Minneapolis St. Paul International Airport (MSP)
2018 Annual Noise Contour Report

Comparison of the 2018 Actual and the 2007 Forecast Noise Contours
February 2018

MAC Noise Program Office and HNTB Corporation

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ES EXECUTIVE SUMMARY

ES.1 BACKGROUND

The issue of aircraft noise at Minneapolis-St. Paul International Airport (MSP) includes a long history of local efforts to quantify and mitigate noise impacts in a manner responsive to concerns raised by communities around the airport and consistent with federal policy. In 1992, the Metropolitan Airports Commission (MAC) embarked on a 14 CFR Part 150 Program at MSP (Program), which included a noise mitigation program for single-family and multi-family residences and schools, as well as property acquisition and relocation based on mitigation eligibility defined by the 1996 forecast 65 decibel Day-Night Average Sound Level (dB DNL) noise contour. When the original Part 150 Program was completed in 2006, noise mitigation had been provided to 7,846 single-family homes, 1,327 multi-family units and 19 schools. Additionally, 437 residential properties were acquired around MSP as part of the program. The total cost of the program was approximately $385.6 million.

In 1999 the MAC began an update to its Program and published a draft Part 150 Update document in October 2000, which included a 2005 forecast noise contour. In May 2002, after further consideration of the effects of September 11, 2001, the MAC withdrew the draft Part 150 Update to ensure the operational impacts and MSP fleet mix changes were considered in the noise contours.

One of the largest discussion items in the Part 150 Update process focused on the mitigation program. Expansion of noise mitigation efforts beyond the federally-recognized level of 65 dB DNL was outlined as part of the Dual-Track Airport Planning Process (a process directed by the State Legislature that began in 1989 and concluded in 1998 that examined moving MSP versus expanding it in its current location). Through the Part 150 Update, the MAC detailed a specific mitigation package to be offered to homes located in the 60-64 dB DNL noise contour area, which proposed providing central air conditioning to single-family homes that did not have it, with a homeowner co-pay based on the degree of noise impact.

ES.2 AIRPORT NOISE LITIGATION AND CONSENT DECREE

The cities located around MSP expressed dissatisfaction with the Part 150 Update associated with the expanded noise mitigation proposal in the context of the Dual-Track Airport Planning Process discussions. Contention grew and in early 2005, the Cities of Minneapolis, Eagan, and Richfield and the Minneapolis Public Housing Authority filed a lawsuit in Hennepin County District Court against the MAC on the grounds that the MAC violated environmental quality standards and the Minnesota Environmental Rights Act by failing to provide a Full 5-decibel Noise Reduction Package (as was provided in the 1996 65 dB DNL noise contour) to single-family homes in the 60-64 dB DNL noise contour areas. In September 2005, plaintiffs seeking class action certification filed a separate action against the MAC alleging breach of contract claims associated with mitigation in the 60-64 dB DNL noise contours.

In 2007, the MAC and the Cities of Minneapolis, Eagan, and Richfield and the Minneapolis Public Housing Authority entered into a Consent Decree that settled the litigation. The 2007 Consent Decree provided the Full 5-decibel Reduction Package to single-family homes within the 2007 forecast 63 dB DNL noise contour and a Partial Noise Reduction Package to single-family homes located in the 2007 forecast 60-62 dB DNL noise contours. A Homeowner Reimbursement

Program was also offered to single-family homes located in areas between the 2005 forecast 60 dB DNL noise contour and the 2007 forecast 60 dB DNL noise contour. Multi-family structures within the 2007 forecast 60 dB DNL noise contour were offered a uniform Multi-Family Reduction Package.

Upon the completion of the 2007 Consent Decree noise mitigation program in 2014, more than 15,000 single-family homes and 3,303 multi-family units were provided noise mitigation around MSP. The total cost to implement mitigation under the 2007 Consent Decree was $95 million, raising the MAC's expenditures related to its noise mitigation program efforts to over $482 million.

ES.3 MSP 2020 IMPROVEMENTS EA/EAW

In January 2013, the MAC published the Final MSP 2020 Improvements Environmental Assessment/Environmental Assessment Worksheet (EA/EAW), which reviewed the potential and cumulative environmental impacts of MSP terminal and landside developments needed through the year 2020. In response to new concerns expressed by MSP Noise Oversight Committee membership, a new noise mitigation plan was proposed in the EA/EAW leading to an amendment to the 2007 Consent Decree.

ES.4 THE AMENDED CONSENT DECREE

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 to 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 replaced the Integrated Noise Model (INM) as 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.

ES.5 2018 NOISE CONTOUR

Based on the 406,913[1] total operations at MSP in 2018, the actual 60 dB DNL contour is approximately 28 percent smaller than the 2007 forecast contour and the 65 dB DNL contour is approximately 39 percent smaller than the 2007 forecast contour. The predominant contraction in the contours from the 2007 forecast to the 2018 actual noise contour scenario is driven largely by a reduction in total aircraft operations by 30.1 percent, 274.2 fewer average daily flights in Hushkit Stage 3 aircraft, and a daily average of 3.0 fewer flights during the nighttime. However, there continues to be a small area in Minneapolis and Eagan where the 2018 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 occurred in 2018, particularly an increase of the nighttime arrival operations on Runway 12R.

ES.6 AMENDED CONSENT DECREE PROGRAM ELIGIBILITY

First-Year Candidate Eligibility

There are 313 single-family homes that achieved the first year of eligibility with the 2018 actual noise contour. All 313 homes are in Minneapolis. Of these, 216 homes are in the Partial Noise Reduction Package. All 216 of these homes were previously outside the mitigation program area. The 2018 actual noise contour includes 97 single-family homes within the first year of eligibility for the Full 5-decibel Reduction Package. Additionally, there are 525 multi-family units in the 2018 noise contour that achieved the first year of eligibility. If these 313 single-family homes and 525 multi-family units 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 2022.

Second-Year Candidate Eligibility

The 2018 actual contour shrunk near both the arrival and departure lobes of Runway 30L, resulting in some homes in Minneapolis, Eagan and Inver Grove Heights not reaching a second consecutive year of eligibility. Of the 63 homes that met the first year of candidate eligibility in the 2017 actual noise contour, 16 achieved a second consecutive year of candidate eligibility with the 2018 actual noise contour. All 16 single-family homes are located on one block in Eagan within the Partial Noise Reduction Package. The homes on this block were previously eligible for homeowner reimbursements during the Original Consent Decree Program. If these 16 single-family homes remain in a higher noise impact area in the 2019 actual noise contour compared to the previous noise mitigation program, they will be eligible for mitigation in 2021.

There are no multi-family units within the second year of eligibility.

[1] Based on airport operations counts documented by the Federal Aviation Administration Opsnet for MSP in 2018.

Third-Year Candidate Eligibility

There were 243 single-family homes that met the Second-Year Candidate Eligibility in the 2017 Annual Noise Contour Report analysis. All 243 homes are located within the third-year eligibility area and are eligible to participate in the mitigation program in 2020.

Of the 243 single-family homes that meet the Third-year Candidate Eligibility, a total of 164 single-family homes are eligible for the Partial Noise Reduction Package. Of these homes, 140 previously were located outside the eligibility area, and 24 previously were eligible for homeowner reimbursements. These single-family homes are eligible to participate in the 2020 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 79 single-family homes are eligible for the Full 5-decibel Reduction Package. Four of the homeowners of these 79 homes previously opted out of the Partial Noise Reduction Package. There are no multi-family units that meet the criteria for Third-Year Candidate Eligibility. All homes eligible for the 2020 mitigation program are located in Minneapolis.

Homeowners of eligible properties will be notified by the MAC in writing by mid-2019. In cases where homes have received previous reimbursement from the MAC, the value of 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. In cases where homes received previous improvements from the MAC, those efforts will not be duplicated in the design of future mitigation activity.

The blocks meeting the first, second and third consecutive year(s) of noise mitigation eligibility by virtue of the 2018 actual noise contours are shown in Figures ES-1, ES-2 and ES-3.

ES.7 AMENDED CONSENT DECREE PROGRAM MITIGATION STATUS

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 4, 2019, 116 homes have been completed, 1 home is in the construction or pre-construction phase, 15 homes declined to participate while 6 homes were moved to the 2019 program as a result of homeowner actions.

Two multi-family structures were also eligible to participate in the Multi-Family Mitigation Program in 2017; one property is completed, and one property declined to participate. The total cost for the 2017 Mitigation Program to date is $2,409,317.

2018 Mitigation Program

In 2017 the MAC began the project to provide mitigation to 283 single-family homes that became eligible by virtue of the 2016 actual noise contour. As of February 4, 2019, 167 homes have been completed, 65 homes are in the construction or pre-construction phase, 27 homes declined to participate while 24 homes were moved to the 2019 program. The 2018 Mitigation Program does not include any multi-family properties. The total cost for the 2018 Mitigation Program to date is $4,847,480.

2019 Mitigation Program

In 2018 the MAC began the project to provide mitigation to 429 single-family homes that became eligible by virtue of the 2017 actual noise contour. As of February 4, 2019, including the homes transitioned from the 2017 and 2018 programs, 10 homes have been completed, 410 homes are in the construction or pre-construction phase and 39 homes declined to participate. The 2019 Mitigation Program does not include any multi-family properties. The total cost for the 2019 Mitigation Program to date is $251,952.

Figure ES-1: 2018 Contours and Mitigation Program Eligibility

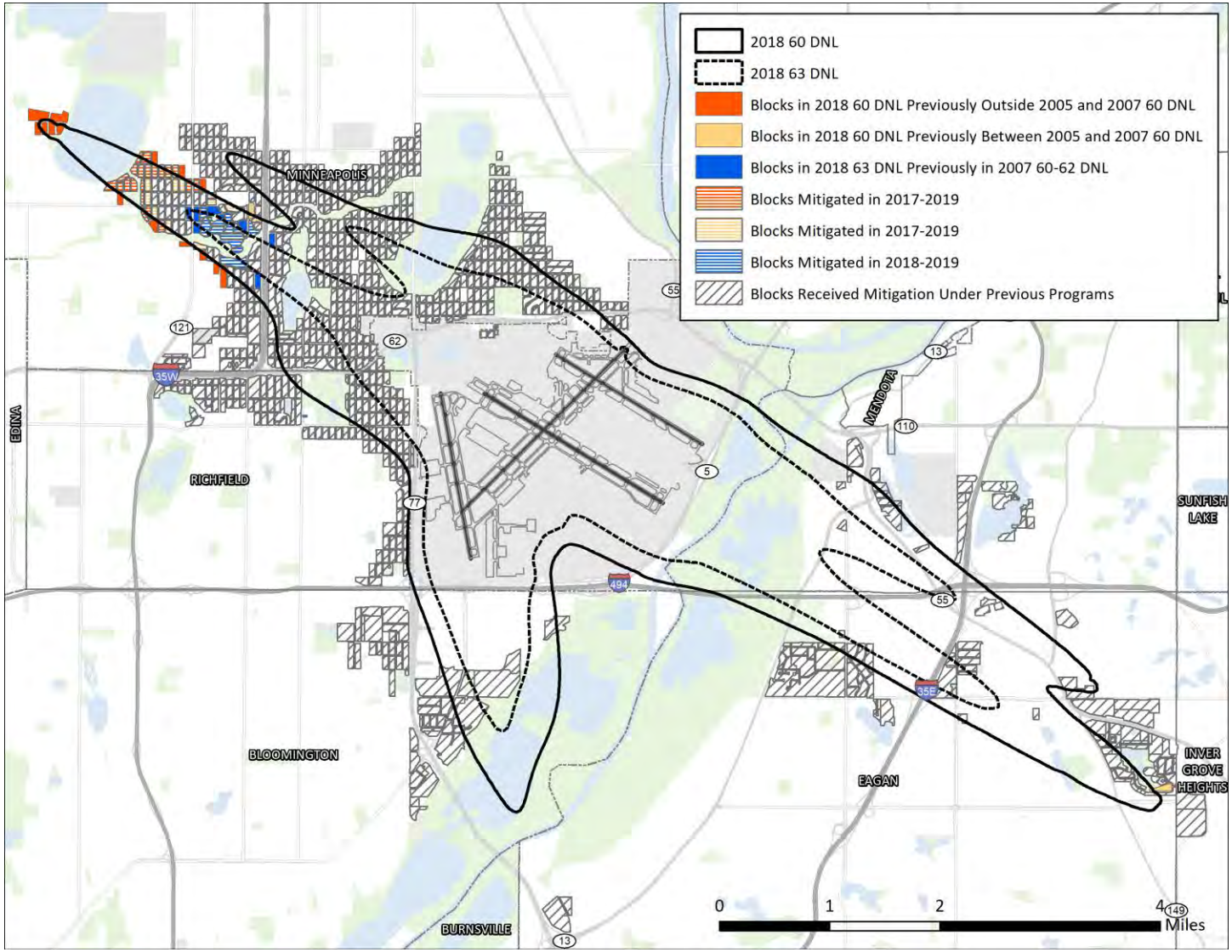


Figure ES-2: 2018 Contours and Mitigation Program Eligibility – City of Minneapolis

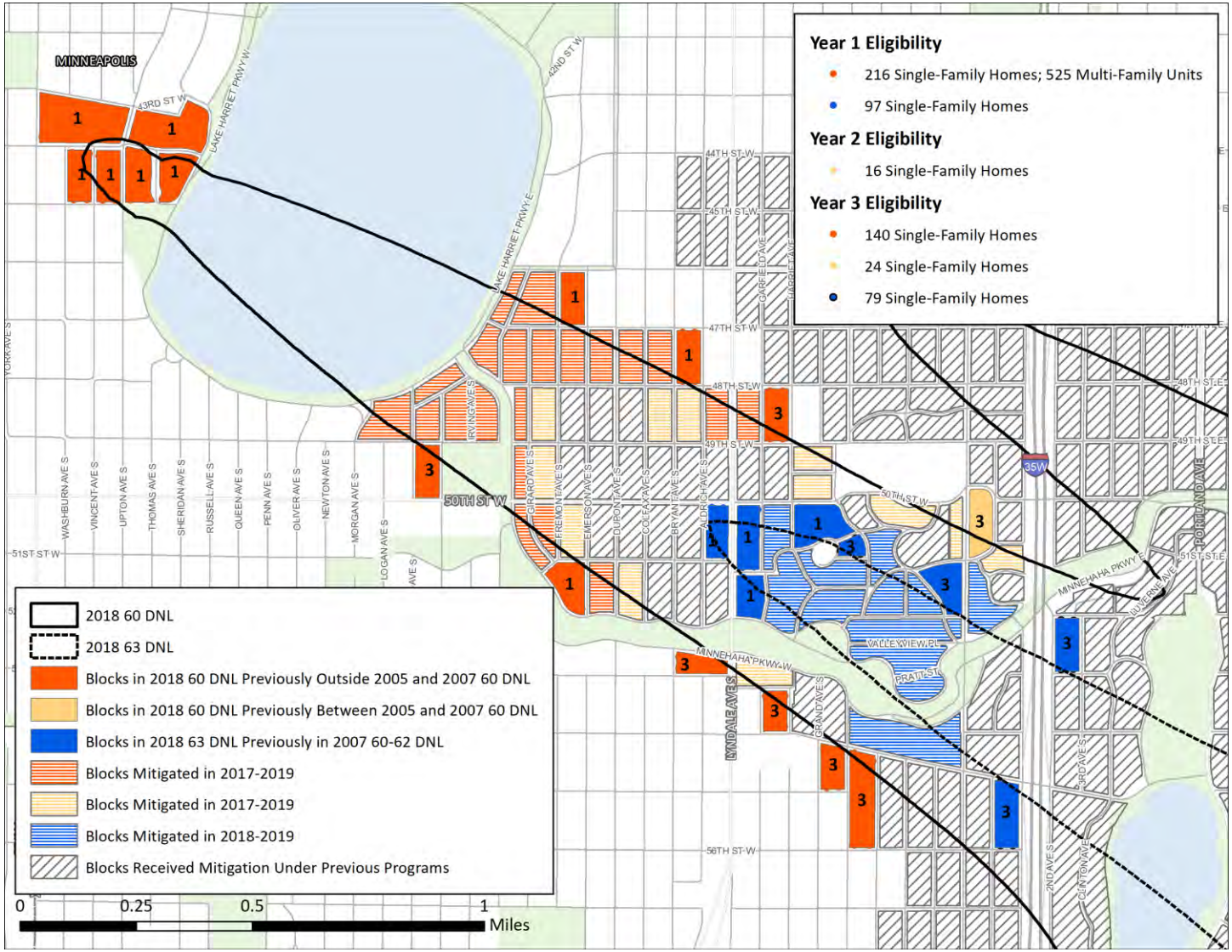
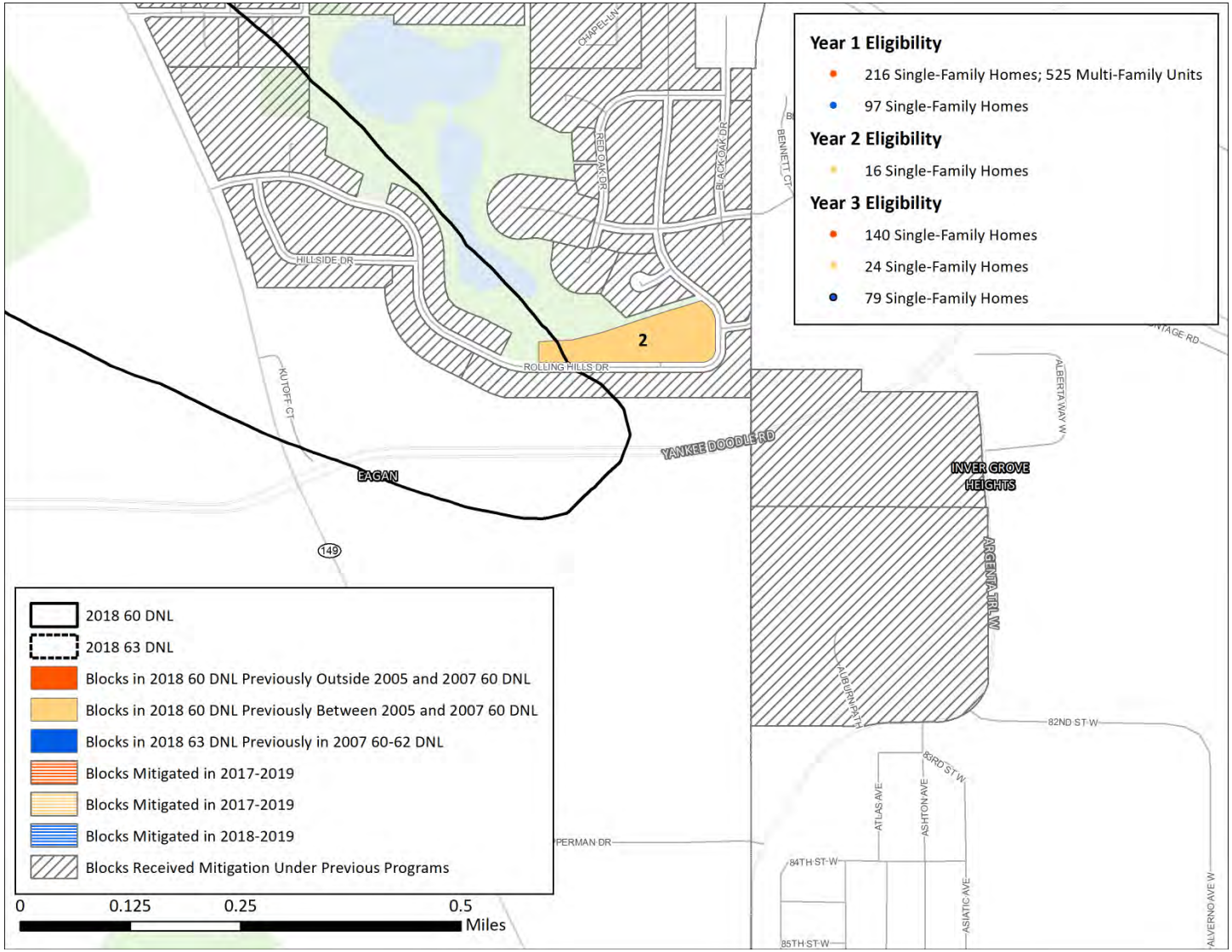


Figure ES-3: 2018 Contours and Mitigation Program Eligibility – City of Eagan



1. INTRODUCTION AND BACKGROUND

The issue of aircraft noise at Minneapolis-St. Paul International Airport (MSP) includes a long history of local efforts to quantify and mitigate noise impacts in a manner responsive to concerns raised by the communities around the airport and consistent with federal policy. The Metropolitan Airports Commission (MAC) has led the way with these efforts in the conceptualization and implementation of many initiatives to reduce noise impacts around MSP. One of the most notable of these initiatives has been the sound insulation program originally implemented under 14 Code of Federal Regulations Part 150 (Part 150).

Part 150 provides a framework for airport operators to develop a comprehensive noise plan for an airport in the form of a Noise Compatibility Program (NCP). An NCP is comprised of two fundamental approaches to addressing noise impacts around an airport: (1) Land Use Measures, and (2) Noise Abatement (NA) Measures (operational measures to reduce noise). A key component of Part 150 program planning is the development of a Base Case Noise Exposure Map (NEM) and a five-year forecast NEM without (unmitigated forecast scenario) and with (forecast mitigated scenario) the recommended operational noise abatement measures. Including operational noise abatement measures is important because the way an airport is operated, and the way aircraft procedures are executed have a direct effect on an airport's noise impact.

NEMs are commonly referred to as noise contours. Forecast mitigated noise contours depict the areas that may be eligible for Land Use Measures (compatible land use plans, property acquisition, residential relocation, and sound mitigation) around an airport.

Recognizing the need for increased infrastructure and the emerging importance of noise issues as operations at MSP increased, the MAC submitted its first MSP Part 150 Study to the Federal Aviation Administration (FAA) in October 1987. NEMs were accepted by the FAA in October 1989, and portions of the NCP were approved in April 1990. The NCP included Corrective Land Use Measures which called for the soundproofing of residences, schools and other public buildings. A 1992 update to the NCP and NEM marked the beginning of corrective mitigation measures within the forecast 1996 NEM 65 dB Day-Night Average Sound Level (DNL) noise contours.

1.1 CORRECTIVE LAND USE EFFORTS TO ADDRESS AIRCRAFT NOISE

From 1992 to 2006, the Residential Noise Mitigation Program was a large and visible part of the Part 150 program at MSP. The MAC designed the MSP Residential Noise Mitigation Program using FAA structural Noise Level Reduction (NLR) documentation to establish product-specific Sound Transmission Class (STC) ratings and associated NLR goals, creative bidding practices, and cooperative prioritization and funding efforts. Through innovative approaches to enhancing the program as new information and technologies became available, the MSP Residential Noise Mitigation Program quickly became a national model.

Because testing and evaluation of single-family homes near MSP indicated that the majority of such homes provided an average 30 dB of exterior to interior sound attenuation, the MAC developed a "Full 5-decibel Reduction Package" for single-family homes within the 65 dB DNL and greater noise contours. This package provided an average exterior-to-interior noise reduction level of 5 dB, ensuring a noticeable level of reduction designed to meet the FAA's target of a 45 dB DNL interior noise level in each home. The Full 5-decibel Reduction Package offered a menu of mitigation measures that the MAC might install to achieve an average 5 dB noise reduction and meet the 45 dB DNL interior noise level in an individual home. The menu of mitigation measures

included: windows; prime doors; attic insulation; baffling of attic vents, mail slots and chimneys; and the addition of central air-conditioning. The MAC determined which specific mitigation measures were necessary for a particular home after assessing the home's existing condition.

As a result of detailed and extensive project management and quality control, the program achieved an excellent record of homeowner satisfaction. Throughout the duration of the program, when homeowners were asked if the improvements were effective at reducing aircraft noise, at least 95 percent responded yes. When asked if the modifications improved interior home comfort, at least 95 percent responded yes.

In 2004, the MAC awarded the final bids for the remaining unmitigated homes in the 1996 65 dB DNL noise contour. In early 2006, the MAC completed the mitigation of an additional 165 single-family homes in the 2007 forecast mitigated 65 dB DNL noise contour. With the completion of the 165 single-family homes, all eligible and participating homes within the 2007 forecast mitigated 65 dB DNL contour have been mitigated. This represented a significant accomplishment for an industry-leading aircraft noise mitigation program. The program resulted in the mitigation of over 7,800 single-family homes in communities around MSP.

The financial investment in the MSP Residential Noise Mitigation Program was among the largest in the nation for such programs. Throughout the 14-year project (1992-2006) several variables had an impact on the project's annual financial profile. Year-to-year variations in housing stock and material costs caused fluctuations in the unit, or per-house, costs. This, combined with variations in annual budgets as a result of challenges such as the terrorist attacks of September 11, 2001, resulted in a fluctuating rate of annual home completions.

Annual average mitigation costs per single-family home ranged from a low of $17,300 in 1994 to a high of $45,000 in 2001. The MAC spent a total of approximately $229.5 million on the single-family home mitigation program during its 14-year lifespan.

In addition to the single-family mitigation program, the MAC also mitigated multi-family units and schools, and engaged in property acquisition and relocation. The multi-family component of the Residential Noise Mitigation Program began in 2001 and was significantly smaller in both the number of structures mitigated and the associated costs. With completion of multi-family structures in the 1996 65 dB DNL noise contour, the MAC mitigated approximately 1,327 multi-family units at a total cost of approximately $11.1 million. There were no additional multi-family structures inside the 2007 forecast mitigated 65 dB DNL noise contour. All eligible and participating multi-family structures within the 2007 forecast mitigated 65 dB DNL noise contour have been mitigated.

Also, since 1981, the MAC has mitigated 19 schools located around MSP. This total represents all of the schools located within the 1996 65 dB DNL noise contour. In response to the Minnesota State Legislature's directives, the MAC also provided mitigation to certain schools located outside the 1996 65 dB DNL noise contour. The costs of insulating individual schools varied from $850,000 to $8 million. A total of approximately $52 million was spent on the school sound insulation program.

In addition to the residential and school noise mitigation programs, the MAC implemented a residential property acquisition program that facilitated the relocation of sensitive land uses, such as residential buildings, in noise impact areas. The intent of the residential acquisition program was to address impacted properties in the 1996 65 dB DNL noise contour, with the property owners and the city in which the respective property resided agreeing that acquisition was the

desirable means of mitigating the homes. As a result, the MAC acquired approximately 437 residential properties. In total, the MAC expended approximately $93 million on the residential property acquisition program.

1.2 2007 FORECAST MITIGATED NOISE CONTOUR

In late 1998, the MAC authorized an update to the Part 150 program at MSP. The update process began in 1999 with the development of noise contours and noise abatement and land use measures. The MAC published a draft Part 150 Update document in October 2000 and submitted the study, including a 2005 forecast NEM and revised NCP, to the FAA for review. In May 2002, after further consideration of the events of September 11, 2001, the MAC withdrew the study to update the forecast and associated noise contours.

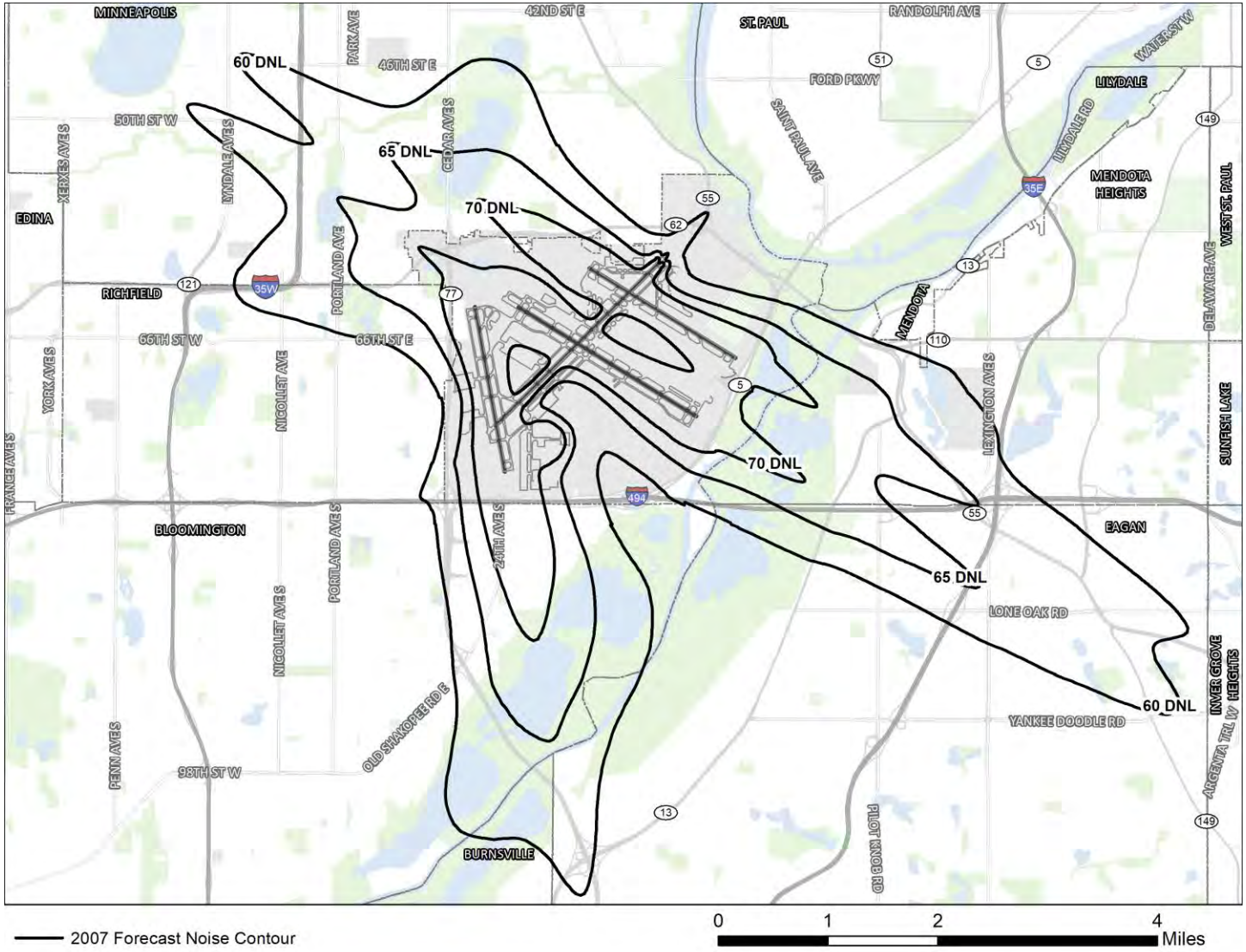
The forecast update process began in February 2003. This effort focused on updating the Base Case year from a 2000 scenario to a 2002 Base Case and updating the forecast year from 2005 to 2007. The purpose of the forecast update was to ensure that the noise contours considered the impacts of the events of September 11, 2001 and ongoing changes in the MSP aircraft fleet. In addition to updating the forecast, the MAC and the MSP Noise Oversight Committee (NOC) conducted a review of the Integrated Noise Model (INM) input methodology and data to ensure continued consensus with the previous contour (i.e., November 2001) development process.

On November 17, 2003, the MAC approved the revised forecast and fleet mix numbers and INM input methodology and data for use in developing the 2002 and 2007 NEMs. In March 2004, the MAC revised the forecast to incorporate certain corrections in general aviation numbers and to reflect Northwest Airlines' announcement that it would resume service of five aircraft that had been taken out of service previously.

The 2004 Part 150 Update resulted in a comprehensive NCP recommendation. In addition to several land use measures around MSP, the NCP included provisions for a number of operational NA measures. The aircraft and airport operational noise abatement initiatives in the 2004 Part 150 Update focused on aircraft operational procedures, runway use, departure and arrival flight tracks, voluntary operational agreements with the airlines, and provisions for further evaluation of technology. The MAC has implemented the operational NA Measures outlined in the November 2004 Part 150 Update NCP that are reflected in the 2007 forecast mitigated noise contour included in the 2004 MSP Part 150 Update.

Based on the estimate of 582,366 total operations in the 2007 forecast mitigated scenario, approximately 7,234.4 acres are in the 65 dB DNL noise contour and approximately 15,708.3 acres are in the 60 dB DNL noise contour. Since 2014 all eligible and participating homes within the 2007 forecast mitigated 60 dB DNL noise contour have been mitigated. A depiction of the 2007 forecast noise contours is provided in Figure 1.

Figure 1: 2007 Forecast Noise Contour



1.3 AIRCRAFT NOISE LITIGATION

One of the largest discussion items in the Part 150 Update process that began in 1999 focused on the mitigation program that the MAC would offer in the 60-64 dB DNL noise contour area. The FAA recognizes sensitive land uses, such as residential land uses eligible for noise mitigation under Part 150, only within the 65 dB DNL noise contour or greater. However, as part of the Dual-Track Airport Planning Process (a process that examined moving MSP versus expanding it in its current location, undertaken at the direction of the Minnesota State Legislature), the MAC made a policy decision to provide some level of noise mitigation out to the 60 dB DNL noise contour area surrounding MSP. During the Dual-Track Airport Planning Process, an MSP Noise Mitigation Committee was developed and tasked with proposing a noise mitigation plan to be considered in conjunction with the expansion of MSP at its present location.

