Metropolitan Airports Commission (MAC)

Minneapolis-St. Paul International Airport (MSP)
Noise Oversight Committee (NOC)
MAC General Office Building
Lindbergh Conference Room
6040 28th Avenue South
Minneapolis, MN 55450

NOC Committee Members
Dianne Miller – Co-Chair, City of Eagan Representative (City of Eagan)
Jeffrey Hart – Co-Chair (Delta Air Lines)
Ryan Barette – Minnesota Business Aviation Association Representative
Kyle Bronowski – At-Large Airport User Representative (Endeavor Air, Inc.)
Pam Dmytrenko – City of Richfield Representative (City of Richfield)
Andrew Johnson – City of Minneapolis Representative (Minneapolis City Council)
John Klinger – Chief Pilot Representative (Delta Air Lines)
Todd Lawrence – Charter/Scheduled Operator Representative (Sun Country Airlines)
Tom Link – At-Large Community Representative (City of Inver Grove Heights)
Dwayne Lowman – City of Bloomington Representative (Bloomington City Council)
Jay Miller – City of Mendota Heights Representative (Mendota Heights City Council)
Angie Moos – Cargo Carrier Representative (United Parcel Service)

MEETING AGENDA

March 21, 2018 at 1:30 pm
MAC General Office Building
Lindbergh Conference Room
(Jeff Hart, Delta Air Lines, will be the acting Chairperson for the meeting)
***Note:** 1:00 to 1:30 – Committee Agenda Review Session
(NOC members only in the Coleman Conference Room)

1. 1:30 – 1:35 Review and Approval of the January 24, 2018 Meeting Minutes
2. 1:35 – 1:50 Review of Monthly Operations Reports: January and February, 2018
3. 1:50 – 2:30 Response to MSP FairSkies Requests
4. 2:30 – 3:00 MSP Noise Management Benchmarking Study Scope
5. 3:00 – 3:20 2017 Annual Noise Contour Report and Mitigation Eligibility
6. 3:20 – 3:30 Vortex Generator Noise Monitoring Study
7. 3:30 – 3:40 Super Bowl Activity Debrief
8. 3:40 – 3:50 Review of the Winter Listening Session
9. 4:00 Public Comment Period
10. Announcements
11. Adjourn

MSP NOISE OVERSIGHT COMMITTEE
DRAFT MEETING MINUTES
Wednesday, 24th of January 2018 at 1:30pm

MAC General Office
Lindbergh Conference Room

Call to Order

A regularly-scheduled meeting of the MSP Noise Oversight Committee, having been duly called, was held Wednesday, 24th of January 2018, in the Lindbergh Conference Room at the MAC General Office. Chair Miller called the meeting to order at 1:31pm. The following were in attendance:

Representatives: T. Link; L. Moore; G. Goss; H. Moody; D. Miller; P. Dmytrenko; L. Olson; D. Sloan; A. Moos; D. Lowman; A. Mason

Staff: D. Nelson; B. Juffer, C. Leqve; A. Kolesar; J. Lewis;

Others: C. Koppen – UPS; D. O'Leary – City of Sunfish Lake; M. Nolan – City of Edina; Maria Reagan Gonzalez – City of Richfield; J. Winingar – FAA; J. Davidman Delta; L. Grotz – City of Edina; B. Hoffman – City of Saint Louis Park; K. Terrell – MSP FairSkies; S. Devich – City of Richfield; M. Sands – FAA; S. Thompson – MSP FairSkies

1. Review and Approval of the November 15, 2017 Meeting Minutes

Chair Miller, Eagan asked if there were changes to the November Meeting Minutes, there were none and approval was moved by **Representative Dmytrenko, Richfield,** seconded by **Representative Goss, Delta,** and passed unanimously.

2. Review of Monthly Operations Reports: November and December, 2017

Brad Juffer, Assistant Technical Advisor, reported that there were 32,268 operations in November and 33,098 operations in December, with November 2017 slightly higher than 2016 while December 2017 had 5 less flights than December 2016.

Juffer then reported there were 1,789 flights between 10:30 PM and 6:00 AM in November, which is two more than November 2016. December had 2,119 nighttime operations, which is 33 less than December 2016.

The annual flights recorded in the MAC's Noise and Operations Monitoring System (MACNOMS) in 2017 was 413,480. This is a minimal increase of .6% from 2016. Total operations between 10:30 pm and 6:00 am ended the year at 24,241. This is a 3.35% decrease from 2016.

Juffer then noted that MACNOMS does not record every operation at MSP, historically we capture 99.5% of all activity as reported by the FAA. In 2017, the FAA recorded 415,703 operations at MSP.

MSP runway use during 2017 saw more of a balance between use of North Flows and South Flows than in 2016. Approximately 50% of all departures in 2017 used Runways 30L or 30R while nearly 50% used 12L, 12R or 17. Approximately 57% of all arrivals in 2017 used Runways 30L, 30R or 35 and 43% used 12L or 12R.

The chief cause of change in runway use is a result of the FAA's efforts to adjust to CRO rules. Northbound arrivals to Runways 30L, 30R and 35 increased in 2017 when compared to 2016. The net result was more hours spent in a North or Straight North Flow.

Departures from Runways 30L and 30R also increased in 2017. The change was not balanced between the two runways. One of the effects of CRO was the FAA funneling departures to Runway 30R during CRO operations and in 2016 there were atypically more departures on Runway 30R than on Runway 30L. This condition returned to a more normal state with Runway 30L handling 27% of the departures and Runway 30R taking 23%.On the south flow runways, arrivals to Runways 12L and 12R decreased by more than 13,000 operations and the same 13,000 reduction occurred on Departures from 12L,12R and 17. The drop in time spent in South Flow was absorbed by time in a North Flow and a slight increase in Mixed Flow.

Juffer then reported on the trends in fleetmix categories, noting that the annual numbers for carrier jet splits follow the trend from 2013 through 2017. The use of narrowbody aircraft is increasing, use of regional jets is decreasing, and widebodies are stable.

The noise office received complaints from 244 locations in November falling to 187 in December. In 2016, 304 locations filed a complaint in November and 183 locations filed a complaint in December. These locations filed a total of 8,929 complaints in November and 7,184 complaints in December. The two months had 2,500 more complaints than the same time period in 2016, a 19% increase.

For all of 2017, the Noise Office received 149,055 complaints. This is an increase of 32,000 or 27% from the previous year.

Juffer used a grid map to visually differentiate complaint numbers and locations.

Grids highlighted in yellow filed 12 or less complaints for the whole year or 1 per month. There were 179 of these areas out of the 403 total. 63 areas only filed one complaint all year.

On the other end of the spectrum,

- there were 8 areas of the metro that filed between 10-25 times per day
- There was 1 area that filed between 25-50 complaints per day
- There was 1 area that filed more than 50 complaints per day

Juffer then changed to a graphic showing the grid shading to represent complaint location density.

The majority of the 403 unique grid areas from 2017 had 10 or less locations. 368 or 91% of these locations had less than 10 locations. What is noteworthy is 60% of the grids had 1 or 2 locations.

Moving up the scale

- 21 grids had between 11 and 20 locations
- 11 grids had between 21 and 30 locations
- And 3 locations had more than 30 locations. There were 105 locations in this 3 grid area E of Lake Harriet

Juffer explained that the top ten complaint locations filed a total of 78,106 complaints or 52% of the total at MSP. The top 25 locations filed 101,761 complaints or 68% of the total at MSP. On the opposite end, 1,146 locations or 71% of all accounts filed 10 or less complaints.

Juffer continued with presenting sound monitoring data. He reported a total of 438 hours of November was spent above 65 dB recorded by aircraft at the MAC's system of 39 Remote Monitoring Towers (RMTs), dropping to 365 hours in December.

The RMTs recorded 83,362 aircraft events above 65 dB in November and 73,949 events in December.

Juffer continued on to noise abatement, the Runway 17 Departure Procedure was used 99.7% and 98.8% of the time in November and December, respectively. There were 46 jets that turned west of the turn-point in December, higher than normal. During December 7, strong winds from the west/southwest were reported, resulting in 15 flights diverting west of the turn point.

The Eagan-Mendota Heights Corridor Procedure was used 97% and 97.2% of the time in November and December, respectively. **Juffer** noted the continuing trend of 4 consecutive months with > 97% usage. The Crossing-in-the-Corridor procedure was used 25% and 31% of the time during the day and 45% and 34% of the time at night in November and December, respectively.

On the Runway Use System, high priority runways were used 54% and 55% of the time in November and December, respectively. In November there was more balance between North/South priority runways. That shifted in December when 50% of the hours were spent in a North Flow and 27% of the hours were spent in a South flow.

Juffer then reported the 2017 year-end noise abatement trends compared to 2016, noting the annual use of the Eagan-Mendota Heights Corridor and Runway 17 Departure procedures increased, while the Crossing-in-the-Corridor procedure fell slightly and the RUS high-priority runways remained level

Representative Link, Inver Grove Heights, asked why the nighttime flight numbers leveled off and **Juffer** responded that there may be one specific reason, then a multitude of other reasons for the leveling-off of nighttime operations in 2017. During 2016 Delta Air Lines had a computer interruption, which led to many nighttime operations in order for the flight schedules to get back on track. **Representative Olson, Minneapolis,** asked to clarify November and December's flow and the percentages of their use. **Juffer** responded that in both months, anything that isn't represented by the North Flow/South Flow/Mixed Flow would be either considered Unusual, which

didn't occur in December, or Opposite Flow. Opposite Flow numbers aren't usually reported because they represent so few operations because it usually occurs only at night.

3. Update on Phoenix Sky Harbor International Airport PBN Ruling

Dana Nelson, Technical Advisor, reminded the committee that the D.C. Circuit Court ruled that the FAA vacate Performance Based Navigation (PBN) procedures implemented at Phoenix Sky Harbor (PHX) Airport for failing to follow environmental laws and for failing to involve all stakeholders. In response, the parties jointly filed a petition to the Court to accept a two-step plan that they co-developed. The petition asks the Court to clarify the scope of its order; requesting the Court limit it to the nine westbound Area Navigation (RNAV) departure procedures at PHX which were the focus of the litigation and to r*emand* but not *vacate* the procedures. Step one of the petition says that the FAA would create new, temporary instructions for departures to the west that would route aircraft near the airport in a manner to approximate the routes prior to the implementation of RNAV departures. Step two states that the FAA would develop new westbound RNAV departure procedures and consider routes that approximate the routes prior to the initial RNAV implementation near the airport. The FAA also would consider feedback on procedures throughout the Phoenix area. The FAA would also be required to conduct community outreach, safety and environmental reviews during these two steps.

Nelson then reminded the Committee of its 2014 RNAV Resolution for MSP PBN procedures and stated that these recent FAA actions in Phoenix reinforce the exact points raised in the NOC's RNAV Resolution: a successful implementation of such RNAV flight procedures requires community outreach.

Chair Miller, Eagan, asked if there was anyone present from MSP FairSkies that was planning to speak as Kevin Terrell was not present. Nobody came forward and as such, **Chair Miller** swapped agenda item 4 and 5 to accommodate.

4. Annual MSP Fleet Mix and Nighttime Operations Report

Dana Nelson, Technical Advisor, reminded the Committee that at the end of every year, the noise office reports the annual fleet mix and night time operations information. In November 2017, the Committee had some suggestions for data points to be added to the report. Staff took the opportunity to revise the report to account for the Committees feedback and to use year-end 2017 data for an annual comparison.

Nelson's summary of the Annual MSP Fleet Mix and Nighttime Operations Report began with a steady increase in narrowbody jets to 57.3% of aircraft while regional jets decreased to 40% and widebody jets have stayed at a steady low level, about 2.7% of the total aircraft fleet.

In the widebody category, the A330 continues to be a more popular jet with the B763 coming in second, the MD11 is third and the B777 is fourth. In the narrowbody category, the two top aircraft types are the A319 and the A320, the B738 is next, and the last is the MD90 at 8.8% within this category of aircraft. The regional jet category shows the CRJ2 being used the most, the CRJ9 dropped from 13% to 11% in 2017, and the E170 came in last.

Nelson presented a graph that showed each aircraft in the fleet and its related certificated noise level as a source to compare the cumulative noise levels associated with the fleet mix. Stage 3 noise requirements are what is currently required by the FAA and all the jets meet that criteria, all

but one of the jets meet the Stage 4 noise standards, and majority of them meet the new Stage 5 noise standards.

A graph showing the altitude points for aircraft arriving to MSP was presented and **Nelson** noted the altitude arrival patterns and points have been consistent since 2016 with the average around 1,000 feet above MSP field elevation. Looking at the same points for departures, **Nelson** again noted the consistency in aircraft altitudes with the average altitude between 1,400 and 1,800 feet above MSP field elevation.

Nelson mentioned the average daily nighttime operations and showed the numbers from 2008-2017 and reported an average of 66 operations per night.

Overall runway use numbers for 2017 as compared to the 2014-2016 average show that there is some variation. Runway 35 has a slight increase in arrivals as does 30L, while arrivals to Runways 12L and 12R both show a decrease. **Nelson** presented a chart showing the top 15 nighttime operations by airline, reporting that Delta has the highest contribution to the total nighttime operations count, however their nighttime operations are only 4% of their total operations at MSP. United Airlines increased nighttime operations from 2016 by about 30%, Delta decreased by 6%, FedEx increased by 31%, and Endeavor decreased by 41%. These numbers are representative of actual operations, not scheduled operations. Related to this, **Nelson** then showed a graph representing the top 15 aircraft during nighttime operations and the B738 had the highest count which is about 11.3-17.1 EPNdB below Stage 3 noise standards. **Nelson** also noted that the majority of arrivals at night are originating from western airports such as Los Angeles, Las Vegas, San Francisco and Phoenix. On average in 2017, 50% of nighttime operations occurred between 10:30 PM and midnight. Comparing 2017 numbers to the average of 2013-2016, the biggest increase occurred between 10:30pm-1:00am while the operations decreased from 1:00am-3:00am. When comparing the variation in scheduled nighttime operations to actual, there is an increase in actual for both 2017 and the average of 2013-2016. It should be noted that the source for tracking the scheduled operations at MSP doesn't account for all operations, such as some MSP regional jets or cargo schedules, therefore those operational statistics are only for a portion of the data.

5. Response to MSP FairSkies Requests

Chad Leqve, MAC Director of Environment, provided background on the MSP FairSkies request presented to the NOC in 2017. MSP FairSkies requested the NOC: enhance the NOC with greater stakeholder (citizen) representation, establish a goal to reduce noise, and to produce a 55dB and N65 NEM/Contour.

In regards to the request to enhance NOC with greater stakeholder engagement, **Leqve** provided history of the NOC and how it came to be in 2003 after the disbanding of MASAC in 2001. He reviewed the NOC's mission, the Committee's focus on balanced forum for discussion, and noted that the functions of the NOC are to be conducted in a manner that considers public and airport user concerns. Public input is taken into consideration on a variety of communication channels through the MAC and NOC and **Leqve** gave examples of how citizen input has guided NOC action and that some NOC accomplishments have won national awards.

Chair Miller, Eagan, asked **Kevin Terrell, MSP FairSkies Co-Founder,** for comments. **Terrell** commented on implementing the NOC mission and how the metrics listed are process metrics and not outcome metrics. An outcome metric would be listing the number of people impacted by noise.

