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***CHAPTER 4.0 – ENVIRONMENTAL OVERVIEW***

## **4.0 ENVIRONMENTAL OVERVIEW**

### **4.1 INTRODUCTION**

This Master Plan environmental overview provides Federal, State and local officials as well as the general public with an understanding of the potential environmental impacts of proposed development at the Delaware Municipal Airport. The objective of this process is to enhance the quality of the environment and to ultimately avoid or minimize, where it is feasible, adverse impacts that may result from the proposed development.

This Master Plan analysis has been modeled after the format and content of an Environmental Assessment, as described in FAA Order 5050.4. This format will enable this section to be easily converted into a formal Environmental Assessment, with a minimal amount of added effort, if necessary.

Prior to the runway extension, a detailed environmental assessment (EA) will be required for FAA National Environmental Policy Act (NEPA) approval. The EA will be performed after the project need is clearly identified and approximately two years prior to the proposed construction.

### **4.2 IDENTIFICATION OF THE PROPOSED ACTION**

The Proposed Action would call for development of the Delaware Municipal Airport, which would include a 1000 foot runway extension, and terminal area development with T-hangars and corporate hangars.

### **4.3 ENVIRONMENTAL CONSEQUENCES – SPECIFIC IMPACT CATEGORIES**

#### **4.3.1 NOISE EXPOSURE – AFFECTED SOUND LEVEL ENVIRONMENT**

##### **4.3.1(a) REASON FOR STUDY**

Generally, as stated in FAA 5050.4A, a noise analysis is not needed for utility and transport type airports with Group I and II airplanes whose forecasts operations in the analysis year[s] do not exceed 90,000 annual adjusted propeller operations or 700 annual adjusted jet operations. The number of operations is predicted to 89,250 total operations of which 2048 are jet operations. Therefore, a noise analysis is required as scoped in the request for proposal (RFP).

#### **4.3.1(b) EXISTING CONDITIONS**

The existing year 2003 condition is based on the current data provided and inventoried from the Airport. The noise analysis was conducted using FAA's Integrated Noise Model (INM), Version 6.0b. INM is the recognized model for developing noise exposure maps in accordance with requirements prescribed in 14 CFR, Part 150 Study, "Airport Noise Compatibility Planning." This regulation was developed to implement portions of the Aviation Safety and Noise Abatement Act of 1979, as amended (49 U.S.C. 2101, et. seq.). The INM results are used to generate sound level contours (i.e., lines connecting points of equal sound level). These contours are the typical and customary method for defining and displaying the magnitude and extent of noise impacts around airports. These contours also reflect the overall weighted average noise energy over a period of time. Exhibits that show the predicted sound level contours are presented at the end of Chapter 4.0.

The sound levels generated by the proposed helicopter operations were analyzed using FAA's Helicopter Noise Model (HNM), Version 2.2. The HNM description and use requirements are similar to the INM program. For the existing environment, there are zero (0) based or transient rotorcraft operations at the Airport. Therefore, even though the HNM program is described below with the INM program because of its similarities, it was only applied to the future year projections.

#### **4.3.1(c) INM/HNM PROGRAM INPUT**

The INM and HNM programs are a computerized overflight noise prediction model, originally developed by the Volpe Transportation Systems Center of the U.S. Department of Transportation at Cambridge, Massachusetts and managed in the FAA's Office of Environment and Energy (AEE), Noise Division (AEE-100).

The INM has been specified as one of two models acceptable for noise studies. The alternative, NOISEMAP, is used by the military. However, NOISEMAP algorithms have been incorporated into the latest versions of INM. The model accounts for separate aircraft flying along flight tracks defined as straight-line or curved segments during an annually averaged 24-hour period. These flight tracks are coupled with separate tables in the computer program's database defining the noise, velocity, distance, and engine thrust for the different aircraft types. The HNM program is the accepted model for helicopter noise.

The INM and HNM programs requires a variety of similar input data. These include a definition of the runways and the assignment of specific aircraft and rotorcraft to individual flight tracks. The user may adjust database information to reflect any locally-specific departure and approach profiles, noise curves, aircraft weights, and velocities when such data are available and known to portray existing conditions accurately. Also, craft not included in the model's database were defined using the INM aircraft

substitution module. An overview of the input data used to prepare the noise exposure contours for the Airport is provided in the following sections.

