Metropolitan Airports Commission

2000 MSP Part 150 Update

Updating the Noise Compatibility Program at the Minneapolis/St. Paul International Airport in an Effort to Address the Current and Future Noise Environment Through the Year 2005

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Introduction

The issue of airport noise continues to be of paramount importance to the Metropolitan Airports Commission (MAC). Realizing the noise impacts the Minneapolis/St. Paul International Airport (MSP) imposes on surrounding communities, the MAC has pursued multiple noise reduction programs around MSP. A significant part of this effort has been the establishment of a Federal Aviation Regulation (FAR) Part 150 Program at MSP.

Since 1987 Part 150 has provided funding sources and effective solutions addressing the noise impacts around the airport. The Part 150 program has a long history at MSP and has evolved over the years to address the changing noise impacts that aviation development and expansion can influence.

This document provides specific information related to the most recent Part 150 initiative - the 2000 MSP Part 150 Update. This update is an example of comprehensive community involvement and extensive analytical efforts. The precedent-setting elements of this study and the manner in which they were addressed, from a noise impact modeling perspective, represent an example of thorough noise impact assessment. This effort resulted in extensive noise mitigation proposals to address noise impacts around MSP, well into the future.

The following information will provide a summary of the 2000 MSP Part 150 Update.

Section

1 FAR Part 150 and MSP

There is no question that the Minneapolis/St. Paul International Airport (MSP) imposes noise impacts on neighboring communities. Realizing this, the Metropolitan Airports Commission (MAC) has actively developed and implemented a number of programs and procedures aimed at reducing residential noise impacts. These initiatives include insulating homes in areas of high noise impact, in addition to coordinated efforts with surrounding communities to reduce the introduction of non-compatible land uses in areas of known noise impacts.

Federal Aviation Regulation (FAR) Part 150 provides a means for airports to accomplish comprehensive noise reduction goals. FAR Part 150 is a federal program appropriating aviation-generated funds for the purpose of aircraft noise mitigation measures in communities surrounding an airport (including sound insulation). Currently MSP appropriates $36.5 million annually for the Residential Sound Insulation Program. However, the ability for an airport authority to use Part 150 funds or any aviation generated funds for the purpose of noise mitigation hinges upon completion and federal acceptance of approved noise mitigation measures proposed in a Part 150 study.

The Part 150 process provides airport operators with the procedures, standards and methodology governing the development, submission and review of airport noise exposure maps (typically referred to as contours) and airport Noise Compatibility Programs (NCPs).

A Part 150 program has been in place at MSP since 1987. Since the program was updated in 1991 and the residential sound installation program began in 1992, the MAC has insulated approximately 5,882 homes in Minneapolis, Richfield, Bloomington, Eagan and Mendota Heights at a total cost of $148.9 million. Construction has started or is planned for an additional 1,418 homes. As the MAC continues to strive for residential noise impact reduction around MSP, the NCP components, as included in the Part 150 Program at MSP, will continue to be the cornerstone of noise reduction initiatives at MSP.

MSP Part 150 Update

Because of the impending change in the noise environment around Minneapolis/St. Paul International Airport (MSP), substantial research, analysis, study and public input was conducted via the federally defined guidelines of a Part 150 Update.

A key component of a Part 150 program is the development of a Noise Exposure Map (NEM), commonly referred to as a noise contour. Noise contours outline the areas eligible for compatible land use plans, property acquisition, residential relocation and sound insulation. In addition, airport use, aircraft operations and airspace usage amendments can be pursued via a Part 150 program. The manner in which an airport is operated and aircraft procedures are executed have a direct effect on the noise impact around an airport. As a result, operational procedures contained in a Noise Compatibility Program (NCP) can have a direct effect on the shape and size of the noise contours. In turn, the resulting noise contours define the areas eligible for sound insulation. Thus, as a result of

the projected changes in the operations at MSP due to the change in aircraft fleets and the addition of a new runway, a Part 150 Update is being conducted.

Currently the Metropolitan Airports Commission (MAC), the Metropolitan Aircraft Sound Abatement Council (MASAC) and HNTB Corporation (MAC's environmental noise consultant) are preparing a Part 150 Update. The update is predicated on forecasted 2005 airport configuration and use, airline fleet mix, airspace use and proposed noise reduction measures.

The draft document will be completed in October 2000 with two consecutive public hearings in November 2000. The final Part 150 recommendations are subject to MAC and Federal Aviation Administration's (FAA's) review, comment and approval. After determining its adequacy, the FAA has 180 days to approve or disapprove the provisions in the document.

For more information on the update process, visit the MAC Aviation Noise and Satellite Program's website at www.macavsat.org or check local papers for meeting times and dates.

Mitigation Measures Associated With FAR Part 150

While the Part 150 program is most often associated with sound insulation (usually the most significant portion of a Part 150 program), there are many other components. A Noise Compatibility Program (NCP) can contain a number of noise compatibility measures. These measures typically focus on airport or aircraft operational noise mitigation measures, land use measures and any other noise reduction initiatives.

Part 150 operational initiatives usually include mitigation measures such as:

- ***Aircraft Departure and Arrival Procedures***
- ***Runway Use Selection***
- ***Flight Track Usage***
- ***Airport Use Considerations*** – which can include aircraft type-specific provisions or time of aircraft operation considerations

Part 150 land use initiatives usually include mitigation measures such as:

- ***Preventative Land Use Measures*** – efforts to prevent the introduction of incompatible land uses, where applicable, around the airport; and
- ***Corrective Land Use Measures*** – efforts to correct existing incompatible land uses around the airport

Other mitigation measures not directly related to operational procedures or land use measures, which focus on reducing or quantifying noise around an airport, can include:

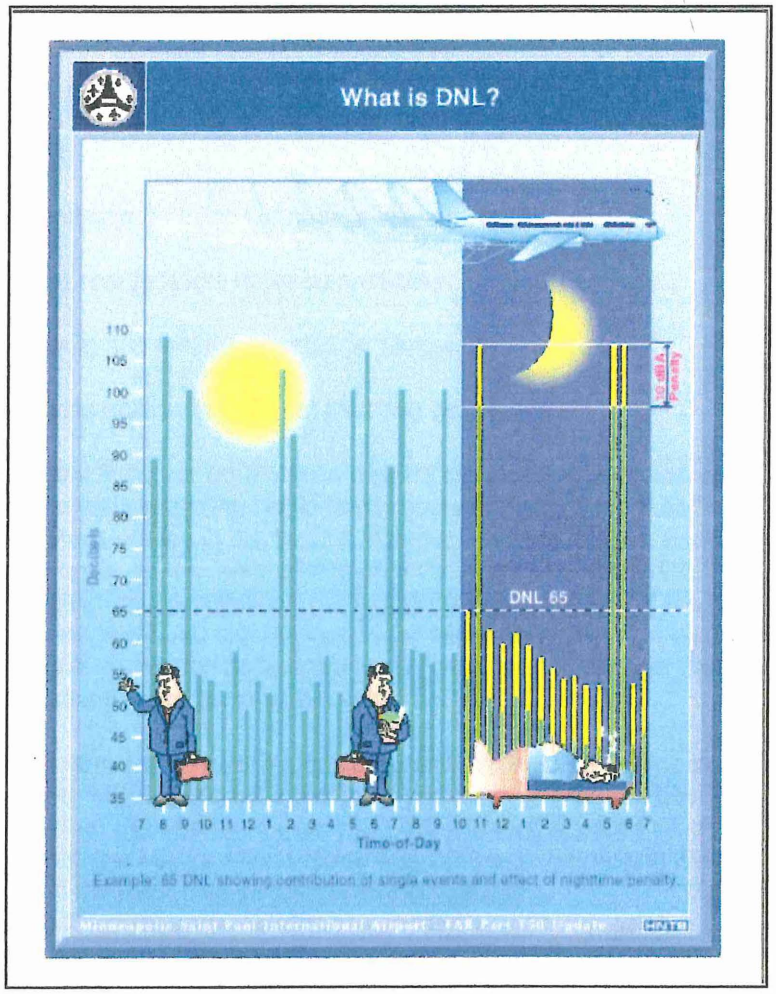
- ***Airport Improvements Helping to Reduce Noise*** – including any new noise-reducing or measuring technologies