Throughout the Part 150 Update process, the intent of the MSP Noise Mitigation Committee's recommendation regarding mitigation outside the 65 dB DNL contour was a topic of detailed discussion and debate. During the course of the Part 150 Update process the MAC formulated a number of mitigation proposals, culminating in a final MAC position on mitigation outside the 65 dB DNL contour. In the November 2004 Part 150 Update, the MAC's recommendation for mitigation in the 60-64 dB DNL contours called for providing central air-conditioning to single-family homes that did not have it, with a homeowner co-pay based on the degree of noise impact.

The MAC based eligibility for the mitigation proposal on the 2007 forecast mitigated noise contour using the block-intersect methodology. The cities located around MSP expressed dissatisfaction with the MAC proposal, asserting that the MSP Noise Mitigation Committee recommended that the Full 5-decibel Reduction Package was to be expanded to all properties in the 60-64 dB DNL noise contours. The MAC countered that the MSP Noise Mitigation Committee's recommendations did not specify the mitigation package elements to be offered in the 60-64dB DNL noise contour area and that, because homes in Minnesota have higher than the national average pre-existing noise attenuation characteristics, the Full 5-decibel Reduction Package was not necessary outside the 65 dB DNL contour.

In early 2005, the Cities of Minneapolis, Eagan, and Richfield and the Minneapolis Public Housing Authority filed suit in Hennepin County District Court claiming, among other things, the MAC violated environmental quality standards and the Minnesota Environmental Rights Act (MERA) by failing to provide the Full 5-decibel Reduction Package to single-family homes in the 60-64 dB DNL contours. In September 2005, plaintiffs seeking class action certification filed a separate action against the MAC alleging breach of contract claims associated with mitigation in the 60-64 dB DNL contours. In January 2007, Hennepin County District Judge Stephen Aldrich granted the cities partial summary judgment. The court found, among other things, that the MAC, by virtue of implementing the Full 5-decibel Reduction Package, created an environmental standard that the MAC violated by recommending different mitigation in the 64 to 60 DNL noise contour area. In February 2007, the court held a trial on the cities' MERA and mandamus claims. Before the court entered final judgment post-trial, however, the parties negotiated a global settlement resolving the cities' case and the class action suit.

1.4 NOISE MITIGATION SETTLEMENT AND ANNUAL NOISE CONTOUR

On October 19, 2007, Judge Stephen Aldrich approved a Consent Decree entered into by the MAC and the Cities of Minneapolis, Eagan, and Richfield and the Minneapolis Public Housing Authority that settled the litigation. The Consent Decree provided that it became effective only if:

(1) the FAA advised the MAC in writing by November 15, 2007 that the Decree was an appropriate use of airport revenue and was consistent with the MAC's federal grant obligations; and (2) that the court approved a settlement in the class action case by January 17, 2008. Both of these conditions were satisfied, and in 2008 the MAC began implementing single-family and multi-family mitigation out to the 2007 60 dB DNL noise contours and mitigation reimbursement funds out to the 2005 60 dB DNL noise contours, as the Consent Decree required. Under the Decree, mitigation activities would vary based on noise exposure. Homes with the highest noise exposure were eligible for more extensive mitigation than those with less noise exposure.

The 2007 Consent Decree provided that approximately 457 homes in the 2007 63-64 dB DNL forecast noise contours were eligible to receive the Full 5-decibel Reduction Package, which was the same level of noise mitigation that the MAC provided in the 1996 65 dB DNL and greater contours. The 2007 63-64 dB DNL noise contour mitigation program was designed to achieve five dB of noise reduction on average, with mitigation measures that might include the following, depending upon the home's existing condition: central air-conditioning; exterior and storm window repair or replacement; prime door and storm door repair or replacement; wall and attic insulation; baffling of roof vents and chimney treatment. As required by the Consent Decree, the MAC completed construction of mitigation in the 2007 63-64 dB DNL noise contours by December 31, 2009. A total of 404 homes participated in the program.

In addition, under the Decree, owners of the approximately 5,428 single-family homes in the 2007 60-62 dB DNL noise contours were eligible for one of two mitigation packages: 1) homes that did not have central air-conditioning as of September 1, 2007 would receive it and up to $4,000 (including installation costs) in other noise mitigation products and services they could choose from a menu provided by the MAC; or 2) owners of homes that already had central air-conditioning installed as of September 1, 2007 or who chose not to receive central air-conditioning were eligible for up to $14,000 (including installation costs) in noise mitigation products and services they could choose from a menu provided by the MAC. The mitigation menu included acoustical modifications such as: exterior and storm window repair or replacement; prime door and storm door repair or replacement; wall and attic insulation; and baffling of roof vents and chimney treatment. These packages collectively became known as the Partial Noise Reduction Program. As required by the Consent Decree, the MAC completed the Partial Noise Reduction Program by December 1, 2012. A total of 5,055 homes participated in the program.

According to the provisions in the Consent Decree, single-family homes in the 2007 63-64 dB DNL contours and in the 2007 60-62 dB DNL contours whose earlier owners opted out of the previously-completed MAC noise mitigation program for the 1996 65 dB DNL noise contours and greater, but that had new owners on September 1, 2007, were eligible to "opt in" and receive noise mitigation. If the total cost to the MAC of the opt-in mitigation is less than $7 million, any remaining funds were used to reimburse owners of single-family homes between the 2005 mitigated 60 dB DNL contour and the 2007 forecast mitigated 60 dB DNL contour for purchase and installation of products included on a menu provided by the MAC. The amount each homeowner received was determined by subtracting dollars spent for the opt-in program from the total $7 million budget, and then by dividing the remainder of funds among the total number of single-family homes within the 2005 60 dB DNL and 2007 dB 60 DNL contours. This program became known as the Homeowner Reimbursement Program.

In September 2014, the MAC completed the Homeowner Reimbursement Program for a total of 1,773 participating single-family homes between the 2005 mitigated 60 dB DNL contour and the

2007 forecast mitigated 60 dB DNL contour. The total cost of the “opt-in” mitigation and the 2005 mitigated 60 dB DNL contour reimbursement mitigation program was capped at $7 million.

The MAC completed the Multi-Family Noise Reduction Package in 2010 by installing acoustical covers on air-conditioners or installing new air-conditioners in 1,976 dwelling units.

All of the phases of the Residential Noise Mitigation Program required under the original Consent Decree were completed by September 2014. The total cost to implement mitigation under the original Consent Decree was approximately $95 million, (which is inclusive of the $7 million for opt-in mitigation and single-family mitigation reimbursement).

In addition to the MAC’s mitigation obligations, the Consent Decree releases legal claims that the cities and homeowners have against the MAC in exchange for the actions that the MAC would perform under the Decree. The releases cease to be effective for a certain location if the average annual aircraft noise level in DNL at that location is at or above DNL 60 dB and is at least 2 dB DNL higher than the Base Case DNL Noise Level.

The Base Case DNL Noise Level is established by the actual DNL noise level at a location during the year the home in that location becomes eligible for noise mitigation under the amended Consent Decree. The Base Case DNL Noise Level for homes that are not eligible for mitigation under the amended Consent Decree is established using the 2007 forecast DNL level for that location.

The MAC determines DNL values by using the FAA’s AEDT noise modeling software and actual MSP operations data to generate a noise contour reflecting noise conditions associated with MSP activity for the prior calendar year. The MSP noise contour must be published by March 1 of each year. The MAC has prepared this report to satisfy Section 8.1(d) of the Consent Decree.

MAC staff and representatives from the Cities of Minneapolis, Eagan, and Richfield met on February 11 and 20, 2008 to discuss and finalize the annual report format. The actual contour that the MAC must develop under Section 8.1(d) of the Consent Decree is relevant to the release provisions in Section 8.1 as well as the determination of mitigation eligibility as defined by an amendment to the Consent Decree, described in Chapter 4 of this report.

1.5 FINAL MSP 2020 IMPROVEMENTS EA/EAW AND AMENDED CONSENT DECREE

In January 2013, the MAC published the Final MSP 2020 Improvements Environmental Assessment/Environmental Assessment Worksheet (EA/EAW), which reviewed the potential and cumulative environmental impacts of MSP terminal and landside developments needed through the year 2020.

As is detailed in the EA/EAW, the Federal Aviation Administration’s (FAA) Finding of No Significant Impact/Record of Decision (FONSI/ROD), and summarized in the MAC’s related Findings of Fact, Conclusions of Law, and Order, the Preferred Alternative scenario does not have the potential for significant environmental effects. The forecasted noise contours around MSP are driven by natural traffic growth that is anticipated to occur with or without implementation of the 2020 Improvements.

However, given past noise mitigation activities surrounding MSP, the terms of the 2007 Consent Decree in *City of Minneapolis, et. al. v. Metropolitan Airports Commission*, and local land use

compatibility guidelines defined by the Metropolitan Council, many of the public comments on the EA/EAW focused on future noise mitigation efforts. Additionally, the anticipated completion of the Consent Decree Residential Noise Mitigation Program in 2014 raised community interest regarding the future of noise mitigation at MSP.

In response, MAC staff, in consultation with the MSP NOC, began the process of developing a noise mitigation plan to be included in the EA/EAW. The resulting recommended noise mitigation program established that eligibility be based upon actual noise contours that the MAC would prepare for MSP on an annual basis. To be eligible for noise mitigation, a home would need to be located for three consecutive years in a higher noise mitigation impact area when compared to the home's status under the terms of the 2007 Consent Decree.

The Final MSP 2020 Improvements EA/EAW detailed the following mitigation program elements:

- Mitigation eligibility would be assessed annually based on the actual noise contours for the previous year.
- The annual mitigation assessment would begin with the actual noise contour for the year in which the FAA FONSI/ROD for the EA/EAW was issued.
- For a home to be considered eligible for mitigation it must be located within the actual 60 dB DNL noise contour, within a higher noise impact mitigation area when compared to its status relative to the original Consent Decree noise mitigation program, for a total of three consecutive years, with the first of the three years beginning no later than 2020.
- The noise contour boundary would be based on the block intersect methodology.
- Homes would be mitigated in the year following their eligibility determination.

On January 7, 2013, the FAA published the Final MSP 2020 Improvements EA/EAW and the Draft FONSI/ROD, which included the following position regarding the proposed noise mitigation program:

> "*The FAA is reviewing MAC's proposal for noise mitigation of homes for consistency with the 1999 FAA Policy and Procedures concerning the use of airport revenue and other applicable policy guidance."*

During the public comment period on the FAA's Draft FONSI/ROD many communities submitted comments urging the FAA to approve the MAC's revised noise mitigation proposal.

On March 5, 2013, the FAA approved the FONSI/ROD for the Final MSP 2020 Improvements EA/EAW. Specifically, the FAA stated that noise mitigation would not be a condition of FAA approval of the MSP 2020 Improvements project because "[n]o areas of sensitive land uses would experience a 1.5 dB or greater increase in the 65 dB DNL noise contour when comparing the No Action Alternative for 2020 and 2025 with the Proposed Action for the respective years." However, the FAA included a letter dated March 5, 2013, as an attachment to the FONSI/ROD that addresses the conditions under which airport revenue may be used for off-airport noise mitigation. In that letter, the FAA stated:

> *"As a matter of general principle mitigation measures imposed by a state court as part of a consent decree are eligible for use of airport revenue. Conceptually MAC could use airport revenues if it were to amend the 2007 consent decree to include the proposed mitigation."*

Based on the FAA guidance, the MAC initiated discussions with the other parties to the Consent Decree (Cities of Minneapolis, Richfield and Eagan and the Minneapolis Public Housing Authority) to begin the amendment process. Additionally, at the March 20, 2013, NOC meeting, the Committee was updated on the progress of this issue and voted unanimously, supporting the following position:

> *"NOC supports the noise mitigation program as detailed in the final EA/EAW in principal and supports follow-up negotiations between the parties to the Consent Decree to establish mutually agreeable terms for the modification of the Consent Decree consistent with the March 5th FAA letter in Appendix D of the FONSI ROD, for consideration by the Court."*

The first amendment to the 2007 Consent Decree was initiated in 2014 with the 2013 actual noise contours establishing the first year of candidate eligibility based on the criteria detailed in the Final MSP 2020 Improvements EA/EAW. The Full 5-decibel Reduction Package is offered to single-family homes meeting the eligibility 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 contour marked the first year in assessing this amended mitigation program.

In 2017 MAC began construction on homes meeting the eligibility requirements, which includes 138 single-family homes and 88 multi-family units as part of the 2017 program, 283 single-family homes in the 2018 program, and 429 single-family homes in the 2019 program. As of February 2019, $7,508,750 has been spent on mitigating homes pursuant to the amended Consent Decree.

A second amendment was made to the 2007 Consent Decree in 2017. This amendment allows the use of the new federally approved noise model, the Aviation Environmental Design Tool (AEDT) to run the actual noise contours each year, beginning with the 2016 actual noise contour. The second amendment also provides clarity on two points with regard to the Opt-Out Eligibility criteria: (1) homeowners who failed to participate in the reimbursement program are not considered "Opt-Outs" and may participate in future programs provided the home meets the eligibility requirements; and (2) 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.

2. 2018 ACTUAL NOISE CONTOURS

2.1 DEVELOPMENT OF THE 2018 ACTUAL NOISE CONTOURS

2.1.1 Noise Modeling

By March 1 of each year, the MAC is required to prepare actual noise contours reflecting the noise exposure from MSP aircraft operations that took place during the previous calendar year. The availability of federal or airport-generated funds for the purpose of noise mitigation is contingent upon the development of noise contours in a manner consistent with FAA requirements. One of these requirements is the use of the DNL noise assessment metric to determine and analyze aircraft noise exposure. The DNL metric is calculated by averaging cumulative sound levels over a 24-hour period. This average cumulative sound exposure includes a 10-decibel penalty to sound exposures occurring during the nighttime (10:00 PM to 7:00 AM) to account for relatively low nighttime ambient noise levels and because most people are asleep during these hours.

In 2015, the FAA began evaluating its methods for measuring aircraft noise. According to the FAA, the results of the evaluation will be used to determine whether an update to policies regarding the DNL metric is warranted, along with the parameters under which a home is eligible to receive funding for mitigation. The FAA has not made any updates to these policies at the time this report was developed.

The most recent version of AEDT, version 2d, was used to develop the 2018 actual noise contours. In May 2015, AEDT version 2b was released by the FAA to replace a series of legacy tools, including the INM, which was previously used for modeling noise pursuant to the terms of the Consent Decree. According to the FAA, there is overlap in functionality and underlying methodologies between AEDT and the legacy tools, however updates were made in AEDT that result in differences when comparing outputs from AEDT and the legacy tools. The updates related to noise modeling include: smaller flight segments to more accurately model aircraft noise levels for a larger number of aircraft positions and states along a flight path; a new standard (SAE-ARP-5534) for computing the effects of weather on noise; correcting misidentified aircraft engine mounted locations for three aircraft types; and moving from recursive grids to dynamic grids for noise contour generation. The AEDT version 2d release included new features, updates, and a series of bug fixes and usability improvements. Upgrades include dynamic grid support for time-based noise metrics, track dispersion enhancements, updates to the study database and fleet database that include new noise profiles for the Boeing 737 MAX8, Bombardier Global Express 5000, Bombardier Global Express 6000, and Gulfstream G650 aircraft types.

Noise contours depict an annualized average day of aircraft noise impacts using model inputs, such as runway use, flight track use, aircraft fleet mix, aircraft performance and thrust settings, topography, and atmospheric conditions. Quantifying aircraft-specific noise characteristics in AEDT is accomplished through the use of a comprehensive noise database that has been developed under 14 CFR Part 36. As part of the airworthiness certification process, aircraft manufacturers are required to subject aircraft to a battery of noise tests. Through the use of federally adopted and endorsed algorithms, this aircraft-specific noise information is used in the generation of DNL contours. Justification for such an approach is rooted in national standardization of noise quantification at airports.

2.1.2 2018 Aircraft Operations and Fleet Mix

The past 18 years have presented many challenges to the aviation industry. From a local perspective, operational levels and the aircraft fleet mix at MSP have been affected by the terrorist attacks on September 11, 2001, high fuel prices, bankruptcy filings by several legacy airlines (notably the former Northwest Airlines), and economic recession. Additionally, overall market forces appear to be favoring consolidation of major airlines through acquisitions and mergers, such as Delta Air Lines' acquisition of Northwest Airlines in 2008, followed by United Airlines' acquisition of Continental Airlines in 2012, the merger of American Airlines and US Airways in 2013 and the merger of Southwest Airlines and AirTran in 2014. These developments have had an effect on airline and aircraft operations. For example, the actual 2018 operations level at MSP is still below the operational level documented at the airport over 25 years ago.

The MAC used its Noise and Operations Monitoring System (MACNOMS) for the 2018 fleet mix data used in the assessment. The MACNOMS total operations number was 0.4 percent lower than the operations number reported in the FAA's Operations Network (OPSNET). To rectify the numbers, MACNOMS data was adjusted upward to equal the OPSNET number. In 2018, the total operations at MSP was 406,913[2], an average of 1,114.8 daily flights. This represents a decrease of 2.1 percent from the 2017 annual operations level reported by the FAA. A summary of the 2018 fleet mix is provided in Table 2.1. A more detailed presentation of the 2018 aircraft fleet mix is provided in Appendix 1.

Table 2.1: Summary of 2018 Average Daily Flight Operations

Average Daily Flight Operations	Day	Night	Total	% of Total Operations
Manufactured to be Stage 3+	953.3	117.4	1,070.8	96.1%
Hushkit Stage 3 Jets	0.3	0.5	0.8	0.1%
Microjet	0.6	0.0	0.6	0.1%
Propeller	38.3	2.3	40.5	3.6%
Helicopter	0.1	0.0	0.1	0.0%
Military	1.9	0.0	2.0	0.2%
Total	*994.5*	*120.3*	*1,114.8*	*100.00%*
% of Total Operations	*89.2%*	*10.8%*	*100.00%*	

Note: Totals may differ due to rounding.

Source: MAC-provided MACNOMS data, HNTB 2019

In 2018, the average daily number of total nighttime operations was 120.3, up slightly from 119.7 in 2017. The use of newer and quieter aircraft is on the rise. In 2018, there were 1,400 Airbus A320neo ("new engine option") operations, which according to Airbus are 50 percent quieter than the current engine option. The current version of AEDT does not have a noise profile for the A320neo, therefore a conservative approach was taken, consistent with FAA guidance, to input

[2] Based on airport operations counts documented by the Federal Aviation Administration Opsnet for MSP in 2018.

the current engine option for the 2018 annual noise contour. All nonstandard aircraft substitutions in AEDT were approved by the FAA Office of Energy and Environment.

There were other notable changes to aircraft fleets at MSP that contributed to less noise in 2018. For example, 283 operations in the Boeing 737 MAX8, which Boeing says are 40 percent quieter than today's B737. Meanwhile use of older and louder aircraft is declining. The MD-80s saw an 88 percent drop in operations at MSP in 2018 as Delta Airlines discontinued scheduling MD-80 operations at MSP; American Airlines also reduced the number of flights using that group of aircraft.

2.1.3 2018 Runway Use

FAA control and coordination of runway use throughout the year for arrival and departure operations at MSP has a notable effect on the noise impact around the airport. The number of people and dwellings impacted by noise is a direct result of the number of operations using any given runway, and the land uses off the end of the runway as well as the areas underlying the flight paths that aircraft follow to get to and from the airport.

Historically, prior to the opening of Runway 17/35, arrival and departure operations at MSP occurred on the parallel runways (12L/30R and 12R/30L) in a manner that resulted in approximately 50 percent of the arrival and departure operations occurring to the northwest over South Minneapolis, and 50 percent to the southeast over Mendota Heights and Eagan. Because of the dense residential land uses to the northwest and the predominantly industrial/commercial land uses southeast of MSP, there was a concerted effort to focus departure operations over areas to the southeast as the preferred operational configuration. This tactic proved to affect fewer sensitive land uses and people from an aircraft noise perspective.

The introduction of Runway 17/35 at MSP in 2005 provided another opportunity to route aircraft over an unpopulated area – the Minnesota River Valley. With use of the Runway 17 Departure Procedure, westbound departing aircraft are routed such that they avoid close-in residential areas southwest of Runway 17. Thus, use of Runway 17 for departing aircraft is the second preferred operational configuration (after Runways 12L and 12R) for noise reduction purposes.

In 2013, the National Transportation Safety Board (NTSB) recommended modifications to arrival and departure procedures for airports with Converging Runway Operations (CRO). CRO exists when the extended centerline of two runways intersect within one nautical mile of the two runway departure ends. This situation poses a potential risk for aircraft converging at the intersection point. At MSP, the extended centerline of Runway 35 intersects within one mile of the extended centerlines for both Runways 30L and 30R. Since Runway 35 is used only for arrivals from the south, potential convergence of flight paths would occur only if an aircraft executes an aborted landing ("go around") on its approach to Runway 35.

The FAA used a phase-in approach to introduce new safety requirements at United States airports identified by the NTSB. Beginning in July 2015, the FAA worked to introduce the requirements at MSP. At the end of 2015 and throughout 2016, the airport saw notable changes in runway use resulting from increased southerly winds plus the added complexity for controllers when the airport was in a CRO condition (landing and departing in a northerly direction). In response, the MSP NOC unanimously passed a resolution requesting the FAA evaluate the current and future environmental and capacity impacts from the new CRO rules and to communicate the findings back to the NOC. The MAC Board of Commissioners took unanimous action supporting the NOC resolution and forwarded it to the FAA.

During 2017, the FAA made progress in designing and employing technological tools within its air traffic control system to revert changes in runway use, regain some capacity loss, and reduce air traffic controller work load at MSP during CRO. In January 2017, the FAA began using two Arrival Departure Windows (ADWs) for each of the parallel runways. In order to use two ADWs at the same time, a thorough risk assessment and approval process was required. These windows help alternate flights departing from Runways 30L and 30R with flights arriving to Runway 35. Use of the two ADWs increased MSP's northerly arrival rate from 64 to 75 aircraft per hour.

In June 2017, the FAA implemented a Converging Runway Display Aid (CRDA), which aligns aircraft arriving to Runway 30L with Runway 35 to offer efficiency gains in sequencing departures to the northwest. The CRDA tool helps arrivals on Runway 35 line up with arrivals on Runway 30L to create a predictable departure gap for Runway 30L. This has allowed the FAA to flex arrival rates up to 84 aircraft per hour during three peak arrival demand periods throughout the day which reduces arrival delays. Similarly, in August 2017 the FAA began flexing departure rates upward during peak departure demand periods by routing Runway 35 arrivals to either parallel runway (30L or 30R), thus eliminating the dependency on ADWs for aircraft departing to the northwest.

During 2018, the FAA continued the implementation of tools and agreements designed to standardize operating expectations within its air traffic control system. The three MSP air traffic control facilities – Tower, Terminal Radar Approach Control (TRACON), and Minneapolis Center – have similar interests in controlling air traffic but different constraints on their activity. To standardize the agreements regarding use of CRO, the facilities began to develop standard operating procedures between the three facilities that identify the variables necessary to commence CRO measures. The standard operating procedure agreement between the facilities is expected to be finalized in 2019.

A summary of notable changes in runway use from 2017 to 2018 is provided below. Areas where the 2018 actual noise contour extended beyond the 2017 noise contour are within previously mitigated neighborhoods, except for the Runway 12R arrival lobe near Lake Harriet in Minneapolis. Chapter 4 details the Residential Noise Mitigation eligibility impacts in this area.

- Runways 30L and 30R were utilized less frequently in 2018 than in 2017, whereas Runways 12L and 12R were utilized more frequently in 2018 than in 2017. Runways 30L and 30R accounted for 47.2 percent of arrivals in 2018—down from 50.5 percent of arrivals in 2017. In 2018, 44.7 percent of all departures were on Runways 30L and 30R, a reduction from the 50.1 percent usage in 2017. Runways 12L and 12R handled 47.1 percent of all arrivals in 2018 compared to 43.0 percent in 2017. For departures, Runways 12L and 12R accounted for 20.9 percent of all departures in 2018, up from 18.7 percent in 2017.
- Runway 17 was utilized more frequently for departures in 2018 compared to 2017, and Runway 35 was utilized less frequently for arrivals in 2018 as compared to 2017. Data show 33.8 percent of departures in 2018 used Runway 17 compared to 31.0 percent in 2017. Only 5.5 percent of arrivals were routed to Runway 35 in 2018, down from 6.4 percent in 2017.

Changes in runway use between 2017 and 2018 are the primary cause of changes in the shape of the noise contours. Table 2.2 provides the average annual runway use distribution for 2018.

Table 2.2: Summary of 2018 Average Annual Runway Use

Operation	Runway	Day	Night	Total
Arrivals	4	0.0%	0.3%	0.1%
	12L	22.2%	14.2%	21.3%
	12R	25.6%	27.5%	25.8%
	17	0.0%	0.6%	0.1%
	22	0.0%	0.0%	0.0%
	30L	24.8%	34.7%	25.9%
	30R	21.9%	16.6%	21.3%
	35	5.4%	6.1%	5.5%
Departures	4	0.5%	1.0%	0.5%
	12L	14.2%	18.6%	14.7%
	12R	4.1%	24.9%	6.2%
	17	36.3%	11.7%	33.8%
	22	0.0%	0.0%	0.0%
	30L	23.2%	25.0%	23.4%
	30R	21.6%	18.5%	21.3%
	35	0.0%	0.2%	0.0%

Note: Total may not add up due to rounding. Helicopters are excluded.

Source: MAC-provided MACNOMS Data, HNTB 2019

2.1.4 2018 Flight Tracks

Modeled departure and arrival flight tracks were developed using actual flight track data. The model tracks used in the 2018 actual noise contour were identical to those used for the 2017 actual noise contour. Sub-tracks are added to each of the backbone arrival and departure model tracks. The distribution of operations among the backbone and sub-tracks in AEDT use a standard "bell curve" distribution, based on the number of sub-tracks developed. The methodology in AEDT is consistent with the way INM distributed operations on sub-tracks in the modeling process.

The same methodology used in previous MSP annual reports also was used to assign actual 2018 flight tracks to the modeled tracks. The correlation process employs a best-fit analysis of the actual flight track data based on linear trends. This approach provides the ability to match each actual flight track directly to the appropriate model track.

Graphics of model flight tracks and the percent that each was used in 2018 are provided in Appendix 2.

2.1.5 2018 Atmospheric Conditions

The weather data used in the 2018 actual noise contour were acquired from the National Oceanic and Atmospheric Administration (NOAA) National Climatic Data Center. As per FAA guidance, the following default weather parameters from the MSP weather station were applied:

- Temperature – 45.0 degrees Fahrenheit
- Dew point – 35.9 degrees Fahrenheit
- Wind speed – 8.4 knots

- Pressure – 985.4 Millibars
- Relative humidity – 67.7 percent

2.2 2018 MODELED VERSUS MEASURED DNL VALUES

As part of the 2018 actual noise contour evaluation, a comparison was conducted on the actual 2018 measured aircraft noise levels at the MAC's 39 sound monitoring sites to the modeled DNL noise values from AEDT. The latitude and longitude coordinates for each sound monitoring site was used to calculate modeled DNL values in AEDT.

Table 2.3 provides a comparison of the AEDT modeled DNL noise values and the actual measured aircraft DNLs at those locations in 2018.

Table 2.3: 2018 Measured vs. Modeled DNL Values

Sound Monitoring Site	2018 Measured DNL (a)	2018 Modeled DNL	Difference	Absolute Difference
1	55.9	57.6	1.7	1.7
2	58.1	58.2	0.1	0.1
3	62.6	63.6	1.0	1.0
4	59.2	59.7	0.5	0.5
5	67.5	68.2	0.7	0.7
6	67.1	66.0	-1.1	1.1
7	58.8	58.1	-0.7	0.7
8	55.3	55.6	0.3	0.3
9	36.9	43.5	6.6	6.6
10	44.1	50.2	6.1	6.1
11	38.3	45.1	6.8	6.8
12	39.2	47.7	8.5	8.5
13	53.9	55.3	1.4	1.4
14	59.8	61.2	1.4	1.4
15	55.7	55.9	0.2	0.2
16	64.0	63.6	-0.4	0.4
17	44.0	49.7	5.7	5.7
18	52.4	58.9	6.5	6.5
19	48.0	54.5	6.5	6.5
20	40.8	51.3	10.5	10.5
21	44.5	50.1	5.6	5.6
22	54.9	57.6	2.7	2.7
23	60.6	60.2	-0.4	0.4
24	58.1	59.9	1.8	1.8
25	50.0	52.8	2.8	2.8
26	51.0	54.8	3.8	3.8
27	52.1	55.3	3.2	3.2
28	54.9	61.1	6.2	6.2
29	51.5	53.1	1.6	1.6
30	60.6	60.6	0.0	0.0
31	46.1	50.9	4.8	4.8
32	40.4	48.2	7.8	7.8
33	46.0	50.6	4.6	4.6
34	42.8	48.5	5.7	5.7
35	50.8	53.2	2.4	2.4
36	50.8	51.4	0.6	0.6
37	46.0	48.8	2.8	2.8
38	49.1	50.9	1.8	1.8
39	49.9	51.6	1.7	1.7
			Average	*3.3*
			Median	*2.4*

Notes:
All units in dB DNL
(a) Computed from daily DNLs

Source: MAC sound monitoring data and HNTB, 2019

There is an inherent difference between modeled noise results and measured noise results. AEDT modeled data only reports on aircraft noise. It cannot replicate the various other sources of community noise that exist and contribute to ambient conditions. AEDT cannot replicate the exact operating characteristics of each aircraft that is input into the model. AEDT uses average weather conditions instead of actual weather conditions at the time of the flight. AEDT also uses conservative aircraft substitutions when new aircraft are not yet available in the model. Conversely, RMT measured data is highly impacted by community sound. The MACNOMS system must set thresholds for events to attempt to eliminate occurrences of community sound events being assigned to aircraft noise. While some of the data is evaluated by staff, most events are assumed to be aircraft if a flight track existed during the time of the event. The factors that may contribute to the difference include site terrain, building reflection, foliage and ground cover, ambient noise level as well as atmospheric conditions. There variables will impact the propagation of sound differently.

The use of absolute values provides a perspective of total difference between the modeled values and the measured values. The average absolute difference between modeled and measured DNLs is approximately 3.3 dB, compared with 3.1 dB in 2017, 2.3 dB in 2016 and 2.1 dB in 2015. The absolute median difference is 2.4 dB DNL compared with 1.4 dB DNL in 2017, 1.1 dB DNL in 2016 and 1.4 dB DNL in 2015; this indicates that the 2018 actual noise contours generated through modeling in AEDT are similar in absolute difference to actual measured noise levels. The absolute median difference is considered the most reliable indicator of correlation when considering the data variability across modeled and measured data.

The larger variations between measured and modeled data occur at sites that have less events overall. When more data is available, that variance begins to decrease. For example, sites 3, 5, 6, 14, 16, 23 and 30 all had a modeled DNL above 60 dB. The average difference between the modeled DNL and measured DNL at those sites was only 0.2 dB. The median of the absolute difference was 0.7 dB at those sites. The small variation between actual measured aircraft noise levels and the AEDT modeled noise levels provides additional system verification that AEDT is providing an accurate assessment of the aircraft noise impacts at or above 60 dB DNL.

2.3 2018 NOISE CONTOUR IMPACTS

Based on the 406,913 total operations in 2018, 4,444 acres are in the 65 dB DNL noise contour (a decrease of 25 acres, or 0.6 percent, from the 2017 actual noise contour) and approximately 11,323 acres are in the 60 dB DNL noise contour (a decrease of 137 acres, or 1.2 percent, from the 2017 actual noise contour). The decrease is due to the contribution of various factors, but the primary cause is the decrease in the number of total operations.

The changes in the noise contours are consistent with changes in day/night split, runway and flight track use. While the total size of the 65 dB and 60 dB DNL contours contract overall in 2018, there are geographic areas of the contour that extend beyond the 2017 noise contour area. To the northwest, the 60 dB DNL arrival lobe along Runway 12R extends across Lake Harriet yet the contour becomes narrower closer to the runways in 2018.

Table 2.5 contains the count of single-family (one to three units per structure) and multi-family (more than three units per structure) dwelling units in the 2018 actual noise contours. The counts are based on the block intersect methodology where all structures on a block that located within or touched by the noise contour are counted. The spatial analysis was performed in Universal Transverse Mercator (UTM Zone 15).

