CHAPTER 6: LAND USE COMPATIBILITY

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6.1 INTRODUCTION

Planning for the maintenance and development of airport facilities is a complex process. Successfully developing airports requires insightful decision-making predicated on various facts that drive the need for the development of additional airport infrastructure. Airports cannot be developed in a vacuum; the development effort must consider the needs of the surrounding populations and the land uses in the area surrounding the airport.

Cities and airport operators are both responsible for the ongoing development of public assets. The development of United States airports, as well as city infrastructure, falls within the concept of conducting development predicated on the greater public interest. The responsible development of such community and airport infrastructure requires cooperative efforts on behalf of the airport proprietor and the community.

As city governments are responsible for the development and enhancement of city infrastructure, airport proprietors are responsible for the federally endorsed enhancement of our nation's airport system. Airport operators would be remiss in their duties if such efforts did not consider the land use consequences of decisions made regarding airport development.

This chapter evaluates the land use implications of the planned operation and development of the Minneapolis-St. Paul International Airport.

6.2 LAND USE COMPATIBILITY

The Federal Aviation Administration (FAA) has established Land Use Compatibility criteria in 14 C.F.R. Part 150 detailing acceptable land uses around airports by considering noise impacts in terms of Day-Night Sound Level (DNL). In the case of airports located in the Minneapolis-St. Paul Metropolitan Area additional criteria also must be evaluated in relation to noise exposure as established by the Metropolitan Council's Transportation Policy Plan (TPP).

6.2.1 FAA LAND USE COMPATIBILITY GUIDELINES

Federal guidelines for compatible land use that take into account the impact of aviation noise have been developed for land near airports. They were derived through an iterative process that started before 1972. Independent efforts by the FAA, US Department of Housing and Urban Development, US Air Force, US Navy, US Environmental Protection Agency and other Federal agencies to develop compatible land use criteria were melded into a single effort by the Federal Interagency Committee on Urban Noise (FICUN) in 1979, and resulted in the FICUN Guidelines document (1980). The Guidelines document adopted DNL as its standard noise descriptor, and the Standard Land Use Coding Manual (SLUCM) as its standard descriptor for land uses. The noise-to-land use relationships were then expanded for the FAA's Advisory Circular Airport-Land Use Compatibility Planning. The current individual agency compatible land

use criteria have been, for the most part, derived from those in the FICUN Guidelines. Airport environments pertain only to certain categories of these guidelines.[5]

In 1985 the FAA adopted 14 C.F.R. Part 150 outlining land use compatibility guidelines around airports. **Table 6.1** provides the land use compatibility guidelines as established by the FAA.

According to FAA standards, areas with noise levels less than 65 DNL are considered compatible with residential development.

6.2.2 METROPOLITAN COUNCIL LAND USE COMPATIBILITY GUIDELINES

The Metropolitan Council has developed a set of land-use planning guidelines for responsible community development in the Minneapolis-St. Paul Metropolitan Area. The intent is to provide city governments with a comprehensive resource with regard to planning and community development in a manner that considers the adequacy, quality and environmental elements of planned land uses.

In 1976 the Minnesota Legislature enacted the Minnesota State Land Planning Act, the underlying law that requires local units of government to prepare a comprehensive plan and submit it for Metropolitan Council review. Under the 1976 legislation, communities designated land uses and defined the zoning applicable to the particular land use parcel. Zoning was the statute's priority. The land use measure was a request that local jurisdictions review existing zoning in Airport Noise Zones to determine consistency with the regional compatibility guidelines and rezone property for compatible development if consistent with other development factors. In 1977, the Metropolitan Council also updated the 1973 Aviation Chapter of the Metropolitan Development Guide. In 1983, the Metropolitan Council amended its Aviation Policy Plan to include "Land Use Compatibility Guidelines for Aircraft Noise."

In 1994 the Minnesota Legislature amended the Land Planning Act to require that communities update their comprehensive plans at least every 10 years. As a result, all Metropolitan Development Guide chapters were updated by December 1996. Under the amended Land Planning Act, communities determine the land use designation; zoning must be consistent with that designation. Thus, the communities had to re-evaluate designated use, permitted uses within the designation, zoning classifications and adequacy.

[5] Federal Interagency Committee On Noise (FICON), "Federal Agency Review of Selected Airport Noise Analysis Issues, " (1992), pp. 2-6 to 2-7.

TABLE 6.1: FAA AIRCRAFT NOISE AND LAND USE COMPATIBILITY GUIDELINES

Land Use	DNL Contour Interval (dB)					
	Less than 65	65-69	70-74	75-79	80-84	Greater than 85
Residential						
Residential, other than mobile homes and transient lodgings	Y	N(1)	N(1)	N	N	N
Mobile home park,	Y	N	N	N	N	N
Transient Lodgings	Y	N(1)	N(1)	N(1)	N	N
Public Use						
Schools	Y	N(1)	N(1)	N	N	N
Hospitals and nursing homes	Y	25	30	N	N	N
Churches, auditoriums, and concert halls	Y	25	30	N	N	N
Governmental services	Y	Y	25	30	N	N
Transportation	Y	Y	Y(2)	Y(3)	Y(4)	Y(4)
Parking	Y	Y	Y(2)	Y(3)	Y(4)	Y
Commercial Use						
Offices, business and professional	Y	Y	25	30	N	N
Wholesale and retail–building materials, Hardware and farm equipment	Y	Y	Y(2)	Y(3)	Y(4)	N
Retail trade–general	Y	Y	25	30	N	N
Utilities	Y	Y	Y(2)	Y(3)	Y(4)	N
Communication	Y	Y	25	30	N	N
Manufacturing and Production						
Manufacturing, general	Y	Y	Y(2)	Y(3)	Y(4)	N
Photographic and optical	Y	Y	25	30	N	N
Agriculture (except livestock) and forestry	Y	Y(6)	Y(7)	Y(8)	Y(8)	Y(8)
Livestock farming and breeding	Y	Y(6)	Y(7)	N	N	N
Mining and fishing, resource Production and extraction	Y	Y	Y	Y	Y	Y
Recreational						
Outdoor sports arenas and spectator sports	Y	Y(5)	Y(5)	N	N	N
Outdoor music shells, amphitheaters	Y	N	N	N	N	N
Nature exhibits and zoos	Y	Y	N	N	N	N
Amusements, parks, resorts and camps	Y	Y	Y	N	N	N
Golf courses, riding stables, and water recreation	Y	Y	25	30	N	N

See following page for Table Key and Notes.

