

## **Supplemental Chapter**

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### **Introduction**

Subsequent to the presentation of the Recommendations to the public at a Public Hearing in March 2011 and the development of the Draft Federal Aviation Regulation (FAR) Part 150 Study in June 2011, the Federal Aviation Administration (FAA) revised the national Terminal Area Forecasts (TAF) to reflect anticipated aircraft operational levels at Willow Run Airport. The TAF projections are based on a national forecast of aviation activity which is allocated to the individual airports in the National Airspace System and are based on previous year's actual activity. The forecast methodology is presented in the Appendix.

The revised forecasts were significantly different from the forecasts developed for the original Draft Part 150 Study, and as such, it was determined that the Study be updated to reflect the new forecasts and the resulting noise contours associated with those forecasts. Along with the noise contours, existing population numbers were updated to reflect changed conditions. In addition, the Recommendations have been updated to reflect the removal of Recommendations which are no longer valid. The revised Existing Noise Exposure Map and the revised Future Noise Exposure Map reflect 2012 and 2018 operations, respectively.

### **Revised Land Use Analysis and Noise Exposure Maps**

The land use analysis and alternatives evaluation contained in the original study were developed using an existing year reflecting 2009 and a future year contour reflecting 2015. The existing year was chosen because it reflected the most current operational data available at the time the Study was initiated.

One of the key products of a FAR Part 150 Noise Compatibility Plan is the preparation of the Noise Exposure Maps (NEM's). The Noise Exposure Maps

identify the existing and future noise exposure and have been prepared using the Federal Aviation Administration's Integrated Noise Model (INM) Version 7.0c. To prepare a noise contour for a particular year, the INM requires information concerning the number of aircraft operations, the types of aircraft (fleet mix), and the time of day that the activity takes place. As stated in the original document, noise measurements were used to help validate the model. The noise measurements followed Part 150 guidelines.

In an effort to use the most current information available, November 2011 through October 2012 operations was used to produce the revised Existing Noise Exposure Map (**Figure s1**) and fiscal year 2018 operational projections were used to produce the five-year revised Future Base Case Noise Exposure Map (**Figure s2**), based on the TAF.<sup>1</sup> These two revised maps are shown on the following two pages and were developed using the operations presented in **Table s1**.

The Future Noise Exposure Map reflects one facility change, the planned closing and removal of Runway 14/32. An Environmental Assessment was prepared on the proposed closing of the runway in 2013. Subsequent to this, plans and specifications for the closing of the runway were prepared, and the runway is programmed to be removed in 2014, along with the reconstruction of Runway 5R/23L. As such, the 2018 map reflects the closing of the runway and a shifting of operations from Runway 14/32 to Runway 9/27. No other facility or operational changes are reflected in the Future Noise Exposure Map different from what is shown on the Existing Noise Exposure Map.

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<sup>1</sup> Note the 2018 TAF projections are based on the Federal fiscal year, (beginning in October and ending in September).

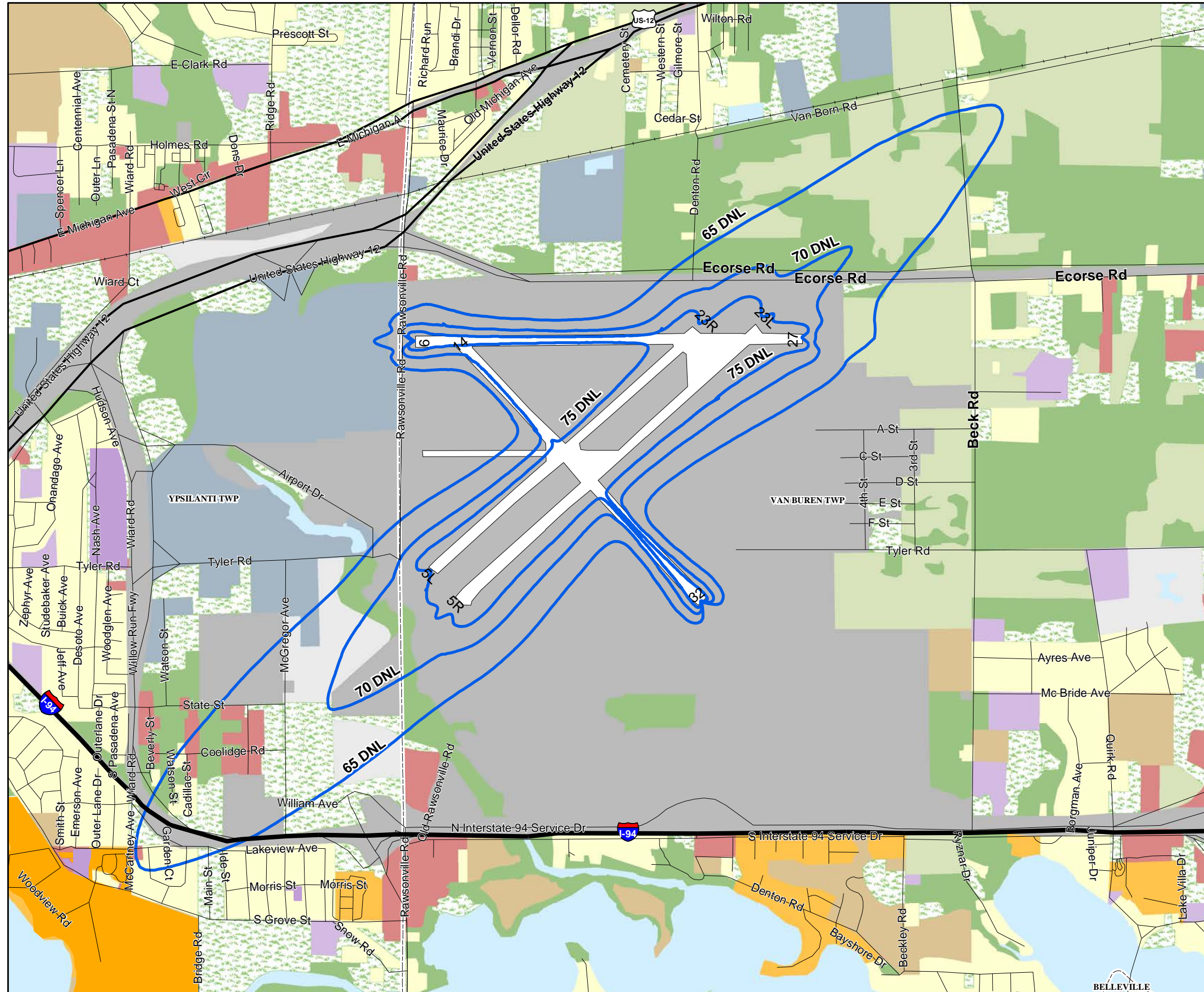
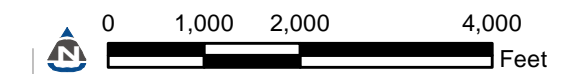


Figure S1  
Existing 2012 DNL Contours  
Noise Exposure Map

**Land Use Legend**

- 2012 Baseline DNL Noise Contours
- Single-family residential
- Residential areas with 25% or more vacant land
- Multiple-family residential
- Commercial and office
- Institutional
- Industrial
- Transportation, communication, and utility
- Under development
- Vacant nonresidential
- Extractive and barren
- Cultural, outdoor recreation, and cemetery
- Woodland and wetland
- Active agriculture
- Grassland, and shrub
- Water





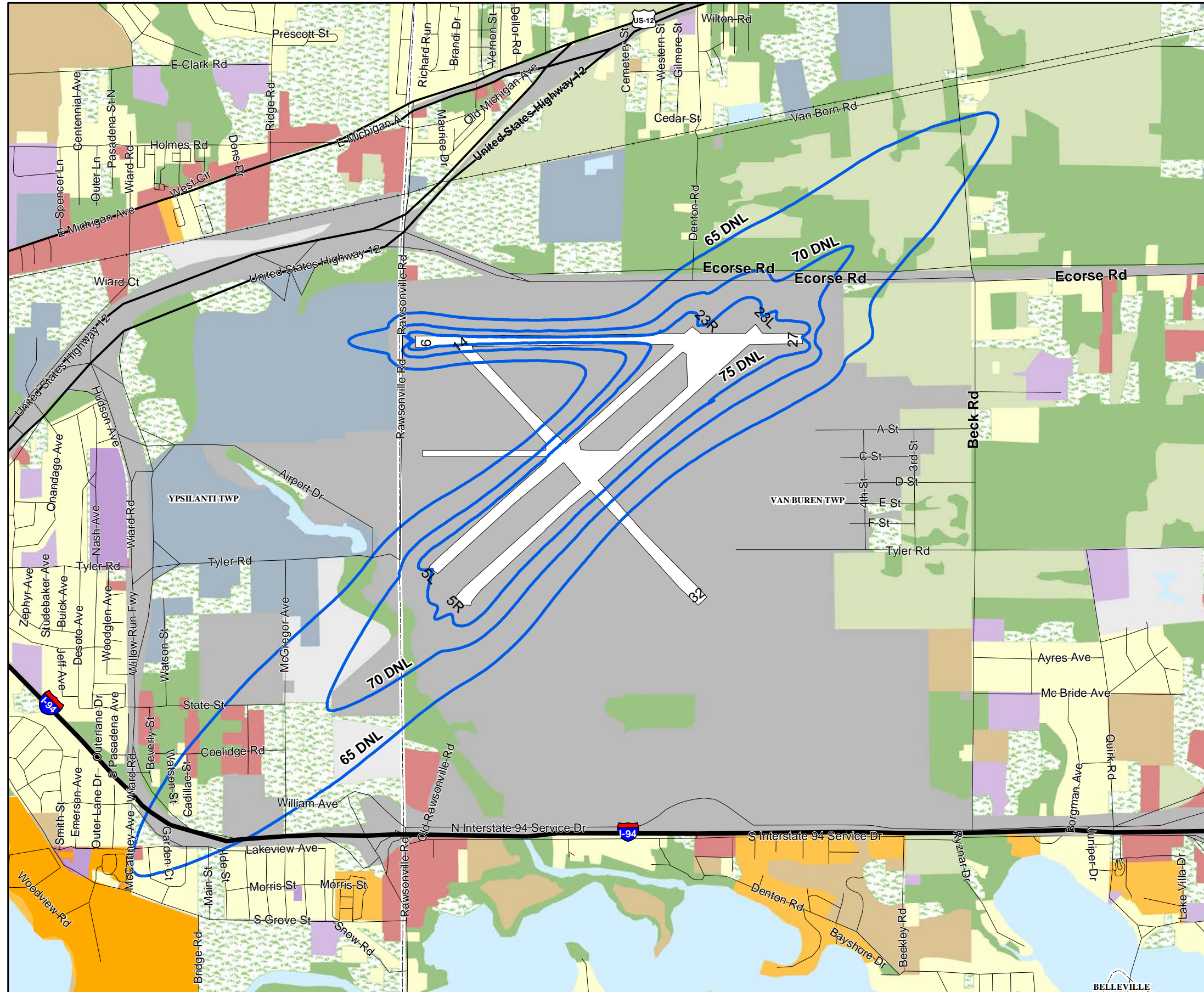


Figure S2  
Future 2018 DNL Contours  
Noise Exposure Map

**Land Use Legend**

- Futurer 2018 DNL Noise Contours
- Single-family residential
- Residential areas with 25% or more vacant land
- Multiple-family residential
- Commercial and office
- Institutional
- Industrial
- Transportation, communication, and utility
- Under development
- Vacant nonresidential
- Extractive and barren
- Cultural, outdoor recreation, and cemetery
- Woodland and wetland
- Active agriculture
- Grassland, and shrub
- Water

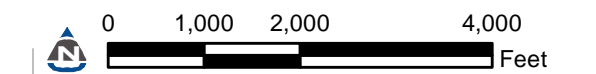


Table S1  
SUMMARY OF AIRCRAFT OPERATIONS, BY TYPE  
*Willow Run Airport FAR Part 150 Study*

Aircraft Category	2012 Base	2018 Forecast
Widebody Jets	17	0
Narrowbody Jets	3,356	3,532
Regional Jets	2,151	2,256
Business/Corporate Jets	8,174	10,523
Single Engine Prop	44,141	54,653
Multi-Engine Prop	15,314	4,042
Helicopter	182	214
Military	269	0
<b>Total Operations</b>	<b>73,604</b>	<b>75,220</b>

Source: Jacobsen/Daniels Associates LLC

Note—Military aircraft operations were associated with an airshow the airport used to sponsor. The airshow no longer occurs and as such, no military operations are forecast in the future.

