

## **6.0 PHYSICAL AND NATURAL ENVIRONMENT IMPACTS**

### **6.1 AIR QUALITY**

The Affected Environment for air quality for the I-494 corridor reconstruction was described in Section 4.2.1 of the DEIS. Impacts and Mitigation Measures for air quality were addressed in Section 5.3.3 of the DEIS.

#### **6.1.1 INFORMATION FROM THE DEIS THAT REMAINS UNCHANGED**

The background information on air quality standards presented in the DEIS has not changed. The DEIS presented an analysis of future carbon monoxide (CO) concentrations adjacent to the most congested interchanges in the corridor study area. The maximum CO concentrations were predicted at (among others) the France Avenue and Portland Avenue interchanges (year 2010). The DEIS analysis did not identify any locations where state or federal air quality standards would be exceeded.

#### **6.1.2 CHANGES IN THE SETTING OR TECHNICAL ANALYSIS THAT HAVE OCCURRED SINCE THE DEIS**

At the time of the DEIS, the Minneapolis-St. Paul Metropolitan Area was in non-attainment status regarding compliance with federal carbon monoxide (CO) standards. Due to the achievement of decreasing CO levels in recent years, the Environmental Protection Agency (EPA) reclassified the area as an attainment area for this parameter in 1999. The attainment status is contingent upon the implementation of measures to assure that CO levels remain below standards. The contingency stipulates that future CO concentrations be modeled for proposed transportation projects.

Since the completion of the DEIS, the EPA has released a new version of the mobile source emissions model entitled MOBILE5a. The analysis presented in the DEIS based emission factors on the MOBILE4 model. In addition, the DEIS modeling used the CALINE-3 air quality dispersion model to predict average CO concentrations. An update to the CALINE-3 model, CAL3QHC, is now accepted for this type of air quality modeling.

Based upon a review of updated traffic operational analyses with Minnesota Pollution Control Agency (MPCA) staff, new background monitoring and modeling locations were used for the FEIS relative to the DEIS. New background air quality data was collected in March and April of 2000. While the DEIS used 2010 as the design year, the analysis performed for this FEIS used 2022 as the design year. Further information regarding the FEIS monitoring and analysis is presented in 6.1.3.4.

#### **6.1.3 PREFERRED ALTERNATIVE IMPACTS**

The EPA designates areas as “attainment” or “non-attainment” areas for certain air pollutants. Attainment areas are those areas that consistently meet air quality standards whereas non-attainment areas do not, or have not met standards for specific pollutants. The attainment status

of the primary air quality parameters relevant to roadway projects (ozone, particulate matter, lead, and carbon monoxide) is addressed in the sections below. In Minnesota, air quality is regulated by the EPA and by the MPCA.

#### **6.1.3.1 Ozone**

Transportation sources emit nitrogen oxides and hydrocarbons, which are precursors of ozone. Ozone levels in the Twin Cities Metropolitan Area currently meet state and federal standards. Nitrogen oxide and hydrocarbon concentrations are influenced primarily by the total number of vehicle-miles traveled in the metropolitan area and by meteorological conditions. The MPCA has determined that the contribution of a single roadway project to the total concentrations of these pollutants on an area-wide basis is negligible and difficult to accurately quantify. The State of Minnesota is classified by the EPA as an ozone attainment area. Ozone levels in the Twin Cities Metropolitan Area currently meet state and federal standards. Because of these factors, ozone modeling was not conducted for this project.

#### **6.1.3.2 Particulate Matter**

Particulate matter (PM) is categorized by the size of particles being measured. For example, the PM<sub>2.5</sub> value is the measurement of particles smaller than 2.5 microns (a micron is a millionth of a meter) in a particular volume of air. Based on recent (1995) ambient monitoring data, Minnesota meets existing air quality standards except for a small area of St. Paul that exceeded particulate standards in 1995.

Motor vehicles emit small amounts of particulate matter, and wind turbulence from traffic causes these particulates and roadway dirt to be mixed into the air. In urban areas, traffic contributes a small percentage of total ambient particulate concentrations when compared with the percentage of particulates contributed to ambient air by stationary sources. As stated in the U.S. Department of Energy's *Transportation Energy Data Book* in 1999, highway-related sources of particulate matter contributed to the nation's total particulates by 0.8 percent for PM<sub>10</sub>, and by 2.5 percent for PM<sub>2.5</sub>.

Because particulate matter impacts from vehicular traffic would be limited in both distribution and magnitude (based upon the Build and No-Build traffic volumes, and based upon known particulate matter characteristics), neither the Build or No-Build Alternative would be expected to increase particulate concentrations within the project area. Therefore, particulate matter modeling was not conducted for this project.

