NOISE MITIGATION EVALUATION

Kendall-Tamiami Executive Airport

Prepared for
Miami-Dade Aviation Department

Prepared by
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Introduction

1.1 Introduction

In response to citizen interest located in the vicinity of the Kendall-Tamiami Executive Airport (TMB), the Miami-Dade Aviation Department (MDAD) has sponsored this study to identify ways to reduce noise exposure from aircraft operations on the communities near the airport. MDAD Noise Abatement Division has in the past recommended measures that reduce noise exposure for areas surrounding the Miami International and Opa-locka Airports, both owned by Miami-Dade County.

The study includes the roles and responsibilities for the entities involved with implementing noise mitigation measures, documentation of existing noise exposure, an analysis of historic noise complaint data, a review of 24 potential noise mitigation measures, and a strategy for implementing the recommended measures.

A study kick-off meeting was held with the Kendall-Tamiami Airport Citizens Advisory Committee on the evening of March 25, 2009 at the Hammocks Main Clubhouse. The meeting was an open forum to discuss the concerns of the residents and explain the study process. The concerns that were brought forward at the meeting, as well as the requests and questions have been considered and responded to in this study.

In conducting the noise mitigation analysis, aircraft operations and fleet mixes for 2008 were used to consider each noise abatement alternative. A base case was developed which represented the noise exposure surrounding TMB without any changes. Noise mitigation measures were then compared to this base to understand the potential reductions in noise exposure that would result.

A number of noise metrics have been used in this study in order to capture, to the greatest extent possible, the best measures to be recommended for implementation. The implementation process will include the corporative efforts of MDAD, the Federal Aviation Administration, pilots, flight instructors, and citizens.

SECTION 2
Roles and Responsibilities

2.1 Introduction

The means by which aircraft noise is controlled does not lie with one individual, government agency, or local community. Instead, various entities come into play during the preparation of an aircraft noise mitigation program.

The primary entities involved in aircraft noise issues are:

- Federal Government
- Airport Proprietors
- Local and State Governments
- Aircraft Operators
- Residents and Prospective Residents

The following identifies specifics related to each of the entities involved.

The Federal Aviation Administration (FAA) regulates airspace and the safe and efficient use of the national air transportation system. The FAA's 1976 Aviation Noise Abatement Policy described the FAA's role in aviation noise by setting the noise level requirements for aircraft, by providing funding for noise compatibility planning, and by managing the air traffic control and airspace system.

Airport Proprietors plan and implement actions designed to reduce the adverse effects of noise on residents of surrounding areas including: improvements in airport design, noise abatement flight and ground procedures, and land acquisition.

Local and State governments plan the land uses around airports in a manner that should be compatible with airport and aircraft operations.

Aircraft Operators contribute by flying quieter aircraft, using industry recommended noise abatement procedures, and following the airport's published noise abatement procedures. It should be noted that the pilot is in command has the sole responsibility for

the safe operation of his or her aircraft. Should conditions occur (weather for example) where following noise abatement procedures could create an unsafe condition, the pilot would avoid the use of the noise abatement procedure.

Aviation system users pay for aviation system costs including the costs associated with mitigating the adverse impacts of noise. Commercial airline passengers, air cargo operators, general aviation pilots, corporate aviation and flight schools finance airport development, and the cost of noise reducing measures.

Current residents should seek to learn what can be done to minimize noise effects, recognize that everybody responds to noise differently and realize that reducing noise levels may not fully eliminate annoyance. Prospective residents should be aware of the potential effects of aircraft noise on the future quality of life and act accordingly.

2.2 Regulatory Framework

Airports operate in a highly regulated environment. TMB is designated as a reliever airport in the National Plan of Integrated Airport Systems (NPIAS). Inclusion in the NPIAS indicates that an airport is "significant to national air transportation and therefore, eligible to receive grants under the Federal Aviation Administration Airport Improvement Program (AIP)." Airports like TMB that receive federal grants to fund planning studies, development, or other eligible projects are contractually obligated to comply with federal grant assurances. These assurances require airports to comply with federal guidelines and standards and remain available to support intrastate commerce. Key assurances include:

> 5b. Preserving rights and powers
>
> An Airport Sponsor "will not sell, lease, encumber, or otherwise transfer or dispose of its title or other interests in the property…without approval by the Secretary"
>
> 19a. Operation and Maintenance
>
> "The Airport… shall be operated at all times in a safe and serviceable condition"
>
> "It will not cause or permit any activity or action thereon which would interfere with its use for Airport Purposes."
>
> 22. Economic Nondiscrimination
>
> a. "It will make the airport available…for public use on reasonable terms without unjust discrimination to all types, kinds and classes of aeronautical activities."

b. The sponsor is required to ensure that airport businesses provide "services on a reasonable basis to all users…charge reasonable, and not unjustly discriminatory, prices."

Federal law also sets aircraft noise standards, prescribes operating rules, establishes the noise compatibility planning processes, and limits the airport proprietor's ability to restrict aircraft operations. State law sets forth compatible planning guidelines, while local noise ordinances set noise standards and also provide for compatible land use planning.

It should be noted that aircraft in flight are regulated under Federal law and that Federal law preempts state and local regulations.

2.3 Aircraft Noise Regulations

A series of aircraft-related noise regulations have been established by the Federal government over the past 50 years. The following summarize these measures.

Federal Aviation Regulation (FAR) Part 36 – Noise Standards: Aircraft Type and Airworthiness Certification was adopted in 1960 and prescribes noise standards for issuance of new aircraft type certifications. Aircraft were certified as Stage 1, Stage 2, or Stage 3 based on their noise level, with Stage 3 being the quietest.

FAR Part 91- General Operating and Flight Rules addresses all aspects of aircraft operation including the establishment of airspace classifications and operating conditions.

The United States Department of Transportation Aviation Noise Abatement Policy was adopted in 1976. The policy set forth noise abatement authorities and responsibilities of the Federal Government, airport proprietors, state and local governments, air carriers, cargo shippers, airport area residents and prospective residents. In terms of noise abatement, the policy identifies that the FAA's role is primarily to regulate noise at its source (the aircraft and engines), in addition to supporting local efforts to develop noise abatement programs.

The Aviation Safety and Noise Abatement Act of 1979 further strengthened FAA's supporting role in noise compatibility planning by identifying that its stated purpose is to "provide assistance to airport operators to prepare and carry out compatibility programs." The Act also established funding for noise compatibility planning and requirements by which airport operators can apply for such funding. It should be noted that the Act does not require airports to develop a noise compatibility program. It is a voluntary program for airport sponsors to implement when conditions warrant.

The Airport Noise and Capacity Act of 1990 established a method to review noise, and airport use or access restrictions imposed by airport proprietors. The Act required the phase out of noise Stage 2 aircraft over 75,000 lbs. by December 31, 1999. The Act

applies to all local noise restrictions that are proposed after October 1990, and grandfathered all aircraft noise and access restrictions that existed prior to November 1990. It also limited the ability to establish any new restrictions and established a process for proposed aircraft noise and access restrictions (FAR Part 161).

FAR Part 150 - Airport Noise Compatibility Planning is the adopted regulation by the FAA for implementing the Aviation Safety and Noise Abatement Act of 1979. Adopted in 1983, Part 150 includes noise and land use compatibility guidelines with respect to uses that are compatible or incompatible with the levels of aircraft noise exposure. Part 150 studies are prepared for individual airports and result in the development of a noise mitigation program and implementation plan.

FAR Part 161 -Notice And Approval Of Airport Noise And Access Restrictions established a stringent review and approval process for implementing use or access restrictions by airport proprietors. The Part 161 process is only implemented when significant noise impacts are occurring and all other noise reduction strategies have been implemented. While nearly 20 years has passed since the establishment of this provision, only one Part 161 study has currently been approved in the United States.

SECTION 3
Noise Exposure

3.1 Introduction

This section includes the existing noise exposure conditions surrounding TMB. The existing condition is established not only to identify the existing noise exposure, but to provide a basis for determining the potential benefits of noise abatement measures.

3.2 Project Study Area

TMB, which is classified as a reliever airport for Miami International Airport (MIA), is located approximately 13 miles southwest of the City of Miami. The Airport has three existing runways available for use designated as 9L-27R (5,003 feet in length), 9R-27L (5,002 feet) and 13-31 (4,001 feet).

Airport property is generally defined by four roads along the property line: Southwest 120th Street to the north, Southwest 137th Avenue to the east, Southwest 136th Street to the south, and Southwest 157th Avenue to the west. In addition, the Airport owns property on the west side of Southwest 157th Avenue. The project study area includes the residential neighborhoods to the north of the Airport, the vacant land to the west, the mixed commercial and limited residential areas to the east, and a mixture of commercial, industrial, and residential uses to the south.

3.3 Noise Fundamentals

Sound is a complex vibration transmitted through the air which moves outward from its point of origin in waves just as ripples move outward from the point at which a pebble enters a pond. Noise is generally defined as any unwanted sound. In the case of sound of aircraft arriving and departing an airport, the aircraft sound could be unwanted and intrusive enough to be considered noise.

Sound can be technically described in terms of its sound pressure (amplitude). Amplitude is a direct measure of the magnitude, or loudness, of a sound without consideration for other factors that may influence its perception. The ranges of sound pressures that occur in the environment are expressed on a logarithmic scale. The standard unit of measurement of sound is the decibel (dB). A sound pressure level in dB describes the pressure of a sound relative to a reference pressure. This reference pressure is a sound

that approximates the weakest sound that can be heard by a person with very good hearing in an extremely quiet room. If a scale in dB is established with zero as the threshold of hearing for the weakest sound, then the strongest sound within the range of the human ear would be around 130 dB.

While an increase of 10 dB represents a 10-fold increase in sound energy, it is perceived by the human ear as doubling the loudness. For example, a single noise event of 70 dB is perceived to be twice as loud as a 60 dB noise event, and an 80 dB noise event is four times louder than a 60 dB. Again, using 60 dB as the reference noise level, 50 dB is perceived by the listener to be half as loud.

The description, analysis, and reporting of community sound levels is made difficult by the complexity of human response to sound and the myriad of sound-rating scales and metrics that have been developed for describing acoustic effects. Various rating scales have been devised to approximate the human subjective assessment to the "loudness" or "noisiness" of a sound. Noise metrics have been developed to account for additional parameters, such as duration and cumulative effect of multiple events.

Noise metrics can be categorized as single-event metrics and cumulative metrics. Single-event metrics describe the noise from individual events, such as an aircraft flyover. Cumulative metrics describe the noise in terms of the total noise exposure throughout the day.

Single Event Metrics

Maximum Noise Level – The highest noise level reached during a noise event is called the "Maximum Noise Level," or Lmax. For example, as an aircraft approaches, the sound of the aircraft begins to rise above ambient noise levels. The closer the aircraft gets, the louder the sound until the aircraft is at its closest point. As the aircraft passes, the noise level decreases until the sound settles to ambient levels. It is this metric to which people generally respond to when an aircraft flyover occurs. An aircraft flyover is graphically illustrated at the top of Exhibit 3-1.

Sound Exposure Level (SEL) – Another metric that is used for aircraft flyovers is the Sound Exposure Level (SEL) metric. It is computed from dBA sound levels. Referring again to the top of Exhibit 3-1, the shaded area, or the area within 10 dB of the maximum noise level, is the area from which the SEL is computed. The SEL value is the integration of all the acoustic energy contained within the event into a time period of 1 second.

This metric takes into account the maximum noise level of the event and the duration of the event. For aircraft flyovers, the SEL value is typically about 10 dBA higher than the maximum noise level. Single event metrics are a convenient method for describing noise from individual aircraft events. This metric is useful in that airport noise models contain aircraft noise curve data based upon the SEL metric.

Cumulative Metrics

Cumulative noise metrics have been developed to assess community response to noise. They are useful because these scales attempt to include the loudness of the noise, the duration of the noise, the total number of noise events, and the time of day these events occur into one single number rating scale.

Equivalent Noise Level (Leq) – Leq is the sound level corresponding to a steady-state, A-weighted sound level containing the same total energy as a time-varying signal over a given sample period. Leq is the "energy" average noise level during the time period of the sample. It is based on the observation that the potential for a noise to impact people is dependent on the total acoustical energy content of the noise. It is the energy sum of all the sound that occurs during that time period. This is graphically illustrated in the middle graph of Exhibit 3-1. Leq can be measured for any time period, but is typically measured for 15 minutes, 1 hour, or 24 hours.

Day-Night Average Sound Level (DNL) – The DNL index is a 24-hour, time-weighted energy average noise level based on the A-weighted decibel. It is a measure of the overall noise experienced during an entire day. The time-weighting refers to the fact that noise occurring during certain sensitive time periods is penalized for occurring at these times. In calculating DNL, the Leq level is used as the hourly equivalent sound level. The hourly noise figures are summed for the 15 hours of daytime (7 a.m. to 10 p.m.) and added to the sum of Leq hourly figures for the remaining 9 hours of nighttime with a 10 dB penalty added to the nighttime figures (to reflect added human sensitivity to nighttime noise). The result is the DNL noise level or a 24 hour summary of noise levels for a given location. When aircraft noise contours are calculated, however, the noise levels are solely due to the aircraft and do not include background or ambient noise levels.

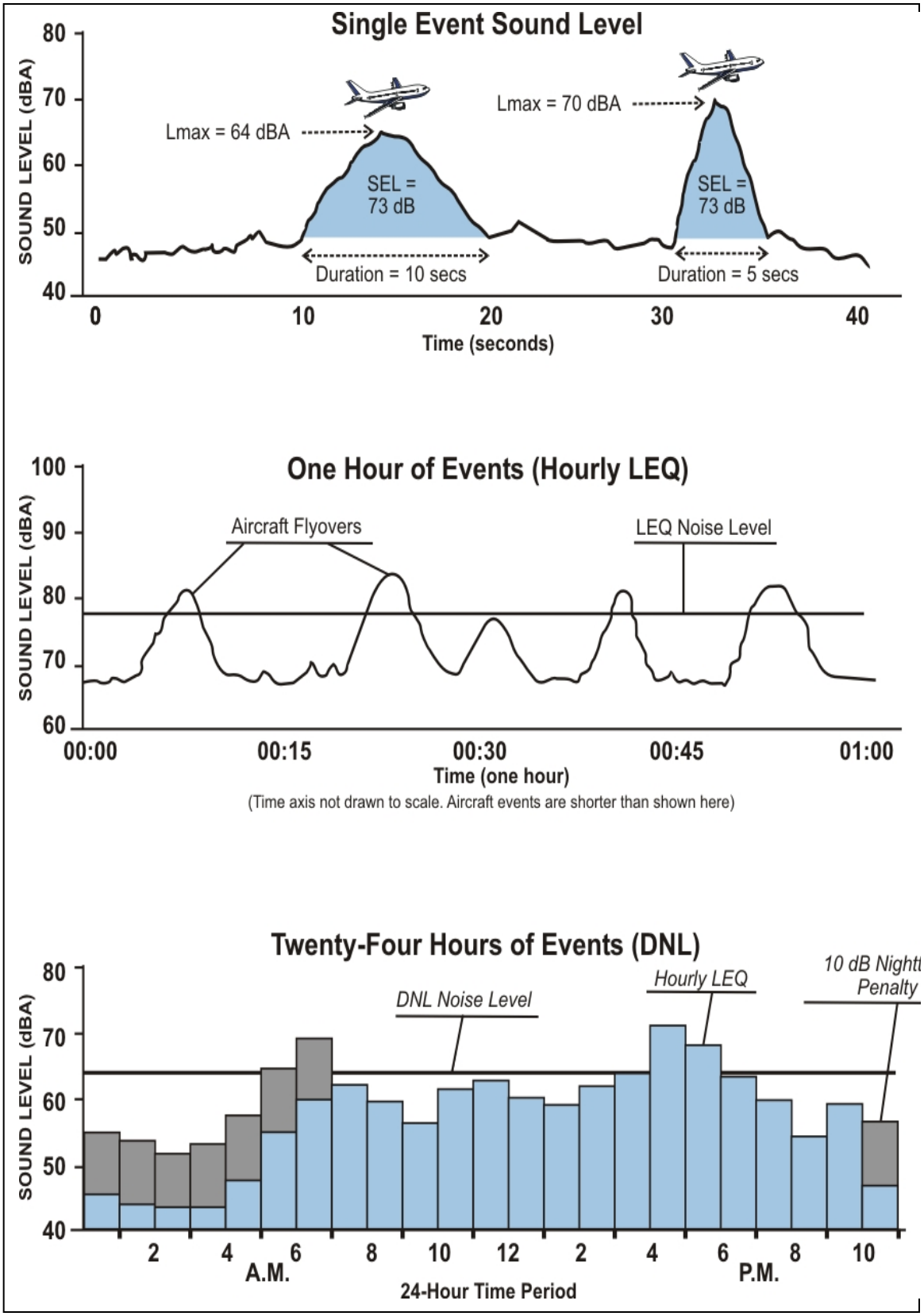
The FAA specifies DNL for airport noise assessment, and the EPA specifies DNL for community noise and for airport noise assessments. DNL is graphically illustrated in the bottom of **Exhibit 3-1**. The important concepts of DNL are as follows:

- Time of Day Weighting - The 10 dB nighttime penalty accounts for greater sensitivity to noise and/or lower background levels at night.

- Energy Averaging - The energy mean is the best general single number description of sound level that varies with time, in terms of average community response.

DNL is currently the preferred measure of cumulative noise exposure by the agencies represented on the Federal Interagency Committee on Aviation Noise (FICAN) including the FAA, EPA, NASA, Department of Defense and the National Parks Service.

EXHIBIT 3-1
NOISE METRICS



3.4 Noise Model

The standard methodology for analyzing the noise conditions at airports involves the use of an aircraft noise model. The FAA has approved the Integrated Noise Model (INM) for use in noise studies. The INM was developed by the Transportation Systems Center of the United States Department of Transportation (USDOT) and is undergoing continuous refinement. Version 7.0a of the INM, the most current version of the model, was used for the noise analysis described in this study.

The INM works by defining a network of grid points at ground level around an airport. It then selects the shortest distance from each grid point to each flight track and computes the noise exposure generated by each aircraft operation, along each flight track. Corrections are applied for atmospheric acoustical attenuation, acoustical shielding of the aircraft engines by the aircraft itself, and aircraft speed variations. The noise exposure levels for each aircraft are then summed at each grid location. The cumulative noise exposure levels at all grid points are then used to develop noise exposure contours for selected values.

In addition to the mathematical procedures defined in the model, the INM has another very important element. There is a database containing tables correlating noise level, thrust settings, and distance for most of the civilian aircraft, and many common military aircraft, operating in the United States. This database is often referred to as the noise power distance curve data and has been developed under FAA guidance based on thousands of actual noise measurements in controlled settings for each aircraft type. The database also includes performance data for each aircraft type. This data allows the model to compute airport-specific flight profiles (rates of climb and descent) for each aircraft type providing an accurate representation of actual procedures.

In order to model the noise exposure around an airport, the INM uses a series of input factors. Some of these factors are included in the database for the model (such as engine noise levels, thrust settings, aircraft profiles and aircraft speeds) and others are airport-specific and need to be determined for each condition analyzed.

3.5 Airport Operations

The 2008 annual aircraft operations by major operational category are identified in **Table 3-1.**

TABLE 3-1
2008 AIRCRAFT OPERATIONS

Large Jets	General Aviation	Military	Helicopter	Total
36	260,602	63	55,405	316,106

Source: MDAD

In 2008, 316,106 aircraft operations occurred, which is an average of 866 per day. Aircraft operations can be further classified as local or itinerant. An itinerant operation is defined as an aircraft take-off where the aircraft leaves the airport vicinity and lands at another airport, or an aircraft landing where the aircraft has arrived from another airport. Local operations are most often associated with aircraft conducting touch and go training operations at the airport. A touch and go operation occurs when an aircraft lands on a runway, travels down the runway and takes off from the runway without stopping. The aircraft then climbs and enters the pattern, circles around and lands again on the runway. This pattern often continues for several cycles. Helicopters also conduct training at TMB which can be classified as a local operation. The helicopter training pattern is similar to an aircraft touch and go operation with the exception that the helicopters do not touch down on the ground; rather they often follow a low altitude approach over a specific area (often a designated helipad). The number of itinerant and local operations that occurred in 2008 is presented in **Table 3-2**. A detailed breakdown of aircraft operations and fleet mix for itinerant, local, and helicopter operations is included in **Appendix B**.