Chair Miller thanked **Terrell** and addressed the NOC for their comments on the first request. **Representative Dmytrenko, Richfield,** stated that she is interested in looking at and possibly adjusting the bylaws to see how citizen representation can be improved. **Representative Link, Inver Grove Heights,** stated that this conversation has been occurring among the At-Large Community members and while the MAC staff has done a lot to improve citizen input, there may be room for more to be done. That may be done in how the agendas are structured, how the NOC provides for the input, and stated that FairSkies and other organizations have considerable information and value to offer. The At-Large cities agree that the NOC structure, as it is now, works well and is a balance between cities and airline industries. Bottom line, the At-Large Community is comfortable keeping the NOC membership the way it is now but providing for increased opportunities for FairSkies and similar groups to provide information. **Representative Goss, Delta,** reminded everyone that industry members are also community members and live near the airport. In addition, **Goss** mentioned that he is struck by how challenging it can be to receive citizen input and is very concerned with the idea of changing the NOC membership structure itself. However, he noted that this forum does not provide greater opportunities for organizational or individual involvement. Overall, **Goss** said it is important to re-evaluate how the NOC allows for input from the public during its meetings. **Representative Sloan, Mendota Heights,** said that he agrees with Terrell's analysis of including the customer input but to be careful to evaluate if the collective voice is being spoken, or if it is that of a particular community, or even that of an individual. He stated that there are meetings once a month in Mendota Heights where the community can present concerns, those concerns are brought to the at large meeting and then to city council who then brings those to the NOC. This is in addition to Listening Sessions where noise office staff attend and can listen to community concerns face to face; more than one of these sessions led to items being added to the NOC's work plan. With these resources available, the citizen attendance is minimal and it's hard to encourage participation. **Representative Lowman, Bloomington,** commented that if there are changes to the process for citizen representation that it's important to note the process to NOC from MASAC and the steps that were taken to get to where the NOC is today. He also noted the location, time, and public transportation issues that may be barriers to citizen engagement. **Lowman** then echoed **Goss's** comment about the process for which to make a public comment at a NOC meeting. **Chair Miller** said there have been a lot of comments and asked for solutions to the question being raised. **Lowman** suggested that creating a subcommittee may be helpful to address the issues of citizen representation and public comments during the NOC meeting to make some direct recommendations to the NOC Committee. **Link** said he would like the group to look and asses the bylaws as they are what restricts the citizen input processes at NOC meetings. **Goss** asked a clarifying question, given the NOC is an advisory body to the MAC, is the structure dictated by itself or does the MAC Board have input? **Chair Miller** asked **Leqve** if bylaw changes were made, would they need to be approved by the MAC Commission. **Leqve** responded that suggested changes would be brought to the Planning, Development & Environment Committee which would then go before the Full Commission. **Chair Miller** chimed in that she would be interested in the public input process being similar to that of a city council meeting; a set time is in place, everyone has a certain amount of time to speak and there aren't so many procedural rules. **Sloan** asked what the FairSkies group has to say about the conversation.

Kevin Terrell, MSP FairSkies, said that the request being made is a symptom of lack of trust in the process as well as a lack of perceived transparency on the impact of noise on the community. As such their community feels that they need to be closer to NOC conversation and there needs to be a better way to comment, the city council approach is legitimate and a fair approach. **Lowman** asked what is meant by lack of transparency and what he means by saying his group should be closer to the issue, and to clarify the citizen representation because realistically the city representatives on the NOC are meant to represent its citizens. **Terrell** responded that MSP

FairSkies started because the 2012 flight tracks were published, came out of nowhere and the NOC wasn't representing citizen interest. In regards to transparency, **Terrell** states that citizens are being told that nothing has changed yet when he received the noise exposure map and had the University of Minnesota map the noise levels, 30% more people are within the 55 dB DNL noise contour than they were in the last two years. **Lowman** mentioned he would like to continue a conversation with **Terrell** offline, **Chair Miller** asked for sub-committee volunteers. Bylaw subcommittee members are: Dwayne Lowman (Bloomington), Loren Olson (Minneapolis), Gordy Goss (Delta), and Alex Mason (At-Large Industry). The group will meet within the next couple months and come back to the NOC with suggestions bylaw changes; a motion was made by **Chair Miller**, seconded by **Lowman** and passed unanimously.

Chair Miller, Eagan, moved on to the noise reduction goal. **Leqve** provided context for aircraft noise regulations and covered the roles and responsibilities of the FAA with regard to Federal Aviation Regulation Part 36, Air Traffic Control, Federal Aviation Regulation Part 150 for noise compatibility and land use planning, the Airport Noise and Capacity Act of 1990, and Federal Aviation Regulation Part 161 regarding access restrictions for airports in the name of reducing noise. **Leqve** ended with explaining his experience with goal-setting using the SMART model – Smart, Measureable, Achievable, Realistic and Timely – has served him and his staff well in the past.

Chair Miller asked **Terrell** if he had comments before the committee discussion. With regard to FAR Part 161, **Terrell** said there is an airport in California that stated it doesn't want federal money and therefore has regained control of the airport. As he understands it, MSP has handcuffed itself to federal control of our local airport in exchange for a trivial amount of money. **Representative Goss, Delta,** interjected and asked **Terrell** which airport no longer wants federal funding and also what amount of money **Terrell**, himself, perceives to be a trivial funding amount. **Terrell** stated that he thinks the amount is about $150 million over 10 years and couldn't name the airport in California. He followed up by saying there are noise restrictions that can be made and while many are against federal law in the US right now, there should be a different way to measure noise so it can be reduced for the neighboring communities. **Representative Olson, Minneapolis,** asked MAC staff how a creative solution can be formed to track trends. She mentioned the DNL map and asked if the contours would shrink if the nighttime penalty was not included in the DNL calculation. **Leqve** responded that more nighttime operations means more impact, and the MAC tracks trends at the airport. He mentioned that he and his staff are committed to tracking trends, trying to transparent and explain to citizens why they are experiencing the things they are. He mentioned staff would commend ideas and thoughts from the Committee to leverage the information and data we are collecting to help address citizen concerns. **Leqve** explained the nuance that many people use the term impact differently, which makes this discussion difficult. He also said he thinks goals are very important, however he is sensitive to expectations and maintaining the balance between the varying interests of all stakeholders. **Loren** clarified that her question is technical, in nature. If the penalty for nighttime operations was eliminated, what would happen to the contour? **Leqve** confirmed that without the nighttime penalty, the noise contour would shrink. **Olson** confirmed that adding the noise penalty to nighttime operations is a decision made by FAA to recognize the impact to residents by those flights. She continued that she's interested in looking at other metrics to measure noise and that she wouldn't necessarily look at number of people within a certain area, because at least in Minneapolis' case, the city is growing in population. **Olson** also noted that she isn't afraid to create a metric or goal that we don't always succeed at. **Representative Lowman, Bloomington,** asked is there a SMART goal to be made for reducing nighttime flights that can fit within the restrictions of the six regulations laid out earlier?

Terrell stated he wanted to provide context for their 55 dB DNL noise contour goal [in reference to FairSkies previously stated goal for a 50% noise reduction by 2025]. He stated that he found an airport that was similar to MSP and found Amsterdam, it's relatively the same size, the same distance from a major city, and has roughly the same amount and type of flights. He then looked at their contours and their noise impacts, then based of that information, his group came up with a specific and reasonable goal for MSP based off Amsterdam's information. **Leqve** said the goal is to have the 60 dB DNL contour mitigated by 2024 by virtue of the Consent Decree. Receiving funding approval for that goal with the FAA has been a delicate process due to regulatory framework but it's something the MAC devotes a lot of resources to and is dedicated to seeing through. Attempting to create a noise reduction goal that decreases DNL is part of a larger conversation that includes countering efforts to continue to have competitive air service, providing economic travel options to consumers, airlines adding flights based on passenger demand. **Leqve** also mentioned hesitation as a staff member perspective of creating a goal that we don't have a chance to accomplish. **Chair Miller** asked if there was another airport across the country using airport generated revenue to mitigate out to the 60 dB DNL and **Leqve** responded no, there is not. **Goss** mentioned that the DNL increase year over year may actually be from increased nighttime flights by Spirit and Southwest Airlines and other members that aren't on the NOC. **Leqve** clarified that increase off 12R and the added mitigation is related to nighttime operations but also overall runway use. **Goss** recognized that the issue at hand is multidimensional and that maybe the airlines we are looking to have a conversation with about nighttime operations are not actually on the NOC. He followed up by saying that he does not accept the comparison of MSP to Amsterdam. The airports may be the same distance from the core downtown area but there is a significant land use difference, and as a pilot who has flown into both cities numerous times, the two cities look nothing alike. **Goss** said his concern is that a goal will be set up that isn't achievable and realistic and that would do everyone a great disservice. He likes the idea of broadening the lens of creativity in goal-setting but making sure the goal is reasonable and attainable. **Lowman** suggested that this conversation go back to MAC staff and see if they come up with something. **Leqve** answered that the best way to go would be to codify the investment made within the 60 dB DNL mitigation program. This is the goal, it has been set, the investment has been made through an agreement with the local cities, and it's in process. **Lowman** made a motion to solidify the goal to mitigate homes out to the actual 60 dB DNL by 2024. **Olson** stated that there is a legal agreement to already mitigate out to the 60 dB DNL but she would like to see a goal that stated a noise reduction by acreage and when that can't happen there will be mitigation to the 60 dB DNL without an end date. **Lowman** asked for staff input as he wasn't comfortable changing his motion without staff feedback if it was achievable. **Leqve** responded that his team is always trying to reduce the size of the contour but for now leaving the specifics of the 60 dB DNL and the end date creates an achievable metric and fulfils the timely component of a SMART goal. **Representative Dmytrenko, Richfield,** added that it may be advantageous to open this conversation to airline representatives that aren't at the NOC table as means for creating a message of awareness and advocating for reducing nighttime operations. She also suggested that it may be helpful to have a goal-setting work session in the future. **Goss** asked to clarify the goal for mitigation the actual 60 dB DNL contour by 2024 is a part of the Consent Decree. Staff responded it is. **Chair Miller** pointed out that even though the Committee is considering and establishing a goal today, it does not preclude further discussion to establish more goals in the future. **Lowman's** motion was called to the floor again and was passed unanimously.

Chair Miller, Eagan, moved on to the third request by MSP FairSkies to publish the 55 dB DNL and N65 noise contours and Noise Exposure Maps. **Leqve** started by saying that he and his team recognize residents beyond the 60 dB DNL contour experience aircraft noise and sticking to the 60 dB isn't a means of ignoring that. **Chair Miller** interrupted and said that **Representative Goss, Delta,** had a flight in one hour and asked if there was a quorum if he left. **Dana Nelson, Technical**

Advisor, responded that there wasn't and as such **Chair Miller** said the Committee needed to delay this portion of the presentation and decision to the March 2018 meeting.

6. Vortex Generator Noise Monitoring Study
Dana Nelson, Technical Advisor, the Committee decided to delay the presentation of this report until the March 2018 meeting.

7. Super Bowl Communication Plan Update
Dana Nelson, Technical Advisor, stated that she emailed the committee a fact sheet with anticipated flight information related to the Super Bowl. That information will be on the Noise website and handed out as part of the Winter 2018 Listening Session.

8. Public Comment Period - None

9. Announcements
Dana Nelson, Technical Advisor, made note of the Winter Listening Session on Tuesday, January 30, 2018 at Mount Olivet Church and the next NOC Meeting will be Wednesday, March 21, 2018 at 1:30pm.

10. Adjourn
A motion to adjourn was requested by **Chair Miller, Eagan,** moved by **Representative Dmytrenko, Richfield,** and seconded by **Representative Lowman, Bloomington.**

The meeting adjourned at 3:11 p.m.

The next meeting of the NOC is scheduled for Wednesday, 21st March, 2018.

Respectfully Submitted,
Amie Kolesar, Recording Secretary

ITEM 2

MEMORANDUM

TO: MSP Noise Oversight Committee (NOC)

FROM: Bradley Juffer, Assistant Manager—Noise, Environment & Planning

SUBJECT: **REVIEW OF MONTHLY OPERATIONS REPORTS: JANUARY AND FEBRUARY, 2018**

DATE: March 7, 2018

Each month the MAC reports information on MSP aircraft operations, aircraft noise complaints, sound levels associated with MSP aircraft operations, and compliance with established noise abatement procedures on its interactive reporting website: https://www.macenvironment.org/reports/.

At the March 21, 2018 NOC meeting, MAC staff will provide a summary of this information for the months of January and February. To view these summary reports prior to the meeting, visit the Archives section at the link above.

THIS IS AN INFORMATIONAL ITEM ONLY; NO COMMITTEE ACTION REQUIRED.

ITEM 3

MEMORANDUM

TO: MSP Noise Oversight Committee (NOC)

FROM: Dana Nelson, Manager—Noise, Environment & Planning

SUBJECT: **RESPONSE TO MSP FAIRSKIES REQUESTS**

DATE: March 7, 2018

At the September 20, 2017 NOC meeting, the co-founders of the MSP FairSkies Coalition made several requests to the Committee. The presentation slides containing these requests were sent to the Committee following the meeting and added to the meeting presentation deck at: www.macnoise.com/sites/www.macenvironment.org/files/pdf/noc-presentation-20170920.pdf.

In summary, the following requests were made to the NOC:

1. Enhance the NOC with greater stakeholder (citizen) representation
2. Establish a goal to reduce noise
3. Produce and publish a 55 dB DNL and N65 NEM/Contour

The NOC Co-Chairs directed MAC staff to present information for consideration with respect to each request at the November 15, 2017 NOC meeting. Presentation slides containing these considerations are available in the meeting presentation deck under Item 3 at: www.macnoise.com/pdf/noc-presentation-20171115FINAL.pdf

During the November 2017 meeting the Committee members discussed the requests and determined it was necessary to allow time to consider staff's presentation, discuss among the at-large groups and respond to the requests at its January 2018 meeting. During the January meeting the Committee members discussed the first two requests above. MAC Staff presented contextual points related to the requests. These presentation slides are available under Item 4 at: https://www.macnoise.com/sites/www.macenvironment.org/files/pdf/noc-presentation-20180124_final.pdf.

During the NOC's discussion in January, a representative of MSP FairSkies was available to answer questions and provide additional detail to the Committee. Related to the first request, Committee members recognized the importance of a balanced forum for discussing aircraft noise issues at MSP. It was noted that the predecessor to the NOC did not have such a balanced membership, which contributed to its discontinuation. The Committee agreed that the membership of the NOC should remain the same with six industry representatives and six community representatives, however they recognized the opportunity to review the NOC Bylaws in an effort to facilitate greater citizen input. Therefore, the Committee decided to create a NOC Bylaw Review Subcommittee made up of the following four member representatives: City of

Minneapolis, City of Bloomington, At-Large Industry, and Chief Pilot. The Subcommittee has met on one occasion and plans to bring recommended Bylaw changes back to the NOC in May.

With regard to the request to establish a noise reduction goal, the Committee thoroughly discussed the challenges in creating a goal that is specific, measurable, achievable, realistic and timely given the strict regulatory requirements imposed on airports in the United States in the name of noise reduction. The Committee agreed that a significant amount of effort and resources are provided to the residential sound insulation program and passed the following goal: *To provide residential sound mitigation out to the actual 60 dB DNL noise contour by the year 2024.* It was noted that passing such a goal will not prevent the Committee from discussing the establishment of additional goals in the future. The draft meeting minutes from the January 24, 2018 NOC meeting, provided in Item 1 of this agenda packet includes a detailed account of the dialogue during the meeting.

This request and ensuing discussion at the NOC regarding the establishment of a noise reduction goal is the impetus behind conducting the MSP Noise Management Benchmarking Study, discussed in this agenda packet under Item 5. A component of the Benchmarking Study is to look at how other airports are discussing and achieving noise reductions and identify improvement opportunities for the MAC Noise Program Office and the NOC.

Due to the length of the meeting in January, the Committee decided to delay the discussion about the remaining requests until its March 21, 2018 meeting.

REQUESTED ACTION

PROVIDE COMMITTEE RESPONSE TO THE REMAINING MSP FAIRSKIES REQUESTS.

ITEM 4

MEMORANDUM

TO: MSP Noise Oversight Committee (NOC)

FROM: Dana Nelson, Manager—Noise, Environment & Planning

SUBJECT: **MSP NOISE MANAGEMENT BENCHMARKING STUDY SCOPE**

DATE: March 7, 2018

Aircraft noise issues are not unique to MSP; however, aviation regulations vary from country to country, as do the noise abatement activities across U.S. airports. There are some instances where the noise abatement activities are unique to a specific country or airport. The NOC has shown interest in thinking creatively about goal-setting and finding realistic solutions to aircraft noise issues at MSP by learning more about how other airports are discussing and achieving noise reductions and creatively applying them to address noise issues at MSP.

To that end, a study scope will be proposed at the March 21, 2018 NOC meeting to compare and contrast the constraints imposed on U.S. airport noise programs with airport in other countries and to rank the MSP noise abatement activities with peer airports in the U.S.

A consulting firm, HMMH, in collaboration with the NOC is proposing to perform a MSP Noise Management Benchmarking Study. The proposed study scope is provided in this meeting agenda packet and specifically calls out the following three objectives:

1. Detail the constraints imposed on U.S. airport noise programs due to the highly-regulated environment in contrast with airports in other countries;
2. Provide an independent and transparent review of the MAC Noise Program Office and related noise abatement activities as compared with peer airports in the U.S.; and
3. Identify improvement opportunities for the MAC Noise Program Office and MSP Noise Oversight Committee

Mary Ellen Eagan President/CEO of HMMH Corporation, will present and request approval of the attached proposed scope of work at the March 21, 2018 NOC meeting.