The following is a brief description of how the models work: The model divides the surrounding area into triangular-shaped grids on the ground around the Airport. For each grid location, the associated noise exposure level is computed for specific aircraft types and engine thrust levels used at that point along their flight tracks. Corrections are applied for excess air-to-ground acoustical attenuation, acoustical shielding of the aircraft engines by the aircraft itself, and speed variations. The noise exposure levels for each event are then summed for each grid location. For any predicted nighttime flights (between 10:00 p.m. and 7:00 a.m.), a nighttime penalty of 10 dB would be added to flights prior to summation to reflect increased annoyance. The cumulative values of noise exposure at each grid location are then interpolated to define equal noise exposure contours for average Day-Night Levels (DNL) of 65, 70, and 75, as required by the FAA. A discussion of the DNL noise metric is provided later in this section.

### **Operations Data**

To define the current level of operations for INM applications, the aircraft data was provided and/or extrapolated from the Airport's *Master Plan: Draft Inventory And Forecast, June, 2003*. We also incorporated a conservative estimate of 60% TGOs, similar to operations at other small airports. Local operations are shown in Table 1 and itinerant operations are shown in Tables 2A and 2B. These were calculated based on the percentage of based and itinerant aircraft presented in the Master Plan.

### **Time of Day**

The time of day that operations occur is particularly important as input to the INM due to the penalty ascribed to nighttime operations. For analysis purposes, 97% of all scheduled departures and arrivals occur during the day (defined in the INM as 7 AM -10 PM local time). Therefore, 3% of the flights were considered to be nighttime ops. All of the proposed helicopter operations were assumed to be during the daytime.

### **Runway Use**

Runway use percentages are another essential input to the INM. Aircraft operate best when oriented into the wind. The operations at the Airport are oriented to an 80% west flow and 20% east flow. West flow operations include arrivals and departures on Runway 28. East flow operations include arrivals and departures on Runway 10. Current runway utilization was based on the wind rose.

### **Flight Tracks**

It is necessary to determine not only the type and number of aircraft flown but also where they fly. Generally, flight tracks followed by individual fixed-wing aircraft operating to and from the Airport are straight in and straight out. There are turns related to various GPS, NBD, and VOR operations, but they do not affect the contours with respect to potentially impacted areas near the Airport. All individual flight tracks were consolidated to represent average tracks within the broader travel corridors leading to and

from the Airport. While consolidated flight tracks appear as distinct, specific paths each represents an average directional orientation that has increased variability as distance from the Airport increases.

The process of grouping and averaging tracks resulted in the delineation of two arrival, and two departure tracks for the runway configuration as they affect fixed-wing aircraft. Variations by individual aircraft along these tracks would occur based on pilot techniques, aircraft type, weather conditions, and any pilot preference needs. Essentially, as they relate to potential noise impacts, the flight tracks are straight in-straight out. Additionally, TGO tracks for Runways 28 and 10 were included in the model runs.

Helicopter flight tracks are discussed in the Environmental Consequences section.

#### **Assignment of Aircraft and Rotorcraft to Tracks**

After defining flight tracks, determining runway utilization, and evaluating the number of aircraft and rotorcraft operations, the final step in developing data for INM and HNM is the assignment of the craft to these flight tracks. Air traffic routings by aircraft type were made in accordance with an “average day during the peak month(s)” flight schedule derived from the Airport’s *Master Plan: Draft Inventory And Forecast, June, 2003*.

The percentage of total operations by each aircraft type assigned to a specific flight track was multiplied by the appropriate runway use percentage for the runway under evaluation. The resulting number of operations per day for each runway track were written to a computer input file. The process of track assignments continued until all operations, in all directions, by all types of aircraft using the Airport had been considered and encoded.

#### **4.3.1(d) INM OUTPUT**

Output data selected for calculation by the INM were annual average noise contours for the 65, 70, and 75 Day Night Levels (DNLs) for the existing year 2003.

#### **Day Night Level (DNL) Noise Metric**

The DNL (formerly referred to as Ldn) noise metric is defined as the average A-weighted decibel level during an average 24-hour period, with a ten decibel penalty applied to noise events occurring at night (10:00 p.m. to 7:00 a.m.), when applicable. A-weighting refers to the way that a person’s ear hears sounds. A decibel is defined as an energy unit for expressing the relative intensity of sound on a scale from 1dB, for the average least perceptible sound, through about 130dB for the average pain level.

