AIR INSTALLATION COMPATIBLE USE ZONE STUDY (AICUZ)



MACDILL AIR FORCE BASE, FLORIDA

SEPTEMBER 2008

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COMPATIBLE USE ZONE STUDY

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ACRONYMS AND ABBREVIATIONS

310 AS	310th Airlift Squadron
91 ARS	91st Air Refueling Squadron
AFB	Air Force Base
AFI	Air Force Instruction
AGL	above ground level
AICUZ	Air Installation Compatible Use Zone
ALM	A-weighted sound level or maximum sound level
APZ	Accident Potential Zone
cps	cycles per second
CZ	Clear Zone
dB	decibel
dBA	A-weighted sound level measured in decibels
DNL	Day-Night Average A-Weighted Sound Level
DoD	Department of Defense
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulations
FLUE	Future Land Use Element
HUD	Housing and Urban Development
Hz	Hertz
INM	Integrated Noise Model
JLUS	Joint Land Use Study
LZ	landing zone
MSA	Metropolitan Statistical Area
MSL	mean sea level
NLR	Noise Level Reduction
NOAA	National Oceanic & Atmospheric Administration
PD	Planned Development
SEL	sound exposure level
SLUCM	Standard Land Use Coding Manual
the Base	MacDill Air Force Base
UCLA	University of California at Los Angeles
UFC	Unified Facilities Criteria
U.S.	United States
USEPA	United States Environmental Protection Agency

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SECTION 1
PURPOSE AND NEED

1.1 INTRODUCTION

This study is an update of the 1998 MacDill Air Force Base (AFB), Florida Air Installation Compatible Use Zone (AICUZ) Study. The update presents and documents changes to the AICUZ amendment for the period 1998-2008 and is based on the August 2007 aircraft operations condition. This AICUZ Study reaffirms Air Force policy of assisting local, regional, state, and federal officials in the areas neighboring MacDill AFB by promoting compatible development within the AICUZ area of influence; and protecting Air Force operational capability from the effects of land use that are incompatible with aircraft operations. Specifically, the report documents changes in aircraft operations since the last study and provides noise contours and compatible use guidelines for land areas neighboring the installation based on the August 2007 operations. This information is provided to assist local communities and to serve as a tool for future planning and zoning activities. Changes that occurred since the 1998 MacDill AFB AICUZ Study include:

- Decrease in the number of operations by based aircraft;
- Conversion from T-43 to C-37 aircraft;
- Increase in the number of transient and deployed unit aircraft operations;
- Changes in the number of aircraft maintenance engine runups;
- Addition, elimination, and modification of aircraft flight tracks to correspond to flying operations changes; and
- Technical improvements to the NOISEMAP computer modeling program.

1.2 PURPOSE AND NEED

The purpose of the long-standing AICUZ program is to promote compatible land development in areas subject to aircraft noise and accident potential. The Air Force provides the AICUZ Study to all local communities to assist them in preparing local land use plans. As Hillsborough County and the City of Tampa prepare and modify land use development plans, recommendations from this updated AICUZ Study should be included in the planning process to prevent incompatible land use that could compromise the ability of MacDill AFB to fulfill its mission. Accident potential and aircraft noise should be major considerations in the planning process.

Air Force AICUZ guidelines reflect land use recommendations for the Clear Zones (CZ), Accident Potential Zones (APZ) I and II, and four noise zones exposed to noise levels at or above 65 decibels (dB) Day-Night Average A-Weighted Sound Level (DNL). These guidelines were established on the basis of studies prepared and sponsored by several federal agencies, including the United States Department of Housing and Urban Development, United States Environmental Protection Agency (USEPA), United States Air Force, and state and local agencies. The guidelines recommend land uses that are compatible with airfield

operations while allowing maximum beneficial use of adjacent properties. The Air Force has no desire to recommend land use regulations that render property economically useless. It does, however, have an obligation to the inhabitants of the MacDill AFB area of influence and the citizens of the United States to point out ways to protect the public investment in the installation and the people living in areas adjacent to the installation. The AICUZ area of influence includes the area within the DNL 65 dB and greater noise exposure area and the area within the CZs and APZs.

1.3 PROCESS, PROCEDURE, AND NOISE METRICS

Preparation and presentation of this update to MacDill AFB's AICUZ Study is part of the continuing Air Force participation in the local planning process. Guidance for the Air Force AICUZ program is contained in Air Force Instruction (AFI) 32-7063, *Air Installation Compatible Use Zone Program*, which implements Department of Defense (DoD) Instruction 4165.57, *Air Installations Compatible Use Zones*.

As local communities prepare land use plans and zoning ordinances, the Air Force recognizes it has the responsibility to provide input on its activities relating to the community. This study is presented in the spirit of mutual cooperation and assistance by MacDill AFB to aid in the land use planning process around the Base.

The AICUZ program uses the latest technology to define noise levels in areas near Air Force installations with a flying mission. Aircraft operational data used in this study were collected at MacDill AFB in June 2007. The Air Force reviewed and validated the data through a communicative process that was finalized in August 2007. Aircraft flight data were obtained to derive average daily operations by runway and type of aircraft. Analysis of MacDill AFB's flying operations included the types of aircraft, flight patterns utilized, variations in altitude, power settings, number of operations, and hours of operations. These data were supplemented by flight track information (where we fly), flight profile information (how we fly), and ground runup information. After verification for accuracy, the data were input into the NOISEMAP Version 7.3 computer program to produce DNL noise contours. The noise contours for MacDill AFB were plotted on an area map and overlaid with the CZ and APZ areas for the airfield.

1.4 COMPUTERIZED NOISE EXPOSURE MODELS

The Air Force adopted the NOISEMAP computer program to describe noise impacts created by aircraft operations. NOISEMAP is one of two USEPA-approved computer programs; the other is the Integrated Noise Model (INM) used by the Federal Aviation Administration (FAA) for noise analysis at civil airports. The NOISEMAP and INM programs are similar; however, INM is specifically designed to model aircraft flight operations at civil airports.

NOISEMAP is a suite of computer programs and components developed by the Air Force to predict noise exposure in the vicinity of an airfield due to aircraft flight, maintenance, and ground run-up operations. The components of NOISEMAP are:

- BASEOPS is the input module for NOISEMAP and is used to enter detailed aircraft flight track and profile and ground maintenance operational data.
- NOISEFILE is a comprehensive database of measured military and civil aircraft noise data. Aircraft operational information is matched with the noise measurements in the NOISEFILE after the detailed aircraft flight and ground maintenance operational data has been entered into BASEOPS.
- NMAP is the computational module in NOISEMAP. NMAP takes BASEOPS input and uses the NOISEFILE database to calculate the noise levels caused by aircraft events at specified grid points in the airbase vicinity. The output of NMAP is a series of georeferenced data points, specific grid point locations, and corresponding noise levels.
- NMPLOT is the program for viewing and editing the sets of georeferenced data points. NMPLOT plots the NMAP output in a noise contour grid that can be exported as files that can be used in mapping programs for analyzing the noise impacts.

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SECTION 2
INSTALLATION DESCRIPTION

2.1 DESCRIPTION OF MACDILL AIR FORCE BASE

MacDill AFB is located at the southern end of Hillsborough County on the tip of the Interbay Peninsula. Surrounded on three sides by water and with a significant buffer provided on the east and west by Hillsborough Bay and Tampa Bay, the installation only impacts the City of Tampa, which lies to the north. The Base encompasses 5,767 acres of fee-owned federal land. MacDill AFB has one runway designated as Runway 04/22.

2.2 MISSION

The 6th Air Mobility Wing -- the Base's host wing – provides air refueling power anywhere in the world. The Wing is organized into five groups to provide air refueling, responsive airlift, and airbase support to the United States Central Command and the United States Special Operations Command and 51 other mission partners based at MacDill AFB. Flying operations are accomplished by the 91st Air Refueling Squadron (91 ARS), 310th Airlift Squadron (310 AS), and the National Oceanic & Atmospheric Administration (NOAA) Aircraft Operations Center, all of which are based at MacDill AFB.

2.3 ECONOMIC IMPACT

The local economic characteristics are derived from the Tampa-St. Petersburg-Clearwater Metropolitan Statistical Area (MSA). Located along Florida's west-central coast, Tampa-St. Petersburg-Clearwater MSA is comprised of Hernando, Hillsborough, Pasco, and Pinellas Counties.

2.3.1 Local Economic Characteristics

As shown in Table 2.1, the Tampa-St. Petersburg-Clearwater MSA had a population of over 2.39 million in 2000 and is expected to grow in population to over 2.77 million by 2009. The MSA population has experienced steady growth in recent years, including 15.8 percent growth between 1990 and 2000. During this same period, the City of Tampa grew by 8 percent and Hillsborough County recorded a population growth of over 19 percent. Table 2.1 displays the population data for the City of Tampa, Hillsborough County, and the Tampa-St. Petersburg-Clearwater MSA.

Table 2.1 Historic and Projected Population

Area	1990	2000	2005 estimate	2009 projection
Tampa	280,015	303,447	330,220	353,840
Hillsborough County	834,054	998,948	1,142,850	1,252,850
Tampa-St. Petersburg-Clearwater MSA	2,067,959	2,395,997	2,697,731	2,774,578

Sources: US Census Bureau, 2007, Demographics USA, 2007, University of FL, BEBR, Population Studies, Bulletin 144, February 2006, Hillsborough County City-County Planning Commission.

As of May 2007, employment within the Tampa-St. Petersburg-Clearwater MSA was estimated to be over 1.3 million persons, with an estimated unemployment rate of 3.3 percent. Professional and business services employ the largest percentage of workers, with over 306,000 employees (23 percent of total). Table 2.2 presents the Tampa-St. Petersburg-Clearwater MSA employment by industry group.

Table 2.2 Tampa – St. Petersburg-Clearwater MSA Employment Estimates by Industry Group, 2007

Industry	Jobs
Natural Resources and Mining	600
Construction	88,300
Manufacturing	74,500
Trade, Transportation, and Utilities	235,200
Information	33,700
Financial Activities	104,500
Professional and Business Services	306,800
Education and Health Services	159,300
Leisure and Hospitality	123,600
Government	152,800
Other services	49,800
Total	**1,329,100**
Source: U.S. Department of Labor Bureau of Labor Statistics, May 2007	

2.3.2 Base Impact

The latest available base economic impact report was completed for fiscal year 2003. The Economic Impact Region used for this report is the geographic area subject to significant base-generated economic impacts and is comprised of the nine counties within a 50-mile radius of MacDill AFB. As shown in Table 2.3, MacDill AFB directly employs over 17,000 personnel. The annual payroll of the installation is over $2.7 billion (Table 2.3). As a result of payroll expenditures, annual expenses, and the estimated value of indirect jobs in the local area, MacDill AFB has an estimated total economic impact of nearly $6.7 billion on the local economy.

Table 2.3 Annual Payroll

Category	MSA ($)
Total Annual Payroll	$2,741,670,838
Total Annual Expenditures	$1,176,660,862
Estimated Value of Indirect Jobs	$2,763,083,037
Total	**$6,681,414,737.00**
Source: MacDill AFB Economic Impact Report FY03	

2.3.2.1 Defense Expenditures

In 2005, the Department of Defense expended $2,098.6 million in Hillsborough County. The largest component of defense expenditures in the county was $858.6 million and was directly associated with the acquisition of contract services, construction, maintenance, operating expenditures, and research and development at MacDill AFB, US Central

Command and US Special Operations Command. The second largest component of $650.3 million was for pensions and transfer payments to military and retirees and veterans. The remaining $589.7 million in expenditures were salaries and wages.

The direct defense expenditures of $2,098.6 million expended in the county generated additional employment, wages, consumption spending and Investments.

Table 2.4 Defense Expenditures, 2005

Expenditure	Amount ($millions)	Percent
Goods and Services	858.6	40.9
Salaries and wages	589.7	28.1
Pensions and transfers	650.3	31.0
Total	**2098.6**	**100.0**
Sources: Consolidated Federal Funds Report, retrieved on October 30, 2007		

2.3.2.2 Employment and Wages

In 2005, Department of Defense spending in Hillsborough County directly and indirectly accounted for 61,860 jobs. These employees earned gross wages of $2,576 million. Sources of wage income by sector include professional or technological services ($258.6 million), finance and insurance ($183.3 million), retail trade ($154.8 million), construction ($143.2 million), administrative and waste services ($110.1 million), information ($95.76 million), wholesale trade ($88.27 million), health care and social assistance ($83.34 million), and other sectors.

2.3.2.3 Revenues and Gross Regional Product

The combined spending inputs of $2,098.6 million circulated through the Hillsborough County economy and generated sales revenue of $5,174.0 million in 2005. The latter amount includes direct Department of Defense spending in the county, other spending flowing from wages and transfer payments, plus spending associated with the multiplier effect as initial recipients re-spent their earnings and receipts. Gross sales revenue includes both sales to final users as well as business-to-business (intermediate) sales. It incorporates the value of goods and services produced and sold in the county, imported into the county, as well as those exported from the county. When both imports and exports are considered and the value of intermediate transactions removed, the contribution of defense spending to the gross regional product of the Hillsborough County economy reached $5,310.1 million. The gross regional product attributable to defense expenditures in the county is forecasted to be $5,785.3 million in 2005 and $5,920.2 million in 2010.

2.3.2.4 Consumption Expenditures

Consumption expenditures attributable to 2005 defense spending totaled $2,728.8 million in 2005. This consumption consisted of purchases of vehicles and parts ($215.8 million), computers and furniture ($243.6 million), other durables ($99.8 million), food and beverages ($512.1 million), clothing and shoes ($175.6 million), gasoline and oil ($84.9 million), fuel oil and coal ($6.4 million), other non-durables ($97.0 million), housing ($172.7 million),

household operation ($198.4 million), transportation ($132.8 million), medical care ($115.9 million) and other services ($673.9 million).

Consumption is forecasted to reach $2,930.6 million in 2007 and $3,082.6 million in 2010.

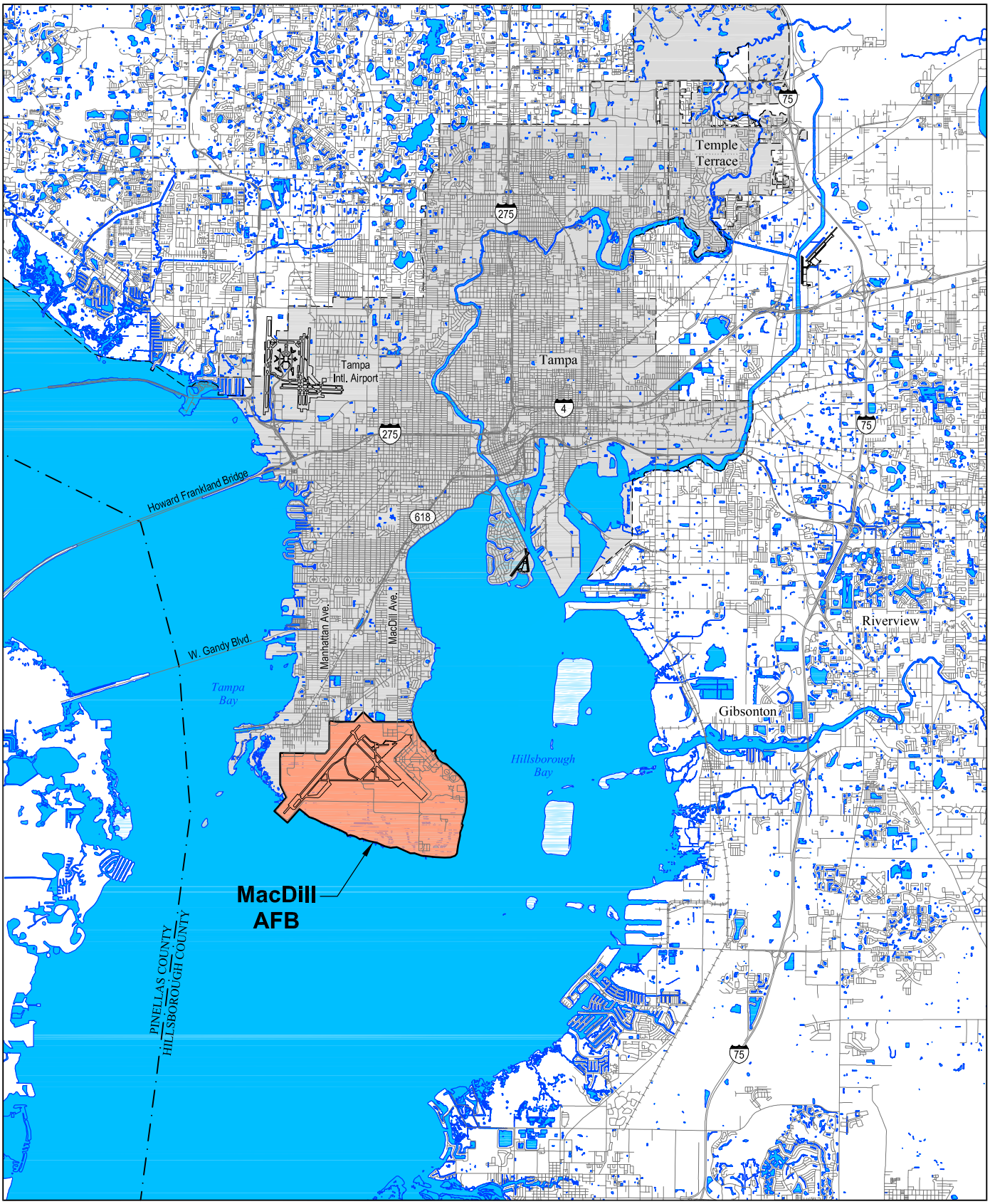
2.3.2.5 Investment Expenditures

Investment expenditures attributable to defense spending in the county were estimated at $505.6 million in 2005. These expenditures were used to invest $341.4 million in residential real estate and $104.5 million in non-residential real estate. Durable equipment purchases by business owners were estimated at $59.7 million.

The direct residential real estate investments are forecasted to increase to $540.0 million in 2007 and $517.3 million in 2010. Non-residential real estate investments are forecasted to reach $167.7 million in 2007 and $153.8 million in 2010. Under the same spending growth assumption, business investments in capital equipment are projected to increase to $161.2 million in 2007 and $305.4 million in 2010.

2.3.2.6 State and Local Government Revenues

State and local government spending attributable to defense spending is estimated at $93.7 million in 2005. It is projected to reach $142.5 million in 2007 and $196.2 million in 2010.



MacDill Air Force Base 2008 AICUZ

LEGEND

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- City Limits
- MacDill AFB

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MacDill AFB Location Map

Figure 2.1

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SECTION 3
AIRCRAFT OPERATIONS

3.1 INTRODUCTION

To describe the relationship between aircraft operations and land use at and around the airfield, it is necessary to fully evaluate the exact nature of flying activities. The August 2007 inventory of MacDill AFB aircraft operations included where aircraft fly, how high they fly, how many times they fly over a given area, and the time of day they operate.

Subsection 3.2 discusses aircraft operations at MacDill AFB. Subsection 3.3 discusses runway and flight track utilization for all operations by aircraft type. Subsection 3.4 describes aircraft maintenance activity, Subsection 3.5 discusses aircraft flight profiles, and Subsection 3.6 presents climatological data.