The actual INM input data sheets, separated by INM aircraft type and percent nighttime use, are found in the Appendix. In addition to aircraft operations and fleet mix, runway use is also an important element in generating DNL noise contours. The runway utilization tables have been updated to reflect revised runway use percentages and are presented in the following tables. **Table s2** presents the runway utilization for the existing conditions, and **Table s3** presents the same information for the future conditions.

Table S2  
**SUMMARY OF REVISED RUNWAY UTILIZATION, EXISTING 2012**  
*Willow Run Airport FAR Part 150 Study*

<u>Aircraft Type</u>	<u>Runway End Percentage Utilization</u>							
	<u>05L</u>	<u>05R</u>	<u>09</u>	<u>14</u>	<u>23L</u>	<u>23R</u>	<u>27</u>	<u>32</u>
<b>Departures</b>								
GA Single Engine Local	8.8%	20.2%	1.8%	0.8%	26.2%	30.4%	8.4%	3.4%
GA Twin Engine Local	12.0%	21.0%	1.0%	0.0%	39.0%	16.0%	6.0%	5.0%
GA Propeller Itinerant	10.1%	23.0%	2.0%	0.6%	29.4%	25.4%	6.9%	2.6%
Commuters	12.0%	21.0%	1.0%	0.0%	39.0%	16.0%	6.0%	5.0%
Business Jets	13.0%	27.3%	2.0%	0.0%	37.1%	13.4%	4.6%	2.6%
Regional Jets	7.0%	28.0%	4.0%	0.0%	48.0%	7.0%	4.0%	2.0%
Air Carriers	7.0%	28.0%	4.0%	0.0%	48.0%	7.0%	4.0%	2.0%
Military	9.0%	29.0%	0.0%	0.0%	54.0%	8.0%	0.0%	0.0%
<b>Arrivals</b>								
GA Single Engine Local	9.4%	17.0%	4.0%	1.6%	26.2%	34.0%	3.6%	4.2%
GA Twin Engine Local	11.0%	21.0%	4.0%	0.0%	43.0%	18.0%	2.0%	1.0%
GA Propeller Itinerant	9.9%	18.1%	4.0%	1.1%	31.0%	29.4%	3.1%	3.3%
Commuters	11.0%	21.0%	4.0%	0.0%	43.0%	18.0%	2.0%	1.0%
Business Jets	10.6%	22.7%	3.1%	0.0%	42.8%	18.3%	2.0%	0.5%
Regional Jets	3.0%	32.0%	3.0%	0.0%	60.0%	2.0%	0.0%	0.0%
Air Carriers	3.0%	32.0%	3.0%	0.0%	60.0%	2.0%	0.0%	0.0%
Military	3.0%	35.0%	0.0%	0.0%	60.0%	2.0%	0.0%	0.0%

*Source: BridgeNet International, 2007*

Table S3

**SUMMARY OF REVISED RUNWAY UTILIZATION, FUTURE 2018***Willow Run Airport FAR Part 150 Study*

<u>Aircraft Type</u>	<u>Runway End Percentage Utilization</u>							
	<u>05L</u>	<u>05R</u>	<u>09</u>	<u>14</u>	<u>23L</u>	<u>23R</u>	<u>27</u>	<u>32</u>
<b>Departures</b>								
GA Single Engine Local	8.8%	20.2%	2.6%	0.0%	26.2%	30.4%	11.8%	0.0%
GA Twin Engine Local	12.0%	21.0%	1.0%	0.0%	39.0%	16.0%	11.0%	0.0%
GA Propeller Itinerant	10.1%	23.0%	2.6%	0.0%	29.4%	25.4%	10.0%	0.0%
Commuters	12.0%	21.0%	1.0%	0.0%	39.0%	16.0%	11.0%	0.0%
Business Jets	13.0%	27.3%	2.0%	0.0%	37.1%	13.4%	7.2%	0.0%
Regional Jets	7.0%	28.0%	4.0%	0.0%	48.0%	7.0%	6.0%	0.0%
Air Carriers	7.0%	28.0%	4.0%	0.0%	48.0%	7.0%	6.0%	0.0%
Military	9.0%	29.0%	0.0%	0.0%	54.0%	8.0%	0.0%	0.0%
<b>Arrivals</b>								
GA Single Engine Local	9.4%	17.0%	5.6%	0.0%	26.2%	34.0%	7.8%	0.0%
GA Twin Engine Local	11.0%	21.0%	4.0%	0.0%	43.0%	18.0%	3.0%	0.0%
GA Propeller Itinerant	9.9%	18.1%	5.1%	0.0%	31.0%	29.4%	6.4%	0.0%
Commuters	11.0%	21.0%	4.0%	0.0%	43.0%	18.0%	3.0%	0.0%
Business Jets	10.6%	22.7%	3.1%	0.0%	42.8%	18.3%	2.5%	0.0%
Regional Jets	3.0%	32.0%	3.0%	0.0%	60.0%	2.0%	0.0%	0.0%
Air Carriers	3.0%	32.0%	3.0%	0.0%	60.0%	2.0%	0.0%	0.0%
Military	3.0%	35.0%	0.0%	0.0%	60.0%	2.0%	0.0%	0.0%
Reduced Operations								
Increased Operations								

*Source: BridgeNet International, 2007*

The land use analysis and population tables presented in the Land Use Chapter have been updated based on the revised noise contour maps and are presented in the following tables. Table 1 of FAR Part 150 was used to determine compatibility.

The following table, **Table S4**, presents the number of people, housing units, and specific land use acreages for the 2012 contour.

Table S4  
**REVISED EXISTING NOISE EXPOSURE MAP WITH GENERALIZED EXISTING LAND USE, 2012**  
*Willow Run Airport FAR Part 150 Study*

Land Use	DNL 65 Contour	DNL 70 Contour	DNL 75 Contour
Residential	20 Ac	0 Ac	0 Ac
People	110	0	0
Housing Units	45	0	0
Schools	0	0	0
Historic Sites	0	0	0
Business/Office	25 Ac	0 Ac	0 Ac
Grassland/woodland	242 Ac	20 Ac	0 Ac
Industrial	7 Ac	0 Ac	0 Ac
Transportation/Communication	946 Ac	603 Ac	297 Ac
Other	199 Ac	15 Ac	0 Ac
<b>Total Acres</b>	<b>1,439 Ac</b>	<b>638 Ac</b>	<b>297 Ac</b>

**Source:** *Southeast Michigan Council of Governments  
2010 Census Data, BDC Analysis.*

The total figures for each contour are cumulative. The figures for the larger contours contain the area within all smaller contours.



The following table, **Table S5**, presents the number of acres of different land use types within the Future Noise Exposure Map, as well as the number of people and housing units.

Table S5

**REVISED FUTURE NOISE EXPOSURE MAP WITH EXISTING LAND USE, 2018**

*Willow Run Airport FAR Part 150 Study*

<b>Land Use</b>	<b>DNL 65 Contour</b>	<b>DNL 70 Contour</b>	<b>DNL 75 Contour</b>
Residential	20 Ac	0 Ac	0 Ac
People	122	0	0
Housing Units	50	0	0
Schools	0	0	0
Historic Sites	0	0	0
Business/Office	24 Ac	0 Ac	0 Ac
Grassland/woodland	214 Ac	18 Ac	0 Ac
Industrial	10 Ac	0 Ac	4 Ac
Transportation/Communication	820 Ac	496 Ac	277 Ac
Other	199 Ac	11 Ac	0 Ac
<b>Total Acres</b>	<b>1,287 Ac</b>	<b>525 Ac</b>	<b>277 Ac</b>

**Source:** *Southeast Michigan Council of Governments  
2010 Census Data, BDC Analysis.*

The total figures for each contour are cumulative. The figures for the larger contours contain the area within all smaller contours.

## Revised Recommendations

Subsequent to the submittal of the Draft Part 150 document, the Recommendations were re-evaluated with some changes. The original Recommendations can be found in the Issues/Actions and Recommendations Chapter of the June 2011 Draft Report. The following Recommendations reflect the official submittal Recommendations and have been presented at a Public Hearing held on November 6, 2013.

### Revised Recommendations Summary Listing

The recommendations are summarized and categorized as follows. The Recommendations are based on the Future Noise Exposure Map. The recommendations are **not listed** in priority of implementation. Priorities may change as conditions change, and should be set each year along with the Airport's Capital Improvement Program (CIP). The original Options are shown in parenthesis.

#### *Land Use Management Elements (LUME)*

- Recommendation 1 Voluntary Sound Insulation of single family residential structures within the 65 DNL noise contour (LUME Alt. 1)**
- Recommendation 2 Voluntary Sales Assistance Program (LUME Alt. 4)**
- Recommendation 3 Recommend communities require disclosure statements/buyer notification (LUME Alt. 5)**
- Recommendation 4 Work with communities to require sound attenuation of new residences (LUME Alt. 6)**
- Recommendation 5 Work with communities to update master plans to discourage noise sensitive uses within the 65 DNL (LUME Alt. 7)**
- Recommendation 6 Work with communities to update zoning ordinances to restrict noise sensitive uses within the 65 DNL (LUME Alt. 8)**

#### *Noise Abatement Elements (NAE)*

- Recommendation 1 Construct ground run-up enclosure (NAE Alt. 7b)**

#### *Program Management and Administrative Elements (PMAE)*

**Recommendation 1 Operations Review and Part 150 Updates (PMAE Alt. 9)**  
**Recommendation 2 Continuation of Study Advisory Committee (PMAE Alt. 11)**

It is the intent of the Airport Authority to implement elements of the proposed Noise Compatibility Program as quickly as possible. However, the timetable for implementation would depend very heavily on the availability of funding, especially federal and local funding.

**Existing Actions**

This is the first FAR Part 150 Study that the Airport has completed; therefore, there is no existing Noise Compatibility Program at the Airport.