TABLE 3-2
2008 ITINERANT AND LOCAL AIRCRAFT OPERATIONS

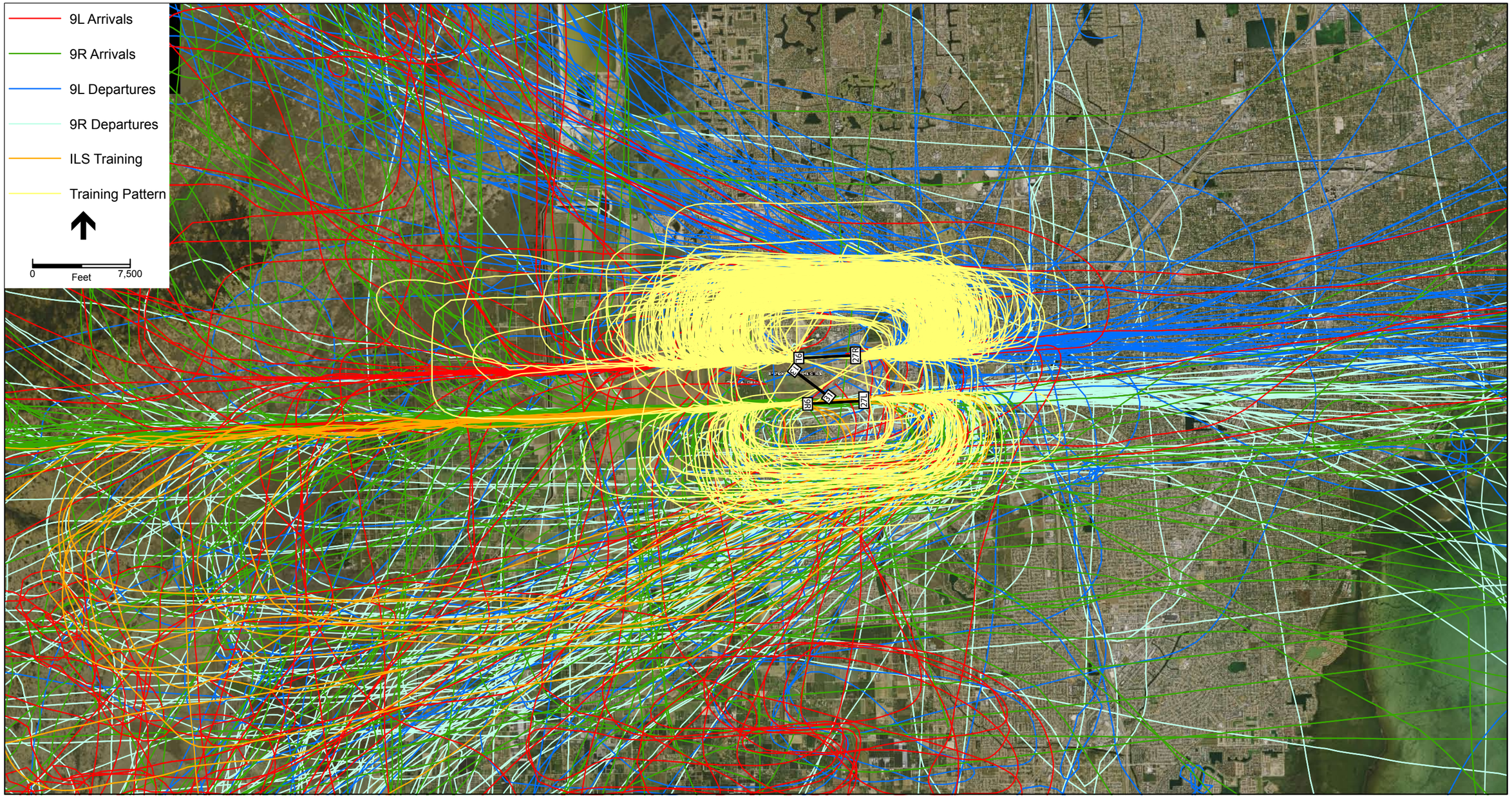
Itinerant Operations	Local Operations	Total
149,775	166,331	316,106

3.6 Flight Corridors

The location of flight corridors is an important factor in determining the geographic distribution of noise contours on the ground. Using MDAD's Aircraft Noise and Operations Monitoring System (ANOMS), flight corridors utilized by arriving and departing aircraft in all flow conditions were reviewed and a series of flight corridors (flight tracks) were established for each condition. Sample radar tracks, obtained over a five day period, two days in east flow shown on **Exhibit 3-2** and three days in west flow shown on **Exhibit 3-3**. The radar tracks have been color coded to help identify the type of operation. The colors correspond to the runway that the aircraft was operating on. In addition, the touch and go training tracks are shown in yellow while the ILS training tracks are shown in orange. Using radar track data, representative flight tracks were established within the INM. The INM flight tracks and use percentages for east flow, west flow and helicopter operations are included in **Appendix B**.

3.7 Runway Use

Overall runway use is presented in **Table 3-3**. As indicated, Runway 9R-27L is the most used runway at TMB handling just over 50% of the overall aircraft operations and is the primary runway used by jet aircraft. There are a number of reasons why this runway is the most used at TMB: first, the Instrument Landing System (ILS) is located on this



SOURCE: ESA Airports; INM 7.0a; TNIP; GlobeXplorer (2009-01-01)
NOTE: Flight tracks depicted represent two average days in east flow.

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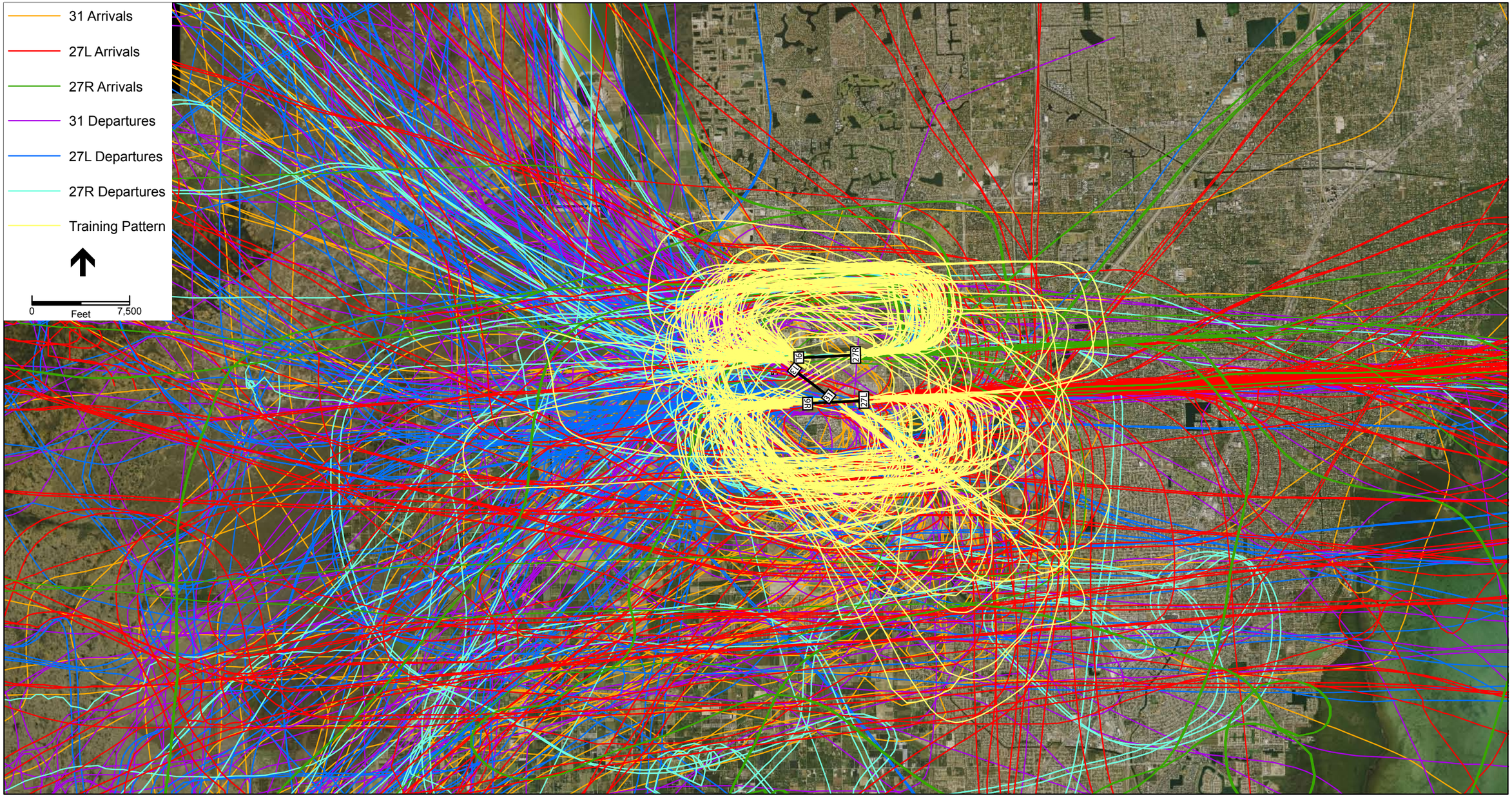
Exhibit 3-2

Radar Flight Tracks - East Flow



SOURCE: ESA Airports; INM 7.0a; TNIP; GlobeXplorer (2009-01-01)
NOTE: Flight tracks depicted represent three average days in west flow.

Kendall-Tamiami Airport Noise Mitigation Study.207429.02

Exhibit 3-3

Radar Flight Tracks - West Flow

runway which requires its use for all instrument approaches; second, the majority of the businesses located at TMB are located on the south side of the airport and third, it receives a vast majority of nighttime activity (when the air traffic control tower and Runway 9L-27R are closed).

For touch and go flight training, Runway 9L-27R handles approximately 66% of these types of operations. The reason why a higher percentage of the touch and go training occurs on Runway 9L-27R is to keep these smaller aircraft separated from the complex mix of aircraft and busier corporate facilities attracting other types of aircraft located on the south side of the airport.

TABLE 3-3
2008 OVERALL RUNWAY USE

Runway	Use Percent	Total Runway Use Percent
9L	31.9	38
27R	6.1	
9R	42	53.5
27L	11.5	
13	5.2	8.5
31	3.3	
Total	100	100

Source: MDAD

3.8 Noise Contours and Land Use Guidelines

Land Use Guidelines

The FAA has developed land use guidelines that relate the compatibility of aircraft noise exposure to areas surrounding airports. These guidelines, shown in **Table 3-4**, identify land use activities that are acceptable within the 65, 70, and 75 DNL contours. FAA guidance indicates that all land uses below the 65 DNL are considered to be compatible with the effects of aircraft noise and therefore will not fund mitigation programs below 65 DNL. It is important to note that the FAA does encourage local land use planning agencies to adopt a lower compatibility level that is more stringent than FAA guidelines.

While the 65 DNL contour is used to determine noise exposure significance, MDAD and the FAA recognize that noise does not stop at the 65 DNL and that people located in close proximity to approach, departure, and training operations will be exposed to levels of noise that some consider annoying. As part of this study, analysis has been prepared for areas beyond the 65 DNL contour, additional noise metrics have been used, and the noise contour exhibits show the DNL contours down to the 60 DNL contour.

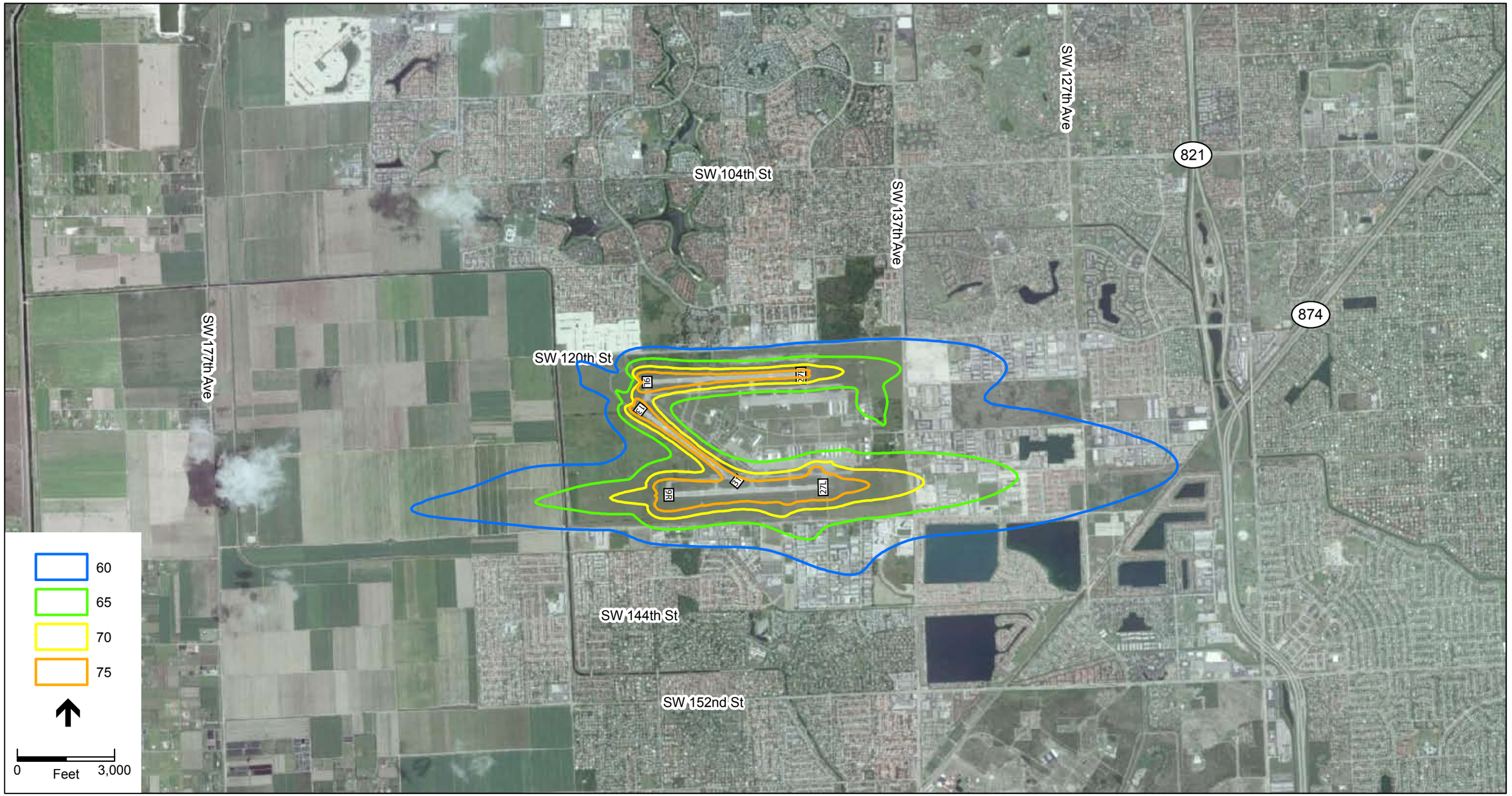
2008 DNL Contours

The 2008 60, 65, 70, and 75 DNL contours for TMB are presented on **Exhibit 3-4**. The 2008 65 DNL contour extends approximately 3,000 feet east of the Airport property boundary along the extended centerline of Runway 9R-27L. The 65 DNL noise contour also extends just off Airport property south of Southwest 136th Street along the extended centerline of Runway 13-31. The larger contour to the east is a result of the Airport primarily operating in east flow (the noise levels from the aircraft operating at TMB are typically louder on departure than on arrival). The 70 and 75 DNL contours remain on Airport property. As shown on **Exhibit 3-4**, the DNL noise contours are the largest off the ends of Runway 9R-27L since it is used by more aircraft than any other runway, used by most of the jet activity, and used almost exclusively during nighttime hours.

While areas north of the airport receive more training overflights, the areas to the south, southeast, and southwest are exposed to the greatest amount of noise. The reason for this is due to the sound energy emitted by each particular aircraft type. Often, the aircraft conducting the repetitive training operations are the smaller single engine piston aircraft. While these aircraft do generate noise levels that are annoying to a percentage of the population, the jet aircraft generate much greater amounts of noise.

2018 DNL Contours

By 2018, annual aircraft operations at TMB are forecast by the FAA to increase to 377,111. In addition, a proposed 1,000 foot extension to the west end of Runway 9R-27L is anticipated to be in place. The 2018 60, 65, 70, and 75 DNL noise contours are presented on **Exhibit 3-5**. As shown on the exhibit, the 2018 DNL noise contours are larger than the 2008 noise contours which is a result of the increase in aircraft operations.



SOURCE: ESA Airports, INM 7.0a, GlobeXplorer (05-08-2007)

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Exhibit 3-4
2008 DNL Contours

SW 104th St
SW 127th Ave
SW 137th Ave
SW 177th Ave
821
874
SW 120th St
Future 1,000'
Runway Extension
9L
27R
9R
27L
SW 144th St
SW 152nd St
60
65
70
75
0
Feet
3,000

SOURCE: ESA Airports, INM 7.0a, GlobeXplorer (05-08-2007)

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Exhibit 3-5
2018 DNL Contours

TABLE 3-4
LAND USE COMPATIBILITY WITH YEARLY DAY-NIGHT AVERAGE SOUND LEVELS

Land Use	Yearly Day-Night Noise Level (DNL) in decibels					
	Below 65	65-70	70-75	75-80	80-85	Over 85
RESIDENTIAL						
Residential, other than mobile homes and transient lodgings	Y	N(1)	N(1)	N	N	N
Mobile home parks	Y	N	N	N	N	N
Transient lodgings	Y	N(1)	N(1)	N(1)	N	N
PUBLIC USE						
Schools	Y	N(1)	N(1)	N	N	N
Hospitals and nursing homes	Y	25	30	N	N	N
Churches, auditoriums and concert halls	Y	25	30	N	N	N
Government services	Y	Y	25	30	N	N
Transportation	Y	Y	Y(2)	Y(3)	Y(4)	Y(4)
Parking	Y	Y	Y(2)	Y(3)	Y(4)	N
COMMERCIAL USE						
Offices, business and professional	Y	Y	25	30	N	N
Wholesale and retail - building materials, hardware and farm equipment	Y	Y	Y(2)	Y(3)	Y(4)	N
Retail trade - general	Y	Y	25	30	N	N
Utilities	Y	Y	Y(2)	Y(3)	Y(4)	N
Communication	Y	Y	25	30	N	N
MANUFACTURING AND PRODUCTION						
Manufacturing, general	Y	Y	Y(2)	Y(3)	Y(4)	N
Photographic and optical	Y	Y	25	30	N	N
Agriculture (except livestock) and forestry	Y	Y(6)	Y(7)	Y(8)	Y(8)	Y(8)
Livestock farming and breeding	Y	Y(6)	Y(7)	N	N	N
Mining and fishing, resource production and extraction	Y	Y	Y	Y	Y	Y
RECREATIONAL						
Outdoor sports arenas and spectator sports	Y	Y(5)	Y(5)	N	N	N
Outdoor music shells, amphitheaters	Y	N	N	N	N	N
Nature exhibits and zoos	Y	Y	N	N	N	N
Amusements, parks, resorts and camps	Y	Y	Y	N	N	N
Golf courses, riding stables and water recreation	Y	Y	25	30	N	N

Numbers in parenthesis refer to notes.

* The designations contained in this table do not constitute a Federal determination that any use of land covered by the program is acceptable or unacceptable under Federal, State or local law. The responsibility for determining the acceptable and permissible land uses and the relationship between specific properties and specific noise contours rests with the local authorities. FAA determinations under Part 150 are not intended to substitute federally determined land uses for those determined to be appropriate by local authorities in response to locally determined needs and values in achieving noise compatible land uses.

Key to Table 1

SLUCM	Standard Land Use Coding Manual.
Y(Yes)	Land Use and related structures compatible without restrictions.
N(No)	Land Use and related structures are not compatible and should be prohibited.
NLR	Noise Level Reduction (outdoor to indoor) to be achieved through incorporation of noise attenuation into the design and construction of the structure.
25, 30 or 35	Land Use and related structures generally compatible; measures to achieve NLR of 25, 30 or 35 dB must be incorporated into design and construction of structure.

Notes:

(1) Where the community determines that residential or school uses must be allowed, measures to achieve outdoor to indoor NLR of at least 25 dB to 30 dB should be incorporated into building codes and be considered in individual approvals. Normal residential construction can be expected to provide a NLR of 20 dB, thus, the reduction requirements are often stated as 5, 10, or 15 dB over standard construction and normally assume mechanical ventilation and closed windows year round. However, the use of NLR criteria will not eliminate outdoor noise problems.

(2) Measures to achieve NLR of 25 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where normal noise level is low.

(3) Measures to achieve NLR of 30 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where normal noise level is low.

(4) Measures to achieve NLR of 35 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where normal noise level is low.

(5) Land use compatible provided that special sound reinforcement systems are installed.

