DETROIT METROPOLITAN WAYNE COUNTY AIRPORT
FAR PART 150 NOISE COMPATIBILITY STUDY UPDATE

DETROIT METRO • WILLOW RUN
WAYNE COUNTY AIRPORT AUTHORITY

CHAPTER G
NOISE ABATEMENT OPTIONS ANALYSIS

Noise Abatement Options Analysis

Introduction

The following chapter summarizes all of the noise abatement options identified and considered in this Part 150 Noise Compatibility Study:

- **Flight Track Options**
  - Option 1 – **Concentrate Noise**
    - Option 1a – Concentrate Noise – Departures off Runway 4R
    - Option 1b – Concentrate Noise – Departures off Runway 3L following the I-94 freeway corridor
    - Option 1c – Concentrate Noise – Departures in South Flow
  - Option 2 – **Disperse Noise**
    - Option 2a – Fan Runway 4R Departures Between 350 and 030 Degrees
    - Option 2b – Fan Runway 03L to the north between 350 to 060 degrees
    - Option 2c – Fan Departures in South Flow
  - Option 3 – **Concentrate in some areas, Disperse in others**
  - Option 4 – **Concentrate Close-in, Disperse Further-away**
- **Runway Use Options**
  - Option 5 – **Runway Use – Concentrate noise**
    - Option 5a – Extend hours of Contra-Flow at night
  - Option 6 – **Runway Use – Disperse noise**
    - Option 6a – Off-set approach to Runway 4L during poor weather in north flow
    - Option 6b – Off-set approach to Runway 22R during poor weather in south flow
- **Departure Climb Procedures**
  - Option 7 – Close-in or Far-Out Procedure of AC 91-53a
- **Landing Procedures**
  - Option 8 - Continuous Descent Approach
- **Airfield/Airport Changes**
  - Option 9 – Extend Runway 3L/21R
  - Option 10 – Displaced landing thresholds
  - Option 11 – High Speed Taxiway Exits
  - Option 12 – Ground Run-up Procedures
  - Option 13 – Ground Run-up Enclosure (hush house)
  - Option 14 – Noise barriers
  - Option 15 – Noise Abatement Procedures for Use During Runway Maintenance
- **Other Measures**, including Noise Management
  - Option 16 - Install Noise Monitoring/Radar Tracking System

- Option 17 – Fly Quiet Report Card and Pilot Awareness Program
- Option 18 – Continuation of the Study Advisory Committee

It should be noted that the analysis documented in this Part 150 includes the 60 DNL contour. This contour, as well as the supplemental metrics (such as the single event sound exposure contours), are included as supplemental information for the sole purposes of identifying areas that may receive increased or decreased sound levels. The 60 DNL contours are generally less accurate than the higher intensity contours, but when comparing one noise abatement option to another, show the locations that could experience an increase or decrease in noise exposure. The 65 DNL contour is the threshold contour for determining land use compatibility per the Part 150 land use guidelines.

The options listed on the prior page were analyzed for this chapter and are documented herein. **Table G1** summarizes the effects of the options that have been completed to date. By the end of the study, the table will be completed with an analysis of the options identified for evaluation. Additional land use alternatives are evaluated in a subsequent chapter. It is important to note that each category of option is intended to stand alone – and thus, information is often repeated.

At the end of this chapter is a list of the options that were recommended by the Committee to be included in the Noise Compatibility Program as Recommendations.

TABLE G1 - Summary of Noise Abatement Options

Option	65 DNL & Greater Impact/Change (Net Change in affected Population)		60 DNL & Greater Impact/Change (Net Change in affected Population)		Locations That Would Experience		Operational Issues/Comments
					Increased Noise	Decreased Noise	
1a – Concentrate –North Flow – 4R Departures	-60	-6.1%	-770	-4.5%	Huron Twp (60), Taylor (60)	Dearborn Heights (60), Inkster, (60) Westland (60,65), Romulus (60,65)	FAA threshold of significant impact could result in preparing an EIS
1b – Concentrate – North Flow 3L (I-94 Corridor)	-10	-1.0%	-140	-0.8%	Taylor (60), Huron Twp (60).	Westland (60) Dearborn Heights (60), Inkster (60), Romulus (60,65)	FAA threshold of significant impact could result in preparing an EIS; could increase aircraft delay and ATC workload
1c – Concentrate – South Flow	0	0%	-650	-3.8%	Sumpter Twp (60), Taylor (60), Inkster (60), Huron Twp (65)	Dearborn Heights (60), Romulus (60,65), Huron Twp (60)	Could increase aircraft delay
2a – Fan 4R (320-025 headings)	-60	-6.1%	-510	-2.8%	Taylor (60), Huron Twp (60), Romulus (60)	Inkster (60), Westland (60,65), Dearborn Heights (60), Romulus (65)	Alterative would be designed with ATC input so delays would not be incurred.
2b – Fan 3L (350-060 headings)	0	0	-40	-0.2%	Dearborn Heights (60), Huron Twp (60), Inkster (60), Romulus (60)	Taylor (60), Westland (65)	Alterative would be designed with ATC input so delays would not be incurred.
2c – Fan South Flow Departures	-40	-4.0%	-440	-2.6%	Huron Twp (60), Taylor (60)	Romulus (60, 65). Dearborn Heights ((60)	Alterative would be designed with ATC input so delays would not be incurred.
3a – Runway 4R Departures – Concentrate South Turning Aircraft and Fan Others	+90	+9.1%	+600	+3.5%	Westland (65), Taylor (60,65), Romulus (65) Inkster (60), Dearborn Heights (60)	Westland (60), Romulus (60)	Could increase aircraft delay
3b - Runway 3L Departures – Concentrate South Turning Aircraft and Fan Others	+150	+15.2%	+610	+3.6%	Taylor (60,65), Inkster (60) Westland (60,65), Romulus (60,65)	Dearborn Heights (60)	Could increase aircraft delay
3c – Runway 4R Departures - Concentrate a Portion of South Turning Aircraft and Fan Others	+150	+15.2	+940	+5.5	Huron Twp (60, 65), Romulus (60,65), Westland (60,65), Taylor (60),Dearborn Heights (60,65)	No reductions	Could increase flight delays
3d – Runway 3L Departures Concentrate a Portion of South Turning Aircraft and Fan Others	-20	-2.0%	-230	-1.4%	Romulus (60,65), Westland (60), Inkster (60), Dearborn Heights	Huron Twp(60), Taylor (60)	Could Increase flight delays

Option	65 DNL & Greater Impact/Change (Net Change in affected Population)		60 DNL & Greater Impact/Change (Net Change in affected Population)		Locations That Would Experience		Operational Issues/Comments
					Increased Noise	Decreased Noise	
					(60)		
4 – Concentrate Close-in/Disperse Further Away	+30	+3.0%	0	0%	Westland (65), Huron Twp (65), Taylor (60,65), Inkster (60)	Romulus (60,65), Westland (60), Dearborn Heights (60)	
5– Runway Use – Concentrate - Increase Nighttime Contra Flow	-60	-6.1%	-720	-4.3%	Sumpter Twp (60), Huron Twp (60,65), Romulus (60)	Dearborn Heights (60), Taylor (60), Inkster (60), Westland (65), Romulus (65)	Could increase ATC workload
6a – Runway Use – Disperse Using Offset Approach to 4L/22R	-40	-4%	+160	+0.94%	Romulus (60,65), Westland (60), Huron Twp (60)	Westland (65), Inkster (60)	
7 – Departure Climb Procedure	Evaluated using SEL contours Close procedure increased 85, 90, 95 SEL Distant procedure decrease 85, 90 SEL, increased 95 SEL				Close procedure increased 85, 90, 95 SEL	Distant procedure decrease 85, 90 SEL, increased 95 SEL	With Close-In procedures aircraft would not climb are fast as they do today, potentially affecting airspace
8 – Continuous Descent Approach	SEL contours (for combined Rwy 22R & 21L Arrivals) 3% reduction 85 SEL, 7% reduction 80 SEL and 10% reduction 75 SEL.				None	Detroit, Redford, Dearborn, Inkster	Operates best with a homogeneous fleet
9a – Extend Runway 3L/21R – N&S	-60	-6.1%	-320	-1.9%	Huron Twp (65,60) Romulus (65,60), Westland (60), Inkster (60)	Westland (65), Taylor (60), Dearborn Hts (60)	
9b – Extend Runway 3L/21R – North	-60	-6.1%	-1,790	-10.6%	Huron Twp (65,60) Romulus (65,60), Westland (65,60), Inkster (60)	Taylor (60), Dearborn Hts (60)	
9c – Extend Runway 3L/21R - South	-70	-7.1%	-1,360	-8.0%	Romulus (65), Westland (65,60), Inkster (60), Dearborn Hts (60), Taylor (60)	Huron Twp (65, 60)	Potential taxiway congestion from increases queue
10 – Displaced landing thresholds	-80	-8.1%	-420	-2.5%	Westland (65), Dearborn Hts (60), Inkster (60), Taylor (60)	Huron Twp (60),Romulus (60), Westland (60)	
11 – High Speed Taxiway Exits	NA	NA	NA	NA	ND	ND	
12 – Ground Run-up Procedures	38% reduction in population affected by Lmax 70 dBA from noisiest aircraft				Huron Twp	Romulus	
13 – Ground Run-up Enclosure	Eliminate population affected by 70 Lmax				Huron Twp, Romulus, Taylor, Wayne		
14 – Noise barriers	ND	ND	ND	ND	ND	ND	No meaningful site available

Option	65 DNL & Greater Impact/Change (Net Change in affected Population)		60 DNL & Greater Impact/Change (Net Change in affected Population)		Locations That Would Experience		Operational Issues/Comments
					Increased Noise	Decreased Noise	
15 – Noise Abatement Procedures for Use During Runway Maintenance	Periodic runway/airfield maintenance is required and noise abatement procedures would vary according to the specific maintenance needs				Periodic runway/airfield maintenance is required and noise abatement procedures would vary according to the specific maintenance needs		
16 - Install Noise Management/ Radar Tracking System	ND	ND	ND	ND	ND	ND	This action could increase understanding and compliance with noise abatement procedures
17 – Fly Quiet Report Card and Pilot Awareness Program	ND	ND	ND	ND	ND	ND	This action could increase understanding and compliance with noise abatement procedures
18 – Continuation of the Study Advisory Committee	ND	ND	ND	ND	ND	ND	This action would continue for a short period to monitor the implementation of the Part 150 Recommendations

With location, the (60) indicates farther from the DTW (i.e. 60 DNL contour), and (65) indicates closer to the DTW (i.e., 65 DNL contour).

ND – Not detectable by the noise exposure contours

NA – Not evaluated, as option would not be expected to have noise reduction benefits

The 60 DNL contour, as well as the supplemental metrics (such as the single event sound exposure contours), are included as supplemental information for the sole purposes of identifying areas that may receive increased or decreased sound levels. The 60 DNL contours are generally less accurate than the higher intensity contours, but when comparing one noise abatement option to another, show the locations that could experience an increase or decrease in noise exposure

Option 1: Concentrate Noise by Using Satellite Based Technology Flight Paths

Discussion: In general noise abatement options either concentrate noise over a predefined area or attempt to disperse or equalize noise. A third option, discussed later, that combines the concentration with equalization is also possible. Concentrated noise provides a general predictability that noise would occur over specific areas, whereas dispersal generally results in less predictability, with flights being dispersed over an area.

Within the concept of concentrate noise, the goal of these options is to provide for more precise noise abatement flight paths for aircraft departing to both the north and south. These procedures would take advantage of satellite-based Global Positioning System (GPS) technology (such as Flight Management Systems - FMS and Required Navigation – RNAV) to concentrate aircraft along specific paths. In general aircraft departing to the northwest, west, and southwest operate from the western complex of runways (Runway 4L/22R and 4R/22L) while the northeast, east and southeast flights operate from the eastern complex (3L/21R and 3R/21L).

For departures due north, no clear corridor of lowest population density was identified. For departures to the east and southeast, a relatively narrow corridor was identified that generally follows the I-94 corridors from DTW to the east. For departures to the southwest, lower densities were identified south of Michigan Avenue. Based on these limited corridors, three sub-options to concentrate noise were identified:

- Option 1a: departures to the northwest off Runway 4R,
- Option 1b: departures to the northeast off Runway 3L following the I-94 corridor, and
- Option 1c: departures to the south off Runways 22L and 21R.

As the existing noise abatement procedure at DTW during the daytime hours consists of a fanning procedure that disperses flights, these options would change the philosophy of the existing program.

Option 1a: Concentrate Noise – Departures off Runway 4R

Noise Abatement Procedure Goal: The goal of this option is to provide for more precise flight paths for aircraft departing Runway 4R to concentrate noise over the lower density population. It is important to note that residences are located under some portion of all flight paths; however, attempts are made to concentrate noise over the areas that have the lowest densities, where possible.

Description of the Option: Aircraft would use satellite-based navigation technologies to fly multiple headings over land uses with lower population densities. The headings (similar to compass directions) would be used that correspond with the different routes that aircraft fly as they depart the Detroit airspace. North, northwest and west bound aircraft would follow existing tracks, while, southwest- and south-bound aircraft would turn sooner than the existing turns and either stay on course to the west or initially turn west and then to the south. Westbound aircraft that use Runway 4R are turned to the west and south before turning on their course, these flights would avoid the higher density population areas by turning south of Wayne and Westland. **Figure G1** shows the desired flight track corridors for this option along with existing flight tracks.

Comparable Existing Procedure(s): Aircraft currently depart from Runway 4R and fly a straight path (runway heading) until the aircraft reaches at least 500 feet above ground before turning west. This

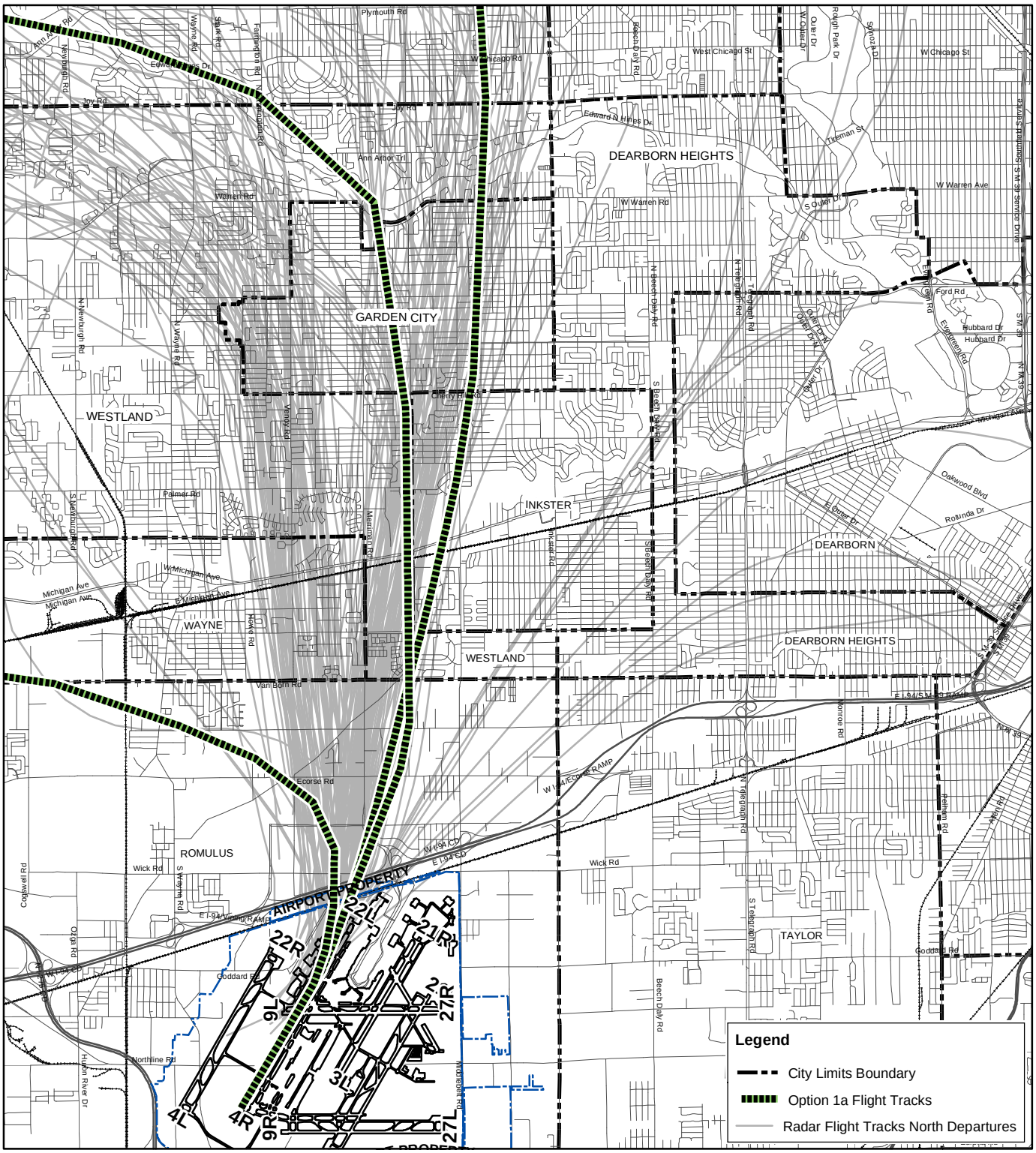

Figure G1 **Option 1a, Flight Tracks**

Source: US Census, 2000

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may occur before the runway end or up to one mile past the runway end, depending on the weight/performance of the aircraft. Aircraft are then assigned a westward heading between 355 and 030. The existing procedure essentially "fans" aircraft to three headings (355, 010 and 030), with more aircraft on two of the headings (355 and 010 headings). Aircraft fly this heading for 3 to 10 miles until ATC directs the aircraft to turn towards a navigational aid that provides a heading to exit the DTW airspace, approximately 50 miles from the Airport. An example of the existing jet flight paths for this runway is presented in **Figure G1**, which shows a density plot of seven months of actual flight tracks.

Modeling Assumptions/New Procedure: Using satellite-based navigation technology, aircraft would be flown on one of three headings, depending upon the city/destination. Aircraft with northern destinations, would fly northward on a path virtually the same as today's path. Aircraft with destinations to the west, the path would be similar to what is flown today. Departures to south destinations initially turn west before ultimately turning to the south over primarily undeveloped area. West departures go to the south over undeveloped areas. The southwest jet path would commence a turn to the west earlier than the current procedure, following a path along Michigan Avenue and then turning southward on a path north of Willow Run, effectively avoiding overflying Wayne and Westland. Turboprop aircraft currently occupy the space where the new track would be located, and thus, the turboprop aircraft would need to be turned sooner, enabling a 15 degree divergence from the southern jet path. The new jet path would be designed to fly over less densely populated areas south of Michigan Avenue**. Figure G1** also shows the proposed tracks.

It is estimated that 80% of the future aircraft fleet at DTW could use this satellite-based technology procedure. Older generation aircraft that are not equipped with satellite navigation could generally follow a track that follows this turn, with the development of an Instrument Flight Rule (IFR) overlay of the proposed procedure. The flight path would be similar to the satellite-based procedure, except that the precision of the flight track would not be as great, and for those not equipped with the newer technology, may drift outside the preferred path. In addition, some jets (an estimated 5%) may not be able to make such a quick turn on departure from Runway 4L. These aircraft would be expected to follow the existing flight path.

Analysis of New Procedure:

The analysis of this option considered the noise exposure, as well as possible operational effects.

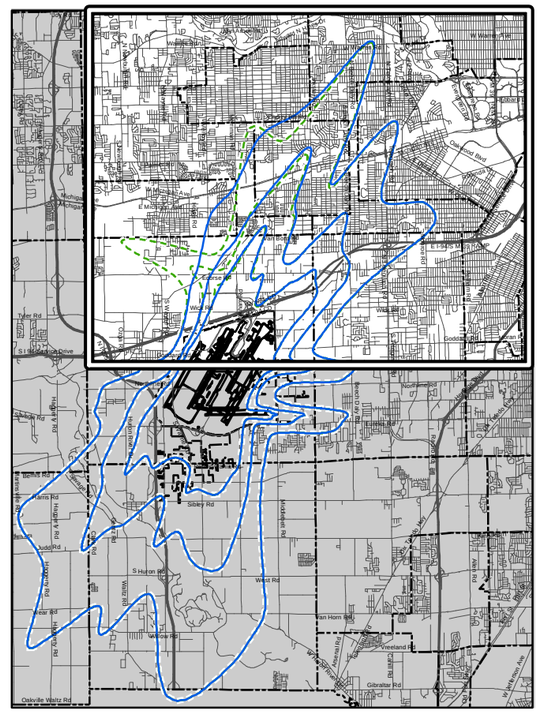
Noise Analysis:

The study relied upon the use of the average annual DNL noise contours to consider possible noise exposure consequences of the option.

Impact on Annual DNL Contour: **Table G2** summarizes the impact on the 65 DNL and greater noise exposure contours from implementation of this option in comparison with the 2011 baseline. As this table notes, this option would reduce overall population and housing exposed to 65 DNL by 60 people/30 houses in comparison to the Baseline. **Figure G2 NE-1** shows the noise exposure contours relative to the No Action/2011 Baseline along with Option 2a (dispersal option) contours. All of the changes associated with this option would occur for properties located within the 65-70 DNL contour.

Within the 60 DNL contour, the changes would be more pronounced (a reduction of 4.5% in population and 6% reduction in housing units relative to the 2011 Baseline), with the contour moving in the direction of the new southbound track. Within the 65 DNL and greater contour, impact reductions would occur in Westland and Romulus relative to the baseline.

Figure G2 **Option 1a, FMS Departures to the Northwest off Runway 4R and Option 2a, Fan Runway 4R Departures Between 320 and 025 Degrees**



Legend

- City Limits Boundary
- 2011 Base Case
- Option 1a, FMS Departures Northwest Runway 4R
- Option 1a Area newly affected
- Option 1a Area no longer affected
- Option 2a, Fan Runway 4R Departures Between 320 and 025 Degrees
- Option 2a Area newly affected
- Option 2a Area no longer affected

Source: US Census, 2000

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FAA guidance for implementing the National Environmental Policy Act (NEPA) states that a 1.5 DNL increase in noise to noise sensitive uses (i.e., residences) within the 65 DNL due to federal action is considered a significant impact.

Operational Impacts

The following issues could arise from implementation of the option. Also identified are the agencies that would have a role in assisting in the implementation of this option.

Airport and ATC Operational Considerations (Safety and efficiency issues): FAA has ultimate responsibility for the control of aircraft flight. This option would not be expected to change FAA ATC workloads, as more aircraft would be flying precise tracks based on satellite navigation. This option would not be expected to increase flight delay, and could slightly reduce fuel burn as jet aircraft would be turned sooner toward their ultimate direction. Airport staff would work with the FAA to ensure the procedure would be implemented to achieve its intended goal(s).

Other Environmental Issues (NEPA, etc): Implementation of noise abatement flight procedures requires compliance with the National Environmental Policy Act (NEPA). FAA Order 1050.1E **Environmental Impacts: Policies and Procedures** outlines the documentation required based on the types of federal action. This option would likely require preparation of an Environmental Assessment to determine if the impacts would be significant; however based on the analysis prepared for this study, increased noise to residential uses within the 65 DNL contour is unlikely to trigger the 1.5 DNL threshold of significance, and warrant an Environmental Impact Statement. This option could produce a 3 DNL or greater change within the 60-65 DNL

Legal Issues: The option does not appear to have legal issues associated with its implementation.

Conclusions of Consultant Team:

This option would achieve a slight noise impact reduction within the 65 DNL contour, as well as lower level contours. At the lower levels, however, the contours result in substantial changes in noise which effectively shift noise from one area/neighborhood/community to another. No recommendation is made at this time, pending discussion among the Study Advisory Committee (Appendix Five, Six & Seven) concerning concentration versus dispersal.

TABLE G2

Comparison of DNL Effects of Option 1a to the Baseline

	Baseline (2011)/No Action		**Option 1a- Concentrate – 4R Departures**	
65-70 DNL	Population	Housing	Population	Housing
Huron Township	90	40	90	40
Romulus	730	330	680	310
Taylor	0	0	10	10
Westland	120	60	100	40
Subtotal	940	430	880	400
70-75 DNL				
Romulus	50	30	50	30
Subtotal	50	30	50	30
65 DNL & Greater				
Huron Township	90	40	90	40
Romulus	780	360	730	340
Taylor	0	0	10	10
Westland	120	60	100	40
Subtotal	990	460	930	430
60 DNL & Greater*				
Dearborn Heights	1,000	310	990	310
Huron Twp.	2,000	780	2,050	780
Inkster	4,560	1,980	4,040	1,720
Romulus	4,000	1,680	3,770	1,590
Sumpter Twp.	20	10	20	10
Taylor	3,000	1,210	3,040	1,190
Westland	2,360	990	2,260	940
Total	16,940	6,960	16,170	6,540

Source: 2000 US Census Numbers rounded to the nearest 10 – for digits less than 5, rounded to 10.

Note: no residential uses are located in the 75 DNL and greater contours.

* includes the 65 DNL & Greater

Option 1b: Concentrate Noise – Departures off Runway 3L Following the I-94 Freeway Corridor

Noise Abatement Procedure Goal: The goal of this option is to provide for more precise flight paths for aircraft departing Runway 3L to concentrate noise over lower population densities. It is important to note that residences are located under some portion of all flight paths; however, attempts are made to concentrate noise over the areas that have the lowest densities, where possible.

Description of the Option: This procedure would create a more defined and narrow flight path to concentrate aircraft flight tracks for departures off Runway 3L along the I-94 corridor east of the Airport.

Comparable Existing Procedure(s): Aircraft currently depart to the northeast from Runway 3L and fly a straight path (runway heading) reaching up to three miles, depending on the weight/aircraft performance. Aircraft are then assigned a heading from Air Traffic Control between 350 and 050 magnetic degrees (north and northeastern headings). Aircraft then fly the heading for two to five miles until ATC directs the aircraft to turn towards a navigational aid that provides a heading leading out of the Detroit airspace. For aircraft with a destination to the east or south, this is either a due east or due south heading. The existing procedure essentially "fans" aircraft in a desired equal distribution between these headings.

An example of the existing jet flight paths is shown in **Figure G3** shows with a density plot of seven months of actual flight tracks. This figure graphically shows the distribution of aircraft flight tracks over the ground between 350 and 050. The current procedure provides for a dispersed track flow, with the greatest concentration of actual flight tracks occurring today just north of the I-94 corridor.

Modeling Assumptions/New Procedure: Aircraft bound for due north locations would follow existing flight tracks. Eastern and southeastern bound aircraft would depart Runway 3L and fly runway heading for one mile past the departure end of the runway, then turn eastward on an satellite-based heading that would be designed to follow the I-94 freeway corridor and the rail line corridor. At approximately eight miles from the Airport (Oakwood/I-94 Intersection), aircraft would diverge on two paths, either turning south or continuing east as they do today.

This new track would replace the existing two tracks that serve the same destinations, but which do not turn in an easterly direction as soon as the new option. This procedure would be designed for those aircraft that initially turn eastward for east or southern destinations. Today, about 80% of the departures on this runway are directed to the east and south. Some heavier aircraft might not be able to fly this new track, and thus, would follow the existing tracks.

It is estimated that 80% of the future aircraft fleet at DTW could use this satellite-based technology procedure. Older generation aircraft that are not equipped with satellite navigation could generally follow a track that follows this turn, with the development of an Instrument Flight Rule (IFR) overlay of the proposed procedure. The flight path would be similar to the satellite-based procedure, except that the precision of the flight track would not be as great, and those aircraft not equipped with the newer technology, may disperse.

Analysis of New Procedure:

The analysis of this option considered both the noise exposure impacts of the option, as well as the possible operational effects.

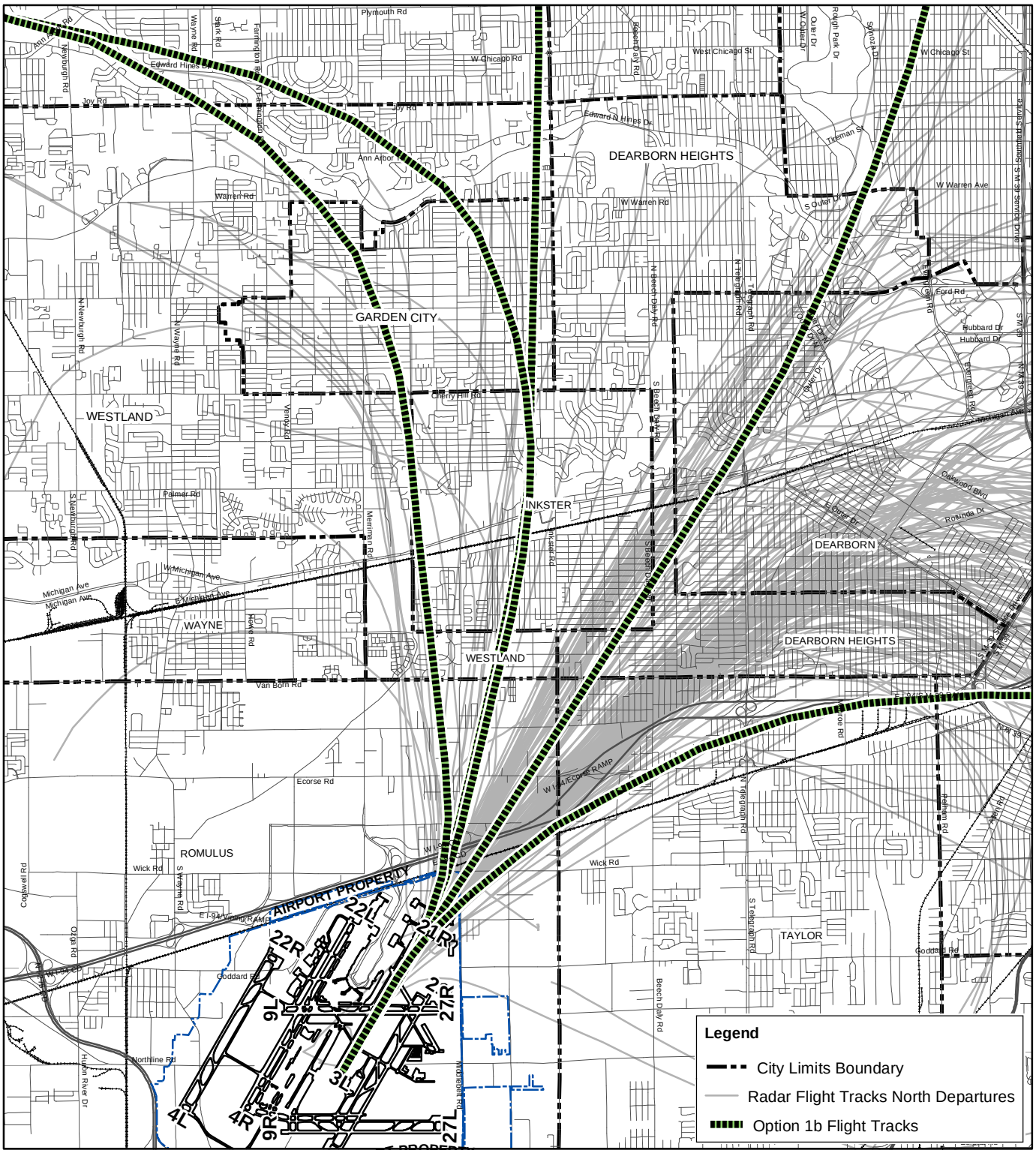

Figure G3 **Option 1b, Flight Tracks**

Source: US Census, 2000

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Noise Analysis:

The study relied upon the use of the average annual DNL noise contours to consider possible noise exposure consequences of the option.

Impact on Annual DNL Contour: **Table G3** summarizes the impact on the 65 DNL and greater noise exposure contours from implementation of this option in comparison with the 2011 baseline. As this table notes, this option would produce a reduction in overall population and housing exposed to 65 DNL by 10 people and no change in housing in comparison to the Baseline. **Figure G4 NW-1** shows the noise exposure contours relative to the No Action/2011 Baseline and the Option 2b (dispersal option) noise contours. All of the changes associated with this option would occur for properties located within the 65-70 DNL contour.

Within the 60 DNL contour, the changes would be slightly more pronounced (a reduction of 0.8% in population and 0.6% reduction in housing units relative to the 2011 Baseline), with the contour moving in the direction of the new track. Within the 65 DNL and greater contour, impact reductions would occur in Romulus relative to the Baseline, with no changes in other locations.

FAA guidance for implementing the National Environmental Policy Act (NEPA) states that a 1.5 DNL increase in noise to noise sensitive uses (i.e., residences) within the 65 DNL due to federal action is considered a significant impact. A review of the noise exposure contour indicates that a 1.5 DNL increase in noise due to Option 1b could occur directly under the path of the new eastbound track. This option could also produce 3 DNL and greater changes within the 60-65 DNL.

Operational Impacts

The following issues could arise from implementation of the option. Also identified are the agencies that would have a role in assisting in the implementation of this option.

Airport and ATC Operational Considerations (Safety and efficiency issues): FAA has ultimate responsibility for the control of aircraft flight. This option would potentially increase FAA ATC workloads and increase operating delay, due to the dependency that would be created for flights headed to the east and south; flights to these locations would occur on the same track for some distance, before they divert, creating an in-trail separation requirement to safely separate aircraft. Airport staff would work with the FAA to ensure the procedure would be implemented to achieve its intended goal(s).

Other Environmental Issues (NEPA, etc): Implementation of noise abatement flight procedures requires compliance with the National Environmental Policy Act (NEPA). FAA Order 1050.1E **Environmental Impacts: Policies and Procedures** outlines the documentation required based on the types of federal action. This option would likely require preparation of an Environmental Assessment to determine if the impacts would be significant; however based on the analysis prepared for this study, increased noise to residential uses within the 65 DNL contour could trigger this 1.5 DNL threshold of significance, and warrant an Environmental Impact Statement. This option could produce a 3 DNL or greater change within the 60-65 DNL.

Legal Issues: The option does not appear to have legal issues associated with its implementation.

TABLE 1b-1
Comparison of DNL Effects of Option 1b to the Baseline

	Baseline (2011)/No Action		Option 1b- Concentrate – 3L Departures – I-94 Corridor	
	Population	Housing	Population	Housing
65-70 DNL				
Huron Township	90	40	90	40
Romulus	730	330	710	320
Taylor	0	0	10	10
Westland	120	60	120	60
Subtotal	940	430	930	430
70-75 DNL				
Romulus	50	30	50	30
Subtotal	50	30	50	30
65 DNL & Greater				
Huron Township	90	40	90	40
Romulus	780	360	760	350
Taylor	0	0	10	10
Westland	120	60	120	60
Subtotal	990	460	980	460
60 DNL & Greater*				
Dearborn Heights	1,000	310	140	20
Huron Twp.	2,000	780	2,050	780
Inkster	4,560	1,980	4,490	1,950
Romulus	4,000	1,680	3,940	1,650
Sumpter Twp.	20	10	20	10
Taylor	3,000	1,210	3,810	1,520
Westland	2,360	990	2,350	990
Total	16,940	6,960	16,800	6,920

Source: 2000 US Census Numbers rounded to the nearest 10 – for digits less than 5, rounded to the nearest 10.
Note: no residential uses are located in the 75 DNL and greater contours.
* includes the 65 DNL & Greater

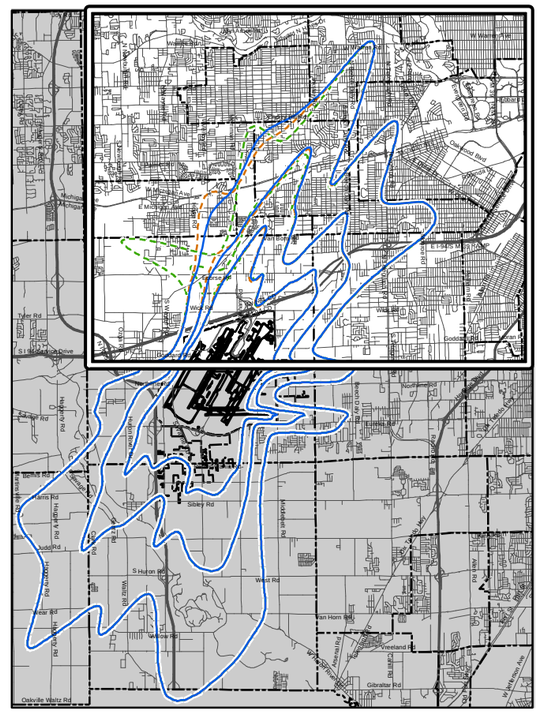
TABLE 2b-1
Comparison of DNL Effects of Option 2b to the Baseline

	Baseline (2011)/No Action		Option 2b- Disperse – 3L Departures (320-025)	
	Population	Housing	Population	Housing
65-70 DNL				
Huron Township	90	40	90	40
Romulus	730	330	740	340
Taylor	0	0	10	10
Westland	120	60	110	50
Subtotal	940	430	950	440
70-75 DNL				
Romulus	50	30	40	20
Subtotal	50	30	40	20
65 DNL & Greater				
Huron Township	90	40	90	40
Romulus	780	360	780	360
Taylor	0	0	10	10
Westland	120	60	110	50
Subtotal	990	460	990	460
60 DNL & Greater*				
Dearborn Heights	1,000	310	1,200	400
Huron Twp.	2,000	780	2,050	780
Inkster	4,560	1,980	4,650	2,020
Romulus	4,000	1,680	4,040	1,690
Sumpter Twp.	20	10	20	10
Taylor	3,000	1,210	2,580	990
Westland	2,360	990	2,360	990
Total	16,940	6,960	16,900	6,880

Source: 2000 US Census Numbers rounded to the nearest 10 – for digits less than 5, rounded to the nearest 10.
Note: no residential uses are located in the 75 DNL and greater contours.
* includes the 65 DNL & Greater

Source: US Census, 2000

Figure G4 **Option 1b, FMS Departures to the Northeast off Runway 3L Following I-94 Corridor and Option 2b, Fan Runway 3L Departures Between 350 and 060 Degrees**



Legend

- City Limits Boundary
- 2011 Base Case
- Option 1b FMS Departures Northeast Runway 3L Following I-94 Corridor
- Option 1b Area newly affected
- Option 1b Area no longer affected
- Option 2b, Fan Runway 3L Departures Between 350 and 060 Degrees
- Option 2b Area newly affected
- Option 2b Area no longer affected

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Conclusions of Consultant Team:

This option would achieve noise impact reductions within the 65 DNL contour, as well as lower level contours. At the lower levels, however, the contours result in substantial changes in noise which effectively shift noise from one area/neighborhood/community to another. No recommendation is made at this time, pending discussion among the Study Advisory Committee (Appendix Five, Six & Seven) concerning concentration versus dispersal.

TABLE G3

Comparison of DNL Effects of Option 1b to the Baseline

	Baseline (2011)/No Action		**Option 1b- Concentrate – 3L Departures – I-94 Corridor**	
65-70 DNL	Population	Housing	Population	Housing
Huron Township	90	40	90	40
Romulus	730	330	710	320
Taylor	0	0	10	10
Westland	120	60	120	60
Subtotal	940	430	930	430
70-75 DNL				
Romulus	50	30	50	30
Subtotal	50	30	50	30
65 DNL & Greater				
Huron Township	90	40	90	40
Romulus	780	360	760	350
Taylor	0	0	10	10
Westland	120	60	120	60
Subtotal	990	460	980	460
60 DNL & Greater*				
Dearborn Heights	1,000	310	140	20
Huron Twp.	2,000	780	2,050	780
Inkster	4,560	1,980	4,490	1,950
Romulus	4,000	1,680	3,940	1,650
Sumpter Twp.	20	10	20	10
Taylor	3,000	1,210	3,810	1,520
Westland	2,360	990	2,350	990
Total	16,940	6,960	16,800	6,920

Source: 2000 US Census Numbers rounded to the nearest 10 – for digits less than 5, rounded to 10.
Note: no residential uses are located in the 75 DNL and greater contours.

- includes the 65 DNL & Greater

Option 1c: Concentrate Noise – South Flow Departure Procedures off Runways 22L/R and 21L/R

Noise Abatement Procedure Goal: The goal of this option is to provide for more precise flight paths for aircraft to concentrate noise over the lower density population areas to the south.

Description of the Option: This procedure would take the existing Instrument Flight Rule (IFR) procedure and translate it into satellite-based navigation to enable greater concentration along the existing tracks. This option would increase the precision of the track by including additional radar vectors and to keep the aircraft tracking the proper heading. Aircraft would fly the same paths as they do today, except that modern navigational technology would be used to reduce overflights of the more densely populated areas to the south by reducing drift from aircraft operations.

Comparable Existing Procedure(s): Aircraft depart to the south and fly a straight path (runway heading) until the aircraft reaches at least 500 feet above ground level. This generally occurs anywhere from before the runway end to about one mile past the runway end. ATC then assigns a heading that is determined based upon intended destination and the required separation between other departing aircraft. The existing procedure "fans" aircraft on essentially four headings (170, 190, 220, and 240). Aircraft fly this heading for 3 to 10 miles until ATC directs the aircraft to turn towards a navigational aid that provides a heading to exit the Detroit airspace, approximately 50 miles from the Airport.

An example of the existing jet flight paths is presented in **Figure G5** shows with a density plot of seven months of actual flight tracks along with proposed flight tracks of this option.

Modeling Assumptions/New Procedure: This option would result in the development of satellite-based navigation procedures to improve the effectiveness of the existing south flow procedures to avoid the more densely population areas. This option would change the existing paths to the south are described below:

- Eastern destinations: Aircraft departing on Runway 21R would fly runway heading to at least one-half mile past the end of the runway before commencing any turns to the east. Current procedures have some early turns flying near or over the southeastern portion of Romulus (south of Eureka Road and west of Middlebelt Road).
- Southern destinations: Aircraft departing on Runway 22L to southern destinations may use either a 220 or 190 heading. Option 1c proposes that the preferred procedure would be to only use the 190 heading to avoid overflying New Boston.
- North and western destinations: Aircraft departing on Runway 22L to western or northern destinations would turn westward over a wide range of possible headings, assigned based on destination, required aircraft separation, and ATC work load. Aircraft flying to northern destination would fly the northern portion of the existing turn on a heading of 240. Aircraft flying to western destinations would fly the southern portion of the existing turn on an initial heading of 240. The goal of the procedure would be to have all turns completed before reaching New Boston.

