include a NLR of 25 dB in the building construction. Mobile homes, however, are not recommended in this noise contour.

There are 0.69 acres of Land and Forest land use in the 65-69 dB DNL. Land and Forest land uses are generally compatible within this noise contour. Exceptions are in place for uses that include residential buildings, which are recommended to incorporate a NLR of 25 dB in the building construction. Residential uses, however, are not recommended in this noise zone.

The 0.17 acres of the Services land use are located on the southwest border of the installation and include a car wash. Services land uses are compatible in this noise zone with some exceptions depending on the use. For example, some uses require a NLR of 25 dB or 30 dB, while other uses are recommended to achieve NLR of 25 dB in portions of the building where the public is received.

Future Land Use for the City of Biloxi

Figure 5-7 illustrates the City of Biloxi's future land use compatibility with the land uses recommended in AFI 32-7063. Table 5-6 shows the breakdown of future land use and acreage within each noise contour and identifies whether or not the land use is compatible with the recommendations. The analysis of future land use is based upon data provided by Harrison County and Keesler AFB in GIS. In total, there are 7.77 acres of future land use in the 65-69 dB DNL noise contour that are incompatible with the recommendations.


Existing Land Use Compatibility Legend
Existing Land Use
Conditionally Compatible
Not Compatible
Residential
Services
Government
Land and Forest
Compatible
Keesler AFB
BAYVIEW
FORREST
JUDGE SEKUL
WHITE
IRISH HILL
BERVILLE
RODENBERG
PASS
Figure 5-6
Analysis of Existing Land Use and Noise
Legend
DNL Noise Contour (dB)
65 DNL
70 DNL
75 DNL
80 DNL
Installation Boundary
City
Railroad
Waterbody
Runway
Source:
Keesler AFB, 2010.
Keesler AFB
JOINT LAND USE STUDY
Matrix
DESIGN GROUP
0
¼
½
Miles

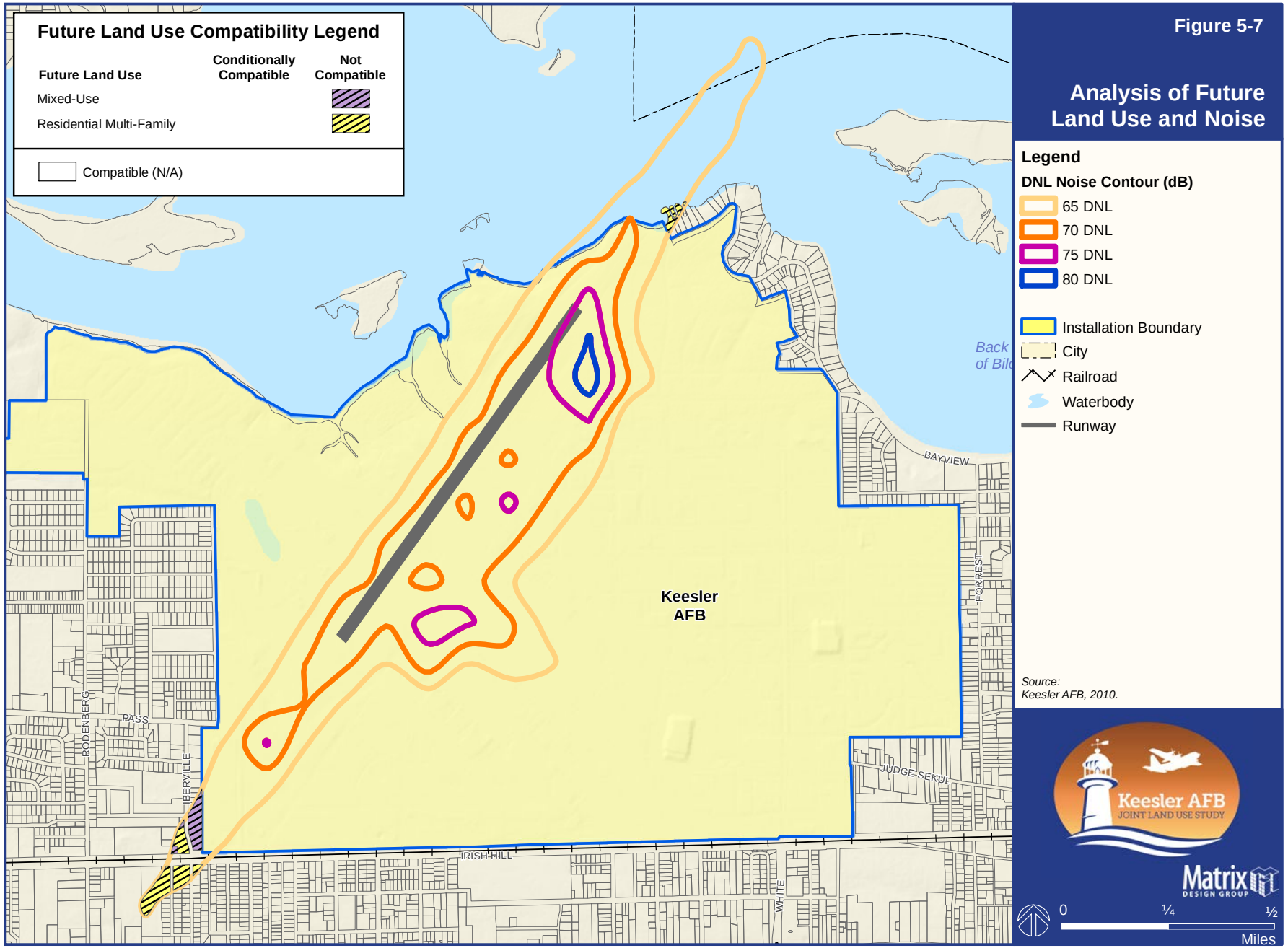

Future Land Use Compatibility Legend
Future Land Use
Conditionally Compatible
Not Compatible
Mixed-Use
Residential Multi-Family
Compatible (N/A)
Keesler AFB
BAYVIEW
FORREST
JUDGE SEKUL
IRISH HILL
WHITE
BERWILLE
RODENBERG
PASS
Figure 5-7
Analysis of Future Land Use and Noise
Legend
DNL Noise Contour (dB)
65 DNL
70 DNL
75 DNL
80 DNL
Installation Boundary
City
Railroad
Waterbody
Runway
Source:
Keesler AFB, 2010.
Keesler AFB
JOINT LAND USE STUDY
Matrix
DESIGN GROUP
0
¼
½
Miles

Table 5-6 City of Biloxi Future Land Use Acreage within Noise Contour

Future Land Use	65-69 dB DNL	Compatibility
Institutional / School	0.02	Yes w/ Exceptions
Mixed-Use	2.34	No
Residential Multi-Family	5.43	No

Source: Harrison County FLU GIS

The City of Biloxi's future land uses suggest that there will be three types of land use located in the 65-69 dB DNL noise zone in the future. Of these three, Mixed-Use and Residential Multi-Family uses are not compatible with the recommendations. Mixed-use, making up 2.34 acres of the land in the noise contour, is not compatible due to residential use. Since any type of residential use is not recommended in this noise contour, Residential Multi-Family, comprising 5.43 acres of the land in this noise contour, is also incompatible.

Biloxi's future land use also comprises 0.02 acres of Institutional / School uses. Institutional / School land uses are compatible with the recommendations; however, NLR may be necessary depending on the use. For example, educational services are recommended to have a NLR of 25 dB.

Zoning for the City of Biloxi

Figure 5-8 illustrates the City of Biloxi's zoning compatibility with the land uses recommended in AFI 32-7063. Table 5-7 shows the breakdown of zoning and acreage within each noise contour and identifies whether or not the land use is compatible with the recommendations. The analysis of zoning is based upon data provided by the City of Biloxi and Keesler AFB in GIS. In total, there are 7.79 acres of zoning in the 65-69 dB DNL noise contour that are incompatible with the recommendations.

Table 5-7 City of Biloxi Zoning Acreage within Noise Contour

Zoning District	65-69 dB DNL	Compatibility
Neighborhood Business (NB)	3.34	No
Multi-Family Residential, High-Density (RM-30)	1.42	No
Single-Family Residential, Low-Density (RS-10)	0.02	No
Single-Family Residential, Medium Density (RS-7.5)	3.01	No

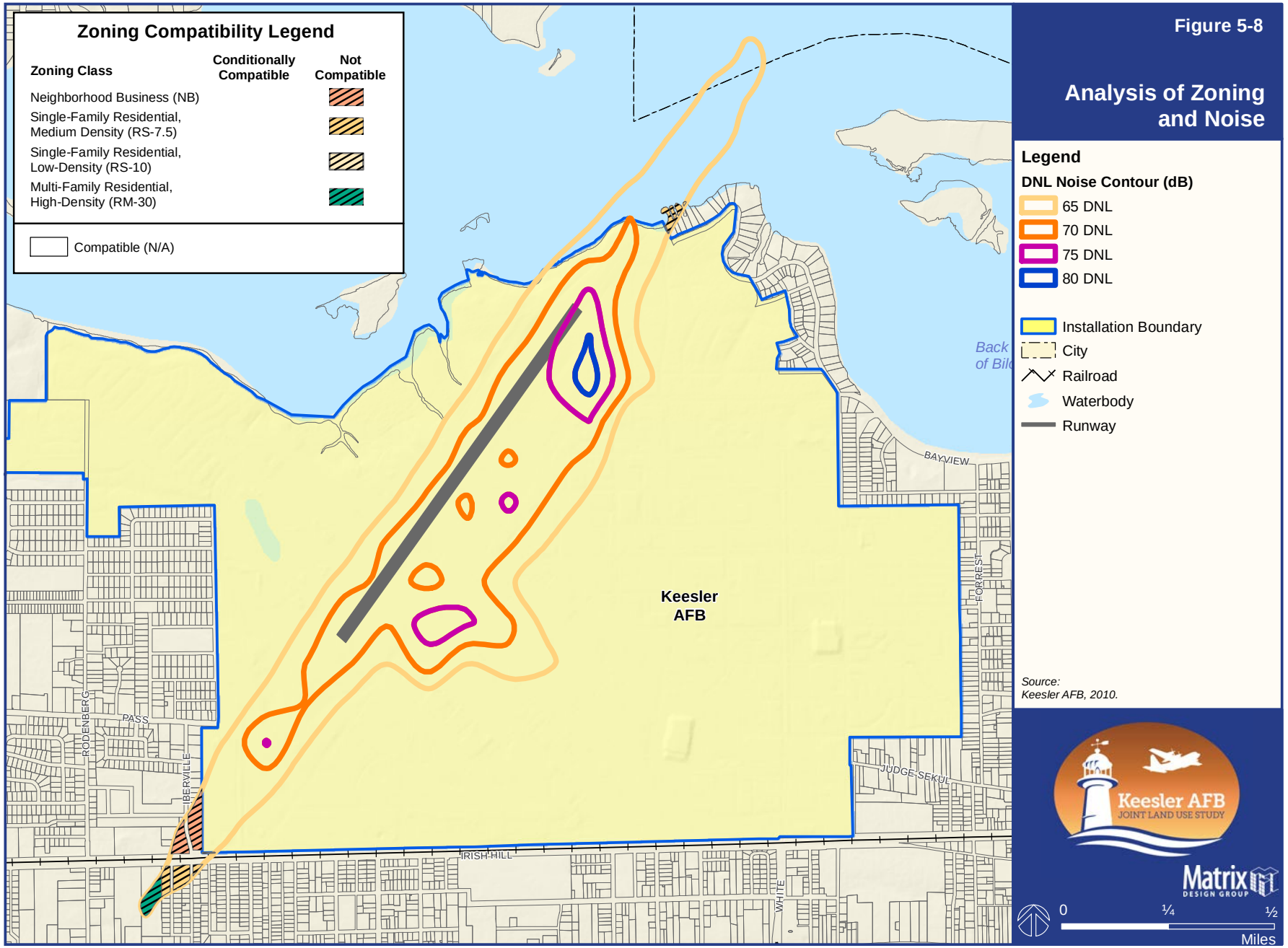
Source: City of Biloxi Land Development Ordinance

The City of Biloxi's Land Development Ordinance, Section E is an Airport Noise Overlay District. This overlay requires additional regulation for the area surrounding Keesler AFB, including NLR for certain building uses. This is discussed in NOI-5.

Currently the 65-69 dB DNL zone falls over four types of zoning, all of which are incompatible. All of the zones, including Neighborhood Business, permit a level of residential use, which is incompatible with the recommendations. In total, there are 7.79 acres of zoning that are incompatible with the land use recommendations.

Findings

- The City of Biloxi contains some incompatible land uses within the Keesler AFB noise contours. Some uses are compatible provided there is a level of NLR involved in the construction of buildings.
- The City has adopted an Airport Noise Overlay District to mitigate the effects of noise.


Zoning Compatibility Legend
Zoning Class
Conditionally Compatible
Not Compatible
Neighborhood Business (NB)
Single-Family Residential, Medium Density (RS-7.5)
Single-Family Residential, Low-Density (RS-10)
Multi-Family Residential, High-Density (RM-30)
Compatible (N/A)
Keesler AFB
BAYVIEW
FORREST
JUDGE SEKUL
WHITE
IRISH HILL
PASS
RODENBERG
BERVILLE
Figure 5-8
Analysis of Zoning and Noise
Legend
DNL Noise Contour (dB)
65 DNL
70 DNL
75 DNL
80 DNL
Installation Boundary
City
Railroad
Waterbody
Runway
Source:
Keesler AFB, 2010.
Keesler AFB
JOINT LAND USE STUDY
Matrix
DESIGN GROUP
0
¼
½
Miles

Please see the next page.

Public Trespassing (PT)

This factor addresses public trespassing, either purposeful or unintentional, onto a military installation. The potential for trespassing increases when public use areas are in close proximity to an installation.

Key Terms

Trespass. Trespass is either intentional or unintentional entry or access by persons onto Keesler AFB in a physical or non-physical manner.

ISSUE PT-1	**Trespassing along Eastern Perimeter of Keesler Air Force Base** Concern for trespassing onto Keesler AFB, particularly along the eastern perimeter near the Judge Sekul Gate where incidences have historically occurred.

Since 2014, there have been 23 incidences of trespassing at Keesler AFB. The trespassing incidences generally occur on the southeastern border of the installation near the Judge Sekul Avenue Gate which is closed and generally only used in the event of an emergency.

Trespassing onto Keesler AFB is it a federal offense. Furthermore, trespassers may be exposed to the risks associated with aviation operations and training and pose a threat to public safety. When security is breached by public trespassers, Keesler AFB Security Forces are notified and must work to remove the trespasser from the installation.

Compatibility Assessment

Keesler AFB and the surrounding jurisdictions' law enforcement work together to mitigate crime. The installation's Security Forces are able to listen in on the City of Biloxi and City of D'Iberville's police radios, allowing the security forces to respond to incidences as appropriate. Law enforcement from local jurisdictions also monitor their own radios for incidences around Keesler AFB and will notify the installation of criminal activities. In addition to initial notification, the City of Biloxi Police Department tracks trespassers to ensure that such incidences do not reoccur. The police department also maintains an online crime mapping tool to identify weekly criminal activities. Although this does not track trespassing on the installation, this tool could help the Keesler AFB Security Forces stay prepared and informed of local crime.

Snapshot of the City of Biloxi Police Department website mapping of criminal incidences

Source: http://www.crimemapping.com/

At the federal level, DoD Instruction 2000.16 DoD Antiterrorism (AT) Standards authorizes the Commanders at all levels to enforce security measures at their will and are charged with the responsibility of the protection of persons and property under the commanders' control. As such, there are numerous UFC guidance publications that outline various fencing and security measures appropriate for military installations.

The Military Handbook (MIL HNDBK 1013/10) Design Guidelines for Security Fencing, Gates, Barriers, and Guard Facilities indicates that installations should use signage at 200-foot intervals on the exterior installation fencing to inform and warn potential trespassers that there is a U.S. military installation at the specified location. All military services recognize the importance of a secured installation; however, only the U.S. Navy has published specific guidelines for the installation of warning / no trespassing signs. Because the intent of the JLUS is to promote land use information and compatibility regardless of military service and because the recommendations are provided for local governments, the public trespassing assessment is based on these recommendations as a best practice. There are currently signs along the outer border of the installation that notify the community of the presence of the installation.

Findings

- Trespassing generally occurs on the eastern end of the installation.
- There are signs on the fence line that identify the presence of the installation.
- The City of Biloxi and D'Iberville work with the Keesler AFB security forces to identify occurrences of trespassing onto Keesler AFB.
- Although Keesler AFB currently posts 'warning' signs on the fence line, there are no specific Air Force guidelines for such signs.

Roadway Capacity (RC)

Roadway capacity relates to the ability of existing interstates, highways, arterials, and other local roads to provide adequate mobility and access between military installations and their surrounding communities. As urban development expands, roads once carrying limited local traffic begin to function more as urban major arterial roadways. These roads often become the main transportation corridors for all traffic from residential to commercial trucking, including access to military installations. As transportation systems grow and demand more capacity, these facilities become congested and create delays for both military and non-military automobile users.

Key Terms

Level of Service. Level of Service (LOS) is a common measurement used by traffic engineers to determine the effectiveness of a traffic system. This grading system assigns a letter grade from A to F to roadways and intersections based upon traffic flow and safety characteristics as shown in Table 5-8.