(6) Residential buildings require an NLR of 25 dB.

(7) Residential buildings require an NLR of 30 dB.

(8) Residential buildings not permitted.

Source: FAA

3.9 Noise Complaints

Citizens in the vicinity of TMB who are concerned with aircraft noise have the ability to call and register their complaints with MDAD. These complaints are maintained in log by MDAD. **Table 3-5** includes the number of complaints received per year since 2001.

TABLE 3-5
ANNUAL NOISE COMPLAINTS

Year	Complaints
2001	1
2002	0
2003	4
2004	0
2005	6
2006	11
2007	22
2008	1,025
2009 YTD	120

Source: MDAD

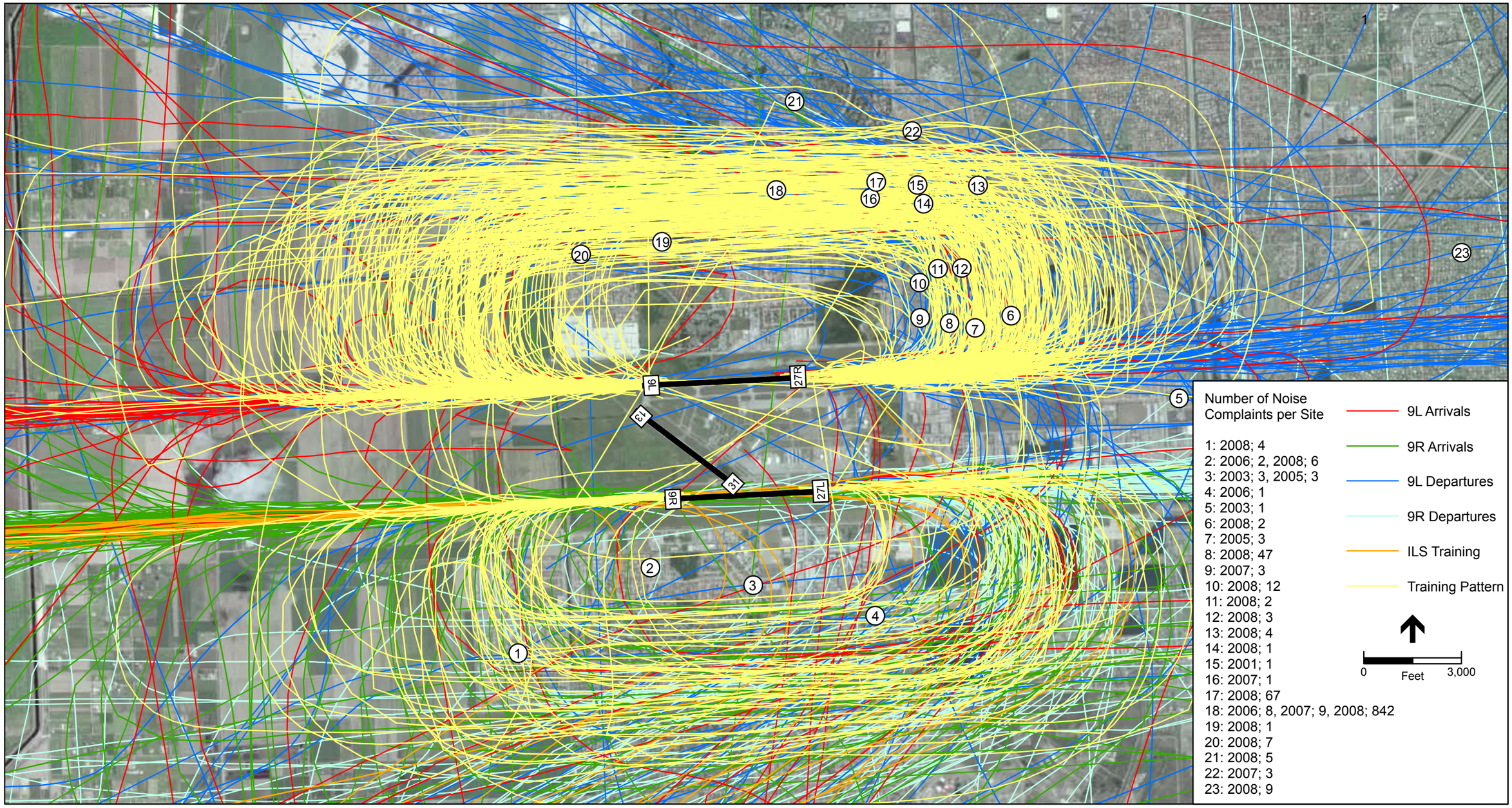
As shown in the table, in 2008 the number of complaints registered increased significantly when compared to previous years. In 2001, only one complaint was received. Of the 1,025 registered complaints in 2008, the same household accounted for 842 of them and over 90 percent of the complaints came from three households. Through August of 2009, a total of 120 complaints had been received.

Exhibit 3-6 identifies the locations of the households that registered the noise complaints. The exhibit also shows the radar flight tracks in the vicinity of TMB. It is clear from the exhibit that the touch and go training pattern are what generated the majority of the complaints.

3.10 Additional Noise Metrics

Although the 2008 65 DNL noise contour (previously shown on Exhibit 3-4) represents the limits of what the Federal government defines as a significant noise impact (significant to the extent that noise sensitive sites would be eligible for FAA funding of sound insulation or noise-related property acquisition), these contours are of limited benefit in analyzing options for noise mitigation at TMB as virtually all of the 65 DNL is on TMB property.

Thus, this study has also evaluated the noise exposure on areas around TMB by using both a lower level of DNL (60 DNL) and a Time-Above metric and individual grid point locations disbursed throughout the noise sensitive areas...



SOURCE: ESA Airports; MDAD; INM 7.0a; GlobeXplorer (2007-05-08)
NOTE: Flight tracks depicted represent two average days in east flow.

Exhibit 3-6
Noise Complaint Locations

In addition to the 65 DNL, Exhibits 3-4 and 3-5 also show the 60 DNL contour. This larger area can be of use in assessing noise mitigation measures discussed in Section 4 of this report. FAA studies have indicated that approximately 40 percent of the people located within the 60 DNL contour at an airport would be annoyed, to some extent, by aircraft noise.

Other noise metrics use peak noise levels generated by aircraft. One noise metric, the Time-Above identifies the amount of time, in minutes per day, that a given decibel level is exceeded. The Time-Above metric differs from the DNL in that the Time-Above is measured using the noise levels of individual aircraft events whereas the DNL metric is a weighted average noise level over the course of a 24-hour day. The FAA encourages the use of alternative metrics in noise studies but, unlike the DNL, the Time-Above metric has no criteria to base the specific extent of annoyance. The noise levels used in the Time-Above analysis are in units of decibels.

The Time-Above analysis established a specific noise level and then indicates how many cumulative minutes per day this level would be exceeded in areas around the airport. For this study, the Time-Above 70 decibels was chosen as it represents the noise level that begins to disrupt normal speech communication. To provide an indication of the range of noise levels experienced in daily life, **Table 3-6** is provided. The table indicates the 70 decibels would be approximately equivalent to the noise level from a vacuum cleaner at a distance of 10 feet.

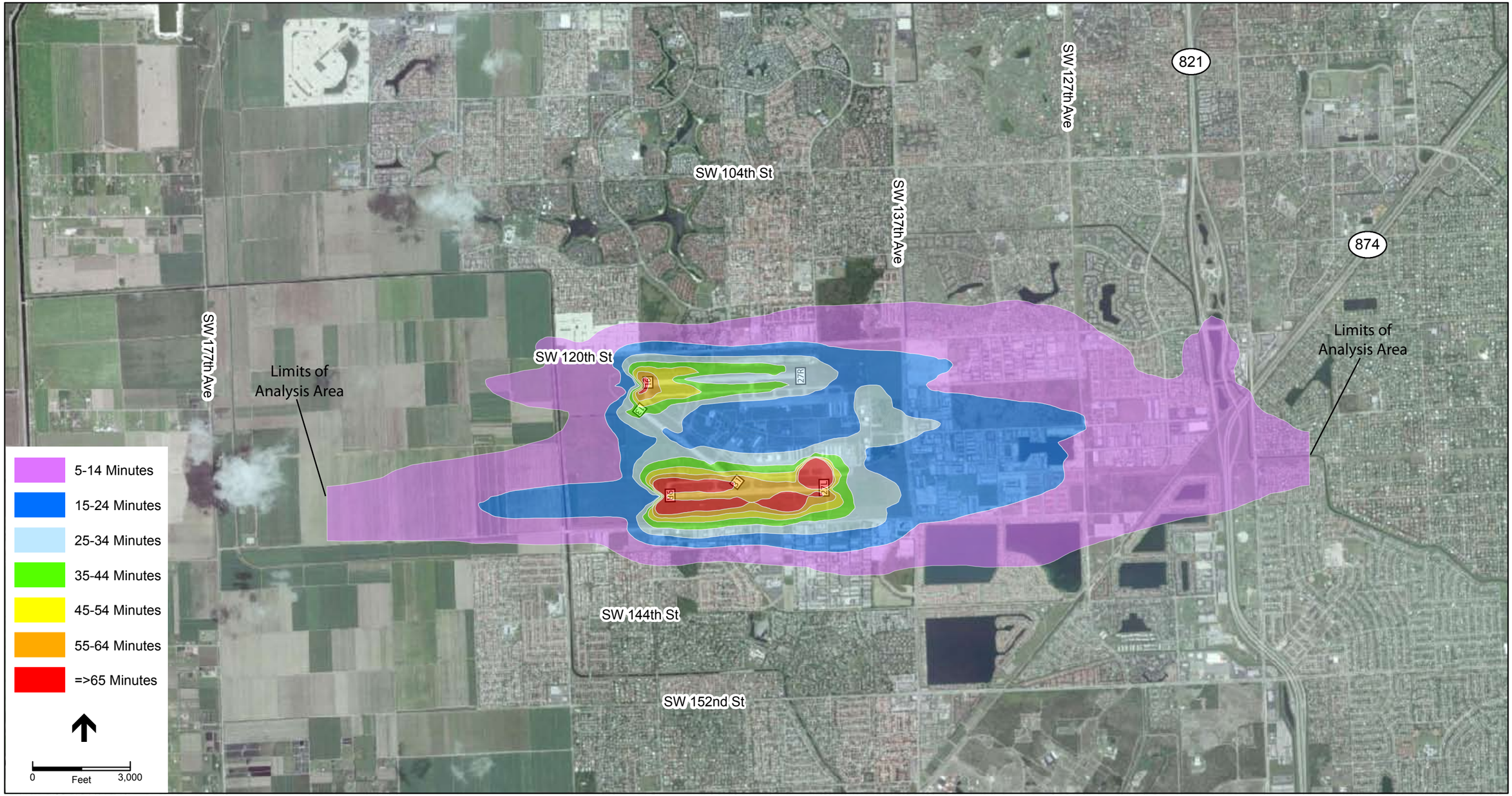
TABLE 3-6
TYPICAL DECIBEL (DBA) VALUES ENCOUNTERED IN DAILY LIFE AND INDUSTRY

Activity	dBA
Room in a quiet dwelling at midnight	32
Soft whispers at 5 feet	34
Window air conditioner	53
Conversational speech	60
Busy restaurant	65
Vacuum cleaner in private residence (at 10 feet)	69
Loudly reproduced orchestral music in large room	82
Heavy diesel truck (about 25 feet away)	92
Cut-off saw	97
Home lawn mower	98
150 cubic foot air compressor	100
Air hammer	107

**When distances are not specified, sound levels are the value at the typical location of the machine operator.*
Source: Aviation Noise Effects Report No. FAA-EE-85-2

Exhibit 3-7 shows the Time-Above ranges for an average-annual day. The average-annual day reflects the airport operating in east flow approximately 70 percent of the time and in west flow approximately 30 percent. The Time-Above has been further refined into the times when the airport operates exclusively in east flow or west flow. The Time-Above ranges for east flow are shown on **Exhibit 3-8** and for west flow in **Exhibit 3-9**.

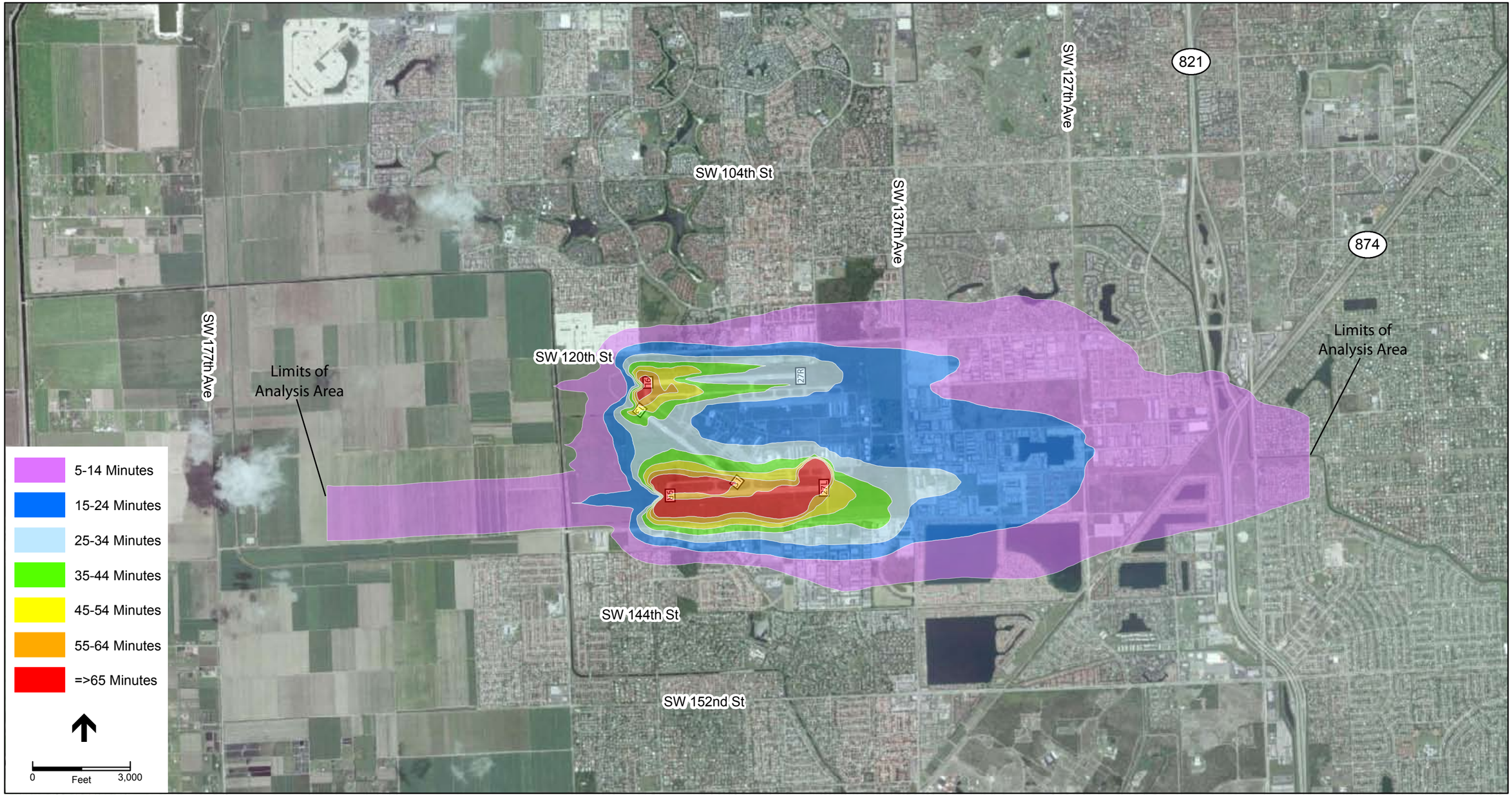
In summary, the noise exposure presented in this section, using both the DNL and Time Above metrics will be used as a basis for analyzing some of the mitigation measures discussed in Section 4.



SOURCE: ESA Airports; INM 7.0a; TNIP; GlobeXplorer (2007-05-08)

NOTE: Areas not shaded experience less than 5 minutes above 70 dBA.

Exhibit 3-7
Time-Above 70 dBA On An Average Day

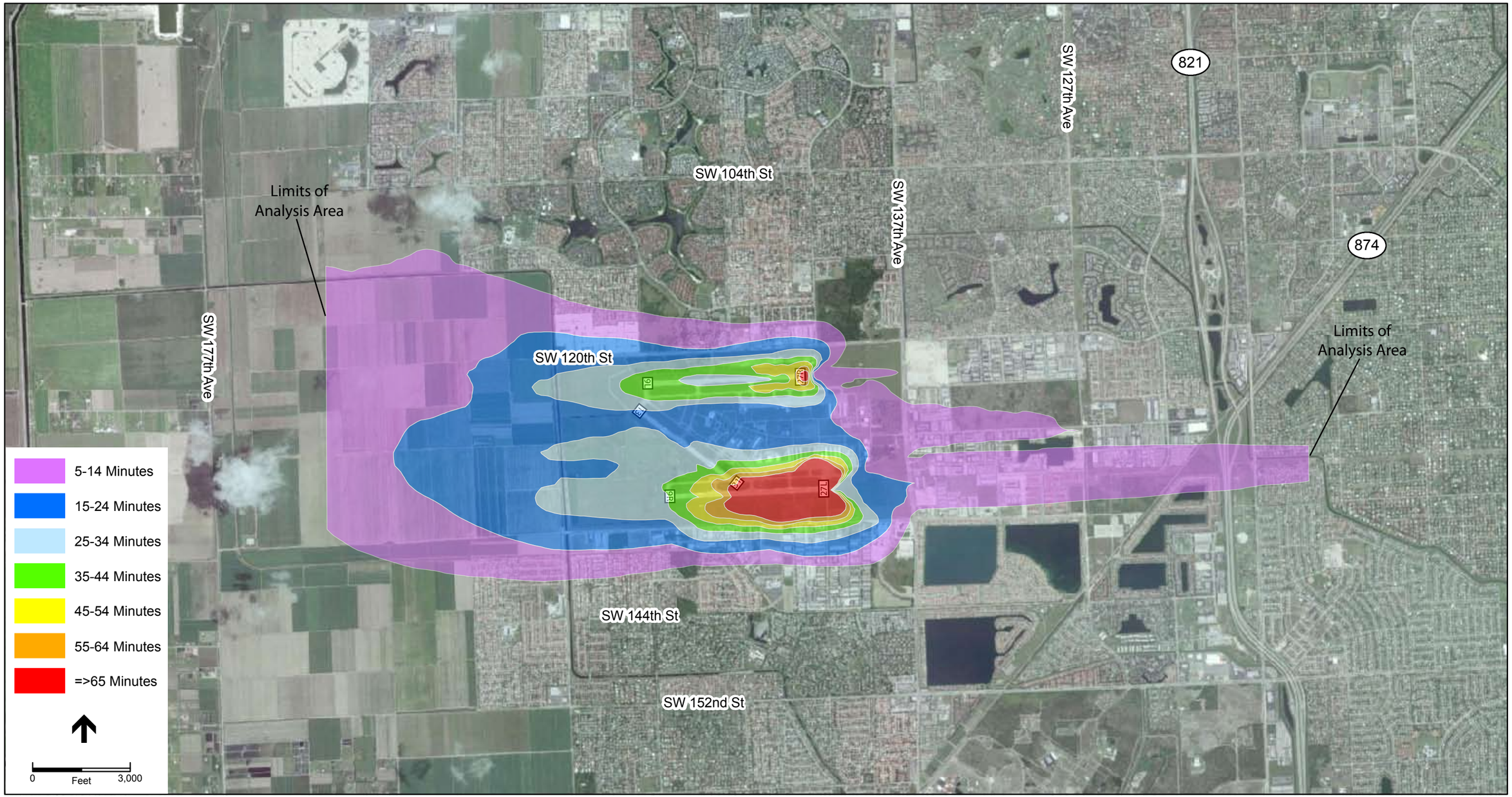


SOURCE: ESA Airports; INM 7.0a; TNIP; GlobeXplorer (2007-05-08)

NOTE: Areas not shaded experience less than 5 minutes above 70 dBA.

Exhibit 3-8

Time-Above 70 dBA - East Flow



SOURCE: ESA Airports; INM 7.0a; TNIP; GlobeXplorer (2007-05-08)

NOTE: Areas not shaded experience less than 5 minutes above 70 dBA.