REQUESTED ACTION

APPROVE THE ATTACHED PROPOSED SCOPE OF WORK BY HMMH FOR THE MSP NOISE MANAGEMENT BENCHMARKING STUDY.

HMMH
77 South Bedford Street
Burlington, Massachusetts 01803
781.229.0707
www.hmmh.com

MEMORANDUM

To:	Dana Nelson Chad Leqve Metropolitan Airports Commission 6040 28th Avenue South Minneapolis, MN 55450
From:	Mary Ellen Eagan President/CEO
Date:	February 27, 2018
Subject:	Proposed Scope of Work for Noise Management Benchmarking
Reference:	HMMH Proposal Number P18-20025

This memorandum outlines a proposed scope of work for Metropolitan Airport Commission's (MAC) Airport Noise Management Benchmarking Study. The objective of this study is to (1) detail the constraints imposed on U.S. airport noise programs due to the highly-regulated environment in contrast with airports in other countries; (2) provide an independent and transparent review of the MAC Noise Program Office and related noise abatement activities as compared with peer airports in the U.S.; and (3) identify improvement opportunities for the MAC Noise Program Office and MSP Noise Oversight Committee (NOC). We have identified the following six tasks to accomplish this objective:

Task 1: Identify noise program components and activities to benchmark

Task 2: Develop data gathering strategy to include an airport survey, process for identifying a cohort of peer airports, and documentation of U.S. noise related laws/rules/regulations/policies

Task 3: Data collection

Task 4: Data and policy analysis

Task 5: Draft report

Task 6: Final report

Each of these tasks is described in detail below.

Task 1: Identify noise program activities to benchmark

HMMH, in consultation with the MSP Noise Oversight Committee (NOC) will develop a preliminary list of MAC Noise Program Office components and related noise program activities that would be appropriate to benchmark. These activities will provide a comprehensive overview of airport activities in the following categories:

- ***Operational Measures***: such as preferential runway use programs, noise abatement flight tracks, noise abatement flight procedures, operational use restrictions, ground noise mitigation measures, and airspace design and consultation
- ***Mitigation and Land Use Measures***: including sound insulation, land acquisition, easements, overlay zoning, real estate disclosures, cooperative land use agreements, and revised building codes
- ***Program Management and use of Technology***: including established noise office, noise monitoring system, and flight track monitoring system
- ***Stakeholder Engagement***: including standing noise committee or roundtable, website, online flight tracking, online complaint portal, annual/quarterly/monthly noise report, Fly Quiet program, regular meetings with local land use jurisdictions, local government, and FAA (ADO/ATO)
- ***Noise reduction metrics and/or goals***
- *Industry leadership, research and policy*: activities such as technology/policy development/innovation, briefings to political representatives, participation in national research programs/studies (e.g., ACRP), participation in Airport Council International – North America (ACI-NA) and other national aviation organizations conducting research on or advocating for noise issues

HMMH will review the list of proposed program activities with the NOC to finalize the list, and to identify

possible metrics for reporting and quantifying (when possible) airport activities in these areas.

Deliverables:

- Draft list of noise office activities and proposed metrics
- Final list of noise office activities and proposed metrics

Task 2: Develop survey

HMMH will develop an online survey to collect data on the activities developed in Task 1. HMMH will also work with staff from ACI-NA and AAAE to develop a list of survey recipients, focusing primarily on large and medium hub airports (i.e., those that provide good comparison to MSP). HMMH will review both the draft survey and survey recipient list with MAC staff.

Deliverables:

- Draft online survey
- Draft list of proposed survey recipients
- Final online survey
- Final list of survey recipients

Task 3: Data collection

HMMH will draft an email for MSP to send to survey recipients containing a link to the online survey. After a period of two weeks, HMMH will follow up with a reminder email to survey recipients. After another week, HMMH will follow up with a phone call and offer to assist airports to complete the survey. Additionally, HMMH will research and document the current laws/rules/regulations/policies in the U.S. related to noise and mitigation.

Deliverables:

- Survey data in excel format
- Summary of U.S. noise related laws/rules/regulations/policies

Task 4: Data/Policy analysis

HMMH will summarize the data collected through online and telephone survey and translation of management implications of U.S. laws/rules/regulations/policies. HMMH will review results with NOC.

Deliverables:

- Memorandum summarizing survey results and noise management considerations/limitations imposed by federal laws/rules/regulations/policies.

Task 5: Draft report

HMMH will prepare a draft report summarizing motivation for the benchmarking study (including discussion of noise management activities at select international airports), study methodology, findings, and recommendations. HMMH will review this report with NOC.

Deliverables:

- Draft report
- One round of comments and revisions

Task 6: Final report

HMMH will finalize report based on input received from NOC. HMMH will also prepare and present the study results to the MSP Noise Oversight Committee.

Deliverables:

- Final report
- Presentation to NOC

ITEM 5

MEMORANDUM

TO: MSP Noise Oversight Committee (NOC)

FROM: Dana Nelson, Manager—Noise, Environment & Planning

SUBJECT: **2017 ANNUAL NOISE CONTOUR REPORT AND MITIGATION ELIGIBILITY**

DATE: March 7, 2018

In October 2007, the Metropolitan Airports Commission (MAC) and the cities of Minneapolis, Richfield and Eagan, received judicial approval of a Consent Decree that provided settlement of the noise mitigation lawsuits filed in 2005. Pursuant to the Consent Decree, the MAC is required, by March of each calendar year, to prepare an Annual Noise Contour Analysis that reflects an assessment of actual noise generated by operations at Minneapolis-St. Paul International Airport (MSP).

Consent Decree Background

The first amendment to the 2007 Consent Decree was initiated in 2013 and establishes Residential Noise Mitigation Program eligibility based on annual assessments of actual MSP aircraft activity rather than projections. To be eligible, a home must be located within the actual 60 dB DNL noise contour and exposed to a higher noise mitigation eligibility area when compared the previous noise mitigation program area for three consecutive years. The first of the three years must occur by 2020. The Full 5-decibel Reduction Package is offered to single-family homes meeting these criteria inside the actual 63 dB DNL noise contour while the Partial Noise Reduction Package is offered to single-family homes in the actual 60-62 dB DNL noise contours. A uniform Multi-Family Noise Reduction Package is offered to multi-family units within the actual 60 dB DNL noise contour. Homes will be mitigated in the year following their eligibility determination. The 2013 actual noise contour marked the first year in assessing this new mitigation program.

A second amendment was made to the 2007 Consent Decree in 2017. This amendment allows the use of the Aviation Environmental Design Tool (AEDT) to develop the actual noise contours each year, beginning with the 2016 actual noise contour. In 2015, AEDT became the federally-approved computer model for determining and analyzing noise exposure and land use compatibility issues around airports in the United States. The second amendment also provided clarity on the Opt-Out Eligibility criteria. Specifically, single-family homes that previously opted out of the Partial Noise Reduction Package may participate in the Full 5-decibel Reduction Package, provided the home meets the eligibility requirements.

2017 Annual Noise Contours

The 2017 Annual Noise Contour Report evaluation concludes that there was an overall decrease in residents within the 60 dB DNL noise contours as compared to both the 2016 actual and 2007 forecast noise exposure contours. Most areas around MSP have been provided noise mitigation beyond the actual 60 dB DNL noise exposure levels experienced in 2017. Based on the 415,703[1] total operations at MSP in 2017, the actual 60 dB DNL contour is approximately 27 percent smaller

[1] Based on airport operations counts documented by the Federal Aviation Administration for MSP in 2017.

than the 2007 forecast contour and the 65 dB DNL contour is approximately 38 percent smaller than the 2007 forecast contour. The predominant contraction in the contours from the 2007 forecast to the 2017 actual noise contour scenario is driven largely by a reduction in total aircraft operations by 28.6 percent, 274.9 fewer average daily flights in Hushkit Stage 3 aircraft, and a daily average of 3.2 fewer flights during the nighttime. However, there continues to be small areas where the 2017 actual noise contours extend beyond the 2007 forecast noise contours establishing First-, Second-, and Third-year Candidate Eligibility under the terms of the amended Consent Decree. This expansion of noise impacts can largely be attributed to nighttime runway use variances between what was forecasted for 2007 and what actually occurred in 2017, particularly an increase of the nighttime arrival operations on Runways 12R and 30L.

First-Year Candidate Mitigation Eligibility
The 2017 actual noise contour includes 63 single-family homes within the First-Year eligibility area for the Partial Noise Reduction Package. These homes were previously eligible for homeowner reimbursements. Of these homes, 33 are located in Eagan, 25 are in Minneapolis and 5 are located in Inver Grove Heights. There are no multi-family units within the First-Year eligibility area. If these 63 single-family homes remain in a higher noise impact area compared to the previous noise mitigation program for two more consecutive years, they will be eligible for mitigation in 2021.

Second-Year Candidate Mitigation Eligibility
The 2017 actual noise contour includes 243 homes within the Second-Year eligibility area. It is important to note that a reduction in aircraft noise exposure in 2017 compared to 2016 resulted in the 2017 actual noise contour shrinking in Minneapolis along the arrival lobe for Runway 12R. Based on this analysis, 200 single-family homes and 149 multi-family units that met the First-Year Candidate Eligibility criteria in the 2016 analysis no longer meet the noise level criteria required for Second-Year Candidate Eligibility.

Of the 243 homes within the 2017 Second-Year eligibility area, 140 were previously outside the program area and 24 were previously eligible for homeowner reimbursements. The 2017 actual noise contour includes another 79 single-family homes within the Second-Year eligibility area for the Full 5-decibel Reduction Package. There are no multi-family units within the Second-Year eligibility area. If these 243 total single-family homes remain in a higher noise impact area compared to the previous noise mitigation program by virtue of the 2018 actual noise contour, they will be eligible for mitigation in 2020.

Third-Year Candidate Mitigation Eligibility
The 2017 actual noise contour includes 430 homes within the Third-Year eligibility area and will be invited into the mitigation program in 2019. Again, it is important to note that a reduction in aircraft noise exposure in 2017 compared to 2016 resulted in the 2017 actual noise contour shrinking in Minneapolis along the arrival lobe for Runway 12R. Based on this analysis, 53 homes that met the Second-year Candidate Eligibility criteria in the 2016 analysis no longer meet the noise level criteria required for Third-year Candidate Eligibility.

Of the 430 homes that meet the Third-year Candidate Eligibility, 249 homes were eligible for the Partial Noise Reduction Package. Of these, 177 homes were previously located outside the eligibility area and 72 homes were previously eligible for homeowner reimbursements. These single-family homes are entered into the 2019 mitigation program to receive one of two mitigation options, as detailed in Section 9.5(b) of the first amendment to the 2007 Consent Decree. The remaining 181 single-family homes are eligible for the Full 5-decibel Reduction Package.

There are no multi-family units that meet the criteria for Third-Year Candidate Eligibility. Homeowners of eligible properties will be notified by the MAC in writing by mid-2018.

In cases where homes have received previous reimbursements or mitigation from the MAC, those improvements will be deducted from the efforts required to increase the home mitigation relative to the actual noise level, per the amended Consent Decree.

The blocks meeting the First-, Second-, and Third-Year Candidate Eligibility by virtue of the 2017 actual noise contours are shown in Figures 1 and 2 on the next page.

Red blocks are those that were previously outside any previous mitigation area and are inside the Partial Mitigation Package area.

Orange blocks are those that were previously inside the mitigation reimbursement area and are now inside the Partial Mitigation Package area. Any previous reimbursements paid are deducted from the dollar allocation for the Partial Mitigation Package.

Blue blocks are those that were previously eligible for the Partial Mitigation Package and are now inside the Full 5-decibel Mitigation Package area. The value of previous mitigation provided to the home would be deducted from the Full 5-decibel Package.

Figure 1: 2017 Contours with Mitigation Program Eligibility – Minneapolis

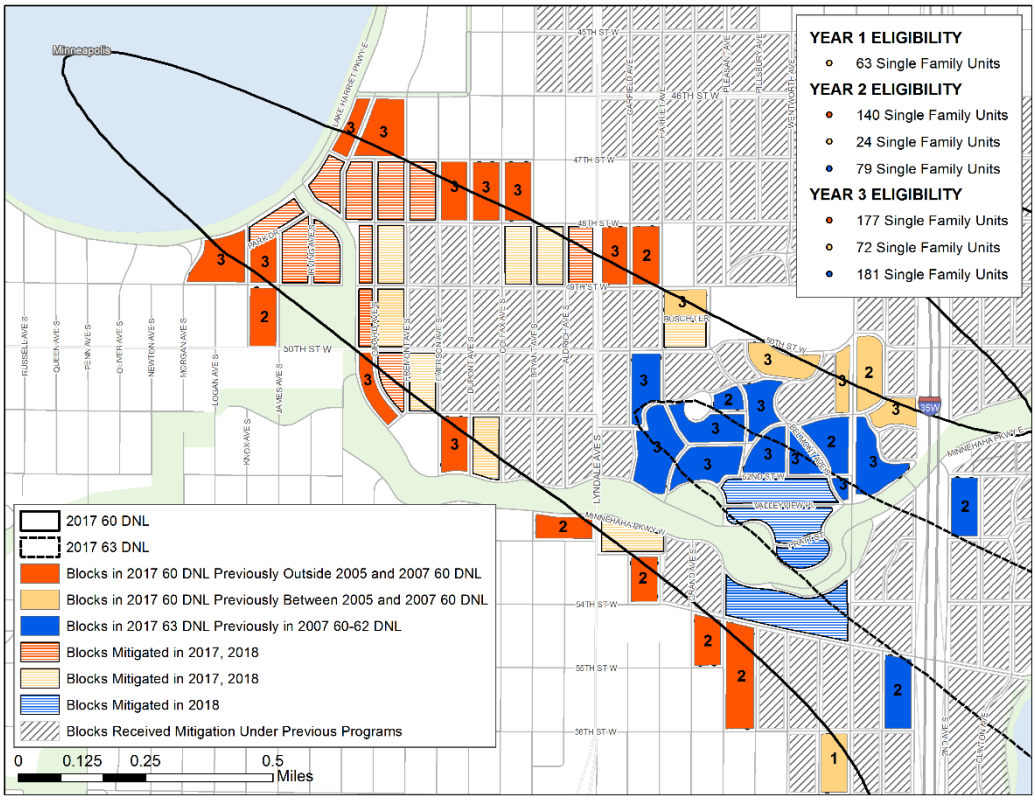
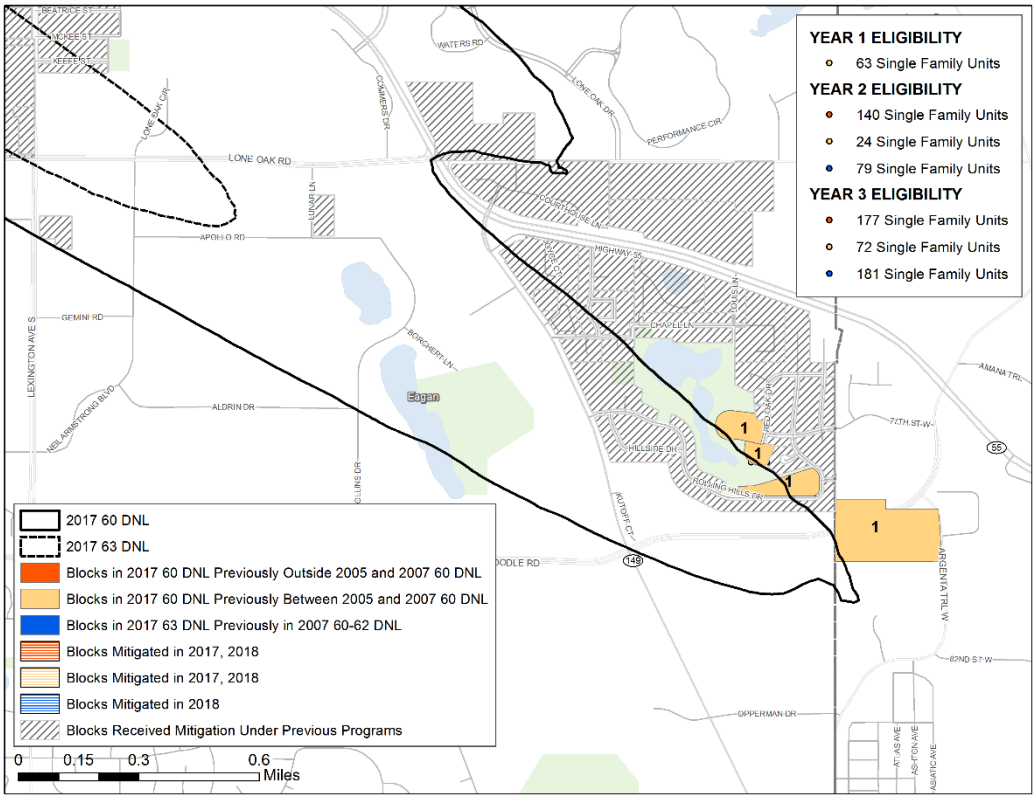