Roadway Capacity. Roadway capacity refers to the ability of existing freeways, highway, arterials and other local roads to provide adequate mobility and access among military installations and their surrounding communities.

Table 5-8 Roadway Level of Service Ratings

	LOS Rating	Definition
ACCEPTABLE	A	Represents a free-flow operation. Vehicles are almost completely unimpeded in their ability to maneuver within the traffic stream.
	B	Represents reasonably free-flow operation. Ability to maneuver within the traffic stream is slightly restricted.
	C	Represents a traffic flow with speeds near or at free-flow speed of the freeway. There is noticeable restricted ability to maneuver within the stream of traffic.
	D	Speeds begin to decline with increased density. Ability to maneuver within the traffic stream is noticeably limited.
UNACCEPTABLE	E	Operation is at capacity. Vehicles are closely spaced within the traffic stream and there are no useable gaps to maneuver.
	F	A breakdown of vehicle flow is present. This condition exists within the queues forming behind the breakdown points.

ISSUE RC-1	**Traffic Congestion Outside of Keesler AFB Gates** Traffic backs up at White Avenue Gate, Meadows Drive Gate, and along Forrest Avenue and Irish Hill Drive during peak hours.

Vehicular traffic currently enters and exits the installation through four gates: White Avenue Main Gate, Meadows Drive Gate, Pass Road Gate, and the Commercial Gate. Presently, both White Avenue Gate and Meadows Gate have an inadequate lane capacity. At White Avenue Gate, traffic queuing creates traffic onto Irish Hill Drive, which can consequently also create standstills on US Highway 90 for those waiting for access onto White Avenue. Traffic queuing at Meadows Gate creates traffic onto Forrest Avenue. This congestion generally occurs during peak hours, such as morning rush hour, lunch time, and evening rush hour. Currently, 45 percent of traffic entering the installation goes through Meadows Gate, while 41 percent goes through White Avenue Gate.

In addition to peak hour vehicular traffic outside of the installation gates, the CSX rail also crosses over White Avenue with approximately 15 trains traversing this line per day. Trains that pass through the area in the morning create excessive traffic queuing as vehicles must wait for trains to pass before entering the White Avenue Gate. This creates further delays with traffic stacking outside the installation, contributing to traffic congestion on Irish Hill Drive.

When traffic congestion occurs, military mission activities may be delayed, resulting in lost productive hours. In addition, traffic congestion can also affect the surrounding community if vehicle queuing at the gate extends out to public roads and intersections causing traffic delays. For example, Biloxi Junior High School, located on Irish Hill Drive begins student drop off at 7:30 a.m. and has their first class at 7:50 a.m. These times coincide with the peak hours at Keesler AFB, which can affect the student' and their families' weekly commute to school.

In addition to potential safety and traffic flow problems that can be associated with vehicles stopping on roadways, traffic backups can also create issues with force protection and anti-terrorism measures. Since 2011, the DoD encourages vehicle queuing on installation property to reduce the threat risk of terrorist acts.

Within an entry control or gate, the Approach Zone is designated for vehicle queuing, though the amount of area afforded for this zone is generally based on the amount of available land. The intent of this area is to minimize excessive queuing of vehicles on adjacent highways and roads. The Approach Zone is also used for vehicle sorting, i.e., trucks versus employee vehicles, and for accommodating traffic calming techniques, such as temporary barricades to reduce high-speed threats.

Compatibility Assessment

The streets surrounding Keesler AFB contribute to accessibility throughout the community as well as accessibility into Keesler AFB. The roadways that are affected by Keesler AFB congestion are listed below with their roadway classification. These classifications identify the use of these roadways throughout the community:

- White Avenue – Minor Arterial
- Irish Hill Drive - Minor Arterial
- Meadows Drive – Non-Classified Local Street

Forrest Avenue - CollectorTraffic on White Avenue, between the installation and U.S. Highway 90 is rated by the Gulf Regional Planning Commission (GRPC) as LOS "D. In addition, Forest Avenue, from Columbus Street to Division Street is at LOS "C" and projected to reach LOS "D" by 2035. As described in Table 5-8, under "D" LOS, speeds begin to decline with increased density and the ability to maneuver within the traffic stream is noticeably limited. LOS "C" represents a traffic flow with speeds near or at free-flow speed of the freeway. There is noticeable restricted ability to

maneuver within the stream of traffic. Both levels of service describe a level of restricted mobility with the addition of traffic on the roadways.

On Irish Hill Drive, the GRPC projected that traffic volumes will increase on White Avenue and Irish Hill Drive as shown in Table 5-9; such projections were not provided for Forrest Avenue or Meadows Drive. The GRPC provided the following projections for Average Daily Traffic (ADT):

Table 5-9 Roadway Average Daily Traffic Projections

Roadway Segment	2007 ADT	2030 Projected ADT	Roadway Capacity
White Ave. Between U.S. Highway 90 and Irish Hill Dr.	7,000	14,200	23,400
Irish Hill Dr. between Veterans Ave. and Iberville Dr.	4,350	7,850	11,840
Irish Hill Dr. between White Ave. and Porter Ave.	9,200	16,900	11,840

Source: GRPC Regional Demand Forecasting Model, City of Biloxi 2009 Comprehensive Plan

The table indicates that White Avenue and Irish Hill Drive between Veterans Avenue and Iberville Drive, located towards the southwest end of the installation, are not projected to meet their capacity for roadway traffic. Although this is the case, both roadways are projected to nearly double in daily traffic by 2030, indicating that traffic mitigation will be needed if the upward trend in growth continues. Irish Hill Drive between White Avenue and Porter Avenue, located towards the east end of the installation, is projected to increase beyond its roadway capacity by 2030. This indicates a need for roadway improvements on Irish Hill Drive.

Keesler AFB is planning a new main gate on Division Street, which will be the primary entry for all vehicles entering the installation including commercial vehicles. The use of the new gate will alleviate traffic at White Avenue Gate and Irish Hill Avenue if vehicles use U.S. 90 or I-110 to access Division Street. With the development of the Division Street Gate, White Avenue Gate will become a secondary access into the installation. As a result of the Division Street Gate, there is potential for Meadows Drive Gate to be closed with the addition of Division Street Gate. This would reduce traffic on Meadows Drive, but would likely not reduce traffic on Forrest Avenue since the collector will provide access to Division Street Gate. Thus, traffic in this residential neighborhood may continue to exist.

Currently, Division Street is classified as a minor arterial roadway. With improvements to the road, it is envisioned that Division Street will have the capacity to queue traffic into the installation without creating further backups on other roads. The development of Division Street Gate is further discussed in Issue IE-1.

The DoD provides specific standards associated with the proper queuing and stacking of vehicles, which have been established to allow for this activity to take place largely within the installation property. The United Facilities Criteria (UFC) 4-022-01, Security Engineering: Entry Control Facilities / Access Control Points, provides design and construction standards for entry control / access control points that assist in providing security and anti-terrorism design elements needed for protecting military installations.

The standard provides the design standards for an entry control facility, which allow for persons and vehicles entering and leaving the installation to do so safely, ensuring the protection of security personnel, pedestrians and other vehicles. The standard is also meant to ensure a design that maximizes traffic flow, while minimizing the impacts on safety, security, and public highway use.

Design Guidelines for Approach Zones include:

- *Maximize the length of the approach zone, to provide optimal stacking distance for the traffic queue.*
- *Reversible lanes can increase throughput and flexibility where space is unavailable for additional lanes.*
- *Sort traffic by vehicle type. For example - use the farthest right lane for truck traffic. Rejection of these vehicles requires additional space for their larger turning radii.*
- *Separating vehicles with varying inspection requirements can also increase throughput. For example - authorized personnel could use a separate lane with automated equipment.*

The development and design of the new Division Street Gate should follow such standards.

Within the Biloxi Comprehensive Plan, it is noted that the Keesler AFB creates limitations to accessibility across the city. Although Biloxi does not pose strategies for mitigating this with the installation in the Comprehensive Plan, the City is involved in the development of Division Street Gate. The Biloxi Comprehensive Plan includes a strategy for creating a thriving community in east Biloxi, which is to create a network of corridors that would support multiple modes of transportation. One such key corridor is Division Street.

Source: Gulf Regional Planning Commission Proposed 2014 City of Biloxi Road Classifications, GRPC Regional Demand Forecasting Model

Findings

- The development of Division Street Gate will alleviate traffic on White Avenue and Irish Hill Avenue.
- The development of Division Street Gate will likely initiate the closure of Meadows Drive Gate, reducing traffic at the gate, but likely not reducing traffic on Forrest Avenue due to the location of the new gate.
- DoD standards for queuing should be considered during the development of Division Street Gate.
- The development of Division Street Gate is identified in the Biloxi Comprehensive Plan.

ISSUE RC-2

Traffic Generation at Commercial Gate

Use of temporary commercial gate on Bayview Street creates heavy truck traffic in the Oak Park neighborhood.

As discussed in Issue NOI-4, the Kensington Drive gate was intended to be a temporary commercial gate for construction purposes following Hurricane Katrina. The gate has since remained open, creating commercial traffic through the Oak Park neighborhood. Although the construction for Hurricane Katrina improvements has since ended, the Keesler Medical Center is looking to begin renovations, which will further contribute to the commercial truck traffic through the neighborhood.

Compatibility Assessment

The development of Division Street Gate will include a permanent entry for commercial vehicles separate from the visitor entrances. The new gate will prompt the closure of the commercial gate, reducing traffic that passes through the Oak Park neighborhood. The development of Division Street Gate is further discussed in Issue IE-1.

Findings

- The commercial truck use at the Kensington Drive Gate is creating traffic concerns for nearby residents.
- The development of Division Street Gate will discontinue the use of Kensington Drive gate.

ISSUE RC-3	**Significant Traffic during Temporary Base Gate Closures**
	Temporary gate closures, due to weather, on base training, or security events, create traffic congestion on White Avenue and Irish Hill Drive.

Keesler AFB must conduct temporary gate closures during weather events, security events, and training. During the gate closures, traffic along White Avenue and Irish Hill Drive (one of the only east-west alternatives to U.S. Highway 90) may develop due to traffic exiting from the installation. If gate closures are not coordinated with local jurisdictions, congestion can cause delays to residents commuting through the community. High levels of traffic can also increase the risk of accidents and delay emergency responders within the community. This may be a concern especially for roadways which have only one lane travelling in one direction, such as Irish Hill Drive and Forrest Avenue, as emergency vehicles may not be able to move around traffic easily. This can effect emergency response times and the health risks of residents.

Compatibility Assessment

Keesler AFB has evacuation procedures in emergency events. Although evacuation measures are in place, they may still create traffic disruptions to the community.

Findings

- Temporary base gate closures have the potential to create traffic congestion on surrounding roadways, causing traffic delays for commuters and emergency responders. Keesler AFB has procedures in place for storm related evacuations and gate closures.

Please see next page.

Safety Zones (SA)

Safety zones are areas in which development should be more restrictive in terms of use and concentrations of people due to the higher risks to public safety. An issue to consider includes aircraft accident potential zones.

Military installations often engage in activities or contain facilities that require special consideration by local jurisdictions when evaluating compatibility due to public safety concerns. It is important to regulate land use near military airfields in order to minimize damage from potential aircraft accidents and to reduce air navigation hazards. To help mitigate potential issues, the Department of Defense (DoD) has delineated Clear Zones (CZ) and Accident Potential Zones (APZ) in the vicinity of airfield runways. APZs are usually divided into APZ I and APZ II. Each zone was developed based on the statistical review of aircraft accidents. Studies show that most mishaps occur on or near the runway, predominately along its extended centerline.

Key Terms

Area Operations Area (AOA). The Area Operations Area (AOA) is an area that encompasses the entire airport's approach or departure airspace including the circling space.

Accident Potential Zone I (APZ I). Accident Potential Zone I (APZ I) is an area beginning at the end of each clear zone (see definition) and continuing out to a length of 5,000 feet long by 3,000 feet wide. APZ I follows a curved shape to reflect the predominant flight tracks, and can even split to reflect differences in standard approaches / departures and closed pattern tracks. This area has a lower potential for accidents and therefore, has less restrictive development restrictions recommended.

Accident Potential Zone II (APZ II). Accident Potential Zone II (APZ II) is an area that begins at the end of each APZ I and extends an additional 7,000 feet long by 3,000 feet wide. This APZ can also be curved as the flight tracks are considered in the designation of this APZ. The accident potential is further reduced; thus some additional development types are allowed.

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

BASH Relevancy Area. The BASH Relevancy Area is a 5-statute mile area from the airport operational area, including the runway. This area has been determined by the FAA as an area where BASH incidences are likely to occur due to the types of flying operations that occur near the airfield. Such operations are typically at slower speeds and lower altitudes making the conditions for BASH opportune.

Clear Zone (CZ). The Clear Zone (CZ) is the area that has the highest statistical potential of an aircraft incident (but again, a very low probability). As the name reflects, this area should be kept clear of all structures, including fences. The CZs at Keesler AFB begin at the end of each displaced threshold and measures 3,000 feet long and 3,000 feet wide, or 1,500 feet on each side of the runway center line.

ISSUE SA-1	**Incompatible Uses in Clear Zones and Accident Potential Zones** Incompatible land uses in the Clear Zones and Accident Potential Zones create a safety concern.

The DoD has designated Safety Zones around military airfields comprising the CZ, APZ I, and APZ II that extend out from each end of a runway. Development is a concern in these areas because this is statistically where aircraft accidents have occurred in the past around military installations which is a risk assessment where accidents are more likely to occur due to aircraft flying at lower speeds and altitudes. The risk to people on the ground in the event of an aircraft accident is small; however, the consequences associated with these incidents are high. Because of this potential impact, the Air Force has identified recommended land uses within airfield safety zones. The land uses are incorporated in Air Force Instruction (AFI) 32-7063, Air Installation Compatibility Use Zones (AICUZ) Program which defines land uses for studies. The land uses that are evaluated for compatibility in AFI 32-7063 are based on the national Standard Land Use Coding Manual (SLUCM) developed by U.S. Department of Transportation (DoT) in 1977. Because the SLUCM does not contain an exhaustive list of land uses, an interpretation of land uses within the cities has been made based on similar characteristics to those within the SLUCM where necessary. For instance SLUCM No. 58 Retail trade - eating and drinking establishments is the only land use that would apply to bars, brewpubs, restaurants, and specialty eating establishments in the Biloxi Land Development Ordinance.

Because the Clear Zone is the area of highest probability where an accident is likely to occur, only open space and agricultural uses (without structures) are recommended within the CZ. Due to the potential hazard to the public, an installation may sometimes either acquire property within the CZ or purchase avigation easements on private property within the CZ to ensure the CZ is free from development.

The Accident Potential Zones (APZ I and II), located just at the ends of the CZ, have a lower safety risk potential due to their proximity to the runway. Though still considered a risk, land uses with restrictions are recommended in the APZs to protect the public safety.

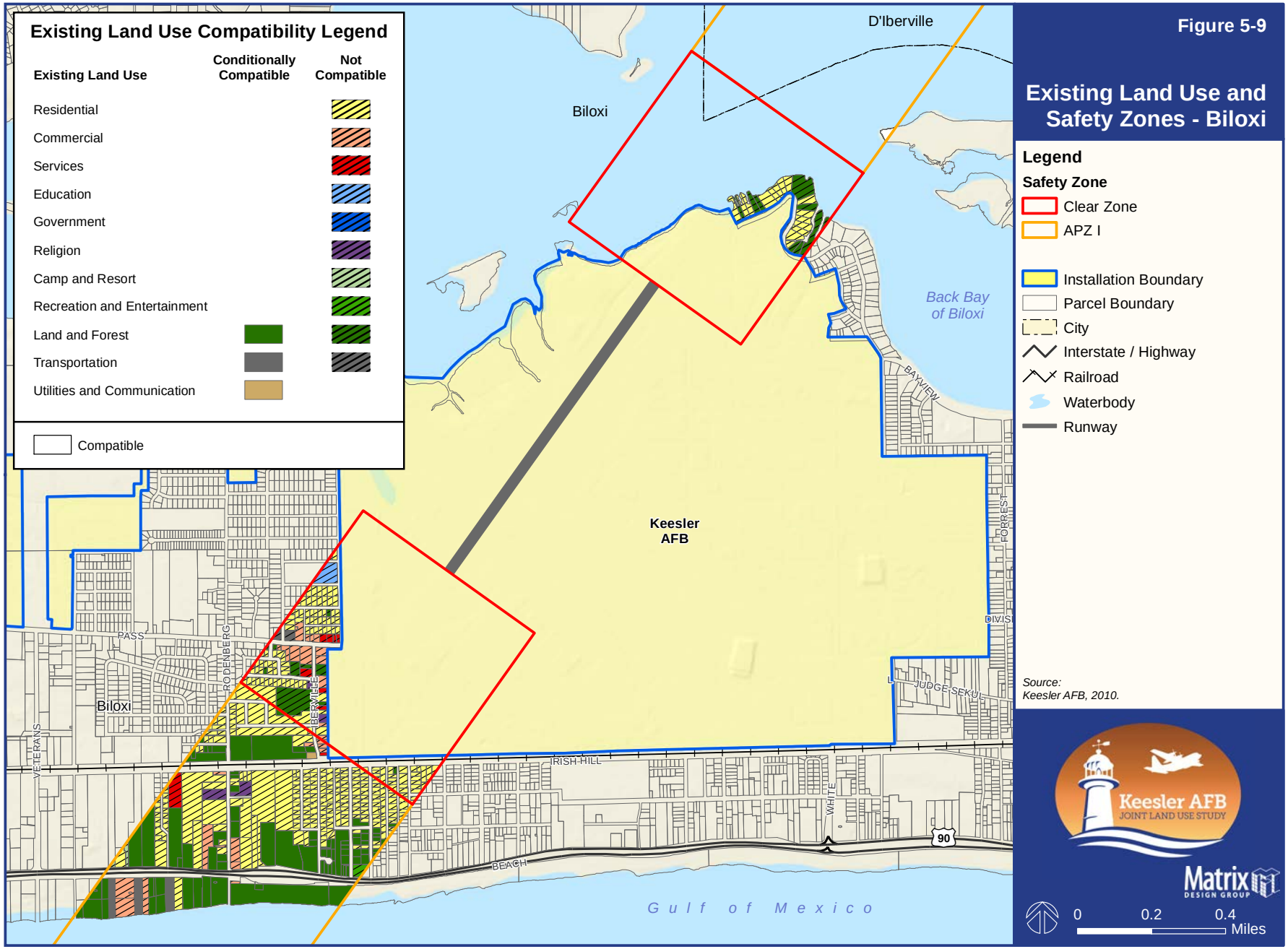
The following is an assessment of land use compatibility in the areas for existing land use, future land use, and zoning for both the cities of Biloxi and D'Iberville. The assessment compares the existing land use as provided in Geographical Information System (GIS) from each of the cities; future land use as depicted in each city's Comprehensive Plan and provided in GIS; and zoning districts and their associated permitted land uses, zoning maps from the Zoning Ordinances and Land Development Ordinance, and GIS data provided by each city, to the land use recommendations found in Air Force Instruction (AFI) 32-7063 Air Installations Compatible Use Zones Program.