Kendall-Tamiami Airport Noise Mitigation Evaluation.207429.02

Exhibit 3-9

Time Above 70 dBA - West Flow

SECTION 4
Noise Abatement Alternatives and Recommendations

4.1 Alternatives

A series of noise abatement alternatives have been evaluated during the preparation of this study. The alternatives evaluated are those that have been considered at other airports, those that were suggested by the Kendall Tamiami Airport Citizens Advisory Committee and those resulting from discussions with aviation users and MDAD staff. For each alternative considered, a discussion of its potential to reduce noise exposure is followed by a recommendation of whether to recommend the alternative for implementation given the particular circumstances at TMB. The following noise abatement alternatives are addressed in this section:

- **Increase West Flow Operations**
- **Preferential Runway Use for Runways 9L and 9R**
- **Use of Other Airports such as X51 and TNT for Flight Training**
- **Eliminate TNT User Fee**
- **Consideration to Restrict Flight Training Movements on Holidays and Weekends**
- **Location of Crosswind Turns**
- **Intersection Takeoffs**
- **Modify Arrival and Departure Flight Tracks (Single Engine Piston Aircraft)**
- **Raise Operational Ceiling for Touch-and Go Patterns**
- **Restrict Nighttime Activity at TMB**
- **Limit the Size and Weight of Aircraft Permitted at the Airport or Restrict Aircraft Types**
- **Implement Reverse Thrust Restrictions**
- **Modify Helicopter Procedures**
- **Establish Engine Run-Up Locations**
- **Consider Navigation Aid Changes, including RNAV, GPS and/or FMS**
- **Install Walls or Barriers**
- **Permanent Noise Monitors**
- **Noise Abatement Information (Fly Friendly Program)**
- **Airport Noise Abatement Signage**
- **Penalties for Noisier Operations**
- **Close Airport at Night**
- **Close Certain Runways at Night**
- **Limit Railroad Effect in Pattern**
- **Jet and High Performance Aircraft Turn Locations**

4.1.1 Increase West Flow Operations

This procedure would increase the time that the airport operates in west flow. The airport currently operates in east flow approximately 70 percent of the time (aircraft arriving from the west over the Everglades and departing to the east towards Miami).

Aircraft typically generate greater amounts of noise during departure than arrival. The land immediately east of TMB includes a mix commercial and residential uses. The land immediately west of TMB is virtually undeveloped therefore, increasing west flow would decrease the amount noise over the residential areas east of TMB and increase noise over the undeveloped areas to the west.

The direction of the wind generally dictates how aircraft arrive and depart an airport. Aircraft land and depart into the wind in order to maximize the lift needed to maintain flight. In south Florida, the prevailing winds move from the ocean inland (east to west). Therefore, the winds dictate that a vast majority of the time aircraft need to depart to the east at most airports in south Florida.

Due to the complex nature of the airspace in the south Florida area, the flow at TMB is dictated by the flow at MIA and the other large airports in the south Florida area. While the pilot has the ultimate decision as to which runway to use, pilots operating at TMB will follow the flow that is occurring at MIA. When MIA is operating in east flow, TMB will operate in east flow, when MIA is operating in west flow, TMB will be in west flow. This is the case for both daytime and nighttime operations.

In addition, there will be periods of calm winds at TMB which provide the opportunity for aircraft to follow either east of west flow. However, as noted previously, the flow at TMB is dictated by the flow at MIA.

Recommendation: *Given the fact that the flow at TMB is dictated by the flow at MIA and the other large airports in the south Florida area, it is not feasible to modify the flow exclusively at TMB.*

4.1.2 Preferential Runway Use for Runways 9L and 9R

A preferential runway system, as the name implies, refers to the allocation of arriving and departing aircraft to preferred runway ends. The airport currently has three runways. Two are oriented in an east-west direction (Runway 9R-27L and Runway 9L-27R) and one is oriented in a northwest-southeast direction (Runway 13-31). The runway layout is shown on **Exhibit 3-2**.

As noted previously, the prevailing winds in the south Florida area are in an east-west direction. At times however, winds will be occurring from other directions, such as from the north or south. When this occurs at TMB, it is described as a crosswind. When these crosswinds are high enough, the small single engine aircraft at TMB will need to use Runway 13-31, which occurs less 10 percent of the time. Small single engine aircraft

have more limitations due to wind direction than the higher performance jet aircraft. That is, jet aircraft will be able to use the east-west parallel runways at times when Runway 13-31 is required for use by the single engine aircraft. While at times the winds will dictate the use of Runway 13-31, this occurs infrequently at TMB. Thus, consideration of preferential runway use at TMB would be to determine if changing the use of the east-west runways would result in a reduction of aircraft noise exposure over non-compatible land use areas.

When considering preferential runway use a number of factors need to be considered. First, because aircraft normally takeoff and arrive into the wind, preferential runway assignments can be made only during weather conditions that would allow such assignments; that is, when wind direction and speed do not dictate that a specific runway end be used. Second, the instrument landing system is only available for Runway 9R-27L.

Thus, when considering preferential runway use at TMB virtually all the aircraft involved would be propeller aircraft that could use either runway. A shift of some propeller aircraft from Runway 9L–27R to Runway 9R-27L could be made to balance out the propeller (training) activity at TMB. However in doing so, those residential areas near Runway 9R-27L, that currently are exposed to higher noise levels, would have this noise exposure increase. In addition, a shift of more propeller aircraft to Runway 9R-27L would increase the mix of jet and prop activity on the runway. The separation of the faster approaching and departing jet aircraft from slower propeller aircraft should be maintained. Since land use is noise-compatible off the ends of both east-west runways (open land to the west and primarily commercial property to the east), any shift in runway use would not result in a benefit off the ends of the runways.

Recommendation: *Since TMB currently has a balance between operational activity and noise exposure, a shift in runway use would not provide an overall benefit but merely move some noise and over flights between one neighborhood and another. MDAD and the FAA would not support this. Thus, a preferential runway system for noise abatement is not recommended.*

4.1.3 Use of Other Airports such as X51 and TNT for Flight Training

This alternative would request that local flight training operators at TMB use the Homestead General Aviation Airport (X51), and the Dade-Collier Training and Transition Airport (TNT) to the extent possible. Under this procedure, the based aircraft used for training would depart TMB, conduct their training activities at X51 or TNT and then return to TMB. The purpose of this procedure would be to reduce the impacts of aircraft training noise and shift or relocate overflights of more densely populated residential areas around TMB to sparsely populated areas around X51 and TNT.

MDAD can not require all training flights to locate to other airports due to commitments related to Federal grant assurances as well as current leases. However, MDAD should

work with flight training schools to encourage the increase in use of other airports, particularly where the land uses around these airports is compatible with aircraft noise (undeveloped or commercial and industrial uses).

TNT, located approximately 25 nautical miles from TMB, is completely surrounded by undeveloped land. TNT, from a noise mitigation perspective, is an ideal place for aircraft to conduct repetitive training flights. For the aircraft types that typically use TNT for flight training, the time that it would take an aircraft to fly to TNT ranges between 10-20 minutes depending on the aircraft type.

A similar situation occurs at X51. The area around X51 is predominately undeveloped and is located about 15 miles southwest of TMB.

The largest flight school at TMB currently uses both TNT and X51 for a portion of their training activity. Expanded use of TNT and X51 by the other operators would reduce noise on the areas around TMB.

Recommendation: *It is recommended that MDAD promote the use of TNT and X51 for flight training.*

4.1.4 Eliminate TNT User Fee

The Dade-Collier Training and Transition Airport (TNT) currently charges a fee for certain operators to use the airport. All aircraft operating under a commercial permit are charged $28.00 per landing or touch and go. Aircraft flight schools can obtain a permit for $1,200.00/year for unlimited use. Privately owned and not for commercial use aircraft can use the airport for free.

While the permit fee is a revenue generator for the county, the elimination of the fee could be a positive step in attracting the flight schools that currently do not use TNT. Any movement of flight training activity from TMB to TNT reduces noise exposure to the residents around TMB.

Recommendation: *It is recommended that MDAD evaluate the possibility of eliminating user fees at TNT. MDAD should determine the financial impact and survey existing flight schools to determine if the elimination of fees would increase the use of TNT.*

4.1.5 Consideration to Restrict Flight Training Movements on Holidays and Weekends

The purpose of this would be to restrict local flight training activity for all or portions of holidays and weekends. It is more common for people to be home at these times, and restricting aircraft flights reduce noise at times when it is most annoying for the residents.

Federal law does not allow an airport proprietor to restrict the use of the airport unless there are significant noise impacts and all reasonable noise mitigation measures have

been exhausted. Significant noise impacts, as defined by the Federal government, are residences and other noise sensitive sites being exposed to aircraft noise levels greater than 65 DNL. For TMB, no residences are exposed to noise levels greater than 65 DNL for the existing 2008, or future year 2018 condition.

While MDAD cannot restrict the use of the airport, it should encourage that flight schools place an emphasis on using TNT for flight training on holidays and weekends. MDAD could also make a request to flight schools that training start at a later time on weekends and holidays.

Recommendation: *It is recommended that MDAD encourage flight schools and other users to place an emphasis on using TNT and X51 on national holidays and weekends. It is also recommended that MDAD encourage flight schools to begin TMB local pattern training operations after 9:00 a.m. and end prior to 9:00 p.m. on weekends and national holidays.*

4.1.6 Location of Crosswind Turns

Aircraft begin their take-off following the runway heading. At some point after lift off the aircraft will turn either to join the airport pattern or to head towards their destination. Since land use off the ends of the primary runways at TMB is primarily compatible with aircraft noise (predominately commercial and industrial uses to the east and undeveloped to the west), it would be advantageous for aircraft to gain altitude over these noise compatible areas prior to initiating turns. The Aeronautical Information Manual (AIM) advises pilots to turn to the crosswind segment at an altitude that is within 300 feet of the published pattern altitude. Aircraft then continue to climb as they transit the crosswind segment typically reaching pattern altitude as they turn to the downwind leg. As aircraft climb while on the crosswind leg, they operate with a higher engine setting than they do while at pattern altitude increasing the noise experienced at residences located under crosswind segment. If aircraft turn before reaching 300 feet below pattern altitude, the noise increases accordingly.

At TMB, the pattern altitude is 1,000 feet for piston aircraft and 1,500 feet for high performance aircraft. Therefore, consistent with the AIM, piston aircraft should not initiate turns prior to reaching at least 700 feet and high performance aircraft should not initiate turns prior to reaching at least 1,200 feet. Interviews with airport training operators indicate that they are well aware of the minimum turn altitudes. However, the community has raised concerns on numerous occasions about aircraft turning early. As a result, the community has requested that no turns occur prior to 700 feet and that no turns take place prior to passing 137th Avenue when operating on Runway 27L. Reviewing the radar tracks for the airport (Exhibits 3-1 and 3-2); it appears that the turns typically occur in a band approximately 3,000 – 4,000 feet in length and that a number of turns do take place prior to 137th Avenue. The wide banding means that no single area receives all of the crosswind overflights but also indicates that some aircraft are turning early placing them lower over the residential areas while completing their climb.

Raising the altitude at which aircraft turn from the departure segment to the crosswind segment will decrease the amount of time that aircraft are climbing over residences. Therefore it is recommended that aircraft in the pattern should not turn to the crosswind segment until reaching pattern altitude (1,000 feet for piston aircraft and 1,500 feet for high performance aircraft).

It should be noted that at times, due to weather or air traffic conditions, aircraft may be required to turn prior to reaching these altitudes. Additionally wind and weather will influence the performance and climb capabilities of a given aircraft on a given day. As a result the actual location at which an aircraft reaches a given altitude may vary.

Recommendation: *It is recommended that aircraft that intend to stay in the local flight training pattern should not turn to the crosswind segment until reaching pattern altitude (1,000 feet for piston aircraft and 1,500 feet for high performance aircraft).*

4.1.7 Intersection Takeoffs

Most aircraft begin their takeoff roll at the end of a runway in order to have as much useful runway as possible. However, some pilots will avoid a longer taxi prior to takeoff by taxiing on to the runway at some interim point where the remaining runway is long enough for that aircraft to safely depart. The intersection takeoff can result in an increase in noise exposure because the aircraft is lower along the departure path than an aircraft that begins its takeoff roll at the beginning of the runway.

Recommendation*: It is recommended that the use of intersection takeoffs be prohibited.*

4.1.8 Modify Arrival and Departure Flight Tracks (Single Engine Piston)

In cases where itinerant arrival and departure flight tracks pass over residential or other noise sensitive areas, establishment of standard instrument arrival and departure procedures using GPS or RNAV can sometimes be effective in minimizing potential noise exposure. A review of the departure procedures at the airport indicates that it is already a standard practice for aircraft departing TMB to climb to pattern altitude before making any turns. Reviewing the radar tracks for the airport, it does appear that departing itinerant aircraft are largely confined to areas along the extended runway centerline to the east and west of the airport and turn outside the pattern turn locations. Establishing a published RNAV or GPS procedure for departures would concentrate aircraft overflights over a small area. Since there are no clear corridors of non noise sensitive uses to route aircraft as they turn to the north or south when departing to the east of the airport, a published procedure is not recommended. However, a recommendation related to the turn location of jet aircraft is included later in this section. During west flow, aircraft are already flying over compatible land uses and as a result, any benefit from modifying the departure tracks to the west would be minimal.

When reviewing the radar tracks associated with arrival fights, it is clear that nearly all itinerant aircraft are established on extended runway centerlines at a significant distance (more than 3 miles) from the airport. This places them directly over the more compatible land uses both to the east and the west of the airport. Therefore the potential benefits of an operational procedure for arrivals also would be minimal.

Recommendation: *It is recommended that operational procedures for itinerant aircraft not be pursued at this time. Implementation of departure procedures would have the potential to increase or concentrate the frequency of overflights for certain residents, (particularly to the northeast and southeast of the airport). However, a modification to the location at which jet aircraft initiate turns from runway heading is included later in this section. Procedures are not recommended for arriving aircraft due the fact that these aircraft are already established on the extended runway centerline a significant distance from the airport.*

4.1.9 Raise Operational Ceiling for Touch-and Go Patterns

The airspace in the vicinity of TMB is complex as a result of the relative location of MIA. The airspace surrounding TMB is categorized as Class D and includes from the ground up to 2,000 feet. Above 2,000 feet is MIA Class B airspace. Aircraft using TMB transit the area at between 1,000 and 2,000 feet unless they are in the process of landing or departing from the airport.

Aircraft patterns heights at airports throughout the national airspace system have evolved over time. Historically, the FAA's recommended standard aircraft pattern height was set at 800 feet and many airports throughout the country continue to operate with patterns at this height. As residential encroachment occurred around airports and aircraft climb performance improved, the recommended piston aircraft pattern was increased to 1,000 feet and the high performance aircraft pattern was raised to 1,500 feet. Consistent with the revised "standard", the current pattern altitudes at TMB are 1,000 feet for piston aircraft and 1,500 feet for high performance aircraft.

MDAD has expressed interest in evaluating if additional increases in the pattern altitudes can be achieved.

Recommendation: *It is recommended that MDAD explore the feasibility of increasing the pattern altitude with the FAA.*

4.1.10 Restrict Nighttime Activity at TMB

The purpose of this alternative would be to reduce aircraft noise levels associated with aircraft operations during the nighttime hours. Noise from nighttime flights can be disruptive to airport neighbors and has increased potential for annoyance.

Some airports have instituted nightly restrictions or curfews in the past; however no new curfews have been approved at any airport within the United States since the passage of the Airport Noise and Capacity Act of 1990. All use restrictions that were in place prior to 1990 were allowed to continue under the Act. However, this Act does not allow an airport proprietor to restrict the use of the airport unless there are significant noise impacts and all reasonable noise mitigation measures have been exhausted. Significant noise impacts, as defined by the Federal government, are residences and other noise sensitive sites being exposed to aircraft noise levels greater than 65 DNL. For TMB, no residences are exposed to noise levels greater than 65 DNL for the existing 2008 or future year 2018 condition.

With this said, MDAD can work with its operators to encourage a voluntary reduction in nighttime activity. Information materials prepared by MDAD should list the voluntary reduction of nighttime activity as one of its noise abatement goals.

In addition, consideration was given on having the nighttime training pattern at TMB be a left hand turn off Runway 9R and a right hand turn off Runway 27L which would try and keep the downwind leg of the training pattern over the Airport. Based on a review of the radar tracks, a left pattern from Runway 9R has a high potential to place aircraft over residential areas north of TMB, not just over airport property. In addition, this would have potential safety considerations as it would be a non-standard procedure being conducted during the time the Tower is closed. Therefore, a change in the training pattern at night is not recommended.

Recommendation: *It is recommended that MDAD encourage the voluntary reduction of nighttime activity at the Airport in the noise abatement materials that will be prepared as part of the Fly Friendly Program.*

4.1.11 Limit the Size and Weight of Aircraft Permitted to Operate at the Airport or Restrict Aircraft Types

The runway pavement strength and lengths at an airport limit, to an extent, the size and weight of aircraft that can be accommodated. Any additional restrictions on size and weight or type of aircraft that an airport proprietor may want to require would, as with previous restrictions under consideration, be subject to showing a significant noise impact exists around the airport and a FAR Part 161 study completed. It should be noted that in many instances the size and weight of an aircraft is not indicative of the noise generated from the aircraft. The noise exposure can result more from the age of an aircraft (an aircraft developed prior to the advancements in quiet aircraft technology) than its size or weight.

Recommendation: *Establishment of limits on the size or weight of an aircraft is not recommended since the noise exposure at TMB cannot warrant its justification and that a restriction of this type would need to be approved by the Federal government. However, MDAD should coordinate with the tenants and request that they notify MDAD when a*

larger aircraft is being brought in and, when possible, schedule the flight during daytime hours.

4.1.12 Implement Reverse Thrust Restrictions

Noise from the use of jet-engine thrust reverse is another source of noise at the Airport. Pilots utilize reverse thrust to slow jet aircraft at a rate that is appropriate for landing conditions. Reverse thrust redirects the flow of the jet-engine exhaust toward the front of the aircraft, helping slow the aircraft and maintain directional control on the ground following a landing. This redirected jet exhaust sometimes results in an increase in noise to the sides of the aircraft. The effects of this noise are typically more noticeable during the nighttime hours when other aircraft noise sources are less frequent and community background noise levels are low

Recommendation: *The use of reverse thrust is a safety measure and part of the standard procedure of landing an aircraft. However, MDAD should work with the FBO's and pilots to request they minimize the use of reverse thrust, when possible, without compromising safety.*

4.1.13 Modify Helicopter Procedures

Helicopter noise abatement procedures are currently in place at TMB for non-emergency operations. Helicopters east of TMB generally follow Highway 821 and then straight in/out towards the center of the airport. West of the airport, helicopters generally follow Krome Avenue then straight in/out towards the center of the airport. These procedures keep the non-emergency helicopters away from residential areas. It should be noted that at times helicopters will not follow these preferred routes due to weather or other air traffic conditions.

Recommendation: *It is recommended that the current non-emergency helicopter routes remain in place. In addition, the noise abatement materials that will be prepared as part of the Fly Friendly program will include the helicopter routes, and be distributed to the helicopter operators.*

4.1.14 Establish Engine Run-Up Locations

Engine run-ups at TMB are performed during engine maintenance activities. Maintenance often involves running the engine at partial or full power for a short duration followed by a much longer period at idle power or with the engines off. This sequence is often repeated several times over the course of the maintenance period, which could range from 20 minutes to over an hour. Based on discussions with industry-wide professionals who perform this type of engine maintenance, it has been estimated that aircraft are typically at full power for a total of 45 seconds for jet aircraft and 60 seconds for turboprop aircraft over the course the entire maintenance event.

Airports often have designated areas on the airfield that are used during the longer duration maintenance events. The location on the airfield is chosen to minimize noise exposure from these events on the surrounding areas. It is recommended that MDAD prepare a review that could identify a location at TMB for these types of run-ups.

An additional measure would be to establish preferred hours for non-emergency maintenance engine run-ups. It is recommended that no non emergency maintenance engine run-ups occur between the hours of 9:00 p.m. and 7:00 a.m. on weekdays and between 9:00 p.m. and 9:00 a.m. on weekends and holidays on a voluntary basis.

Recommendation: *It is recommended that MDAD identify a location at TMB where longer duration maintenance run-ups should occur so as to minimize noise exposure to the surrounding areas and that* no *non emergency maintenance engine run-ups occur between the hours of 9:00 p.m. and 7:00 a.m. on weekdays and between 9:00 p.m. and 9:00 a.m. on weekends and holidays on a voluntary basis.*

4.1.15 Consider Navigation Aid Changes, Including RNAV, GPS and/or FMS

A recent advancement in aircraft navigation has resulted from GPS technology. Area Navigation (RNAV) and Flight Management Systems (FMS) allow aircraft to follow a precise path when departing an airport. These types of systems can concentrate the aircraft flights over a relatively small area. From a noise abatement standpoint, these systems can be effective by directing aircraft away from noise sensitive areas and over commercial of industrial uses.