The Federal Aviation Administration (FAA) evaluates a NCP based on several different criteria including determination of the burden on interstate or foreign commerce, reduction of existing non-compatible land uses and prevention of the addition of new non-compatible land uses. Additionally, the FAA reviews the use of new or modified flight procedures to control the operation of aircraft for the purposes of noise mitigation. The FAA comprehensively explores the objectives of the program and any measures used to achieve the noise mitigation goals. Through this process, the FAA accepts or rejects any or all of the mitigation measures outlined in the program.

Quantifying Noise Impact and Sound Insulation Eligibility

Day-Night Average Sound Level (DNL)

Since its creation in 1984, Part 150 has provided a means of establishing a nationally uniform process for quantifying aircraft noise exposure through the use of a standardized noise metric. The Federal Aviation Administration (FAA) uses the Integrated Noise Model (INM) to assess the noise impact of aircraft operations. INM is a computer model used to develop Noise Exposure Maps (NEMs), to determine noise impact areas. INM uses runway use, aircraft operations, flight track use, aircraft performance and terrain information to generate an NEM. The computer model generates contours that depict areas of noise impact based on a noise metric called Day-Night Average Sound Level (DNL). The DNL contours generated, are the focal point of any noise mitigation measure proposed in a Part 150 program.



• **Figure 1:** Day-Night Average Sound Level (DNL) noise metric description

The DNL metric is calculated by adding all the sound exposure during the daytime plus a 10-decibel penalty during the nighttime (10:00 p.m. to 7:00 a.m.). The night sound exposures are increased by 10 decibels because nighttime noise is more intrusive.

Most federal agencies dealing with noise exposure, including the FAA, Department of Defense and the Department of Housing and Urban Development, have formally adopted DNL as a metric for measuring noise impact.

Sound Insulation Eligibility

In most large-scale Part 150 programs, sound insulation is included as one of the mitigation measures. At Minneapolis/St. Paul International Airport (MSP), sound insulation is a significant portion of the Part 150 program.

The MSP Part 150 update will provide a current assessment of today's noise environment (year 2000) and a projection of the impacts for 2005. The document will contain all of the data and supporting information for the noise mitigation recommendations including the following:

- Noise Exposure Maps (NEMs) with noise, airport layout, aircraft operations, and extensive land use data
- A noise compatibility program detailing the noise abatement measures
- Land use measures that ensure future noise compatibility
- Results of a public hearing and extensive technical review
- Comments and responses relative to the Draft Part 150 Document

The MSP Noise Compatibility Program (NCP) goes beyond typical FAA noise insulation programs. This plan recommends insulating single-family homes (eligibility for multi-family homes is also being evaluated) located in the 60 DNL contour. Traditionally, the FAA has recognized the 65 DNL contour as the area of eligibility for noise insulation. With this update, the MAC is requesting sound insulation out to the 60 DNL contour. If the FAA approves the Part 150 update, the MAC can then apply for separate approval to allocate aviation-generated funds (federal aviation dollars and locally generated Passenger Facility Charges) for financing the sound insulation program out to the 60 DNL contour.

The prioritization for single-family and multi-family residences, schools and day cares is determined on a local level with significant input from surrounding communities. The overall priority of homes within the approved Part 150 NEM contour is based on actual impact data available through the MAC's Airport Noise and Operation Monitoring System (ANOMS). Homes impacted the most receive first priority for insulation.

Section 2

METROPOLITAN AIRCRAFT SOUND ABATEMENT COUNCIL

The Metropolitan Aircraft Sound Abatement Council (MASAC), a private nonprofit organization made up of 38 public and aviation industry representatives, is dedicated to the management and alleviation of aircraft noise at and around the Minneapolis-St. Paul International Airport (MSP).

Since its inception in 1969, MASAC has advised the Metropolitan Airports Commission (MAC) on noise-related issues, evaluated existing noise policies, recommended and instituted new policies and studied international noise abatement programs. It is the first noise abatement program in the country to bring together public and industry interests and has served as a model for other noise control groups around the world, including Chicago O'Hare, San Francisco International and Seattle-Tacoma airports.

There are no simple answers to the problem of aircraft noise. With the goals of reducing aircraft noise, providing mitigation, and increasing public knowledge and awareness of noise-related issues, three objectives of MASAC are:

1. **The study and evaluation of existing noise abatement policies at the airport and the proposal and initiation of new programs.** Several noise abatement policies, such as the Voluntary Nighttime Agreement and Noise Surcharge, were reviewed and endorsed by MASAC. In addition, noise abatement programs outlining departure procedures that redirect and/or redistribute flights to minimize impact on residential areas – such as the Eagan/Mendota Heights Departure Corridor, Crossing in the Corridor Procedure and the Minneapolis Straight-out Departure Procedure – were analyzed and endorsed by MASAC.

   MASAC sponsors research and studies programs to ensure that every measure possible is taken to reduce aircraft noise. With the advent of the Airport Noise and Operations Monitoring System (ANOMS) (an airport/airspace management software program that gathers noise measurements from Remote Monitoring Towers, located in surrounding communities, and compares it to actual flight track information collected from the MSP Air Traffic Control Tower), new levels of analytical capabilities are possible. With actual flight track and noise data, significant studies and analyses are conducted by MASAC to assess the use of noise-reducing procedures and conduct feasibility assessments for the purpose of proposing new procedures such as Noise Abatement Departure Profiles, the Minneapolis Straight-out Departure Procedures, Boeing 757 modifications (which led to the reduction of engine noise during landing) and others.

2. **Conduct a program of public education on noise-related issues.** Considering the importance and economic necessity of MSP, MASAC believes that an understanding must be established between the airport and surrounding communities. The MAC continually develops information programs for the public, including a quarterly newsletter, an Internet Web site and monthly noise reporting

packets. MASAC also hosts regular information sessions for the community to explain current noise abatement policies and discuss future programs.

