Minneapolis St. Paul International Airport (MSP)
2016 Annual Noise Contour Report

Comparison of the 2016 Actual and the 2007 Forecast Noise Contours
February 2017

MAC Noise Program Office and HNTB Corporation

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ES EXECUTIVE SUMMARY

ES.1 BACKGROUND

The issue of 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. In 1992, the Metropolitan Airports Commission (MAC) embarked on a 14 CFR Part 150 Program at MSP, 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 Day-Night Average Sound Level (DNL) noise contour. When the original Part 150 Program was completed in 2006, noise mitigation had been provided to over 7,800 single-family homes, 1,401 multi-family units, 18 schools and 437 residential properties were acquired around MSP at a cost of approximately $385.6 million.

In 1999 the MAC began an update to the Part 150 Program at MSP. The MAC 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 events of September 11, 2001, the MAC withdrew the draft Part 150 Update to ensure that the noise contours considered the impacts of the events of September 11, 2001 and ongoing changes in the MSP aircraft fleet. 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.

This effort resulted in a 2007 forecast noise contour and a 2005 forecast noise contour. One of the largest discussion items in the Part 150 Update process focused on the mitigation program the MAC would offer in the 2007 64 to 60 DNL noise contour area. Expansion of noise mitigation efforts beyond the federally-recognized level of 65 DNL was outlined as part of the Dual-Track Airport Planning Process (a process begun in 1989 and concluded in 1998 that examined moving MSP versus expanding it in its current location, undertaken at the direction of the Minnesota State Legislature). Through the Part 150 Update, the MAC detailed a specific mitigation package to be offered in the 64 to 60 DNL noise contour area, proposing 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 64 to 60 DNL noise mitigation proposal in the context of the Dual-Track Airport Planning Process discussions. In early 2005, the Cities of Minneapolis, Eagan, and Richfield and the Minneapolis Public Housing Authority filed suit 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 DNL noise contour) to single-family homes in the 64 to 60 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 64 to 60 DNL 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 DNL noise contour and a Partial Noise Reduction Package to single family-homes located in the 2007 forecast 60-62 DNL noise contours. A Homeowner Reimbursement Program was also offered to single-family homes located between the forecast 2007 and 2005 60 DNL noise contours. Multi-family structures within the 2007 forecast 60 DNL noise contour were offered a uniform Multi-Family Reduction Package.

All phases of the 2007 Consent Decree noise mitigation program have been completed at a cost of approximately $95 million. Completion of the 2007 Consent Decree increased the total number of single-family homes that have received noise mitigation around MSP to over 15,000, and multi-family units to 3,303. The total cost of the MAC's noise mitigation programs to date is over $480 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. 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 actual noise contours that the MAC prepares for MSP on an annual basis. To be eligible, a home must be located within the actual 60 DNL noise contour and exposed to a higher noise mitigation eligibility area when compared to its status relative to the previous noise mitigation program for a total of 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 DNL noise contour while the Partial Noise Reduction Package is offered to single-family homes in the actual 60-62 DNL noise contours. A Multi-Family Noise Reduction Package is offered to multi-family units within the actual 60 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.

A second amendment was made to the 2007 Consent Decree in 2017. This amendment allows the use of the Aviation Environmental Design Tool (AEDT) to develop the actual noise contours each year, beginning with the 2016 actual noise contour. In 2015, AEDT became the federally-approved computer model for determining and analyzing noise exposure and land use compatibility issues around United States airports. 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 NOISE MITIGATION PROGRAM ELIGIBILITY UNDER THE AMENDED CONSENT DECREE

Based on the 412,898 total operations at MSP in 2016, the actual 60 DNL contour is approximately 29 percent smaller than the 2007 forecast contour and the 65 DNL contour is approximately 39 percent smaller than the 2007 forecast contour. The predominant contraction in the contours from the 2007 forecast to the 2016 actual noise contour scenario is driven largely by fleet mix changes, including over a 99.9 percent reduction in Hushkit Stage 3 aircraft operations and a 29 percent reduction in total aircraft operations. However, there continues to be a small area in South Minneapolis where the 2016 actual noise contours extend beyond the 2007 forecast noise contours establishing first, second, and third year impacts in certain residential areas above their noise mitigation eligibility impact levels under the terms of the 2007 Consent Decree. This expansion of noise impacts can largely be attributed to nighttime runway use variances between what was forecasted for 2007 and what actually occurred in 2016, particularly an increase of the nighttime arrival operations on Runway 12R. This same trend existed in 2013 and 2014.

The 2016 actual noise contour includes 320 single-family homes within the first year of eligibility for the Partial Noise Reduction Package. Of these homes, 296 were previously outside the program area and 24 were previously eligible for homeowner reimbursements. The 2016 actual noise contour includes another 123 single-family homes within the first year of eligibility for the Full 5-decibel Reduction Package. These homes were previously located inside the Partial Noise Reduction Package area. Additionally, there are 149 multi-family units which were previously outside the mitigation program area and are now located in the 2016 actual 60 DNL noise contour. If these 433 total single-family homes and 149 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 2020.

All single-family homes that met the first year of candidate eligibility in the 2015 actual noise contour achieved a second consecutive year of candidate eligibility with the 2016 actual noise contour. There are 251 single-family homes within the second year of eligibility for the Partial Noise Reduction Package. Of these homes, 177 were previously outside the program area and 74 were previously eligible for homeowner reimbursements. The 2016 actual noise contour includes another 234 single-family homes within the second year of eligibility for the Full 5-decibel Reduction Package. There are no multi-family units within the second year of eligibility. If these 485 total single-family homes remain in a higher noise impact area compared to the previous noise mitigation program by virtue of the 2017 actual noise contour, they will be eligible for mitigation in 2019.

All single-family homes that met the second year of candidate eligibility in the 2015 actual noise contour achieved a third and final year of eligibility with the 2016 actual noise contour. There are 165 single-family homes eligible for the Partial Noise Reduction Package. Of these homes, 126 were previously outside the program area and 39 were previously eligible for homeowner reimbursements. These single-family homes are eligible for one of two mitigation options, as detailed in Section 9.5(b) of the amended Consent Decree. The 2016 actual noise contour includes another 121 single-family homes that are eligible for the Full 5-decibel Reduction

Package. There are no multi-family units within the third year of eligibility. These 286 total single-family homes are eligible to receive mitigation in 2018.

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

In 2017 the MAC began the project to provide mitigation to 138 single-family homes and 88 multi-family units that became eligible by virtue of the 2015 actual noise contour. Similarly, in late 2017 the MAC will begin contacting the homeowners of the 286 single-family homes that are eligible for mitigation in 2018.

All blocks meeting the first, second and third consecutive year(s) of eligibility in the 2016 actual noise contour are in the City of Minneapolis, as shown in Figures ES-1 and ES-2.

Figure ES-1: 2016 Contours and Mitigation Program Eligibility

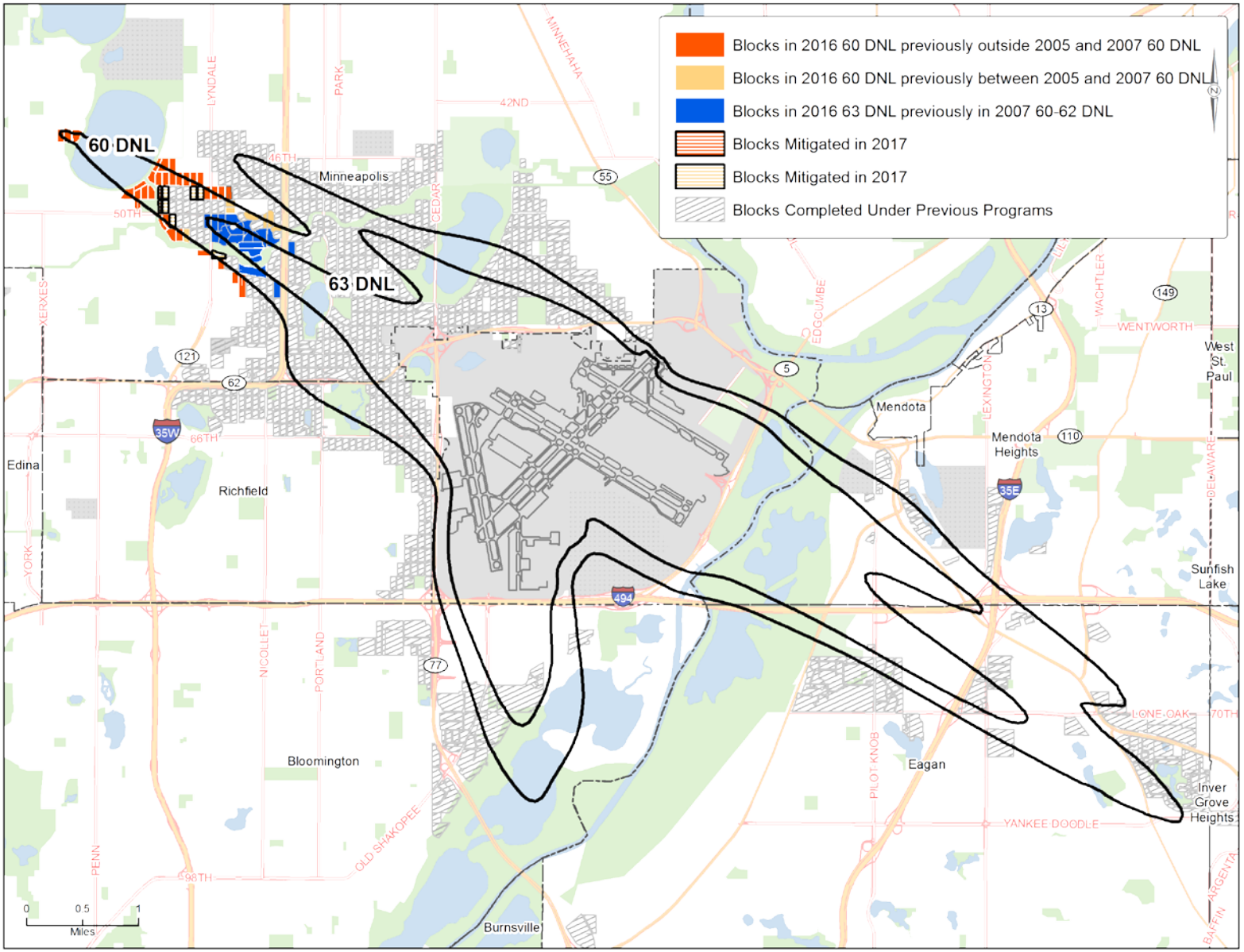
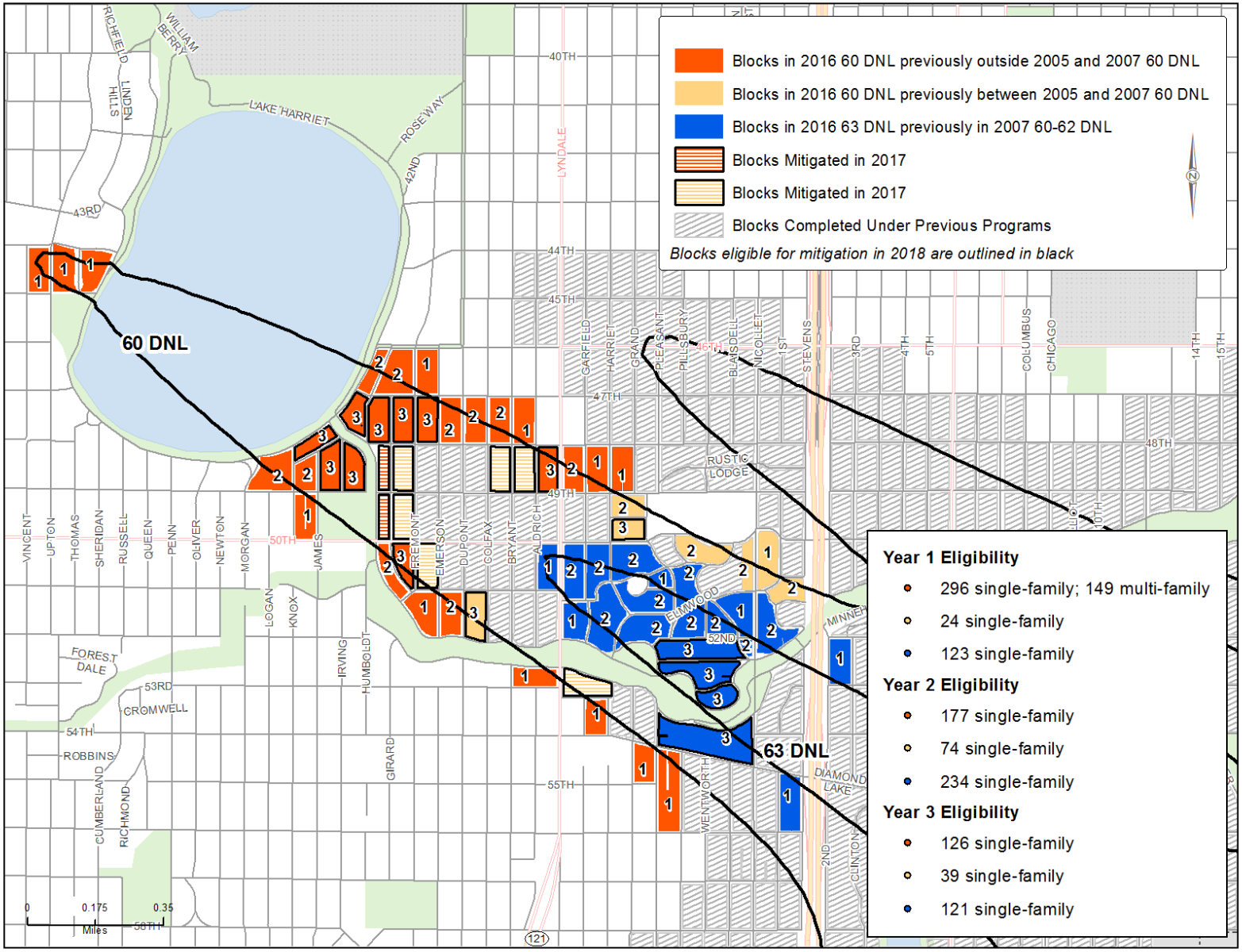


Figure ES-2: 2016 Contours and Mitigation Program Eligibility – City of Minneapolis



1. INTRODUCTION AND BACKGROUND

The issue of 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. These efforts have resulted 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 (C.F.R.) 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). A Part 150 NCP is comprised of two fundamental approaches to addressing noise impacts around an airport: (1) Land Use Measures, and (2) Noise Abatement 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 how an airport is operated and how 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 Metropolitan Airports Commission (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 Day-Night Average Sound Level (DNL) noise contours.

1.1 CORRECTIVE LAND USE EFFORTS TO ADDRESS AIRPORT 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 decibels (dB) of exterior to interior sound attenuation, the MAC developed a "Full 5-decibel Reduction Package" for single-family homes within the 65 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 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 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 DNL noise contour. In early 2006, the MAC completed the mitigation of an additional 165 single-family homes in the 2007 forecast mitigated 65 DNL noise contour. With the completion of the 165 single-family homes, all eligible and participating homes within the 2007 forecast mitigated 65 DNL contour have been mitigated. This represented a significant accomplishment for an industry-leading airport 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 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 DNL noise contour. All eligible and participating multi-family structures within the 2007 forecast mitigated 65 DNL noise contour have been mitigated.

Also, since 1981, the MAC has mitigated 18 schools located around MSP. This total represents all of the schools located within the 1996 65 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 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 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.

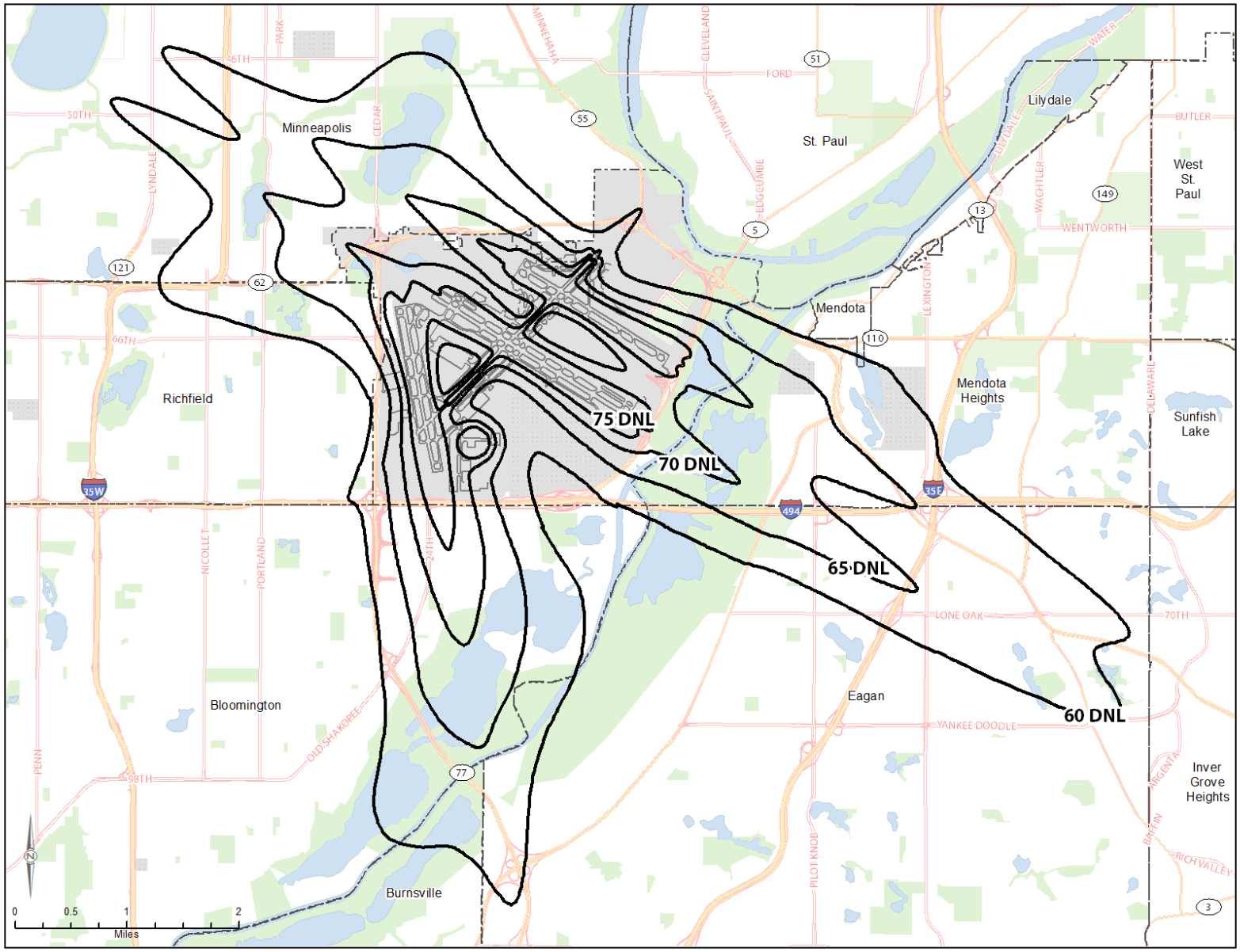
On November 17, 2003, the MAC approved the revised forecast and fleet mix numbers and INM input methodology and data for use in developing the 2002 and 2007 NEMs. In March 2004, the MAC revised the forecast to incorporate certain corrections in general aviation numbers and to reflect Northwest Airlines' 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 Noise Compatibility Program (NCP) recommendation. In addition to several land use measures around MSP, the NCP included provisions for a number of operational Noise Abatement (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 DNL noise contour and approximately 15,708.3 acres are in the 60 DNL noise contour. Since 2014 all eligible and participating homes within the 2007 forecast mitigated 60 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 AIRPORT 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 64 to 60 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 and greater DNL noise contours. 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 DNL noise contour at 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 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 DNL contour. In the November 2004 Part 150 Update, the MAC's recommendation for mitigation in the 64 to 60 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 64 to 60 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 64 to 60 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 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 64 to 60 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 64 to 60 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 cities' 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 DNL noise contours and mitigation reimbursement funds out to the 2005 60 DNL noise contours, as the Consent Decree required. Under the Decree, mitigation activities would vary based on noise contour. Homes in the most noise-impacted contours were eligible for more extensive mitigation than those in less-impacted areas.

The 2007 Consent Decree provided that approximately 457 homes in the 2007 64 to 63 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 DNL and greater contours. The 2007 64 to 63 DNL noise contour mitigation program was designed to achieve 5 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 64 and 63 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 62 to 60 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 64 and 63 DNL contours and in the 2007 62 to 60 DNL contours whose earlier owners opted out of the previously-completed MAC noise mitigation program for the 1996 65 and greater DNL contours, 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 DNL contour and the 2007 forecast mitigated 60 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 DNL and 2007 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 DNL contour and the 2007 forecast mitigated 60 DNL contour. The total cost of the "opt-in" mitigation and the 2005 mitigated 60 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 living units.

With the final payments in September 2014 for noise mitigation reimbursements, all of the phases of the noise mitigation program required under the original Consent Decree have been completed. 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 and is at least 2 dB in DNL higher than the Base Case DNL Noise Level. The Base Case DNL Noise Level is established by 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 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 noise modeling software and actual MSP operations data to generate a noise contour reflecting noise conditions at MSP for the prior calendar year. The MAC must develop a noise contour reflecting noise conditions for the prior calendar year 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 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 Noise Oversight Committee (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 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 Finding of No Significant Impact/Record of Decision (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 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 2013 and establishes residential noise mitigation program 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 DNL noise contour while the Partial Noise Reduction Package is offered to single-family homes in the actual 60-62 DNL noise contours. A Multi-Family Noise Reduction Package is offered to multi-family units within the actual 60 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.

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 provides a safeguard for homes that may fall out of consecutive year mitigation eligibility in the 2016 actual contour by virtue of a change in the model used to generate the noise contours. Should any blocks fail to qualify for a second or third consecutive year of mitigation eligibility in the 2016 actual noise contour, the second amendment requires MAC to run the same data inputs in INM version 7.0d to determine whether these blocks would have advanced in consecutive year eligibility in the INM-generated 2016 actual noise contour. If so, the block would qualify for the advanced eligibility for one year. This safeguard is only applicable to the 2016 actual noise contour. In subsequent years, only the most recently released version of FAA's noise modeling software will be used for the actual noise contours. Lastly, the second amendment 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. 2016 ACTUAL NOISE CONTOURS

2.1 DEVELOPMENT OF THE 2016 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 Federal Aviation Administration (FAA) requirements. One of these requirements is the use of the Day-Night Average Sound Level (DNL) metric to determine and analyze noise exposure. The DNL metric is calculated by cumulatively averaging sound levels over a 24-hour period. This average cumulative sound exposure includes the application of a 10-decibel penalty to sound exposures occurring during the nighttime (10:00 PM to 7:00 AM). The night sound exposures are increased by 10 decibels 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. At the time of this report, the FAA has not made any updates to these policies.

The most recent version of the Aviation Environmental Design Tool (AEDT), version 2c, was used to develop the 2016 actual noise contours. In May 2015, the AEDT version 2b was released by the FAA to replace a series of legacy tools, including the Integrated Noise Model (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 which 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. Through thorough evaluation, these updates in AEDT have had the effect of reducing the 60 DNL noise contour by 0.6 percent at MSP.

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 information, 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 Federal Aviation Regulation 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 2016 Aircraft Operations and Fleet Mix

The past 16 years have presented many challenges to the aviation industry. From a local perspective, operational levels and the aircraft fleet mix at MSP have been subject to effects from the events of September 11, 2001, high fuel prices, a flurry of bankruptcy filings by several legacy airlines including the former Northwest Airlines, and an economic recession. Additionally, overall market forces appear to be favoring consolidation, as indicated by major airline acquisitions and mergers, beginning with 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 airport operations. For example, the actual 2016 operational level at MSP, while up from 2015, is still below the operational level documented at the airport over 24 years ago.

The MAC used its Noise and Operations Monitoring System (MACNOMS) for the 2016 fleet mix. The MACNOMS total operations number was 0.5 percent lower than the official tower counts, as reported in the FAA's Operations Network (OPSNET). To rectify the numbers, MACNOMS data was adjusted upward to equal the OPSNET number. In 2016, the total operations at MSP was 412,898, or an average of 1,131.2 daily flights. This represents a 2.1 percent increase from the 2015 annual operations. A summary of the 2016 fleet mix is provided in Table 2.1. A more detailed presentation of the 2016 aircraft fleet mix is provided in Appendix 1.

On average, one Hushkit Stage 3 Jet operated every ten days in 2016, this is similar to 2015 Hushkit Stage 3 Jet activity. In 2016, the average daily number of total nighttime operations was 118.8, up from the 106.7 in 2015. Stage 2 aircraft below 75,000 pounds were required to meet Stage 3 noise regulations by January 1, 2016. The operators of these aircraft achieved this by retrofitting their aircraft with hush kits, therefore a new category was added for "Retrofitted Stage 2 Jets <75,000 lbs".

Table 2.1: Summary of 2016 Average Daily Flight Operations

Average Daily Flight Operations	Day	Night	Total	% of Total Operations
2016				
Manufactured to be Stage 3+	972.7	114.5	1087.3	96.1%
Hushkit Stage 3 Jets	0.1	0.0	0.1	0.0%
Retrofitted Stage 2 Jets <75,000 lbs	0.7	1.7	2.3	0.2%
Microjet	0.6	0.0	0.7	0.1%
Propeller	35.7	2.5	38.2	3.4%
Helicopter	0.1	0.0	0.1	0.0%
Military	2.5	0.0	2.5	0.2%
Total	*1012.4*	*118.8*	*1131.2*	*100.0%*
% of Total Operations	*89.5%*	*10.5%*	*100.0%*	

Notes:

Totals may differ due to rounding.
By January 1, 2016, Stage 2 aircraft below 75,000 lbs were required to meet Stage 3 noise regulations.

Source: MAC-provided AEDT input data, HNTB 2017

The use of newer and quieter aircraft is on the rise. Some examples at MSP of these newer aircraft are the Airbus A320neo, Boeing B717, B737-900/900 and Embraer E170 regional jets. Meanwhile use of older and louder aircraft is declining. All scheduled flights in DC-9 aircraft were eliminated in January 2014 and within the next two years, the airlines plan to retire their fleets of MD-80s.

2.1.3 2016 Runway Use

FAA control 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 on a given runway and the land uses off the end of the runway.

Historically, prior to the opening of Runway 17/35, arrival and departure operations occurred on the parallel runways at MSP (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. As a result of the dense residential land uses to the northwest and the predominantly industrial/commercial land uses to the southeast of MSP, focusing departure operations to the southeast has long been the preferred operational configuration from a noise reduction perspective.

Since the introduction of Runway 17/35 at MSP in 2005, another opportunity exists to route aircraft over an unpopulated area – the Minnesota River Valley. With use of the Runway 17 Departure Procedure, westbound departure operations are routed such that they avoid close-in residential areas southwest of Runway 17. Thus, use of Runway 17 for departure operations 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). Converging runway operations exist when the extended centerline of two runways intersect within one nautical mile of the two runway departure ends. This poses a potential risk for aircraft converging at the intersection point.