While the flight goals of this option are similar to those of Option 2c, this option would concentrate traffic along the defined corridors using satellite-based navigation; Option 2c would rely on existing navigation technology that by its nature is less precise, and results in dispersion.

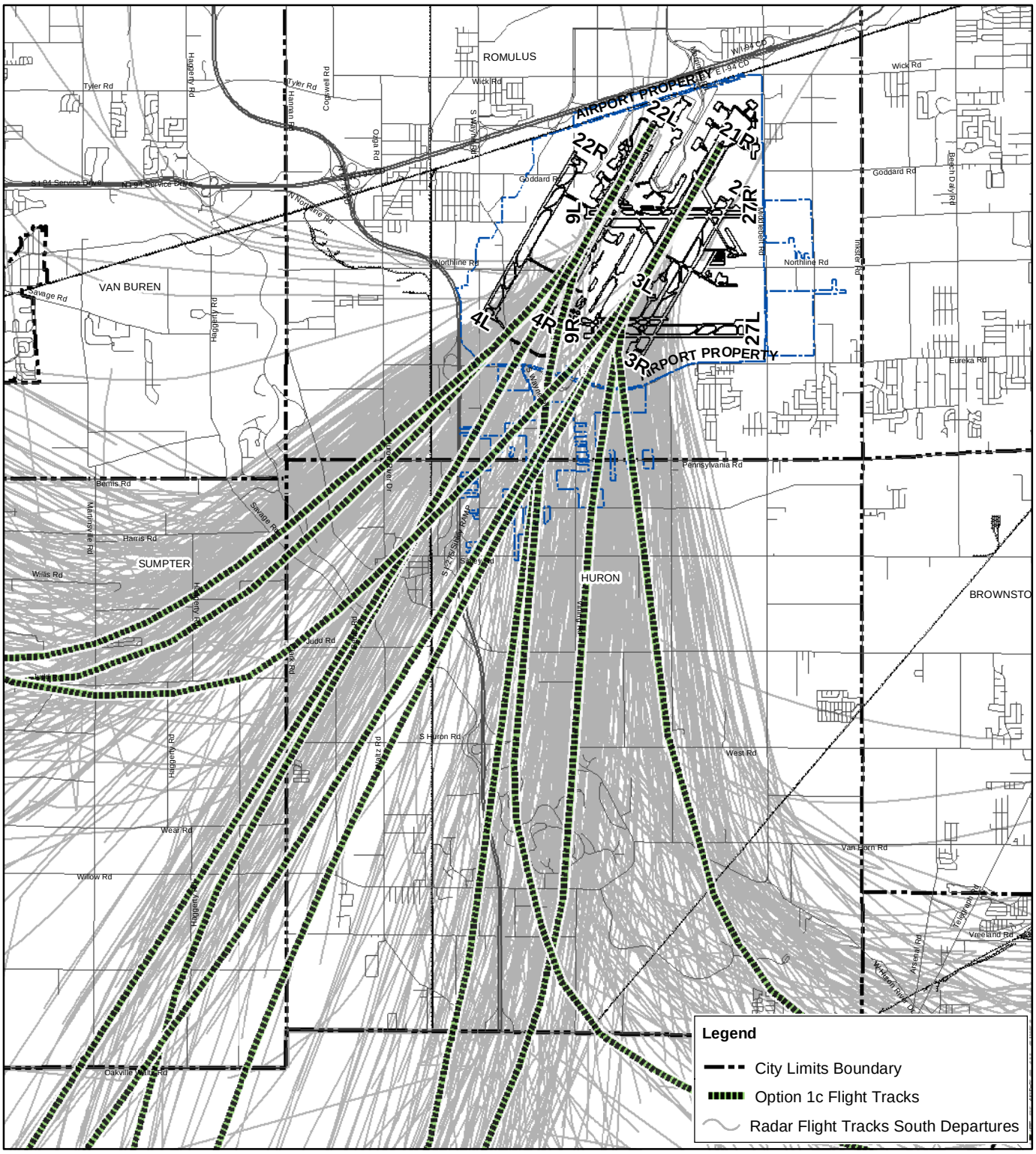

Figure G5 **Option 1c, Flight Tracks**

Source: US Census, 2000

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It is estimated that 80% of the future aircraft fleet at DTW could use this satellite-based technology procedure. Older generation aircraft that are not equipped with satellite navigation could continue to use the existing IFR procedure. The flight path would be similar to the satellite-based procedure, except that the precision of the flight track would not be as great, and those not equipped with the newer technology, would disperse.

Analysis of New Procedure:

The analysis of this option considered both the noise exposure impacts of the option, as well as the possible operational effects.

Noise Analysis:

The study relied upon the use of the average annual DNL noise contours to consider possible noise exposure consequences of the option.

Impact on Annual DNL Contour: **Table G4** summarizes the impact on the 65 DNL and greater noise exposure contour from implementation of this option in comparison with the 2011 Baseline. As this table notes, this option would not alter the total population/housing affected by 65 DNL and greater noise levels relative to the Baseline, although it would alter the location of those impacts. **Figure G6 S-1** shows the noise exposure contours for Option 1c – Concentrate Noise – South Flow along with the Option 2c (dispersal) noise contours. All of the changes associated with this option would occur for properties located within the 65-70 DNL contour.

Within the 60 DNL contour, the changes would be slightly more pronounced (a reduction of 3.8% in population and 4.2% reduction in housing relative to the 2011 Baseline), with the contour moving in the direction of the new track. Within the 65 DNL and greater contour, impact reductions would occur in Romulus (6.8% reduction) relative to the Baseline, with an increase in Huron Township of 44.4%.

Operational Impacts

The following issues could arise from implementation of the option. Also identified are the agencies that would have a role in assisting in the implementation of this option.

Airport and ATC Operational Considerations (Safety and efficiency issues): FAA has ultimate responsibility for the control of aircraft flight. This option would not be expected to alter FAA ATC workloads, as more aircraft would be flying precise tracks based on satellite navigation. The reduction of on heading for southern destinations would have an impact on delay; however, a replacement track could be developed by the FAA, keeping with the goal of avoiding New Boston. Airport staff would work with the FAA to ensure the procedure would be implemented to achieve its intended goal(s). This Option would not be used when it resulted in delays.

Other Environmental Issues (NEPA, etc): Implementation of noise abatement flight procedures requires compliance with the National Environmental Policy Act (NEPA). FAA Order 1050.1E **Environmental Impacts: Policies and Procedures** outlines the documentation required based on the types of federal action. This option would likely require preparation of an Environmental Assessment to determine if the impacts would be significant; however based on the analysis prepared for this study, increased noise to noise sensitive residential uses might be sufficient to trigger this 1.5 DNL threshold of significance. However, Option 1c would produce 3 DNL and greater changes within the 60-65 DNL.

TABLE 1c-1
Comparison of DNL Effects of Option 1c to the Baseline

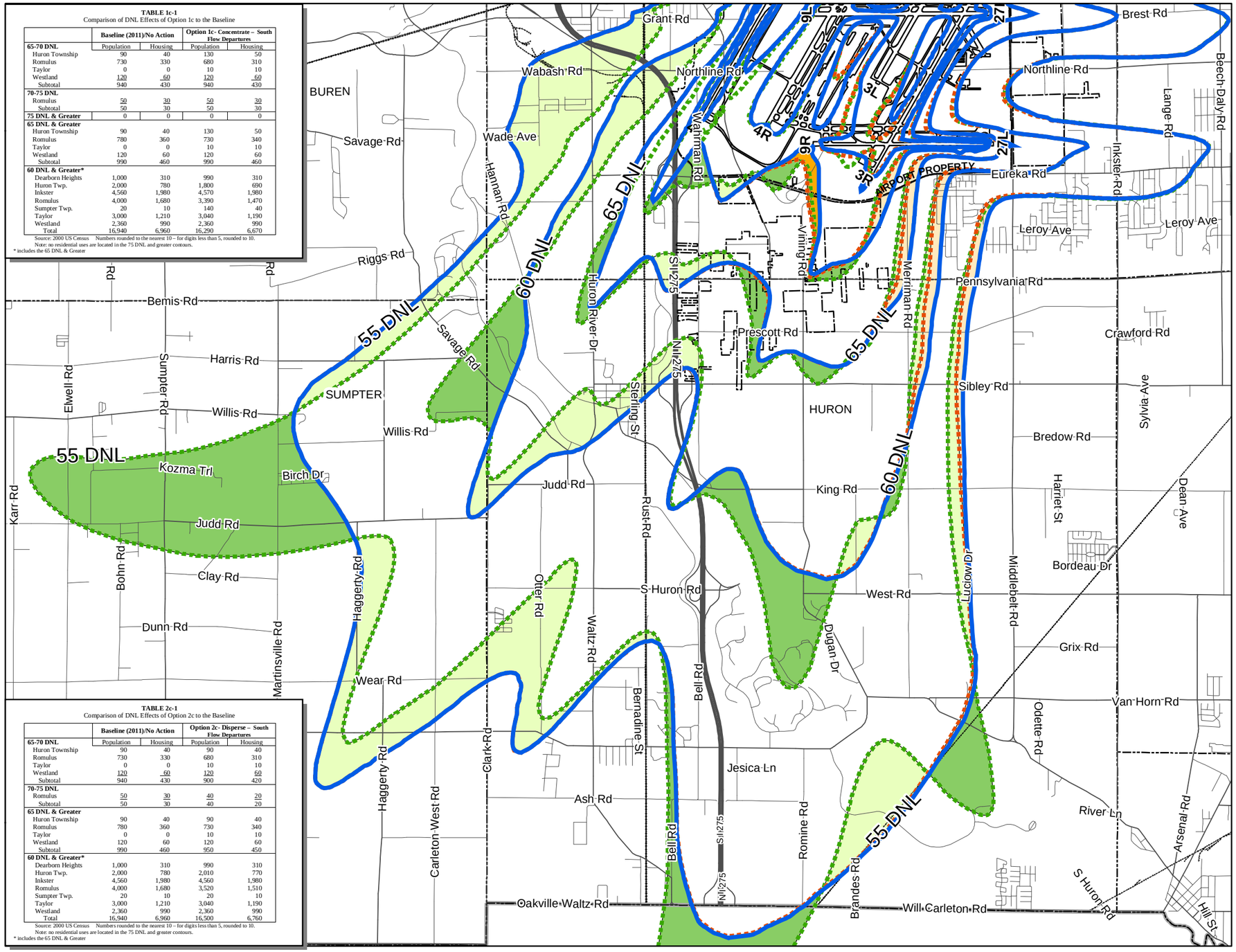
	Baseline (2011)/No Action		Option 1c- Concentrate – South Flow Departures	
	Population	Housing	Population	Housing
65-70 DNL				
Huron Township	90	40	130	50
Romulus	730	330	680	310
Taylor	0	0	10	10
Westland	120	60	120	60
Subtotal	940	430	940	430
70-75 DNL				
Romulus	50	30	50	30
Subtotal	50	30	50	30
75 DNL & Greater	0	0	0	0
65 DNL & Greater				
Huron Township	90	40	130	50
Romulus	780	360	730	340
Taylor	0	0	10	10
Westland	120	60	120	60
Subtotal	990	460	990	460
60 DNL & Greater*				
Dearborn Heights	1,000	310	990	310
Huron Twp.	2,000	780	1,800	690
Inkster	4,560	1,980	4,570	1,980
Romulus	4,000	1,680	3,390	1,470
Sumpter Twp.	20	10	140	40
Taylor	3,000	1,210	3,040	1,190
Westland	2,360	990	2,360	990
Total	16,940	6,960	16,290	6,670

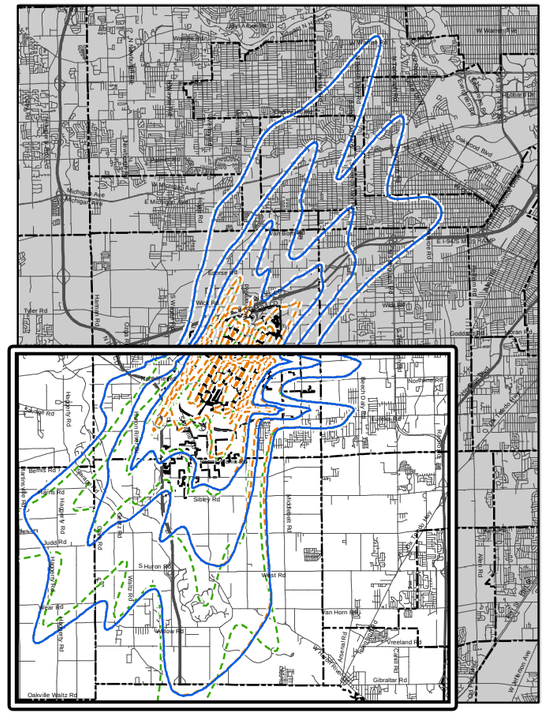
Source: 2000 US Census Numbers rounded to the nearest 10 – for digits less than 5, rounded to 10.
Note: no residential uses are located in the 75 DNL and greater contours.
* includes the 65 DNL & Greater

TABLE 2c-1
Comparison of DNL Effects of Option 2c to the Baseline

	Baseline (2011)/No Action		Option 2c- Disperse – South Flow Departures	
	Population	Housing	Population	Housing
65-70 DNL				
Huron Township	90	40	90	40
Romulus	730	330	680	310
Taylor	0	0	10	10
Westland	120	60	120	60
Subtotal	940	430	900	420
70-75 DNL				
Romulus	50	30	40	20
Subtotal	50	30	40	20
65 DNL & Greater				
Huron Township	90	40	90	40
Romulus	780	360	730	340
Taylor	0	0	10	10
Westland	120	60	120	60
Subtotal	990	460	950	450
60 DNL & Greater*				
Dearborn Heights	1,000	310	990	310
Huron Twp.	2,000	780	2,010	770
Inkster	4,560	1,980	4,560	1,980
Romulus	4,000	1,680	3,520	1,510
Sumpter Twp.	20	10	20	10
Taylor	3,000	1,210	3,040	1,190
Westland	2,360	990	2,360	990
Total	16,940	6,960	16,500	6,760

Source: 2000 US Census Numbers rounded to the nearest 10 – for digits less than 5, rounded to 10.
Note: no residential uses are located in the 75 DNL and greater contours.
* includes the 65 DNL & Greater





Legend

- City Limits Boundary
- 2011 Base Case
- Option 1c. FMS for South Flow Departures
- Option 1c Area newly affected
- Option 1c Area no longer affected
- Option 2c, Fan South Flow Departures
- Option 2c Area newly affected
- Option 2c Area no longer affected

0 0.5 1 2 Miles

Source: US Census, 2000

Figure G6 **Option 1c, FMS For South Flow Departures and Option 2c, Fan South Flow Departures**

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Legal Issues: The option does not appear to have legal issues associated with its implementation.

Conclusions of Consultant Team:

This option would slightly change conditions within the 65 DNL contour. At the lower levels, however, the contours result in substantial changes in noise which effectively shift noise from one area/neighborhood/community to another. No recommendation is made at this time, pending discussion among the Study Advisory Committee (Appendix Five, Six & Seven) concerning concentration versus dispersal.

TABLE G4

Comparison of DNL Effects of Option 1c to the Baseline

	Baseline (2011)/No Action		**Option 1c- Concentrate – South Flow Departures**	
65-70 DNL	Population	Housing	Population	Housing
Huron Township	90	40	130	50
Romulus	730	330	680	310
Taylor	0	0	10	10
Westland	120	60	120	60
Subtotal	940	430	940	430
70-75 DNL				
Romulus	50	30	50	30
Subtotal	50	30	50	30
75 DNL & Greater	0	0	0	0
65 DNL & Greater				
Huron Township	90	40	130	50
Romulus	780	360	730	340
Taylor	0	0	10	10
Westland	120	60	120	60
Subtotal	990	460	990	460
60 DNL & Greater*				
Dearborn Heights	1,000	310	990	310
Huron Twp.	2,000	780	1,800	690
Inkster	4,560	1,980	4,570	1,980
Romulus	4,000	1,680	3,390	1,470
Sumpter Twp.	20	10	140	40
Taylor	3,000	1,210	3,040	1,190
Westland	2,360	990	2,360	990
Total	16,940	6,960	16,290	6,670

Source: 2000 US Census Numbers rounded to the nearest 10 – for digits less than 5, rounded to 10.
Note: no residential uses are located in the 75 DNL and greater contours.

- includes the 65 DNL & Greater

Option 2: Disperse Noise by Using Multiple Flight Tracks

Discussion: As noted earlier, in general noise abatement options either concentrate noise over a predefined area or attempt to disperse or equalize noise. A third option, that combines the concentration with equalization is also possible. Concentrated noise provides a general predictability that noise would occur over specific areas, whereas dispersal generally results in less predictability, with flights being dispersed over an area.

Within the concept of dispersing noise, the goal of these options is to not affect the operational efficiency of DTW while dispersing overflights and reducing the population affected by aircraft noise. In general, dispersal results in less predictability of overflights in an attempt to equalize the areas affected. The goal of this option is to provide for an equal distribution of aircraft noise by using multiple and dispersed flight tracks for aircraft departing in both north and south flow conditions. There are three dispersal sub-options that have been identified:

- Option 2a: Fan Runway 4R Departures Between 350 and 030 Degrees,
- Option 2b: Fan Runway 3L Departures Between 350 and 060 Degrees, and
- Option 2c: Fan South Flow Departures.

As the existing noise abatement procedure at DTW during the daytime hours is a fanning procedure that disperses flights, these options are intended to improve the fan.

Figures G7 2a, G8 2b andG9 2c show the noise contours for these options.

Option 2a: Disperse Noise – Fan Runway 4R Departures Between 350 and 030 degrees

Noise Abatement Procedure Goal: The goal of this option is to create an equitable distribution of flight tracks of aircraft departing to the north from Runway 4R.

Description of the Option: This procedure would define the corridor in which aircraft would depart from Runway 4R to the north and northwest as between 350 and 030 degrees.

Comparable Existing Procedure(s): Today, departures from Runway 4R depart to the northwest and fly a straight path (runway heading) until reaching at least 500 feet above ground. This generally occurs anywhere from before the runway end to about one mile past the runway end. Aircraft are then assigned a heading from Air Traffic Control between 360 and 030. The existing procedure "fans" aircraft onto three headings (355, 010, and 030), with more aircraft on the 360 and 010 headings. The existing procedure headings are based on analysis of seven months of flight track data. Aircraft fly this heading for 3 to 10 miles until ATC directs the aircraft to turn towards a navigational aid that provides a heading to exit the Detroit airspace, approximately 50 miles from the Airport. An example of the existing jet flight paths is presented in **Figure G7** shows with a density plot of seven months of actual flight tracks, along with the proposed flight tracks.

The figure shows the percentage distribution of aircraft flight tracks over the ground between 350 and 035. The data show that the current procedure provides for a dispersed track flow. Where the aircraft actually flies over the ground varies by a number of factors, with the assigned heading being only one of the factors. Other factors are how long the aircraft flies before the initial turn occurs, how long the aircraft flies before it is directed toward a navigational aid and the speed and direction of the winds.

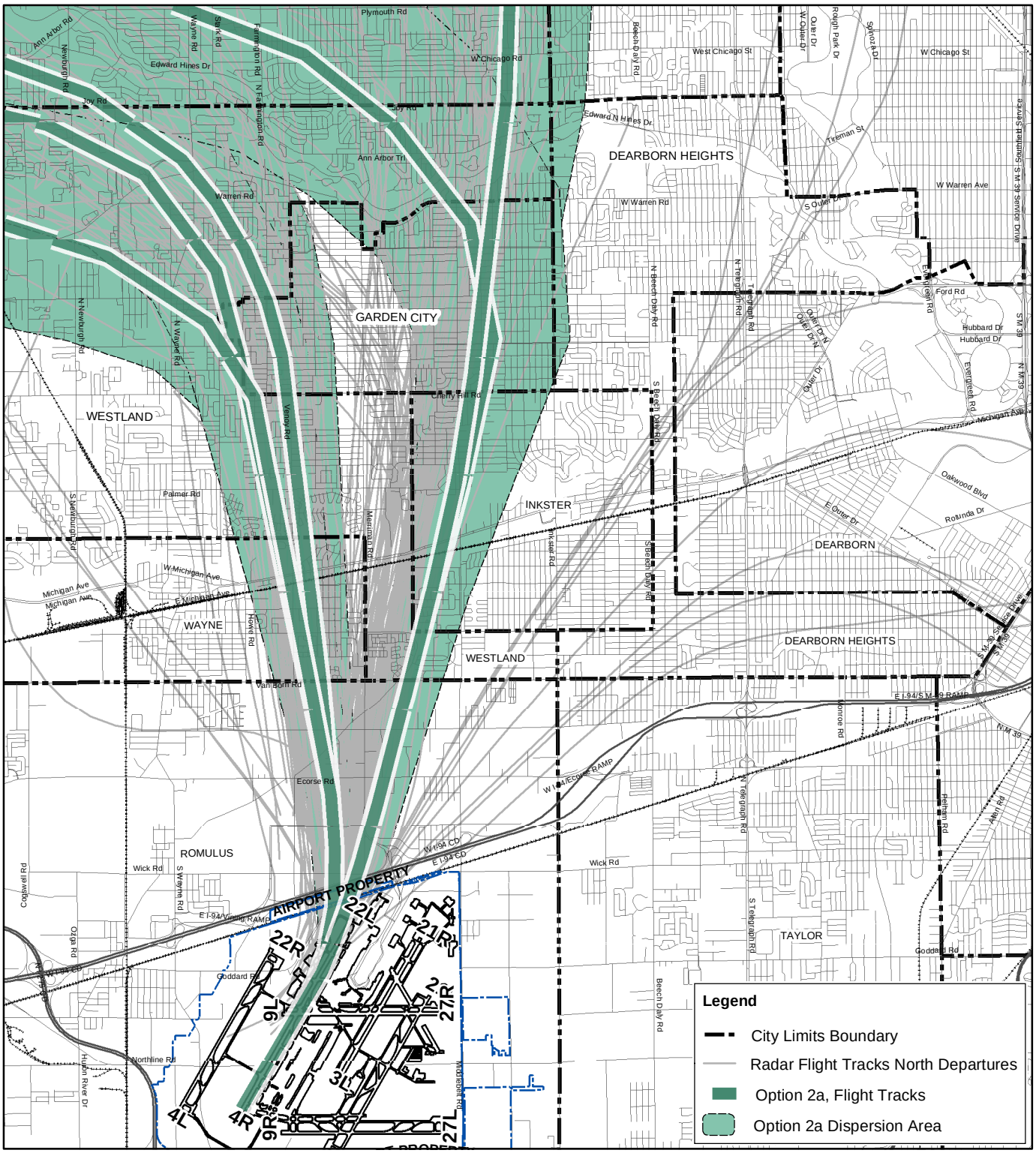

Figure G7 **Option 2a, Flight Tracks**

Source: US Census, 2000

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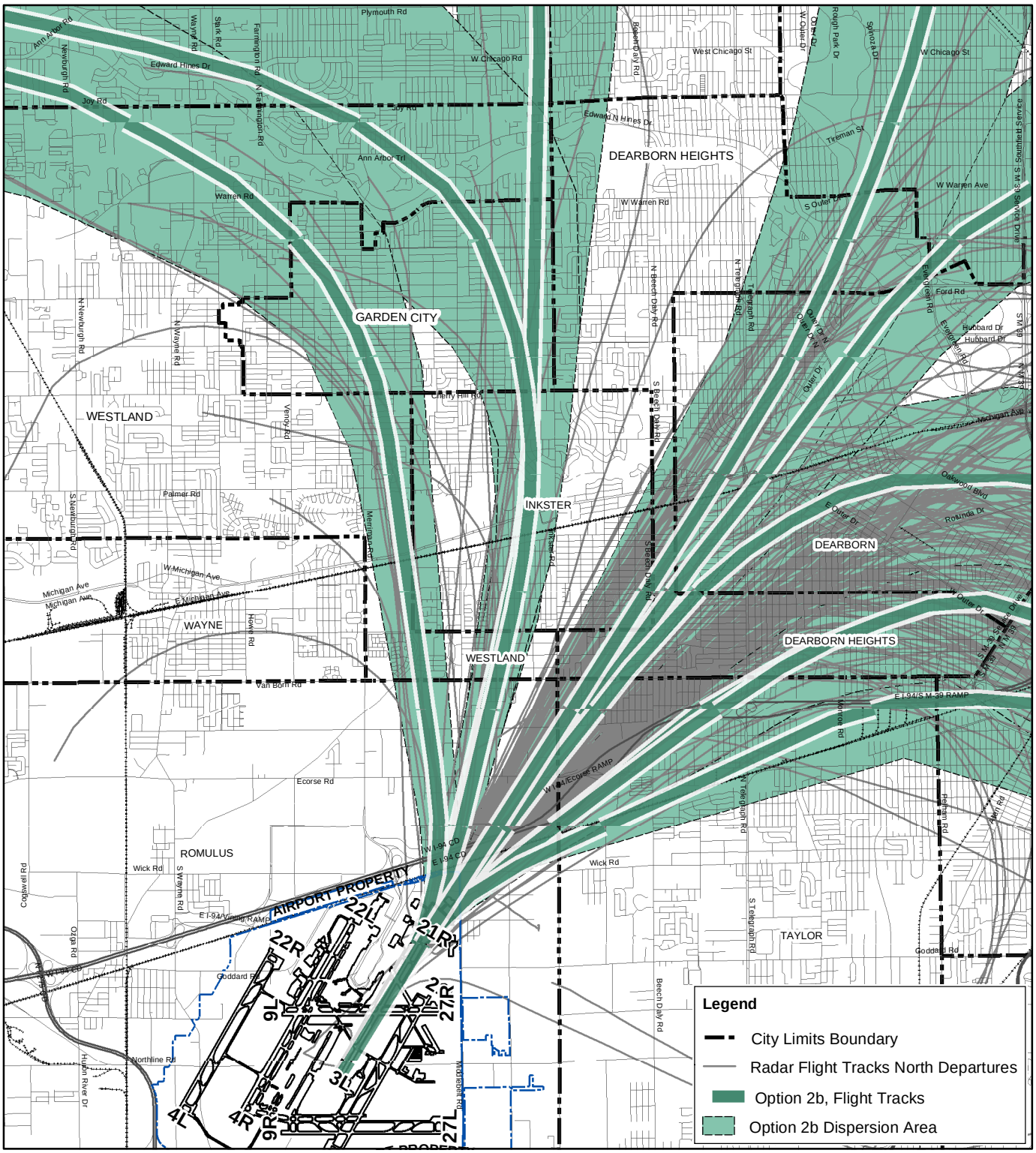

Figure G8 **Option 2b, Flight Tracks**

0 0.75 1.5 3 Miles

Source: US Census, 2000

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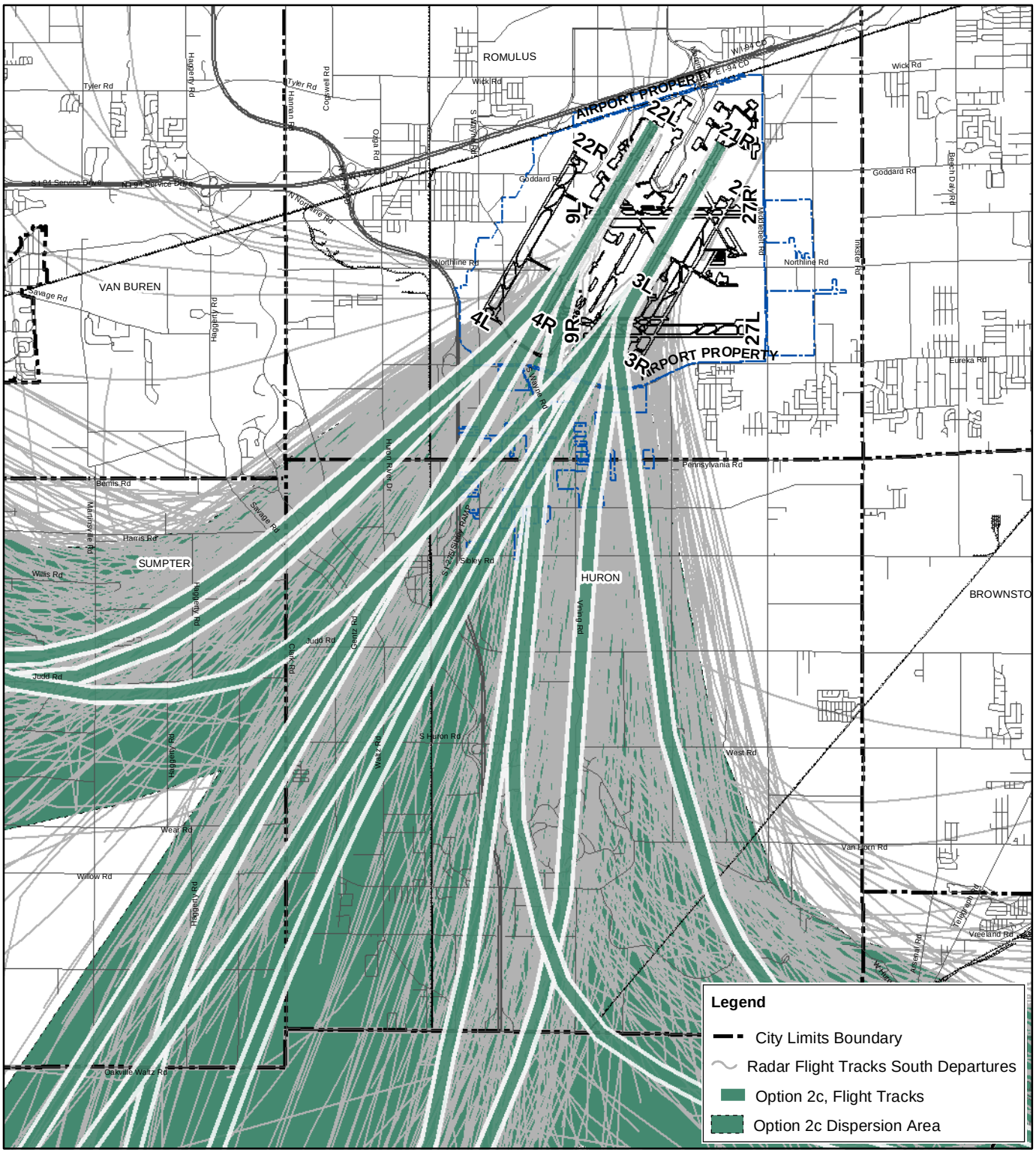

Figure G9 **Option 2c, Flight Tracks**

0 0.75 1.5 3 Miles

Source: US Census, 2000

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Modeling Assumptions/New Procedure: This option is similar to today's procedure, except for the addition of a fourth heading, located farthest to the west. Aircraft would depart Runway 4R and fly a straight path (runway heading) until reaching at least 500 feet above ground. At this point aircraft would be assigned a heading by ATC; the heading would be between 350 and 035 degrees; aircraft would fly this heading for three to six miles. This procedure would take advantage of the western flight tracks on the 350 heading, adding to an equitable distribution of aircraft flying to the north and northwest. Aircraft flying to southern destinations would predominately fly the 350 heading (the inside of the turn) while aircraft flying to western destinations would predominately fly the 010 and 035 headings. Aircraft flying to the north would fly the 035 heading. An example of these proposed flight paths is shown in **Figure G7**.

Analysis of New Procedure:

The analysis of this option considered both the noise exposure of the option, as well as the possible operational effects.

Noise Analysis:

The study relied upon the use of the average annual DNL noise contours to consider possible noise exposure consequences of the option.

Impact on Annual DNL Contour: **Table G5** summarizes the impact on the 65 DNL and greater noise exposure contour from implementation of this option in comparison with the 2011 Baseline. **Figure G2 NE-1** shows the noise exposure contours for Option 2a. Changes within the 65-70 DNL, as well as 70-75 DNL would occur with this option. As this table notes, this option would produce a reduction in overall population and housing exposed to 65-70 DNL by 60 people/30 houses in comparison to the Baseline. No change in would occur within the 70-75 DNL contour relative to the Baseline.

Within the 60 DNL contour, the changes would be slightly more pronounced (a reduction of 2.8% in population and 3.7% reduction in housing units relative to the 2011 Baseline), with the contour moving in the direction of the new track. Within the 65 DNL and greater contour, impact reductions would occur in Westland (41.7%), and Romulus (2.7%) relative to the Baseline, with no changes in other locations.

FAA guidance for implementing the National Environmental Policy Act (NEPA) states that a 1.5 DNL increase in noise to noise sensitive uses (i.e., residences) within the 65 DNL due to federal action is considered a significant impact. A review of the noise exposure contour indicates that a 1.5 DNL increase in noise due to Option 2a would not be expected.

Operational Impacts

The following issues could arise from implementation of the option. Also identified are the agencies that would have a role in assisting in the implementation of this option.

Airport and ATC Operational Considerations (Safety and efficiency issues): FAA has ultimate responsibility for the control of aircraft flight. This option would not be expected to alter FAA ATC workload, as fanning would continue. Airport staff would work with the FAA to ensure the procedure

would be implemented to achieve its intended goal(s) and work with ATC so delays would not be incurred.

Other Environmental Issues (NEPA, etc): Implementation of noise abatement flight procedures requires compliance with the National Environmental Policy Act (NEPA). FAA Order 1050.1E **Environmental Impacts: Policies and Procedures** outlines the documentation required based on the types of federal action. This option would likely require preparation of an Environmental Assessment to determine if the impacts would be significant; however based on the analysis prepared for this study, increased noise to noise sensitive residential uses would not be expected to trigger this 1.5 DNL threshold of significance, and warrant an Environmental Impact Statement. Similarly, Option 2a would not be expected to produce 3 DNL and greater within the 60-65 DNL.

Legal Issues: The option does not appear to have legal issues associated with its implementation.

Conclusions of Consultant Team:

This option would achieve noise impact reductions within the 65 DNL contour, as well as lower level contours. At the lower levels, however, the contours result in substantial changes in noise which effectively shift noise from one area/neighborhood/community to another. No recommendation is made at this time, pending discussion among the Study Advisory Committee (Appendix Five, Six & Seven) concerning concentration versus dispersal.

TABLE G5
Comparison of DNL Effects of Option 2a to the Baseline

	Baseline (2011)/No Action		Option 2a- Disperse – Fan 4R Departures	
65-70 DNL	Population	Housing	Population	Housing
Huron Township	90	40	90	40
Romulus	730	330	710	320
Taylor	0	0	10	10
Westland	120	60	70	30
Subtotal	940	430	880	400
70-75 DNL				
Romulus	50	30	50	30
Subtotal	50	30	50	30
65 DNL & Greater				
Huron Township	90	40	90	40
Romulus	780	360	760	350
Taylor	0	0	10	10
Westland	120	60	70	30
Subtotal	990	460	930	430
60 DNL & Greater*				
Dearborn Heights	1,000	310	990	310
Huron Twp.	2,000	780	2,050	780
Inkster	4,560	1,980	4,130	1,810
Romulus	4,000	1,680	4,040	1,690
Sumpter Twp.	20	10	20	10
Taylor	3,000	1,210	3,040	1,190
Westland	2,360	990	2,190	910
Total	16,940	6,960	16,460	6,700

Source: 2000 US Census Numbers rounded to the nearest 10 – for digits less than 5, rounded to 10.
Note: no residential uses are located in the 75 DNL and greater contours.
* includes the 65 DNL & Greater

Option 2b: Disperse Noise – Departures off Runway 3L between 350 and 060 Degrees

Noise Abatement Procedure Goal: The goal of this option is to create an equitable distribution of flight tracks of aircraft departing to the north from Runway 3L.

Description of the Option: This procedure would modify the existing east turn in north flow for departures from Runway 3L. The change is to increase the range of departure headings from the current 350 to 050 degrees to 350 to 060 degrees, an increase of 10 degrees to the east. The focus of this option is on flight tracks to the east, which comprises the majority of the flights departing Runway 3L; 86% of the existing flight tracks for aircraft departures off Runway 3L are to the east, and 14% of the flight tracks are to the west.

Comparable Existing Procedure(s): Aircraft depart to the northeast and fly a straight path (runway heading) until approximately reaching the runway end up to three miles past the runway end. Aircraft are then assigned a heading from Air Traffic Control between 350 and 050 magnetic degrees; the existing procedure headings are based on analysis of six months of flight track data. The majority, over 86% of departures, of the aircraft departing Runway 3L fly on headings between 025 – 055 degrees; the remaining 14% of departures fly on headings between 350-025 degrees. The existing procedure "fans" aircraft in a fairly equal distribution between these headings. Aircraft fly this heading for two to five miles until ATC directs the aircraft to turn towards a navigational aid that provides a bearing to exit the Detroit airspace. When aircraft turn to the east or south, they generally follow a flight path that is due east for eastern destinations and due south for southern destinations. An example of the existing jet flight paths is presented in **Figure G8** shows with a density plot of seven months of actual flight tracks, along with the proposed flight tracks.

Modeling Assumptions/New Procedure: This option would use the same navigational technology as is used today. Aircraft would depart Runway 3L and fly runway heading until reaching at least 500 feet above ground. Aircraft would then be assigned a heading by ATC; the heading would be between 350 and 060 degrees. This procedure would take advantage of the southern most flight tracks on the 060 heading, adding to the distribution of aircraft flying to the east. The new procedure would have aircraft turning earlier and later than is done today; this would more equally distribute aircraft within the entire 350 to 060 "corridor."

To achieve this equitable distribution, operations to the east would be divided between two flight tracks: one for those aircraft continuing on to the east and another for those aircraft that turn back toward the south. Aircraft flying to the north would be considered a separate path. For this option, aircraft with northern destinations would be assigned a heading between 350 and 000 degrees. Eastbound aircraft would be assigned a heading between 005 and 030 degrees. Eastbound aircraft whose routing results in the flying to the south would be assigned a heading between 035 and 060 degrees.

Analysis of New Procedure:

The analysis of this option considered both the noise exposure impacts of the option, as well as the possible operational effects.

Noise Analysis:

The study relied upon the use of the average annual DNL noise contours to consider possible noise exposure consequences of the option.

Impact on Annual DNL Contour: **Table G6** summarizes the impact on the 65 DNL and greater noise exposure contour from implementation of this option in comparison with the 2011 Baseline. **Figure G4 NW-1** shows the noise exposure contours for Option 2b along with the contours for Option 1b. As is shown, the total population affected within the 65 DNL and greater contour would not change with this option, although a shift of residences from the 70-75 DNL (higher noise contour), to the 65-70 DNL (lower noise contour) would occur. As this table notes, this option would produce a slight increase in overall population and housing exposed to 65-70 DNL by 10 people/10 houses in comparison to the Baseline. Within the 70-75 DNL contour, this option would affect 10 less people in 10 homes relative to the Baseline.

Within the 60 DNL contour, the changes would be slightly more pronounced (a reduction of 0.2% in population and 1.1% reduction in housing units relative to the Baseline), with the contour moving in the direction of the new eastbound track. Within the 65 DNL and greater contour, impact reductions would occur in Westland (8.3%), and Romulus (1.4%) relative to the Baseline.

FAA guidance for implementing the National Environmental Policy Act (NEPA) states that a 1.5 DNL increase in noise to noise sensitive uses (i.e., residences) within the 65 DNL due to federal action is considered a significant impact. A review of the noise exposure contour indicates that a 1.5 DNL increase in noise due to Option 2b would not be expected. This option would not be expected to result in a 3 DNL and greater changes within the 60-65 DNL.

Operational Impacts

The following issues could arise from implementation of the option. Also identified are the agencies that would have a role in assisting in the implementation of this option.

Airport and ATC Operational Considerations (Safety and efficiency issues): FAA has ultimate responsibility for the control of aircraft flight. This option would not be expected to change FAA ATC workload, as fanning is currently practiced for departures from this runway. Airport staff would work with the FAA to ensure the procedure would be implemented to achieve its intended goal(s) and work with ATC so delays would not be incurred.

Other Environmental Issues (NEPA, etc): Implementation of noise abatement flight procedures requires compliance with the National Environmental Policy Act (NEPA). FAA Order 1050.1E **Environmental Impacts: Policies and Procedures** outlines the documentation required based on the types of federal action. This option would likely require preparation of an Environmental Assessment to determine if the impacts would be significant; however based on the analysis prepared for this study, noise level increases to noise sensitive residential uses within the 65 DNL would be less than 1.5 DNL threshold of significance.

Legal Issues: The option does not appear to have legal issues associated with its implementation.

Conclusions of Consultant Team:

This option would not alter conditions within the 65 DNL contour, but would produce slight reductions in lesser contours. At the lower levels, however, the contours result in substantial changes in noise which effectively shift noise from one area/neighborhood/community to another. No recommendation is made at this time, pending discussion among the Study Advisory Committee (Appendix Five, Six & Seven) concerning concentration versus dispersal.

TABLE G6

Comparison of DNL Effects of Option 2b to the Baseline

	Baseline (2011)/No Action		**Option 2b- Disperse – 3L Departures (320-025)**	
65-70 DNL	Population	Housing	Population	Housing
Huron Township	90	40	90	40
Romulus	730	330	740	340
Taylor	0	0	10	10
Westland	120	60	110	50
Subtotal	940	430	950	440
70-75 DNL				
Romulus	50	30	40	20
Subtotal	50	30	40	20
65 DNL & Greater				
Huron Township	90	40	90	40
Romulus	780	360	780	360
Taylor	0	0	10	10
Westland	120	60	110	50
Subtotal	990	460	990	460
60 DNL & Greater*				
Dearborn Heights	1,000	310	1,200	400
Huron Twp.	2,000	780	2,050	780
Inkster	4,560	1,980	4,650	2,020
Romulus	4,000	1,680	4,040	1,690
Sumpter Twp.	20	10	20	10
Taylor	3,000	1,210	2,580	990
Westland	2,360	990	2,360	990
Total	16,940	6,960	16,900	6,880

Source: 2000 US Census Numbers rounded to the nearest 10 – for digits less than 5, rounded to 10.

Note: no residential uses are located in the 75 DNL and greater contours.

* includes the 65 DNL & Greater

Option 2c: Disperse Noise – South Flow Departures

Noise Abatement Procedure Goal: The goal of this option is to create an equitable distribution of flight tracks of aircraft departing to the south over lower population density areas, while also avoiding flying near areas of higher population density.

Description of the Option: The current procedures to the south provide for basic dispersion. This option would provide for adjustments to those procedures, including reducing the fanning over populated areas, but continue to fan aircraft in general.