Table 2.5 Summary of 2018 Actual DNL Noise Contour Unit Counts

City		Dwelling Units Within dB DNL Interval									
		Single Family					Multi-Family				
		60-64	65-69	70-74	75+	Total	60-64	65-69	70-74	75+	Total
Bloomington	Completed	70	1			71	522				522
	Additional					0					0
	Total	70	1	0	0	71	522	0	0	0	522
Eagan	Completed	325	15			340	38				38
	Additional	16				16					0
	Total	341	15	0	0	356	38	0	0	0	38
Inver Grove Heights	Completed					0					0
	Additional					0					0
	Total	0	0	0	0	0	0	0	0	0	0
Mendota Heights	Completed	48	1			49					0
	Additional					0					0
	Total	48	1	0	0	49	0	0	0	0	0
Minneapolis	Completed	7,805	1,535			9,340	600	507			1,107
	Additional	313				313	525				525
	Total	8,118	1,535	0	0	9,653	1,125	507	0	0	1,632
Richfield	Completed	800	21			821	256				256
	Additional					0					0
	Total	800	21	0	0	821	256	0	0	0	256
All Cities	Completed	9,048	1,573	0	0	10,621	1,416	507	0	0	1,923
	Additional	329	0	0	0	329	525	0	0	0	525
	Total	9,377	1,573	0	0	10,950	1,941	507	0	0	2,448

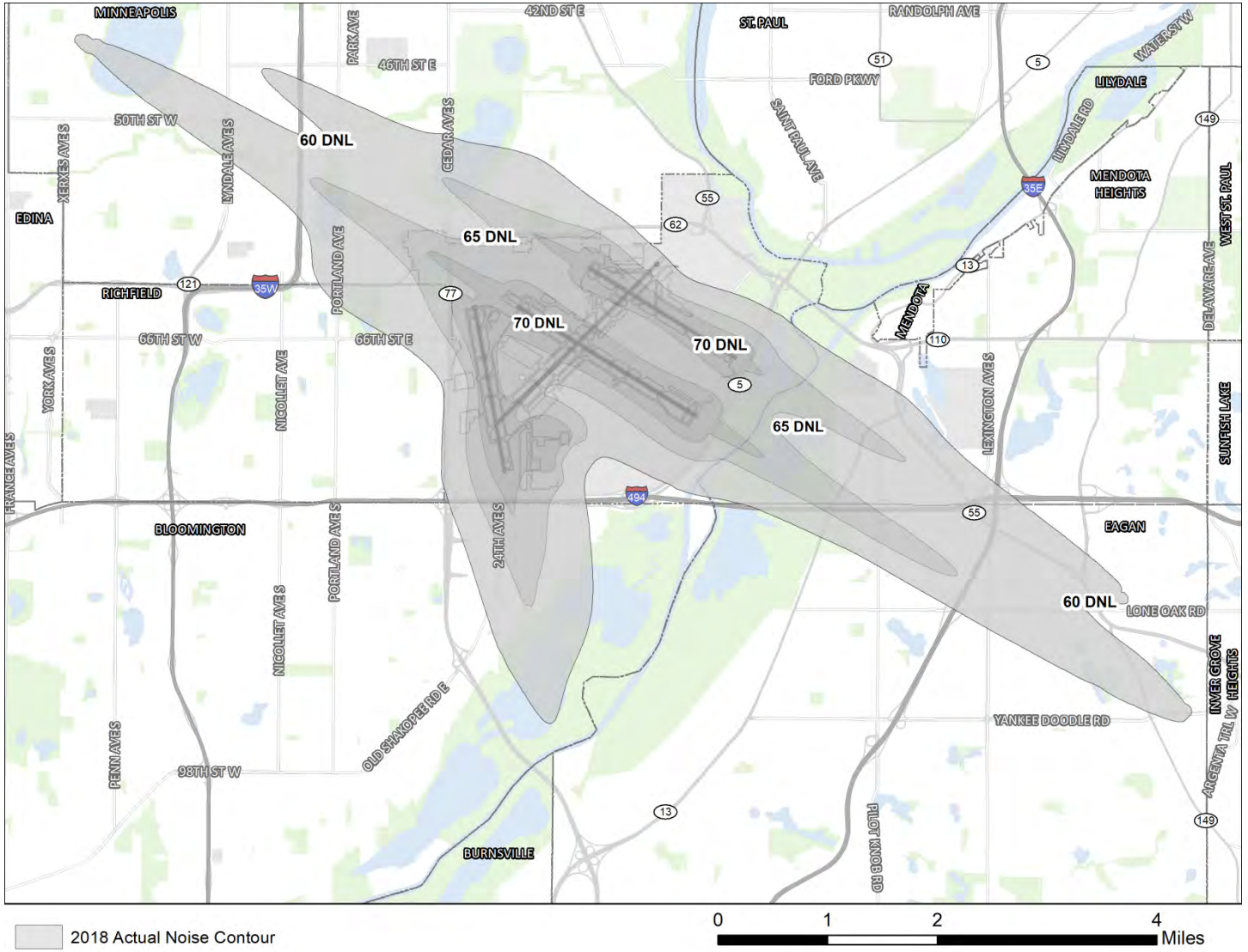
Notes: Block intersect methodology; Multi-family units = 4 or more units; As a result of parcel information updated in July 2018, unit counts may differ from previous reports. Completed counts include residences that are eligible for the 2017-2020 Mitigation Programs.

Source: HNTB provided AEDT contours, MAC analysis, 2019

A total of 851 single-family residences and 88 multi-family units within the 60 dB DNL noise contour in the City of Minneapolis were entered into the 2017 – 2019 Mitigation Programs. An additional 243 single-family residences within the 60 dB DNL noise contour in the City of Minneapolis received mitigation eligibility for the 2020 Mitigation Program by virtue of the 2018 actual noise contour. The 2018 count of residential units within the actual 60 dB DNL noise contour that have not received noise mitigation around MSP and are not part of the 2017 – 2020 programs is 329.

A thorough evaluation of the 2018 actual noise contour and resulting changes to residential noise mitigation is provided in Chapter 4. A depiction of the 2018 actual noise contour is provided in Figure 2.

Figure 2: 2018 Actual Noise Contours



3. COMPARISON OF THE 2018 ACTUAL AND THE 2007 FORECAST NOISE CONTOURS

3.1 COMPARISON OF NOISE CONTOUR INPUTS

3.1.1 Noise Model Considerations

The 2018 actual noise contour was modeled in AEDT version 2d, which incorporates updates to flight segments, atmospheric computing standards, grids used for noise contour generation and other issues that carried over from the INM. The AEDT 2d release includes new features, updates, and a series of bug fixes and usability improvements. Updates include dynamic grid support for time-based noise metrics, track dispersion enhancements, updates to the study database and fleet database, including new noise profiles for the Boeing 737 MAX8, Bombardier Global Express 5000, Bombardier Global Express 6000, and Gulfstream G650. The 2007 forecast noise contour was developed using INM Version 6.1.

It is important to note that modeling modifications over time can change the size and shape of a noise contour. For example, a range of case study airports revealed that improvements to lateral attenuation adjustment algorithms and flight path segmentation in INM version 7.0 were found by the FAA to increase the size of a DNL contour for a range of case study airports between 3 and 10 percent over what previous versions of INM would have modeled. Additionally, some updates incorporated into AEDT, had the effect of reducing the 60 dB DNL noise contour by 0.6 percent at MSP compared to the latest version of INM.

3.1.2 Aircraft Operations and Fleet Mix Comparison

The forecasted level of operations in the 2007 noise contour was 582,366 annual flights, an average of 1,595.9 flights per day. In 2018, the actual number of operations at MSP was 406,913, or 1,114.8 flights per day. This represents a 30.1 percent reduction from the 2007 forecast number. Nighttime operations decreased by 3 average daily flights from the 2007 forecast level to 2018 actual level. Table 3.1 provides a summary comparison of the 2018 actual and the 2007 forecast average daily operations. A more detailed comparison of the 2007 forecast fleet mix and the 2018 actual aircraft fleet mix is provided in Appendix 1.

In general, many of the aircraft groups operating at MSP showed a reduction in the number of average daily operations from the 2007 forecasted level to the 2018 actual level. On average, there was 0.8 Hushkit Stage 3 Jet operations per day in 2018. This is down from the 2007 forecast average of 275 flights per day. Manufactured Stage 3+ average daily operations in 2018 were down by 85.7 flights per day from the 2007 forecast. The number of propeller-driven and military aircraft operations decreased 110.5 per day and 6.4 per day, respectively.

Table 3.1: Summary of 2018 and 2007 Average Daily Flight Operations

Average Daily Flight Operations	Day	Night	Total	% of Total Operations
2018				
Manufactured to be Stage 3+	953.4	117.4	1070.8	96.1%
Hushkit Stage 3 Jet	0.3	0.5	0.8	0.1%
Microjet	0.6	0.0	0.6	0.1%
Propeller	38.3	2.3	40.5	3.6%
Helicopter	0.1	0.0	0.1	0.0%
Military	1.9	0.0	2.0	0.2%
Total	*994.5*	*120.3*	*1114.8*	*100.0%*
% of Total Operations	*89.2%*	*10.8%*	*100.0%*	
2007				
Manufactured to be Stage 3+	1071.5	21.7	1156.5	72.5%
Hushkit Stage 3 Jet	253.3	0.0	275.0	17.2%
Retrofitted Stage 2 Jet	0.0	0.6	0.0	0.0%
Stage 2 Jets under 75,000 lbs	4.2	0.0	4.8	0.3%
Microjet	0.0	15.8	0.0	0.0%
Propeller	135.2	0.0	151.0	9.5%
Helicopter	0.0	0.2	0.0	0.0%
Military	8.2	21.7	8.4	0.5%
Total	*1472.4*	*123.3*	*1595.9*	*100.0%*
% of Total Operations	*92.3%*	*7.7%*	*100.0%*	

Notes:
Totals may differ due to rounding
As of January 1, 2016, Stage 2 aircraft below 75,000 lbs are required to be compliant with Stage 3 noise regulations.

Source: MAC-provided MACNOMS data, HNTB 2019

3.1.3 Runway Use Comparison

Table 3.2 provides the runway use percentages for 2018 and a comparison to the 2007 forecast runway use percentages. A general evaluation of the runway use percentages in Table 3.2 shows that the use of Runways 12R and 30L for nighttime arrivals in 2018 is higher than what was forecasted in the 2007 noise contour; use of Runways 12L and 30R was lower than the 2007 forecast.

The use of Runway 35 for total arrivals was at 5.5 percent in 2018 compared to 16.5 percent during the 2007 forecast.

In 2007, Runway 17 was forecasted to be used for 34.6 percent of all nighttime departures. In 2018, it was used for only 11.7 percent of nighttime departures.

Lastly, the 2018 Runway 30L departure percentage was 8.2 percent higher at night and 12.2 percent higher during the day than the 2007 forecast.

Table 3.2: Summary of Average Annual Runway Use 2018, 2007

Operation	Runway	Day		Night		Total	
		2018 Actual	2007 Forecast	2018 Actual	2007 Forecast	2018 Actual	2007 Forecast
Arrivals	4	0.0%	0.0%	0.3%	3.8%	0.1%	0.3%
	12L	22.2%	21.8%	14.2%	17.2%	21.3%	21.4%
	12R	25.6%	14.7%	27.5%	12.4%	25.8%	14.5%
	17	0.0%	0.0%	0.6%	0.0%	0.1%	0.0%
	22	0.0%	0.5%	0.0%	2.4%	0.0%	0.6%
	30L	24.8%	21.1%	34.7%	25.1%	25.9%	21.4%
	30R	21.9%	25.1%	16.6%	26.4%	21.3%	25.2%
	35	5.4%	16.9%	6.1%	12.7%	5.5%	16.5%
Departures	4	0.5%	0.2%	1.0%	0.4%	0.5%	0.2%
	12L	14.2%	8.9%	18.6%	14.1%	14.7%	9.3%
	12R	4.1%	15.9%	24.9%	18.3%	6.2%	16.1%
	17	36.3%	37.2%	11.7%	34.6%	33.8%	37.0%
	22	0.0%	0.1%	0.0%	0.8%	0.0%	0.1%
	30L	23.2%	15.0%	25.0%	12.8%	23.4%	14.8%
	30R	21.6%	22.7%	18.5%	19.2%	21.3%	22.4%
	35	0.0%	0.0%	0.2%	0.0%	0.0%	0.0%

Note: Total may not add up due to rounding.
Source: MAC-provided MACNOMS data, HNTB 2019. Annual runway use for 2007 Forecast was obtained from the November 2004 Part 150 document.

3.1.4 Flight Track Considerations

Modeled departure and arrival flight tracks were developed using actual flight track data from 2018. These flight tracks differ from those used to develop the 2007 forecast noise contour due to enhanced modeling methods and improved technologies. Sub-tracks were also added to each of the backbone tracks. Standard distribution in both INM and AEDT were used to distribute the flights to the sub-tracks.

The same methodology as in previous annual reports was used to assign actual 2018 flight tracks to the modeled tracks. The correlation process employs a best-fit analysis of the actual flight track data based on linear trends. This approach provides the ability to match each actual flight track directly to the appropriate model track.

3.1.5 Atmospheric Conditions Comparison

The atmospheric condition inputs vary slightly between INM and AEDT. INM uses pressure values in inches of Mercury, where standard atmospheric pressure is 29.92. AEDT takes pressure in millibars, where standard is 1013.25. AEDT takes an additional input value for dew point temperature in degrees Fahrenheit. As stated in Section 2.1.5, the weather data used in the 2018 actual noise contour were acquired from the National Oceanic and Atmospheric Administration (NOAA) National Climatic Data Center. As per FAA guidance, the following default weather parameters from the MSP weather station were applied:

- Temperature – 45.0 degrees Fahrenheit
- Dew point – 35.9 degrees Fahrenheit

- Wind speed – 8.4 knots
- Pressure – 985.4 Millibars
- Relative humidity – 67.7 percent

The following annual average atmospheric conditions were used in the 2007 forecast noise contour:

- Temperature – 47.7 degrees Fahrenheit
- Wind speed – 5.3 knots
- Pressure – 29.90 inches of Mercury
- Relative humidity – 64.0 percent

3.2 COMPARATIVE NOISE MODEL GRID POINT ANALYSIS

AEDT was used to calculate DNL values for the center points of each city block included in the mitigation programs outlined in the amended Consent Decree. Graphics showing the actual 2018 DNL levels calculated for each block, Base Case DNL Noise Levels calculated for each block and the block-by-block difference in DNL levels between the Base Case and the 2018 actual noise contours are contained in Appendix 3.

The Base Case DNL is established using the actual DNL noise level for that location during the year the home becomes eligible for noise mitigation under the amended Consent Decree. The Base Case DNL for homes that are not eligible for mitigation under the amended Consent Decree is established using the 2007 forecast DNL for that location.

It is important to note that the 2007 forecast DNL was developed in INM Version 6.2a because this was the oldest version of INM available to MAC staff to conduct the analysis in early 2008 when the MSP annual noise contour reporting efforts began. When comparing the DNL values generated for the MACNOMS sound monitoring sites with INM 6.1 in the November 2004 Part 150 Update document to the DNL generated for those same locations with INM 6.2a, the differences were insignificant.

3.3 CONTOUR COMPARISON SUMMARY

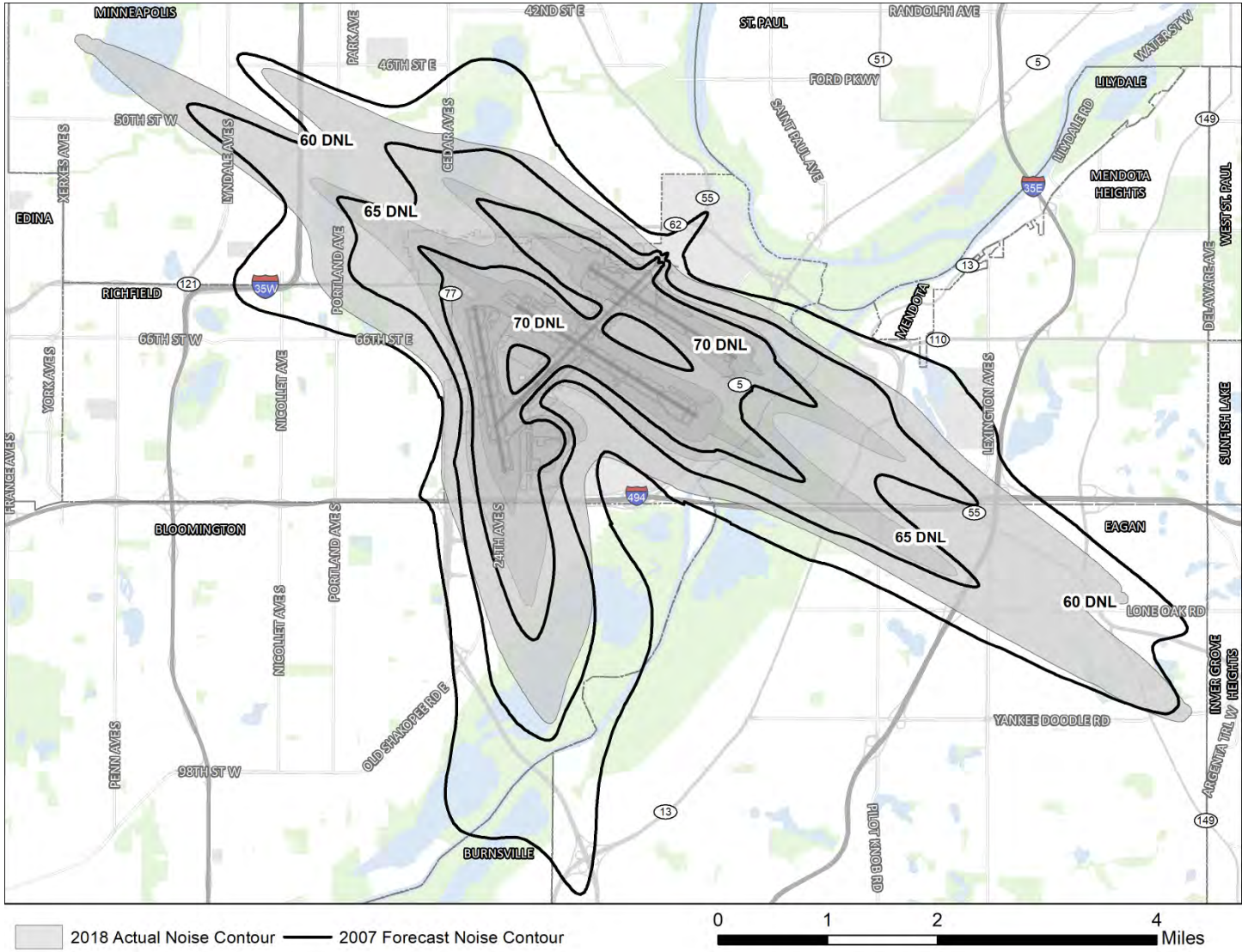
The 2018 actual noise contour is smaller than the 2007 forecast mitigated contour by 4,385 acres (28 percent reduction) in the 60 dB DNL contour and by 2,790 acres (39 percent reduction) in the 65 dB DNL contour. As depicted in Figure 3, there is an area in Minneapolis and an area in Eagan where the 2018 actual noise contours extend beyond the 2007 forecast noise contours. The increase in these areas is primarily due to runway use in 2018, particularly arrival operations on Runways 12R and 30L. All homes within the 2018 actual 65 dB DNL contour have received the 5 dB noise reduction mitigation package. Chapter 4 provides an analysis of mitigation eligibility relative to the 2018 actual contour consistent with the requirements of the amended Consent Decree.

The predominant contraction in the contours from the 2007 forecast to the 2018 actual noise contour scenarios is driven largely by fleet mix changes, including a significant reduction in Hushkit Stage 3 aircraft operations, and a reduction of 481.8 average daily operations. The extension of the 2018 actual noise contour beyond the 2007 forecast mitigated noise contour can largely be attributed to nighttime runway use variances between what was forecasted for 2007

and what occurred in 2018, particularly an increase in nighttime arrival operations on Runway 12R.

In summary, in addition to modeling changes and updates, the primary factors to consider when comparing the 2007 forecast mitigated noise contours to the 2018 actual noise contours are total operation numbers, fleet mix, nighttime operations, and runway use.

Figure 3: 2018 Actual and 2007 Forecast Noise Contour Comparison



4. 2018 ANNUAL NOISE CONTOUR AND THE AMENDED CONSENT DECREE

4.1 FIRST AMENDMENT TO THE NOISE MITIGATION CONSENT DECREE

As discussed previously, the first amendment to the Consent Decree requires the MAC to determine eligibility for noise mitigation on an annual basis using actual noise contours, developed under Section 8.1(d) of the Consent Decree. This chapter provides detailed information about noise mitigation impacts from the 2018 actual noise contour at MSP.

On July 31, 2013, the Cities of Minneapolis, Richfield and Eagan, and the Minneapolis Public Housing Authority and the MAC jointly filed the first amendment to the Consent Decree to Hennepin County Court. On September 25, 2013, Hennepin County Court Judge Ivy S. Bernardson approved the first amendment to the 2007 Consent Decree. The first amendment contains language that binds the MAC to provide noise mitigation services consistent with the noise mitigation terms described in the Final MSP 2020 Improvements Environmental Assessment/Environmental Assessment Worksheet (EA/EAW).

In 2014 the Annual Noise Contour Report format was updated in consultation and agreement with the parties to the Consent Decree to address the mitigation program requirements detailed in the first amendment. The report was updated to provide maps analyzing changes that occur in noise mitigation eligibility as compared to the 2007 Consent Decree, and associated trends relative to consecutive yearly impacts.

4.2 SECOND AMENDMENT TO THE CONSENT DECREE

In 2016, the Cities of Minneapolis, Richfield and Eagan, and the Minneapolis Public Housing Authority and the MAC began drafting a second amendment to the 2007 consent decree. This amendment: 1) allows the use of the Aviation Environmental Design Tool (AEDT) to run the actual noise contours each year; 2) provides clarity on the Opt-Out Eligibility criteria; and 3) provides a safeguard for homes that may fall out of consecutive year mitigation eligibility by virtue of a change in the model used to generate the noise contours. By November 2016, the parties to the Consent Decree signed the second amendment. On December 23, 2016, the FAA sent a letter to MAC Executive Director/CEO declaring the provisions included in the drafted second amendment “constitute a proper use of airport revenue” and “is consistent with MAC’s grant obligations.” On January 31, 2017 Judge Bernardson approved the second amendment to the 2007 Consent Decree.

Due to the increase in total in operations in 2016 as well as the increase in nighttime operations, there were no blocks that failed to qualify for a second or third consecutive year of mitigation eligibility in the 2016 actual noise contour. Therefore, there was no need to run the 2016 actual contour inputs in the INM version 7.0d to determine whether these blocks would have advanced in consecutive year eligibility in the INM-generated 2016 actual noise contour, as stipulated in agreement with the parties to the Consent Decree.

4.3 2018 ACTUAL CONTOUR NOISE MITIGATION IMPACT

Under the provisions of the first and second amendments to the Consent Decree, properties must meet certain criteria to be considered eligible for participation in the MAC noise mitigation program.

First, as stated in the first amendment:

> *"The community in which the home is located has adopted local land use controls and building performance standards applicable to the home for which mitigation is sought that prohibit new residential construction, unless the construction materials and practices are consistent with the local land use controls and heightened building performance standards for homes within the 60 dB DNL Contour within the community in which the home is located."*

This criterion has been met by all of the communities contiguous to MSP.

Second, as stated in the first amendment:

> *"The home is located, for a period of three consecutive years, with the first of the three years beginning no later than calendar year 2020 (i) in the actual 60-64 dB DNL noise contour prepared by the MAC under Section 8.I(d) of this Consent Decree and (ii) within a higher noise impact mitigation area when compared to the Single-Family home's status under the noise mitigation programs for Single-Family homes provided in Sections 5.1 through 5.3 of this Consent Decree or when compared to the Multi- Family home's status under the noise mitigation programs for Multi-Family homes provided in Section 5.4 of this Consent Decree. The noise contour boundary will be based on the block intersect methodology. The MAC will offer noise mitigation under Section IX of this Consent Decree to owners of eligible Single-Family homes and Multi-Family homes in the year following the MAC's determination that a Single-Family or Multi-Family home is eligible for noise mitigation under this Section."*

Table 4.1 provides a summary of the number of single-family living units within the 2018 60 dB DNL noise contour, as well as changes in mitigation and the number of years of eligibility achieved by virtue of the 2018 actual noise contour.

Table 4.2 provides the number of multi-family living units within the 2018 60 dB DNL noise contour, as well as changes in mitigation and the number of years of eligibility achieved by virtue of the 2018 actual noise contour. The spatial analysis was performed in Universal Transverse Mercator (UTM Zone 15).

Table 4.1: Summary of 2018 Actual Noise Contour Single-Family Unit Counts

Year of Eligibility	City	Mitigation	DNL Contours					
			60-62	63-64	65-69	70-74	75+	Total
No Change in Eligibility	Bloomington	In 2018 Actual Contours previously mitigated	63	7	1	-	-	71
2	Eagan	In 2018 Actual 60 dB DNL previously between 2005 and 2007 60 dB DNL *(Eligible for additional mitigation, less previous reimbursements after 3 consecutive years)*	16	-	-	-	-	16
No Change in Eligibility	Eagan	In 2018 Actual Contours previously mitigated	262	63	15	-	-	340
No Change in Eligibility	Mendota Heights	In 2018 Actual Contours previously mitigated	48	-	1	-	-	49
1	Minneapolis	In 2018 Actual 60 dB DNL previously outside 2005 and 2007 60 dB DNL (*Eligible for mitigation after 3 consecutive years)*	216	-	-	-	-	216
		In 2018 Actual 63 dB DNL previously outside 2005 and 2007 60 dB DNL *(Eligible for the "five decibel package" after 3 consecutive years)*	-	97	-	-	-	97
Entered the 2020 Mitigation Program	Minneapolis	In 2018 Actual 60 dB DNL previously outside 2005 and 2007 60 dB DNL (*Eligible for mitigation)*	140	-	-	-	-	140
		In 2018 Actual 60 dB DNL previously between 2005 and 2007 60 dB DNL *(Eligible for additional mitigation, less previous reimbursements)*	24	-	-	-	-	24
		In 2018 Actual 63 dB DNL previously in 2007 60-62 dB DNL (*Eligible for the "five decibel package")*	-	79	-	-	-	79
Entered the 2019 Mitigation Program	Minneapolis	In 2018 Actual 60 dB DNL previously outside 2005 and 2007 60 dB DNL (*Eligible for mitigation)*	177	-	-	-	-	177
		In 2018 Actual 60 dB DNL previously between 2005 and 2007 60 dB DNL *(Eligible for additional mitigation, less previous reimbursements)*	72	-	-	-	-	72
		In 2018 Actual 63 dB DNL previously in 2007 60-62 dB DNL *(Eligible for the "five decibel package")*	-	180	-	-	-	180
No Change in Eligibility	Minneapolis	In 2018 Actual Contours previously mitigated	5,070	2,063	1,535	-	-	8,668
No Change in Eligibility	Richfield	In 2018 Actual Contours previously mitigated	563	237	21			821
		Grand Total	**6,651**	**2,726**	**1,573**	**-**	**-**	**10,950**

Notes: Block Intersect Methodology; Multi-Family = 4 or more units; As a result of parcel information updated in July 2018, unit counts may differ from previous reports.

Source: HNTB provided AEDT Contours, MAC analysis 2019

Table 4.2 Summary of 2018 Actual Noise Contour Multi-Family Unit Counts

Year of Eligibility	City	Mitigation	DNL Contours				
			60-64	65-69	70-74	75+	Total
No Change in Eligibility	Bloomington	In 2018 Actual Contours previously mitigated	522	-	-	-	522
No Change in Eligibility	Eagan	In 2018 Actual Contours previously mitigated	38	-	-	-	38
No Change in Eligibility	Minneapolis	In 2018 Actual Contours previously mitigated	600	507	-	-	1,107
1	Minneapolis	In 2018 Actual 60 dB DNL previously outside 2005 and 2007 60 dB DNL (*Eligible for mitigation after 3 consecutive years)*	525	-	-	-	525
No Change in Eligibility	Richfield	In 2018 Actual Contours previously mitigated	256	-	-	-	256
		Grand Total	**1,941**	**507**	**-**	**-**	**2,448**

Notes: Block Intersect Methodology; Multi-Family = 4 or more units; As a result of parcel information updated in July 2018, unit counts may differ from previous reports.

Source: HNTB provided AEDT Contours, MAC analysis 2019

4.4 AMENDED CONSENT DECREE PROGRAM ELIGIBILITY

First-Year Candidate Eligibility

There are 313 single-family homes that achieved the first year of eligibility with the 2018 actual noise contour. All 313 homes are in Minneapolis. Of these, 216 homes are in the Partial Noise Reduction Package. All 216 of these homes were previously outside the mitigation program area. The 2018 actual noise contour includes 97 single-family homes within the first year of eligibility for the Full 5-decibel Reduction Package. Additionally, there are 525 multi-family units in the 2018 noise contour that achieved the first year of eligibility. If these 313 single-family homes and 525 multi-family units 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 2022.

Second-Year Candidate Eligibility

The 2018 actual contour shrunk near both the arrival and departure lobes of Runway 30L, resulting in some homes in Minneapolis, Eagan and Inver Grove Heights not reaching a second consecutive year of eligibility. Of the 63 homes that met the first year of candidate eligibility in the 2017 actual noise contour, 16 achieved a second consecutive year of candidate eligibility with the 2018 actual noise contour. All 16 single-family homes are located on one block in Eagan within the Partial Noise Reduction Package. The homes on this block were previously eligible for homeowner reimbursements during the Original Consent Decree Program. If these 16 single-family homes remain in a higher noise impact area in the 2019 actual noise contour compared to the previous noise mitigation program, they will be eligible for mitigation in 2021.

There are no multi-family units within the second year of eligibility.

Third-Year Candidate Eligibility

There were 243 single-family homes that met the Second-Year Candidate Eligibility in the 2017 Annual Noise Contour Report analysis. All 243 homes are located within the third-year eligibility area and are eligible to participate in the mitigation program in 2020.

Of the 243 single-family homes that meet the Third-year Candidate Eligibility, a total of 164 single-family homes are eligible for the Partial Noise Reduction Package. Of these homes, 140 previously were located outside the eligibility area, and 24 previously were eligible for homeowner reimbursements. These single-family homes are eligible to participate in the 2020 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 79 single-family homes are eligible for the Full 5-decibel Reduction Package. Four of the homeowners of these 79 homes previously opted out of the Partial Noise Reduction Package. There are no multi-family units that meet the criteria for Third-Year Candidate Eligibility. All homes eligible for the 2020 mitigation program are located in Minneapolis.

Homeowners of eligible properties will be notified by the MAC in writing by mid-2019. In cases where homes have received previous reimbursement from the MAC, the value of 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. In cases where homes received previous improvements from the MAC, those efforts will not be duplicated in the design of future mitigation activity.

The blocks meeting the first, second and third consecutive year(s) of noise mitigation eligibility by virtue of the 2018 actual noise contours are shown in Figures 4.1, 4.2, and 4.3.

4.5 AMENDED CONSENT DECREE PROGRAM MITIGATION STATUS

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 4, 2019, 116 homes have been completed, 1 home is in the construction or pre-construction phase, 15 homes declined to participate while 6 homes were moved to the 2019 program as a result of homeowner actions.

Two multi-family structures were also eligible to participate in the Multi-Family Mitigation Program in 2017; one property is completed, and one property declined to participate. The total cost for the 2017 Mitigation Program to date is $2,409,317.

2018 Mitigation Program

In 2017 the MAC began the project to provide mitigation to 283 single-family homes that became eligible by virtue of the 2016 actual noise contour. As of February 4, 2019, 167 homes have been completed, 65 homes are in the construction or pre-construction phase, 27 homes declined to participate while 24 homes were moved to the 2019 program. The 2018 Mitigation Program does not include any multi-family properties. The total cost for the 2018 Mitigation Program to date is $4,847,480.

2019 Mitigation Program

In 2018 the MAC began the project to provide mitigation to 429 single-family homes that became eligible by virtue of the 2017 actual noise contour. As of February 4, 2019, including the homes transitioned from the 2017 and 2018 programs, 10 homes have been completed, 410 homes are in the construction or pre-construction phase and 39 homes declined to participate. The 2019 Mitigation Program does not include any multi-family properties. The total cost for the 2019 Mitigation Program to date is $251,952.