At MSP, the extended centerline of Runway 35 intersects within one mile with the extended centerlines of both Runway 30L and 30R. Since Runway 35 is only used for arrivals from the south, potential convergence in flight paths would only occur if an aircraft executes an aborted landing (“go around”) on Runway 35. CRO procedures prevent an aircraft that aborts its landing on Runway 35 from conflicting with aircraft departing Runways 30L or 30R.

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. 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 Noise Oversight Committee (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.

Notable changes in runway use from 2015 to 2016 include:

- Runway 12R arrivals at night increased 9.4 percent
- Runway 30L arrivals during the day increased 30.2 percent; Runway 30L arrivals at night increased 15.7 percent; in total, Runway 30L arrivals increased 27.8 percent
- Runway 30R nighttime arrivals decreased 12.6 percent
- In total, Runway 35 arrivals decreased 57.8 percent, mostly driven by decreased daytime usage
- Runway 12L departures at night increased 27.2 percent
- Runway 12R departures at night increased 14.8 percent
- In total, Runway 17 departures increased 14.6 percent, driven by increased daytime usage; Runway 17 departures at night decreased 16.7 percent
- In total, Runway 30L departures decreased by 15.7 percent, mostly driven by a decrease during the daytime; Runway 30L departures at night increased by 27.9 percent
- Runway 30R departures at night increased 34.1 percent

Table 2.2 provides the average annual runway use distribution for 2016.

Table 2.2: Summary of 2016 Average Annual Runway Use

Operation	Runway	Day	Night	Total
Arrivals	4	0.0%	0.0%	0.0%
	12L	23.6%	17.6%	23.0%
	12R	26.4%	29.7%	26.7%
	17	0.0%	0.0%	0.0%
	22	0.2%	0.2%	0.2%
	30L	24.1%	34.5%	25.3%
	30R	20.5%	16.8%	20.1%
	35	5.1%	1.2%	4.7%
Departures	4	0.1%	0.2%	0.1%
	12L	15.1%	21.4%	15.7%
	12R	5.2%	27.9%	7.5%
	17	36.1%	8.3%	33.4%
	22	0.2%	0.2%	0.2%
	30L	20.8%	23.7%	21.1%
	30R	22.5%	18.5%	22.1%
	35	0.0%	0.0%	0.0%

Note: Total may not add up due to rounding.

Source: MAC-provided AEDT Input Data, HNTB 2017

2.1.4 2016 Flight Tracks

Modeled departure and arrival flight tracks were developed using actual flight track data. The model tracks used for departure operations in the 2016 actual noise contour were identical to those used for the 2015 actual noise contour. An evaluation of the arrival model tracks found that most of the modeled tracks are closely aligned with the actual flight track data. A few model tracks

were added to represent a small number of flights that strayed from the final approach path in 2016. Additional geometry changes were made to several arrival model tracks but their impacts were determined to be minimal. Sub-tracks are added to each of the backbone arrival and departure model tracks. The distribution of operations among the backbone and sub-tracks use a standard "bell curve" distribution, based on the number of sub-tracks developed. This is consistent with the way INM distributed operations on sub-tracks in the modeling process.

The same methodology as in previous annual reports was used to assign actual 2016 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 2016 are provided in Appendix 2.

2.1.5 2016 Atmospheric Conditions

The MAC gathered annual atmospheric data for the 2016 actual noise contour from the Minnesota State Climatology Office. The 2016 annual average atmospheric conditions are as follows:

- Temperature – 49.8 degrees Fahrenheit
- Dew point – 38.1 degrees Fahrenheit
- Wind speed – 8.1 knots
- Pressure – 1,015.6 Millibars
- Relative humidity – 64.1 percent

2.2 2016 MODELED VERSUS MEASURED DNL LEVELS

As part of the 2016 actual noise contour evaluation, a comparison was conducted on the actual 2016 measured aircraft noise levels at the MAC's 39 sound monitoring sites around MSP to the modeled DNL noise levels 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 levels and the actual measured aircraft DNLs at those locations in 2016.

The use of absolute values provides a perspective of total difference between the modeled values and the measured values. The average absolute difference between the modeled and measured DNLs is approximately 2.3 dB, compared with 2.1 dB in 2015 and 2.2 dB in 2014. The absolute median difference is 1.1 dB, compared with 1.4 dB in 2015 and 1.5 dB in 2014 indicating that the 2016 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. There were 12 RMTs that reported slightly higher DNL levels than the model generated. The MAC believes that this is due in part to the inclusive approach MAC staff has taken in its noise-to-track matching parameters. This inclusive approach, along with the increasing number of quieter jets operating at the airport, results in some instances of community-driven noise events being attributed to aircraft operations. Overall, the small variation between the actual measured aircraft noise levels and the AEDT modeled noise levels provides additional external system verification that AEDT is providing an accurate assessment of the actual aircraft noise impacts around MSP.

Table 2.3: 2016 Measured vs. Modeled DNL Values

Sound Monitoring Site	2016 Measured DNL (a)	2016 Modeled DNL	Difference	Absolute Difference
1	56.8	57.6	0.7	0.7
2	59.2	58.3	-0.9	0.9
3	63.2	63.7	0.5	0.5
4	60.5	61.1	0.6	0.6
5	68.2	68.3	0.0	0.0
6	68.4	66.2	-2.3	2.3
7	59.8	58.1	-1.8	1.8
8	55.8	55.4	-0.4	0.4
9	43.6	44.6	1.0	1.0
10	46.1	50.0	3.9	3.9
11	35.5	44.7	9.2	9.2
12	35.7	47.5	11.8	11.8
13	55.2	55.0	-0.2	0.2
14	61.2	60.9	-0.3	0.3
15	56.6	55.7	-1.0	1.0
16	64.7	63.6	-1.1	1.1
17	42.1	48.3	6.3	6.3
18	53.8	59.0	5.2	5.2
19	49.9	53.8	4.0	4.0
20	43.5	50.5	7.0	7.0
21	47.5	49.9	2.4	2.4
22	55.9	57.3	1.4	1.4
23	61.6	60.3	-1.4	1.4
24	59.6	59.7	0.1	0.1
25	51.6	54.7	3.2	3.2
26	53.5	52.6	-0.9	0.9
27	55.3	55.5	0.2	0.2
28	56.4	60.6	4.2	4.2
29	52.0	52.6	0.6	0.6
30	61.1	60.2	-0.9	0.9
31	46.8	50.4	3.7	3.7
32	41.9	47.9	6.0	6.0
33	48.1	50.2	2.0	2.0
34	45.5	48.0	2.5	2.5
35	51.0	51.8	0.8	0.8
36	49.1	49.1	-0.1	0.1
37	47.3	48.6	1.3	1.3
38	50.7	50.9	0.2	0.2
39	51.6	52.0	0.5	0.5
			Average	*2.3*
			Median	*1.1*

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

Source: MAC sound monitoring data and HNTB, 2017

2.3 2016 NOISE CONTOUR IMPACTS

Based on the 412,898 total operations in 2016, approximately 4,413 acres are in the 65 DNL noise contour (an increase of 530 acres, or 13.7 percent, from the 2015 actual noise contour) and approximately 11,148 acres are in the 60 DNL noise contour (an increase of 1,376 acres, or 14.1 percent, from the 2015 actual noise contour). The increase is due to the contribution of various factors, particularly a higher number of total operations and a higher number of operations at night.

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 2016 actual noise contours. The counts are based off the block intersect methodology where all structures on a block that are 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 2016 Actual DNL Noise Contour Unit Counts

City	Count	Dwelling Units Within DNL (dB) Interval									
		Single Family					Multi-Family				
		60-64	65-69	70-74	75+	Total	60-64	65-69	70-74	75+	Total
Minneapolis	Completed	7045	1636	-	-	8681	447	507	-	-	954
	Additional	1352	-	-	-	1352	237	-	-	-	237
	Total	8387	1636	-	-	10023	684	507	-	-	1191
Bloomington	Completed	16	1	-	-	17	513	-	-	-	513
	Additional	-	-	-	-	-	-	-	-	-	-
	Total	16	1	-	-	17	513	-	-	-	513
Richfield	Completed	689	22	-	-	711	66	-	-	-	66
	Additional	-	-	-	-	-	-	-	-	-	-
	Total	689	22	-	-	711	66	-	-	-	66
Eagan	Completed	319	15	-	-	334	38	-	-	-	38
	Additional	-	-	-	-	-	-	-	-	-	-
	Total	319	15	-	-	334	-	-	-	-	-
Mendota Heights	Completed	43	1	-	-	44	-	-	-	-	-
	Additional	-	-	-	-	-	-	-	-	-	-
	Total	43	1	-	-	44	-	-	-	-	-
All Cities	Completed	8112	1675	-	-	9787	1064	507	-	-	1571
	Additional	1352	-	-	-	1352	237	-	-	-	237
	Total	9464	1675	-	-	11139	1301	507	-	-	1808

Notes:

Block intersect methodology

Multi-Family = 4+ Units

Units that declined mitigation or were determined to be ineligible for participation in the current program are not included in the table.

As a result of updated parcel information the MAC obtained from Metro GIS in January 2017, the unit counts in the tables above have slightly different values than previously published.

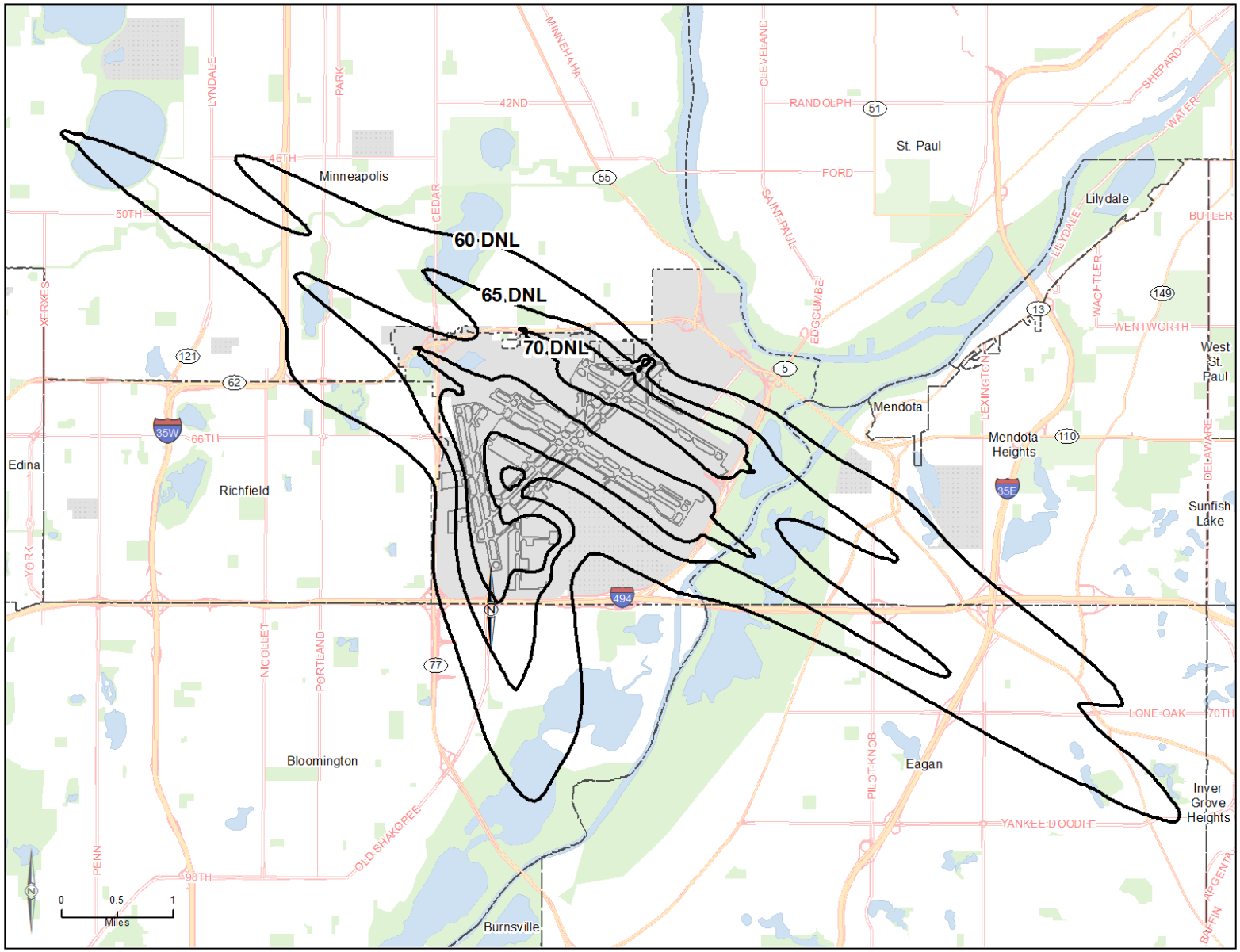
Source: HNTB provided AEDT contours, MAC analysis, 2017

A total of 138 residences within the 60-64 noise contour in the City of Minneapolis will receive noise mitigation in 2017 per the terms of the Consent Decree. The 2016 count of residential units within the actual 60 DNL noise contour that have not received noise mitigation around MSP is 1,589, an increase from the 994 based on the 2015 actual noise contours. The increase is due,

in large part, to an increase in nighttime operations in 2016, particularly nighttime arrival operations on Runway 12R. All homes within the 2016 actual 65 DNL contour have received the 5 dB noise reduction mitigation package.

A depiction of the 2016 actual noise contour is provided in Figure 2.

Figure 2: 2016 Actual Noise Contours



3. COMPARISON OF THE 2016 ACTUAL AND THE 2007 FORECAST NOISE CONTOURS

3.1 COMPARISON OF NOISE CONTOUR INPUTS

3.1.1 Noise Model Considerations

To develop the 2016 actual contour, HNTB used AEDT version 2c, which incorporates updates to flight segments, atmospheric computing standards, grids used for noise contour generation and other corrections necessary to the Integrated Noise Model (INM). The 2007 forecast noise contour was developed using INM Version 6.1.

It is important to note that modeling changes over time can change the size and shape of a noise contour. For example, the 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, the updates incorporated into AEDT, had the effect of reducing the 60 DNL noise contour by 0.6 percent at MSP compared to the last 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, or an average of 1,595.9 flights per day. In 2016, the actual number of operations was 412,898, or 1,131.2 flights per day. This represents a 29.1 percent reduction from the 2007 forecast number. Nighttime operations decreased by 4.5 average daily flights from the 2007 forecast to 2016 actual. Table 3.1 provides a summary comparison of the 2016 actual and the 2007 forecast average daily operations. A more detailed comparison of the 2007 forecast fleet mix and the 2016 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 forecast to 2016. On average, one Hushkit Stage 3 Jet operated every ten days in 2016, this is down from the 2007 forecast average of 274.9 flights per day. Manufactured Stage 3+ average daily operations in 2016 were down six percent from the 2007 forecast. The number of propeller-driven and military aircraft operations decreased 74.7 and 70.4 percent, respectively.

Stage 2 aircraft below 75,000 pounds were required to meet Stage 3 noise regulations by January 1, 2016. The operators of these aircraft achieved this by retrofitting their aircraft with hush kits, therefore a new category was added for “Retrofitted Stage 2 Jets <75,000 lbs”.

Table 3.1: Summary of 2016 and 2007 Average Daily Flight Operations

Average Daily Flight Operations	Day	Night	Total	% of Total Operations
2016				
Manufactured to be Stage 3+	972.7	114.5	1087.3	96.1%
Hushkit Stage 3 Jet	0.1	0.0	0.1	0.0%
Retrofitted Stage 2 Jet	0.7	1.7	2.3	0.2%
Stage 2 Jets under 75,000 lbs	-	-	-	-
Microjet	0.6	0.0	0.7	0.1%
Propeller	35.7	2.5	38.2	3.4%
Helicopter	0.1	0.0	0.1	0.0%
Military	2.5	0.0	2.5	0.2%
Total	*1012.4*	*118.8*	*1131.2*	*100.0%*
% of Total Operations	*89.5%*	*10.5%*	*100.0%*	
2007				
Manufactured to be Stage 3+	1071.5	85.0	1156.7	72.5%
Hushkit Stage 3 Jet	253.3	21.7	274.9	17.2%
Retrofitted Stage 2 Jet	-	-	-	-
Stage 2 Jets under 75,000 lbs	4.2	0.6	4.8	0.3%
Microjet	-	-	-	-
Propeller	135.2	15.8	151.0	9.5%
Helicopter	-	-	-	-
Military	8.2	0.2	8.5	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 AEDT input data, HNTB 2017

3.1.3 Runway Use Comparison

Table 3.2 provides the runway use percentages for 2016 and a comparison to the 2007 forecast runway use percentages. A general evaluation of the runway use percentages in Table 3.2 indicates that the use of Runway 12R for arrivals in 2016 is notably higher than what was forecasted in the 2007 noise contour. The use of Runway 35 arrivals is notably lower than the 2007 forecast. The daytime departure percentage on Runway 12R in 2016 is well below the 2007 forecast, while the nighttime percentage on this runway was higher than the 2007 forecast. The departure difference on Runway 17 at night is almost 30 percent below the 2007 forecast. Lastly, the Runway 30L departure percentage at night is above the 2007 forecast.

Table 3.2: Summary of Average Annual Runway Use 2016, 2007

Operation	Runway	Day		Night		Total	
		2016 Actual	2007 Forecast	2016 Actual	2007 Forecast	2016 Actual	2007 Forecast
Arrivals	4	0.0%	0.0%	0.0%	3.8%	0.0%	0.3%
	12L	23.6%	21.8%	17.6%	17.2%	23.0%	21.4%
	12R	26.4%	14.7%	29.7%	12.4%	26.7%	14.5%
	17	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	22	0.2%	0.5%	0.2%	2.4%	0.2%	0.6%
	30L	24.1%	21.1%	34.5%	25.1%	25.3%	21.4%
	30R	20.5%	25.1%	16.8%	26.4%	20.1%	25.2%
	35	5.1%	16.9%	1.2%	12.7%	4.7%	16.5%
Departures	4	0.1%	0.2%	0.2%	0.4%	0.1%	0.2%
	12L	15.1%	8.9%	21.4%	14.1%	15.7%	9.3%
	12R	5.2%	15.9%	27.9%	18.3%	7.5%	16.1%
	17	36.1%	37.2%	8.3%	34.6%	33.4%	37.0%
	22	0.2%	0.1%	0.2%	0.8%	0.2%	0.1%
	30L	20.8%	15.0%	23.7%	12.8%	21.1%	14.8%
	30R	22.5%	22.7%	18.5%	19.2%	22.1%	22.4%
	35	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Note: Total may not add up due to rounding.

Source: MAC-provided AEDT Input Data, HNTB 2017. 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 2016. 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. The INM's standard distribution was used in distributing the flights to the sub-tracks.

The same methodology as in previous annual reports was used to assign actual 2016 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 takes 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 2.1.3, MAC gathered annual atmospheric data for the 2016 actual noise contour from the Minnesota State Climatology Office. The 2016 annual average atmospheric conditions are as follows:

- Temperature – 49.8 degrees Fahrenheit
- Dew point – 38.1 degrees Fahrenheit
- Wind speed – 8.1 knots
- Pressure – 1,015.6 Millibars
- Relative humidity – 64.1 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 2016 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 2016 actual noise contours are contained in Appendix 3.

The Base Case DNL Noise Level 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 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.

It is important to note that the 2007 forecast DNL levels were 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 levels generated for those same locations with INM 6.2a, the differences were insignificant.

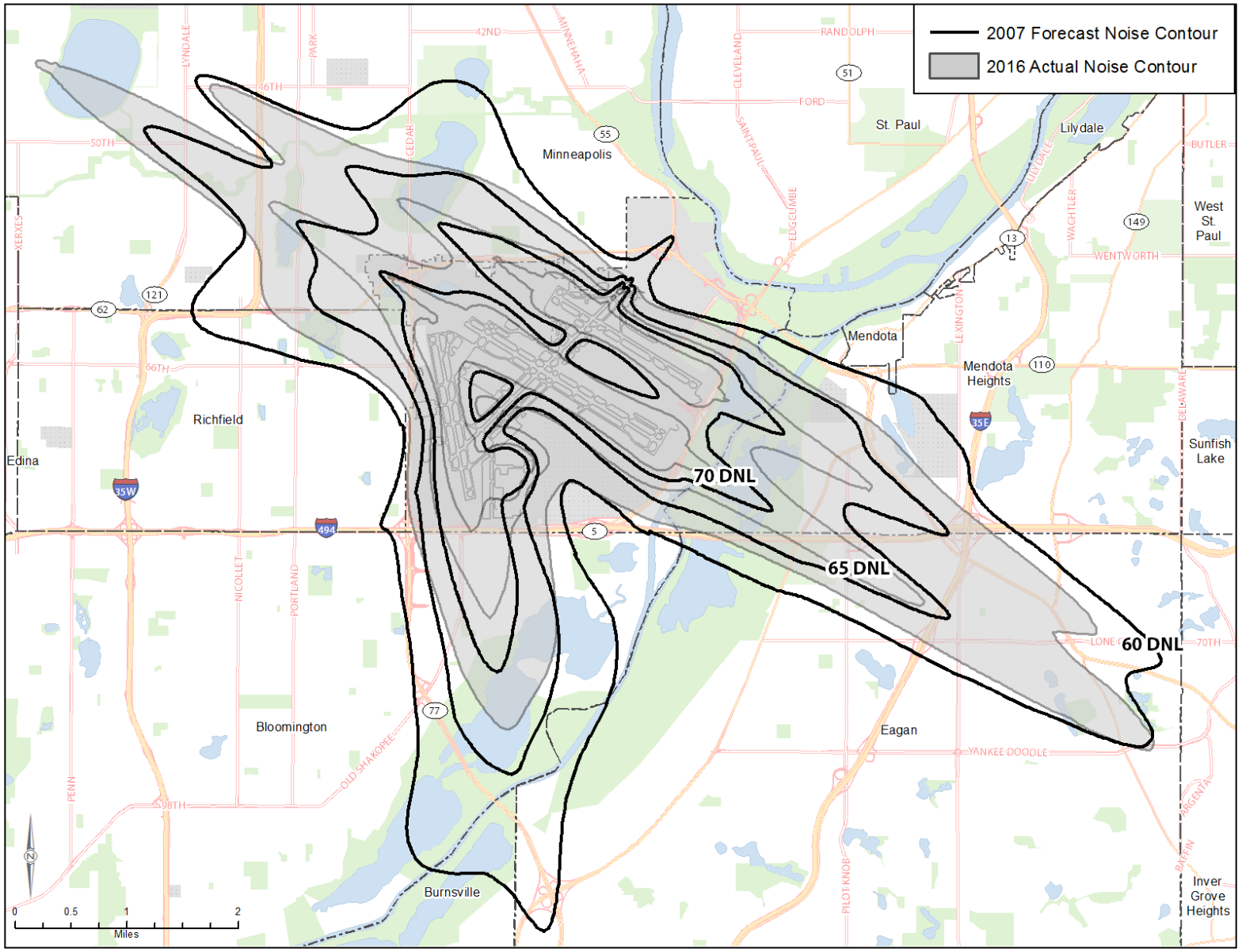
3.3 CONTOUR COMPARISON SUMMARY

The 2016 actual noise contour is smaller than the 2007 forecast mitigated contour by 4,560 acres (29 percent reduction) in the 60 DNL contour and by 2,821 acres (39 percent reduction) in the 65 DNL contour. As depicted in Figure 3, there is an area in Minneapolis where the 2016 actual noise contours extend beyond the 2007 forecast noise contours. Chapter 4 provides an analysis of mitigation eligibility relative to the 2016 actual contour consistent with the requirements of the amended Consent Decree.

The predominant contraction in the contours from the 2007 forecast to the 2016 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 462.2 average daily operations. The extension of the 2016 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 2016, 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 2016 actual noise contours are total operation numbers, fleet mix, nighttime operations, and runway use.

Figure 3: 2016 Actual and 2007 Forecast Noise Contour Comparison



4. 2016 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 2016 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) provided clarity on the Opt-Out Eligibility criteria; and (3) provided 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 off on 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 Integrated Noise Model (INM) version 7.0d to determine whether these blocks would have advanced in consecutive year eligibility in the INM-generated 2016 actual noise contour.

4.2 2016 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 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 DNL noise contour prepared by the MAC under Section 8.l(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 2016 60 DNL noise contour, as well as changes in mitigation and the number of years of eligibility achieved by virtue of the 2016 actual noise contour.

Table 4.2 provides the number of multi-family living units within the 2016 60 DNL noise contour, as well as changes in mitigation and the number of years of eligibility achieved by virtue of the 2016 actual noise contour.

Table 4.1: Summary of 2016 Actual Noise Contour Single-Family Unit Counts

Year of Eligibility	City	Mitigation	DNL Contours 60-62	63-64	65-69	70-74	75+	Total
On Blocks Previously Mitigated	Bloomington	In 2016 Actual Contours previously mitigated *(No mitigation eligibility change)*	16	-	1	-	-	17
On Blocks Previously Mitigated	Eagan	In 2016 Actual Contours previously mitigated *(No mitigation eligibility change)*	257	62	15	-	-	334
On Blocks Previously Mitigated	Mendota Heights	In 2016 Actual Contours previously mitigated *(No mitigation eligibility change)*	43	-	1	-	-	44
On Blocks Previously Mitigated	Minneapolis	In 2016 Actual Contours previously mitigated *(No mitigation eligibility change)*	5,113	1,932	1,636	-	-	8,681
1	Minneapolis	In 2016 Actual 60 DNL previously outside 2005 and 2007 60 DNL *(Eligible for mitigation after 3 consecutive years)*	296	-	-	-	-	296
		In 2016 Actual 60 DNL previously between 2005 and 2007 60 DNL *(Eligible for additional mitigation, less previous reimbursements after 3 consecutive years)*	24	-	-	-	-	24
		In 2016 Actual 63 DNL previously in 2007 60-62 DNL *(Eligible for the "five decibel package" after 3 consecutive years)*	-	123	-	-	-	123
2	Minneapolis	In 2016 Actual 60 DNL previously outside 2005 and 2007 60 DNL *(Eligible for mitigation after 3 consecutive years)*	177	-	-	-	-	177
		In 2016 Actual 60 DNL previously between 2005 and 2007 60 DNL *(Eligible for additional mitigation, less previous reimbursements after 3 consecutive years)*	74	-	-	-	-	74
		In 2016 Actual 63 DNL previously in 2007 60-62 DNL *(Eligible for the "five decibel package" after 3 consecutive years)*	-	234	-	-	-	234
3 (To be Mitigated in 2018)	Minneapolis	In 2016 Actual 60 DNL previously outside 2005 and 2007 60 DNL *(Eligible for mitigation)*	126	-	-	-	-	126
		In 2016 Actual 60 DNL previously between 2005 and 2007 60 DNL *(Eligible for additional mitigation, less previous reimbursements)*	39	-	-	-	-	39
		In 2016 Actual 63 DNL previously in 2007 60-62 DNL *(Eligible for the "five decibel package")*	-	121				121
Mitigated in 2017	Minneapolis	In 2016 Actual 60 DNL previously outside 2005 and 2007 60 DNL	19	-	-	-	-	19
		In 2016 Actual 60 DNL previously between 2005 and 2007 60 DNL	119	-	-	-	-	119
On Blocks Previously Mitigated	Richfield	In 2016 Actual Contours previously mitigated *(No mitigation eligibility change)*	477	212	22	-	-	711
		Grand Total	**6,780**	**2,684**	**1,675**			**11,139**

Notes:
Block Intersect Methodology
Multi-Family = 4 or more units
As a result of updated parcel information the MAC obtained from Metro GIS in January 2017, the unit counts in the tables above have slightly different values than previously published.
Source: HNTB provided AEDT Contours, MAC analysis 2017

Table 4.2 Summary of 2016 Actual Noise Contour Multi-Family Unit Counts

Year of Eligibility	City	Mitigation	DNL Contours 60-64	65-69	70-74	75+	Total
On Blocks Previously Mitigated	Bloomington	In 2016 Actual Contours previously mitigated *(No mitigation eligibility change)*	513	-	-	-	513
On Blocks Previously Mitigated	Eagan	In 2016 Actual Contours previously mitigated *(No mitigation eligibility change)*	38	-	-	-	38
-	Mendota Heights	No multi-family units in 2016 Actual Contours	-	-	-	-	-
On Blocks Previously Mitigated	Minneapolis	In 2016 Actual Contours previously mitigated *(No mitigation eligibility change)*	447	507	-	-	954
1	Minneapolis	In 2016 Actual 60 DNL previously outside 2005 and 2007 60 DNL *(Eligible for mitigation)*	149	-	-	-	149
Mitigated in 2017	Minneapolis	In 2016 Actual 60 DNL previously outside 2005 and 2007 60 DNL *(Eligible for mitigation)*	88	-	-	-	88
On Blocks Previously Mitigated	Richfield	In 2016 Actual Contours previously mitigated *(No mitigation eligibility change)*	66	-	-	-	66
		Grand Total	**1,301**	**507**			**1,808**

Notes:
Block Intersect Methodology
Multi-Family = 4+ units
As a result of updated parcel information the MAC obtained from Metro GIS in January 2017, the unit counts in the tables above have slightly different values than previously published.