Key

SLUCM	Standard Land Use Coding Manual.
Y(Yes)	Land use and related structures compatible without restrictions.
N(No)	Land use and related structures are not compatible and should be prohibited.
NLR	Noise Level Reduction (outdoor to indoor) to be achieved through incorporation of noise attenuation into the design and construction of the structure.
25, 30, or 35	Land use and related structures generally compatible; measures to achieve NLR of 25, 30, or 35 dB must be incorporated into design and construction of structure.

Notes

The designations contained in this table do not constitute a federal determination that any use of land covered by the program is acceptable or unacceptable under federal, state, or local law. The responsibility for determining the acceptable and permissible land uses and the relationship between specific properties and specific noise contours rests with the local authorities. FAA determinations under Part 150 are not intended to substitute locally determined land uses for those determined to be appropriate by local authorities in response to locally determined needs and values in achieving noise compatible land uses.

(1) Where the community determines that residential or school uses must be allowed, measures to achieve outdoor to indoor Noise Level Reduction (NLR) of at least 25 dB and 30 dB should be incorporated into building codes and be considered in individual approvals. Normal residential construction can be expected to provide a NLR of 20 dB, thus, the reduction requirements are often stated as 5, 10, or 15 dB over standard construction and normally assume mechanical ventilation and closed windows year round. However, the use of NLR criteria will not eliminate outdoor noise problems.

(2) Measures to achieve NLR of 25 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

(3) Measures to achieve NLR of 30 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

(4) Measures to achieve NLR of 35 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

(5) Land use compatible provided special sound reinforcement systems are installed.

(6) Residential buildings require an NLR of 25.

(7) Residential buildings require an NLR of 30.

(8) Residential buildings not permitted.

Source: 14 CFR Part 150

In 2004 the Metropolitan Council incorporated its Aviation Policy Plan into the Transportation Policy Plan (TPP) of the Metropolitan Development Guide. It was updated in January 2009. Land use compatibility guidelines for all metropolitan system airports are included in the TPP. The TPP considered noise exposure associated with airports located in the Minneapolis-St. Paul Metropolitan Area and provided land use

guidelines based on four noise zones around an airport. The following is the Metropolitan Council's description of each noise zone:

- **Zone 1** – Occurs on and immediately adjacent to the airport property. Existing and projected noise intensity in the zone is severe and permanent. It is an area affected by frequent landings and takeoffs and subjected to aircraft noise greater than 75 DNL. Proximity of the airfield operating area, particularly runway thresholds, reduces the probability of relief resulting from changes in the operating characteristics of either the aircraft or the airport. Only new, non-sensitive, land uses should be considered – in addition to preventing future noise problems the severely noise-impacted areas should be fully evaluated to determine alternative land use strategies including eventual changes in existing land uses.[6]

- **Zone 2** – Noise impacts are generally sustained, especially close to runway ends. Noise levels are in the 70 to 74 DNL range. Based upon proximity to the airfield the seriousness of the noise exposure routinely interferes with sleep and speech activity. The noise intensity in this area is generally serious and continuing. New development should be limited to uses that have been constructed to achieve certain exterior-to-interior noise attenuation and that discourage certain outdoor uses.[7]

- **Zone 3** – Noise impacts can be categorized as sustaining. Noise levels are in the 65 to 69 DNL range. In addition to the intensity of the noise, location of buildings receiving the noise must also be fully considered. Aircraft and runway use operational changes can provide some relief for certain uses in this area. Residential development may be acceptable if it is located outside areas exposed to frequent landings and takeoffs, is constructed to achieve certain exterior-to-interior noise attenuation, and is restrictive as to outdoor use. Certain medical and educational facilities that involve permanent lodging and outdoor use should be discouraged.[8]

- **Zone 4** – Defined as a transitional area where noise exposure might be considered moderate. Noise levels are in the 60 to 64 DNL range. The area is considered transitional since potential changes in airport and aircraft operating procedures could lower or raise noise levels. Development in this area can benefit from insulation levels above typical new construction standards in Minnesota, but insulation cannot eliminate outdoor noise problems.[9]

- **Noise Buffer Zones -** Additional area that can be protected at the option of the affected community; generally, the buffer zone becomes an extension of noise zone 4. At MSP, a one-mile buffer zone beyond the DNL 60 has been established to address the range of variability in noise impact, by allowing implementation of additional local noise mitigation efforts. A buffer zone, out to DNL 55 is optional at those reliever airports with noise policy areas outside the MUSA.[10]

[6] Metropolitan Council 2030 Transportation Policy Plan, Appendix L, January 2009.
[7] Ibid.
[8] Ibid.
[9] Ibid.
[10] Ibid.

The listed Metropolitan Council noise zones also use the DNL noise exposure metric. The Metropolitan Council Land Use Compatibility Guidelines for Aircraft Noise are provided in **Table 6.2.**

As outlined above, the Metropolitan Council developed the Aviation Chapter of the Metropolitan Development Guide, including the Builder's Guide and Model Ordinance for Aircraft Noise Attenuation, to provide a program framework for community adoption, pursuant to MSP Part 150 preventive land use measures.

The Model Ordinance and Builder's Guide are intended to ensure consistency with local land use planning practices in areas of infill development (e.g., building a home on a vacant lot on a residential block – including reconstruction and/or additions to existing structures) in known airport noise impact areas (2007 - 60+ DNL noise contours) around MSP. Specifically, the documents provide a mechanism for cities around MSP to adopt building material and construction standards to ensure that developments in the airport impact areas are constructed consistent with MSP Part 150 program goals.

In establishing noise reduction level requirements the March 2006 Metropolitan Council Builder's Guide states the following on page 20:

"The overall noise reduction level (NRL) required within a given noise zone can be determined by subtracting the desired level (45 dBA) from the highest noise level within that contour. For example, in Noise Zone 4 (60 to 64 dBA), the required reduction is calculated as 64 – 45 = 19 dBA."[11]

[11] The Metropolitan Council's NRL calculation approach is consistent with FAA's calculations in 14 C.F.R. Part 150.