This assessment determines which land uses within the jurisdictions are compatible, conditionally compatible, or incompatible with the Air Force recommendations. The discussion of each jurisdiction's land use compatibility is organized by the North Safety Zones and the South Safety Zones to provide a clearer assessment of the land use compatibly in each of the Keesler AFB safety zones.

Biloxi

Existing Land Use

Figure 5-9 shows the conditionally compatible and incompatible existing land uses within the Safety Zones based on the Air Force land use recommendations. Table 5-10 shows the breakdown of acreage of existing land use within the Safety Zones with conditionally compatible acreages in black and incompatible acreages in red. In total, there are approximately 220 acres in the Safety Zones in Biloxi, 144.85 acres of which are incompatible.


Existing Land Use Compatibility Legend
Existing Land Use
Conditionally Compatible
Not Compatible
Residential
Commercial
Services
Education
Government
Religion
Camp and Resort
Recreation and Entertainment
Land and Forest
Transportation
Utilities and Communication
Compatible
D'Iberville
Biloxi
Back Bay of Biloxi
Keesler AFB
Biloxi
Gulf of Mexico
BAYVIEW
FORREST
PASS
RODENBERG
BERMUDE
VETERANS
IRISH HILL
WHITE
BEACH
JUDGE SEKUL
90
Figure 5-9
Existing Land Use and Safety Zones - Biloxi
Legend
Safety Zone
Clear Zone
APZ I
Installation Boundary
Parcel Boundary
City
Interstate / Highway
Railroad
Waterbody
Runway
Source:
Keesler AFB, 2010.
Keesler AFB
JOINT LAND USE STUDY
Matrix
DESIGN GROUP
0
0.2
0.4
Miles

This CZ is located in the portions of Biloxi, north and south of Keesler AFB airfield. Within the North CZ, there are 7.77 acres of residential uses comprising single-family homes, which are incompatible with the Air Force land use recommendations. Also within the North CZ are 6.28 acres of land designated Land and Forest, which consists of vacant land. There are 0.26 acres of Government / Institutional land, which is also currently undeveloped. The undeveloped land is currently compatible but conditionally compatible depending on future development.

Table 5-10 City of Biloxi Existing Land Use within the Keesler AFB Safety Zones

Existing Land Use	CZ		APZ I		Total
	North	South	North	South	
Camp and Resort	-	-	-	0.51	0.51
Commercial	-	5.66	-	8.95	14.61
Education	-	1.78	-	-	1.78
Government	0.26	0.09	-	0.01	0.36
Land and Forest	6.28	6.58	0.46	70.26	83.58
Recreation And Entertainment	-	0.68	-	0.72	1.40
Religion	-	-	-	2.20	2.20
Residential	7.77	23.32	-	75.28	106.37
Services	-	1.85	-	2.12	3.97
Transportation	-	0.79	-	3.95	4.74
Utilities and Communication	-	-	-	0.29	0.29

Note: Acreages in red are incompatible; Acreages in black are conditionally compatible

The South CZ comprises more acreage within the city than the North CZ. The greatest area is currently Residential, which includes Single-Family Residential along Iberville Drive, which is incompatible. The second greatest use is Land and Forest, which comprises 6.58 acres. The Land and Forest uses comprise vacant land, which is compatible but conditionally compatible depending on future development. Land uses also include 5.66 acres of Commercial, most of which are located along Pass Road and include restaurants, retail stores, and a veterinarian, all of which are incompatible uses in the CZ. There are also 1.78 acres of Education, 0.09 acres of Government / Institutional, which includes a church on Iberville Drive, 0.68 acres of Recreation and Entertainment, 1.85 acres of Services, and 0.79 acres of Transportation, all of which are incompatible uses in the CZ.

The South APZ I includes areas in Biloxi and a portion of the Gulf of Mexico. The land use in the South APZ I with the most land is Residential, comprising 75.28 acres. The residential land use includes both Single-Family Residential between Irish Hill Drive and U.S. Highway 90 and Multi-Family Residential south of Irish Hill Drive and east of Rodenberg Avenue. These residential uses are incompatible in APZ I. The second largest land use is Land and Forest comprising 70.26 acres. This land includes vacant parcels south of Irish Hill Drive and south of U.S. Highway 90 along the beach including the sand beach. Vacant land and sand beach uses are compatible with APZ I. Commercial uses in APZ I comprise 8.95 acres and include retail, hotels, and restaurants, much of which are located south of Irish Hill Drive and north of U.S. Highway 90. Prominent restaurants in APZ I are located south of U.S. Highway 90 along the beach. These uses are incompatible in APZ I. Additionally, the South APZ I comprises 0.01 acres of Government, 0.51 acres of Camp and Resort, 0.72 acres of Recreation and Entertainment, 2.12 acres of Services, 2.20 acres of Religion, 3.95 acres of Transportation, and 0.29 acres designated Utilities and Communication. Transportation and Utilities and Communication are conditionally compatible while the other uses are incompatible with the safety zone.

There are 0.46 acres in the North APZ I, which are located on Goat Island. Goat Island is an uninhabited island, comprising of wetlands. The land within the North APZ I is not developed and thus compatible with the safety zone.

There are no areas in Biloxi within APZ II.

Future Land Use

Figure 5-10 shows the compatibility assessment for future land uses within the safety zones in Biloxi. Future land uses that are identified in the City of Biloxi Comprehensive Plan identify the general desired pattern of land use in the city. Table 5-11 shows the breakdown of future land use acreages within the safety zones with conditionally compatible acreages in black and incompatible acreages in red. In total, all of the acres in Biloxi that are located in the safety zones, 216.91 acres, are incompatible with the safety zones.

Table 5-11 City of Biloxi Future Land Use within the Keesler AFB Safety Zones

Future Land Use	CZ		APZ I		Total
	North	South	North	South	
Institutional / School	0.26	0.09	-	0.01	0.36
Mixed-Use	-	16.31	-	60.94	77.25
Park / Open Space	-	-	0.46	29.05	29.51
Residential Multi-Family	14.05	24.34	-	71.41	109.80

Note: Acreages in red are incompatible; Acreages in black are conditionally compatible

Future land uses within the South CZ consist of Residential Multi-Family and Mixed-Use categories with some Institutional / School in Biloxi. The residential future land uses categories are along Irish Hill Drive and west of Keesler AFB along Iberville Drive. Mixed-Use future land use is located west of the installation along Iberville Drive and Pass Road. All of the future land uses for this area are incompatible with the land use recommendations for the CZ. Within the North CZ, the future land use category is residential with medium- to high-density land uses, which are incompatible.

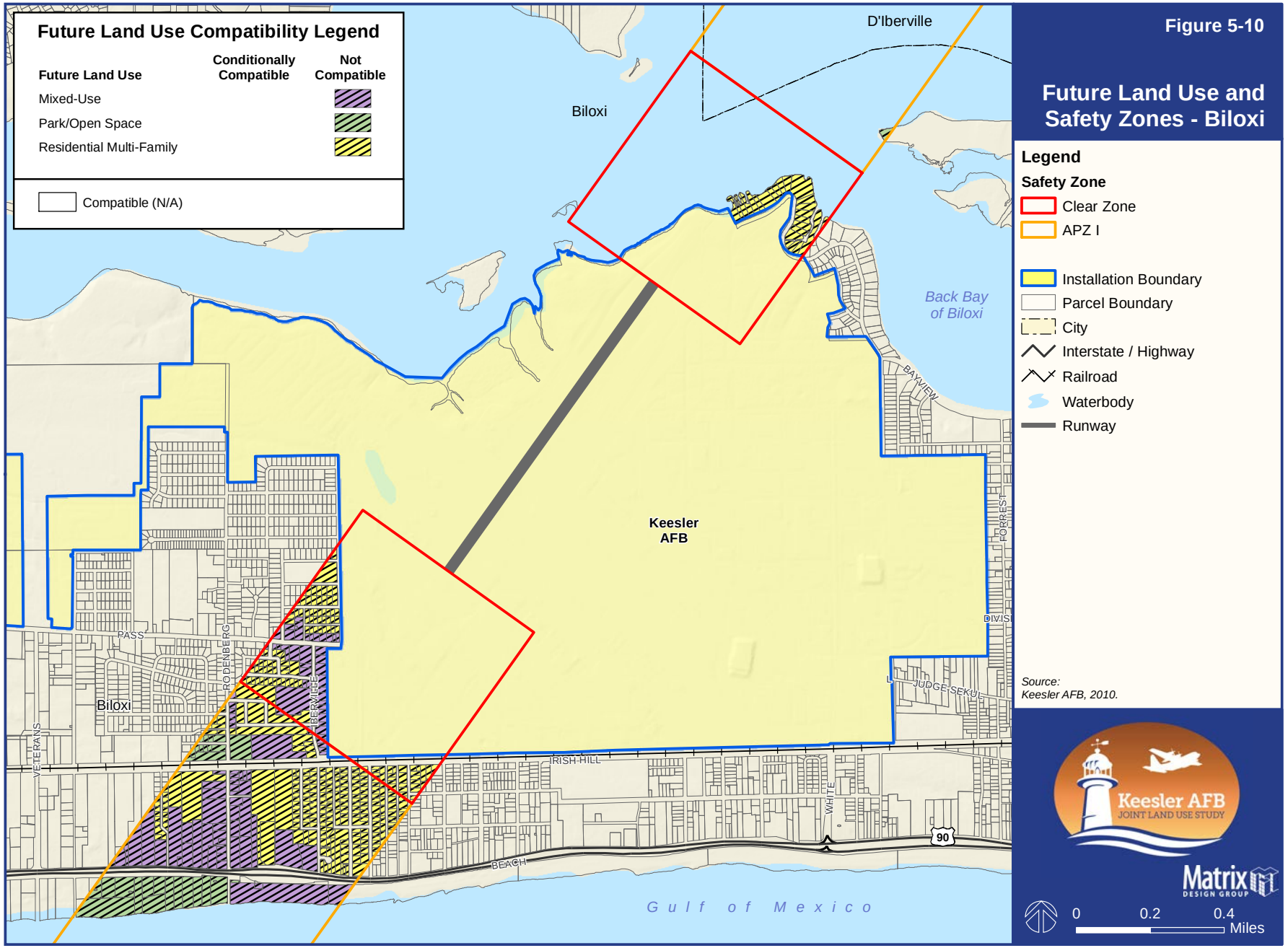
Future land uses in the South APZ I primarily consist of Residential – both low-density and medium to high density, as well as Mixed-Use. These future land uses are considered incompatible. The Land and Forest future land use category is also within APZ I. Much of the Land and Forest area is located along the beach and north of Irish Hill Drive from Keesler AFB, west of Rodenberg Avenue. The future land use designated Parks and Recreation is currently undeveloped property and is compatible, but would only be compatible with future development if it is low intensity and excludes playgrounds and facilities that encourage the congregation of people such as club houses, meeting places, and auditoriums.

The future land use in the North APZ I is located on Goat Island and is designated as Parks / Open Space. Although Parks / Open Space is conditionally compatible in APZ I, Goat Island is not likely to be developed in the future due to its geography.

Zoning

Figure 5-11 shows conditionally compatible and incompatible zoning within the Safety Zones. Table 5-12 shows the breakdown of zoning within the Safety Zones with conditionally compatible acreages in black and incompatible acreages in red.

In total, there are approximately 217 acres zoned in the Safety Zones in Biloxi, 193.2 acres of which are incompatible with the Air Force land use recommendations.


Future Land Use Compatibility Legend
Future Land Use
Conditionally Compatible
Not Compatible
Mixed-Use
Park/Open Space
Residential Multi-Family
Compatible (N/A)
D'Iberville
Biloxi
Back Bay of Biloxi
Keesler AFB
Biloxi
PASS
RODENBERG
BERTHELOT
VETERANS
IRISH HILL
WHITE
BEACH
90
BAYVIEW
FORREST
DIVIS
JUDGE SEKUL
Gulf of Mexico
Figure 5-10
Future Land Use and Safety Zones - Biloxi
Legend
Safety Zone
Clear Zone
APZ I
Installation Boundary
Parcel Boundary
City
Interstate / Highway
Railroad
Waterbody
Runway
Source:
Keesler AFB, 2010.
Keesler AFB
JOINT LAND USE STUDY
Matrix
DESIGN GROUP
0
0.2
0.4
Miles

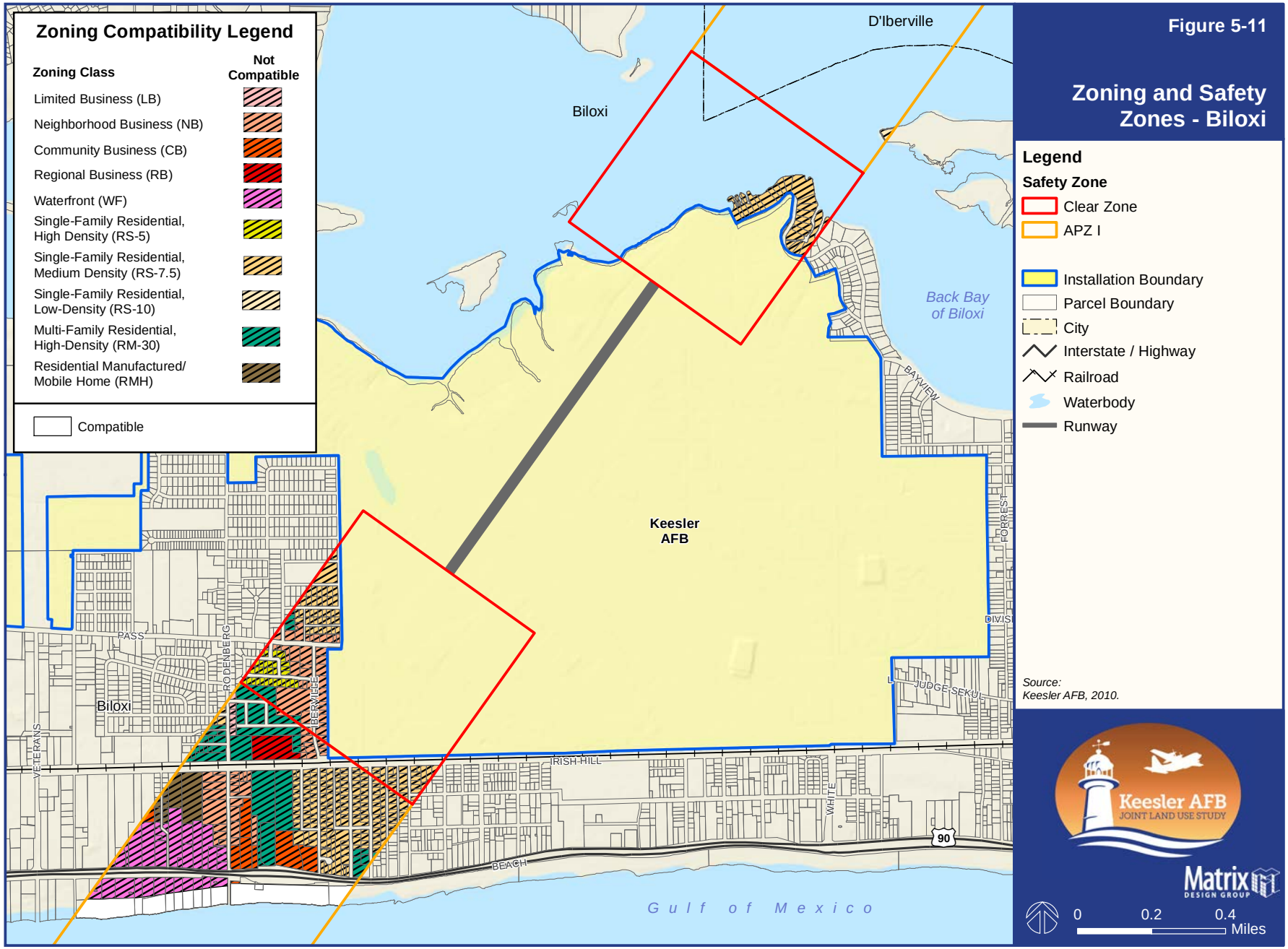

Zoning Compatibility Legend
Zoning Class
Not Compatible
Limited Business (LB)
Neighborhood Business (NB)
Community Business (CB)
Regional Business (RB)
Waterfront (WF)
Single-Family Residential, High Density (RS-5)
Single-Family Residential, Medium Density (RS-7.5)
Single-Family Residential, Low-Density (RS-10)
Multi-Family Residential, High-Density (RM-30)
Residential Manufactured/ Mobile Home (RMH)
Compatible
D'Iberville
Biloxi
Back Bay of Biloxi
Keesler AFB
BAYVIEW
FORREST
DIVIS
L JUDGE SEKUL
PASS
RODENBERG
BERTHE
Biloxi
VETERANS
IRISH HILL
WHITE
90
BEACH
Gulf of Mexico
Figure 5-11
Zoning and Safety Zones - Biloxi
Legend
Safety Zone
Clear Zone
APZ I
Installation Boundary
Parcel Boundary
City
Interstate / Highway
Railroad
Waterbody
Runway
Source:
Keesler AFB, 2010.
Keesler AFB
JOINT LAND USE STUDY
Matrix
DESIGN GROUP
0
0.2
0.4
Miles