Comparable Existing Procedure(s): Aircraft depart to the south and fly runway heading until the aircraft reaches at least 500 feet above ground. This generally occurs anywhere from before the runway end to one mile past the runway end. Aircraft are then assigned a heading from Air Traffic Control that is determined based upon intended destination and separation between other departing aircraft. The existing procedure "fans" aircraft onto essentially four headings (170, 190, 220, and 240); the existing procedure headings are based on analysis of six months of flight track data. The aircraft flies on this heading for 3 to 10 miles until ATC directs the aircraft to turn towards a navigational aid that provides a heading to exit the DTW airspace, approximately 50 miles from the Airport.

An example of the existing jet flight paths is presented in **Figure G9** shows with a density plot of seven months of actual flight tracks along with the proposed flight tracks.

Modeling Assumptions/New Procedure: This option would have aircraft fly the same procedures that are used today, except for the following three changes to avoid the more densely populated areas. It is assumed that the procedures would continue use the same heading-based procedures as are used today.

- Aircraft departing on Runway 21R would fly runway heading to at least one-half mile past the end of the runway before commencing any turns to the east. Current procedures have some early turns flying near or over the community off southeastern Romulus.
- Aircraft departing on Runway 22L and flying to a southern destination should fly the 190 heading. Option 2c proposes that the preferred procedure would be to overlay the 190 heading which avoids overflying the community of New Boston, then aircraft could fly to the 220 heading after passing New Boston.
- Aircraft departing on Runway 22L and flying to western or northern destination currently turn westward over a wide range of possible headings. Some aircraft fly as far south as New Boston before turning to the west. This procedure would focus on turning the west bound aircraft before reaching New Boston.

While the flight goals of this option are similar to those of Option 1c, this option would disperse traffic along the defined corridors which are designed to avoid the more densely populated areas south of the Airport; Option 2c would rely on existing navigation technology that by its nature is less precise, and results in dispersion.

Analysis of the Option:

The analysis of this option considered both the noise exposure of the option, as well as the possible operational effects.

Noise Analysis:

The study relied upon the use of the average annual DNL noise contours to consider possible noise exposure consequences of the option.

Impact on Annual DNL Contour: **Table G7** summarizes the impact on the 65 DNL and greater noise exposure contour from implementation of this option in comparison with the 2011 Baseline. **Figure G6 S-1** shows the noise exposure contours for Option 2c along with the contours for Option 1c. As this table notes, this option would produce a reduction in overall population and housing exposed to 65 DNL and greater levels by 40 people/10 houses in comparison to the Baseline.

Within the 60 DNL contour, the changes would be slightly more pronounced (a reduction of 2.6% in population and 2.9% reduction in housing units relative to the 2011 Baseline), with the contour moving in the direction of the new eastbound track. Within the 65 DNL and greater contour, impact reductions would occur in Romulus (6.8%) relative to the Baseline with no changes occurring in other locations within this contour.

Operational Impacts

The following issues could arise from implementation of the option. Also identified are the agencies that would have a role in assisting in the implementation of this option.

Airport and ATC Operational Considerations (Safety and efficiency issues): FAA has ultimate responsibility for the control of aircraft flight. This option would not be expected to alter FAA ATC workloads, as more aircraft would be flying precise tracks based on satellite navigation. It would be anticipated that implementation of this action could come at the request of the Airport Authority. Airport staff would work with the FAA to ensure the procedure would be implemented to achieve its intended goal(s) and work with ATC so delays would not be incurred.

Other Environmental Issues (NEPA, etc): Implementation of noise abatement procedures requires compliance with the National Environmental Policy Act (NEPA). FAA Order 1050.1E **Environmental Impacts: Policies and Procedures** outlines the documentation required based on the types of federal action. This option would likely require preparation of an Environmental Assessment to determine if the impacts would be significant; however based on the analysis prepared for this study, increased noise to noise sensitive residential uses could exceed the 1.5 DNL significance criteria.

Legal Issues: The option does not appear to have legal issues associated with its implementation.

Conclusions of Consultant Team:

This option would result in a slight noise impact reduction within the 65 DNL contour, with slight reductions in lesser contours. At the lower levels, however, the contours result in substantial changes in noise which effectively shift noise from one area/neighborhood/ community to another. No recommendation is made at this time, pending discussion among the Study Advisory Committee (Appendix Five, Six & Seven) concerning concentration versus dispersal.

TABLE G7
Comparison of DNL Effects of Option 2c to the Baseline

	Baseline (2011)/No Action		**Option 2c- Disperse – South Flow Departures**	
65-70 DNL	Population	Housing	Population	Housing
Huron Township	90	40	90	40
Romulus	730	330	680	310
Taylor	0	0	10	10
Westland	120	60	120	60
Subtotal	940	430	900	420
70-75 DNL				
Romulus	50	30	40	20
Subtotal	50	30	40	20
65 DNL & Greater				
Huron Township	90	40	90	40
Romulus	780	360	730	340
Taylor	0	0	10	10
Westland	120	60	120	60
Subtotal	990	460	950	450
60 DNL & Greater*				
Dearborn Heights	1,000	310	990	310
Huron Twp.	2,000	780	2,010	770
Inkster	4,560	1,980	4,560	1,980
Romulus	4,000	1,680	3,520	1,510
Sumpter Twp.	20	10	20	10
Taylor	3,000	1,210	3,040	1,190
Westland	2,360	990	2,360	990
Total	16,940	6,960	16,500	6,760

Source: 2000 US Census Numbers rounded to the nearest 10 – for digits less than 5, rounded to 10.
Note: no residential uses are located in the 75 DNL and greater contours.
* includes the 65 DNL & Greater

Option 3: Concentrate in Some Areas, Disperse in Others

Discussion: As noted earlier, in general, noise abatement options either concentrate noise over a predefined area or attempt to disperse or equalize noise. A third option that combines concentration with equalization is also possible. Concentrated noise provides a general predictability that noise would occur over specific areas, whereas dispersal generally results in less predictability, with flights being dispersed over an area.

In general, it is desirable to concentrate noise over compatible land use. However, while there are areas of compatible land uses around DTW, insufficient area exists to shift all of the operations. Aircraft will continue to fly over non-compatible land uses. Thus, these alternatives are designed to concentrate aircraft that fly over compatible land uses and to disperse flights that fly over non-compatible land use.

With this series of options, it might be desirable in north flow to concentrate the noise for the south turning aircraft and disperse noise for areas to the north/northeast, and north/northwest. For example, portions of option 1a might be combined with portions of option 2a. Two sub-options that have been identified:

- Option 3a – Runway 4R Departures – Concentrate South Turning Aircraft and Fan Others
- Option 3b – Runway 3L Departures – Concentrate South Turning Aircraft and Fan Others

As population densities north of the Airport are generally much greater than south of the Airport, an option for south flow in this category was not identified.

Option 3a: Runway 4R Departures – Concentrate South Turning Aircraft and Fan Others

Noise Abatement Procedure Goal: The goal of this alternative is to concentrate the flight paths over predominately compatible land uses and to disperse the flight paths when the aircraft are flying over predominately non-compatible (i.e., residential) land uses. Given that there are residential areas of various densities around DTW, it is not possible to avoid overflying residential areas. This alternative is designed to locate some flight paths over predominately compatible land uses, concentrate those paths, and disperse the rest of the paths that fly over non-compatible land uses.

Description of the Option: Pilots would use satellite-based navigation technologies to fly multiple headings using a combination of both concentrated and dispersed tracks, depending upon the underlying land use. The headings (similar to compass directions) would be used that correspond with the different routes that aircraft fly as they depart the Detroit airspace. Departures to locations to the north, east, and northwest would be fanned (dispersed) between 350 and 030 degrees similar to Option 2a, while, south-bound aircraft from Runway 4R would be turned sooner than the existing turns using a concentrated procedure and stay on course to the west and then to the south. As south-bound aircraft that use Runway 4R are turned to the west and south before turning on their southerly course, these southbound flights would avoid the higher density population areas by turning south of Wayne and Westland. **Figure G10** shows the desired flight track corridors for this option along with existing flight tracks.

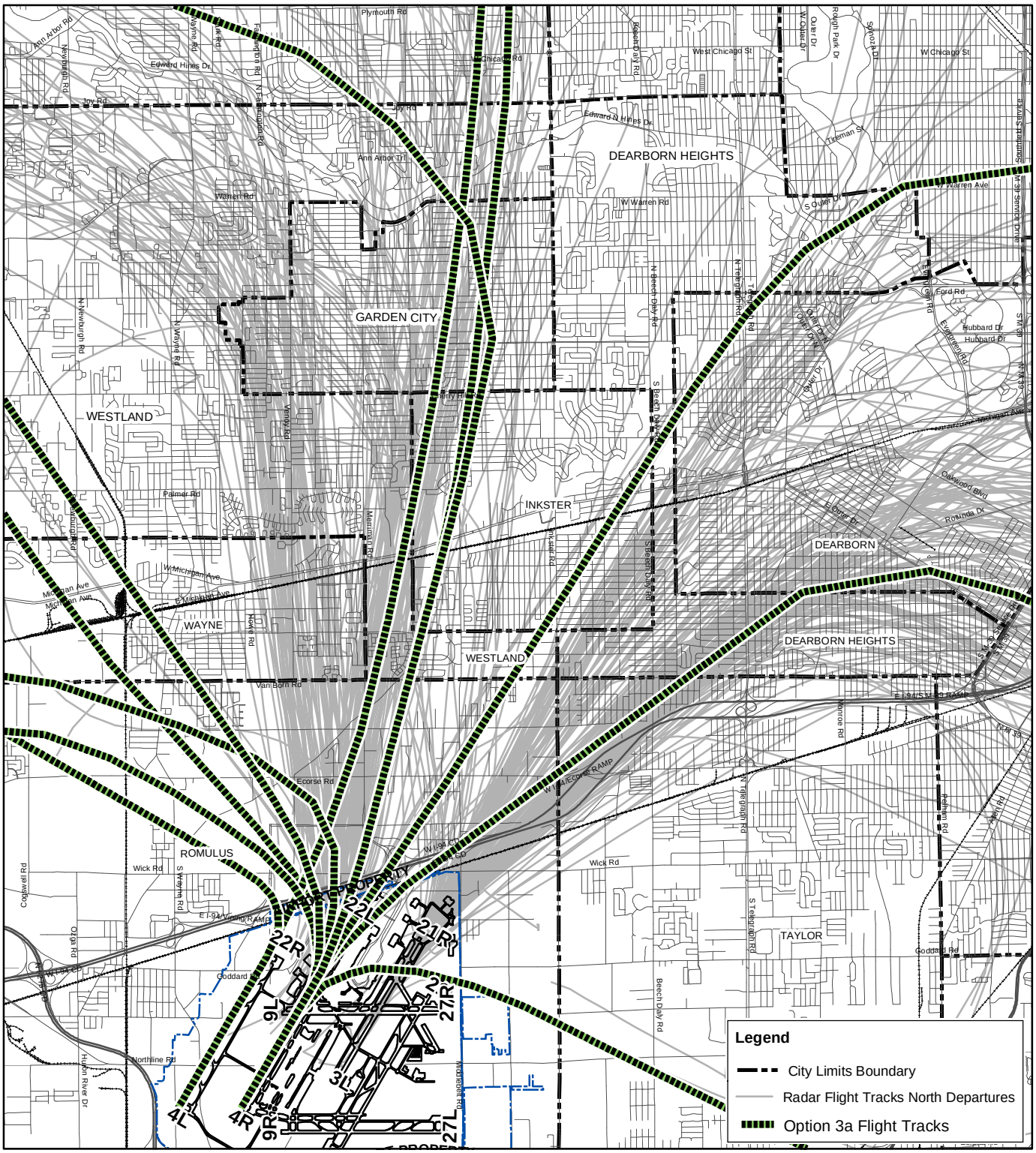

Figure G10 **Option 3a, Blend West Flight Tracks**

Tracks for Alternative 3a are the same as Alternative 3c.

Source: US Census, 2000

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Comparable Existing Procedure(s): Aircraft currently depart from Runway 4R and fly a straight path (runway heading) until the aircraft reaches at least 500 feet above ground before turning west. This generally occurs anywhere from before the runway end to one mile past the runway end, depending on the weight/performance of the aircraft. Aircraft are then assigned a westward heading between 355 and 030. The existing procedure essentially "fans" aircraft to three headings (355, 010 and 030), with more aircraft on two of the headings (355 and 010 headings). Aircraft fly this heading for three to 10 miles until ATC directs the aircraft to turn towards a navigational aid that provides a heading to exit the DTW airspace, approximately 50 miles from the Airport.

Modeling Assumptions/New Procedure: This alternative combines a portion of option 1a (Concentrate Noise – Departures off Runway 4R) and option 2a (Disperse Noise – Fan Runway 4R Departures between 350 and 030 Degrees). For aircraft with northern, eastern or western destinations, aircraft would depart Runway 4R and fly a straight path (runway heading) until reaching at least 500 feet above ground. At this point aircraft would be assigned a heading by ATC; the heading would be between 350 and 035 degrees; aircraft would fly this heading for three to 10 miles using 15-20 degree dispersed heading. The southern jet path is a new concentrated path that would start the turn to the west earlier than the current procedure, following a path along Michigan Avenue and then turning southward on a path north of Willow Run, effectively avoiding overflying Wayne and Westland. Turboprop aircraft currently occupy the space where the new track would be located, and thus, the turboprop aircraft would need to be turned sooner, enabling a 15 degree divergence from the southern jet path. The new jet path would be designed to fly over less densely populated areas south of Michigan Avenue**. Figure G10** also shows the proposed tracks.

About 80% of the future aircraft fleet at DTW are equipped with the necessary technology and could use this satellite-based technology procedure. Older generation aircraft that are not equipped with satellite navigation could generally follow a track that follows this turn, with the development of an Instrument Flight Rule (IFR) overlay of the proposed procedure. The flight path would be similar to the satellite-based procedure, except that the precision of the flight track would not be as great, and for those not equipped with the newer technology, would disperse. In addition, some jets (an estimated 5%) may not be able to make such a quick turn on departure from Runway 4L. These aircraft would be expected to follow the existing flight path.

Analysis of New Procedure:

The analysis of this option considered both the noise exposure, as well as the possible operational effects.

Noise Analysis:

The study relied upon the use of the average annual DNL noise contours to consider possible noise exposure consequences of the option.

Impact on Annual DNL Contour: **Table G8** summarizes the impact on the 65 DNL and greater noise exposure contours from implementation of this option in comparison with the 2011 baseline. As this table notes, this option would increase overall population and housing exposed to 65 DNL by 90 people/40 houses in comparison to the Baseline (a 9.1% and 8.7% increase respectively). **Figure G11 NE-3** in Appendix B shows the noise exposure contours relative to the No Action/2011 Baseline. Within the 65 DNL, all of the changes associated with this option would occur for properties located within the 65-70 DNL contour. Within the 60 DNL contour, the changes would be less pronounced (an increase of 3.5% in population and 3.2% increase in housing units), with the contour moving in the direction of the new southbound track.

TABLE 3a-1
Comparison of DNL Effects of Option 3a to the Baseline

	Baseline (2011)/No Action		Option 3a- Runway 4R Departures – Concentrate South Turning Aircraft and Fan Others	
65-70 DNL	Population	Housing	Population	Housing
Huron Township	90	40	90	40
Romulus	730	330	790	350
Taylor	0	0	10	10
Westland	120	60	150	70
Subtotal	940	430	1,040	470
70-75 DNL				
Romulus	50	30	50	30
Subtotal	50	30	50	30
65 DNL & Greater				
Huron Township	90	40	90	40
Romulus	780	360	830	380
Taylor	0	0	10	10
Westland	120	60	150	70
Subtotal	990	460	1,080	500
60 DNL & Greater*				
Dearborn Heights	1,000	310	1,070	350
Huron Twp.	2,000	780	2,000	780
Inkster	4,560	1,980	4,710	2,030
Romulus	4,000	1,680	3,980	1,670
Sumpter Twp.	20	10	20	10
Taylor	3,000	1,210	3,460	1,380
Westland	2,360	990	2,300	960
Subtotal	16,940	6,960	17,540	7,180

Source: 2000 US Census Numbers rounded to the nearest 10 – for digits less than 5, rounded to 10.
Note: no residential uses are located in the 75 DNL and greater contours.
* includes the 65 DNL & Greater

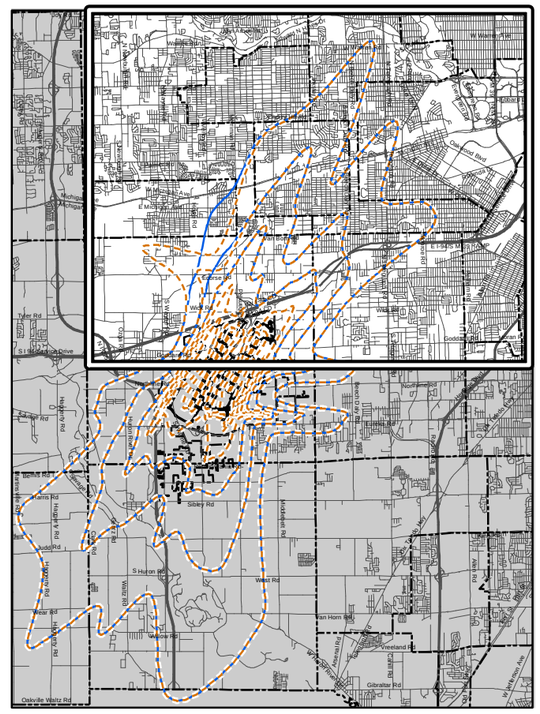

Figure G11 **Option 3a, Blend West**

Legend

- City Limits Boundary
- 2011 Base Case
- Option 3a, Blend West
- Option 3a Area newly affected
- Option 3a Area no longer affected

0 0.5 1 2 Miles

Source: US Census, 2000

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Within the 65 DNL and greater contour, a population noise impact increase would occur in Westland (25% increase) and Romulus (6.4%) relative to the Baseline. Within the 60 DNL contour, population impact reductions would occur in Westland (2.5%) and Romulus (0.5%) with increases to Taylor (15.3%), Dearborn Heights (7%), and Inkster (3.3%).

FAA guidance for implementing the National Environmental Policy Act (NEPA) states that a 1.5 DNL increase in noise to noise sensitive uses (i.e., residences) within the 65 DNL due to federal action is considered a significant impact. A review of the noise exposure contour indicates that a 1.5 DNL increase in noise due to Option 3a could occur directly under the path of the new southbound track.

Operational Impacts

The following issues could arise from implementation of the option. Also identified are the agencies that would have a role in assisting in the implementation of this option.

Airport and ATC Operational Considerations (Safety and efficiency issues): FAA has ultimate responsibility for the control of aircraft flight. This option would not be expected to change FAA ATC workloads, as more aircraft would be flying precise tracks based on satellite navigation. This option would not be expected to increase flight delay, and could slightly reduce fuel burn as jet aircraft would be turned sooner toward their ultimate direction. There could be some concern with aircraft following in-trail for a longer period then they do today. Airport staff would work with the FAA to ensure the procedure would be implemented to achieve its intended goal(s). There may be issue with respect to Willow Run airspace and the airspace currently reserved for propeller aircraft that now would be used for jet aircraft.

Other Environmental Issues (NEPA, etc): Implementation of noise abatement flight procedures requires compliance with the National Environmental Policy Act (NEPA). FAA Order 1050.1E **Environmental Impacts: Policies and Procedures** outlines the documentation required based on the types of federal action. This option would likely require preparation of an Environmental Assessment to determine if the impacts would be significant; however based on the analysis prepared for this study, increased noise to residential uses within the 65 DNL contour is unlikely to trigger the 1.5 DNL threshold of significance, and warrant an Environmental Impact Statement. This option would produce 5 DNL or greater increases in noise within the 55-60 DNL contour, and could produce a 3 DNL or greater change within the 60-65 DNL

Legal Issues: The option does not appear to have legal issues associated with its implementation.

Conclusions of Consultant Team:

This option would result in noise impact increases within the 65 DNL contour and therefore is not recommended.

TABLE G8
Comparison of DNL Effects of Option 3a to the Baseline

	Baseline (2011)/No Action		**Option 3a-** Runway 4R Departures – Concentrate South Turning Aircraft and Fan Others	
65-70 DNL	Population	Housing	Population	Housing
Huron Township	90	40	90	40
Romulus	730	330	790	350
Taylor	0	0	10	10
Westland	120	60	150	70
Subtotal	940	430	1,040	470
70-75 DNL				
Romulus	50	30	50	30
Subtotal	50	30	50	30
65 DNL & Greater				
Huron Township	90	40	90	40
Romulus	780	360	830	380
Taylor	0	0	10	10
Westland	120	60	150	70
Subtotal	990	460	1,080	500
60 DNL & Greater*				
Dearborn Heights	1,000	310	1,070	350
Huron Twp.	2,000	780	2,000	780
Inkster	4,560	1,980	4,710	2,030
Romulus	4,000	1,680	3,980	1,670
Sumpter Twp.	20	10	20	10
Taylor	3,000	1,210	3,460	1,380
Westland	2,360	990	2,300	960
Subtotal	16,940	6,960	17,540	7,180

Source: 2000 US Census Numbers rounded to the nearest 10 – for digits less than 5, rounded to 10.
Note: no residential uses are located in the 75 DNL and greater contours.

- includes the 65 DNL & Greater

Option 3b: Runway 3L Departures – Concentrate South Turning Aircraft and Fan Others.

Noise Abatement Procedure Goal: The goal of this alternative is to concentrate the flight paths over predominately compatible land uses and to disperse the flight paths when the aircraft are flying over predominately non-compatible (i.e., residential) land uses. Given that there are residential areas of various densities around DTW, it is not possible to avoid overflying residential areas. This alternative is designed to locate some flight paths over predominately compatible land uses, concentrate those paths, and disperse the rest of the paths that fly over non-compatible land uses.

Description of the Option: Aircraft would use satellite-based navigation technologies to fly multiple headings using a combination of both concentrated and dispersed tracks. Aircraft to southern destinations that turn eastward and then to the south would fly a track following the I-94 corridor to concentrate flights in this area. Aircraft flying to north, east and west destinations would fly along the same paths as they do today, using dispersed flight procedures. **Figure G12** shows the desired flight track corridors for this option along with existing flight tracks. Basically this option combines Option 1b with the dispersal options of 2a and 2c.

Comparable Existing Procedure(s): Aircraft currently depart to the northeast from Runway 3L and fly a straight path (runway heading) until the aircraft reaches at least 500 feet above ground before turning. This generally occurs anywhere from before the runway end to one mile past the runway end, depending on the weight/performance of the aircraft. Aircraft are assigned a heading from Air Traffic Control between 350 and 050 magnetic degrees (north and northeastern headings). Aircraft fly the heading for two to five miles until ATC directs the aircraft to turn towards a navigational aid that provides a heading leading out of the Detroit airspace. For aircraft with a destination to the east or south, this is either a due east or due south heading. The existing departure procedure essentially "fans" aircraft in a desired equal distribution between these headings. An example of the existing jet flight paths for this runway is presented in **Figure G12** which shows a density plot of seven months of actual flight tracks shown with light gray tracks in these figures. This figure graphically shows the distribution of aircraft flight tracks over the ground between 350 and 050. The current procedure provides for a dispersed track flow, with the greatest concentration of actual tracks occurring today just north of the I-94 corridor.

Modeling Assumptions/New Procedure: Aircraft bound for northern, western, and eastern locations would follow existing flight tracks using dispersed procedures. Southern bound aircraft would depart Runway 3L and fly runway heading for one mile past the departure end of the runway, then turning eastward on an satellite-based heading that would be designed to follow the I-94 freeway corridor and the rail line corridor. At approximately eight miles from the Airport (Oakwood/I-94 Intersection), aircraft would turn south.

This new track would replace the existing south turning track that serve the same destinations, but which do not turn in an easterly direction as soon as the new option. This procedure would be designed for those aircraft that initially turn eastward for southern destinations. Today, about 30% of the departures on this runway are directed to the south. Some heavier aircraft might not be able to fly this new track, and thus, would follow the existing tracks.

It is estimated that 80% of the future aircraft fleet at DTW could use this satellite-based technology procedure. Older generation aircraft that are not equipped with satellite navigation could generally follow a track that follows this turn, with the development of an Instrument Flight Rule (IFR) overlay of the proposed procedure. The flight path would be similar to the satellite-based procedure, except that the

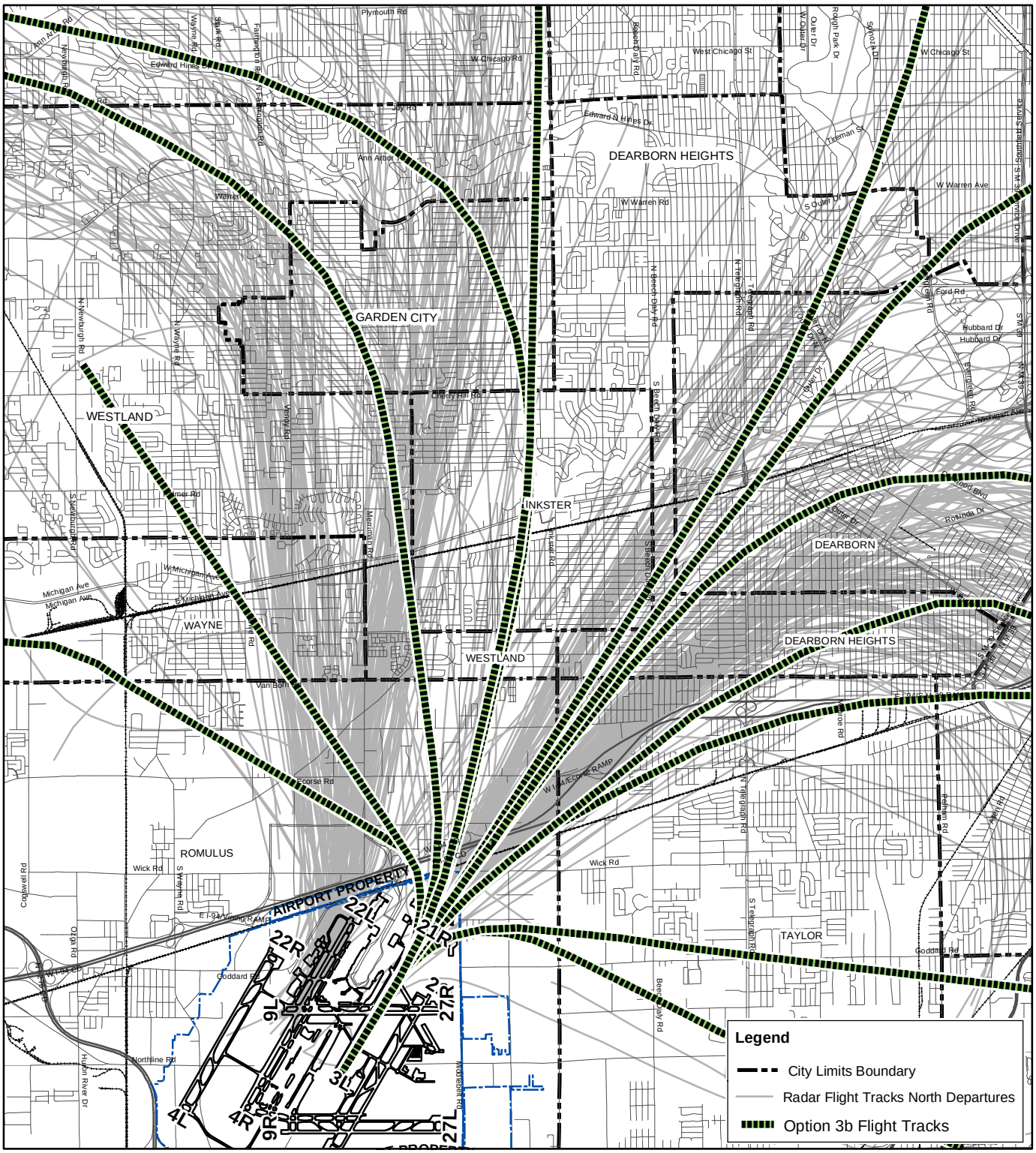

Figure G12 **Option 3b, Blend East Flight Tracks**

Tracks for Alternative 3b are the same as Alternative 3d.

N

0 0.75 1.5 3 Miles

Source: US Census, 2000

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precision of the flight track would not be as great, and for those not equipped with the newer technology, would disperse.

Analysis of New Procedure:

The analysis of this option considered both the noise exposure, as well as the possible operational effects.

Noise Analysis:

The study relied upon the use of the average annual DNL noise contours to consider possible noise exposure consequences of the option.

Impact on Annual DNL Contour: **Table G9** summarizes the impact on the 65 DNL and greater noise exposure contours from implementation of this option in comparison with the 2011 baseline. As this table notes, this option would increase overall population and housing exposed to 65 DNL by 150 people/60 houses in comparison to the Baseline, a 15.2% and 13.0% increase respectively. **Figure G13 NW-2** shows the noise exposure contours relative to the No Action/2011 Baseline. Within the 65 DNL, all of the changes associated with this option would occur for properties located within the 65-70 DNL contour. Within the 60 DNL contour, the changes would be less pronounced (an increase of 3.6% in population and 3.6% in housing units), with the contour moving in the direction of the new eastern/southbound track.

Within the 65 DNL and greater contour, impact increases would occur in Westland (33.3%) and Romulus (12.8%) relative to the Baseline. Within the 60 DNL contour, population impact reductions would occur only in Dearborn Heights (1% reduction), with increases to Taylor (9.7%), Inkster (4.4%), Westland (3.0%), and Romulus (1.5%).

FAA guidance for implementing the National Environmental Policy Act (NEPA) states that a 1.5 DNL increase in noise to noise sensitive uses (i.e., residences) within the 65 DNL due to federal action is considered a significant impact. A review of the noise exposure contour indicates that a 1.5 DNL increase in noise due to Option 3b could not be expected. Therefore, the FAA is likely to require completion of an Environmental Assessment (EA) that may be eligible for a Finding of No Significant Impact.

Operational Impacts

The following issues could arise from implementation of the option. Also identified are the agencies that would have a role in assisting in the implementation of this option.

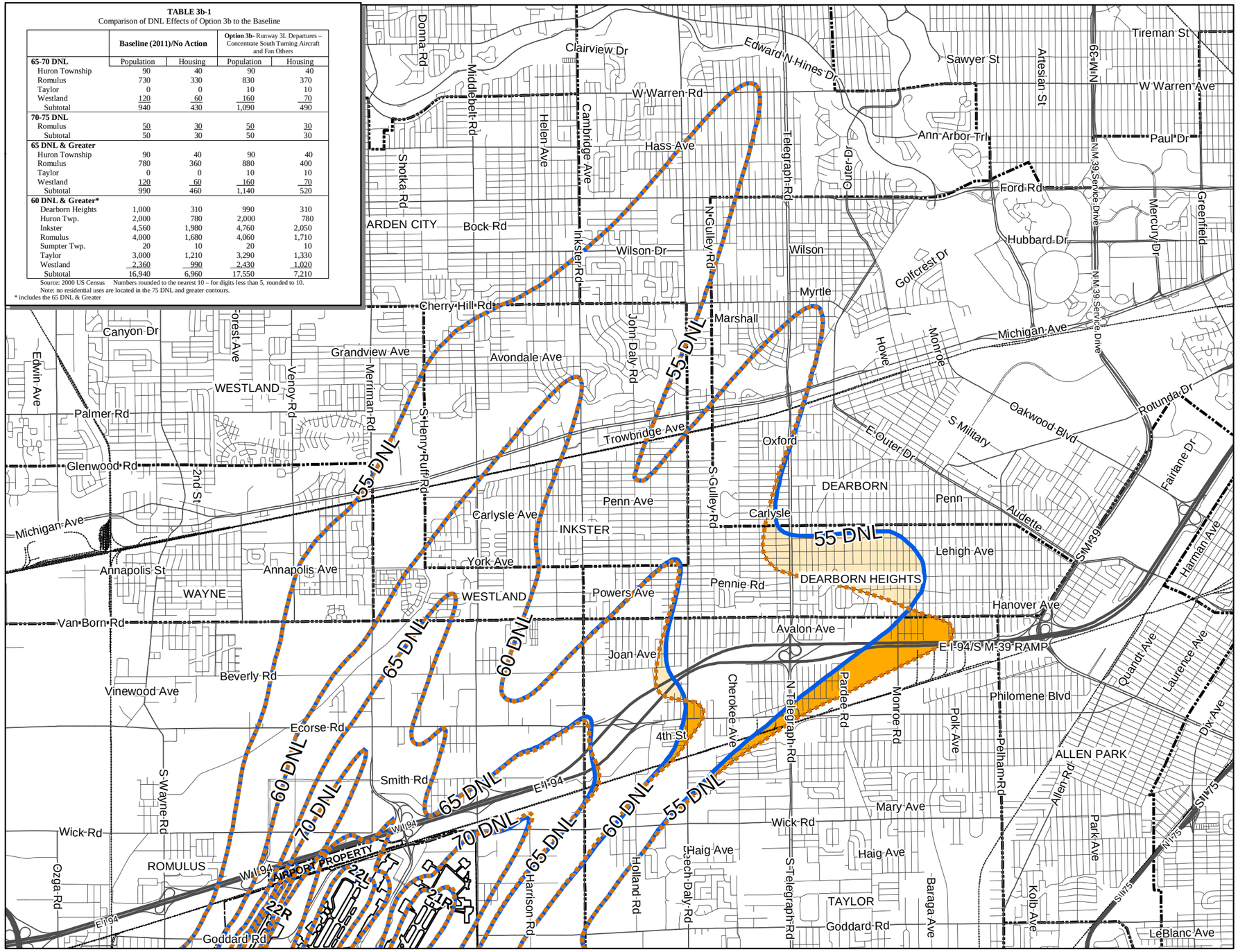
Airport and ATC Operational Considerations (Safety and efficiency issues): FAA has ultimate responsibility for the control of aircraft flight. This option would not be expected to change FAA ATC workloads, as more aircraft would be flying precise tracks based on satellite navigation. This option would not be expected to increase flight delay, and could slightly reduce fuel burn as jet aircraft would be turned sooner toward their ultimate direction. Airport staff would work with the FAA to ensure the procedure would be implemented to achieve its intended goal(s). There may be issues with respect to entrail flight paths for an extended distance and the use of airspace for jets that currently is being used for propeller aircraft.

Other Environmental Issues (NEPA, etc): Implementation of noise abatement flight procedures requires compliance with the National Environmental Policy Act (NEPA). FAA Order 1050.1E **Environmental Impacts: Policies and Procedures** outlines the documentation required based on the types of federal action. This option would likely require preparation of an Environmental Assessment

TABLE 3b-1
Comparison of DNL Effects of Option 3b to the Baseline

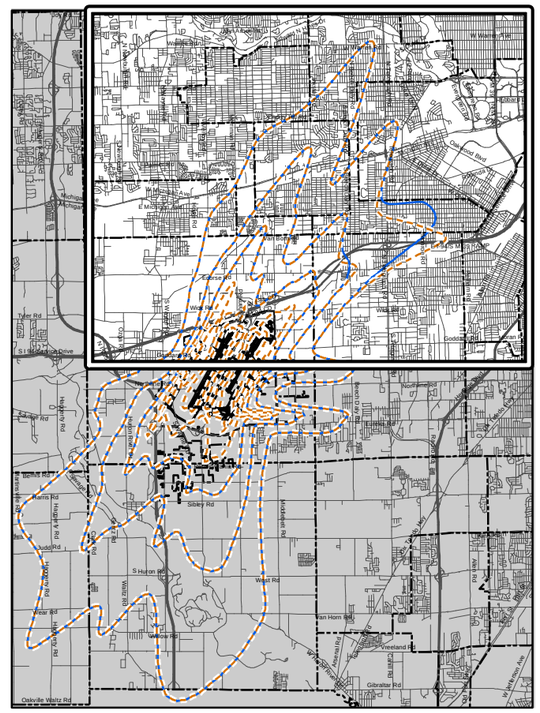
	Baseline (2011)/No Action		Option 3b- Runway 3L Departures – Concentrate South Turning Aircraft and Fan Others	
65-70 DNL	Population	Housing	Population	Housing
Huron Township	90	40	90	40
Romulus	730	330	830	370
Taylor	0	0	10	10
Westland	120	60	160	70
Subtotal	940	430	1,090	490
70-75 DNL				
Romulus	50	30	50	30
Subtotal	50	30	50	30
65 DNL & Greater				
Huron Township	90	40	90	40
Romulus	780	360	880	400
Taylor	0	0	10	10
Westland	120	60	160	70
Subtotal	990	460	1,140	520
60 DNL & Greater*				
Dearborn Heights	1,000	310	990	310
Huron Twp.	2,000	780	2,000	780
Inkster	4,560	1,980	4,760	2,050
Romulus	4,000	1,680	4,060	1,710
Sumpter Twp.	20	10	20	10
Taylor	3,000	1,210	3,290	1,330
Westland	2,360	990	2,430	1,020
Subtotal	16,940	6,960	17,550	7,210

Source: 2000 US Census Numbers rounded to the nearest 10 – for digits less than 5, rounded to 10.
Note: no residential uses are located in the 75 DNL and greater contours.
* includes the 65 DNL & Greater



Source: US Census, 2000

Figure G13 **Option 3b, Blend East**



Legend

- City Limits Boundary
- 2011 Base Case
- Option 3b, Blend East
- Option 3b Area newly affected
- Option 3b Area no longer affected

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to determine if the impacts would be significant; however based on the analysis prepared for this study, increased noise to residential uses within the 65 DNL contour is unlikely to trigger the 1.5 DNL threshold of significance, and warrant an Environmental Impact Statement. This option could produce 5 DNL or greater increases in noise within the 55-60 DNL contour, and could produce a 3 DNL or greater change within the 60-65 DNL.

Legal Issues: The option does not appear to have legal issues associated with its implementation.

Conclusions of Consultant Team:

This option would result in noise impact increases within the 65 DNL contour. This alternative is not recommended due to the increase within the 65 DNL.

TABLE G9
Comparison of DNL Effects of Option 3b to the Baseline

	Baseline (2011)/No Action		**Option 3b-** Runway 3L Departures – Concentrate South Turning Aircraft and Fan Others	
65-70 DNL	Population	Housing	Population	Housing
Huron Township	90	40	90	40
Romulus	730	330	830	370
Taylor	0	0	10	10
Westland	120	60	160	70
Subtotal	940	430	1,090	490
70-75 DNL				
Romulus	50	30	50	30
Subtotal	50	30	50	30
65 DNL & Greater				
Huron Township	90	40	90	40
Romulus	780	360	880	400
Taylor	0	0	10	10
Westland	120	60	160	70
Subtotal	990	460	1,140	520
60 DNL & Greater*				
Dearborn Heights	1,000	310	990	310
Huron Twp.	2,000	780	2,000	780
Inkster	4,560	1,980	4,760	2,050
Romulus	4,000	1,680	4,060	1,710
Sumpter Twp.	20	10	20	10
Taylor	3,000	1,210	3,290	1,330
Westland	2,360	990	2,430	1,020
Subtotal	16,940	6,960	17,550	7,210

Source: 2000 US Census Numbers rounded to the nearest 10 – for digits less than 5, rounded to 10.
Note: no residential uses are located in the 75 DNL and greater contours.

- includes the 65 DNL & Greater

Option 3c: Runway 4R Departures – Concentrate a Portion of South Turning Aircraft and Fan Others

Noise Abatement Procedure Goal: The goal of this alternative is to concentrate the flight paths over predominately compatible land uses and to disperse the flight paths when the aircraft are flying over predominately non-compatible (i.e., residential) land uses. Given that there are residential areas of various densities around DTW, it is not possible to avoid overflying residential areas. This alternative is designed to locate some flight paths over predominately compatible land uses, concentrate those paths, and disperse the rest of the paths that fly over non-compatible land uses. This option was designed to reduce impacts caused by Option 3a.

Description of the Option: This option is very similar to the Option 3a, Runway 4R Departures – Concentrate South Turning Aircraft and Fan Others**.** Relative to Option 3a, Option 3c would concentrate a smaller portion of the south turning departures instead of concentrating all south turning departures.

Pilots would use satellite-based navigation technologies to fly multiple headings using a combination of both concentrated and dispersed tracks, depending upon the underlying land use. The headings (similar to compass directions) would be used that correspond with the different routes that aircraft fly as they depart the Detroit airspace. Departures to locations to the north, east, and northwest would be fanned (dispersed) between 350 and 030 degrees similar to Option 2a, while, south-bound aircraft from Runway 4R would be turned sooner than the existing turns using a concentrated procedure and stay on course to the west and then to the south. As south-bound aircraft that use Runway 4R are turned to the west and south before turning on their southerly course, these southbound flights would avoid the higher density population areas by turning south of Wayne and Westland. **Figure G10** shows the desired flight track corridors for this option along with existing flight tracks, as Option 3c and Option 3a would use the same tracks.

Comparable Existing Procedure(s): Aircraft currently depart from Runway 4R and fly a straight path (runway heading) until the aircraft reaches at least 500 feet above ground before turning west. This generally occurs anywhere from before the runway end to one mile past the runway end, depending on the weight/performance of the aircraft. Aircraft are then assigned a westward heading between 355 and 030. The existing procedure essentially "fans" aircraft to three headings (355, 010, and 030), with more aircraft on two of the headings (355 and 010 headings). Aircraft fly this heading for three to 10 miles until ATC directs the aircraft to turn towards a navigational aid that provides a heading to exit the DTW airspace, approximately 50 miles from the Airport.

Modeling Assumptions/New Procedure: This option uses the same theory as Option 3a, combining a portion of option 1a (Concentrate Noise – Departures off Runway 4R) and option 2a (Disperse Noise – Fan Runway 4R Departures between 350 and 030 Degrees). For aircraft with northern, eastern or western destinations, aircraft would depart Runway 4R and fly a straight path (runway heading) until reaching at least 500 feet above ground. At this point aircraft would be assigned a heading by ATC; the heading would be between 350 and 035 degrees; aircraft would fly this heading for three to 10 miles using 15-20 degree dispersed heading. The southern jet path would be a new concentrated path that would start the turn to the west earlier than the current procedure, following a path along Michigan Avenue and then turning southward on a path north of Willow Run, effectively avoiding overflying Wayne and Westland. Turboprop aircraft currently occupy the space where the new track would be located, and thus, the turboprop aircraft would need to be turned sooner, enabling a 15 degree divergence from the southern jet path. The new jet path would be designed to fly over less densely populated areas south of Michigan Avenue**.**

About 80% of the future aircraft fleet at DTW are equipped with the necessary technology and could use this satellite-based technology procedure. Older generation aircraft that are not equipped with satellite navigation could generally follow a track that follows this turn, with the development of an Instrument

Flight Rule (IFR) overlay of the proposed procedure. The flight path would be similar to the satellite-based procedure, except that the precision of the flight track would not be as great, and for those not equipped with the newer technology, would disperse. In addition, some jets (an estimated 5%) may not be able to make such a quick turn on departure from Runway 4L. These aircraft would be expected to follow the existing flight path.