TABLE 6.2: LAND USE COMPATIBILITY GUIDELINES

Metropolitan Council Land Use Compatibility Guidelines for Aircraft Noise										
	Noise Exposure Zones									
Type of Development	**New Development or Major Redevelopment**					**Infill - Reconstruction or Additions to Existing Structures**				
Land Use Category	1 DNL 75+	2 DNL 74-70	3 DNL 69-65	4 DNL 64-60	BZ	1 DNL 75+	2 DNL 74-70	3 DNL 69-65	4 DNL 64-60	BZ
Residential										
Single/Multiplex, with individual entrance	INCO	INCO	INCO	INCO		COND	COND	COND	COND	
Multiplex/Apartment, with shared entrance	INCO	INCO	COND	PROV		COND	COND	PROV	PROV	
Mobile Home	INCO	INCO	INCO	COND		COND	COND	COND	COND	
Educational, Medical, Schools, Churches, Hospitals, & Nursing Homes	INCO	INCO	INCO	COND		COND	COND	COND	PROV	
Cultural, Entertainment, & Recreation										
Indoor	COND	COND	COND	PROV		COND	COND	COND	PROV	
Outdoor	COND	COND	COND	COND		COND	COND	COND	COMP	
Office, Commercial, Retail	COND	PROV	PROV	COMP		COND	PROV	PROV	COMP	
Services										
Transportation - Passenger Facilities	COND	PROV	PROV	COMP		COND	PROV	PROV	COMP	
Transient Lodging	INCO	COND	PROV	PROV		COND	COND	PROV	PROV	
Other Medical, Health, and Education	COND	PROV	PROV	COMP		COND	PROV	PROV	COMP	
Other Services	COND	PROV	PROV	COMP		COND	PROV	PROV	COMP	
Industrial, Communication, & Utilities	PROV	COMP	COMP	COMP		PROV	COMP	COMP	COMP	
Agriculture, Land/Water Area, & Resource Extraction	COMP	COMP	COMP	COMP		COMP	COMP	COMP	COMP	

Table Key:

- **COMP** – "Compatible" – uses that are acoustically acceptable for both indoors and outdoors.
- **PROV** – "Provisional" – uses that should be discouraged if at all feasible; if allowed, must meet certain structural performance standards to be acceptable according to MS473.192 (metropolitan area Noise Attenuation Act). Structures built after December 1983 shall be acoustically constructed so as to achieve interior noise levels as follows:
  - Residential, Educational and Medical = 45 dBA Interior Sound Level
  - Cultural, Entertainment, Recreational, Office, Commercial, Retail and Services = 50 dBA Interior Sound Level
  - Industrial, Communications, Utility, Agricultural Land, Water Area, Resource Extraction = 60 dBA Interior Sound Level

  Each local governmental unit having land within the airport noise zones is responsible for implementing and enforcing the structural performance standards in its jurisdiction.
- **COND** – "Conditional" – uses that should be strongly discouraged; if allowed, must meet the structural performance standards, and requires a comprehensive plan amendment for review of the project under the Conditional Land Use Review Factors outlined in the Metropolitan Council's 2030 Transportation Policy Plan, Appendix H, Table 5.
- **INCO** – "Incompatible" – land uses that are not acceptable even if acoustical treatment were incorporated in the structure and outside uses restricted.

Source: Metropolitan Council 2030 Transportation Policy Plan, Appendix H – December 15, 2004.

Table 6.3 provides the Metropolitan Council's Structural Performance Standards (interior noise level goals).

TABLE 6.3: STRUCTURE PERFORMANCE STANDARDS[1]

Land Use	Typical Interior[2] Sound Level
Residential	45 dBA
Educational/Medical/Churches, etc.	45 dBA[3]
Cultural/Entertainment/Recreational	50 dBA
Office/Commercial/Retail	50 dBA
Services	50 dBA
Industrial/Communication/Utility	60 dBA
Agricultural Land/Water Area/Resource Extraction	60 dBA

[1] These performance standards do not apply to buildings, accessory buildings, or portions of buildings that are not normally occupied by people.
[2] The noise description used to delineate the appropriate noise policy zone is an annualized Ldn.
[3] Special attention is required for certain noise sensitive uses, such as concert halls.

Source: Metropolitan Council 2030 Transportation Policy Plan, Appendix L – January 2009.

6.3 RUNWAY SAFETY ZONING CONSIDERATIONS

At the Federal level, the Federal Aviation Administration (FAA) is the agency primarily responsible for land use compatibility around airports. Although the FAA does not play a direct role in the zoning and land use planning practices around United States airports, it provides critical land use planning guidance, technical assistance and funding to airports. In this capacity, the FAA issues a variety of regulations and guidance documents under federal law that affects land use planning around airports.

FAA land use guidance focuses on two areas: (1) runway protection zones; and (2) airspace protection.

6.3.1 FEDERAL RUNWAY PROTECTION ZONES

Runway Protection Zones (RPZs) are defined in FAA Advisory Circular 150/5300-13, *Airport Design*. RPZs are trapezoid shapes centered on the approximate extended runway centerline radiating from the end of a runway. The dimensions of an RPZ are a function of the type of aircraft using the runway and approach visibility minimums associated with the runway end. The intent of RPZs is to provide safety for people and property on the ground in the vicinity of runway ends at airports. The FAA accomplishes this goal through land use controls in RPZs designed to maintain areas near the ends of airport runways that are free of incompatible objects and activities.

6.3.2 FEDERAL AIRSPACE PROTECTION

Federal Aviation Regulation Part 77, *Objects Affecting Navigable Airspace*, establishes standards for determining obstructions to navigable airspace and the effects of such obstructions on the safe and efficient use of that airspace.

The height limitations associated with Part 77 are defined in terms of imaginary surfaces in the airspace surrounding an airport. These surfaces extend from about two to three miles from the airport, except for runways with precision instrument approaches, in which case the surfaces extend approximately 9.5 miles from the runway end. The various imaginary surfaces include the primary surface, transitional surface, horizontal surface, conical surface and the approach surface.