Most of the aircraft departing TMB to the east generally turn back to the north-northwest or to the south-southwest to avoid the MIA airspace. The land under these departure routes is generally a mix of residential and commercial uses. No clear corridors of compatible land uses are located in these areas.

Recommendation: *It is not recommended that MDAD initiate changes to navigational aids or begin the process of establishing RNAV of FMS based procedures at this time. As technology continues to advance, MDAD should continue to monitor the changes and assess potential for implementation at TMB.*

4.1.16 Install Walls or Barriers

A noise barrier is an obstruction to the path of sound transmission. Barriers can include walls, earth mounds (or berms), buildings, or dense landscaping. In the case of barriers, neighbors are shielded from the noise source as long as the barrier is solid and sufficiently breaks the line-of-sight from the noise source to the listener. Barriers can potentially provide noise reduction benefits for communities near an airport from aircraft ground operations. Once an aircraft becomes airborne and there is a direct line of sight from the aircraft to the receiver, barriers have no further effect.

To be effective, a barrier needs to be close to the source of noise (aircraft) and/or close to the receiver (noise sensitive site). A good example of effective barriers is their construction along interstate highways (barrier close to the source and receiver). With respect to aircraft, due to aircraft operational safety requirements, barriers cannot be constructed very close to the source (aircraft). For placing barriers close to the receiver, the distance from the source of noise at TMB is so far that a barrier would be ineffective.

Recommendation: *The development of barriers is not recommended due to the physical distances from the source to the receiver at TMB, barriers would not be effective in achieving meaningful noise reductions.*

4.1.17 Permanent Use of Noise Monitors

Permanent noise monitors are installed in communities surrounding an airport at a cost of approximately $30,000 each. The monitors generally work best surrounding air carrier airports and military bases where the aircraft noise is much greater than areas surrounding a general aviation airport, such as TMB. The permanent monitors also provide the best data when placed at locations close to the airport. The farther away from the airport, the less reliable the data becomes. The monitors cannot differentiate noise from an aircraft versus noise from other community events. Rather, the monitors are set to record when a given decibel level is exceeded, whether from an aircraft, passing truck, siren, or other event. When a complaint is registered, aircraft radar tracks near the monitor are identified around the time of the complaint. The monitor sound level data is reviewed and an attempt is made to correlate the sound level with a particular aircraft. At noted previously, permanent noise monitors work best at commercial airports and military bases because the sound levels of these aircraft are much greater than the background community sound levels. It is therefore much more accurate in being able to match a noise event with a particular aircraft event.

The sound levels generated by the aircraft that operate at TMB are generally are not excessive enough that permanent noise monitors in the areas around TMB would be able to provide much reliable data. The farther away an aircraft is from the airport, the less noise is heard on the ground. As some point, aircraft are at high enough altitudes where the noise from the aircraft falls below noise events from other community sources occurring on the ground. When this is the case, even if a flight track was identified, one would not know if the noise level recorded was a result of the aircraft or other community noise source. MDAD does maintain portable noise meters. The portable meters are capable of recording the same data as the permanent monitors. Additionally, the portable meters can be moved from location to location to capture specific events at specific locations.

Recommendation: Purchasing an installing a permanent noise monitor system at TMB is not recommended as little if any reliable data would result. The use of portable meters to record aircraft events as needed is recommended.

4.1.18 Noise Abatement Information (Fly Friendly Program)

Noise abatement information is available at MDAD's Noise Abatement office and on the internet. Additional noise abatement materials should be published and distributed to the operators at TMB as part of a comprehensive Fly Friendly program. This program can include fliers, posters, and pilot handouts. These materials will help reduce noise impacts by ensuring pilots are aware of the noise sensitive areas surrounding TMB and understand the importance of being a good neighbor.

Recommendation: *It is recommended that comprehensive noise abatement information materials be prepared and distributed to enhance the awareness of noise abatement procedures at TMB. It is also recommended that MDAD meet with training and other based operators to discuss the TMB Fly Friendly Program on at least an annual basis.*

4.1.19 Airport Noise Abatement Signage

Noise abatement reminder signs placed on the airfield that are visible to pilots just prior to takeoff are common at airports throughout the country. The signs reduce noise impacts by increasing pilot awareness of noise sensitive areas. These signs often contain the expression thank you for following noise abatement procedures, or noise sensitive areas in all quadrants.

Recommendation: *It is recommended that MDAD purchase and installs noise abatement reminder signs at the ends of the runways at TMB to raise awareness of the Airport's noise sensitive nature. The purchase and installation will be based on available funding.*

4.1.20 Penalties for Noisier Operations

One possible noise abatement measure could be to establish penalties (fees) for aircraft that exceed a given noise level. As noted previously, the Airport Noise and Capacity Act of 1990 limited the airport operator's ability to impose new restrictions. Any type of fee for noisier aircraft would not be able to be implemented at TMB.

Recommendation: *Establishing fees for noisier aircraft at TMB is not recommended.*

4.1.21 Close Airport at Night

Federal Law and Federal Aviation Regulations require all public-use airports in the United States to be open for aircraft 24-hours a day. Any curfew or other restriction that currently exists at an airport in the United States was passed prior to the Airport Noise and Capacity Act of 1990. The Act limited airport proprietors from enacting any additional use restrictions or curfews.

Recommendation: *Closure of the Airport at night is not recommended.*

4.1.22 Close Certain Runways at Night

Currently, Runway 9L-27R is closed at night from 11:00 p.m. to 7:00 a.m. (when the Tower is closed). Runway 9R-27L (which is equipped with an instrument landing system) and Runway 13-31 remain open at night. Runway 9R-27L is the most heavily used runway of the two. At certain times winds dictate that aircraft need to use Runway 13-31.

Recommendation: *Closure of either Runway 9R-27L or Runway 13-31 at night would impact safety and is not recommended.*

4.1.23 Limit Railroad Effect in Pattern

A major element of annoyance associated with aircraft training and pattern activity is the frequency of overflight. Aircraft following directly behind the aircraft in front of them can create a "railroad effect" with a constant stream of aircraft over the same set of residences. By varying the aircraft flight paths slightly (as little as one to two hundred feet) in attempts to avoid flying over the same houses, the effect of the overflights on any single residence can be reduced. Reviewing the radar tracks for TMB indicates that aircraft do fly in roughly a mile wide band rather a single line from an overall operational standpoint. However, individual flights within that overall band often track over the same locations creating higher frequencies of overflights during compressed periods of time. By changing visual cues as they fly the pattern, pilots can vary their flight paths enough to limit impacts to the same set of residences.

Recommendation: *It is recommended that training operators be encouraged to change their visual cues while operating in the pattern to avoid creating a railroad effect.*

4.1.24 Jet and High Performance Aircraft Turns

The intent of this procedure is to have jet and high performance aircraft avoid low altitude departure overflights of noise sensitive areas. This procedure would have jet and high performance aircraft departures from Runway 9R-27L and Runway 9L-27R to maintain runway heading and not initiate turns until after crossing the Florida Turnpike to the east and Krome Avenue to the west. This places the aircraft directly over the more compatible land uses both to the east and the west of the airport and avoids low altitudes overflights of residential areas to the north and south.

Recommendation: *It is recommended that jet and high performance aircraft departing from Runway 9R-27L and Runway 9L-27R not initiate turns until after crossing the Florida Turnpike to the east and Krome Avenue to the west when weather, air traffic, and safety conditions permit.*

4.2 Summary of Recommendations

In summary, 24 noise abatement measures were reviewed in this study. Fifteen noise abatement measures are recommended for implementation at TMB and are described below.

1. It is recommended that MDAD promote the use of TNT and X51 for flight training.

2. It is recommended that MDAD evaluate the possibility of eliminating user fees at TNT. MDAD should determine the financial impact and survey existing flight schools to determine if the elimination of fees would increase the use of TNT.

3. It is recommended that MDAD encourage flight schools and other users to place an emphasis on using TNT and X51 on national holidays and weekends. It is also recommended that MDAD encourage flight schools to begin TMB local pattern training operations after 9:00 a.m. and end prior to 9:00 p.m. on weekends and national holidays.

4. It is recommended that when weather, air traffic and safety conditions permit, aircraft that intend to stay in the local flight training pattern should not turn to the crosswind segment until reaching pattern altitude (1,000 feet for piston aircraft and 1,500 feet for high performance aircraft).

5. It is recommended that the use of intersection takeoffs be prohibited.

6. It is recommended that MDAD explore the feasibility of increasing the pattern altitude with the FAA.

7. It is recommended that MDAD encourage the voluntary reduction of nighttime activity at the Airport in the noise abatement materials that will be prepared as part of the Fly Friendly Program.

8. It is recommended that MDAD coordinate with the tenants and request that they notify MDAD when a larger aircraft is being brought in and, when possible, schedule the flight during daytime hours.

9. It is recommended that MDAD work with the FBO's and pilots to request they minimize the use of reverse thrust, when possible, without compromising safety.

10. It is recommended that MDAD identify a location at TMB where longer duration maintenance run-ups should occur so as to minimize noise exposure to the surrounding areas and that no non emergency maintenance engine run-ups occur between the hours of 9:00 p.m. and 7:00 a.m. on weekdays and between 9:00 p.m. and 9:00 a.m. on weekends and holidays on a voluntary basis.

11. It is recommended that comprehensive noise abatement information materials be prepared and distributed to enhance the awareness of noise abatement procedures at TMB. It is also recommended that MDAD meet with training and other based operators to discuss the TMB Fly Friendly Program on at least an annual basis.

12. It is recommended that MDAD purchase and installs noise abatement reminder signs at the ends of the runways at TMB to raise awareness of the airport's noise sensitive nature. The purchase and installation will be based on available funding.

13. It is recommended that training operators be encouraged to change their visual cues for turns while operating in the pattern to avoid creating a railroad effect over one particular set of residences.

14. It is recommended that jet and high performance aircraft departing from Runway 9R-27L and Runway 9L-27R not initiate turns until after crossing the Florida Turnpike to the east and Krome Avenue to the west when weather, air traffic, and safety conditions permit.

15. It is recommended that the Aircraft Owner and Pilots Association (AOPA) noise reduction recommendations be provided to the operators at TMB. The AOPA information is included in Appendix C of this document.

SECTION 5
Noise Exposure Reduction

5.1 Introduction

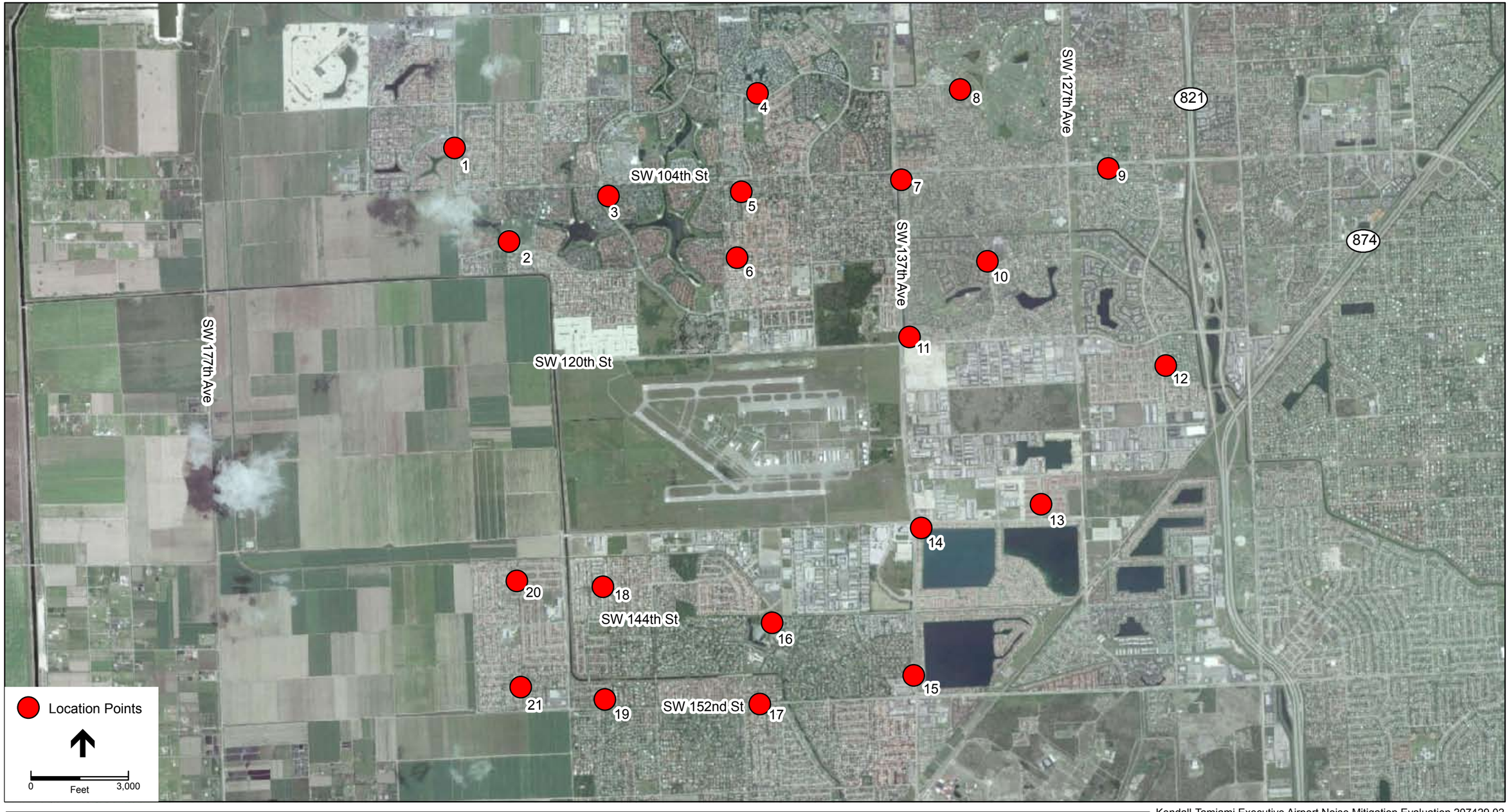
This section provides the noise exposure reduction following the implementation of the recommended noise measures.

5.2 Grid Point Analysis

In order to demonstrate the noise reduction following the implementation of the recommended measures, a series of grid points were input into the INM model. The existing noise levels at these grid points were identified. The noise levels with the recommended measures in place were then calculated in the model and compared to the existing noise levels. The locations of the grid points are shown on **Exhibit 5-1**.

5.3 Noise Levels by Individual Aircraft

Noise levels generated by individual aircraft types at each grid point was also determined within the INM and by measurements taken in the field by MDAD staff. The noise levels were determined using the Lamax noise metric. The Lamax is the maximum noise level achieved (in decibels) during an individual aircraft event. The Lamax levels generated at each grid point for four of the most common aircraft that operate at TMB are shown in **Table 5-1**. The four aircraft include a Cessna 152 (single engine piston aircraft), a Beech Barron (twin engine piston aircraft), a Cessna 441 (twin engine turboprop aircraft) and a Learjet 35 (general aviation jet aircraft).



SOURCE: ESA Airports; INM 7.0a; GlobeXplorer (2007-05-08)

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Exhibit 5-1
Grid Point Analysis Locations

TABLE 5-1
LAMAX NOISE LEVELS AT GRID POINTS

Site	Cessna 152	Beech Barron	Cessna 441	Learjet 35
1	65.6	73.0	67.6	82.1
2	66.0	77.0	69.7	83.9
3	61.5	72.9	60.8	71.1
4	60.1	68.3	61.3	71.1
5	61.4	72.7	62.3	72.1
6	59.9	69.0	62.2	71.9
7	63.0	72.8	64.6	75.6
8	61.8	69.7	62.7	72.7
9	62.3	70.3	64.1	74.9
10	65.2	73.3	67.5	81.9
11	67.9	79.3	72.0	87.0
12	64.8	74.1	73.3	78.6
13	68.1	77.8	71.7	84.6
14	68.9	80.1	72.9	87.9
15	67.9	77.3	69.8	84.3
16	64.5	76.8	69.3	83.6
17	67.4	77.2	69.8	84.1
18	57.6	71.4	63.9	76.2
19	61.5	72.8	60.9	71.0
20	62.0	74.4	67.2	80.6
21	61.2	72.6	62.3	72.1

5.4 Noise Reduction

Noise levels were calculated at the grid points with the recommended noise mitigation measures in place. For the purposes of this analysis, it was estimated that the elimination of the permit fee at TNT would result in 15 percent of the touch and go training that currently occurs at TMB would relocate to TNT. The noise levels at each grid point were calculates for both the DNL and Time-Above metrics and are presented in **Tables 5-2** and **5-3** respectively.

TABLE 5-2
DNL NOISE LEVEL REDUCTIONS

Site	Existing DNL	DNL With Noise Mitigation Measures	Change in DNL
1	45.1	44.9	-0.2
2	48.5	48.4	-0.1
3	46.6	46.3	-0.3
4	44.9	44.6	-0.3
5	47.5	47.0	-0.5
6	47.4	47.1	-0.3
7	48.1	48.3	0.2
8	45.0	44.8	-0.2
9	46.9	46.8	-0.1
10	51.0	51.3	0.3
11	59.0	58.4	-0.6
12	56.4	56.4	0.0
13	62.7	61.9	-0.8
14	62.3	62.1	-0.2
15	52.1	51.9	-0.2
16	50.7	50.6	-0.1
17	47.4	46.6	-0.8
18	51.7	51.6	-0.1
19	45.4	45.2	-0.2
20	51.3	51.3	0.0
21	45.2	45.0	-0.2

TABLE 5-3
TIME-ABOVE REDUCTIONS

Site	Existing Time-Above (in minutes per day)	Time-Above With Noise Mitigation Measures (in minutes per day)	Reduction (in minutes per day)
1	0.2	0.1	-0.1
2	0.8	0.7	-0.1
3	0.7	0.6	-0.1
4	0.1	0	-0.1
5	0.7	0.6	-0.1
6	0.1	0.1	0.0
7	0.3	0.7	0.4
8	0.1	0.1	0.0
9	0.2	0.2	0.0
10	1.0	1	0.0
11	14.1	10.1	-4.0
12	4.3	4.4	0.1
13	13.6	13	-0.6
14	15.0	14.3	-0.7
15	1.5	1.5	0.0
16	0.8	0.7	-0.1
17	0.4	0.3	-0.1
18	1.4	1.3	-0.1
19	0.3	0.3	0.0
20	1.3	1.3	0.0
21	0.3	0.3	0.0

SECTION 6
Implementation of Noise Abatement Recommendations

This section provides the actions that need to be taken in order to implement each of the recommended noise abatement measures. For those measures that will require a cost to implement, an estimate has been included.

1. It is recommended that MDAD promote the use of TNT and X51 for flight training.

   Implementation: MDAD should prepare materials associated with a Fly Friendly Program. These materials may include fliers, brochures, posters and/or pilot handouts. The materials should be provided to the operators at TBM. The encouragement of the use of TNT and X51 should be included in these publications.

2. It is recommended that MDAD evaluate the possibility of eliminating user fees at TNT. MDAD should determine the financial impact and survey existing flight schools to determine if the elimination of fees would increase the use of TNT.

   Implementation: MDAD would initiate a review of the financials and make contact with the flight schools at TMB to estimate the increase in use of TNT if the fee was eliminated. Ultimately it is up to the Miami-Dade County Board of County Commissioners (BCC) to decide if this fee should be eliminated.

3. It is recommended that MDAD encourage flight schools and other users to place an emphasis on using TNT and X51 on national holidays and weekends. It is also recommended that MDAD encourage flight schools to begin TMB local pattern training operations after 9:00 a.m. and end prior to 9:00 p.m. on weekends and national holidays.

   Implementation: MDAD should prepare materials associated with a Fly Friendly Program. These materials may include fliers, brochures, posters and/or pilot handouts. The materials should be provided to the operators at TBM. The emphasis on using TNT and X51 on national holidays and weekends as well as the voluntary pattern training times should be included in these publications.

4. It is recommended that when weather, air traffic and safety conditions permit, aircraft that intend to stay in the local flight training pattern should not turn to the crosswind segment until reaching pattern altitude (1,000 feet for piston aircraft and 1,500 feet for high performance aircraft).

   Implementation: MDAD should coordinate with flight schools, airport operators, and ATCT personnel. This item should also be included in the Fly Friendly publications.

5. It is recommended that the use of intersection takeoffs be prohibited.

   Implementation: MDAD should coordinate with ATCT personnel. This item should also be included in the Fly Friendly publications.