3.2 AIRCRAFT OPERATIONS

Over 21,000 annual aircraft operations occurred at MacDill AFB for the period May 2006-April 2007 based on aircraft operations data validated in August 2007. An aircraft operation is defined as one takeoff/departure, one approach/landing, or half a closed pattern. A closed pattern consists of two portions, a takeoff/departure and an approach/landing, *i.e.*, two operations. A sortie is a single military aircraft flight from the initial takeoff through the termination landing. The minimum number of aircraft operations for one sortie is two operations, one takeoff (departure) and one landing (approach).

Table 3.1 summarizes the projected average busy-day aircraft operations for the MacDill AFB airfield based on information provided by Base staff, flying organization, and air traffic control personnel. In addition to the operations by MacDill AFB-based 91 ARS. 310 AS, and NOAA aircraft, 118 types of transient military and civil aircraft conduct operations at the Base. The transient aircraft include fighter-type aircraft that deploy to MacDill AFB about six times per year and operate from the Base for as long as two weeks per deployment. The table reflects a total of about 163 average busy-day aircraft operations based on collected operations data. Approximately 2 percent of the operations occur at night (10:00 p.m.-7:00 a.m.).

Although the number of military and civil aircraft operations at an installation usually varies from day to day, NOISEMAP requires input of the specific numbers of daily flight and aircraft maintenance engine runup operations. The Air Force does not follow the FAA's use of the "average annual day" in which annual operations are averaged over an entire 365-day year. Neither does the Air Force use the "worst-case day" since it typically does not represent the typical noise exposure. Instead, the Air Force uses the "average busy-day" concept in which annual operations for an aircraft type are averaged over the number of flying days per year by that aircraft type. Non-flying days (*e.g.*, weekends or holidays) are not used in computing the "average busy-day" operations. Flying by units that operate at MacDill AFB ranges from 90 days per year for the fighters that deploy to and operate from the Base to

365 days for based units such as the 91 ARS and 310 AS. Transient aircraft operations are based on 365 days per year.

Table 3.1 Average Busy-Day Aircraft Operations for 2007

Aircraft Type	Daily Arrival/ Departure Operations	Daily Closed Pattern Operations	Total Daily Operations
Aircraft Based at MacDill AFB			
91 ARS KC-135	4.43	25.60	30.03
310 AS C-37	1.55	0.20	1.75
NOAA P-3	0.15	0.34	0.49
NOAA Gulfstream	0.24	0.21	0.45
NOAA Twin Otter	0.12	.0.60	0.72
NOAA Shrike	0.12	0.86	0.98
Subtotal	6.60	27.81	34.41
Fighter Aircraft that Deploy to MacDill AFB			
A-10	7.51	0.00	7.51
F-15	8.77	0.00	8.77
F-16	9.39	0.00	9.39
F-18	13.14	0.00	13.14
Subtotal	38.81	0.00	38.81
Transient Aircraft			
Coast Guard C-130	1.20	12.60	13.80
C-130	2.41	0.00	2.41
C-130 Airdrop	6.00	30.00	36.00
Navy P-3	0.40	4.20	4.60
Coast Guard H-60	1.20	21.60	22.80
118 types	9.85	0.00	9.85
Subtotal	21.06	68.40	89.46
Total	**66.47**	**96.21**	**162.68**

Note: An operation is one takeoff/departure or one arrival/landing. A closed pattern consists of two operations, one takeoff and one landing.

3.3 RUNWAY AND FLIGHT TRACK UTILIZATION

Runway 04/22 is oriented 044°–244°magnetic and is 11,421 feet long and 151 feet wide. The overruns at the ends of each runway are approximately 995 feet long. The airfield elevation is 14 feet above mean sea level (MSL).

Runway use is influenced by other airports near the Base. The Tampa International Airport is eight miles north; Peter O. Knight Airport is five miles northeast; Albert Whitted Airport is eight miles southwest; and St. Petersburg/Clearwater International Airport is nine miles northwest. The location of these airports relative to MacDill AFB require that all patterns (except for helicopter patterns that remain within about ¾ of a mile of the northwest side of the runway) be flown to the east, southeast, and south of the Base. Additionally, the locations of the Peter O. Knight and Albert Whitted Airports require that aircraft executing straight-in approaches to MacDill AFB maintain minimum altitudes until safely past the respective airport or fly a track that allows the aircraft to avoid overflying the airport. The high population density of the area surrounding the Base requires strict use of noise abatement procedures for arriving and departing aircraft. Considering the above limitations, aircraft operating at MacDill AFB use the following flight patterns:

- Departures to the southwest (Runway 22) turn to a southerly heading of 190 degrees at the departure end of the runway and departures to the northeast (Runway 04) turn to a heading of 080 degrees at the departure end of the runway;
- Straight-in arrival;
- Tower controlled closed patterns southeast of the runway;
- Radar closed patterns to the east, southeast, and south of the airfield;
- Re-entry patterns; and
- Coordination with the FAA to minimize conflict with civilian aircraft operations in the area around the Base.

To reduce the affect of noise, MacDill AFB limits transient aircraft to one approach to a full stop landing between the hours of 10:00 p.m. and 6:00 a.m. Fighter aircraft are restricted to straight-in/full stop approaches/landings after 9:00 p.m. Additionally, the Base controls and schedules missions to keep noise levels low, especially at night.

Flight patterns specific to MacDill AFB result from several considerations, including:

- Takeoff patterns routed to avoid noise-sensitive areas as much as possible;
- Arrivals and departures routed to avoid restricted airspace;
- 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.

Planning for the areas surrounding an airfield considers three primary aircraft operational/land-use determinants: (1) aircraft accident potential to land users; (2) aircraft noise; and (3) hazards to operations from land uses (*e.g*., height of structures). Each of these concerns is addressed in conjunction with mission requirements and safe aircraft operations to determine the optimum flight track for each aircraft type. The flight tracks depicted in Figures 3.1 through 3.3 are the result of such planning and depict the representative flight tracks used for noise modeling. The flight track locations represent the various types of arrivals, departures, and closed patterns accomplished at MacDill AFB. The location for each track is representative for the specific track and may vary due to air traffic control, weather, and other reasons (*e.g*., one pilot may fly the track on one side of the depicted track, while another pilot may fly the track slightly to the other side). Runway use is: Runway 04-75 percent; and Runway 22- 25 percent.

3.4 AIRCRAFT MAINTENANCE RUNUP OPERATIONS

To the maximum extent possible, aircraft maintenance engine runup locations have been established in areas to minimize noise for people in the surrounding communities, as well as

for those on base. Aircraft maintenance engine runup operations are accomplished by based flying units and their associated maintenance functions.

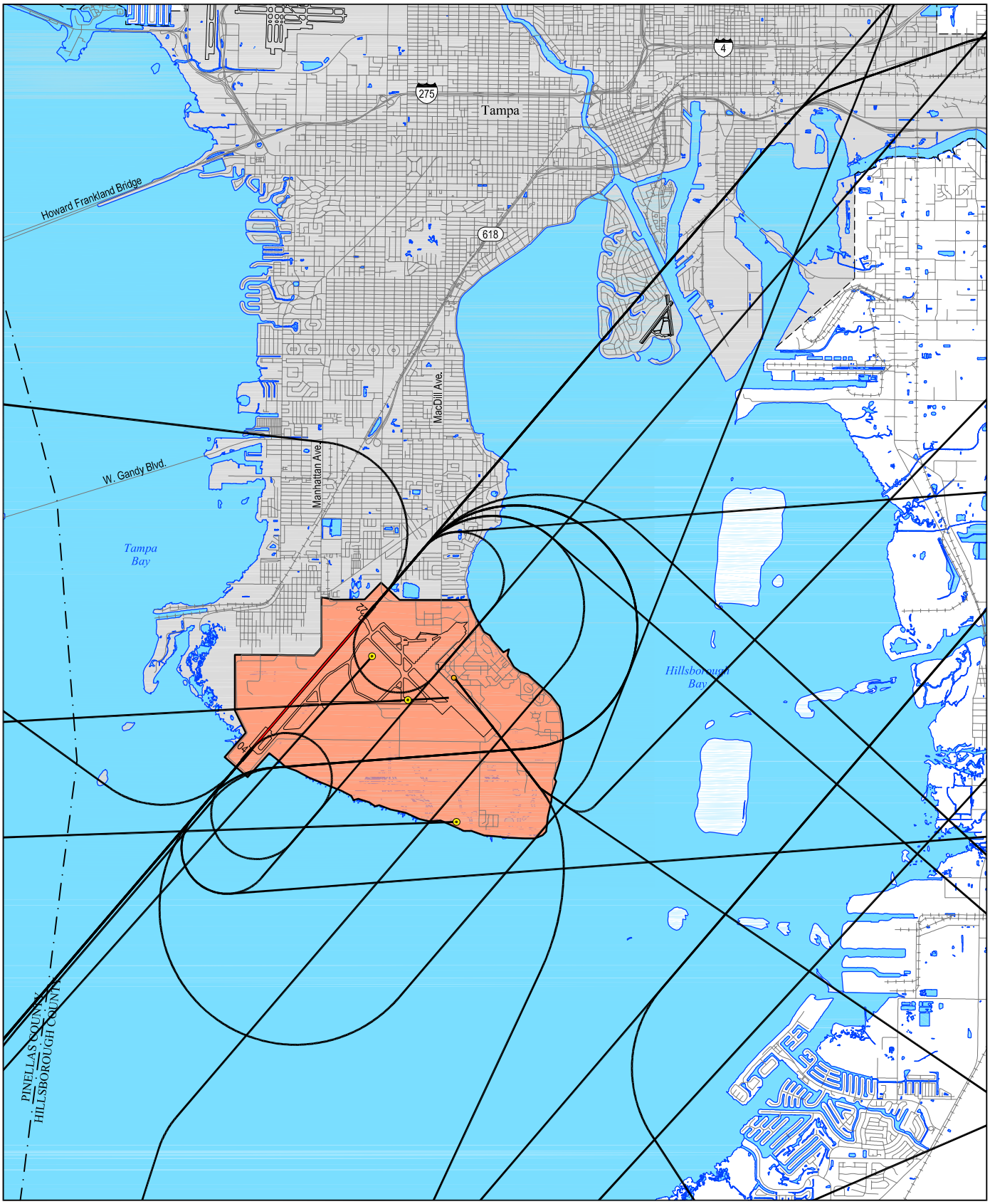
Average busy-day aircraft maintenance runup operations were calculated similarly to flight operations described in Subsection 3.1. Weekly, monthly, or annual estimates of runups provided by MacDill AFB aircraft maintenance personnel were divided by the typical number of days runups were performed over the respective period. None of the aircraft maintenance runups at MacDill AFB occur during nighttime (10:00 p.m. to 7:00 a.m.).

3.5 AIRCRAFT FLIGHT PROFILES

For purposes of this AICUZ Study, aircraft "flight profiles" denote the aircraft power settings, altitudes above runway level, and airspeeds along each flight track. Aircraft flight profiles for based aircraft were obtained from MacDill AFB personnel. Generic flight profiles from the BASEOPS database were used to model operations for the other military and civilian aircraft types. Noise data from the NOISEFILE database were used to model operations for all aircraft types.

3.6 CLIMATOLOGICAL DATA

Weather conditions, measured by temperature and relative humidity, are an important factor in the propagation of noise. Temperature and relative humidity affect sound absorption. The average temperature and humidity for each month of the year are input into BASEOPS, which then calculates the sound absorption coefficient for each month. Ranking the twelve monthly sound absorption coefficients from smallest to largest, BASEOPS chooses the sixth smallest sound absorption coefficient to represent the typical weather conditions at the installation. The month with the sixth smallest sound absorption coefficient for MacDill AFB is the month with the average monthly temperature of 73 degrees Fahrenheit and 65 percent relative humidity.



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MacDill Air Force Base 2008 AICUZ

LEGEND

- Flight Track
- Runway
- Roadway
- MacDill AFB
- Drop Zone
- Helipad
- City Limits

N

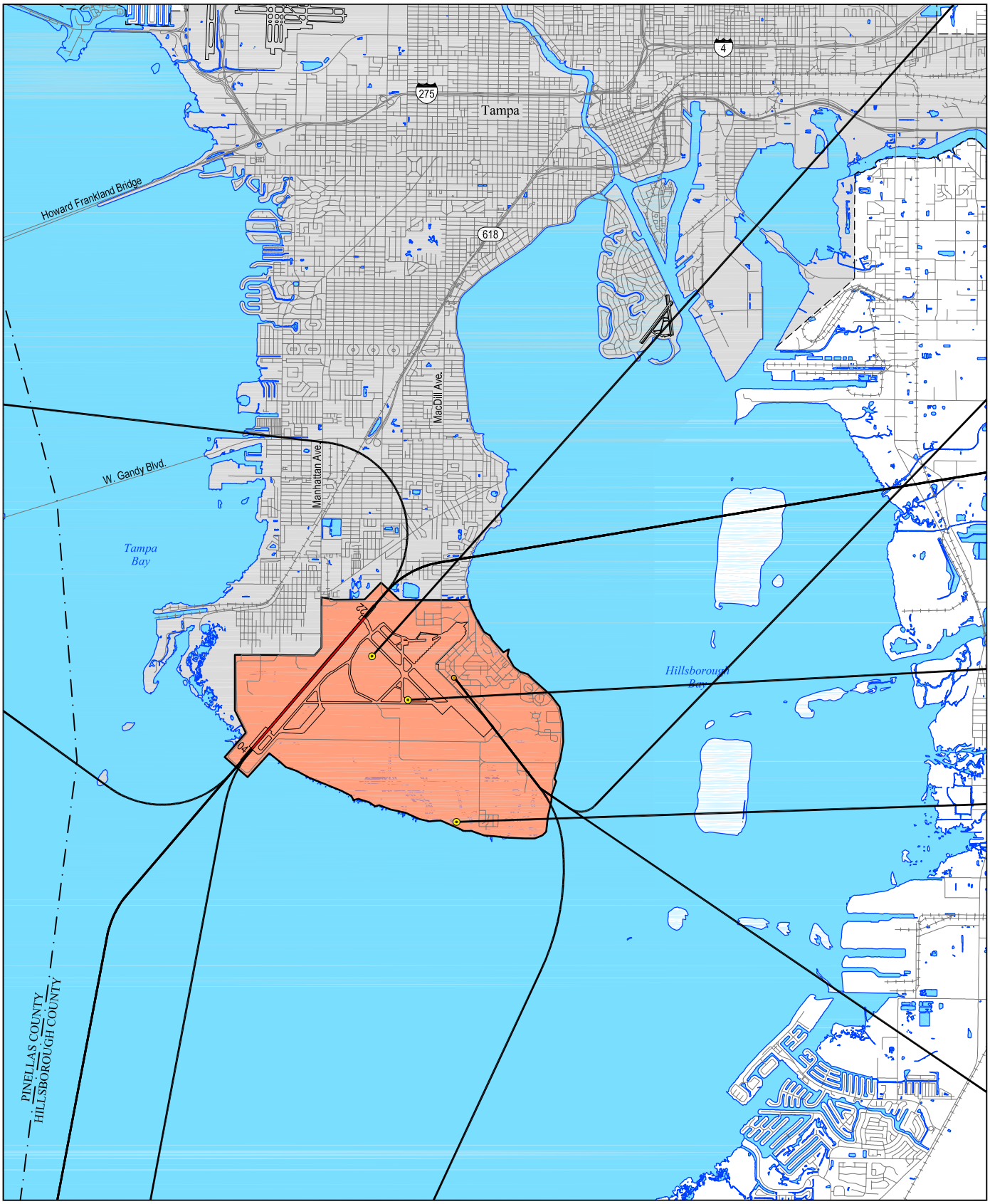
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Feet

Arrival Flight Tracks

Figure 3.1

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MacDill Air Force Base 2008 AICUZ

LEGEND

- Flight Track
- Runway
- Roadway
- MacDill AFB
- Drop Zone
- Helipad
- City Limits

N

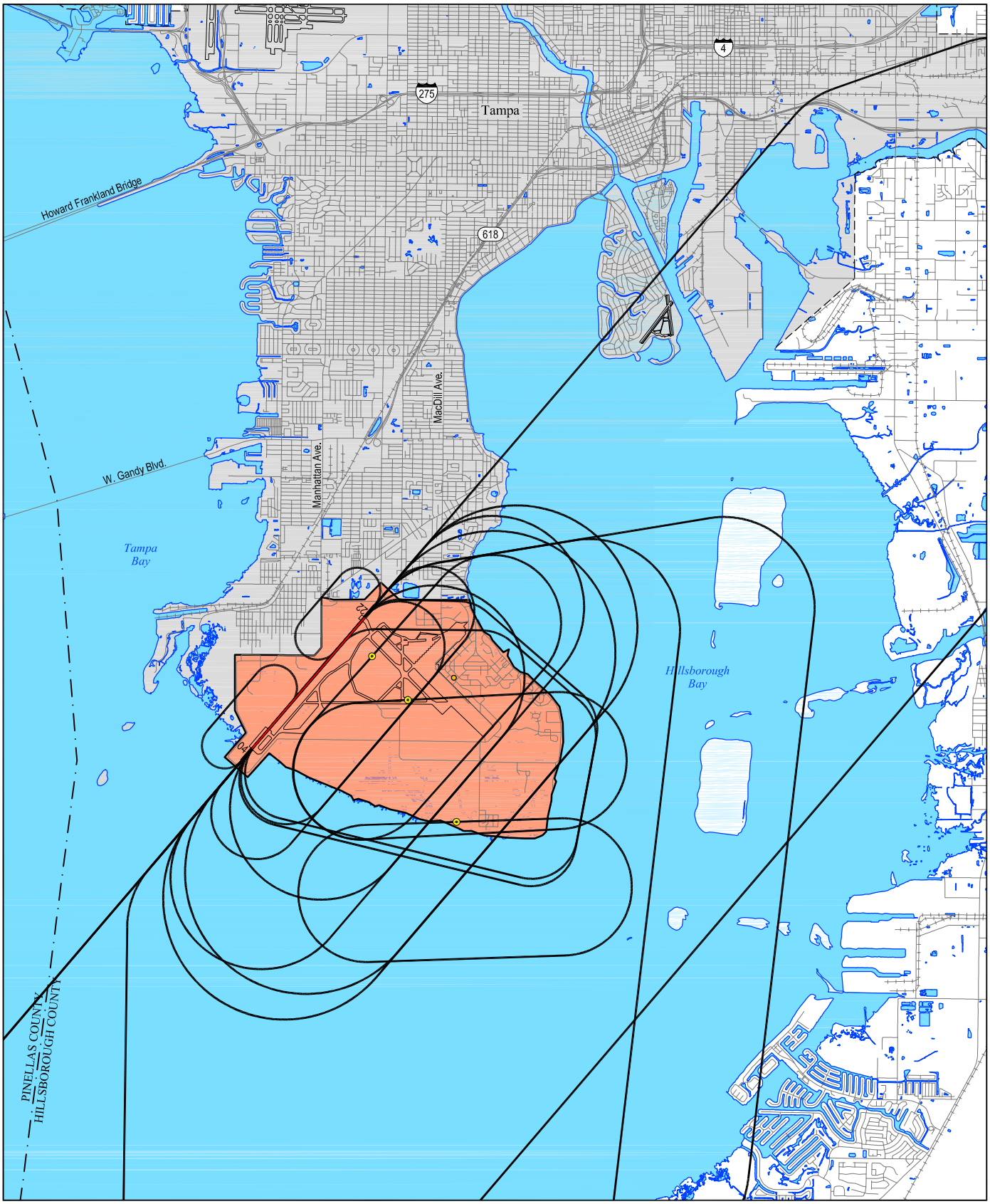
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Feet

Departure Flight Tracks

Figure 3.2

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Closed Pattern Flight Tracks

Figure 3.3

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SECTION 4
EFFECTS OF AIRCRAFT OPERATIONS

4.1 INTRODUCTION

This section has two purposes. The first is to describe the imaginary surfaces associated with obstructions to air navigation, noise exposure, CZs, and APZs. The second purpose is to present applicable land-use compatibility guidelines and the Air Force's participation in the land-use planning process.