Source: HNTB provided AEDT Contours, MAC analysis 2017

The 2016 actual noise contour includes 320 single-family homes within the first year of eligibility for the Partial Noise Reduction Package. Of these homes, 296 were previously outside the program area and 24 were previously eligible for homeowner reimbursements. The 2016 actual noise contour includes another 123 single-family homes within the first year of eligibility for the Full 5-decibel Reduction Package. These homes were previously located inside the Partial Noise Reduction Package area. Additionally, there are 149 multi-family units which were previously outside the mitigation program area and are now located in the 2016 actual 60 DNL noise contour. If these 443 total single-family homes and 149 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 2020.

All single-family homes that met the first year of candidate eligibility in the 2015 actual noise contour achieved a second consecutive year of candidate eligibility with the 2016 actual noise contour. There are 251 single-family homes within the second year of eligibility for the Partial Noise Reduction Package. Of these homes, 177 were previously outside the program area and 74 were previously eligible for homeowner reimbursements. The 2016 actual noise contour includes another 234 single-family homes within the second year of eligibility for the Full 5-decibel Reduction Package. There are no multi-family units within the second year of eligibility. If these 485 total single-family homes remain in a higher noise impact area compared to the previous noise mitigation program by virtue of the 2017 actual noise contour, they will be eligible for mitigation in 2019.

All single-family homes that met the second year of candidate eligibility in the 2015 actual noise contour achieved a third and final year of eligibility with the 2016 actual noise contour. There are 165 single-family homes eligible for the Partial Noise Reduction Package. Of these homes, 126 were previously outside the program area and 39 were previously eligible for homeowner reimbursements. These single-family homes are eligible for one of two mitigation options, as detailed in Section 9.5(b) of the first amendment to the 2007 Consent Decree. The 2016 actual noise contour includes another 121 single-family homes that are eligible for the Full 5-decibel Reduction Package. Two of the homeowners of these 121 homes previously opted out of the Partial Noise Reduction Package. There are no multi-family units within the third year of eligibility. These 286 total single-family homes are eligible to receive mitigation in 2018.

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

In 2017 the MAC began the project to provide mitigation to 138 single-family homes and 88 multi-family units that became eligible by virtue of the 2015 actual noise contour. Similarly, in late 2017 the MAC will begin contacting the homeowners of the 286 single-family homes that are eligible for mitigation in 2018.

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

Figure 4.1: 2016 Contours and Mitigation Program Eligibility

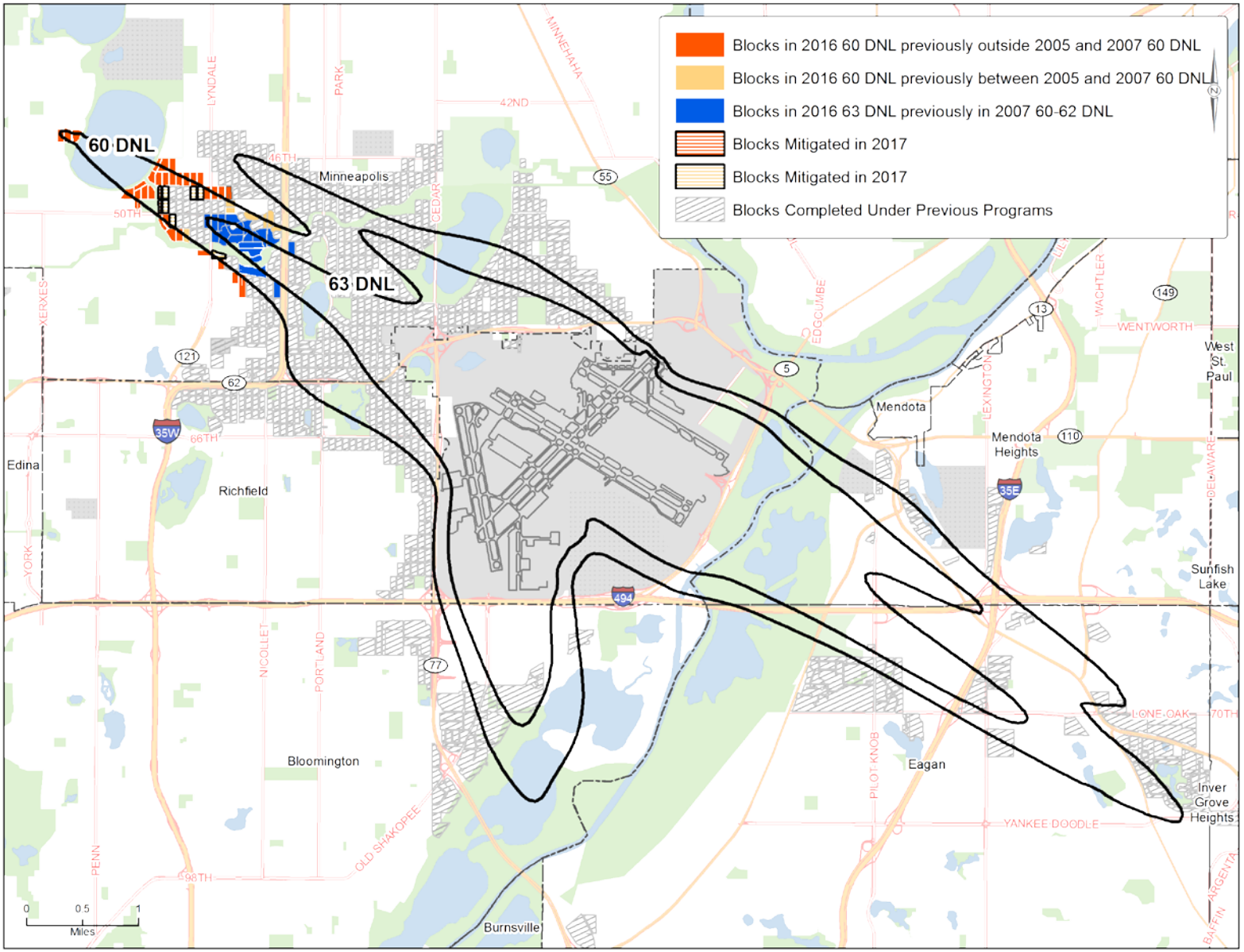
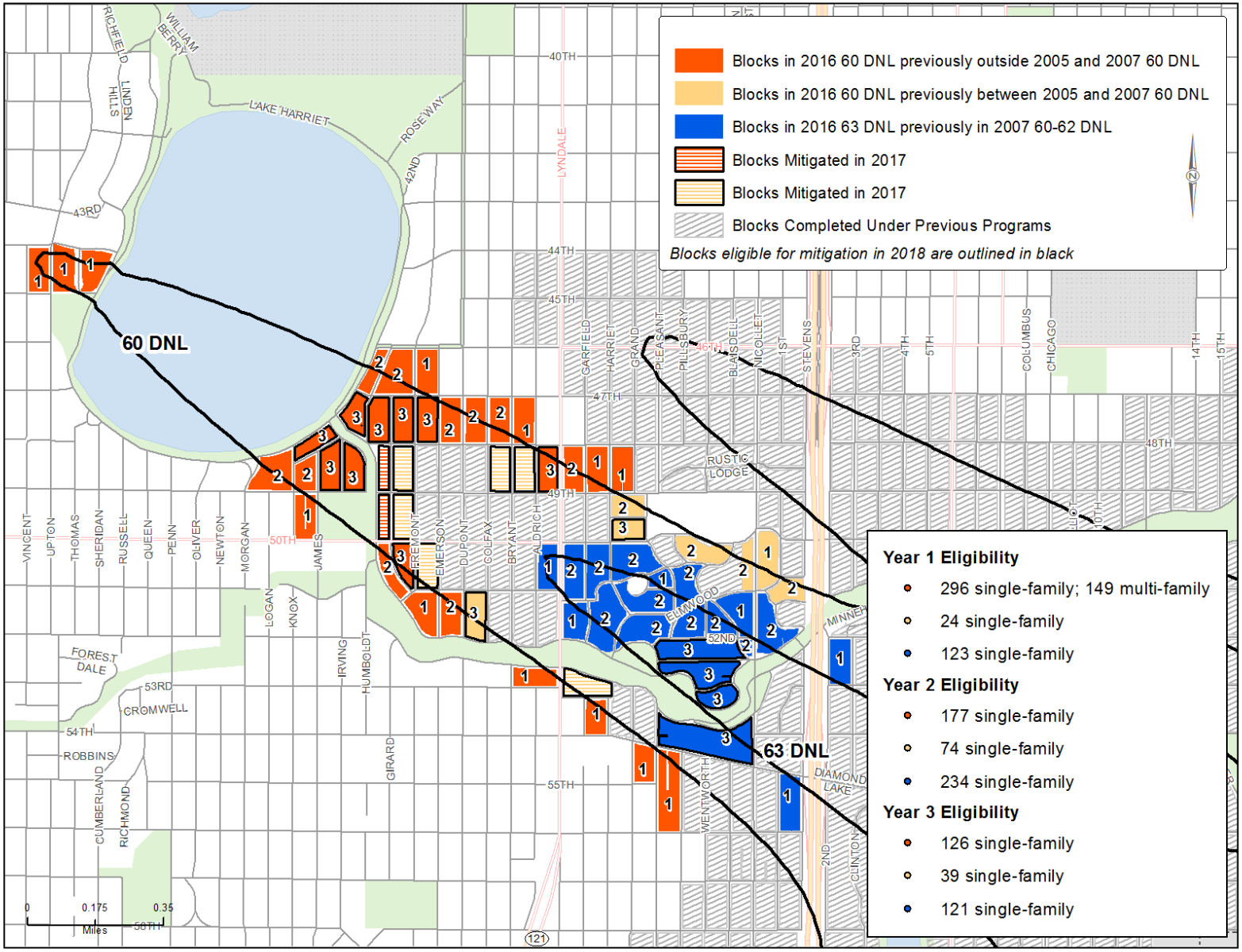


Figure 4.2: 2016 Contours and Mitigation Program Eligibility – City of Minneapolis



List of Appendices

Appendix 1: Detailed Aircraft Fleet Mix Average Daily Operations

Table A1-1: 2016 Aircraft Fleet Mix Average Daily Operations

Group	Aircraft Type	2016 Day	2016 Night	2016 Total
Manufactured to be Stage 3+	7478	0.0	0.0	0.0
	717200	23.2	1.6	24.8
	737300	2.7	0.8	3.5
	737400	0.2	0.1	0.3
	737500	0.0	0.0	0.0
	737700	40.3	10.5	50.8
	737800	63.3	18.8	82.1
	737900	33.5	6.1	39.7
	747400	0.1	0.0	0.1
	757300	15.0	1.3	16.3
	767300	8.0	1.4	9.4
	767400	1.9	0.6	2.5
	777200	1.7	0.0	1.8
	777300	0.0	-	0.0
	7373B2	3.1	0.4	3.5
	74720B	0.0	-	0.0
	757PW	33.1	7.1	40.2
	757RR	2.4	2.1	4.5
	767CF6	0.6	0.1	0.7
	767JT9	0.8	0.0	0.8
	7772LR	0.1	0.0	0.1
	7773ER	0.0	0.0	0.0
	7878R	0.0	-	0.0
	A300-622R	0.3	0.1	0.3
	A319-131	69.7	5.8	75.6
	A320-232	89.6	14.5	104.2
	A321-232	3.1	1.8	4.8
	A330-301	0.0	-	0.0
	A330-343	6.8	0.3	7.1
	A340-211	0.7	-	0.7
	A340-642	0.0	-	0.0
	AN124	0.0	0.0	0.0
	BAE146	0.0	-	0.0
	BD700	0.5	0.0	0.5
	BEC400	0.8	0.1	0.9
	CL600	5.1	0.4	5.6
	CL601	0.7	0.0	0.7
	CLREGJ	171.4	10.1	181.4
	CNA500	0.2	0.0	0.3
	CNA501	0.0	-	0.0
	CNA525C	0.8	0.0	0.8
	CNA550	0.2	0.0	0.2
	CNA55B	1.2	0.1	1.2
	CNA560	0.0	-	0.0

Group	Aircraft Type	2016 Day	2016 Night	2016 Total
Manufactured to be Stage 3+ (Cont'd)	CNA560E	0.4	0.0	0.5
	CNA560U	0.3	0.0	0.3
	CNA560XL	2.7	0.1	2.8
	CNA650	0.3	0.0	0.3
	CNA680	2.8	0.1	3.0
	CNA750	3.3	0.2	3.5
	CRJ701	27.4	1.4	28.8
	CRJ900	136.3	7.8	144.0
	D328J	0.1	0.0	0.1
	DC1010	0.4	0.1	0.4
	DC1030	0.3	0.1	0.4
	DC1040	0.3	0.1	0.5
	DC870	0.0	-	0.0
	EMB135	0.4	0.0	0.4
	EMB145	1.4	0.1	1.5
	EMB14L	0.7	0.0	0.7
	EMB170	82.8	8.3	91.1
	EMB175	0.0	-	0.0
	EMB190	2.0	0.1	2.1
	F10062	0.1	0.0	0.2
	FAL10	0.1	0.0	0.1
	FAL20A	1.7	0.1	1.8
	FAL50	1.3	0.1	1.4
	FAL900	1.2	0.1	1.3
	G150	0.2	0.0	0.3
	G200	1.2	0.1	1.3
	GIV	1.4	0.1	1.6
	GV	2.0	0.3	2.3
	HK4000	0.0	0.0	0.0
	HS125	0.0	-	0.0
	HS1258	2.6	0.2	2.7
	IA1124	0.0	0.0	0.0
	IA1125	0.5	0.0	0.6
	LEAR31	0.1	0.0	0.1
	LEAR35	0.7	0.1	0.8
	LEAR45	2.0	0.1	2.1
	LEAR55	0.1	0.0	0.1
	LEAR60	0.5	0.0	0.5
	MD11GE	2.7	1.8	4.5
	MD11PW	1.2	0.7	1.9
	MD81	0.0	0.0	0.0
	MD82	4.7	1.2	5.8
	MD83	7.0	1.6	8.5
	MD88	22.7	0.6	23.3
	MD9025	34.2	1.8	36.0
	MD9028	41.3	2.7	44.0
	MU300	0.0	0.0	0.0
	R390	0.2	0.0	0.2
Manufactured to be Stage 3+ Total		*972.7*	*114.5*	*1,087.3*

Group	Aircraft Type	2016 Day	2016 Night	2016 Total
Hushkit Stage 3 Jet	727EM2	-	0.0	0.0
	737N17	0.1	0.0	0.1
	DC93LW	0.0	0.0	0.0
Hushkit Stage 3 Jet Total		*0.1*	*0.0*	*0.1*
Retrofitted Stage 2 Jet	FAL20	0.6	1.7	2.3
	GIIB	0.1	0.0	0.1
Retrofitted Stage 2 Jet Total		*0.7*	*1.7*	*2.3*
Microjet	CNA510	0.4	0.0	0.5
	ECLIPSE500	0.2	0.0	0.2
Microjet Total		*0.6*	*0.0*	*0.7*
Propeller	1900D	7.0	0.8	7.8
	AC95	0.0	-	0.0
	ATR42	1.3	0.1	1.4
	ATR72	0.0	-	0.0
	BEC100	0.0	-	0.0
	BEC200	0.4	0.1	0.5
	BEC300	0.6	0.0	0.6
	BEC30B	0.3	0.0	0.3
	BEC33	0.0	-	0.0
	BEC55	0.0	-	0.0
	BEC58	0.1	0.0	0.1
	BEC58P	0.0	0.0	0.0
	BEC65	5.0	0.3	5.3
	BEC80	3.7	0.2	4.0
	BEC90	0.4	0.1	0.4
	BEC99	4.3	0.2	4.5
	BECM35	0.1	-	0.1
	CNA172	0.1	-	0.1
	CNA177	0.0	-	0.0
	CNA180	0.0	-	0.0
	CNA182	0.1	0.0	0.1
	CNA206	0.0	0.0	0.0
	CNA208	3.4	0.0	3.4
	CNA210	0.0	-	0.0
	CNA303	0.0	0.0	0.0
	CNA310	0.1	0.0	0.1
	CNA340	0.0	-	0.0
	CNA402	0.0	0.0	0.0
	CNA404	0.0	0.0	0.0
	CNA414	0.1	-	0.1
	CNA421	0.1	0.0	0.1
	CNA425	0.1	0.0	0.1
	CNA441	0.3	0.0	0.3
	DA42	0.0	-	0.0
	DC3	0.0	-	0.0
	DHC6	0.0	-	0.0
	DHC6QP	0.0	-	0.0
	DO328	0.0	-	0.0
	EMB120	0.0	0.0	0.0

Group	Aircraft Type	2016 Day	2016 Night	2016 Total
Propeller (Cont'd)	GASEPF	0.0	-	0.0
	GASEPV	0.1	0.0	0.1
	M20J	0.1	0.0	0.1
	MU2	0.0	0.0	0.0
	P180	0.0	0.0	0.1
	PA23AZ	0.0	-	0.0
	PA24	0.0	-	0.0
	PA28	0.0	0.0	0.0
	PA28AR	0.0	0.0	0.0
	PA28CA	0.0	-	0.0
	PA28DK	0.0	0.0	0.0
	PA30	0.0	-	0.0
	PA31	0.1	0.0	0.1
	PA31T	0.1	0.0	0.1
	PA32SG	0.0	-	0.0
	PA34	0.0	0.0	0.0
	PA42	0.0	-	0.0
	PA46	0.0	0.0	0.0
	PA60	0.0	-	0.0
	PC12	3.0	0.1	3.1
	RWCM69	0.0	-	0.0
	SAMER3	0.0	0.0	0.0
	SAMER4	4.0	0.3	4.3
	SR22	0.2	0.0	0.2
	STBM7	0.0	0.0	0.0
	TED600	0.2	0.0	0.2
Propeller Total		*35.7*	*2.5*	*38.2*
Helicopter	B206L	0.0	-	0.0
	B429	0.0	0.0	0.0
	R22	0.0	-	0.0
	R44	0.0	-	0.0
	S76	0.0	-	0.0
Helicopter Total		*0.1*	*0.0*	*0.1*
Military	C130E	0.1	0.0	0.1
	C-130E	2.2	0.0	2.3
	C17	0.0	-	0.0
	F-18	0.0	-	0.0
	KC-135	0.1	-	0.1
	T-38A	0.0	-	0.0
	T6	0.1	0.0	0.1
Military Total		*2.5*	*0.0*	*2.5*
Grand Total		*1,012.4*	*118.8*	*1,131.2*

Notes:

Totals may differ due to rounding.

As of January 1, 2016, all Stage 2 aircraft types are required to meet Stage 3 noise standards.

Source: MAC-provided AEDT input data, HNTB 2017

Table A1-2: Comparison of 2007 Forecast Fleet Mix and 2016 Actual Fleet Mix Average Daily Operations

Group	Aircraft Type	Day		Night		Total		Difference
		2007 Forecast	2016 Actual	2007 Forecast	2016 Actual	2007 Forecast	2016 Actual	
Manufactured to be Stage 3+	7478	-	0.0	-	0.0	-	0.0	0.0
	717200	7.3	23.2	1.0	1.6	8.3	24.8	16.5
	737300	48.2	2.7	3.5	0.8	51.7	3.5	(48.2)
	737400	0.1	0.2	-	0.1	0.1	0.3	0.2
	737500	5.7	0.0	0.5	0.0	6.2	0.0	(6.2)
	737700	7.8	40.3	0.5	10.5	8.3	50.8	42.5
	737800	65.5	63.3	12.6	18.8	78.1	82.1	4.0
	737900	5.7	33.5	0.5	6.1	6.2	39.7	33.5
	7373B2	-	3.1	-	0.4	-	3.5	3.5
	747400	1.9	0.1	0.2	0.0	2.1	0.1	(2.0)
	74720B	-	0.0	-	-	-	0.0	0.0
	757300	34.1	15.0	1.1	1.3	35.1	16.3	(18.8)
	757PW	88.4	33.1	8.6	7.1	97.1	40.2	(56.9)
	757RR	-	2.4	-	2.1	-	4.5	4.5
	767200	1.2	-	0.5	-	1.7	-	(1.7)
	767300	-	8.0	-	1.4	-	9.4	9.4
	767400	-	1.9	-	0.6	-	2.5	2.5
	767CF6	-	0.6	-	0.1	-	0.7	0.7
	767JT9	-	0.8	-	0.0	-	0.8	0.8
	777200	-	1.7	-	0.0	-	1.8	1.8
	7773ER	-	0.0	-	0.0	-	0.0	0.0
	777300	-	0.0	-	-		0.0	0.0
	7772LR	-	0.1	-	0.0		0.1	0.1
	7878R	-	0.0	-	-		0.0	0.0
	A300-622R	4.8	0.3	4.2	0.1	9.1	0.3	(8.8)
	A310-304	1.4	-	1.3		2.7		(2.7)
	A318	5.7	-	0.5	-	6.2	-	(6.2)
	A319-131	149.1	69.7	3.9	5.8	153.0	75.6	(77.4)
	A320-211	173.4	-	16.5	-	189.9	-	(189.9)
	A320-232	-	89.6	-	14.5	-	104.2	104.2
	A321-232	-	3.1	-	1.8	-	4.8	4.8
	A330-301	6.2	0.0	-	-	6.2	0.0	(6.2)
	A330-343	-	6.8	-	0.3	-	7.1	7.1
	A340-211	-	0.7		-	-	0.7	0.7
	A340-642	2.1	0.0	-	-	2.1	0.0	(2.1)
	AN124	-	0.0	-	0.0	-	0.0	0.0
	ASTR	2.3	-	0.2	-	2.5	-	(2.5)
	BAE146	74.3	0.0	2.2	-	76.5	0.0	(76.5)
	BD700	-	0.5	-	0.0	-	0.5	0.5
	BEC400	-	0.8	-	0.1	-	0.9	0.9
	CL600	-	5.1	-	0.4	-	5.6	5.6
	CL601	264.1	0.7	14.7	0.0	278.8	0.7	(278.1)
	CLREGJ	-	171.4	-	10.1	-	181.4	181.4
	CNA500	1.4	0.2	0.1	0.0	1.4	0.3	(1.1)
	CNA501	-	0.0	-	-	-	0.0	0.0

Group	Aircraft Type	Day		Night		Total		Difference
		2007 Forecast	2016 Actual	2007 Forecast	2016 Actual	2007 Forecast	2016 Actual	
Manufactured to be Stage 3+ (Cont'd)	CNA525C	-	0.8	-	0.0	-	0.8	0.8
	CNA550	-	0.2	-	0.0	-	0.2	0.2
	CNA55B	-	1.2	-	0.1	-	1.2	1.2
	CNA560	-	0.0	-	-	-	0.0	0.0
	CNA560E	-	0.4	-	0.0	-	0.5	0.5
	CNA560U	-	0.3	-	0.0	-	0.3	0.3
	CNA560XL	-	2.7	-	0.1	-	2.8	2.8
	CNA650	4.9	0.3	0.6	0.0	5.5	0.3	(5.2)
	CNA680	-	2.8	-	0.1	-	3.0	3.0
	CNA750	4.6	3.3	0.3	0.2	4.9	3.5	(1.4)
	CRJ701	-	27.4	-	1.4	-	28.8	28.8
	CRJ900	-	136.3	-	7.8	-	144.0	144.0
	D328J	-	0.1	-	0.0	-	0.1	0.1
	DC1010	9.6	0.4	3.8	0.1	13.4	0.4	(13.0)
	DC1030	-	0.3	-	0.1		0.4	0.4
	DC1040	-	0.3	-	0.1		0.5	0.5
	DC820	-	-	-	-	-	-	-
	DC860	-	-	-	-	-	-	-
	DC870	-	0.0	1.4	-	1.4	0.0	(1.4)
	EMB135	-	0.4	-	0.0	-	0.4	0.4
	EMB145	45.3	1.4	0.2	0.1	45.5	1.5	(44.0)
	EMB14L	-	0.7	-	0.0	-	0.7	0.7
	EMB170	-	82.8	-	8.3	-	91.1	91.1
	EMB175	-	0.0	-	-		0.0	0.0
	EMB190	-	2.0	-	0.1	-	2.1	2.1
	F10062	-	0.1	-	0.0	-	0.2	0.2
	FAL10	-	0.1	-	0.0	-	0.1	0.1
	FAL20A	1.0	1.7	0.7	0.1	1.7	1.8	0.1
	FAL50	-	1.3	-	0.1	-	1.4	1.4
	FAL900	-	1.2	-	0.1	-	1.3	1.3
	G150	-	0.2	-	0.0	-	0.3	0.3
	G200	-	1.2	-	0.1	-	1.3	1.3
	GIV	2.6	1.4	0.2	0.1	2.8	1.6	(1.2)
	GV	0.8	2.0	0.1	0.3	0.9	2.3	1.4
	HK4000	-	0.0	-	0.0	-	0.0	0.0
	HS125	-	0.0	-	-	-	0.0	0.0
	HS1258	-	2.6	-	0.2	-	2.7	2.7
	IA1124	-	0.0	-	0.0	-	0.0	0.0
	IA1125	-	0.5	-	0.0	-	0.6	0.6
	L101	0.6	-	0.2	-	0.8	-	(0.8)
	LEAR31	-	0.1	-	0.0	-	0.1	0.1
	LEAR35	26.0	0.7	2.3	0.1	28.4	0.8	(27.6)
	LEAR45	-	2.0	-	0.1	-	2.1	2.1
	LEAR55	-	0.1	-	0.0	-	0.1	0.1
	LEAR60	-	0.5	-	0.0	-	0.5	0.5
	MD11GE	0.3	2.7	0.4	1.8	0.7	4.5	3.8
	MD11PW	-	1.2	-	0.7	-	1.9	1.9
	MD80	-	-	-		-		-