Generally, DNL describes the relationship between daytime (D) and nighttime (N) sound Level Equivalents (Leq). Leq is the basic summation measurement used to calculate DNL values. It is formulated in terms of the equivalent steady noise level which, in a

given time period, contains the same noise energy as the sum of the individual noise events (as measured by their Sound Exposure Level), during the same time period. The Sound Exposure Level is a representation of the sound energy from a single noise event, compressed into a single second.

Summation methodologies, such as DNL and Leq, were developed in response to a need to define noise in an objective way. Because previous techniques, such as Aircraft Sound Description System, Time Above (above present thresholds) and single-event analysis, did not prove to correlate well to human response characteristics, the averaging metrics were developed. These correlate highly with human response and have been in use for several decades as an effective tool.

The summation metrics allow the development of objective comparative analyses between various alternatives, while the earlier measures required subjective comparison. The earlier measures required judgments of preference (i.e., are many events at low noise levels preferable to a few events at high levels, or vice versa) that varied from individual to individual. DNL and Leq eliminate the subjective characteristics of the evaluation and describe noise exposure comprehensively over a large area. DNL is consistent with existing measurement technologies and meets the defined criteria for an appropriate metric. Additionally, this metric is required by the FAA for use in all FAR Part 150 Study (noise compatibility) studies and is specified for use in FAA Advisory Circular 5050.4A for the preparation of environmental documents. DNL is recognized by the EPA, DOD, and the Department of Housing and Urban Development as an appropriate measure of cumulative noise exposure.

Generally, however, given that annoyance is a phenomenon for which there is no perfect descriptor, all known research illustrates that DNL provides an excellent indicator of airport noise exposure for the purposes of assessing land use compatibility and controlling noise. DNL is the most widely accepted descriptor for aviation noise because it possesses the following characteristics:

- It is a measurable quantity.
- It is a summation of all the sound and not an averaging.
- It is simple to understand and used by airport planners and the public, which is generally not familiar with acoustics or acoustical theory.
- It provides a simple method to compare the effectiveness of alternative airport scenarios.
- It is considered the “standard” for noise impacts which have been based on the reaction of communities to environmental noise.

- It is the best measure of noise exposure to identify significant impacts on the quality of the human environment.
- It is the best descriptor of all noise sources for land use compatibility planning, as determined by Federal interagency agreement.
- It is the only metric with a substantial body of scientific survey data on the reactions of people to noise.

### **Noise Contours**

DNL noise levels are depicted by a series of contour lines connecting points of equal noise exposure. The contour lines are superimposed on a map of the Airport and its environs. These levels are calculated for points on the ground from the weighted summation of the effects of all aircraft operations. Some operations are far enough away from a location that their effect is minimal, while other operations may dominate noise exposure at that location. FAA has determined, through comparisons with actual monitoring, that the accuracy of the INM is within 1.5 dBA of actual noise levels.

#### **4.3.1(e) EXISTING CONDITIONS ANALYSIS RESULTS**

As mentioned previously, the results are based on the current data provided and inventoried from the Airport. Exhibit 4-1 shows the plotted results of the INM contour analysis for the existing year 2003. The contours shown are 65, 70, and 75 DNL. The surface areas and number of impacted dwellings within each contour are presented in Table 3.

The cumulative square miles covered by each contour is as follows: the 75 DNL contour occupies 0.025 square miles, the 70 DNL occupies 0.075 square miles, and the 65 DNL contour occupies 0.175 square miles.

The number of dwellings present within each contour range for each year was also estimated. None of the DNL contour lines leave the airport property except for a small area on the northeast side of the runway which is an industrial area. As a result, the number of impacted dwellings within the 75 DNL (and greater); within the 70-75 DNL range, and within the 65-70 range, is zero (0).