Figure 4.1: 2018 Contours and Mitigation Program Eligibility

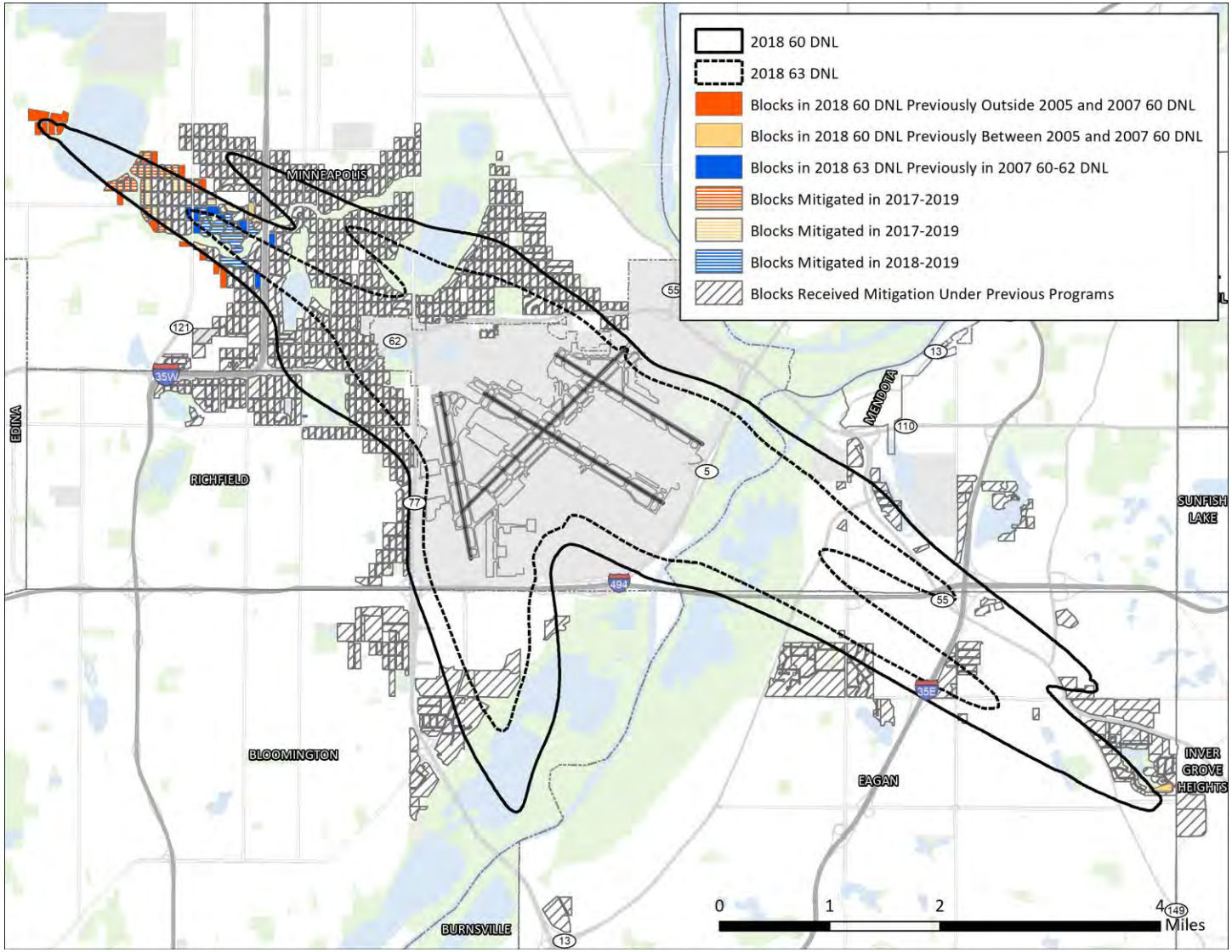


Figure 4.2: 2018 Contours and Mitigation Program Eligibility – City of Minneapolis

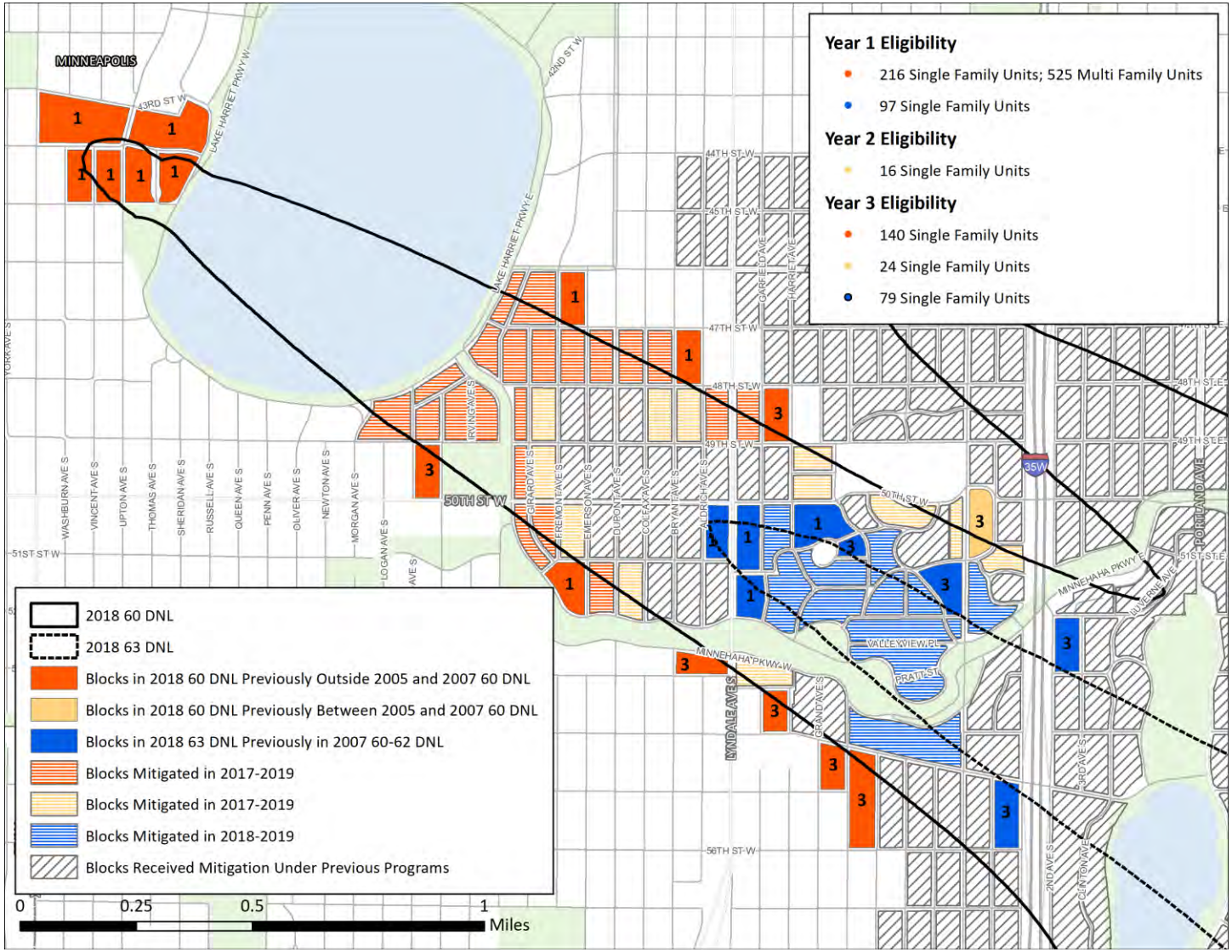
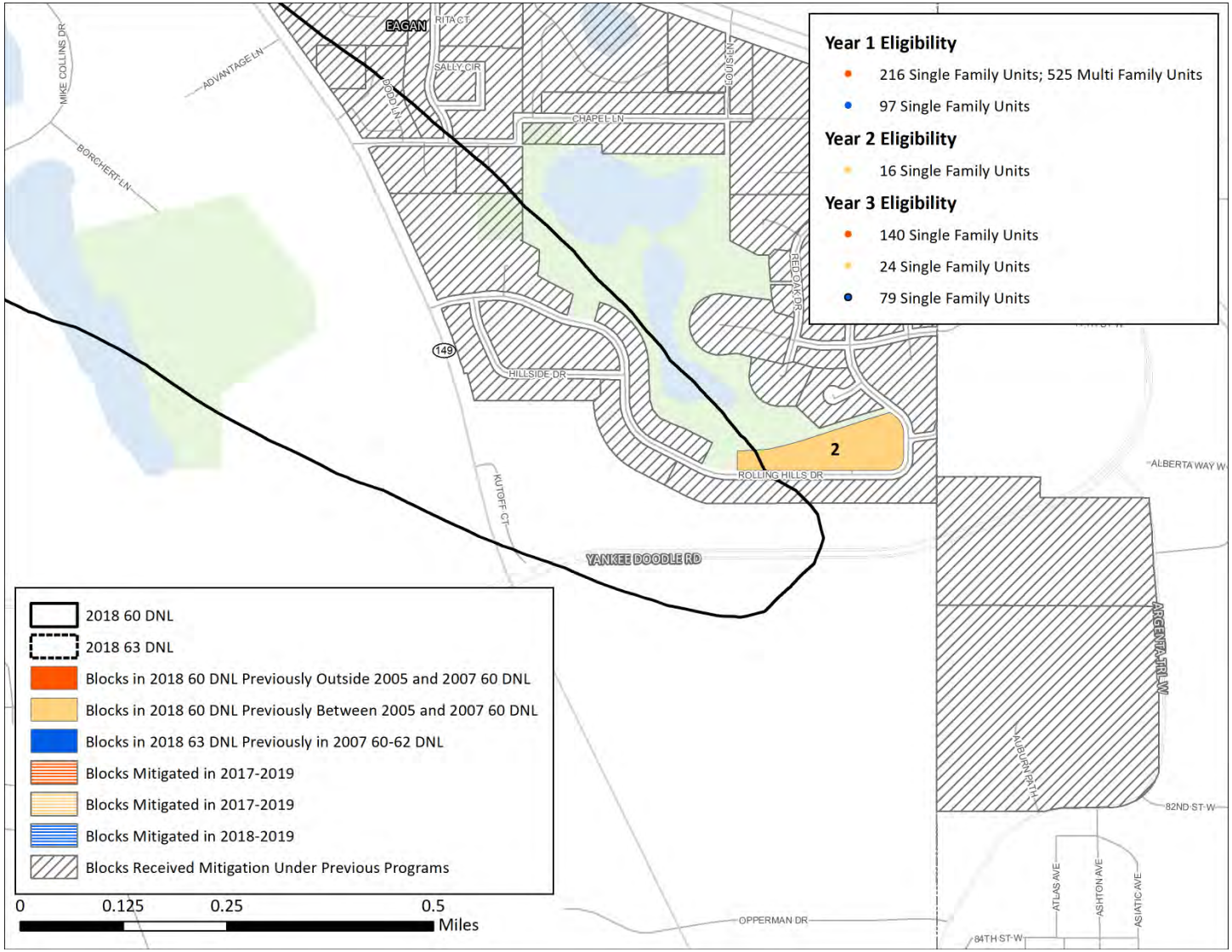


Figure 4.3: 2018 Contours and Mitigation Program Eligibility – City of Eagan



List of Appendices

Appendix 1: Detailed Aircraft Fleet Mix Average Daily Operations

Table A1-1: 2018 Aircraft Fleet Mix Average Daily Operations

Group	Aircraft Code	AEDT Aircraft (ANP)	AEDT Aircraft Description	2018 Day	2018 Night	2018 Total
Manufactured to be Stage 3+	A124	74720B	Antonov An-124 Russlan	0.0	0.0	0.0
	A306	A300-622R	Airbus A300-600/622R	0.6	0.9	1.5
	A306	A300B4-203	Airbus A300-600/622R	0.0	0.0	0.0
	A310	A310-304	Airbus A310 Series	0.0	0.0	0.0
	A319	A319-131	Airbus A319 series	60.4	5.8	66.1
	A320	A320-211	Airbus A320 series	42.6	3.5	46.0
	A320	A320-211	Boeing 717-200 / Extended Range	0.0	-	0.0
	A320	A320-232	Airbus A320 series	16.6	5.4	22.0
	A320	A320-251N	Airbus A320-NEO	2.6	0.4	3.1
	A320	A320-271N	Airbus A320-NEO	0.6	0.2	0.8
	A321	A321-232	Airbus A321 series	17.8	4.6	22.4
	A332	A330-301	Airbus A330-200	0.4	0.0	0.4
	A332	A330-343	Airbus A330-200	0.2	0.1	0.3
	A333	A330-301	Airbus A330-300	4.9	0.7	5.6
	A333	A330-343	Airbus A330-300	1.0	0.1	1.1
	A343	A340-211	Airbus A340-300	0.4	0.0	0.5
	A359	A330-343	Airbus A350-900	0.0	0.0	0.0
	ASTR	IA1125	IAI 1125 Astra	0.0	-	0.0
	B38M	7378MAX	Boeing 737 MAX 8	0.7	0.1	0.8
	B712	717200	Boeing 717-200 / Extended Range	56.9	3.8	60.8
	B733	737300	Boeing 737-300	0.1	0.0	0.1
	B734	737400	Boeing 737-400	0.4	0.1	0.5
	B735	737500	Boeing 737-500	0.0	0.0	0.0
	B737	737700	Boeing 737-700	37.2	11.0	48.2
	B738	737800	Boeing 737-800	82.7	22.1	104.9
	B739	737800	Boeing 737-900	66.9	10.5	77.4
	B744	747400	Boeing 747-400	0.1	0.1	0.2
	B748	7478	Boeing 747-800	0.0	0.0	0.0
	B752	757PW	Boeing 757-200	35.0	8.5	43.5
	B752	757RR	Boeing 757-200	3.6	2.1	5.7
	B753	757300	Boeing 757-300	12.6	1.2	13.8
	B762	767CF6	Boeing 767-200	0.1	0.0	0.1
	B762	767JT9	Boeing 767-200	0.2	0.1	0.3
	B763	767300	Boeing 767-300	5.8	2.4	8.2
	B764	767400	Boeing 767-400ER	0.1	0.0	0.1
	B772	777200	Boeing 777-200	3.7	0.1	3.8
	B77L	777300	Boeing 777-200LR	0.4	0.0	0.4
	B77W	7773ER	Boeing 777-300ER	0.0	-	0.0
	B788	7878R	Boeing 787 Dreamliner (800 Model)	0.0	0.0	0.0
	B789	7878R	Boeing 787-9 Dreamliner	0.3	0.1	0.4
	BE40	MU3001	Beechcraft Beechjet 400	0.5	0.0	0.6
	C25A	CNA500	Cessna CitationJet CJ2, 525A	0.2	0.0	0.2
	C25B	CNA500	Cessna CitationJet CJ3, 525B	0.4	0.0	0.4
	C25C	CNA525C	Cessna CitationJet CJ4, 525C	0.1	0.0	0.1
	C25M	CNA500	Cessna CitationJet CJ1, 525	0.0	-	0.0
	C500	CNA500	Cessna Citation I Twin Jet	0.0	0.0	0.0
	C501	CNA500	Cessna Citation I Single Pilot Twin Jet	0.0	-	0.0
	C525	CNA500	Cessna CitationJet CJ1, 525	0.2	0.0	0.2
	C550	CNA55B	Cessna Citation 550 Citation II	0.2	0.0	0.3
	C551	CNA55B	Cessna Citation II Single Pilot (SP)	0.0	-	0.0
	C560	CNA560E	Cessna 560 Citation V, Ultra & Ultra Encore	0.4	0.0	0.5
	C560	CNA560U	Cessna 560 Citation V, Ultra & Ultra Encore	0.3	0.0	0.4
	C560	CNA560XL	Cessna 560 Citation V, Ultra & Ultra Encore	0.1	0.0	0.1
	C56X	CNA560XL	Cessna 560XL Citation Excel	3.0	0.2	3.2
	C650	CIT3	Cessna Citation III	0.3	0.0	0.3
	C680	CNA680	Cessna 680 Citation Sovereign	2.9	0.1	3.0
	C68A	CNA680	Cessna Citation Latitude	1.0	0.0	1.1
	C700	CNA680	Cessna 680 Citation Sovereign	0.0	-	0.0
	C750	CNA750	Cessna 750 series/Citation X	2.7	0.2	2.9
	CL30	CL600	Bombardier Challenger 300	3.4	0.3	3.7
	CL35	CL600	Bombardier Challenger 350	1.8	0.1	1.9
	CL60	CL600	Canadair Bombardier CL600/610 Challenger Twin Jet	0.1	0.0	0.1

Group	Aircraft Code	AEDT Aircraft (ANP)	AEDT Aircraft Description	2018 Day	2018 Night	2018 Total
Manufactured to be Stage 3+	CRJ1	CL600	Bombardier CRJ-100	0.0	-	0.0
	CRJ2	CL600	Canadair CRJ 200 Regional Jet	140.2	8.5	148.6
	CRJ7	CRJ9-ER	Canadair CRJ 700 Regional Jet	69.2	3.7	72.8
	CRJ9	CRJ9-ER	Canadair CRJ 900 Regional Jet	128.3	6.4	134.7
	DC10	DC1010	McDonnell Douglas DC-10	1.4	0.6	2.0
	DC10	DC1030	McDonnell Douglas DC-10	0.4	0.2	0.5
	E135	EMB145	Embraer ERJ-135	0.3	0.0	0.3
	E145	EMB145	Embraer ERJ-145	0.1	0.0	0.1
	E170	EMB170	Embraer ERJ-170	6.9	1.1	8.0
	E190	EMB190	Embraer ERJ-190-100 /-200	2.6	0.2	2.8
	E35L	EMB145	Embraer EMB135 LR	0.1	0.0	0.1
	E45X	EMB145	Embraer EMB-145 EX (Extra Long Range)	0.1	0.0	0.1
	E550	CNA55B	Embraer EMB550 Phenom 300	0.2	-	0.2
	E55P	CNA55B	Embraer EMB550 Phenom 300	1.1	0.1	1.2
	E75L	EMB175	Embraer ERJ-175	33.6	4.0	37.6
	E75S	EMB175	Embraer ERJ-175	9.3	2.2	11.5
	F2TH	CNA750	Dassault Falcon 2000	1.3	0.1	1.4
	F900	CNA750	Dassault Falcon 900	1.1	0.1	1.2
	FA10	LEAR35	Dassault Falcon 10	0.0	-	0.0
	FA50	CNA750	Dassault Falcon 50	1.1	0.1	1.1
	FA7X	CNA750	Dassault Falcon 7X	0.1	0.0	0.1
	FA7X	GIV	Dassault Falcon 7X	0.1	0.0	0.1
	FA8X	GIV	Gulfstream IV	0.0	-	0.0
	G150	IA1125	Gulfstream G150	0.2	0.0	0.3
	G280	IA1125	Gulfstream G280	0.3	0.0	0.3
	GALX	CNA750	IAI 1126 Astra Galaxy/Gulfstream 200	1.0	0.1	1.1
	GL5T	BD-700-1A11	Bombardier Global 5000 BD-700	0.2	0.0	0.2
	GLEX	BD-700-1A10	Bombardier BD-700 Global Express	0.4	0.0	0.4
	GLF4	GIV	Gulfstream IV	1.3	0.1	1.4
	GLF5	GV	Gulfstream V	1.6	0.3	1.8
	GLF6	G650	Gulfstream VI / G650	0.0	0.0	0.0
	GLF6	G650ER	Gulfstream VI / G650	0.1	0.0	0.1
	GLF7	GV	Gulfstream V	0.0	-	0.0
	H25B	LEAR35	Hawker 800/800 XP/850 XP Twin Turbojet	1.0	0.1	1.1
	H25C	LEAR35	Hawker 1000 / Bae 125-1000	0.0	0.0	0.1
	HA4T	CNA750	Hawker Beechcraft 4000 Horizon (Horizon 1000)	0.1	0.0	0.1
	HAWK	MU3001	Raytheon Hawker 400	0.0	-	0.0
	HDJT	CNA680	Honda Jet	0.0	-	0.0
	J328	CNA750	Fairchild Dornier 328 Jet	0.0	0.0	0.1
	LJ31	LEAR35	Learjet 31 Twin Jet	0.1	0.0	0.1
	LJ35	LEAR35	Learjet 35 Twin Jet	0.4	0.0	0.4
	LJ40	LEAR35	Learjet 40 Twin Jet	0.1	0.0	0.1
	LJ45	LEAR35	Learjet 45 Twin Jet	1.0	0.0	1.0
	LJ55	LEAR35	Learjet 55 Twin Jet	0.1	0.0	0.1
	LJ60	LEAR35	Learjet 60 Twin Jet	0.4	0.0	0.4
	LJ70	LEAR35	Learjet 70 Twin Jet	0.1	0.0	0.1
	MD11	MD11GE	McDonnell Douglas MD-11 (Mixed)	1.2	0.5	1.8
	MD11	MD11PW	McDonnell Douglas MD-11 (Mixed)	1.3	0.5	1.8
	MD81	MD81	McDonnell Douglas MD-81	0.0	0.0	0.0
	MD82	MD82	McDonnell Douglas MD-82	0.5	0.0	0.6
	MD83	MD83	McDonnell Douglas MD-83	2.0	0.1	2.1
	MD88	MD83	McDonnell Douglas MD-88	0.3	0.1	0.4
	MD90	MD9025	McDonnell Douglas MD-90	14.0	0.6	14.6
	MD90	MD9028	McDonnell Douglas MD-90	54.1	2.2	56.3
	PRM1	CNA55B	Raytheon 390 Premier	0.1	0.0	0.1
	SBR1	SABR80	North American Sabreliner	0.0	-	0.0
	SJ30	CNA55B	Embraer EMB550 Phenom 300	0.0	0.0	0.0
	WW24	IA1125	IAI 1124 Westwind	0.0	-	0.0
Manufactured to be Stage 3+ Total				***953.4***	***117.4***	***1,070.8***

Group	Aircraft Code	AEDT Aircraft (ANP)	AEDT Aircraft Description	2018 Day	2018 Night	2018 Total
Microjet	E50P	CNA510	Embraer EMB500 Phenom 100	0.1	0.0	0.1
	E545	CNA510	Embraer Legacy 545	0.3	0.0	0.4
	EA50	ECLIPSE500	Eclipse 500 VLJ	0.1	-	0.1
	SF50	ECLIPSE500	Eclipse 500 VLJ	0.0	-	0.0
Microjet Total				***0.6***	***0.0***	***0.6***
Hushkit Stage 3 Jet	B722	727EM2	Boeing 727-200	0.0	0.0	0.0
	B732	737N17	Boeing 737-200 Modified Stage 3	0.0	-	0.0
	DC91	DC93LW	McDonnell Douglas DC-9-10 with ABS3 Hushkit	0.0	0.0	0.0
	DC93	DC93LW	McDonnell Douglas DC-9-30 with ABS3 Hushkit	0.0	0.0	0.0
	FA20	FAL20	Dassault Falcon 20 Mystere 20 /200	0.1	0.5	0.6
	GLF3	GIIB	Gulfstream III	0.1	0.0	0.1
Hushkit Stage 3 Jet Total				***0.3***	***0.5***	***0.8***
Military	A400	C-130E	Airbus A400M Altas	0.0	-	0.0
	AN12	C130	Antonov An-12 Cub	0.0	-	0.0
	C130	C130E	Lockheed Martin C-130	1.8	0.0	1.8
	C17	C17	Boeing C-17 Globemaster III	0.0	0.0	0.0
	C30J	C130HP	Lockheed Martin C-130J Super Hercules	0.1	-	0.1
	F18	F-18	McDonnell Douglas (Boeing) F/A-18 Hornet	0.0	-	0.0
	F18S	F-18	McDonnell Douglas (Boeing) F/A-18 Hornet	0.0	-	0.0
	K35R	KC-135	Boeing C-135R Stratotanker	0.0	-	0.0
	T38	T-38A	Northrop T-38 Talon	0.0	-	0.0
	T38C	T-38A	Northrop T-38 Talon	0.0	-	0.0
Military Total				***1.9***	***0.0***	***2.0***
Propeller	AC50	BEC58P	Rockwell Aero Commander 500	0.0	0.0	0.0
	AC90	DHC6	Rockwell Turbo Commander 690	0.0	0.0	0.0
	AC95	CNA441	Rockwell / Gulfstream 695 Jetprop Commander 1000	0.0	-	0.0
	AEST	BEC58P	Ted Smith Aerostar 600 /Piper Aerostar	0.0	0.0	0.0
	AT43	DHC8	Avions de Transport Régional ATR-43	1.3	0.1	1.4
	AT72	DHC830	Avions de Transport Régional ATR-72	0.0	0.0	0.0
	B190	1900D	Beechcraft 1900D	3.3	0.4	3.7
	B350	DHC6	Beechcraft Super King Air 350/300B	0.5	0.0	0.5
	BE10	DHC6	Beechcraft King Air 100	0.0	-	0.0
	BE20	DHC6	Beechcraft Model 200 (Super) King Air 200	0.4	0.1	0.5
	BE30	DHC6	Beechcraft Super King Air 300	0.3	0.0	0.3
	BE33	GASEPV	Beechcraft Model 33 Debonair/Bonanza	0.0	-	0.0
	BE36	CNA208	Beechcraft Model 36 Bonanza	0.0	-	0.0
	BE55	BEC58P	Beechcraft Model 58 Baron	0.0	-	0.0
	BE58	BEC58P	Beechcraft Model 58 Baron	0.0	0.0	0.1
	BE65	BEC58P	Beechcraft Model 65 Queen Air	5.8	0.4	6.2
	BE80	BEC58P	Beechcraft Model 80 Queen Air	3.2	0.2	3.4
	BE99	DHC6	Beechcraft Airliner Model 99	5.0	0.3	5.4
	BE9L	DHC6	Beechcraft Model 90 King Air	0.3	0.0	0.3
	C172	CNA172	Cessna 172 Single Engine SEPF	0.0	0.0	0.0
	C182	CNA182	Cessna 182 Skylane	0.0	-	0.0
	C206	CNA206	Cessna 206 Stationair	0.0	-	0.0
	C208	CNA208	Cessna 208 Caravan I	6.4	0.0	6.4
	C210	GASEPV	Cessna 210 Centurion	0.0	0.0	0.0
	C310	BEC58P	Cessna 310 Twin Engine Piston aircraft	0.0	0.0	0.0
	C335	BEC58P	Cessna 335 Twin Piston MEVP	0.0	-	0.0
	C340	BEC58P	Cessna 340 Twin Piston MEVP	0.0	-	0.0
	C402	BEC58P	Cessna 402 Businessliner	0.0	0.0	0.0
	C414	BEC58P	Cessna 414 Chancellor MEVP	0.1	-	0.1
	C421	BEC58P	Cessna 421 Golden Eagle	0.0	0.0	0.0
	C425	CNA441	Cessna 425 (Corsair/Conquest)	0.0	-	0.0
	C441	CNA441	Cessna 441 (Conquest/Conquest2)	0.1	0.0	0.1
	C77R	GASEPV	Cessna 177RG Cardinal	0.0	-	0.0
	COL4	GASEPV	Cessna 400 Corvallis/Lancair LC41/Columbia 400	0.0	-	0.0
	CORS	GASEPV	Mooney Mark 20 Series	0.0	-	0.0
	COUR	GASEPV	Helio U-10 Super Courier (Piston-single)	0.0	0.0	0.0
	CVLT	CVR580	Convair CV-580/-600/-640	0.0	-	0.0
	DHC6	DHC6	de Havilland Canada DHC-6 Twin Otter	0.0	-	0.0
	E120	EMB120	Embraer EMB-120 Brasilia	0.0	0.0	0.1

Group	Aircraft Code	AEDT Aircraft (ANP)	AEDT Aircraft Description	2018 Day	2018 Night	2018 Total
Propeller	LEG2	GASEPV	Lancair Legacy 2000 (Piston-single)	0.0	-	0.0
	M20P	GASEPV	Mooney Mark 20 Series	0.0	0.0	0.1
	M600	CNA441	Beechcraft Model 90 King Air	0.0	-	0.0
	MU2	DHC6	Mitsubishi MU-2 Marquise / Solitaire	0.0	-	0.0
	P180	DHC6	Piaggio P180 Avanti	0.1	0.0	0.1
	P210	GASEPV	Cessna P210 Centurion (Pressurized)	0.0	-	0.0
	P28A	GASEPF	Piper PA-28-140/150/160/180 Cherokee	0.0	0.0	0.0
	P28R	GASEPF	Piper PA-28R-180/200/201 Cherokee Arrow I/II/III	0.0	-	0.0
	P46T	CNA441	Piper PA-46-500TP Malibu Meridian	0.0	-	0.0
	PA31	BEC58P	Piper PA-31 Navajo	0.1	-	0.1
	PA32	GASEPV	Piper PA-32 Cherokee Six	0.0	0.0	0.0
	PA34	BEC58P	Piper PA-34 Seneca	0.0	-	0.0
	PA46	GASEPV	Piper PA-46 Malibu	0.0	0.0	0.0
	PAT4	CNA441	Piper PA-31T-2 Cheyenne I/II	0.0	-	0.0
	PAY1	CNA441	Piper PA-31T-2 Cheyenne I/II	0.0	-	0.0
	PAY2	CNA441	Piper PA-31T-2 Cheyenne I/II	0.0	-	0.0
	PC12	CNA208	Pilatus PC-12	5.3	0.1	5.4
	RV4	GASEPF	Van's Aircraft RV-4	0.0	-	0.0
	S22T	COMSEP	Cirrus SR22 Turbo	0.0	0.0	0.0
	SB20	HS748A	Saab 2000	0.0	-	0.0
	SH36	SD330	Shorts 360	0.0	0.0	0.0
	SR22	COMSEP	Cirrus SR22	0.2	0.0	0.2
	SW3	DHC6	Swearingen Merlin III /Fairchild Merlin III	0.0	0.0	0.0
	SW4	DHC6	Swearingen Merlin IV /Fairchild Merlin IV	5.2	0.4	5.5
	T6	GASEPV	Beechcraft T-6 Texan II	0.0	-	0.0
	TBM7	GASEPV	Socata TBM 700	0.0	-	0.0
	TBM8	CNA441	Socata TBM 850 Single Engine Turboprop	0.0	0.0	0.0
	TBM9	CNA208	Daher TMB900	0.0	-	0.0
	TEX2	GASEPV	Beechcraft T-6 Texan II	0.0	0.0	0.0
Propeller Total				***38.3***	***2.3***	***40.5***
Helicopter	AS50	SA350D	Eurocopter AS-350	0.0	-	0.0
	B407	B407	Bell Helicopter 407	0.0	-	0.0
	B412	S76	Bell Helicopter 412 Sentinel	0.0	-	0.0
	B429	B429	Bell Helicopter 429	0.0	-	0.0
	HELO	SA350D	Unidentifiable Helicopter	0.0	-	0.0
	R44	R44	Robinson R44 Clipper/Raven Helicopter	0.0	-	0.0
	UH60	S70	Sikorsky UH-60 Black Hawk Helicopter	0.0	-	0.0
Helicopter Total				***0.1***	***-***	***0.1***
Grand Total				***994.5***	***120.3***	***1,114.8***

Notes: Totals may differ due to rounding

Source: MAC-provided AEDT input data, HNTB 2019.