Under Part 77, the FAA has established a process for reviewing and evaluating proposed structures in the vicinity of airports. FAA Advisory Circular 7460 establishes an airspace review process and provides information to individuals wishing to erect or alter structures that may affect navigable airspace around an airport. In administering 14 CFR Part 77, the FAA's main objective is to ensure the safe and efficient use of navigable airspace around airports.

The FAA has established five different thresholds for evaluating whether a structure may affect navigable airspace around an airport. If any one of these thresholds is reached, the FAA requests that an individual wishing to erect or alter a structure seek its approval before commencing construction. One of the FAA thresholds applies if a structure is within "20,000 feet of an airport or seaplane base with at least one runway more than 3,200 feet in length and the object would exceed a slope of 100:1 horizontally (100 feet horizontally for each 1 foot vertically) from the nearest point of the nearest runway."[12]

After receiving a request for approval, the FAA will typically issue one of the following three determinations:

- **Determination of No Hazard to Air Navigation** – "The subject construction does not exceed obstruction standards and marking/lighting is not required."
- **Conditional Determination** – "The proposed construction/alteration would be acceptable contingent upon implementing mitigating measures (marking and lighting etc.)."
- **Objectionable** – "The proposed construction/alteration is determined to be a hazard and is thus objectionable. The reasons for this determination are outlines to the proponent."

By establishing threshold criteria and then requiring a detailed airspace hazard analysis, the FAA process provides a safety buffer. In certain circumstances, the FAA's detailed airspace hazard analysis results in FAA approval for developments near airports that may be in excess of the general height limitations set forth in 14 CFR Part 77.

6.3.3 STATE MODEL ZONING ORDINANCE

On January 1, 1946, the State of Minnesota enacted its first model airport zoning ordinance. By 1958 the State designated Safety Zones A, B and C as part of the model airport zoning standard. In 1973, local protective airport zoning was made a condition for receiving federal and state funds. Minnesota is one of the few states that has land use safety controls for airports that go beyond the requirements of FAA regulations.

[12] Federal Aviation Administration Advisory Circular 70/7460.2k, pg 2.

State Runway Safety Zones

The State Safety Zone A is a trapezoidal shape at the end of a runway, beginning at the edge of the primary surface and flaring outward to a distance of approximately 2/3 of the runway length. State Safety Zone B is a trapezoidal shape, with the same flare as Zone A, extending outward from the end of Zone A to a distance of approximately 1/3 of the runway length. The extent of State Safety Zone C is coincidental with the extent of the horizontal airspace surface.

Under Minnesota law, Zone A must not contain buildings, temporary structures, exposed transmission lines, or other similar above-ground land use structural hazards. Land uses in Zone A are restricted to those uses that will not create, attract, or bring together an assembly of persons. Permitted uses in Zone A include, but are not limited to, agriculture (seasonal crops), horticulture, animal husbandry, raising of livestock, wildlife habitat, light outdoor recreation (non-spectator), cemeteries, and automobile parking.

Zone B uses are restricted as follows:

- Each use must be on a site whose area is not less than 3 acres.
- Each use must not create, attract, or bring together a site population that would exceed 15 times that of the site acreage.
- Each site must have no more than one building plot upon which any number of structures may be erected.
- A building plot must be a single, uniform, and non-contrived area, whose shape is uncomplicated and whose area must not exceed minimum ratios with respect to the total site area.
- The following uses are specifically prohibited in Zone B: Churches, hospitals, schools, theaters, stadiums, hotels, motels, trailer courts, campgrounds, and other places of frequent public or semi-public assembly.

In Zone C no use may be made of any land that creates or causes interference with the operations of radio or electronic facilities on the airport or with radio or electronic communications between the airport and aircraft. In addition, Zone C prohibits land uses that make it difficult for pilots to distinguish between airport lights and other lights, result in glare in the eyes of pilots using the airport, impair visibility in the vicinity of the airport, or otherwise endanger the landing, taking off, or maneuvering of aircraft. All structure heights in Zone C are limited to 150 feet above the primary surface at the airport.

State Model Zoning Ordinance Airspace Protection

The State Model Zoning Ordinance height restrictions are predicated directly on the FAA's Part 77 imaginary airspace surfaces.

6.4 MSP ZONING ORDINANCE

Minnesota Statutes establish that airports in the state must adopt airport zoning ordinances. To do this, the statutes spell out the formation of a Joint Airport Zoning

Board comprised of two members from each jurisdiction with land use control in the areas affected by airport zoning, as well as the airport proprietor.

The MSP Joint Airport Zoning Board met to discuss and recommend a revised MSP zoning ordinance in light of the construction of Runway 17-35. An important part of this process was balancing the land use controls needed to provide safety while at the same time considering the social and economic impacts related to prospective land use controls. Minn. Stat. §360.066, subd. 1 is particularly instructive when addressing the question of zoning around complex urbanized airports such as MSP. The statute also addresses the concept of "reasonableness" when balancing the variables to be considered in the zoning process. Specifically, Minn. Stat. §360.066, subd. 1 states:

> "Reasonableness Standards of the commissioner defining airport hazard areas and the categories of uses permitted and airport zoning regulations adopted under sections 360.011 to 360.076, shall be reasonable, and none shall impose a requirement or restriction which is not reasonably necessary to effectuate the purposes of sections 360.011 to 360.076. In determining what minimum airport zoning regulations may be adopted, the commissioner and a local airport zoning authority shall consider, among other things, the character of the flying operations expected to be conducted at the airport, the location of the airport, the nature of the terrain within the airport hazard area, the existing land uses and character of the neighborhood around the airport, the uses to which the property to be zoned are planned and adaptable, and the social and economic costs of restricting land uses versus the benefits derived from a strict application of the standards of the commissioner."

Consistent with the guidance provided in Minn. Stat. §360.066, subd. 1, the MSP Joint Airport Zoning Board focused its discussion on the land use controls that were necessary to ensure a reasonable degree of safety around MSP. Based on the substantial property development and/or structural modification restrictions that would be placed on the largely urbanized and developed areas around the airport, the MSP Joint Airport Zoning Board turned its focus to safety. The MSP Joint Airport Zoning Board directed staff to conduct a risk analysis to provide the Board with further clarification on the question of zoning requirements necessary to ensure a "reasonable standard of safety."