Analysis of New Procedure:

The analysis of this option considered both the noise exposure, as well as the possible operational effects.

Noise Analysis:

The study relied upon the use of the average annual DNL noise contours to consider possible noise exposure consequences of the option.

Impact on Annual DNL Contour: **Table G10** summarizes the impact on the 65 DNL and greater noise exposure contours from implementation of this option in comparison with the 2011 Baseline. As this table notes, this option would reduce overall population and housing exposed to 65 DNL by 10 people/10 houses in comparison to the Baseline (a 1.0% and 2.2% reduction respectively). **Figure G14 NW-4,** shows the noise exposure contours relative to the No Action/2011 Baseline. Within the 65 DNL, all of the changes associated with this option would occur for properties located within the 65-70 DNL contour. Within the 60 DNL contour, the changes would be less pronounced (a reduction of 0.9% homes and 0.2% population), with the contour moving in the direction of the new southbound track.

Within the 65 DNL and greater contour, a population noise impact reduction would occur in Romulus (2.6%) relative to the Baseline, and while impacted population would not change, the number of housing units affected in Westland would decrease by 10 homes (a 16.7% change). Within the 60 DNL contour, population impact increases would occur in Taylor (1.3%) and Huron Township (0.5%), with reductions in Westland (2.5%), and Dearborn Heights (1.0%).

FAA guidance for implementing the National Environmental Policy Act (NEPA) states that a 1.5 DNL increase in noise to noise sensitive uses (i.e., residences) within the 65 DNL due to a federal action is considered a significant noise impact. A review of the noise exposure contour indicates that a 1.5 DNL increase in noise would not be expected to occur due to Option 3c.

Operational Impacts

The following issues could arise from implementation of the option. Also the agencies are identified that would have a role in assisting in the implementation of this option.

Airport and ATC Operational Considerations (Safety and efficiency issues): FAA has ultimate responsibility for the control of aircraft flight. This option would not be expected to change FAA ATC workloads, as more aircraft would be flying precise tracks based on satellite navigation. This option would not be expected to increase flight delay, and could slightly reduce fuel burn as jet aircraft would be turned sooner toward their ultimate direction. There could be some concern with aircraft following the precision tracks for a longer period then they do today. Airport staff would

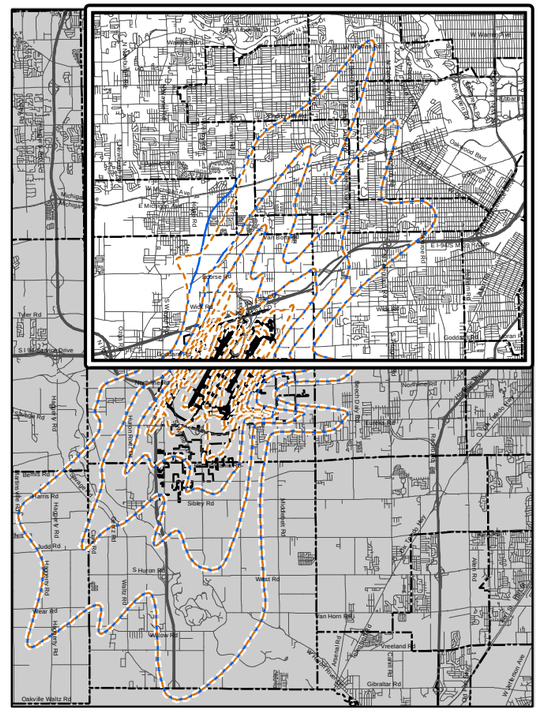
TABLE 3c-1
Comparison of DNL Effects of Option 3c to the Baseline

	Baseline (2011)/No Action		Option 3c- Runway 4R Departures – Concentrate a Portion of South Turning Aircraft and Fan Others	
65-70 DNL	Population	Housing	Population	Housing
Huron Township	90	40	90	40
Romulus	730	330	710	320
Taylor	0	0	10	10
Westland	120	60	120	50
Subtotal	940	430	930	420
70-75 DNL				
Romulus	50	30	50	30
Subtotal	50	30	50	30
65 DNL & Greater				
Huron Township	90	40	90	40
Romulus	780	360	760	350
Taylor	0	0	10	10
Westland	120	60	120	50
Subtotal	990	460	980	450
60 DNL & Greater*				
Dearborn Heights	1,000	310	990	310
Huron Twp.	2,040	780	2,050	780
Inkster	4,560	1,980	4,540	1,970
Romulus	4,000	1,680	4,000	1,680
Sumpter Twp.	20	10	20	10
Taylor	3,000	1,210	3,040	1,190
Westland	2,360	990	2,300	960
Subtotal	16,940	6,960	16,940	6,900

Source: 2000 US Census Numbers rounded to the nearest 10 – for digits less than 5, rounded to 10.
Note: no residential uses are located in the 75 DNL and greater contours.
* includes the 65 DNL & Greater

Source: US Census, 2000

Figure G14 **Option 3c, Blend 15% West**



Legend

- City Limits Boundary
- 2011 Base Case
- Option 3c, Blend 15% West
- Option 3c Area newly affected
- Option 3c Area no longer affected

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work with the FAA to ensure the procedure would be implemented to achieve its intended goal(s). There may be issue with respect to Willow Run airspace and the airspace currently reserved for propeller aircraft that now would be used for jet aircraft.

Other Environmental Issues (NEPA, etc): Implementation of noise abatement flight procedures requires compliance with the National Environmental Policy Act (NEPA). FAA Order 1050.1E **Environmental Impacts: Policies and Procedures** outlines the documentation required based on the types of federal action. This option would likely require preparation of an Environmental Assessment to determine if the impacts would be significant; however based on the analysis prepared for this study, increased noise to residential uses within the 65 DNL contour is unlikely to trigger the 1.5 DNL threshold of significance, and warrant an Environmental Impact Statement. This option would produce 5 DNL or greater increases in noise within the 55-60 DNL contour, and could produce a 3 DNL or greater change within the 60-65 DNL

Legal Issues: The option does not appear to have legal issues associated with its implementation.

Conclusions of Consultant Team:

No conclusion is made at this time, pending discussion with the Study Advisory Committee. (Appendix Five, Six & Seven)

TABLE G10
Comparison of DNL Effects of Option 3c to the Baseline

	Baseline (2011)/No Action		**Option 3c-** Runway 4R Departures – Concentrate a Portion of South Turning Aircraft and Fan Others	
65-70 DNL	Population	Housing	Population	Housing
Huron Township	90	40	90	40
Romulus	730	330	710	320
Taylor	0	0	10	10
Westland	120	60	120	50
Subtotal	940	430	930	420
70-75 DNL				
Romulus	50	30	50	30
Subtotal	50	30	50	30
65 DNL & Greater				
Huron Township	90	40	90	40
Romulus	780	360	760	350
Taylor	0	0	10	10
Westland	120	60	120	50
Subtotal	990	460	980	450
60 DNL & Greater*				
Dearborn Heights	1,000	310	990	310
Huron Twp.	2,040	780	2,050	780
Inkster	4,560	1,980	4,540	1,970
Romulus	4,000	1,680	4,000	1,680
Sumpter Twp.	20	10	20	10
Taylor	3,000	1,210	3,040	1,190
Westland	2,360	990	2,300	960
Subtotal	16,940	6,960	16,940	6,900

Source: 2000 US Census Numbers rounded to the nearest 10 – for digits less than 5, rounded to 10.
Note: no residential uses are located in the 75 DNL and greater contours.

- includes the 65 DNL & Greater

Option 3d: Runway 3L Departures – Concentrate a Portion of South Turning Aircraft and Fan Others.

Noise Abatement Procedure Goal: The goal of this alternative is to concentrate a portion of the flight paths over predominately compatible land uses and to disperse the flight paths when the aircraft are flying over predominately non-compatible (i.e., residential) land uses. Given that there are residential areas of various densities around DTW, it is not possible to avoid overflying residential areas. This alternative is designed to locate some flight paths over predominately compatible land uses, concentrate half of those paths, and disperse the rest of the paths that fly over non-compatible land uses.

Description of the Option: This option is very similar to the Option 3b, Runway 3L Departures – Concentrate South Turning Aircraft and Fan Others. The difference is that Option 3d would concentrate a portion of the south turning departures instead of concentrating all departures, as was assumed with Option 3b. This is to reduce the potential for increases in new areas. Aircraft would use satellite-based navigation technologies to fly multiple headings using a combination of concentrated and dispersed tracks. Aircraft flying to southern destinations that turn eastward and then to the south, would fly a track following the I-94 corridor to concentrate flights in this area. Aircraft flying to north, east and west destinations would fly along the same paths as they do today, using dispersed flight procedures. **Figure G12** shows the desired flight track corridors for this option along with the existing flight tracks, as the tracks for Option 3d are the same as Option 3b.

Comparable Existing Procedure(s): Aircraft currently depart to the northeast from Runway 3L and fly a straight path (runway heading) until the aircraft reaches at least 500 feet above ground before turning. Generally, aircraft reach this altitude from anywhere before the runway end to one mile past the runway end, depending on the weight/performance of the aircraft. Aircraft are assigned a heading from Air Traffic Control between 350 and 050 magnetic degrees (north and northeastern headings). Aircraft fly the heading for two to five miles until ATC directs the aircraft to turn towards a navigational aid that provides a heading leading out of the Detroit airspace. For aircraft with a destination to the east or south, this is either a due east or due south heading. The existing departure procedure essentially "fans" aircraft in a desired equal distribution between these headings. An example of the existing jet flight paths for this runway is presented in **Figure G12**, which shows a seven month density plot of actual flight tracks shown with light gray tracks in these figures. This figure graphically shows the distribution of aircraft flight tracks over the ground between 350 and 050. The current procedure provides for a dispersed track flow, with the greatest concentration of actual tracks occurring today just north of the I-94 corridor.

Modeling Assumptions/New Procedure: Under this option, aircraft bound for northern, western, and eastern locations would follow existing flight tracks using dispersal procedures. Southern bound aircraft would depart Runway 3L and fly runway heading for one mile past the departure end of the runway, then turn eastward on a satellite-based heading designed to follow the I-94 freeway corridor and the rail line corridor. At approximately eight miles from the Airport (Oakwood/I-94 Intersection), aircraft would turn south.

This new track would replace the existing south turning track that serves the same destinations, but which does not turn in an easterly direction as soon as the new option. This procedure would be designed for those aircraft that initially turn eastward for southern destinations. Today, about 30% of the departures on this runway are directed to the south. Some heavier aircraft might not be able to fly this new track, and thus, would follow the existing tracks.

It is estimated that 80% of the future aircraft fleet at DTW could use this satellite-based technology procedure. Older generation aircraft that are not equipped with satellite navigation could generally follow a track that follows this turn, with the development of an Instrument Flight Rule (IFR) overlay of the proposed procedure. The flight path would be similar to the satellite-based procedure, except that the precision of the flight track would not be as great, and for those not equipped with the newer technology, would disperse.

Analysis of New Procedure:

The analysis of this option considered both the noise exposure and the possible operational effects.

Noise Analysis:

The study relied upon the use of the average annual DNL noise contours to consider possible noise exposure consequences of the option.

Impact on Annual DNL Contour: **Table G11** summarizes the impact on the 65 DNL and greater noise exposure contours from implementation of this option in comparison with the 2011 baseline. As this table notes, this option would reduce overall population and housing exposed to 65 DNL by 20 people/20 houses in comparison to the Baseline, a 2.0% and 4.3% reduction respectively. **Figure G15 NE-5** shows the noise exposure contours relative to the No Action/2011 Baseline. Within the 65 DNL, all of the changes associated with this option would occur for properties located within the 65-70 DNL contour. Within the 60 DNL contour, the changes would be slightly less pronounced (a reduction of 1.6% in population and 2.0% in housing units), with the contour moving in the direction of the new eastern/southbound track.

Within the 65 DNL and greater contour, noise impacts would decrease within Romulus. While population impacts within the 65 DNL in Westland would not change, housing impacts would decrease nearly 17% (10 homes) relative to the Baseline. This slight decrease in number of impacted homes is primarily due to the rounding of population and housing to the nearest 10 people/homes. Within the 60 DNL contour, population impact reductions would occur in Westland (5.1%), Romulus (3.5%), and Dearborn Heights (1% reduction), with an increase to Taylor (1.3%) and Huron Township (0.5%).

FAA guidance for implementing the National Environmental Policy Act (NEPA) states that a 1.5 DNL increase in noise to noise sensitive uses (i.e., residences) within the 65 DNL due to federal action is considered a significant impact. A review of the noise exposure contour indicates that a 1.5 DNL increase in noise due to Option 3d would not be expected. Therefore, the FAA is likely to require completion of an Environmental Assessment (EA) that may be eligible for a Finding of No Significant Impact.

Operational Impacts

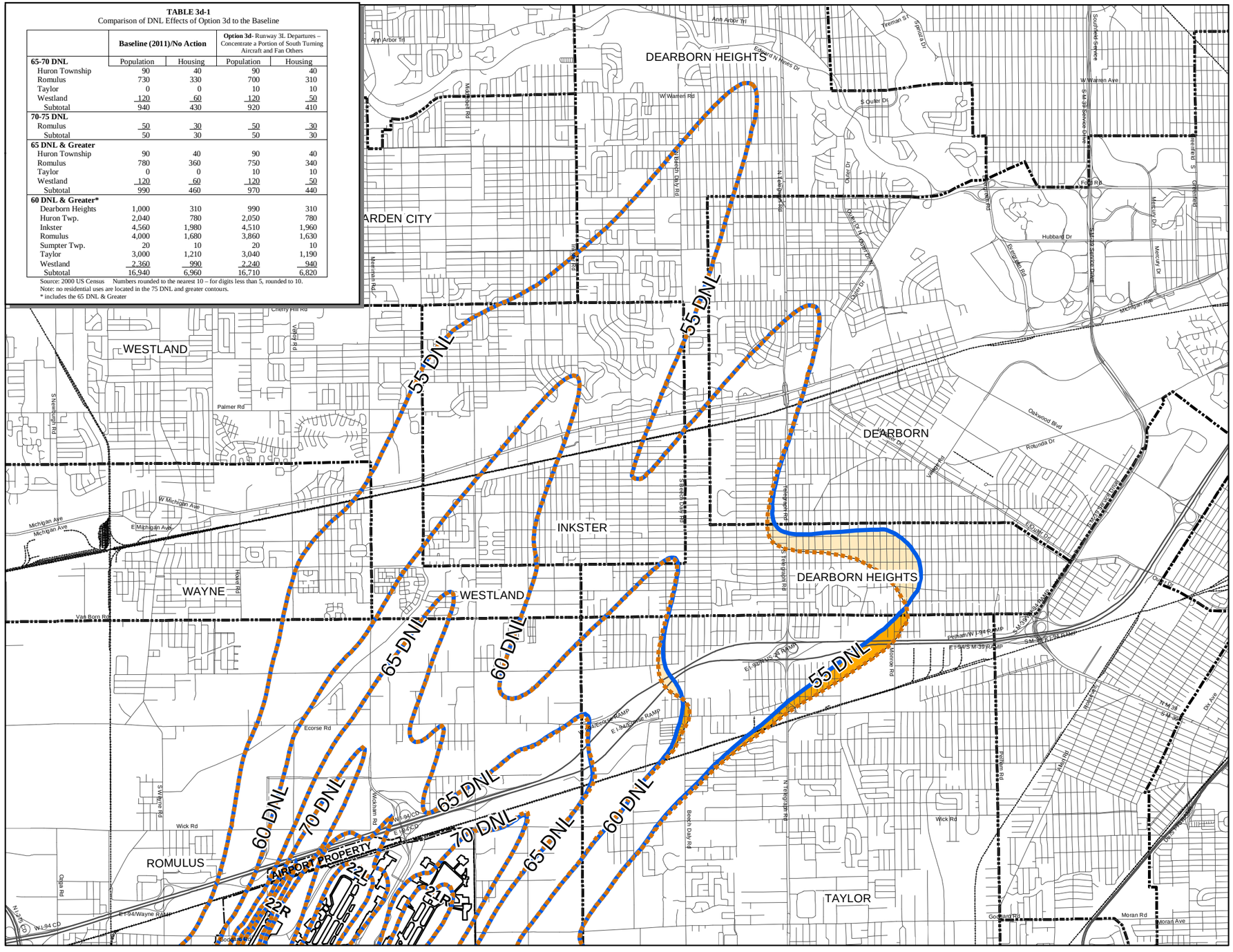
The following issues could arise from implementation of the option. Also identified are the agencies that would have a role in assisting in the implementation of this option.

Airport and ATC Operational Considerations (Safety and efficiency issues): FAA has ultimate responsibility for the control of aircraft flight. This option would not be expected to change FAA ATC workloads, as more aircraft would be flying precise tracks based on satellite navigation. This option would not be expected to increase flight delay, and could slightly reduce fuel burn as jet aircraft would be turned sooner toward their ultimate direction. Airport staff would work with the

TABLE 3d-1
Comparison of DNL Effects of Option 3d to the Baseline

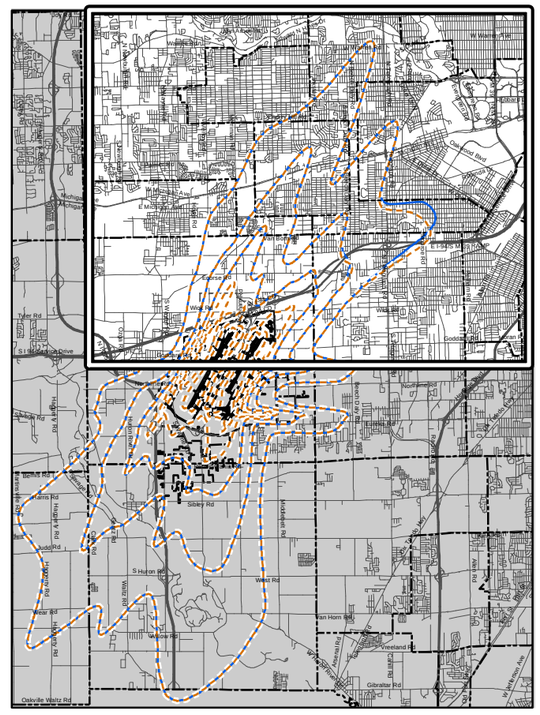
	Baseline (2011)/No Action		**Option 3d**- Runway 3L Departures – Concentrate a Portion of South Turning Aircraft and Fan Others	
65-70 DNL	Population	Housing	Population	Housing
Huron Township	90	40	90	40
Romulus	730	330	700	310
Taylor	0	0	10	10
Westland	120	60	120	50
Subtotal	940	430	920	410
70-75 DNL				
Romulus	50	30	50	30
Subtotal	50	30	50	30
65 DNL & Greater				
Huron Township	90	40	90	40
Romulus	780	360	750	340
Taylor	0	0	10	10
Westland	120	60	120	50
Subtotal	990	460	970	440
60 DNL & Greater*				
Dearborn Heights	1,000	310	990	310
Huron Twp.	2,040	780	2,050	780
Inkster	4,560	1,980	4,510	1,960
Romulus	4,000	1,680	3,860	1,630
Sumpter Twp.	20	10	20	10
Taylor	3,000	1,210	3,040	1,190
Westland	2,360	990	2,240	940
Subtotal	16,940	6,960	16,710	6,820

Source: 2000 US Census Numbers rounded to the nearest 10 – for digits less than 5, rounded to 10.
Note: no residential uses are located in the 75 DNL and greater contours.
* includes the 65 DNL & Greater



Source: US Census, 2000

Figure G15 **Option 3d, Blend East**



Legend

- City Limits Boundary
- 2011 Base Case
- Option 3d, Blend West
- Option 3d Area newly affected
- Option 3d Area no longer affected

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FAA to ensure the procedure would be implemented to achieve its intended goal(s). There may be issues with respect to aircraft separation associated with these flight paths for an extended distance and the use of airspace for jets that currently is being used for propeller aircraft.

Other Environmental Issues (NEPA, etc): Implementation of noise abatement flight procedures requires compliance with the National Environmental Policy Act (NEPA). FAA Order 1050.1E **Environmental Impacts: Policies and Procedures** outlines the documentation required based on the types of federal action. This option would likely require preparation of an Environmental Assessment to determine if the impacts would be significant; however based on the analysis prepared for this study, increased noise to residential uses within the 65 DNL contour is unlikely to trigger the 1.5 DNL threshold of significance. Therefore, while an Environmental Assessment may be required, an Environmental Impacts Statement would not be expected. This option could produce 5 DNL or greater increases in noise within the 55-60 DNL contour, and could produce a 3 DNL or greater change within the 60-65 DNL.

Legal Issues: The option does not appear to have legal issues associated with its implementation.

Conclusions of Consultant Team:

No conclusion is made at this time, pending discussion with the Study Advisory Committee. (Appendix Five, Six & Seven)

TABLE G11
Comparison of DNL Effects of Option 3d to the Baseline

	Baseline (2011)/No Action		**Option 3d-** Runway 3L Departures – Concentrate a Portion of South Turning Aircraft and Fan Others	
65-70 DNL	Population	Housing	Population	Housing
Huron Township	90	40	90	40
Romulus	730	330	700	310
Taylor	0	0	10	10
Westland	120	60	120	50
Subtotal	940	430	920	410
70-75 DNL				
Romulus	50	30	50	30
Subtotal	50	30	50	30
65 DNL & Greater				
Huron Township	90	40	90	40
Romulus	780	360	750	340
Taylor	0	0	10	10
Westland	120	60	120	50
Subtotal	990	460	970	440
60 DNL & Greater*				
Dearborn Heights	1,000	310	990	310
Huron Twp.	2,040	780	2,050	780
Inkster	4,560	1,980	4,510	1,960
Romulus	4,000	1,680	3,860	1,630
Sumpter Twp.	20	10	20	10
Taylor	3,000	1,210	3,040	1,190
Westland	2,360	990	2,240	940
Subtotal	16,940	6,960	16,710	6,820

Source: 2000 US Census Numbers rounded to the nearest 10 – for digits less than 5, rounded to 10.
Note: no residential uses are located in the 75 DNL and greater contours.
* includes the 65 DNL & Greater

Option 4: Concentrate Close-in, Disperse Further Away

Discussion: As noted earlier, in general, noise abatement options either concentrate noise over a predefined area or attempt to disperse or equalize noise. A third option, that combines the concentration with equalization is also possible. Concentrated noise provides a general predictability that noise would occur over specific areas, whereas dispersal generally results in less predictability, with flights being dispersed over an area. With the Option 4, it might be desirable to concentrate noise close-in where there is more compatible land use (within 2-4 miles of the Airport), and disperse flights further away (3 miles and beyond).

Noise Abatement Procedure Goal: The Airport generally has higher ratios of compatible land use close-in around the Airport. This includes open space, commercial, land acquisition, and home insulation. The goal of this alternative is to initially concentrate the flight paths close to the Airport and then disperse them at more distant locations that generally consist of non-compatible land use. The option is designed to take advantage of the compatible land use areas around the Airport.

Description of the Option: This option would result in aircraft flying the same paths as occur today, except that the initial departure paths would be concentrated using satellite-based technology. The pilots would fly the current paths that include multiple headings, but with FMS technology. With this technology, drift and dispersion (when aircraft stray from a desired path) would be reduced. At a distance of 3 to 5 miles from the Airport, the paths would disperse as occurs with the current procedures.

Comparable Existing Procedure(s): Aircraft currently depart from Runway 4R and fly a straight path (runway heading) until the aircraft reaches at least 500 feet above ground before turning west. This generally occurs anywhere from before the runway end to one mile past the runway end, depending on the weight/performance of the aircraft. Aircraft are then assigned a westward heading between 355 and 030. The existing procedure essentially "fans" aircraft to three headings (355, 010, and 030), with more aircraft on two of the headings (355 and 010 headings). Aircraft fly this heading for 3 to 10 miles until ATC directs the aircraft to turn towards a navigational aid that provides a heading to exit the DTW airspace, approximately 50 miles from the Airport. An example of the existing jet flight paths for this runway is presented in **Figure G16**, which shows a plot of seven months of actual flight tracks shown as light gray tracks.

Modeling Assumptions/New Procedure: This option would have aircraft fly the same general paths and headings as they do today, concentrating the paths close-in to the Airport. The concentration point is generally within areas of compatible land use. These locations are roughly 3 to 5 miles from the Airport, depending upon each runway. Further away, tracks would disperse using fanned headings provided by ATC. **Figure G16** presents the locations along each path were dispersion of the path would start to occur.

Analysis of New Procedure:

The analysis of this option considered both the noise exposure, as well as the possible operational effects.

Noise Analysis:

The study relied upon the use of the average annual DNL noise contours to consider possible noise exposure consequences of the option.

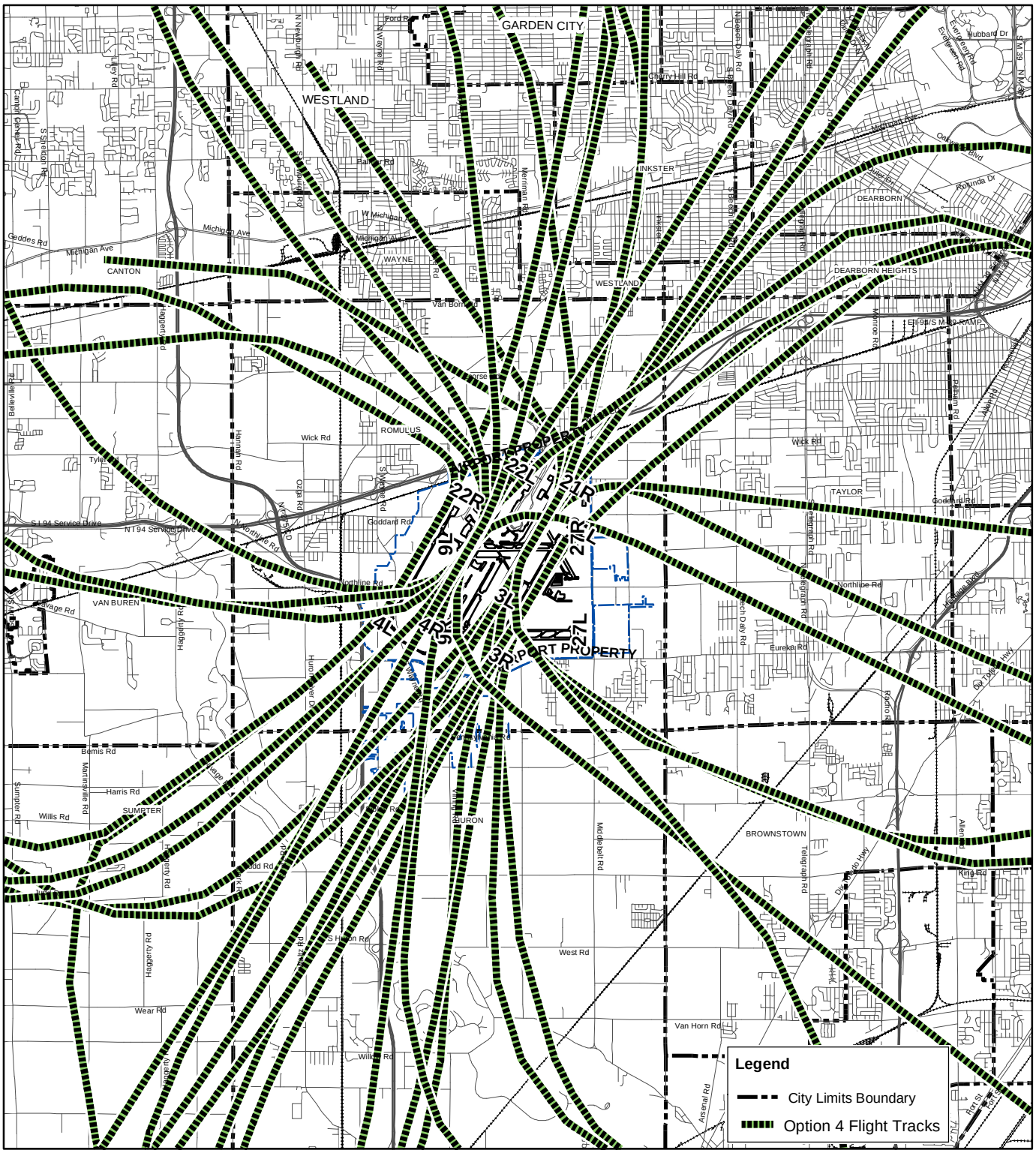

Figure G16 **Option 4, Concentrated Dispersion Flight Tracks**

0 1 2 4 Miles

Source: US Census, 2000

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Impact on Annual DNL Contour: **Table G12** summarizes the impact on the 65 DNL and greater noise exposure contours from implementation of this option in comparison with the 2011 baseline. As this table notes, this option would slightly increase overall population and housing exposed to 65 DNL; with an increase of 30 people/10 houses in comparison to the Baseline (3% and 2% respectively). **Figure G17 Full-2** shows the noise exposure contours relative to the No Action/2011 Baseline. Within the 65 DNL, a slight reduction in population and housing would occur. Within the 60 DNL contour, the changes would be less pronounced (with no change in population, but a slight reduction in housing – 50 homes/0.7%).

Within the 65 DNL and greater contour, a population impact reduction would occur in Romulus (5.1%) relative to the Baseline, with increases occurring in Westland (33.3%). Within the 60 DNL contour, population impact reductions would occur in Romulus (5.3%), Westland (2.1%), and Dearborn Heights (1.0%). Population impact increases would occur with Alternative 4 within the 60 DNL to Taylor (6%), and Inkster (2%).

FAA guidance for implementing the National Environmental Policy Act (NEPA) states that a 1.5 DNL increase in noise to noise sensitive uses (i.e., residences) within the 65 DNL due to federal action is considered a significant impact. A review of the noise exposure contour indicates that a 1.5 DNL increase in noise due to Option 4 could not be expected and thus, compliance with NEPA might be achieved with an Environmental Assessment.

Operational Impacts

The following issues could arise from implementation of the option. Also identified are the agencies that would have a role in assisting in the implementation of this option.

Airport and ATC Operational Considerations (Safety and efficiency issues): FAA has ultimate responsibility for the control of aircraft flight. This option would not be expected to change FAA ATC workloads, as more aircraft would be flying precise tracks based on satellite navigation. This option would not be expected to increase flight delay, and could slightly reduce fuel burn as jet aircraft would be turned sooner toward their ultimate direction. Airport staff would work with the FAA to ensure the procedure would be implemented to achieve its intended goal(s).

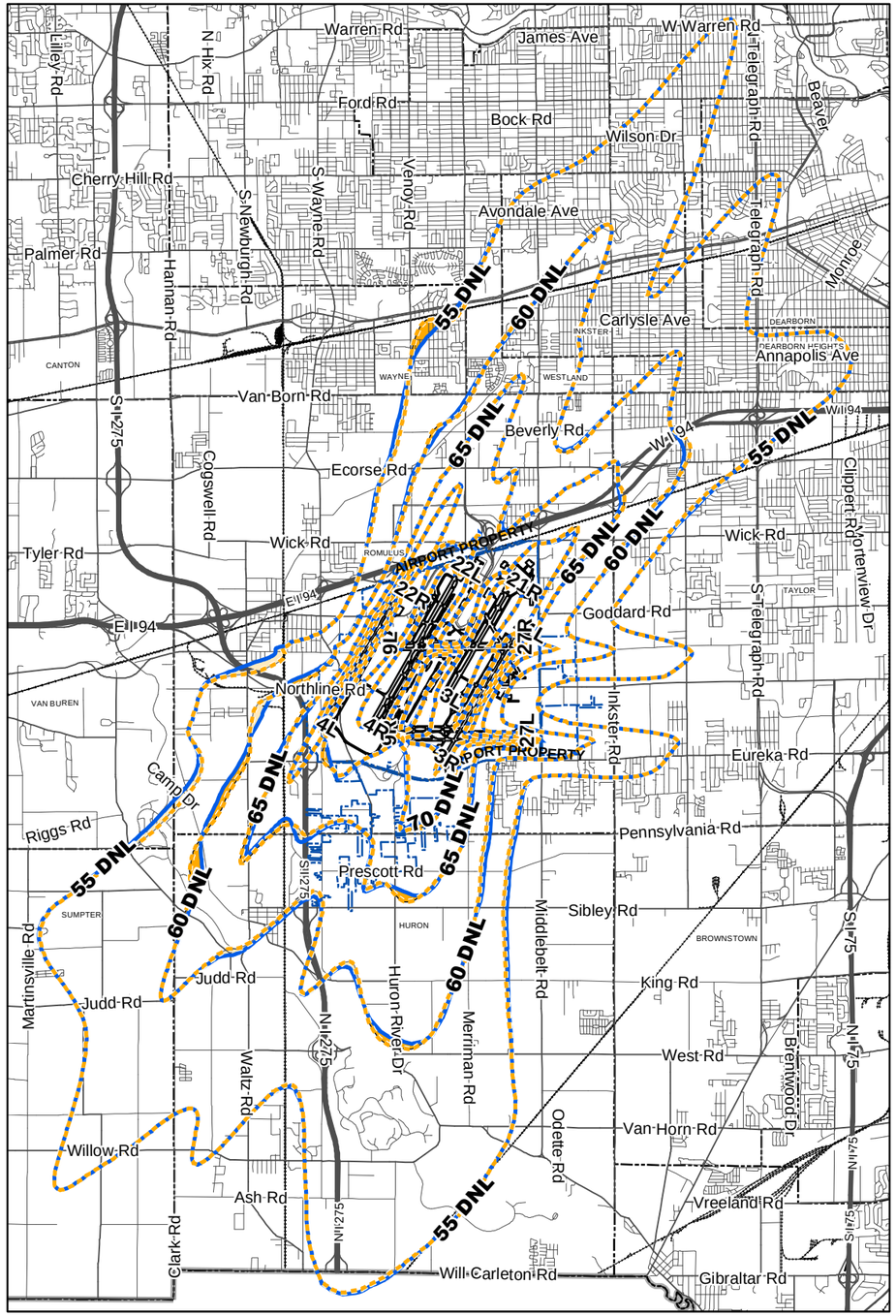
Other Environmental Issues (NEPA, etc): Implementation of noise abatement flight procedures requires compliance with the National Environmental Policy Act (NEPA). FAA Order 1050.1E **Environmental Impacts: Policies and Procedures** outlines the documentation required based on the types of federal action. This option would likely require preparation of an Environmental Assessment to determine if the impacts would be significant; however based on the analysis prepared for this study, increased noise to residential uses within the 65 DNL contour is not expected to trigger the 1.5 DNL threshold of significance, and warrant an Environmental Impact Statement.

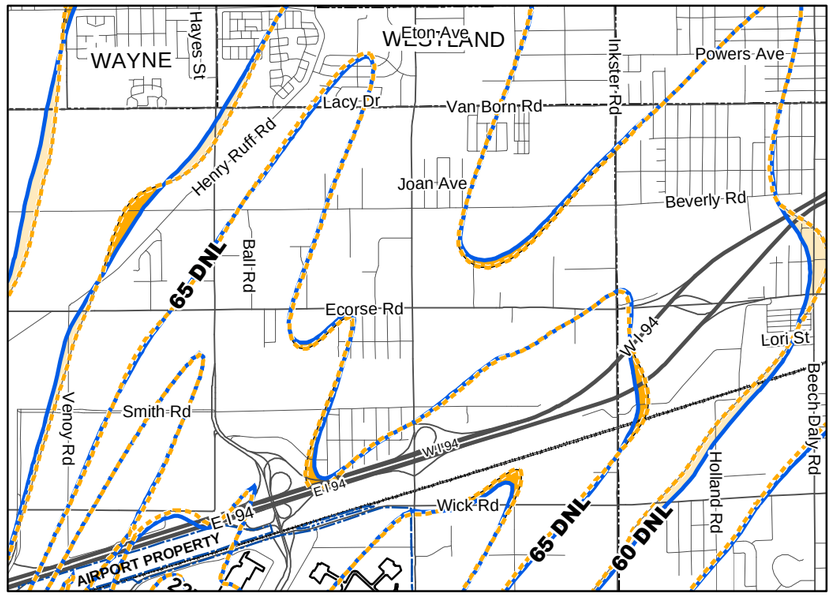
Legal Issues: The option does not appear to have legal issues associated with its implementation.

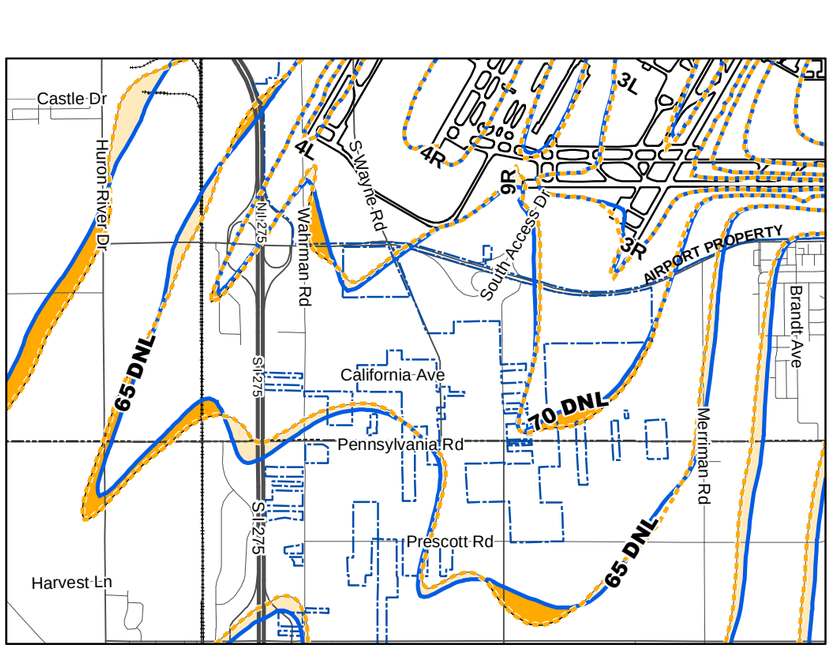
Conclusions of Consultant Team:

This option would result in noise impact increases within the 65 DNL contour. This alternative is not recommended due to the increase within the 65 DNL.

Figure G17 **Option 4, Concentrated Dispersion**







0 2,000 4,000 8,000 Feet

0 1 2 4 Miles

TABLE 4-1
Comparison of DNL Effects of Option 4 to the Baseline

	Baseline (2011)/No Action		**Option 4**.- Concentrate Close-in, Disperse Further Away	
65-70 DNL	Population	Housing	Population	Housing
Huron Township	90	40	110	50
Romulus	730	330	700	320
Taylor	0	0	10	0
Westland	120	60	160	70
Subtotal	940	430	980	440
70-75 DNL				
Romulus	50	30	50	20
Subtotal	50	30	50	20
65 DNL & Greater				
Huron Township	90	40	110	50
Romulus	780	360	740	350
Taylor	0	0	10	0
Westland	120	60	160	70
Subtotal	990	460	1,020	470
60 DNL & Greater*				
Dearborn Heights	1,000	310	990	310
Huron Twp.	2,000	780	2,000	760
Inkster	4,560	1,980	4,650	2,000
Romulus	4,000	1,680	3,790	1,600
Sumpter Twp.	20	10	20	10
Taylor	3,000	1,210	3,180	1,260
Westland	2,360	990	2,310	970
Subtotal	16,940	6,960	16,940	6,910

Source: 2000 US Census Numbers rounded to the nearest 10 – for digits less than 5, rounded to 10.
Note: no residential uses are located in the 75 DNL and greater contours.
* includes the 65 DNL & Greater

Legend

- City Limits Boundary
- 2011 Base Case
- Option 4 Concentrated Dispersion
- Option 4, Area newly affected
- Option4, Area no longer affected

Source: US Census, 2000

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TABLE G12
Comparison of DNL Effects of Option 4 to the Baseline

	Baseline (2011)/No Action		**Option 4**.- Concentrate Close-in, Disperse Further Away	
65-70 DNL	Population	Housing	Population	Housing
Huron Township	90	40	110	50
Romulus	730	330	700	320
Taylor	0	0	10	0
Westland	120	60	160	70
Subtotal	940	430	980	440
70-75 DNL				
Romulus	50	30	50	20
Subtotal	50	30	50	20
65 DNL & Greater				
Huron Township	90	40	110	50
Romulus	780	360	740	350
Taylor	0	0	10	0
Westland	120	60	160	70
Subtotal	990	460	1,020	470
60 DNL & Greater*				
Dearborn Heights	1,000	310	990	310
Huron Twp.	2,000	780	2,000	760
Inkster	4,560	1,980	4,650	2,000
Romulus	4,000	1,680	3,790	1,600
Sumpter Twp.	20	10	20	10
Taylor	3,000	1,210	3,180	1,260
Westland	2,360	990	2,310	970
Subtotal	16,940	6,960	16,940	6,910

Source: 2000 US Census Numbers rounded to the nearest 10 – for digits less than 5, rounded to 10.
Note: no residential uses are located in the 75 DNL and greater contours.
* includes the 65 DNL & Greater.

Option 5: Runway Use – Concentrate Noise

Discussion: As noted earlier, in general noise abatement options either concentrate noise over a predefined area or attempt to disperse or equalize noise. A third option, that combines the concentration with equalization is also possible. Concentrated noise provides a general predictability that noise would occur over specific areas, whereas dispersal generally results in less predictability, with flights being dispersed over an area.

The current noise abatement program at Detroit Metro consists of using Runways 21L/R and 22L/R with tail wind conditions up to 7-knots. This means that the south flow operation is the primary noise abatement procedure, whereas arrivals are more dominant on Runways 22R and 21L (the outer runways relative to the terminal), with departures more dominant on Runways 22L and 21R. This operational flow was identified in the 1992 Part 150 Study because departure noise was identified as the most intense and bothersome (relative to arrival noise), and population densities to the south (relative to the north) were lower. Visual inspection of the population density map indicates that the south remains with a lower population density relative to areas to the north. Therefore, the existing daytime runway use concentrates the most intense and bothersome noise conditions to the south over the relatively lower population.