Group	Aircraft Type	Day		Night		Total		Difference
		2007 Forecast	2016 Actual	2007 Forecast	2016 Actual	2007 Forecast	2016 Actual	
Manufactured to be Stage 3+ (Cont'd)	MD81	0.5	0.0	-	0.0	0.6	0.0	(0.6)
	MD82	-	4.7	-	1.2	-	5.8	5.8
	MD83	17.0	7.0	1.6	1.6	18.6	8.5	(10.1)
	MD88	-	22.7	-	0.6	-	23.3	23.3
	MD9025	-	34.2	-	1.8	-	36.0	36.0
	MD9028	-	41.3	-	2.7	-	44.0	44.0
	MU300	7.2	0.0	0.6	0.0	7.8	0.0	(7.8)
	R390	-	0.2	-	0.0	-	0.2	0.2
	SBR2	0.4	-	-	-	0.4	-	(0.4)
Manufactured to be Stage 3+ Total		*1,071.5*	*972.7*	*85.0*	*114.5*	*1,156.7*	*1,087.3*	*(69.4)*
Hushkit Stage 3 Jet	727EM2	8.0	-	6.4	0.0	14.4	0.0	(14.4)
	737N17	-	0.1	-	0.0	-	0.1	0.1
	DC93LW	-	0.0	-	0.0	-	0.0	0.0
	DC9Q	245.3	-	15.3	-	260.5	-	(260.5)
Hushkit Stage 3 Jet Total		*253.3*	*0.1*	*21.7*	*0.0*	*274.9*	*0.1*	*(274.8)*
Retrofitted Stage 2 Jet	FAL20	-	0.6	-	1.7	-	2.3	2.3
	GIIB	-	0.1	-	0.0	-	0.1	0.1
Retrofitted Stage 2 Jet Total		*-*	*0.7*	*-*	*1.7*	*-*	*2.3*	2.3
Stage 2 Jets under 75,000 lbs	GIIB	2.1	-	0.2	-	2.3	-	(2.3)
	LEAR25	2.1	-	0.4	-	2.5	-	(2.5)
Stage 2 Jets Under 75,000 lbs Total		*4.2*	*-*	*0.6*	*-*	*4.8*	*-*	*(4.8)*
Microjet	CNA510	-	0.4	-	0.0	-	0.5	0.5
	ECLIPSE500	-	0.2	-	0.0	-	0.2	0.2
Microjet Total		*-*	*0.6*	*-*	*0.0*	*-*	*0.7*	*0.7*
Propeller	1900D	-	7.0	-	0.8	-	7.8	7.8
	AC95	-	0.0	-	-	-	0.0	0.0
	ATR42	-	1.3	-	0.1	-	1.4	1.4
	ATR72	-	0.0	-	-	-	0.0	0.0
	BEC100	-	0.0	-	-	-	0.0	0.0
	BEC200	-	0.4	-	0.1	-	0.5	0.5
	BEC300	-	0.6	-	0.0	-	0.6	0.6
	BEC30B	-	0.3	-	0.0	-	0.3	0.3
	BEC33	-	0.0	-	-	-	0.0	0.0
	BEC55		0.0	-	-		0.0	0.0
	BEC58	14.3	0.1	4.7	0.0	19.0	0.1	(18.9)
	BEC58P	-	0.0	-	0.0		0.0	0.0
	BEC65	-	5.0	-	0.3	-	5.3	5.3
	BEC80	-	3.7	-	0.2	-	4.0	4.0
	BEC90	-	0.4	-	0.1	-	0.4	0.4
	BEC99	-	4.3	-	0.2	-	4.5	4.5
	BECM35	-	0.1	-	-	-	0.1	0.1
	CNA172	-	0.1	-	-	-	0.1	0.1
	CNA177	-	0.0	-	-		0.0	0.0
	CNA180	-	0.0	-	-	-	0.0	0.0
	CNA182	-	0.1	-	0.0	-	0.1	0.1
	CNA206	-	0.0	-	0.0	-	0.0	0.0
	CNA208	-	3.4	-	0.0	-	3.4	3.4
	CNA210	-	0.0	-	-	-	0.0	0.0

Group	Aircraft Type	Day		Night		Total		Difference
		2007 Forecast	2016 Actual	2007 Forecast	2016 Actual	2007 Forecast	2016 Actual	
Propeller (Cont'd)	CNA303	-	0.0	-	0.0	-	0.0	0.0
	CNA310	-	0.1	-	0.0	-	0.1	0.1
	CNA340	-	0.0	-	-	-	0.0	0.0
	CNA402	-	0.0	-	0.0	-	0.0	0.0
	CNA404	-	0.0	-	0.0	-	0.0	0.0
	CNA414	-	0.1	-	-	-	0.1	0.1
	CNA421	-	0.1	-	0.0	-	0.1	0.1
	CNA425	-	0.1	-	0.0	-	0.1	0.1
	CNA441	-	0.3	-	0.0	-	0.3	0.3
	DA42	-	0.0	-	-	-	0.0	0.0
	DC3	-	0.0	-	-		0.0	0.0
	DHC6	22.5	0.0	4.4	-	26.8	0.0	(26.8)
	DHC6QP	-	0.0	-	-	-	0.0	0.0
	DO328	-	0.0	-	-	-	0.0	0.0
	EMB120	-	0.0	-	0.0		0.0	0.0
	FK27	0.1	-	-	-	0.1	-	(0.1)
	GASEPF	1.3	0.0	0.3	-	1.6	0.0	(1.6)
	GASEPV	3.7	0.1	0.5	0.0	4.3	0.1	(4.2)
	M20J	-	0.1	-	0.0	-	0.1	0.1
	MU2	-	0.0	-	0.0	-	0.0	0.0
	P180	-	0.0	-	0.0	-	0.1	0.1
	PA23AZ	-	0.0	-	-	-	0.0	0.0
	PA24	-	0.0	-	-	-	0.0	0.0
	PA28	-	0.0	-	0.0	-	0.0	0.0
	PA28AR	-	0.0	-	0.0	-	0.0	0.0
	PA28CA	-	0.0	-	-		0.0	0.0
	PA28DK	-	0.0	-	0.0	-	0.0	0.0
	PA30	-	0.0	-	-	-	0.0	0.0
	PA31	-	0.1	-	0.0	-	0.1	0.1
	PA31T	-	0.1	-	0.0	-	0.1	0.1
	PA32SG	-	0.0	-	-	-	0.0	0.0
	PA34	-	0.0	-	0.0	-	0.0	0.0
	PA42	-	0.0	-	-	-	0.0	0.0
	PA46	-	0.0	-	0.0	-	0.0	0.0
	PA60	-	0.0	-	-	-	0.0	0.0
	PC12	-	3.0	-	0.1	-	3.1	3.1
	RWCM69	-	0.0	-	-	-	0.0	0.0
	SAMER3	-	0.0	-	0.0	-	0.0	0.0
	SAMER4	-	4.0	-	0.3	-	4.3	4.3
	SF340	93.3	-	5.9	-	99.2	-	(99.2)
	SR22	-	0.2	-	0.0	-	0.2	0.2
	STBM7	-	0.0	-	0.0	-	0.0	0.0
	TED600	-	0.2	-	0.0	-	0.2	0.2
Propeller Total		*135.2*	*35.7*	*15.8*	*2.5*	*151.0*	*38.2*	*(112.8)*

Group	Aircraft Type	Day		Night		Total		Difference
		2007 Forecast	2016 Actual	2007 Forecast	2016 Actual	2007 Forecast	2016 Actual	
Helicopter	B206L	-	0.0	-	-	-	0.0	0.0
	B429	-	0.0	-	0.0	-	0.0	0.0
	R22	-	0.0	-	-	-	0.0	0.0
	R44	-	0.0	-	-	-	0.0	0.0
	S76	-	0.0	-	-	-	0.0	0.0
Helicopter Total		-	*0.1*	-	*0.0*	-	*0.1*	*0.1*
Military	C130E	-	0.1	-	0.0	-	0.1	0.1
	C-130E	7.8	2.2	0.2	0.0	8.0	2.3	(5.7)
	C17	-	0.0	-	-	0.1	0.0	(0.1)
	C5	0.1	-	-	-	0.1	-	(0.1)
	F16GE	0.1	-	-	-	0.1	-	(0.1)
	F-18	-	0.0	-	-	-	0.0	0.0
	KC-135	-	0.1	-	-	-	0.1	0.1
	T37	0.1	-	-	-	0.1	-	(0.1)
	T38	0.1	-	-	-	0.1	-	(0.1)
	T-38A	-	0.0	-	-	-	0.0	0.0
	T6	-	0.1	-	0.0	-	0.1	0.1
Military Total		*8.2*	*2.5*	*0.2*	*0.0*	*8.5*	*2.5*	*(6.0)*
Grand Total		***1,472.4***	***1,011.7***	***123.3***	***117.1***	***1,595.9***	***1,128.9***	**(467.0)**

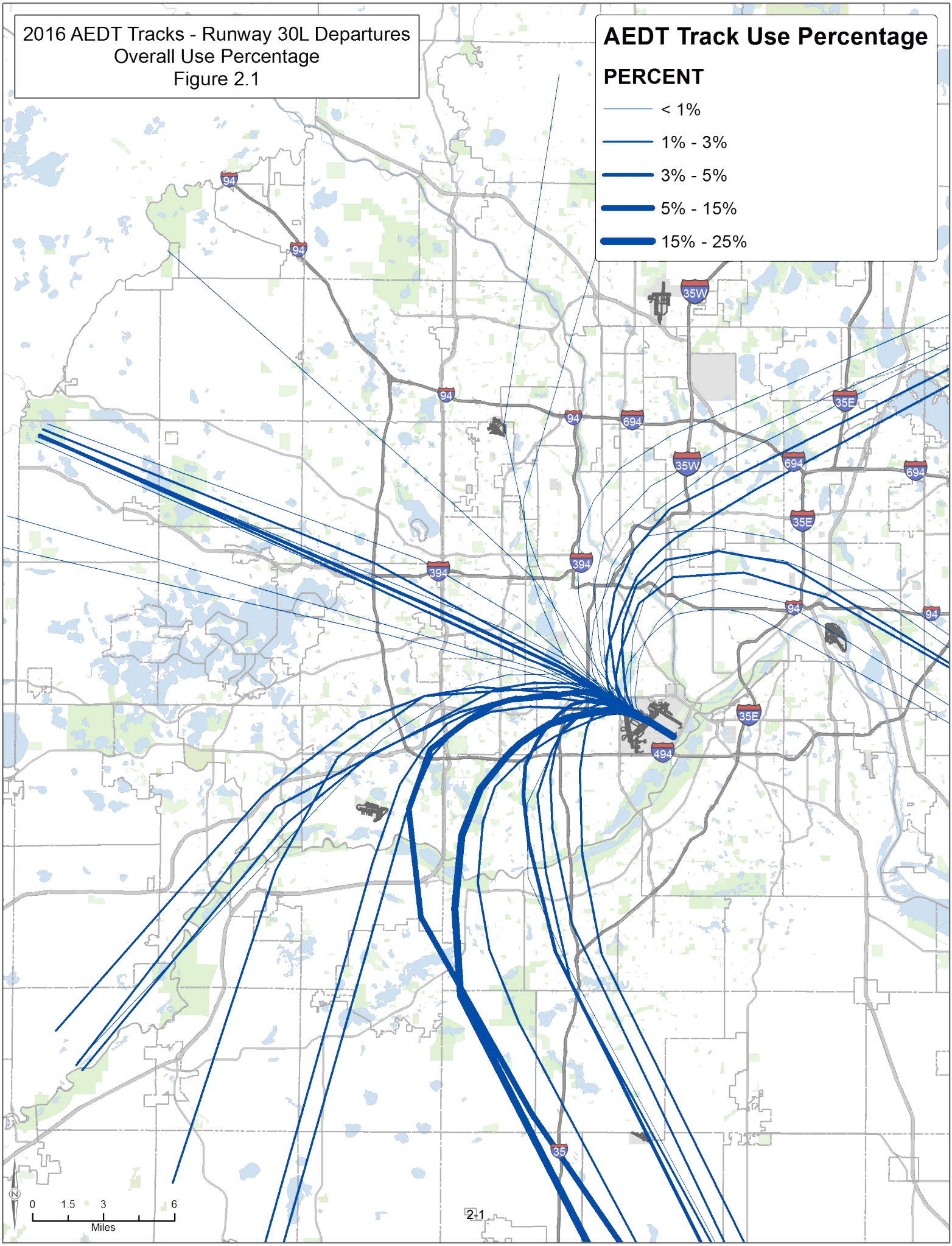
Notes:

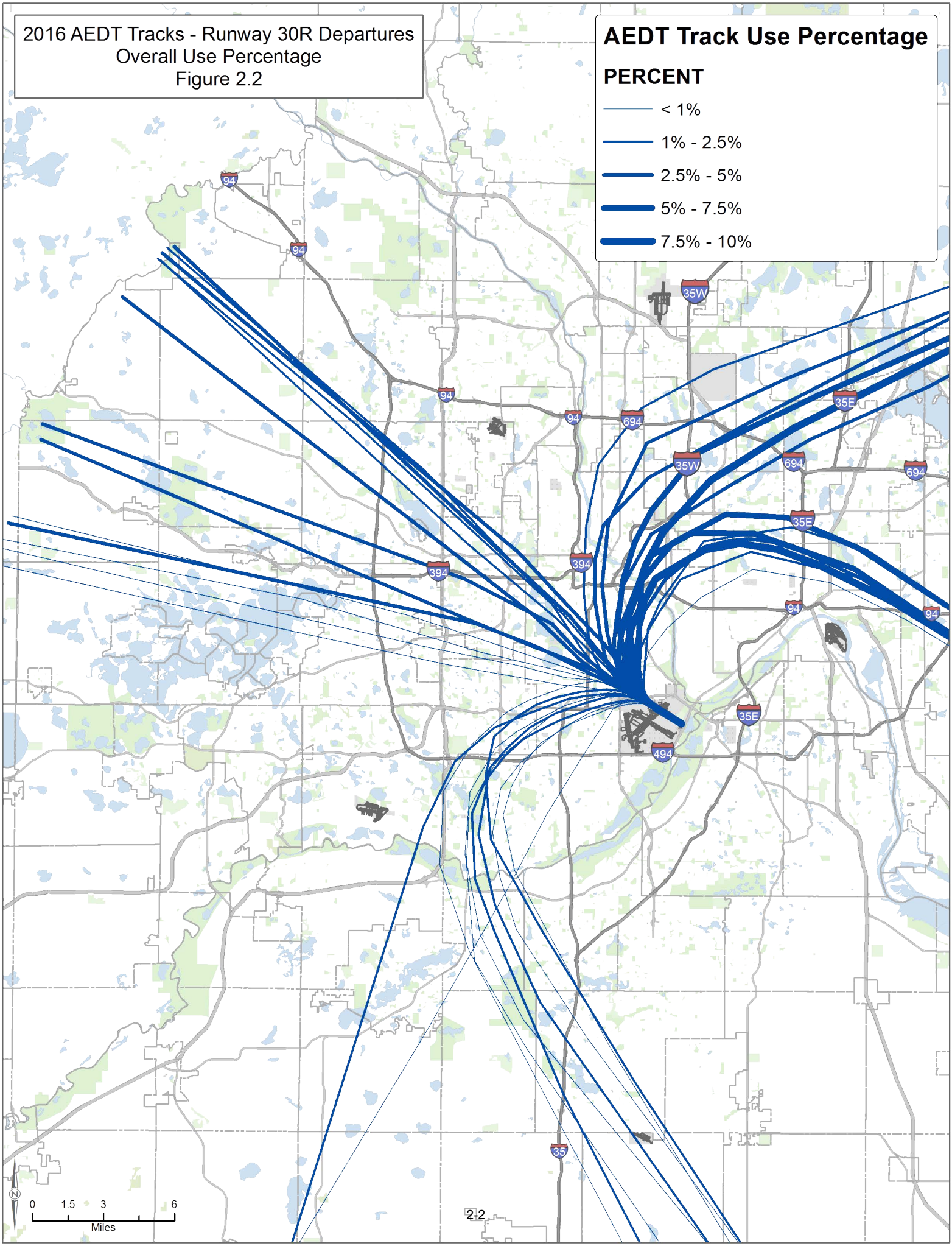
Total may differ due to rounding.

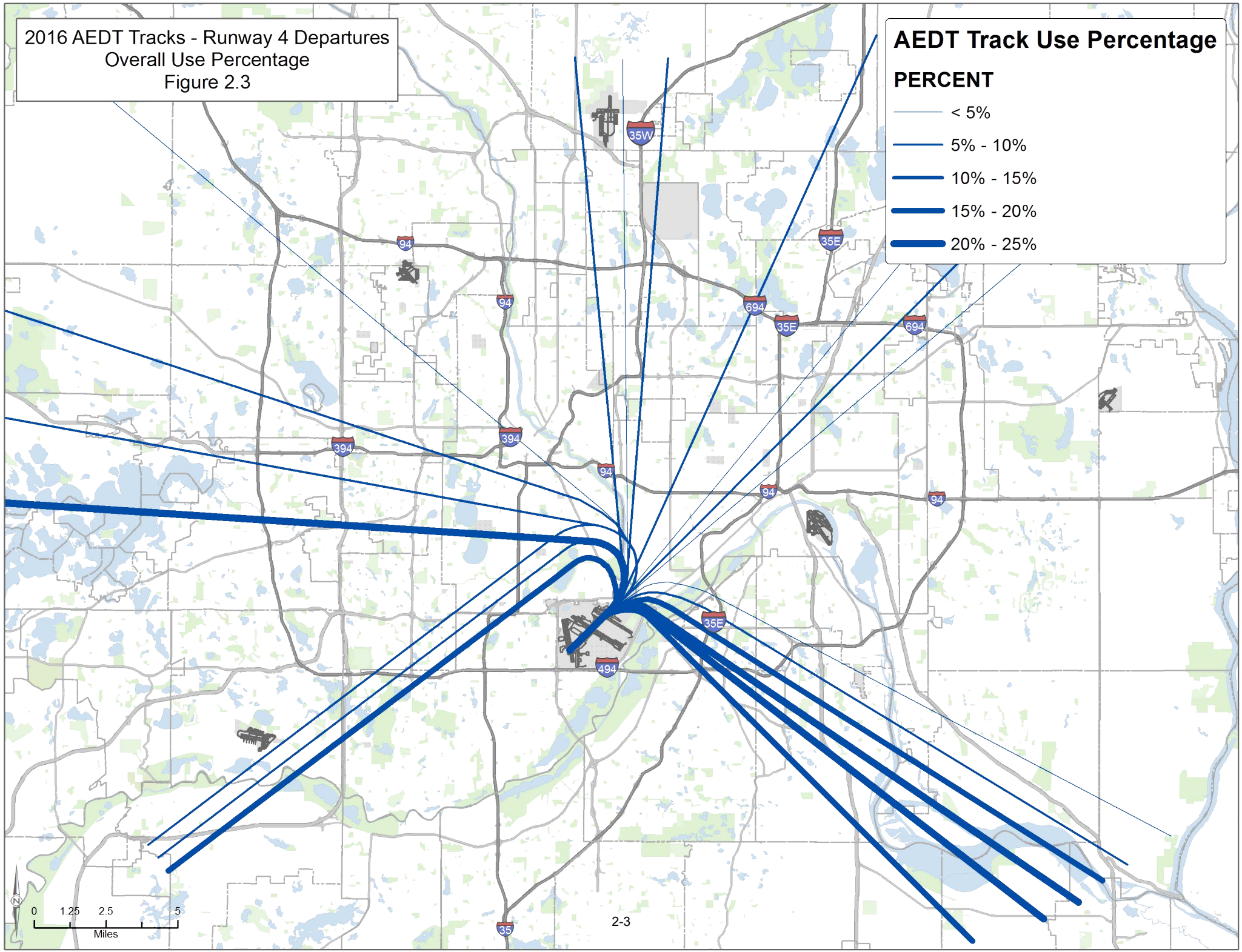
As of January 1, 2016, all Stage 2 aircraft types are required to meet Stage 3 noise standards.

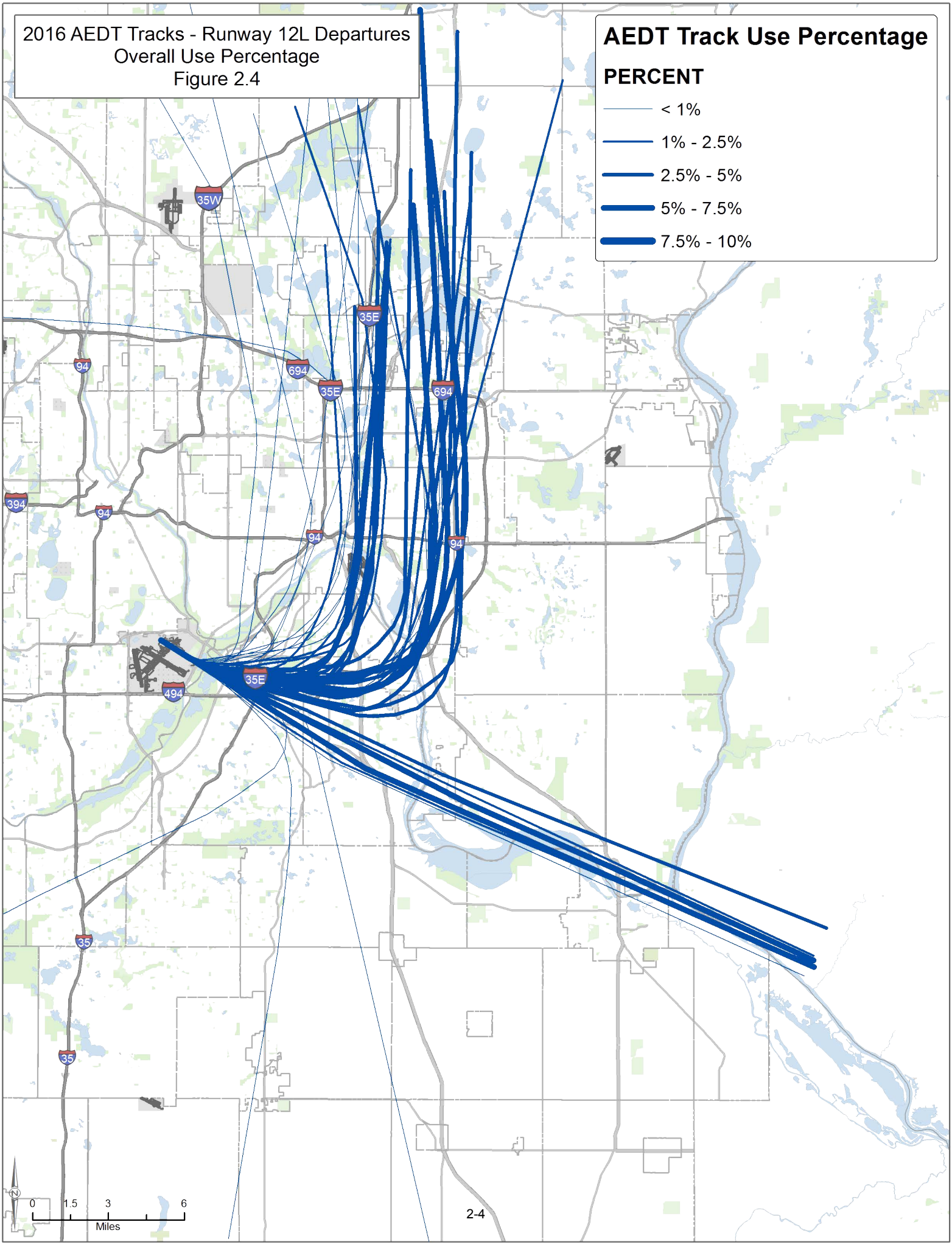
Source: MAC-provided INM Input Data, HNTB 2016. Average Daily Operations for 2007 Forecast were obtained from the November 2004 Part 150 document.