6. It is recommended that MDAD explore the feasibility of increasing the pattern altitude with the FAA.

   Implementation: MDAD should coordinate with ATCT personnel and the flight schools to determine the feasibility of raising the pattern altitudes.

7. It is recommended that MDAD encourage the voluntary reduction of nighttime activity at the TMB.

   Implementation: MDAD should prepare materials associated with a Fly Friendly Program. These materials may include fliers, brochures, posters and/or pilot handouts. The materials should be provided to the operators at TBM. The encouragement of the voluntary reduction of nighttime activity at the TMB should be included in these publications.

8. It is recommended that MDAD coordinate with the tenants and request that they notify MDAD when a larger aircraft is being brought in and, when possible, schedule the flight during daytime hours.

   Implementation: MDAD should send letters to and meet with tenants identifying this request.

9. It is recommended that MDAD work with the FBO's and pilots to request they minimize the use of reverse thrust, when possible, without compromising safety.

   Implementation: MDAD should send letters to and meet with the FBO's, tenants and pilots as available. This item should be included in the Fly Friendly publications.

10. It is recommended that MDAD identify a location at TMB where longer duration maintenance run-ups should occur so as to minimize noise exposure to the

surrounding areas and that no non emergency maintenance engine run-ups occur between the hours of 9:00 p.m. and 7:00 a.m. on weekdays and between 9:00 p.m. and 9:00 a.m. on weekends and holidays on a voluntary basis.

Implementation: MDAD would initiate a review of the airfield and determine if a specific location can be identified that would reduce the noise exposure to residential areas. The voluntary non-emergency run-up times should be included in the Fly Friendly publications.

11. It is recommended that comprehensive noise abatement information materials be prepared and distributed to enhance the awareness of noise abatement procedures at TMB. It is also recommended that MDAD meet with training and other based operators to discuss the TMB Fly Friendly Program on at least an annual basis.

Implementation: MDAD should prepare and publish the materials. These materials may include fliers, brochures, posters and/or pilot handouts. The total costs for the design, publication, and distribution may be up $15,000. The timing for implementation of this measure is dependant on available funding.

12. It is recommended that MDAD purchase and installs noise abatement reminder signs at the ends of the runways at TMB to raise awareness of the Airport's noise sensitive nature. The purchase and installation will be based on available funding.

Implementation: MDAD should purchase these signs from a vendor and contract with a company for installation. It is estimated that the cost for this measure could be up to $20,000. The signs will need to meet all FAA requirements. The timing for implementation of this measure is dependant on available funding.

13. It is recommended that training operators be encouraged to change their visual cues for turns while operating in the pattern to avoid creating a railroad effect over one particular set of residences.

Implementation: MDAD should send letters to and meet with the flight schools, tenants, and pilots as available. This request should also be a part of the Fly Friendly publications.

14. It is recommended that jet and high performance aircraft departing from Runway 9R-27L and Runway 9L-27R not initiate turns until after crossing the Florida Turnpike to the east and Krome Avenue to the west when weather, air traffic, and safety conditions permit.

Implementation: MDAD should coordinate with the ATCT personnel, tenants, and the FBO's. This item should also be included in the Fly Friendly publications.

15. It is recommended that the Aircraft Owner and Pilots Association (AOPA) noise reduction recommendations be provided to the operators at TMB. The AOPA information is included in **Appendix C** of this document.

    Implementation: MDAD request that the AOPA provide its information in hardcopy or electronic (CD or DVD) in sufficient quantities to provide to the operators at TMB including updates as necessary.

APPENDIX A

Direct Responses to Kendall-Tamiami Airport Citizens Committee Requests and Hammocks Community Association Letter

The following includes direct responses to the short-term/immediate and long-term requests presented by the Kendall-Tamiami Airport Citizens Advisory Committee (KTACAC). In addition, responses to the noise issues contained in the Hammocks Community Association letter are also included. Each request has been listed followed by the response.

KTACAC Short-Term/Immediate Requests

1. Request Place temporary sound meters at strategic locations to monitor conditions.

1. Response: Temporary sound meters were placed at 10 locations over the course of several days in March and April. The sound levels were recorded and used in providing a sense of existing aircraft noise levels within the community.

2. Request: No early turns/no turns before SW 137th Ave. Restrict and enforce no turns prior to reaching 500 feet altitude.

2. Response: The study recommends no turns to the crosswind leg prior to reaching 1,000 feet for piston aircraft and 1,500 feet for high performance aircraft conducting touch and go training at TMB, when weather, air traffic and safety conditions permit. Formal restrictions and enforcement by means of penalties are not recommended because they are not enforceable. MDAD will continue to process radar data and assess the general compliance with this measure.

3. Request: Prohibit intersection takeoffs. All planes to begin west/east of runway (use full length of runway).

3. Response: The study recommends that the use of intersection takeoffs be prohibited and will be included as an item in the noise abatement materials to be developed as part of the Fly Friendly Program.

4. Request: Eliminate usage fee at Dade Collier Jet Port for flight training and advertise and encourage use of airport.

4. Response: The study recommends that MDAD evaluate the possibility of eliminating user fees at TNT. MDAD should determine the financial impact and survey existing flight schools to determine if the elimination of fees would increase the use of TNT. In addition, the study recommends that MDAD encourage flight schools and other users to place an emphasis on using TNT and X51 on national holidays and weekends.

5. Request: Restrict and enforce no turns prior to reaching 500 feet altitude.

5. Response: The study recommends no turns to the crosswind leg prior to reaching 1,000 feet for piston aircraft and 1,500 feet for high performance aircraft conducting touch and go training at TMB, when weather, air traffic and safety conditions permit. Formal restrictions and enforcement by means of penalties are not recommended because they are not enforceable. MDAD will continue to process radar data and assess the general compliance with this measure.

6. Request: Define and establish an airport Fly Friendly program in coordination with the Kendall Tamiami Airport Community Advisory Committee (KTACAC).

6. Response: The study recommends a comprehensive Fly Friendly program. Elements of the Fly Friendly Program are described in the following two responses and in Sections 4 and 6 of the study.

7. Request: Pilot noise sensitivity training (Fly Friendly) and placement of sign at end of runway to request pilots to reduce noise and follow restrictions.

7. Response: The study recommends that MDAD purchase and installs noise abatement reminder signs at the ends of the runways at TMB to raise awareness of the airport's noise sensitive nature. The purchase and installation will be based on available funding. Fly Friendly program materials will be developed and provided to the airport operators.

8. Request: Request all fixed base operators (aircraft related businesses at Kendall/Tamiami Airport) to provide training to customers/students, relating to Flying Friendly and reducing noise and provide posters to these facilities encouraging this.

8. Response: The study recommends a comprehensive Fly Friendly program that will include the publication of posters and other materials to be offered to the FBO's, flight training schools, and other airport operators.

9. Request: Enforce all rules that would mitigate noise to homeowners.

9. Response: As indicated in Sections 2 and 4, mandatory rules are not recommended in this study as they are not legally enforceable. Federal law oversees all aspects of aircraft in flight. However, it should be noted that a comprehensive voluntary program is being recommended in this study and every reasonable effort will be made to encourage the use of the program.

KTACAC Long-Term Requests

1. Request: Internet real time monitoring of aircraft usage including altitude (Passur type system similar to Boca Raton website),

1. Response: MDAD currently has an Aircraft Noise and Operations Monitoring System (ANOMS). The ANOMS system allows MDAD to view and record aircraft flight tracks and altitudes for aircraft that operate at its airports (including TMB). The Passur type system that is shown on the Boca Raton website is proprietary software that shows real time (with a short delay) aircraft flight tracks via the internet. This system is very expensive. The airport proprietor that purchases this software pays a monthly fee of around $3,000, or approximately $36,000 per year. MDAD should continue to use its current ANOMS system to view and record aircraft flight tracks, and to use the ANOMS to respond to citizen

complaints. Due to the high costs, a Passur type system is not recommended at this time.

2. Request: Place permanent meters at strategic locations.

2. Response: As described in Section 4, permanent noise monitors are installed in communities surrounding an airport at a cost of approximately $30,000 each. The monitors generally work best surrounding air carrier airports and military bases where the aircraft noise is much greater than areas surrounding a general aviation airport, such as TMB. The permanent monitors also provide the best data when placed at locations close to the airport. The farther away from the airport, the less reliable the data becomes. The monitors cannot differentiate noise from an aircraft versus noise from other community events. Rather, the monitors are set to record when a given decibel level is exceeded, whether from an aircraft, passing truck, siren, or other event. When a complaint is registered, aircraft radar tracks near the monitor are identified around the time of the complaint. The monitor sound level data is reviewed and an attempt is made to correlate the sound level with a particular aircraft. As noted previously, permanent noise monitors work best at commercial airports and military bases because the sound levels of these aircraft are much greater than the background community sound levels. It is therefore much more accurate in being able to match a noise event with a particular aircraft event.

The sound levels generated by the aircraft that operate at TMB are generally not excessive enough that permanent noise monitors in the areas around TMB would be able to provide much reliable data. The farther away an aircraft is from the airport, the less noise is heard on the ground. At some point, aircraft are at high enough altitudes where the noise from the aircraft falls below noise events from other community sources occurring on the ground. When this is the case, even if a flight track was identified, one would not know if the noise level recorded was a result of the aircraft or other community noise source. MDAD does maintain portable noise meters. The portable meters are capable of recording the same data as the permanent monitors. Additionally, the portable meters can be moved from location to location to capture specific events at specific locations. The purchase and installation of a permanent noise monitor system at TMB is not recommended at this time.

KTACAC Requests to Aviation

1. Request: Volume of planes using Runway 9L vs. 9R

1. Response: Appendix B contains detailed information regarding the aircraft fleet and runway use. In general, approximately two-thirds of the flight training activity occurs on 9L-27R (north runway) and one-third on 9R-27L (south runway). Virtually all the jet traffic occurs on Runway 9R-27L. Also, Runway 9L-27R is closed when the Air Traffic Control Tower is closed (11:00p.m.-7:00a.m.)

2. Request: Can buffer walls be placed at appropriate locations at the airport (restrict runoffs)?

2. Response: Barriers can potentially provide noise reduction benefits for communities near an airport from aircraft ground operations. Once an aircraft becomes airborne and there is a direct line of sight from the aircraft to the receiver, barriers have no further effect. To be effective, a barrier needs to be close to the source of noise (aircraft) and/or close to the receiver (noise sensitive site). A good example of effective barriers is their construction along interstate highways (barrier close to the source and receiver). Due to aircraft operational safety requirements, barriers cannot be constructed very close to the source (aircraft). For placing barriers close to the receiver, the distance from the source of noise at TMB is so far that a barrier would be ineffective.

3. Request: Can homes in area of airport receive funding to help soundproof homes?

3. Response: The FAA offers funding for sound insulation of residences that are exposed to high noise levels. The FAA uses the 65 DNL contour line as the limits for sound insulating residences. No residences are located within the 65 DNL contour at TMB.

4. Request: Can flights be restricted on holidays and weekends?

4. Response: Any type of mandatory restriction would fall under FAR Part 161. The airport receives federal funding and therefore must remain open and accessible to any user. However, the study recommends MDAD encourage flight schools and other users to place an emphasis on using TNT and X51 on national holidays and weekends. It is also recommends

that MDAD encourage flight schools to begin TMB local pattern training operations after 9:00 a.m. and end prior to 9:00 p.m. on weekends and national holidays.

5. Request: How many flight schools operate and number of students and planes per school?

5. Response: Three certified flight schools are currently located at TMB which total approximately 90 aircraft. The number of students at a given school varies over the course of the year. At some times enrollment is up, at others, enrollment is down. The overall economy is an indicator of whether enrollment is high or low.

6. Request: Respond to letter from Hammocks HOA.

6. Response: Responses to the noise related items in the Hammocks letter are included at the end of this Appendix.

7. Request: What is the maximum size and weights of aircraft permitted to operate at the airport? What are their policies, procedures and aircraft training required?

7. Response: Runway 9L-27R and 9R-27L have an airport reference code of D-III. This means that the runways have the appropriate clearances and safety areas to support aircraft with approach speeds up to 165 knots and wingspans less than 118 feet. The runway pavement strength provides for aircraft up to 65,000 pounds in a single gear landing configuration, 110,000 pounds for aircraft in a dual wheel configuration, and 195,000 pounds in a dual tandem gear configuration. These criteria allow the airport to serve operations by most large business jet aircraft such as the Gulfstream V as well as occasional operations by the largest aircraft in the business jet fleet including the Boeing Business Jet or the Global Express.

8. Request: What is the benefit to homeowners in West Kendall to allow/have the test runway operate?

8. Response: There is no specific test runway at TMB. At times, certain aircraft fly approaches to runways to test equipment. As stated previously, the airport

is required by Federal law to remain open to any and all users without mandatory restrictions.

9. Request: Can Homestead Air Reserve Base be open to touch and go training traffic and encourage flight schools at Kendall/Tamiami to use this?

9. Response: Given the high performance military aircraft that use the base, as well as for government security reasons, the use of Homestead Air Reserve Base for touch and go flight training is not an option.

Responses to Hammocks Community Association Letter

The letter from the Hammocks Community Association addressed to the Miami-Dade Aviation Department, dated August 18, 2008, includes a number of areas of concern. As the focus of this study is noise, those questions raised in the letter regarding noise are addressed below.

1. Request: Sound meters need to be installed in our community to verify that airplanes are not violating FAA and agreed upon noise abatement policies.

1. Response: MDAD currently has an Aircraft Noise and Operations Monitoring System (ANOMS). The ANOMS system allows MDAD to view and record aircraft flight tracks and altitudes for aircraft that operate at its airports (including TMB). MDAD should continue to use its current ANOMS system to view and record aircraft flight tracks, and to use the ANOMS to respond to citizen complaints. In addition, all noise abatement recommendations are voluntary and as per Federal law, penalties or fines cannot be imposed by MDAD. However MDAD will continue to use the ANOMS system to check for general compliance with the recommendations.

2. Request: Airport walls need to be modified to minimize noise coming from the airport, similar to what Miami Airport has done to help the communities reduce the noise level.

2. Response: A noise barrier is an obstruction to the path of sound transmission. Barriers can include walls, earth mounds (or berms), buildings, or dense landscaping. In the case of barriers, neighbors are shielded from the noise source as long as the barrier is solid and sufficiently breaks the line-of-sight from the noise source to the listener. Barriers can potentially provide noise reduction benefits for communities near an airport from aircraft

ground operations. Once an aircraft becomes airborne and there is a direct line of sight from the aircraft to the receiver, barriers have no further effect.

To be effective, a barrier needs to be close to the source of noise (aircraft) and/or close to the receiver (noise sensitive site). A good example of effective barriers is their construction along interstate highways (barrier close to the source and receiver). With respect to aircraft, due to aircraft operational safety requirements, barriers cannot be constructed very close to the source (aircraft). For placing barriers close to the receiver, the distance from the source of noise at TMB is so far that a barrier would be ineffective.

3. Request: Communities directly around and under the path of airplanes need to have the ability to secure funding (which should be allocated because of the expansion) for their homes to have upgrades, which would minimize the noise coming into their homes (added insulation in walls, etc.).

3. Response: The FAA offers funding for sound insulation of residences that are exposed to high noise levels. The FAA uses the 65 DNL contour line as the limits for sound insulating residences. No residences are located within the 65 DNL contour at TMB.

4. Request: Prohibit "Early Crosswind Turns" after departure.

4. Response: The study recommends no turns to the crosswind leg prior to reaching 1,000 feet for piston aircraft and 1,500 feet for high performance aircraft conducting touch and go training at TMB, when weather, air traffic, and safety conditions permit.

5. Request: An implementation of improved noise monitoring would assist surrounding communities in better identifying the issues affecting their community. A tool such as the one on the Boca Raton Airport website should be implemented at TMB.

5. Response: MDAD currently has an Aircraft Noise and Operations Monitoring System (ANOMS). The ANOMS system allows MDAD to view and record aircraft flight tracks and altitudes for aircraft that operate at its airports (including TMB). The Passur type system that is shown on the

Boca Raton website is proprietary software that shows real time (with a short delay) aircraft flight tracks via the internet. This system is very expensive. The airport proprietor that purchases this software pays a monthly fee of around $3,000, or approximately $36,000 per year. MDAD should continue to use its current ANOMS system to view and record aircraft flight tracks, and to use the ANOMS to respond to citizen complaints. Due to the high costs, a Passur type system is not recommended at this time.

APPENDIX B

Aircraft Fleet Mix, Runway Use, and INM Flight Tracks

TABLE B-1
DAILY AVERAGE GENERAL AVIATION OPERATIONS (2008)

Aircraft Category	INM Aircraft	Aircraft Type	Daytime Operations	Nighttime Operations	Total
Single Piston	CNA172	Cessna 172	58.95	3.11	62.06
	CNA206	Cessna Staionair	15.03	0.79	15.82
	GASEPF	Single Piston - Fixed Pitch Prop	10.97	0.57	11.54
	GASEPV	Single Piston - Variable Pitch Prop	47.80	2.50	50.29
	CNA20T	Turbo Stationair	2.34	0.12	2.46
Twin Piston	BEC58P	Beech Baron	55.28	2.94	58.23
	DC3	Douglas DC-3	0.05	0.00	0.05
	DC6	Douglas DC-6	0.01	0.00	0.02
Turboprop	CNA441	King Air	28.67	1.53	30.20
	DHC6	DeHavilland DASH-6	25.99	1.41	27.39
	EMB120	Embraer Brasilia	0.77	0.04	0.81
	SD330	Shorts SD330	0.73	0.04	0.77
	DHC8	DeHavilland DASH-8	0.30	0.02	0.32
	HS748A	Hawker Sidley 748	0.22	0.01	0.24
	SF340	SAAB SF-340	0.34	0.02	0.35
Jet	CIT3	Citation 3	5.23	0.31	5.54
	CL600	Challenger, Falcon 2000	4.33	0.23	4.57
	CL601	Canadair Regional Jet	0.17	0.01	0.18
	CNA500	Citation I	9.35	0.49	9.84
	CNA55B	Citation II	9.49	0.50	9.99
	CNA750	Citation X	0.70	0.04	0.73
	FAL20	Falcon 20	0.35	0.02	0.37
	FAL50	Falcon 50, 900	2.24	0.12	2.36
	GII	Gulfstream II	0.50	0.03	0.52
	GIIB	Gulfstream IIB	0.17	0.01	0.18
	GIV	Gulfstream IV	1.15	0.06	1.21
	GV	Gulfstream V	0.42	0.02	0.44
	IA1125	Westwind 24,25	2.14	0.12	2.25
	LEAR25	Learjet 24, 25	4.30	0.23	4.53
	LEAR35	Learjet 35,45,55	29.14	1.62	30.76
	MU3001	Mitsubishi Diamond	9.45	0.49	9.94
Helicopter	B206L	Bell Jetranger	23.65	1.52	25.08
	BO105	Bell 412	18.45	1.19	19.64
	H500D	Hughes 500	8.20	0.53	8.73
	S76	Sikorsky S-76	1.03	0.01	0.12
Total			**388.80**	**21.25**	**410.05**

Numbers may not sum due to rounding
Source: ESA Airports

TABLE B-2
DAILY AVERAGE ITINERANT MILITARY OPERATIONS (2008)

Aircraft Category	INM Aircraft	Aircraft Type	Daytime Operations	Nighttime Operations	Total
Turboprop	C-12	Military Super King Air	0.02	0.00	0.02
Jet	C-20	Military Gulfstream	0.01	0.00	0.01
	C-21A	Military Learjet 35	0.01	0.00	0.01
	T-1	Lockheed Sea Star	0.02	0.00	0.02
Helicopter	SA365N	Aerospatiale Dauphin	0.11	0.01	0.12
Total			**0.17**	**0.01**	**0.40**

Numbers may not sum due to rounding
Source: ESA Airports

TABLE B-3
DAILY AVERAGE LOCAL FLIGHT TRAINING OPERATIONS (2008)