## **Land Use Management Elements (LUME)**

### ***LUME RECOMMENDATION 1—VOLUNTARY SOUND INSULATION OF SINGLE FAMILY HOMES WITHIN THE 65 DNL***

#### ***ISSUE***

Reduction of noise sensitive land uses within the airport environs.

#### ***NEW ACTION***

It is recommended that the Airport sound attenuate to achieve an inside noise level of less than 45 dB, on a voluntary basis, those single-family homes within the future 65 DNL noise contour as defined by the Eligibility Boundary shown on the following page. In addition to being within the Eligibility Boundary, the residence must have an inside noise level greater than 45 dB as defined by the latest FAA guidance. The sound attenuation would reduce indoor noise levels which would result in the houses being considered as a compatible land use. As a consideration for such sound attenuation, the Airport would receive a noise easement from the homeowner. If attenuation is found to be economically unfeasible or if other circumstances exist, the Airport would determine if purchase of a noise easement only would be more desirable.

In addition, if other noise sensitive uses are found within the Eligibility Boundary they too would be considered to receive sound attenuation on a voluntary basis.

#### ***COMMENTS***

This Action would allow those homeowners within the 65 DNL noise contour or greater to receive sound attenuation to reduce the inside noise levels to 45 dB or below. If a residential structure has an inside noise level of less than 45 dB, then it may not be eligible for federal



funding. The FAA guidelines consider sound attenuated houses within the 65 DNL contour compatible if sound attenuated. Sound attenuation does not apply to manufactured or mobile homes, as they cannot be attenuated to meet reduction codes. This Action would convert non-compatible uses to compatible uses and would reduce the noise intrusion to those residences where the owner decides to take advantage of sound attenuation. The Airport would receive a noise easement in return for the sound attenuation. However, if the local jurisdiction will not issue a building permit until the house is “brought up to code”, the cost to do so is not eligible for FAA funding.

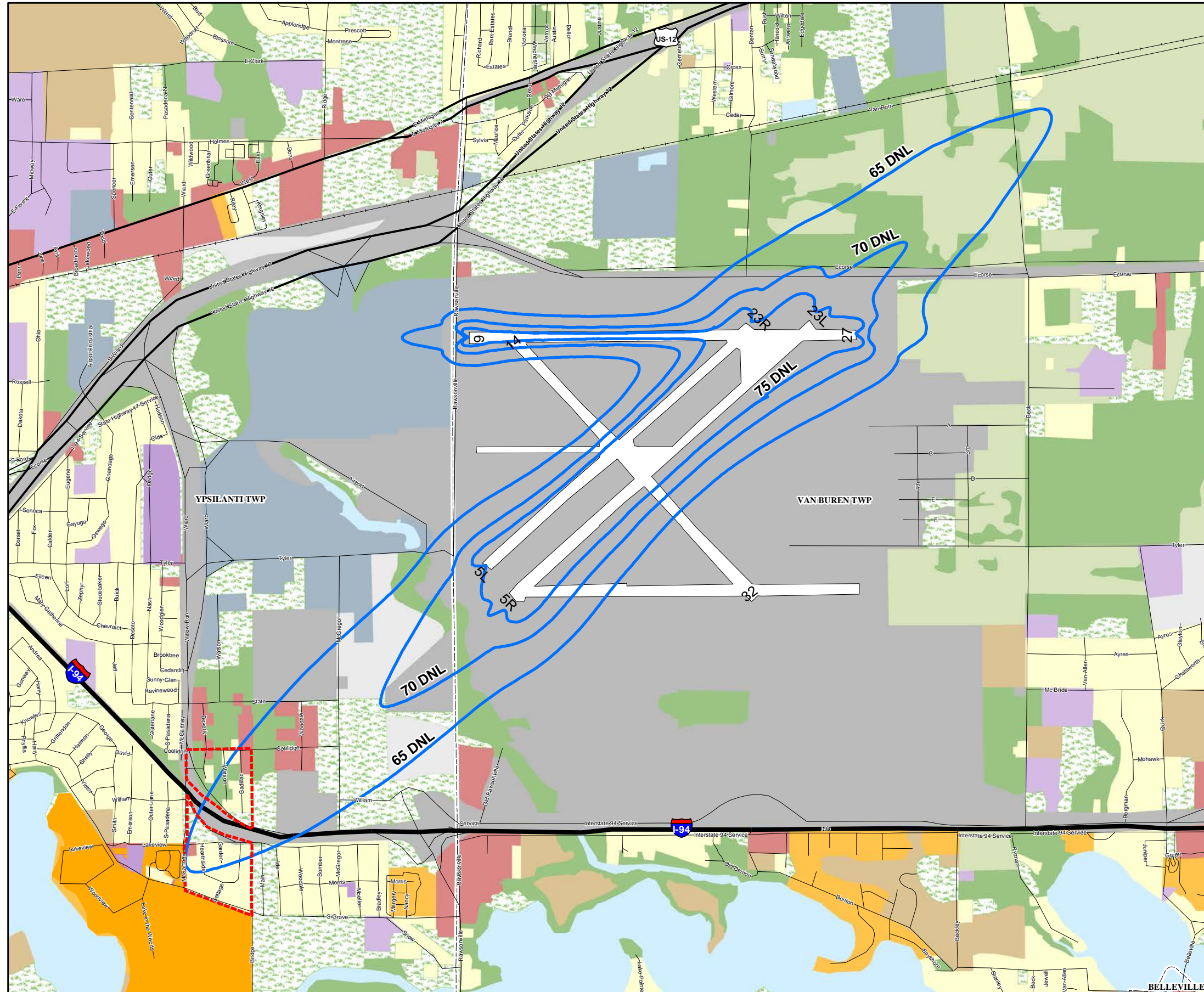


Figure S3  
Eligibility Boundary Map

Land Use Legend

- Future 2018 DNL Noise Contours
- ▬ Eligibility Boundary
- Single-family residential
- Residential areas with 25% or more vacant land
- Multiple-family residential
- Commercial and office
- Institutional
- Industrial
- Transportation, communication, and utility
- Under development
- Vacant nonresidential
- Extractive and barren
- Cultural, outdoor recreation, and cemetery
- Woodland and wetland
- Active agriculture
- Grassland, and shrub
- Water

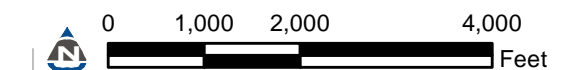
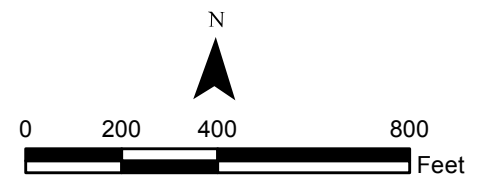
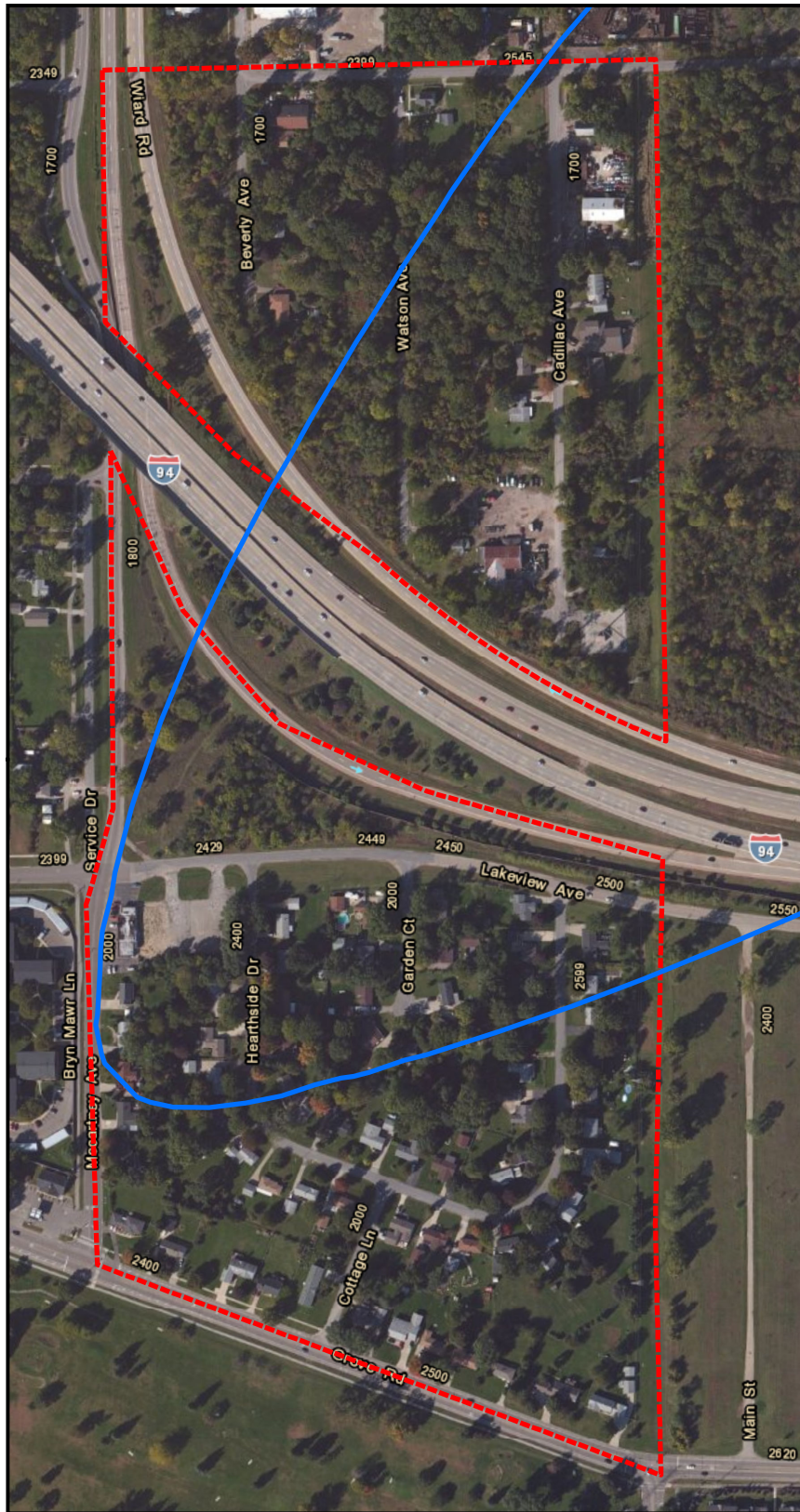




Figure S4  
Eligibility Boundary Detail



Service Layer Credits: Copyright:© 2013 Esri, DeLorme, NAVTEQ, TomTom  
Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, and the GIS User Community

Aerial photo date: 9/18/2011

### Legend

- 2018 DNL Noise
- Eligibility Boundary

SOURCE: Southeast Michigan Council of Governments (SEMCOG), November, 2006.



## FAA Part 150 Supplemental Report Willow Run Airport (YIP)

***COST***

There are approximately 75 single family residential structures within the Eligibility Boundary. The cost for sound attenuation is estimated at approximately \$50,000 per house, depending upon type of construction, resulting in an estimated cost of \$3.75 million for the single family units. The cost for just an easement is estimated to be approximately \$3 – 5,000.