Figure 2: 2017 Contours with Mitigation Program Eligibility – Eagan and Inver Grove Heights

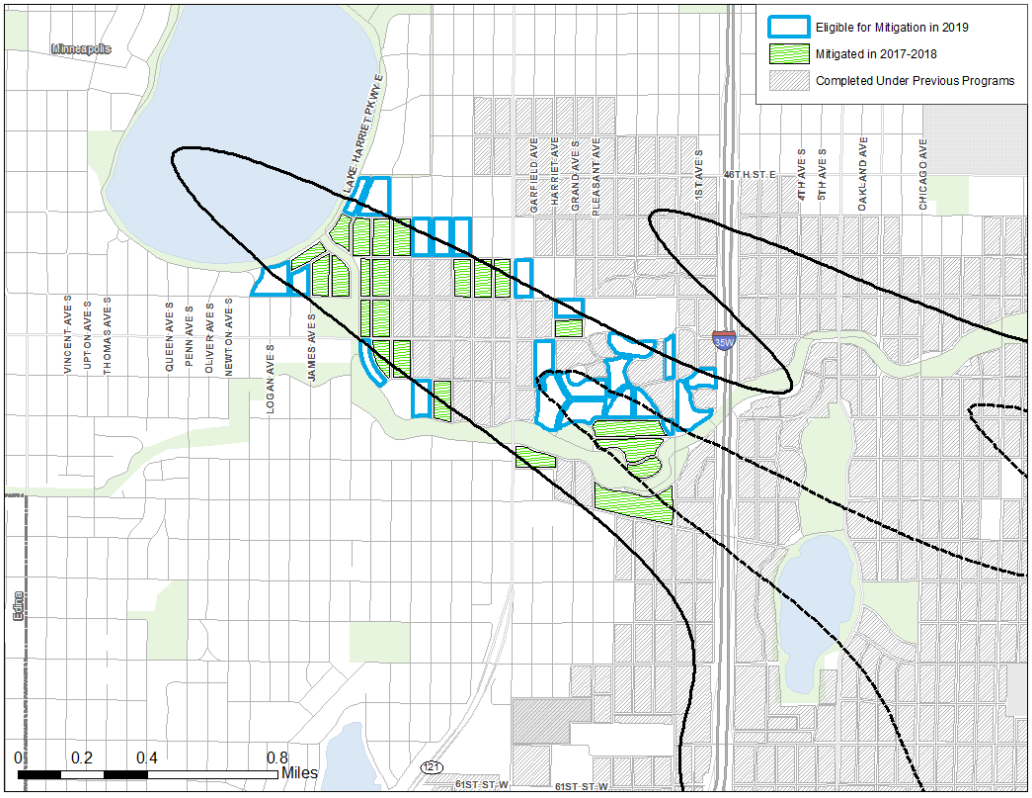


2017 Mitigation Program
In 2017 the MAC began the project to provide mitigation to 138 single-family homes that became eligible by virtue of the 2015 actual noise contour. As of February 12, 2018, 92 homes have been completed, 37 homes have begun the construction or pre-construction phases, and nine homes declined participation.

Two multi-family structures are also eligible to participate in the Multi-Family Mitigation Program in 2017; one property is in pre-construction, and one property declined to participate. The year-to-date construction cost for the 2017 Mitigation Program is $1,795,957.

2018 Mitigation Program
In late 2017 the MAC began contacting the homeowners of 283 single-family homes that achieved eligibility by virtue of the 2016 actual noise contour. As of February 12, 2018, five homes have been completed, 271 homes have begun the construction or pre-construction phases, and seven homes declined participation. The 2018 Mitigation Program does not include any multi-family properties. To date, $90,252 has been spent on the 2018 Mitigation Program. Figure 3 below illustrates the areas that are included in the 2017 and 2018 Mitigation Programs in green. Those outlined in blue will be invited to participate in the 2019 Mitigation Program. All blocks eligible for mitigation in the 2017-2019 programs are located within the City of Minneapolis.

Figure 3: 2017 Contours with 2017-2019 Mitigation Program Eligibility



The 2017 Annual Noise Contour Report is available at http://www.macnoise.com/noise-mitigation-program/msp-annual-noise-contour-analysis-reports. MAC staff will present the 2017 Annual Noise Contour Report and associated mitigation eligibility at the March 21, 2018 NOC meeting.

THIS IS AN INFORMATIONAL ITEM ONLY; NO COMMITTEE ACTION REQUIRED.

ITEM 6

MEMORANDUM

TO: MSP Noise Oversight Committee (NOC)

FROM: Dana Nelson, Manager—Noise, Environment & Planning

SUBJECT: **VORTEX GENERATOR NOISE MONITORING STUDY**

DATE: March 7, 2018

In 2016, the NOC discussed the noise reduction benefits of vortex generators, a device made to divert airflow from vents on the underside of wings on the Airbus A320-family aircraft to reduce aircraft noise on arrival prior to landing gear and flap extension. The 2017 NOC Work Plan directed staff to commission a mobile noise monitoring study to quantify the noise reduction benefits of vortex generators at MSP. The monitoring was completed in 2017 and the report is included in this meeting agenda packet. MAC Staff can respond to questions from the Committee at the March 21, 2018 meeting.

The noise benefit provided by vortex generators is provided between 5,000 and 9,000 feet when arriving to an airport, when the aircraft is in a clean configuration (prior to landing gear and flap extension). While the MAC has long maintained a system of permanent sound monitoring equipment, none are suitably located or configured to collect aircraft sound levels during this particular phase of flight. To collect these levels, a temporary, mobile noise monitoring study was necessary.

The attached report presents noise measurement data that were collected between August 30, 2017 and October 12, 2017 for a monitoring site near East Bush Lake in Bloomington. The purpose of the data collection was to quantify the noise benefits of vortex generators during Airbus A320 family aircraft arrivals. The aircraft noise monitoring and analysis provided in this report offer a comparison of A320 family aircraft equipped with vortex generators to those without.

The vortex generator noise data had Lmax noise level differences from -0.4 to +1.6 dBA, SEL noise level differences from -1.0 to +1.2 dBA and average duration from -1 to +5 seconds. These minor noise level differences are unlikely to be perceptible on the ground.

The MAC Noise Office staff conducted several examinations of the noise data to ensure the methodology was accurately collecting the data. Vortex generators are designed to provide noise reduction benefits during the arrival phase of flight when the aircraft is in a clean configuration. When taking aircraft noise measurements from the ground during this phase of flight, staff found the measured aircraft noise events struggled to exceed the ambient noise level in the community. Therefore, quantifying the noise reduction benefits provided by these devices from the ground becomes extremely difficult. The particular limitations in this study included the low threshold settings required to collect the aircraft arrival events when aircraft are at altitudes between 5,000 and 9,000 feet, which resulted in noise level data that was impacted by louder community noise events; and the small sample of vortex generator-equipped aircraft operations that were available to analyze.

THIS IS AN INFORMATIONAL ITEM ONLY; NO COMMITTEE ACTION REQUIRED.

VORTEX GENERATOR NOISE MONITORING STUDY

November 2017

Environment Department, Noise Program Office

Metropolitan Airports Commission
6040 28th Avenue South, Minneapolis, MN 55450
MetroAirports.org

VORTEX GENERATOR NOISE MONITORING STUDY

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Executive Summary

The 2017 Minneapolis-St. Paul International Airport (MSP) Noise Oversight Committee (NOC) Work Plan directed staff to commission a mobile sound monitoring study as a follow-on to the Committee's 2016 discussion on the topic. The NOC directed Metropolitan Airport Commission (MAC) Noise Office staff to collect sound data to quantify the noise reduction benefits of vortex generators. These devices are designed to disrupt the flow of air over open vent holes on the underside of the wings on Airbus A319, A320 and A321 aircraft. This air flow disruption is intended to reduce high-pitch sound produced when air passes over the vent holes. The potential benefit exists between 5,000 feet and 9,000 feet when arriving to an airport, in a clean configuration (prior to landing gear and flap extension). While the MAC has long maintained a system of permanent sound monitoring equipment, none are suitably located or configured to collect aircraft sound levels during this particular phase of flight. To collect these levels, a temporary, mobile noise monitoring study was necessary.

Site selection was an important consideration during this study. Staff found it difficult to identify locations in the metro area where arriving aircraft would generate sound levels above the ambient noise level, but still be in a clean configuration. Ultimately, the study team chose one site in Bloomington and one site in St. Paul situated under multiple published RNAV (Area Navigation) STARs (Standard Terminal Arrival Routes).

After one week of study, the data was imported and analyzed. The St. Paul site was found to be collecting a considerable number of sound events generated from community activity. To mitigate this, the study team relocated the equipment.

After a second week of data collection, the data was again imported and analyzed. The St. Paul site data was found to continue to contain a considerable amount of community events and monitoring at the site was discontinued. The Bloomington site was performing successfully and was further improved with slight modifications to the event thresholds. The noise monitoring period was extended in order to collect a sufficient sample of data.

The Bloomington sound monitor was deployed for 44 days from August 30, 2017 to October 12, 2017. In total, 9,181 noise events were recorded during the monitoring period. Of those, 4,033 were correlated to MSP aircraft operations, 3,527 of which were aircraft arriving to MSP. Staff identified and verified 491 noise events correlated to Airbus A319, A320 or A321 aircraft.

When comparing to operations in non-vortex generator operations, the vortex generator noise data had maximum noise level (Lmax) differences ranging from -0.4 to +1.6 A-weighted decibels (dBA). The sound exposure level (SEL) differences ranged from -1.0 to +1.2 dBA and the average noise event duration ranged from -1 to +5 seconds. These minor noise level differences are unlikely to be perceptible on the ground[1].

Limitations existing in this study included settings required to collect the aircraft arrival events when aircraft are at altitudes between 5,000 and 9,000 feet, resulting in noise level data clouded by community noise events, as well as a small sample of vortex generator-equipped aircraft included in the study.

[1] A reduction on the order of 3 dBA is widely considered to be required in order to be perceptible.

1. Introduction

The Minneapolis-St. Paul International Airport (MSP) Noise Oversight Committee (NOC) 2017 Work Plan includes an item to quantify the noise reduction benefits of vortex generators on Airbus aircraft arrivals at MSP. The NOC members identified the need for a mobile noise monitoring study after discussing the vortex generator topic at its January 2016 meeting. During this discussion, it was noted that some of the published noise benefits from vortex generators in the public domain are not consistent; therefore, the NOC decided to add a noise monitoring study to its 2017 Work Plan to quantify the benefits using actual data around MSP.

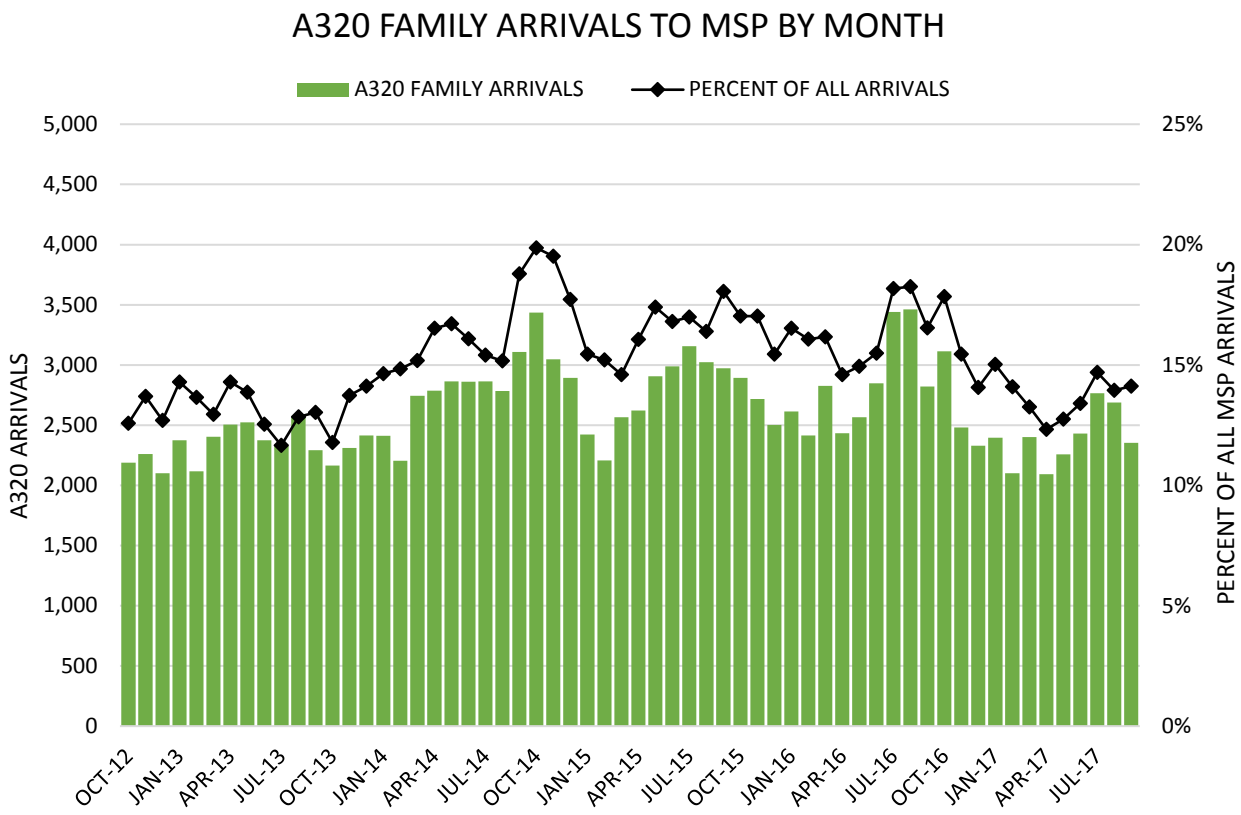
German Aerospace Center developed vortex generators, which are small triangular pieces of aluminum sheet metal mounted upstream of vents on the underside of each wing on the Airbus A320 family aircraft to divert airflow. This is intended to reduce high-pitch sound produced when air passes over this vent. The potential noise reduction benefits of vortex generators only exist between 5,000 feet and 9,000 feet when arriving to an airport in a clean configuration (prior to landing gear and flap extension). At MSP this typically occurs beyond 28 flight track miles from the runway end. While the MAC has long maintained a permanent array of 39 remote monitoring towers (RMTs), by the time arriving aircraft fly over them, they typically have already deployed airflow spoilers (i.e. landing gear, flaps, slats) to slow to a safe airspeed for a stabilized approach. Therefore, deploying a temporary mobile noise monitor was necessary to record sound level data at ground level for aircraft arrivals in a clean configuration at MSP in order to quantify the noise benefits of vortex generators.

The goal of this noise monitoring study is to compare recorded noise levels from like aircraft types in the family of A320 aircraft to quantify the noise benefits of vortex generators.

2. Airbus A320 Family Operations at MSP

The Airbus A320 family of aircraft are narrow body aircraft commonly used for domestic passenger flights. They have been in production since the late 1980's. Approximately 91.9% of 2017 MSP operations were conducted in carrier jets. Further, 57.2% of those were classified as narrow body aircraft. This class of aircraft represents the majority of the operations at MSP and are dominated by the Airbus A320 and Boeing 737 aircraft and associated variants. The A320 family is one of the most flown aircraft at MSP. Figure 2-1 below shows the number and percent of arrivals conducted by the A320 family of aircraft at MSP since October 2012.

Figure 2-1



United Airlines, Lufthansa, and AirFrance started to retrofit their fleet of A320 family aircraft with vortex generators in 2014. Additionally, all new A320 family aircraft delivered after 2014 will have these devices installed. Currently, vortex generators are installed on certain A320 family aircraft operating at MSP with some regularity, providing the opportunity to record sound level data associated with the devices.

To establish a dataset of the Airbus aircraft equipped with vortex generators, the FAA Aircraft Registration database was used along with an online civil aircraft fleet status database from Airfleets.net. United Airlines aircraft operations were excluded from the study results, as they began retrofitting their aircraft in 2017 and the pace of that retrofit is unknown.