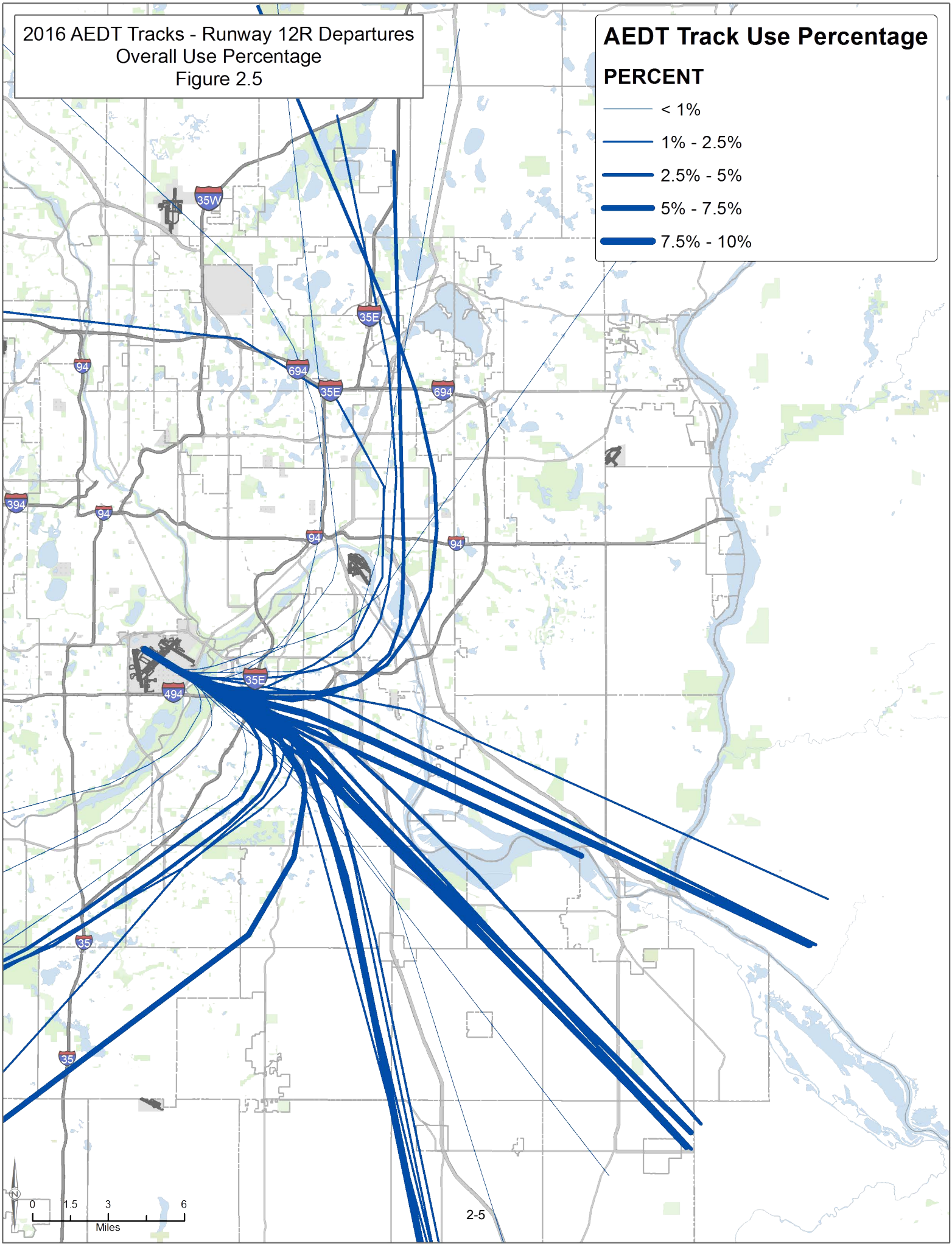
Appendix 2: 2016 Model Flight Tracks and Use

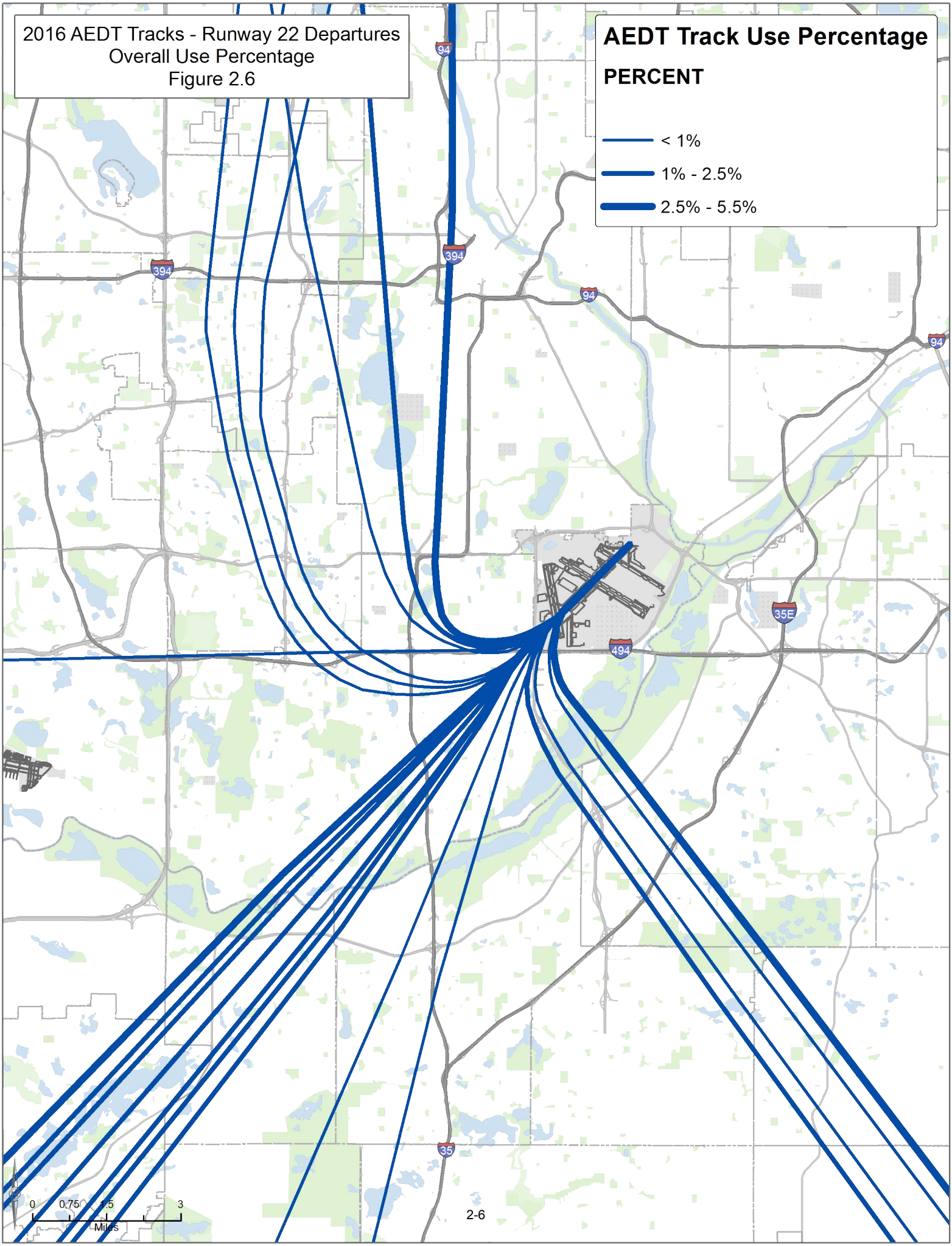

2016 AEDT Tracks - Runway 30L Departures
Overall Use Percentage
Figure 2.1
AEDT Track Use Percentage
PERCENT
< 1%
1% - 3%
3% - 5%
5% - 15%
15% - 25%
94
35W
35E
694
394
494
35
0
1.5
3
6
Miles
2-1

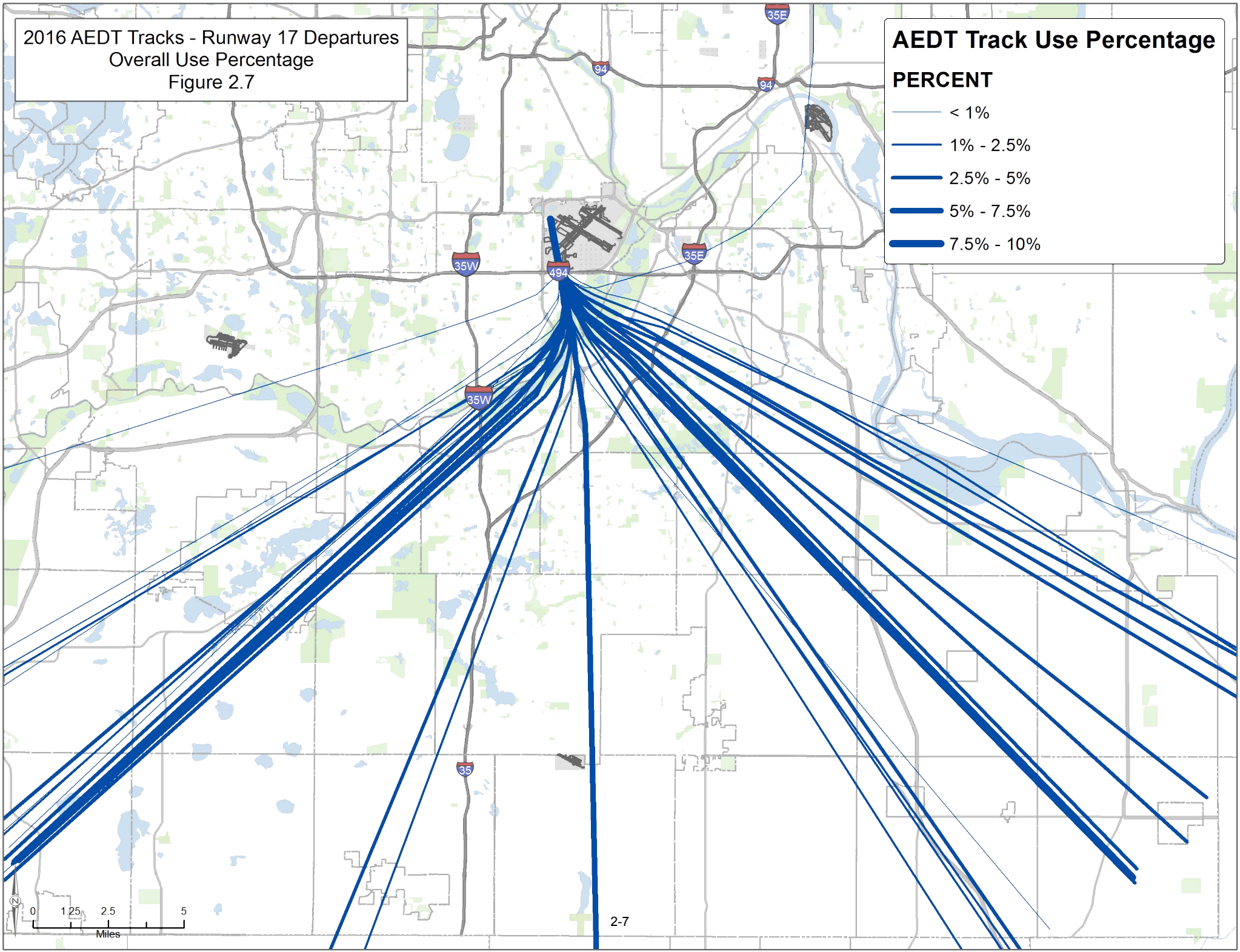

2016 AEDT Tracks - Runway 30R Departures
Overall Use Percentage
Figure 2.2
AEDT Track Use Percentage
PERCENT
< 1%
1% - 2.5%
2.5% - 5%
5% - 7.5%
7.5% - 10%
94
35W
694
35E
394
494
35
0
1.5
3
6
Miles
2-2

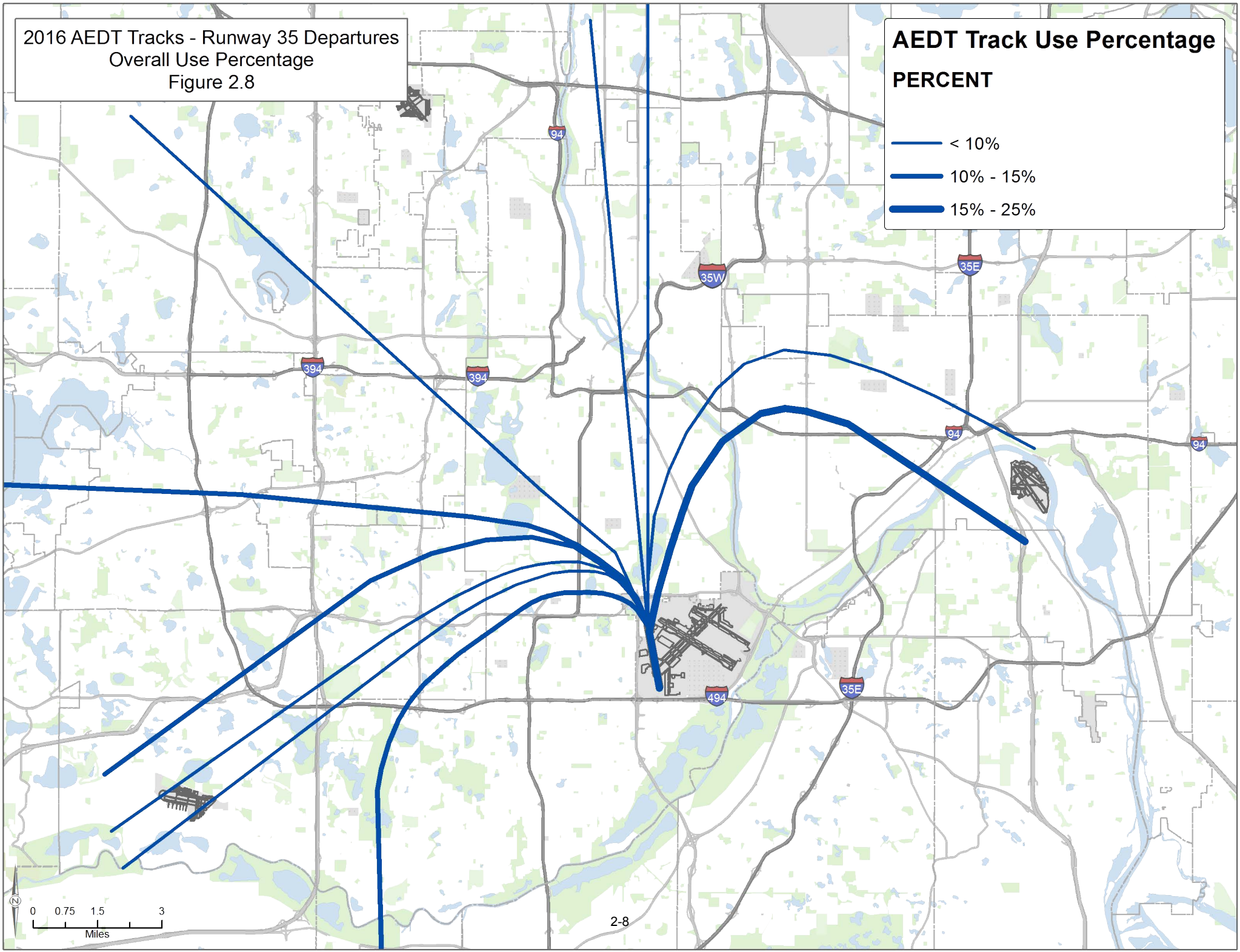

2016 AEDT Tracks - Runway 4 Departures
Overall Use Percentage
Figure 2.3
AEDT Track Use Percentage
PERCENT
< 5%
5% - 10%
10% - 15%
15% - 20%
20% - 25%
35W
94
35E
694
394
494
35
0
1.25
2.5
5
Miles

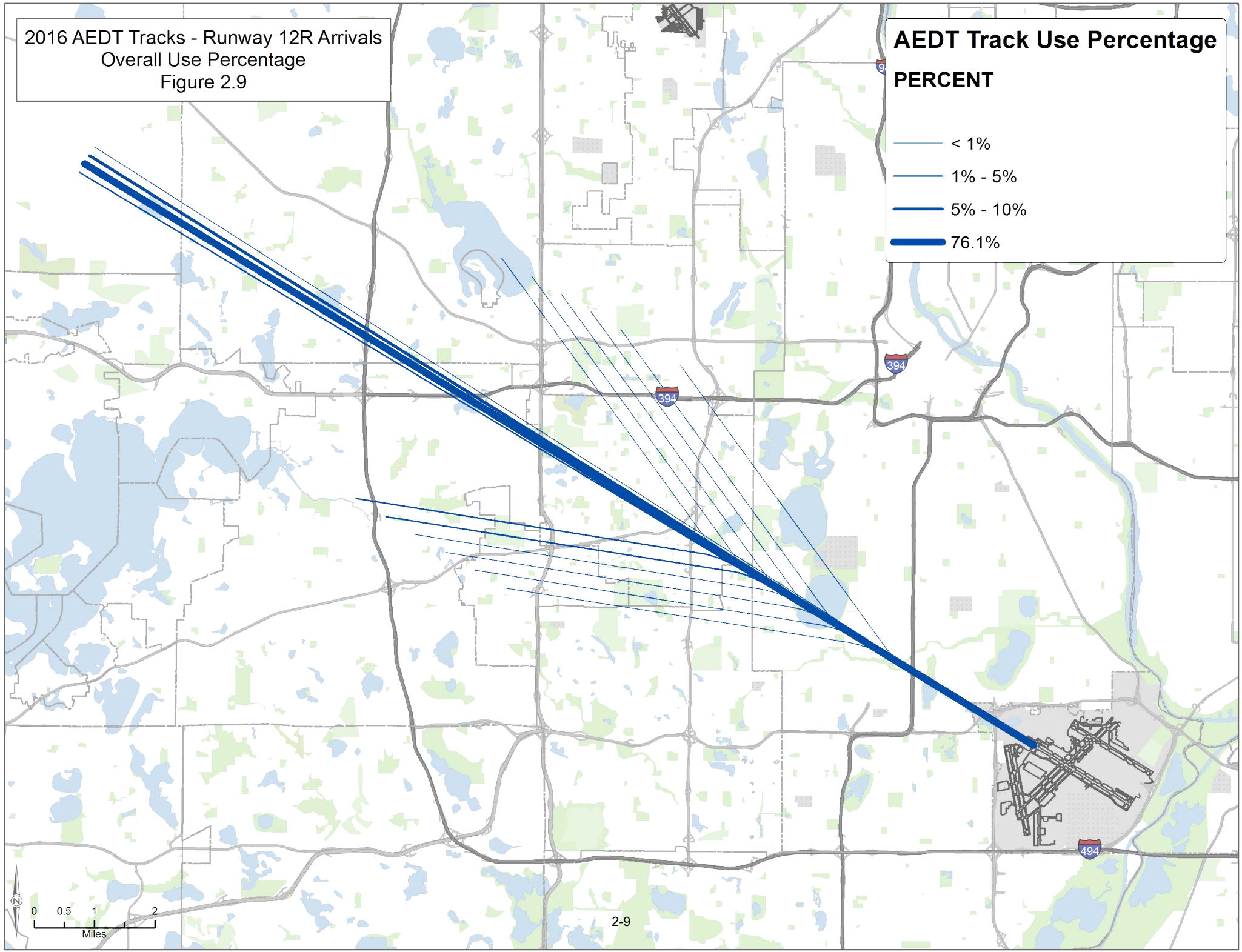

2016 AEDT Tracks - Runway 12L Departures
Overall Use Percentage
Figure 2.4
AEDT Track Use Percentage
PERCENT
< 1%
1% - 2.5%
2.5% - 5%
5% - 7.5%
7.5% - 10%
35W
35E
694
94
394
494
35
0
1.5
3
6
Miles
N

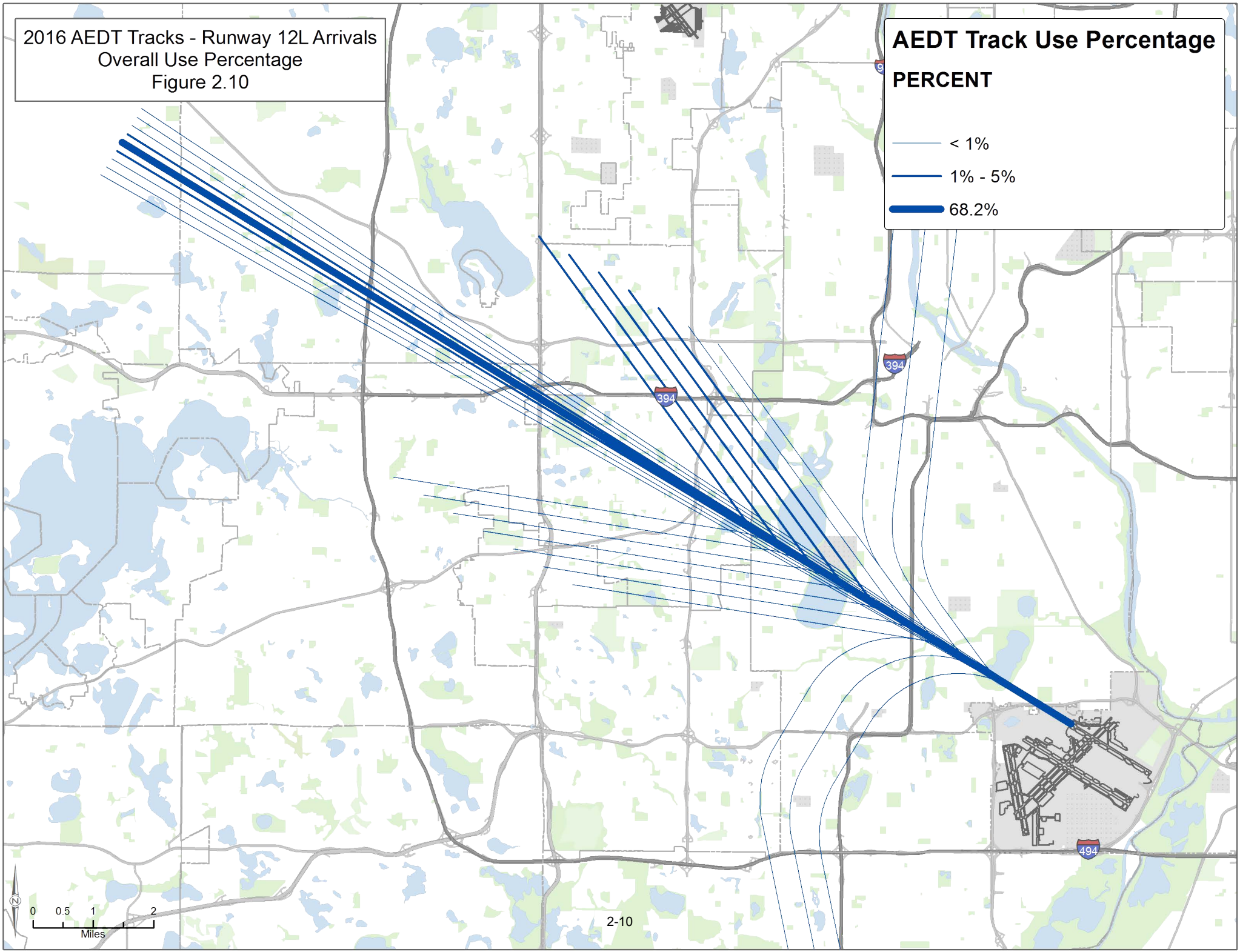

2016 AEDT Tracks - Runway 12R Departures
Overall Use Percentage
Figure 2.5
AEDT Track Use Percentage
PERCENT
< 1%
1% - 2.5%
2.5% - 5%
5% - 7.5%
7.5% - 10%
35W
35E
94
694
394
494
35
0
1.5
3
6
Miles
2-5

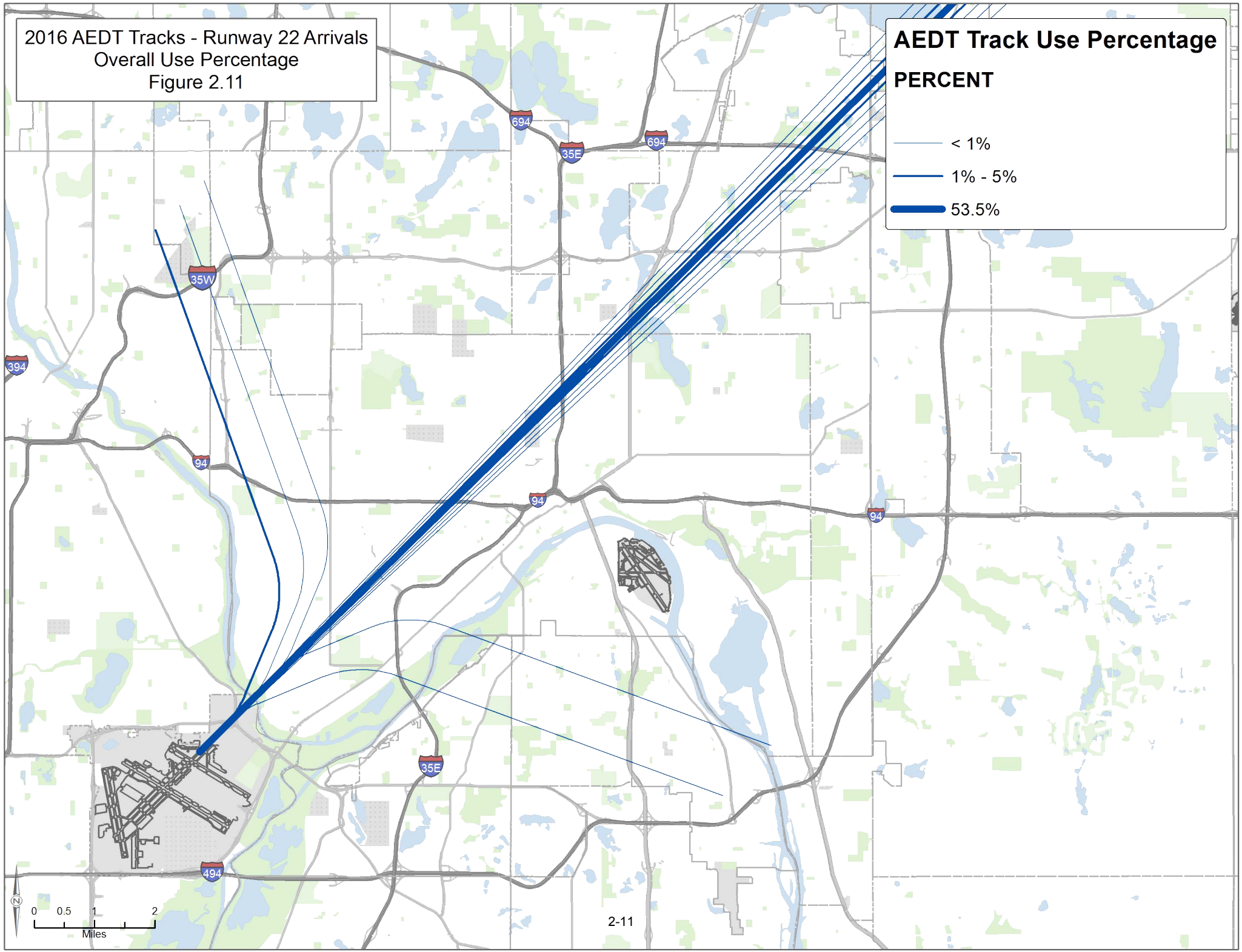

2016 AEDT Tracks - Runway 22 Departures
Overall Use Percentage
Figure 2.6
AEDT Track Use Percentage
PERCENT
< 1%
1% - 2.5%
2.5% - 5.5%
94
394
494
35E
35
0
0.75
1.5
3
Miles

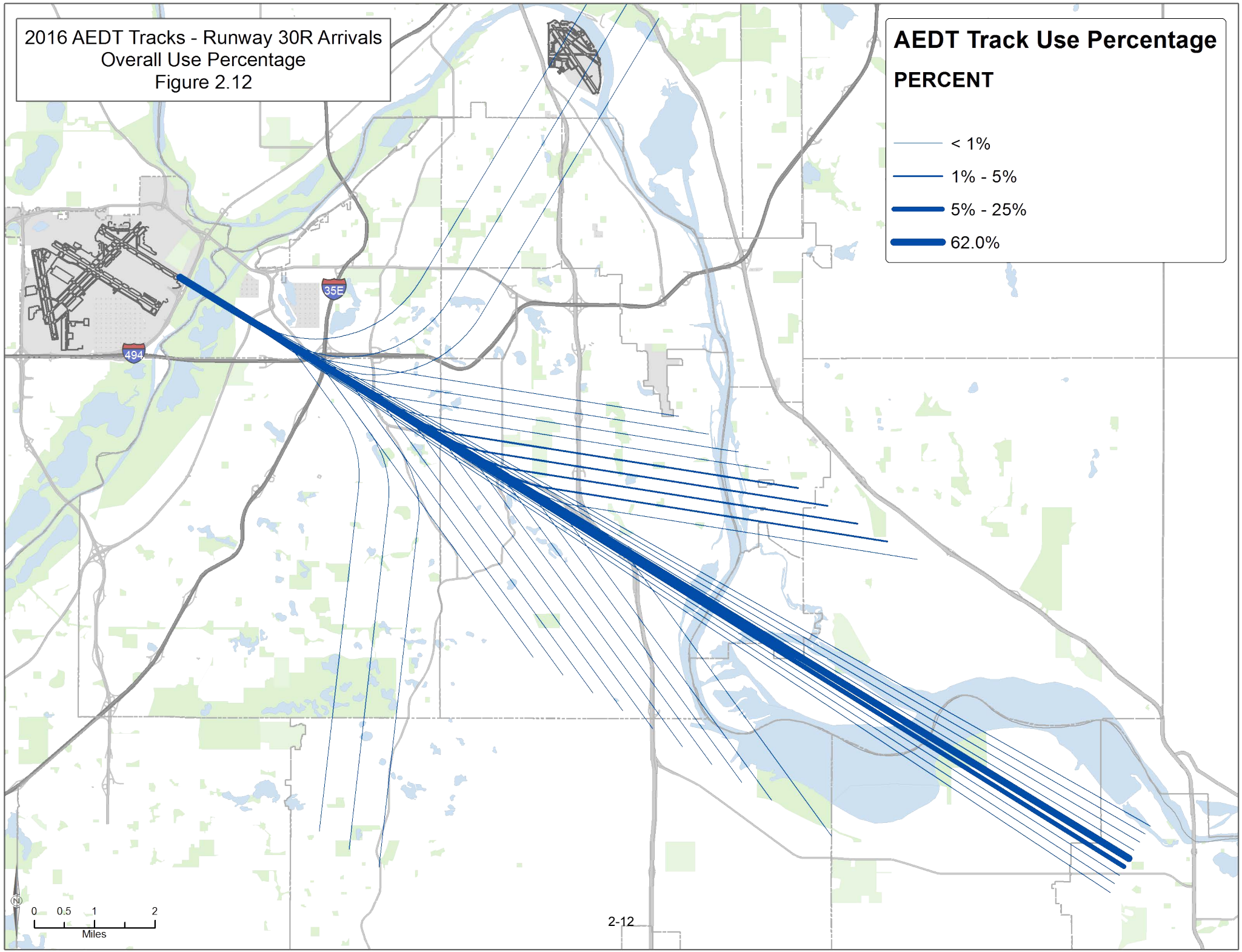

2016 AEDT Tracks - Runway 17 Departures
Overall Use Percentage
Figure 2.7
AEDT Track Use Percentage
PERCENT
< 1%
1% - 2.5%
2.5% - 5%
5% - 7.5%
7.5% - 10%
35E
94
94
35W
494
35E
35W
35
0
1.25
2.5
5
Miles
N