Table A1-2: Comparison of 2007 Forecast Fleet Mix and 2018 Actual Fleet Mix Average Daily Operations

Group	Aircraft Type	Day		Night		Total		Difference
		2007 Forecast	2018 Actual	2007 Forecast	2018 Actual	2007 Forecast	2018 Actual	
Manufactured to be Stage 3+	7478	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	717200	7.3	56.9	1.0	3.8	8.3	60.8	52.5
	737300	48.2	0.1	3.5	0.0	51.7	0.1	(51.6)
	737400	0.1	0.4	0.0	0.1	0.1	0.5	0.4
	737500	5.7	0.0	0.5	0.0	6.2	0.0	(6.2)
	737700	7.8	37.2	0.5	11.0	8.3	48.2	39.9
	737800	65.5	149.7	12.6	32.6	78.1	182.3	104.2
	737900	5.7	0.0	0.5	0.0	6.2	0.0	(6.2)
	747400	1.9	0.1	0.2	0.1	2.1	0.2	(1.9)
	757300	34.1	12.6	1.1	1.2	35.2	13.8	(21.4)
	767200	1.2	0.0	0.5	0.0	1.7	0.0	(1.7)
	767300	0.0	5.8	0.0	2.4	0.0	8.2	8.2
	767400	0.0	0.1	0.0	0.0	0.0	0.1	0.1
	777200	0.0	3.7	0.0	0.1	0.0	3.8	3.8
	777300	0.0	0.4	0.0	0.0	0.0	0.4	0.4
	7378MAX	0.0	0.7	0.0	0.1	0.0	0.8	0.8
	74720B	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	757PW	88.4	35.0	8.6	8.5	97.0	43.5	(53.5)
	757RR	0.0	3.6	0.0	2.1	0.0	5.7	5.7
	767CF6	0.0	0.1	0.0	0.0	0.0	0.1	0.1
	767JT9	0.0	0.2	0.0	0.1	0.0	0.3	0.3
	7773ER	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	7878R	0.0	0.4	0.0	0.1	0.0	0.4	0.4
	A300-622R	4.8	0.6	4.2	0.9	9.0	1.5	(7.5)
	A300B4-203	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	A310-304	1.4	0.0	1.3	0.0	2.7	0.0	(2.7)
	A318	5.7	0.0	0.5	0.0	6.2	0.0	(6.2)
	A319-131	149.1	60.4	3.9	5.8	153.0	66.1	(86.9)
	A320-211	173.4	42.6	16.5	3.5	189.9	46.0	(143.9)
	A320-232	0.0	16.6	0.0	5.4	0.0	22.0	22.0
	A320-251N	0.0	2.6	0.0	0.4	0.0	3.1	3.1
	A320-271N	0.0	0.6	0.0	0.2	0.0	0.8	0.8
	A321-232	0.0	17.8	0.0	4.6	0.0	22.4	22.4
	A330-301	6.2	5.3	0.0	0.7	6.2	6.0	(0.2)
	A330-343	0.0	1.3	0.0	0.2	0.0	1.5	1.5
	A340-211	0.0	0.4	0.0	0.0	0.0	0.5	0.5
	A340-642	2.1	0.0	0.0	0.0	2.1	0.0	(2.1)
	ASTR	2.3	0.0	0.2	0.0	2.5	0.0	(2.5)
	BAE146	74.3	0.0	2.2	0.0	76.5	0.0	(76.5)
	BD-700-1A10	0.0	0.4	0.0	0.0	0.0	0.4	0.4
	BD-700-1A11	0.0	0.2	0.0	0.0	0.0	0.2	0.2
	CIT3	0.0	0.3	0.0	0.0	0.0	0.3	0.3
	CL600	0.0	145.4	0.0	8.9	0.0	154.2	154.2
	CL601	264.1	1.2	14.7	0.1	278.8	1.3	(277.5)
	CNA500	1.4	0.8	0.1	0.0	1.5	0.8	(0.7)
	CNA525C	0.0	0.1	0.0	0.0	0.0	0.1	0.1
	CNA55B	0.0	1.6	0.0	0.1	0.0	1.7	1.7
	CNA560E	0.0	0.4	0.0	0.0	0.0	0.5	0.5
	CNA560U	0.0	0.3	0.0	0.0	0.0	0.4	0.4
	CNA560XL	0.0	3.1	0.0	0.2	0.0	3.3	3.3
	CNA650	4.9	0.0	0.6	0.0	5.5	0.0	(5.5)
	CNA680	0.0	3.9	0.0	0.2	0.0	4.1	4.1
	CNA750	4.6	7.5	0.3	0.5	4.9	8.0	3.1
	CRJ9-ER	0.0	197.5	0.0	10.1	0.0	207.6	207.6
	DC1010	9.6	1.4	3.8	0.6	13.4	2.0	(11.4)
	DC1030	0.0	0.4	0.0	0.2	0.0	0.5	0.5
	DC870	0.0	0.0	1.4	0.0	1.4	0.0	(1.4)
	EMB145	45.3	0.6	0.2	0.1	45.5	0.6	(44.9)
	EMB170	0.0	6.9	0.0	1.1	0.0	8.0	8.0

Group	Aircraft Type	Day		Night		Total		Difference
		2007 Forecast	2018 Actual	2007 Forecast	2018 Actual	2007 Forecast	2018 Actual	
Manufactured to be Stage 3+	EMB175	0.0	42.9	0.0	6.3	0.0	49.1	49.1
	EMB190	0.0	2.6	0.0	0.2	0.0	2.8	2.8
	FAL20A	1.0	0.0	0.7	0.0	1.7	0.0	(1.7)
	G650	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	G650ER	0.0	0.1	0.0	0.0	0.0	0.1	0.1
	GIV	2.6	1.4	0.2	0.1	2.8	1.5	(1.3)
	GV	0.8	1.6	0.1	0.3	0.9	1.8	0.9
	IA1125	0.0	0.6	0.0	0.0	0.0	0.7	0.7
	L101	0.6	0.0	0.2	0.0	0.8	0.0	(0.8)
	LEAR35	26.0	3.1	2.3	0.2	28.3	3.3	(25.0)
	MD11GE	0.3	1.2	0.4	0.5	0.7	1.8	1.1
	MD11PW	0.0	1.3	0.0	0.5	0.0	1.8	1.8
	MD81	0.5	0.0	0.0	0.0	0.5	0.0	(0.5)
	MD82	0.0	0.5	0.0	0.0	0.0	0.6	0.6
	MD83	17.0	2.4	1.6	0.1	18.6	2.5	(16.1)
	MD9025	0.0	14.0	0.0	0.6	0.0	14.6	14.6
	MD9028	0.0	54.1	0.0	2.2	0.0	56.3	56.3
	MU300	7.2	0.0	0.6	0.0	7.8	0.0	(7.8)
	MU3001	0.0	0.6	0.0	0.0	0.0	0.6	0.6
	SABR80	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	SBR2	0.4	0.0	0.0	0.0	0.4	0.0	(0.4)
Manufactured to be Stage 3+ Total		***1,071.5***	***953.4***	***85.0***	***117.4***	***1,156.5***	***1,070.8***	***(85.7)***
Microjet	CNA510	0.0	0.5	0.0	0.0	0.0	0.5	0.5
	ECLIPSE500	0.0	0.1	0.0	0.0	0.0	0.1	0.1
Microjet Total		***0.0***	***0.6***	***0.0***	***0.0***	***0.0***	***0.6***	***0.6***
Hushkit Stage 3 Jet	727EM2	8.0	0.0	6.4	0.0	14.4	0.0	(14.4)
	737N17	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	DC93LW	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	DC9Q	245.3	0.0	15.3	0.0	260.6	0.0	(260.6)
	FAL20	0.0	0.1	0.0	0.5	0.0	0.6	0.6
	GIIB	0.0	0.1	0.0	0.0	0.0	0.1	0.1
Hushkit Stage 3 Jet Total		***253.3***	***0.3***	***21.7***	***0.5***	***275.0***	***0.8***	***(274.3)***
Military	C130	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	C130E	0.0	1.8	0.0	0.0	0.0	1.8	1.8
	C-130E	7.8	0.0	0.2	0.0	8.0	0.0	(8.0)
	C130HP	0.0	0.1	0.0	0.0	0.0	0.1	0.1
	C17	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	C5	0.1	0.0	0.0	0.0	0.1	0.0	(0.1)
	F16GE	0.1	0.0	0.0	0.0	0.1	0.0	(0.1)
	F-18	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	KC-135	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	T37	0.1	0.0	0.0	0.0	0.1	0.0	(0.1)
	T38	0.1	0.0	0.0	0.0	0.1	0.0	(0.1)
	T-38A	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Military Total		***8.2***	***1.9***	***0.2***	***0.0***	***8.4***	***2.0***	***(6.4)***

Group	Aircraft Type	Day		Night		Total		Difference
		2007 Forecast	2018 Actual	2007 Forecast	2018 Actual	2007 Forecast	2018 Actual	
Propeller	1900D	0.0	3.3	0.0	0.4	0.0	3.7	3.7
	BEC58	14.3	0.0	4.7	0.0	19.0	0.0	(19.0)
	BEC58P	0.0	9.4	0.0	0.6	0.0	10.1	10.1
	CNA172	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CNA182	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CNA206	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	CNA208	0.0	11.7	0.0	0.1	0.0	11.8	11.8
	CNA441	0.0	0.2	0.0	0.0	0.0	0.2	0.2
	COMSEP	0.0	0.2	0.0	0.0	0.0	0.2	0.2
	CVR580	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	DHC6	22.5	11.8	4.4	0.9	26.9	12.7	(14.2)
	DHC8	0.0	1.3	0.0	0.1	0.0	1.4	1.4
	DHC830	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	EMB120	0.0	0.0	0.0	0.0	0.0	0.1	0.1
	FK27	0.1	0.0	0.0	0.0	0.1	0.0	(0.1)
	GASEPF	1.3	0.0	0.3	0.0	1.6	0.0	(1.6)
	GASEPV	3.7	0.2	0.5	0.0	4.2	0.2	(4.0)
	HS748A	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	SD330	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	SF340	93.3	0.0	5.9	0.0	99.2	0.0	(99.2)
Propeller Total		***135.2***	***38.3***	***15.8***	***2.3***	***151.0***	***40.5***	***(110.5)***
Stage 2 Jets under 75,000 lbs	GIIB	2.1	0.0	0.2	0.0	2.3	0.0	(2.3)
	LEAR25	2.1	0.0	0.4	0.0	2.5	0.0	(2.5)
Stage 2 Jets under 75,000 lbs Total		***4.2***	***0.0***	***0.6***	***0.0***	***4.8***	***0.0***	***(4.7)***
Grand Total		***1,472.4***	***994.5***	***123.3***	***120.3***	***1,595.9***	***1,114.8***	***(481.1)***

Notes: Totals may differ due to rounding

Source: MAC-provided AEDT input data, HNTB 2019.

Appendix 2: 2018 Model Flight Tracks and Use

2018 AEDT TRACKS - ARRIVAL RUNWAY 4

Overall Use Percentage

Figure 2.1

AEDT Track Use Percentage

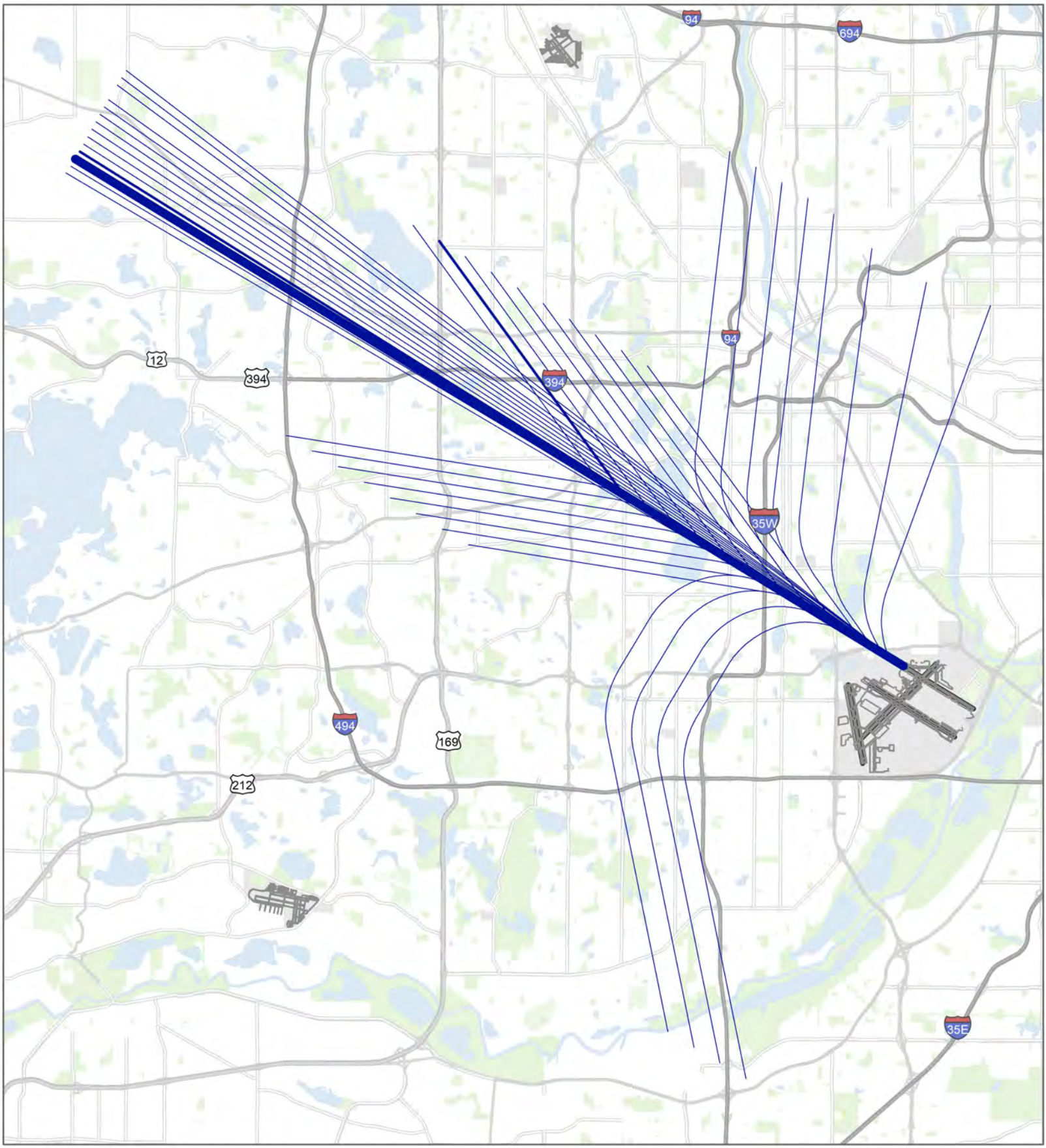
< 5% | 5 - 10% | 10 - 20% | 20 - 30% | 30 - 50% | > 50%

0 1.25 2.5 5 Miles

2018 AEDT TRACKS - ARRIVAL RUNWAY 12L

Overall Use Percentage

Figure 2.2



AEDT Track Use Percentage

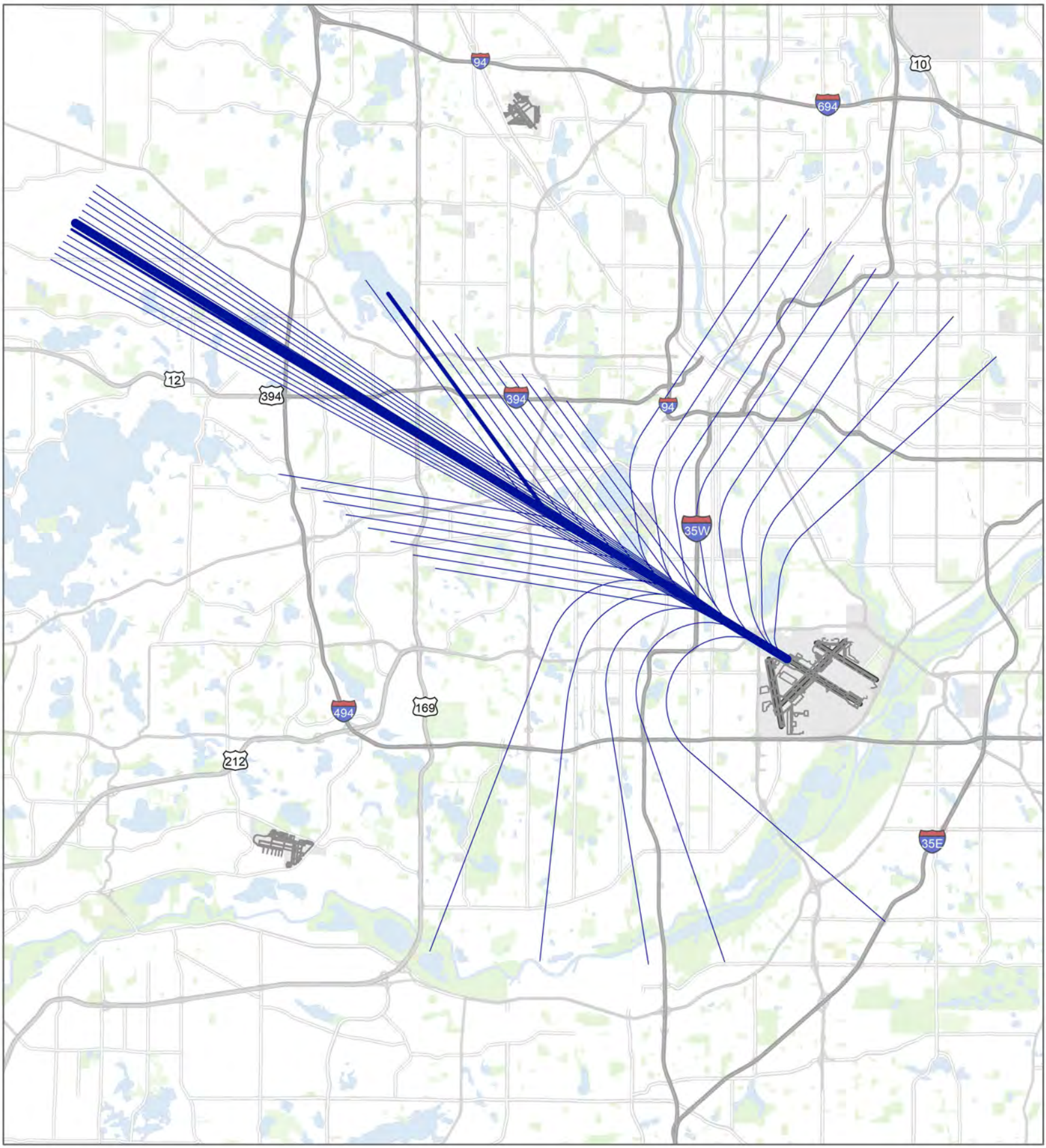
< 5% | 5 - 10% | 10 - 20% | 20 - 30% | 30 - 50% | > 50%

0 1.5 3 6 Miles

2018 AEDT TRACKS - ARRIVAL RUNWAY 12R

Overall Use Percentage

Figure 2.3



AEDT Track Use Percentage

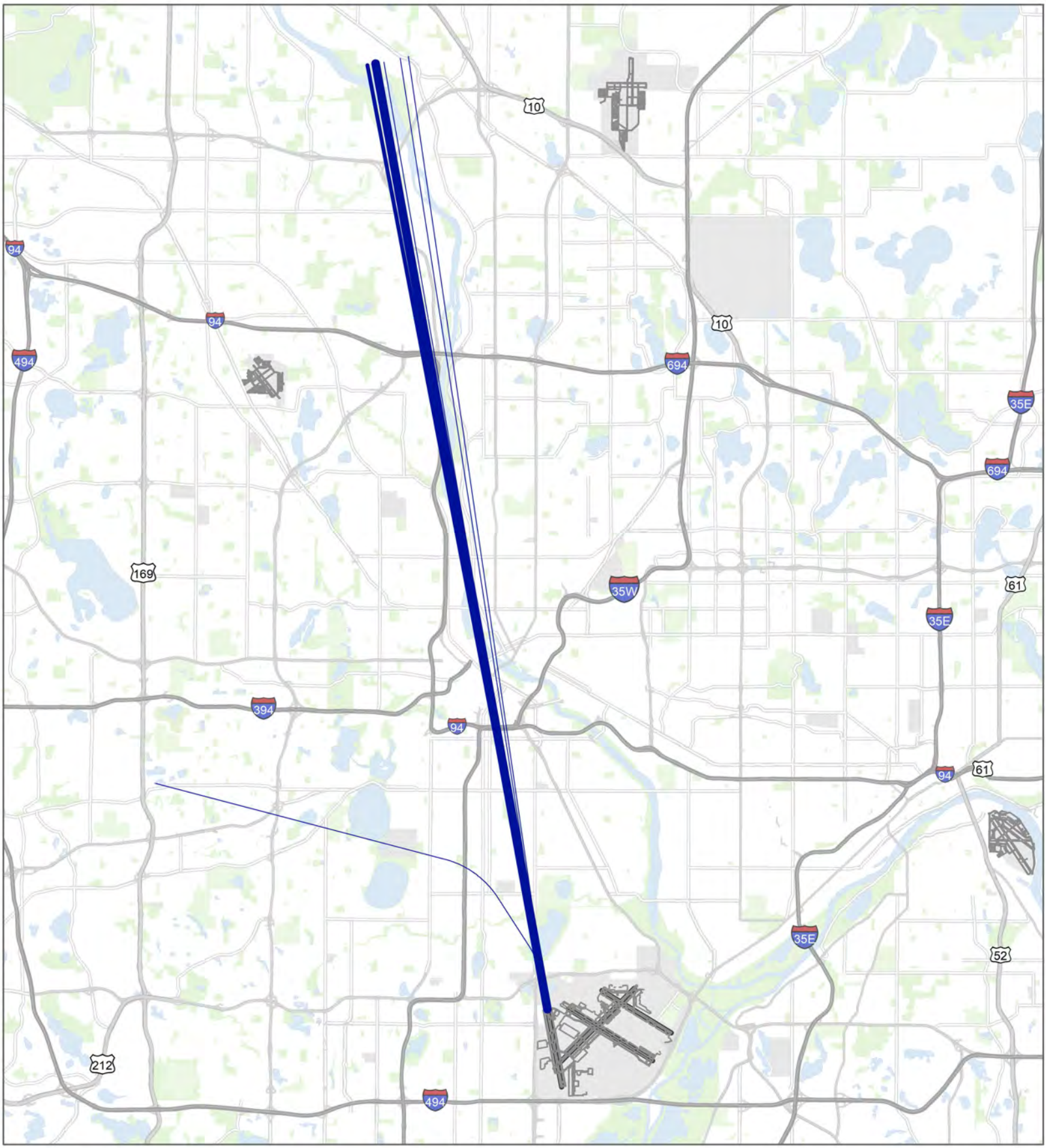
< 5% | 5 - 10% | 10 - 20% | 20 - 30% | 30 - 50% | > 50%

0 1.5 3 6 Miles

2018 AEDT TRACKS - ARRIVAL RUNWAY 17

Overall Use Percentage

Figure 2.4



AEDT Track Use Percentage

< 5% | 5 - 10% | 10 - 20% | 20 - 30% | 30 - 50% | > 50%

0 1.5 3 6 Miles

2018 AEDT TRACKS - ARRIVAL RUNWAY 22

Overall Use Percentage

Figure 2.5

AEDT Track Use Percentage

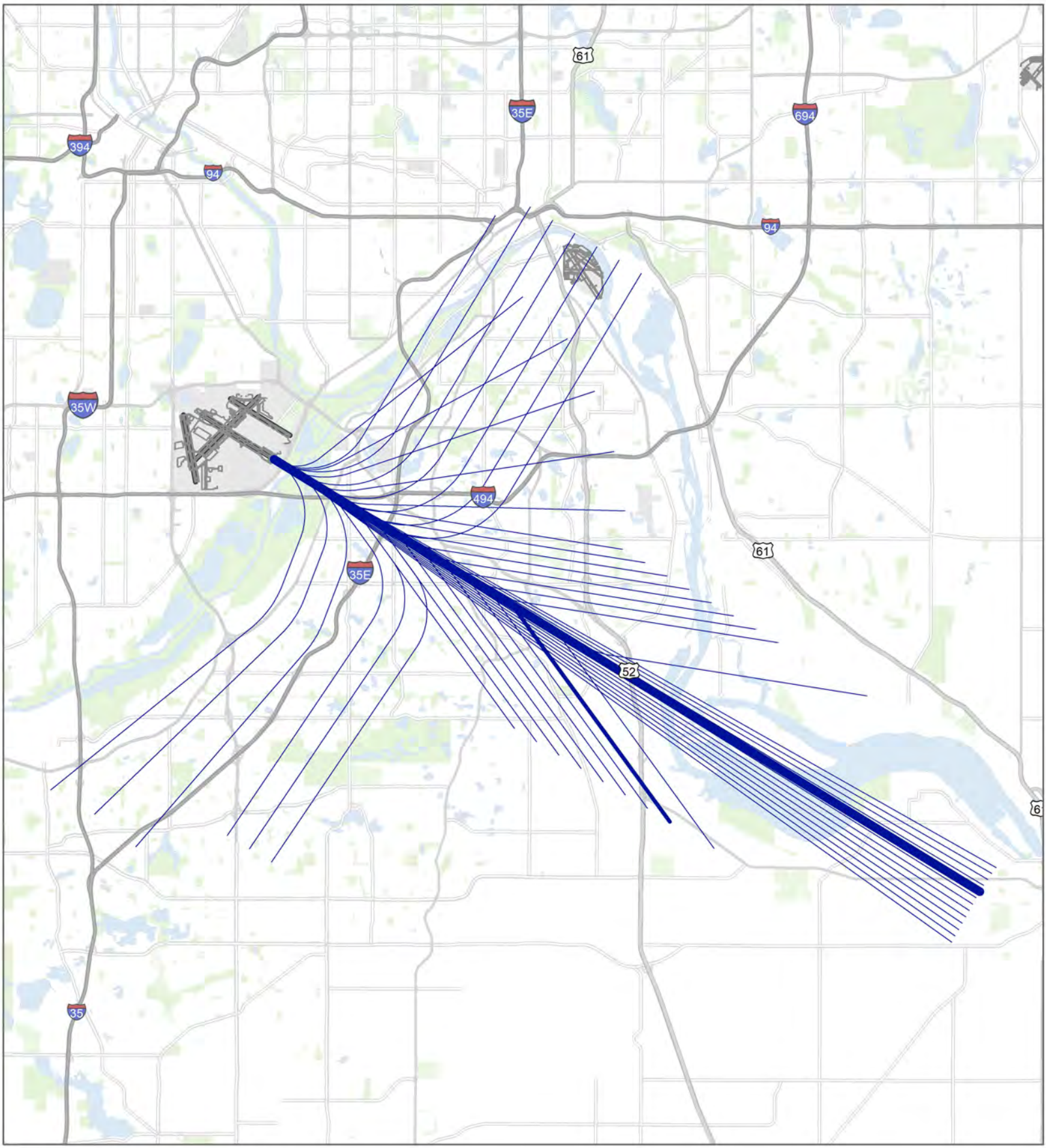
< 5%
5 - 10%
10 - 20%
20 - 30%
30 - 50%
> 50%

0 1.25 2.5 5 Miles

2018 AEDT TRACKS - ARRIVAL RUNWAY 30L

Overall Use Percentage

Figure 2.6



AEDT Track Use Percentage

< 5% 10 - 20% 30 - 50%

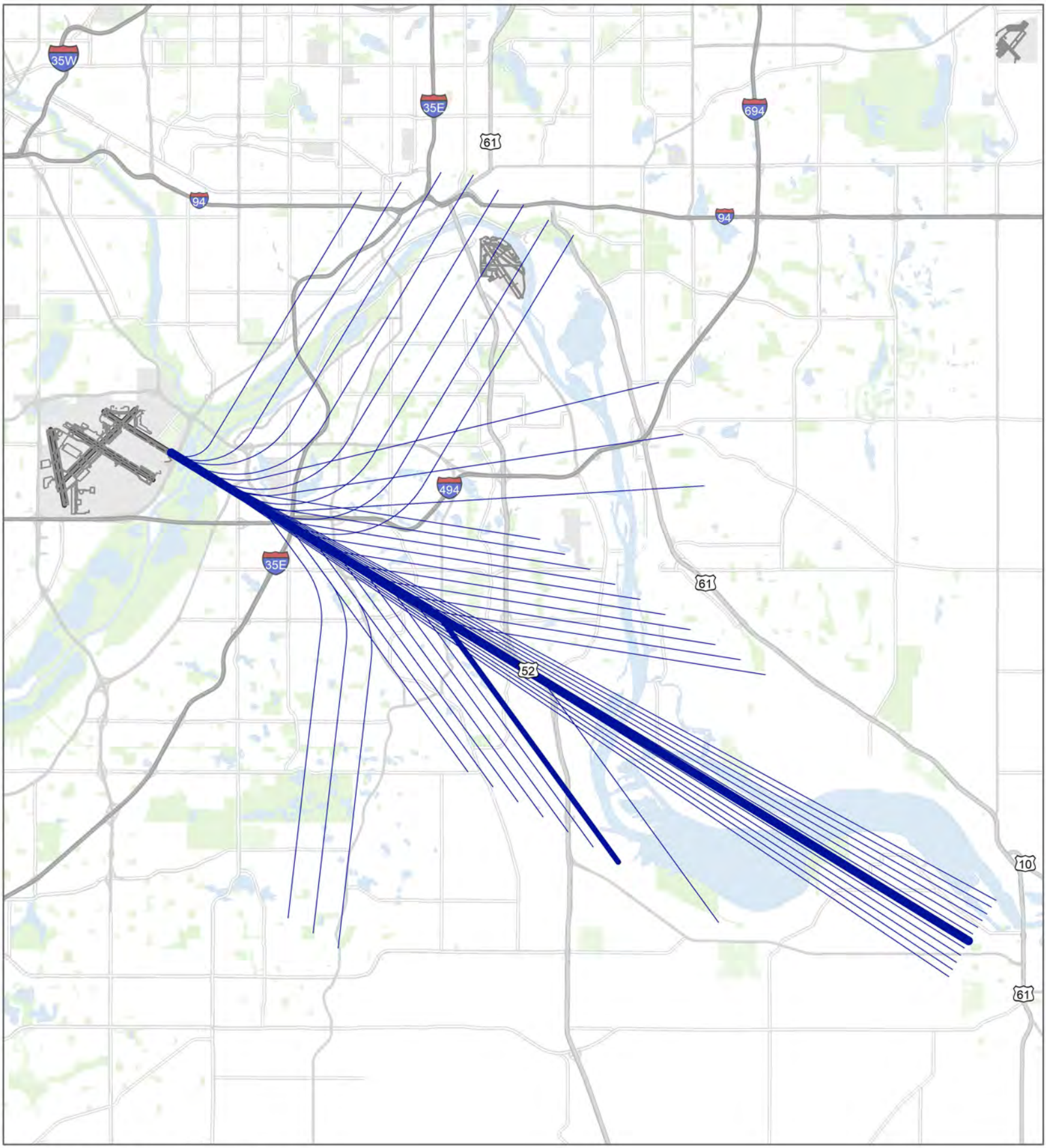
5 - 10% 20 - 30% > 50%

0 1.75 3.5 7 Miles

2018 AEDT TRACKS - ARRIVAL RUNWAY 30R

Overall Use Percentage

Figure 2.7



AEDT Track Use Percentage

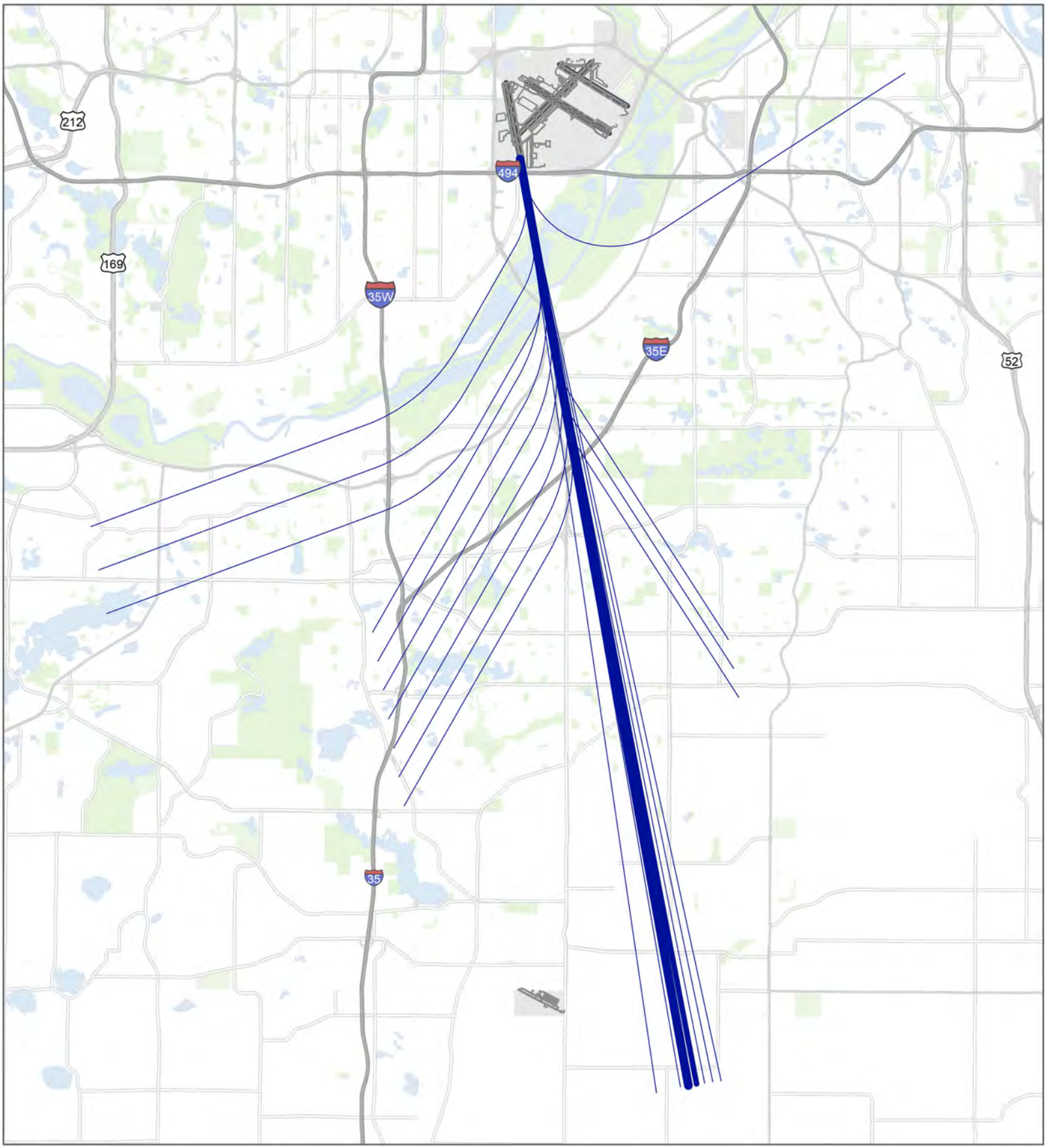
< 5%
5 - 10%
10 - 20%
20 - 30%
30 - 50%
> 50%