In short, the analysis found that within State Zones A and B but outside the federal RPZ, the accident probability at MSP was less than the FAA standard of one accident in 10 million operations. Additionally, based on the accident rate calculations, the MSP Joint Airport Zoning Board determined that the likelihood of a fatality from an accident in State Safety Zones A and B outside the RPZ is extremely remote or extremely improbable, based on FAA criteria.

In addition to the risk analysis, the MSP Joint Airport Zoning Board focused on addressing the economic considerations as the statute requires. The Board relied on the analyses and information that were provided by the respective cities with jurisdiction over the land uses, and concluded that there were significant financial costs associated with implementation of the State Model Zoning Ordinance.

In summary, based on the findings of the Safety Study and the Economic Analysis, the Board adopted the following changes to the State Model Zoning Ordinance:

- Safety Zone A – is co-terminus with the Federal Runway Protection Zone (RPZ).
- Safety Zone B – use restrictions do not include site acre/structure limitations and site-area-to-building-plot-area ratios and population criteria.
- Exemption for Established Residential Neighborhoods – allows for the improvement, expansion and development of new residential uses in and adjacent to Established Residential Neighborhoods in Safety Zone B.

In 2004 the Commissioner of Transportation for the State of Minnesota approved the MSP Joint Airport Zoning Board's recommended ordinance.

6.5 LAND USE COMPATIBILITY ANALYSIS

The Minneapolis-St. Paul International Airport (MSP) is located in Hennepin County. The airport is bordered to the northwest by the City of Minneapolis, to the west by the City of Richfield, south by the City of Bloomington, to the southeast by the cities of Eagan and Mendota Heights and to the north by the City of St. Paul. The airport is bordered by residential land uses to the north, northwest, and west. A combination of mixed-use industrial, commercial and single-family residential exists to the south and southeast of the airport.

The following sections detail land use considerations in the context of existing and planned land uses around MSP focusing on airport noise and runway safety zones.

6.5.1 EXISTING CONDITION LAND USE COMPATIBILITY

In general, the area around the airport is primarily residential to the north, northwest, and east and to the south and southeast a combination of commercial/industrial and park/open space land uses. The Runway Protection Zones (RPZ) and State Safety Zones for MSP are shown on **Figure 6-1**.

Land Use Compatibility and Airport Noise Considerations

As detailed in Chapter 5, Section 5.3.6, the 2008 baseline noise contours around MSP contain 10,163 single-family homes and 3,701 multi-family units in the 60 and greater DNL noise contours, and 2,564 single-family homes and 1,372 multi-family units in the 65 and greater DNL noise contours. The 70 and greater DNL contours contained 116 single family homes and six multi- family units. The 75 and greater DNL does not contain any residential units.

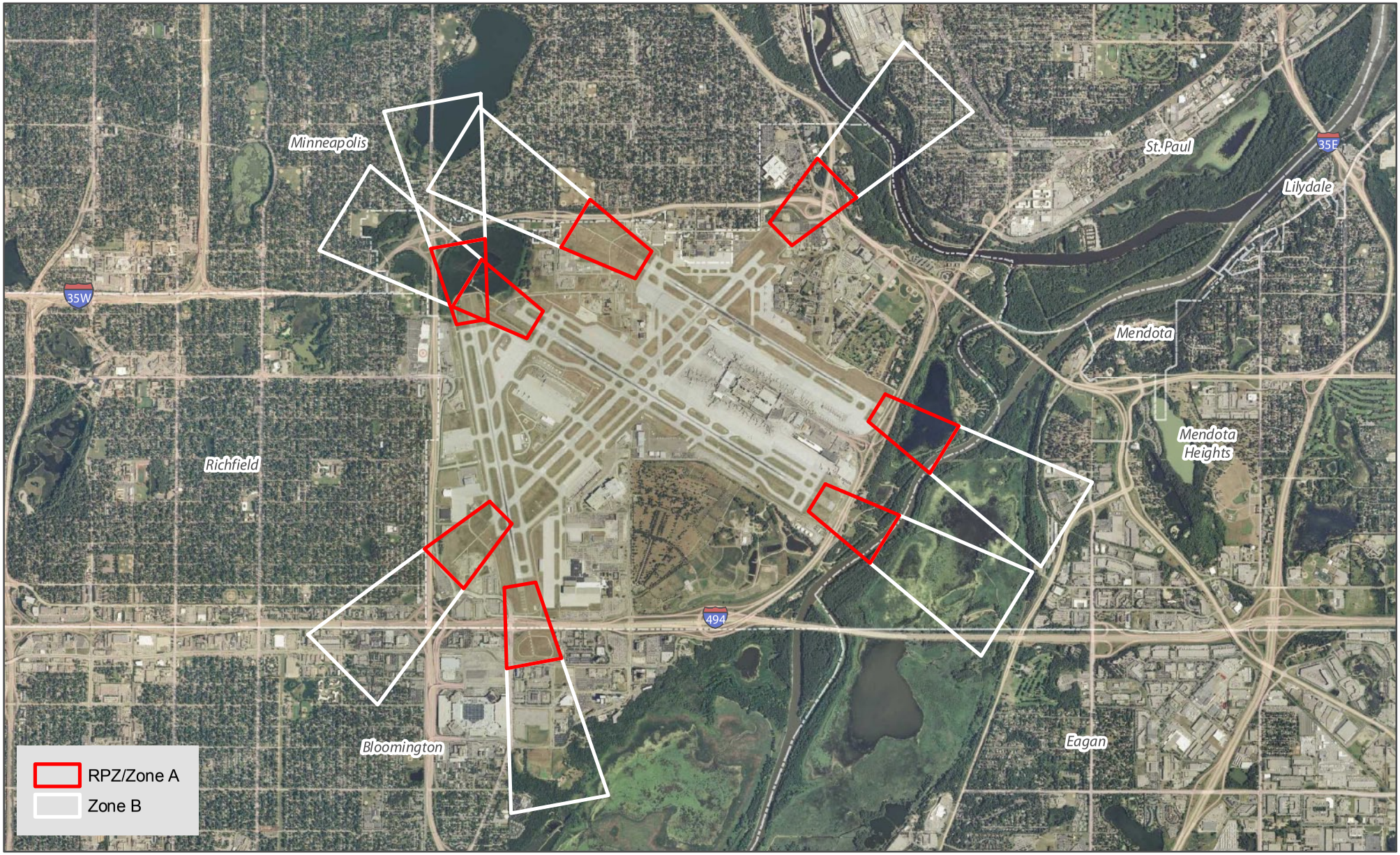
Figure 6-2 provides the 2008 base case 60 and greater DNL noise contours around MSP with 2005 land use data provided by the Metropolitan Council.