3. **The study and evaluation of complaints from neighboring residents, accomplished through a 24-hour phone line.** Each complaint is recorded and filed by the MAC noise staff. At the end of each month, the file is reviewed and statistics are compiled regarding the number, type and geographic origin of complaints. The results are then presented at monthly MASAC meetings. This process provides people in the community with direct access to the MAC and MASAC, which in turn, helps those organizations examine the extent of noise concerns in specific areas. Using the hotline, callers can speak with a MAC representative in person during business hours, leave a recorded comment or noise complaint or obtain more information about noise and other airport issues.

MASAC board members serve on a voluntary basis. Funding for research, staff work, equipment and supplies is provided by the MAC. For more information about MASAC or noise abatement-related policies, please call Chad Leqve at (612) 725-6328 or visit MASAC's Web site at www.macavsat.org/MASAC.

MASAC and the Part 150 Update

In February 1999 the Metropolitan Airports Commission (MAC), with consultation from the HNTB Corporation, along with the Metropolitan Aircraft Sound Abatement Council (MASAC) began the process of updating the Part 150 Program at Minneapolis-St. Paul International Airport (MSP). Since that time, a comprehensive proposal has been developed addressing noise impacts at MSP through 2005.

As part of the update process MASAC reviewed and provided input on the following Part 150 topics:

- Validation of the Integrated Noise Model (INM) noise contour modeling software and the methodology used to forecast future noise impacts
- Airport and aircraft noise mitigation measures and policy
- Boundaries defining insulation eligibility
- Existing and proposed land use measures and insulation projects
- Insulation priorities for single-family, multi-family, schools/daycare facilities.

As part of the Part 150 update process, a reevaluation of the noise impacts within the communities has been conducted to account for increased aircraft operations at MSP. As a result of this evaluation, homes will be added to the current Part 150 eligibility area. The insulation of the newly added homes is anticipated to begin in early 2002 or as soon as the Federal Aviation Administration (FAA) approves the Part 150 Update, should the approval date extend beyond the early 2002 completion timeframe for existing single-family dwellings in the current program.

Due to MASAC's unique composition of community and airline representatives, accessibility and coordination of critical data sets have been enhanced. Information such as forecasted aircraft counts and fleet compositions from airlines, airspace management information from the FAA and existing land use and planning information from community representatives, has been a tremendous asset to the update process.

MASAC and the MASAC Operations Committee held briefings, prior to involvement in the update process, on the history of the Federal Aviation Regulation Part 150 program, the history of Part 150 programs at MSP, the Part 150 process, terminology, noise metrics and the noise modeling methodology used. This review of Part 150-specific topics by MASAC contributed to insightful input into the Part 150 Update.

MASAC's involvement in the Part 150 Update has been critical to ensuring that adequate public input occurs throughout the entire process.

MASAC Operations Committee

The MASAC Operations Committee addressed the vast majority of the in-depth analyses associated with the final MASAC Part 150 Update recommendations. The MASAC Operations Committee serves as an advisory Committee to the full MASAC. The focus of this group is in-depth exploration of technical issues, typically more than members of the full MASAC body will address. This allows the MASAC Operations Committee members to concentrate heavily on the operational initiatives of the Council's charter. The MASAC chairman appoints the MASAC Operations Committee Chairman and the membership is comprised of equal public and airline representation.

MASAC Communications Advisory Board

In June 1999 MASAC established the MASAC Communications Advisory Board (CAB). Beginning the first quarter 2000, the MASAC CAB began publishing the quarterly *MASAC News* newsletter. Throughout the rest of the year the MASAC CAB published several articles on MASAC Part 150 Update initiatives, providing a chronological documentation of the Council's efforts and the progression of the Part 150 Update process. Editions of *MASAC News* can be found on the Internet at www.macavsat.org/MASAC/newsltr_table.html.

MASAC Sponsored Public Workshops

As part of the Part 150 Update process, MASAC sponsored three sets of public meetings. The first series of public workshops, held in September 1999, provided information on the need for an update, the Part 150 process and contour modeling. The second round of workshops focused on the 2005 forecasts, past Part 150 program recommendations and various preliminary aircraft and airport noise reduction recommendations. The third and final workshop focused on MASAC's role in the Part 150 process, impacted communities and the MAC's recommended mitigation strategies for the Part 150 update (including the sound insulation program).

Section

3 Updated MSP Part 150 Program

The Update process is yielding new noise mitigation initiatives and is validating existing procedures at the Minneapolis/St. Paul International Airport (MSP). Using technological advancements, the Metropolitan Airports Commission (MAC) is increasing modeling accuracy and is attempting to extend noise insulation boundaries beyond present federal guidelines. As a result, the MSP Part 150 Update is proving to be a national precedent-setting initiative.

The Part 150 Update has resulted in a comprehensive Noise Compatibility Program (NCP). The NCP includes provisions for operational noise mitigation and land use measures (including sound insulation).

The aircraft and airport operational noise mitigation initiatives focus on:

- ***Noise Abatement Departure Profiles (NADP)***
- ***Runway Use System***
- ***Departure Flight Tracks***
- ***Voluntary Operational Agreements With the Airlines***
- ***Provisions for Further Evaluation of Technology***

Land use noise mitigation initiatives include:

- ***Continuing and expanding the Part 150 sound insulation program***
- ***Bringing local land use plans into compliance with Metropolitan Council Noise Compatibility Guidelines***
- ***Zoning for compatible development***
- ***Applying zoning performance standards***
- ***Establishing a public information program***
- ***Revising building codes***
- ***Acquiring developed property in incompatible use areas***
- ***Investigating the application of a property purchase guarantee***
- ***Sound Buffers and Barriers***

The following information provides further description of the above provisions focusing on new initiatives as included in the Part 150 Update.