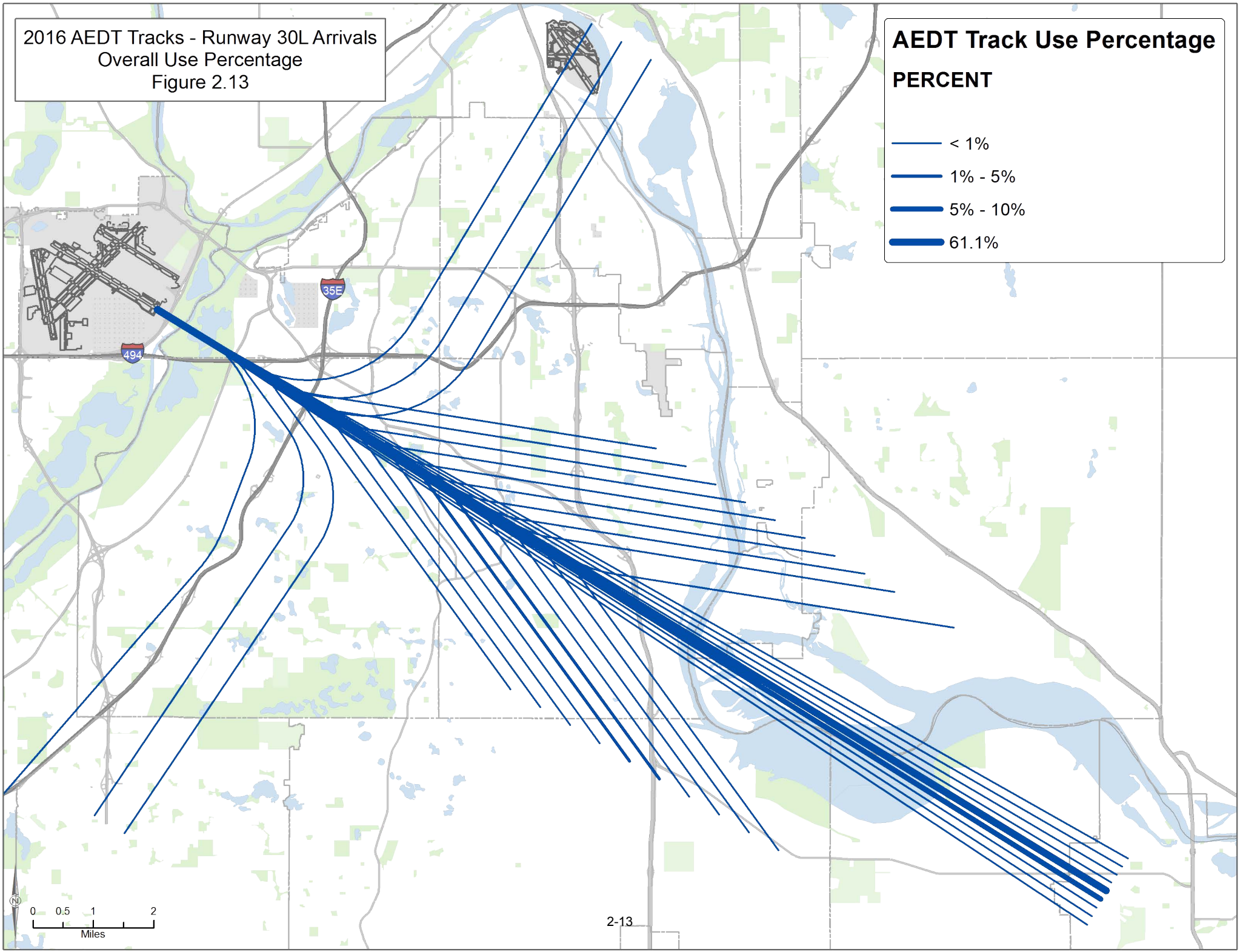

2016 AEDT Tracks - Runway 35 Departures
Overall Use Percentage
Figure 2.8
AEDT Track Use Percentage
PERCENT
< 10%
10% - 15%
15% - 25%
94
35W
35E
394
494
0 0.75 1.5 3
Miles

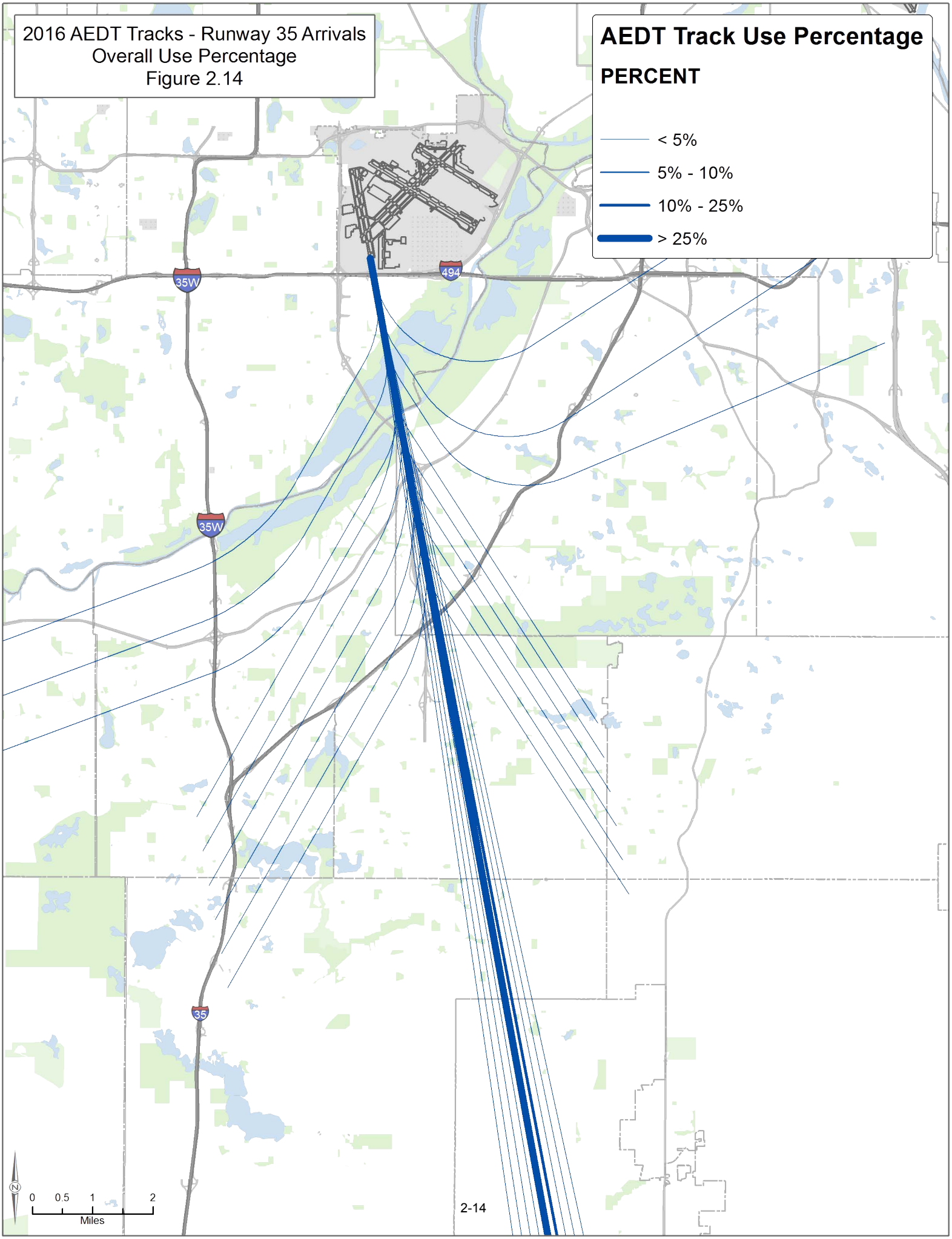

2016 AEDT Tracks - Runway 12R Arrivals
Overall Use Percentage
Figure 2.9
AEDT Track Use Percentage
PERCENT
< 1%
1% - 5%
5% - 10%
76.1%
394
394
494
0 0.5 1 2
Miles

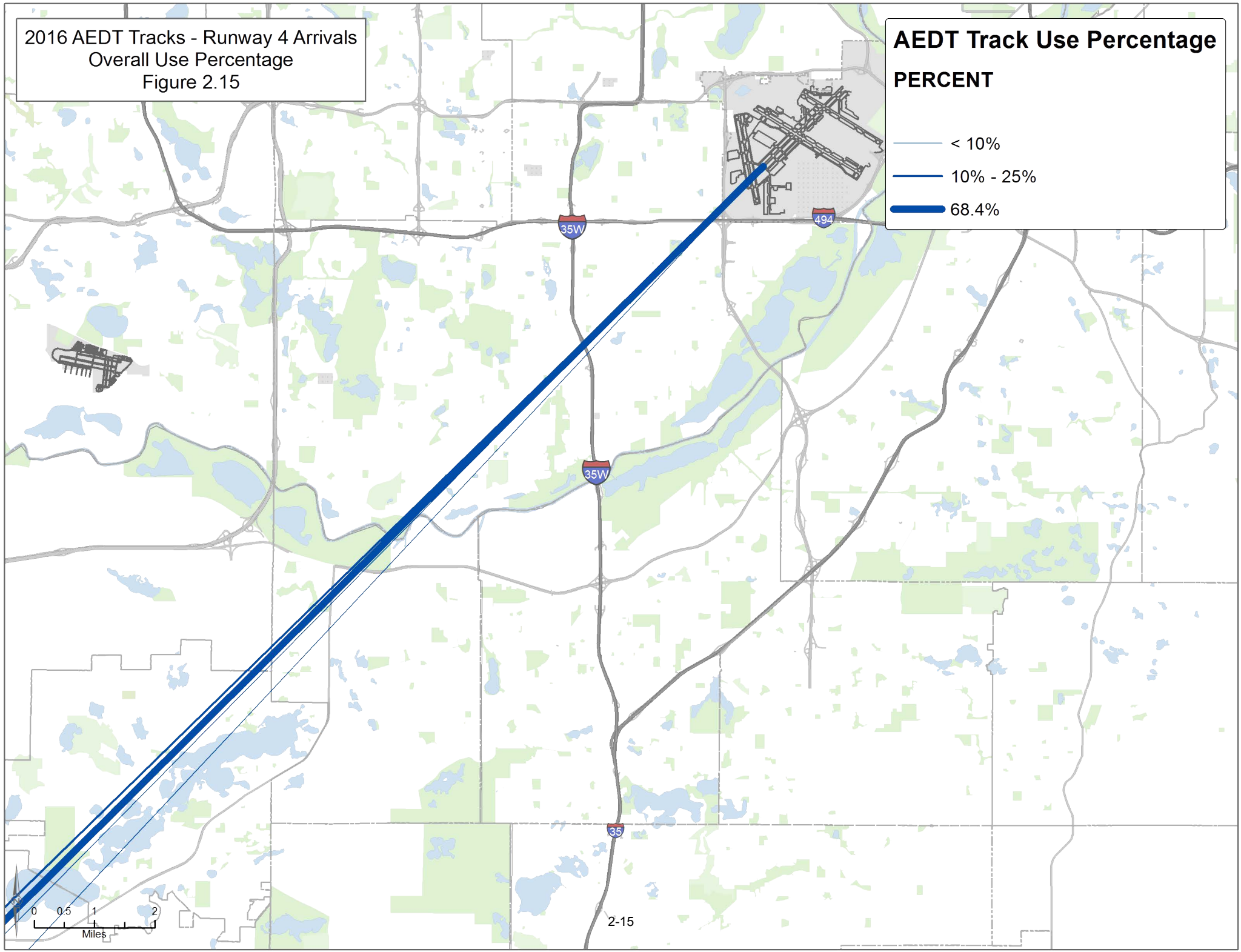

2016 AEDT Tracks - Runway 12L Arrivals
Overall Use Percentage
Figure 2.10
AEDT Track Use Percentage
PERCENT
< 1%
1% - 5%
68.2%
394
494
0 0.5 1 2
Miles

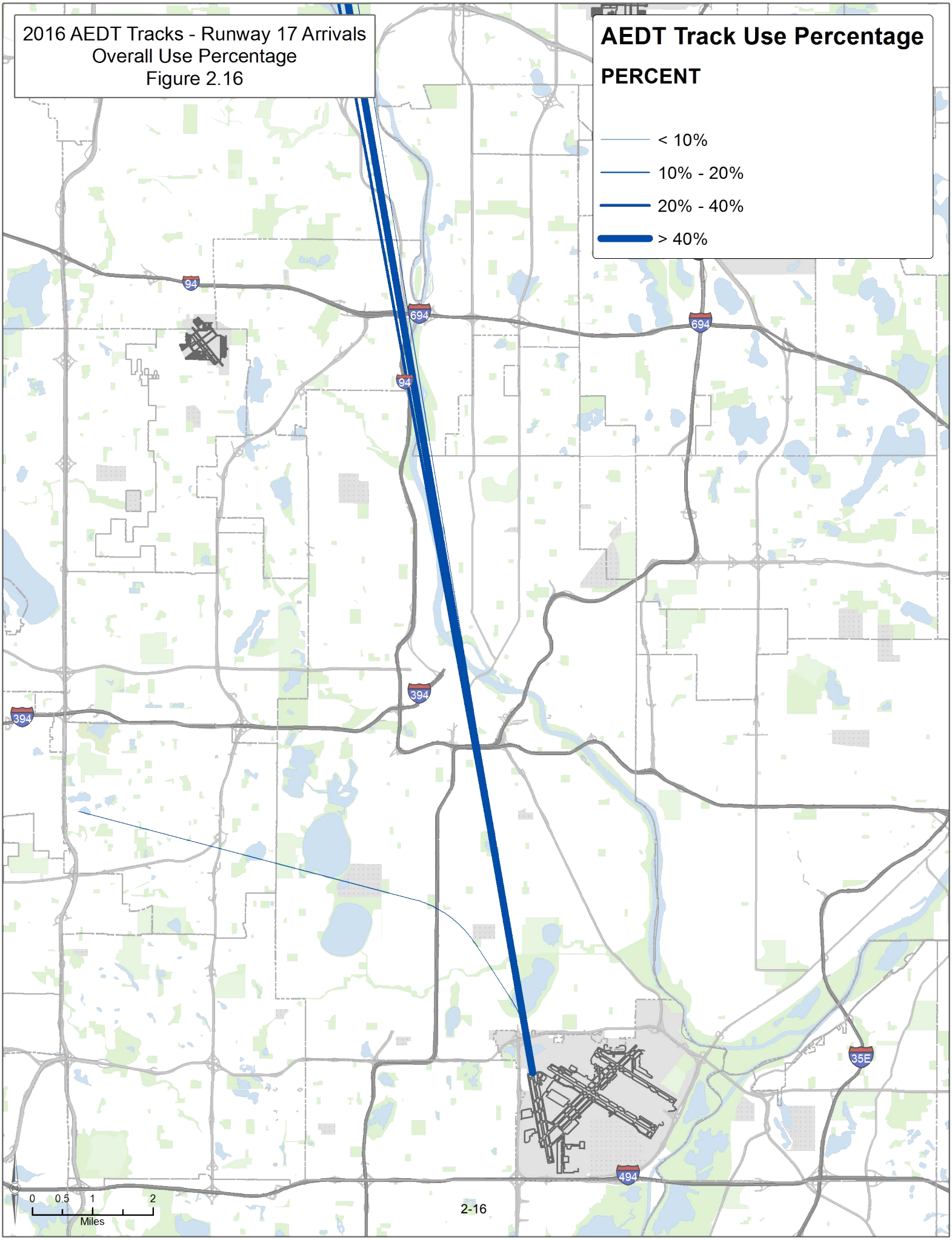

2016 AEDT Tracks - Runway 22 Arrivals
Overall Use Percentage
Figure 2.11
AEDT Track Use Percentage
PERCENT
< 1%
1% - 5%
53.5%
694
35E
35W
394
94
494
0 0.5 1 2
Miles


2016 AEDT Tracks - Runway 30R Arrivals
Overall Use Percentage
Figure 2.12
AEDT Track Use Percentage
PERCENT
< 1%
1% - 5%
5% - 25%
62.0%
35E
494
0 0.5 1 2
Miles

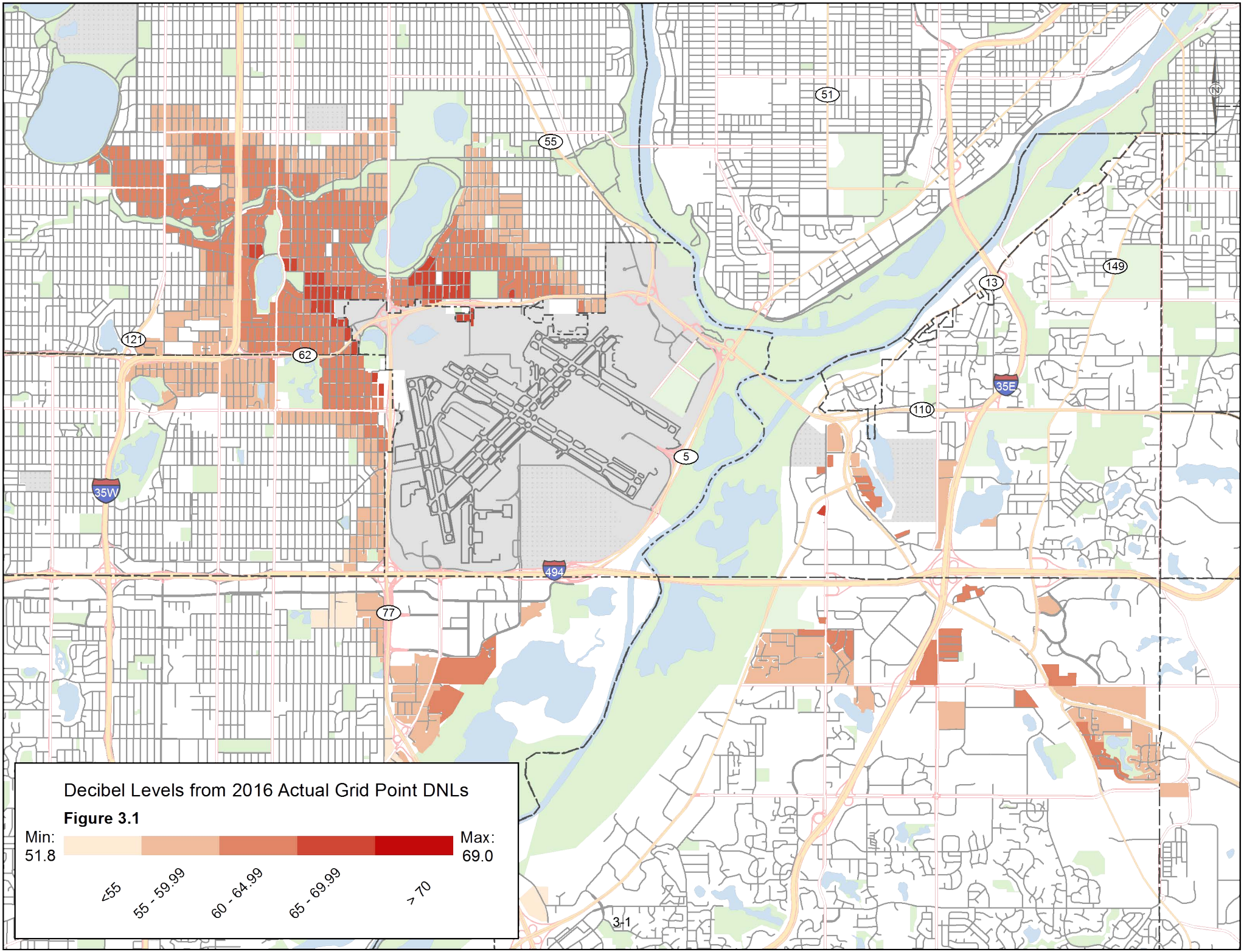

2016 AEDT Tracks - Runway 30L Arrivals
Overall Use Percentage
Figure 2.13
AEDT Track Use Percentage
PERCENT
< 1%
1% - 5%
5% - 10%
61.1%
35E
494
0 0.5 1 2
Miles

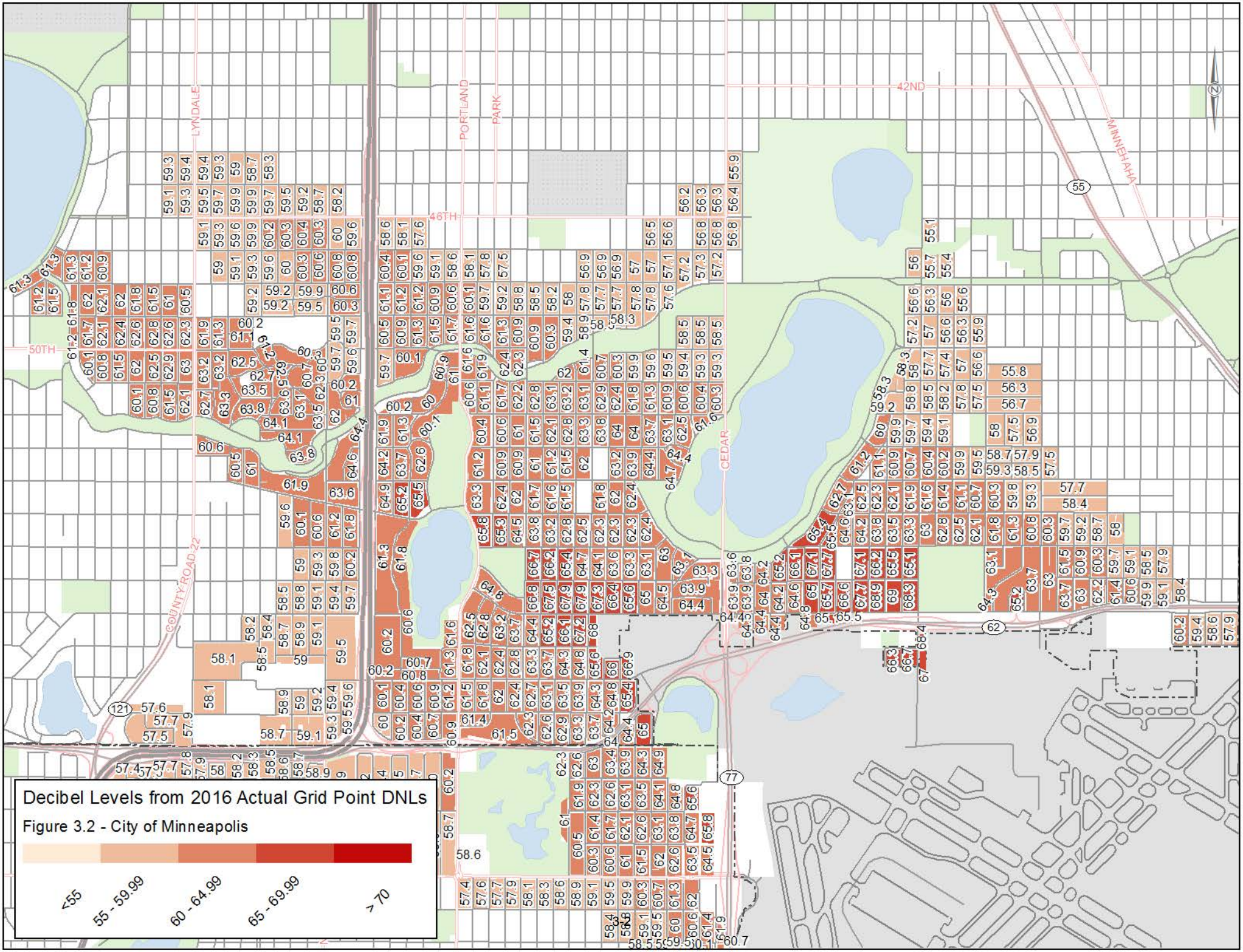

2016 AEDT Tracks - Runway 35 Arrivals
Overall Use Percentage
Figure 2.14
AEDT Track Use Percentage
PERCENT
< 5%
5% - 10%
10% - 25%
> 25%
35W
494
35W
35
0
0.5
1
2
Miles

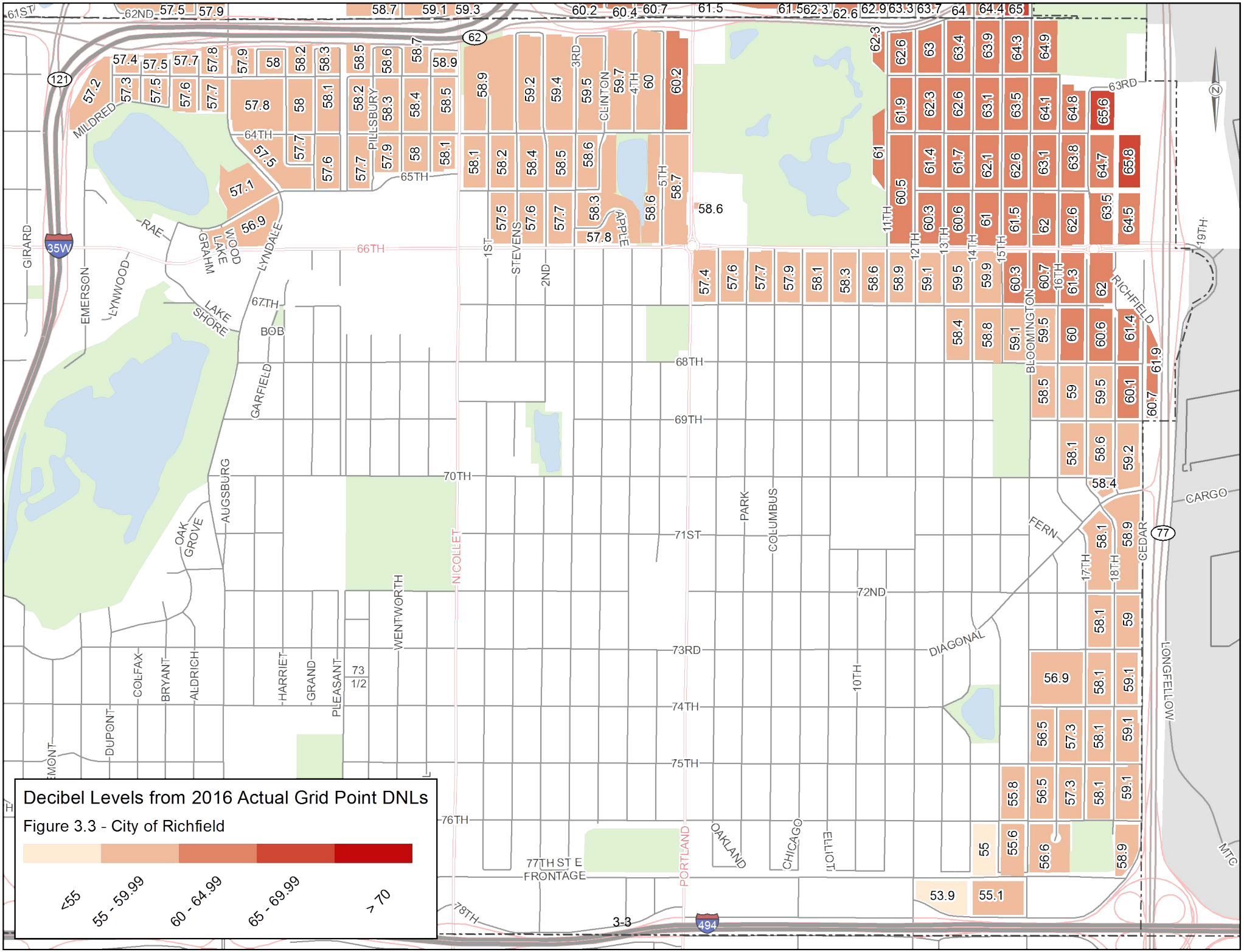

2016 AEDT Tracks - Runway 4 Arrivals
Overall Use Percentage
Figure 2.15
AEDT Track Use Percentage
PERCENT
< 10%
10% - 25%
68.4%
35W
494
35W
35
0
0.5
1
2
Miles