Table 5-12 City of Biloxi Zoning within the Keesler AFB Safety Zones

Zoning District	CZ		APZ I		Total
	North	South	North	South	
Agricultural Restricted District (AR)	-	-	-	-	0.46
Community Business (CB)	-	-	-	12.03	12.03
Limited Business (LB)	-	-	-	1.21	1.21
Neighborhood Business (NB)	-	17.42	-	15.58	33.00
Regional Business (RB)	-	-	-	4.88	4.88
Multi-Family Residential, High-Density (RM-30)	-	2.63	-	31.31	33.94
Residential Manufactured/Mobile Home (RMH)	-	-	-	8.37	8.37
Single-Family Residential, Low-Density (RS-10)	0.26	0.09	.46	0.01	0.36
Single-Family Residential, Medium Density (RS 7.5)	14.05	15.50	-	34.09	63.64
Single-Family Residential, High Density (RS-5)	-	5.11	-	0.02	5.13
Sand Beach (SB)	-	-	-	23.29	23.29
Waterfront (WF)	-	-	-	30.64	30.64

Note: Acreages in red are incompatible; Acreages in black are conditionally compatible

All of the land in the South CZ is zoned residential. The majority is zoned Single-Family Residential, Medium Density while approximately one third is zoned Single-Family Residential, High Density. Both zoning designations are incompatible with the land use recommendations.

Land located in the north CZ is also zoned residential. The majority, 14.05 acres, is zoned Single-Family Residential, Medium Density, while 0.26 acres are zoned Single-Family Residential, Low Density. These zoning designations are incompatible with the land use recommendations for the CZ.

The South APZ I is zoned to allow various business and residential uses. All residential uses are incompatible with APZ I. Although the Community Business (CB), Limited Business (LB), and Neighborhood Business (NB) zoning designations primarily allow business services and commercial uses, each zoning district permits single-family residences, which are incompatible, and the Community Business zoning district permits multi-family residences, which are also incompatible.

The North APZ I on Goat Island is zoned Single-Family Residential, Low Density. Single family residential is not compatible in APZ I regardless of density.

Compatibility is based on land use and not the zoning district since each zoning district allows multiple land uses. An assessment of land uses in the zoning districts within Biloxi and APZ I and II is necessary to establish land use compatibility. Uses within these districts and their compatibility with the Air Force land use compatibility guidelines are provided in Table 5-13. Notes are provided at the end of the table where additional consideration is recommended.

Table 5-13 Land Use Compatibility with Air Force Guidelines in APZs in Biloxi

Land Use	APZ I Compatibility Assessment	APZ II Compatibility Assessment
Adult Day Care	Not Compatible	Not Compatible
All Wholesale Trade Uses	Compatible	Compatible
Animal Care, Training, or Kennel	Not Compatible	Compatible
Arboretum or Botanical Garden	Compatible[4]	Compatible[4]
Arena, Stadium, or Amphitheater	Not Compatible	Not Compatible
Art, Music, or Dance Studio	Not Compatible	Not Compatible
Assisted Living Facility	Not Compatible	Not Compatible
Athletic Field or Clubhouse	Not Compatible	Not Compatible
Auditorium or Theater	Not Compatible	Not Compatible
Auditorium / Convention Center	Not Compatible	Not Compatible
Auto Parts Sales and Installation	Compatible	Compatible
Auto Repair and Servicing, without Painting / Bodywork	Compatible	Compatible
Auto Sales / Rental, New or Used	Compatible	Compatible
Bank or Financial Institution, with Drive-Through Service	Not Compatible	Compatible
Bar or Lounge	Not Compatible	Not Compatible
Beach Vending	Not Compatible	Compatible
Billboard	Compatible	Compatible
Blood / Tissue Collection Facility	Not Compatible	Not Compatible
Boat Repair	Compatible	Compatible
Boat Sales	Compatible	Compatible
Boat Storage	Compatible	Compatible
Book or Media Shop	Not Compatible	Compatible
Brewpub	Not Compatible	Not Compatible
Business Services Offices	Not Compatible	Compatible

Table 5-13 Land Use Compatibility with Air Force Guidelines in APZs in Biloxi (continued)

Land Use	APZ I Compatibility Assessment	APZ II Compatibility Assessment
Car Wash or Auto Detailing	Compatible	Compatible
Check Cashing or Title Loan	Not Compatible	Compatible
Child Day Care	Not Compatible	Not Compatible
Cinema	Not Compatible	Not Compatible
College or University	Not Compatible	Not Compatible
Community Garden	Compatible[4]	Compatible[4]
Conference / Training Center	Not Compatible	Not Compatible
Contractor's Offices	Compatible	Compatible
Convenience Store, with Gas Sales	Not Compatible	Compatible
Convenience Store, without Gas Sales	Not Compatible	Compatible
Convent or Monastery	Not Compatible	Not Compatible
Day Labor Employment Service	Not Compatible	Compatible
Drug or Alcohol Treatment Facility	Not Compatible	Not Compatible
Drug Store or Pharmacy, with Drive-through Service	Not Compatible	Compatible
Drug Store or Pharmacy, without Drive-through Service	Not Compatible	Compatible
Dry Cleaning or Laundry Drop-off Establishment	Not Compatible	Compatible
Dwelling, Live-Work	Not Compatible	Not Compatible
Dwelling, Multifamily	Not Compatible	Not Compatible
Dwelling, Single-Family Attached or Townhouse	Not Compatible	Not Compatible
Dwelling, Single-Family Detached	Not Compatible	Compatible[2]
Dwelling, Single-Family Detached - Mississippi Cottage	Not Compatible	Compatible[2]
Dwelling, Single-Family Detached - Zero Lot Line	Not Compatible	Not Compatible
Dwelling, Three- to Four-Family	Not Compatible	Not Compatible
Dwelling, Two-Family	Not Compatible	Not Compatible

Table 5-13 Land Use Compatibility with Air Force Guidelines in APZs in Biloxi (continued)

Land Use	APZ I Compatibility Assessment	APZ II Compatibility Assessment
Dwelling, Upper Story	Not Compatible	Not Compatible
Elementary School	Not Compatible	Not Compatible
Family Child Care Home	Not Compatible	Not Compatible
Family Child Day Care Home	Not Compatible	Not Compatible
Financial Services Offices	Not Compatible	Compatible
Fish Camp	Not Compatible	Not Compatible
Gas Station	Not Compatible	Compatible
General Retail	Not Compatible	Compatible
Golf Course (Private or Public)	Compatible[4]	Compatible
Golf Driving Range	Not Compatible	Compatible
Government Maintenance, Storage, or Distribution Facility	Compatible	Compatible
Government Office or Building	Not Compatible	Compatible
Greenway	Compatible[4]	Compatible[4]
Grocery Store	Not Compatible	Compatible
Group Home	Not Compatible	Not Compatible
Halfway House	Not Compatible	Not Compatible
Heavy Equipment Sales, Rental, Storage, or Repair	Compatible	Compatible
High School	Not Compatible	Not Compatible
Hospital	Not Compatible	Not Compatible
Hotel or Motel	Not Compatible	Not Compatible
Junior High or Middle School	Not Compatible	Not Compatible
Laundromat	Not Compatible	Compatible
Library	Not Compatible	Not Compatible
Liquor Store	Not Compatible	Compatible

Table 5-13 Land Use Compatibility with Air Force Guidelines in APZs in Biloxi (continued)

Land Use	APZ I Compatibility Assessment	APZ II Compatibility Assessment
Manufactured Home [Class A]	Not Compatible	Not Compatible
Manufactured Home [Class B]	Not Compatible	Not Compatible
Manufactured Home Park	Not Compatible	Not Compatible
Massage Therapy	Not Compatible	Compatible
Medical or Dental Clinic	Not Compatible	Not Compatible
Medical or Dental Lab	Not Compatible	Not Compatible
Mobile Home	Not Compatible	Not Compatible
Museum	Not Compatible	Not Compatible
Nightclub	Not Compatible	Not Compatible
Non-Automobile Vehicle Sales/Rental	Compatible	Compatible
Nursing Home	Not Compatible	Not Compatible
Other Outdoor Recreational/Entertainment Uses	Compatible	Compatible
Other Recreational/Entertainment Indoor	Compatible	Compatible
Outpatient Facility	Not Compatible	Not Compatible
Park (Private or Public)	Compatible[4]	Compatible[4]
Parking Garage or Deck (as a principal use)	Compatible[3]	Compatible
Parking Lot (as a principal use)	Compatible[3]	Compatible
Passenger Terminal / Surface Transportation	Compatible[3]	Compatible
Pawn or Buy-Sell Shop	Not Compatible	Compatible
Personal Services Establishment	Not Compatible	Compatible
Pier or Boathouse (as a principal use)	Compatible[4]	Compatible[4]
Place of Worship	Not Compatible	Not Compatible
Plant nursery	Compatible	Compatible
Post Office	Not Compatible	Compatible

Table 5-13 Land Use Compatibility with Air Force Guidelines in APZs in Biloxi (continued)

Land Use	APZ I Compatibility Assessment	APZ II Compatibility Assessment
Professional Services	Not Compatible	Compatible
Public Health Center	Not Compatible	Not Compatible
Public Square or Plaza	Not Compatible	Not Compatible
Radio or Television Station	Compatible[3]	Compatible
Recreational Vehicle Park	Not Compatible	Not Compatible
Repair Establishment	Compatible	Compatible
Research and Development	Not Compatible	Not Compatible
Restaurant, with Drive-Through Service	Not Compatible	Not Compatible
Restaurant, with Indoor or Outdoor Seating	Not Compatible	Not Compatible
Retail Manufacturing	Compatible	Compatible
Sales Offices	Not Compatible	Compatible
Self-Storage Facility	Compatible	Compatible
Specialty Eating Establishment	Not Compatible	Not Compatible
Swimming Pool (as a principal use)	Compatible[4]	Compatible[4]
Tattoo or Body-Piercing Establishment	Not Compatible	Compatible
Taxicab Service / Stand	Compatible[3]	Compatible
Telecommunications Antenna, Collocation or Placement on	Compatible[3]	Compatible[3]
Tire / Muffler Sales and Mounting	Compatible	Compatible
Trade, Vocational, or Industrial School	Not Compatible	Not Compatible
Utility, Major	Compatible[3]	Compatible[3]
Utility, Minor	Compatible[3]	Compatible[3]
Veterinary Clinic	Not Compatible	Not Compatible
Warehouse	Compatible	Compatible
Youth Center	Not Compatible	Not Compatible

Table 5-13 Land Use Compatibility with Air Force Guidelines in APZs in Biloxi (continued)

Land Use	APZ I Compatibility Assessment	APZ II Compatibility Assessment

Table 5-13 Notes:

1. *A "Yes" or a "No" designation for compatible land use is to be used only for general comparison. Within each, uses exist where further evaluation may be needed in each category as to whether it is clearly compatible, normally compatible, or not compatible due to the variation of densities of people and structures. In order to assist air installations and local governments, general suggestions as to FARs are provided as a guide to density in some categories. In general, land use restrictions that limit occupants, including employees, of commercial, service, or industrial buildings or structures to 25 an acre in APZ I and 50 an acre in APZ II are considered to be low density. Outside events should normally be limited to assemblies of not more than 25 people an acre in APZ I, and maximum assemblies of 50 people an acre in APZ II.*
2. *The suggested maximum density for detached single-family housing is two Du/Ac.*
3. *No above ground passenger terminals and no above ground power transmission or distribution lines. Prohibited power lines include high-voltage transmission lines and distribution lines that provide power to cities, towns, or regional power for unincorporated areas.*
4. *Facilities must be low intensity, and provide no playgrounds, etc. Facilities such as club houses, meeting places, auditoriums, large classes, etc., are not recommended.*

D'Iberville

Existing Land Use

Figure 5-12 shows the conditionally compatible and incompatible existing land uses within the Keesler AFB airfield Safety Zones. Table 5-14 shows the breakdown of acreage by existing land use within the Safety Zones. Safety zones with acreages in black are conditionally compatible and acreages in red are incompatible. In total, there are approximately 549 acres in APZ I and II in D'Iberville, of which 306.6 acres are incompatible. There is no land within the North CZ in D'Iberville.

The majority of the existing land use within the North APZ I is Vacant, comprising 97.65 acres. This land is located along the waterfront and was once low-density residential prior to Hurricane Katrina. Existing land use is compatible with the Air Force land use recommendations, but conditionally compatible depending on future development. There are 47.21 acres of Single-Family Residential uses in APZ I, which are incompatible. The 3.46 acres of Public land consists of a wastewater treatment facility, which is compatible.

The majority of existing land uses within APZ II is Single-Family Residential. This existing land use is conditionally compatible, provided that the density does not exceed two dwelling units per acre. About 66.29 acres of Single-Family Residential in the North APZ II are incompatible due to its density. The second largest existing land use is Vacant land, the majority of which is situated south of the I-10 and I-110 interchange. This land is currently compatible with the Air Force land use recommendations but conditionally compatible depending on future development. The largest incompatible existing land use is Commercial located west of I-110. Commercial uses include retail trade as well as professional office and medical facilities. Generally, commercial uses are compatible in APZ II, but because this land use category includes medical facilities, this existing land use area is incompatible. Multi-Family is another existing land use, comprising almost 1,000 multi-family units in apartments. High-density housing, such as this, is incompatible in APZ II since residential units are only recommended at a maximum density of two dwelling units per acre. Also within APZ II are Public / Quasi Public uses including the City Hall, Library, Civic Center, and parks.