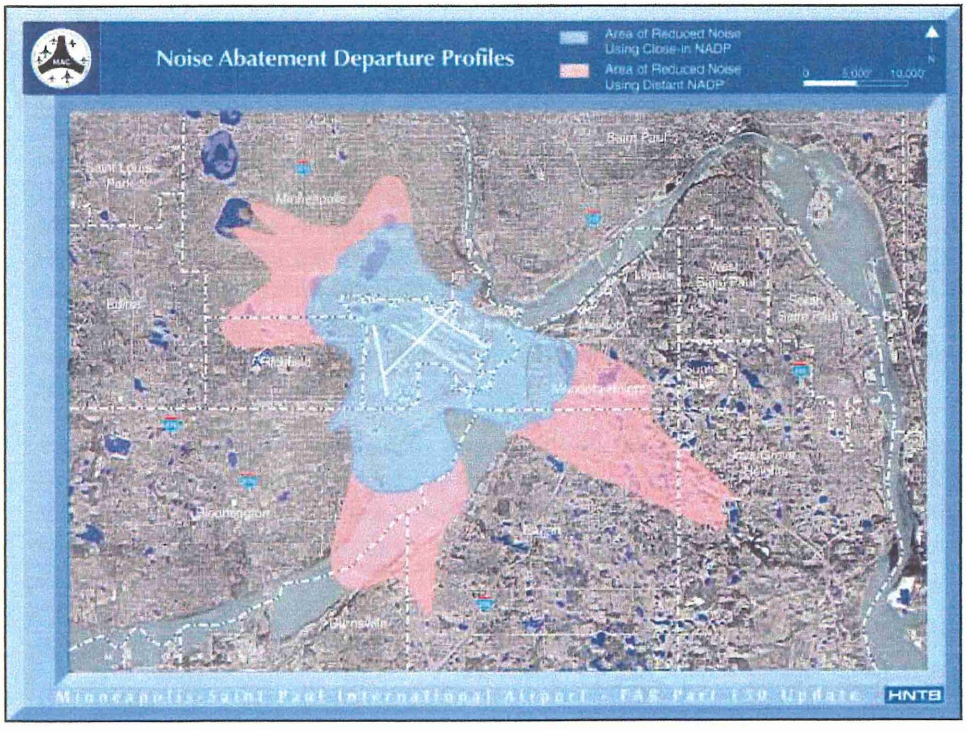
Noise Mitigation Measures

Noise Abatement Departure Profiles

A Noise Abatement Departure Profile (NADP) is a complex set of procedures that a pilot follows to control the way that an aircraft climbs away from an airport during takeoff. The procedures deal with the pitch of the aircraft, as well as power and flap settings. In the early 1990s, the Federal Aviation Administration (FAA) conducted several studies to develop standardized departure profiles to minimize aircraft noise. The intention was to provide standardized departure profiles for all airports around the country.

Prior to standardization, NADPs were developed on an airport-specific basis – resulting in a variety of intricate profiles that posed a risk of compromising the pilot's attention to cockpit details, traffic avoidance and other associated safety functions.

Under the FAA standardized rules, there are two departure profiles that airport operators can implement to reduce aircraft noise around airports. Each procedure is outlined in detail providing acceptable criteria for speed, thrust settings and airplane configurations associated with two NADPs (Close-In and Distant profiles). The Close-In Departure Profile is intended to reduce noise impacts for communities within approximately 3.5 miles (from the start of takeoff roll) of the airport the other NADP, the Distant Departure Profile, is intended to provide noise reduction for all other noise sensitive areas beyond the 3.5-mile area.



• **Figure 2:** Close-In vs. Distant NADP impacts within the contour

When the airport operator selects a departure profile, air carriers are required to implement the selected NADP for use on the specified runways. In parallel runway situations, such as the case at MSP, the same procedure must be used when departing in the same direction off the parallel runways.

Noise Abatement Departure Profile Recommendation

One of the major aircraft operational procedures providing substantial noise reduction as included in the Part 150 Update, is the implementation of the Distant Noise Abatement Departure Profile for all runways at MSP. This action represents an endorsement of the Distant Departure Profile procedure, which is already in use on runways 12L, 12R, 22, and 04. Additionally the use of the Distant Departure Profile off runway 17 is consistent with the procedures modeled in the Environmental Impact Statement (EIS) prepared for the development of that runway. The resulting change is over the South Minneapolis area where currently the Close-In Departure Profile is used. This recommendation reduces the number of residents impacted within the 60+ DNL Unmitigated Contour by approximately 9,800 residents.

The decision to implement the Distant Departure Profile on all runways, through the Part 150 Update process, was a result of significant review and analysis by the Metropolitan Aircraft Sound Abatement Council (MASAC), local governments, the Metropolitan Airports Commission (MAC) and MAC's consultant, HNTB. Implementation of the procedure can be pursued concurrently with the submittal and approval of the Part 150 Update by the authority granted to the airport operator as part of the FAA's NADP Advisory Circular provisions.

Runway Use System

The implementation of a Runway Use System (RUS) as a noise mitigation element at an airport can provide additional noise reduction benefits as part of an airport's overall operational philosophy. An effective RUS, when approached from the perspective of aircraft overflight noise reduction, can solidify runway use selections that minimize residential overflights around an airport while at the same time maximizing the use of existing compatible land uses. The challenge of successful RUS implementation is striking a balance between runway use, for the purpose of maintaining safe and expedient operations into and out of an airport, with minimizing the noise impact on surrounding residential areas.

Through the process of reviewing possible noise mitigation measures contained in the Part 150 Update Noise Compatibility Program (NCP), the MASAC Operations Committee reviewed the possibility of implementing a revised RUS. The evaluation encompassed several analyses. Implementation of an RUS is predicated on several variables including the following:

- Weather and wind conditions
- Safety
- Capacity and flow requirements
- Traffic Demand
- Aircraft Separation

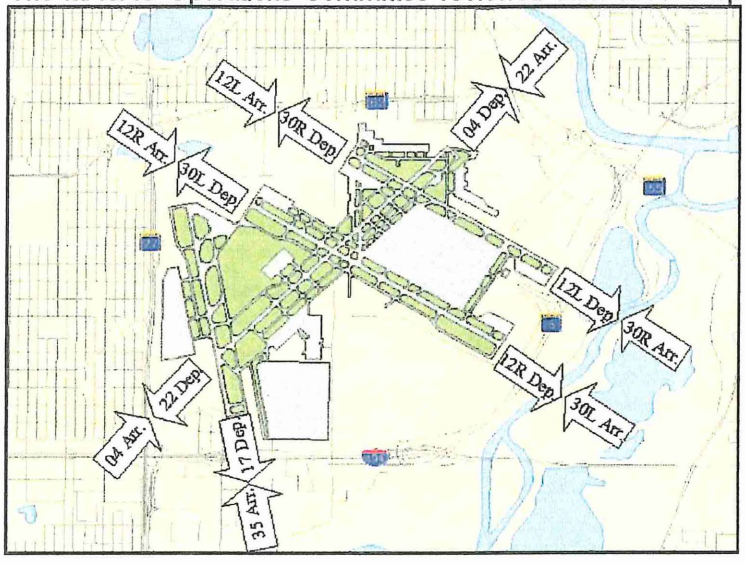
- Pilot compliance
- Air Traffic Control

Through the evaluation of the above variables, several specific factors were discovered relative to runway use at MSP. The selection of runways at MSP is determined primarily by wind and driven by capacity requirements. This results in limited options to significantly change runway use, especially during the daytime hours where capacity drives the runway determinations. Conversely, the nighttime hours provided a period where RUS implementation was a distinct possibility.

To further quantify the times of available RUS utilization, HNTB conducted an analysis that assessed daily operations at the airport on an hourly and 15 minute basis. It was determined that during times of high demand (greater than 60 operations an hour) runway use would be dictated by the wind and capacity requirements. Although, during periods of medium (between 15 and 60 operations per hour) and low (14 or less operations per hour) traffic demands, an RUS for the express purpose of noise reduction could be implemented.