During the nighttime, the 1992 Part 150 Study recommended that Contra-Flow (also referred to as opposite direction or head-to-head operation) runway use between midnight and 6am. Contra flow allows departures to occur to the south, with arrivals also occurring from the south. The purpose of this program is to concentrate nighttime noise over the lower density population areas.

As improvements to the daytime use were not identified, the review focused on improvements to the existing nighttime program. To increase the effectiveness of the existing nighttime (10pm-7am) noise abatement procedures, two options have been identified:

- Option 5a: Extend Hours of Contra-Flow at Night,
- Option 5b: Preferred Nighttime Use of Runways 22L/22R for Arrivals when Contra Flow is Not Feasible—to be developed based on input from the Study Advisory Committee (Appendix Five, Six & Seven)

Option 5a: Extend Hours of Contra-Flow at Night

Noise Abatement Procedure Goal: The goal of this option is to increase the number of hours at night that the Contra-Flow is used.

Description of the Option: This procedure would increase the hours of Contra-Flow operations at night when operationally feasible.

Comparable Existing Procedure(s): The Airport currently operates in Contra-Flow between the hours of midnight and 6 a.m. Contra-Flow operations involve aircraft arriving from the south and departing to the south, as activity during this period enables aircraft to safely operate these procedures under acceptable winds and/or weather.

The following table shows the average daily operations per hour for the hours between 10 pm and 7 am. The data also shows the percentage of the operations that either arrived from the south or departed to the south. On average, the airfield operated in south flow 67% of the time. The data shows that starting at midnight up until 6 am, there is an increase in south flow activity of about 5%, reflecting a reduction in

south flow arrivals of more than 40%. This data shows that the contra-flow procedure is in effect, with a slight increase in the south flow departures and a large reduction in the south flow arrivals.

	Number of Operations by Nighttime Hour									
	10p-11p	11p-12a	12a-1a	1a -2a	2a- 3a	3a- 4a	4a- 5a	5a- 6a	6a- 7a	12a-6am
Daily Operations										
Arrivals	13	9	5	1	1	1	2	9	3	19
Departures	15	5	1	1	1	1	1	1	14	6
Percent South Flow										
Arrivals	66%	63%	36%	29%	29%	26%	34%	34%	61%	34%
Departures	64%	63%	67%	84%	77%	94%	80%	68%	64%	72%

Source- 7 months of radar data during 2004

Modeling Assumptions/New Procedure: Based on the current and forecast number of hourly arrivals and departures, consideration was given to the ability of the FAA to increase the number of hours when Contra-Flow can be used. It is important to note that Contra-Flow can be effective when the level of aircraft operations is low. As the table above shows, the greatest number of arrivals when Contra-Flow has occurred was 9 arrivals, with the greatest number of departures being 1 departure during the same hour. Therefore, it might be possible to increase the hours of use to the 11pm to midnight hour (where 9 arrivals have occurred, and possibly 6am); however consideration must also be given to the number of departures that would share the same airspace. Evaluation of the data indicates that it might be possible to accommodate up to the 11pm-6am period, but it would not be possible to accommodate a greater number of departures at the same time as accommodating arrivals. Therefore, it was recommended that the hours only be increased by 1 hour for program that would operate from 11pm until 6am. To model the effects, operations during the 11pm-midnight period would follow the existing nighttime percentage.

Analysis of the Option:

The analysis of this option considered both the noise exposure of the option, as well as the possible operational effects.

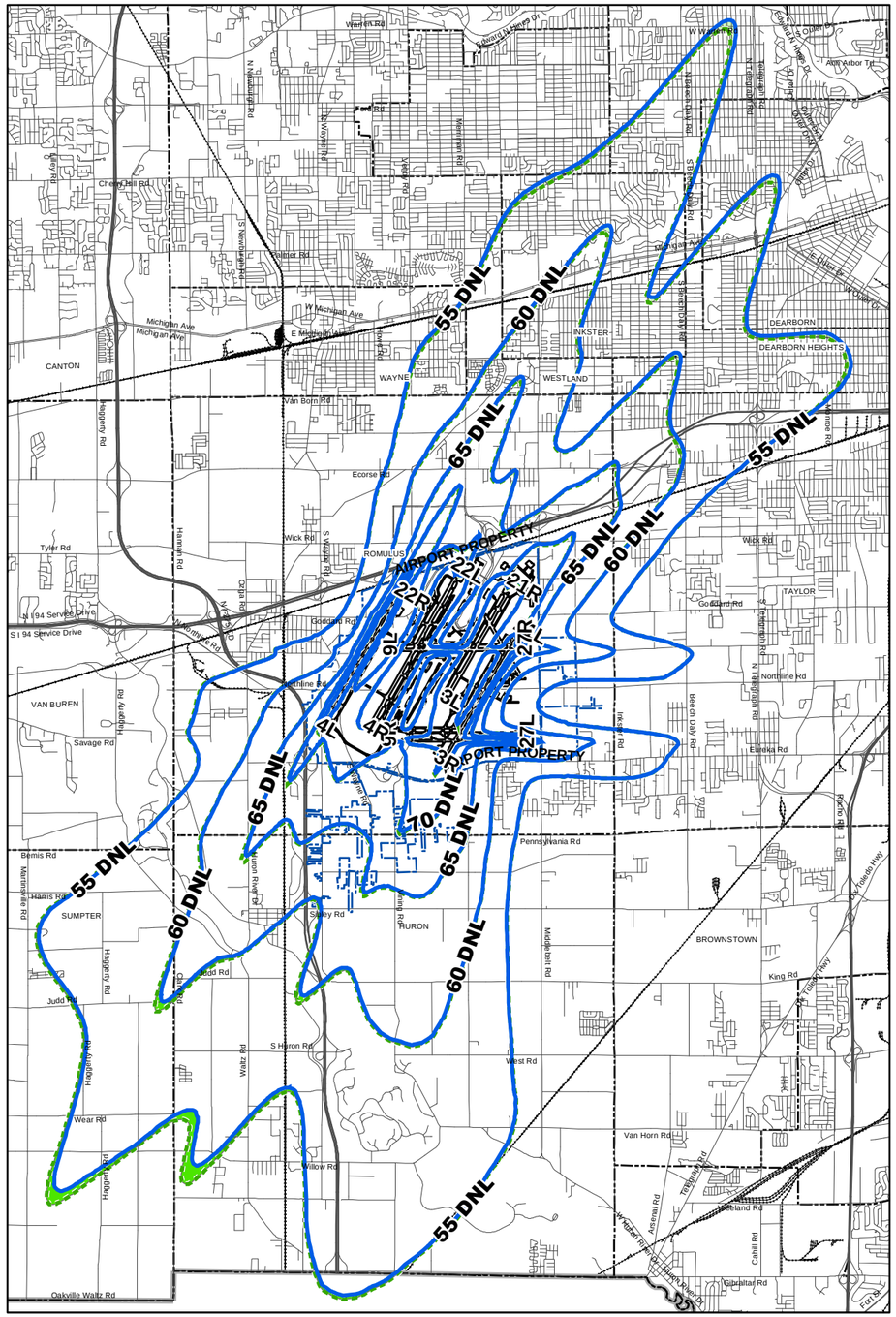
Noise Analysis:

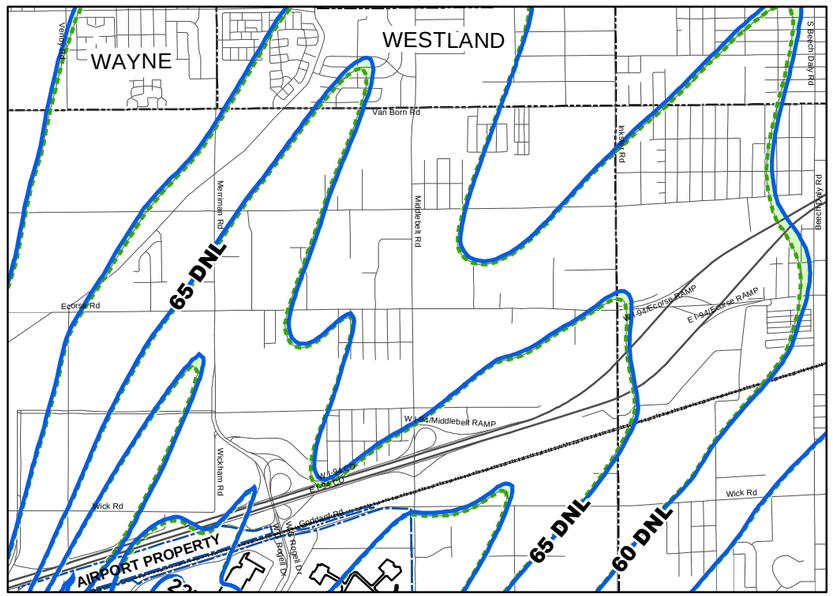
The study relied upon the use of the average annual DNL noise contours to consider possible noise exposure consequences of the option.

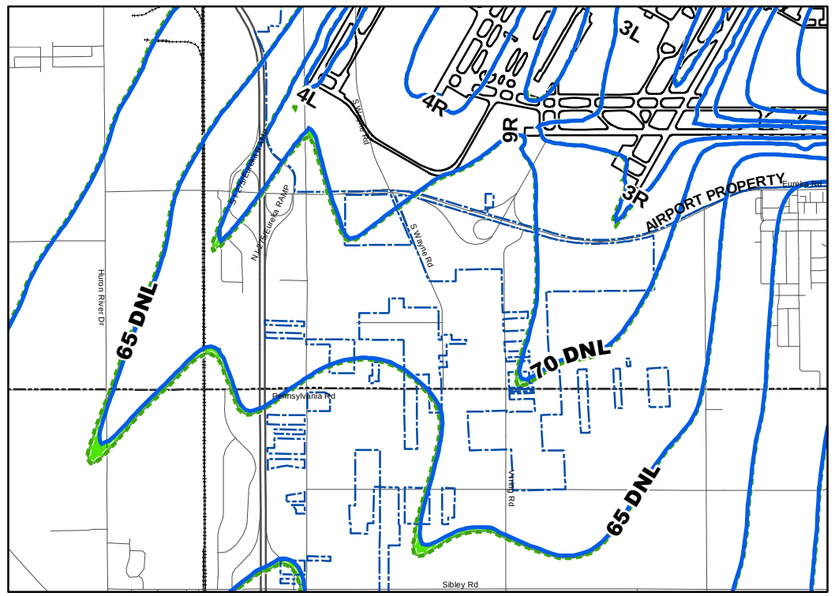
Impact on Annual DNL Contour: **Table G13** summarizes the impact on the 65 DNL and greater noise exposure contour from implementation of this option in comparison with the 2011 Baseline. **Figure G18 Full-1** shows the noise exposure contours for this option. As this table notes, this option would produce a reduction in overall population and housing exposed to 65 DNL and greater contour by 60 people/40 houses in comparison to the Baseline.

Within the 60 DNL contour, the changes would be slightly more pronounced (a reduction of 4.3% in population and 5.2% reduction in housing relative to the 2011 Baseline), with the contour moving in the direction of the new eastbound track. Within the 65 DNL and greater contour, impact reductions would occur in Westland (50%), and Romulus (2.7%) relative to the Baseline, with an increase of 11.1% in Huron Township.

Figure G18 **Option 5a, Increase Contra Flow**







0 2,000 4,000 8,000 Feet

0 1 2 4 Miles

TABLE 5a-1
Comparison of DNL Effects of Option 5a to the Baseline

	Baseline (2011)/No Action		Option 5a- Increase Hours of Nighttime Conta-Flow	
65-70 DNL	Population	Housing	Population	Housing
Huron Township	90	40	100	40
Romulus	730	330	710	320
Taylor	0	0	10	10
Westland	120	60	60	20
Subtotal	940	430	880	390
70-75 DNL				
Romulus	50	30	50	30
Subtotal	50	30	50	30
65 DNL & Greater				
Huron Township	90	40	100	40
Romulus	780	360	760	350
Taylor	0	0	10	10
Westland	120	60	60	20
Subtotal	990	460	930	420
60 DNL & Greater*				
Dearborn Heights	1,000	310	830	250
Huron Twp.	2,000	780	2,120	810
Inkster	4,560	1,980	4,140	1,800
Romulus	4,000	1,680	4,010	1,680
Sumpter Twp.	20	10	30	10
Taylor	3,000	1,210	2,800	1,100
Westland	2,360	990	2,290	950
Total	16,940	6,960	16,220	6,600

Source: 2000 US Census Numbers rounded to the nearest 10 – for digits less than 5, rounded to 10.
Note: no residential uses are located in the 75 DNL and greater contours.
* includes the 65 DNL & Greater

Legend

- City Limits Boundary
- 2011 Base Case
- Increase Contra Flow
- Option 5a, Area newly affected
- Option 5a, Area no longer affected

Source: US Census, 2000

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Operational Impacts

The following issues could arise from implementation of the option. Also identified are the agencies that would have a role in assisting in the implementation of this option.

Airport and ATC Operational Considerations (Safety and efficiency issues): FAA has ultimate responsibility for the control of aircraft flight. This option would potentially increase FAA ATC workloads because of the contra-flow operation. It would be anticipated that implementation of this action could come at the request of the Airport Authority (Appendix Nine). Airport staff would work with the FAA to ensure the procedure would be implemented to achieve its intended goal(s).

Other Environmental Issues (NEPA, etc): Implementation of noise abatement procedures requires compliance with the National Environmental Policy Act (NEPA). FAA Order 1050.1E **Environmental Impacts: Policies and Procedures** outlines the documentation required based on the types of federal action. This option would likely require preparation of an Environmental Assessment to determine if the impacts would be significant; however based on the analysis prepared for this study, increased noise to noise sensitive residential uses are expected to be less than the 1.5 DNL significance criteria.

Legal Issues: The option does not appear to have legal issues associated with its implementation.

Conclusions of Consultant Team:

The Consultant Team recommends increasing the hours of the nighttime Contra-Flow operation, when activity levels, wind, and weather allow.

TABLE G13
Comparison of DNL Effects of Option 5a to the Baseline

	Baseline (2011)/No Action		Option 5a- Increase Hours of Nighttime Contra-Flow	
65-70 DNL	Population	Housing	Population	Housing
Huron Township	90	40	100	40
Romulus	730	330	710	320
Taylor	0	0	10	10
Westland	120	60	60	20
Subtotal	940	430	880	390
70-75 DNL				
Romulus	50	30	50	30
Subtotal	50	30	50	30
65 DNL & Greater				
Huron Township	90	40	100	40
Romulus	780	360	760	350
Taylor	0	0	10	10
Westland	120	60	60	20
Subtotal	990	460	930	420
60 DNL & Greater*				
Dearborn Heights	1,000	310	830	250
Huron Twp.	2,000	780	2,120	810
Inkster	4,560	1,980	4,140	1,800
Romulus	4,000	1,680	4,010	1,680
Sumpter Twp.	20	10	30	10
Taylor	3,000	1,210	2,800	1,100
Westland	2,360	990	2,290	950
Total	16,940	6,960	16,220	6,600

Source: 2000 US Census Numbers rounded to the nearest 10 – for digits less than 5, rounded to 10.
Note: no residential uses are located in the 75 DNL and greater contours.

- includes the 65 DNL & Greater

Option 6: Runway Use – Disperse Noise

Discussion: As noted earlier, in general, noise abatement options either concentrate noise over a predefined area or attempt to disperse or equalize noise. A third option, that combines the concentration with equalization is also possible. Concentrated noise provides a general predictability that noise would occur over specific areas, whereas dispersal generally results in less predictability, with flights being dispersed over an area.

The current noise abatement program at Detroit Metro consists of using Runways 21L/R and 22L/R with tail wind conditions up to 7-knots. This means that the south flow operation is the primary noise abatement procedure. With this runway use program, arrivals are most frequent on Runways 22R and 21L (outboard runways), with departures most frequent on Runways 22L and 21R (inboard runways). This operational flow (south flow) was identified in the 1992 Part 150 Study because departure noise was identified as the most intense and bothersome (relative to arrival noise), and population densities to the south (relative to the north) were lower. Visual inspection of the population density map indicates that the south currently has a lower population density relative to areas to the north. Therefore, the existing daytime runway use concentrates the most intense and bothersome noise conditions to the south over the relatively lower population.

During the 1992 Part 150 Study, consideration was given to a rotational runway use program. A rotation runway use program would attempt to equalize the use of all runways to more evenly distribute the noise exposure. That study noted that capacity constraints (i.e., increased aircraft delay) could arise from a true rotational runway use program, as capacity is reduced when only the crosswind runways are in use. Because of this capacity concern, the 1992 study did not consider rotational runway use further. However, since that time, additional runways have been completed at Detroit Metro (fourth parallel Runway 4L/22R and crosswind 9R/27L) which may enable the runway system to be used to assist with further dispersal of flights within the existing south flow runway use program.

Typically, the crosswind runways are used infrequently; their use is based on wind and weather conditions, or when airfield maintenance is being conducted. Consideration was given to changing the runway use program to increase use of the crosswind runways (9R/27L and 9L/278R). However, relative to areas to the south previously discussed, population density to the east is higher and similar to that to the north. Therefore, increased crosswind runway use would not be expected to result in reduced noise impacts.

Consideration was given to procedures that might alter the use of the existing parallel runways. One option was identified:

- Option 6a: Runway Use – Disperse: Off-Set Approach To Runway 4L/22R during poor weather

Option 6a: Off-Set Approach To Runway 4L/22R During Poor Weather

Noise Abatement Procedure Goal: The goal of this procedure is to spread or disperse arrival noise. By enabling aircraft to land more quickly, this option would reduce the duration of the arrival bank (periods of high levels of arrivals or departures associated with a single airline are called "banks"). From a noise perspective, this option would reduce the frequency of overflights occurring on the existing two arrival runways by providing for a third runway during poor weather.

Description of the Option: Today, during poor weather, to ensure safe separation among aircraft, only two runways can be used at the same time. The new procedure would allow three arrival runways

during poor weather by using new navigation and radar technology that permits aircraft to operate more closely spaced then can occur with technology in place at DTW in 2006. In south flow conditions, aircraft would land straight-in on the east outboard runway (21L), straight-in on the west inboard runway (22L), and on a 3-degree offset (shifted to the west) to the west outboard runway (22R). In north flow conditions, aircraft would land straight-in on the east outboard runway (3R), straight-in on the west inboard runway (4R), and on a 3-degree offset (shifted to the west) to the west outboard runway (4L).

The 3-degree off-set means that aircraft would approach the runway not from straight-in, but at three degrees to the west of straight-in. When the aircraft is about 3 miles from the Airport and the pilot can visually see the runway, the aircraft would transition to the straight-in centerline approach for landing. The off-set allows for additional separation from aircraft landing on the adjacent runway so that a safe landing during poor weather can occur. An additional component to this procedure is a new radar technology that allows Air Traffic Controllers more precise information about the position of the landing aircraft**. Figure G19** shows the new 3-degree off-set approach track overlaid on a base map.

Comparable Existing Procedure(s): The current procedures are primarily to land on the outboard runways (4L/22R and 3R/21L) on a straight in path to the runway. Landing on these runways can occur independently of each other. During busy arrival periods and good weather ATC will at times also land on the west inboard runway (4R/22L). This is referred to triple independent arrivals. During poor weather, independent approaches are restricted to only two runways at a time. All approaches to the runways occur on a straight in path that is typically 5 to 15 miles from the Airport.

Modeling Assumptions/New Procedure: This option would allow for triple independent approaches during poor weather conditions. To accomplish this, an offset approach of 3 degrees would be used for approaches to Runway 4L/22R during Instrument Meteorological Conditions (IMC), poor weather. Based on historic weather data, IMC conditions occur approximately 10% of the time at DTW.

In addition to the new approach path, the option would also alter the runway usage during poor weather conditions. Normally, during poor weather conditions south flow arrivals (arriving from the north heading south) occur on Runways 22R and 21L and north flow arrivals occur on Runways 4L and 3R. The offset approach to Runways 22R and 4L would allow triple simultaneous south flow arrivals on Runways 22R, 22L, and 21L and for north flow arrivals on Runways 4L, 4R, and 3R.

The option would allow a more evenly distributed use of the existing runways under IMC conditions. This would cause a decrease in the use of 22R/4L because DTW would be able to operate arrivals on three runways allowing more operations to use 22L/4R. This option assumes approximately 0.3% of all south flow arrivals would shift from Runway 22R to Runway 22L. It is expected that under Option 6a approximately one-tenth of one percent (0.1%) of all arrivals will shift from Runway 4R to Runway 4L.

Analysis of New Procedure:

The analysis of this option considered both the noise exposure, as well as the possible operational effects.

Noise Analysis:

The study relied upon the use of the average annual DNL noise contours to consider possible noise exposure consequences of the option.

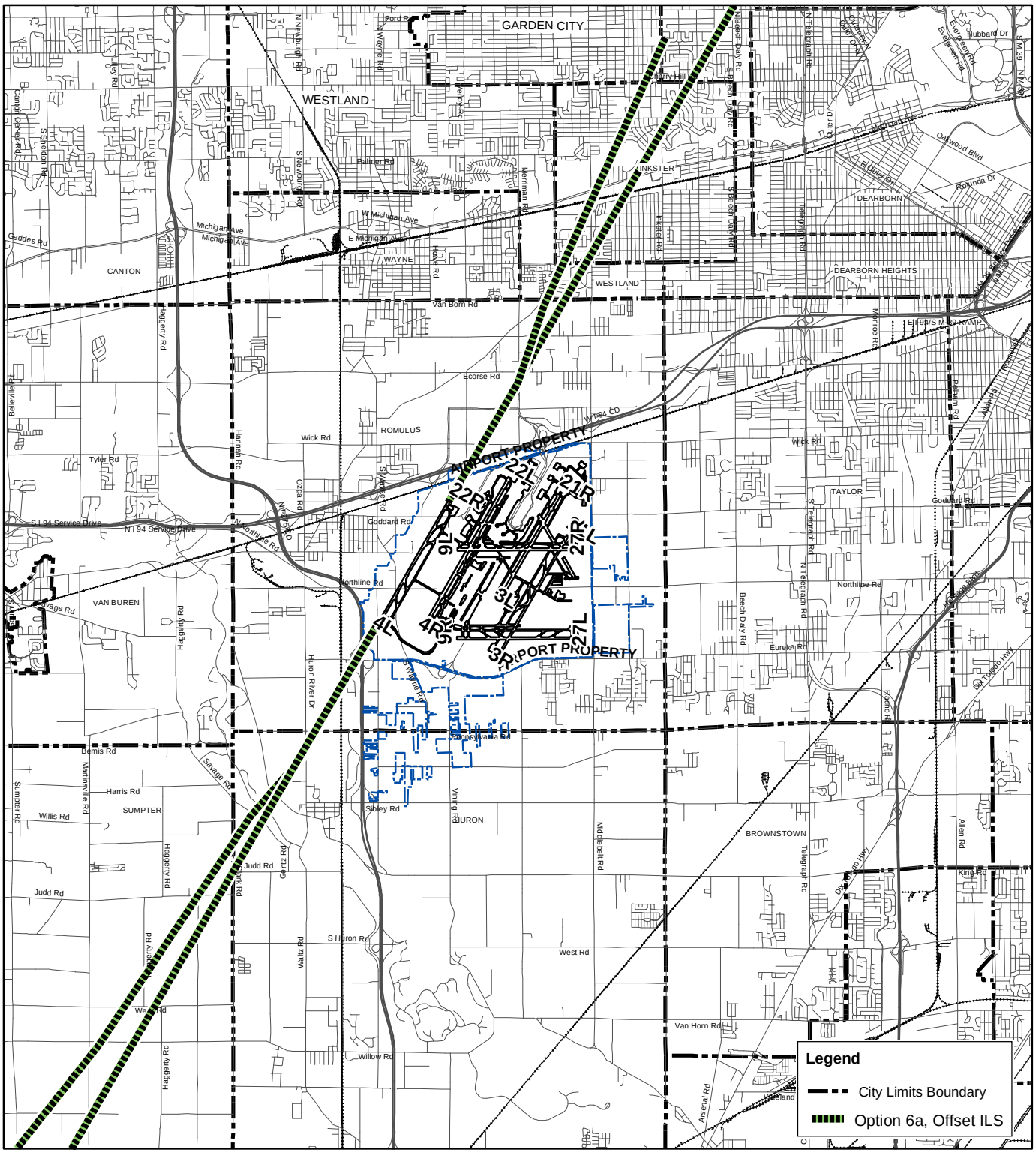

Figure G19 **Option 6a, Offset ILS Flight Tracks**

Source: US Census, 2000

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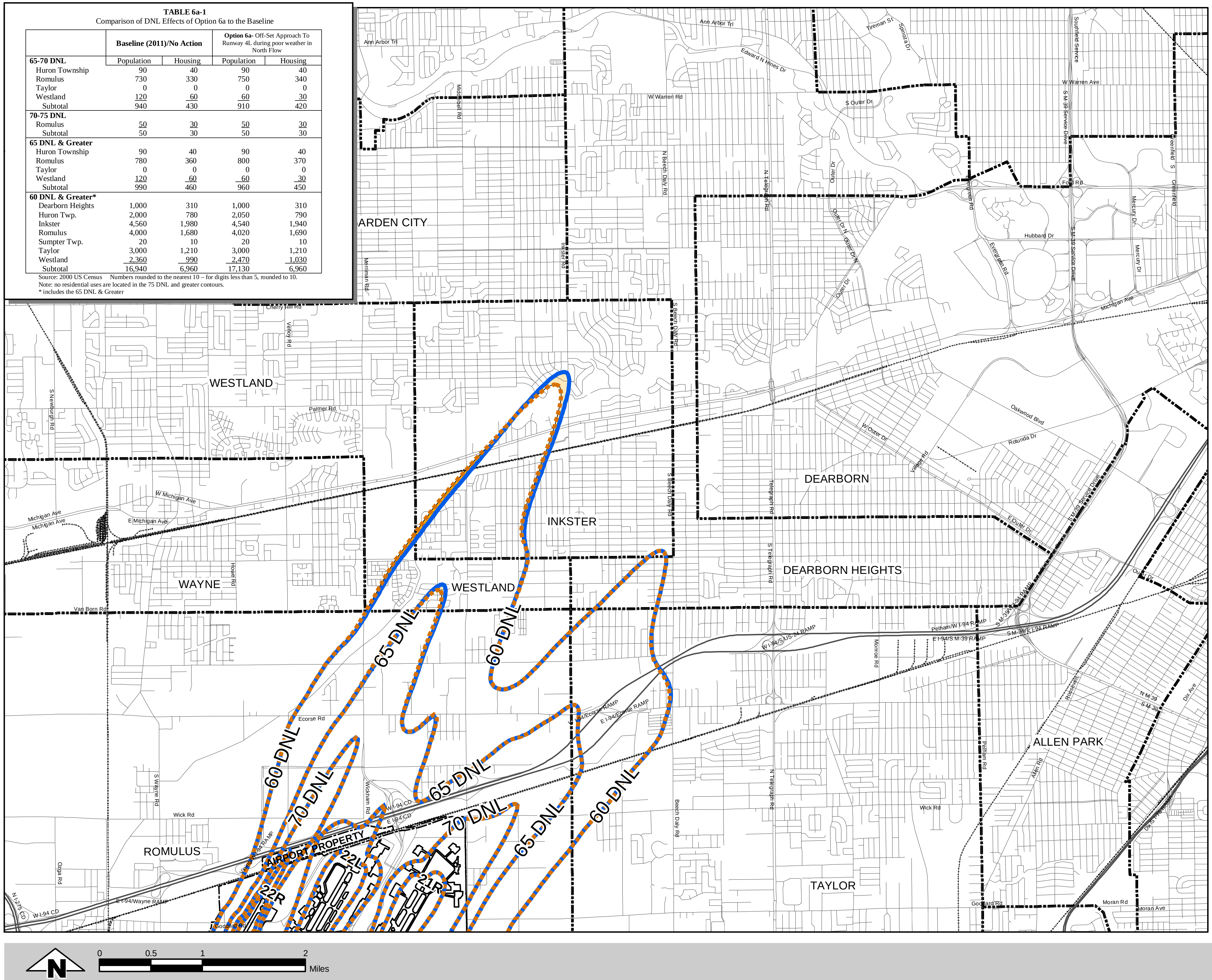
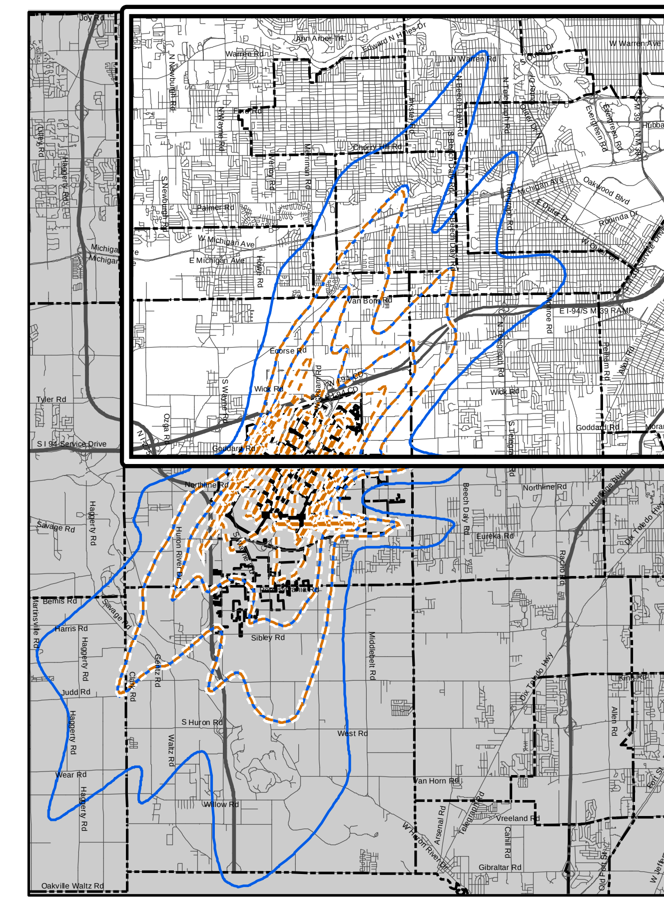
Figure G20 **Option 6a, Offset ILS**

TABLE 6a-1
Comparison of DNL Effects of Option 6a to the Baseline

	Baseline (2011)/No Action		**Option 6a-** Off-Set Approach To Runway 4L during poor weather in North Flow	
65-70 DNL	Population	Housing	Population	Housing
Huron Township	90	40	90	40
Romulus	730	330	750	340
Taylor	0	0	0	0
Westland	120	60	60	30
Subtotal	940	430	910	420
70-75 DNL				
Romulus	50	30	50	30
Subtotal	50	30	50	30
65 DNL & Greater				
Huron Township	90	40	90	40
Romulus	780	360	800	370
Taylor	0	0	0	0
Westland	120	60	60	30
Subtotal	990	460	960	450
60 DNL & Greater*				
Dearborn Heights	1,000	310	1,000	310
Huron Twp.	2,000	780	2,050	790
Inkster	4,560	1,980	4,540	1,940
Romulus	4,000	1,680	4,020	1,690
Sumpter Twp.	20	10	20	10
Taylor	3,000	1,210	3,000	1,210
Westland	2,360	990	2,470	1,030
Subtotal	16,940	6,960	17,130	6,960

Source: 2000 US Census Numbers rounded to the nearest 10 – for digits less than 5, rounded to 10.
Note: no residential uses are located in the 75 DNL and greater contours.
* includes the 65 DNL & Greater





Legend

City Limits Boundary
2011 Base Case
Option 6a, Offset ILS
Option 6a Area newly affected
Option 6a Area no longer affected

Source: US Census, 2000

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Impact on Annual DNL Contour: **Table G14** summarizes the impact on the 65 DNL and greater noise exposure contours from implementation of this option in comparison with the 2011 baseline. As this table notes, this option would reduce overall population and housing exposed to 65 DNL by 40 people/20 houses in comparison to the Baseline. **Figure G21 Full-3** shows the noise exposure contours relative to the No Action/2011 Baseline. All of the changes associated with this option would occur for properties located within the 65-70 DNL contour. Within the 60 DNL contour, the changes would be more pronounced but would result in a slight increase in impacts (an increase of 0.94% in population and 0.29% increase in housing units.

Within the 65 DNL and greater contour, an impact reduction would occur in Westland (50%) relative to the Baseline, but with an increase to Romulus (2.6%). Within the 60 DNL contour, a slight population impact reduction would occur in Inkster (0.4%) with increases to Westland (4.7%), Huron Township (2.5%), Taylor (1%), and Romulus (0.5%).

Because this option would improve airport operational efficiency, FAA has prepared an Environmental Assessment (EA). A Draft EA was released in October 2006, and a public hearing was conducted in November 2006. As no significant adverse noise or other environmental effects were identified with this proposed procedure, it is expected that FAA will issue a Finding of No Significant Impact (FONSI). The noise contours presented for Option 6a were taken from the FAA's Draft EA titled **Environmental Assessment for the Proposed Runway 22R/4L Offset ILS** (Instrument Landing System).

Operational Impacts

The following issues could arise from implementation of the option. Also identified are the agencies that would have a role in assisting in the implementation of this option.

Airport and ATC Operational Considerations (Safety and efficiency issues): FAA has ultimate responsibility for the control of aircraft flight. This option could increase controller work load in that controllers must observe each landing to ensure sufficient aircraft separation is maintained. While overall capacity would not change with the option, the airfield could operate more efficiently during poor weather conditions. Airport staff would work with the FAA to ensure the procedure would be implemented to achieve its intended goal(s).

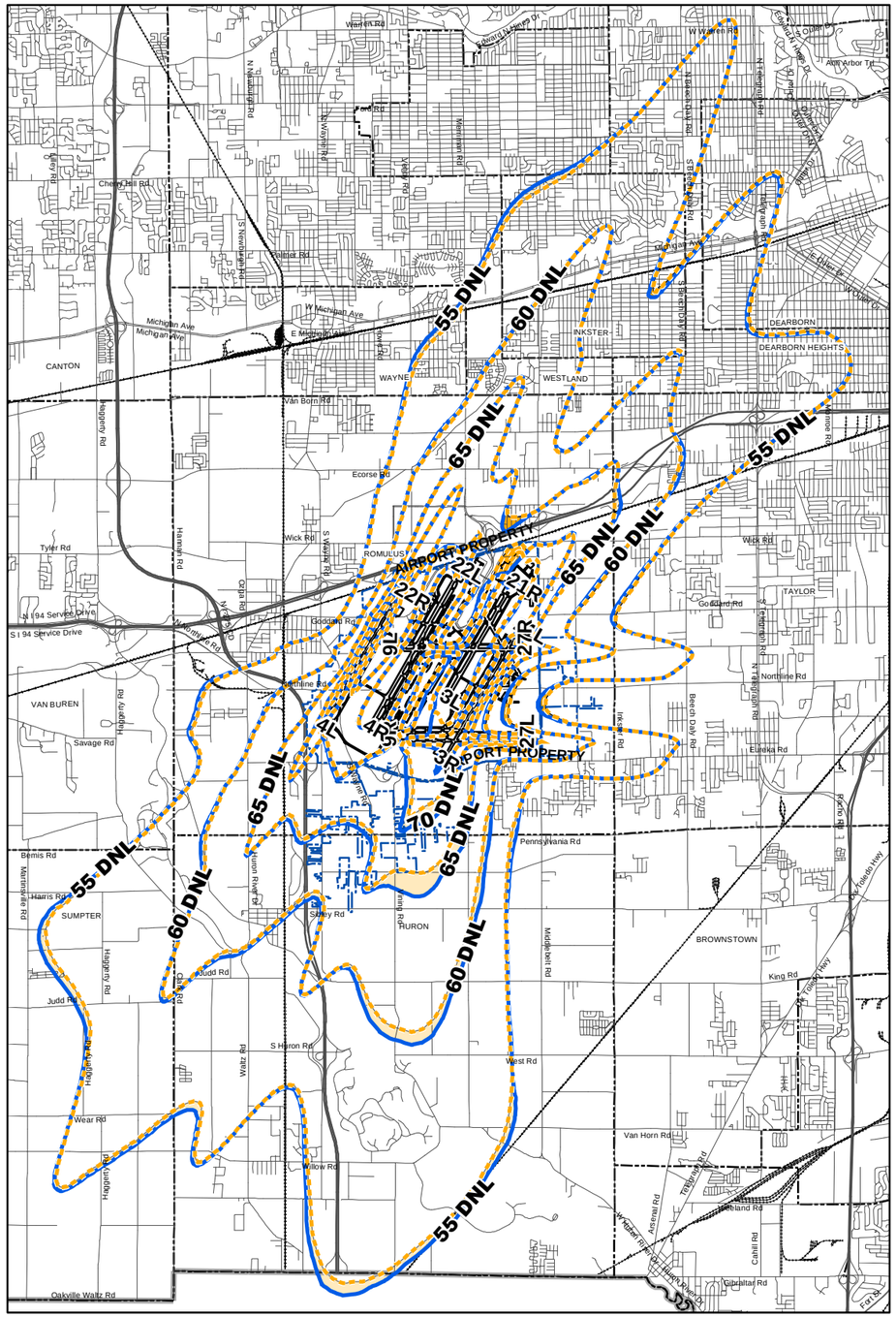
Other Environmental Issues (NEPA, etc): Implementation of noise abatement flight procedures requires compliance with the National Environmental Policy Act (NEPA). As noted, FAA has initiated the NEPA process and is expected to issue a Finding of No Significant Impact in early 2007.

Legal Issues: The option does not appear to have legal issues associated with its implementation.

Conclusions of Consultant Team:

Due to the operational benefits, combined with the noise reduction within the 65 DNL contour, this option is recommended.

Figure G21 **Option 6a, Extend North & South**



0 2,000 4,000 8,000 Feet

TABLE 9
Population Comparison within the DNL Noise Contours- Runway Extensions

	Baseline (2011)/No Action		Option 9a- North and South Extension		Option 9b-North Extension		Option 9c-South Extension	
65-70 DNL	Population	Housing	Population	Housing	Population	Housing	Population	Housing
Huron Township	90	40	70	30	40	20	100	40
Romulus	730	330	670	310	730	340	690	310
Taylor	0	0	10	10	10	10	0	0
Westland	120	60	130	60	100	50	90	40
Subtotal	940	430	880	410	880	420	880	390
70-75 DNL								
Romulus	50	30	50	30	50	30	40	20
Subtotal	50	30	50	30	50	30	40	20
65 DNL & Greater								
Huron Township	90	40	70	30	40	20	100	40
Romulus	780	360	720	340	780	370	730	330
Taylor	0	0	10	10	10	10	0	0
Westland	120	60	130	60	100	50	90	40
Subtotal	990	460	930	440	930	450	920	410
60 DNL & Greater*								
Dearborn Heights	1,000	310	1,010	320	1,110	360	920	280
Huron Twp.	2,040	780	1,820	700	1,790	690	2,040	780
Inkster	4,560	1,980	4,460	1,930	4,470	1,950	4,290	1,870
Romulus	4,000	1,680	3,840	1,620	2,020	1,700	4,000	1,670
Sumpter Twp.	20	10	20	10	10	10	20	10
Taylor	3,000	1,210	3,230	1,270	3,470	1,380	2,070	770
Westland	2,360	990	2,240	940	2,280	950	2,240	930
Subtotal	16,940	6,960	16,620	6,790	15,150	7,040	15,580	6,310

Source: 2000 US Census Numbers rounded to the nearest 10 – for digits less than 5, rounded to 10.
Note: no residential uses are located in the 75 DNL and greater contours.
* includes the 65 DNL & Greater

Legend

- City Limits Boundary
- 2011 Base Case
- 2011 Alternative 9a
- Option 9a, Area newly affected
- Option 9a, Area no longer affected

N

0 1 2 4 Miles

Source: US Census, 2000

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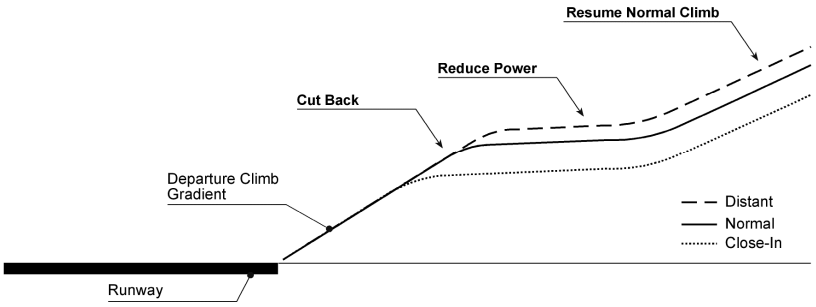
TABLE G14
Comparison of DNL Effects of Option 6a to the Baseline

	Baseline (2011)/No Action		**Option 6a-** Off-Set Approach To Runway 4L during poor weather in North Flow	
65-70 DNL	Population	Housing	Population	Housing
Huron Township	90	40	90	40
Romulus	730	330	750	340
Taylor	0	0	0	0
Westland	120	60	60	30
Subtotal	940	430	910	420
70-75 DNL				
Romulus	50	30	50	30
Subtotal	50	30	50	30
65 DNL & Greater				
Huron Township	90	40	90	40
Romulus	780	360	800	370
Taylor	0	0	0	0
Westland	120	60	60	30
Subtotal	990	460	960	450
60 DNL & Greater*				
Dearborn Heights	1,000	310	1,000	310
Huron Twp.	2,000	780	2,050	790
Inkster	4,560	1,980	4,540	1,940
Romulus	4,000	1,680	4,020	1,690
Sumpter Twp.	20	10	20	10
Taylor	3,000	1,210	3,000	1,210
Westland	2,360	990	2,470	1,030
Subtotal	16,940	6,960	17,130	6,960

Source: 2000 US Census Numbers rounded to the nearest 10 – for digits less than 5, rounded to 10.
Note: no residential uses are located in the 75 DNL and greater contours.
* includes the 65 DNL & Greater

Option 7: Departure Climb Procedures

Discussion: Changes in departure climb procedure (the location relative to the ground where power is applied), can alter aircraft noise exposure, and can increase noise exposure in some areas and decrease it in others. Aircraft that climb quickly deliver a greater noise impact to these areas nearer an airport, while a more gradual climb may increase noise levels further from an airport.