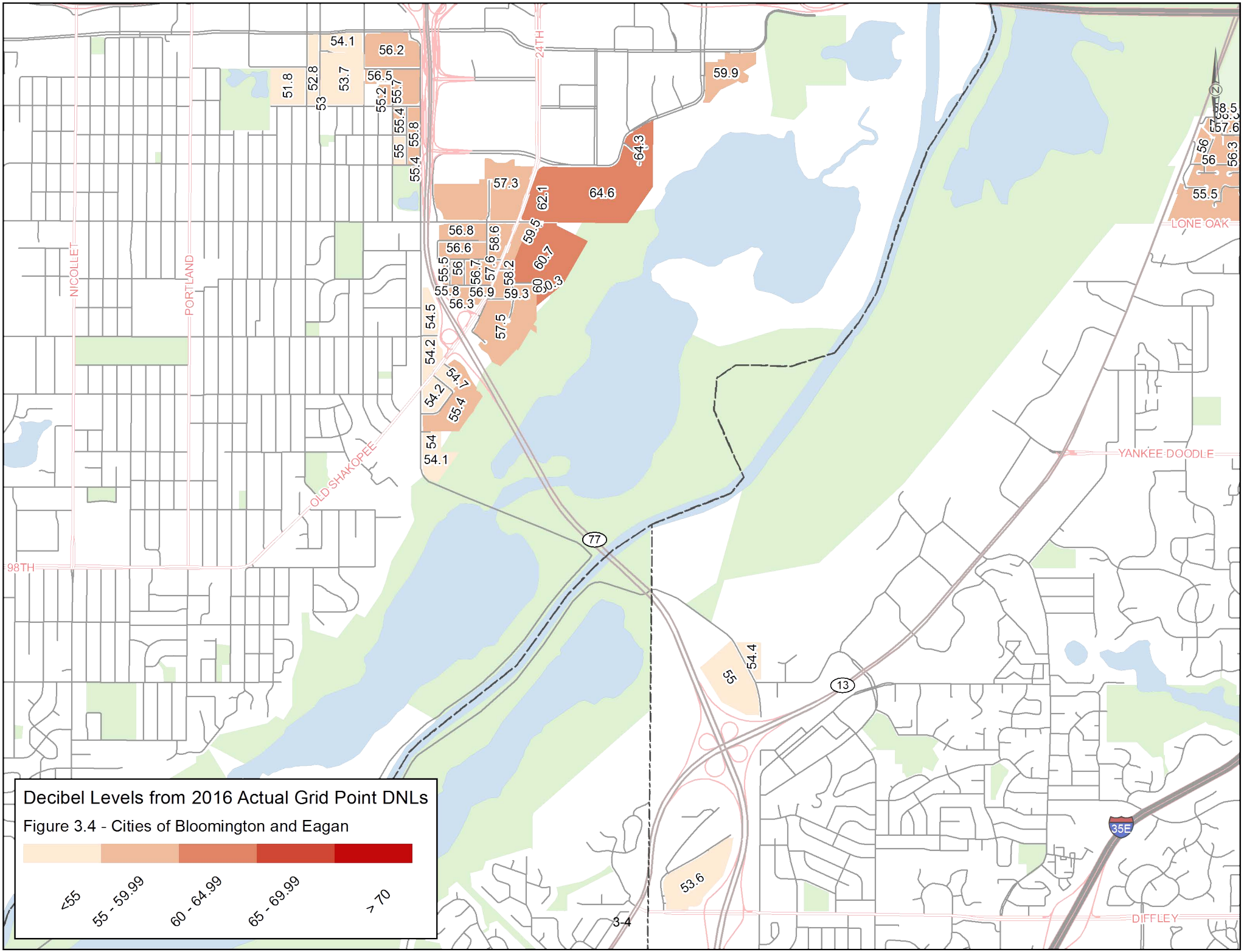

2016 AEDT Tracks - Runway 17 Arrivals
Overall Use Percentage
Figure 2.16
AEDT Track Use Percentage
PERCENT
< 10%
10% - 20%
20% - 40%
> 40%
94
694
394
35E
494
0 0.5 1 2
Miles

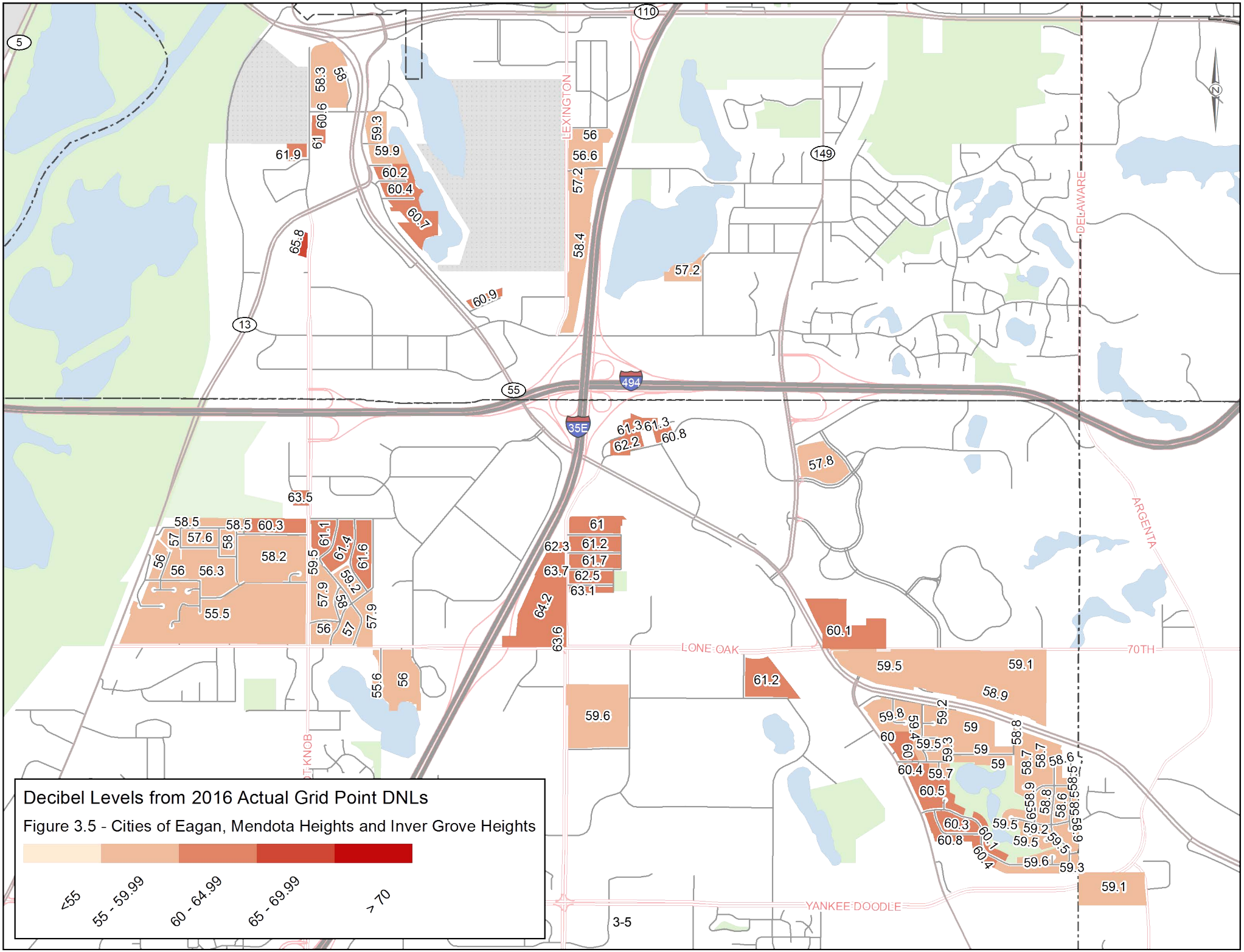
Appendix 3: Noise Model Grid Point Maps

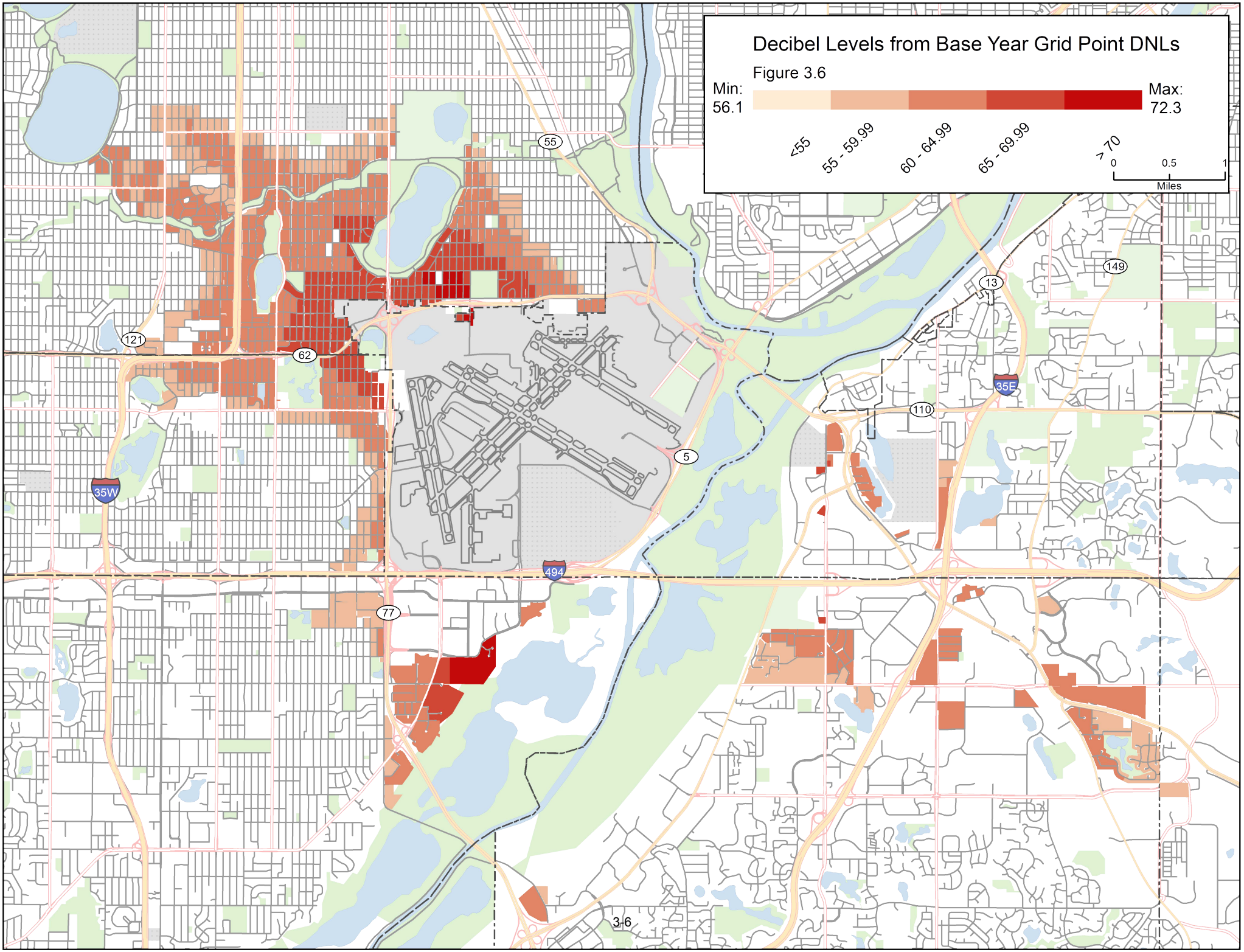

Decibel Levels from 2016 Actual Grid Point DNLs
Figure 3.1
Min: 51.8
Max: 69.0
<55
55 - 59.99
60 - 64.99
65 - 69.99
> 70
51
55
149
13
121
62
35E
110
5
35W
494
77

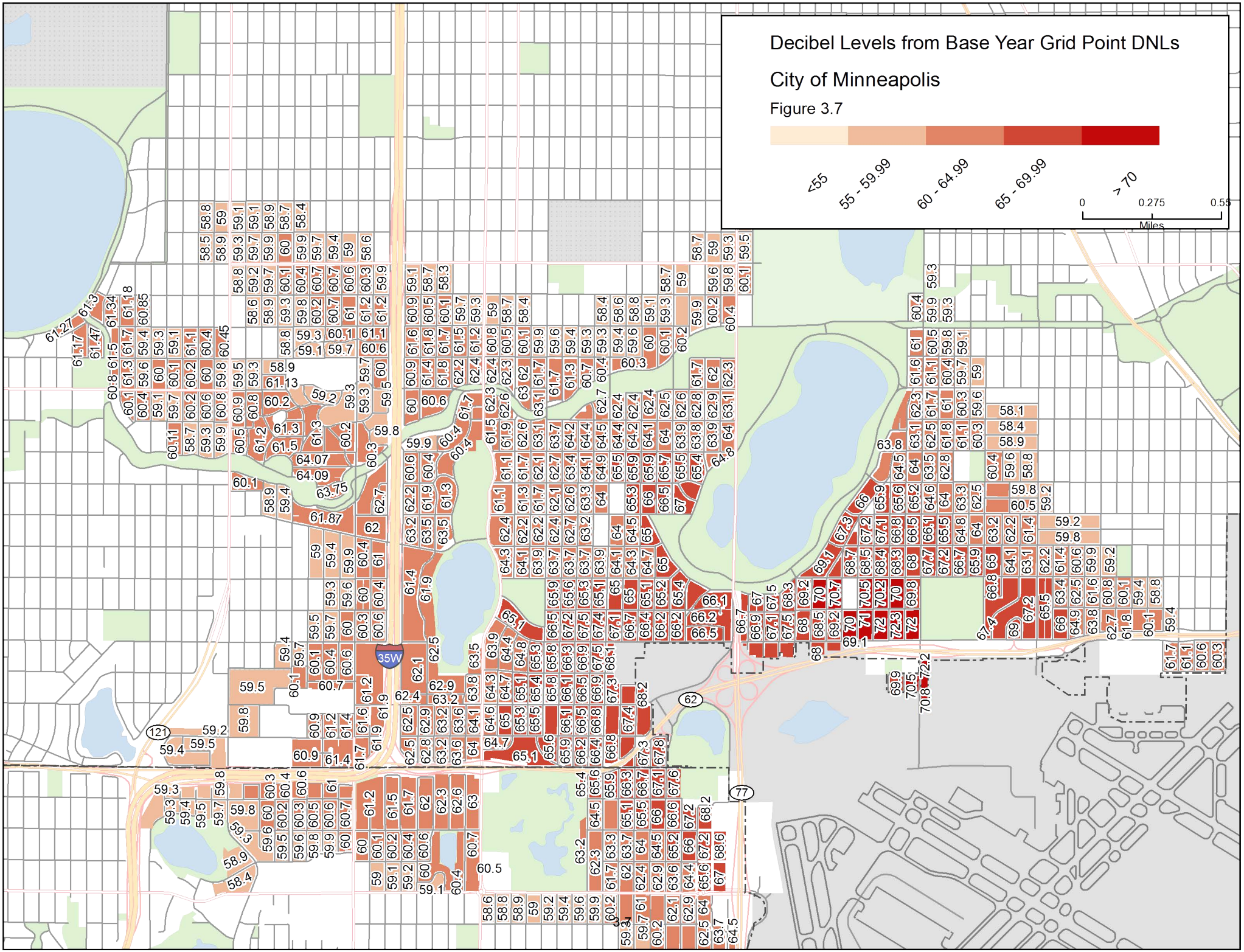

Decibel Levels from 2016 Actual Grid Point DNLs
Figure 3.2 - City of Minneapolis
<55
55 - 59.99
60 - 64.99
65 - 69.99
> 70
LYNDALE
PORTLAND
PARK
CEDAR
MINNEHAHA
42ND
46TH
50TH
COUNTY ROAD 22
55
62
77
121

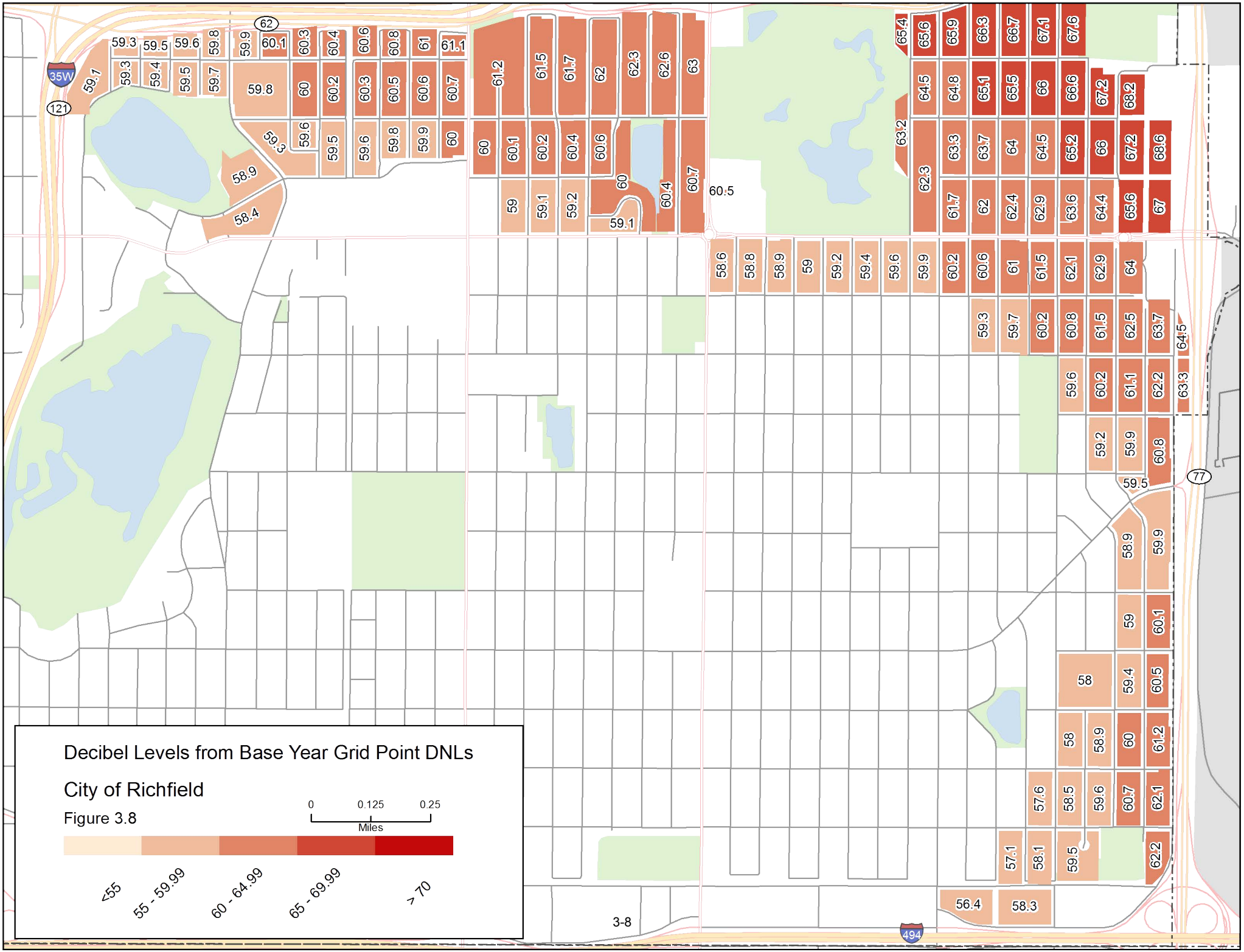

Decibel Levels from 2016 Actual Grid Point DNLs
Figure 3.3 - City of Richfield
<55
55 - 59.99
60 - 64.99
65 - 69.99
> 70
62ND
64TH
65TH
66TH
67TH
68TH
69TH
70TH
71ST
72ND
73RD
74TH
75TH
76TH
77TH ST E FRONTAGE
78TH
63RD
19TH
MILDRED
RAE
LYNWOOD
EMERSON
GRAND
LAKE SHORE
GARFIELD
AUGSBURG
OAK GROVE
COLFAX
BRYANT
ALDRICH
DUPONT
HARRIET
GRAND
PLEASANT
WENTWORTH
NICOLLET
LYNDALE
1ST
STEVENS
2ND
3RD
CLINTON
4TH
PILLSBURY
5TH
APPLE
PARK
COLUMBUS
10TH
11TH
12TH
13TH
14TH
15TH
16TH
17TH
18TH
BLOOMINGTON
RICHFIELD
FERN
CEDAR
DIAGONAL
CARGO
LONGFELLOW
PORTLAND
OAKLAND
CHICAGO
ELLIOT
35W
494
62
77
121

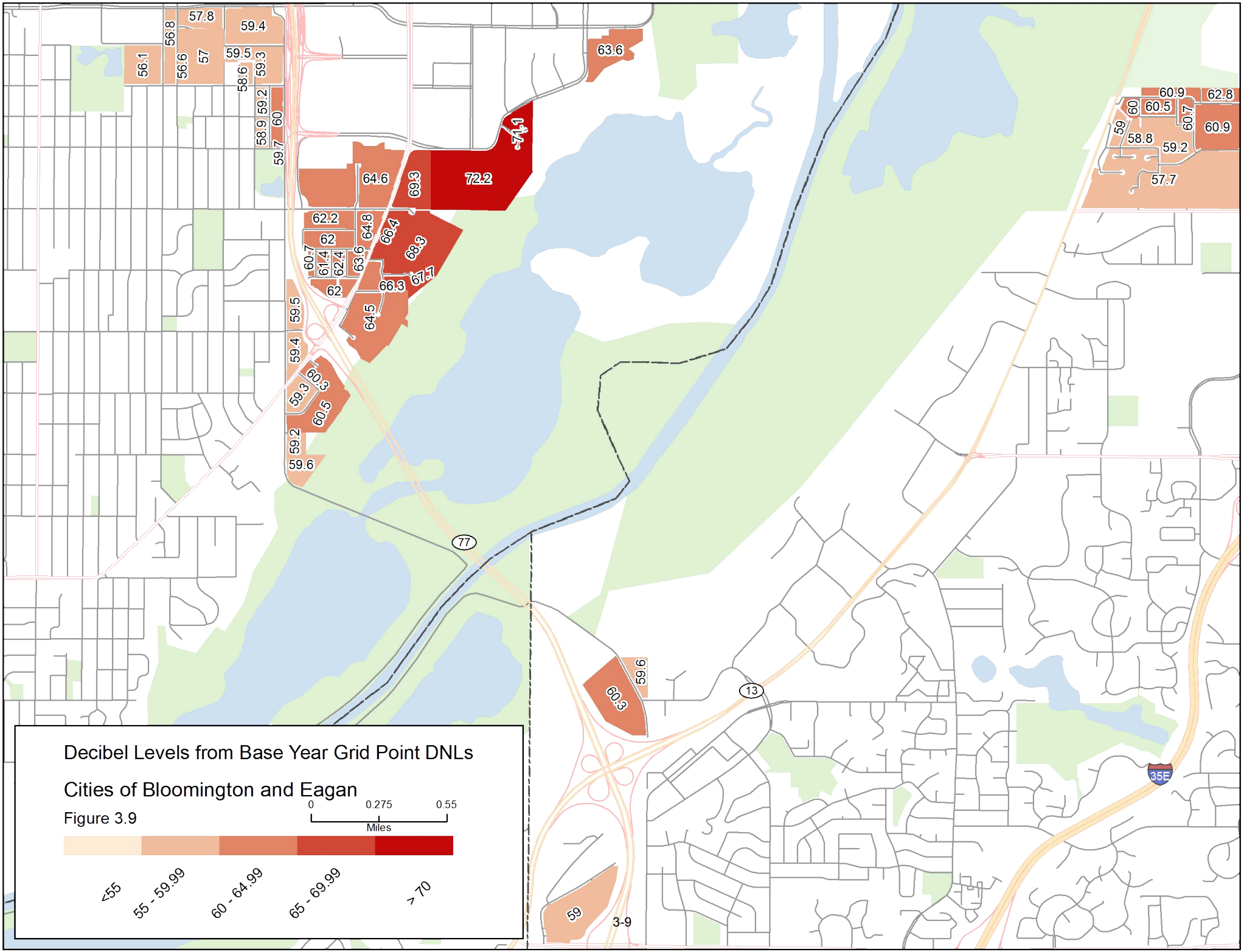

Decibel Levels from 2016 Actual Grid Point DNLs
Figure 3.4 - Cities of Bloomington and Eagan
<55
55 - 59.99
60 - 64.99
65 - 69.99
> 70
NICOLLET
PORTLAND
OLD SHAKOPEE
98TH
24TH
YANKEE DOODLE
LONE OAK
DIFFLEY
77
13
35E
3-4