Proposed Runway Use System

The MASAC Operations Committee reviewed various RUS options for implementation during low, medium and high operational periods at MSP. The result was the development of an RUS that could be implemented during the low and medium operational time periods at MSP. Use of the capacity driven RUS outlined in the Environmental Impact Statement (EIS) would be used during high demand periods.



• **Figure 3:** MSP runway configuration and runway use terminology

The RUS to be considered for noise mitigation purposes as part of the Part 150 Update NCP is listed as follows:

- Maximize use of the Eagan/Mendota Heights Corridor: depart Runways 12L/12R, arrive 30L/30R
- Second priority - depart Runway 17 arrive Runway 35
- Head to head operations when needed and operationally feasible
- Third priority - balanced use of Runway 4/22

- Depart Runways 30L/30R and arrive Runways 12L/12R at all other times

By using the proposed preferred RUS departure runway priorities of 12's, 17, 22, 04, 30's and arrival runway priorities of 30's, 35, 04, 22, 12's, the proposal results in a reduction of 540 people within the 60+ DNL contour (the population change values are relative to the 2005 Unmitigated Contour).

Runway 17 Departure Flight Tracks

The introduction of Runway 17/35 in 2003 will change the dynamics of the noise environment around MSP. This is especially significant when generating noise contours and a Noise Compatibility Program (NCP) as part of a Part 150 Update predicated on 2005 airport operations.

As part of the review process for runway 17/35 the EIS and Record of Decision (ROD) stated that noise abatement measures could evaluate departure tracks off Runway 17 in an effort to avoid populated areas in close proximity to MSP, specifically in Bloomington. Pursuant to that initiative, MASAC investigated flight track options off Runway 17 through the Part 150 Update process.

The EIS contained a series of proposed flight tracks off Runway 17 that included tracks "A" through "G", which provided a 190° heading fan from 95° clockwise to 285°. Using these tracks as a starting point, MASAC began an evaluation of possible flight track options off Runway 17. Throughout the process consideration was given to procedures that provide sufficient guidance to ensure that aircraft of varying performance capabilities could avoid, as much as possible, populated areas while en-route to their destinations.

The MASAC Operations Committee goals relative to the Runway 17 departure flight track analysis were as follows:

- Reduce noise impacts within the 60+ DNL contour
- Avoid increased overflights of other communities
- Maintain runway capacity
- Feasible implementation by FAA/Air Traffic Control
- Provide positive guidance to aircraft so they can reasonably follow desired flight tracks
- Allow for possible future transition to FMS/Global Positioning System (GPS) navigation

With the above goals as the cornerstone of the evaluation efforts, several options were discussed. The options included varying departure track fan concentrations ranging from a 60° fan (headings from 140° to 200°) to a full 190° fan (headings from 095° to 285°). These various scenarios also included the proposed deletion of EIS modeled tracks, in some cases, to accommodate the various departure fan ranges. As a result of the extensive analyses conducted by the MASAC Operations Committee and the Runway 17/35 City Group, a proposal was developed that addressed the areas west and east of runway heading (170°) uniquely relative to the existing land uses on either side of runway heading.

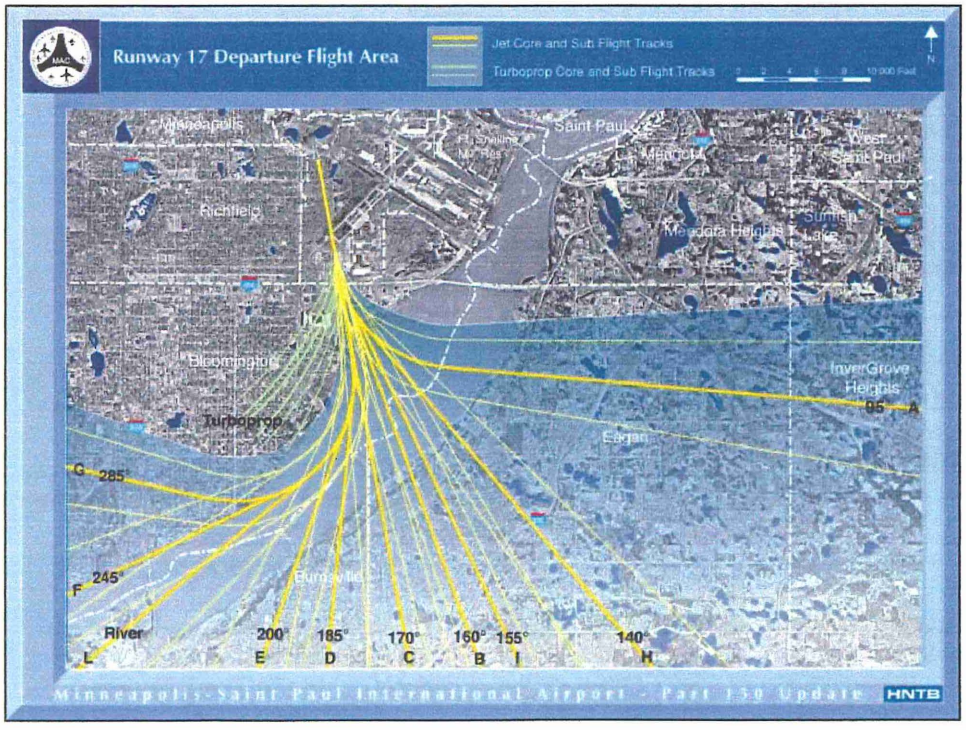
Runway 17 Departure Flight Track Recommendation

After significant review, MASAC recommended that operations which have initial departure headings east of runway heading (headings from 95° to 170°) should initiate their turns as soon as possible when departing Runway 17. This recommendation was made due to the fact that there is no one flight path considered "better" than another when departing to the southeast over the existing residentially developed areas. This is consistent with the EIS documentation for Runway 17.

When conducting the same evaluation for departure headings west of centerline (headings from 170° to 285°) two main considerations arose: (1) Heavily residential developed areas exist west of runway heading almost immediately off the runway end and (2) the Minnesota River Valley south of the airport offers an area where departure operations could overfly at higher altitudes in an effort to reduce residential overflight impacts close-in to the airport.

As a result of the deliberations, a delayed turn point off runway heading (170°) for westbound jet departures offered a solution that not only reduced the number of residents within the 2005 Mitigated Contour but was also feasible for implementation according to the FAA's airspace management criteria.

As a result of evaluations and comprehensive input from MASAC, the MASAC Operations Committee and the Runway 17/35 City Group, the recommended Runway 17 departure tracks include departure turns as soon as possible for departures east of 170° to 95° and a 2.5 nautical mile (from the start of takeoff) turn point, as determined by Distance



• **Figure 4:** Runway 17 departure tracks with a 2.5 nautical mile DME turn point

Measuring Equipment (DME), at which time jet departure operations would turn from runway heading (170°) to westbound departure headings between 170° and 285°.