***RESPONSIBLE PARTIES***

The Airport would apply to the FAA for the necessary funding to conduct the program and to sound attenuate those houses found feasible. Contingent upon availability of federal funds, the Airport would institute the new sound attenuation program. The homeowners need to respond to the Airport concerning attenuation.

***AIRPORT ACTION***

The Airport would apply to the FAA for necessary funds to accomplish this Action upon the approval of the FAR Part 150 Study. The Airport would then hire a consultant to prepare a Program Manual and initiate the Program.

***TIME FRAME***

This New Action would be initiated by the Airport as soon as the FAR Part 150 Study is approved. It is estimated that it will take approximately two to six years to complete the sound attenuation program, depending upon funding availability.



## **LUME RECOMMENDATION 2—VOLUNTARY SALES ASSISTANCE.**

### **ISSUE**

Reduce noise impacts to areas of non-compatible land uses.

### **NEW ACTION**

The Airport would offer Sales Assistance to home owners wishing to sell their homes but who are concerned that they are not able to do so due to proximity to the Airport. This would be a voluntary Action available to home owners who are within the 65 DNL noise contour, but chose not to participate in sound insulation.

### **COMMENTS**

This voluntary Action would provide a Sales Assistance Program as an option for owners of residential uses if they are eligible for sound insulation. In some cases, home owners desire to sell their homes and feel that they cannot receive fair market value for a home due to its proximity to the Airport. This Action helps alleviate that situation, but it does not require the Airport to actually purchase the homes. As a result, if fair market value could not be obtained, the Airport would compensate the current owner for a sale that is verified to be less than the current fair market or appraised value.

The owner is guaranteed fair market value for the property. In this type of program, the Airport operator does not take title to the property, but rather compensates the property seller for the difference between fair market value and the value offered by a purchaser. Should the property sell for less than the appraised value, the Airport operator would compensate the selling owner for the shortfall. Property is appraised at its current fair market value of the home owner's interest "as is," subject to aircraft noise. The property is listed

and sold subject to the Airport's easement that is conveyed to the Airport at the sale of the property. This Action is most successful with single family, as opposed to multifamily, structures because the sale prices of most owner-occupied multifamily structures are not as sensitive to aircraft noise levels.

***COST***

Participation in such a program is traditionally relatively small, about 3% of those eligible for sound attenuation. Assuming 2 owners participate and an approximate differential of \$5,000 for each sale, the cost would be approximately \$10,000.

***RESPONSIBLE PARTIES***

The Airport is responsible for applying to the FAA for funding, the home owners are responsible for notifying the Airport of their intention to participate. The FAA is responsible for granting funds, if available.

***AIRPORT ACTION***

The Airport would apply to the FAA for necessary funds to accomplish this Action upon the approval of the FAR Part 150 Study.

***TIME FRAME***

This Action can be initiated immediately upon approval of the Part 150 Study and is not contingent upon other Recommendations.

### **LAND USE MANAGEMENT ELEMENT RECOMMENDATION 3—REQUIRE BUYER NOTIFICATION WITHIN THE 60 DNL**

#### **ISSUE**

Ensure notification of potential aircraft noise intrusion to prospective residents by providing direct notice of the possibility of such intrusion.

#### **CONTINUED ACTION**

It is recommended that the Airport Authority work with the surrounding communities to require notice of noise to be placed on subdivision plats or deed for each individual lot. Such notice would be recorded on the deed and is identified in a title opinion or title insurance report, as are other similar notices

#### **COMMENTS**

This action would give direct notice to prospective home buyers that the home they are considering may be subject to aircraft noise intrusion. Many new home buyers are not aware of the proximity of the airport to the home they are considering. This would allow them to make an informed decision. Such plat or deed notice would require local jurisdiction adoption and implementation because the Airport Authority does not have land use control authority. The local jurisdictions have the authority to require notice to be placed on plats or deeds for a new subdivision or as a condition of building permit approval. This would be most effective for such approvals within the 60 DNL and greater noise contour, as shown on the following page. This is similar to the types of notice required for other public health, safety, and welfare issues such as severe terrain, underground conditions, historic districts, and tax assessment districts.

#### **COST**

The cost to implement this recommendation is within the normal subdivision and plat review of the local jurisdictions.

***RESPONSIBLE PARTIES***

The Airport Authority is responsible for coordinating with the local jurisdictions concerning location of properties for notice, and the local jurisdictions are responsible for implementing the notice requirements

***AIRPORT ACTION***

The Airport Authority would coordinate with the local jurisdictions and ensure that they have the proper maps to identify the 60 DNL and greater noise exposure contour.

***TIME FRAME***

This Action could be initiated by the Airport Authority and the jurisdictions immediately.



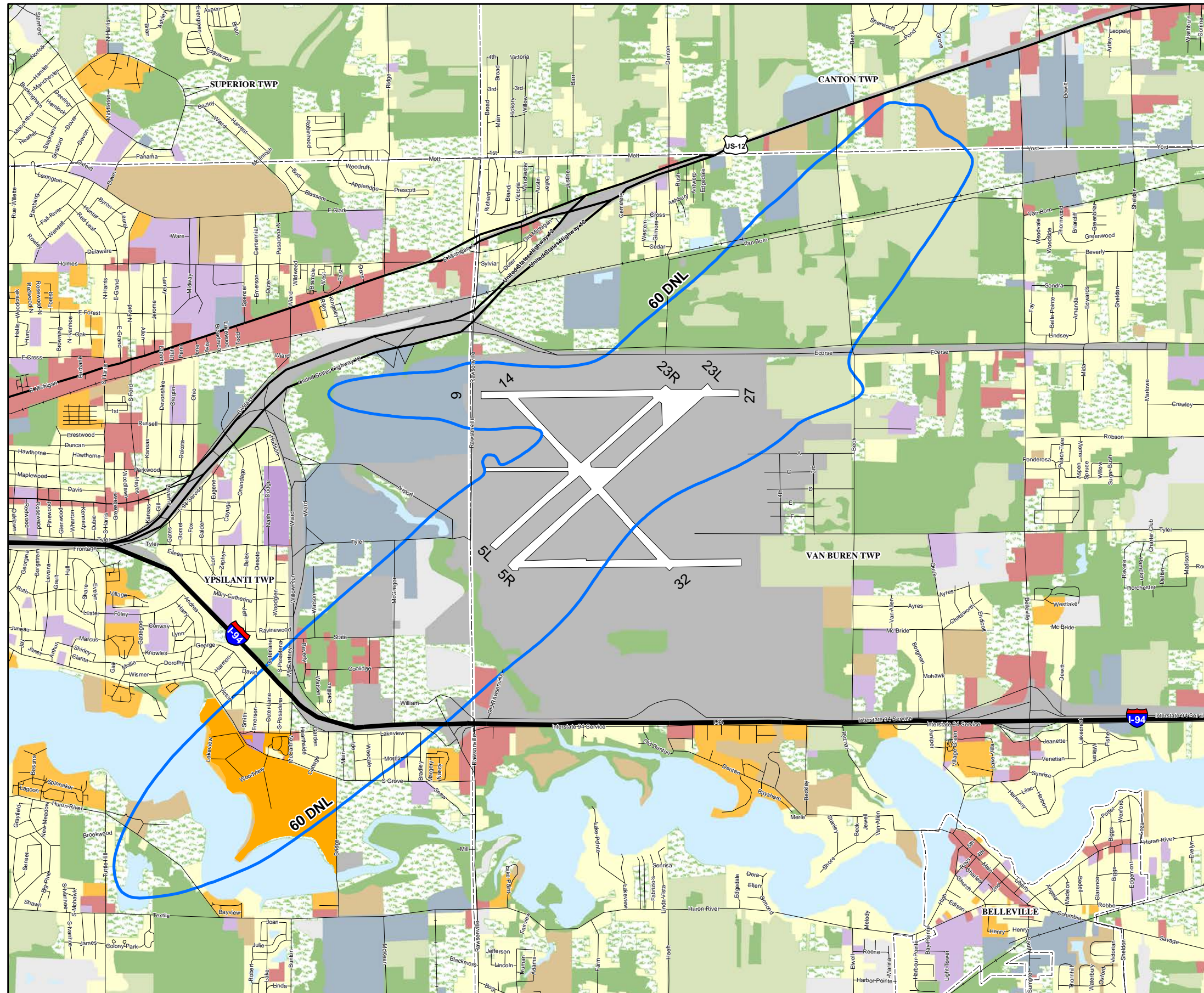
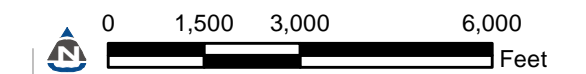


Figure S5  
Buyer Notification Boundary

#### Land Use Legend

- Future 2018 '60' DNL Noise Contour
- Single-family residential
- Residential areas with 25% or more vacant land
- Multiple-family residential
- Commercial and office
- Institutional
- Industrial
- Transportation, communication, and utility
- Under development
- Vacant nonresidential
- Extractive and barren
- Cultural, outdoor recreation, and cemetery
- Woodland and wetland
- Active agriculture
- Grassland, and shrub
- Water



**LAND USE MANAGEMENT ELEMENT RECOMMENDATION 4—WORK WITH COMMUNITIES TO REQUIRE SOUND ATTENUATION OF NEW RESIDENCES WITHIN THE 65 DNL**

**ISSUE**

Reduce the number of non-compatible residences within the 65 DNL.

**CONTINUED ACTION**

It is recommended that the Airport Authority work with the local jurisdictions to require sound attenuation for new residential structures within the 65 DNL and greater noise contour.

**COMMENTS**

This action would amend requirements to include sound attenuation standards for any new construction of noise sensitive uses within the 65 DNL contour. This action would not address existing residences, but would prevent future incompatibilities by requiring noise reduction or sound attenuation for new construction. Prior to building permit or plat approval, noise sensitive uses would be required, through construction techniques, to achieve a minimum 30 dB noise reduction between outside noise levels and inside noise levels.

The local jurisdictions would not specify the means to achieve this reduction in the code, only that such reduction is necessary. The builder is given the option of how to achieve such reduction. Normally, the plat or building plans are certified to provide for the necessary noise reduction by an engineer or architect licensed to practice in the State. Although FAA guidelines suggest a 25 dB reduction within the 65 DNL, experience has shown that it may be desirable to achieve a 30 dB reduction within the 65 DNL since aircraft noise annoyances at



Willow Run Airport are experienced at lower noise levels (at noise levels less than 65 DNL).

Once implemented, these requirements would result in a slight increase in the cost of construction, as homes are built with the appropriate insulation. At other airports, contractors have found that the cost of such insulation, performed at the time of construction is less than \$10,000, compared to the cost of retrofitting an already built home (estimated at approximately \$50,000).

***COST***

As stated above, the approximate cost to sound attenuate a home during construction is less than \$10,000 per home. The cost to administer the requirements would be part of the normal review and approval process of the various jurisdictions. The estimated cost to amend existing codes would be approximately \$30,000, and would be borne by the municipality.

***RESPONSIBLE PARTIES***

The Airport Authority and the jurisdictions are responsible for working together to identify areas that would require sound attenuation. The Airport Authority is responsible for coordinating and assisting the jurisdictions and the jurisdictions are responsible for implementation.

***AIRPORT ACTION***

The Airport Authority would coordinate with the jurisdictions in updating their codes and would assist them to the extent possible.