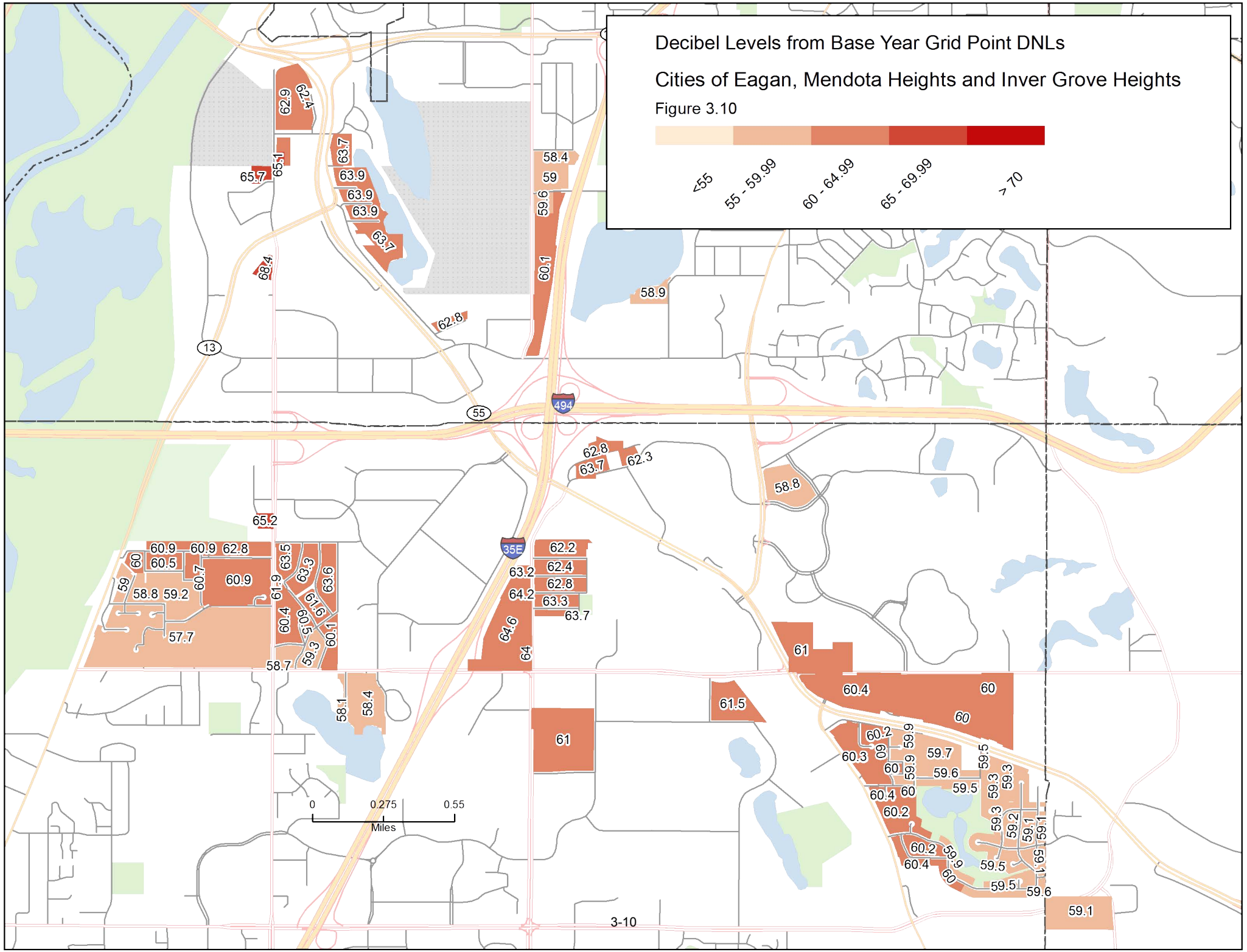

Decibel Levels from 2016 Actual Grid Point DNLs
Figure 3.5 - Cities of Eagan, Mendota Heights and Inver Grove Heights
<55
55 - 59.99
60 - 64.99
65 - 69.99
> 70
LEXINGTON
DELAWARE
ARGENTA
LONE OAK
70TH
YANKEE DOODLE
35E
494
110
149
55
13
5
3-5

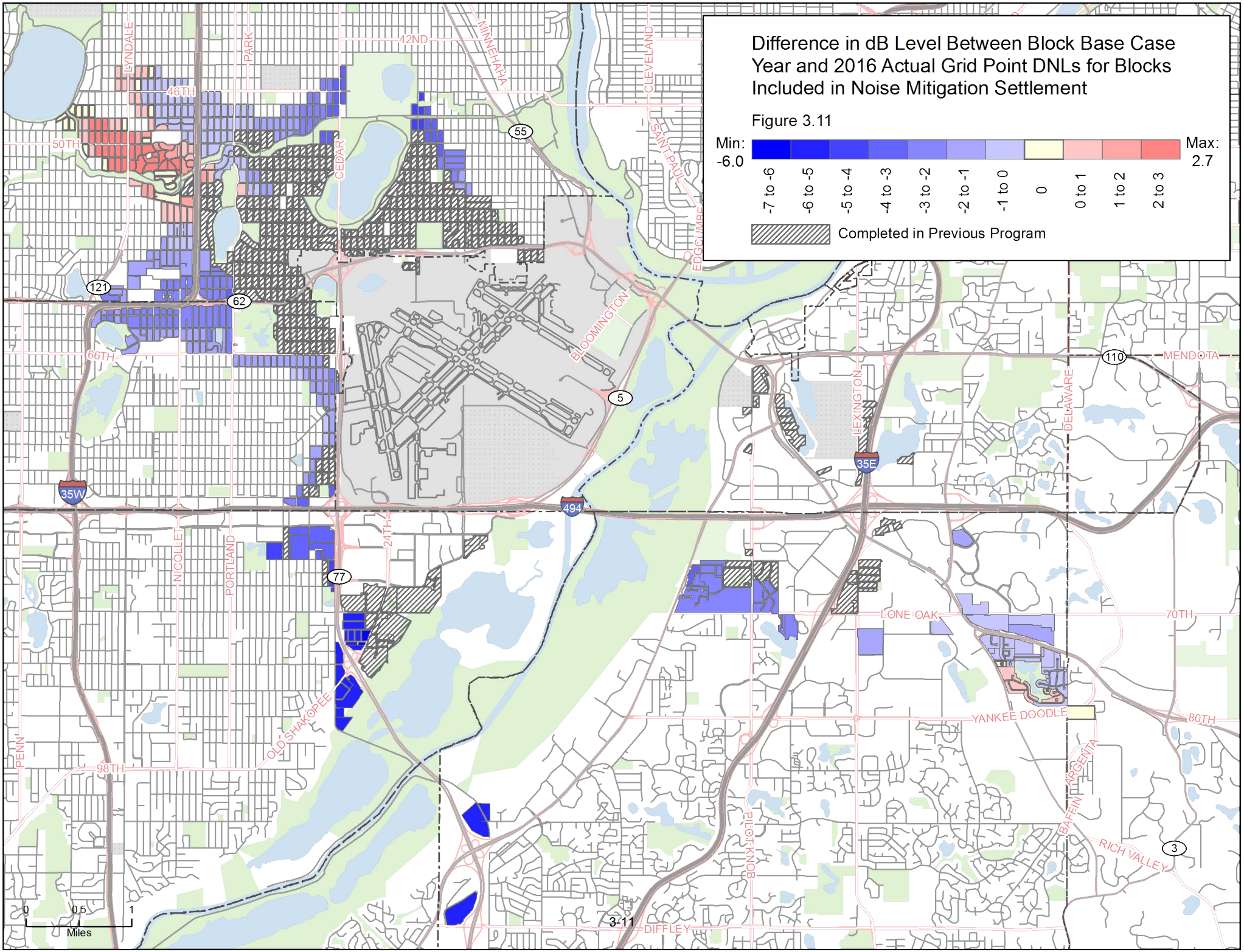

Decibel Levels from Base Year Grid Point DNLs
Figure 3.6
Min:
56.1
Max:
72.3
<55
55 - 59.99
60 - 64.99
65 - 69.99
> 70
0
0.5
1
Miles
55
121
62
13
149
35E
110
5
35W
494
77

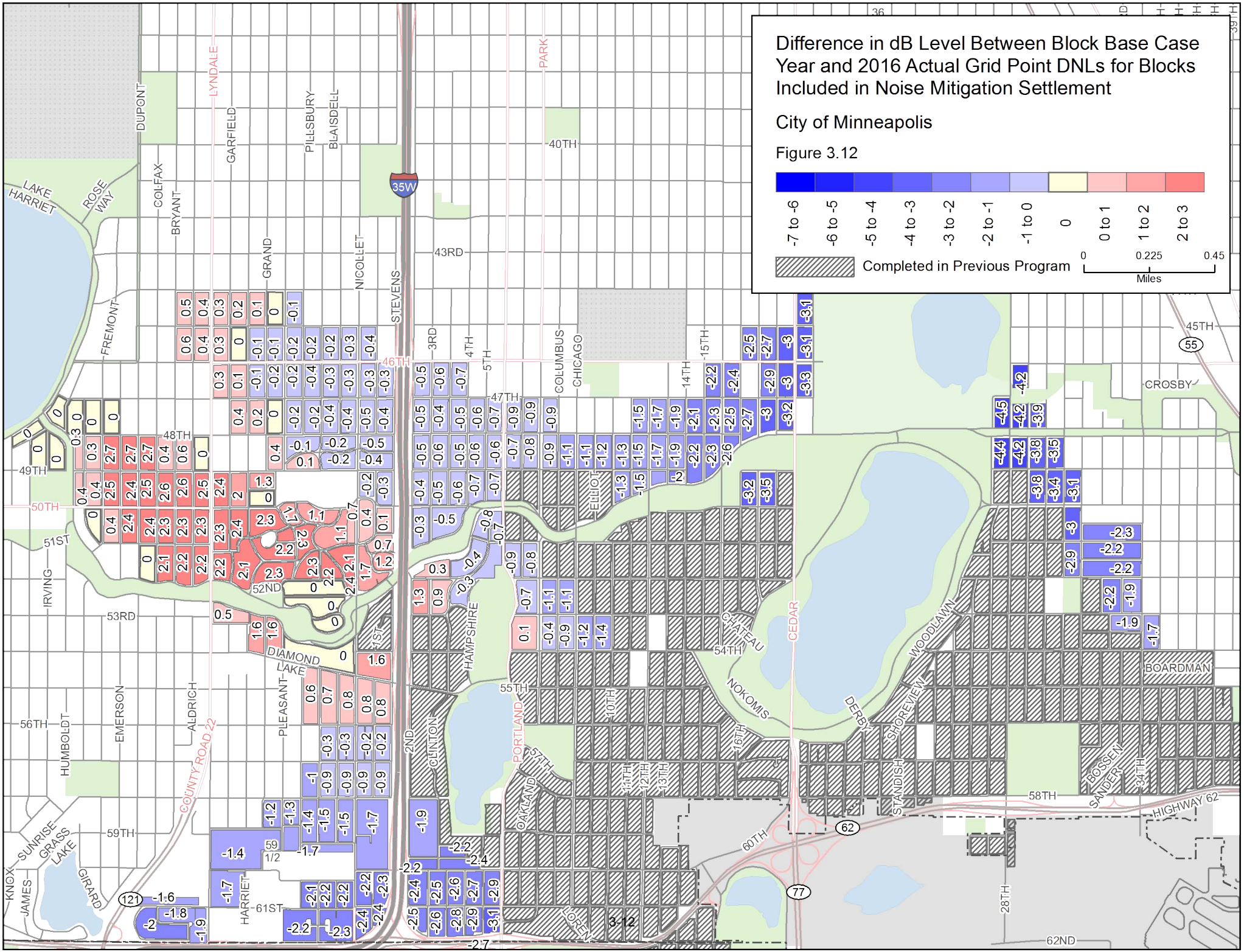

Decibel Levels from Base Year Grid Point DNLs
City of Minneapolis
Figure 3.7
<55
55 - 59.99
60 - 64.99
65 - 69.99
> 70
0
0.275
0.55
Miles
35W
62
77
121

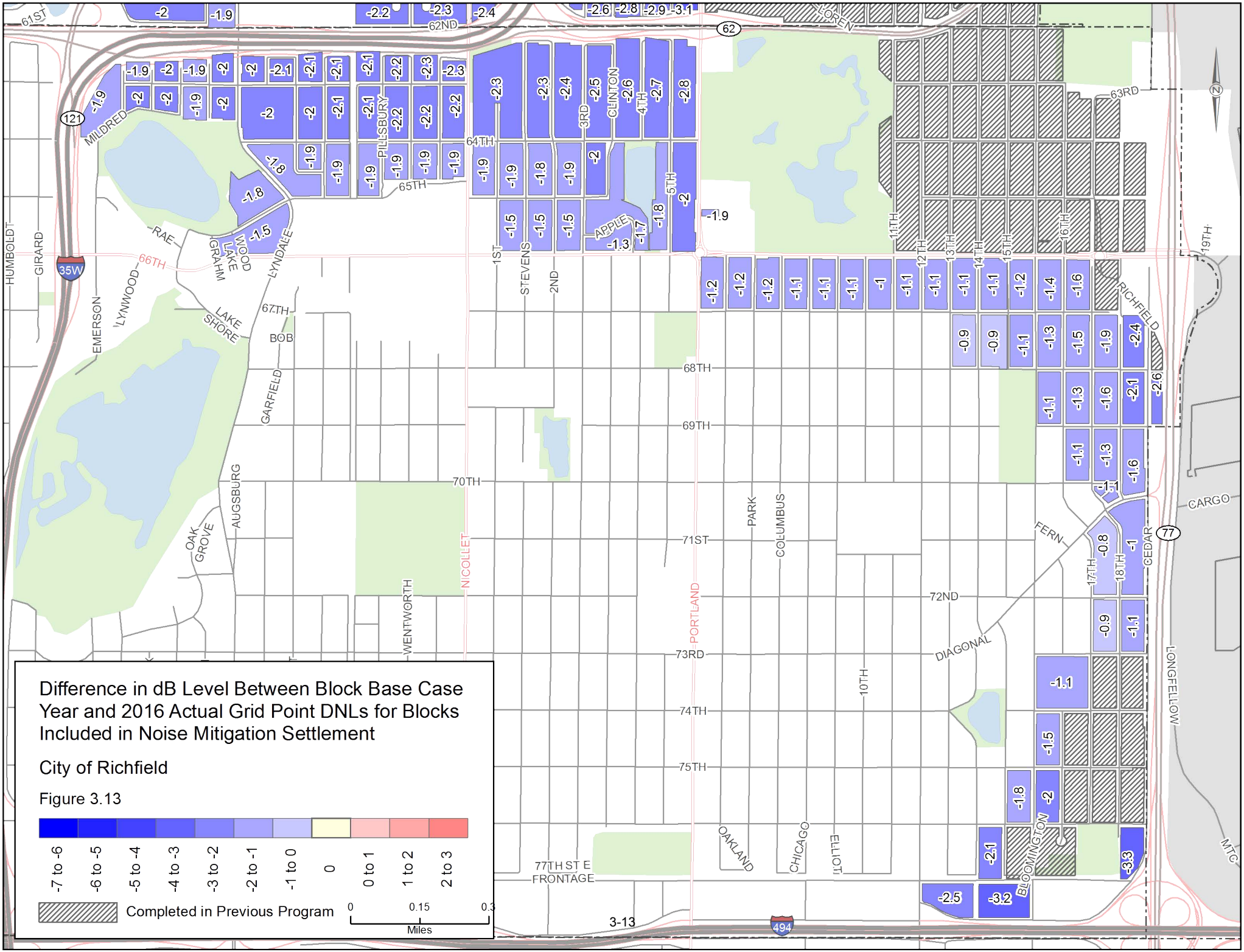

Decibel Levels from Base Year Grid Point DNLs
City of Richfield
Figure 3.8
0
0.125
0.25
Miles
<55
55 - 59.99
60 - 64.99
65 - 69.99
> 70
35W
121
62
77
494
60.5
3-8

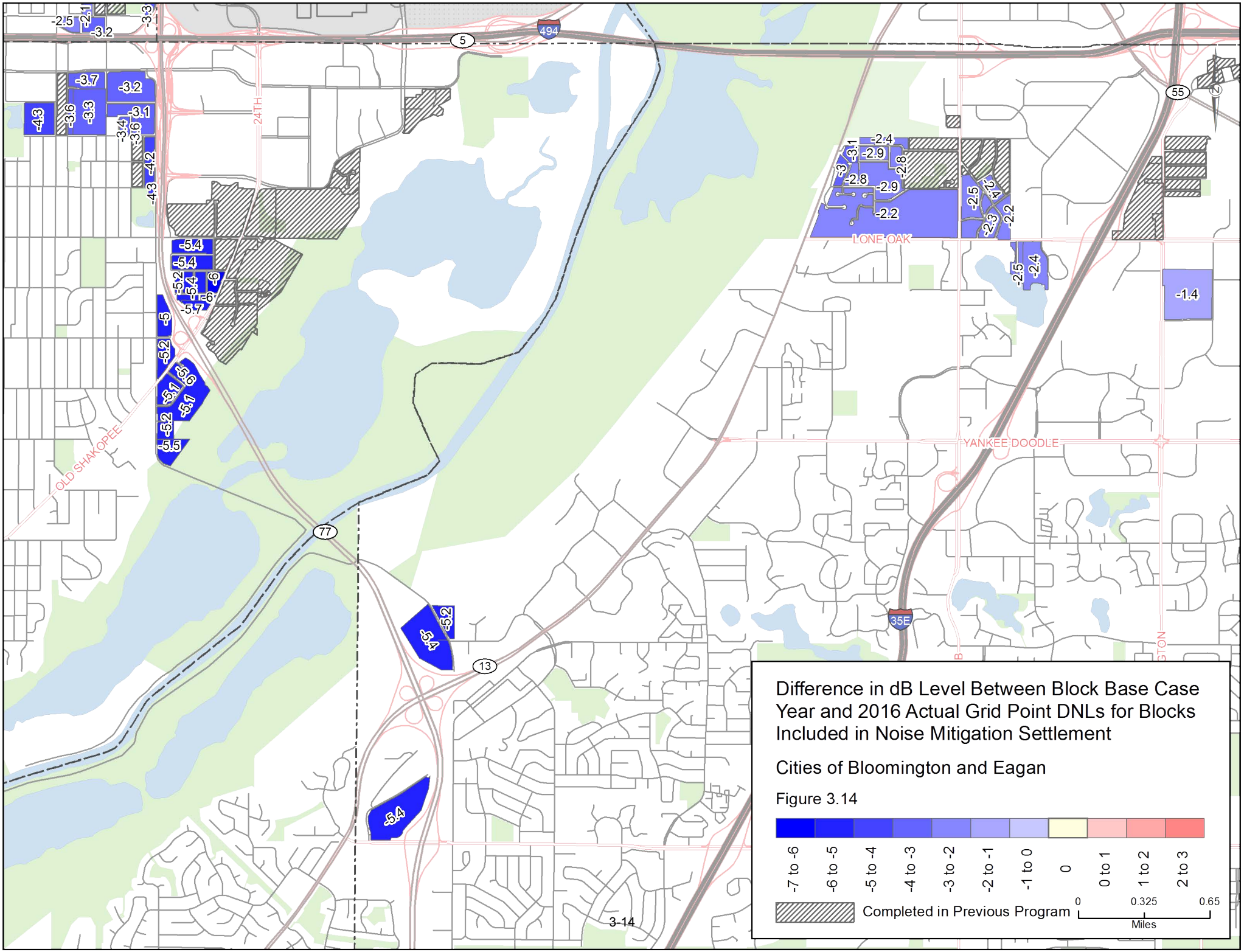

Decibel Levels from Base Year Grid Point DNLs
Cities of Bloomington and Eagan
Figure 3.9
0
0.275
0.55
Miles
<55
55 - 59.99
60 - 64.99
65 - 69.99
> 70
77
13
35E
3-9

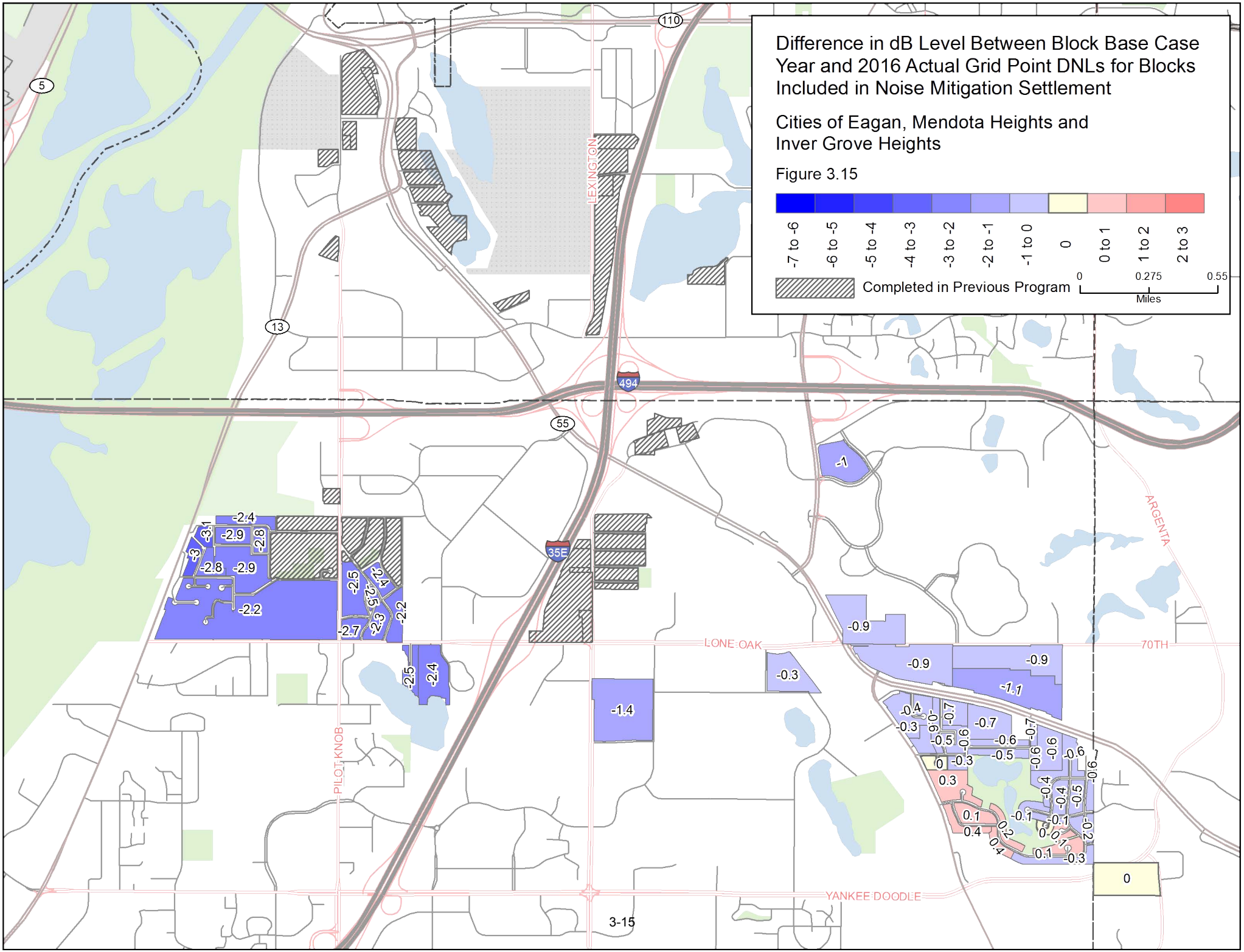

Decibel Levels from Base Year Grid Point DNLs
Cities of Eagan, Mendota Heights and Inver Grove Heights
Figure 3.10
<55
55 - 59.99
60 - 64.99
65 - 69.99
> 70
0
0.275
0.55
Miles
13
55
494
35E
3-10


Difference in dB Level Between Block Base Case Year and 2016 Actual Grid Point DNLs for Blocks Included in Noise Mitigation Settlement
Figure 3.11
Min: -6.0
Max: 2.7
-7 to -6
-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
46TH
50TH
66TH
98TH
LYNDALE
PARK
CEDAR
MINNEHAHA
CLEVELAND
SAINT PAUL
EDGCUMBE
BLOOMINGTON
LEXINGTON
DELAWARE
MENDOTA
NICOLLET
PORTLAND
24TH
OLD SHAKOPEE
PENN
LONE OAK
70TH
YANKEE DOODLE
80TH
PILOT KNOB
BAPTISTA
RICH VALLEY
DIFFLEY
55
121
62
5
35W
494
35E
110
77
3
0
0.5
1
Miles
3-11


Difference in dB Level Between Block Base Case Year and 2016 Actual Grid Point DNLs for Blocks Included in Noise Mitigation Settlement
City of Minneapolis
Figure 3.12
-7 to -6
-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
0
0.225
0.45
Miles
LAKE HARRIET
ROSE WAY
COLFAX
BRYANT
DUPONT
LYNDALE
GARFIELD
PILLSBURY
BLAISDELL
PARK
40TH
35W
43RD
GRAND
NICOLLET
STEVENS
FREMONT
46TH
3RD
4TH
5TH
COLUMBUS
CHICAGO
14TH
15TH
47TH
45TH
55
CROSBY
48TH
49TH
50TH
51ST
IRVING
52ND
53RD
DIAMOND LAKE
7ST
HAMPSHIRE
ELLIOT
CHATEAU
CEDAR
54TH
WOODLAWN
BOARDMAN
55TH
NOKOMIS
DERBY
SHOREVIEW
STANDISH
10TH
16TH
11TH
12TH
13TH
34TH
BOSSEN
SANDERS
58TH
HIGHWAY 62
62
60TH
56TH
HUMBOLDT
EMERSON
ALDRICH
PLEASANT
CLINTON
2ND
PORTLAND
OAKLAND
57TH
COUNTY ROAD 22
59TH
SUNRISE
GRASS LAKE
KNOX
JAMES
GIRARD
121
59 1/2
HARRIET
61ST
LOREN
77
28TH
62ND
3-12


Difference in dB Level Between Block Base Case Year and 2016 Actual Grid Point DNLs for Blocks Included in Noise Mitigation Settlement
City of Richfield
Figure 3.13
-7 to -6
-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
0
0.15
0.3
Miles
61ST
62ND
62
63RD
64TH
65TH
66TH
67TH
68TH
69TH
70TH
71ST
72ND
73RD
74TH
75TH
77TH ST E FRONTAGE
HUMBOLDT
GIRARD
EMERSON
LYNWOOD
35W
121
MILDRED
RAE
GRAHAM
WOOD
LAKE
LYNDALE
LAKE SHORE
BOB
GARFIELD
AUGSBURG
OAK GROVE
WENTWORTH
NICOLLET
PORTLAND
PARK
COLUMBUS
1ST
STEVENS
2ND
3RD
CLINTON
4TH
5TH
APPLE
PILLSBURY
10TH
11TH
12TH
13TH
14TH
15TH
16TH
17TH
18TH
19TH
RICHFIELD
FERN
CEDAR
77
CARGO
LONGFELLOW
DIAGONAL
OAKLAND
CHICAGO
ELLIOTT
BLOOMINGTON
494
MTC
3-13


Difference in dB Level Between Block Base Case Year and 2016 Actual Grid Point DNLs for Blocks Included in Noise Mitigation Settlement
Cities of Bloomington and Eagan
Figure 3.14
-7 to -6
-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
0
0.325
0.65
Miles
3-14
494
5
55
35E
77
13
24TH
OLD SHAKOPEE
YANKEE DOODLE
LONE OAK


Difference in dB Level Between Block Base Case Year and 2016 Actual Grid Point DNLs for Blocks Included in Noise Mitigation Settlement
Cities of Eagan, Mendota Heights and Inver Grove Heights
Figure 3.15
-7 to -6
-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
0
0.275
0.55
Miles
LEXINGTON
PILOT KNOB
LONE OAK
70TH
ARGENTA
YANKEE DOODLE
110
5
13
494
55
35E
3-15

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