4.2 RUNWAY AIRSPACE IMAGINARY SURFACES

Obstructions to air navigation are considered to be:

- Natural objects or man-made structures that protrude above the planes or imaginary surfaces, and/or;
- Man-made objects that extend more than 500 feet above ground level (AGL) at the site of the structure.

4.2.1 Explanation of Terms

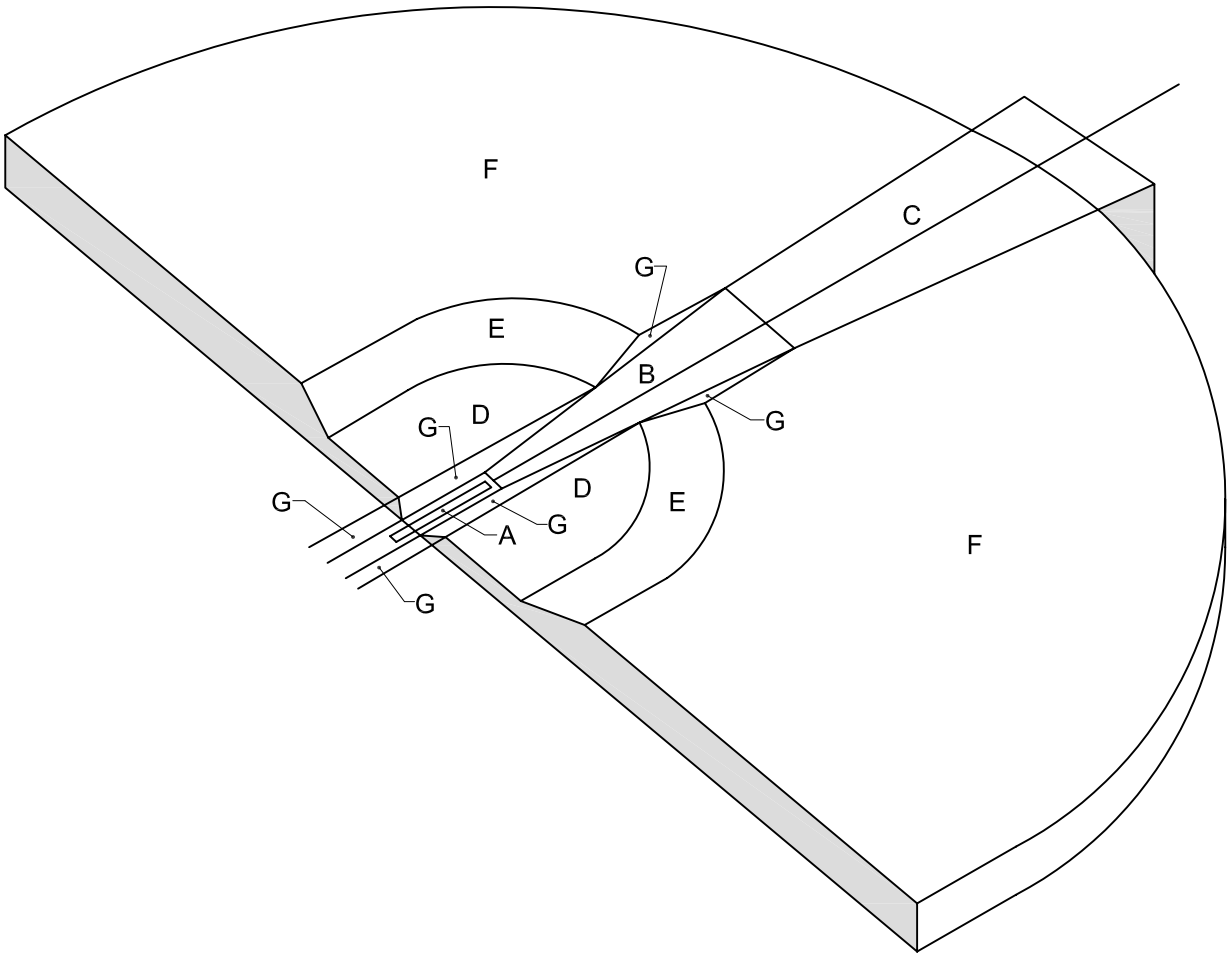
The following elevation, runway length, and dimensional criteria apply:

- Controlling Elevation—Whenever surfaces or planes within the obstruction criteria overlap, the controlling (or governing) elevation becomes that of the lowest surface or plane.
- Runway Length—MacDill AFB has one runway. Runway 04/22 is 11,421 feet long and is a Class B runway that is designed and built for sustained aircraft landings and take-offs:
- Established Airfield Elevation—The established elevation for the MacDill AFB airfield is 14 feet above MSL.
- Dimensions—All dimensions are measured horizontally unless otherwise noted.

4.2.2 Runway Airspace Imaginary Surfaces

Runway airspace imaginary surfaces, in graphical form, are the result of the application of obstruction height criteria to MacDill AFB. Imaginary surfaces are surfaces in space around airfields in relation to runways. The surfaces are designed to define the obstacle-free airspace at and around the airfield. Refer to Unified Facilities Criteria (UFC) 3-260-01, *Airfield and Heliport Planning and Design,* for a more complete description of runway airspace imaginary surfaces for Class B runways. Figure 4.1 depicts the runway airspace imaginary surfaces for the MacDill AFB Class B runway. Air Force obstruction criteria in UFC 3-260-01 are based on those contained in Federal Aviation Regulation (FAR) Part 77, *Objects Affecting Navigable Airspace,* Subpart C. The following paragraphs contain definitions of the runway airspace imaginary surfaces for Air Force class B runways:

- Accident Potential Zone Surfaces—APZ I begins at the outer end of the CZ and is 5,000 feet long and 3,000 feet wide. APZ II begins at the outer end of APZ I and is 7,000 feet long and 3,000 feet wide.
- Approach-Departure Clearance Surface—This imaginary surface is symmetrically centered on the extended runway centerline, beginning as an inclined plane (glide angle) 200 feet beyond each end of the primary surface, and extending for 50,000 feet. The slope of the approach-departure clearance surface is 50:1 until it reaches an elevation of 500 feet above the established airfield elevation. It then continues horizontally at this elevation to a point 50,000 feet from the starting point. The width of this surface at the runway end is 2,000 feet, flaring uniformly to a width of 16,000 feet at the end point.
- Clear Zone Surface—An obstruction-free surface (except for features essential for aircraft operations) on the ground symmetrically centered on the extended runway centerline beginning at the end of the runway and extending outward 3,000 feet. The CZ width is 3,000 feet (1,500 feet to either side of runway centerline).
- Conical Surface—This is an inclined imaginary surface extending outward and upward from the outer periphery of the inner horizontal surface for a horizontal distance of 7,000 feet to a height of 500 feet above the established airfield elevation. The slope of the conical surface is 20:1. The conical surface connects the inner and outer horizontal surfaces.
- Inner Horizontal Surface—This imaginary surface is an oval plane at a height of 150 feet above the established airfield elevation. The inner boundary intersects with the approach-departure clearance surface and the transitional surface. The outer boundary is formed by scribing arcs with a radius 7,500 feet from the centerline of each runway end and interconnecting these arcs with tangents.
- Outer Horizontal Surface—This imaginary surface is located 500 feet above the established airfield elevation and extends outward from the outer periphery of the conical surface for a horizontal distance of 30,000 feet.
- Primary Surface—An imaginary surface symmetrically centered on the runway, extending 200 feet beyond each runway end that defines the limits of the obstruction clearance requirements in the vicinity of the landing area. The width of the primary surface is 2,000 feet, or 1,000 feet on each side of the runway centerline.
- Transitional Surface—This imaginary surface extends outward and upward at right angles to the runway centerline and extended runway centerline at a slope of 7:1. The transitional surface connects the primary and the approach-departure clearance surfaces to the inner horizontal, the conical, and the outer horizontal surfaces.



Note:
The outer edge of the outer horizontal surfaces (F) extends to 44,500 feet from the runway centerline.

LEGEND

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

Class B Air Force Runway Airspace Imaginary Surfaces

Figure 4.1

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4.3 RESTRICTED AND/OR PROHIBITED LAND USES

The land areas outlined by these criteria should be regulated to prevent uses that might otherwise be hazardous to aircraft operations. The following uses should be restricted and/or prohibited:

- Releases into the air of any substance that would impair visibility or otherwise interfere with the operation of aircraft (*e.g.*, steam, dust, or smoke);
- Light emissions, either direct or indirect (reflective), that would interfere with pilot vision;
- Electrical emissions that would interfere with aircraft communications systems or navigational equipment;
- Uses that would attract birds or waterfowl, including but not limited to, operation of sanitary landfills, waste transfer facilities, maintenance of feeding stations, sand and gravel dredging operations, storm water retention ponds, created wetland areas, or the growing of certain vegetation; and
- Structures within 10 feet of aircraft approach-departure and/or transitional surfaces.

4.4 HEIGHT RESTRICTIONS

City/County agencies involved with approvals of permits for construction should require developers to submit calculations which show that projects meet the height restriction criteria of FAA Part 77 as described, in part by the information contained in this section.

MacDill AFB, Florida Coordinates and Elevations		
Airport Elevation:	14 ft. MSL	
Coordinates:		
Runway 04	Lat.	27˚ 50’ 14.61” N
	Long.	82˚ 31’ 57.66” W
Runway 22	Lat.	27˚ 51’ 40.63” N
	Long.	82˚ 30’ 35.07” W

4.5 NOISE EXPOSURE

NOISEMAP Version 7.3 was used to calculate and plot the DNL noise contours based on the average busy-day aircraft operations data collected in 2007 and described in Subsections 3.1 through 3.6. Figure 4.2 shows the DNL noise contours plotted in 5 dB increments, ranging from DNL 65 dB to DNL at or above 80 dB.

Different sounds have different frequency content. When describing sound and its effect on a human population, A-weighted (dB) sound levels are typically used to account for the response of the human ear. The term "A-weighted" refers to a filtering of the sound signal to emphasize frequencies in the middle of the audible spectrum and to de-emphasize low and high frequencies in a manner corresponding to the way the human ear perceives sound. This filtering network has been established by the American National Standards Institute. The A-weighted noise level has been found to correlate well with people's judgments of the noisiness of different sounds and has been in use for many years as a measure of community noise.

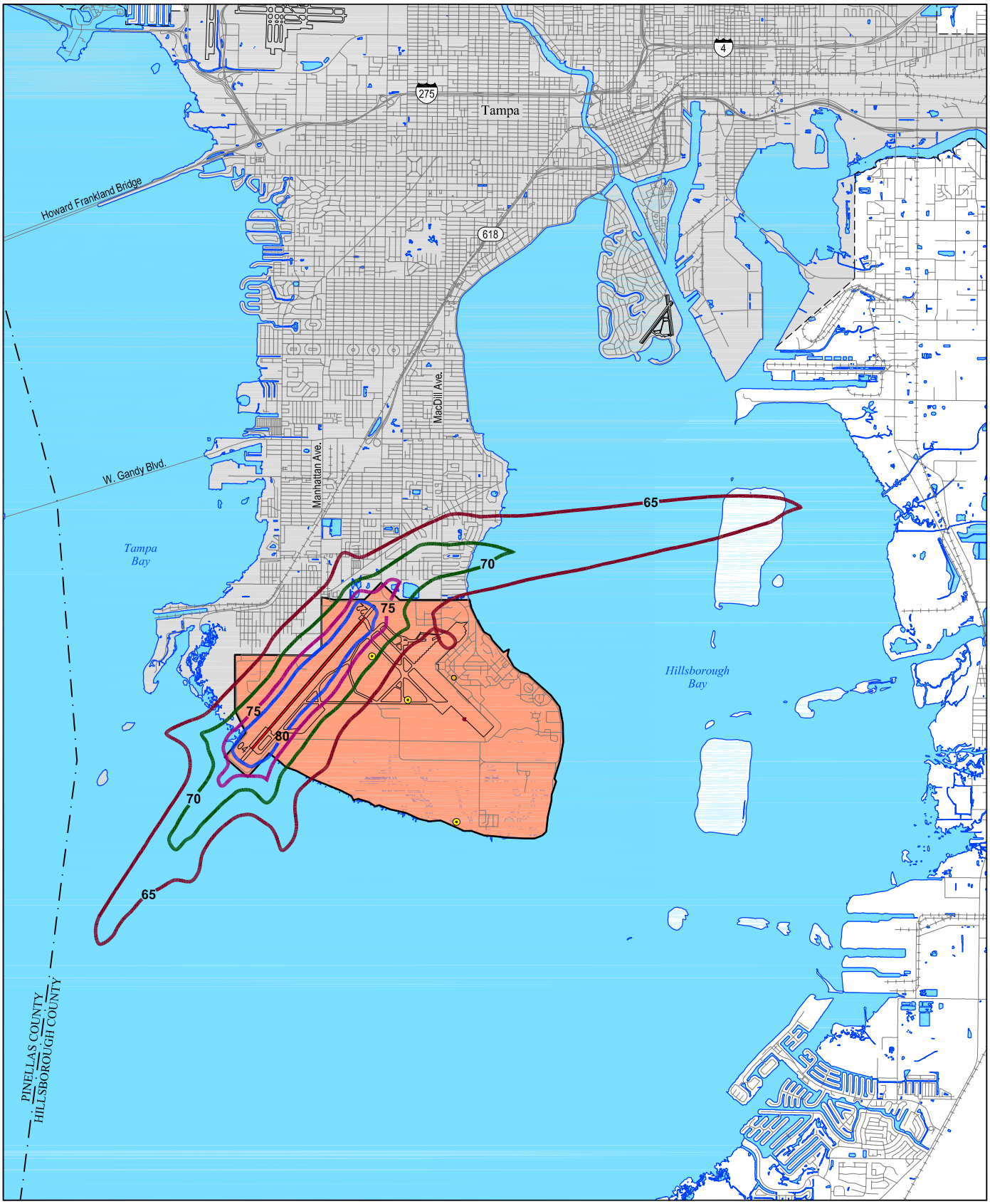
Table 4.1 shows the off-installation noise exposure within the DNL 65 dB and greater noise exposure area for aircraft operations at MacDill AFB in terms of acreage and estimated population. DNL is the measure of the total noise environment. DNL averages the sum of all aircraft noise producing events over a 24-hour period, with a 10 dBA upward adjustment added to the nighttime events (between 10:00 p.m. and 7:00 a.m.). The population data used in preparing this estimate was obtained from the United States Census Bureau 2000 census. To estimate affected population, it was assumed that population was equally distributed within a census tract area. Using this assumption, the total acreage and population in each census tract surrounding MacDill AFB was collected and assessed. Using the noise contour information, the number of acres of land in each noise zone (*i.e.*, DNL 65-69 dB, 70-74 dB, 75-79 dB, and 80 dB and greater) was divided by the number of acres of land in each census tract to determine what portion of the census tract was contained within each noise zone. The population total in each block-group was then multiplied by this ratio to estimate population exposed to aircraft noise at and above DNL 65 dB.

Table 4.1 Area and Population within DNL 65 dB and Greater Noise Exposure Area (Off-Installation, excluding water surface)

DNL Noise Zone	Acres	Population
65–69	712	3,500
70–74	424	1,827
75–79	55	31
80+	3	0
Total	**1,194**	**5,358**

From Table 4.1, a total of 1,194 acres of land and 5,358 persons are expected to be in the off-installation area within the DNL 65 dB and greater noise exposure area. The largest affected population is within the DNL 65–69 dB noise zone. This area is estimated to contain 712 acres in off-installation land area (60 percent of the total) and an estimated population of 3,500 persons (65 percent of the total) based on the calculated population densities for the area.

As shown in Figure 4.2, the noise contours begin to "turn" to the east approximately 7,000 feet from the northeast end of the runway, and extend about 24,000 feet. The average noise northeast of the point where the contour "turns" is less than DNL 65 dB. Although aircraft overfly this northeastern area (see Figures 3.1 through 3.3), the sum of all aircraft noise producing events on the flight tracks that overfly or are near this area is less than DNL 65 dB. As mentioned in Section 1.2, DNL 65 dB is the noise level below which all land uses are compatible with airfield operations.



MacDill Air Force Base 2008 AICUZ

LEGEND

- DNL 65 dB Contour
- DNL 70 dB Contour
- DNL 75 dB Contour
- DNL 80 dB Contour
- Runway
- Roadway
- City Limits
- MacDill AFB
- Drop Zone
- Helipad

N

0 9,000

Feet

Average Busy-Day Noise Contours for 2008

Figure 4.2

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4.6 COMPARISON WITH 1998 AICUZ STUDY

Noise contours presented in this study are similar in both shape and extent of coverage when compared to the noise contours in the 1998 AICUZ Study. Figure 4.3 depicts the 1998 AICUZ Study contours and Figure 4.4 compares the 2008 and 1998 contours. The differences in the contours occur to the northeast where the 2007 contour extends farther over the water and along and laterally along the length of the runway. The reason for the changes in the contours is an overall increase in average daily operations when comparing the 2007 condition to 1998.

The overall exposure for this AICUZ Study is 2,755 acres greater than the 1998 AICUZ Study. Table 4.2 lists the total noise exposure for the four noise zones in each study.

Table 4.2 Total Acres within the 2008 and 1998 AICUZ Study Noise Zones

	Acres	
DNL Noise Zone	**2008 Study**	**1998 Study**
65–69	3,949	2,268
70–74	1,300	713
75–79	477	293
80+	572	269
Total	**6,298**	**3,543**

4.7 CLEAR ZONES AND ACCIDENT POTENTIAL ZONES

The purpose of this section is to describe the basis for CZs and APZs and apply the zones to the MacDill AFB runways.

4.7.1 Basis for Clear Zones and Accident Potential Zones

Areas around airports are exposed to the possibility of aircraft accidents even with well-maintained aircraft and highly trained aircrews. Despite stringent maintenance requirements and countless hours of training, past history makes it clear that accidents may occur.

The risk of people on the ground being killed or injured by aircraft accidents is miniscule. However, an aircraft accident is a high-consequence event and, when a crash does occur, the result is often catastrophic. Because of this, the Air Force does not attempt to base its safety standards on accident probabilities. Instead it approaches this safety issue from a land use-planning perspective. Designation of safety zones around the airfield and restriction of incompatible land uses can reduce the public's exposure to safety hazards.

The AICUZ program includes three safety zones: the CZ, APZ I, and APZ II. These zones were developed from analysis of over 800 major Air Force accidents that occurred within 10 miles of an Air Force installation between 1968 and 1995. Figure B-3 in Appendix B summarizes the location of these accidents.