**TABLE 1**  
**2003 Percent Daily Fleet Mix & Local Aircraft Operations**

Aircraft Type	Based Totals	Percent of Based Aircraft	Daily Ops by INM Code
Cessna 172R / Lycoming IO-360-L2A	8	11.0	CNA172: 23.79
Cessna 150	2	2.7	
Rans S-12 Ultra Light	1	1.4	
Taylor Craft	1	1.4	
Citabria	1	1.4	
Experimental	1	1.4	
Luscombe	1	1.4	
Sky Star	1	1.4	
Waco YMF5	1	1.4	
Aircraft, Apron Tie Down (1/2 fleet)	7	9.6	
Sub-total %:		<u>32.9</u>	
Grumman Cheetah (AA5B)	5	6.8	GASEPF: 24.78
Globe Swift	1	1.4	
RV-4	1	1.4	
Stinson 108	1	1.4	
Aircraft, Apron Tie Down (1/2 fleet)	7	9.6	
Piper PA-28-181 Archer II	2	2.7	
Piper Cherokee 6 PA-32	1	1.4	
Piper Cherokee PA-28	5	6.8	
Piper Pacer PA-20	1	1.4	
Ercoupe 415	1	1.4	
Sub-total %:		<u>34.2</u>	
Beechcraft Model 33 Debonair/Bonanza	1	1.4	GASEPV: 13.88
Mooney 201LM and 205 (M20J)	4	5.5	
Mooney 252TSE (M20K)	1	1.4	
Beechcraft Model 35	1	1.4	
Piper PA-28R	2	2.7	
Piper PA-24-260	1	1.4	
North American T6	1	1.4	
Piper PA-32 Saratoga	2	2.7	
IAR-823	1	1.4	
Sub-total %:		<u>19.2</u>	
Piper Twin Comanche PA-30	1	1.4	BEC58P:
Cessna 340 Twin	1	1.4	
Piper Navajo PA-31	1	1.4	

Camair Twin Navion	1	1.4	3.96
Sub-total %:		<u>5.5</u>	
Cessna 182 Skylane	5	6.8	CNA206: 5.95
Cessna 195	1	1.4	
Sub-total %:		<u>8.2</u>	
Totals:	73	<u>100.0%</u>	

Note: Daily ops based on 170 total operations on an average day during the peak month in 2003 (2003 Master Plan inventory)

**TABLE 2A**  
**2003 Percent Daily Fleet Mix & Observed Itinerant Jet Aircraft Operations**

Itinerant Jet Aircraft Type	Observed Annual Ops	Percent of Jet Ops	Daily Ops by INM Code
BeechJet 400	8	6.3	LEAR35: 0.33
Gates Learjet 24B	4	3.1	
Gates Learjet 31	22	17.2	
Gates Learjet 35	8	6.3	
Gates Learjet 45	30	23.4	
Gates Learjet 55	2	1.6	
Gates Learjet 60	6	4.7	
Lockheed Jetstar 1329	2	1.6	
Raytheon Hawker 700	4	3.1	
Raytheon Hawker 800	10	7.8	
Total %:		<u>75.0</u>	
Canadair 601	6	4.7	CL601: 0.02
Total %:		<u>4.7</u>	
Cessna Citation 550	2	1.6	MU3001: 0.01
Cessna Citation 3	2	1.6	
Total %:		<u>3.1</u>	
Dassault Falcon 10	2	1.6	FAL20: 0.02
Dassault Falcon 2000	2	1.6	
Dassault Falcon 50	2	1.6	
Total %:		<u>4.7</u>	
Cessna Citation 10	8	6.3	CNA501: 0.03
Total %:		<u>6.3</u>	
Gulfstream IV	8	6.3	GIIB: 0.03
Total %:		<u>6.3</u>	

Note 1: Daily ops based on 170 total operations on an average day during the peak month in 2003 (2003 Master Plan inventory)

Note 2: Itinerant jet operations account for 0.45% of all itinerant operations at DLZ. Also, even though the observed annual jet operations was totaled to be 128 (from above), the predicted number is 160. (2003 Master Plan Inventory).

**TABLE 2B**  
**2003 Percent Daily Fleet Mix & Itinerant Non-Jet Aircraft Operations**

Itinerant Non-Jet Aircraft Type	2003 Annual Ops	Percent of Itinerant Ops	Daily Ops by INM Code
Turbo Prop	15	.042	CNA441: 0.04
Total %:		.042	
Single Engine	32,892	92.3	GASEPV: 90.13
Total %:		92.3	
Multi Engine	2571	7.2	BEC58P: 7.03
Total %:		7.2	

Note 1: Daily ops based on 170 total operations on an average day during the peak month in 2003 (2003 Master Plan inventory)

Note 2: Itinerant non-jet operations account for 99.55% of all itinerant operations at DLZ. (2003 Master Plan Inventory)

**TABLE 3**  
**Noise Exposures**

Condition	DNL Range	Square Miles	Number of Population Impacted	Cumulative Total	
				DNL Range	Square Miles *
2003 Existing	>75	0.03	0	>75	0.03
	70-75	0.05	0	>70	0.08
	65-70	0.10	0	>65	0.18

\*refers to the total cumulative area for that value and higher.