0 1.5 3 6 Miles

2018 AEDT TRACKS - ARRIVAL RUNWAY 35

Overall Use Percentage

Figure 2.8



AEDT Track Use Percentage

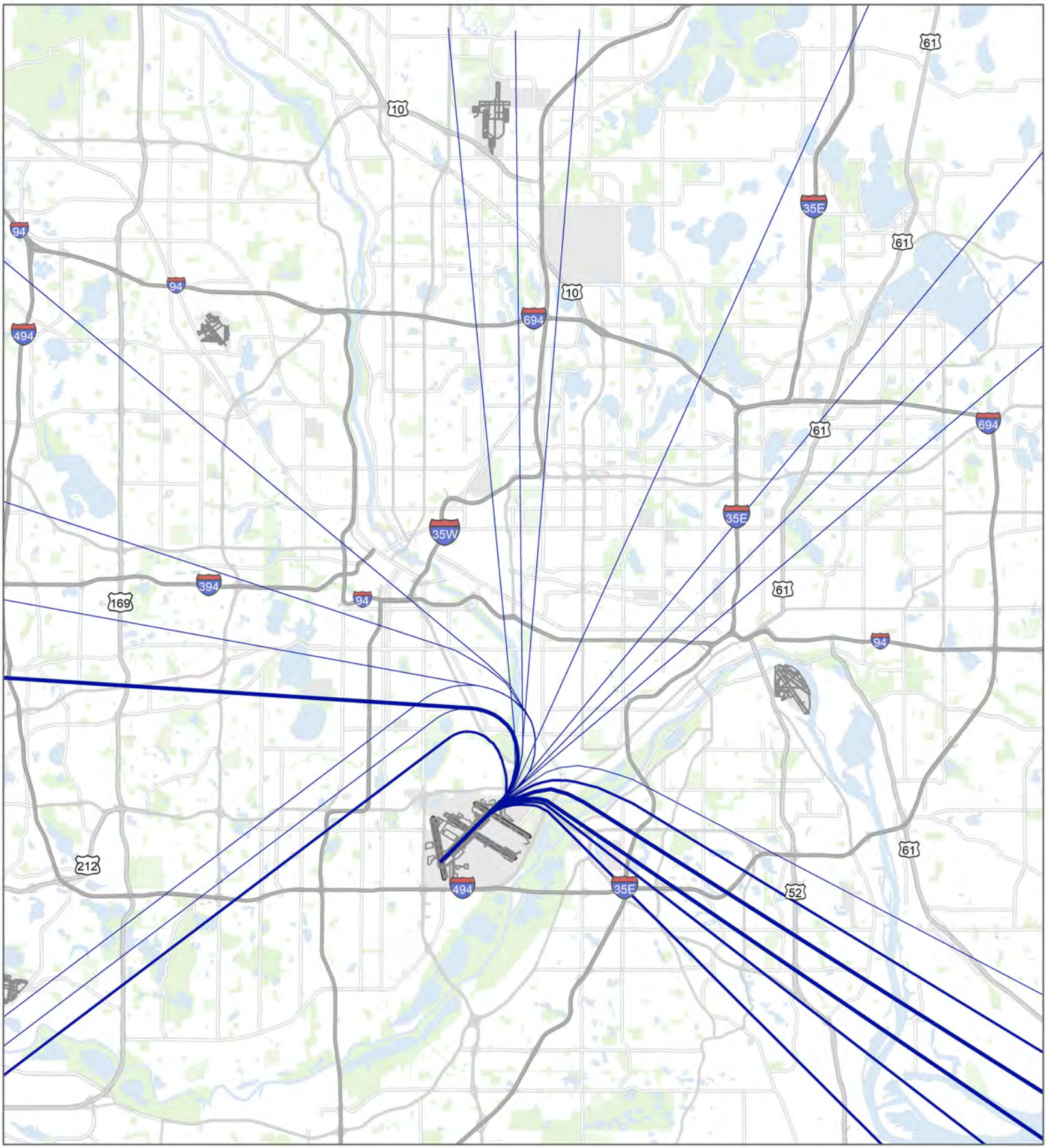
< 5% | 5 - 10% | 10 - 20% | 20 - 30% | 30 - 50% | > 50%

0 1.5 3 6 Miles

2018 AEDT TRACKS - DEPARTURE RUNWAY 4

Overall Use Percentage

Figure 2.9



AEDT Track Use Percentage

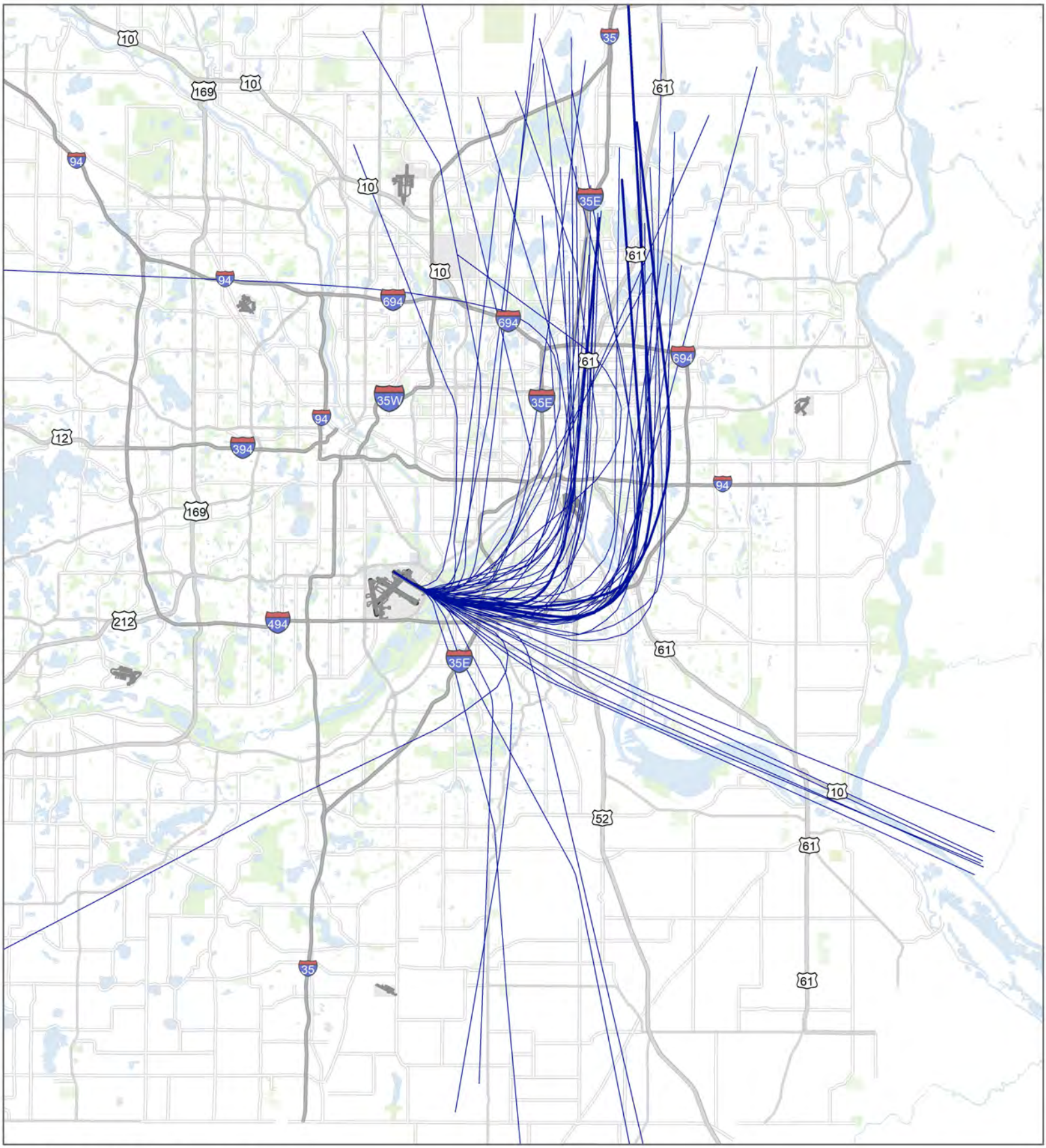
< 5% | 5 - 10% | 10 - 20% | 20 - 30% | 30 - 50% | > 50%

0 1.75 3.5 7 Miles

2018 AEDT TRACKS - DEPARTURE RUNWAY 12L

Overall Use Percentage

Figure 2.10



AEDT Track Use Percentage

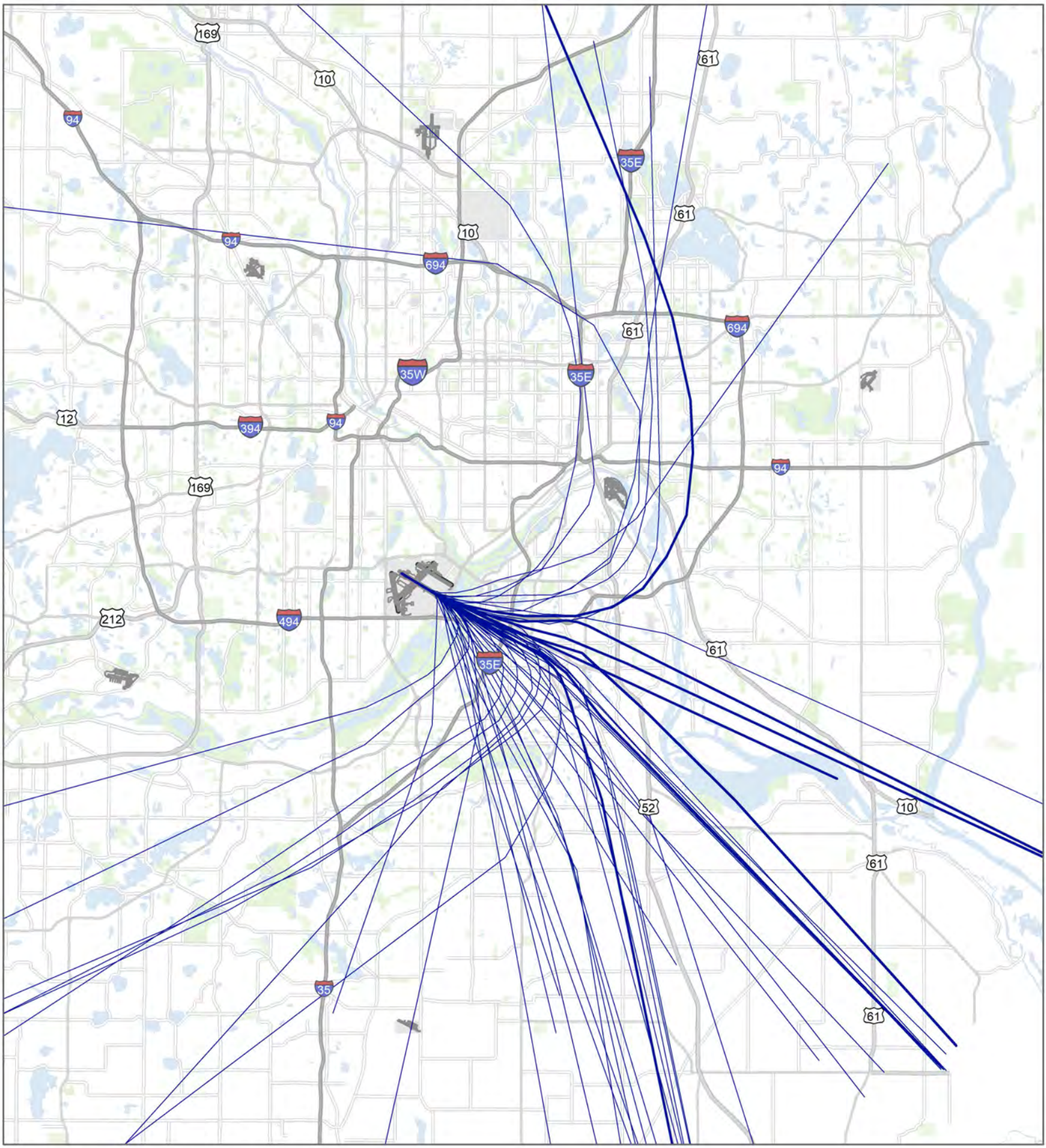
< 5% | 5 - 10% | 10 - 20% | 20 - 30% | 30 - 50% | > 50%

0 3.25 6.5 13 Miles

2018 AEDT TRACKS - DEPARTURE RUNWAY 12R

Overall Use Percentage

Figure 2.11



AEDT Track Use Percentage

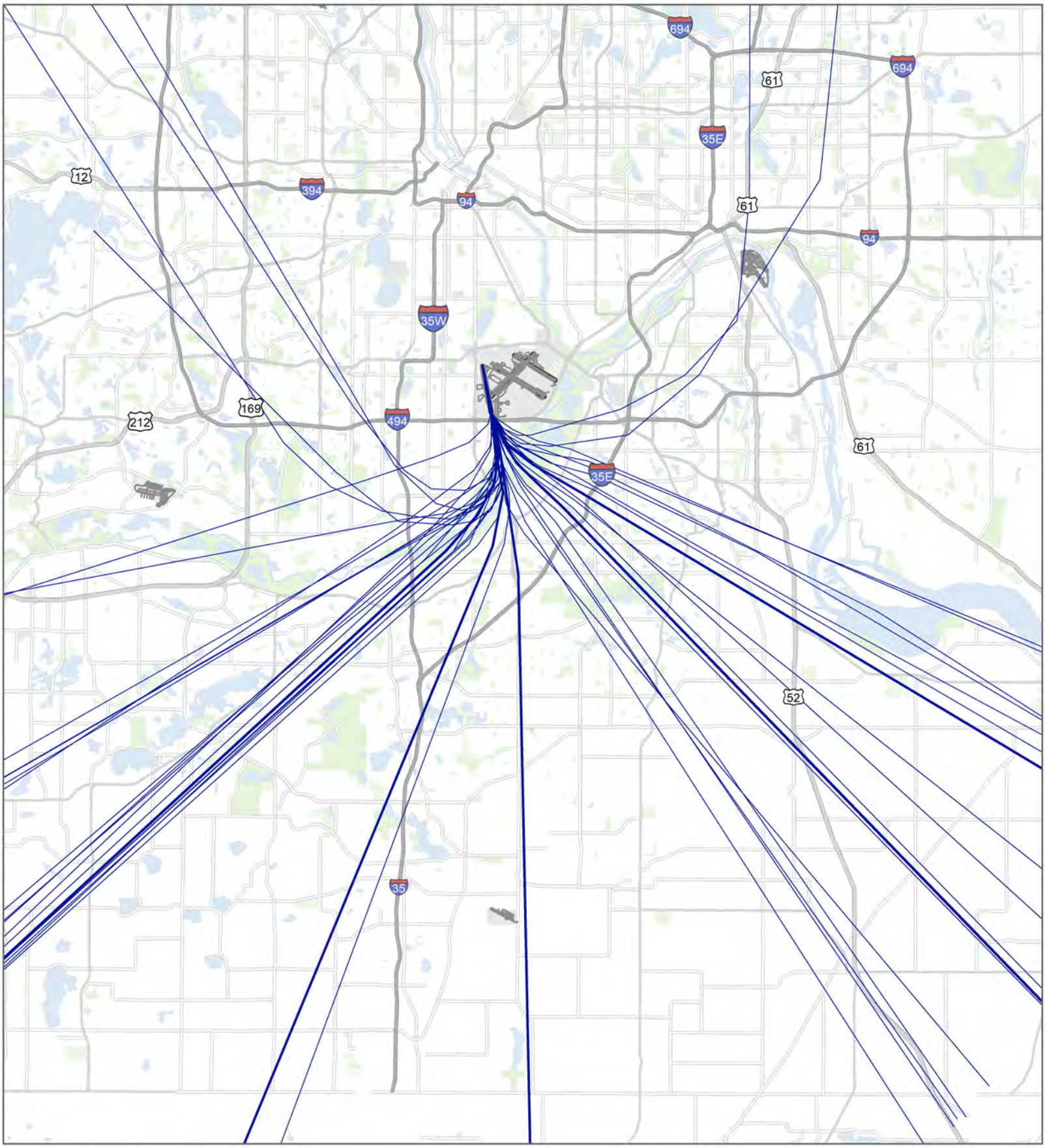
< 5% | 5 - 10% | 10 - 20% | 20 - 30% | 30 - 50% | > 50%

0 3 6 12 Miles

2018 AEDT TRACKS - DEPARTURE RUNWAY 17

Overall Use Percentage

Figure 2.12



AEDT Track Use Percentage

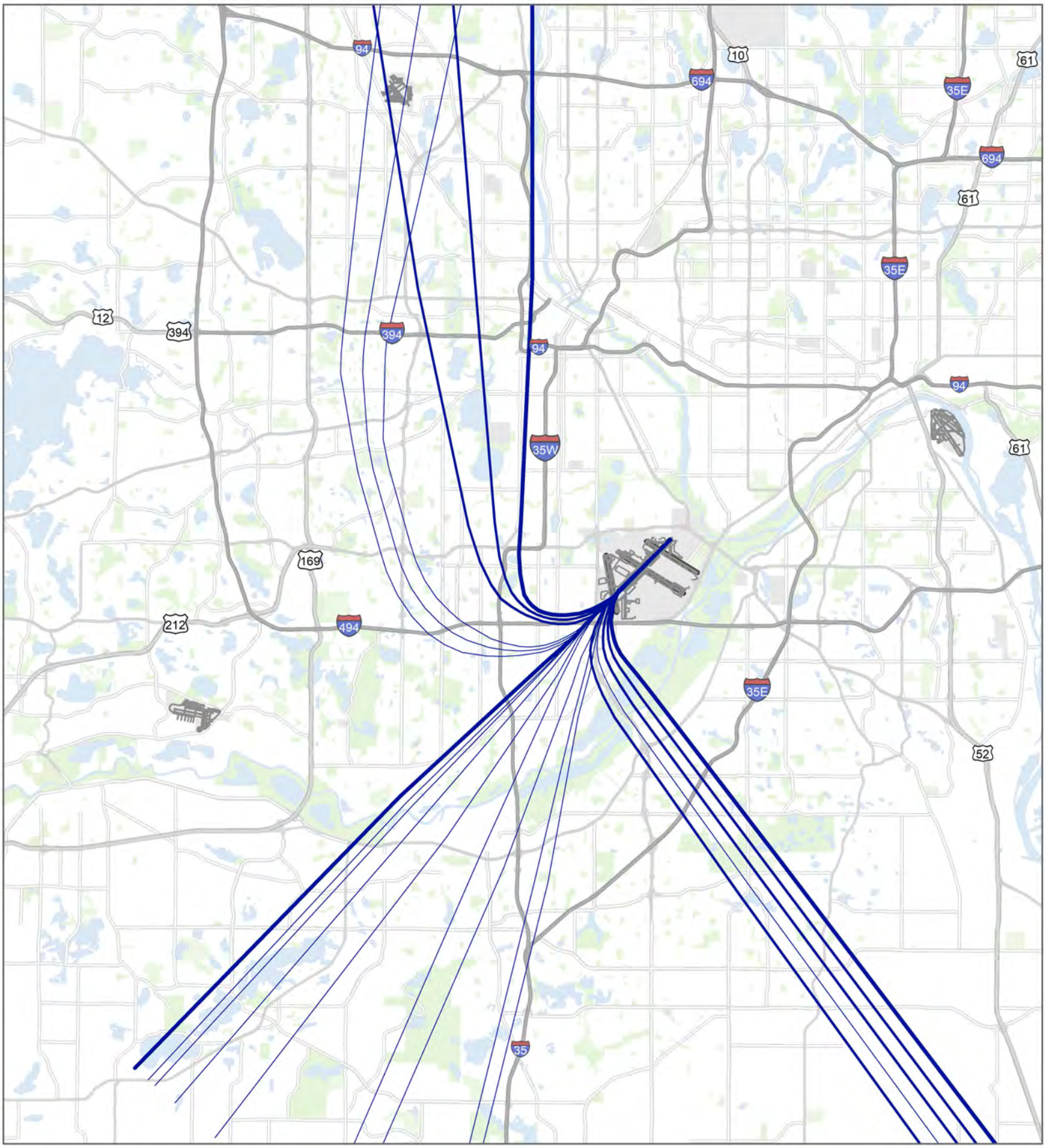
< 5%
5 - 10%
10 - 20%
20 - 30%
30 - 50%
> 50%

0 2.5 5 10 Miles

2018 AEDT TRACKS - DEPARTURE RUNWAY 22

Overall Use Percentage

Figure 2.13



AEDT Track Use Percentage

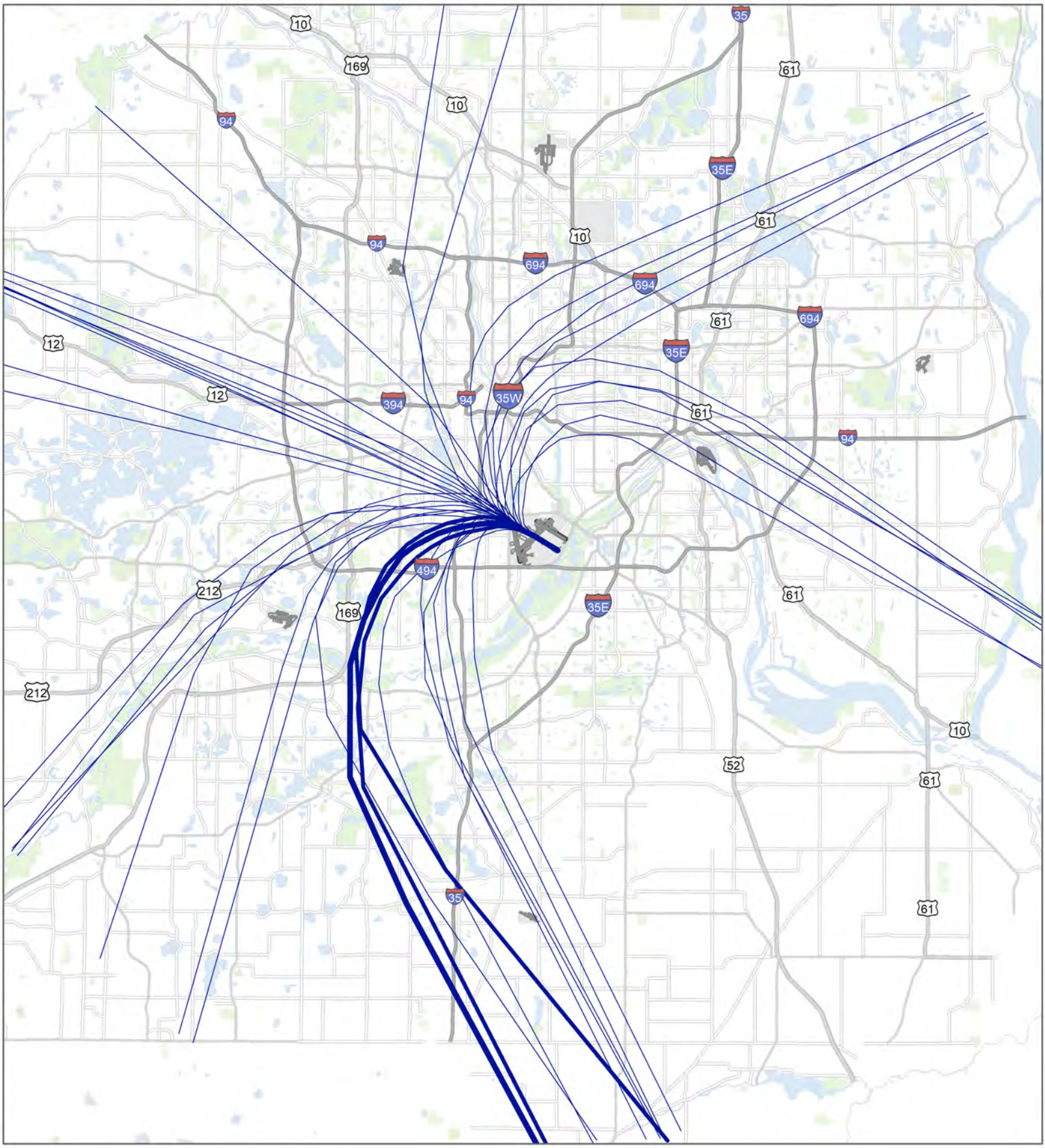
< 5% | 5 - 10% | 10 - 20% | 20 - 30% | 30 - 50% | > 50%

0 2 4 8 Miles

2018 AEDT TRACKS - DEPARTURE RUNWAY 30L

Overall Use Percentage

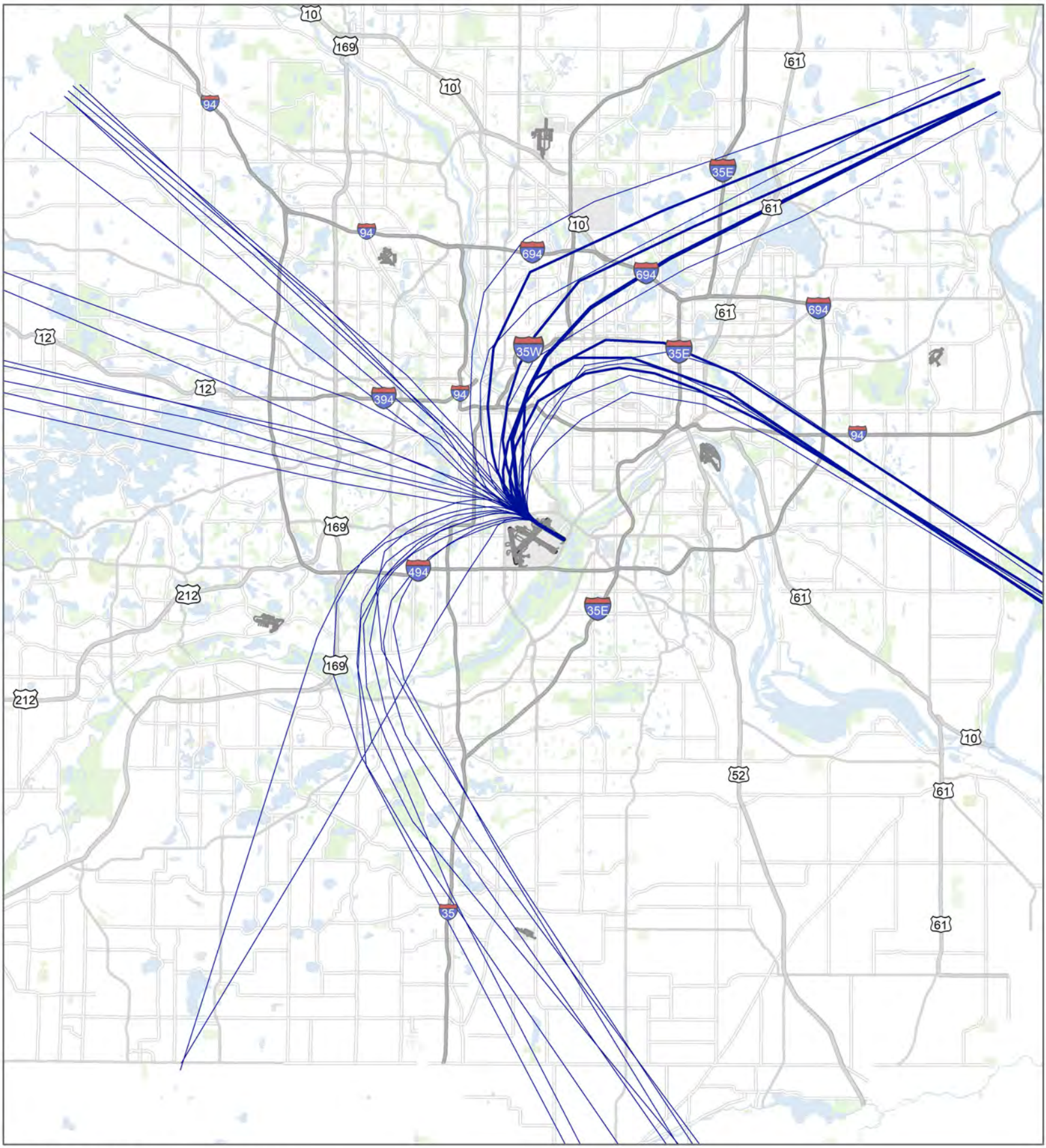
Figure 2.14



2018 AEDT TRACKS - DEPARTURE RUNWAY 30R

Overall Use Percentage

Figure 2.15



AEDT Track Use Percentage

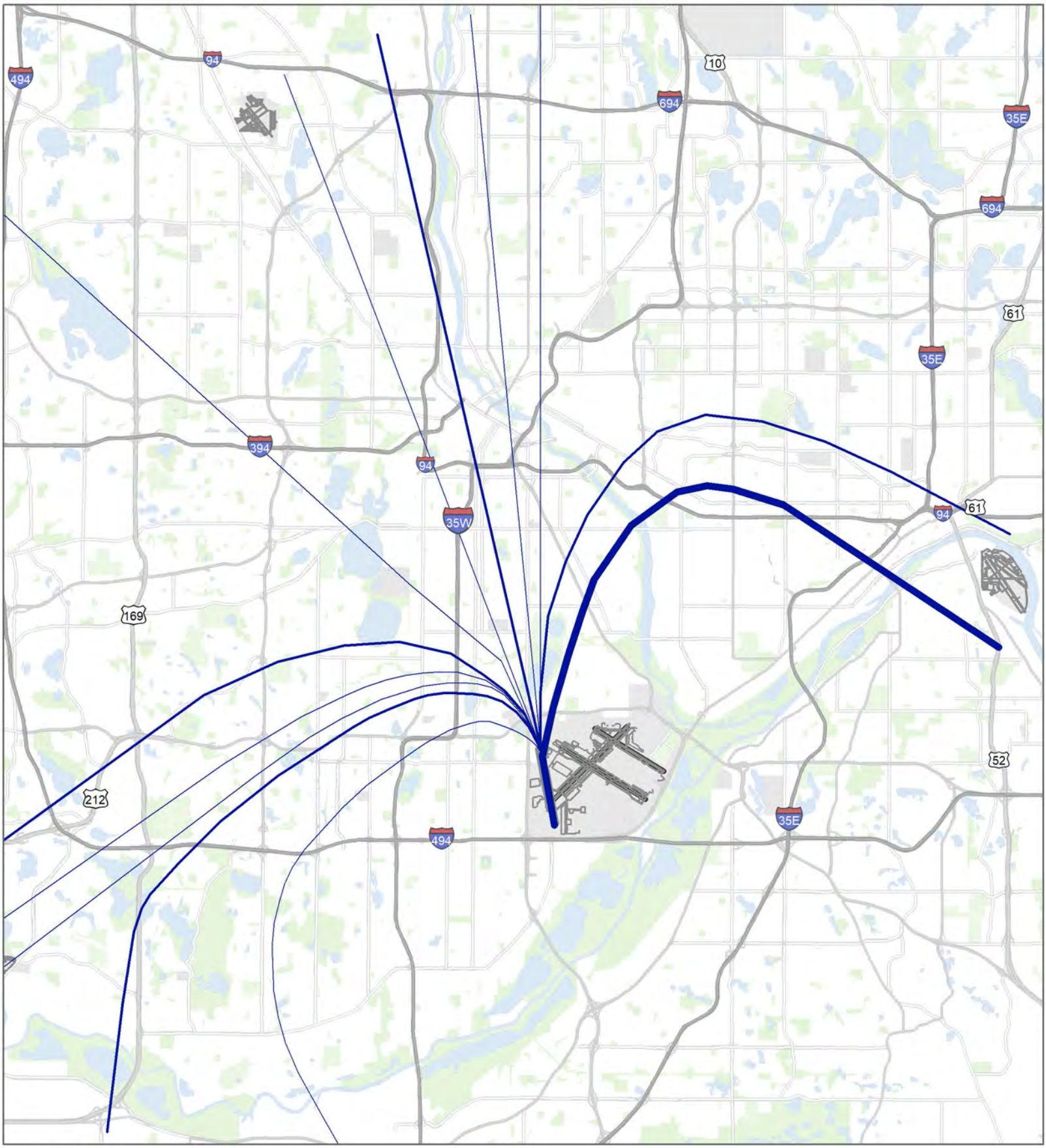
< 5% | 5 - 10% | 10 - 20% | 20 - 30% | 30 - 50% | > 50%