3. Noise Monitoring Location Selection Process

Since the potential noise benefit of vortex generators would occur during the arrival phase when an aircraft is in a clean configuration, selecting proper monitoring locations was critical to achieving the study's purpose. The MAC Noise Office used the following criteria to select potential monitoring locations:

1. Near an area navigation (RNAV) standard terminal arrival route (STAR) arrival track in order to capture as many MSP arrival events as possible
2. Published altitude of arrival traffic between 6,000 and 9,000 feet to ensure the aircraft would still be in a clean configuration
3. Site must have low ambient noise so as to not pollute the quality of the measurements
4. Location on public land preferred for accessibility

Using these criteria, the following two sites were selected as candidate locations for this study:

Location #1: Como Golf Course, St. Paul

The Como Golf Course in St. Paul provided a large public space away from large arterial road and railways and near an arrival route for aircraft approaching the airport from the east and south inbound to Runway 12L and from the north to Runway 30R.

Location #2: East Bush Lake, Bloomington

East Bush Lake is centrally located near routes for aircraft approaching the airport from the east and south inbound to Runway 12R and from the west inbound to Runways 30L and 35. This location, at the maintenance facility for the park is also located far from large arterial road and railways, allowing for manageable and limited background (ambient) sound levels. Due to potential for sound level interference from insects and wind, the sound level meter was located on the roof of the maintenance facility. The roof of the facility contained fencing that acted as a wind deflector. This fence was able to deflect surrounding ground noises away from the monitoring equipment, while maintaining an unobstructed upward field of view.

After selecting these candidate sites, staff consulted with Federal Aviation Administration (FAA) terminal area and tower control management and the Delta Air Lines Chief Pilot Office to verify the locations would capture aircraft in a clean configuration and not be impacted by regular speed reduction instructions or airline standard operating procedures, which may result in variations in noise levels. It was determined that at these locations, aircraft speed is dictated by the arrival procedure, which is published at either 210 or 230 knots (indicated airspeed – depending upon the arrival runway). Provided the speed is above 210 knots, it was confirmed the aircraft would more than likely be in a clean configuration.

Figures 3-1 through 3-3 show the two mobile noise monitoring locations overlaid on the RNAV arrival routes at MSP. Figure 3-4 shows the mobile noise monitoring locations overlaid on an arrival density gradient map that depicts actual arrival operations at MSP for August 2017.

Figure 3-1

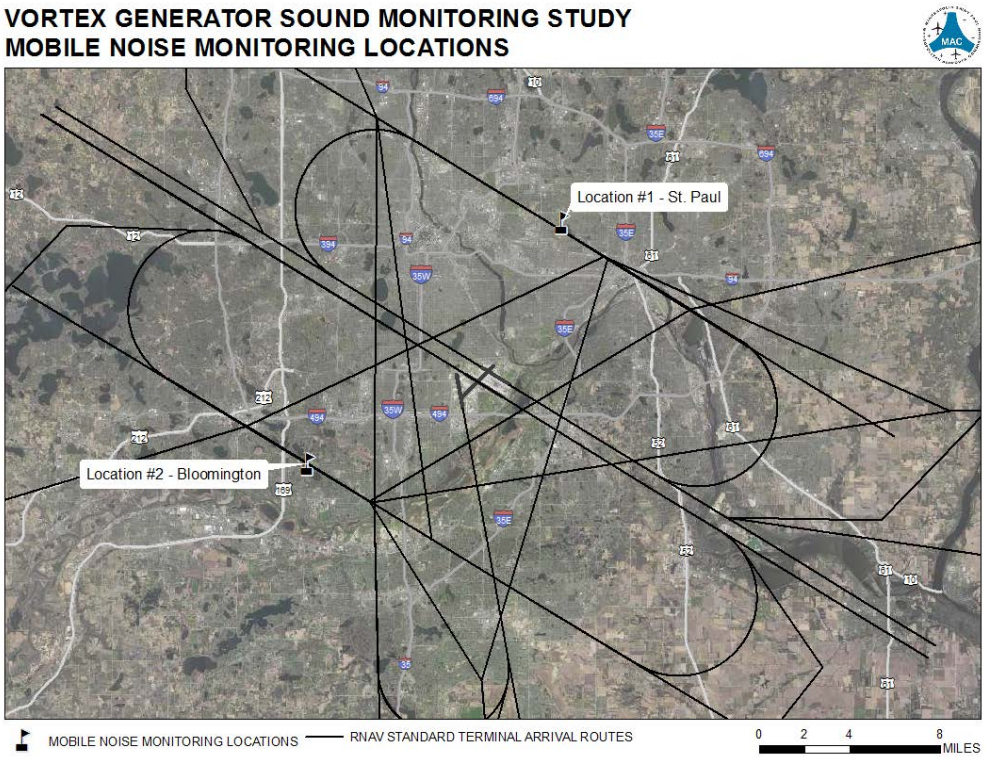


Figure 3-2

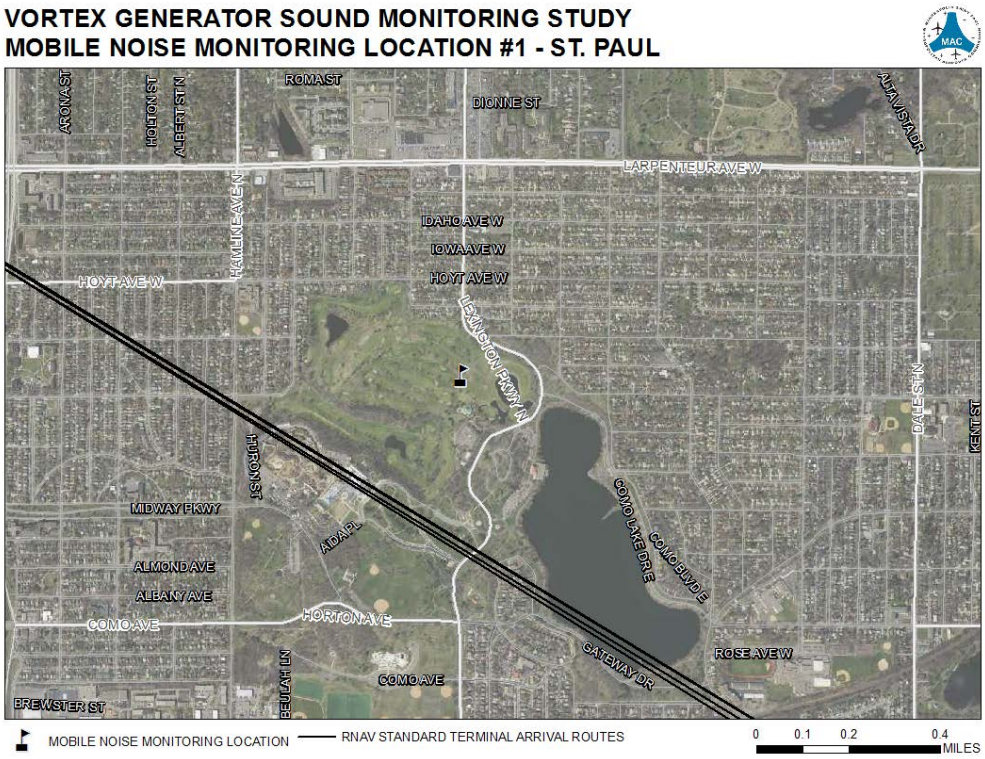


Figure 3-3

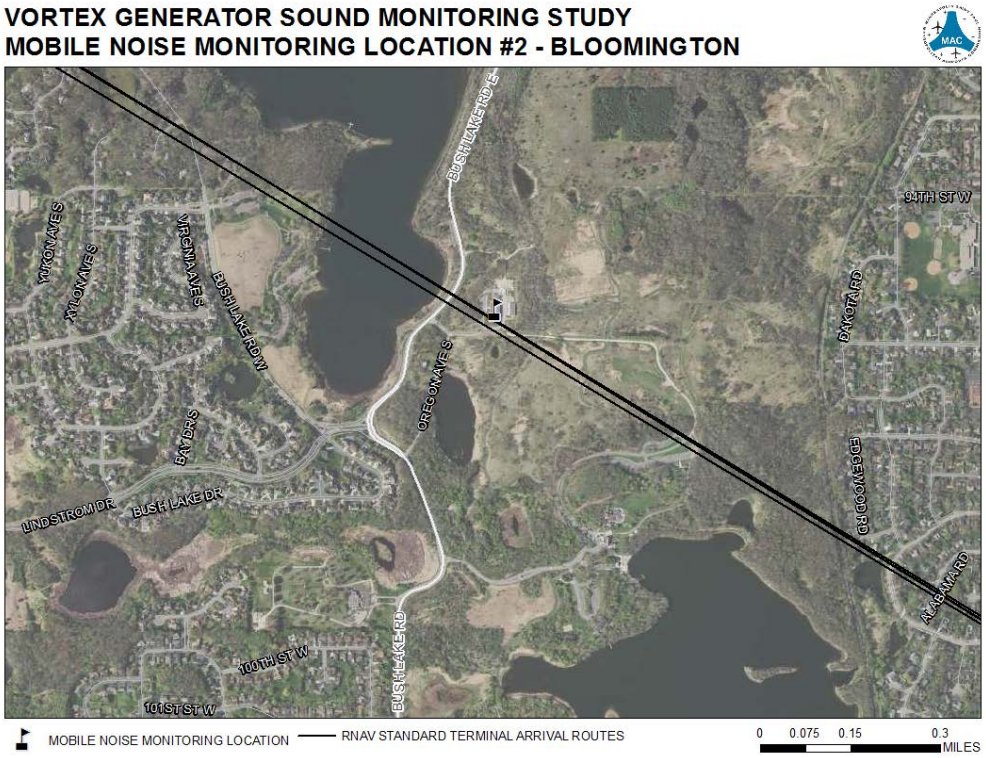
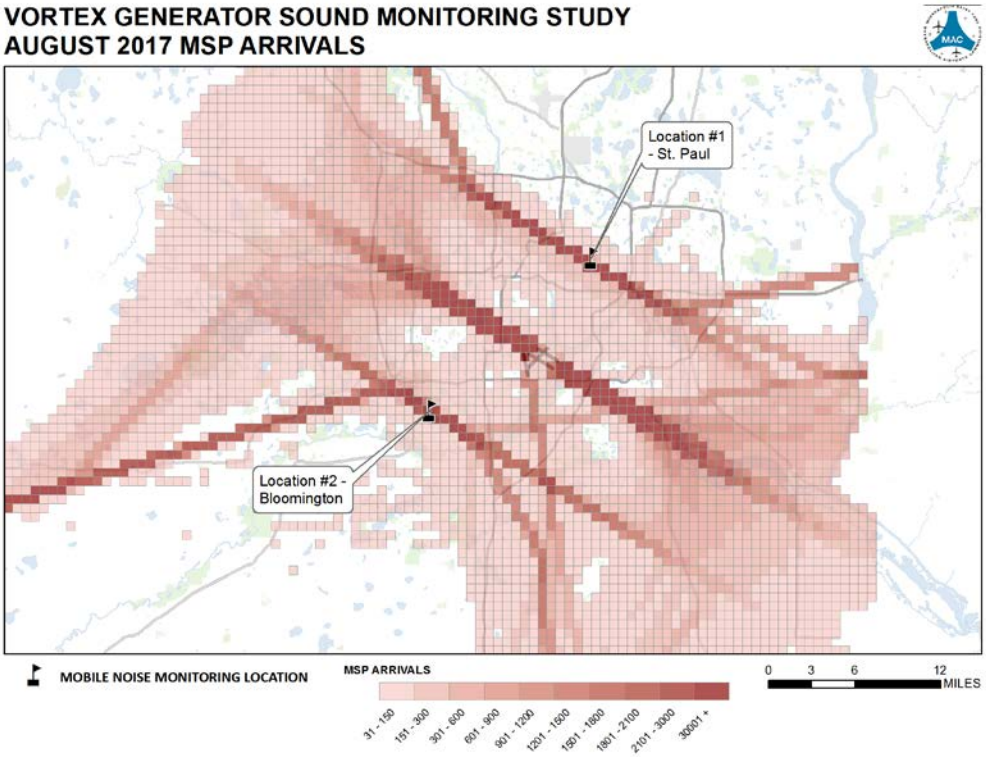


Figure 3-4



4. Noise Monitoring Period

Noise event monitoring and data collection period began at 11:00 A.M. on August 30, 2017 and was initially set to conclude in mid-September. Due to data collection issues at the St. Paul location, discussed in Section 7 below, the monitoring period was extended to mid-October. In total, there were 44 days of data collection from August 30 to 10:00 A.M. on October 12, 2017. The aircraft noise monitoring project was conducted by the staff of the MAC Noise Program Office.

The MSP aircraft operations and runway use during the monitoring period reflect normal airport operational conditions. Since the monitoring period extended beyond a month, there was a representative sample of arrival operations to each runway at MSP. Table 4-1 below shows the MSP aircraft arrival operations during the measurement period. In total there were 21,070 arrivals, 2,880 of which were from A320 family aircraft. Using the aircraft registration identification, staff determined that 168 (6%) of the Airbus A320 family arrivals were conducted by aircraft manufactured during 2014 or later and therefore determined to be equipped with vortex generators.

Table 4-1

Runway	Total Arrivals	Runway Use	A320 Family Arrivals	A320 Family Runway Use
04	1	0.0%	0	0.0%
12L	5,748	27.3%	794	27.6%
12R	6,751	32.0%	941	32.7%
22	1	0.0%	0	0.0%
30L	3,916	18.6%	587	20.4%
30R	3,438	16.3%	442	15.3%
35	1,216	5.8%	116	4.0%
Total	**21,070**	**100.0%**	**2,880**	**100.0%**

5. Noise Monitoring Equipment

Laboratory-quality noise monitoring equipment manufactured by Larson Davis Incorporated (LD) was utilized for this study. The main sound measurement components included a Type 1-LD 831 sound level meter connected to a PRM831 preamplifier and 377B02 microphone. This equipment is calibrated and certified annually.

6. Analysis Parameters

The sound level meters collected noise levels continuously utilizing slow response with A-weighting, as directed by FAR Part 150 standards (*Federal Aviation Regulation, Part 150 – Airport Noise Compatibility Planning*). The sound level meters were initially configured to detect an event when the sound pressure level (SPL) reached a threshold of 52 A-weighted decibels (dBA) and recorded events when the SPL remained at or above 52 dBA for four seconds or longer. This threshold is considerably different from the MAC's system of 39 permanent remote monitoring tower (RMT) locations, which have higher thresholds due to the louder noise levels collected at a closer proximity to the airport. At the permanent RMT sites,

an event is detected when the SPL reaches 65 dBA and recorded if the SPL remains above 63 dBA for a minimum of eight seconds. The lower threshold set for this mobile noise monitoring study introduces a greater probability that the ambient level and/or community noise events would be recorded in the data.

The noise events recorded at the mobile noise monitors are matched to flight track data obtained from the MAC's Noise and Operations Monitoring System (MACNOMS) to determine whether the noise source was associated with an aircraft operation or a non-aircraft noise source (i.e. community). Geographic space and time are used to match recorded noise events to aircraft flight tracks. Matching parameters include a two-dimensional distance, altitude ceiling and time buffer. For an event to be matched to a flight operation, the flight track must be within a 500 meter radius (1,640 feet) around the Bloomington location and within a 1,000 meter radius (3,281 feet) around the St. Paul location. At both locations, a ceiling was set at 3,000 meters (9,842 feet), below which aircraft flights must be flying in order to be matched to a noise event. Additionally, the flight time must occur 30 seconds before or 30 seconds after the maximum sound level (Lmax) event time in order for the operation to be matched to the noise event. Aircraft noise events that were not generated by operations associated with MSP were excluded from the data.

7. Refining the Analysis Parameters

Since the noise monitoring sites were located a distance away from MSP with low threshold settings, staff took extra precautions to verify the sound level meter settings were effective in capturing the desired aircraft noise data in order to achieve the purpose of the study. Therefore, after one week of monitoring, initial data were processed and analyzed.

The Bloomington site experienced a power interruption on Friday, September 1st and data was not collected between September 1st and September 6th. However, when the monitor was operational, 314 events were recorded using the thresholds identified above. Of these, 148 events (47%) were correlated to an aircraft operation and 166 events (53%) were caused by community noise sources. During the same timeframe, the St. Paul site recorded 4,024 events. Of these, only 441 (11%) were correlated to a flight and the remaining 3,583 events (89%) were caused by community noise sources.

Table 7-1 below provides a breakout of the initial noise events matched to aircraft operations at each location.