#### 4.3.1(f) ENVIRONMENTAL CONSEQUENCES

This section provides an evaluation of the resultant noise effects associated with various noise contours, and summarizes the effects as a result of the proposed various actions. This analysis is based on projected reasonable and foreseeable data approved and available at the time of this report. For aircraft operations, the data was taken from the Airport's *Master Plan: Draft Inventory And Forecast, June, 2003*. As discussed in the Affected Environment section (existing conditions), the noise analysis was conducted using FAA's INM, Version 6.0b.

Additionally, as discussed, the HNM Version 2.2 program was run to account for the predicted transient helicopter operations in the 2013 interim year and the one (1) based rotorcraft and transient operations that are predicted in the 2023 design year. Exhibits showing the predicted sound level contours are presented at the end of Chapter 4.0.

#### **4.3.1(g) INM/HNM PROGRAM INPUT**

Many of the input parameters were previously described in the Affected Environment section. Only additional information regarding future operations is discussed below.

##### **Operations Data**

For future operations regarding INM/HNM, the aircraft and rotorcraft data was provided and/or extrapolated from the Airport's *Master Plan: Draft Inventory And Forecast, June, 2003*. The future ops also included the conservative estimate of 60% TGOs.

The future conditions represent four (4) total scenarios of operation for the 2013 interim year and 2023 design year based on the project scope plus the addition of an alternative runway length. As a result, the 2013 and 2023 scenarios were both modeled for 500 and 1000 foot runway extensions.

The future number of operations by aircraft type was also based on the same information presented in Tables 1, 2A and 2B. The number of operations was modified based on the Airport's *Master Plan: Draft Inventory And Forecast, June, 2003*, specifically, the table on page 2-8, "Local Itinerant and Total Aircraft Operations Forecast by Type" for the years 2013 and 2023. Average day operations during the peak month were taken from the table on page 2-10 "Average and Peak Daily Operations" of the same report.

##### **Time of Day**

These input parameters were previously described in the Affected Environment section. For the future year analysis, all of the proposed helicopter operations were assumed to be during the daytime.

##### **Runway Use**

Rotorcraft are not necessarily wind dependent for lift requirements so they do not necessarily have to follow the runway alignment for departures and arrivals. For the future year analysis, it was assumed that the rotorcraft would take off from the existing and/or proposed adjacent tie down areas.

##### **Flight Tracks**

These input parameters were previously described in the Affected Environment section. For a worst-case analysis, only one (1) helicopter flight track was assumed. The track would originate at the pad and head west along the runway to a point at the west end of the runway where it would turn and head towards its final destination. It was assumed that the helicopters would avoid going immediately over the buildings to the north, east and south of DLZ.

### **Assignment of Aircraft and Rotorcraft to Tracks**

These input parameters were previously described in the Affected Environment section. For the helicopter operations, all of the rotorcraft were assigned to the same track to account for a worst-case condition.

#### **4.3.1(h) INM/HNM OUTPUT**

Output data selected for calculation by the INM were annual average noise contours for the 65, 70, and 75 DNLs for the existing year 2003, and the 500 and 1000 foot extension Build Alternatives for the years 2013 and 2013.

The HNM was also run to incorporate the proposed helicopter operations. The result of the HNM run and the relatively small number of operations generated a 65 DNL contour that was less than 0.001 square miles. (0.265 and 1.297 daily LTO's for 2013 and 2023, respectively) As a result, they do not influence/increase the total 65 DNL area. However, in order to produce a relatively worst-case scenario and have some accountability for these sound levels, the helicopter operations were reassigned as aircraft operations in the INM program. As a result, the total area calculations are slightly overestimated.

#### **Day Night Level (DNL) Noise Metric**

The DNL noise metric was previously described in the Affected Environment section.

#### **Noise Contours**

The noise contour narrative was described in the Affected Environment section.