The CZ has the highest accident potential of the three zones, as 27 percent of accidents studied occurred in this area. Due to the relatively high accident potential, the Air Force adopted a policy of acquiring real estate interests in the CZ through purchase or easement when feasible.

APZ I is an area that possesses somewhat less accident potential than the CZ, with 10 percent of the accidents studied occurring in this zone. APZ II has less accident potential than APZ I, with 6 percent of the accidents studied occurring in this zone. While the potential for aircraft accidents in APZs I and II does not warrant land acquisition by the Air Force, land-use planning and controls are strongly encouraged in these areas for the protection of the public.

4.7.2 Clear Zones and Accident Potential Zones

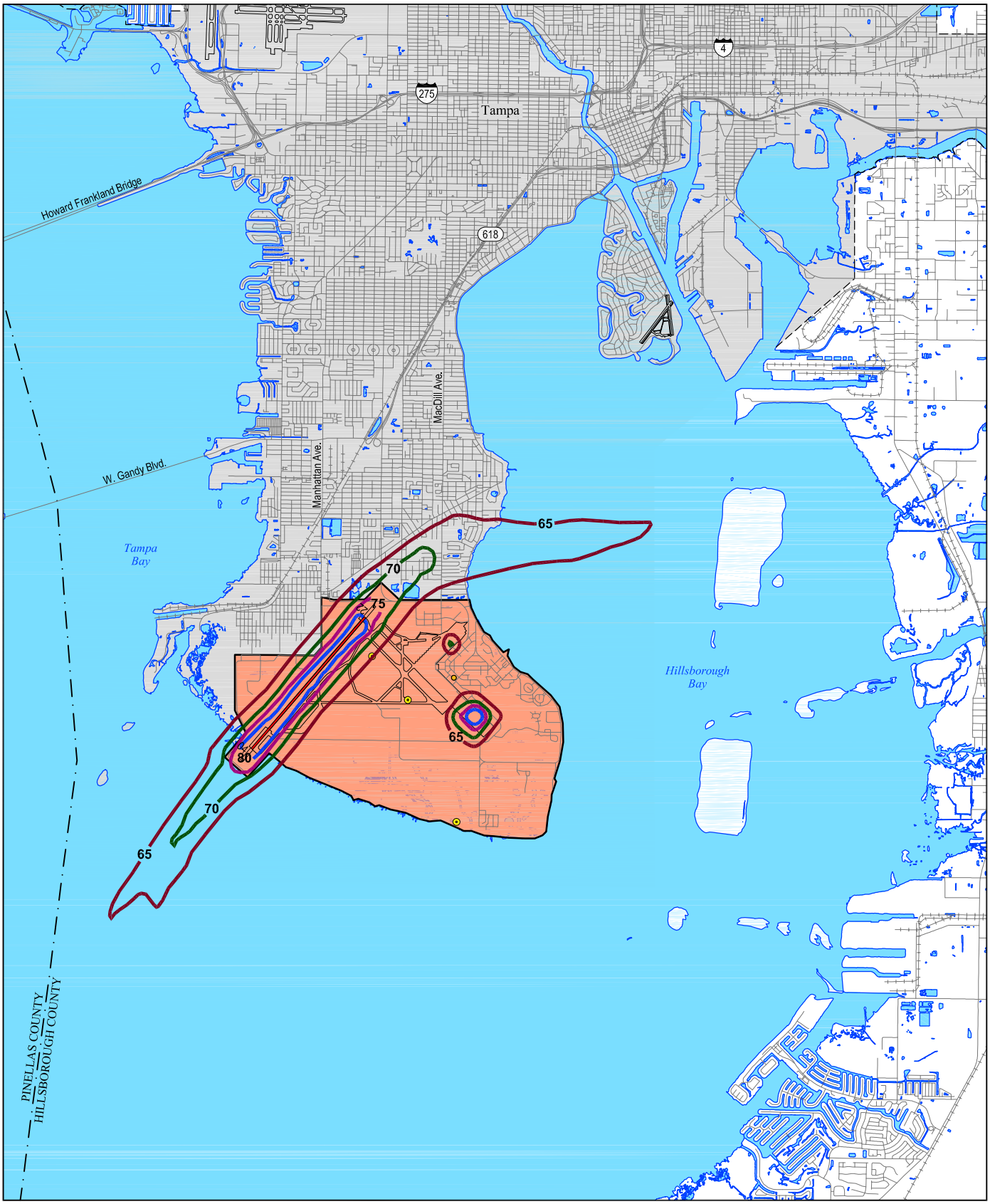
Figure 4.5 depicts the CZs and APZs for Runway 04/22 at MacDill AFB. Each end of the runway has a 3,000 foot by 3,000 foot CZ and two APZs. CZs and APZs typically extend straight off the end of the runway along an extension of the centerline of the runway. As noted in Figure 4.5, the APZs at the northeast end of the runway form a "Y." The dimensions of the APZs that extend to the east are the same as standard APZs; however, the east APZs align on the center of departure flight tracks that turn east at the departure end of the runway. Air Force policy permits establishment of non-standard APZs in such cases.

Accident potential on or adjacent to the runway or within the CZ is so high that the necessary land use restrictions would prohibit reasonable economic use of land. It is Air Force policy to request that Congress authorize and appropriate funds to purchase the real property interests in this area to prevent incompatible land uses.

Accident potential in zone I is less critical than the CZ, but still possesses a significant risk factor. This 3,000 foot by 5,000 foot area has land use compatibility guidelines that are sufficiently flexible to allow reasonable economic use of the land, such as industrial/manufacturing, transportation, communication/utilities, wholesale trade, open space, recreation, and agriculture. However, uses that concentrate people in small areas are not acceptable.

Accident potential zone II is less critical than APZ I, but still possesses potential for accidents. Accident potential zone II, also 3,000 feet wide, is 7,000 feet long extending to 15,000 feet from the runway threshold. Acceptable uses include those of APZ I, as well as low density single family residential and those personal and business services and commercial/retail trade uses of low intensity or scale of operation. High density functions such as multi-story buildings, places of assembly (*e.g.*, theaters, churches, schools, restaurants, *etc*.), and high density office uses are not considered appropriate.

High people densities should be limited to the maximum extent possible in APZ II. The optimum density recommended for residential usage (where it does not conflict with noise criteria) in APZ II is one dwelling per acre. For most nonresidential usage, buildings should be limited to one story and the lot coverage should not exceed 20 percent.



MacDill Air Force Base 2008 AICUZ

LEGEND

- DNL 65 dB Contour
- DNL 70 dB Contour
- DNL 75 dB Contour
- DNL 80 dB Contour
- Runway
- Roadway
- City Limits
- MacDill AFB
- Drop Zone
- Helipad

N

0 9,000

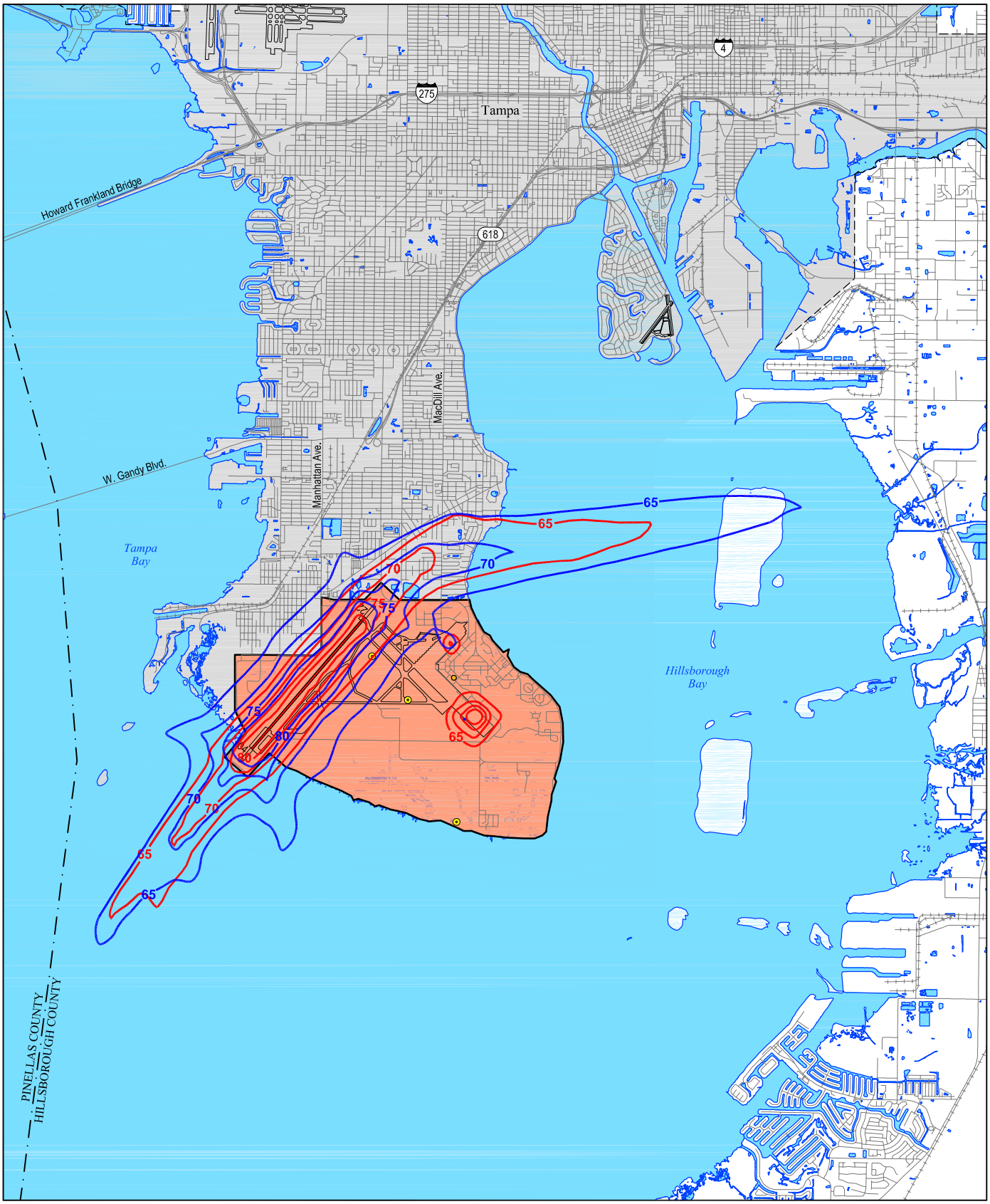
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1998 AICUZ Study Noise Contours

Figure 4.3

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MacDill Air Force Base 2008 AICUZ

LEGEND

- 1998 AICUZ Noise Contours
- 2008 AICUZ Noise Contours
- Runway
- Roadway
- City Limits
- MacDill AFB
- Drop Zone
- Helipad

N

0 9,000

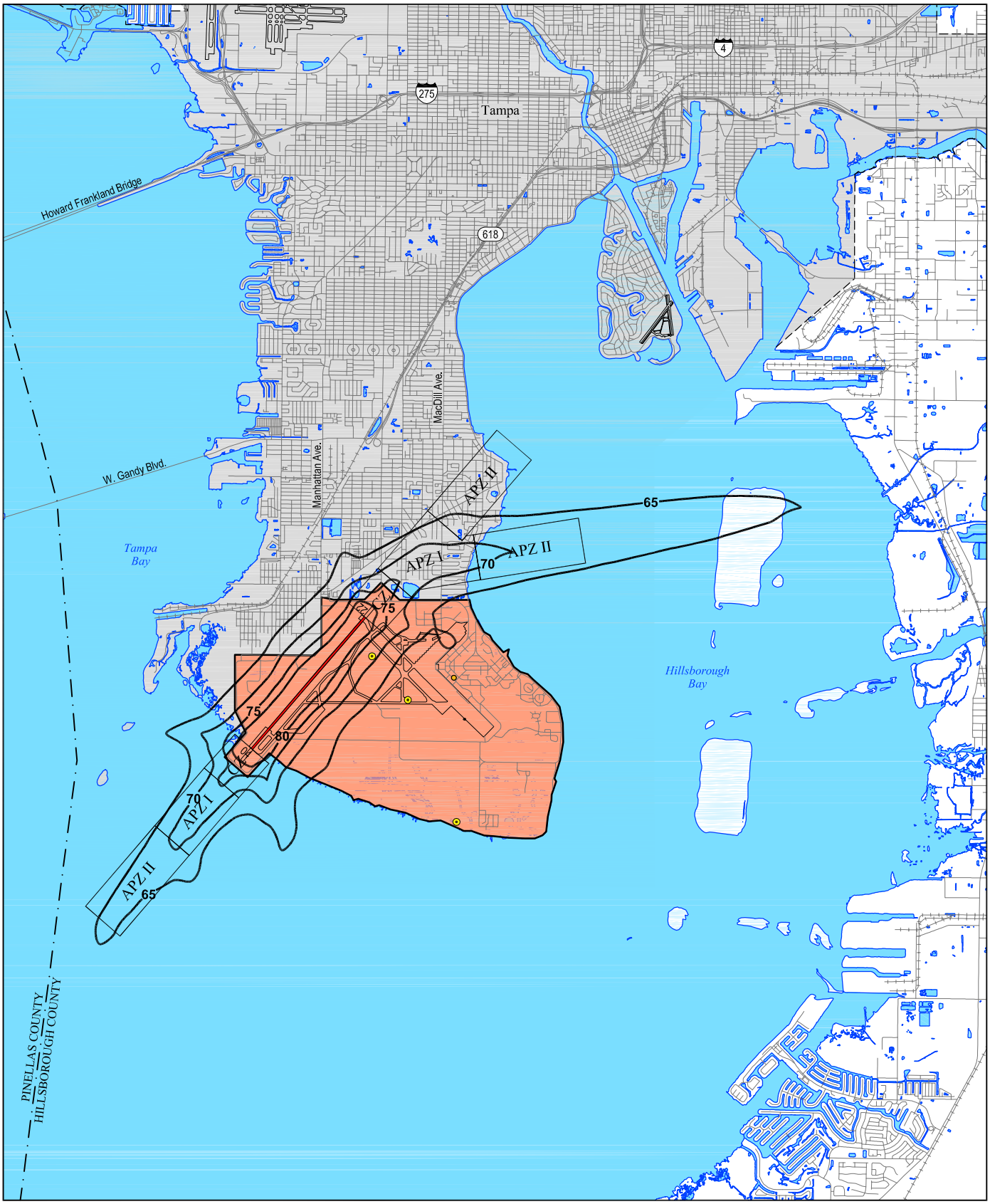
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Comparison of 2008 and 1998 AICUZ Study Noise Contours

Figure 4.4

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MacDill Air Force Base 2008 AICUZ

LEGEND

- Runway
- Roadway
- City Limits
- MacDill AFB
- CZ Clear Zone
- APZ Accident Potential Zone
- Drop Zone
- Helipad

N

0 9,000

Feet

Clear Zones and Accident Potential Zones

Figure 4.5

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4.7.3 Land Use Compatibility Guidelines

Subsection 4.6.3.1 introduces the AICUZ concept and Subsection 4.6.3.2 presents the land-use compatibility guidelines applicable to MacDill AFB.

4.7.3.1 Introduction

The DoD developed the AICUZ program for military airfields. Using this program at its installations, the DoD works to protect aircraft operational capabilities and to assist local government officials in protecting and promoting the public's health, safety, and quality of life. The goal is to promote compatible land-use development around military airfields by providing information on aircraft noise exposure and accident potential.

AICUZ reports describe three basic types of constraints that affect, or result from, flight operations. The first constraint involves areas that the FAA and the DoD identified for height limitations (see Subsection 4.2).

The second constraint involves noise zones based on the DNL metric and the DoD NOISEMAP method. Using the NOISEMAP program, which is similar to FAA's INM, the Air Force produces noise contours showing the noise levels generated by aircraft operations. The AICUZ report contains noise contours plotted in 5 dB increments, ranging from DNL 65 dB to 80+ dB.

The third constraint involves CZs and APZs based on statistical analysis of past DoD aircraft accidents. DoD analysis has determined that areas immediately beyond the ends of runways and along the approach and departure flight paths have greater potential for aircraft accidents (see Figure 4.5).

4.7.3.2 Land-Use Compatibility Guidelines

Each AICUZ Study contains land-use guidelines. Table 4.3 identifies land uses and possible noise exposure and accident potential combinations for MacDill AFB. These noise guidelines are essentially the same as those published by the Federal Interagency Committee on Urban Noise in the June 1980 publication, *Guidelines for Considering Noise in Land-Use Planning and Control.* The U.S. Department of Transportation publication, *Standard Land Use Coding Manual (SLUCM),* has been used to identify and code land-use activities. The designations are a combination of criteria listed in the Legend and Notes at the end of the table. For example, Y^1 means land use and related structures are compatible without restriction at a suggested maximum density of 1-2 dwelling units per acre, possibly increased under a Planned Unit Development where lot coverage is less than 20 percent.