River Departure and Arrival Flight Tracks

In an effort to further utilize the compatible land use which the Minnesota River Valley offers south of MSP, consideration was given to specific procedures that would maximize the overflight of the river valley for departures off Runway 17 and arrivals on Runway 35. Through significant evaluation and with input from the FAA three options were developed.

Recommended River Departure and Arrival Flight Tracks

As a result of the mentioned analysis, two Runway 17 river departure procedures and one Runway 35 river arrival procedure were incorporated into the Part 150 Update. The three procedures include a published river departure procedure, river heading departure flight track and a visual river approach procedure.

Published River Departure Procedure

This procedure would be implemented via a published departure procedure for Runway 17. It is intended to route Runway 17 departure operations over the Minnesota River Valley, avoiding residential areas.

The procedure would direct aircraft to fly a straight-out heading of 170° until reaching a turn point located three nautical miles from the start of takeoff roll. At that point, the aircraft would turn to a heading of 245° to overfly the river. This procedure is intended for aircraft departing to the south and west of the airport.

Because of the capacity impact this procedure poses during mid and high traffic demand time at the airport; this procedure would most likely only be used during low demand time periods. This would equate to typical procedural use between the hours of 12:15 a.m. and 5:30 p.m.

River Heading Departure Flight Track

This procedure designates the 230° heading as a river heading, when used in conjunction with the 2.5 nautical mile turn departure fan off Runway 17. The 230° heading (Track L) routes aircraft over the river valley.

Because this procedure is not a published procedure, and not part of a flight plan, the heading can be assigned by the Air Traffic Control Tower as part of the takeoff clearance. This would allow for the procedure to be used at any time when the FAA personnel in the Air Traffic Control Tower can work it into the traffic flow. This procedure is intended for aircraft departing to the south and west of the airport.

Visual River Approach Procedure

This procedure considers a visual river approach to Runway 35 that routes arriving aircraft over the river valley. The purpose of this procedure is to reduce aircraft arrival overflights of residential areas.

Aircraft using this procedure would approach from the southwest, flying a 65° heading over the river. As the aircraft nears the airport, it would turn on to final approach and align with Runway 35.

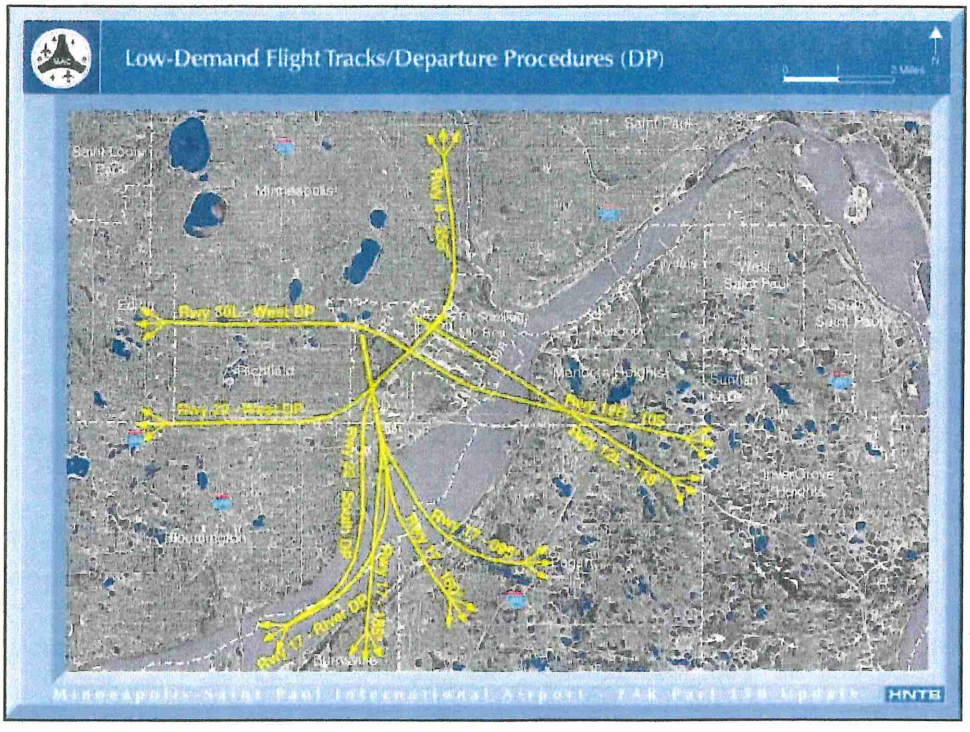
Several issues need to be resolved prior to implementation of this procedure, including airspace design, Flight Standards District Office (FSDO) concurrence and flight testing. Also, additional analysis would be required to determine if the procedure could be safely used at night.

Low Demand Flight Tracks

In an effort to reduce noise impacts during low demand periods the MASAC Operations Committee endorsed preferred departure tracks for runways 30L, 12L/12R, 04, 22 and 17. The intent of this initiative was to determine flight track priorities and procedures for use by Air Traffic Control (ATC), which would minimize the impacted population, for use during low demand periods.

Low Demand Flight Track Recommendation

In order to establish the best low demand flight tracks for each runway, HNTB used DC9 hushkit, 90 dBA SEL contours to measure impact. The resultant MASAC Operations Committee proposal does not severely detour aircraft from their destination and is intended to give ATC guidance on selection of appropriate flight tracks during low-demand periods producing the least amount of noise impact on residents. This does not negate



• Figure 5: Low demand flight tracks

deviation from these tracks for the purposes of safety, aircraft performance, pilot compliance, weather and traffic conflicts. Below are MASAC's recommendations by runway.

Runway 04

- When practical, ATC will assign headings that roughly overfly the river basin (approximately 355° true/353° magnetic). However, precise navigation of this route is not possible without external navigation to aid the pilot. Therefore, a departure

procedure (DP) that overflies the river basin for use by non-heavy and high-performance aircraft should be developed and implemented.

Runway 22

- Develop and implement two departure procedures, a west DP and a south DP.
- West DP - Flight track over the I-494 Highway Corridor for use by westbound and northbound traffic.
- South DP - Flight track with a turn prior to Cedar Avenue and then another turn to the southwest over the river for use by westbound and southbound traffic.

Runway 12L and 12R

- Continue use of the Crossing in the Corridor procedure.
- Investigate use of future technology to optimize flight track location and further minimize the impacted population.

Runway 30L and 30R

- Continue the existing procedure of dispersing departure traffic away from the runway centerline flight track to avoid concentrating both arrival and departure traffic on the same flight track.
- Investigate a DP that overflies Trunk Highway 62.

Runway 17

- Disperse departure traffic away from the centerline flight track to avoid concentrating arrival and departure traffic.
- Eastbound departures use a 095° heading
- Southbound departures use a 160° heading
- Westbound departures use a 185° heading
- Investigate use of a river DP for use by westbound departures

Development of some of the above DPs will require the use of precision navigation technologies such as FMS/GPS. In an effort to implement the above procedures, coordination with the FAA will be paramount in determining the feasibility and implementation options with respect to the proposed DP per runway. The evaluation of new navigation technologies is currently being conducted as part of a GPS Needs Assessment. This Assessment will consider the integration of GPS-related applications and technologies at MSP as an element of the Part 150 Update Noise Compatibility Program (NCP) recommendations.