#### **4.3.1(i) ANALYSIS RESULTS**

##### **2013 Build Noise Exposure - 500 Foot Extension**

Exhibit 4-2 shows the plotted results of the INM contour analysis for this alternative. The contours shown are 65, 70, and 75 DNL. The surface areas and number of impacted dwellings falling within each contour are presented in Table 4.

Implementation of this alternative results in a slight reconfiguration of the existing noise contours. Generally, it is a slightly extended version of the existing contours, primarily on the east side where the proposed extension occurs.

As a result, the cumulative 75 DNL contour increases by less than 0.005 square miles over the existing year, the 70 DNL also by less than 0.005 square miles, and the 65 DNL contour by 0.01 square miles.

None of the DNL contour lines leave the airport property except for a small area of the 65 DNL on the northeast side of the runway which is an industrial area and a small sliver of property located west of the existing NDB. As mentioned, Exhibit 4-2 presents the contour lines as a result of this proposed action.

One other important note to consider: the proposed future year projections incorporate unconstrained forecasts, implying that adequate facilities will be available to meet the demand. Furthermore, as a worst-case scenario, the percentage of TGOs was projected to be the same into the future. If any of these conditions or proposed service improvements are not implemented, then the contours would be expectedly smaller as a result of lower number of subsequent operations.

### **2013 Build Noise Exposure - 1000 Foot Extension**

Exhibit 4-3 shows the plotted results of the INM contour analysis for this alternative. The contours shown are 65, 70, and 75 DNL. The surface areas and number of impacted dwellings falling within each contour are presented in Table 4.

Implementation of this alternative results in a slight reconfiguration of the noise contours. Generally, it is a slightly extended version of the existing contours and of the proposed 500 foot extension, primarily on the east side where the proposed extension occurs.

As a result, the cumulative 75 DNL contour increases by less than 0.005 square miles over the existing year, the 70 DNL also by less than 0.005 square miles, and the 65 DNL contour by 0.02 square miles.

Similar to the 500 foot extension, the DNL contour lines primarily stay within the airport property except for a small area of the 65 DNL on the northeast side of the runway which is an industrial area and a small sliver of property located west of the existing NDB. The 1000 foot extension alternative also encroaches a maximum of nearly 75 feet onto the property located immediately south of the start of Runway 28, (on US 42). However, the 65 DNL contour encompasses zero (0) population since the residential apartment building is approximately 300 feet outside of the 65 DNL contour. As mentioned, Exhibit 4-3 presents the contour lines as a result of this proposed action.

As above, the proposed future year projections incorporate unconstrained forecasts, implying that adequate facilities will be available to meet the demand and projected TGO's of 60%. If any of these conditions are not implemented, then the contours would be expectedly smaller as a result of lower number of subsequent operations.

### **2023 Build Noise Exposure - 500 Foot Extension**

Exhibit 4-4 shows the plotted results of the INM contour analysis for this alternative. The contours shown are 65, 70, and 75 DNL. The surface areas and number of impacted dwellings falling within each contour are presented in Table 4.

As with the 2013 alternatives, the implementation of this alternative results in a slight reconfiguration of the existing noise contours and an even smaller change over the 2013 contours. (This is because the number of jet ops is more than triple from 2003 to 2013,

but only double from 2013 to 2023. Please note that noise is added on a logarithmic scale. As a result, relative changes in the operations are more noticeable for noise than just absolute operational volume changes.) Generally, it is a slightly extended version of the existing contours, primarily on the east side where the proposed extension occurs.

In comparison to the existing year, the cumulative 75 DNL contour increases by less than 0.005 square miles, the 70 DNL by 0.01 square miles, and the 65 DNL contour by 0.03 square miles.

In comparison to the 2013 interim year alternative with the 500 foot extension, the cumulative 75 DNL contour increases by less than 0.005 square miles, the 70 DNL by 0.01 square miles, and the 65 DNL contour by 0.02 square miles.

Similar to the 500 foot extension in 2013, the DNL contour lines primarily stay within the airport property except for a small area of the 65 DNL on the northeast side of the runway which is an industrial area and a small sliver of property located west of the existing NDB. However, the 1000 foot extension alternative also encroaches on the property located immediately south of the start of Runway 28, (on US 42). As mentioned, Exhibit 4-4 presents the contour lines as a result of this proposed action.

As above, the proposed future year projections incorporate unconstrained forecasts and imply that adequate facilities will be available to meet the demand.