Land Use Compatibility and Existing Runway Protection/Safety Zones

The existing RPZs and State Safety Zones A and B at MSP are depicted in **Figure 6-3** with the existing land uses around the airport.

RPZs and State Zones

Figure 6-1

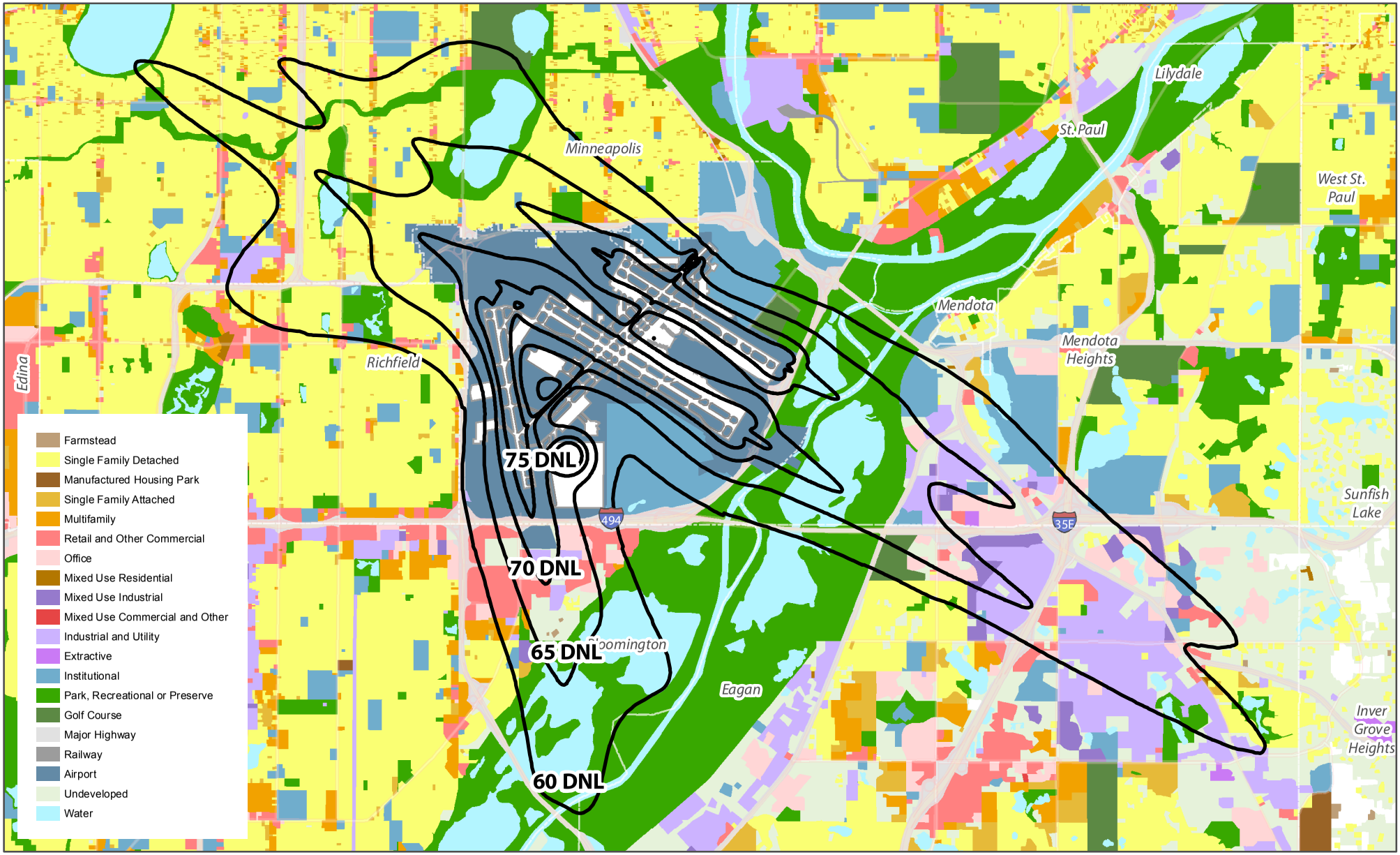


Minneapolis - St Paul International Airport (MSP)