Noise Abatement Procedure Goal: The goal of this option would be to reduce single event noise levels from jet departures over residential land uses by using the appropriate power (thrust) cutback, which would result in the lowest noise levels in the community.

Description of the Option: In response to communities desiring to consider noise reductions close to the airport, and locations wishing to consider reductions further away, the FAA adopted a new Advisory Circular (AC-91-53A **Noise Abatement Departure Procedures**) in 1993 allowing for two new options 1) a close-in procedure, and 2) and further away procedure. These departure profiles have the potential to minimize noise to specific areas by modifying distance and altitude for application of full takeoff power, engine thrust cutback, and re-application of normal climb thrust.

The close-in departure typically reduces noise closer to an airport, but may increase noise farther from an airport (8 to 10 miles away). Conversely, the distant procedure concentrates noise closer to an airport (within 3 to 6 miles), but reduces noise farther away.

Comparable Existing Procedure(s): Radar data obtained for Detroit Metro Airport indicates that aircraft thrust cutback typically occurs at about 1,000 to 1,200 feet above field elevation (AFE). The current departure climb procedure is applicable to most jet aircraft. Takeoff power (full power) is applied until reaching about 1,000 feet above airfield elevation (AFE), at which point the power is cut back to a reduced climb power. Regular climb power is re-applied when reaching an altitude of 3,000 feet AFE.

Modeling Assumptions/New Procedure: At Detroit Metro, the re-application of normal climb thrust would occur in the vicinity of 3 to 6 statute miles from the beginning of takeoff. Locations where normal climb thrust is re-applied may experience an increase in noise above what would be experienced during a typical departure, due to lower aircraft altitude and the re-application of normal climb thrust. To test the noise implications of the possible procedures, single-event sound exposure level (SEL) contours were developed for a noisy aircraft (DC-9). The following describe the various procedures:

Close-In Departure Procedure: Full power is applied until reaching an altitude of 800 feet, and then the thrust is cut back until reaching 3,000 feet, where climb power would be

re-applied. **FigureG22 NE-2** shows the points where a typical DC9 reaches 800 feet above ground, and then 3,000 feet above ground when using the close-in procedure.

Distant Departure Procedure: The "distant" departure procedure is a variant on the current Airport departure - the difference being that the initial full power would remain until aircraft reach an altitude of 1,500 feet above ground before thrust cut back. Similar to the previous procedures, full power would again resume at an altitude of 3,000 feet above ground. **Figure G22 NE-2** also shows the points where a typical DC9 reaches 1,500 feet, and then 3,000 feet above ground when flying this procedure.

Following is a summary of each Noise Abatement Departure Profile scenario:

1. Current Airport Departure Procedure: At present, pilots apply takeoff power until reaching about 1,000 to 1,200 feet above ground, when they cut back power to reduce noise levels on the ground. Regular climb power is re-applied when reaching an altitude of 3,000 feet above ground. With this procedure, no noise change would occur.

2. Close-In Departure Procedure: Using this procedure, aircraft would apply full power until reaching an altitude of 800 feet above ground when they cut back and re-apply regular power at 3,000 feet above ground. With this procedure, noise would be decreased for areas closest to the Airport, but would increase for areas at a distance, when the power is re-applied.

3. Distant Departure Procedure: This procedure is a variant on the current Airport departure - the only difference being that full power would remain until aircraft reach an altitude of 1,500 feet above ground before the cutting back. Regular power would again resume at an altitude of 3,000 feet above ground. A slight increase in noise would be expected to the area closer to the Airport, with a slight reduction in noise at more distant locations.

Analysis of Option:

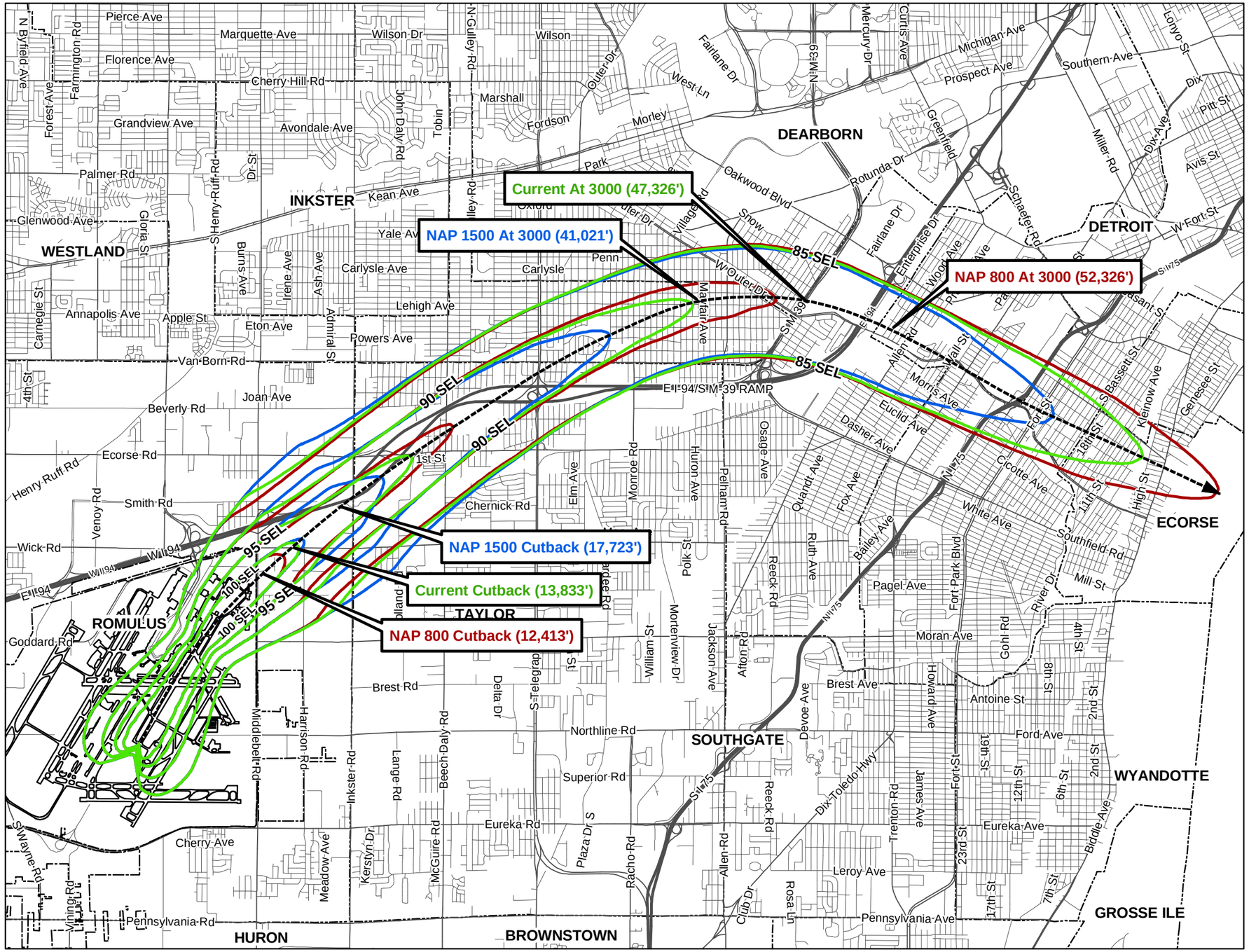
The analysis of this option considered both the noise exposure impacts of the option, as well as the possible operational effects.

Noise Analysis:

As required by FAR Part 150, the study relied upon the use of the average annual DNL noise contours to consider possible noise exposure consequences of the option.

Impact on Annual DNL Contour: Experience with evaluating this option at other airports indicates that it would not have a measurable effect on the annualized DNL noise exposure contours. Therefore, DNL contours were not generated for this option. However, SEL contours were evaluated to identify how the various procedures would affect single event noise. SEL contours represent the noise associated with an individual aircraft departure, and for this test case, we assumed to depart Runway 3L. SEL 80 dBA contours were developed for each procedure, as this SEL has often been identified as a sound level that individuals may be awakened at night.

Figure G22 **Option 7, Single Event Level Noise Contours (DC-9)**
85-100 SEL



Legend

- Standard Departure SEL
- Close In Departure SEL
- Distant Departure SEL

TABLE 7
Total Population Comparison within the 85, 90, 95 and 100 SEL
For Option 7 Departure Procedures

	Close-in Departure Procedure	Distant Departure Procedure	Standard Departure Procedure
85 SEL Population	50,600	38,030	45,300
90 SEL Population	10,590	4,420	7,170
95 SEL Population	390	60	50
100 SEL Population	0	10	10

Source: 2000 US Census

Source: Michigan Department of Natural Resources, SEMCOG, Detroit Metropolitan Wayne County Airport files.

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With the close-in procedure, a noise level reduction would be expected in the areas closer in to the Airport (within 2 miles), where noise levels would decline by 1 to 2 dBA. Those areas more distant from the Airport would experience an equivalent increase in noise.

With the distant procedure, a noise reduction would occur in the areas more distant from the Airport (about 5 miles) where the noise levels would decline by 1 to 2 dBA. The areas close-in to the Airport would experience an increase in noise of 1 to 2 dBA. The population analysis associated with each departure procedure for the 85, 90, 95 and 100 SEL is shown in **Table G15**.

Operational Impacts

The following issues could arise from implementation of the option. Also identified are the agencies that would have a role in assisting in the implementation of this option.

Airport and ATC Operational Considerations (Safety and efficiency issues): FAA has ultimate responsibility for the control of aircraft flight, whereas, the airlines/pilot control the fight procedures, such as departure climb. This option would not be expected to materially change FAA ATC workload. However, with the close-in procedure, aircraft would not climb as fast as they currently do and thus, there could be airspace issues to ensure proper separation of aircraft.

Other Environmental Issues (NEPA, etc): Implementation of noise abatement procedures requires compliance with the National Environmental Policy Act (NEPA). FAA Order 1050.1E **Environmental Impacts: Policies and Procedures** outlines the documentation required based on the types of federal action. This option would likely require preparation of an Environmental Assessment to determine if the impacts would be significant; however based on the analysis prepared for this study, this procedure is not expected to result in a 1.5 DNL change in noise exposure within the 65 DNL and greater noise contour.

Legal Issues: The option does not appear to have legal issues associated with its implementation.

Conclusions of Consultant Team:

The Consultant Team does not recommend implementation of this option for older generation narrow body jets. For the newer generation aircraft it would be recommended.

TABLE G15

Total Population Comparison within the 85, 90, 95 and 100 SEL

For Option 7 Departure Procedures

	Close-in Departure Procedure	Distant Departure Procedure	Standard Departure Procedure
85 SEL Population	50,600	38,030	45,300
90 SEL Population	10,590	4,420	7,170
95 SEL Population	390	60	50
100 SEL Population	0	10	10

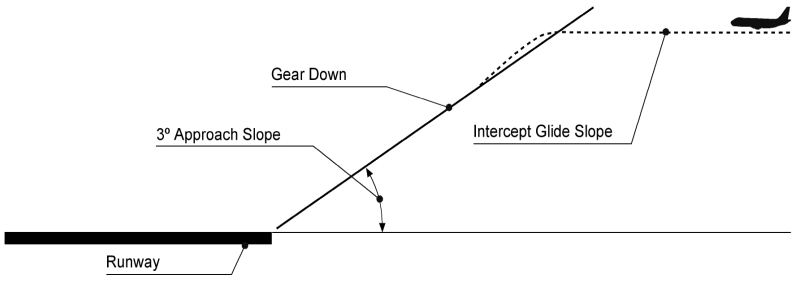
Source: 2000 US Census

Option 8: Continuous Descent Approach

Discussion: Approach noise has been a concern to communities directly north of DTW Airport. While approach noise typically is lower in magnitude then departure noise, approach noise occurs more often north of the Airport then departure noise. Measures to reduce the noise from landing aircraft are more difficult to implement because navigation technology require the aircraft to be on a stable approach path prior to landing so there are few options available to modify the landing procedures. For arrivals, keeping the arriving aircraft at their cruise altitude as long as possible before beginning a continuous descent to the runway at idle or near idle thrust (with no level flight segments) may reduce noise to areas at a distance from the Airport. Procedures with these features are commonly referred to as continuous descent approach (CDA) procedures.

Noise Abatement Procedure Goal: Provide for approach procedures that minimize the need for higher power settings or adjustment of power during the approach, and/or minimize level flight segments on approach. .

Description of the Option: Changes in approach/descent procedures are used to increase the altitude of aircraft over noise-sensitive areas under the arrival path without increasing engine power. Recently, the FAA, NASA, Boeing, MIT and UPS participated to test an approach procedure designed to reduce noise during approaches at Louisville Kentucky. The approach procedure tested is a called a "Continuous Descent Approach". This is contrasted with the common, but not exclusive, stepped down approach (see illustration below). To intercept the 3-degree glide slope, pilots fly under the glide slope or on a level flight segment until the aircraft intercepts the 3-degree radio signal that marks the glide slope. The aircraft may then be slightly above or below the signal beam as the aircraft adjusts to the correct angle. This "stepped down" approach is used at some airports to keep aircraft below an airway occupied by other aircraft. It is also used so that aircraft intercept the glide slope from below rather than above. Both of the reasons for 'stepped down' approaches are based on safety and separation considerations.



The Continuous Descent Approach (CDA) is an approach procedure that allows aircraft to approach and land at an airport with minimal changes in engine power/thrust. During a CDA approach, aircraft are not leveled out and the aircraft gradually descends from high altitude to reach the 3-degree glide slope. Generally, the aircraft should be established on a stable approach no less then 5 miles from the runway. This means that the aircraft flaps and landing gear are set, the aircraft speed is stable, and the aircraft is lined up with the runway. Beyond this distance, i.e., more that 5 miles from the runway, the difference between a stepped down approach and a continuous descent approach can be realized. It is clear that at distances farther than 5 miles from the runway, the continuous descent approach is potentially quieter because the aircraft is higher than for a stepped down approach. These areas are typically outside the 65

DNL noise exposure contour. Preliminary results from the test described earlier showed that the continuous descent approach resulted in 3 to 6 dB reductions in single event noise under the flight path.

At many airports, CDA procedures are used during low activity periods when there are few other aircraft in the sky. The noise measurement data shows that jet arrival single-event noise levels are somewhat quieter during the nighttime than those measured during the daytime (when standard approach procedures are used). This demonstrates that CDA approaches can result in lower noise levels than occur with standard approaches.

Comparable Existing Procedure(s):

Aircraft line up for final approach approximately 8-15 miles away from the Airport and during poor weather as much as 25 miles from the Airport. Example existing jet arrival flight tracks are presented in **Figure G23.** The aircraft descend to the Airport at varying altitudes, and intercept the glide slope along this path. When aircraft are intercepting the glide slope, they are between 2,500 and 5,500 feet above the air field elevation (AFE). Some aircraft approach the Airport at higher altitudes than 5,500 feet AFE in a manner similar to the CDA option. Aircraft altitudes are typically given by ATC to maintain proper aircraft separation on approach. Once aircraft intercept the glide slope, they fly the 3-degree approach to the Airport. Analysis shows that aircraft are on the 3-degree glide slope at least 5 miles away from the Airport. An example of the approach altitude of existing jet aircraft is presented **in Figure G23.**

Modeling Assumptions/New Procedure:

For this analysis two procedures were modeled:

- Typical existing approach procedure at DTW
- CDA approach procedure

This analysis was completed in terms of an assessment of the potential changes in the single-event noise levels (SEL) of aircraft during approach. The A320 aircraft was used as an example aircraft to illustrate the changes in single-event noise levels that might occur. All other commercial jet aircraft would experience a similar change in noise as occurs with this aircraft.

This option could be implemented through a number of potential methods. The three methods are listed below:

- Continuous Descent Approach (CDA) approach procedures are currently under study and evaluation by the FAA. The Airport Authority (Appendix Nine) should follow those evaluation programs to determine the feasibility and use at DTW.

- Work with the FAA and the airlines to develop, implement and use CDA-type approaches during the lower activity periods.

- The single-event noise levels for landing aircraft could also become an element of the Fly Quiet Program (Option 17).

Analysis of New Procedure:

The analysis of this option considered both the noise exposure, as well as the possible operational effects.

Noise Analysis:

The study relied upon the use of single event sound exposure level (SEL) contours to consider possible noise exposure consequences of the option. DNL noise contours were not developed for this alternative as the single event analysis best illustrates the potential benefits and location of benefits of this alternative.

The SEL analysis included noise contours. Two arrival tracks were analyzed to illustrate the potential changes: one from the south flow landing on Runway 22R and one from south flow landings 21L. The SEL contours for an arrival are presented in **Figure G24 NE-4** for both Runways**.** The existing standard approach is presented in red lines on this figure. The CDA approach is presented in blue lines.

Table G16
Total Population Comparison

Noise Exposure	Population within SEL contour	Percent change over Existing
90 SEL		
Existing Approach	50	
CDA Approach	50	0%
85 SEL		
Existing Approach	1,470	
CDA Approach	1,430	1.4%
80 SEL		
Existing Approach	19,200	
CDA Approach	17,820	7.2%

The population comparison table, **Table G16**, shows the number of people that would be affected by the use of CDA. These population numbers are the combined populations within the contours for landings on both Runways 22R and 21L. The analysis shows that the single-event noise levels are predicted to be lower with the CDA approach. This predicted change varies by location, but in general is greatest farther from the Airport (at lower SEL levels). In general, the reduction in single-event noise level is no change within 5 miles from the Airport and from 1 to 5 dBA at the greater distances away.

CDA can reduce both overall arrival noise and reduce the occasional extra loud arrival noise events. CDA procedures can reduce the number of times that extra loud arrival noise events occur when an aircraft is lower or using higher power than normal.

Operational Impacts

The following issues could arise from implementation of the option. Also identified are the agencies that would have a role in assisting in the implementation of this option.

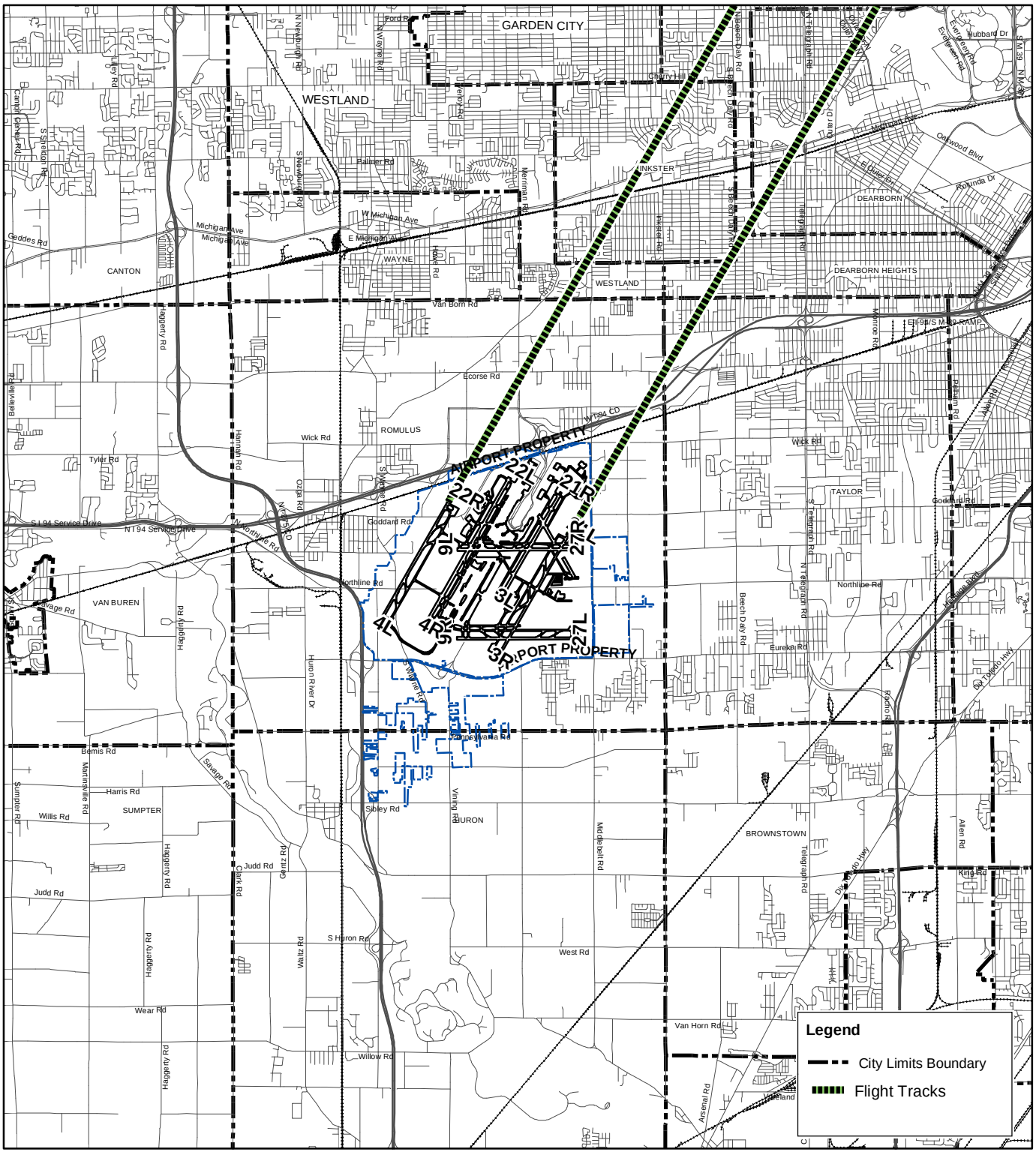


Figure G23 **Option 8, Continuous Descent Approach Flight Tracks**

Source: US Census, 2000

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Airport and ATC Operational Considerations (Safety and efficiency issues): FAA has ultimate responsibility for the control of aircraft flight. This option would not be expected to change FAA

ATC workloads, however, it is more complicated to implement during busy periods and may not be practical during peak times. This is due to aircraft needing increased separation to use CDA for approach and the added complexity of a variety of different aircraft types with different performance characteristics. This procedure is currently being reviewed by FAA at a national level and further review may be required to determine if it can be used at a major/large air carrier airport.

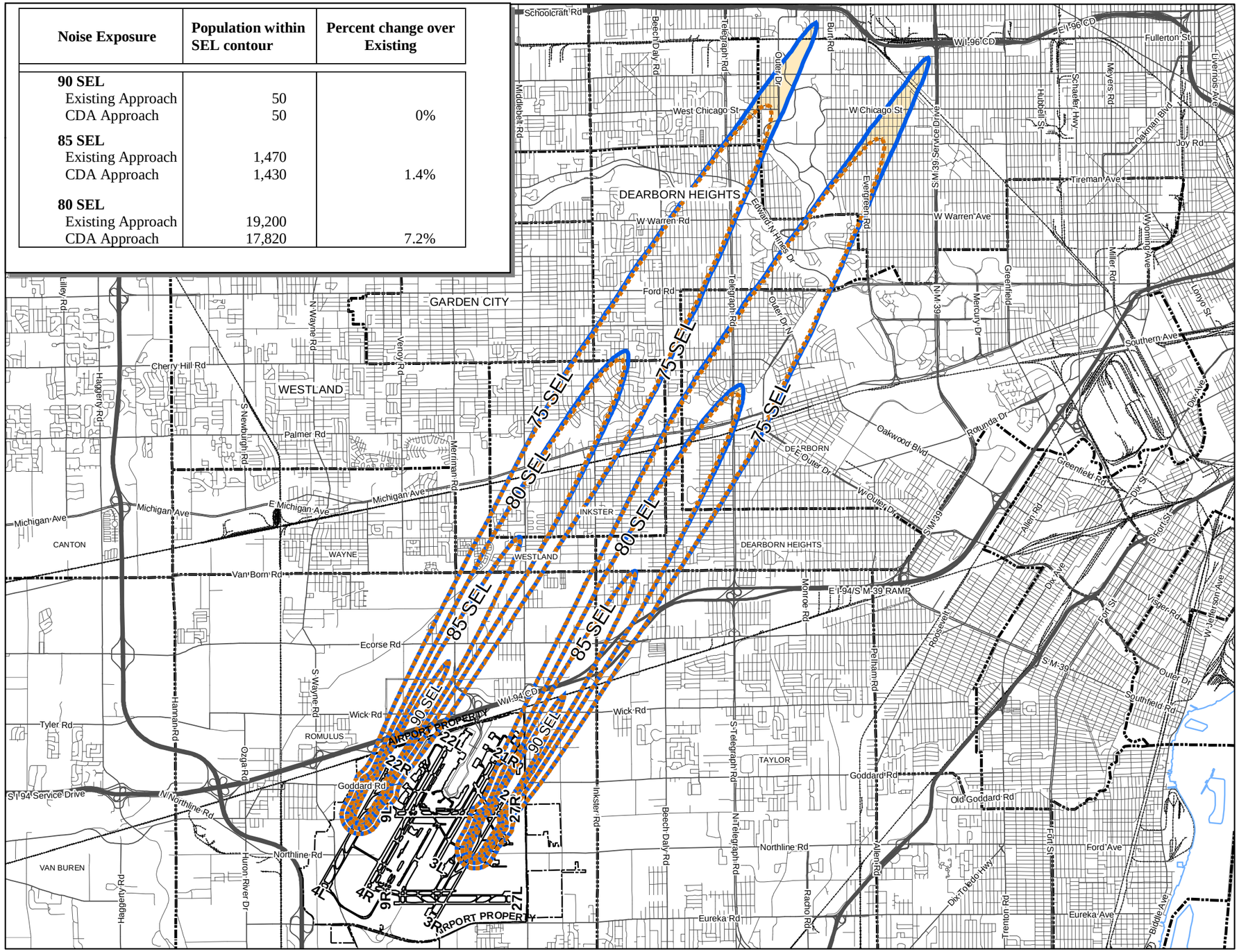
Other Environmental Issues (NEPA, etc): Implementation of noise abatement flight procedures requires compliance with the National Environmental Policy Act (NEPA). FAA Order 1050.1E **Environmental Impacts: Policies and Procedures** outlines the documentation required based on the types of federal action. This option would likely require preparation of an Environmental Assessment to determine if the impacts would be significant; however based on the analysis prepared for this study, increased noise to residential uses within the 65 DNL contour is not expected to generate a 1.5 DNL increase within the 65 DNL, and warrant an Environmental Impact Statement. This option could produce 5 DNL or greater increases in noise within the 55-60 DNL contour, and could produce a 3 DNL or greater change within the 60-65 DNL

Legal Issues: The option does not appear to have legal issues associated with its implementation.

Conclusions of Consultant Team:

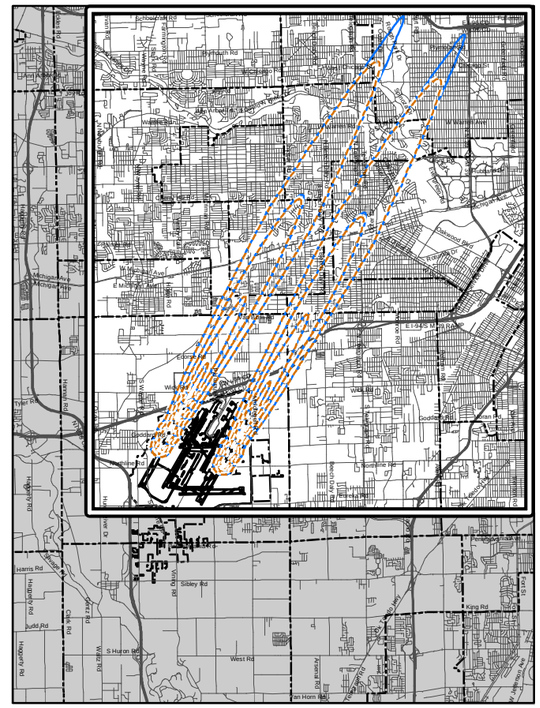
This option would result in a slight noise impact reduction within the 65 DNL contour, as well as lower level contours. At the lower levels, however, the contours result in substantial changes in noise which effectively shift noise from one area/neighborhood/community to another. No recommendation is made at this time, pending discussion among the Study Advisory Committee (Appendix Five, Six & Seven) concerning concentration versus dispersal.

Noise Exposure	Population within SEL contour	Percent change over Existing
90 SEL		
Existing Approach	50	
CDA Approach	50	0%
85 SEL		
Existing Approach	1,470	
CDA Approach	1,430	1.4%
80 SEL		
Existing Approach	19,200	
CDA Approach	17,820	7.2%



Source: US Census, 2000

Figure G24 **Option 8, CDA**



Legend

- City Limits Boundary
- Airbus A320 Without CDA
- Airbus A320 With CDA
- Area no longer affected

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Option 9: Runway Extensions

Discussion:

Runway extensions have the ability to alter aircraft noise exposure by:

- lengthing "shorter" runways so that they can be used by bigger aircraft, thus changing how frequently a runway is used for departures; and,
- placing the departure roll further away from residential areas, enabling aircraft to be higher over residential areas on departure. This is most effective for residences closest to the Airport.

The length of the runways at DTW are:

- Runway 4L/22R – 10,000 feet long.
- Runway 4R/22L – 12,001 feet long.
- Runway 3L/21R – 8,500 feet long.
- Runway 3R/21L – 10,000 feet long.
- Runway 9L/27R – 8,700 feet long.
- Runway 9R/27L – 8,500 feet long.

Figure G25 shows the airfield configuration. The primary runways used for jet departures are Runway 4R/22L and 3L/21R. As Runway 3L/21R is the shorter of the two primary departure runways; consideration was given to extending this runway.

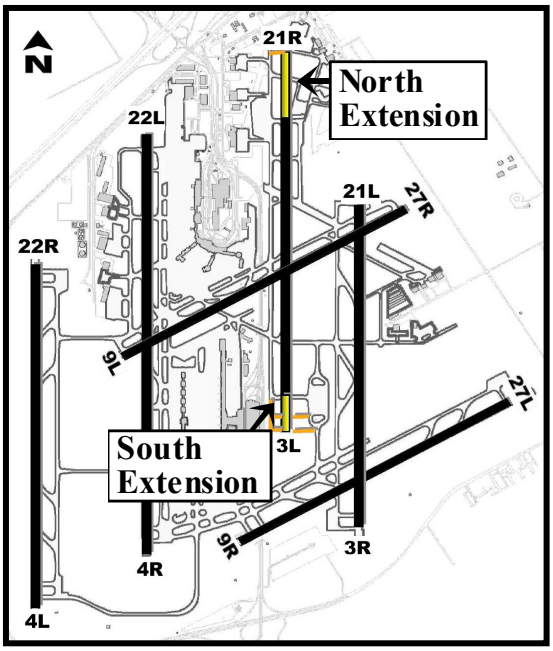
In this case, the extension(s) would be targeted at providing a 12,000 ft runway so that Runway 3L/21R would be virtually the same length as Runway 4R/22L. Extension of 3L/21R would allow larger, widebody aircraft (e.g. B-747) to use either of the two departure runways, spreading the activity, and thus noise, more evenly. Three options for the extension of Runway 3L/21R were evaluated:

- Option 9a – North & South Extension (900 feet to the south and 2,600 feet to the north);
- Option 9b – North Extension (3,500 feet); and
- Option 9c – South Extension (3,500 feet).

Noise Abatement Procedure Goal:

The goal of this option is to reduce the noise levels from jet departures over individual residential land uses by increasing the distance from the start of the departure roll to the point where departing aircraft reach residential land use. The aircraft would achieve higher altitudes, and thus lower noise as a result of the additional flight distance. In addition, if both runways are of equal length, the use of the runways could be equalized.

Option 9a – North & South Extension Runway 3L/21R



Description of the Option:

This option for extending Runway 3L/21R to 12,000 feet includes runway extensions of approximately 900 feet to the south and 2,600 feet to the north, with accompanying parallel taxiways. In terms of available runway length, this option would allow Runway 3L/21R to be used as frequently for departures as Runway 4R/22L.

Comparable Existing Procedure(s):

In general, departures occur on the two inner runways (Runway 3L/21R and Runway 4R/22L) and arrivals land on the two outer runways (Runway 3R/21L and Runway 4L/22R). Thus, Runway 3L/21R currently operates as a primary departure runway with only destination), primarily use Runway 4R/22L due to its greater runway length. Not all wide body operations require the full runway length, thus, Runway 3L/21R is still used by widebody aircraft. Based upon historic radar flight track data, Runway 3L/21R is currently used by departing wide body aircraft 22% of the time while Runway 4R/22L is used 70% of the time. For the other types of departing aircraft, these two runways are used roughly the same. Note that the destinations for widebody aircraft are generally split 50/50 for airports to the east or west of DTW.

Modeling Assumptions/New Procedure(s):

It is assumed that Runway 3L/21R would be used by all aircraft types at the Airport, as runway length would no longer be a limiting factor. By limiting the extension to the south, aircraft taxiing on Taxiways T and J would continue without imposing a mandatory hold position associated with the 3L end of the runway.

The following table presents the base case 2011 and Alternative 9a runway use assumptions for the widebody aircraft. The analysis assumes that the east complex (Runways 3L/21R and 3R/21L) and west complex (Runway 4R/22L and 4L/22R) would be used nearly equally. All other runway use and other assumptions are assumed to be the same with the proposed alternative.

	Departure Use of Runway- Widebody and Heavy Aircraft	
Runway	**Base Case**	**Alternative 9a**
Runway 4L/22R	<1%	<1%
Runway 4R/22L	70%	48%
Runway 3L/21R	22%	44%
Runway 3R/22L	5%	5%
Runway 9L/27R	<1%	<1%
Runway 9R/27L	<1%	<1%

Source: BridgeNet International, January 2007

The analysis assumes that the landing thresholds would be displaced, remaining at their existing locations (See Option 10 concerning displaced thresholds). As a result of the displaced thresholds, arrival aircraft would continue to land at the same ground point as they do with the current runway configuration. Thus, arrival noise would be unaffected by this alternative.

Analysis of Option:

The analysis of this option considered both the noise exposure impacts of the option and the possible operational effects.

Noise Analysis:

As required by FAR Part 150, the study relied upon the use of the average annual DNL noise contours to consider possible noise exposure consequences of the option.

Impact on Annual DNL Contour: **TableG17** shows the DNL noise contour results associated with this option in comparison to the No Action and to the other runway extension options. **Figure G21 Full-3** shows the noise contours for Option 9a. As this table notes, this option would reduce overall population and housing exposed to 65 DNL by 60 people/20 houses in comparison to the Baseline, a 6.1% and 4.3% reduction respectively. Within the 65 DNL, all of the changes associated with this option would occur for properties located within the 65-70 DNL contour. Within the 60 DNL contour, the changes would be less pronounced (a reduction of 2.1% in population and 2.4% in housing affected).

Within the 65 DNL and greater contour, impact reductions would occur in Huron Township (22.2%), and Romulus (7.7%) relative to the Baseline, and an increase to Westland (8.3%). Within the 60 DNL contour, population impact reductions would occur in Huron Township (10.8%), Westland (5.1%), Romulus (4%), and Inkster (2.2%), with increases in Taylor (7.7%) and Dearborn Heights (1%). While this option would increase the altitude of departures relative to the Baseline, the changes in runway use would result in increased impacts in some communities and reductions in others.

FAA guidance for implementing the National Environmental Policy Act (NEPA) states that a 1.5 DNL increase in noise to noise sensitive uses (i.e., residences) within the 65 DNL due to federal action is considered a significant impact. A review of the noise exposure contour indicates that a 1.5 DNL increase in noise due to Option 9a would not be expected. Therefore, the FAA is likely to require the completion of an Environmental Assessment (EA) that may be eligible for a Finding of No Significant Impact.

Operational Impacts:

The south extension (900 feet) would be designed to allow aircraft to depart to the north or south on Runway 3L/21R without restricting aircraft movement on Taxiways J or T. The north extension portion (2,600 feet) of the alternative would not be anticipated to result in any additional restrictions to aircraft movements on the ground.

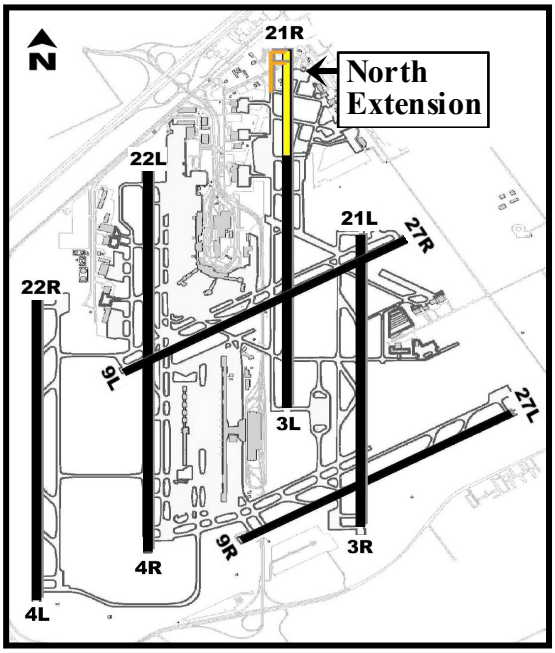
Departure activity would be impacted in that all aircraft types could use the runway, as opposed to the current restrictions on aircraft use due to the limited runway length. Although the FAA has ultimate responsibility for the control of aircraft flight, this alternative could potentially decrease FAA ATC workloads and overall aircraft delay by eliminating restrictions and the imbalance in departure demand experienced with the existing runway length.

The option does not appear to have any legal issues associated with its implementation. As noted earlier, this option is not expected to create a 1.5 DNL increase in aircraft noise and thus, compliance with NEPA could be expected with an Environmental Assessment.

Conclusions of Consultant Team:

Continue to study the feasibility of implementing a runway extension.

Option 9b – North Extension Runway 3L/21R



Description of the Option:

This option for extending Runway 3L/21R to 12,000 feet includes a 3,500 foot runway extension to the north with accompanying parallel taxiways.

Comparable Existing Procedure(s):

In general, departures occur on the two inner runways (Runway 3L/21R and Runway 4R/22L) and arrivals land on the two outer runways (Runway 3R/21L and Runway 4L/22R). Thus, Runway 3L/21R currently operates as a primary departure runway with only occasional arrival activity. Long-haul widebody departures (regardless of their east or west departure destination), have use Runway 4R/22L due to its greater runway length. Not all wide body operations require the full runway length, thus, Runway 3L/21R is still used by widebody aircraft. Based upon historic radar flight track data, Runway 3L/21R is currently used by departing wide body aircraft 22% of the time while Runway 4R/22L is used 70% of the time. For the other types of departing aircraft, these two runways are used roughly the same.

Modeling Assumptions/New Procedure:

In modeling the contours, it was assumed that Runway 3L/21R would be used by all aircraft types at the Airport, as runway length would no longer be a limiting factor. By limiting the extension to the north, aircraft taxiing on Taxiways T and J would continue without imposing a mandatory hold position associated with the 3L end of the runway.

The following table presents the base case 2011 and Alternative 9b runway use assumptions for the widebody aircraft. The analysis assumes that the east complex (Runways 3L/21R and 3R/21L) and west complex (Runway 4R/22L and 4L/22R) would be used nearly equal. All other runway use and other assumptions remain unchanged under the proposed alternative.

	Departure Use of Runway- Widebody and Heavy Aircraft	
Runway	**Base Case**	**Alternative 9b**
Runway 4L/22R	<1%	<1%
Runway 4R/22L	70%	48%
Runway 3L/21R	22%	44%
Runway 3R/22L	5%	5%
Runway 9L/27R	<1%	<1%
Runway 9R/27L	<1%	<1%

Source: BridgeNet International, January 2007

The analysis assumes that the landing thresholds would be displaced, remaining at their existing locations (See Option 10 concerning displaced thresholds). As a result of the displaced thresholds, arrival aircraft

would continue to land at the same ground point as they do with the current runway configuration. Thus, arrival noise would be unaffected by this alternative.

Analysis of Option:

The analysis of this option considered both the noise exposure impacts of the option, as well as the possible operational effects.

Noise Analysis:

As required by FAR Part 150, the study relied upon the use of the average annual DNL noise contours to consider possible noise exposure consequences of the option.

Impact on Annual DNL Contour: **Table G17** shows the DNL noise contour results associated with this option in comparison to the No Action and to the other runway extension options. **Figure G25 Full-4** shows the noise contours for Option 9b. As this table notes, this option would reduce overall population and housing exposed to 65 DNL by 60 people/20 houses in comparison to the Baseline, a 6.1% and 2.2% reduction respectively. Within the 65 DNL, all of the changes associated with this option would occur for properties located within the 65-70 DNL contour. Within the 60 DNL contour, the changes would be more pronounced (a reduction of 10.8% in population and 1.1% in housing affected).

Within the 65 DNL and greater contour, impact reductions would occur in Huron Township (55.6%) and Westland (16.7%) relative to the Baseline. Within the 60 DNL contour, population impact reductions would occur in Sumpter Township (50%), Romulus (49.5%), Huron Township (12.3%), Westland (3.4%), and Inkster (2%) with increases in Dearborn Heights (11%) and Taylor (15.7%). While this option would increase the altitude of departures relative to the Baseline, the changes in runway use would result in increased impacts in to some communities and reductions in others.

FAA guidance for implementing the National Environmental Policy Act (NEPA) states that a 1.5 DNL increase in noise to noise sensitive uses (i.e., residences) within the 65 DNL due to federal action is considered a significant impact. A review of the noise exposure contour indicates that a 1.5 DNL increase in noise due to Option 9b would not be expected. Therefore, the FAA is likely to require completion of an Environmental Assessment (EA) that may be eligible for a Finding of No Significant Impact.