#### **2023 Build Noise Exposure - 1000 Foot Extension**

Exhibit 4-5 shows the plotted results of the INM contour analysis for this alternative. The contours shown are 65, 70, and 75 DNL. The surface areas and number of impacted dwellings falling within each contour are presented in Table 4.

As with the 2013 alternatives, the implementation of this alternative results in a slight reconfiguration of the existing noise contours and an even smaller change over the 2013 contours. (This is because the number of jet ops is more than triple from 2003 to 2013, but only double from 2013 to 2023, similar to the year 2023 500 foot extension alternative.) Generally, it is a slightly extended version of the existing contours, primarily on the east side where the proposed extension occurs.

In comparison to the existing year, the cumulative 75 DNL contour increases by less than 0.005 square miles, the 70 DNL by 0.01 square miles, and the 65 DNL contour by 0.04 square miles.

In comparison to the 2013 interim year alternative with the 1000 foot extension, the cumulative 75 DNL contour increases by less than 0.005 square miles, the 70 DNL by 0.01 square miles, and the 65 DNL contour by 0.02 square miles.

Similar to the 500 foot extension, the DNL contour lines primarily stay within the airport property except for a small area of the 65 DNL on the northeast side of the runway which is an industrial area and a small sliver of property located west of the existing NDB. The 1000 foot extension alternative also encroaches maximum of approximately 75 feet onto the property located immediately south of the start of Runway 28, (on US 42). However, the 65 DNL contour encompasses zero (0) population since the residential apartment building is nearly 300 feet outside of the 65 DNL contour. As mentioned, Exhibit 4-5 presents the contour lines as a result of this proposed action.

As above, the proposed future year projections incorporate unconstrained forecasts, implying that adequate facilities will be available to meet the demand and projected TGO's of 60%. If any of these conditions are not implemented, then the contours would be expectedly smaller as a result of lower number of subsequent operations.

**Table 4  
Noise Exposures**

Condition	DNL Range	Square Miles	Number of Population Impacts	Cumulative Total	
				DNL Range	Square Miles *
2003 Existing	>75	0.03	0	>75	0.03
	70-75	0.05	0	>70	0.08
	65-70	0.10	0	>65	0.18
2013 Build 500' Extension	> 75	0.03	0	>75	0.03
	70-75	0.05	0	>70	0.08
	65-70	0.11	0	>65	0.19
2013 Build 1000' Extension	> 75	0.03	0	>75	0.03
	70-75	0.05	0	>70	0.08
	65-70	0.12	0	>65	0.20
2023 Build 500' Extension	> 75	0.03	0	>75	0.03
	70-75	0.06	0	>70	0.09
	65-70	0.12	0	>65	0.21
2023 Build 1000' Extension	> 75	0.03	0	>75	0.03
	70-75	0.06	0	>70	0.09
	65-70	0.13	0	>65	0.22

\*refers to the total cumulative area for that value and higher. Also, all numbers are rounded up to the nearest one-hundredth of a square mile.

**4.3.1(j) NOISE MITIGATION MEASURES**

If mitigation or noise abatement is required, it can take several forms, such as:

- Voluntary property acquisition (and subsequent land use management)

- Operation changes to runway frequency
- Sound insulation of dwelling
- Various air traffic control of operations
- Specific restriction of night operations to one runway between 10 PM and 7 AM
- Specific restriction of some/all night operations between 10 PM and 7 AM

Currently, airport operating procedures at DLZ incorporate a primary (Runway 28) and secondary (Runway 10) system. Whenever weather conditions permit, aircraft are directed for west flow operations on Runway 28 for both departures and arrivals.

As indicated, the assessment of noise exposure patterns from aircraft operations indicates that sensitive sites will not be impacted by the 65 DNL contour for the year 2013 and 2023 500 foot extension alternatives. Therefore, mitigation is not required for the 500 foot extensions for any analysis year.

However, for the year 2013 and 2023 1000 foot extension alternatives, the 65 DNL encroaches approximately 75 feet onto a residential apartment property. As discussed previously, the property is located immediately south of the start of Runway 28 on US 42. However, the apartment building structure is located approximately 300 feet outside the 65 DNL contour and as a result, there is zero (0) population within the contour.