Table 4.3 Land Use Compatibility Guidelines

Land Use		Accident Potential Zones			Noise Zones in DNL dB			
SLUCM No.	Name	Clear Zone	APZ I	APZ II	65-69	70-74	75-79	80+
10	**Residential**							
11	Household units							
11.11	Single units; detached	N	N	Y[1]	A[11]	B[11]	N	N
11.12	Single units; semidetached	N	N	N	A[11]	B[11]	N	N
11.13	Single units; attached row	N	N	N	A[11]	B[11]	N	N
11.21	Two units; side-by-side	N	N	N	A[11]	B[11]	N	N
11.22	Two units; one above the other	N	N	N	A[11]	B[11]	N	N
11.31	Apartments; walk up	N	N	N	A[11]	B[11]	N	N
11.32	Apartments; elevator	N	N	N	A[11]	B[11]	N	N
12	Group quarters	N	N	N	A[11]	B[11]	N	N
13	Residential hotels	N	N	N	A[11]	B[11]	N	N
14	Mobile home parks or courts	N	N	N	N	N	N	N
15	Transient lodgings	N	N	N	A[11]	B[11]	C[11]	N
16	Other residential	N	N	N[1]	A[11]	B[11]	N	N
20	**Manufacturing**							
21	Food & kindred products; manufacturing	N	N[2]	Y	Y	Y[12]	Y[13]	Y[14]
22	Textile mill products; manufacturing	N	N[2]	Y	Y	Y[12]	Y[13]	Y[14]
23	Apparel and other finished products made from fabrics, leather, and similar materials; manufacturing	N	N	N[2]	Y	Y[12]	Y[13]	Y[14]
24	Lumber and wood products (except furniture); manufacturing	N	Y[2]	Y	Y	Y[12]	Y[13]	Y[14]
25	Furniture and fixtures; manufacturing	N	Y[2]	Y	Y	Y[12]	Y[13]	Y[14]
26	Paper & allied products; manufacturing	N	Y[2]	Y	Y	Y[12]	Y[13]	Y[14]
27	Printing, publishing, and allied industries	N	Y[2]	Y	Y	Y[12]	Y[13]	Y[14]
28	Chemicals and allied products; manufacturing	N	N	N[2]	Y	Y[12]	Y[13]	Y[14]
29	Petroleum refining and related industries	N	N	Y	Y	Y[12]	Y[13]	Y[14]

Table 4.3 Land Use Compatibility Guidelines *(continued)*

Land Use		Accident Potential Zones			Noise Zones			
SLUCM No.	Name	Clear Zone	APZ I	APZ II	65-69	70-74	75-79	80+
30	**Manufacturing**							
31	Rubber and misc. plastic products, manufacturing	N	N[2]	N[2]	Y	Y[12]	Y[13]	Y[14]
32	Stone, clay and glass products manufacturing	N	N[2]	Y	Y	Y[12]	Y[13]	Y[14]
33	Primary metal industries	N	N[2]	Y	Y	Y[12]	Y[13]	Y[14]
34	Fabricated metal products; manufacturing	N	N[2]	Y	Y	Y[12]	Y[13]	Y[14]
35	Professional, scientific, and controlling instruments; photographic and optical goods; watches and clocks manufacturing	N	N	N[2]	Y	A	B	N
39	Miscellaneous manufacturing	N	Y[2]	Y[2]	Y	Y[12]	Y[13]	Y[14]
40	**Transportation, Communications and Utilities**							
41	Railroad, rapid rail transit and street railroad transportation	N[3]	Y[4]	Y	Y	Y[12]	Y[13]	Y[14]
42	Motor vehicle transportation	N[3]	Y	Y	Y	Y[12]	Y[13]	Y[14]
43	Aircraft transportation	N[3]	Y[4]	Y	Y	Y[12]	Y[13]	Y[14]
44	Marine craft transportation	N[3]	Y[4]	Y	Y	Y[12]	Y[13]	Y[14]
45	Highway & street right-of-way	N[3]	Y	Y	Y	Y[12]	Y[13]	Y[14]
46	Automobile parking	N[3]	Y[4]	Y	Y	Y[12]	Y[13]	Y[14]
47	Communications	N[3]	Y[4]	Y	Y	A[15]	B[15]	N
48	Utilities	N[3]	Y[4]	Y	Y	Y	Y[12]	Y[13]
49	Other transportation communications and utilities	N[3]	Y[4]	Y	Y	A[15]	B[15]	N
50	**Trade**							
51	Wholesale trade	N	Y[2]	Y	Y	Y[12]	Y[13]	Y[14]
52	Retail trade-building materials, hardware and farm equipment	N	Y[2]	Y	Y	Y[12]	Y[13]	Y[14]
53	Retail trade-general merchandise	N	N[2]	Y[2]	Y	A	B	N
54	Retail trade-food	N	N[2]	Y[2]	Y	A	B	N
55	Retail trade-automotive, marine craft, aircraft and accessories	N	Y[2]	Y[2]	Y	A	B	N
56	Retail trade-apparel and accessories	N	N[2]	Y[2]	Y	A	B	N
57	Retail trade-furniture, home furnishings and equipment	N	N[2]	Y[2]	Y	A	B	N
58	Retail trade-eating and drinking establishments	N	N	N[2]	Y	A	B	N
59	Other retail trade	N	N[2]	Y[2]	Y	A	B	N

Table 4.3 Land Use Compatibility Guidelines *(continued)*

Land Use		Accident Potential Zones			Noise Zones			
SLUCM No.	Name	Clear Zone	APZ I	APZ II	65-69	70-74	75-79	80+
60	**Services**							
61	Finance, insurance and real estate services	N	N	Y[6]	Y	A	B	N
62	Personal services	N	N	Y[6]	Y	A	B	N
62.4	Cemeteries	N	Y[7]	Y[7]	Y	Y[12]	Y[13]	Y[14,21]
63	Business services	N	Y[8]	Y[8]	Y	A	B	N
64	Repair services	N	Y[2]	Y	Y	Y[12]	Y[13]	Y[14]
65	Professional services	N	N	Y[6]	Y	A	B	N
65.1	Hospitals, nursing homes	N	N	N	A*	B*	N	N
65.1	Other medical facilities	N	N	N	Y	A	B	N
66	Contract construction services	N	Y[6]	Y	Y	A	B	N
67	Governmental services	N	N	Y[6]	Y*	A*	B*	N
68	Educational services	N	N	N	A*	B*	N	N
69	Miscellaneous services	N	N[2]	Y[2]	Y	A	B	N
70	**Cultural, Entertainment and Recreational**							
71	Cultural activities (including churches)	N	N	N[2]	A*	B*	N	N
71.2	Nature exhibits	N	Y[2]	Y	Y*	N	N	N
72	Public assembly	N	N	N	Y	N	N	N
72.1	Auditoriums, concert halls	N	N	N	A	B	N	N
72.11	Outdoor music shell, amphitheaters	N	N	N	N	N	N	N
72.2	Outdoor sports arenas, spectator sports	N	N	N	Y[17]	Y[17]	N	N
73	Amusements	N	N	Y[8]	Y	Y	N	N
74	Recreational activities (including golf courses, riding stables, water recreation)	N	Y[8,9,10]	Y	Y*	A*	B*	N
75	Resorts and group camps	N	N	N	Y*	Y*	N	N
76	Parks	N	Y[8]	Y[8]	Y*	Y*	N	N
79	Other cultural, entertainment and recreation	N	Y[9]	Y[9]	Y*	Y*	N	N

Table 4.3 Land Use Compatibility Guidelines *(continued)*

Land Use		Accident Potential Zones			Noise Zones			
SLUCM No.	Name	Clear Zone	APZ I	APZ II	65-69	70-74	75-79	80+
80	**Resources Production and Extraction**							
81	Agriculture (except livestock)	Y[16]	Y	Y	Y[18]	Y[19]	Y[20]	Y[20,21]
81.5 to 81.7	Livestock farming and animal breeding	N	Y	Y	Y[18]	Y[19]	Y[20]	Y[20,21]
82	Agricultural related activities	N	Y[5]	Y	Y[18]	Y[19]	N	N
83	Forestry activities and related services	N[5]	Y	Y	Y[18]	Y[19]	Y[20]	Y[20,21]
84	Fishing activities and related services	N[5]	Y[5]	Y	Y	Y	Y	Y
85	Mining activities and related services	N	Y[5]	Y	Y	Y	Y	Y
89	Other resources production and extraction	N	Y[5]	Y	Y	Y	Y	Y

LEGEND

SLUCM - Standard Land Use Coding Manual, U.S. Department of Transportation.
Y - (Yes) - Land use and related structures are compatible without restriction.
N - (No) - Land use and related structures are not compatible and should be prohibited.
Y[x] - (yes with restrictions) - Land use and related structures generally compatible; see notes 1-21.
N[x] - (no with exceptions) - See notes 1-21.
NLR - (Noise Level Reduction) - NLR (outdoor to indoor) to be achieved through incorporation of noise attenuation measures into the design and construction of the structures (see Appendix C, section c.4).
A, B, or C - Land use and related structures generally compatible; measures to achieve NLR of A (DNL 25 dB), B (DNL 30 dB), or C (DNL 35 dB) need to be incorporated into the design and construction of structures.
A[*], B[*], and C[*] - Land use generally compatible with NLR. However, measures to achieve an overall noise level reduction do not necessarily solve noise difficulties and additional evaluation is warranted. See appropriate footnotes.
***** - The designation of these uses as "compatible" in this zone reflects individual federal agency and program consideration of general cost and feasibility factors, as well as past community experiences and program objectives. Localities, when evaluating the application of these guidelines to specific situations, may have different concerns or goals to consider.

NOTES

1. Suggested maximum density of 1-2 dwelling units per acre possibly increased under a Planned Unit Development where maximum lot coverage is less than 20 percent.
2. Within each land use category, uses exist where further definition may be needed due to the variation of densities in people and structures. Shopping malls and shopping centers are considered incompatible in any accident potential zone (CZ, APZ I, or APZ II).
3. The placing of structures, buildings, or aboveground utility lines in the clear zone is subject to severe restrictions. In a majority of the clear zones, these items are prohibited. See AFI 32-7063 and UFC 3-260-01 for specific guidance.
4. No passenger terminals and no major aboveground transmission lines in APZ I.
5. Factors to be considered: labor intensity, structural coverage, explosive characteristics, and air pollution.
6. Low-intensity office uses only. Meeting places, auditoriums, etc., are not recommended.
7. Excludes chapels.
8. Facilities must be low intensity.
9. Clubhouse not recommended.
10. Areas for gatherings of people are not recommended.

11A. Although local conditions may require residential use, it is discouraged in DNL 65-69 dB and strongly discouraged in DNL 70-74 dB. An evaluation should be conducted prior to approvals, indicating a demonstrated community need for residential use would not be met if development were prohibited in these zones, and there are no viable alternative locations.

11B. Where the community determines the residential uses must be allowed, measures to achieve outdoor to indoor NLR for DNL 65-69 dB and DNL 70-74 dB should be incorporated into building codes and considered in individual approvals.

11C. NLR criteria will not eliminate outdoor noise problems. However, building location and site planning, and design and use of berms and barriers can help mitigate outdoor exposure, particularly from near ground level sources. Measures that reduce outdoor noise should be used whenever practical in preference to measures which only protect interior spaces.

12. Measures to achieve the same NLR as required for facilities in the DNL 65-69 dB range 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.

13. Measures to achieve the same NLR as required for facilities in the DNL 70-74 dB range 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.

14. Measures to achieve the same NLR as required for facilities in the DNL 75-79 dB range 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.

15. If noise sensitive, use indicated NLR; if not, the use is compatible.

16. No buildings.

17. Land use is compatible provided special sound reinforcement systems are installed.

18. Residential buildings require the same NLR required for facilities in the DNL 65-69 dB range.

19. Residential buildings require the same NLR required for facilities in the DNL 70-74 dB range.

20. Residential buildings are not permitted.

21. Land use is not recommended. If the community decides the use is necessary, personnel should wear hearing protection devices.

4.8 PARTICIPATION IN THE PLANNING PROCESS

The Air Force provides the AICUZ Study to local communities to assist them in preparing their local land use plans. This section discusses how the base participates in the community planning process. Subsection 6.3 addresses the role played by the local community in enhancing compatible land use.

Airspace obstructions, construction in the APZs, residential development, and the construction of other noise-sensitive uses near the base are of great concern to MacDill AFB. The Air Force is very interested in minimizing increases in incompatible usage and in encouraging voluntary conversion of non-compatible usage to compatible usage. Applying the categories for compatible land use described in Table 4.3, the Base evaluates the impact aircraft operations have on surrounding properties and the effect new development or changes in land use might have on MacDill AFB operational capabilities.

In addition to working with local governing entities and planning professionals, the MacDill AFB Base Public Affairs Office works to address complaints and concerns expressed by off-airfield neighbors.

MacDill AFB conducts active outreach with the local community by participating in continuing discussions about zoning and other land use issues that affect or may be affected by operations on the base. A representative from base civil engineering has been appointed as a liaison to the local planning commission to facilitate the exchange of information about local land use issues of mutual concern. MacDill AFB is committed to providing the local community, planning officials, and other concerned organizations with information about the AICUZ, through a variety of means, in an effort to facilitate compatible land use.

The MacDill AFB Civil Engineer and Public Affairs Offices work together providing public meetings and informational workshops to disseminate information about base operations, forecasts, plans, and mitigation strategies.

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SECTION 5
LAND USE ANALYSIS

5.1 INTRODUCTION

Land use planning and control is a dynamic, rather than a static process. The specific characteristics of land use determinants will always reflect, to some degree, the changing conditions of the economic, social, and physical environment of a community, as well as changing public concern. The planning process accommodates this fluidity in which decisions are normally not based on boundary lines, but rather on more generalized area designations.

Originally known as Southeast Air Base, Tampa, and later named MacDill Field, the field became MacDill Air Force Base shortly after the establishment of the United States Air Force in 1947. At the time of establishment in the early 1940's, the area surrounding MacDill was mostly undeveloped. An initial development surge occurred in conjunction with the base in the 1940s and 1950s, with a second wave of increased development in the 1980's.

Computer technology enables MacDill AFB to more precisely display its flight tracks and noise contours for land use planning purposes. The computer technology reveals the extent of the MacDill AFB region of impact into the counties and surrounding nearby cities and towns.

For the purpose of this Study, existing and future land uses on the figures in this section are generalized into one of the following six categories:

Residential: This category includes all types of residential activity, such as single and multi-family residences and mobile homes, at a density greater than one dwelling unit per acre.

Commercial: This category includes offices, retail, restaurants and other types of commercial establishments.

Industrial: This category includes manufacturing, warehousing, and other similar uses.

Public/Quasi-Public: This category includes publicly owned lands and/or land to which the public has access, including military reservations and training grounds, public buildings, schools, churches, cemeteries, and hospitals.

Recreational: This category includes land areas designated for recreational activity including parks, wilderness areas and reservations, conservation areas, and areas designated for trails, hikes, camping, etc.

Open/Agricultural/Low Density: This category includes undeveloped land areas, agricultural areas, grazing lands and areas with residential activity at densities less than or equal to one dwelling unit per acre.

5.2 EXISTING LAND USE

Existing land use in the vicinity of MacDill AFB is shown in Figure 5.1. Surrounded on three sides by water and with a significant buffer provided on the east and west by Hillsborough and Tampa Bays, the installation and its airfield activities only impact the City of Tampa, which lies to the north. The majority of the land surrounding the base can be characterized as moderate-density urban developed, mostly residential land uses, with some areas of undeveloped land northwest of the installation.

The majority of the area northeast of the base is comprised of residential land uses, with commercial uses focused along the Dale Mabry Highway and MacDill Avenue corridors. Several public/quasi-public activities are interspersed throughout the area, including churches, schools, and child development centers. The area east of Dale Mabry Highway is generally fully developed, but individual, vacant parcels are scattered throughout the area. Three sizeable parks, Gadsden, Sky View, and Ballast Point, are located northeast of the base. Significant infill and redevelopment construction, predominantly residential, is currently taking place, with much of the activity occurring in the Ballast Point area.

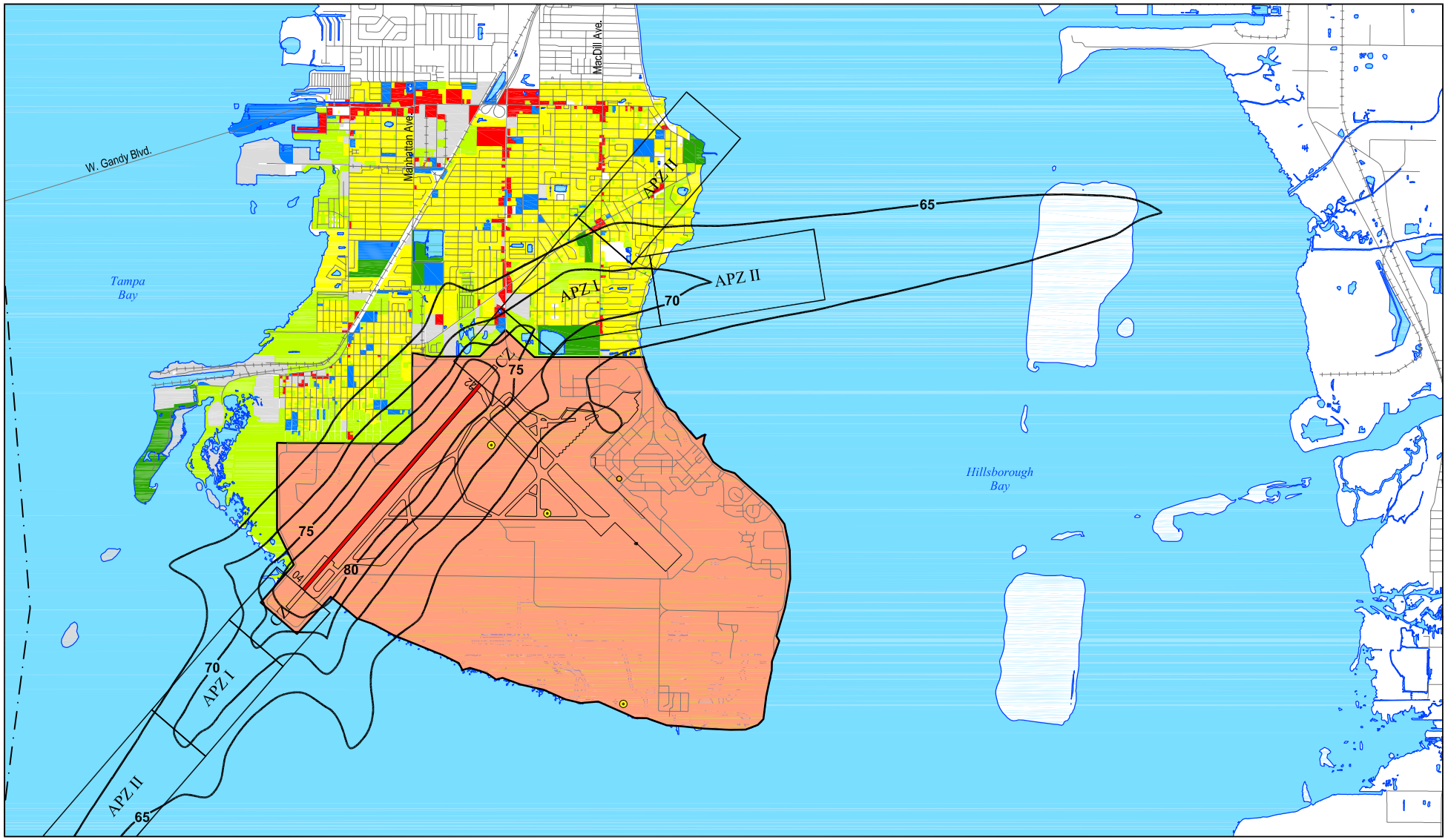
The area northwest of MacDill AFB (west of Dale Mabry Highway) is also predominantly residential, containing a mix of single family and multi-family units. There are moderate amounts of vacant undeveloped property northwest of the base. The extreme western portion of the study area is the former Port Tampa City, with industrial warehouse type activities currently comprising much of the area. The greatest amount of these industrial land uses extend along Interbay Boulevard, between West Shore Boulevard and Dale Mabry Highway. Commercial uses in the northwest portion of the study area are limited to small amounts of commercial along Commerce Street and strip commercial along Gandy Boulevard at the extreme northern portion of the study area. Picnic Island Park, the largest park in the vicinity of MacDill AFB, is located at the extreme western portion of the area, directly adjacent to Tampa Bay.

Figure 5.1 presents the existing land uses for the area that surrounds MacDill AFB and within the DNL 65 dB and greater noise exposure area. Table 5.1 summarizes the acreage by land use category exposed to noise levels of DNL 65 dB and greater. Note that these acreages represent only the area outside the MacDill AFB boundaries and exclude water surface.

Table 5.1 Generalized Existing Land Use Within DNL 65 dB and Greater Noise Exposure Area (Off-Installation, excluding water surface)

Category	Acreage
Residential	406
Commercial	21
Industrial	72
Public/Quasi-public	16
Recreational	81
Open/Agricultural/Low Density	372
Total	**968**

Source: Planning Commission 2007



Generalized Existing Land Use

Figure 5.1

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The analysis also includes land use within the MacDill AFB CZs and APZs. Inclusion of the CZs and APZs in the evaluation shows 429 acres of residential land within the MacDill AFB CZs and APZs. Table 5.2 reflects the land use (outside the MacDill AFB boundaries) within the MacDill AFB CZs and APZs.