Provision for On-Going Evaluations of Global Positioning System (GPS) Technology

As part of the development of various mitigation measures for the Part 150 Update, MASAC and the MASAC Operations Committee undertook an evaluation of GPS technology from the perspective of noise reduction around MSP. The evaluation yielded findings that highlighted the need for a national FAA policy relative to GPS technology in concert with national airport and aircraft GPS augmentation in order to fully realize the benefits of GPS technology in helping to enhance noise programs at the nation's airports.

GPS Evaluation Recommendation

As a result of the evaluation, it was determined that GPS technology, although available, is not currently at the point of offering immediate noise-reducing aircraft operational enhancements because of the mentioned variables. However, as the technology

continues to become integrated into the National Airspace System, future applications could prove beneficial to enhancing aircraft operational noise reduction initiatives at airports. Therefore, MASAC approved the exploration of GPS/FMS technology to evaluate existing and proposed departure and arrival procedures as a future noise mitigation measure as part of the Part 150 Update mitigation program.

Voluntary Nighttime Operations Agreements With the Airlines

Throughout the Part 150 Update process, the MAC and MAC's consultant (HNTB) have worked closely with airlines operating at MSP to compile accurate fleet mix information for the development of the 2005 Noise Exposure Maps (contours). As part of this process, extensive evaluations were conducted on behalf of the airlines and the MASAC Operations Committee with regard to the reduction of nighttime operations at MSP.

Voluntary Nighttime Operations Agreement Recommendation

Several options were evaluated from the perspective of all parties involved. The result of this cooperative effort was approval and endorsement by MASAC of a voluntary nighttime agreement with airlines operating at MSP. The agreement would state that, to the greatest extent possible, airlines operating at MSP should not schedule operations in the nighttime hours between 10:30 p.m. and 6:00 a.m. The agreement would further state that, if an operation must occur during this timeframe, the aircraft used should be the quieter (non-hushkitted) manufactured Stage 3 aircraft. Special exceptions would apply to operations that occur during the nighttime hours because of emergencies, mechanical problems, Air Traffic Control delays and weather.

Low Frequency Noise Abatement

The Low Frequency Noise Policy Committee (a group consisting of representatives from Richfield, Bloomington, Minneapolis and the MAC that studied the impact of low frequency noise on residential properties) has produced a report that addresses low frequency noise impacts and mitigation tactics which will be incorporated into the Part 150 Update.

The Committee, established through an agreement between the city of Richfield and the MAC in December 1998, received technical support from the FAA, Minnesota Pollution Control Agency, Metropolitan Council, MASAC and industry experts. One expert was appointed by the MAC, one by the city of Richfield and the third was appointed by the first two designated experts. The goal of the Committee was to establish a descriptor for low frequency noise, a threshold, proposed mitigation and associated policies.

The scope of the MSP low frequency noise study is significant because it goes beyond other studies undertaken by the FAA and other airports.

Low Frequency Noise Recommendations

On August 10, 2000 the Low Frequency Noise Policy Committee met to discuss the draft Low Frequency Noise Policy Committee Report. The draft document was approved outlining the Harris and Fidell contours and the resultant policy contour, which outlines the mitigation areas relative to the 87 dB, 78 dB and 70 dB Low Frequency Sound Levels (LFSL).

The recommendations for treatment to reduce interior LFSL in **existing residential** areas are as follows:

- **<70 dB LFSL**: no treatment to reduce rattle and no requirement to reduce interior LFSL.

- **70-77 dB LSFL**: treat rattle directly and decrease interior LFSL by 5 dB (Based on findings of the social survey, the existing Part 150 Residential Sound Insulation Program provides the equivalent of 5 dB reduction, therefore no further reduction is necessary.)

- **78-86 dB LFSL**: treat rattle directly (may not be fully adequate) and decrease interior LFSL by 5 dB and consider reducing by more than 5 dB.

- **>87 dB LFSL**: treat rattle directly (probably not fully adequate) and decrease interior LFSL by at least 10 dB (probably not economically feasible).

In addition to the above recommended treatments the report outlined recommended rattle prevention and limits for interior LFSL for **new construction**. Below is a summary of the information:

- **<70 dB LFSL**: no rattle treatment and no special requirement for interior LFSL reduction.

- **70-77 dB LSFL**: rattle prevention and 15 dB interior LFSL reduction.

- **78-86 dB LFSL**: rattle prevention and 20 dB interior LFSL reduction.

- **>87 dB LFSL**: do not develop for residential use.

The next step in the approval process includes submittal to the FAA via incorporation in the Part 150 Update document. Additional information, such as the number of affected units and associated costs, are being generated.

Land Use Measures

A Noise Compatibility Program (NCP), in addition to operational noise mitigation measures, includes a multitude of Land Use (LU) Measures (the portion of the NCP that addresses sound insulation). NCP measures focused on land use initiatives usually include measures associated with:

- ***Preventative Land Use Measures*** (efforts to prevent the introduction of incompatible land uses around the airport)

- ***Corrective Land Use Measures*** (efforts to correct existing incompatible land uses around the airport)

The Metropolitan Aircraft Sound Abatement Council (MASAC) Operations Committee reviewed 14 total land use measures for consideration.

Recommended Land Use Measures

Eight of the 14 evaluated land use measures were existing Part 150 land use measures modified slightly for incorporation into the Part 150 Update. The Council endorsed the original eight land use measures with slight modifications. Six additional land use

measures were evaluated resulting in the endorsement of one additional land use measure (LU9 - Creation of sound buffers/barriers). The land use measures that were analyzed and approved by MASAC are as follows:

- LU1: Bring local land use plans into compliance with Metropolitan Council Noise Compatibility Guidelines: Metropolitan Council, the Metropolitan Airports Commission (MAC) and MASAC have developed language that designates the DNL 60 as the land use planning standard for the application of preventative and corrective land use measures.

- LU2: Zone for compatible development: Based on the new Metropolitan Council land use planning language, communities should adopt zoning classifications and ordinances that prevent future incompatible land use.

- LU3: Apply zoning performance standards: Develop new model ordinances for home construction consistent with the Federal Aviation Administration (FAA) land use policies aircraft noise attenuation.

- LU4: Establish a public information program: Continue to provide information utilizing new technologies and multimedia capabilities.

- LU5: Revise building codes: Support revision of state and local building codes to ensure interior noise level reduction as a result of new building techniques.

- LU6: Acquire developed property in incompatible use: Review the possible practical application of this measure as part of the program in coordination with other mitigation measures.

- LU7: Property purchase guarantee: Develop this program in coordination with other mitigation measures.

- LU8: Part 150 sound insulation program: Provide sound insulation in coordination with other operational mitigation measures (out to the 60 DNL contour).

- LU9: Creation of sound buffers/barriers.