0 1.5 3 Miles

2008 Base Case Contours with 2005 Land Use

Figure 6-2

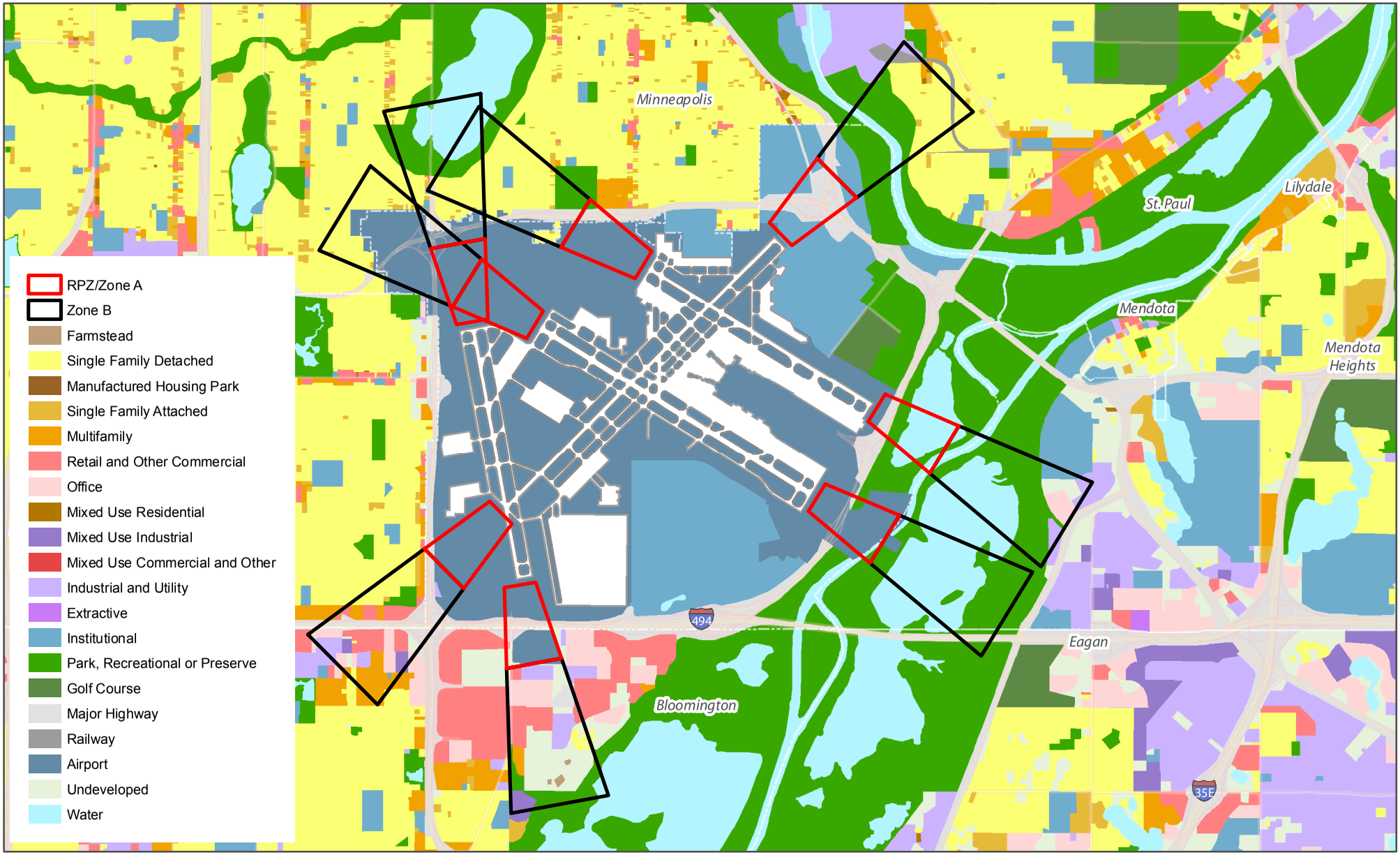


Minneapolis - St Paul International Airport (MSP)

0 2 4 Miles

RPZs and State Zones with 2005 Land Use

Figure 6-3



Minneapolis - St Paul International Airport (MSP)

0 1.5 3 Miles

The Runway 4 RPZ/State Zone A is 78.85 acres total and encompasses 76.97 acres of airport property, 1.87 acres of major highway and 0.01 acres of single-family attached land use. Zone B covers 250.3 acres: 17.55 acres of airport property, 15.25 acres of industrial and utility land use, 0.58 acres institutional, 53.80 acres major highway, 8.33 acres mixed use industrial, 40.77 acres multi-family land use, 22.94 acres office, 10.2 acres of park land, 40.92 acres retail and other commercial land use, 4.18 acres single-family attached, 30.49 acres single-family detached and 5.30 acres undeveloped land. State Zone B contains 113 single-family homes and 706 multi-family units.

The RPZ/State Zone A for Runway 17 is 78.85 acres and is entirely on airport property. Zone B covers 250.3 acres: 32.93 acres are airport property, 1.91 acres institutional, 11.42 acres major highway, 60.32 acres park land, 0.91 acres retail and other commercial, 3.48 acres single-family attached, 64.35 acres single-family detached, and 74.99 acres water. State Zone B contains 341 single-family homes and 32 multi-family units.

The Runway 22 RPZ/ State Zone A encompasses 78.85 acres: 46.26 acres major highway, 31.69 acres institutional land use, and 0.90 acres airport property. State Zone B is 250.3 acres total and covers 100.69 acres park land, 81.47 acres single-family detached, 25.51 acres institutional, 16.24 acres water, 8.85 acres railway, 8.55 acres major highway, 3.23 acres industrial and utility, 2.52 acres single-family attached, 2.16 acres multi-family, and 1.08 acres mixed use residential. State Zone B contains two single-family homes.

The Runway 35 RPZ/State Zone A is 78.85 acres total and covers 58.94 acres airport, 14.44 acres major highway, 4.08 acres undeveloped, 1.30 acres retail and other commercial, and 0.08 acres industrial and utility land use. Zone B encompasses 250.3 acres: 86.93 acres undeveloped land, 36.37 acres retail and other commercial, 34.87 acres park, 26.41 acres industrial and utility, 25.94 acres office, 10.01 acres mixed use industrial, 8.48 acres major highway, 6.59 acres multi-family, 6.07 acres single-family detached 4.21 acres water, 2.83 acres farmstead, and 1.60 acres airport. State Zone B contains two multi-family units.

The Runway 12L RPZ/State Zone A encompasses 78.85 acres: 70.45 acres airport property, 6.87 acres major highway, 1.42 acres park, and 0.10 acres multi-family. Zone A contains 12 multi-family units. State Zone B covers 250.3 acres: 137.58 acres single-family detached, 43.97 acres park, 22.05 acres airport, 20.23 acres water, 19.31 acres major highway, 5.06 acres institutional, 1.84 acres single-family attached, and 0.27 acres undeveloped land. State Zone B contains 759 single-family homes and 24 multi-family units.

The RPZ/State Zone A for Runway 12R is 78.85 acres and is entirely on airport property. Zone B encompasses 250.3 acres: 171.55 acres airport, 70.66 acres single-family detached, 4.16 acres major highway, 3.52 acres single-family attached, 0.17 acres undeveloped land, 0.13 acres retail and other commercial, 0.05 acres industrial and utility, and 0.05 acres park land. State Zone B contains 390 single-family homes and 40 multi-family units.