Table 5.2 Generalized Existing Land Use within the MacDill AFB Clear Zones and Accident Potential Zones (Off-Installation)

Category	Acreage
Residential	429
Commercial	15
Industrial	5
Public/Quasi-public	21
Recreational/Open/Agricultural/Low Density	268
Total	**738**
Source: Planning Commission 2007	

5.3 CURRENT ZONING

Figure 5.2 overlays the 2008 noise contours, CZs, and APZs on a map displaying the current generalized zoning in the vicinity of MacDill AFB. As described in the following sections, several zoning related initiatives that may impact future development in the MacDill vicinity have been completed or are currently underway.

The City of Tampa has included MacDill AFB AICUZ data and recommendations in its comprehensive planning and zoning documents since the late 1980's. The City of Tampa Comprehensive Plan contains a Future Land Use Element (FLUE) which includes policies and objectives meant to support and strengthen the role of MacDill AFB. While the City includes the CZ and APZs on their comprehensive plan maps, the Tampa International Airport is the only airport in the City with specific comprehensive land use plan category and zoning districts designed to promote compatible development surrounding an airfield.

Due to encroachment concerns in the vicinity of MacDill AFB, the City of Tampa conducted a Military Readiness Assessment in 2003. This assessment focused on zoning, development activities, and past recommendations related to MacDill AFB. Additionally, in response to the Base Realignment and Closure Committee hearings in 2005, the City established a one year abatement on plan amendments or rezonings that would increase residential development within the MacDill AFB CZ or APZ I boundary. This abatement was subsequently extended for an additional year but has since expired. The City also supported the preparation of a Joint Land Use Study (JLUS) for MacDill AFB. The JLUS was completed in 2006 and produced formal recommendations related to land use compatibility in the AICUZ environs.

After significant debate regarding the JLUS recommendations, the City of Tampa is in the process of updating the Comprehensive Plan to include revisions to objectives and policies in support of compatible planning in the vicinity of the base. The proposed revisions include the following key policies:

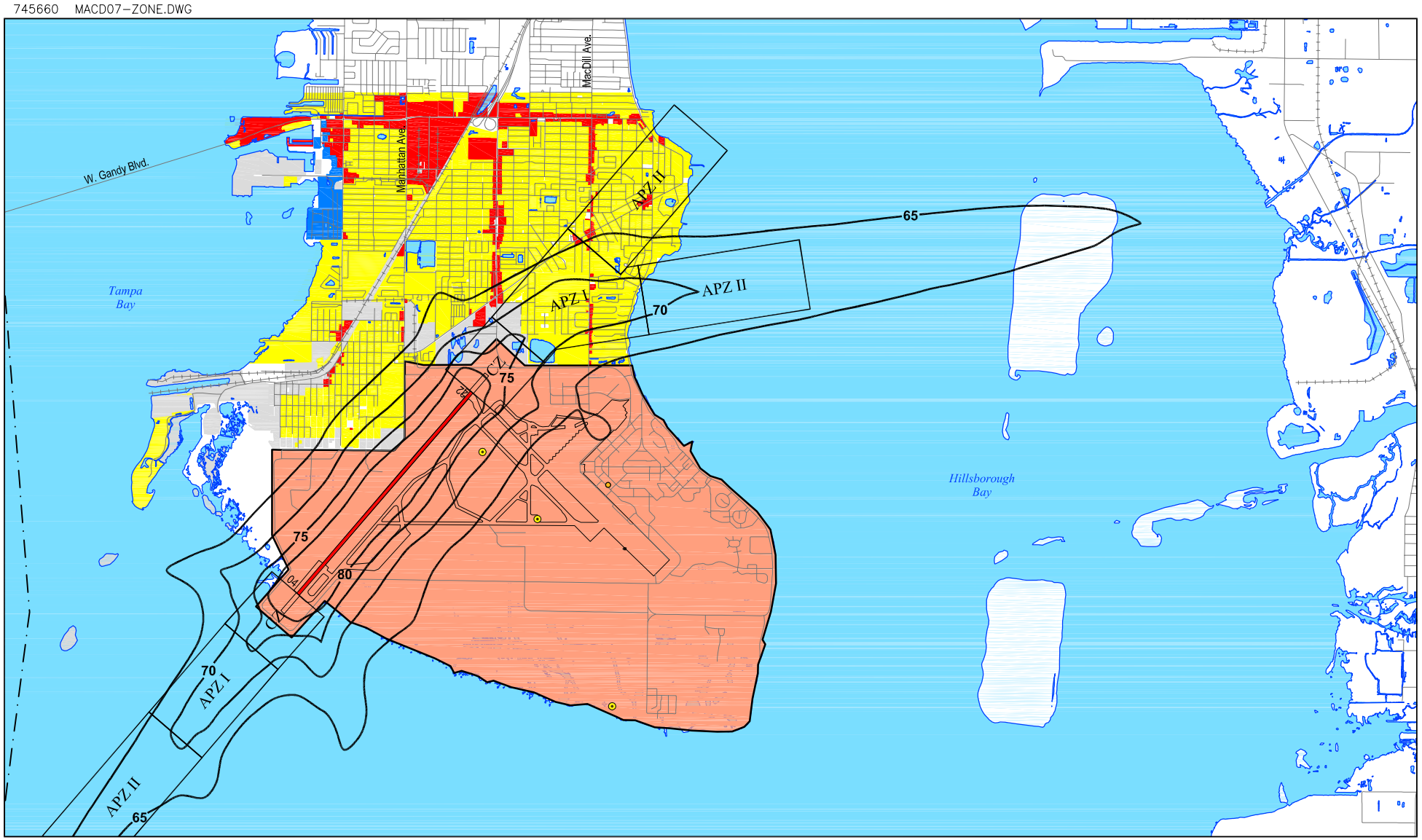
- Establish a committee, including member(s) of city administration, city council, MacDill AFB personnel, neighborhood association representatives, and other area stakeholders, to address base operations, flight plans, future base activities, residents and community needs and desires, and any city proposed plans, improvements, studies, etc.;
- Include MacDill AFB and Hillsborough County Aviation Authority in the Development Review Committee to maintain open communication regarding all petitions for rezoning and special use; and
- Limit new residential development within the MacDill AFB flight path to six units per acre (currently 10 units per acre). Existing development would be grandfathered and considered conforming.

Zoning within the AICUZ area of influence generally reflects existing land use patterns. The vast majority of land in the MacDill AFB area of influence is zoned for various densities of residential uses. Commercial zoning exists along the major road corridors of Gandy Boulevard, West Shore Boulevard, Dale Mabry Highway, and MacDill Avenue. The amount of commercially zoned land increases north towards Gandy Boulevard. Industrial zoning occurs directly adjacent to the base, predominantly in the western portion of the study area, anchored by the industrial port activities in the former Port Tampa City.

Analysis of the current zoning map was performed to determine the acreage of each zoning designation within the DNL 65 dB and greater noise area. For this analysis, zoning designations were generalized into residential, commercial, and industrial. Since the City of Tampa incorporates open space and public uses into other zoning categories, those categories are not shown. Several areas surrounding MacDill AFB are zoned as Planned Developments (PDs), which can be developed with varying mixed land uses. Generally, these areas are depicted as residential, although the PD's are separated into the actual zoning categories if specific development plans are known. Figure 5.2 shows the results of the compilation, and Table 5.3 provides a breakdown of the generalized zoning (areas outside MacDill AFB only and outside CZs and APZs) within the DNL 65 dB and greater noise area.

Table 5.3 Generalized Zoning within DNL 65 dB and Greater Noise Exposure Area (Off-Installation outside CZs and APZs)

Category	Acreage
Residential	293
Commercial	15
Industrial	83
Public/Quasi-public	0
Recreational/Open/Agricultural/Low Density	0
Total	**391**
Source: City of Tampa Planning Commission Zoning Maps	



Generalized Zoning

Figure 5.2

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A similar analysis was performed to determine the acreage of each generalized zoning category within the MacDill AFB CZs and APZs and is shown on Table 5.4.

Table 5.4 Generalized Zoning within the MacDill AFB Clear Zones and Accident Potential Zones (Off-Installation)

Category	Acreage
Residential	661
Commercial	21
Industrial	91
Public/Quasi-public	1
Recreational/Open/Agricultural/Low Density	0
Total	**774**
Source: City of Tampa Planning Commission Zoning Maps	

5.4 FUTURE LAND USE AND FUTURE DEVELOPMENT PROJECTS

Figure 5.3 shows generalized future land use predicted for the MacDill AFB area which reflects local zoning maps, comprehensive plans, and local development proposals. The predominant data source for depicted future land use is the City of Tampa's FLUE. The FLUE is a guide for future development and redevelopment within the City. It designates the general distribution, location, and extent of the land uses projected to the year 2015. The FLUE is based on surveys, studies and data which show the amount of land required to accommodate anticipated growth, projected population of the area, character of undeveloped land, and other factors. The following paragraphs discuss the anticipated future land use patterns in the MacDill vicinity.

Although the majority of land within the AICUZ environs is developed, a few small undeveloped areas exist and numerous individual parcels are vacant. Due to the area's prime location, infill and redevelopment has increased significantly in recent years. This redevelopment has generally focused on residential uses. Development in the area northeast of the base is generally limited to smaller redevelopments, while some larger tracts are available northwest of the base. In this area, several moderately scaled developments are currently under construction, most notably several areas directly adjacent to the MacDill AFB boundary. These include two multi-family residential developments south of Interbay Boulevard, between Dale Mabry Highway and South Manhattan Avenue, Hemingway Pointe and South Pointe Townhomes. A significant single family residential development is planned for the area south of Interbay Boulevard and west of South Manhattan, directly north of the base. Ashton Woods Homes plans to develop over 120 home sites which will be intermingled throughout the old Port Tampa City. The majority of remaining future development will consist of residential infill and redevelopment throughout the area.

The proposed recommendations and policy changes to the City's Comprehensive Plan, especially those recommendations to increase involvement of MacDill AFB representatives in advising local officials about AICUZ requirements during the zoning and development process, should facilitate compatible land uses within the AICUZ areas of influence. The potential amendments to reduce the allowed residential densities from 10 to 6 dwelling units

per acre should have a positive impact on compatibility in the AICUZ environs. The JLUS indicated that past studies have determined the existing density of the AICUZ area to be 5-6 dwelling units per acre, still greater than the average current densities. Consequently, the reduction in allowed density may not have a significant impact on future development patterns. However, the improved proactive and cooperative environment between the City, MacDill AFB, and area residents will help to promote more responsible future development in the vicinity of the base.

5.5 INCOMPATIBLE LAND USES

Table 4.3 shows land use compatibility as it is applied to existing land use within the MacDill AFB area of influence. For a land use area to be considered compatible, it must meet criteria for its category for both noise and accident potential as shown in Table 4.3. The compatibility guidelines shown in Table 4.3 were combined with the existing land use data presented on Figure 5.1 to determine land use compatibility associated with aircraft noise and the accident potential zones at MacDill AFB. Results of this analysis are shown numerically in Table 5.5 and graphically on Figure 5.4.

Table 5.5 Incompatible Land Use for Runway 04/22 at MacDill AFB

Category	Acreage Within CZs and APZs			Acreage Within Noise Zones, Not Included in CZs and APZs				Total
	CLEAR ZONE	APZ I	APZ II	65-69	70-74	75-79	80+	
Residential	0	223	201	267	140	0	0	**831**
Commercial	4	5	•	•	•	•	0	**9**
Industrial	4	•	•	•	•	•	•	**4**
Public/Quasi-public	4	1	17	•		•	0	**22**
Recreation/Open/ Agricultural/Low Density	0	•	•	•	•	•	•	**0**
Total	**12**	**229**	**218**	**267**	**140**	**0**	**0**	**866**

• Represents compatible land use

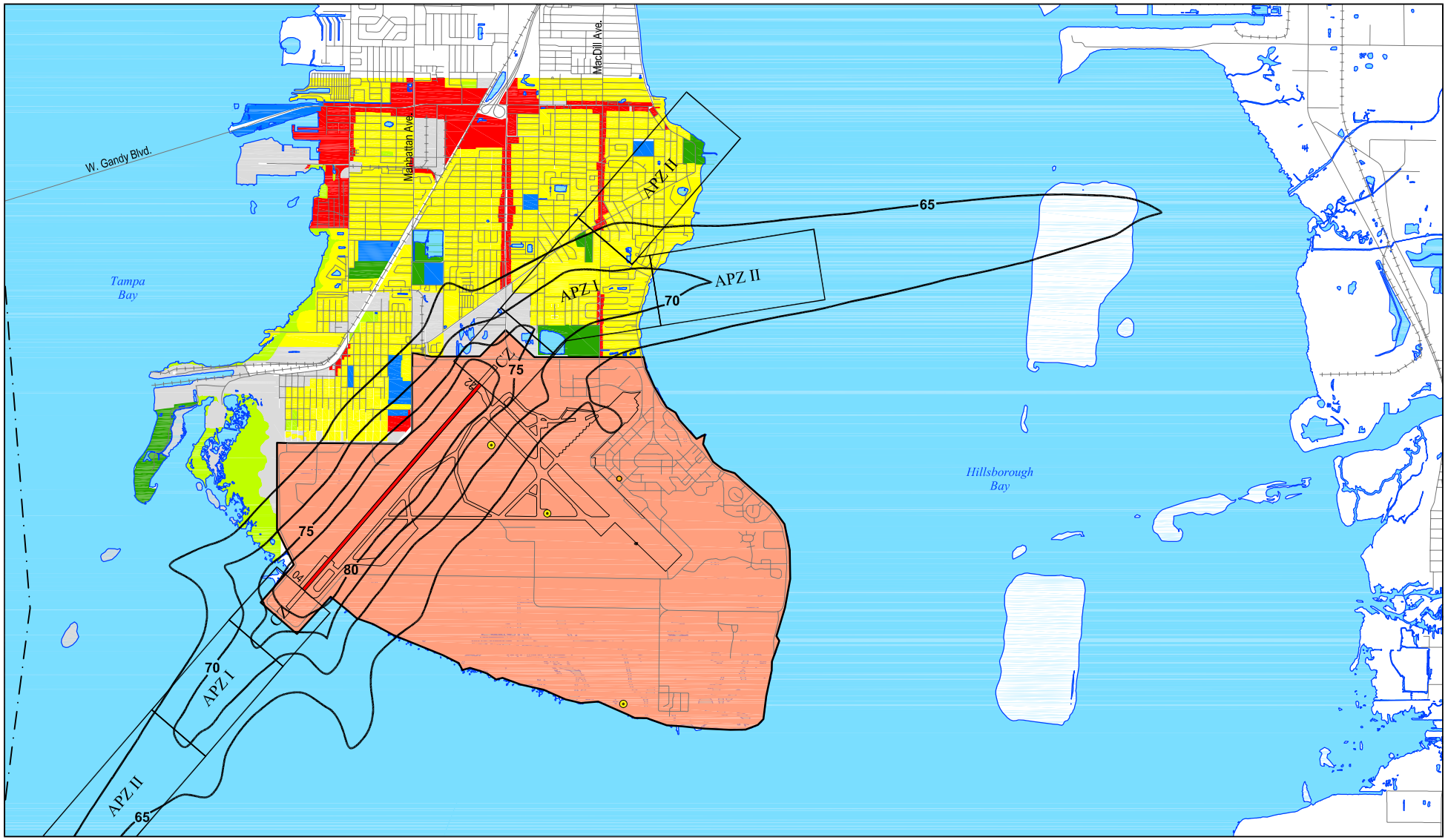
5.5.1 Runway 22 Clear Zone and Accident Potential Zones

5.5.1.1 Runway 22 Clear Zone (Northeast of the Airfield)

The majority of the Runway 22 CZ is located on MacDill AFB property. Small areas of incompatible industrial, commercial, and public/quasi public are located in the extreme northern end of the CZ, just outside of the MacDill AFB Main Gate.

5.5.1.2 Runway 22 Accident Potential Zone I (Northeast of the Airfield)

In general, industrial, recreational, vacant, and agricultural/open land uses are compatible with the safety criteria established for APZ I. Compatibility of commercial uses within APZ I is dependent on densities and intensity of uses. Large areas of single and multi-family residential uses are located throughout APZ I. A small amount of incompatible public/quasi public and commercial uses are also present in APZ I.

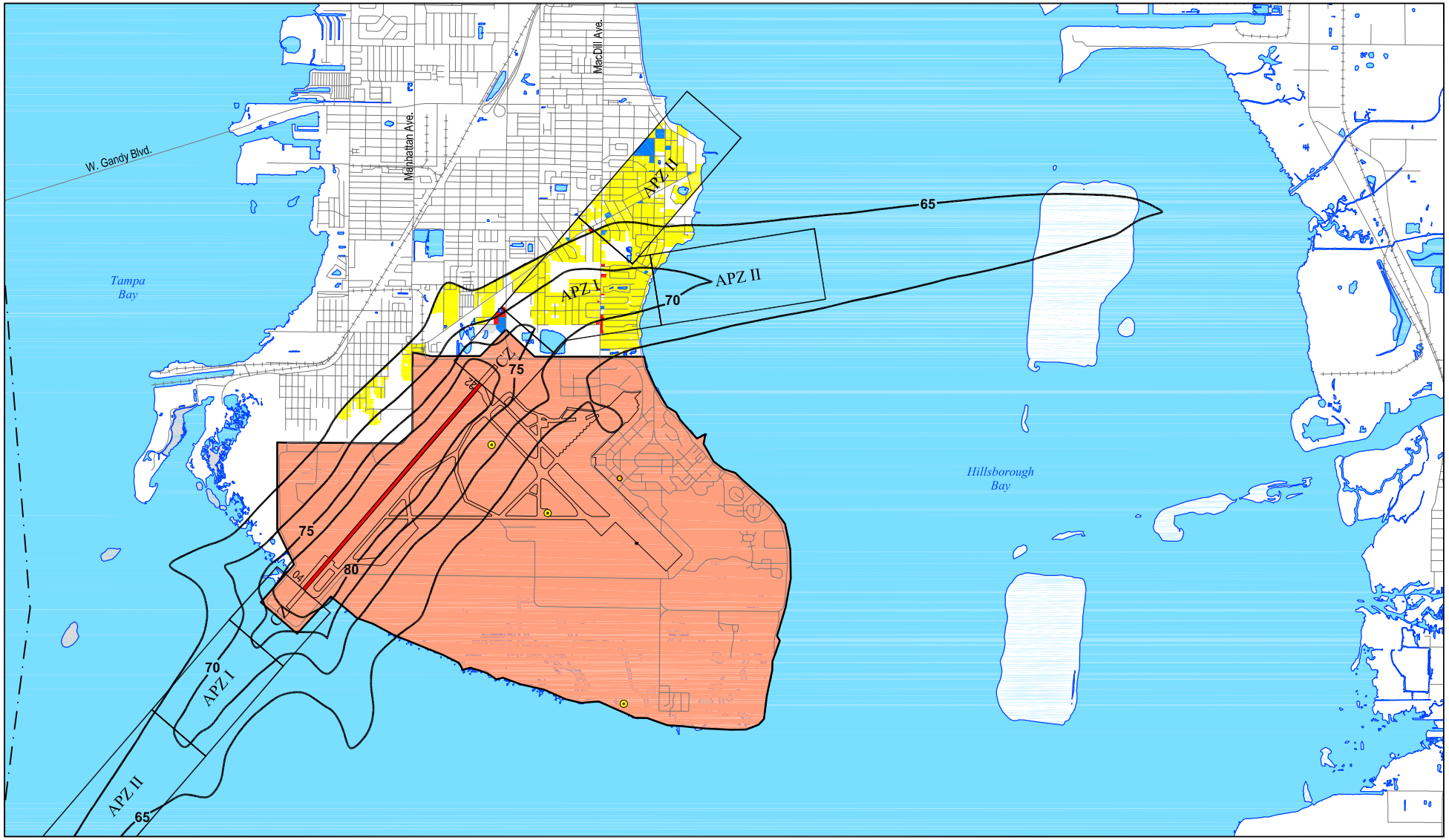


Generalized Future Land Use

Figure 5.3

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MacDill Air Force Base 2008 AICUZ

LEGEND

- MacDill AFB
- Residential
- Commercial
- Industrial
- Public/Quasi-Public
- Recreational
- Drop Zone
- Helipad
- Runway
- DNL dB Contours
- City Limits

N

0 6,000

Feet

Incompatible Land Uses

Figure 5.4

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5.5.1.3 Runway 22 Accident Potential Zone II (Northeast of the Airfield)

Most categories of land use are compatible with the safety criteria established for APZ II with the exception of public/quasi-public and some densities of residential. These land uses generally would be incompatible if residential densities are greater than two dwelling units per acre. A significant amount of residential uses exist in APZ II at a density greater than two dwelling units per acre and are considered incompatible. Incompatible public uses include the Ballast Point Elementary School, Circle Ranch Child Development Center, and several churches.