***TIME FRAME***

This Action can be initiated immediately.

**LAND USE MANAGEMENT ELEMENT RECOMMENDATION 5--WORK  
WITH COMMUNITIES TO UPDATE  
COMPREHENSIVE PLANS TO  
DISCOURAGE NOISE SENSITIVE USES  
WITHIN THE 65 DNL.**

**ISSUE**

Reduce introduction of new noise sensitive uses within the 65 DNL noise contour.

**CONTINUED ACTION**

The Airport Authority would work with the communities to either amend comprehensive plans, as necessary, to discourage the introduction of new noise sensitive uses within the 65 DNL noise contour or continue to use those plans which do discourage such development.

**COMMENTS**

All of the communities surrounding the Airport have adopted comprehensive plans, which are updated periodically as conditions change. The Airport Authority would work with the communities to ensure that the plans do not recommend the introduction or continuation of non-compatible land uses within the 65 DNL noise contour. There is concern to the amount of vacant property within the 65 DNL that could potentially be developed with additional non-compatible land uses, such as residences, schools, hospitals, or other noise sensitive uses. In addition, it would be helpful if the noise contours were adopted as part of the comprehensive plan to help guide compatible development.

**COST**

As the communities update their existing comprehensive plans, airport compatibility issues should be taken into consideration as part of the normal updating process. As such there should be no additional cost associated with this action.

***RESPONSIBLE PARTIES***

The Airport Authority is responsible for coordinating with the communities during the update process and providing whatever information is needed. The communities are responsible for actually updating and implementing the plans.

***AIRPORT ACTION***

The Airport Authority would assist the communities in development of these plans as requested.

***TIME FRAME***

This Action can be initiated immediately.

**LAND USE MANAGEMENT ELEMENT RECOMMENDATION 6--WORK  
WITH COMMUNITIES TO UPDATE ZONING  
ORDINANCES TO RESTRICT NOISE  
SENSITIVE USES WITHIN THE 65 DNL.**

**ISSUE**

Reduce introduction of new noise sensitive uses within the 65 DNL noise contour.

**CONTINUED ACTION**

The Airport Authority would work with the communities to either amend zoning ordinances, as necessary, to restrict the introduction of new noise sensitive uses within the 65 DNL noise contour or continue to utilize those ordinances which do prohibit such development.

**COMMENTS**

All of the communities surrounding the Airport have adopted zoning ordinances, which are updated periodically as conditions change. Most of the property within the 65 DNL is currently zoned for non-residential uses. However, zoning is a creation of the political body and can be changed through the political process. In addition, one of the dilemmas of contemporary planning and zoning is to incorporate high density residential development in commercial, retail, and industrial zones. While the majority of an area may be non-residential, the introduction of residential units can result in noise concerns that were not as prevalent with non-residential uses. Zoning code amendments can stimulate some desired community development changes while at the same time introducing new citizen concerns.

Therefore, it is important that the Airport Authority work with the communities to review any amendments to the code that may unintentionally introduce non-compatible land

uses, or amend those ordinances which may already permit such uses.

***COST***

As the communities update their existing comprehensive plans, airport compatibility issues should be taken into consideration as part of the normal update. As such there should be no additional cost associated with this action.

***RESPONSIBLE PARTIES***

The Airport Authority is responsible for coordinating with the communities during the update process and providing whatever information is needed. The communities are responsible for updating and implementing the plans.

***AIRPORT ACTION***

The Airport Authority would assist the communities in plan development as requested.

***TIME FRAME***

This Action can be initiated immediately.



## Noise Abatement Elements (NAE)

### ***NOISE ABATEMENT ELEMENT RECOMMENDATION 1—CONSTRUCT GROUND RUN-UP ENCLOSURE PER A SITE SELECTION STUDY***

#### ***ISSUE***

Reduce engine maintenance noise intrusion on residents living close to the Airport.

#### ***NEW ACTION***

This action would construct a Ground Run-up Enclosure (GRE) in which to conduct maintenance ground run-up operations.

#### ***COMMENTS***

Aircraft operators must regularly conduct maintenance or repairs on aircraft systems and engines. For certain types of aircraft maintenance, engine run-up tests are conducted to demonstrate that the aircraft's in-flight systems are working properly before the aircraft can be put back into service. A run-up is a pre-flight test of the engine systems, where various levels of engine power are applied while the aircraft remains stationary. A substantial amount of noise can be created when run-up tests occur. A GRE can provide a location for such operations to occur that minimize engine noise intrusion on the surrounding community. A GRE could be sited adjacent to one of the existing taxiways to enable aircraft to perform run-ups in a manner that minimizes aircraft noise for the surrounding community. There are approximately 5,900 people within the 70 Lmax contour that could be eliminated by this Action, as shown on page G.48, Table G15 of the June 2011 Draft Report.

A GRE cannot be used under all wind conditions, as the enclosure is aligned with the prevailing winds. However, assuming a south

orientation, the facility could be used approximately 95% of the time.

Using the DC-9 as an example, a GRE could reduce the noise levels associated with run-up operations by approximately 15 dBA which translates into a 100% reduction in the population exposed to 70 dBA Lmax or greater noise.

***COST***

The cost to implement this action is approximately \$5 to \$7 million. The final location and more definitive cost estimates should be developed as part of this Action.

***RESPONSIBLE PARTIES***

The Airport Authority is responsible for identifying a location for the GRE, writing the request for a proposal for design and construction, and notifying the operators of the procedures after construction is complete. The FAA is responsible for directing taxiing aircraft to the GRE and the operators are responsible for using the GRE.

***AIRPORT ACTION***

The Airport Authority would identify an acceptable GRE location, apply for federal funding to hire consultants to design the structure, write the specifications and write the Request for Bid for contractors. Then, the Authority would hire the contractor to construct the facility.

***TIME FRAME***

This Action can be initiated immediately upon approval of this Study; air space review of the location; and receipt of funding.

## **Program Management and Administrative Elements (PMAE)**

### **PROGRAM MANAGEMENT AND ADMINISTRATIVE ELEMENT RECOMMENDATION 1—OPERATIONS REVIEW AND PART 150 UPDATES**

<b>ISSUE</b>	Update and review of the FAR Part 150 Study.
<b>CONTINUED ACTION</b>	The FAR Part 150 Study is a five-year program recommended to be re-evaluated at the end of the five-year period. In addition, if there is a significant change in either aircraft types or numbers of operations, or significant new facilities, then it is recommended that the Study be re-evaluated prior to the end of the five-year time frame.
<b>COMMENTS</b>	It is recommended that Airport Authority staff undertake a yearly review of the aircraft types and numbers, along with the actual number of operations occurring at the Airport and determine if they are consistent with the projections contained in the FAR Part 150 document. The various actions would also be reviewed to assess their ability to mitigate the projected noise intrusion and to rate the overall effectiveness of the program.
<b>COST</b>	The cost of monitoring the information set forth in this section would be borne out of the normal Airport Authority operating budget. Consultant assistance for various elements would be approximately \$40,000. The cost to update the entire Part 150 Study ranges from \$200,000 to \$300,000.
<b>RESPONSIBLE PARTIES</b>	The Airport Authority would be responsible for updating and monitoring the study. The FAA could help fund the update if there are funds available for such planning.

***AIRPORT ACTION***

Based on the monitoring activities described, the Airport Authority would reevaluate the program when there is a significant change in operations, aircraft types, or at the end of the five-year timeframe.

***TIME FRAME***

The Airport Authority would continue its monitoring program and consider the need for a full update at the end of the fifth-year after submittal or earlier if necessary as per FAR Part 150.

**PROGRAM MANAGEMENT AND ADMINISTRATIVE ELEMENT  
RECOMMENDATION 2—CONTINUATION OF  
STUDY ADVISORY COMMITTEE**

**ISSUE**

Continuation of learning curve and “body of knowledge” developed during the Study process, and follow-up on the implementation of the recommendations.

**NEW ACTION**

The Study Advisory Committee established for this Study has been instrumental in establishing these recommendations. It is recommended that a similar committee or the same committee continue to monitor programs implemented as a result of the Part 150 Study after its completion.

**COMMENTS**

Considerable time and effort has been expended, by both the Airport Authority and the Committee members, in the development of this Study, especially the “learning curve” effort and the building of relationships. This committee is too valuable a tool for communication to risk losing at the end of this process. In addition, on-going aircraft operational procedures evaluation should be discussed through the Committee. It is very difficult to foster a feeling of trust in many airport planning efforts. Such a feeling can be developed through the members of this or a similar Committee. Both sides of most issues are represented and all interests are heard. This is very important for the continued successful implementation of the noise compatibility program and operation of the Airport.

***COST***

The cost for organizing and conducting Committee meetings could be included in the normal operating expenses of the Airport Authority at approximately \$30,000 per year.

***RESPONSIBLE PARTIES***

The Airport Authority would be responsible for the formulation of the Committee and Committee administration. Other parties may be responsible for appointing members of the Committee. Committee members are responsible for attending and participation in Committee functions.

***AIRPORT ACTION***

The Airport Authority would schedule and conduct the Committee meetings, on at least a quarterly basis, as a means of disseminating information and gathering input on noise compatibility issues.

***TIME FRAME***

This action can occur within the first few months of approval of the FAR Part 150 Study. It can also be implemented without regard to any other recommendation.

## **Appendix**

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<b>INM Operational Tables (Intentionally left blank)</b>	<b>Appendix A</b>
<b>Hearing Transcript (Intentionally left blank)</b>	<b>Appendix B</b>
<b>Proof of Publication (Intentionally left blank)</b>	<b>Appendix C</b>
<b>Sponsor Approval Record (Intentionally left blank)</b>	<b>Appendix D</b>
<b>Response to Comments (Intentionally left blank)</b>	<b>Appendix E</b>
<b>Forecast Methodology</b>	<b>Appendix F</b>



## **Appendix A INM Operational Tables**

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## **Appendix B Hearing Transcript**

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## **Appendix C Proof of Publication**

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## **Appendix D Sponsor Approval Record**

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## **Appendix E Response to Comments**

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## **Appendix F Forecast Methodology**

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## Forecast of Aviation Demand

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### INTRODUCTION

Aircraft operations data is a key input variable in the development of Noise Exposure Maps (NEM) as required in the development of Part 150 Noise Compatibility Plans. Actual aircraft operations data from the most recent year is used to develop the baseline or current year NEM. And a forecast of aircraft operations for a period at least five years in the future is used to develop the future year NEM. In the preparation of Willow Run Airport's (YIP or the Airport) NEMs, 2012 was established as the current year and 2018 was chosen as the future year.

This report provides a review of the existing baseline year (2012) aircraft operations, as well as the future forecast of operations from the FAA's Terminal Area Forecast released January 2013 (2013 TAF) and determines the reasonableness of its use in developing the Airport's 2018 future year noise exposure maps (NEM). In addition, to support NEM development, this report provides existing aircraft type (fleet mix) information, as well as the anticipated shifts in fleet mix between 2012 and 2018.

### 2012 BASELINE OPERATIONS

The aircraft operations used to develop the 2012 current year noise exposure map is based on Airport Situational Display (ASD) data (IFR operations) and Airport management records (VFR operations) for the period November 2011 through October 2012 (2012 Airport Data). The 2012 Airport Data was used because it was the most recent data available and it provided the most accurate portrayal of existing Airport operations by aircraft type (fleet mix).