Table 7-1

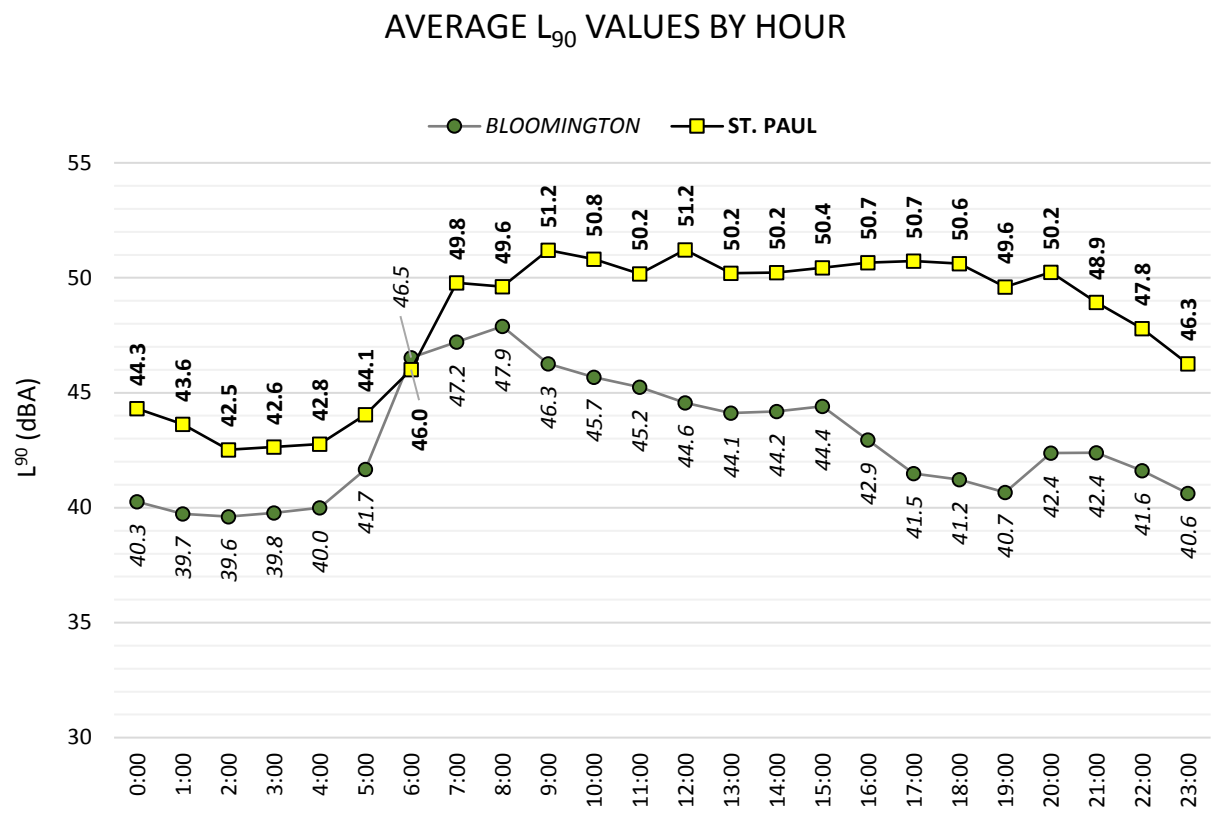
Site	Events	Events Matched to Aircraft Operations	Rate
St. Paul – Como Golf Course	4,024	441	11.0%
Bloomington – East Bush Lake	314	148	47.1%

The high number of events at the Como Golf Course necessitated a small location change in an effort to place it in an area with fewer community noise sources. Staff relocated the monitoring equipment from the original location to an alternate location on the golf course property. The selection process for this refined location followed the same criteria described in Section 3 of this report.

A secondary evaluation of the monitoring parameters was conducted on September 12th using noise monitoring data from September 6th to September 12th. One of the metrics recorded and evaluated was L_{90}. The L_{90} metric is the sound pressure level exceeded for 90% of the time. It generally represents the background or ambient level of a noise environment. The average L_{90} value for the Bloomington location was 44.0 dBA. The average L_{90} value for the St. Paul location was 48.9 dBA. With the sound level meters set to record an event when the SPL exceeded 50 dBA, the high ambient level at the St. Paul location continued to be problematic. Figure 7-1 displays the average hourly L_{90} levels for both monitoring locations.

After the secondary evaluation, staff determined that moving the noise monitoring equipment to the new location on the Como Golf Course did not rectify the issues with the high number of community noise events recorded. It was determined that this site could not properly measure arrival aircraft noise during this phase of flight due to the higher ambient levels overpowering the aircraft overflight noise levels. Therefore, the equipment was removed from the Como Golf Course on September 12th.

Figure 7-1



The September 12th evaluation confirmed that the mobile noise monitoring location #2 in Bloomington was, indeed, successful at collecting aircraft arrival events with a reasonable number of community events recorded in the data. In fact, the evaluation revealed that there was an opportunity to collect more aircraft event data at the Bloomington site by refining the parameters in the sound level meter. Due to its park location, site characteristics, and elevation off the ground, the ambient level at this site was lower than

that at the St. Paul location. On September 12th the threshold parameters were lowered from the initial 52 dBA to 50 dBA. For the duration of the study, a noise event was recorded at the Bloomington location when the sound pressure level reached 50 dBA or greater for a minimum of four seconds. The adjustment to the threshold parameter did not affect the data that had already been collected. Since the noise monitoring effort was reduced to one location for data collection, staff extended the study period to mid-October in order to capture a sufficient sample size for the study.

8. Study Results

Bloomington location recorded a total of 9,181 noise events. Of those, 4,033 were correlated to MSP aircraft operations; 3,527 arrivals and 506 departures. Staff went through an audial and visual verification process for noise events matched to Airbus A320 family aircraft operations. Audio for each noise event was reviewed individually. Additionally, one-second, ⅓ octave data measurements were plotted and reviewed to ensure the source was an arriving aircraft. This process verified 491 noise events correlated to Airbus A320 family aircraft arriving to MSP. Of these, 38 noise events associated with United Airlines operations were removed from the dataset due to the unknown pace of the airline's vortex generator retrofit. This resulted in 453 A320 family arrival flights registering a noise event at the Bloomington noise monitor. The predominant arrival runways captured in the noise data were Runways 12R, 30L and 35. Figures 8-1 and 8-2 show the aircraft operations that generated a noise event colored by runway.

Figure 8-1

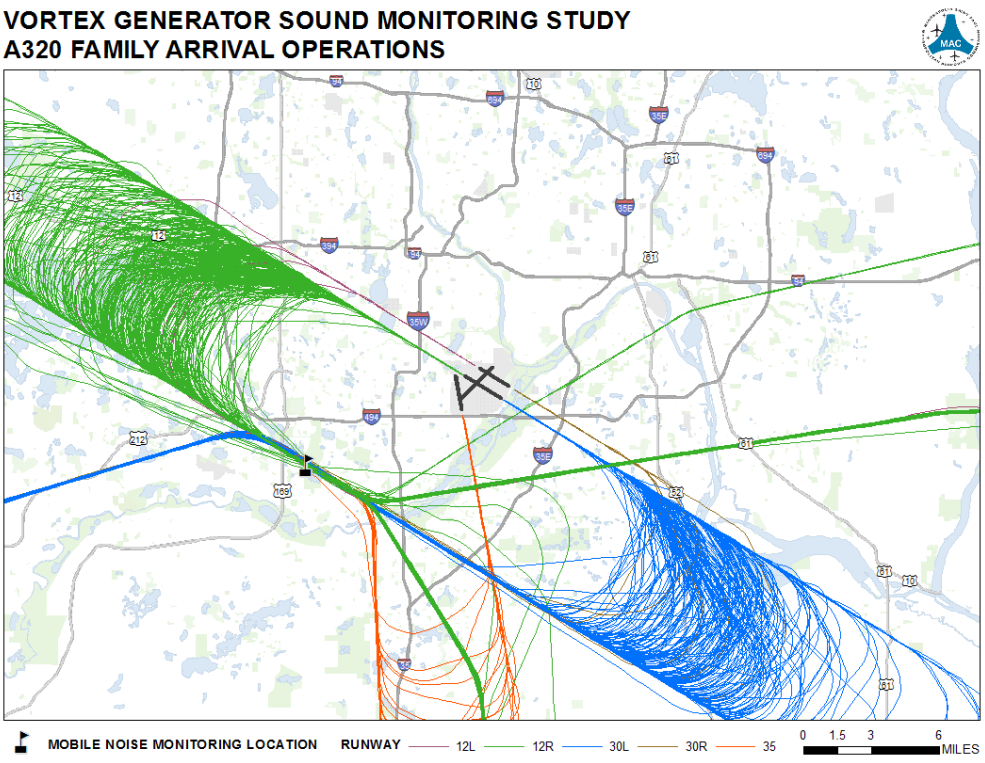
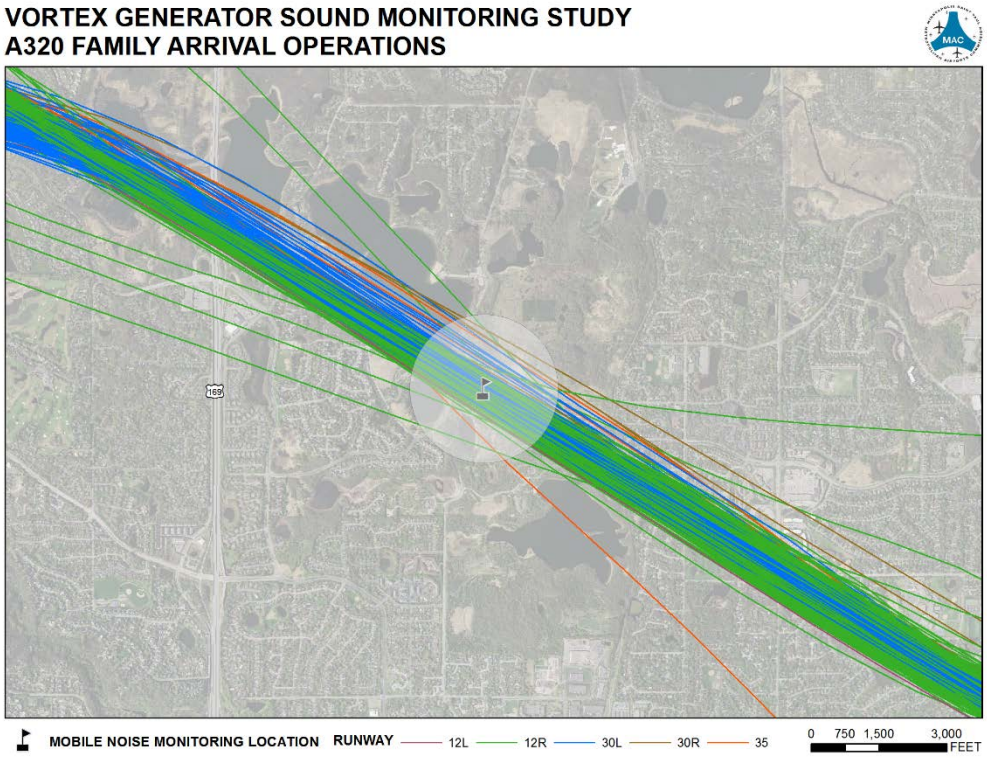


Figure 8-2



The noise data results include the Maximum Sound Level (Lmax), which is the peak noise level generated during the event; Sound Exposure Level (SEL), which is the total noise level someone would experience if all of the noise energy occurred in one second to account for both amplitude and duration; and the event duration, which is the length of the noise event, in seconds.

Table 8-1 below shows a comparison, by aircraft type and arrival runway(s), of the logarithmic average Lmax and SEL, as well as the average event duration for aircraft noise events in vortex generator-equipped aircraft and non-equipped aircraft. The data was examined by aircraft type and arrival runway(s) to allow for a direct comparison.

Table 8-1

A319 Aircraft

Vortex Generator Equipped	Arrival Runway(s)	Count	Average Lmax (dBA)	Average SEL (dBA)	Average Event Duration (seconds)
No	12L or 12R	118	59.2	69.9	29
No	30L or 30R	65	60.3	70.4	24
No	35	5	57.6	69.3	33

A320 Aircraft

Vortex Generator Equipped	Arrival Runway(s)	Count	Average Lmax (dBA)	Average SEL (dBA)	Average Event Duration (seconds)
No	12L or 12R	147	59.4	70.5	31
Yes	12L or 12R	20	59.0	69.5	30
No	30L or 30R	72	57.7	68.3	26
Yes	30L or 30R	5	58.6	69.4	22
No	35	5	59.8	71.3	40

A321 Aircraft

Vortex Generator Equipped	Arrival Runway(s)	Count	Average Lmax (dBA)	Average SEL (dBA)	Average Event Duration (seconds)
No	12L or 12R	12	60.7	70.9	28
Yes	12L or 12R	4	62.3	72.1	33

The mobile noise monitoring study collected aircraft arrival events from Airbus A320 family aircraft providing a sample of aircraft events equipped with and without vortex generators; however, the small sample of vortex generator-equipped aircraft operations was a limitation in the study.

Of the 453 A320 family arrival flights registering a noise event, 29 were determined to be equipped with vortex generators and 424 were non-equipped. There were no vortex generator-equipped A319 aircraft recorded at the noise monitor during the study period.

The vortex generator-equipped A320 aircraft noise levels for Runway 12L or 12R arrivals had a lower Lmax (-0.4 dBA), SEL (-1.0 dBA) and average duration (-1 second). The vortex generator-equipped A320 aircraft noise levels for Runway 30L or 30R arrivals had a higher Lmax (+0.9 dBA) and SEL (+1.1 dBA) and a shorter average duration (-4 seconds).

The vortex generator-equipped A321 aircraft noise levels for Runway 12L or 12R arrivals had a higher Lmax (+1.6 dBA), SEL (+1.2 DBA) and average duration (+5 seconds).

9. Summary

This report presents noise measurement data that were collected between August 30, 2017 and October 12, 2017 for a monitoring site near East Bush Lake in Bloomington. The purpose of the data collection was to quantify the noise benefits of vortex generators in Airbus A320 family aircraft arrivals. The aircraft noise monitoring and analysis provided in this report offer a comparison of A320 family aircraft equipped with vortex generators to those without in accordance with the 2017 NOC Work Plan.

The vortex generator noise data had Lmax noise level differences from -0.4 to +1.6 dBA, SEL noise level differences from -1.0 to +1.2 dBA and average duration that varied from -1 to +5 seconds. These minor noise level differences are unlikely to be perceptible on the ground[2].

The MAC Noise Office staff conducted several examinations of the noise data to ensure the methodology was accurately collecting the data. Vortex generators are designed to provide noise reduction benefits during the arrival phase of flight when the aircraft is in a clean configuration (prior to landing gear and flap extension). When taking aircraft noise measurements from the ground during this phase of flight, staff found the measured aircraft noise events struggled to exceed the ambient noise level in the community. Therefore, quantifying the noise reduction benefits provided by these devices from the ground becomes extremely difficult. The particular limitations in this study included the low threshold settings required to collect the aircraft arrival events when aircraft are at altitudes between 5,000 and 9,000 feet resulted in noise level data that was impacted by louder community noise events; and the small sample of vortex generator-equipped aircraft operations that were available to analyze.

[2] A reduction on the order of 3 dBA is widely considered to be required in order to be perceptible.