0 3.5 7 14 Miles

2018 AEDT TRACKS - DEPARTURE RUNWAY 35

Overall Use Percentage

Figure 2.16

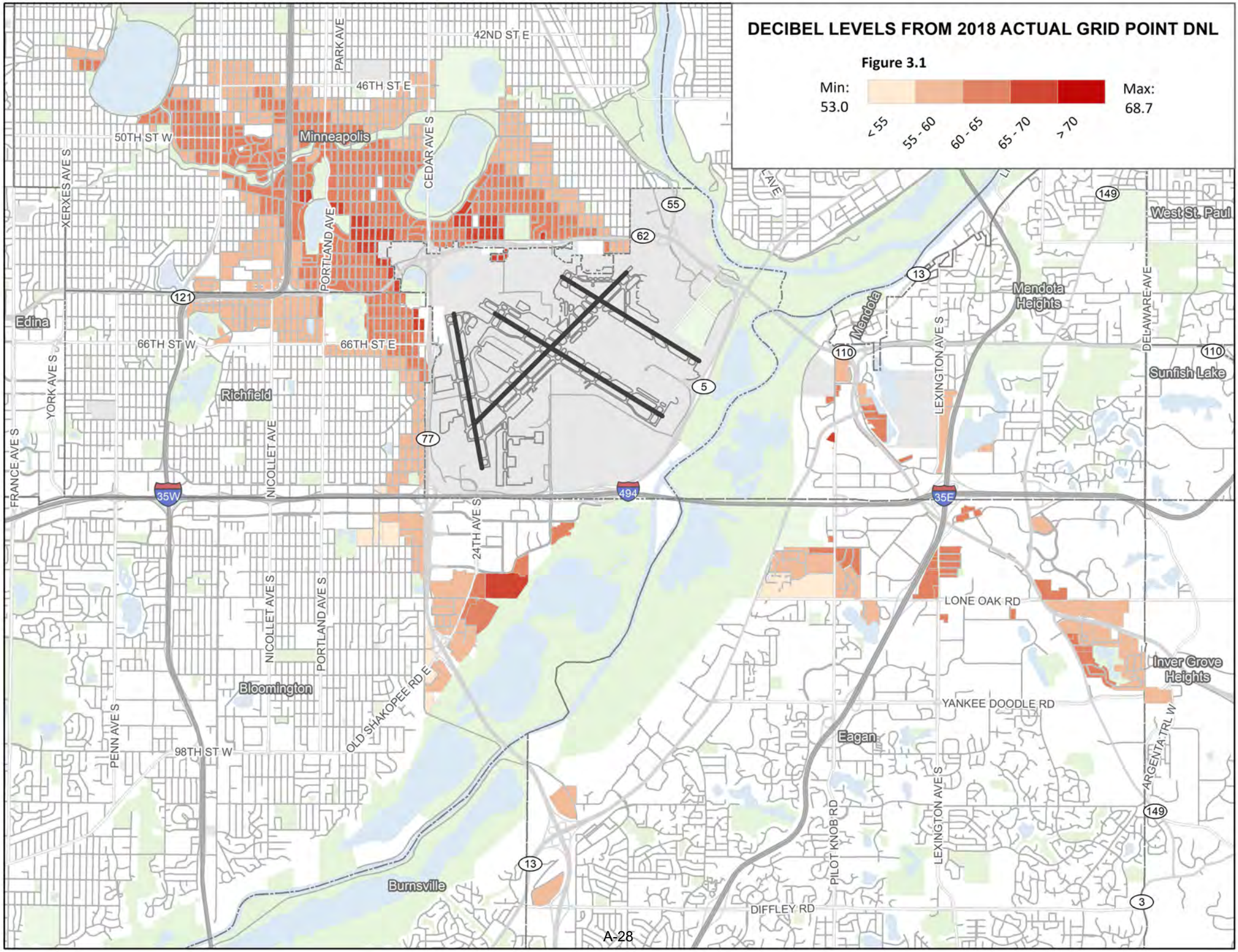


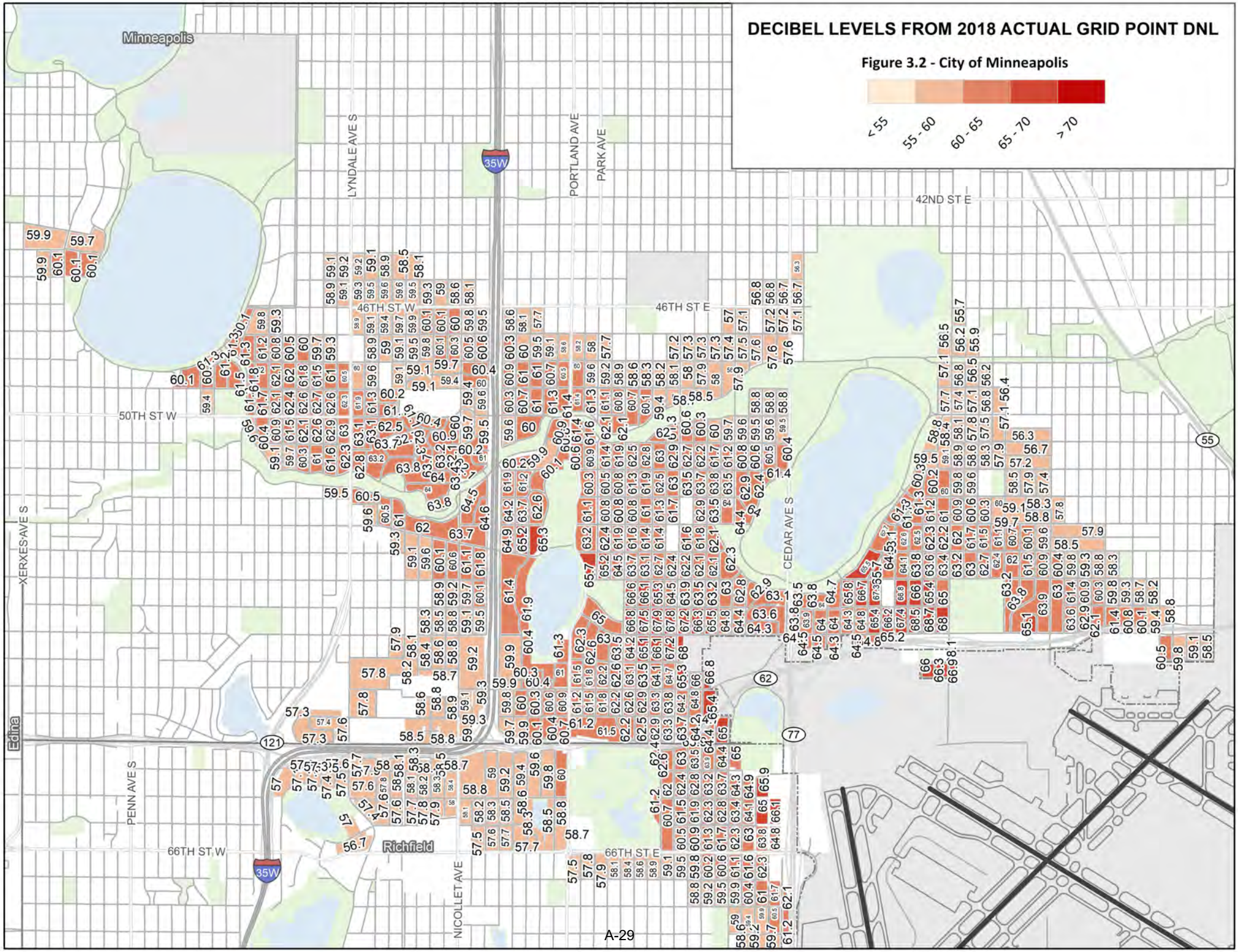
AEDT Track Use Percentage

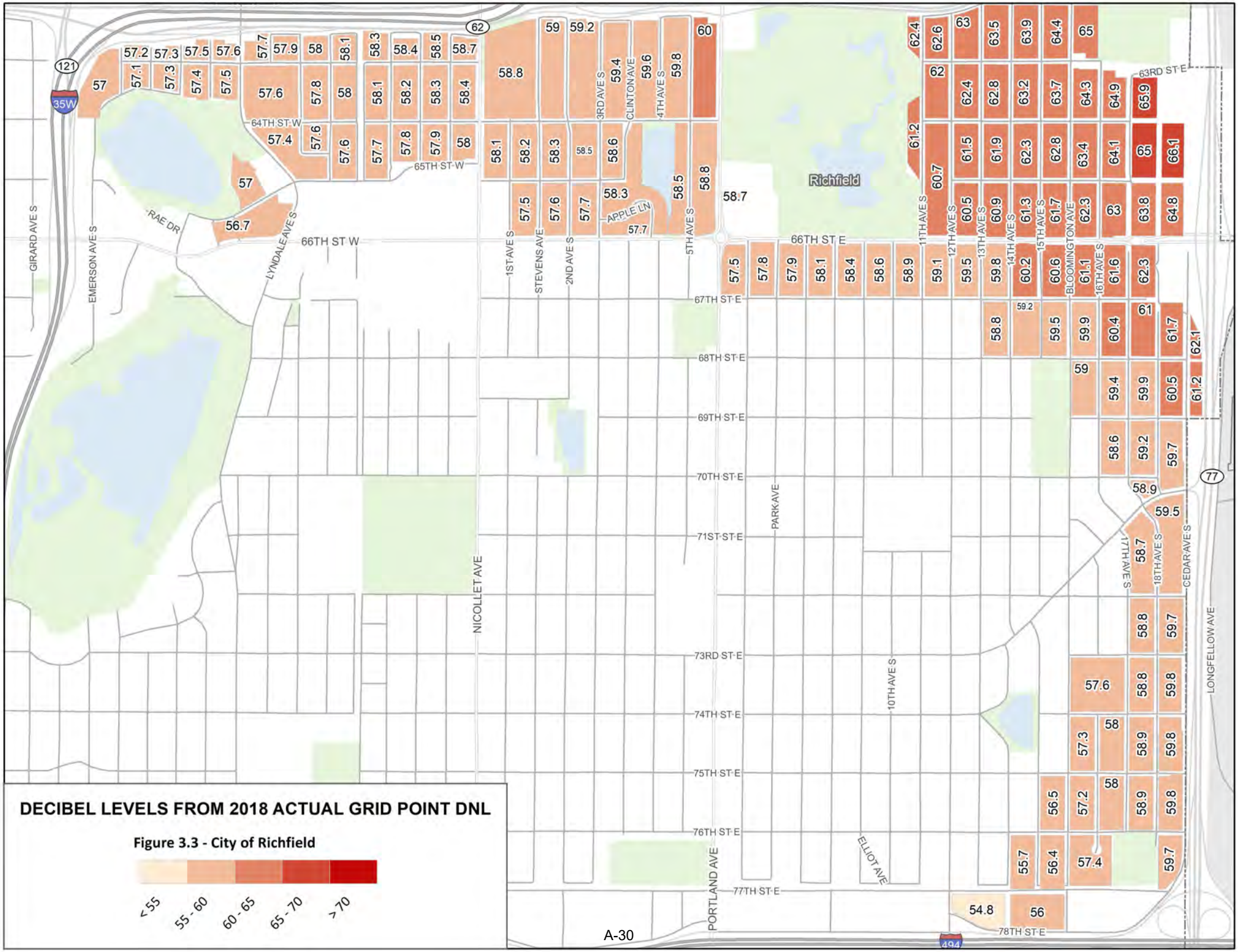
< 5% | 5 - 10% | 10 - 20% | 20 - 30% | 30 - 50% | > 50%

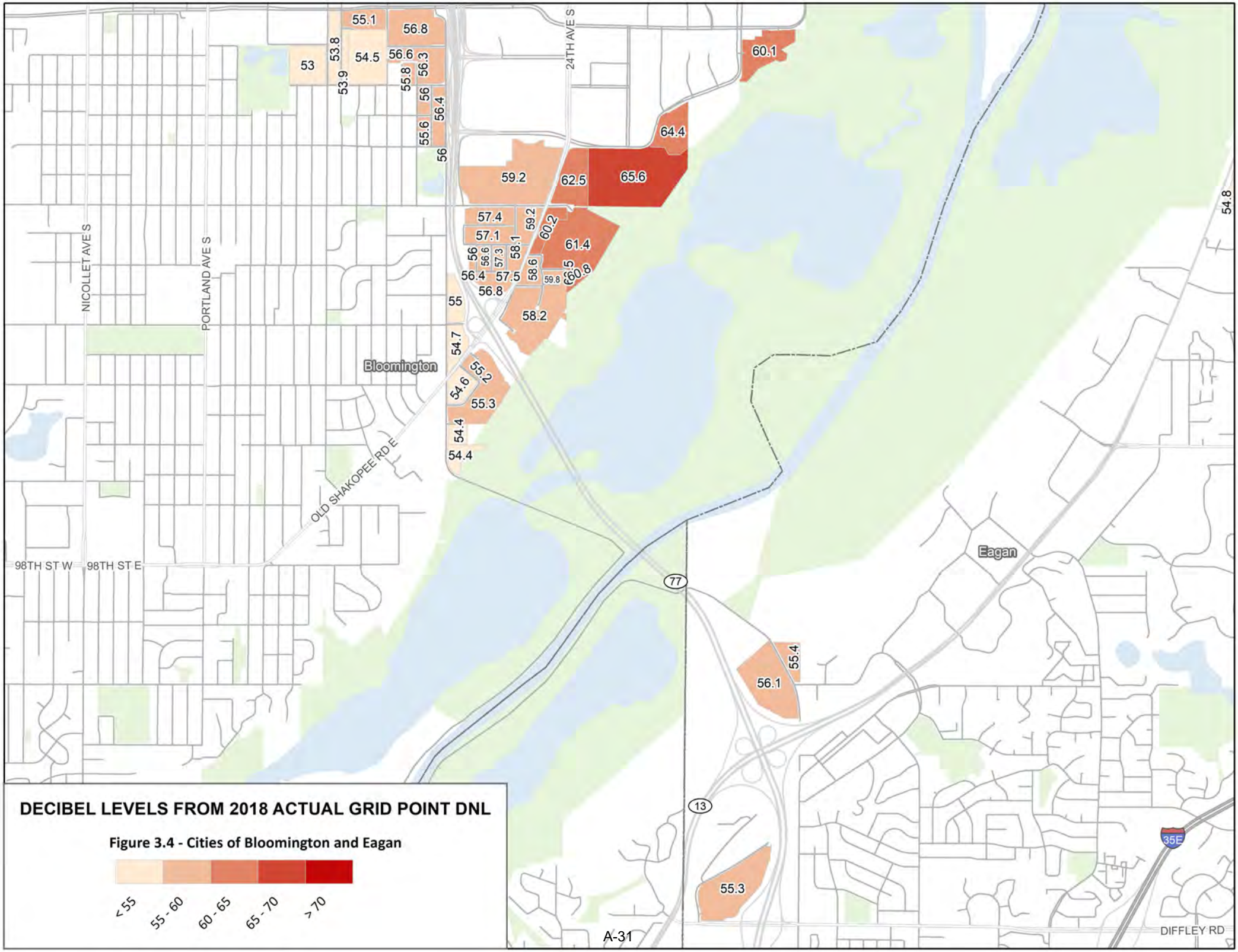
0 1.5 3 6 Miles

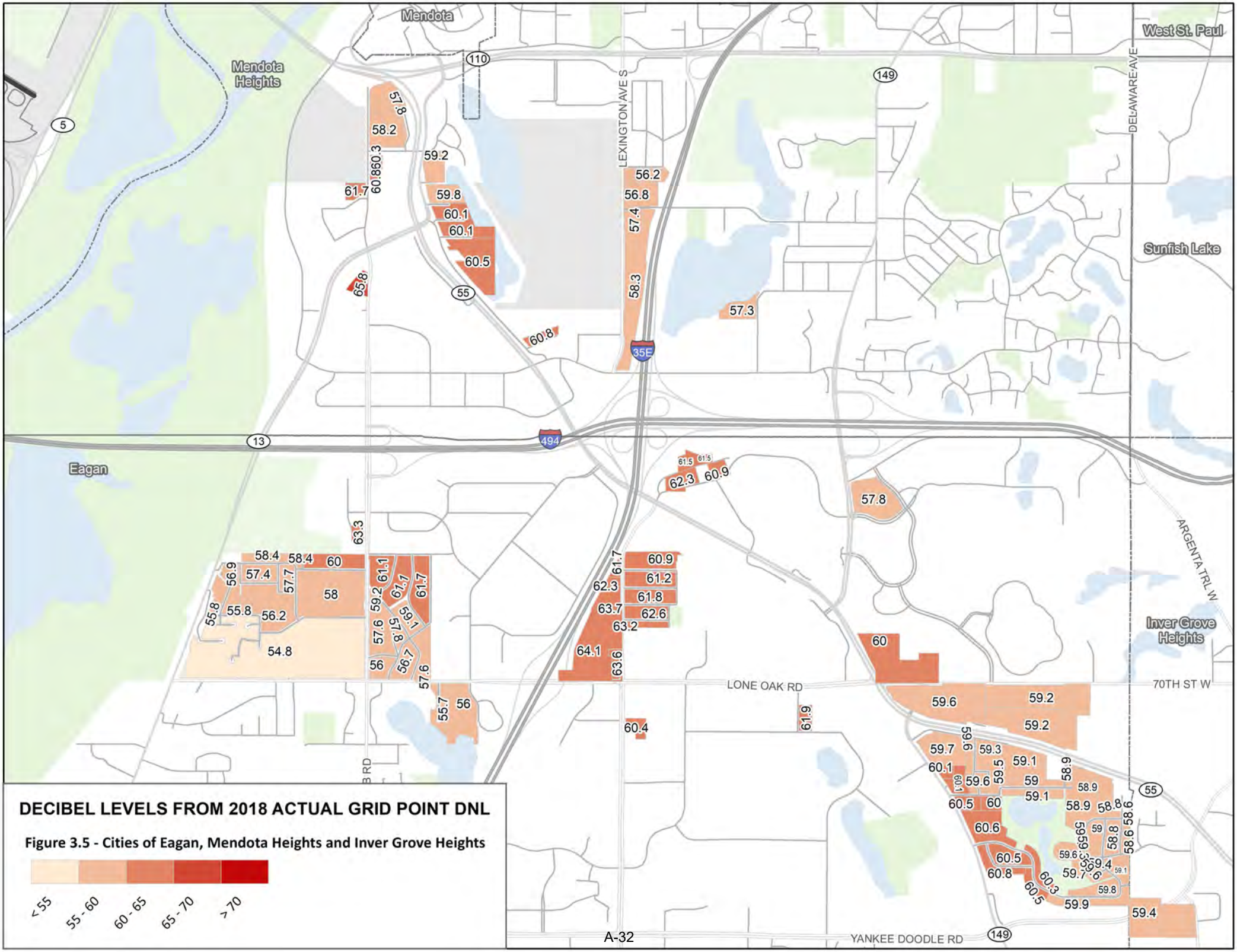
Appendix 3: Noise Model Grid Point Maps

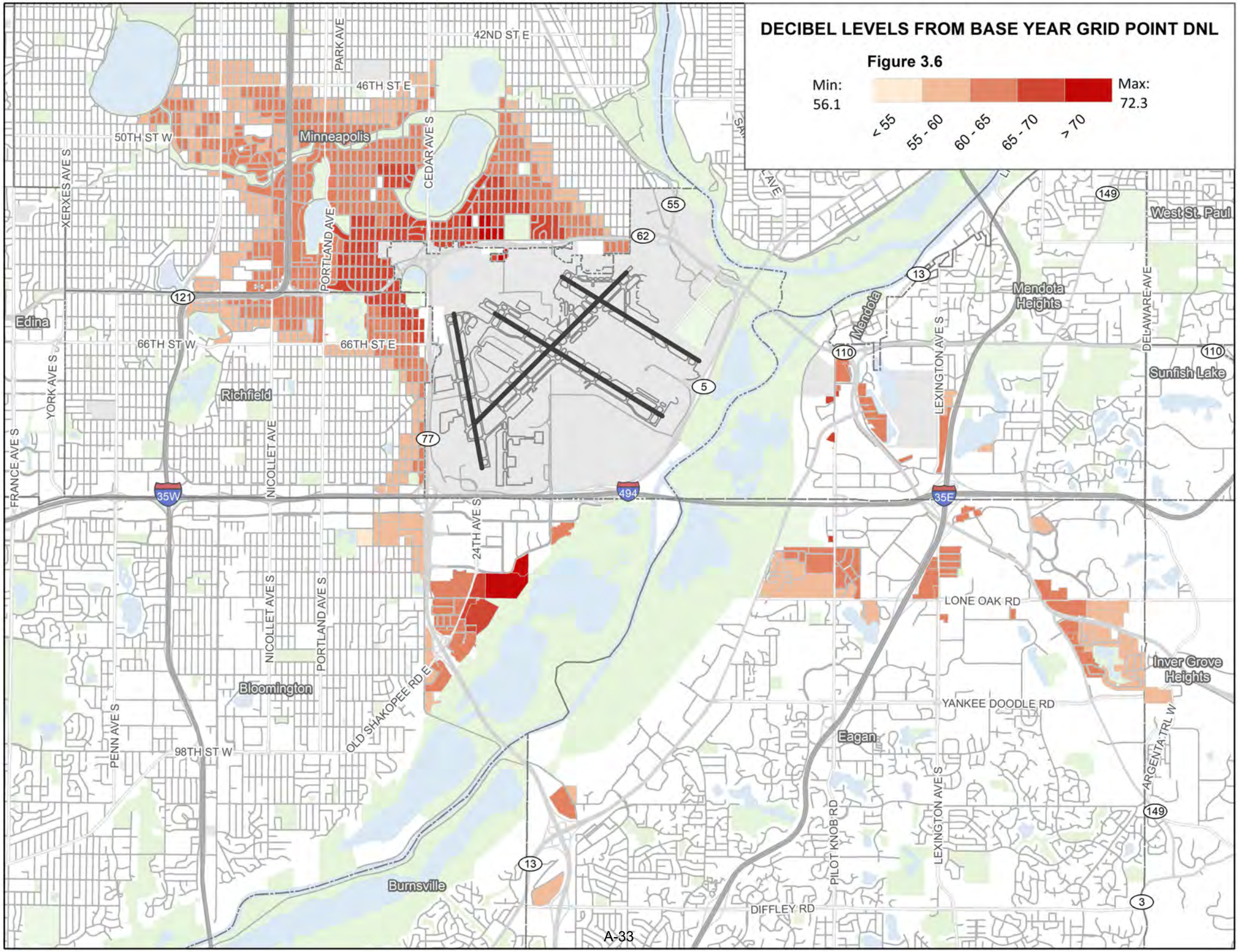

DECIBEL LEVELS FROM 2018 ACTUAL GRID POINT DNL
Figure 3.1
Min:
53.0
Max:
68.7
< 55
55 - 60
60 - 65
65 - 70
> 70
42ND ST E
PARK AVE
46TH ST E
50TH ST W
Minneapolis
CEDAR AVE S
XERXES AVE S
PORTLAND AVE
55
62
121
Edina
66TH ST W
66TH ST E
Richfield
YORK AVE S
FRANCE AVE S
77
5
35W
494
35E
NICOLLET AVE
24TH AVE S
NICOLLET AVE S
PORTLAND AVE S
Bloomington
PENN AVE S
98TH ST W
OLD SHAKOPEE RD E
Burnsville
13
Mendota
Mendota Heights
LEXINGTON AVE S
DELAWARE AVE
110
149
West St. Paul
Sunfish Lake
LONE OAK RD
Inver Grove Heights
YANKEE DOODLE RD
Eagan
PILOT KNOB RD
ARGENTA TRL W
DIFFLEY RD
3

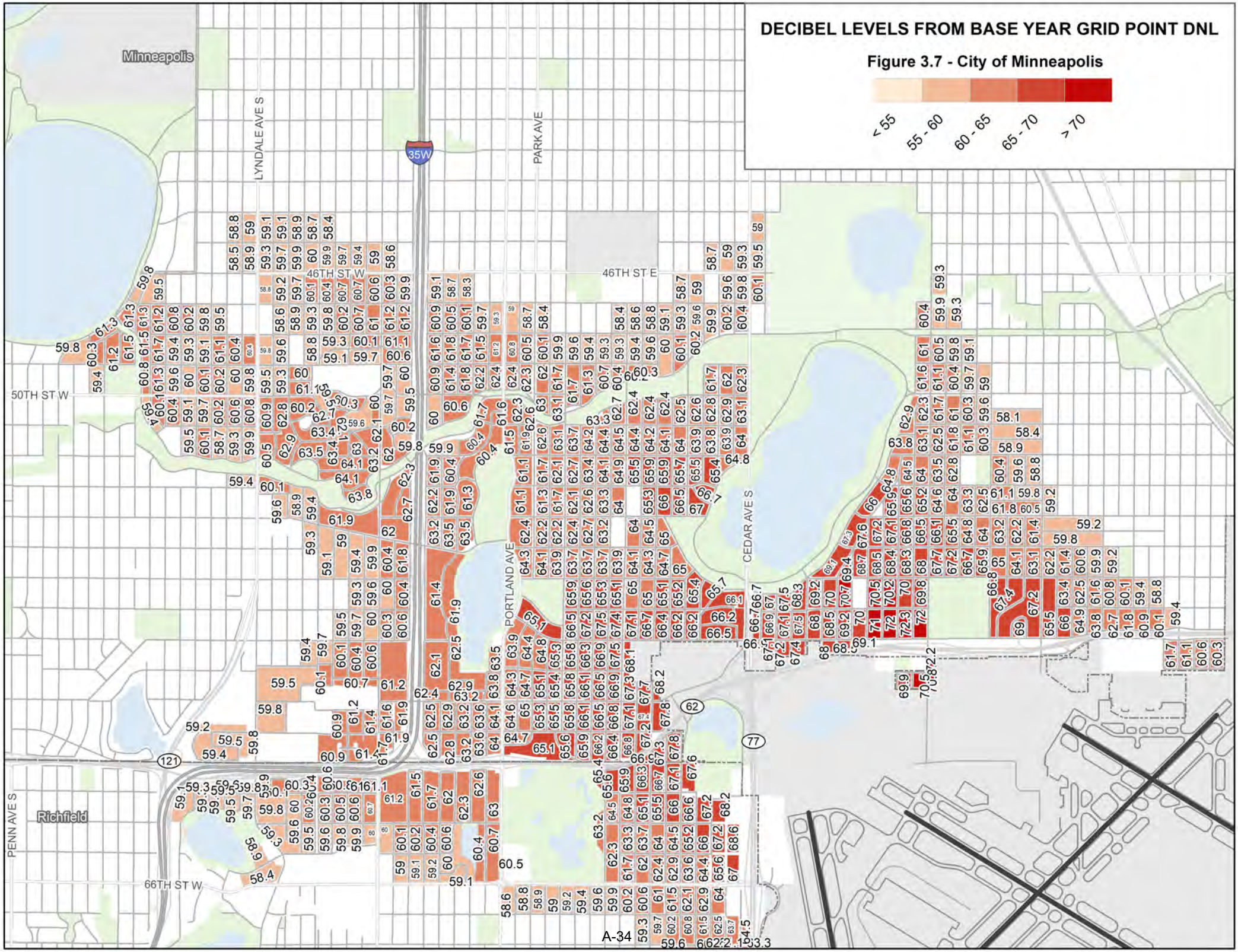

DECIBEL LEVELS FROM 2018 ACTUAL GRID POINT DNL
Figure 3.2 - City of Minneapolis
< 55
55 - 60
60 - 65
65 - 70
> 70
Minneapolis
LYNDALE AVE S
PORTLAND AVE
PARK AVE
CEDAR AVE S
XERXES AVE S
PENN AVE S
NICOLLET AVE
42ND ST E
46TH ST W
46TH ST E
50TH ST W
66TH ST W
66TH ST E
Richfield
Edina
35W
55
62
77
121

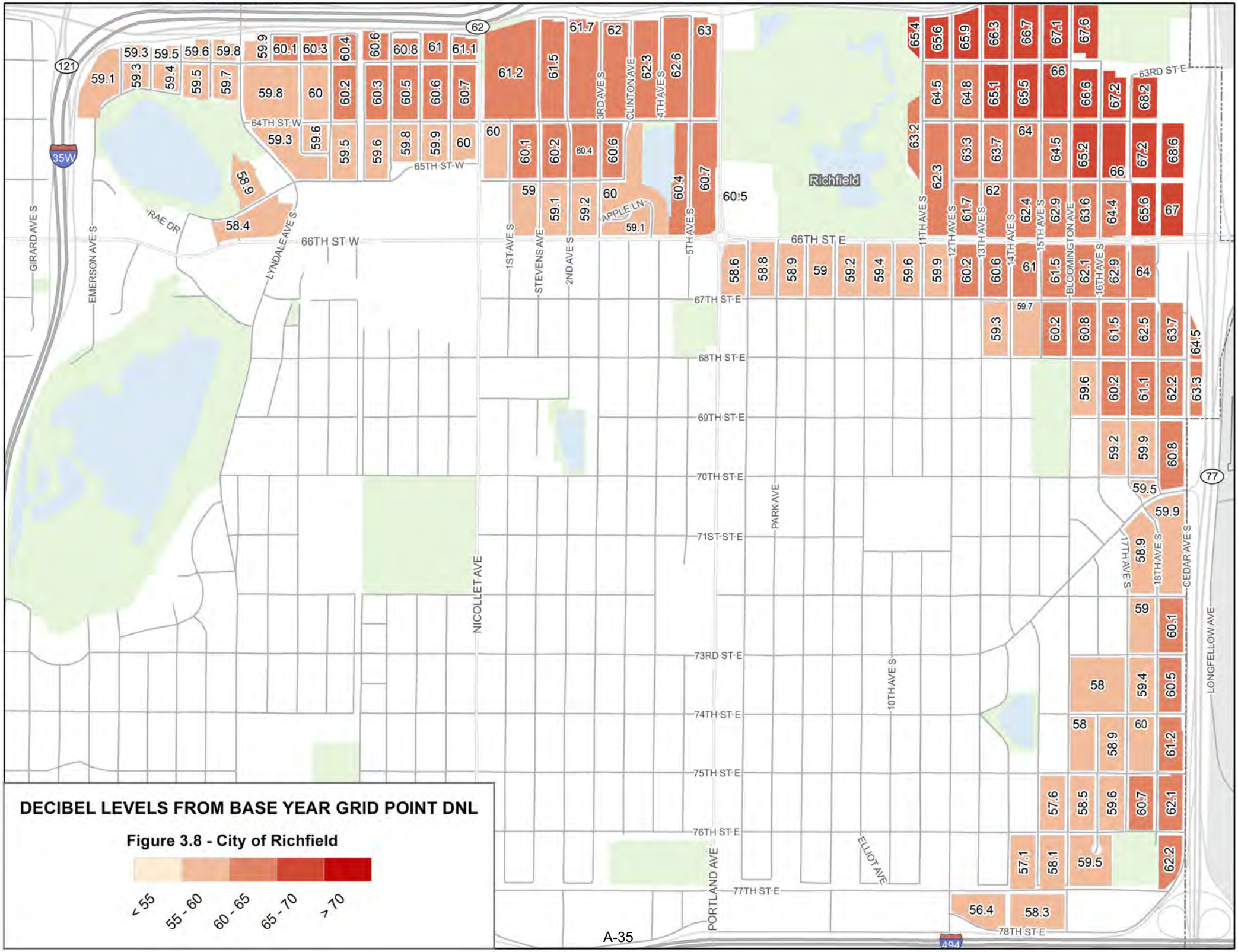

DECIBEL LEVELS FROM 2018 ACTUAL GRID POINT DNL
Figure 3.3 - City of Richfield
<55
55 - 60
60 - 65
65 - 70
>70
Richfield
62
121
35W
494
77
64TH ST W
65TH ST W
66TH ST W
66TH ST E
63RD ST E
67TH ST E
68TH ST E
69TH ST E
70TH ST E
71ST ST E
73RD ST E
74TH ST E
75TH ST E
76TH ST E
77TH ST E
78TH ST E
GIRARD AVE S
EMERSON AVE S
RAE DR
LYNDALE AVE S
1ST AVE S
STEVENS AVE
2ND AVE S
3RD AVE S
CLINTON AVE
4TH AVE S
5TH AVE S
APPLE LN
11TH AVE S
12TH AVE S
13TH AVE S
14TH AVE S
15TH AVE S
BLOOMINGTON AVE
16TH AVE S
17TH AVE S
18TH AVE S
CEDAR AVE S
LONGFELLOW AVE
NICOLLET AVE
PARK AVE
10TH AVE S
ELLIOT AVE
PORTLAND AVE