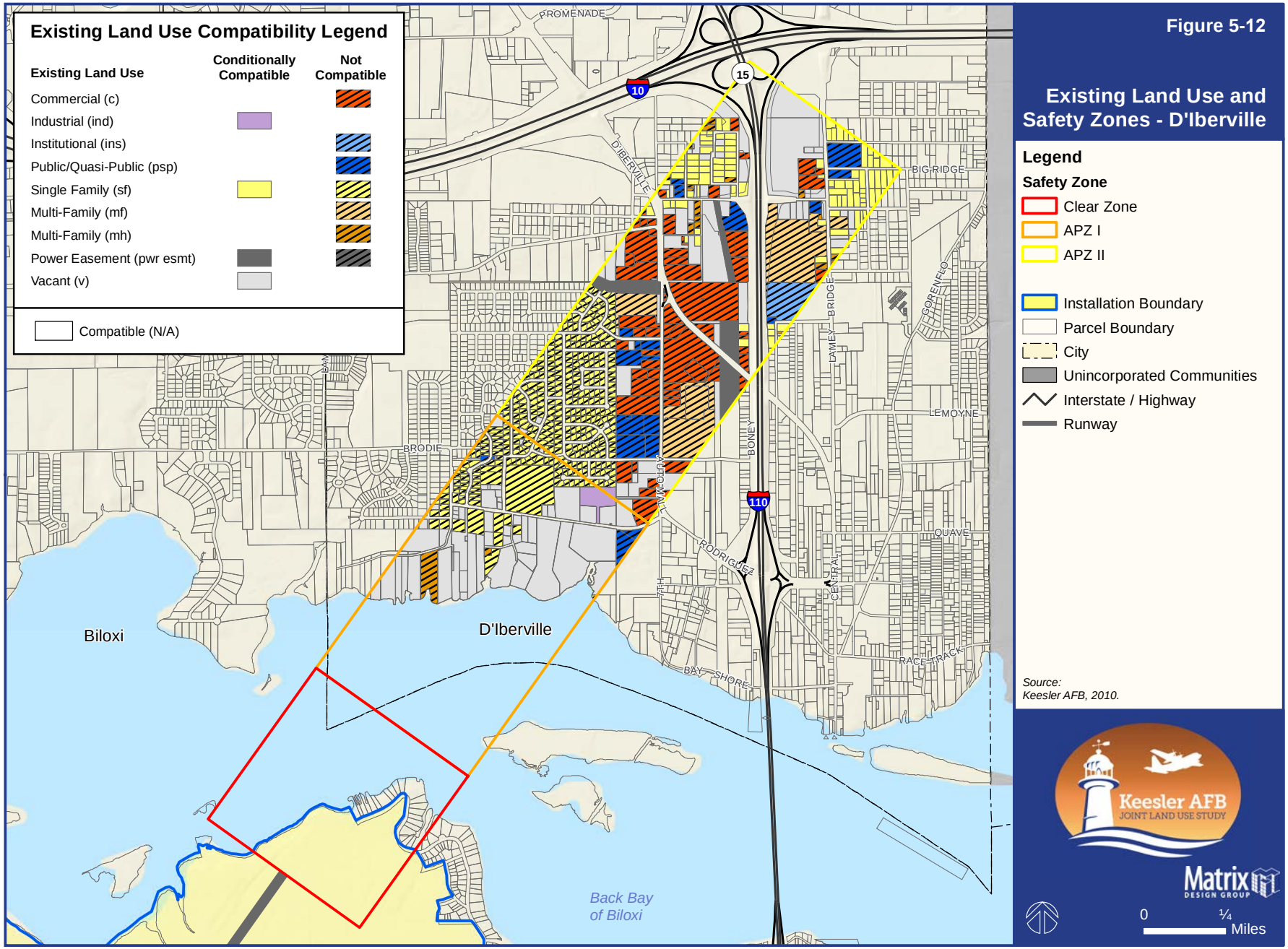


Figure 5-12

Existing Land Use and Safety Zones - D'Iberville

Legend

Safety Zone

- Clear Zone
- APZ I
- APZ II
- Installation Boundary
- Parcel Boundary
- City
- Unincorporated Communities
- Interstate / Highway
- Runway

Source:
Keesler AFB, 2010.

Keesler AFB JOINT LAND USE STUDY

Matrix DESIGN GROUP

0 ¼ Miles

Government services and parks are compatible provided that they comply with recommended maximum non-residential floor area ratios (FAR) in the Air Force guidance. Parks must be low intensity and exclude playgrounds and facilities that encourage the congregation of people such as club houses, meeting places, or auditoriums to be compatible. The North APZ II includes Institutional uses, including the D'Iberville Middle School and four churches, which are all incompatible in APZ II due to the congregations of people these uses attract.

Table 5-14 City of D'Iberville Existing Land Use within the Keesler AFB Safety Zones

Existing Land Use	APZ I North	APZ II North	Total
Commercial / Retail	0.49	94.66	95.15
Industrial	3.75	0.73	4.48
Institutional	-	8.91	8.91
Multi-Family	-	48.50	48.50
Mobile Home	4.96	4.45	9.41
Public / Quasi-Public	3.48	27.66	31.14
Power Easement	-	16.70	16.70
Single Family	47.21	40.95	154.45
		66.29	
Vacant	97.65	82.80	180.45

Note: Acreages in red are incompatible; Acreages in black are conditionally compatible

Future Land Use

Figure 5-13 shows the compatibility assessment for future land uses within the safety zones in D'Iberville. Future land uses that are identified in the City of D'Iberville Comprehensive Plan identify the general desired pattern of land use in the city. Table 5-15 shows the breakdown of acreage of future land use within the safety zones with conditionally compatible acreages in black and incompatible acreages in red. In total, there are 638.21 acres of future land uses that are incompatible with the safety zones.

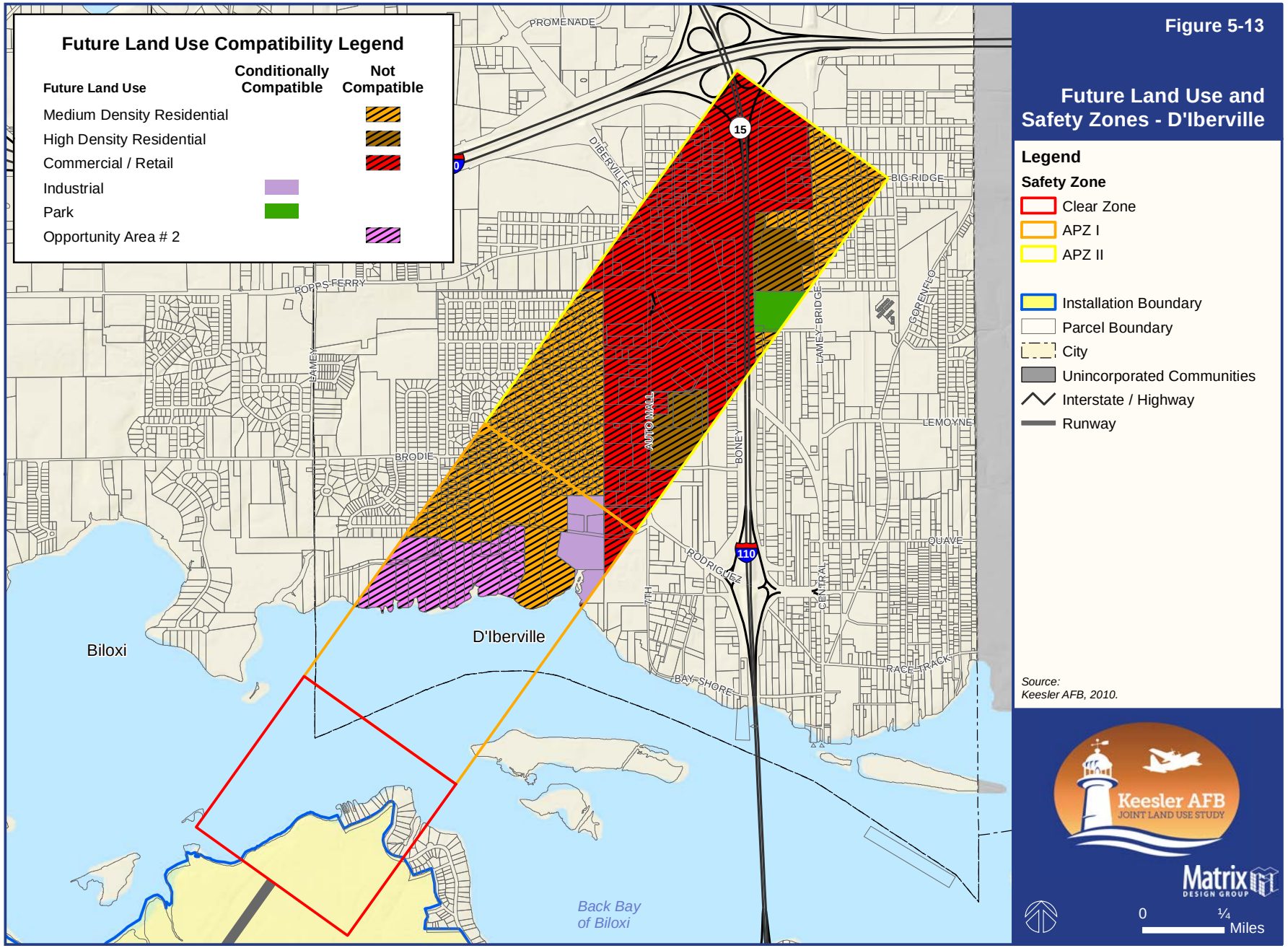
Table 5-15 City of D'Iberville Future Land Use within the Keesler AFB Safety Zones

Future Land Use	APZ I North	APZ II North	Total
Retail / Service	-	160.92	160.92
Residential Multi-Family	98.63	154.06	252.69
Industrial	21.31	0.71	22.02
Mixed-Use	77.17	116.71	193.88
Institutional / School	0.06	30.66	30.72
Park / Open Space	-	9.57	9.57

Note: Acreages in red are incompatible; Acreages in black are conditionally compatible

The North APZ I is predominantly Multi-Family Residential and Mixed-Use future land use categories. Multi-Family Residential is incompatible with the Air Force land use recommendations in APZ I. The Mixed-Use future land use category is located along the waterfront of the Back Bay of Biloxi in APZ I. This area was designated waterfront housing prior to Hurricane Katrina and is designated for both low- and high-density housing. Because residential uses are incompatible in APZ I, this future land use category is incompatible. There is one parcel of land in APZ I designated as the Industrial future land use category, which may be compatible provided the buildings do not exceed a maximum non-residential FAR of 0.28.

Additionally, there is some land within the Retail / Service future land use category, which is incompatible with the Air Force land use recommendations.


Future Land Use Compatibility Legend
Future Land Use
Conditionally Compatible
Not Compatible
Medium Density Residential
High Density Residential
Commercial / Retail
Industrial
Park
Opportunity Area # 2
PROMENADE
DIBERVILLE
BIG RIDGE
POPPS FERRY
LAMEY
AUTO MALL
LAMEY BRIDGE
CORNELIA
LEMOYNE
BRODIE
BONEY
RODRIGUEZ
QUAVE
CENTRAL
7TH
BAY SHORE
RACE TRACK
Biloxi
D'Iberville
Back Bay of Biloxi
15
110
Figure 5-13
Future Land Use and Safety Zones - D'Iberville
Legend
Safety Zone
Clear Zone
APZ I
APZ II
Installation Boundary
Parcel Boundary
City
Unincorporated Communities
Interstate / Highway
Runway
Source:
Keesler AFB, 2010.
Keesler AFB
JOINT LAND USE STUDY
Matrix
DESIGN GROUP
0
¼
Miles

The North APZ II primarily comprises Multi-Family Residential and Retail / Service future land use categories. Multi-Family Residential is incompatible with the Air Force land use recommendations in APZ II since only single- family detached units are recommended at a maximum density of two units per acre. Retail / Services land uses comprise a large portion of the future land use in the North APZ II. While many of the uses within commercial districts are generally compatible with the land use guidelines, the Retail / Commercial land use includes shopping centers, which are not compatible. Additionally, eating and drinking establishments are not compatible with APZ II. Some land designated Industrial and Park future land use is also in APZ II. These future land use categories are conditionally compatible provided the uses do not exceed the established non-residential FAR for industrial uses and the parks are low intensity and exclude playgrounds and facilities that encourage the congregation of people such as club houses, meeting places, or auditoriums.

Zoning

Figure 5-14 shows conditionally compatible and incompatible zoning within the Safety Zones. Table 5-16 shows the breakdown of acreage by zoning district within the safety zones. Acreages denoted in black are conditionally compatible acreages in black and acreages in red are incompatible. In total there are 549.08 acres zoned in the safety zones in D'Iberville, 280.40 acres of which are incompatible.

Within the North APZ I is land zoned for various commercial and residential uses. The residential zoning designations including Single-Family Residential and Multi-Family Residential (R-1, R-2, R-3, R-4) are incompatible in APZ I since residential uses are not recommended. The Interstate Commercial District (C-3), General Commercial District (C-2), and Neighborhood Commercial District (C-1) primarily allow commercial uses; however, these zoning districts also permit medical facilities, which are incompatible in APZ I. The zoning district with the greatest amount of acreage in the North APZ I is the Waterfront District. This district allows a mix of residential, commercial and amusement, and gaming uses. Within this zoning district, residential uses are incompatible as well as amusements and gaming due to the gathering of people they encourage.

Table 5-16 City of D'Iberville Zoning within the Keesler AFB Safety Zones

Zoning District	APZ I North	APZ II North	Total
General Commercial District (C-2)	2.64	175.92	178.56
General Residential District (R-3)	11.27	7.55	18.82
Interstate Commercial District (C-3)	-	93.04	93.04
Multifamily Residential District (R-4)	-	21.54	21.54
Neighborhood Commercial District (C-1)	7.20	0.73	7.93
Single-Family Residential District (R-1)	47.56	92.74	140.30
Single-family Residential District (R-2)	-	0.02	0.02
Waterfront District (WF)	88.87	-	88.87

Note: Acreages in red are incompatible; Acreages in black are conditionally compatible

The majority of the land within the North APZ II is zoned Commercial (C-2, C-3B, C-3C, and C-1), which comprises 269.69 acres. While commercial uses are generally compatible, these four commercial zones include medical facilities, which are not compatible.

Compatibility is based on land use and not the zoning district since each zoning district allows multiple land uses. An assessment of land uses in the zoning districts within D'Iberville and APZ I and II is necessary to establish land use compatibility. Uses within these districts and their compatibility with the Air Force land use compatibility guidelines are provided in Table 5-17.

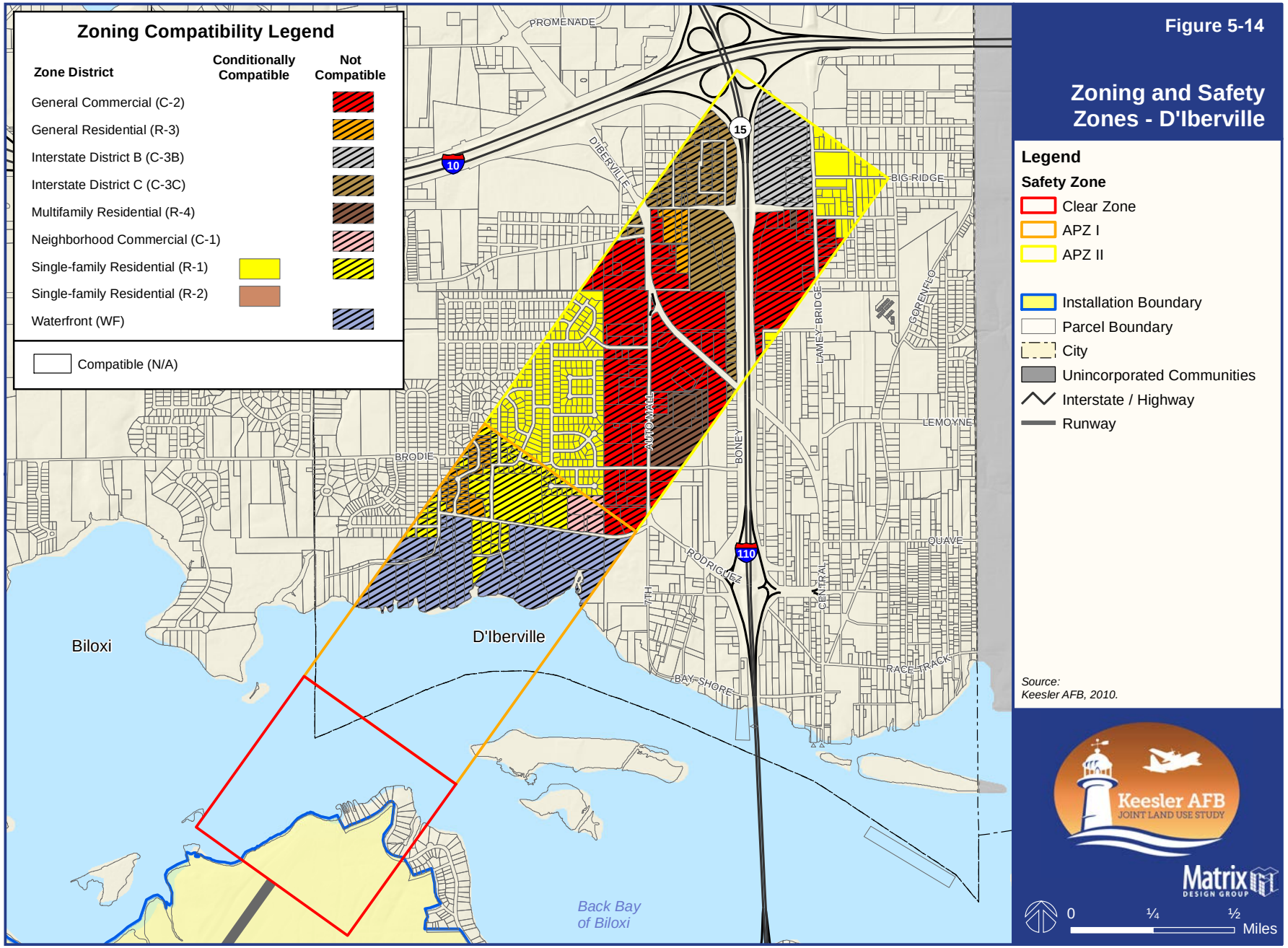

Zoning Compatibility Legend
Zone District
Conditionally Compatible
Not Compatible
General Commercial (C-2)
General Residential (R-3)
Interstate District B (C-3B)
Interstate District C (C-3C)
Multifamily Residential (R-4)
Neighborhood Commercial (C-1)
Single-family Residential (R-1)
Single-family Residential (R-2)
Waterfront (WF)
Compatible (N/A)
PROMENADE
DIBERVILLE
BIG RIDGE
LAMEY BRIDGE
CORNELIA
LEMOYNE
AUTO MALL
BONEY
BRODIE
RODRIGUEZ
QUAVE
CENTRAL
7TH
BAY SHORE
RACE TRACK
Biloxi
D'Iberville
Back Bay of Biloxi
10
15
110
Figure 5-14
Zoning and Safety Zones - D'Iberville
Legend
Safety Zone
Clear Zone
APZ I
APZ II
Installation Boundary
Parcel Boundary
City
Unincorporated Communities
Interstate / Highway
Runway
Source:
Keesler AFB, 2010.
Keesler AFB
JOINT LAND USE STUDY
Matrix
DESIGN GROUP
0
¼
½
Miles