Appendix

Table A-1

Acoustic Term	Description
A-weighted decibel, dBA	"Another important characteristic of sound is its frequency, or "pitch". This is the rate of repetition of the sound pressure oscillations as they reach our ear. Formerly expressed in cycles per second, frequency is now expressed in units known as Hertz (Hz). Most people hear from about 20 Hz to about 10,000 to 15,000 Hz. People respond to sound most readily when the predominant frequency is in the range of normal conversation, around 1,000 to 2,000 Hz. Acousticians have developed "filters" to match our ears' sensitivity and help us to judge the relative loudness of sounds made up of different frequencies. The so-called "A" filter does the best job of matching the sensitivity of our ears to most environmental noises. Sound pressure levels measured through this filter are referred to as A-weighted levels (dBA). A-weighting significantly de-emphasizes noise at low and high frequencies (below about 500 Hz and above about 10,000 Hz) where we do not hear as well. Because this filter generally matches our ears' sensitivity, sounds having higher A-weighted sound levels are usually judged to be louder than those with lower A-weighted sound levels, a relationship which does not always hold true for unweighted levels. It is for these reasons that A-weighted sound levels are normally used to evaluate environmental noise."[i]
Decibel (dB)	"The loudest sounds that we hear without pain have about one million times more energy than the quietest sounds we hear. But our ears are incapable of detecting small differences in these pressures. Thus, to better match how we hear this sound energy, we compress the total range of sound pressures to a more meaningful range by introducing the concept of sound pressure level (SPL). Sound pressure level is a measure of the sound pressure of a given noise source relative to a standard reference value (typically the quietest sound that a young person with good hearing can detect). Sound pressure levels are measured in decibels (abbreviated dB). Decibels are the logarithmic quantities – logarithms of the ratio of the two pressures, the numerator being the pressure of the sound source of interest, and the denominator being the reference pressure (the quietest sound we can hear). The logarithmic conversion of sound pressure to sound pressure level means that the quietest sound we can hear (the reference pressure) has a sound pressure level of about zero decibels, while the loudest sounds we hear without pain have sound pressure levels of about 120 dB. Most sounds in our day-to-day environment have sound pressure levels from 30 to 100 dB."[ii]
L_{90}	"L_{90} is the level exceeded for 90% of the time. For 90% of the time, the noise level is above this level. It is generally considered to be representing the background or ambient level of a noise environment."[iii]

Maximum noise level, L_{max}	"The variation in noise level over time often makes it convenient to describe a particular noise "event" by its maximum sound level, abbreviated as L_{max}."[iv]
SEL	"SEL is a measure of the total noise energy produced during an event, from the time when the A-weighted sound level first exceeds a threshold level (normally just above the background or ambient noise) to the time that the sound level drops back down below the threshold. To allow comparison of noise events with very different durations, SEL "normalizes" the duration in every case to one second; that is, it is expressed as the steady noise level with just a one-second duration that includes the same amount of noise energy as the actual longer duration, time-varying noise. In lay terms, SEL "squeezes" the entire noise event into one second."[v]

Table A-2

Acronym	
KIAS	Knots Indicated Airspeed
LD	Larson Davis
RMT	Remote Monitoring Tower
MAC	Metropolitan Airports Commission
MACNOMS	MAC Noise and Operations Monitoring System
MSP	Minneapolis-St. Paul International Airport
NOC	Noise Oversight Committee
NEO	New Engine Option
RNAV	Area Navigation
SEL	Sound Exposure Level
SPL	Sound Pressure Level
STAR	Standard Terminal Arrival Route

Figure A-1

[i] Harrris Miller Miller & Hanson (March 2014). *Portland International Jetport Noise Exposure Map, HMMH Report No. 298410.* Harrris Miller Miller & Hanson, Inc.

[ii] Harrris Miller Miller & Hanson (March 2014). *Portland International Jetport Noise Exposure Map, HMMH Report No. 298410.* Harrris Miller Miller & Hanson, Inc.

[iii] Environmental Protection Department, The Government of Hong Kong. (2017, 10 30). *Noise Descriptors for Environmental Noise*. Retrieved from Noise Descriptors for Environmental Noise: http://www.epd.gov.hk/epd/noise_education/web/ENG_EPD_HTML/m2/types_3.html

[iv] Harrris Miller Miller & Hanson (March 2014). *Portland International Jetport Noise Exposure Map, HMMH Report No. 298410.* Harrris Miller Miller & Hanson, Inc.

[v] Harrris Miller Miller & Hanson (March 2014). *Portland International Jetport Noise Exposure Map, HMMH Report No. 298410.* Harrris Miller Miller & Hanson, Inc.

ITEM 7

MEMORANDUM

TO: MSP Noise Oversight Committee (NOC)

FROM: Bradley Juffer, Assistant Manager—Noise, Environment & Planning

SUBJECT: **SUPER BOWL ACTIVITY DEBRIEF**

DATE: March 7, 2018

Super Bowl LII was held at U.S. Bank Stadium in Minneapolis on February 4, 2018. The game was bookended by increased aircraft operational activity to accommodate passengers traveling to and from the Minneapolis-St. Paul area.

The MAC's Noise and Operations Monitoring System (MACNOMS) was used to assess the flight operations, noise events and aircraft noise complaints during the week of Super Bowl LII. This memo contains the activity report. MAC Staff can respond to questions from the Committee on this topic at the March 21, 2018 meeting.

Unless otherwise noted, the following charts consider data during the week of Super Bowl LII to be:

- Tuesday, January 30, 2018 – Monday, February 5, 2018

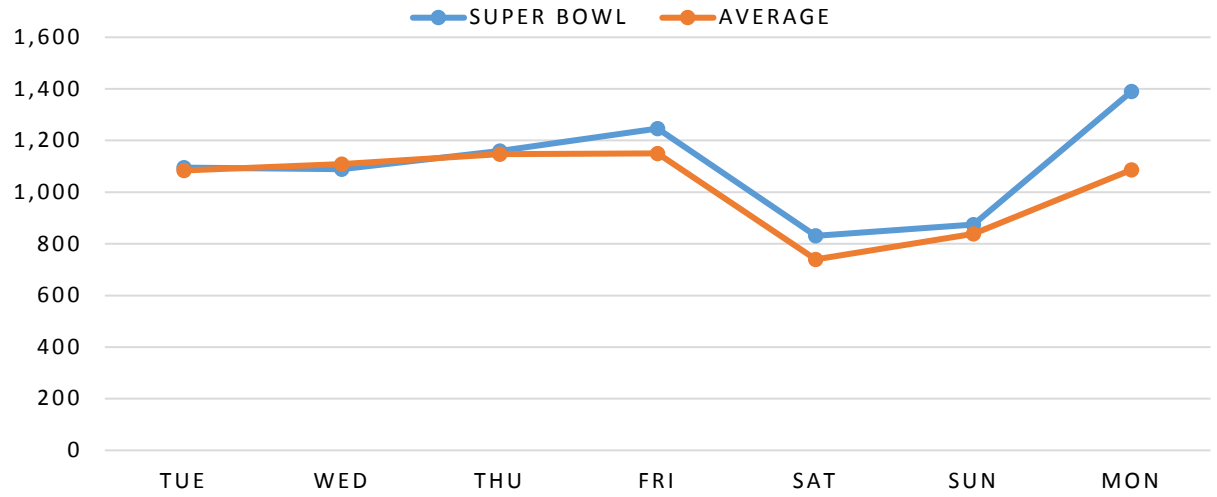
Data is compared to an average derived from activity during the same week during the previous four years. Specifically the reported average includes the following weeks:

- January 28, 2014 – February 3, 2014
- January 27, 2015 – February 2, 2015
- January 26, 2016 – February 1, 2016
- January 31, 2017 – February 6, 2017

Operations

Chart 1, below shows MSP operations during each day of the week. An operation is either a takeoff or a landing from MSP. In the early part of the week, MSP operations were consistent with the average operational levels. Friday and Saturday saw operations increase by roughly 100 operations over average levels. Sunday had 874 operations, 34 more flights than the four-year average. Monday, February 5th had the biggest difference from average. The 1,390 operations were more than 300 above the average Monday.

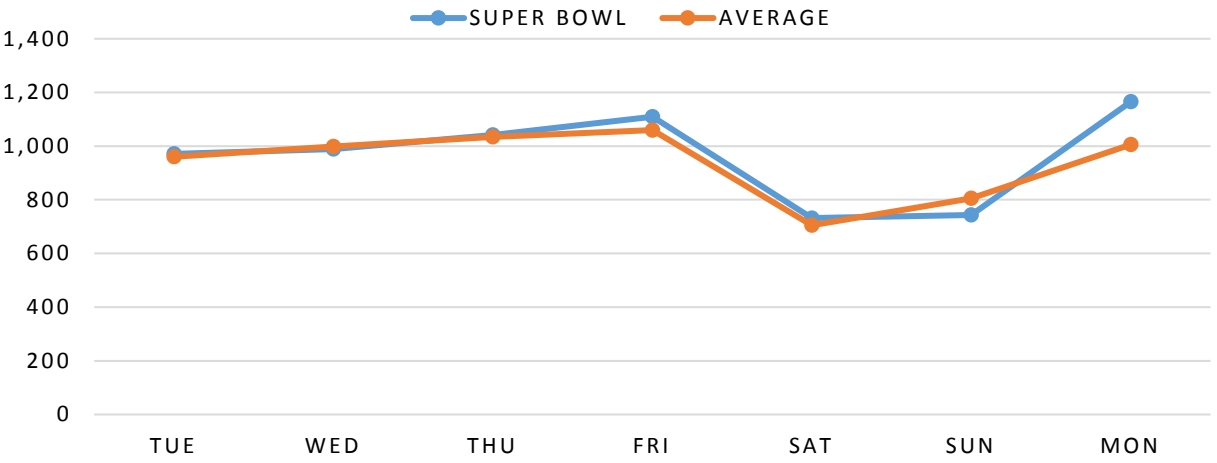
CHART 1 - MSP OPERATIONS BY DAY



The next two charts provide one more level of detail. Chart 2 includes only Carrier Jet operations. Many of the same trends from Chart 1 remain, with the exception of Sunday. The amount of Carrier Jet operations on Sunday was below the average Sunday in the historical time periods. This may be driven by airlines choosing to use larger aircraft to carry more passengers with fewer movements during the day of the Super Bowl. For Monday, Carrier Jets account for 52% of the overall increase.

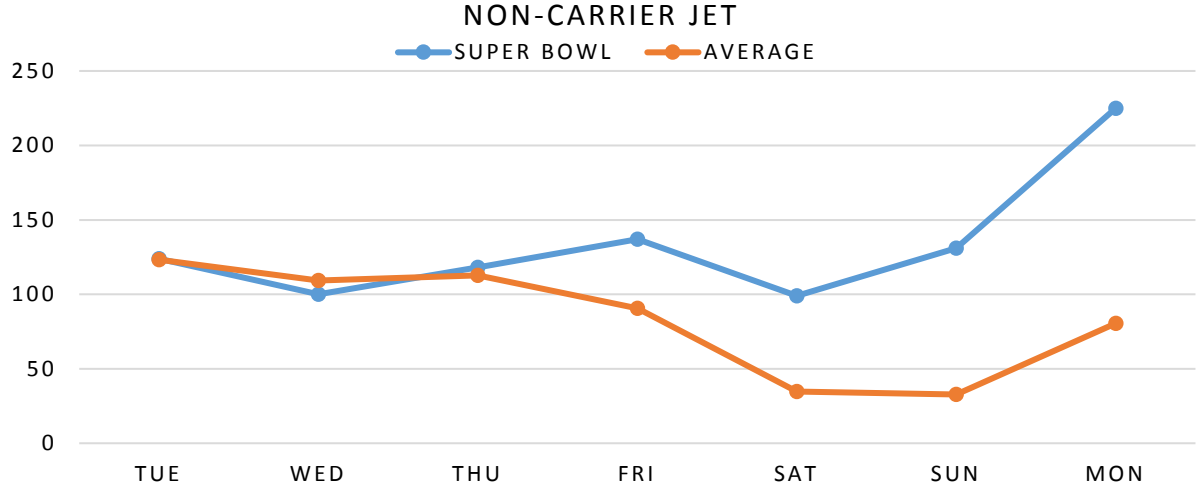
CHART 2 - MSP OPERATIONS BY DAY

CARRIER JET



The remaining 48% of the increase on Monday is the result of non-Carrier Jet operations, primarily general aviation private jet aircraft. Typically, weekends see a lull in turboprop and private jet activity. During the Super Bowl week, these levels remained consistent through Sunday. Monday was a high operations day for non-Carrier Jets as the 225 operations were nearly three times above the historical average.

CHART 3 - MSP OPERATIONS BY DAY



MSP and the MAC's system of reliever airports were expected to have higher operational levels the evening of Super Bowl Sunday into Monday morning. Chart 4 provides the operations from each Sunday in February since 2014. The data only shows flights that operated at MSP between 8:00 PM Sunday through 8:00 AM Monday. After the Super Bowl from 8:00 PM through 8:00 AM on Monday, there were 150 arrivals and 235 departures at MSP. The amount of arrivals was higher than average, but only by 23 arrivals. The 235 departures, however, were 89 above an average level.

CHART 4 - MSP OPERATIONS

8:00 PM SUNDAY - 8:00 AM MONDAY

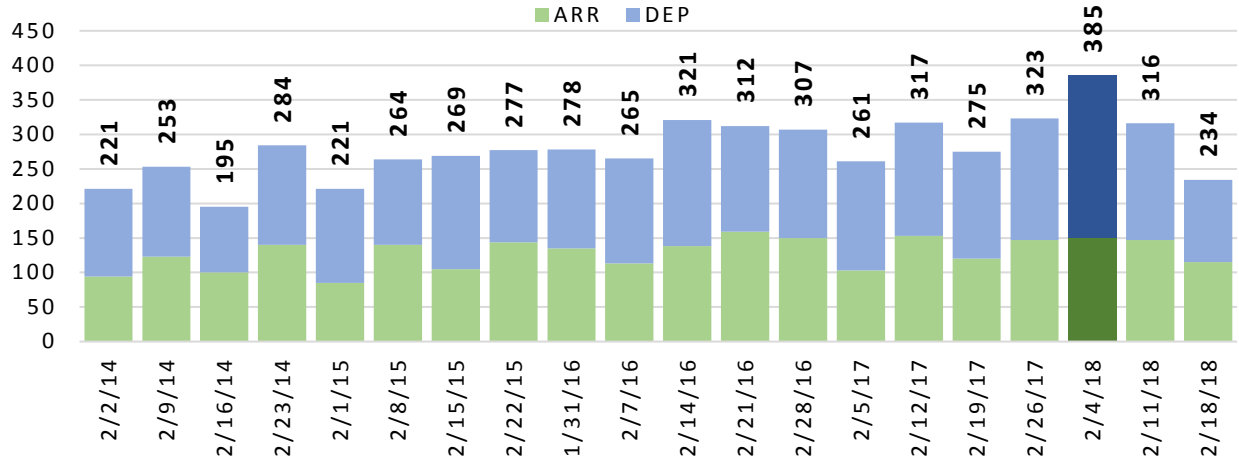
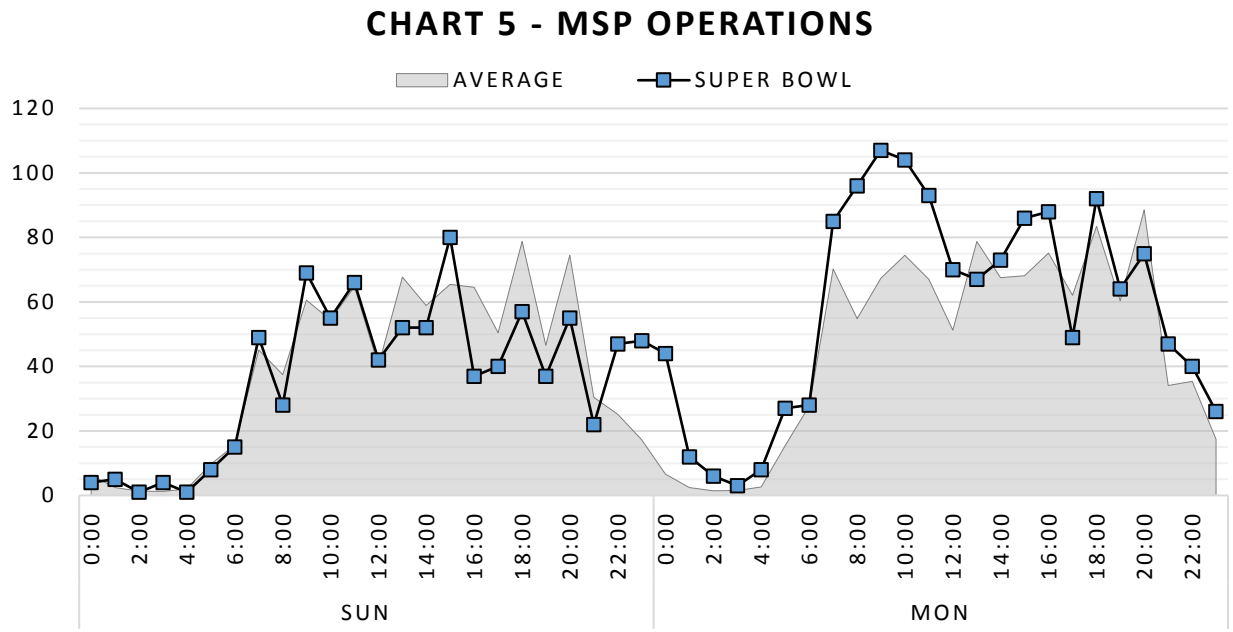


Chart 5 below shows that the bulk of the differences occurred from 10:00 PM – 1:00 AM and again from 7:00 AM – 12:00 PM.