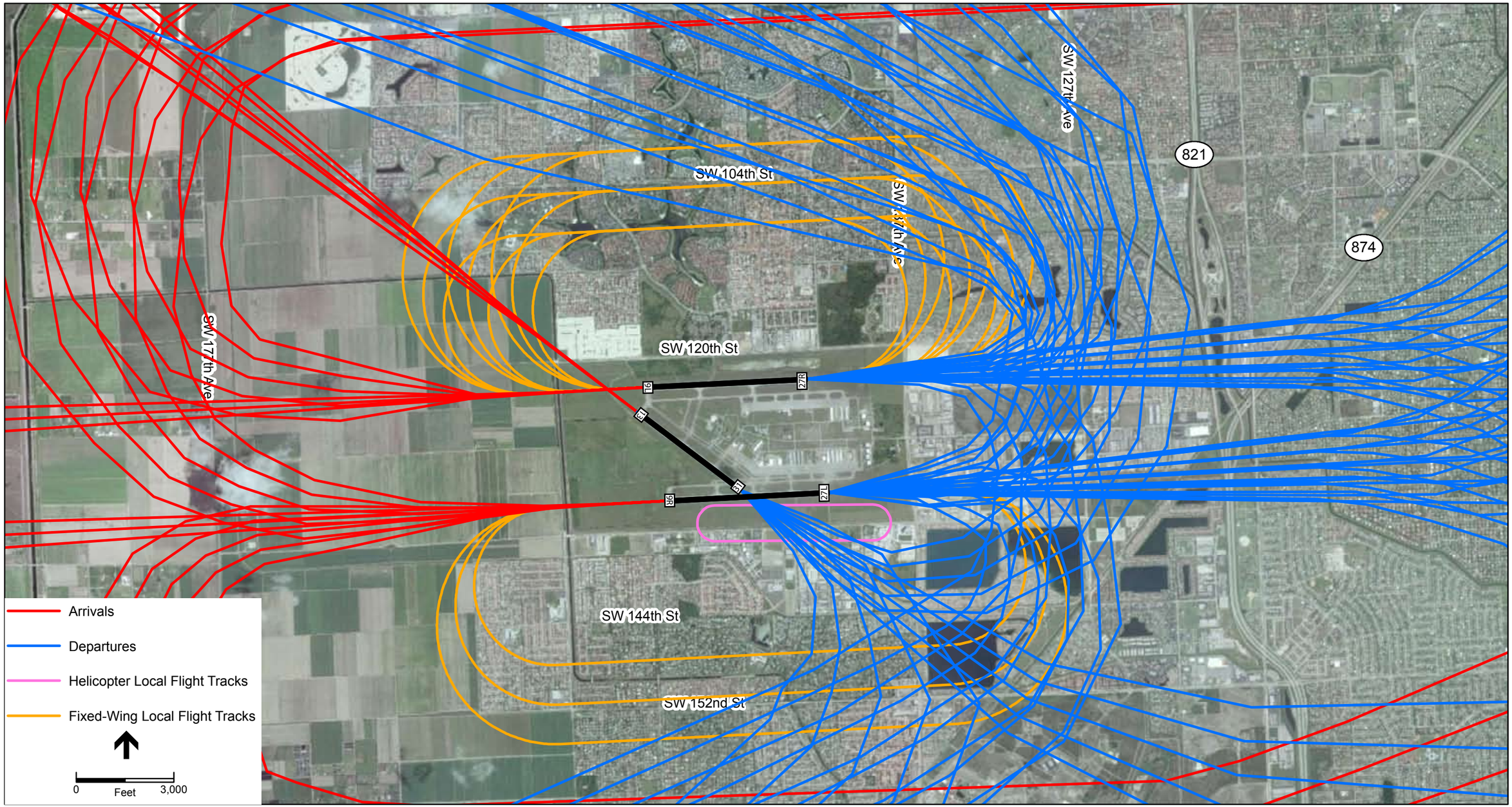
Aircraft Category	INM Aircraft	Aircraft Type	Daytime Operations	Nighttime Operations	Total
Single Piston	GASEPV	Single Piston - Variable Pitch Prop	14.57	minimal	14.57
	CNA172	Cessna 172	116.62	minimal	116.62
	CNA152	Cessna 152	200.45	minimal	200.45
Twin Piston	BEC58P	Beech Baron	32.80	minimal	32.80
				minimal	
Helicopter	H500D	Hughes 500	54.79	minimal	54.79
	B206L	Bell Jetranger	35.61	minimal	35.61
	SA365N*	Aerospatiale Dauphin (Coast Guard)	0.36	minimal	0.36
	BO105*	Bell 412	0.34	minimal	0.34
Total			**455.54**	**0.00**	**455.54**

* Denotes Military
Numbers may not sum due to rounding
Source: ESA Airports

TABLE B-4
2008 RUNWAY USE PERCENTAGES

Flow	Runway	Arrivals		Departures	
		Day	Night	Day	Night
		Jet			
East	9R	73.0	76.0	52.0	70.0
	9L	2.0	0.0	23.0	0.0
	13	1.0	5.0	4.0	10.0
West	27L	22.0	17.0	19.0	19.0
	27R	1.0	0.0	1.0	0.0
	31	1.0	2.0	1.0	1.0
Total		100.0	100.0	100.0	100.0
		Turboprop			
East	9R	62.0	87.0	38.0	79.0
	9L	5.0	0.0	34.0	0.0
	13	10.0	3.0	6.0	0.0
West	27L	15.0	10.0	13.0	18.0
	27R	3.0	0.0	2.0	0.0
	31	5.0	0.0	7.0	3.0
Total		100.0	100.0	100.0	100.0
		Piston			
East	9R	58.0	85.0	37.0	65.0
	9L	10.0	0.0	32.0	0.0
	13	12.0	1.0	9.0	14.0
West	27L	12.0	12.0	9.0	11.0
	27R	4.0	0.0	4.0	0.0
	31	4.0	2.0	9.0	10.0
Total		**100.0**	**100.0**	**100.0**	**100.0**

Source: ESA Airports

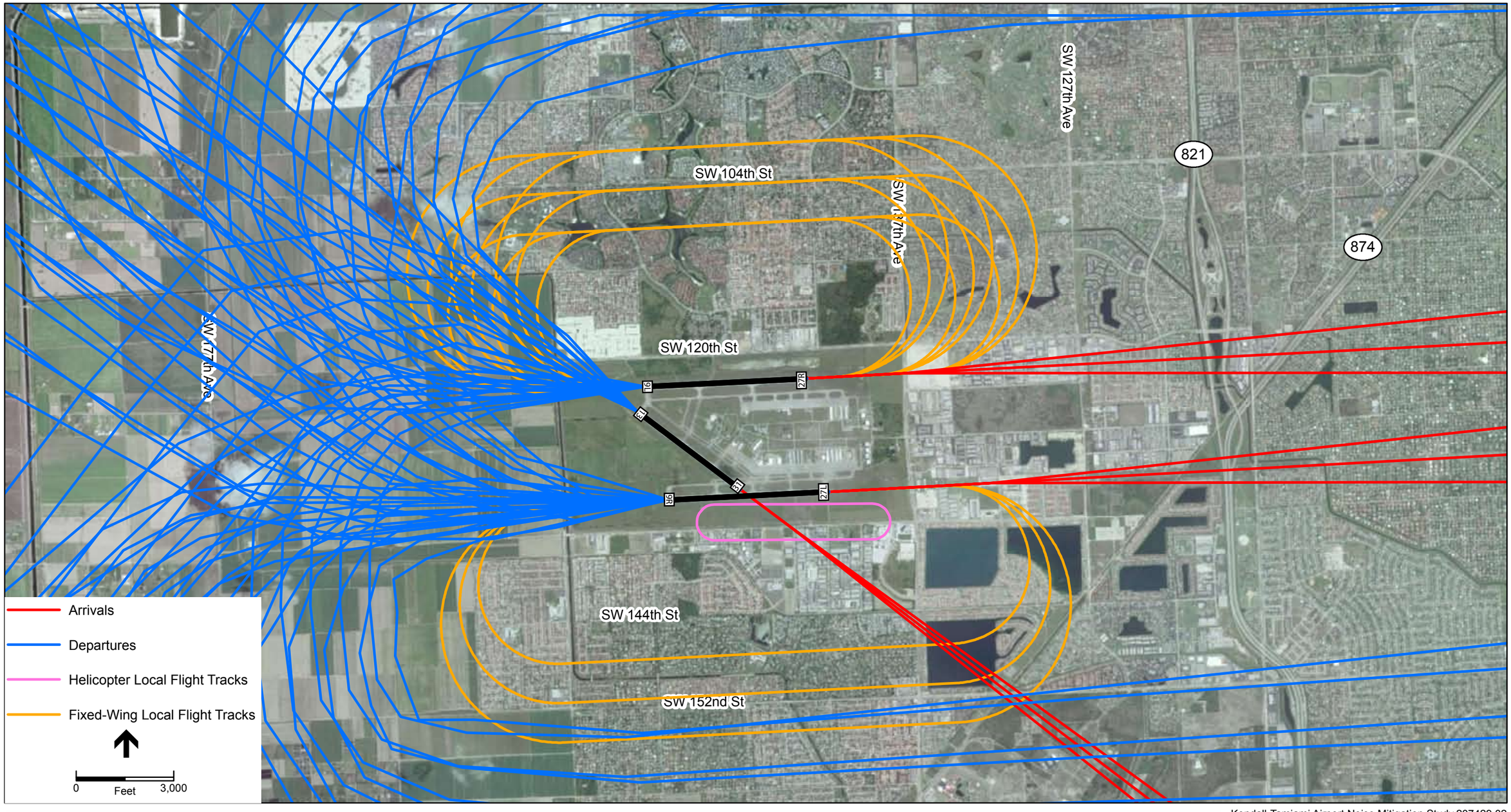


SOURCE: ESA Airports, INM 7.0a, GlobeXplorer (05-08-2007)

Kendall-Tamiami Executive Airport Noise Mitigation Evaluation.207429.02

Exhibit B-1

East Flow INM Flight Tracks

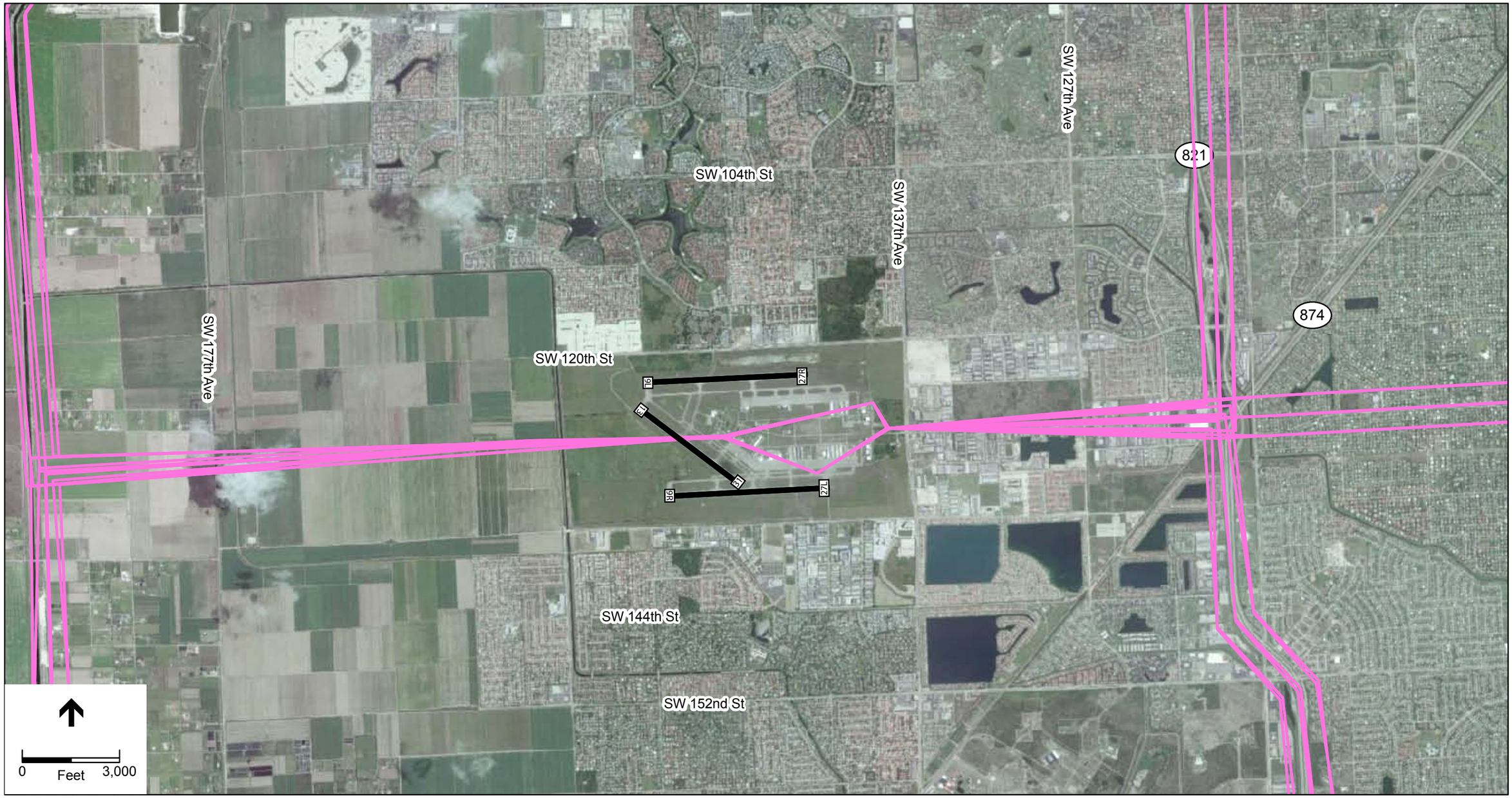


SOURCE: ESA Airports, INM 7.0a, GlobeXplorer (05-08-2007)

Kendall-Tamiami Airport Noise Mitigation Study.207429.02

Exhibit B-2

West Flow INM Flight Tracks



SOURCE: ESA Airports, INM 7.0a, GlobeXplorer (05-08-2007)

Exhibit B-3
Helicopter Flight Tracks

APPENDIX C

Aircraft Owners and Pilots Association (AOPA) Noise Reduction Recommendations

PART 1: Airport Noise

Airport safety, noise, and land use planning go hand in hand. The problem has been, in the past, that most elected officials and airport sponsors just didn't understand this interaction. Even today, many of these decision-makers still don't understand these important issues or their responsibility to the airport and their communities. Many of the problems existing at airports today are the direct result of poor or nonexistent airport land use planning decisions made by elected officials.

Although many who complain about airports cite aircraft noise as disturbing them, the reality of their complaints is often based on fear - if they can hear an airplane, it must be too close to them. If those responsible for administering land use in areas surrounding their airport facility had implemented a long-term approach to responsible land use zoning of areas surrounding the airport, many of the problems experienced by airports and their users simply wouldn't exist in today's world. Responsible land use planning is simply a fair way to protect both the interests of the airport and the community surrounding the airport. Almost every concern a community expressed about an airport relating to noise and safety could be eliminated with responsible land use planning.

Noise: A Matter of Perception

The drone of an airplane overhead may be music to your ears, but for the slumbering non-flier next door, it can be as grating as the gleeful band of trash collectors seeking to finish a day's work between 5 and 6 a.m.

As cities and suburbs have spread, airports and residences have become increasingly wedged together. Saying "the airport was here first" presents an unconvincing argument to homeowners and apartment dwellers who have established their homes a mile from the departure end of a runway. Maybe they knew the airport was there and felt it would be no problem. Others acquired housing ignorant of the nearby airfield. Regardless of who was there first, the airport or the housing development, perceived aircraft noise is a problem that, unless addressed and mitigated, could create an intolerable situation for both the airport and the surrounding community.

Most people can live with airplane noise - particularly the sounds generated at a general aviation airport. Those sounds are less obnoxious than the cacophony of trucks, sirens, construction sites, and motorcycles that one confronts walking down a street.

For some people, the intrusion of airplane sounds into their home, particularly late at night, is a source of irritation that becomes magnified because airplanes are conspicuous, unfamiliar, and perceived by some as unnecessary. In some cases, people may also transfer a subconscious fear of an airplane crash in their neighborhood into anxiety over the airplane's noise.

Those people who find aircraft sounds offensive have been mounting surprisingly effective fights to get at the source of their frustration. Their efforts are leading to bans on jet flights, night closings or "curfews," and restrictions on flight training at airports.

The FAA has set standards for machines that fly, and all users of airspace agree noise standards or limitations should be applied uniformly throughout the country. Most pilots would also argue any noise standards set in a community should be applied equally and fairly to all noise sources - not just airplanes.

This section of the packet provides information about aircraft noise levels and compares aircraft noise to other noise sources.

Description of Noise

Noise is, very simply, unwanted sound or any undesirable sound interfering with normal speech and hearing or sound that is intense and annoying. The best way to describe noise and the problems relating to each individual's response to noise is to view airport noise as a system of integral parts including, but not limited to, the following:

- Nature and intensity.
- Number and fleet mix of aircraft using the airport.
- Distribution of operations among runways.
- Arrival and departure flight patterns.
- Time of day.
- Adjacent land uses, meaning compatible use vs. non-compatible use.
- Background or ambient noise levels in adjacent residential communities.

Each one of these factors plays a major role in the definition of the overall airport noise impact.

There are no less than 25 different methods to define noise; however, the aviation industry uses four basic methodologies to specifically describe aircraft noise:

1. dBA

A-weighted sound level (using a decibel base) that discriminates against lower frequencies according to a relationship approximating the auditory sensitivity of the human ear. In short, it is a unit that measures the intensity of a sound in comparison to the lowest volume detectable to the human ear.

2. EPNdB

Effective perceived noise levels measured in decibels, which provides a subjective assessment of the human perception of the noisiness of the aircraft.

3. SEL

Single event level measures the precise dBA of one activity and considers duration and frequency. The noise produced by an individual aircraft overflight, takeoff, or landing is usually measured in SEL.

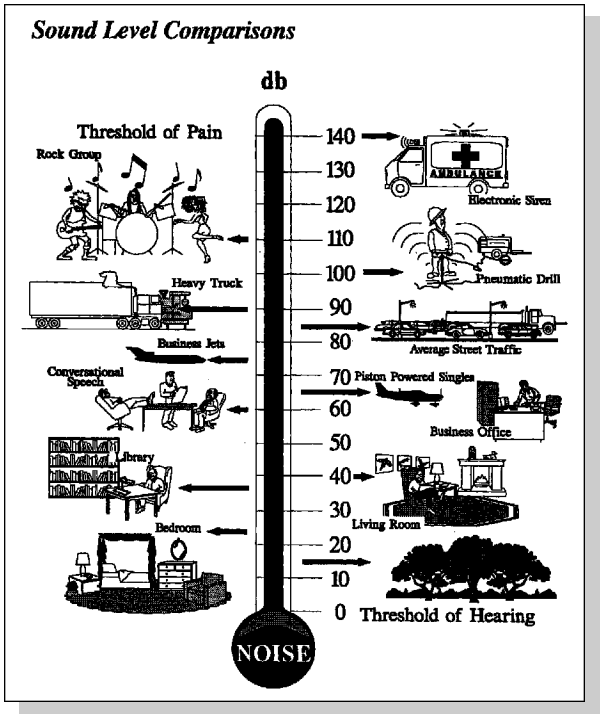
4. Lmax

Maximum noise level, or Lmax, is the maximum sound level, expressed in dBA, that occurs during a single noise event.

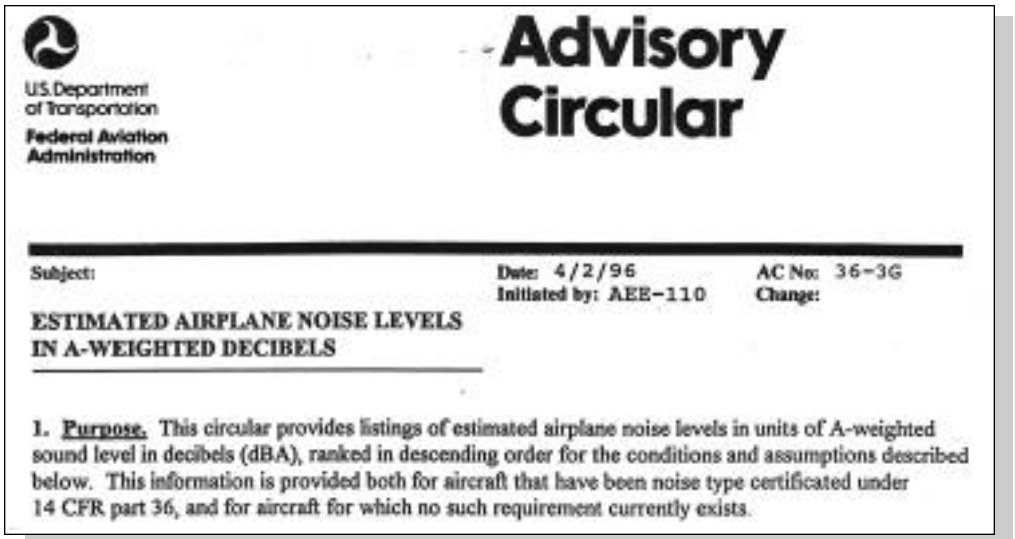
5. Ldn/DNL[1]

Day-night average sound level defines the average A-weighted sound level during a 24-hour period, with a 10-dBA penalty applied to nighttime sound levels (10 p.m. to 7 a.m.), and is applicable to the measurement of all community noise sources.