According to 2012 Airport Data, there were 73,602 total aircraft operations at YIP compared to 74,692 as reported in the 2013 TAF for fiscal year 2012 (the 12-month period ending September 2012 (FY). This equates to a difference of 1,089 operations or a 1.5% variance from the 2013 TAF. Based on the assumption that the 2012 Airport Data provides the most accurate description of current Airport operations by fleet mix, and its minor variance from the 2013 TAF, it was used to develop the 2012 current year NEM. The planned 2018 NEM will be based on the 2013 TAF projections for 2018 of approximately 75,220 total aircraft operations.

### 2013 TERMINAL AREA FORECAST

#### Background

Each year the FAA Office of Policy and Plans publishes a new Terminal Area Forecast (TAF) for each of the nation's active airports. The TAF includes historical and forecast enplaned passengers, historical and forecast aircraft operations, the number of based aircraft, and other related data. All data is reported on a FY basis unless otherwise noted.



The TAF presents aircraft operations data organized by four specific FAA defined aircraft categories based on the size and air service function of each aircraft. The four aircraft categories are: air carrier, air taxi/commuter, general aviation and military. General aviation and military aircraft operations are further subdivided into itinerant and local operations. Itinerant operations include flights from one airport to another while local operations are flights which generally occur within site of the airport such as pilot training or recreational flights. In this report, military operations are presented as a single category because of the relatively small number of operations (182 in 2012).

Presented below in Table 1 is a summary of YIP's historical aircraft operations for the period 2002 through 2012 and the forecast for the period 2013 to 2018 as presented in the 2013 TAF. As discussed above, 2012 Airport Data is the source for 2012 aircraft operations presented on Table 1.

**Table 1**  
**Historical and Forecast Aircraft Operations**  
**Willow Run Airport**

Year	Commercial			General Aviation			Military	Total Operations
	Air Carrier	Air Taxi/ Commuter	Total Commercial	Itinerant	Local	Total GA		
2002	4,584	16,419	21,003	47,393	49,453	96,846	72	117,921
2003	4,366	17,105	21,471	46,458	45,187	91,645	98	113,214
2004	5,838	18,595	24,433	48,286	42,224	90,510	74	115,017
2005	4,904	20,219	25,123	44,139	37,804	81,943	42	107,108
2006	3,537	16,016	19,553	37,742	31,745	69,487	99	89,139
2007	4,682	15,875	20,557	32,143	26,831	58,974	90	79,621
2008	2,997	12,325	15,322	33,223	34,513	67,736	212	83,270
2009	1,274	8,724	9,998	25,610	28,240	53,850	524	64,372
2010	3,099	9,850	12,949	26,384	27,613	53,997	199	67,145
2011	4,402	10,331	14,733	24,730	26,751	51,481	1,061	67,275
2012	3,372	12,621	15,993	23,777	33,650	57,427	182	73,602
<b>Forecast</b>								
2013	3,556	10,106	13,662	26,850	32,479	59,329	182	73,173
2014	3,577	10,285	13,862	26,955	32,577	59,532	182	73,576
2015	3,598	10,465	14,063	27,061	32,675	59,736	182	73,981
2016	3,619	10,649	14,268	27,167	32,773	59,940	182	74,390
2017	3,640	10,836	14,476	27,273	32,872	60,145	182	74,803
2018	3,661	11,026	14,687	27,380	32,971	60,351	182	75,220
<b>Compound Annual Growth Rates</b>								
2002-2012	-3.0%	-2.6%	-2.7%	-6.7%	-3.8%	-5.1%	9.7%	-4.6%
2007-2012	-6.4%	-4.5%	-4.9%	-5.9%	4.6%	-0.5%	15.1%	-1.6%
2009-2012	38.3%	13.1%	17.0%	-2.4%	6.0%	2.2%	-29.7%	4.6%
2012-2018	1.4%	-2.2%	-1.4%	2.4%	-0.3%	0.8%	0.0%	0.4%
2013-2018	0.6%	1.8%	1.5%	0.4%	0.3%	0.3%	0.0%	0.6%

**Sources:**

2002-2011 and 2013-2018: Federal Aviation Administration Terminal Area Forecast, January 2013.

2012: Provided by BridgeNet International from ASD data and Airport management records for the period Nov. 2011 - Oct. 2012.

## Air Carrier Operations

Air carrier operations are defined as commercial operations provided by aircraft, when configured for passenger service, which have greater than 60 seats. This category typically includes scheduled airline service on passenger or all-cargo airlines, on-demand cargo service and charter flights. Since there is no scheduled passenger service at YIP, all of its air carrier operations are all-cargo flights.

**Historical Operations.** Air carrier operations at YIP decreased from approximately 4,600 in 2002 to 3,400 in 2012 at a compound annual growth rate (CAGR) of -3.0%. During the period 2002 to 2012, air carrier operations displayed a significant amount of variability reaching a peak of over 5,800 operations in 2004 before falling to a low of less than 1,300 in 2009 during the most recent national economic recession. The steep decline in 2009 air carrier operations at YIP was the result of a fall-off in air cargo activity which was also experienced on a national level. Since 2009, air carrier operations rebounded to approximately 4,400 in 2011 and settled at slightly below 3,400 in 2012.

**Forecast Operations.** Air carrier operations are forecast to increase from approximately 3,400 annual operations in 2012 to nearly 3,700 operations in 2018 at a CAGR of 1.4%. The forecast indicates that the recent decline in air carrier operations will level-off in 2012 and then air carrier operations will begin to slowly increase over the forecast period.

## Air Taxi/Commuter

Air taxi/commuter operations are defined as commercial operations on aircraft, when configured to carry passengers that have 60 or fewer seats. The majority of air taxi/commuter operations at YIP are by on-demand cargo operators and charter passenger flights. The air taxi/commuter category includes aircraft operations by a wide range of aircraft sizes including operations by multi-engine turboprops and business jets.

**Historical Operations.** Air taxi/commuter activity at YIP is similar to air carrier activity in that it includes primarily all-cargo operations. Likewise, the number of the air taxi/commuter operations displayed considerable variability from year to year. From 2002 to 2012, air taxi/commuter operations declined from over 16,400 operations in 2002 to approximately 12,600 in 2012 at a CAGR of -2.6%. Air taxi/commuter operations peaked at over 20,200 in 2005 before falling to a low of about 8,700 in 2009, largely as a result of the most recent economic recession and the decline in total air cargo tonnage. Since 2009, air taxi/commuter activity has rebounded and reached approximately 12,600 aircraft operations in 2012.

**Forecast Operations.** Air taxi/commuter operations are forecast to decline from approximately 12,600 annual operations in 2012 to over 10,100 operations in 2013. Beginning in 2013, air taxi/commuter operations are projected to increase at a CAGR of 1.8% and reach over 11,000 operations by 2018.

## Commercial Operations

Commercial operations include the combined activity of air carrier and air taxi/commuter aircraft operations.

**Historical Operations.** From 2002 to 2012, total commercial operations followed a trend similar to its individual components. Commercial operations increased from just over 21,000 in 2002 to a peak of approximately 25,100 in 2005 before falling to under 10,000 operations in 2009. Since 2009, commercial operations have rebounded to approximately 16,000 aircraft operations in 2012.

**Forecast Operations.** Total commercial operations are forecast to decline from approximate 16,000 operations in 2012 to 13,700 operations in 2013. Beginning in 2013 total commercial operations are projected to increase at an annual rate of 1.5% and reach approximately 14,700 operations in 2018.

## General Aviation

General aviation (GA) operations are typically defined as operations other than commercial and military. GA operations typically range from small single-engine propeller aircraft used for flight training and recreational use up to large jet aircraft used for business or corporate purposes.

As presented in Table 2 below, GA operations are classified in the TAF as itinerant or local operations. Itinerant operations include those flights that include travel between multiple airports while local operations are those flights that takeoff and land at YIP and whose flight paths generally remain within site of the Airport.

Over the 2002-2012 period, the percentage share of total GA operations represented by itinerant and local operations has remained near 50% for each category, but has ranged from approximately 45% to 55% for each category.

**Table 2**  
**Historical and Forecast General Aviation Aircraft Operations**  
**Willow Run Airport**

Year	Itinerant GA		Local GA		Total General Aviation
	Aircraft Operations	% of Total GA	Aircraft Operations	% of Total GA	
2002	47,393	48.9%	49,453	51.1%	96,846
2003	46,458	50.7%	45,187	49.3%	91,645
2004	48,286	53.3%	42,224	46.7%	90,510
2005	44,139	53.9%	37,804	46.1%	81,943
2006	37,742	54.3%	31,745	45.7%	69,487
2007	32,143	54.5%	26,831	45.5%	58,974
2008	33,223	49.0%	34,513	51.0%	67,736
2009	25,610	47.6%	28,240	52.4%	53,850
2010	26,384	48.9%	27,613	51.1%	53,997
2011	24,730	48.0%	26,751	52.0%	51,481
2012	23,777	41.4%	33,650	58.6%	57,427
<b>Forecast</b>					
2013	26,850	45.3%	32,479	54.7%	59,329
2014	26,955	45.3%	32,577	54.7%	59,532
2015	27,061	45.3%	32,675	54.7%	59,736
2016	27,167	45.3%	32,773	54.7%	59,940
2017	27,273	45.3%	32,872	54.7%	60,145
2018	27,380	45.4%	32,971	54.6%	60,351

**Compound Annual Growth Rates**

2002-2012	-6.7%	-3.8%	-5.1%
2007-2012	-5.9%	4.6%	-0.5%
2009-2012	-2.4%	6.0%	2.2%
2012-2018	2.4%	-0.3%	0.8%
2013-2018	0.4%	0.3%	0.3%

**Sources:**

2002-2011: Federal Aviation Administration Terminal Area Forecast, January 2013 for FY 2012.

2012: Provided by BridgeNet International from ADS data and Airport management records for the period Nov. 2011 - Oct. 2012.

**Historical Itinerant Operations.** From 2002 to 2012, itinerant GA operations declined by approximately 50% from just under 47,400 operations in 2002 to approximately 23,800 operations in 2012 at a CAGR of -6.7%. This decline can be attributed to a number of factors including a significant rise in fuel prices that occurred from approximately 2004 to 2007 and then a severe national economic recession which occurred between approximately 2007 and 2009. Between 2009 and 2012, the decline in itinerant operations has greatly slowed with activity leveling off between approximately 24,000 and 26,000 annual operations.

**Forecast Itinerant Operations.** GA operations are forecast to increase to approximately 27,400 operations in 2018 at an annual rate of 2.4%. The majority of this growth is expected to occur from 2012 to 2013, and then from 2013 to 2018 the growth in itinerant operations is expected to level-off at an annual rate of 0.4%.

**Historical Local Operations.** From 2002 to 2012, local GA operations declined by approximately 32.0% from approximately 49,500 operations in 2002 to approximately 33,700 operations in 2012 at a CAGR of -3.8%. A significant portion of this decline can be attributed to the affects of rising fuel prices during the middle of the last decade and the national economic recession of 2007-2009. Local operations continued to decline through 2011, but in 2012 recorded an increase of nearly 26% as the result of improving economic conditions and the growth of Eastern Michigan University's Aviation Program based out of the Eagle Flight Center located at YIP.