The winds on Sunday, February 4, 2018 were out of the north in the morning, gradually shifting to the west by kickoff. The airport was configured in a North Flow until 7:00 PM when a Mixed Flow A was used. The wind shift continued during the overnight hours. By 6:00 AM the wind was almost directly out of the south. A South Flow runway configuration was in place during the morning hours.

Complaints

The increased aircraft activity at MSP did not lead to an associated increase in aircraft noise complaints. A total of 83 complaints were filed on Super Bowl Sunday from 20 locations. The increased departures on Monday, February 5 caused 154 complaints from 26 locations. These totals were consistent to other days in January and February, as shown on Chart 6 below.

CHART 6 - MSP COMPLAINTS BY DAY

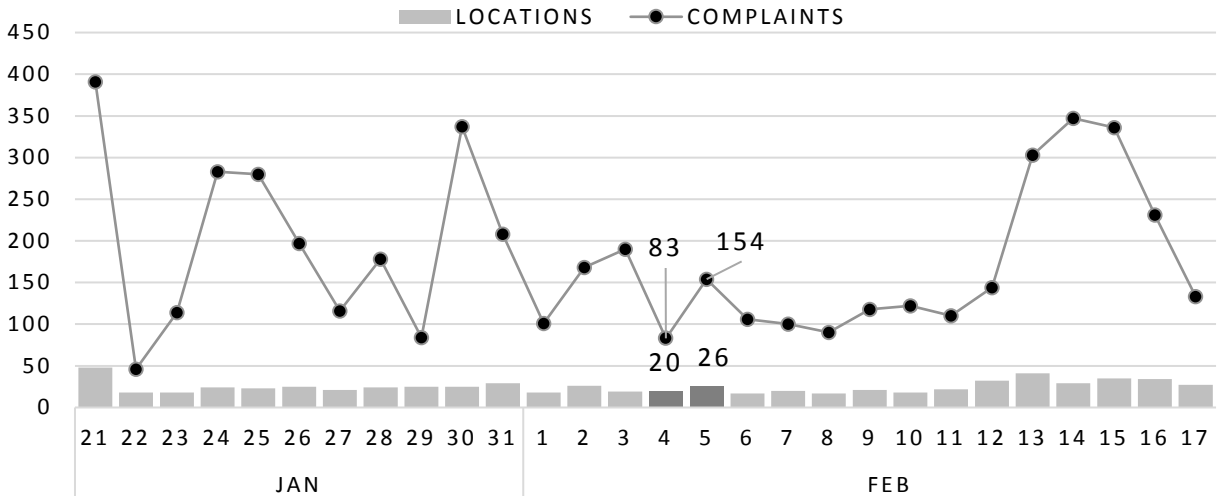
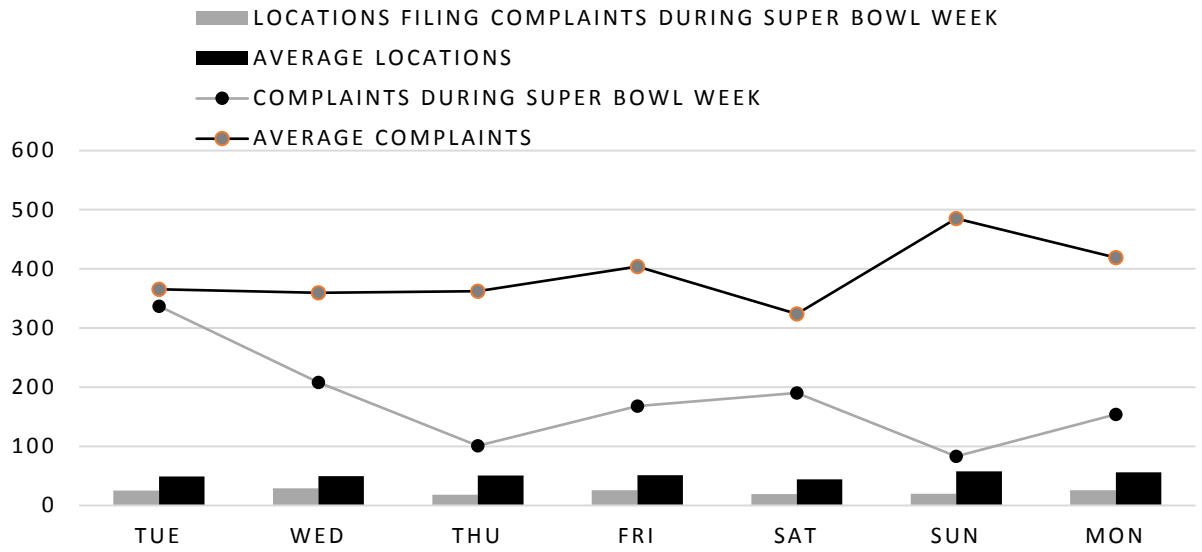


Chart 7 compares complaints received during the week of Super Bowl LII with the historical average. The number of locations filing a complaint and the total complaints received were lower for every day when compared to the historical average. The 83 complaints received on Super Bowl Sunday was more than 400 complaints less than the historical average.

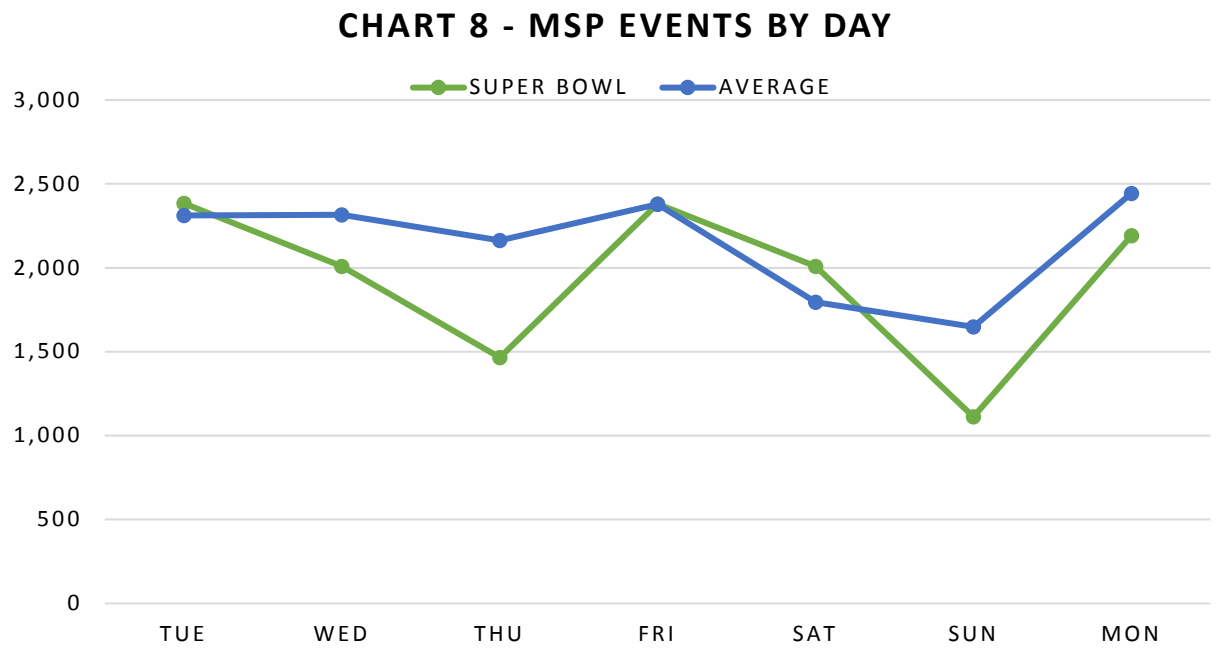
CHART 7 - MSP COMPLAINTS BY DAY



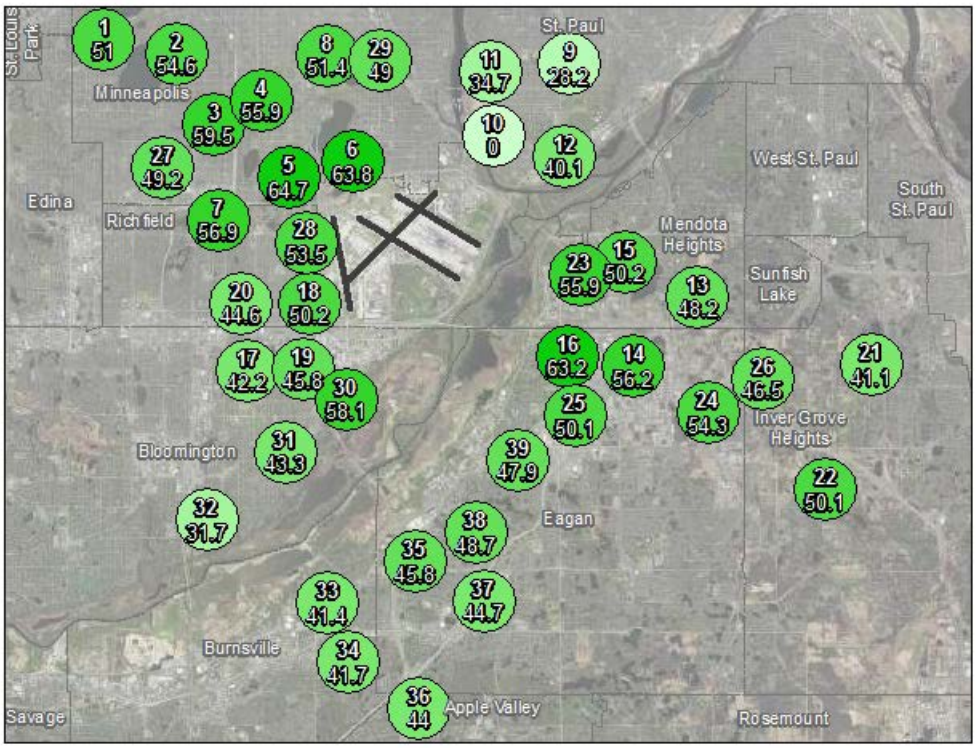
There are many variables that influence the number of aircraft complaints received. One of those factors is temperature. The average temperature on Super Bowl Sunday at MSP was 0° increasing to 5° on Monday, February 5th.

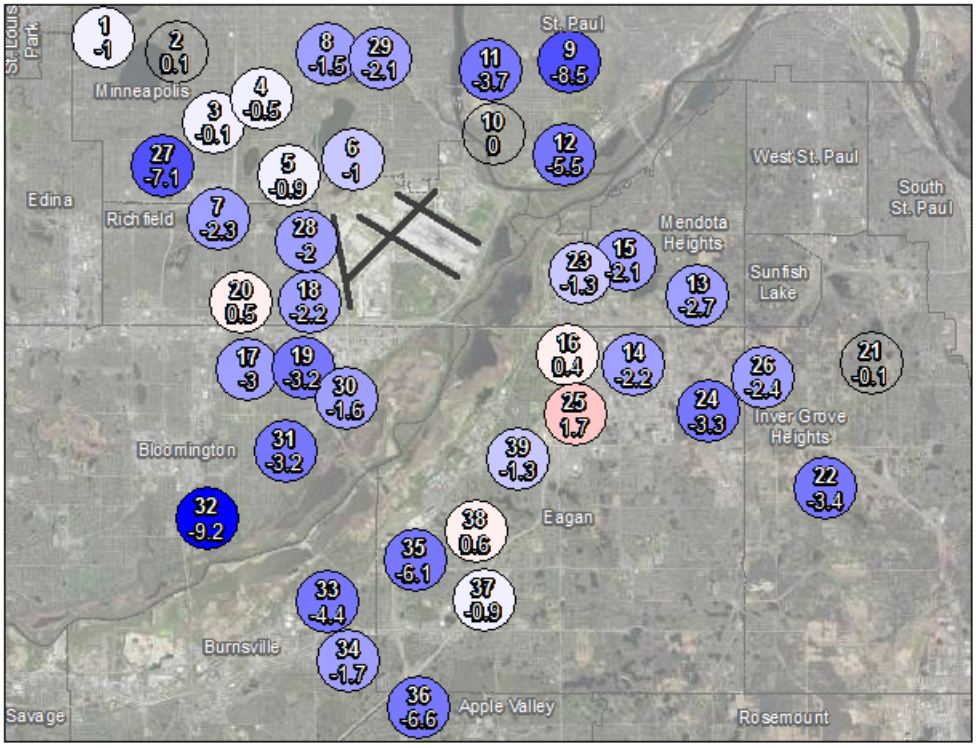
Sound Monitoring

The lower than normal temperatures had a positive effect on aircraft performance which lowers the impact of aircraft noise on the ground. The data collected by the array of Remote Monitoring Towers (RMTs) around MSP during the week of the Super Bowl indicate a quieter week than normal. Chart 8 below compares the aircraft noise events each day during the week of the Super Bowl to the same week from 2014 – 2017. During the week of the Super Bowl, there were over 1,500 fewer noise events attributable to aircraft than average. Only Tuesday and Saturday had slightly more events than average. Super Bowl Sunday had 1,080 events recorded. This was the fewest events recorded of any day during the week.



The lower events translated to lower day-night average sound levels (DNL) at nearly every RMT site. Sites 2, 16, 20, 25 and 38 were the only sites that saw DNL increases when compared to the average DNL for the same week in the last four years. RMT 10 did not have a single event attributable to an MSP operation and as a result the DNL was 0. The first map below shows the DNL level at each RMT for the week of the Super Bowl. The second map displays the difference between the DNL during the week of the Super Bowl and the average DNL during the same week from 2014 – 2017.





THIS IS AN INFORMATIONAL ITEM ONLY; NO COMMITTEE ACTION REQUIRED.

ITEM 8

MEMORANDUM

TO: MSP Noise Oversight Committee (NOC)

FROM: Dana Nelson, Manager—Noise, Environment & Planning

SUBJECT: **REVIEW OF THE WINTER LISTENING SESSION**

DATE: March 7, 2018

One of the elements of the framework for the MSP Noise Oversight Committee (NOC) includes convening a quarterly meeting with the public. The primary goal of the meeting is to ensure residents' concerns are heard and considered as part of the ongoing effort by the MAC and the NOC to address noise and other topics around MSP.

On January 30, 2018 at 7:00 P.M., the Winter Listening Session was held at the Mount Olivet Lutheran Church in the Lynnhurst neighborhood of Minneapolis. Forty residents attended the meeting, the majority of which were from Minneapolis. In addition to MAC staff and FAA air traffic officials, the meeting was also attended by MAC Commission Chair Dan Boivin, and MAC Commissioners Steve Cramer, Leili Fatehi, and Katie Clark-Sieben; Minneapolis City Council Members, Jeremy Schroeder and Linea Palmisano; Bloomington City Council Member and NOC Representative, Dwayne Lowman; NOC Co-Chair, Jeff Hart; Delta Chief Pilot and NOC Member, Captain Gordy Goss; Minneapolis City Staff and NOC member, Loren Olson; and Metropolitan Council representative, Russ Owen.

MAC staff opened the meeting and asked each of the audience members to introduce themselves and where they were from or who they represent. Staff then provided a presentation about the MSP Noise Oversight Committee, operational and noise trends specific to Minneapolis, noise metrics and regulations, information and data available to the public, and air traffic activity related to the Super Bowl. The presentation slides are available at https://www.macnoise.com/sites/www.macenvironment.org/files/pdf/presentation.pdf.

Due to the location of the meeting and the audience, much of the open floor conversation focused on aircraft arriving to Runways 12L and 12R and departing from Runways 30L and 30R. Specifically, the attendees focused on:

- MSP nighttime operations
- Frequency of arrivals to Runways 12L and 12R
- Balancing arrivals to Runways 12L and 12R with departures from Runways 30L and 30R
- Noise monitoring locations and data
- Creation of DNL noise contours and eligibility criteria for the Residential Noise Mitigation Program
- Area Navigation (RNAV) procedures at MSP
- Departures flying runway heading straight-out over Minneapolis
- The DNL noise metric and its representation of actual noise impacts
- Alternative noise metrics
- Anticipated air traffic demand in the future
- MSP Fairskies requests to the NOC

The MSP Spring Listening Session will be on April 25, 2018 at 7:00 P.M. at the MAC General Offices.

Note: The date and location of the MSP Summer Listening Session has been changed to Tuesday, July 17, 2018 at 7:00 PM at the Richfield City Hall, 6700 Portland Avenue South, Richfield 55423.

THIS IS AN INFORMATIONAL ITEM ONLY; NO COMMITTEE ACTION REQUIRED.