Table 5-17 Land Use Compatibility with Air Force Guidelines in APZs in D'Iberville

Land Use	APZ I Compatibility Assessment	APZ II Compatibility Assessment
Agricultural Use (General)	Compatible[3,4]	Compatible[3,4]
Single Family unit	Not Compatible	Compatible[2]
Zero Lot Line unit (patio homes)	Not Compatible	Compatible[2]
Manufactured homes (Single) (Double)	Not Compatible Not Compatible	Not Compatible Not Compatible
Modular Home	Not Compatible	Compatible
Antique Shops	Not Compatible	Compatible
Appliance Stores	Not Compatible	Compatible
Art Studios, Galleries, and Museums	Not Compatible	Not Compatible
Arts Crafts and Hobby Shops	Not Compatible	Compatible
Auto Parts Stores	Compatible	Compatible
Bakery (Retail)	Not Compatible	Compatible
Beauty Salon, Barber Shops, and Similar	Not Compatible	Compatible
Beauty Supply	Not Compatible	Compatible
Bicycle Shops/Sales	Not Compatible	Compatible
Blueprint Shop or Similar	Not Compatible	Compatible
Book Stores	Not Compatible	Compatible
Camera and Photo Shops	Compatible[1]	Compatible
Candy Store with / without Manufacturing	Not Compatible	Compatible
Catering Establishments	Not Compatible	Compatible
City Municipal Building and Facilities	Not Compatible	Compatible

Table 5-17 Land Use Compatibility with Air Force Guidelines in APZs in D'Iberville (continued)

Land Use	APZ I Compatibility Assessment	APZ II Compatibility Assessment
Clothing and Dry Goods Store	Not Compatible	Compatible
Coffee Shops	Not Compatible	Not Compatible
Commercial Laundry Facilities (Including Linen Supply)	Not Compatible	Compatible[1]
Computer Store and Services	Not Compatible	Compatible
Dance Studios and Similar	Not Compatible	Compatible
Delicatessens	Not Compatible	Not Compatible
Department or Variety Stores	Not Compatible	Compatible
Dress making, Tailor Shops	Not Compatible	Compatible
Drive-in Banks and Similar	Not Compatible	Compatible
Drive-in Restaurants	Not Compatible	Not Compatible
Drug Store, Pharmacies	Not Compatible	Not Compatible
Dry Cleaning Facilities (Drop Off / Pick Up)	Not Compatible	Compatible[1]
Feed and Seed Store or Similar (No Outside Storage)	Not Compatible	Compatible
Financial Institutions	Not Cc(continued)	Compatible
Fire and Police Stations	Not Compatible	Compatible
Fixture Stores	Not Compatible	Compatible
Floor Covering Showrooms / Sales	Compatible[5]	Compatible[5]
Florist Shops (no Greenhouses or nurseries)	Not Compatible	Compatible
Furniture Store	Not Compatible	Compatible
Garden Supplies (Including Outside Storage)	Not Compatible	Compatible
General Business Office	Not Compatible	Compatible

Table 5-17 Land Use Compatibility with Air Force Guidelines in APZs in D'Iberville (continued)

Land Use	APZ I Compatibility Assessment	APZ II Compatibility Assessment
Gift Shops	Not Compatible	Compatible
Grocery Stores / Supermarket	Not Compatible	Compatible
Hardware Store (No Outside Storage)	Not Compatible	Compatible
Health Clubs & Fitness Salons	Not Compatible	Compatible
Home Occupations (with outdoor storage)	Not Compatible	Compatible
Ice Cream, Yogurt Shop	Not Compatible	Not Compatible
Interior Decorating	Not Compatible	Compatible
Jewelry Stores	Not Compatible	Compatible
Landscape Garden Sales and Service	Not Compatible	Compatible
Laundromats	Not Compatible	Compatible[1]
Lawnmower Sales / Service	Compatible	Compatible
Libraries	Not Compatible	Compatible
Locksmith	Compatible	Compatible
Medical and Dental Clinics	Not Compatible	Not Compatible
Medical and Dental Laboratories	Not Compatible	Not Compatible
Music Stores	Not Compatible	Compatible
Newspaper Company or Similar	Not Compatible	Compatible
Newsstand	Not Compatible	Compatible
Office Supply Stores	Not Compatible	Compatible
Optician	Not Compatible	Not Compatible
Paint and Decorator Store	Not Compatible	Compatible

Table 5-17 Land Use Compatibility with Air Force Guidelines in APZs in D'Iberville (continued)

Land Use	APZ I Compatibility Assessment	APZ II Compatibility Assessment
Picture and Frame Shop	Not Compatible	Compatible
Printing, Duplicating Shop	Not Compatible	Compatible
Professional Offices	Not Compatible	Compatible
Restaurant (No Lounges)	Not Compatible	Not Compatible[1]
Shopping Center or Mall	Not Compatible	Not Compatible
Snowball Stand	Not Compatible	Compatible
Title Loan Company w/o Storage	Not Compatible	Compatible
Toy Store	Not Compatible	Compatible
Upholstery Shops	Not Compatible	Compatible
Vending Machine Business	Compatible	Compatible
Water Storage Facilities	Not Compatible	Not Compatible
Yacht Club, with / without Marina	Not Compatible	Compatible

Table 5-17 Notes:

1. A "Yes" or a "No" designation for compatible land use is to be used only for general comparison. Within each, uses exist where further evaluation may be needed in each category as to whether it is clearly compatible, normally compatible, or not compatible due to the variation of densities of people and structures. In order to assist air installations and local governments, general suggestions as to FARs are provided as a guide to density in some categories. In general, land use restrictions that limit occupants, including employees, of commercial, service, or industrial buildings or structures to 25 an acre in APZ I and 50 an acre in APZ II are considered to be low density. Outside events should normally be limited to assemblies of not more than 25 people an acre in APZ I, and maximum assemblies of 50 people an acre in APZ II.
2. The suggested maximum density for detached single-family housing is two Du/Ac.
3. Activities that attract concentrations of birds creating a hazard to aircraft operations should be excluded.
4. Factors to be considered: labor intensity, structural coverage, explosive characteristics, and air pollution.
5. Within SLUCM Code 52, maximum FARs for lumberyards (SLUCM Code 521) are 0.20 in APZ I and 0.40 in APZ II; the maximum FARs for hardware, paint, and farm equipment stores, (SLUCM Code 525), are 0.12 in APZ I and 0.24 in APZ II.

Compatibility Assessment

The safety zones extend into both the cities of Biloxi and D'Iberville; however, neither of the cities employ land use controls for uses in the Keesler AFB safety zones.

The City of Biloxi has an Airport Airspace Overlay District within the Land Development Ordinance; however, this ordinance regulates heights and materials used on buildings that have the potential to create an interference with aviation operations. This ordinance does not include density or intensity standards for uses within the Keesler AFB airfield safety zones.

Findings

- There are existing land uses, future land uses, and zoning districts in the cities of Biloxi and D'Iberville that are incompatible with the Air Force recommended land uses in the Keesler AFB airfields zones.
- Neither the City of Biloxi nor the City of D'Iberville employ land use controls to comply with Air Force recommended land uses in the Keesler AFB safety zones.

ISSUE SA-2

Structures Located in Mandatory Frangibility Zones (MFZ)

Structures located within the Mandatory Frangibility Zone sub-area of the South Clear Zone do not meet breakaway requirements.

Mandatory Frangibility Zones (MFZ) are areas where structures must be frangible – or must break away, collapse, or fall upon impact with a moving aircraft with minimal damage to the aircraft. The DoD defines this zone as an area measuring 250' on both sides of the runway centerline, extending 3,000' beyond the ends of the runway thresholds and within 200' of taxiway centerlines. This area is contained within the Keesler AFB airfield CZs, which extend into the City of Biloxi as discussed in Issue SA-1. Per the land use recommendations in AFI 32-7063 Air Installations Compatible Use Zones Program, no development is recommended within the CZ.

While the DoD specifies the measurements for the Mandatory Frangibility Zones (MFZ), it only applies to structures on DoD property; however, it is worth noting that the MFZ for the Keesler AFB airfield extends outside the installation at both the North and South CZs in the City of Biloxi. Existing development in the city within the MFZ in the North CZ includes boathouses and piers. Existing development in the MFZ in the South CZ includes a business along Iberville Drive, a church, a residence, and trees within these properties. Structures that are not frangible have the potential to cause severe aircraft damage in the event of a mishap.

Compatibility Assessment

UFC 3-260-01, Airfield and Heliport Planning and Design sets criteria for the layout, design, and construction of runways, helipads, taxiways, aprons, and related facilities. This guidance establishes the measurements of the MFZ and applicability. This guidance also states that any structure or item that is within the MFZ must be frangible to the maximum extent possible and if it cannot be made frangible, but must be located within this area, it must be waived before construction. Installations are encouraged to interact with property owners within the MFZ to make structures frangible where practical. Air Combat Command Instruction 32-1056, Airfield Planning and Design states that as part of the Airfield Obstruction Reduction Initiative (AORI), all correctable violations of UFC for Airfield and Heliport Planning and Design must be eliminated. Keesler AFB exercised this practice in 2010 when it removed a live oak tree near the southeast end of the runway in the MFZ.

Findings

- The DoD established MFZs within the airfield CZs at military installations to reduce the potential damage from an aircraft mishap.
- There are structures within the North and South CZs extending from the Keesler AFB airfield that extend into Biloxi.
- The DoD recommends that structures within the MFZ should be eliminated or made frangible to the maximum extent practicable.

ISSUE SA-3

Power Lines Located in South Clear Zone (CZ)

High tension power lines within the South Clear Zone are within eight feet of the approach and departure flight path for landing jet aircraft, posing a risk for arc flashes.

Within the South Clear Zone (CZ) are high tension power lines situated within the approach and departure flight path of Runway 03 at Keesler AFB. Because the high tension power lines are located close to the flight path, there is potential for the interaction between aircraft and the high tension power lines to create an arc flash.

Arc flashes occur when there is a fault of short circuit condition that passes through an electric arc. During an arc flash, an electric discharge travels through the air between one conductor to another, or to the ground. Arc flashes have various causes including accidental touching, material failure, corrosion, and faulty installation.

Arc flashes can cause dangerous results including heat, upwards of 35,000 degrees Fahrenheit, which can cause fire and burns; flying objects, such as molten metal; blast pressure, upwards of 2,000 pounds per square foot (psf); and sound blasts that can reach 140 decibels (dB). The results of arc flashes can cause aircraft and instrumentation damage, and injury to those exposed to them.

Sources: https://www.osha.gov/; http://www.allstar.fiu.edu/aero/;https://www.geindustrial.com/

Compatibility Assessment

Because the land use compatibility guidance in AFI 32-7063 Air Installations Compatible Use Zones Program recommends no utilities be located in the CZ, the siting of high tension power lines within the Keesler AFB airfield South CZ is incompatible with the land use recommendations.

Findings

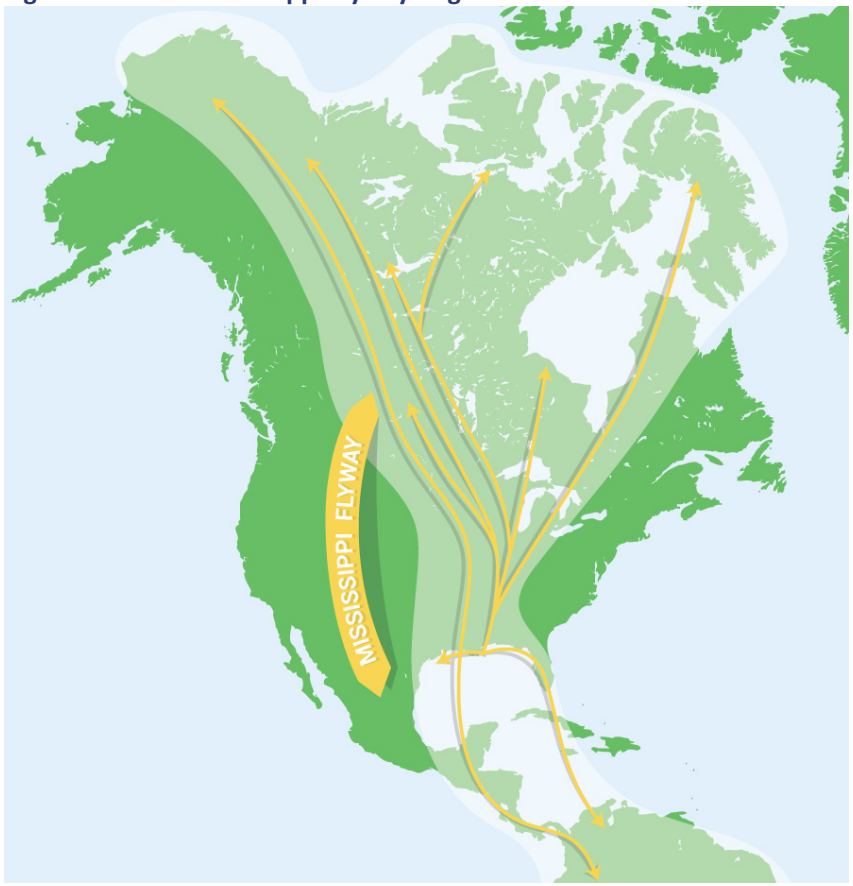
- High tension power lines are located in the South CZ by the approach and departure flight path for approaching aircraft.
- Aircraft interaction with high tension power lines can cause arc flashes, potentially resulting in high risks to people and military equipment.
- AFI Land Use Compatibility guidance recommends that utilities not be located in the CZs.

ISSUE SA-4	**Bird Attractants near Runway** The flight path from Keesler AFB Runway (3/21) extends out over the Gulf of Mexico and Back Bay of Biloxi. Bird attractants, such as wetlands and tree canopies, are located on and around the installation and along with the Mississippi migratory bird flyway, creating the potential for bird aircraft strikes.

Wildlife attractants near Keesler AFB Runway 3/21 are a concern in a region that supports populations of resident and migratory bird species. Bird aircraft strikes can cause significant damage to aircraft and in some cases, may render aircraft completely irreparable resulting in delayed air missions, and may result in injury or loss of life to pilots and citizens.

Biloxi is located within the Mississippi Flyway, a migratory route for more than 325 species of birds. The Mississippi Flyway includes states between the Canadian border and Gulf of Mexico: Alabama, Arkansas, Indiana, Illinois, Iowa, Kentucky, Louisiana, Michigan, Minnesota, Mississippi, Missouri, Ohio, Tennessee, and Wisconsin. Each year, birds migrate between their breeding grounds in Canada and the northern U.S. to their winter grounds along the Gulf of Mexico and Central and South America. Because the Gulf of Mexico is the last stop for many migratory birds, the installation may experience the overflight of migratory bird species, which contribute to the risk of Bird / Wildlife Aircraft Strike Hazards (BASH) at Keesler AFB. Figure 5-15 shows the general routes that migratory birds may take during through the Mississippi Flyway.

Figure 5-15. Mississippi Flyway Migration Routes

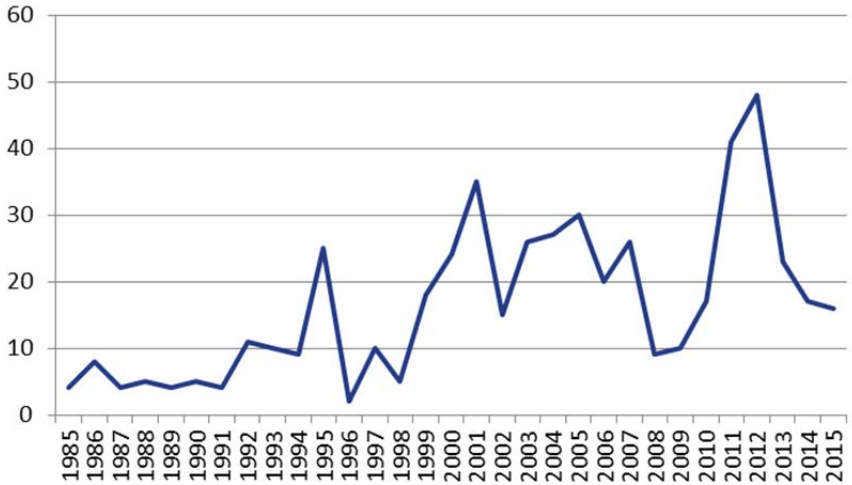


Source: http://www.birdfeeders.com/

In addition to the installation being located at the regional north-south terminus of the Mississippi Flyway, the installation is also located on the Back Bay of Biloxi, which attracts aquatic shorebirds. The shorebirds are attracted to the wetlands on the bay, 22 acres of which are located on the installation and a portion of which is located in the North CZ.