Additionally, MASAC requested modification to the Metropolitan Council's Aviation Policy Plan and Land Use Compatibility Guidelines to reflect language that designates the DNL 60 as the land use planning standard for all corrective and/or preventative Part 150 measures. With Met Council's endorsement, land use planning language would be consistent for all communities within the Part 150 Program land use and impact areas.

Noise Mitigation Implementation Policy Provisions

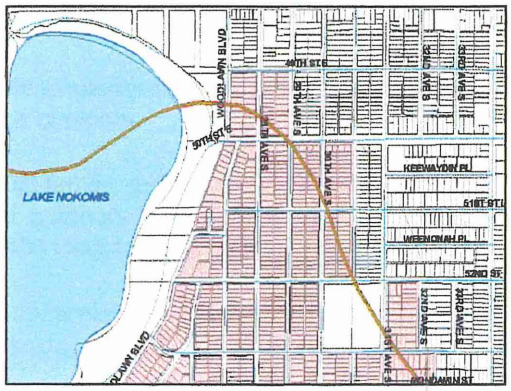
Contour Boundary Definition

Once the Part 150 contours are developed, boundaries outlining the extent of the mitigation area should be assessed relative to homes located at the contour edge. Parcels wholly contained within the approved contour are eligible for sound insulation. But, parcels that are dissected by or just missed by the line need to be evaluated for inclusion with input from the communities, the Metropolitan Airports Commission (MAC) and the Federal Aviation Administration (FAA).

Through input from surrounding communities and approval by the FAA, the MAC has implemented a contour boundary definition scheme that assesses sound mitigation eligibility on a block, rather than a parcel, level. The current program insulates all homes on a given block that is contained within or is touched by the 65 DNL contour.

The 2000 Part 150 update will once again address the issue of contour boundary definition relative to the new contour. Because the Part 150 update proposes that homes beyond the FAA-recognized 65 DNL be insulated, the Metropolitan Aircraft Sound Abatement Council (MASAC), the MAC and surrounding communities have worked together to develop a contour boundary plan acceptable to the FAA. If the MAC and communities propose contour boundaries that are too aggressive, the FAA may disapprove the Part 150 Noise Exposure Map – potentially delaying or even halting the MAC's ability to insulate beyond the DNL 65 contour.

The MAC's proposed boundary area submission to the FAA is only preliminary. The ability for the MAC to determine any given home's participation status cannot be considered until after the FAA approves this Part 150 Update.



• **Figure 6:** Current MSP sound insulation contour boundary definition

Contour Boundary Definition Recommendation

An important part of addressing noise impacts within established noise contours is determining how the contour line and the associated boundary of a noise mitigation program will be addressed. The issue of determining contour boundaries varies from airport to airport throughout the nation. As a result, established FAA precedent, relative to existing airport noise mitigation program boundaries, is significant when evaluating updates to such programs. As part of the Part 150 Update, MASAC evaluated various options for defining the updated contour boundaries out to the 60 DNL contour line. Realizing the national precedent-setting implications of going out to the 60 DNL contour (currently national policy recognizes mitigation only within the 65 and greater DNL contours), MASAC reviewed all boundary definition options in detail. The resulting MASAC recommendation for the Part 150 Update is to maintain the current boundary definition that includes all homes within a given block that is wholly within or touched by the contour.

Single-Family and Multi-Family Sound Insulation Priority

The effective management and implementation of a Residential Sound Insulation Program is contingent on several variables. One of the most critical is establishing a schedule for insulation that addresses the various types of dwelling units and their priority relative to noise insulation. More specifically, prioritizing the insulation of single-family and multi-family dwellings within a defined impact area is a critical portion of Part 150 Residential Sound Insulation Programs.

Realizing this, MASAC reviewed all viable options for sound insulation priorities relative to single-family and multi-family dwellings. After considerable review and consideration of all possible options, keeping in mind FAA concerns, MASAC approved the following sound insulation priority (in order of priority) as part of the Part 150 Update:

1. Complete the sound insulation of single-family and duplex homes within the 1996 DNL 65 and greater noise contours

2A. Complete the sound insulation of multi-family residential structures within the 1996 DNL 65 and greater noise contours in conjunction with priority 2B and then sequencing to 2C below upon FAA approval of the Part 150 Update document

2B. Complete the sound insulation of single-family and duplex homes that fall within the 2005 DNL 65 and greater DNL noise contours

2C. Complete the sound insulation of eligible single-family and duplex homes that fall within the 2005 DNL 60 to DNL 64 noise contours

3. Complete the sound insulation of multi-family residential structures within the 2005 DNL 65 and greater DNL noise contours in conjunction with priority 2C above upon FAA approval of the Part 150 Update document

4. Complete the sound insulation of multi-family residential structures within the 2005 DNL 60 to DNL 64 noise contours

5. Complete the sound insulation of nursing homes and churches with regular weekday daycare/nursery school programs within the 2005 DNL 60 contour

The above priority takes into account FAA input, as well as considerations for the smooth transition from our existing Part 150 noise mitigation program to the expanded noise mitigation program as outlined in the Part 150 Update.

Summary

The Part 150 Update process has been a significant undertaking for the Metropolitan Aircraft Sound Abatement Council (MASAC) and the MASAC Operations Committee. Through extensive commitment and diligent efforts, a comprehensive Noise Compatibility Program (NCP) has been developed. The resultant program addresses the impacts associated with future growth in aviation, as well as the introduction of a new North/South Runway at MSP.

The proposed Part 150 Update NCP results in the following preliminary assessment of effects on population within impacted areas relative to the 2005 Unmitigated DNL Contours:

- DNL 70 dBA contour - approximately 230 people added
- DNL 65 dBA contour - approximately 1,030 people removed
- DNL 60 dBA contour - approximately 13,780 people removed
- Total change in the 60+ DNL contour - approximately 14,580 people removed from the contour

It is important to note that the vast majority of people added to the contour levels between 65 and 75 DNL are already receiving noise insulation as part of the existing Part 150 program. The small number which are added between the 65 and 75 DNL levels, and are not already receiving noise insulation, is largely a result of runway 17/35, which impacts a predominately new area previously not eligible for insulation in Bloomington.

Draft publication of the document will occur on October 6, 2000. Following that, MASAC will sponsor two Part 150 Update public hearings.

The public hearings will be held on November 8, 2000 and November 9, 2000, at the Thunderbird Hotel, 2201 78th Street East, Bloomington, MN 55425-1229. A public workshop will be held each day from 5:00 p.m. to 7:00 p.m. with the public hearing beginning at 7:00 p.m. The two dates are provided to allow a greater opportunity for public involvement. The format and presentation will be the same for both dates.

Both written and verbal comments will be taken at the hearing. Written comments will also be accepted until 5:00 p.m. on November 15, 2000. Following the close of the comment period, the document will be forwarded to the Metropolitan Airports Commission (MAC) for review and approval and then submitted to the Federal Aviation Administration (approximately December 20, 2000) for approval.

Appendix A

2005 Mitigated Contour