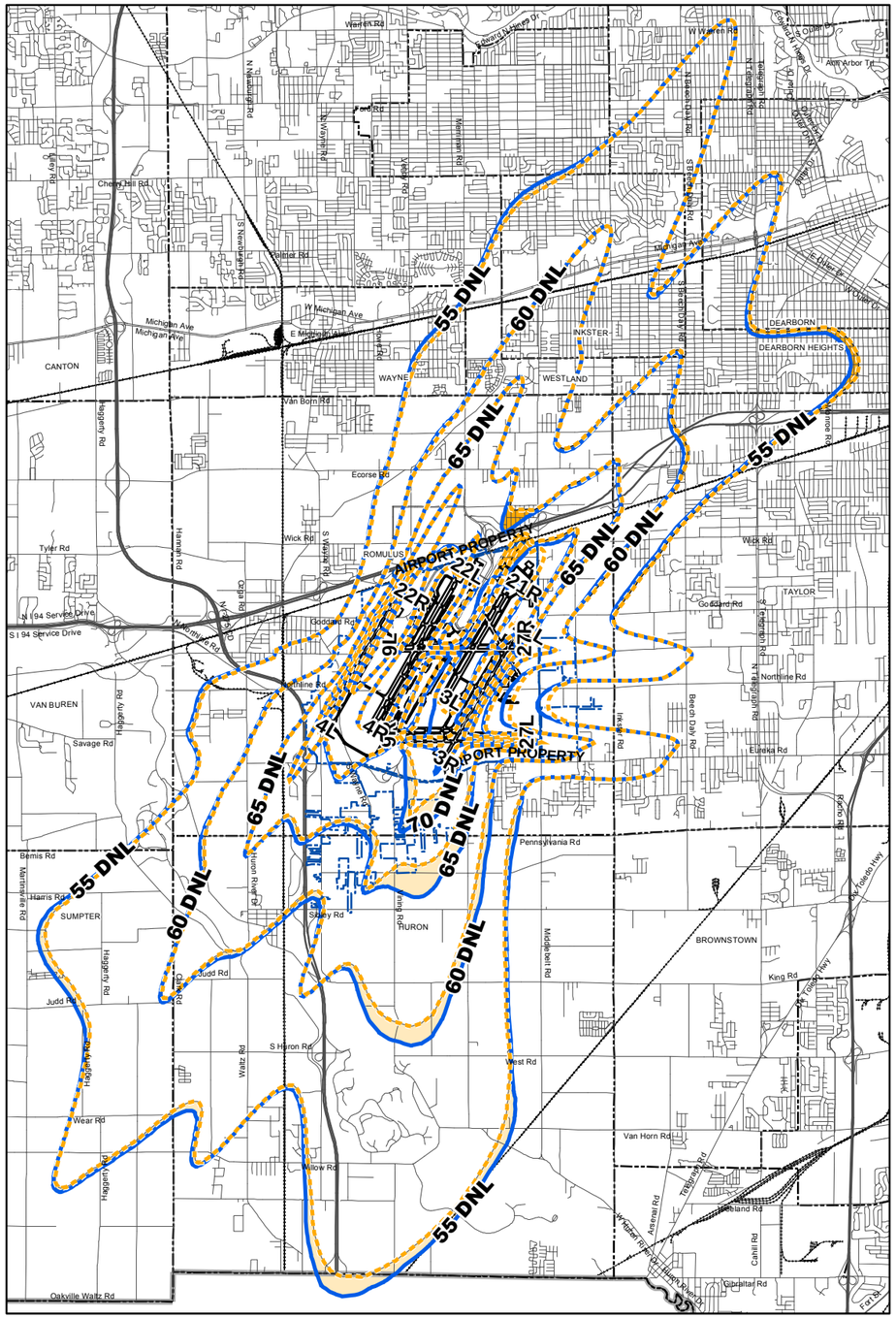
Operational Impacts:

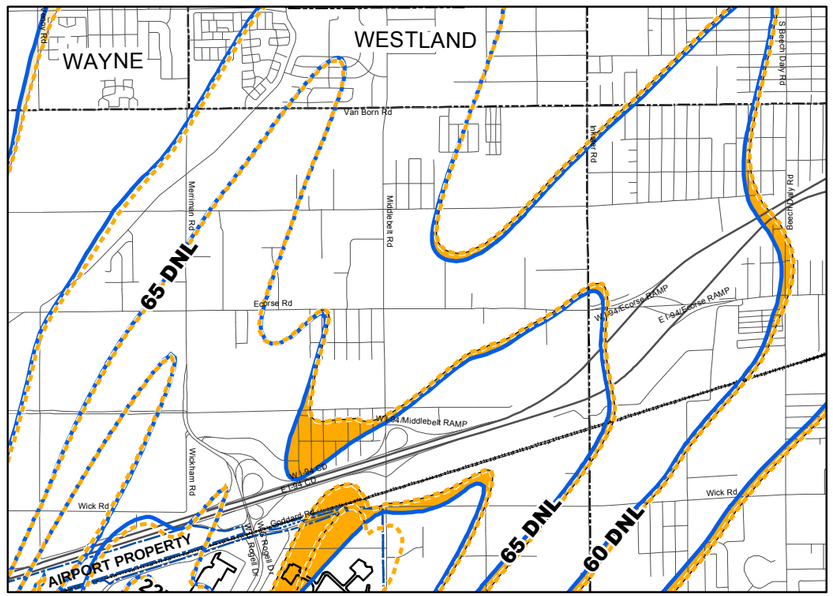
The north extension of 3,500 feet would be designed to allow aircraft to depart to the north or south on Runway 3L/21R without restricting aircraft movement on Taxiways J or T. The north extension is not anticipated to result in any additional restrictions to aircraft movements on the ground.

Departure activity would be impacted in that all aircraft types could use the runway, as opposed to the current restrictions on aircraft use due to the limited runway length. Although the FAA has ultimate responsibility for the control of aircraft flight, this alternative could potentially decrease FAA ATC workloads and overall aircraft delay, by eliminating restrictions and the imbalance in departure demand experienced with the existing runway length.

The option does not appear to have any legal issues associated with its implementation. As noted earlier, this option is not expected to create a 1.5 DNL increase in aircraft noise and thus, compliance with NEPA could be expected with an Environmental Assessment.

Figure G25 **Option 9b, Extend North**





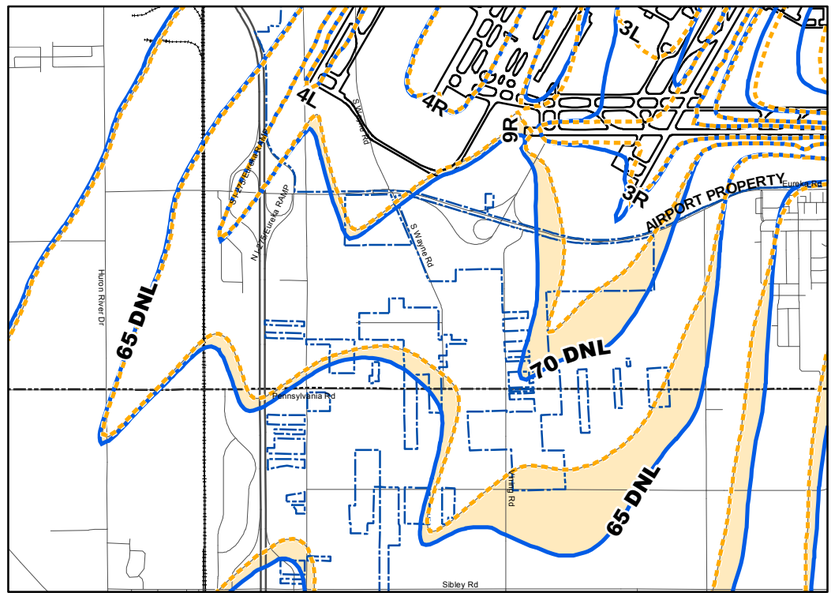


TABLE 9
Population Comparison within the DNL Noise Contours- Runway Extensions

	Baseline (2011)/No Action		Option 9a- North and South Extension		Option 9b-North Extension		Option 9c-South Extension	
65-70 DNL	Population	Housing	Population	Housing	Population	Housing	Population	Housing
Huron Township	90	40	70	30	40	20	100	40
Romulus	730	330	670	310	730	340	690	310
Taylor	0	0	10	10	10	10	0	0
Westland	120	60	130	60	100	50	90	40
Subtotal	940	430	880	410	880	420	880	390
70-75 DNL								
Romulus	50	30	50	30	50	30	40	20
Subtotal	50	30	50	30	50	30	40	20
65 DNL & Greater								
Huron Township	90	40	70	30	40	20	100	40
Romulus	780	360	720	340	780	370	730	330
Taylor	0	0	10	10	10	10	0	0
Westland	120	60	130	60	100	50	90	40
Subtotal	990	460	930	440	930	450	920	410
60 DNL & Greater*								
Dearborn Heights	1,000	310	1,010	320	1,110	360	920	280
Huron Twp.	2,040	780	1,820	700	1,790	690	2,040	780
Inkster	4,560	1,980	4,460	1,930	4,470	1,950	4,290	1,870
Romulus	4,000	1,680	3,840	1,620	2,020	1,700	4,000	1,670
Sumpter Twp.	20	10	20	10	10	10	20	10
Taylor	3,000	1,210	3,230	1,270	3,470	1,380	2,070	770
Westland	2,360	990	2,240	940	2,280	950	2,240	930
Subtotal	16,940	6,960	16,620	6,790	15,150	7,040	15,580	6,310

Source: 2000 US Census Numbers rounded to the nearest 10 – for digits less than 5, rounded to 10.
Note: no residential uses are located in the 75 DNL and greater contours.
* includes the 65 DNL & Greater

Legend

- City Limits Boundary
- 2011 Base Case
- 2011 Alternative 9b
- Option 9b, Area newly affected
- Option 9b, Area no longer affected

N

0 1 2 4 Miles

Source: US Census, 2000

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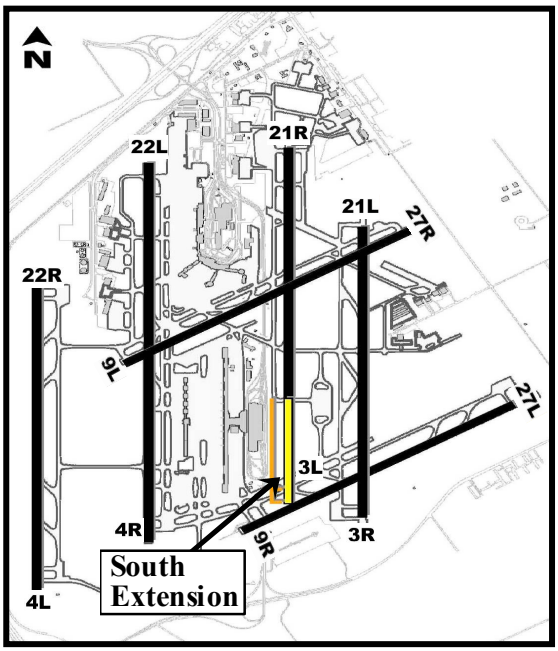
Conclusions of Consultant Team:

Continue to study the feasibility of implementing a runway extension.

Option 9c – South Extension of Runway 3L/21R



Description of the Option:

This option for extending Runway 3L/21R to 12,000 feet includes a 3,500 foot runway extension to the south with accompanying parallel Taxiway M.

Comparable Existing Procedure(s):

In general, departures occur on the two inner runways (Runway 3L/21R and Runway 4R/22L) and arrivals occur on the two outer runways (Runway 3R/21L and Runway 4L/22R). Thus, Runway 3L/21R currently operates as a primary departure runway with only occasional arrival activity. Long-haul widebody departures (regardless of their east or west departure destination), have used Runway 4R/22L due to its greater runway length. Not all wide body operations require the full runway length, thus, Runway 3L/21R is still used by widebody aircraft. Based upon historic radar flight track data, Runway 3L/21R is currently used by departing wide body aircraft 22% of the time while Runway 4R/22L is used 70% of the time. For the other types of departing aircraft, these two runways are used for roughly the same amount of time.

Modeling Assumptions/New Procedure:

It is assumed that Runway 3L/21R would be used by all aircraft types at the Airport, as runway length would no longer be a reason to favor the longer runway. By limiting the extension to the south, the extended runway would intersect with Taxiways T and J which serve the parallel runways. This crossing of the taxiways/extended runway, would likely require the establishment of a hold position so that ground control would have a location to hold aircraft from taxiing across the intersection when landing and takeoffs are occurring on the extended runway.

The following table presents the base case 2011 and Alternative 9 runway use assumptions for the wide body aircraft. The analysis assumes that the east complex (Runways 3L/21R and 3R/21L) and west complex (Runway 4R/22L and 4L/22R) would be used nearly equal. All other runway use and other assumptions are assumed to be the same with the proposed alternative.

	Departure Use of Runway- Widebody and Heavy Aircraft	
Runway	**Base Case**	**Alternative 9c**
Runway 4L/22R	<1%	<1%
Runway 4R/22L	70%	48%
Runway 3L/21R	22%	44%
Runway 3R/22L	5%	5%
Runway 9L/27R	<1%	<1%
Runway 9R/27L	<1%	<1%

Source: BridgeNet International, January 2007

The analysis assumes that arrival aircraft would continue to land at the same ground point as they do with the current runway configuration. Thus, arrival noise would be unaffected by this alternative.

This runway would be extended in an area currently served by taxiways that facilitate movement of arrivals from runway 3R/21L and 9R/27L taxiing to the terminal area. The extension of the runway to the south would require aircraft landing on these runways to "cross" the extended runway. Due to the introduction of additional runway crossings associated with the extended runway to the south, aircraft would be unable to use Taxiways T and J in a free-flow manner while aircraft are operating on Runway 3L/21R.

Analysis of Option:

The analysis of this option considered both the noise exposure impacts of the option, as well as the possible operational effects.

Noise Analysis:

As required by FAR Part 150, the study relied upon the use of the average annual DNL noise contours to consider possible noise exposure consequences of the option.

Impact on Annual DNL Contour: **Table G17** shows the DNL noise contour results associated with this option in comparison to the No Action and to the other runway extension options. **Figure G26 Full-5** shows the Option 9c noise contours. As this table notes, this option would reduce overall population and housing exposed to 65 DNL by 70 people/50 houses in comparison to the Baseline, a 7.1% and 10.9% reduction respectively. Within the 65 DNL, changes would occur in the 70-75 DNL as well as the 65-70 DNL contours. Within the 60 DNL contour, the changes would be slightly more pronounced (a reduction of 8.2% in population and 9.3% in housing affected).

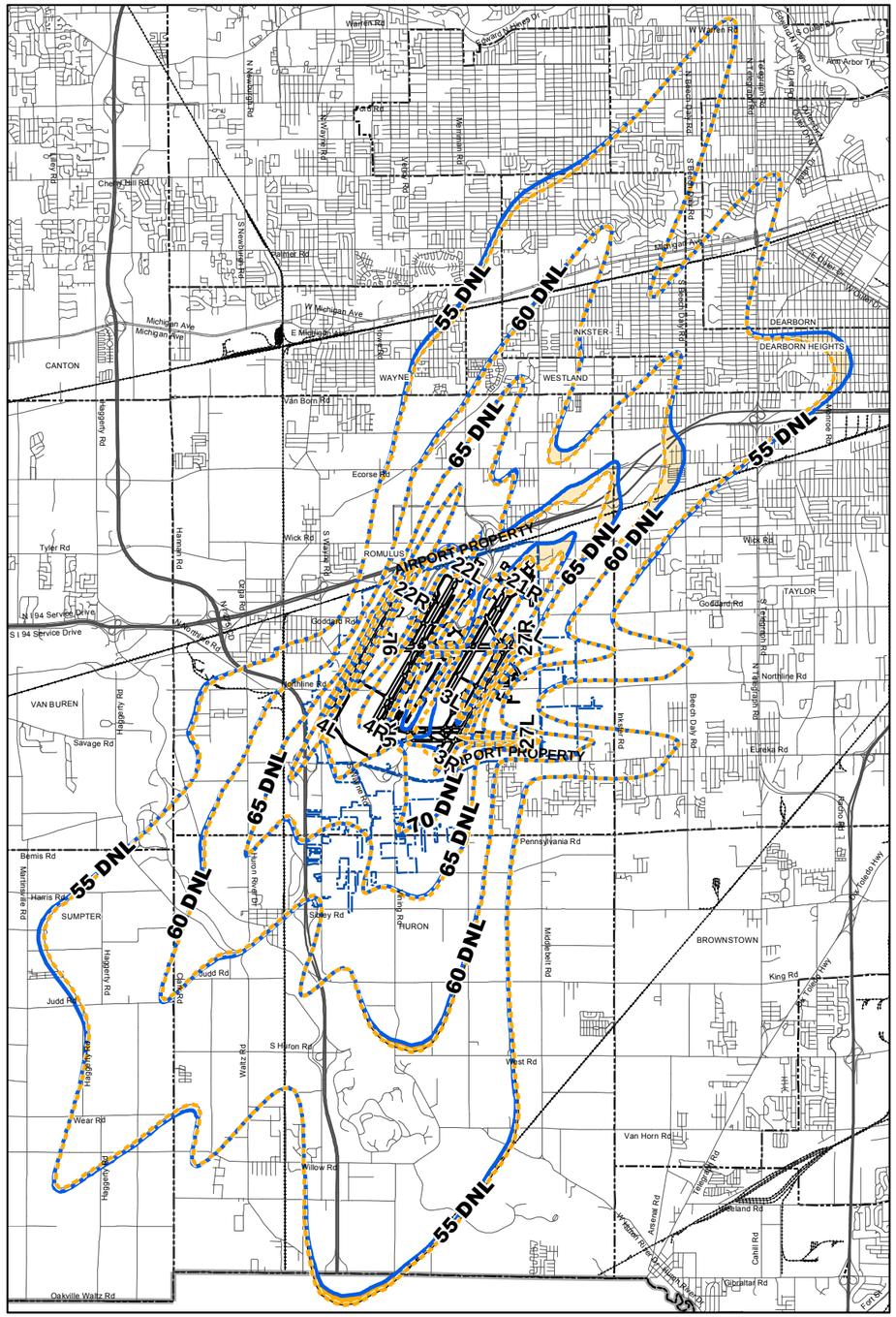
Within the 70 DNL contour, a reduction in impact would occur to Romulus (20% or a reduction of 10 people). Within the 65 DNL and greater contour, population impact reductions would occur in Westland (25%) and Romulus (6.4%) relative to the Baseline, with an increase in Huron Township (11.1%). Within the 60 DNL contour, population impact reductions would occur in Taylor (31%), Dearborn Heights (8%), Inkster (5.9%), and Westland (5.1%). While this option would increase the altitude of departures relative to the Baseline, the changes in runway use would result in increased impacts in to some communities and reductions in others.

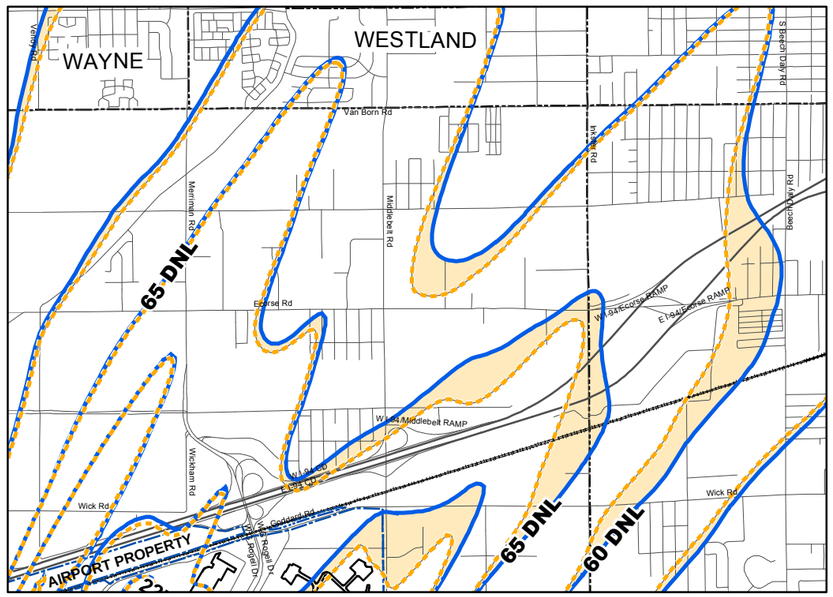
FAA guidance for implementing the National Environmental Policy Act (NEPA) states that a 1.5 DNL increase in noise to noise sensitive uses (i.e., residences) within the 65 DNL due to federal action is considered a significant impact. A review of the noise exposure contour indicates that a 1.5 DNL increase in noise due to Option 9c would not be expected. Therefore, the FAA is likely to require the completion of an Environmental Assessment (EA) that may be eligible for a Finding of No Significant Impact.

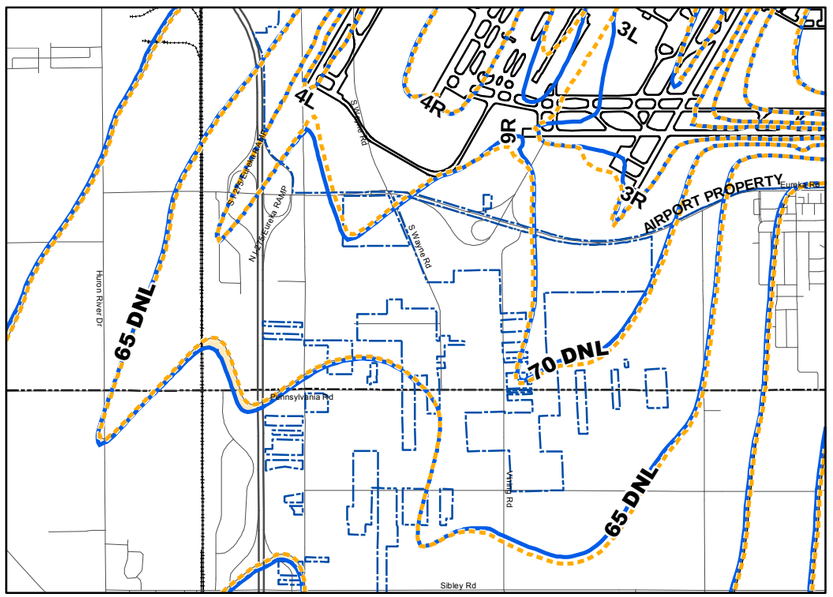
Operational Impacts:

The extension of the runway to the south would require aircraft to queue in a different location and because of its location, could result in an increase of air traffic controller workload. Additional restrictions to aircraft movements on the ground would occur because of the departure queue. However, departure flexibility would be improved in that all aircraft types would be enabled to use the runway, as opposed to the current restrictions on use due to the limited runway length.

Figure G26 **Option 9c, Extend South**







0 2,000 4,000 8,000 Feet

0 1 2 4 Miles

Source: US Census, 2000

TABLE 9
Population Comparison within the DNL Noise Contours- Runway Extensions

	Baseline (2011)/No Action		Option 9a- North and South Extension		Option 9b-North Extension		Option 9c-South Extension	
65-70 DNL	Population	Housing	Population	Housing	Population	Housing	Population	Housing
Huron Township	90	40	70	30	40	20	100	40
Romulus	730	330	670	310	730	340	690	310
Taylor	0	0	10	10	10	10	0	0
Westland	120	60	130	60	100	50	90	40
Subtotal	940	430	880	410	880	420	880	390
70-75 DNL								
Romulus	50	30	50	30	50	30	40	20
Subtotal	50	30	50	30	50	30	40	20
65 DNL & Greater								
Huron Township	90	40	70	30	40	20	100	40
Romulus	780	360	720	340	780	370	730	330
Taylor	0	0	10	10	10	10	0	0
Westland	120	60	130	60	100	50	90	40
Subtotal	990	460	930	440	930	450	920	410
60 DNL & Greater*								
Dearborn Heights	1,000	310	1,010	320	1,110	360	920	280
Huron Twp.	2,040	780	1,820	700	1,790	690	2,040	780
Inkster	4,560	1,980	4,460	1,930	4,470	1,950	4,290	1,870
Romulus	4,000	1,680	3,840	1,620	2,020	1,700	4,000	1,670
Sumpter Twp.	20	10	20	10	10	10	20	10
Taylor	3,000	1,210	3,230	1,270	3,470	1,380	2,070	770
Westland	2,360	990	2,240	940	2,280	950	2,240	930
Subtotal	16,940	6,960	16,620	6,790	15,150	7,040	15,580	6,310

Source: 2000 US Census Numbers rounded to the nearest 10 – for digits less than 5, rounded to 10.
Note: no residential uses are located in the 75 DNL and greater contours.
* includes the 65 DNL & Greater

Legend

- City Limits Boundary
- 2011 Base Case
- 2011 Alternative 9c
- Option 9c, Area newly affected
- Option 9c, Area no longer affected

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The option does not appear to have any legal issues associated with its implementation. As noted earlier, this option is not expected to create a 1.5 DNL increase in aircraft noise and thus, compliance with NEPA could be expected with an Environmental Assessment.

Conclusions of Consultant Team:

Continue to study the feasibility of implementing a runway extension.

TABLE G17

Population Comparison within the DNL Noise Contours- Runway Extensions

	Baseline (2011)/No Action		**Option 9a- North and South Extension**		**Option 9b-North Extension**		**Option 9c-South Extension**	
65-70 DNL	Population	Housing	Population	Housing	Population	Housing	Population	Housing
Huron Township	90	40	70	30	40	20	100	40
Romulus	730	330	670	310	730	340	690	310
Taylor	0	0	10	10	10	10	0	0
Westland	120	60	130	60	100	50	90	40
Subtotal	940	430	880	410	880	420	880	390
70-75 DNL								
Romulus	50	30	50	30	50	30	40	20
Subtotal	50	30	50	30	50	30	40	20
65 DNL & Greater								
Huron Township	90	40	70	30	40	20	100	40
Romulus	780	360	720	340	780	370	730	330
Taylor	0	0	10	10	10	10	0	0
Westland	120	60	130	60	100	50	90	40
Subtotal	990	460	930	440	930	450	920	410
60 DNL & Greater*								
Dearborn Heights	1,000	310	1,010	320	1,110	360	920	280
Huron Twp.	2,040	780	1,820	700	1,790	690	2,040	780
Inkster	4,560	1,980	4,460	1,930	4,470	1,950	4,290	1,870
Romulus	4,000	1,680	3,840	1,620	2,020	1,700	4,000	1,670
Sumpter Twp.	20	10	20	10	10	10	20	10
Taylor	3,000	1,210	3,230	1,270	3,470	1,380	2,070	770
Westland	2,360	990	2,240	940	2,280	950	2,240	930
Subtotal	16,940	6,960	16,620	6,790	15,150	7,040	15,580	6,310

Source: 2000 US Census Numbers rounded to the nearest 10 – for digits less than 5, rounded to 10.

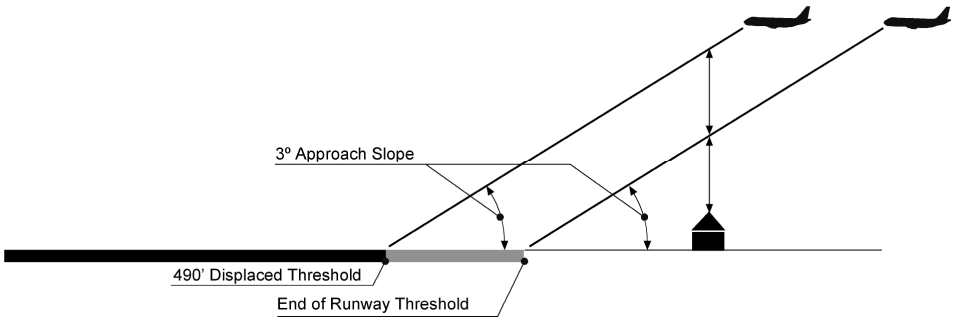
Note: no residential uses are located in the 75 DNL and greater contours.

- includes the 65 DNL & Greater

Option 10: Displaced Landing Thresholds

Discussion:

The runway threshold is the marking on the runway that identifies the end of the runway available for landing or departure. A displaced threshold occurs when the runway marking is not at the physical end of the runway, but rather moved down the runway. Most displaced thresholds are in place to enable landing aircraft to clear tall structures or obstructions. Because the landing threshold is farther down the runway than the actual runway end, aircraft on approach must maintain a higher altitude to reach the extended touchdown point than would otherwise be necessary.



As this option is focused on increasing the altitude of arriving aircraft, its application was considered relative to arrival runways (3R/21L and 4L/22R).

Noise Abatement Procedure Goal:

The goal of this option would be to reduce noise levels from arrivals by increasing the altitude of arriving aircraft over noise sensitive areas. Displacing a landing threshold would slightly increase the altitude of the landing aircraft above residential areas immediately off the ends of the runway, as follows:

- For every 1,000 feet that the threshold is displaced, the aircraft would be about 50 feet higher on approach;
- A 50 foot increase in altitude on approach would reduce noise from each aircraft by about 1 dBA; and
- To achieve a sound level reduction that is perceptible to the human ear, a sound level reduction of 3 dBA or more would be required.

Description of the Option:

The average aircraft uses approximately 6,000 feet or less in runway length to safely land during good weather conditions. During poor weather conditions (including wet pavement), additional runway length may be required to stop; heavier aircraft require longer runways to stop. By displacing the threshold, the useable runway length is reduced.

Displaced threshold alternatives that were considered to reduce noise at DTW include:

1. To achieve a perceptible noise level reduction would require a displacement of 3,000 feet or more. Thus, Runway 4L/22R and 3R/21L (presently 10,000 feet in length) would be shortened to 7,000 feet. A reduction in runway length of 3,000 feet would adversely affect the operating capability of the runways at DTW. Thus, this sub-option was not considered further.
2. Alternatives that include displaced thresholds as well as runway extensions (See Options 9) would enable greater departure altitudes but not reduce arrival altitudes over noise sensitive areas.
3. While a displacement less than 3,000 feet would not provide an appreciable single event noise reduction benefit, some cumulative noise benefits could occur. Option 10 considered a 1,000 foot displaced threshold for Runway 22R and 21L.

Comparable Existing Procedure(s):

Current procedures have landing thresholds at runway ends with the maximum runway length available for arriving aircraft on all runways at DTW.

Modeling Assumptions/New Procedure:

The analysis assumed that the primary arrival runways from the north (Runway 22R and Runway 21L) are displaced 1,000 feet to the south. Displaced thresholds were not evaluated for arrivals from the south, due to the dominance of departure noise south of the Airport.

Analysis of Option:

The analysis of this option considered both the noise exposure impacts of the option, as well as the possible operational effects.

Noise Analysis:

As required by FAR Part 150, the study relied upon the use of the average annual DNL noise contours to consider possible noise exposure consequences of the option.

Impact on Annual DNL Contour: **Table G18** shows the DNL noise contour results associated with this option in comparison to the No Action and to the other runway extension options. **Figure G27 NW-5** shows the noise contours associated with displaced thresholds on Runway 22R and 21L (Option 10). As this table notes, this option would reduce overall population and housing exposed to 65 DNL by 80 people/40 houses in comparison to the Baseline, an 8.1% and 8.7% reduction respectively. Changes would occur in the 70-75 DNL contour as well as the 65-70 DNL contour. Within the 60 DNL contour, the changes would be less pronounced (a reduction of 2.7% in population and 3.3% in housing affected).

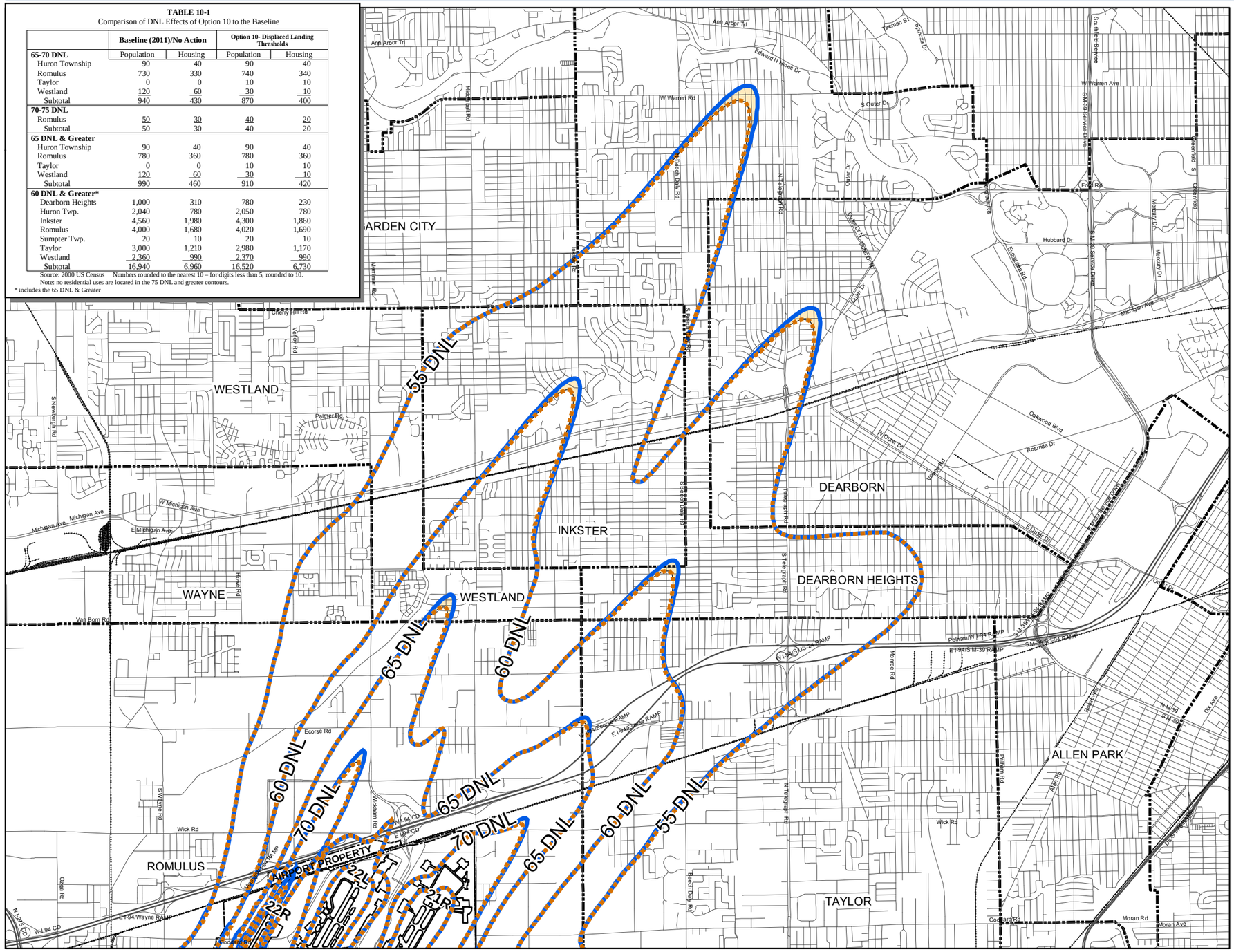
Within the 70 DNL contour, a reduction in population impact would occur to Romulus (20% or a reduction of 10 people). Within the 65 DNL and greater contour, population impact reductions would occur in Westland (75%) while impacts to other communities would remain the same relative to the Baseline. Within the 60 DNL contour, population impact reductions would occur in Dearborn Heights (22%), Inkster (5.7%), and Taylor (0.7%) with increases in Huron Township (0.5%), and Romulus (0.5%).

FAA guidance for implementing the National Environmental Policy Act (NEPA) states that a 1.5 DNL increase in noise to noise sensitive uses (i.e., residences) within the 65 DNL due to federal action is considered a significant impact. A review of the noise exposure contour indicates that a 1.5

TABLE 10-1
Comparison of DNL Effects of Option 10 to the Baseline

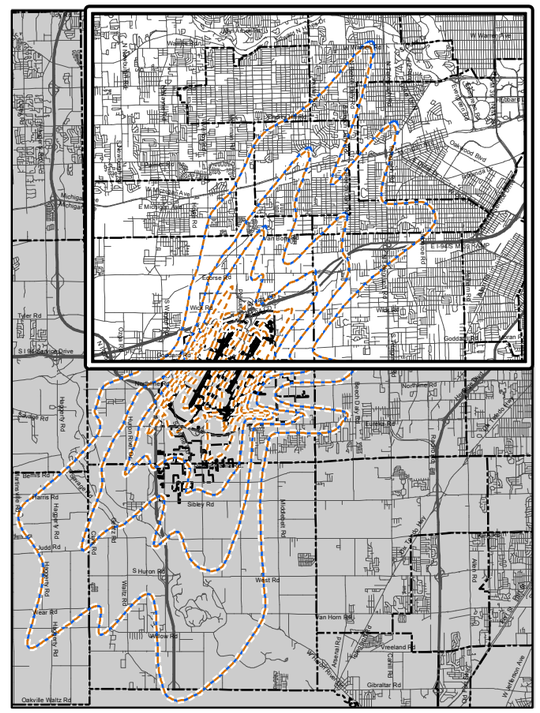
	Baseline (2011)/No Action		Option 10- Displaced Landing Thresholds	
65-70 DNL	Population	Housing	Population	Housing
Huron Township	90	40	90	40
Romulus	730	330	740	340
Taylor	0	0	10	10
Westland	120	60	30	10
Subtotal	940	430	870	400
70-75 DNL				
Romulus	50	30	40	20
Subtotal	50	30	40	20
65 DNL & Greater				
Huron Township	90	40	90	40
Romulus	780	360	780	360
Taylor	0	0	10	10
Westland	120	60	30	10
Subtotal	990	460	910	420
60 DNL & Greater*				
Dearborn Heights	1,000	310	780	230
Huron Twp.	2,040	780	2,050	780
Inkster	4,560	1,980	4,300	1,860
Romulus	4,000	1,680	4,020	1,690
Sumpter Twp.	20	10	20	10
Taylor	3,000	1,210	2,980	1,170
Westland	2,360	990	2,370	990
Subtotal	16,940	6,960	16,520	6,730

Source: 2000 US Census Numbers rounded to the nearest 10 – for digits less than 5, rounded to the nearest 10.
Note: no residential uses are located in the 75 DNL and greater contours.
* includes the 65 DNL & Greater



Source: US Census, 2000

Figure G27 **Option 10, Displaced Threshold**



Legend

- City Limits Boundary
- 2011 Base Case
- Option 10, Displaced Threshold
- Option 10 Area newly affected
- Option 10 Area no longer affected

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DNL increase in noise due to Option 10 would not be expected. Therefore, the FAA is likely to require completion of an Environmental Assessment (EA) that may be eligible for a Finding of No Significant Impact.

Operational Impacts:

Displaced threshold can alter the operational efficiency of an airport and can reduce the available stopping distance of a runway.

The option does not appear to have any legal issues associated with its implementation. As noted earlier, this option is not expected to create a 1.5 DNL increase in aircraft noise and thus, compliance with NEPA could be expected with an Environmental Assessment.

Conclusions of Consultant Team:

No conclusion is made at this time, pending discussion with the Study Advisory Committee. (Appendix Five, Six & Seven)

TABLE G18
Comparison of DNL Effects of Option 10 to the Baseline

	Baseline (2011)/No Action		Option 10- Displaced Landing Thresholds	
65-70 DNL	Population	Housing	Population	Housing
Huron Township	90	40	90	40
Romulus	730	330	740	340
Taylor	0	0	10	10
Westland	120	60	30	10
Subtotal	940	430	870	400
70-75 DNL				
Romulus	50	30	40	20
Subtotal	50	30	40	20
65 DNL & Greater				
Huron Township	90	40	90	40
Romulus	780	360	780	360
Taylor	0	0	10	10
Westland	120	60	30	10
Subtotal	990	460	910	420
60 DNL & Greater*				
Dearborn Heights	1,000	310	780	230
Huron Twp.	2,040	780	2,050	780
Inkster	4,560	1,980	4,300	1,860
Romulus	4,000	1,680	4,020	1,690
Sumpter Twp.	20	10	20	10
Taylor	3,000	1,210	2,980	1,170
Westland	2,360	990	2,370	990
Subtotal	16,940	6,960	16,520	6,730

Source: 2000 US Census Numbers rounded to the nearest 10 – for digits less than 5, rounded to 10.
Note: no residential uses are located in the 75 DNL and greater contours.

- includes the 65 DNL & Greater

Option 11: High Speed Taxiway Exits

Discussion:

High-speed taxiway exits connect the runway to an adjoining taxiway at an angle of about 30-degrees enabling aircraft to exit the runway at higher than normal speeds and spend less time in the landing roll. Traditional taxiway exits are at a 90-degree angle to the runway, requiring the aircraft to slow to a near stop before making the turn onto the taxiway. High-speed taxiway exit use can reduce the amount of reverse thrust deployed by landing aircraft and can increase the capacity of the runway by reducing runway occupancy time. The ability to use high-speed taxiway exits depends on the runway length required by the landing aircraft. In general, larger/heavier aircraft require longer landing distances.

Noise Abatement Procedure Goal:

The goal of this option would be to reduce noise levels from landing jets, where pilots typically deploy reverse thrust to slow the aircraft. The high speed taxiway exits allow faster exiting of the runways with less need for reverse thrust.

Description of the Option:

High speed taxiway exits are typically used on primary arrival runways (3R/21L and 4L/22R) to maximize arrival efficiency and reduce the amount of reverse thrust required when landing, thus reducing noise generated in slowing aircraft. Currently, both primary arrival runways at DTW have high-speed taxiway exits, along with the primary arrival cross-wind Runway 9R/27L. Therefore, no further evaluation was conducted of this option.

Comparable Existing Procedure(s):

Existing primary arrival runways (4L/22R and 3R/21L) and the southern cross-wind runway (9R/27L) use high-speed taxiway exits.

Option 12: Ground Run-Up Procedures

Discussion:

Airlines 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. As a result, airports often establish locations on the airfield for run-ups to minimize the impacts on nearby residences.

Noise Abatement Procedure Goal:

The goal of this option would be to reduce single event noise levels from aircraft maintenance engine testing.

Description of the Option:

The Airport Authority (Appendix Nine) has implemented ground run-up procedures for many years. A review was conducted of the existing procedures' effectiveness and consideration was given to improvements in the procedures. Run-up procedures could be developed for a number of locations adjacent to existing taxiways to enable aircraft to be oriented in a manner that directs aircraft noise away from populated areas and back towards the Airport. These procedures could serve as an updated program for conducting all run-ups.

Comparable Existing Procedure(s):

The Airport Authority (Appendix Nine) has established four (4) locations on the airfield where run-ups can be performed; each location has its own set of procedures to direct the aircraft in a position that would minimize noise exposure to the surrounding community. Below is a list of run-up locations and the allowed aircraft orientation (heading of the nose of the aircraft). Current locations approved for maintenance run-ups are located on **Figure G28.** These positions were identified during the 1992 Part 150 to minimize the noise impacts associated with conducting run-ups. Before conducting a run-up, the airline contacts the Airport Authority operations staff for a request to conduct the run-up and is then directed to one of the following locations.

Position	Allowed Aircraft Orientation
22R hold pad	Either 028° or 206°
27L hold pad	Between 135°-225°
3L deicing pad	Between 194°-211° or 014°-041°
Hold pad on Taxiway F	Between 081°-337°

A review of the historical noise complaint data shows that ground noise continues to be a concern to residents near the Airport. Community representatives on the Study Advisory Committee (Appendix Five & Six) have also expressed concerns about ground based noise.