Since 1985, Keesler AFB has experienced 508 bird-strikes, with 17 bird-strikes documented in 2015. Figure 5-16 shows BASH occurrences at Keesler AFB since 1985. The highest incidence of strikes was in 2012 when there were 48 reported strikes and the lowest incidence was in 1996 when there were two reported incidences.

Figure 5-16. Bird / Wildlife Strikes at Keeler AFB, 1985 - 2015



Source: http://www.usahas.com

Approximately 30 percent of these strikes were doves, 9 percent were swallows, and 4 percent were killdeer. The remaining strikes were from other various birds and bats.

Keesler AFB generally experiences an increase in bird activity in late spring / early summer and bird activity will remain high until late summer, although flocks of birds of various species often fly over the installation during all seasons. The majority of the strikes are doves, which are the most active on the installation in July and the summer months.

High dove activity generally occurs mid-morning and late afternoon. Swallow activity on the Base generally occurs in the morning and will increase during mowing or after rainfall.

Sources: http://www.audubon.org/mississippi-flyway; http://mississippi.flyways.us/

Compatibility Assessment

The installation monitors the presence of birds on the installation in order to maintain the safety of personnel and equipment during operations. Because severe instances of bird presence can affect missions, the installation works to maintain a low level of bird activity on the installation.

Keesler AFB has a BASH Plan for the purpose of identifying wildlife and reducing bird and wildlife strike occurrences. The installation has historically used pyrotechnics, sirens, and cannons for the dispersal of birds, although depredation is occasionally done to ensure removal as some species of birds, such as the dove, are often not frightened by pyrotechnic, sirens, and bioacoustics removal methods. The installation takes measures to discourage birds by managing the height of grass and establishing mowing criteria to maintain the insect population which some birds feed on. Keesler AFB has mapped bird / wildlife attractants in the region to avoid overflight of these areas.

Executive Order 13186 Responsibilities of Federal Agencies To Protect Migratory Birds (2001) requires that federal agencies protect migratory birds and requires a Memorandum of Understanding (MOU) with the U.S. Fish and Wildlife Service to promote the conservation of migratory bird populations if an agency's actions have a measurable adverse effect on migratory bird populations.

Findings

- The geographical location of Keesler AFB creates potential risks for BASH from both migratory birds and aquatic shorebirds.
- Keesler AFB has a BASH Plan in place for mitigating the potential for bird / wildlife aircraft strikes. Keesler AFB last updated its BASH Plan in December 2016 and is currently in review for 2017.

Vertical Obstructions (VO)

Vertical obstructions are created by manmade (buildings, structures) or natural (trees) or other features that may encroach into the navigable airspace or radar signal transmission line of sight pathways used by the military. These obstructions can be a safety hazard to both the public and military personnel and can potentially impact military readiness.

Vertical obstructions can compromise the value of low-level flight training by limiting the areas where such training can occur. These obstructions can include a range of items from man-made, such as telephone poles, utility transmission towers, and radio antennas, to natural, such as tall trees and land features. Vertical obstructions can also interfere with radar transmissions, compromising the integrity of data transmission between the transmitter and receiver. Though most critical near the transmitter, the geographic area impacting the transmissions, or radar viewshed, can be broad depending on the distance between the transmitter and receivers.

Key Terms

Imaginary Surfaces. The term imaginary surface refers to the areas surrounding a heliport or airfield that must be kept clear of objects that might pose a safety threat to aviation activities. A man-made or natural object that projects above an imaginary surface is an obstruction.

Vertical Obstructions. Vertical obstructions are objects or structures that exceed a specified height above ground level and extend into airspace. Vertical obstructions may be created by buildings, trees, structures, or other features that are of greater height than, and encroach into, the navigable airspace used for military operations (aircraft approach-departure surfaces, transitional surfaces, as well as military training or flight routes). These can present a safety hazard to both the public and military personnel and potentially impact military readiness.

Technical Background

In relation to flight operations from an airport (military or civilian), vertical obstructions are addressed through compliance with Code of Federal Regulation (CFR) Title 14 Part 77 Safe, Efficient Use and Preservation of the Navigable Airspace, which establishes standards and notification requirements for objects affecting navigable airspace. Commonly referred to as (CFR) Title 14 Part 77 compliance, this regulation provides details to evaluate the potential for a vertical obstruction based on the elevation of the airfield, the height and resulting elevation of the new structure or facility, and the location of the structure or facility in relation to the airfield in question.

To determine when structures or facilities should be evaluated for vertical obstruction, (CFR) Title 14 Part 77 states the following requirements for notifying the FAA:

> *§77.9 - Any person / organization who intends to sponsor any of the following construction or alterations must notify the Administrator of the FAA:*
>
> *– Any construction or alteration exceeding 200 feet above ground level.*
>
> *Any construction or alteration:*
>
> *– within 20,000 feet of a public use or military airport which exceeds a 100:1 surface from any point on the runway of each airport with at least one runway more than 3,200 feet.*
>
> *– within 10,000 feet of a public use or military airport which exceeds a 50:1 surface from any point on the runway of each airport with its longest runway no more than 3,200 feet.*

– within 5,000 feet of a public use heliport which exceeds a 25:1 surface.

Any highway, railroad, or other traverse way whose prescribed adjusted height would exceed the above noted standards.

When requested by the FAA:

– Any construction or alteration located on a public use airport or heliport regardless of height or location.

(CFR) Title 14 Part 77 also identifies the height at which an object may be considered an obstruction at a designated distance:

§77.17- Obstruction standards.

(a) An existing object, including a mobile object, is, and a future object would be an obstruction to air navigation if it is of greater height than any of the following heights or surfaces:

(1) A height of 499 feet above ground level at the site of the object.

(2) A height that is 200 feet above ground level or above the established airport elevation, whichever is higher, within three nautical miles of the established reference point of an airport, excluding heliports, with its longest runway more than 3,200 feet in actual length, and that height increases in the proportion of 100 feet for each additional nautical mile from the airport up to a maximum of 499 feet.

(3) A height within a terminal obstacle clearance area, including an initial approach segment, a departure area, and a circling approach area, which would result in the vertical distance between any point on the object and an established minimum instrument flight altitude within that area or segment to be less than the required obstacle clearance.

(4) A height within an enroute obstacle clearance area, including turn and termination areas, of a Federal Airway or approved off-airway route, that would increase the minimum obstacle clearance altitude.

(5) The surface of a takeoff and landing area of an airport or any imaginary surface established under § 77.19, 77.21, or 77.23. However, no part of the takeoff or landing area itself will be considered an obstruction.

(b) Except for traverse ways on or near an airport with an operative ground traffic control service furnished by an airport traffic control tower or by the airport management and coordinated with the air traffic control service, the standards of paragraph (a) of this section apply to traverse ways used or to be used for the passage of mobile objects only after the heights of these traverse ways are increased by:

(1) 17 feet for an Interstate Highway that is part of the National System of Military and Interstate Highways where overcrossings are designed for a minimum of 17 feet vertical distance.

(2) 15 feet for any other public roadway.

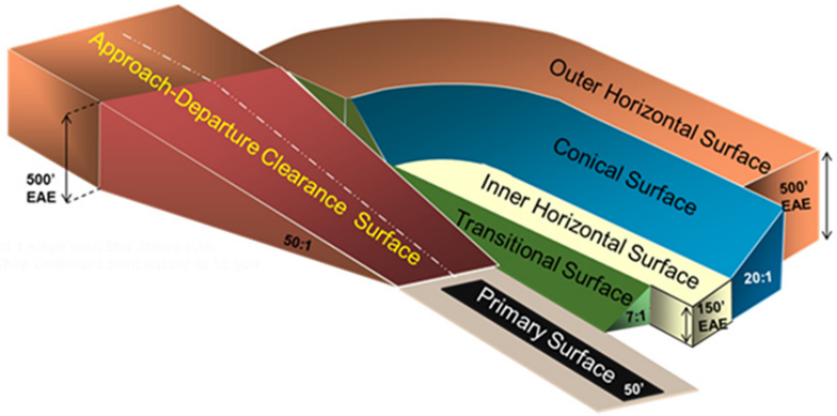
(3) 10 feet or the height of the highest mobile object that would normally traverse the road, whichever is greater, for a private road.

(4) 23 feet for a railroad.

(5) For a waterway or any other traverse way not previously mentioned, an amount equal to the height of the highest mobile object that would normally traverse it.

Apart from the (CFR) Title 14 Part 77, the FAA has developed imaginary surfaces around runways to determine how structures and facilities are evaluated as to whether they pose a vertical obstruction relative to the surrounding airspace. The levels of imaginary surfaces build upon one another and are designed to eliminate obstructions to air navigation and operations, either natural or man-made. The dimension or size of an imaginary surface depends on the runway classification. Figure 5-17 illustrates all the imaginary surfaces of a runway and the heights and ratios that buildings and structures are evaluated for vertical obstructions.

Figure 5-17. Example DoD Imaginary Surfaces Cross-Section



The following are definitions of imaginary surfaces per the DoD criteria:

Primary Surface. This surface defines the limits of the obstruction clearance requirements in the immediate vicinity of the landing area. The primary surface comprises surfaces of the runway, runway shoulders, and lateral safety zones and extends 200 feet beyond the displaced threshold at each end of the runway. The width of the primary surface for the type of runway at Keesler AFB is 2,000 feet, or 1,000 feet on each side of the runway centerline.

Clear Zone Surface. This surface defines the limits of the obstruction clearance requirements beginning at the runway end, or the displaced threshold. The length and width (for a single runway) of a Clear Zone surface at Keesler AFB is 3,000 feet by 3,000 feet.

Approach-Departure Clearance Surface. This surface is symmetrical about the runway centerline extended, begins as an inclined plane (glide angle) 200 feet at the end of the primary surface of the centerline elevation of the runway end, and extends for 50,000 feet. The slope of the approach-departure clearance surface is 50:1 along the extended runway (glide angle) centerline until it reaches an elevation of 500 feet above the established airfield elevation. It then continues horizontally at this elevation to a point 50,000 feet from the start of the glide angle. The width of this surface at the runway end is 2,000 feet; it flares uniformly, and the width at 50,000 feet is 16,000 feet.

Inner Horizontal Surface. This surface is a plane, oval in shape at a height of 150 feet above the established airfield elevation. It is constructed by scribing an arc with a radius of 7,500 feet above the centerline at the end of the runway and interconnecting these arcs with tangents.

Conical Surface. This is an inclined surface extending outward and upward from the outer periphery of the inner horizontal surface for a horizontal distance of 7,000 feet to a height of 500 feet above the established airfield elevation. The slope of the conical surface is 20:1.

Outer Horizontal Surface. This surface is a plane located 500 feet above the established airfield elevation. It extends for a horizontal distance of 30,000 feet from the outer periphery of the conical surface.

Transitional Surfaces. These surfaces connect the primary surfaces, Clear Zone surfaces, and approach-departure clearance surfaces to the outer horizontal surface, conical surface, other horizontal surface, or other transitional surfaces. The slope of the transitional surface is 7:1 outward and upward at right angles to the runway centerline. To determine the elevation for the beginning of the transitional surface slope at any point along the lateral boundary of the primary surface, including the CZ, draw an angle to the runway axis. The elevation at the runway centerline is the elevation for the beginning of the 7:1 slope.

ISSUE VO-1	**Vertical Obstructions in conflict with Imaginary Surface criteria in the City of Biloxi** There are structures including telecommunication towers within the City of Biloxi that exceed height restrictions per the DoD Imaginary Surfaces criteria.

Awareness of various vertical obstructions and how they can impact the installation's operations and missions is needed to limit encroachment within jurisdictions surrounding a military installation. General development, power lines, wind energy projects or any other structures capable of causing incompatible development can ultimately degrade an installation's mission capability. Additionally, cell towers have the ability to create vertical obstructions within the Keesler AFB's Imaginary Surfaces, which can disrupt military operations and the mission. While there are existing cell towers in Biloxi, there is a concern that future cell towers could be incompatible with the Imaginary Surfaces height thresholds.

Incompatible maximum heights within a jurisdiction can create vertical obstructions for both military and civilian aviation operations, particularly if development is located within areas where military operations occur. Incompatible development can include natural or man-made structures within line-of-sight areas or within the Imaginary Surfaces such as the Approach-Departure Clearance Surfaces associated with the runways at Keesler AFB.

Compatibility Assessment

The Biloxi Land Development Ordinance includes Section (D) – AAO: Airport Airspace Overlay district. The section states that structures may not exceed the federal obstruction standards contained in (CFR) Title 14 Part 77 that relate to the primary surface, approach clearance surface, inner horizontal surface, outer horizontal surface, conical surface, or transitional surfaces. Subsection 5 of the Overlay District requires an elevation survey for certain applications including a Certificate of Zoning Compliance, Public Works Permit, Temporary Use Permit, or Sign Permit.

The Imaginary Surfaces associated with the airfield at Keesler AFB extend in all directions form the installation into the City of Biloxi including the 50:1 slope (1 vertical foot for every 50 horizontal feet) of the Approach / Departure Clearance Surface plateauing at 500 feet, Inner Horizontal Surface at 150 feet, Transitional Surface with a slope of 7:1 (1 vertical foot for every 7 horizontal feet), Conical Surface with a slope of 20:1 (1 vertical foot for every 20 horizontal feet), and Outer Horizontal Surface at 500 feet above the established airport elevation (EAE). Objects are considered obstructions

to air navigation if they are greater in height than any of the imaginary surfaces.

Identifying potential vertical obstructions requires having a georeferenced elevation at a location to determine the precise location within the slope of the imaginary surface. Generally, the closer objects are to an airfield, the lower the height at which they become a vertical obstruction. Because of these unique conditions, it is not possible not provide an assessment of vertical obstructions other than noting the relevant imaginary surfaces, their geographies, and allowable structure heights per the City Land Development Ordinance as a guide.

The following is an assessment of existing structures and towers that are located in the City of Biloxi within Keesler AFB Imaginary Surfaces and how the Future Land Use and Land Development Ordinance relate to the height requirements per the Imaginary Surfaces.

City of Biloxi and Keesler AFB Imaginary Surfaces

Existing Land Use

There are currently 12 structures in the City of Biloxi located within the Keesler AFB imaginary surfaces that exceed the imaginary surfaces height. These structures are identified on Figure 5-18. As prescribed by (CFR) Title 14 Part 77, regardless of the underlying height in the zoning districts, development cannot exceed the imaginary surfaces heights or the Existing Military Operations Surface (EMOS). The existing structures, developed before 2003 as stated in the Land Development Ordinance, are able to remain as nonconforming structures.

In addition to the existing structures, there are cell towers that are being developed in Biloxi. These towers are 20 feet under the height restrictions and do not pose a risk for creating a vertical obstruction.

Zoning

The Biloxi Land Development Ordinance establishes an Airport Airspace Overlay (AAO) district, which controls potential hazards to aircraft operations that use the navigable airspace near Keesler AFB. Manmade or natural vertical obstructions within this overlay district must not exceed obstruction standards prescribed by (CFR) Title 14 Part 77. The AAO also provides additional navigation protection standards, which prohibit land uses in land or water within the City that:

- *Creates electrical interference with navigational signals or radio communications between aircraft using the airport at Keesler Air Force Base and the base's control tower;*
- *Makes it difficult for pilots using the airport at Keesler Air Force Base to distinguish airport lights from other lights;*
- *Creates glare in the eyes of pilots using the airport at Keesler Air Force Base during take offs or landings; or*
- *Otherwise endangers or interferes with the safe landing, takeoff, or maneuvering of aircraft intending to use the airport at Keesler Air Force Base.*

Any variances to these standards or to the FAA height standards must require coordination with the FAA and Keesler AFB, which includes a written determination by the FAA as to the effects on the navigable airspace and from Keesler AFB as to the effect on the installation's flight operations.