5.5.2 Runway 04 Clear Zones and Accident Potential Zones

The Runway 04 CZs and APZs are located on MacDill AFB property or over water. Consequently, there are no incompatible land uses associated with the Runway 04.

5.6 NOISE ZONES

At noise levels between DNL 65-69 dB, the only incompatible land use type is residential without NLR materials. Residential uses exist within the DNL 65-69 dB noise exposure zone north of MacDill AFB. A portion of these residential areas, to the northeast, are located within the 70-74 dB noise exposure zone. The majority of the residential areas incompatibly located within the noise zones are also located within the Runway 22 APZs. Homes that have the recommended NLR measures incorporated into their construction are considered compatible.

5.7 AIR INSTALLATION COMPATIBLE USE ZONE STUDY UPDATES

AICUZ noise contours describe the noise characteristics of a specific operational environment, and as such, will change if a significant operational change is made. An AICUZ Study should be evaluated for an update if the noise exposure map changes by DNL 2 dB or more in noise sensitive areas when compared to the noise contour map in the last publicly released AICUZ Study. With this in mind, this AICUZ Study updates the 1998 AICUZ Study and provides flight track, accident potential zone and noise zone information in this report, which reflects the most accurate picture of the installation's aircraft activities as of August 2007.

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SECTION 6
IMPLEMENTATION

6.1 INTRODUCTION

Implementation of the AICUZ Study must be a joint effort between the Air Force and adjacent communities. The role of the Air Force is to minimize impact on the local communities by MacDill AFB aircraft operations. The role of the communities is to ensure that development in the surrounding area is compatible with accepted planning and development principles and practices.

6.2 AIR FORCE RESPONSIBILITIES

In general, the Air Force perceives its AICUZ responsibilities as encompassing the areas of flying safety, noise abatement, and participation in the land use planning process.

Well-maintained aircraft and well-trained aircrews do a great deal to assure that aircraft accidents are avoided. Despite the best aircrew training and aircraft maintenance intentions, however, history clearly shows that accidents do occur. It is imperative flights be routed over sparsely populated areas as regularly as possible to reduce the exposure of lives and property to a potential accident.

Commanders are required by Air Force policy to periodically review existing traffic patterns, instrument approaches, weather minima, and operating practices, and evaluate these factors in relationship to populated areas and other local situations. This requirement is a direct result and expression of Air Force policy that all AICUZ plans must include an analysis of flying and flying-related activities designed to reduce and control the effects of such operations on surrounding land areas. Noise is generated from aircraft both in the air and on the ground. In an effort to reduce the noise effects of MacDill AFB operations on surrounding communities, the installation routes flight tracks to avoid populated areas.

Preparation and presentation of this MacDill AFB AICUZ Study is one phase of continuing Air Force participation in the local planning process. It is recognized that as the local community updates its land use plans, the Air Force must be ready to provide additional input when needed. The AICUZ program is an ongoing activity even after compatible development plans are adopted and implemented. MacDill AFB personnel continually participate in discussions with the local community about zoning and other land use matters as they may affect, or may be affected by the Base. Base personnel are also available to provide information, criteria, and guidelines to state, regional, and local planning bodies, civic associations, and similar groups to assist in land use planning and strategies. Copies of the AICUZ Study, including maps, will be provided to regional planning departments, zoning administrators and made available to the public.

Participation in land-use planning can take many forms. The simplest of these forms is a straightforward and continuous two-way dialogue and sharing of information. Through this communication process, the base is kept informed of applications for development or changes

in land use within the noise impact and safety areas, as well as other nearby parcels. The base coordinates closely with the surrounding communities and counties on these zoning and land-use issues. The installation commander or base designee provides comments and recommendations, as needed, to local and state planning and zoning officials about compatibility of proposed land use changes with the AICUZ, JLUS, as well as any adverse impact they may have on the military mission in accordance with Air Force regulation and Florida Statute 163.3175.

6.3 LOCAL COMMUNITY RESPONSIBILITIES

Residents in the area neighboring MacDill AFB and Base personnel have a long history of working together for mutual benefit of the area around the airfield. Local jurisdictions have taken a proactive approach in incorporating land use regulations into local plans and ordinances which consider the MacDill AFB flying operations when considering development proposals. The recently completed JLUS includes specific recommendations related to the City of Tampa Code Revisions and FLUE, which support the findings and recommendations of the AICUZ Study. Adoption of the following recommendations, many consistent with the JLUS, will strengthen this relationship, increase the health and safety of the public, and help protect the integrity of the installation's flying mission:

- Continue to incorporate AICUZ policies and guidelines into the comprehensive plans of the City of Tampa and Hillsborough County. Use overlay maps of the AICUZ noise contours and Air Force Land Use Compatibility Guidelines to evaluate existing and future land use proposals.
- Modify the FLUE and applicable zoning ordinances to reduce allowable densities in the CZ and APZs to support the compatible land uses outlined in this study.
- Require Real Estate disclosure of noise impact to all prospective property buyers of properties exposed to noise levels greater than DNL 65 dB.
- Modify the FLUE and applicable zoning ordinances to include new zoning categories for the MacDill AFB AICUZ influence area modeled after the M-AP (Municipal Airport) category for Tampa International Airport.
- Modify building codes to ensure new construction within the AICUZ area has the recommended noise level reductions incorporated into its design and construction.
- Implement height and obstruction ordinances which reflect current Air Force and FAR Part 77 requirements.
- Include MacDill AFB and Hillsborough County Aviation Authority in the Development Review committee. This can be accomplished through the inclusion of a non-voting liaison from MacDill AFB, appointed by the installation commander, to the development review committee to facilitate exchanges of information with local community planners about new projects near the base within the AICUZ area of influence.
- Continue to inform MacDill AFB of planning and zoning actions that have the potential of affecting Base operations.

Appendix A

THE AICUZ CONCEPT, PROGRAM, METHOD, AND POLICIES

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THE AICUZ CONCEPT, PROGRAM, METHOD, AND POLICIES

A.1 Concept

Federal legislation, national sentiment, and other external forces, which directly affect the Air Force mission, serve greatly to increase the role of the Air Force in environmental and planning issues. Problems of airfield encroachment from incompatible land uses surrounding installations, as well as air and water pollution and socioeconomic impact, require continued and intensified Air Force involvement. The nature of these problems dictates direct Air Force participation in comprehensive community and land use planning. Effective, coordinated planning that bridges the gap between the federal government and the community requires establishment of good working relationships with local citizens, local planning officials, and state and federal officials. This depends on creating an atmosphere of mutual trust and helpfulness. The AICUZ concept has been developed in an effort to:

- protect local citizens from noise exposure and accident potential associated with flying activities; and
- prevent degradation of the capability of the Air Force to achieve its mission by promoting compatible land use planning.

The land use guidelines developed herein are a composite of a number of other land use compatibility studies that have been refined to fit the MacDill AFB aviation environment.

A.2 Program

Installation commanders establish and maintain active programs to promote the maximum feasible land use compatibility between air installations and neighboring communities. The program requires that all appropriate government bodies and citizens be fully informed whenever AICUZ or other planning matters affecting the installation are under consideration. This includes positive and continuous programs designed to:

- provide information, criteria, and guidelines to federal, state, regional, and local planning bodies, civic associations, and similar groups;
- inform such groups of the requirements of the flying activity, noise exposure, aircraft accident potential, and AICUZ plans;
- describe the noise reduction measures that are being used; and
- ensure that all reasonable, economical, and practical measures are taken to reduce or control the impact of noise-producing activities. These measures include such considerations as proper location of engine test facilities, provision of sound suppressors where necessary, and adjustment of flight patterns and/or techniques to minimize the noise impact on populated areas. This must be done without jeopardizing safety or operational effectiveness.

A.3 Method

The AICUZ consists of land areas upon which certain land uses may obstruct the airspace or otherwise be hazardous to aircraft operations, and land areas that are exposed to the health, safety, or welfare hazards of aircraft operations. The AICUZ includes:

- Accident Potential Zones (APZ) and Clear Zones (CZ) based on past Air Force aircraft accidents and installation operational data (see Appendix B);
- Noise zones (NZ) produced by the computerized DNL modeling of the noise created by aircraft flight and maintenance operations (see Section 3 of the Study); and
- The area designated by the FAA and the Air Force for purposes of height limitations in the approach and departure zones of the base (see Section 4 of the Study).

The APZ, CZ, and NZ are the basic building blocks for land use planning with AICUZ data. Compatible land uses are specified for these zones, and recommendations on building materials and standards to reduce interior noise levels inside structures are provided in Section 4.

As part of the AICUZ Program, the only real property acquisition for which the Air Force has requested and received Congressional authorization, and for which the installation and major commands request appropriation, are the areas designated as the CZ. Compatible land use controls for the airfield area of influence outside MacDill AFB's control should be accomplished through the community land use planning processes.

A.4 AICUZ Land Use Development Policies

The basis for any effective land use control system is the development of, and subsequent adherence to, policies which serve as the standard by which all land use planning and control actions are evaluated. MacDill AFB recommends the following policies be considered for incorporation into the comprehensive plans of agencies in the vicinity of the Base's area of influence:

A.4.1 Policy 1

To promote the public health, safety, peace, comfort, convenience, and general welfare of the inhabitants in the airfield area of influence, it is necessary to:

- guide, control, and regulate future growth and development;
- promote orderly and appropriate use of land;
- protect the character and stability of existing land uses;
- prevent destruction or impairment of the airfield and the public investment therein;
- enhance the quality of living in the areas affected; and
- protect the general economic welfare by restricting incompatible land use.

A.4.2 Policy 2

In furtherance of Policy 1, it is appropriate to:

- establish guidelines of land use compatibility;
- restrict or prohibit incompatible land use;
- prevent establishment of any land use which would unreasonably endanger aircraft operations and the continued use of the airfield;
- incorporate the AICUZ concept into community land use plans, modifying them when necessary; and
- adopt appropriate ordinances to implement airfield area of influence land use plans.

A.4.3 Policy 3

Within the boundaries of the CZ, certain land uses are inherently incompatible. The following land uses are not in the public interest and must be restricted or prohibited:

- uses that release into the air any substance, such as steam, dust, or smoke which would impair visibility or otherwise interfere with the operation of aircraft;
- uses that produce light emissions, either direct or indirect (reflective), which would interfere with pilot vision;
- uses that produce electrical emissions which would interfere with aircraft communication systems or navigation equipment;
- uses that attract birds or waterfowl, such as operation of sanitary landfills, maintenance or feeding stations, or growth of certain vegetation; and
- uses that provide for structures within 10 feet of aircraft approach-departure and/or transitional surfaces.

A.4.4 Policy 4

Certain noise levels of varying duration and frequency create hazards to both physical and mental health. A limited, though definite, danger to life exists in certain areas adjacent to airfields. Where these conditions are sufficiently severe, it is not consistent with public health, safety, and welfare to allow the following land uses:

- residential;
- retail business;
- office buildings;
- public buildings (schools, churches, *etc*.); and
- recreation buildings and structures.

A.4.5 Policy 5

Land areas below takeoff and final approach flight paths are exposed to significant danger of aircraft accidents. The density of development and intensity of use must be limited in such areas.

A.4.6 Policy 6

Different land uses have different sensitivities to noise. Standards of land use acceptability should be adopted, based on these noise sensitivities. In addition, a system of Noise Level Reduction guidelines (Appendix C) for new construction should be implemented to permit certain uses where they would otherwise be prohibited.

A.4.7 Policy 7

Land use planning and zoning in the airfield area of influence cannot be based solely on aircraft-generated effects. Allocation of land used within the AICUZ should be further refined by consideration of:

- physiographic factors;
- climate and hydrology;
- vegetation;
- surface geology;
- soil characteristics;
- intrinsic land use capabilities and constraints;
- existing land use;
- land ownership patterns and values;
- economic and social demands;
- cost and availability of public utilities, transportation, and community facilities; and
- other noise sources.

A.5 Basic Land Use Compatibility

Research on aircraft accident potential, noise, and land use compatibility is ongoing at a number of federal and other agencies. These and all other compatibility guidelines must not be considered inflexible standards. They are the framework within which land use compatibility questions can be addressed and resolved. In each case, full consideration must be given to local conditions such as:

- previous community experience with aircraft accidents and noise;
- local building construction and development practices;

- existing noise environment due to other urban or transportation noise sources;
- time periods of aircraft operations and land use activities;
- specific site analysis; and
- noise buffers, including topography.

These basic guidelines cannot resolve all land use compatibility questions, but they do offer a reasonable framework within which to work.

A.6 Accident Potential

Each end of Runway 04/22 at MacDill AFB has a 3,000 foot by 3,000 foot CZ and two APZs (Section 5). Accident potential on or adjacent to the runway or within a CZ is so high that the necessary land use restrictions would prohibit reasonable economic use of land. As stated previously, it is Air Force policy to request Congress to authorize and appropriate funds for the necessary real property interests in this area to prevent incompatible land uses.

Accident Potential Zone I is less critical than the CZ, but still possesses a significant risk factor. This 3,000 foot by 5,000 foot area has land use compatibility guidelines sufficiently flexible to allow reasonable economic use of the land, such as industrial/manufacturing, transportation, communication/utilities, wholesale trade, open space, recreation, and agriculture. However, uses that concentrate people are not acceptable.

Accident Potential Zone II is less critical than APZ I, but still possesses potential for accidents. Accident potential zone II, also 3,000 feet wide, is 7,000 feet long extending to 15,000 feet from the runway threshold. Acceptable uses include those of APZ I, as well as low density single family residential and those personal and business services and commercial/retail trade uses of low intensity or scale of operation. High density functions such as multistory buildings, places of assembly (theaters, churches, schools, restaurants, *etc*.), and high density office uses are not considered appropriate.

High density populations should be limited to the maximum extent possible. The optimum density recommended for residential usage (where it does not conflict with noise criteria) in APZ II is one dwelling per acre. For most nonresidential usage, buildings should be limited to one story, and the lot coverage should not exceed 20 percent.

Land use guidelines for the two APZs are based on a hazard index system that compares the relationship of accident occurrence for five areas:

- on or adjacent to the runway;
- within the CZ;
- in APZ I;
- in APZ II; and
- in all other areas within a 10 nautical mile radius of the runway.

Accident potential on or adjacent to the runway or within the CZ is so high that few uses are acceptable. The risk outside APZ I and APZ II, but within the 10 nautical mile radius area, is significant, but is acceptable if sound engineering and planning practices are followed.

Land use guidelines for APZs I and II have been developed. The main objective has been to restrict all people-intensive uses because there is greater risk in these areas. The basic guidelines aim at prevention of uses that:

- have high residential density characteristics;
- have high labor intensity;
- involve above-ground explosives, fire, toxic, corrosive, or other hazardous characteristics;
- promote population concentrations;
- involve utilities and services required for area-wide population, where disruption would have an adverse impact (telephone, gas, *etc*.);
- concentrate people who are unable to respond to emergency situations, such as children, elderly, handicapped, *etc*.; and
- pose hazards to aircraft operations.

There is no question that these guidelines are relative. Ideally, there should be no people-intensive uses in either of these APZs. The free market and private property systems prevent this where there is a demand for land development. To go beyond these guidelines, however, substantially increases risk by placing more people in areas where there may ultimately be an aircraft accident.

A.7 Noise

Nearly all studies analyzing aircraft noise and residential compatibility recommend no residential uses in noise zones above DNL 75 dB. Usually, no restrictions are recommended below noise zone DNL 65 dB. There is currently no consensus between DNL 65-74 dB. These areas may not qualify for federal mortgage insurance in residential categories according to United States Department of Housing and Urban Development (HUD) Regulation 24 CFR 51B. In many cases, HUD approval requires noise attenuation measures, the Regional Administrator's concurrence, and an Environmental Impact Statement. The United States Department of Veterans Affairs also has airfield noise and accident restrictions which apply to its home loan guarantee program. Whenever possible, residential land use should be located below DNL 65 dB according to Air Force land use recommendations. Residential buildings within the DNL 65-75 dB noise contours should contain noise level reduction in accordance with the Air Force land use compatibility guidelines in the AICUZ Study, Table 4.3.

Most industrial/manufacturing uses are compatible in the airfield area of influence. Exceptions are uses such as research or scientific activities that require lower noise levels.

Noise attenuation measures are recommended for portions of buildings devoted to office use, receiving the public, or where the normal background noise level is low.

The transportation, communications, and utilities categories have a high noise level compatibility because they generally are not people-intensive. When people use land for these purposes, the use is generally very short in duration. Where buildings are required for these uses, additional evaluation is warranted.

The commercial/retail trade and personal and business services categories are compatible without restriction up to DNL 70 dB; however, they are generally incompatible above DNL 80 dB. Between DNLs 70-79 dB, noise level reduction measures should be included in the design and construction of buildings.

The nature of most uses in the public and quasi-public services category requires a quieter environment, and attempts should be made to locate these uses below DNL 65 dB (an Air Force land use recommendation), or else provide adequate noise level reduction.

Although recreational use has often been recommended as compatible with high noise levels, recent research has resulted in a more conservative view. Above DNL 75 dB, noise becomes a factor that limits the ability to enjoy such uses. Where the requirement to hear is a function of the use (*e.g*., music shell, *etc*.), compatibility is limited. Buildings associated with golf courses and similar uses should be noise attenuated.

With the exception of forestry activities and livestock farming, uses in the resources production, extraction, and open space category are compatible almost without restrictions.

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Appendix B

CLEAR ZONES AND ACCIDENT POTENTIAL ZONES

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CLEAR ZONES AND ACCIDENT POTENTIAL ZONES

B.1 Guidelines for Accident Potential

Areas around airports are exposed to the possibility of aircraft accidents even with well-maintained aircraft and highly trained aircrews. Despite stringent maintenance requirements and countless hours of training, history makes it clear that accidents do happen.