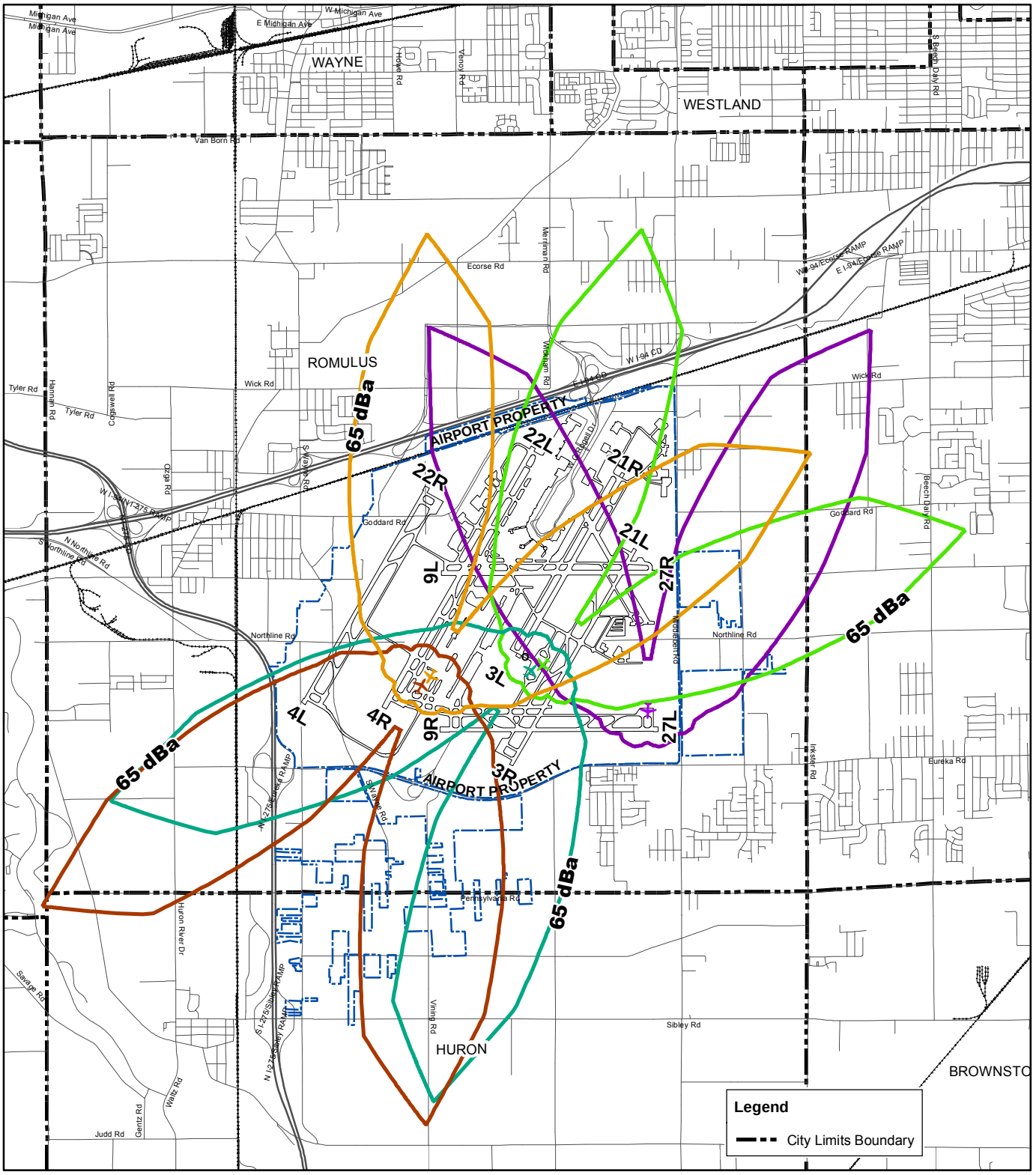

Figure G28 **Mitigated Single Event Ground Run Up**

Source: .

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Modeling Assumptions/New Procedure:

The assumptions related to ground run-up procedures focus on defining the use of a location in terms of type of aircraft, type of maintenance run-up, headings, and time of operation. All ground run-up activity would continue to occur at the current locations and noisier aircraft would use a new location. The specific uses of each run-up location would be more precisely defined so that the optimum location and orientation is used to direct the noise back toward the center of the Airport. These elements would be refined during the Fly Quiet Program (Option 17) or with Airport Operations personnel during the follow-up to this Study.

The proposed alternative would provide for an enhanced description of where and how each run-up can occur and then provide a means of tracking the compliance with these procedures. For instance, new vision detection systems can be used to cost-effectively track when and where run-up activities occur. This technology can also be used to detect when run-ups occur at un-authorized locations or orientations.

The proposed run-up locations are similar to the existing run-up locations, with the addition of one new position closer to the center of the Airport. This new location is more toward the center and south end of the Airport, where nearby population densities are less. This new location would be used specifically for only the loudest aircraft types that are performing a full power run-up.

Older generation jet aircraft (with low bypass ratio jet engines) generate notably higher run-up noise and require more run-up tests then new generation aircraft. At DTW, these are primarily DC9 aircraft along with some MD80s, 727 and B737-200 aircraft. Additionally an aircraft performing a full power run-up generates significantly greater noise then an aircraft performing a lower power run-up. Many new generation aircraft rarely require full power run-ups.

Analysis of Option:

The analysis of this option considered both the noise exposure impacts of the option, as well as the possible operational effects.

Noise Analysis:

DNL noise contours were not used to evaluate the noise impacts associated with ground run-up procedures. Noise from aircraft engine run-ups have varying characteristics depending upon the type of run-up procedure, the power level, the engine type, and the orientation of the plane. Full power run-ups present the greatest potential for noise impacts. The general characteristics of engine run-up noise are summarized below:

- Varying duration noise events that can last many minutes;
- Quick onset and drop-off of the noise;
- Dominant low-frequency characteristics that attenuate slowly;
- Magnitude of the noise is similar to departure ground roll;
- Some run-ups include a number of cycles at full power; and
- Greatest potential for impact is sideline to the Airport,

Run-up Noise Contours. Run-up noise contours were generated for the DC9 aircraft to represent the worst case aircraft. All other aircraft will generate less noise then this aircraft.

Figure G29 presents the Lmax 70 dBA contour for a DC9 aircraft run-up at full power at each of the existing run-up pad locations and permitted orientations. **Figure G30** presents the Lmax 70 dBA contour for a DC9 at the proposed centralized locations and orientation along with a new generation aircraft at each of the existing locations. **Table G19** presents a summary of the total population within all of the run-up locations combined. This table is a composite for the worst case run-up at each of the run-up locations. The results show up to a 38% reduction in the potential population exposed to Run-up noise greater than 70 dBA.

Operational Impacts

Outside of the revised run-up procedures and headings, no significant operational impacts resulting from development of centralized ground run-up procedures for the high noise event run-up activities were identified. There may be some increase in taxi time compared with the use of the current four locations.

The option does not appear to have any legal issues associated with its implementation either.

Conclusions of Consultant Team:

Consultants recommend this action as an interim improvement in run-up procedures until a GRE (Option 13) can be funded and constructed. However, if a GRE is not constructed, then the new run-up location should be permanent. Further development of this program could occur as part of the Fly Quiet Program (Option 17).

Table G19
Procedures for Ground Run-Ups

Noise Exposure	Population Affected		
	Existing Procedures	Proposed Procedures	% Change
65 Lmax			
Huron Township	200	240	+20%
Romulus	3,720	1,510	-68%
Taylor	1,130	0	-100%
Wayne	240	0	-100%
Subtotal	5,290	1,750	-49%

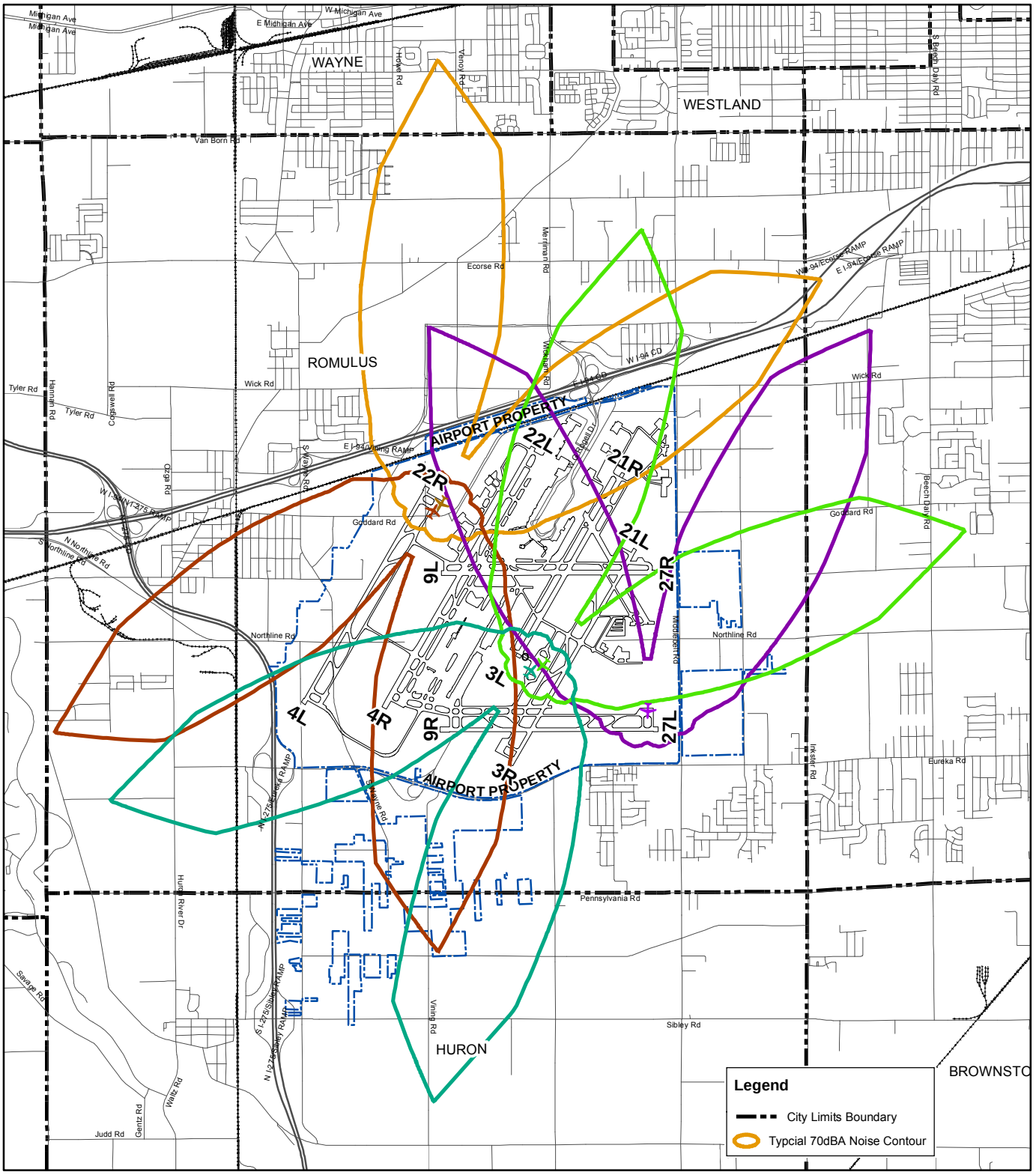

Figure G29 **Unmitigated Single Event Ground Run Up** (70 dBA)

Source: .

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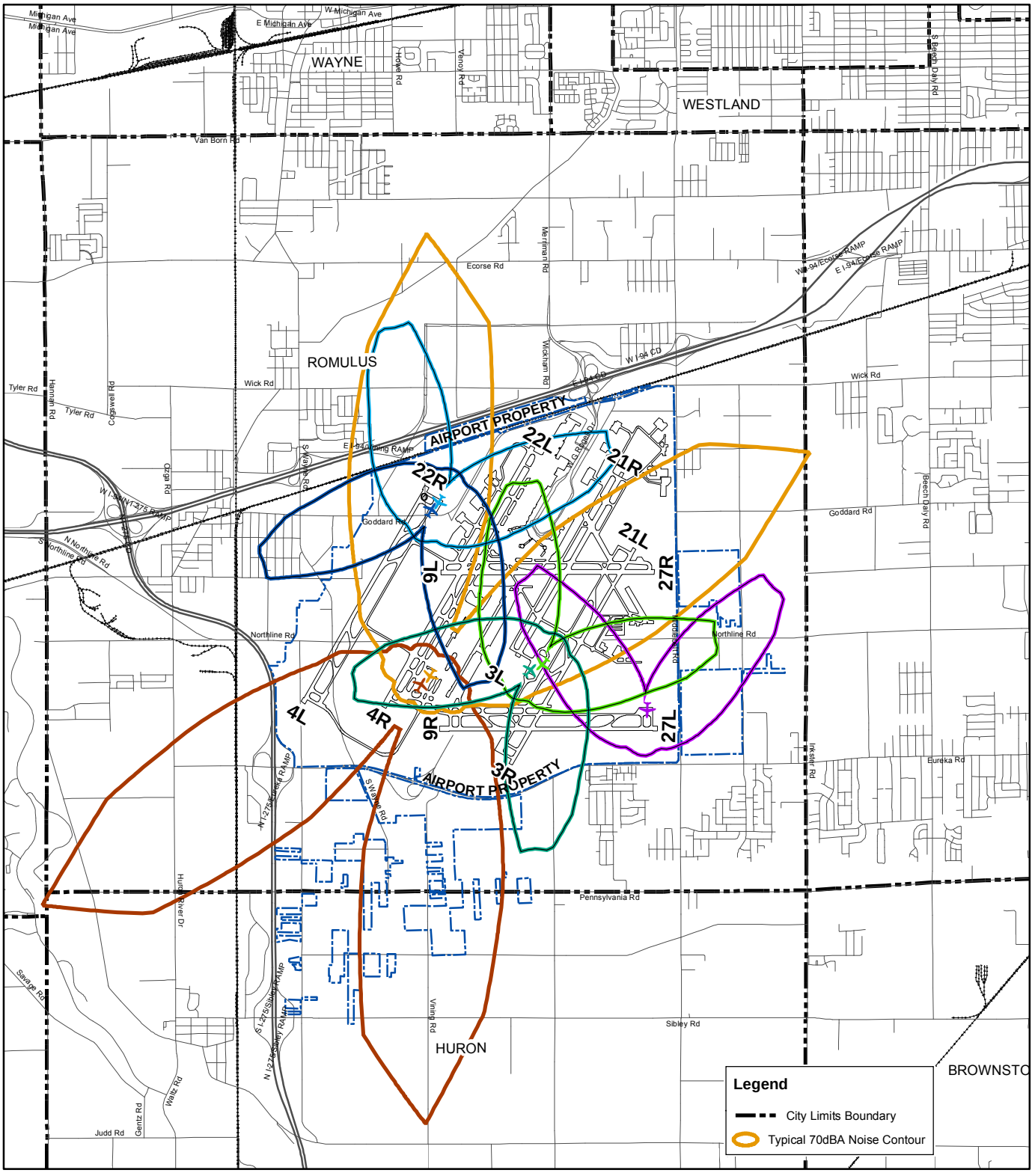


Figure G30 **Mitigated Single Event Ground Run Up** (70 dBA)

Source: .

Option 13: Ground Run-up Enclosure (Hush House or GRE)

Discussion:

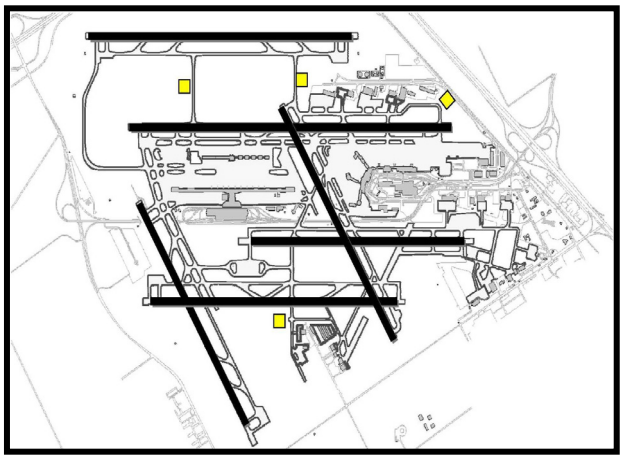
Airlines must regularly conduct maintenance or repairs on aircraft systems and engines. For certain types of aircraft maintenance, engine run-up tests are conducted to demonstrate that the aircraft's in-flight systems are working properly before the aircraft can be put back into service. A run-up is 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 testing occurs. As a result, airports often establish locations on the airfield for run-ups to minimize the impacts on nearby residences. An engine run-up enclosure (sometimes called a GRE or a Hush House) is a structure designed to deflect upward the noise from the run-up, thus reducing noise levels impacting areas surrounding the airport.

Noise Abatement Procedure Goal:

The goal of this option would be to reduce single event noise levels from aircraft maintenance engine run-up testing.

Description of the Option:

Aircraft ground run-ups are routine aircraft engine maintenance tests, which require the operation of an engine at high power for extended periods of time generating continuous elevated noise levels. GREs provide a location for such operations that minimizes engine noise to the surrounding community. A GRE could be sited in one of a number of locations adjacent to existing taxiways to enable aircraft to perform run-ups in a manner that minimizes aircraft noise for the surrounding populated areas.



Chicago O'Hare International Airport was the first large commercial service airport in the U.S. to developed a GRE. Pontiac/Oakland County Airport in Waterford, Michigan has also built a GRE. The O'Hare GRE cost $3 million (in 1999 dollars) and accommodates B-747 aircraft, whereas the smaller Oakland County GRE cost $3.5 million (2004 dollars) and accommodates general aviation aircraft, including business jets. One of the other variables in the cost of the GRE is if new pavement and access is needed to build the GRE facility. If a new pad is need, then the total costs can double.

- A GRE is a three-sided enclosure with no roof where aircraft taxi to for the purpose of conducting an engine run-up. The size of the facility is dependent upon the type of aircraft that would use the facility. An example of the cost vs. size of the facility is presented below.

Aircraft	% of Run-ups that could use facility of this size	Cost ($million)	Land Site (sq ft)
B-747	100%	$5.0	100,000
B-757	95%	$4.5	60,000
B-737/MD80	85%	$4.0	50,000

- The noise footprint for a DC9 aircraft run-up without a GRE at several locations was shown in **Figure G29**. The GRE would reduce noise levels by roughly 15 dBA. The DC9 aircraft is representative of the worst case aircraft in terms of run-up noise at DTW. Although smaller than a B747, older technology jets such as DC9's generate higher noise levels. The location shown on **Figure G31** is one of the possible locations for a GRE.
- No locations exist at DTW that would eliminate all run-up noise from every area adjacent to the Airport. However, several locations could be used to minimize effects.
- A GRE can not be used in all wind conditions. GRE facilities are aligned with the prevailing winds. Assuming a south orientation of the GRE, the facility could be used about 95% of the time.
- Given the meteorological conditions that are present at the Airport, there are times that a GRE is less effective. This is typically during inversions, which at night occurs about 5% of the time. Under these conditions, the benefits of a GRE are less.

Comparable Existing Procedure(s):

Currently DTW does not have a GRE; rather four locations on the airfield are designated where run-ups can be performed, as discussed in Option 12, with each location having its own set of procedures to direct the aircraft in a position that would minimize noise exposure to the surrounding community.

Modeling Assumptions/New Procedure:

As shown above, four locations were identified for possible location of a GRE. The assumptions related to a ground run-up enclosure include unrestricted use in terms of both the headings and time of operation. All ground run-up activity would occur in the enclosure, unless wind conditions precluded the use of the GRE. The existing locations would no longer be available for maintenance activities in order to maximize the use of the GRE.

Analysis of Option:

The analysis of this option considered both the noise exposure impacts of the option, as well as the possible operational effects.

Noise Analysis:

Impact on Annual DNL Contour: DNL noise contours were not used to evaluate the noise impacts associated with a ground run-up enclosure. Noise from aircraft engine run-ups have varying characteristics depending upon the type of run-up procedure, the power level, the engine type, and the orientation of the plane. Full power run-ups present the greatest potential for noise impacts. The characteristics of engine run-up noise are summarized below:

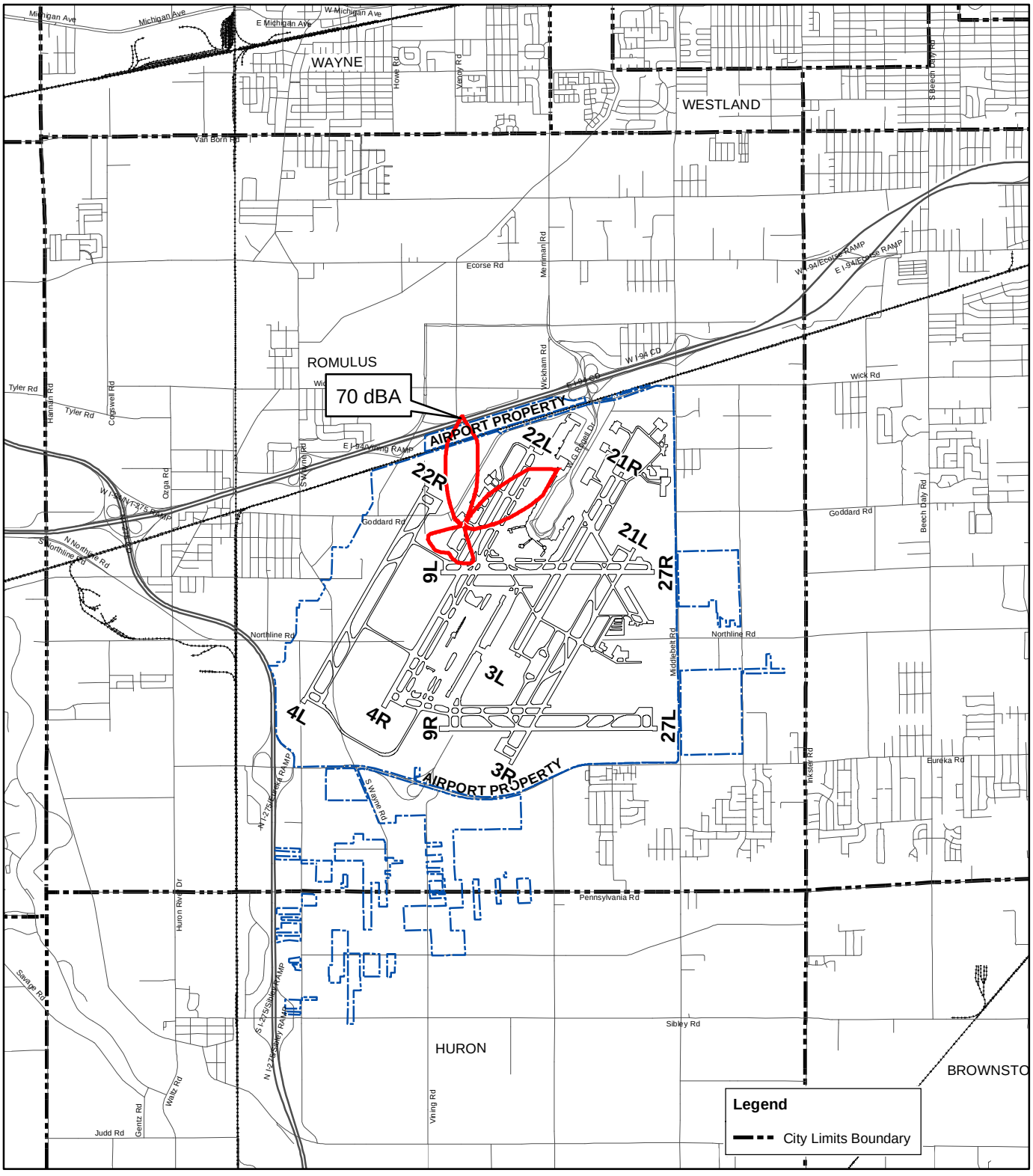


Figure G31 **Single Event Noise Contour**
Ground Run Up Enclosure

0 3,000 6,000 12,000 Feet

Source: .

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- ✓ Varying duration noise events that can last many minutes
- ✓ Quick onset and drop-off of the noise
- ✓ Dominant low-frequency characteristics that attenuate slowly
- ✓ Magnitude of the noise is similar to departure ground roll
- ✓ Some run-ups include a number of cycles at full power
- ✓ Greatest potential for impact is sideline to the Airport

Run-up Noise Contours. Run-up noise contours were generated for a DC9 (hush kited) aircraft. **Figure G31** presents the Lmax 70 dBA contour for a DC9 aircraft run-up at full power in the proposed GRE. The results show significant reductions in noise as a result of the use of a GRE and the centralization of all run-up activity. **Table G20** presents a summary of the total population within all of the run-up locations combined for the existing procedure and for the GRE alternative. The existing procedure table is a composite for the worst case run-up at each of the run-up locations. The results show for the GRE alternative up to a 100% reduction in the potential population exposed to Run-up noise greater than 70 dBA.

Operational Impacts

Outside of the use of the ground run-up enclosure for all maintenance activities, there are no significant operational impacts resulting from development of a centralized ground run-up enclosure. A GRE would require all run-ups to be conducted in a central location. Relative to current procedures, an increase in taxiing would be expected for aircraft to use the GRE, depending upon the location of the maintenance base with respect to the aircraft.

The option does not appear to have any legal issues associated with its implementation either. The development of a GRE may be categorically excluded under NEPA (FAA Order 1050.1e paragraph 310e), meaning that if extraordinary circumstances do not arise, an Environmental Assessment or an Environmental Impact Statement would not be required. No extraordinary circumstances are currently known, although it is suggested that a review of airport environmental conditions would be necessary to ascertain such conditions.

Conclusions of Consultant Team:

Recommended upon the identification of funding priorities.

Table G20
Ground Run-Up Enclosure (GRE)

Noise Exposure	Population Affected	
	Existing Procedures	Proposed GRE
65 Lmax		
Huron Township	200	0
Romulus	3,720	0
Taylor	1,130	0
Wayne	240	0
Subtotal	5,290	0

Note: The existing procedure Lmax is a composite for the worst case run-up at each of the run-up locations.

Option 14: Noise Barrier/Noise Wall

Discussion:

A noise barrier is an obstruction to the path of the sound, reducing noise to properties closest to the barrier. Once an aircraft becomes airborne, barriers have no further effect. Barriers include walls (those used along highways), earth mounds (berms), wall and berm combinations, or placement of buildings and landscaping. In the case of barriers, neighbors would be shielded from the noise source as long as the barrier is solid and sufficiently breaks the line-of-sight from the noise source to the listener. Barriers can potentially provide noise reduction benefits for communities near an airport from aircraft ground operations. The closer a barrier is to the noise source, the more effective the barrier.

The placement of barriers or berms is dictated by airport design guidelines and regulations, one of which is Federal Aviation Regulation (FAR) Part 77, which defines certain height restrictions at specified distances from runways. To ensure the safe operation of aircraft at the Airport, these restrictions would be followed, thereby making berms unfeasible in specific locations. Types of barriers include:

- Noise Wall – a wall, similar to that used along highways, that obstructs the view of the airfield, but also increases the distance noise is required to travel.
- Earth berm – Earth berms are generally composed of earth/soil with a ground cover such as grass, low-profile plants, small bushes, or trees. The height of the berm is dependent on its location on the airfield, its intended use, and proximity to airfield activities. Berms are generally located on airport property boundaries.
- Earth berm and wall combination – Earth berms can be combined with a wall to create a higher structure. Walls can be placed on top of an earthen berm to create a more aesthetically-pleasing noise barrier.
- Landscape – The placement of trees can be effective in breaking the line of sight between a noise source and the community. The density of the trees affects the dissipation of noise. At locations where aircraft noise levels are not substantially higher than the ambient neighborhood noise, landscaping can be a good alternative to reduce the line of sight. Landscaping is generally located on airport property boundaries. When placing landscaping at an airport, careful consideration must be made of the vegetation type relative to wildlife attraction that would be a hazard to aviation.
- Building placement – Airports can take advantage of existing buildings to shield communities from aircraft noise. If ground noise is an issue at an airport, the siting of new buildings can take into account how they can be used for noise reduction.
- Blast fence – Blast fences are used to deflect noise from engine start-up, run-up, and taxiing. Blast fences are located on apron areas, terminal areas, and airport property lines. Blast fences can vary in height and length depending on intended use.
- Ground Run-Up Enclosure (GRE) – A GRE is a three-sided structure that surrounds an area used for aircraft maintenance run-up. The aircraft backs into the GRE and then performs the run-up test. The walls of the GRE are relatively close to the engine, typically at least 20 feet high, and built of sound absorptive material; so, a GRE is very effective in reducing maintenance run-up noise.

The location of a barrier is dependent on its distance from the noise source, the orientation of the noise source, FAR Part 77 surface requirements, and the time of day. Noise propagation is louder in certain directions and during times of low ambient noise levels (generally nighttime hours). It is usually advantageous to locate a noise barrier as close to the noise source as possible; if this is not possible, aircraft should then be located as far away from non-compatible land uses as possible while still taking advantage of the noise barrier. In addition to locating an aircraft as far away as possible, the aircraft

should be oriented so that noise will dissipate away from sensitive land use. For example, an idling jet should be parked with its tail pointed toward the community, because noise from an idling jet is louder at the front of the aircraft due to noise from the engine fans.

Comparable Existing Procedure(s):

Currently the noise barriers at the Airport consist of earth berms that are located along Eureka Road (the south border of the airfield), Middlebelt Road (on the east) from the northern retention pond to just north of Runway 9R-27L, and Wayne Road (on the west). **Figure G23** shows the locations of these existing earth berms.

Description of the Option:

To be effective in reducing noise, a barrier must either be close to the noise source or noise receiver. Given the layout of the Airport, existing berms, and the surrounding community, no new sites for barriers were identified.

Modeling Assumptions/New Procedure:

No new procedures would be implemented by the construction of the noise barriers/walls at the Airport.

Option 15: Noise Abatement Procedures for Use During Runway Maintenance

Discussion:

Noise from aircraft operations during runway/airfield maintenance can impact the surrounding communities to varying levels. Airfield maintenance includes closure of runways and taxiways for a defined time period. Closure of runways and taxiways at an airport due to maintenance creates similar conditions as occurs when highway maintenance occurs (delays and congestion, and temporary adverse environmental effects can arise). When runways are closed for maintenance, the traffic must be diverted to the available runways, which can increase the noise impact to the communities in the flight path of the open runways. To mitigate this unusual impact, noise abatement procedures could be implemented for use during runway maintenance.

Noise Abatement Procedure Goal:

The goal of this option is to minimize noise impacts during runway maintenance.

Description of the Option:

The development of a noise abatement procedure for runway/airfield maintenance involves; (1) establishment of a runway usage program specific to runway/airfield maintenance activities and (2) the development of a Community Outreach Program that brings affected members of the community together to raise awareness of any temporary changes in noise exposure occurring as a result of runway/airfield maintenance.

Keeping the surrounding residents informed of aircraft operations and estimates of noise pollution increases or decreases as a result of runway maintenance would not minimize the actual noise pollution, but would help keep relations between the Airport and the area residents consistent.

Comparable Existing Procedure(s):

Currently, no procedures exist to address noise abatement during runway maintenance.

Modeling Assumptions/New Procedure:

There are numerous possible runway maintenance activities that are needed at an airport. Because these maintenance conditions can include partial closure of taxiways and runways, as well as complete closure, the types of noise abatement procedures that would be considered vary according to the specifics of the maintenance. Therefore, it is recommended by the Consultant Team that the Airport identify its anticipated maintenance needs. Airports have a maintenance schedule that covers routine maintenance; in addition to scheduled maintenance, there is also emergency maintenance as a result of weather or aircraft activity, The Airport Authority (Appendix Nine) can then examine alternative noise abatement runway-use programs and coordinate these programs with the FAA and interested citizens. Option 18 of this study, Continuation of the Study Advisory Committee (Appendix Five, Six & Seven), recommends continuing the Study Advisory Committee to follow-up on the implementation of the recommendations of this study. The Study Advisory Committee would serve as a venue for presenting runway/airfield maintenance needs and discussing alternative noise abatement procedures, if possible, for use during the maintenance program.

Noise contours were not developed for this recommendation, as it is anticipated that if pursued, noise contours would be developed associated with each unique runway/airfield maintenance activity.

Analysis of Option:

The analysis of this option considered both the noise exposure impacts of the option, as well as the possible operational effects.

Noise Analysis:

As required by FAR Part 150, the study relied upon the use of the average annual DNL noise contours to consider possible noise exposure consequences of the option.

Impact on Annual DNL Contour: Noise contours were not developed as each runway/airfield maintenance project is unique. It is anticipated that the noise impact would vary based on the condition occurring at the time. However, if noise abatement procedures could be identified, noise contours could be prepared to show the effect relative to the runway/airfield maintenance conditions.

Operational Impacts

Operational impacts resulting from runway maintenance vary and would be the responsibility of the Air Traffic controllers to adjust traffic patterns for the interim.

The option does not appear to have any legal issues associated with its implementation.

Conclusions of Consultant Team:

The Consultant Team recommends implementation of this recommendation and further development of this program as part of the Fly Quiet Program (Option 17).

Option 16: Install Noise Monitoring/Radar Tracking System

Noise Abatement Procedure Goal: To install a state-of-the art flight tracking system, thereby enhancing Noise Management Office staff's ability to research and respond to public noise inquiries. This system could be connected to a noise monitoring system installed in the local community to record noise levels and monitor changes in noise over time.

Description of the Option: The purpose of a noise monitoring and flight tracking system is to gather reliable and consistent noise data over a considerable period of time. An integrated system includes many components, including a network of permanent noise monitors that measure the noise environment and a system directly connected to the FAA's air traffic control radar that collects aircraft flight tracks. This data is then used to evaluate any change in conditions over time, to identify specific problem flights or ground operations, to respond to citizen complaints, to monitor aircraft adherence to established flight tracks, and to keep a continuous record of noise levels in neighborhoods surrounding the Airport.

This action would consist of acquiring the required computer technologies and interfaces to enable collection of FAA radar data on a permanent basis. Such systems require agreements with the FAA on the collection and use of the data. A sound level measurement program could also be established with remote permanent sound level meters placed around the Airport. The sound level meters would connect to a central computer system. An integrated system allows for the correlation of noise measurements - where noise events are correlated with flight tracking data as well as weather and demographic data. The number of monitors varies from airport to airport, but for major commercial airports 20-30 stations are not unusual.

Comparable Existing Procedure(s): The Airport Authority (Appendix Nine) has periodically collected sound level measurements in the local community using portable equipment, and obtained FAA radar data as needed for studies.

Modeling Assumptions/Option: No modeling was conducted for this option.

Analysis of Option: A noise measurement system would cost approximately, $1 million for 25 permanent measurement stations. Implementation of just a flight tracking system would cost approximately $500,000. An integrated system that conducts measurements and correlates the measurements to flight operations would cost approximately $1.5 million.

Conclusions of Consultant Team:

The Consultant Team recommends implementation of this option subject to the availability of funding to acquire the required technology.

Option 17: Fly Quiet Report Card and Pilot Awareness Program

Noise Abatement Procedure Goal: Increase awareness and compliance concerning the use of various noise abatement procedures, including the performance of individual aircraft types or airlines. The Fly Quiet Report Card program is typically designed to provide a simple measure of compliance with the noise abatement programs at an airport.

Description of the Option: A Fly Quiet Report Card element could be included in many of the actions evaluated by the Part 150, but can be a stand-alone program as well. The Fly Quiet Report Card program is intended to monitor and evaluate the effectiveness and compliance with various noise procedures.

Comparable Existing Procedure(s): Detroit Metro Airport does not have a formal program for monitoring airline operations in the context of Fly Quiet. Currently, Detroit Metro Airport staff coordinates with the airline personnel regarding specific operational and noise abatement topics.

Modeling Assumptions: No modeling was conducted for this option. The following discuss the effects of the option.

Fly Quiet programs can take many forms. As a result, it is recommended that the full breadth of a Fly Quiet Report Card program be developed outside of the Part 150 process in consultation with citizen and airline input.

The Fly Quiet Report Card concept was first developed at Chicago O'Hare, and a similar program subsequently adopted at San Francisco International Airport. Several other airports have started to implement similar programs. These airports have found the Fly Quiet Program to create positive change in working with airlines to reduce annual and single event levels. The program is a reflection of the individual noise concerns and issues at each airport, as no two such programs are alike.

The purpose of Fly Quiet is measure/rank performance and then to motivate carriers by rewarding good noise abatement procedures and inspiring competition. The Fly Quiet Program can consist of a report card that monitors and evaluates the effectiveness and compliance with various noise procedures. The Fly Quiet Report Card is a program aimed at including air carriers and cargo carriers as active participants in noise abatement at Detroit Metro Airport. The reports are intended to be distributed to the airlines, other users, noise committee, and the local media outlets for positive coverage of the work being done at the Airport to abate noise.

The Fly Quiet Report Card program can be designed to consist of numerous categories that rate the performance of aircraft and/or aircraft operators pertinent to operations. Fly Quiet at Detroit Metro Airport could include current noise abatement procedures and new procedures from the Part 150 Study. The following describes the types of potential categories for the Fly Quiet Report Card program.

- **Airline Fleet Noise Quality***:* Airlines are rated on the type of aircraft used, such as a marginal Stage 3 hush-kitted aircraft versus an aircraft that is designed as a Stage 3 aircraft.
- **Single Event Sound Exposure Level***:* SEL ratings, based on the average certificated level for a type of aircraft, could be established for the permanent noise monitor locations. Aircraft could be rated by how many times they are over the set SEL limits. This rating category is typically used for departures.

- **Arrival and Departure Altitude Compliance***:* This component of the program could measure how airlines comply with existing noise abatement procedures or existing and future goals relative to how aircraft should operate at Detroit Metro Airport:
  - **Departure Altitude**: Upon departure, aircraft would be graded based on their altitude at predetermined points, determined by the procedure in use. Good, marginal, and satisfactory altitudes are determined for specific locations based on procedures and historical data.
  - **Arrival Altitude**: Similar to the departure altitude grading, aircraft on arrival would be graded on the altitude the aircraft should be at for the particular arrival path used. Aircraft could also be graded along the arrival path, not at just one location.
- **Nighttime Procedures Compliance**: Aircraft operating at night would be graded on how well they fly existing or proposed nighttime noise abatement procedures.
- **Runway Use** Compliance with runway use targets.

The noise monitoring system is a key tool for the airport operator and citizens to keep track of unusual events as well as changes in the noise environment over time. It also is an important component to a new Fly Quiet Report Card program. The existing system should be reviewed and recommendations made for appropriate updating depending upon the final components of the Fly Quiet Report Card program.

Analysis of the Option:

No specific procedures would be implemented with a Fly Quiet Report Card program, but rather a program would be established for monitoring compliance with existing noise abatement procedures as outlined in the following discussion.

The following steps could be used to formulate a Fly Quiet Report Card program:

1. **Identify categories of aircraft for grading purposes:** The Fly Quiet Report Card program can be formulated with either one broad category or divided into subcategories of air carriers, turboprop carriers, and cargo carriers for purposes of grading or rating performance. The Fly Quiet Report Card program, regardless of how the categories are displayed, could grade aircraft performance based on the actual operations at Detroit Metro Airport.
2. **Identify Scoring System:** This Program is an excellent tool to explain aircraft noise to the public because of its easily understood scoring system. A methodology would be devised to score aircraft based on a 0-100% scale with the corresponding letter grade (A-F). While the Fly Quiet equations would be based on technical acoustical data, the scoring system would present the technical data in a report that translates the data into easy to understand terms.
3. **Determine components to be measured:** Sample categories have been outlined to show potential categories that could be used in a Fly Quiet Report Card program; it is ultimately the decision of the Airport Authority, in working with the public and the airlines, to identify which components are important to measure and report. The effectiveness of Fly Quiet comes from it rating the top four to five noise issues and giving airlines achievable goals rather than grading every published approach and departure.
4. **Rate importance of each component:** Once the components of the Fly Quiet Report Card are identified, its relative importance should then be determined.
5. **Identify method to publicize the results:** The Fly Quiet Report Card program is intended to be a positive tool for an airport to publish its noise abatement efforts. The Program results can be sent

to the local press, such as regional newspapers, community newsletters, and local television stations. Each quarter, a Fly Quiet Report Card press release would be sent to the press that covers airport events. In addition to the quarterly press release, the press would be invited to the annual Fly Quiet Awards.

Airport and ATC Operational Considerations: Would depend on the specific contents of the Fly Quiet Program, however, none are anticipated.

Effect on Aircraft Operators: Would depend on the specific contents of the Fly Quiet Program, however, none are anticipated.

Implementation Factors: None are anticipated. However, the Program cannot be used to force compliance of any specific procedure.

Legal Implications: None are anticipated. However, the Program cannot be used as a mechanism to fine or penalize operators in any manner.

Conclusions of Consultant Team:

The Consultant Team recommends that implementation of this option, subject to funding to enable installation of the necessary radar and monitoring technology (Option 16).

Option 18: Continuation of the Study Advisory Committee

Noise Abatement Procedure Goal: To utilize and preserve the body of knowledge developed through the Part 150 Study to review the progress of implementing the recommendations of this Noise Compatibility Program and provide feedback to the Airport Authority (Appendix Nine) on the effectiveness of the noise program.

Description of the Option: This action would result in continued meetings of the Study Advisory Committee for a 1 year period to monitor the Airport Authority's (Appendix Nine) implementation of the recommendations of the Part 150 Study.

Comparable Existing Procedure(s): The Study Advisory Committee consists of 38 volunteers appointed by the organizations they represent to participate in the Study Advisory Committee (Appendix Five, Six & Seven), whose purpose is to provide input to the Airport Authority (Appendix Nine) concerning noise abatement planning at Detroit Metro Airport. This committee was expected to sunset with the completion of the study.

Modeling Assumptions/Option: No modeling was conducted for this option, as it would not directly affect aircraft noise exposure.

Analysis of the Option: No analysis was conducted for this option. The Airport Authority (Appendix Nine) would hold committee meetings, on a regular basis, as a means of disseminating information and gathering input on noise abatement issues. The Committee could help the Airport Authority (Appendix Nine) in developing the Fly Quiet Program and provide input to the enhancement of the aircraft noise/flight track monitoring system.

Conclusions of Consultant Team:

The Consultant Team recommends that implementation of this option.