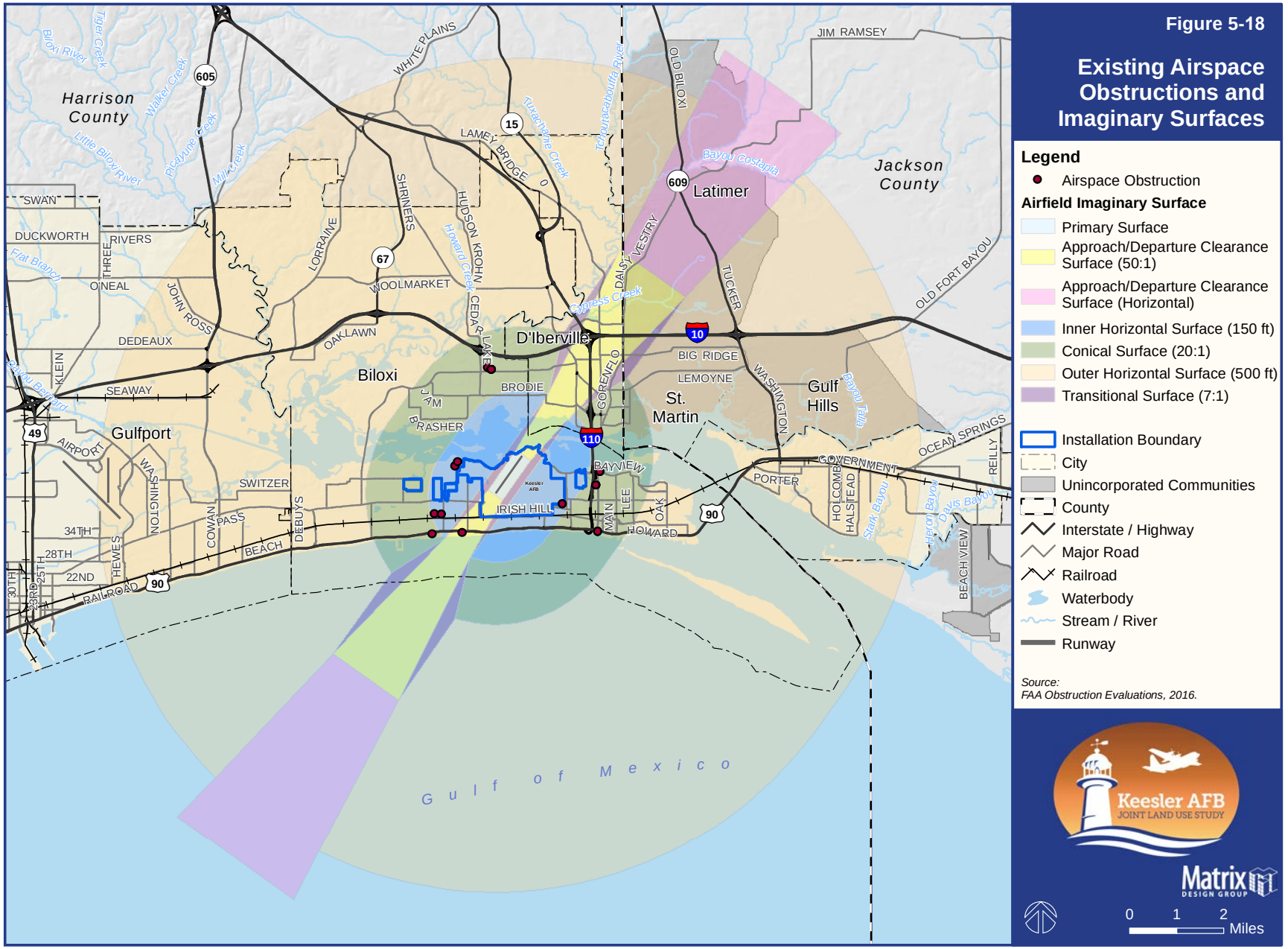


Figure 5-18
Existing Airspace Obstructions and Imaginary Surfaces
Legend
Airspace Obstruction
Airfield Imaginary Surface
Primary Surface
Approach/Departure Clearance Surface (50:1)
Approach/Departure Clearance Surface (Horizontal)
Inner Horizontal Surface (150 ft)
Conical Surface (20:1)
Outer Horizontal Surface (500 ft)
Transitional Surface (7:1)
Installation Boundary
City
Unincorporated Communities
County
Interstate / Highway
Major Road
Railroad
Waterbody
Stream / River
Runway
Source:
FAA Obstruction Evaluations, 2016.
Harrison County
Jackson County
Biloxi
Gulfport
D'Iberville
Latimer
St. Martin
Gulf Hills
Ocean Springs
Keesler AFB
IRISH HILL
BAYVIEW
WOOLMARKET
WHITE PLAINS
LAMEY BRIDGE
OLD BILOXI
JIM RAMSEY
TUCKER
OLD FORT BAYOU
BIG RIDGE
LEMOYNE
BRODIE
OAKLAWN
SEAWAY
DEDEAUX
O'NEAL
DUCKWORTH
SWAN
RIVERS
THREE
JOHN ROSS
KLEIN
LORRAINE
SHRINERS
HUDSON KROHN
CEDAR LAKE
DAISY VESTRY
GORENFLO
JAM
BRASHER
AIRPORT
WASHINGTON
SWITZER
COWAN
PASS
DEBUYS
BEACH
HEWES
RAILROAD
34TH
28TH
25TH
22ND
30TH
23RD
MAIN
LEE
OAK
HOWARD
PORTER
GOVERNMENT
HOLCOMB
HALSTEAD
REILLY
BEACH VIEW
Bayou Costapia
Cypress Creek
Howard Creek
Turkey Creek
Tchoutacabouffa River
Biloxi River
Tiger Creek
Walker Creek
Little Biloxi River
Pickayune Creek
Mill Creek
Flat Branch
Bayou Bernard
Bayou Talla
Stark Bayou
Heron Bayou
Davis Bayou
Gulf of Mexico
605
15
609
67
10
110
49
90
Keesler AFB JOINT LAND USE STUDY
Matrix DESIGN GROUP
0 1 2 Miles

The maximum heights listed for each zoning district in Biloxi do not apply to public monuments, public water towers, public utility towers, poles, and terminal facilities, or spires, chimneys, wind turbines, radio and television antennas, cupolas, domes, elevator shaft enclosures, water towers, ventilators, solar collectors, mechanical equipment and appurtenances.

Within the Inner Horizontal Surface (defined in Figure 5.23-1), there is a pocket of development at the intersection of U.S. Highway 90 and Veterans Avenue that is zoned Waterfront, which has a maximum height of 175 feet. This exceeds the height limit of 150 feet for the Inner Horizontal Surface. There are currently no height obstructions within this area; however, any future development should comply with the DoD Imaginary Surfaces height limitation criteria. The Biloxi Land Development Ordinance should state that heights, regardless of zoning designation, should not exceed 150 feet within this zoning district.

In addition, there is land on Irish Hill Drive and Rodenberg Avenue that is zoned as Regional Business. Although currently vacant, this parcel of land has the potential for development with a maximum height of 80 feet. Due to its proximity to Keesler AFB within the Approach / Departure Clearance Surface (defined in Figure 5.23-1), this parcel could lead to incompatible development height within this Imaginary Surface.

This situation is similar to the land that is zoned Multi-Family Residential, High Density on Irish Hill Drive and Rodenberg Avenue and on U.S. Highway 90 and Acacia Avenue. Some of this land is currently vacant, while some parcels are already developed as Multi-Family Residential. For vacant parcels of land located in proximity to the installation within the Approach / Departure Surface and the Transitional Surface, there is potential for incompatible development since this zoning district allows maximum heights of 100 feet.

Additionally, the Land Development Ordinance establishes a maximum height for communication towers across all zoning districts in the City of Biloxi. Within these districts, freestanding towers are restricted to a maximum height of 180 feet. For towers that are greater than 120 feet in height, the design of the tower must accommodate antennas, and for towers between 70 feet and 120 feet in height, the tower must be designed for future rearrangement of antennas.

The Land Development Ordinance also states that the addition of a tower or antenna onto an existing structure shall not cause the height of the "structure to increase by more than 20 percent or the maximum height allowed in that zoning district, whichever is less."

A general standard for telecommunication towers and antennas in the Land Development Ordinance is that the locations of the towers or antennas do not "interfere with the flight zones of civilian or military airports." Through JLUS interviews, cell tower applications were noted as being passed on to Keesler AFB for review prior to the city approving the permit. Though this review occurs, there is no requirement in the Land Development Ordinance that formalizes this process.

Findings

- There are heights in zoning districts that are incompatible with the height limits for the Keesler AFB airfield Imaginary Surfaces.

ISSUE VO-2

Vertical Obstructions in conflict with Imaginary Surface criteria in the City of D'Iberville

The City of D'Iberville does not have Comprehensive Plan policies or regulations in the Zoning Ordinance to manage development within the Keesler AFB Imaginary Surfaces.

The Keesler AFB Imaginary Surfaces extend into D'Iberville. The City of D'Iberville does not fully incorporate the Keesler AFB airfield Imaginary Surfaces in their Comprehensive Plan policies or Zoning Ordinance. Although there is a maximum height for structures in the city, there are no land development regulations that utilize the Imaginary Surfaces as a maximum threshold.

Imaginary Surfaces have specific height requirements that change within each Imaginary Surface (see Figure 5.23-1). Awareness of various vertical obstructions and how they can impact the installation's operations and missions is needed to limit encroachment within jurisdictions surrounding a military installation. General development, power lines, wind energy projects or any other structures capable of causing incompatible development can ultimately degrade an installation's mission capability.

A lack of height restrictions relative to the DoD Imaginary Surfaces criteria within the City Zoning Ordinance can potentially allow structures and towers to be developed that could create a vertical obstruction, which would impact flight operations at Keesler AFB. For example, cell towers have the ability to create vertical obstructions within the Keesler AFB imaginary surfaces, which can impact the military operations and mission. While there are existing cell towers in D'Iberville, there is a concern that future cell towers could be incompatible with the Imaginary Surfaces.

Structure heights are particularly a concern if located within areas where military operations occur. Incompatible development can include natural or man-made structures within Imaginary Surfaces, such as the Approach-Departure Clearance Surface associated with the runways at Keesler AFB.

Compatibility Assessment

The City of D'Iberville Zoning Ordinance establishes a maximum height of 170 feet for structures across the city. Though in accordance with DoD standards, the code does not reference DoD Imaginary Surfaces criteria.

The Comprehensive Plan does not include policies for heights, but does acknowledge that the city's proximity to the installation may create height restrictions. This is the only reference to Keesler AFB height restrictions in the Comprehensive Plan.

The following is a description of the structures and towers that are located in the City of D'Iberville within Keesler AFB defined Imaginary Surfaces.

City of D'Iberville and Keesler AFB Imaginary Surfaces

Existing Land Use

There are currently no structures or towers in the City of D'Iberville located within the Keesler AFB Imaginary Surfaces that exceed the DoD Imaginary Surfaces as indicate din Figure 5-18.

Zoning

The City of D'Iberville Zoning Ordinance specifies that buildings and structures located in the Runway End, Clear Zone, Runway Airspace Plan and Profile, and the Runway Airspace Imaginary Surfaces for Keesler AFB cannot exceed 170 feet in height based on cited DoD regulations. Although this provides a standard maximum height for structures in these zones and surfaces, the Zoning Ordinance provides height standards for each Zoning District.

Table 5-18 provides an analysis of allowable building heights for each of the zoning districts in the city and where they occur in each imaginary surface with a green box indicating compatibility, a yellow box indicating potential compatibility depending of the approved height, and a red box indicating incompatibly.

Agricultural, Single Family Residential, Multi-Family Residential, Residential Office, and Neighborhood Commercial Zoning Districts have an allowable height of up to 35 feet. General Commercial and Industrial have an allowable height of 50 feet as does Interstate Commercial districts that are located south of I-10 (for structures north of I-10 there are a maximum height of 60 feet). The Mixed-Multifamily Residential Zoning District allows structures up to 3 stories and the French Market Zoning District allows structures up to 4 stories.

The greatest height allowance in the City of D'Iberville is in the Waterfront Zoning District, which allows structures up to 110 feet. The Waterfront District, located along the waterfront of the Back Bay of Biloxi, is potentially compatible with the Keesler AFB Transitional and Approach / Departure Surfaces. The Transitional Surface applies to a handful of properties in the Waterfront District near the eastern boundary of D'Iberville along the shoreline. Assessing whether the permitted height in the Waterfront District complies with the Transitional Surface, is dependent on where the development is sited on the property relative to the maximum 110 foot height for that surface; therefore, there is potential for development in this area to be incompatible with the Imaginary Surfaces.

The Waterfront District is also within the Approach / Departure Clearance Surface. The proximity of land in D'Iberville to the end of the Approach / Departure Clearance Surface at the runway varies from approximately 4,900 feet to 6,300 feet. This yields an allowable height of 100 to 126 feet at the shoreline since the Approach / Departure Clearance Surface is a sloping surface with a 50:1 ratio (1 vertical foot for every 50 horizontal feet). The Zoning Code allows a maximum height of 110 feet. This elevation in the Approach / Departure Clearance Surface roughly begins after the first few shoreline parcels. While the maximum height of structures on most parcels within the Waterfront Zoning District would be compatible with the Imaginary Surfaces, a handful of parcels within this zoning district are not.

Additionally, the D'Iberville Zoning Ordinance identifies "Radio, TV Towers or Similar" as conditional uses in the General Commercial (C-2), Interstate Commercial (C-3), and Industrial (I) zoning districts. There are no specific regulations in the Zoning Ordinance related to telecommunication tower heights; however, buildings and structures are limited to 170 feet in the Keesler AFB Imaginary Surfaces. As an accessory structure, heights may increase above the 170-foot maximum height of the associated zoning district by one foot for every additional foot of setback provided, posing the potential for incompatibility with the Imaginary Surfaces.

Table 5-18 Heights by Zoning District and Imaginary Surfaces in D'Iberville

Zoning District	Max Height	Imaginary Surface					
		Primary	Transitional	Inner Horizontal	Conical	App / Dep	Outer
Agricultural (AG)	35 feet	-	-	-	■	-	■
Single Family Residential Estate (R-E)	35 feet	-	-	-	■	-	■
Single Family Residential (R-1)	35 feet	-	■	■	■	■	■
Single-Family Residential (R-2)	35 feet	-	■	■	■	■	■
General Residential (R-3)	35 feet	-	■	■	■	■	■
Multi-Family Residential (R-4)	35 feet	-	■	-	■	■	■
Mixed Multifamily Residential (R-4A)	3 stories						
Manufactured Home District (R-5)	25 feet	-	-	-	■	-	■
Residential Office (R-O)	35 feet	-	■	-	■	■	■
Neighborhood Commercial (C-1)	35 feet	-	-	-	■	-	-
General Commercial (C-2)	50 feet	-	■	■	■	■	■
Interstate Commercial (C-3)	North of I-10: 60 feet* South of I-10: 50 feet**	-	-	-	-	■	-
Industrial (I)	50 feet	-	-	-	-	■	-
Waterfront (WF)	110 feet	-	■	■	■	■	
French Market District (FMD)	4 stories	-	-	-	■	-	-

*No more than 6 stories, or as otherwise required by the FAA
** No more than 5 stories, or as otherwise required by the FAA

■ Incompatible
■ Potential Compatibility
■ Compatible

Findings

- While the City of D'Iberville has a maximum height for structures, the city does not acknowledge the slopes of the Keesler AFB airfield Imaginary Surfaces.
- There are no structures or towers that currently exceed the Keesler AFB airfield Imaginary Surfaces.
- There are zoning districts that have the potential to allow incompatible land uses in the Keesler AFB airfield Imaginary Surfaces.

ISSUE VO-3	**Existing Military Operations Surface (EMOS)**
	Though the City of Biloxi has incorporated the Existing Military Operations Surface (EMOS) by reference along with a corresponding height hazard map in the Land Development Ordinance (LDO), the EMOS is not graphically depicted per the Air Force description. The City of D'Iberville does not acknowledge the EMOS.

The EMOS is a Keesler AFB requirement for height compatibility to accomplish the strategic flying mission at Keesler AFB. The City of Biloxi has incorporated the EMOS in the Land Development Ordinance (LDO) by written reference and prepared a corresponding Height Hazard Map from the definition provided by Keesler AFB in an effort to define and protect the strategic air mission. Because the EMOS has not been geographically defined by the Air Force, the city relied solely on the EMOS definition to develop the Height Hazard Map. As a result, the map contains deviations. The exclusion of the geographic boundary of the EMOS by Keesler AFB prevents the EMOS from being accurately implemented by the city.

The City of D'Iberville Zoning Ordinance establishes height restrictions for development within the city; however there is no acknowledgement of the EMOS in the Zoning Ordinance.

Compatibility Assessment

Biloxi

The Biloxi Land Development Ordinance refers to the EMOS in Section D AAO: Airport Airspace Overlay District. The section states that structures may not exceed the height of the EMOS; however, there is no EMOS definition or geographic boundary of the EMOS from Keesler AFB to assist the city with evaluating the height of structures in development applications. Because a map of the EMOS did not exist, the city developed a Height Hazard Map to show the EMOS relative to Keesler AFB. Although the map was created using the EMOS definition, there are some discrepancies in the mapped information that affect its accuracy in implementation.

D'Iberville

The D'Iberville Zoning Ordinance contains maximum height requirements for buildings and structures. Though across the Back Bay from Keesler AFB, the EMOS extends into D'Iberville. The area of the city most critical to the EMOS is the Waterfront Zoning District along the north shore where structures are permitted up to 110 feet. Section 5.3 of the Zoning Ordinance states that buildings and structures located in safety zones and Imaginary Surfaces shall not exceed 170 feet in height as established by the Department of Defense; however there is no consideration of the EMOS. Because the EMOS contains both sloped and plateaued surfaces and because the EMOS has not been mapped, the city is unable to accurately assess whether development is compliant / compatible with the EMOS.

Findings

- The Existing Military Operations Surface (EMOS) is a critical element of the operational mission at Keesler AFB.
- Though the EMOS has been defined by Keesler AFB, there is no map depicting the geographic boundaries of the EMOS from Keesler AFB.
- In an effort to consider the impact of development on the strategic flying mission at Keesler AFB, the City of Biloxi adopted the EMOS by reference into the Land Development Ordinance and developed a Height Hazard Map. But because the map was developed solely from the EMOS definition, it contains discrepancies.
- The City of D'Iberville does not acknowledge the EMOS in its Zoning Ordinance which is of particular importance in the Waterfront Zoning District. Because there is no EMOS map, the city is unable to accurately assess development compliance with the EMOS.

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