1 The community noise equivalent level (CNEL) is an additional penalty applied to nighttime noise in states such as California, which require use of CNEL for state environmental analysis. CNEL is identical to DNL, except that CNEL applies a 5-dBA penalty for noise occurring between 7 p.m. and 10 p.m.



The preceding illustration depicts sound level comparisons from absolute quiet to the threshold of pain. These noise levels are encountered in the average environment on a daily basis. By comparing the noise levels indicated for general aviation aircraft to the "noise thermometer," one can clearly see where general aviation aircraft fit into the overall noise picture.



U.S. Department of Transportation
Federal Aviation Administration

Advisory Circular

Subject: ESTIMATED AIRPLANE NOISE LEVELS IN A-WEIGHTED DECIBELS

Date: 4/2/96 Initiated by: AEE-110 AC No: 36-3G Change:

1. Purpose. This circular provides listings of estimated airplane noise levels in units of A-weighted sound level in decibels (dBA), ranked in descending order for the conditions and assumptions described below. This information is provided both for aircraft that have been noise type certificated under 14 CFR part 36, and for aircraft for which no such requirement currently exists.

FAA Advisory Circular (AC) 36-3G is a compilation of aircraft noise generation for takeoff and approach configurations of various makes and models of aircraft. The circular provides listings of estimated airplane noise levels in units of A-weighted sound level in decibels (dBA), ranked in descending order for the conditions and assumptions described in the AC. The information is provided both for aircraft that have been noise type certificated under CFR 14, Part 36, and aircraft for which no such requirement currently exists. All stipulations presented in the text of this AC are applicable to dBA noise levels. The circular also dictates specific placement criteria for noise monitors used during the aircraft noise data collection process. Located in this excellent reference is information such as the noise level of a Concorde taking off, 112.9 dBA; the older 747-100, 100.5 dBA; while the Cessna 152 and the Bellanca 7GCAA only 55.0 dBA and 51.0 dBA, respectively. On the other hand, a heavy truck passing by or the average street traffic can generate 85-90 dBA. Who makes more noise? It is a matter of perception and familiarity.

Manufacturer	Designation	dBA Takeoff	dBA Landing
Reciprocating Engine Category			
Beechcraft	Baron (BE55)	63.0	72.1
	Bonanza (BE35/36)	61.0	65.2
	Duke	63.0	80.0
	Duchess (BE76)	62.0	71.0
Bellanca	Citabria (CH10)	51.0	60.0
	Decathlon (BL30)	58.0	62.0
	Viking (BL26)	65.0	64.0
Cessna	Centurion (C210)	63.0	64.0
	Cessna 150 (C150)	56.0	59.0
	Cessna 152 (C152)	55.0	59.0
	Cessna 170	68.0	61.0
	Cessna 310 (C310)	65.0	73.7
	Cessna 401 (C401)	67.0	74.0
	Cessna 414 (C414)	67.0	73.0
	Skyhawk (C172)	63.0	62.0
	Skylane (C182)	69.0	56.0
	Skymaster (C336)	70.0	72.0
Mooney	Mark 10 (MO10)	68.0	62.0
	Mark 20 (MO20)	65.0	62.0
Piper	Aztec (PA27)	68.0	64.0
	Cherokee (PA28)	60.0	61.0
	Arrow (PARO)	63.0	62.0
	Cherokee Six (PA32)	61.0	64.0
	Cub (PA2)	51.0	59.7
	Seminole (PA44)	62.0	71.0
	Seneca (PASE)	64.0	73.0
	Tomahawk (PA38)	56.0	60.0
	Tripacer/Colt (PA22)	52.0	61.2
	Navajo (PA31)	62.8	72.8
	Chiefton (PA31-350)	70.0	74.0

The noise levels presented in the circular are associated with the aircraft certification process and are NOT INTENDED TO BE USED BY AIRPORT OPERATORS to make arbitrary assessments of which aircraft are and are not suitable for access to the airport. Individual site-specific studies of airport noise are performed under the authority of Federal Aviation Regulations (FAR) Part 150 and are most often federally funded. Within these studies, Noise Exposure Maps (NEMs) are developed, illustrating the most noise-impacted areas surrounding the airport. A more detailed description of the Part 150 process is provided in **"Appendix 1: Final Policy on Part 150 Approval of Noise Mitigation Measures: Effect on the Use of Federal Grants for Noise Mitigation Projects,"** (p. 22).

U.S. Department of Transportation
Federal Aviation Administration

Federal Aviation Regulations

Part 150
Airport Noise Compatibility Planning

In Appendix A of FAR Part 150, land use compatibility with various sound levels is presented in table format. For example, residential land use is considered only compatible with noise levels under 65 Ldn. Commercial land uses, such as bus transfer stations and retail spaces, can be compatible with higher noise levels between 70-75 Ldn. The loudest noise areas at 85 Ldn and above are only compatible with land uses such as mining and forestry. In short, without an accurate and site-specific noise study, including an NEM, the airport will find itself trying to cure an "unidentified disease" with possibly the "wrong medicine."

TABLE 1

LAND USE COMPATIBILITY* WITH YEARLY DAY-NIGHT AVERAGE SOUND LEVELS

Land Use	*Yearly Day-Night Average Sound Level (L_{dn}) in Decibels*					
	Below 65	*65-70*	*70-75*	*75-80*	*80-85*	*Over 85*
Residential						
Residential, other than mobile homes and transient lodgings	Y	N(1)	N(1)	N	N	N
Mobile home parks	Y	N	N	N	N	N
Transient lodgings	Y	N(1)	N(1)	N(1)	N	N
Public Use						
Schools	Y	N1)1	N(1)	N	N	N
Hospitals and nursing homes	Y	25	30	N	N	N
Churches, auditoriums, and concert halls	Y	25	30	N	N	N
Governmental services	Y	Y	25	30	N	N
Transportation	Y	Y	Y(2)	Y(3)	Y(4)	Y(4)
Parking	Y	Y	Y(2)	Y(3)	Y(4)	N
Commercial Use						
Offices, business and professional	Y	Y	25	30	N	N
Wholesale and retail—building materials, hardware and farm equipment	Y	Y	Y(2)	Y(3)	Y(4)	N
Retail trade—general	Y	Y	25	30	N	N
Utilities	Y	Y	Y(2)	Y(3)	Y(4)	N
Communication	Y	Y	25	30	N	N
Manufacturing And Production						
Manufacturing, general	Y	Y	Y(2)	Y(3)	Y(4)	N
Photographic and optical	Y	Y	25	30	N	N
Agriculture (except livestock) and forestry	Y	Y(6)	Y(7)	Y(8)	Y(8)	Y(8)
Livestock farming and breeding	Y	Y(6)	Y(7)	N	N	N
Mining and fishing, resource production and extraction	Y	Y	Y	Y	Y	Y
Recreational						
Outdoor sports arenas and spectator sports	Y	Y(5)	Y(5)	N	N	N
Outdoor music shells, amphitheaters	Y	N	N	N	N	N
Nature exhibits and zoos	Y	Y	N	N	N	N
Amusements, parks, resorts and camps	Y	Y	Y	N	N	N
Golf courses, riding stables and water recreation	Y	Y	25	30	N	N

Numbers in parentheses refer to notes.

* The designations contained in this table do not constitute a Federal determination that any use of land covered by the program is acceptable or unacceptable under Federal, State, or local law. The responsibility for determining the acceptable and permissible land uses and the relationship between specific properties and specific noise contours rests with the local authorities. FAA determinations under Part 150 are not intended to substitute federally determined land uses for those determined to be appropriate by local authorities in response to locally determined needs and values in achieving noise compatible land uses.

KEY TO TABLE 1

SLUCM	Standard Land Use Coding Manual.
Y (Yes)	Land Use and related structures compatible without restrictions.
N (No)	Land Use and related structures are not compatible and should be prohibited.
NLR	Noise Level Reduction (outdoor to indoor) to be achieved through incorporation of noise attenuation into the design and construction of the structure.
25, 30, or 35	Land used and related structures generally compatible; measures to achieve NLR or 25, 30, or 35 dB must be incorporated into design and construction of structure.

Without the aid of a federally funded noise compatibility study, many airports must rely on the use of the land use planning tools (see "Part 2: Airport Compatible Land Use") and, most importantly, the support of airport users.

Airport Noise: We Can Make a Difference

Through a concerted effort, and by demonstrating your sensitivity to the concerns expressed by the community as it relates to airport noise, your relationship with those affected by airport noise can be significantly improved. We must be willing to VOLUNTARILY take the steps necessary to be thoughtful to our fellow community members. Should voluntary efforts not be considered important to the airport, you may find your airport facing local legislation to fix the problem, and this solution isn't always in the best interest of the airport or its users.

Several noise control strategies can be used from an operational standpoint. They include designated ground runup areas, the use of preferential runways when applicable, use of maps displaying noise-sensitive areas, specific pattern procedures and altitudes, and maximum safe climb on takeoff. More specifically, the following ideas might be applied voluntarily to improve the noise impact at your local airport once you know where the noise-sensitive areas are located:

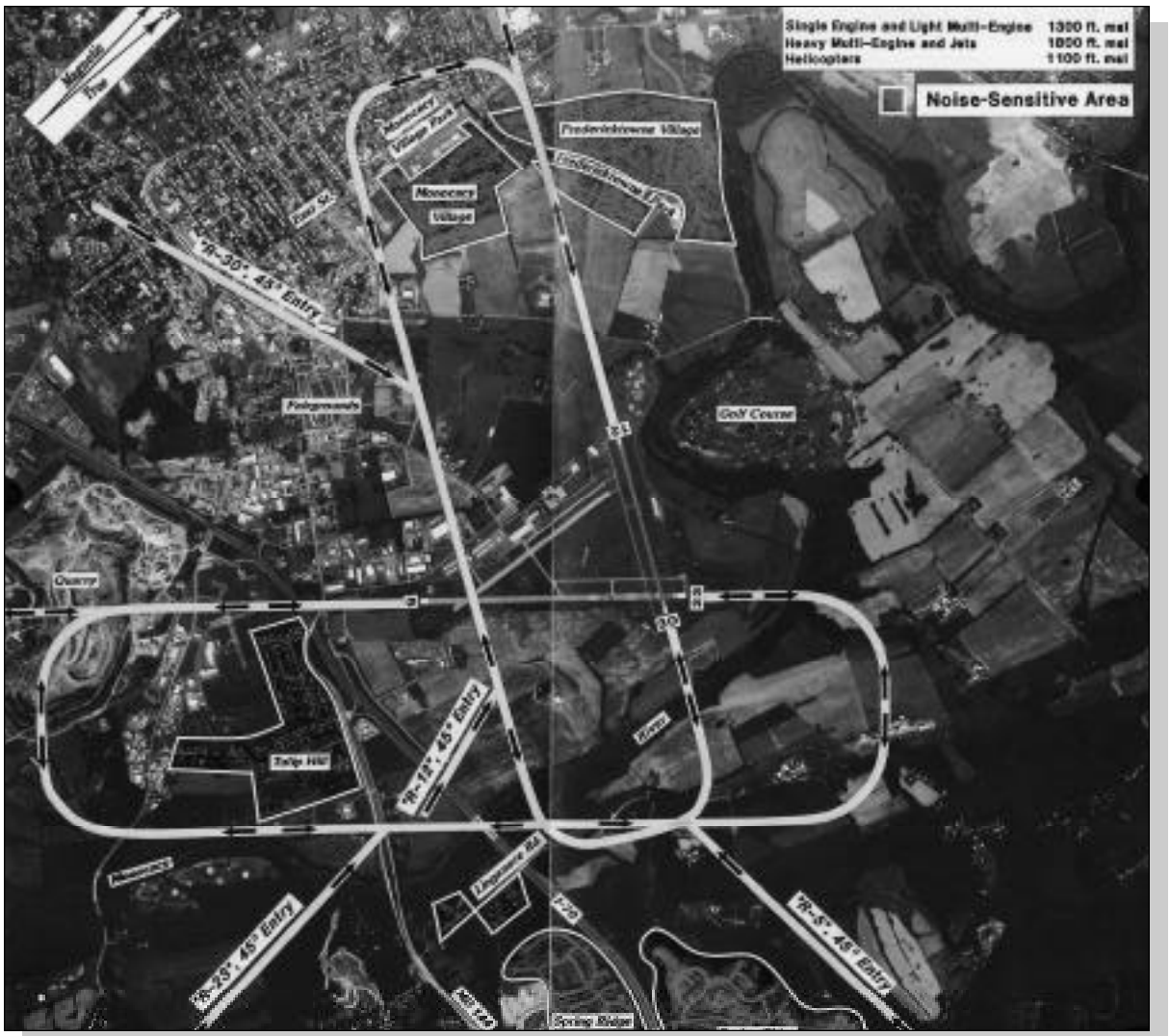
- Decide to undertake a noise-control planning effort.
- Use basic noise-control planning that should sequentially identify the noise problem.
- Address funding issues.
- Set up a working team composed of airport management, airport users, and representatives of the community concerned about the noise.

Subsequent steps could include defining the role of the team members and the scope of the planning effort, considering noise control opportunities, evaluating possible mitigation measures, creating a final plan, and ,of course, adopting and implementing it.

What Can We Do?

As Pilots—

- Be aware of noise-sensitive areas, particularly residential areas near airports you use, and avoid low flight over these areas.
- Educate yourself on any voluntary noise arrival and departure procedures that have been developed at the airport; this could include specific traffic patterns and altitudes. These procedures are normally created in coordination with local pilots to safely minimize noise impacts to the surrounding communities.
- In constant-speed-propeller aircraft, do not use high rpm settings in the pattern. Prop noise from high-performance singles and twins increases drastically at high rpm settings.
- On takeoff, reduce to climb power as soon as safe and practical.
- Climb after liftoff at best-angle-of-climb speed until crossing the airport boundary, then climb at best rate.
- Depart from the start of the runway, rather than intersections, for the highest possible altitude when leaving the airport vicinity.
- Climb out straight ahead to 1,000 feet or so (unless that path crosses a noise-sensitive area). Turns rob an aircraft of climb ability.
- Avoid prolonged runups, and if possible, do them inside the airport area, rather than at its perimeter.
- Try low-power approaches, and always avoid the low, dragged-in approach.
- If you want to practice night landings, stay away from residential airports. Do your practice at major fields where a smaller airplane's sound is less obtrusive.



Courtesy of City of Frederick, MD

As Flight Instructors—

- Teach noise abatement procedures to all students, including pilots you take up for a biennial flight review. Treat noise abatement as you would any other element of instruction.
- Know noise-sensitive areas, and point them out as you come and go with students.
- Make sure that your students fly at or above the recommended pattern altitude.
- Practice maneuvers over unpopulated areas and vary your practice areas so that the same locale is not constantly subjected to aircraft operations.
- During practice of ground-reference maneuvers, be particularly aware of houses, schools, or any other noise-sensitive areas in your flight path.
- Stress that high-rpm prop settings are reserved for takeoff and for short final but not for flying the pattern. Pushing the prop to high rpm results in significantly higher levels of noise.
- If your field is noise sensitive, endorse your students' logbooks for landing at a more remote field, if available within a 25-nm range, to reduce touch-and-go activity at your airport.

As Fixed-Base Operators—

- Identify noise-sensitive areas near your airport, and work with your instructors and customers to create voluntary noise abatement procedures.
- Post any noise abatement procedures in a prominently visible area, and remind pilots who rent your aircraft or fly from your airport of the importance of adhering to them.
- Mail copies of noise abatement procedures with monthly hangar and tiedown bills. Make copies available on counter space for transient pilots.
- Assure your instructors are teaching safe noise abatement techniques.
- Call for use of the least noise-sensitive runway whenever wind conditions permit.
- Try to minimize night touch-and-go training at your airport if it is in a residential area. Encourage the use of nonresidential airports for this type of training operation.
- Initiate pilot education programs to teach and explain the rationale for noise abatement procedures and positive community relations.

For the Surrounding Community—

- Send a copy of the noise abatement procedure established for your airport, along with a brief explanation of its purpose, to the local newspaper. Let the public know PILOTS ARE CONCERNED.
- Ensure the pattern, approach, and departure paths are designated on official ZONING AND PLANNING MAPS so real estate activity is conducted in full awareness of such areas.
- Lobby for land use zoning and building codes in these areas that are compatible with airport activity and will protect neighboring residents.
- Stress, publicize, and communicate the value of the airport to the community and how its operation adds to the safety, economy, and overall worth of the area.
- Sponsor “airport days” at the airport to involve nonfliers with the business and fun of aviation and possibly attract potential new pilots.
- Encourage beautification projects at the airport. Trees and bushes around the runup and departure areas have proven effective in absorbing ground noise from airplanes.

FAA Noise Policies

The FAA’s mission is the development and maintenance of a safe, efficient, and environmentally compatible air transportation system. Since 1968 with an amendment to the Federal Aviation Act of 1958, the FAA has been authorized to develop both noise regulations and standards; aircraft noise issues have been a major factor in the success of FAA’s mission. Under the legislation, the FAA had to respond to Congress and industry in three basic areas:

1. Control of noise at the source - the aircraft itself.
2. Control of air traffic into and out of airports.
3. Technical and financial assistance to airport sponsors for airport noise and compatible land use planning.

The success of any airport noise program is contingent upon a cooperative working relationship amont the airport sponsor, local government, users of the airport, and the adjacent community. Without this vital relationship, the airport noise problem remains just that - a problem.

To this end, the FAA has developed guidelines and regulations to foster this cooperative effort while establishing a systematic policy addressing the issue of controlling noise. A few of the major FAA regulations and advisory circulars include the following documents:

1A. Federal Aviation Regulations Part 150, "Airport Noise Compatibility Planning." Established in 1983, this FAR implements Title I of the Airport Safety and Noise Abatement Act (ASNA) of 1979 by establishing regulations for airport operators who elect to develop an airport noise compatibility plan.

AVIATION SAFETY AND NOISE ABATEMENT ACT OF 1979

Public Law 96–193; 94 Stat. 50; 49 U.S.C. App. 2101 et seq.

AN ACT To provide assistance to airport operators to prepare and carry out noise compatibility programs, to provide assistance to assure continued safety in aviation, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, **That this Act may be cited as the "Aviation Safety and Noise Abatement Act of 1979".**

AIRPORT NOISE AND CAPACITY ACT OF 1990 [1]

SEC. 9301. SHORT TITLE.

This subtitle may be cited as the "Airport Noise and Capacity Act of 1990". [49 U.S.C. App. 2151 note]

SEC. 9302. FINDINGS.

The Congress finds that—

(1) aviation noise management is crucial to the continued increase in airport capacity;

(2) community noise concerns have led to uncoordinated and inconsistent restrictions on aviation which could impede the national air transportation system;

(3) a noise policy must be implemented at the national level;

(4) local interest in aviation noise management shall be considered in determining the national interest;

(5) community concerns can be alleviated through the use of new technology aircraft, combined with the use of revenues, including those available from passenger facility charges, for noise management;

(6) federally controlled revenues can help resolve noise problems and carry with them a responsibility to the national airport system;

1B. In FY 1992, the FAA began administering new FAR Part 161, which was issued in 1991. Part 161 implements provisions of the Airport Noise and Capacity Act of 1990 (ANCA) by establishing a national program for reviewing airport noise and access restrictions on Stage 2 and Stage 3 aircraft operations. Part 161 also advises airport operators on how ANCA and Part 161 apply to the airport noise compatibility planning process conducted under FAR Part 150.

2. Advisory Circular 150/5020-1, "Noise Control and Compatibility Planning For Airports" (1983).
3. Advisory Circular 36-1G, "Noise Levels for U.S. Certification and Foreign Aircraft" (1997).
4. Advisory Circular 36-3G, "Estimated Airplane Noise Levels in A-Weighted Decibels" (1996).
5. Advisory Circular 36-4B, "Noise Certification Handbook" (1988).
6. Advisory Circular 91-36C, "Visual Flight Rules (VFR) Near Noise-Sensitive Areas" (1984).
7. FAR Part 36 - specifies maximum noise levels for turbojet aircraft during approach, takeoff and along the runway sideline.
8. Advisory Circular 91-53A, "Noise Abatement Departure Profiles" (1993).
9. Federal Aviation Administration - Southern Region, "Land Use Compatibility and Airports," September 1999. (http://www.faa.gov/arp/app600/5054a/landuse.htm).

The objectives of each of the above documents are to reduce and prevent noncompatible land uses around airports, establish standardized methods of measuring aircraft noise, and provide specific guidelines to evaluate land use compatibility.