Under *14 CFR, CH I, PART 150.11 Identification of land uses*, the uses of land which are normally compatible or noncompatible with various noise exposure levels to individuals [population] around airports must be identified in accordance with the criteria prescribed by FAA under Part 150 Appendix A. Determination of land use must be based on professional planning criteria and procedures utilizing comprehensive, or master, land use planning, zoning, and building and site designing, as appropriate. If more than one current or future land use is permissible, determination of compatibility must be based on that use most adversely affected by noise.

Currently, the land use is being used as residential apartment units. The 2002 comprehensive plan map identifies the parcel as a medium density residential land use. However, as mentioned above, the apartments are not within the 65 DNL contour, and, as a result, mitigation is not proposed.

### **4.3.2 COMPATIBLE LAND USE**

The Delaware Municipal Airport Master Plan which was completed in 1986 recommended that the City of Delaware revise the land use plans which were developed for the City's 1964 Master Plan to ensure the Airport's future compatibility with surrounding environs. The City of Delaware has considered zoning restrictions in a Comprehensive Plan that was completed in April of 2003. The City's Comprehensive Plan recommends that any new development in the area be compatible with the expanded airport facilities.

### **4.3.3 SOCIAL IMPACTS**

In accordance with FAA Order 5050.4, Paragraph 47e (3) (a), an action is judged as having significant social impact if it involves:

- ❖ The relocation of any residence or business.
- ❖ The alteration of surface transportation patterns.
- ❖ The division or disruption of established communities.
- ❖ The disruption of orderly, planned development.
- ❖ An appreciable change in employment.

The proposed development concept was examined with respect to the above criteria. One of these criteria was found to have relevance with respect to the proposed expansion of Delaware Municipal Airport.

#### **Relocation of any Residence or Business**

The social impact is associated with the acquisition of the two farmholds located south of Airport Road. The acquisition of these farmholds would be necessary in order to expand the airport and provide land for airport area development.

The relocation of the residences would follow the provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Public Law 91-646). This law provides protection for the general public as well as the displaced persons. Under this law, the property acquired is purchased at a “fair market value” and does not allow an overly inflated price because the land is essential to the development of a public facility. The law also specifies the assistance to be provided to the persons being displaced. The displaced families would be eligible to receive moving and related expenses, compensation for differential costs of comparable housing including costs incidental to property purchases, advisory services relating to the relocation laws, and assistance in locating replacement housing. In compliance with the law, every effort would be made to relocate the displaced families in equivalent or better homes and no expense would result from any displacements.

The significance of this social impact will need to be further analyzed during an Environmental Assessment which is required if federal funding is used for airport expansion.

### **4.3.4 INDUCED SOCIOECONOMIC IMPACTS**

The implementation of any of the proposed actions would produce various socioeconomic effects as compared with the do-nothing alternative. In particular we will

identify those effects which produce changes in:

- ❖ Trends of population movement and growth.
- ❖ Public service demands.
- ❖ Business and economic activity.

Implementation of any of the proposed actions would not effectively alter trends of population movement and growth. The location of the Airport with respect to residential, commercial and industrial land uses is such that growth in any of these areas would not be constrained.

None of the proposed actions would cause any significant change in public service demands. It should be noted that existing levels of public service at the airport may currently be inadequate.

Business and economic activity would be expected to increase due to the improved facilities. An increase in business aircraft flying into Delaware Municipal Airport would bring economic growth into the community from fuel and peripheral services such as food, lodging and transportation.

#### **4.3.5 AIR QUALITY**

In accordance with the guidelines set forth in FAA Order 5050.4, Chapter 5, Paragraph 47e, Section (5), air quality analysis needs to be done if, and only if, the Proposed Actions involve the following:

- ❖ Airport location (new airport site).
- ❖ Airport development that allows an increase in aircraft operations.
- ❖ The construction or expansion of passenger handling or parking facilities.

Based on the detailed air quality assessment procedures outlined in Report FAA-EE-82-21, Air Quality Procedures for Civilian and Air Force Bases (1), a general aviation airport must exceed 180,000 annual operations to warrant further air quality assessment.

The number of forecast annual operations for the year 2023 at Delaware Municipal Airport is 89,250. Thus, based on the criteria established in Report FAA-EE-82-21, no further air quality analysis is necessary, and it can be concluded that no air quality impacts will result from implementation of the proposed actions.

#### **4.3.6 WATER QUALITY**

All water is presently supplied to the airport and the immediate surrounding area by wells drilled into the underlying limestone bedrock. These wells are drilled to depths of 80 to