The Runway 30L RPZ/Zone A covers 78.85 acres: 72.04 acres airport, 4.29 acres park land, 1.44 acres water, and 1.07 acres major highway. State Zone B encompasses

250.3 acres: 133.32 acres water, 104.37 acres park, 6.97 acres airport, and 5.65 acres major highway.

The RPZ/State Zone A for Runway 30R covers 78.85 acres: 45.91 acres water, 17.18 acres park, 8.45 acres major highway, and 7.30 acres airport property. Zone B encompasses 250.3 acres: 109.27 acres park, 92.38 acres water, 14.63 acres office, 12.51 acres industrial and utility, 12.16 acres undeveloped land, 9.06 acres institutional, and 0.28 acres major highway.

6.5.2 PREFERRED ALTERNATIVE LAND USE COMPATIBILITY

The preferred development alternative at MSP maintains the existing runway infrastructure. The increase in overall operations and increase in larger jet operations results in larger noise contours around MSP.

Forecast Land Use Compatibility and Airport Noise Considerations

As detailed in Chapter 5, Section 5.4.5, the 2030 preferred alternative forecast 60 and greater DNL noise contours around MSP contains 19,374 single-family homes and 10,267 multi-family units. The 65 DNL and greater contours contain 5,468 single-family homes and 2,470 multi-family units and the 70 DNL and greater contours contain 853 single-family homes and 1,145 multi-family units. The 75 and greater contours do not contain any residential units.

Figure 6-4 provides the 2030 preferred alternative forecast 60 and greater DNL noise contours around MSP with 2005 land use data provided by the Metropolitan Council.

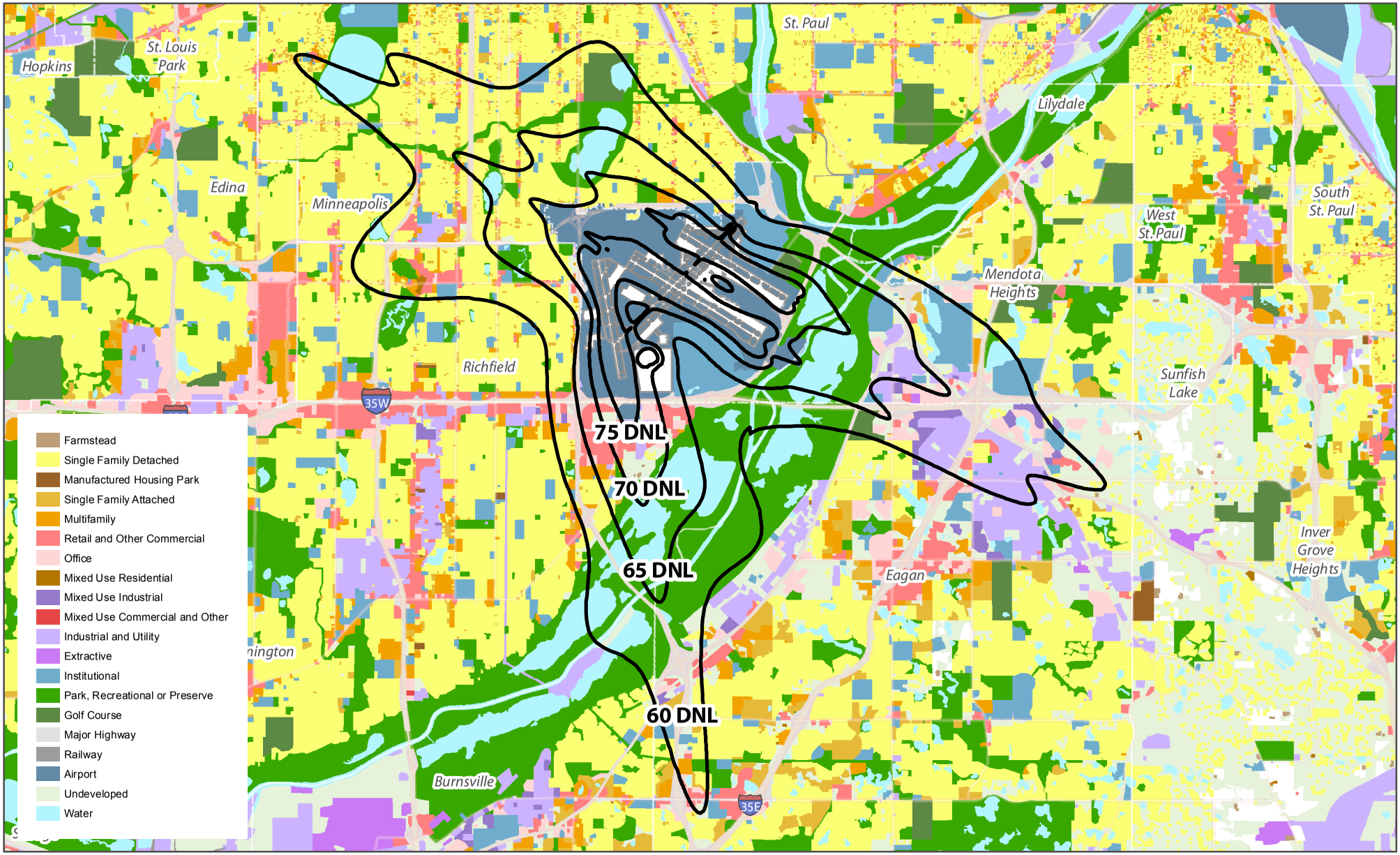
Land Use Compatibility and Preferred Alternative Runway Protection/Safety Zones

The 2030 preferred alternative RPZs and State Safety Zones A and B at MSP are the same as the 2008 RPZs and zones. They are depicted in **Figure 6-4** with existing land uses around the airport.

Additional analysis was conducted relative to the planned 2020 land uses around MSP as provided by the Metropolitan Council. The only substantive proposed changes occur in State Zone B of Runway 35 where undeveloped land becomes commercial land use and in State Zone B off Runway 30R where undeveloped land changes to industrial land use.

2030 Preferred Alternative Contours with 2005 Land Use

Figure 6-4



Minneapolis - St Paul International Airport (MSP)

0 3 6 Miles