**Forecast Local Operations.** Local GA operations are forecast to remain essentially flat, with a slight decline, from approximately 33,700 operations in 2012 to about 33,000 operations in 2018 at CAGR of -0.3%. Although this projection represents a small decline in GA operations from 2012 to 2018, the forecast actually projects a modest decline from 2012 to 2013 followed by an increase at a CAGR of 0.3% from 2013 to 2018.

## **Military Operations**

**Historical Military Operations.** Military operations include all aircraft operations performed by military aircraft. Military operations at YIP are performed by a wide range of aircraft sizes and types from small single engine propeller aircraft to F-18 fighter jets. Similar to GA, military operations are typically classified as itinerant or local. However, due to the small number of operations, the results are presented as a single category.

From 2002 to 2012, military operations averaged less than 0.3% of total operations at YIP and only twice during this period have they accounted for more than 500 annual operations (see Table 1). Because of the unique nature of military operations, largely determined by classified U.S. Department of Defense objectives, they can vary significantly from year-to-year without any identifiable trend. Most of the Military Operations occur in conjunction with the "Thunder over Michigan" annual air show.

**Forecast Military Operations.** Military operations are projected to remain at their 2012 level of 182 annual operations through 2018.

## **Total Airport Operations**

Total Airport operations are forecast to increase from approximately 73,600 annual operations in 2012 to approximately 75,200 operations in 2018 at a CAGR of 0.4%. The forecast indicates that the recent decline in total operations will level-off by 2013 and then traffic will begin to slowly increase over the forecast period. From 2013 to 2018 total airport operations are projected to increase at a CAGR of 0.6%.

## **2013 TERMINAL AREA FORECAST VALIDATION**

The section below provides an evaluation of the 2013 TAF to determine the general reasonableness of its aircraft operations projections. Specifically, it analyzes the use of the year 2018 operations forecast in developing the 2018 future year noise exposure maps.

### **Commercial Operations**

Commercial operations are the sum total of aircraft operations performed by aircraft included in the air carrier and air taxi/commuter categories. Commercial operations have historically accounted for approximately 20% of total YIP operations.

The 2013 TAF commercial operations forecast for the Airport appears reasonable given the long-term trends at YIP and the recent recovery in traffic that has occurred since the trough in 2009. The majority of the commercial operations at the Airport are performed by all-cargo aircraft. YIP has long served as an air cargo facility for Southeast Michigan and according to Airport management this situation is unlikely to change over the 2018 forecast horizon.

According to the FAA Aerospace Forecast 2012-2032 (FAA Aerospace Forecast), U.S. air cargo tonnage is projected to increase at an annual rate of 5.6% during the 2012-2018 period. And the Boeing Market Outlook 2012-2031 forecast projects a CAGR for North American air cargo tonnage of 4.5%. These forecasts suggest that it is reasonable to expect a modest increase in commercial all-cargo aircraft operations at YIP over the 2012-2018 forecast period.

As demonstrated on Table 3, three key regional economic indicators are projected to show significant improvement over the 2012-2018 forecast period. Employment levels are expected to reverse course from annual job losses of -1.3% from 2000 to 2010 to annual job growth of 0.6% from 2010 to 2020. Similarly, per capita personal income is expected to grow at an annual rate of 1.3% up from an annual rate of 1.1%. Likewise, gross regional product is projected to expand at a rate of 1.8% or approximately double its recent historical rate of 0.9%. And while the recovery from the recent economic recession has been slow, most economic forecasts expect it to continue which is likely to result in an increased demand for air service.

**Table 3**  
**Socioeconomic Factors**  
**Detroit Region**

<b>Detroit Region (a)(b)</b>	<b>Historical 2000-2010</b>	<b>Forecast 2010-2020</b>
Employment	-1.3%	0.6%
Per Capita Personal Income	1.1%	1.3%
Gross Regional Product	0.9%	1.8%

**Sources:**

SEMCOG, Southeast Michigan 2040 Forecast Summary Revised, April 2012

U.S. Bureau of Economic Analysis.

Woods and Poole Economics, Inc., 2012 Complete Economic and Demographic Data Source

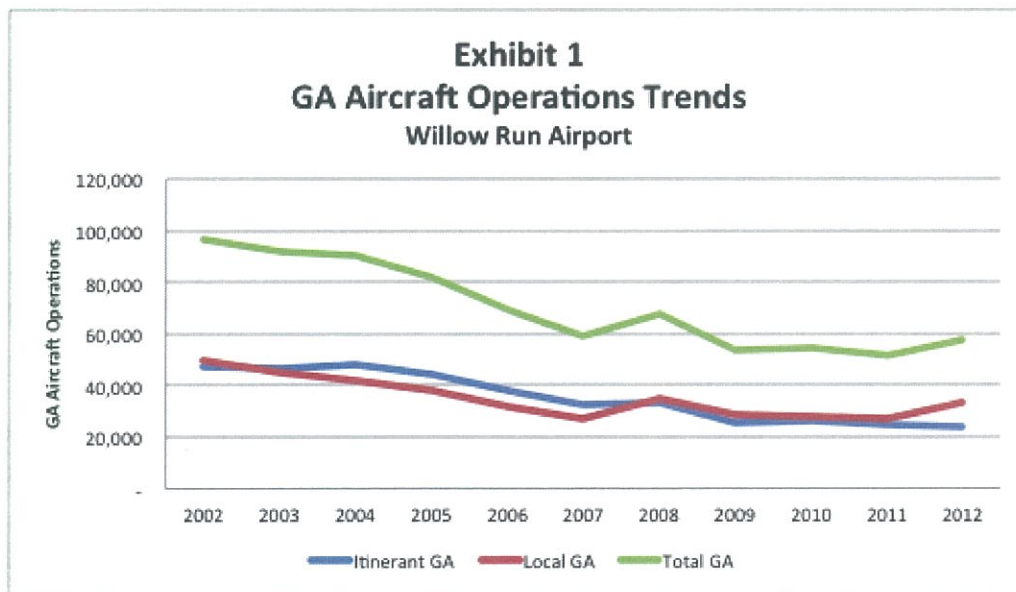
(a) Consolidated Detroit-Warren-Livonia MSA (Wayne, Oakland, Macomb, St. Clair, Livingston, Lapeer), Ann Arbor MSA (Washtenaw), and Monroe MSA (Monroe).

(b) Compound annual growth rates for respective periods.

## General Aviation Operations

GA operations include local and itinerant operations and historically have accounted for approximately 80% of total YIP operations.

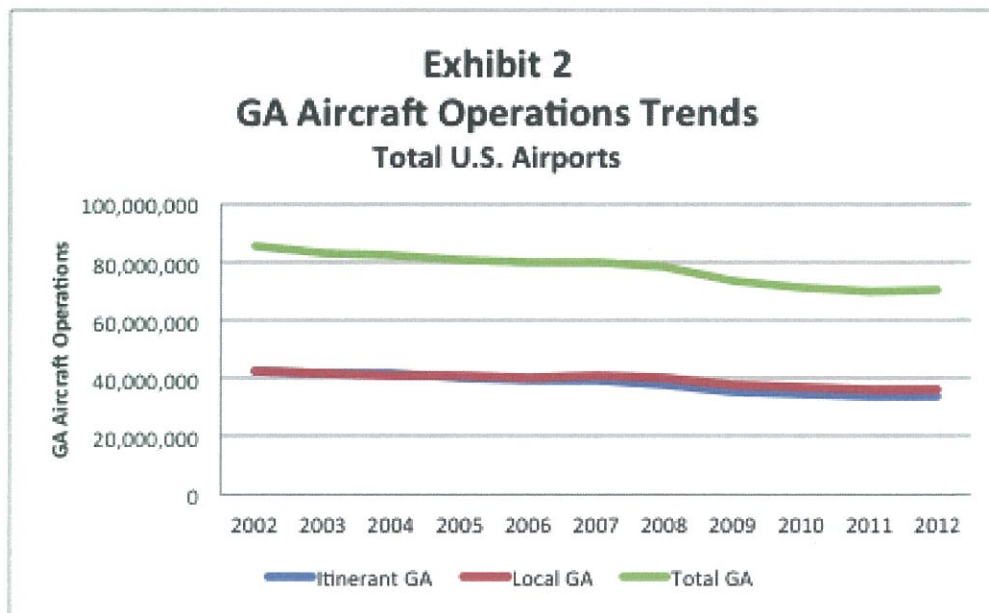
The 2013 TAF GA operations forecast appears reasonable based on the long-term trends of GA activity at YIP. As demonstrated in Exhibit 1 below, GA operations experienced a steady decline from 2002 to 2009, but leveled off in 2010 and 2011 and recorded an increase of 11.6% in 2012. GA operations at individual airports tend to follow national trends and as presented on Exhibit 2, historical GA operations trends for YIP were similar to those for the U.S.





Historically, GA activity has been closely tied to general economic conditions and fuel prices and given that the local and national economies are expected to continue a slow but steady rate it is reasonable to assume that GA operations follow this trend.

According to the 2013 TAF, total GA operations at YIP are projected to increase at an annual rate of 0.3% from 2013 to 2018 compared to 0.4% for the total U.S. This indicates that future GA traffic at YIP will continue to mirror national trends as it has historically.



### Conclusion on Use of 2013 TAF for Noise Modeling Purposes

In our efforts to determine the reasonableness of the 2013 TAF for use in developing the 2018 NEMs, Jacobsen/Daniels Associates LLC (JDA), performed a thorough analysis of the 2013 TAF aircraft operations projections for YIP. In addition, we conducted other independent analyses including a survey of the Airport's largest all-cargo operators for their outlook on likely future demand, a review of other available aviation and socioeconomic forecasts (2013 TAF for State of Michigan and U.S., FAA Aerospace Forecast, Boeing Market Outlook) and discussions with Airport management.

Historical aircraft operations at YIP have been highly variable over the historical period of 2002 to 2012 and exhibited a generally downward trend from 2002 to 2009 before rebounding from 2009 to 2012.

This general decline in activity can be largely explained by economic factors such a decline in the automobile industry (the region's largest employer), a spike in fuel prices which negatively influenced GA traffic, a U.S. financial and banking crisis, and one of the nation's most severe economic recessions. While these negative events have largely passed, general

economic conditions are improving, and air traffic at YIP has been generally increasing, it is impossible to predict future events that may negatively influence air traffic at YIP and for the nation.

Based on the growth in air traffic at YIP from 2009 through 2012, which has likely occurred in response to improving regional and national economic conditions, the modest growth in air traffic projected in the 2013 TAF for the period 2012 to 2018 is considered a reasonable forecast of future aviation demand at YIP. Considering the information described above, in concert with reviewing the 2013 TAF for the State of Michigan and the 2013 TAF for the U.S., the FAA Aerospace Forecast, and the Boeing Market Outlook it was determined that the 2013 TAF operations forecasts are reasonable estimates of future aviation demand at YIP and appropriate for use in the development of the 2018 future year noise exposure maps in support of the YIP Part 150 Noise Compatibility Study.