When the AICUZ Program began, there were no current comprehensive studies on accident potential. To support the program, the Air Force completed a study of Air Force aircraft accidents that occurred between 1968 and 1972 within 10 nautical miles of airfields. The study of 369 accidents revealed that 75 percent of aircraft accidents occurred on or adjacent to the runway (1,000 feet to each side of the runway centerline) and in a corridor 3,000 feet (1,500 feet either side of the runway centerline) wide, extending from the runway threshold along the extended runway centerline for a distance of 15,000 feet. The Air Force updated these studies and this information is presented later in this section.

The CZ, APZ I, and APZ II were established based on crash patterns. The CZ starts at the end of the runway and extends outward 3,000 feet. It has the highest accident potential of the three zones. The Air Force adopted a policy of acquiring property rights to areas designated as CZs because of the high accident potential. APZ I extends from the CZ an additional 5,000 feet. It includes an area of reduced accident potential. APZ II extends from APZ I an additional 7,000 feet in an area of further reduced accident potential.

Research in accident potential conducted by the Air Force was the first significant effort in this subject area since 1952 when the President's Airport Commission published "The Airport and Its Neighbors," better known as the "Doolittle Report." The recommendations of this earlier report were influential in the formulation of the APZ concept.

The risk to people on the ground being killed or injured by aircraft accidents is small. However, an aircraft accident is a high consequence event, and when a crash does occur, the result is often catastrophic. Because of this, the Air Force does not attempt to base its safety standards on accident probabilities. Instead, the Air Force approaches this safety issue from a land use planning perspective.

B.2 Guidelines for Accident Potential

Military aircraft accidents differ from commercial air carrier and general aviation accidents because of the variety of aircraft used, the type of missions, and the number of training flights. In 1973, the Air Force performed a service-wide aircraft accident hazard study to identify land near airfields with significant accident potential. Accidents studied occurred within 10 nautical miles of airfields.

The study reviewed 369 major Air Force accidents during 1968-1972, and found that 61 percent of those accidents were related to landing operations, and 39 percent were takeoff related. It also found that 70 percent occurred in daylight, and that fighter and training aircraft accounted for 80 percent of the accidents.

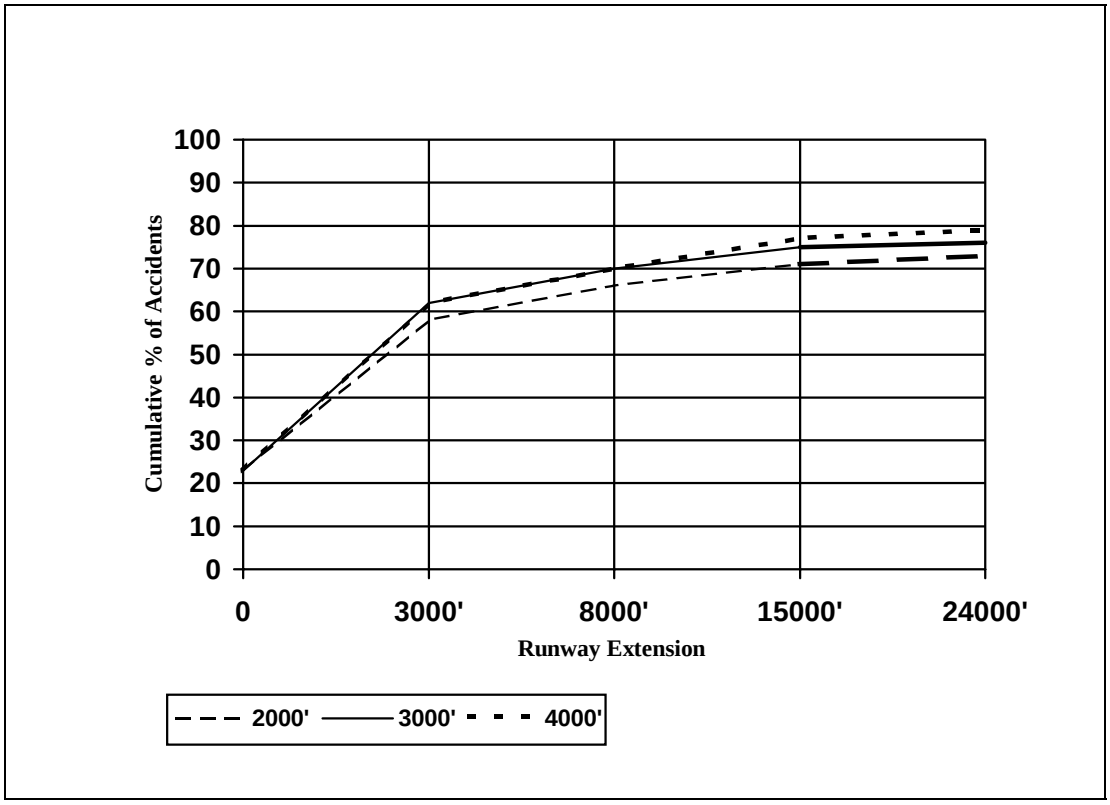
Because the purpose of the study was to identify accident hazards, the study plotted each of the 369 accidents in relation to the airfield. This plotting found that the accidents clustered along the runway and its extended centerline. To further refine this clustering, a tabulation was prepared that described the cumulative frequency of accidents as a function of distance from the runway centerline along the extended centerline. This analysis was done for widths of 2,000, 3,000, and 4,000 total feet. Table B.1 reflects the location analysis.

Table B.1 Location Analysis

	Width of Runway Extension (feet)		
Length From Both Ends of Runway (feet)	**2000**	**3000**	**4000**
Percent of Accidents			
On or Adjacent to Runway (1,000 feet to each side of runway centerline)	23	23	23
0 to 3,000	35	39	39
3,000 to 8,000	8	8	8
8,000 to 15,000	5	5	7
Cumulative Percent of Accidents			
On or Adjacent to Runway (1,000 feet to each side of runway centerline)	23	23	23
0 to 3,000	58	62	62
3,000 to 8,000	66	70	70
8,000 to 15,000	71	75	77

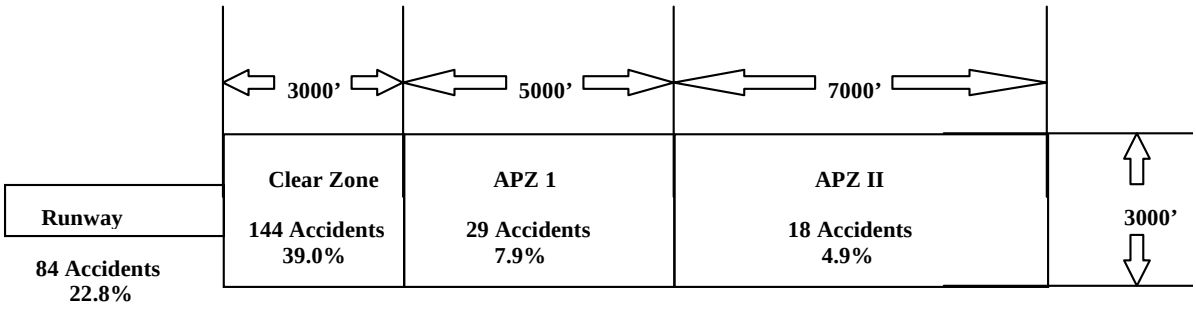
Figure B.1 indicates that the cumulative number of accidents rises rapidly from the end of the runway to 3,000 feet, rises more gradually to 8,000 feet, then continues at about the same rate of increase to 15,000 feet, where it levels off rapidly. The location analysis also indicates 3,000 feet as the optimum runway extension width and the width which includes the maximum percentage of accidents in the smallest area.

Figure B.1 Distribution of Air Force Aircraft Accidents (369 Accidents - 1968 - 1972)



Using the optimum runway extension width, 3,000 feet, and the cumulative distribution of accidents from the end of the runway, zones were established that minimized the land area included and maximized the percentage of accidents included. The zone dimensions and accident statistics for the 1968-1972 study are shown in Figure B.2.

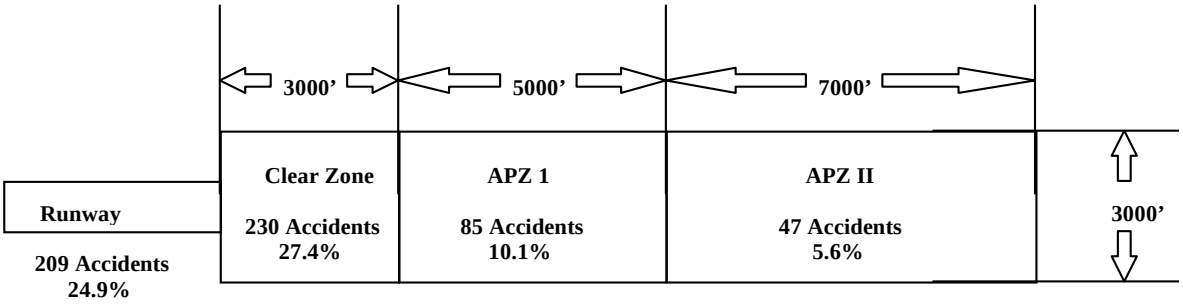
Figure B.2 Air Force Aircraft Accident Data (369 Accidents - 1968 - 1972)



Other Accidents within 10 Nautical Miles
94 Accidents -- 25.4%

The original study was updated to include accidents through September 1995. This updated study includes 838 accidents during the 1968-1995 period. Using the optimum runway extension width of 3,000 feet, the accident statistics of the updated study are shown in Figure B.3.

Figure B.3 Air Force Aircraft Accident Data
(838 Accidents - 1968 - 1995)



Other Accidents within 10 Nautical Miles
267 Accidents -- 31.9%

Using the designated zones and accident data, it is possible to calculate a ratio of percentage of accidents to percentage of area size. These ratios indicate the CZ, with the smallest area size and the highest number of accidents, has the highest ratio, followed by the runway and adjacent area, APZ I, and then APZ II. Table B.2 reflects this data.

Table B.2 Accident to Area Ratio

Ratio of Percentage of Accidents to Percentage of Area
(Air Force Accident Data 1968 - 1995)

	Area[1] (Acres)	Number[2] Accident	Accident Per Acre	Percent of Total Area	Percent of Total Accidents	Ratio:[3] % Accidents to % Area
Runway Area	487	209	1 Per 2.3 acres	0.183	24.9	136
Clear Zone	413	230	1 Per 1.8 acres	0.155	27.4	177
APZ I	689	85	1 Per 8.1 acres	0.258	10.1	39
APZ II	964	47	1 Per 20.5 acres	0.362	5.6	16
Other Area	264,053	267	1 Per 989 acres	99.042	31.9	0.3

1 Area includes land within 10 nautical miles of runway.
2 Total number of accidents is 838 (through 1995).
3 Percent total accidents divided by percent total area.

Additional accident data for 1986 through July 1995 has been analyzed. Specific location data for some of the 1986-1995 accidents were not available and these were not included in the analysis. Table B.3 compares the 1968-1985 data with the data through July 1995:

Table B.3 Additional Accident Data				
	1968-1985		1968-1995	
ZONE	Accidents	% of Total	Accidents	% of Total
On-Runway	197	27.1	209	24.9
Clear Zone	210	28.8	230	27.4
APZ I	57	7.8	85	10.1
APZ II	36	5.0	47	5.7
Other (Within 10 nautical miles)	228	31.3	267	31.9
Total	728	100.0	838	100.0

Analysis shows that the cumulative changes evident in accident location through July 1995 reconfirm the dimensions of the CZs and APZs.

B.3 Definable Debris Impact Areas

The Air Force also determined which accidents had definable debris impact areas, and in what phase of flight the accident occurred. Overall, 75 percent of the accidents had definable debris impact areas, although they varied in size by type of accident. The Air Force used weighted averages of impact areas, for accidents occurring only in the approach and departure phase, to determine the following average impact areas:

Average Impact Areas for Approach and Departure Accidents

Overall Average Impact Area	5.06 acres
Fighter, Trainer, and Misc. Aircraft	2.73 acres
Heavy Bomber and Tanker Aircraft	8.73 acres

B.4 Findings

Designation of safety zones around the airfield and restriction of incompatible land uses can reduce the public's exposure to safety hazards.

Air Force accident studies have found that aircraft accidents near Air Force installations occurred in the following patterns:

- 61% were related to landing operations.
- 39% were related to takeoff operations.
- 70% occurred in daylight.
- 80% were related to fighter and training aircraft operations.
- 25% occurred on the runway or within an area extending 1,000 feet out from each side of the runway.
- 27% occurred in an area extending from the end of the runway to 3,000 feet along the extended centerline and 3,000 feet wide, centered on the extended centerline.

- 15% occurred in an area between 3,000 and 15,000 feet along the extended runway centerline and 3,000 feet wide, centered on the extended centerline.

Air Force aircraft accident statistics found 75 percent of aircraft accidents resulted in definable impact areas. The size of the impact areas were:

- 5.06 acres overall average.
- 2.73 acres for fighters and trainers.
- 8.73 acres for heavy bombers and tankers.

Appendix C

DESCRIPTION OF THE NOISE ENVIRONMENT

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DESCRIPTION OF THE NOISE ENVIRONMENT

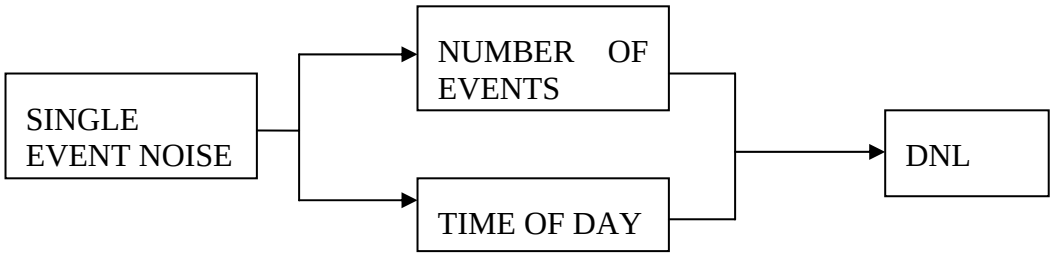
C.1 General

The noise contour methodology used herein is the Day-Night Average A-Weighted Sound Level (DNL) metric of describing the noise environment. Efforts to provide a national uniform standard for noise assessment have resulted in adoption by the Environmental Protection Agency of DNL as the standard noise descriptor. The Air Force uses the DNL descriptor in assessing the amount of aircraft noise exposure, and as a metric for community response to the various levels of exposure.

The DNL values used for planning purposes are 65, 70, 75, and 80 dB. Land use guidelines are based on the compatibility of various land uses with these noise exposure levels.

It is generally recognized that a noise environment descriptor should consider, in addition to the annoyance of a single event, the effect of repetition of such events and the time of day in which these events occur. DNL begins with a single event descriptor and adds corrections for the number of events and the time of day. Since the primary development concern is residential, nighttime events are considered more annoying than daytime events and are weighted accordingly. DNL values are computed from the single event noise descriptor, plus corrections for number of flights and time of day (Figure C-1).

Figure C-1 Day-Night Average A Weighted Sound Level (Only)



As part of the extensive data collection process, detailed information is gathered on the type of aircraft, the number, and time of day of flying operations for each flight track during a typical day. This information is used in conjunction with the single event noise descriptor to produce DNL values. These values are combined on an energy summation basis to provide single DNL values for the mix of aircraft operations at the base. Equal value points are connected to form the contour lines.

C.2 Noise Event Descriptor

The single event noise descriptor used in the DNL system is the Sound Exposure Level (SEL). The SEL measure is an integration of an "A" weighted noise level over the period of a single event such as an aircraft flyover, in dB.

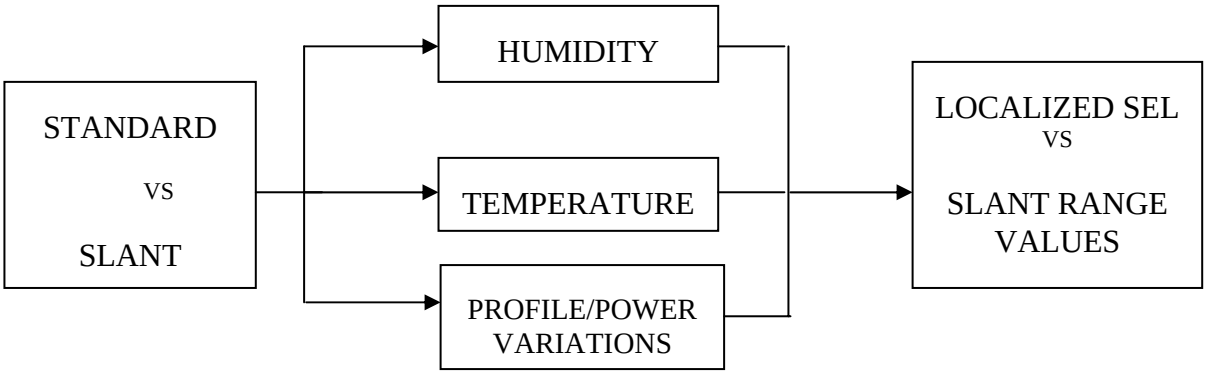
Frequency, magnitude, and duration vary according to aircraft type, engine type, and power setting. Therefore, individual aircraft noise data are collected for various types of aircraft/engines at different power settings and phases of flight. The following diagram shows the relationship of the single event noise descriptor (SEL) to the source sound energy.

SEL vs. slant range values are derived from noise measurements made according to a source noise data acquisition plan developed by Bolt, Beranek, and Newman, Inc., in conjunction with the Air Force's Armstrong Laboratory (AL) and carried out by AL. These standard day, sea level values form the basis for the individual event noise descriptors at any location and are adjusted to the location by applying appropriate corrections for temperature, humidity, and variations from standard profiles and power settings.

Ground-to-ground sound propagation characteristics are used for altitudes up to 500 feet absolute with linear transition between 500 and 700 feet and air-to-ground propagation characteristics above 700 feet.

In addition to the assessment of aircraft flight operations, the DNL system also incorporates noise resulting from engine/aircraft maintenance checks on the ground. Data concerning the orientation of the noise source, type of aircraft or engine, number of test runs on a typical day, power settings used and their duration, and use of suppression devices are collected for each ground run up or test position. This information is processed and the noise contribution added (on an energy summation basis) to the noise generated by flying operations to produce noise contours reflecting the overall noise environment with respect to aircraft air and ground operations.

Figure C-2 Sound Exposure Level



C.3 Noise Contour Production

Data describing flight track distances and turns, altitudes, airspeeds, power settings, flight track operational utilization, maintenance locations, ground run-up engine power settings, and number and duration of runs by type of aircraft/engine is assembled by each individual AFB. The data is screened by the MAJCOM and HQ AFCEE/ECC. Trained personnel process the data for input into a central computer. Flight track maps are generated for verification and approval by the base/MAJCOM. After any required changes have been incorporated, DNL contours are generated by the computer using the supplied data and standard source noise data corrected to local weather conditions. These contours are plotted and prepared for photographic reproduction. A set of these contours is provided in the body of the report.

C.4 Technical Information

Additional technical information on the DNL procedures are available in the following publications:

Community Noise Exposure Resulting from Aircraft Operations: Applications Guide for Predictive Procedure, AMRLTR-73-105, November, 1974, from National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22151.

Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with Adequate Margin of Safety, EPA Report 550/9-74-004, March, 1974, from Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

Adopted Noise Regulations for California Airports, Title 4, Register 70, No. 48-11-28-70, Subchapter 6, Noise Standards.

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