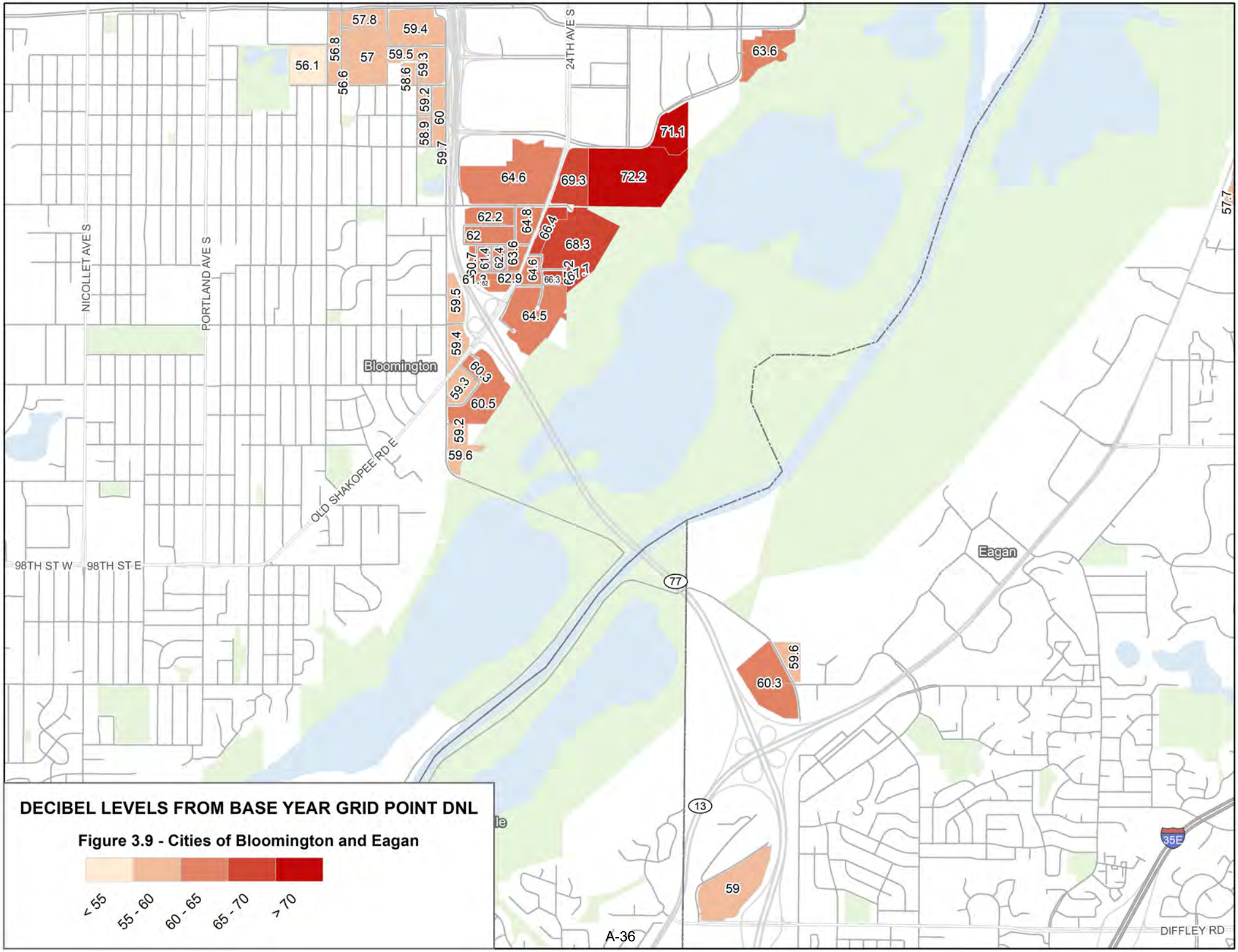

DECIBEL LEVELS FROM 2018 ACTUAL GRID POINT DNL
Figure 3.4 - Cities of Bloomington and Eagan
< 55
55 - 60
60 - 65
65 - 70
> 70
Bloomington
Eagan
NICOLLET AVE S
PORTLAND AVE S
24TH AVE S
OLD SHAKOPEE RD E
98TH ST W
98TH ST E
DIFFLEY RD
35E
77
13
53
53.8
53.9
55.1
54.5
56.8
56.6
56.3
55.8
56
56.4
55.6
56
60.1
64.4
59.2
62.5
65.6
57.4
57.1
59.2
60.2
61.4
58.1
56
56.6
57.3
56.4
57.5
58.6
59.8
60.5
60.8
56.8
58.2
55
54.7
54.6
55.2
55.3
54.4
54.4
54.8
55.4
56.1
55.3


Mendota
Mendota Heights
West St. Paul
Sunfish Lake
Eagan
Inver Grove Heights
LEXINGTON AVE S
DELAWARE AVE
ARGENTA TRL W
LONE OAK RD
70TH ST W
YANKEE DOODLE RD
5
110
149
55
13
494
35E
DECIBEL LEVELS FROM 2018 ACTUAL GRID POINT DNL
Figure 3.5 - Cities of Eagan, Mendota Heights and Inver Grove Heights
< 55
55 - 60
60 - 65
65 - 70
> 70


DECIBEL LEVELS FROM BASE YEAR GRID POINT DNL
Figure 3.6
Min:
56.1
Max:
72.3
< 55
55 - 60
60 - 65
65 - 70
> 70
42ND ST E
PARK AVE
46TH ST E
50TH ST W
Minneapolis
CEDAR AVE S
XERXES AVE S
PORTLAND AVE
55
62
121
Edina
66TH ST W
66TH ST E
Richfield
YORK AVE S
FRANCE AVE S
77
5
35W
494
35E
NICOLLET AVE
24TH AVE S
NICOLLET AVE S
PORTLAND AVE S
Bloomington
PENN AVE S
98TH ST W
OLD SHAKOPEE RD E
Burnsville
13
149
West St. Paul
Mendota Heights
Mendota
LEXINGTON AVE S
DELAWARE AVE
110
Sunfish Lake
LONE OAK RD
Inver Grove Heights
YANKEE DOODLE RD
Eagan
PILOT KNOB RD
ARGENTA TRL W
DIFFLEY RD
3


DECIBEL LEVELS FROM BASE YEAR GRID POINT DNL
Figure 3.7 - City of Minneapolis
< 55
55 - 60
60 - 65
65 - 70
> 70
Minneapolis
Richfield
LYNDALE AVE S
PARK AVE
PORTLAND AVE
CEDAR AVE S
PENN AVE S
35W
46TH ST W
46TH ST E
50TH ST W
66TH ST W
121
62
77


DECIBEL LEVELS FROM BASE YEAR GRID POINT DNL
Figure 3.8 - City of Richfield
< 55
55 - 60
60 - 65
65 - 70
> 70
Richfield
62
121
35W
494
77
64TH ST W
65TH ST W
66TH ST W
66TH ST E
67TH ST E
68TH ST E
69TH ST E
70TH ST E
71ST ST E
73RD ST E
74TH ST E
75TH ST E
76TH ST E
77TH ST E
78TH ST E
63RD ST E
GIRARD AVE S
EMERSON AVE S
RAE DR
LYNDALE AVE S
1ST AVE S
STEVENS AVE
2ND AVE S
3RD AVE S
CLINTON AVE
4TH AVE S
5TH AVE S
APPLE LN
11TH AVE S
12TH AVE S
13TH AVE S
14TH AVE S
15TH AVE S
BLOOMINGTON AVE
16TH AVE S
17TH AVE S
18TH AVE S
CEDAR AVE S
LONGFELLOW AVE
NICOLLET AVE
PARK AVE
10TH AVE S
ELLIOT AVE
PORTLAND AVE


DECIBEL LEVELS FROM BASE YEAR GRID POINT DNL
Figure 3.9 - Cities of Bloomington and Eagan
< 55
55 - 60
60 - 65
65 - 70
> 70
Bloomington
Eagan
NICOLLET AVE S
PORTLAND AVE S
24TH AVE S
OLD SHAKOPEE RD E
98TH ST W
98TH ST E
DIFFLEY RD
35E
77
13
57.8
59.4
56.8
57
59.5
59.3
56.1
56.6
58.6
59.2
60
58.9
59.7
63.6
71.1
64.6
69.3
72.2
62.2
64.8
66.4
62
68.3
63.6
62.4
61.4
64.6
62.9
64.5
59.5
59.4
60.3
59.3
60.5
59.2
59.6
59.6
60.3
59
57.7

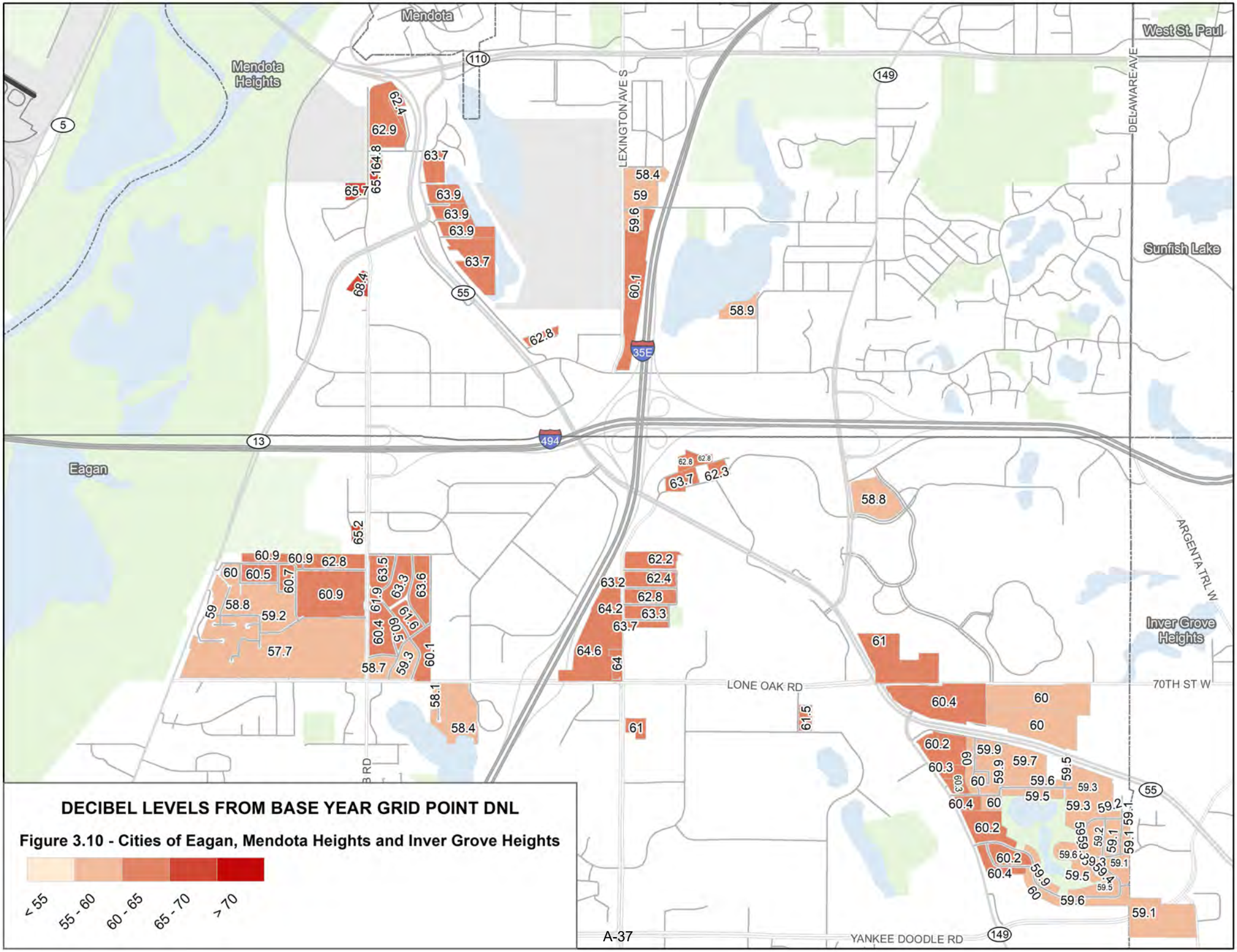
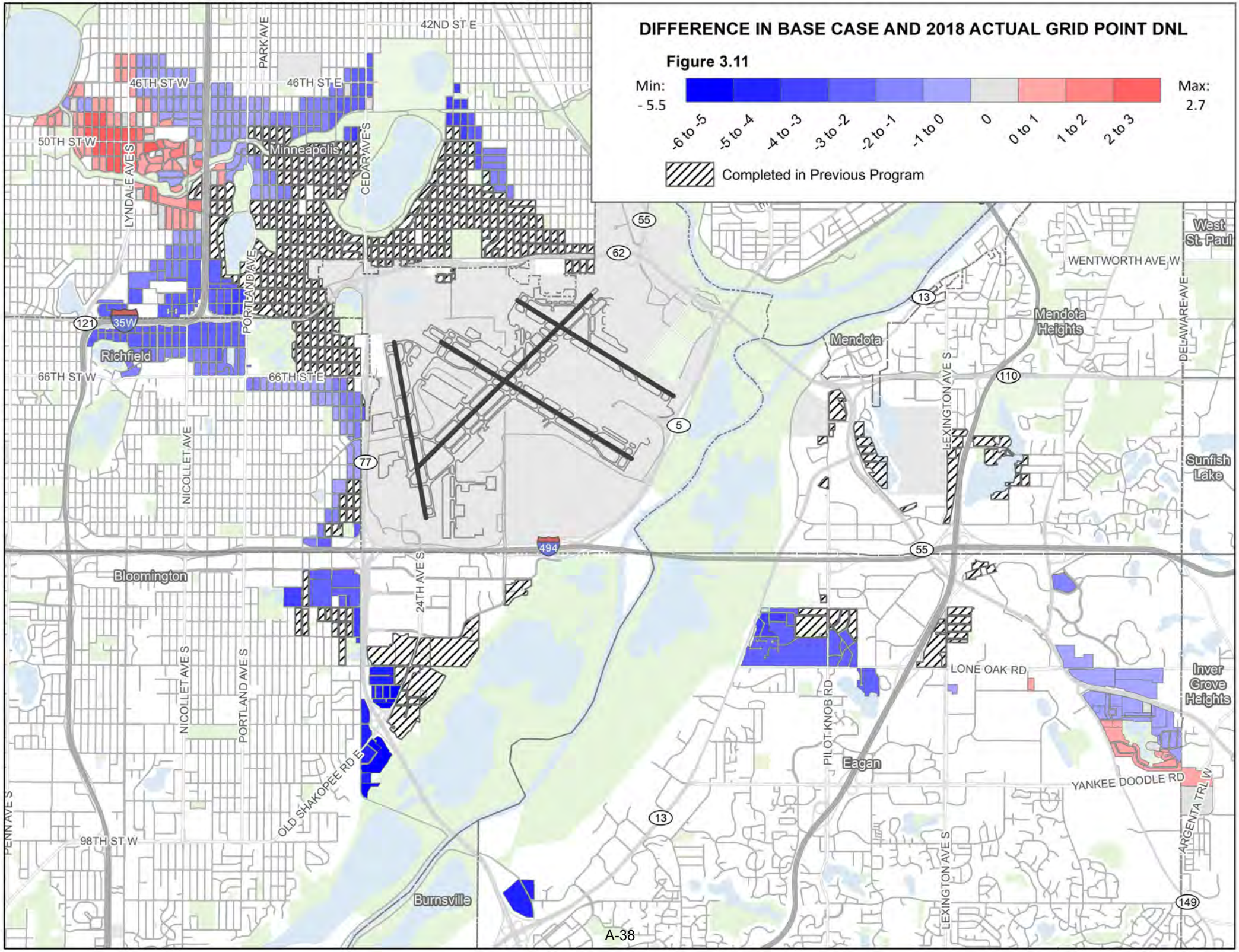
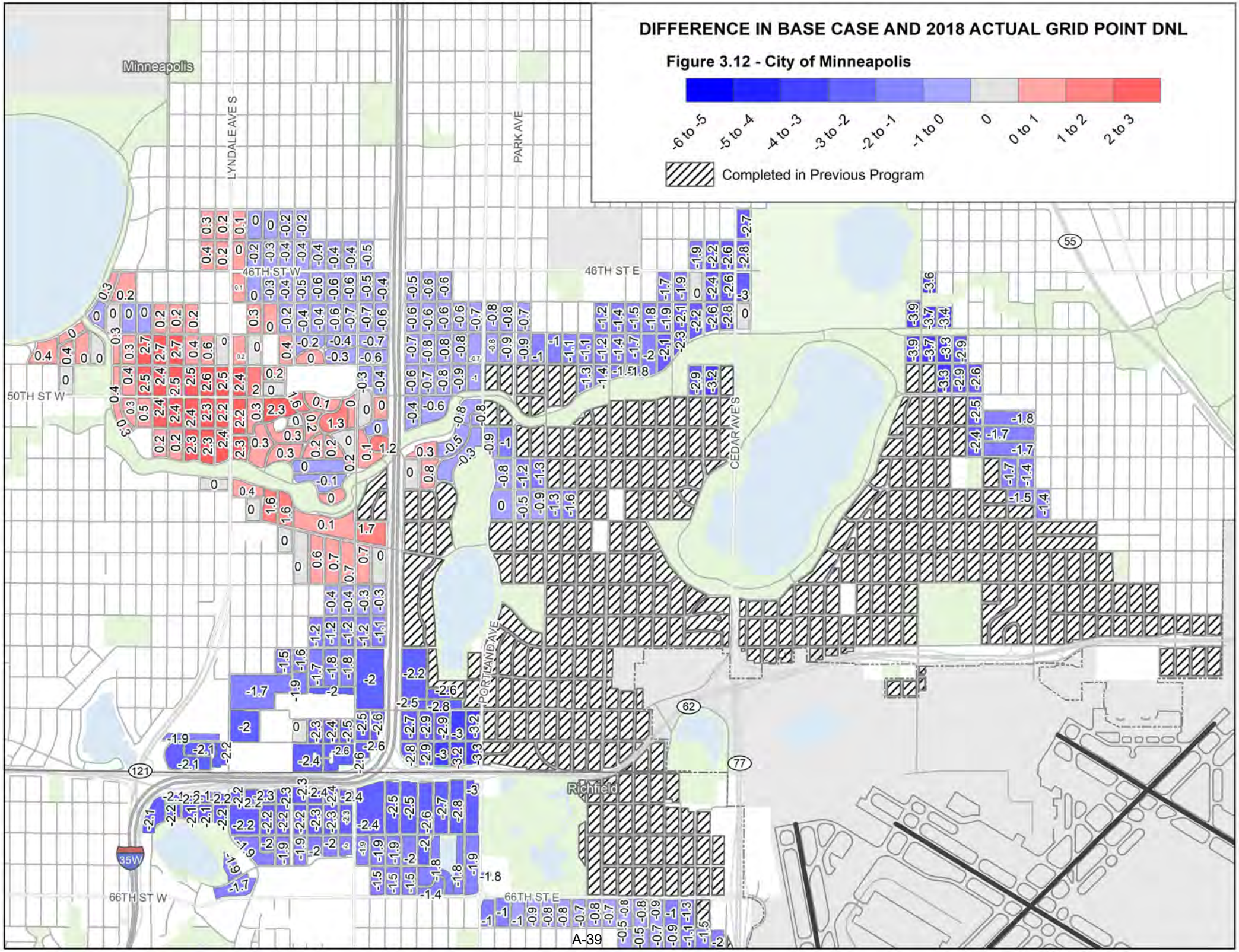
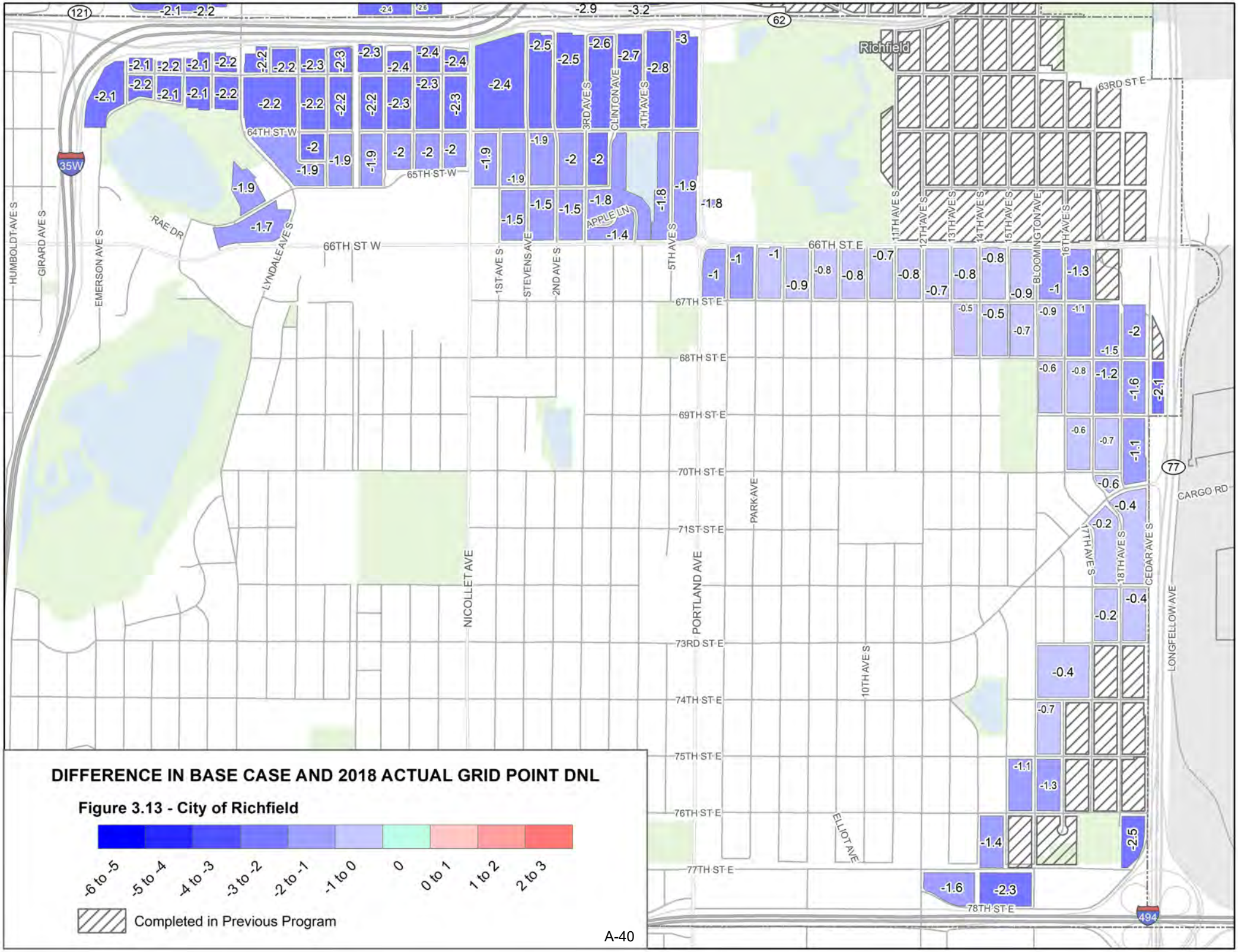
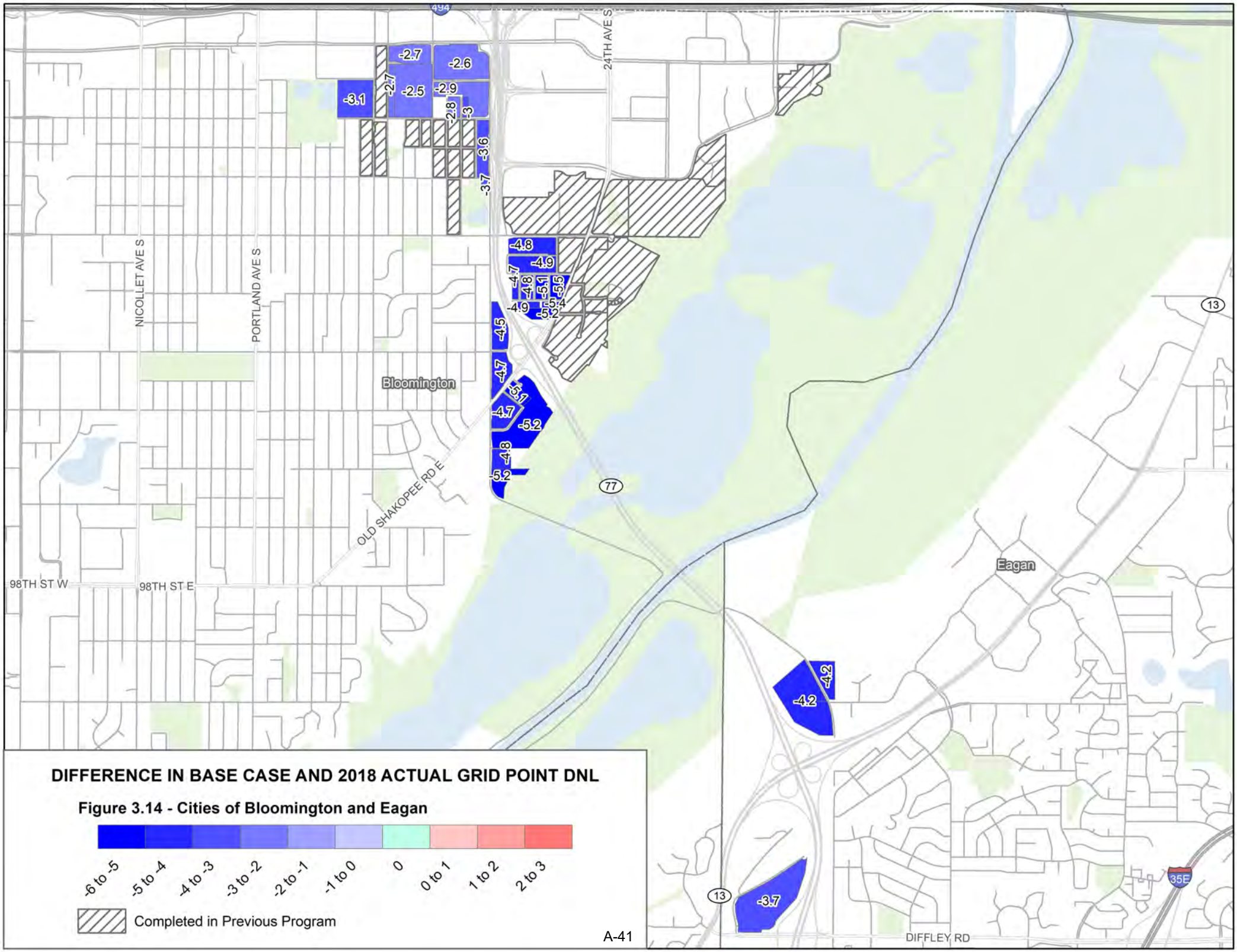


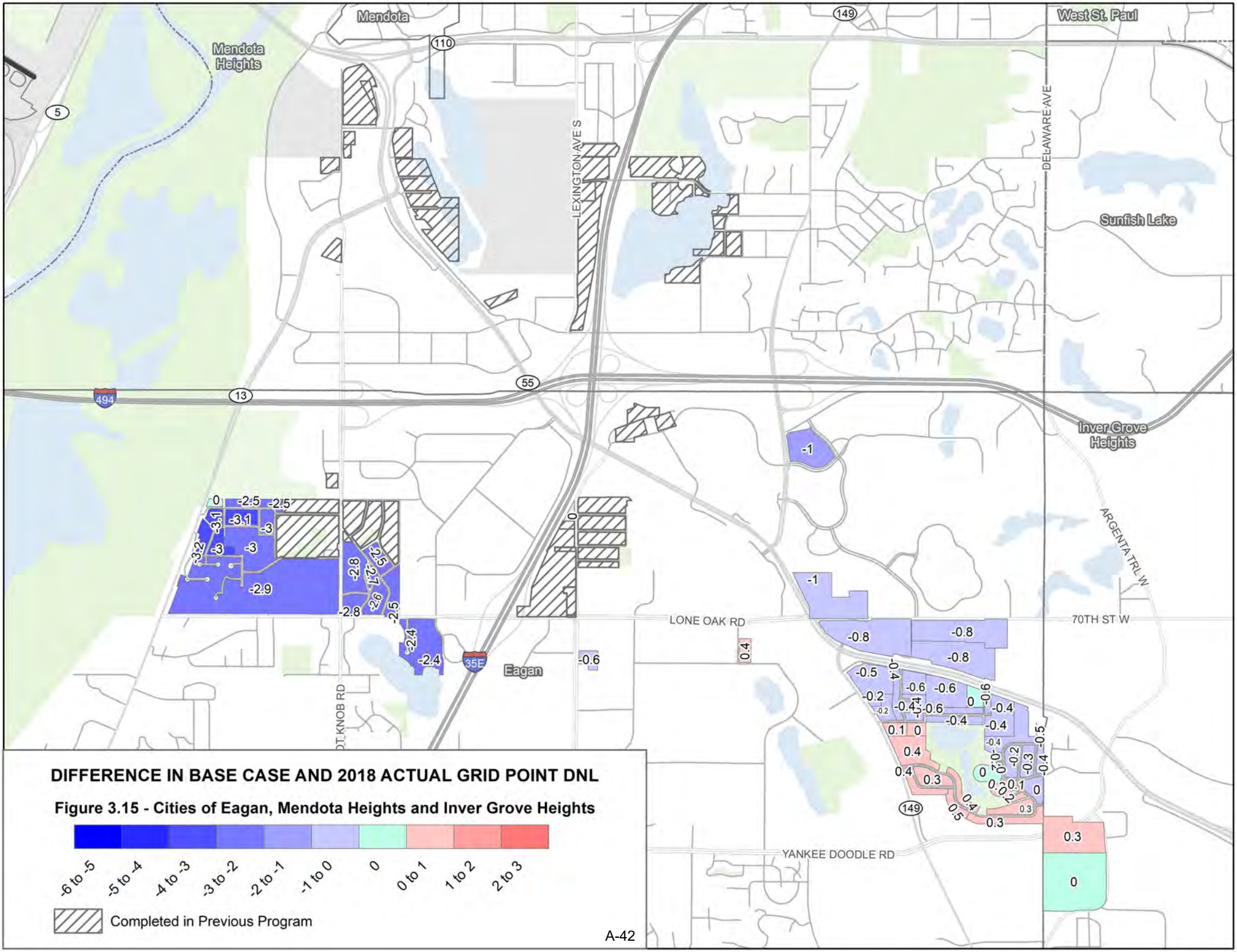
Figure 3.10 - Cities of Eagan, Mendota Heights and Inver Grove Heights


DIFFERENCE IN BASE CASE AND 2018 ACTUAL GRID POINT DNL
Figure 3.11
Min:
- 5.5
Max:
2.7
-6 to -5
-5 to -4
-4 to -3
-3 to -2
-2 to -1
-1 to 0
0
0 to 1
1 to 2
2 to 3
Completed in Previous Program
42ND ST E
46TH ST W
46TH ST E
50TH ST W
66TH ST W
66TH ST E
98TH ST W
PARK AVE
LYNDALE AVE S
CEDAR AVE S
PORTLAND AVE
NICOLLET AVE
NICOLLET AVE S
PORTLAND AVE S
24TH AVE S
OLD SHAKOPEE RD E
PENN AVE S
Minneapolis
Richfield
Bloomington
Burnsville
Mendota
Mendota Heights
West St. Paul
Eagan
Inver Grove Heights
Sunfish Lake
WENTWORTH AVE W
DELAWARE AVE
LEXINGTON AVE S
LONE OAK RD
PILOT KNOB RD
YANKEE DOODLE RD
ARGENTA TRL W
35W
494
55
62
5
77
13
110
121
149


DIFFERENCE IN BASE CASE AND 2018 ACTUAL GRID POINT DNL
Figure 3.12 - City of Minneapolis
-6 to -5
-5 to -4
-4 to -3
-3 to -2
-2 to -1
-1 to 0
0
0 to 1
1 to 2
2 to 3
Completed in Previous Program
Minneapolis
LYNDALE AVE S
PARK AVE
46TH ST W
46TH ST E
50TH ST W
CEDAR AVE S
PORTLAND AVE
Richfield
66TH ST W
66TH ST E
35W
55
62
77
121


DIFFERENCE IN BASE CASE AND 2018 ACTUAL GRID POINT DNL
Figure 3.13 - City of Richfield
-6 to -5
-5 to -4
-4 to -3
-3 to -2
-2 to -1
-1 to 0
0
0 to 1
1 to 2
2 to 3
Completed in Previous Program
Richfield
66TH ST W
66TH ST E
64TH ST W
65TH ST W
67TH ST E
68TH ST E
69TH ST E
70TH ST E
71ST ST E
73RD ST E
74TH ST E
75TH ST E
76TH ST E
77TH ST E
78TH ST E
63RD ST E
NICOLLET AVE
PORTLAND AVE
PARK AVE
10TH AVE S
ELLIOT AVE
CEDAR AVE S
LONGFELLOW AVE
CARGO RD
HUMBOLDT AVE S
GIRARD AVE S
EMERSON AVE S
LYNDALE AVE S
RAE DR
APPLE LN
1ST AVE S
STEVENS AVE
2ND AVE S
3RD AVE S
CLINTON AVE
4TH AVE S
5TH AVE S
11TH AVE S
12TH AVE S
13TH AVE S
14TH AVE S
15TH AVE S
BLOOMINGTON AVE
16TH AVE S
17TH AVE S
18TH AVE S
35W
121
62
77
494


494
24TH AVE S
NICOLLET AVE S
PORTLAND AVE S
Bloomington
98TH ST W
98TH ST E
OLD SHAKOPEE RD E
77
13
Eagan
35E
DIFFLEY RD
-2.7
-2.6
-3.1
-2.5
-2.9
-2.8
-3
-3.6
-3.7
-4.8
-4.9
-4.7
-4.8
-5.1
-5.5
-5.4
-4.9
-5.2
-4.5
-4.7
-5.1
-4.7
-5.2
-4.8
-5.2
-4.2
-4.2
-3.7
DIFFERENCE IN BASE CASE AND 2018 ACTUAL GRID POINT DNL
Figure 3.14 - Cities of Bloomington and Eagan
-6 to -5
-5 to -4
-4 to -3
-3 to -2
-2 to -1
-1 to 0
0
0 to 1
1 to 2
2 to 3
Completed in Previous Program


Mendota
Mendota Heights
West St. Paul
Sunfish Lake
Inver Grove Heights
Eagan
LEXINGTON AVE S
DELAWARE AVE
ARGENTA TRL W
70TH ST W
LONE OAK RD
YANKEE DOODLE RD
DIAMOND KNOB RD
5
110
149
494
13
55
35E
DIFFERENCE IN BASE CASE AND 2018 ACTUAL GRID POINT DNL
Figure 3.15 - Cities of Eagan, Mendota Heights and Inver Grove Heights
-6 to -5
-5 to -4
-4 to -3
-3 to -2
-2 to -1
-1 to 0
0
0 to 1
1 to 2
2 to 3
Completed in Previous Program

Metropolitan Airports Commission
MAC Noise Program Office and HNTB Corporation
6040 28th Avenue South • Minneapolis, MN 55450
macnoise.com