### **Sensitivity Analysis on Updated Baseline Year (2012) Operations from 2012 Airport Data**

Given the slight difference in 2012 operations when comparing the values provided in the TAF and those derived from 2012 Airport Data, a sensitivity analysis was conducted to ensure that this slight change in baseline operations would not influence the conclusion that the 2018 TAF operations are appropriate for use in the development of the 2018 future year noise exposure maps.

2012 Airport Data is approximately 1,090 operations or 1.5% lower than 2012 operations as reported in the 2013 TAF. To evaluate the impact of this difference between the two data sources, a sensitivity analysis was conducted where the 2013 TAF projected annual growth rate for the period 2012 to 2018 was applied to the 2012 Airport Data and generated 2018 forecast operations. This approach produced a new 2018 forecast of 74,122 total operations versus 75,220 total operations for 2018 as reported in 2013 TAF, which equates to a difference of 1,098 total operations or 1.5%. This minor difference between the two forecasts further supports our belief that the forecast for 2018 as presented in the 2013 TAF is reasonable for use in developing the Airport's 2018 NEMs.

In addition to the research and analysis described above, we reviewed the general approach, logic and methodology used in the development of the 2013 TAF. We found the 2013 TAF was prepared in a professional manner, employing a methodology that has been well tested and evaluated by the FAA and the aviation industry and that meets generally accepted industry practices for developing forecasts of aviation demand.

After a careful review of the analyses described above, we made a deliberate decision to use the 2013 TAF to provide the 2018 forecast of total aircraft operations at YIP for use in developing the Airport's 2018 NEM. We realize that if actual results deviate significantly from the forecast presented in the 2013 TAF, that the Authority accepts the responsibility to revise the forecast and related analyses if necessary.

## **EXISTING AND FUTURE FLEET MIX**

The following section discusses the approach used to determine the existing and future aircraft fleet mix at YIP. The allocation of aircraft operations by aircraft type was determined from a variety of sources that include ASD Data, Airport management records, interviews with key Airport tenants and the 2013 TAF.

The 2012 current year fleet mix was determined from an extensive review of the ASD Data that included actual aircraft flight information for 2012. The fleet mix for the 2018 future year was based on the actual 2012 fleet mix which was adjusted for 2018 based on expected changes in the future aircraft fleet at YIP.

### **2012 Current Year Fleet Mix**

The aircraft fleet mix for current year 2012 is provided below in Table 4.

**Table 4**  
**Aircraft Fleet Mix 2012**  
**Willow Run Airport**

Aircraft Type	Arrivals	Departures	Total Operations	Percentage of Total
Airbus A 319 & 320	1	1	2	0.0%
Beech Jet All Series	222	222	444	0.6%
Beech Propeller All Series	2,511	2,511	5,022	6.8%
Boeing 727 All Series	300	300	599	0.8%
Boeing 737 All Series	60	60	120	0.2%
Boeing 747 All Series	8	8	17	0.0%
Boeing 757 All Series	4	4	8	0.0%
Bombardier CRJ All Series	264	264	529	0.7%
Bombardier Learjet All Series	1,002	1,002	2,004	2.7%
Cessna Business Jets All Series	711	711	1,423	1.9%
Cessna Propeller All Series	6,505	6,505	13,011	17.7%
Convair CV-540/580/600/640	52	57	109	0.1%
Dassault Falcon All Series	1,015	1,015	2,031	2.8%
Douglas DC 8 All Series	15	15	29	0.0%
Douglas DC 9 All Series	1,264	1,264	2,528	3.4%
Douglas MD 82 & 83	34	34	68	0.1%
Embraer ERJ All Series	842	842	1,684	2.3%
Gulfstream Jets All Series	306	306	612	0.8%
Hawker Business Jets All Series	85	85	170	0.2%
Helicopters	91	91	182	0.2%
Military Fighter Aircraft	91	91	182	0.2%
Miscellaneous Propeller	18,427	18,427	36,854	50.1%
Miscellaneous Business Jets	457	457	915	1.2%
Miscellaneous Commuters	756	756	1,512	2.1%
Mitsubishi All	3	3	6	0.0%
Piper Propeller All Series	1,179	1,179	2,358	3.2%
Sabreliner 80	592	592	1,184	1.6%
Unknown	-	-	-	0.0%
	<b>36,799</b>	<b>36,804</b>	<b>73,603</b>	<b>100.0%</b>

Source: BridgeNet International, Willow Run Airport (YIP) Aircraft Operations by INM Type, November 1, 2011 to October 31, 2012

Prepared by: Jacobsen/Daniels Associates LLC

Presented on Table 5 is a summary of the 2012 current year fleet mix sorted by aircraft category. Single-engine propeller operations represented the largest category of aircraft operations at YIP accounting for approximately 75.7% of total operations. The second largest share was represented by business/corporate jets at approximately 11.1%, followed by narrowbody jets with 4.6%.

**Table 5**  
**Operations by Aircraft Category**  
**Willow Run Airport**

<b>Aircraft Category</b>	<b>2012 Baseline</b>	<b>% of Total</b>
Widebody Jets	17	0.0%
Narrowbody Jets	3,398	4.6%
Regional Jets	2,151	2.9%
Business/Corporate Jets	8,174	11.1%
Single Engine Prop	55,719	75.7%
Multi-Engine Prop	3,963	5.4%
Helicopter	182	0.2%
<b>Total Operations <sup>1</sup></b>	<b>73,603</b>	<b>100.00%</b>

<sup>1</sup> Total Operations numbers provided from actual 2012 operations (November 1, 2011 to October 31, 2012) as reported by BridgeNet International.

Source: BridgeNet International, Willow Run Airport (YIP) Aircraft Operations by INM Type, November 1, 2011 to October 31, 2012

Prepared by: Jacobsen/Daniels Associates LLC

## 2018 Future Year Fleet Mix

Through information gathered from tenant interviews some assumptions have been made about changes to the fleet mix for 2018. Surveys were issued to on-airport tenants requesting historical and anticipated changes in fleet mix, future flight activity, and facility needs. Results from the tenant interviews are as follows:

- Kalitta Charters plans to maintain their current fleet of 8-727-200, 2-DC-9's, 8-Falcon 20 and 10-Learjets;
- USA Jet's is going to maintain their current fleet of Falcon 20s, DC-9s and MD80s;
- Ameristar Jet Charter is going to maintain their current fleet of Falcon 20s, DC-9s, MD80s and 737s;
- DC-8 activity will likely not continue in the future.

Based on the information gained through tenant interviews and additional industry analysis, the following assumptions were made regarding changes in the Airport's projected 2018 fleet mix.

- Based upon recent discussion with the current tenants, the Airport is projected to have no widebody aircraft operations in 2018. Activity of these aircraft has declined substantially in recent years. The Airport recorded only 16 widebody (B-747) aircraft

operations in 2012 and that service is expected to be discontinued. Projecting future widebody operations at the airport will be closely monitored as this could change suddenly.

- Narrowbody aircraft operations are expected to increase slightly from approximately 4.6% of total aircraft operations in 2012 to 4.7% in 2018. These projections are based on interviews with current narrowbody operators at YIP and the FAA Aerospace Forecast of domestic cargo operations.
  - Regional jet operations are expected to remain largely unchanged increasing from 2.9% of total aircraft operations in 2012 to 3.0% in 2018.
  - Business/Corporate Jet activity is projected to increase from 11.1% of total aircraft operations in 2012 to approximately 14.0% in 2018. This assumption is based on projected changes in long-term, national turbojet activity as presented in the FAA Aerospace Forecast.
  - Single engine, piston-powered aircraft activity is expected to decline from 75.7% of total aircraft operations in 2012 to 72.7% in 2018. This assumption is based on the Airport's historical trends and projected changes in long-term, national GA activity as presented in the FAA Aerospace Forecast for similar type aircraft.
- The Airport's share of multi-engine propeller aircraft operations and helicopter operations are expected to remain largely unchanged from 2012 at 5.4% and 0.3% respectively in 2018.

**Table 6** provides the estimated 2018 future year fleet mix. Only minor changes from the 2012 fleet mix are expected to occur by 2018. The allocation of aircraft operations by aircraft type was based on the 2018 aircraft operations forecast from the 2013 TAF and the baseline fleet mix for 2012 adjusted for anticipated changes to the current fleet mix.

**Table 6**  
**Aircraft Fleet Mix 2018**  
**Willow Run Airport**

Aircraft Type	Arrivals	Departures	Total Operations	Percentage of Total
Airbus A 319 & 320	1	1	2	0.0%
Beech Jet All Series	233	233	466	0.6%
Beech Propeller All Series	2,451	2,451	4,903	6.5%
Boeing 727 All Series	314	314	629	0.8%
Boeing 737 All Series	63	63	126	0.2%
Boeing 747 All Series	-	-	-	0.0%
Boeing 757 All Series	4	4	9	0.0%
Bombardier CRJ All Series	277	277	555	0.7%
Bombardier Learjet All Series	1,290	1,290	2,579	3.4%
Cessna Business Jets All Series	916	916	1,832	2.4%
Cessna Propeller All Series	6,480	6,480	12,959	17.2%
Convair CV-540/580/600/640	57	57	114	0.2%
Dassault Falcon All Series	1,307	1,307	2,614	3.5%
Douglas DC 8 All Series	-	-	-	0.0%
Douglas DC 9 All Series	1,326	1,326	2,652	3.5%
Douglas MD 82 & 83	36	36	72	0.1%
Embraer ERJ All Series	883	883	1,767	2.3%
Gulfstream Jets All Series	394	394	787	1.0%
Hawker Business Jets All Series	89	89	178	0.2%
Helicopters	107	107	214	0.3%
Military Fighter Aircraft	93	93	186	0.2%
Miscellaneous Propeller	17,989	17,989	35,979	47.8%
Miscellaneous Business Jets	589	589	1,178	1.6%
Miscellaneous Commuters	793	793	1,586	2.1%
Mitsubishi All	4	4	8	0.0%
Piper Propeller All Series	1,151	1,151	2,302	3.1%
Sabreliner 80	762	762	1,525	2.0%
Unknown	-	-	-	0.0%
	<b>37,610</b>	<b>37,610</b>	<b>75,220</b>	<b>100.0%</b>

Source: Jacobsen/Daniels Associates LLC

Presented in Table 7 is a summary of the 2018 future year fleet mix for YIP sorted by aircraft category. Single-engine propeller operations are forecast to account for the largest share of aircraft operations at approximately 72.7%, which is down from 75.7% in 2012. The second largest share is projected to be business/corporate jets at approximately 14.0%, which is up from 11.1% in 2012. The third largest share is projected as narrowbody aircraft which is expected to remain near its 2012 level of approximately 4.7% of total aircraft operations.

**Table 7**  
**Operations by Aircraft Category**  
**Willow Run Airport**

<b>Aircraft Category</b>	<b>2018 Forecast</b>	<b>% of Total</b>
Widebody Jets	0	0.0%
Narrowbody Jets	3,532	4.7%
Regional Jets	2,256	3.0%
Business/Corporate Jets	10,523	14.0%
Single Engine Prop	54,653	72.7%
Multi-Engine Prop	4,042	5.4%
Helicopter	214	0.3%
<b>Total Operations</b>	<b>75,220</b>	<b>100.00%</b>

Source: Jacobsen/Daniels Associates LLC