#### **6.1.3.3 Lead**

The State of Minnesota is designated by the EPA as an attainment area for lead. Lead emissions have steadily declined over the past 20 years as the percentage of vehicles using leaded fuel has decreased. Because of these factors, modeling for lead was not performed for this project.

#### **6.1.3.4 Carbon Monoxide**

Carbon monoxide (CO) is the traffic-related pollutant of most concern in the Twin Cities Metropolitan Area. The MPCA has established state standards (or maximum permissible

concentrations) for CO of 30 parts per million (ppm) for a 1-hour period (average concentration), and 9 ppm for an 8-hour period. The MPCA 1-hour standard is more stringent than the federal standard of 35 ppm.

The EPA recently (1999) reclassified Minneapolis/St. Paul as an attainment area for CO. The attainment status is contingent upon the implementation of measures to assure that CO concentrations remain below standards. The contingency stipulates that future CO concentrations be modeled for proposed transportation projects. In compliance with this stipulation, air quality analyses of “worst-case” conditions were performed for this FEIS to estimate the effect of the project alternatives on future CO concentrations at key interchanges and freeway segments in the project corridor. These analyses include monitoring of existing conditions and modeling of future conditions. Minnesota Pollution Control Agency staff was consulted in the development of the scope, methods, and procedures used in performing CO analysis as described below.

This project is consistent with the year 2000 Twin Cities Metropolitan Council's Transportation Policy Plan (TPP), and Phase I of the project is in the current (2001-2003) Twin Cities TIP. Subsequent phases will be included in future TIPs. Therefore, this project conforms to the requirements of the Clean Air Act Amendments and to the Conformity Rules, 40 CFR 93.

#### Background Carbon Monoxide Concentrations

Air quality analysis requires knowledge of background pollutant concentrations. By definition, the background CO concentration in any particular area is the level that exists independent of direct contributions from nearby traffic. The background concentrations are added to micro-scale modeling results to yield projected CO concentrations at specific receptor sites.

Background concentrations are determined by measuring CO levels at locations near the project area but away from local sources of CO such as busy roads and intersections. Background CO concentrations are measured continuously for two weeks. The highest one-hour and eight-hour average concentrations are used.

Background CO concentrations were determined from monitoring conducted at three sites: the Minnesota Department of Transportation (Mn/DOT) Maintenance Garage at 7333 Bryant Lake Drive in Eden Prairie, Poplar Bridge Elementary School at 8401 Palmer Avenue South in Bloomington, and the Mall of America in Bloomington. The first two locations were monitored by Mn/DOT between March 22 and April 9, 2000. The third site was monitored by Interpoll Laboratories, Inc. between February 22 and March 7, 2000.

For the purposes of this analysis, the background concentrations were adjusted for traffic growth (factor for growth between 2000 and 2022) and vehicle emissions (factor for changes in vehicle emissions predicted by the EPA model MOBILE5a resulting from emission control improvements). Because monitoring was performed in the spring, the Holzworth seasonal correction factor was added to simulate worst-case winter temperature conditions. The results of these adjustments are summarized in Table 6.1. It should be noted that existing (2000) CO concentrations measured at the three background monitoring locations and presented on Table 6.1 are below state and federal standards.

Of the seven areas modeled in this analysis, five are located between two monitoring sites. To produce the best estimate of actual background conditions, the background concentrations at these areas are linearly interpolated based on straight-line distance to the two nearest monitoring sites. For the two areas that are not located between two monitoring sites, the background concentration of the nearest site was used.

**TABLE 6.1  
BACKGROUND CARBON MONOXIDE CONCENTRATIONS**

<u>Mn/DOT Eden Prairie</u>		
	<u>1-Hour Avg.</u>	<u>8-Hour Avg.</u>
Monitored Year	2000	2000
Future Year	2022	2022
Monitored Background CO	1.61	1.14
Annual Percentage Background Traffic Growth	1.00	1.00
Background Traffic Growth from 1999 to 2022	1.24	1.24
Emissions Factor reduction	0.82	0.82
Holzworth Factor	1.43	1.43
<b>Adjusted 2022 Average Background CO concentration (ppm)</b>	<b>2.34</b>	<b>1.66</b>
<u>Mn/DOT Bloomington</u>		
	<u>1-Hour</u>	<u>8-Hour</u>
Monitored Year	2000	2000
Future Year	2022	2022
Monitored Background CO	0.90	0.72
Annual Percentage Background Traffic Growth	1.00	1.00
Background Traffic Growth from 1999 to 2022	1.24	1.24
Emissions Factor reduction	0.82	0.82
Holzworth Factor	1.43	1.43
<b>Adjusted 2022 Average Background CO concentration (ppm)</b>	<b>1.31</b>	<b>1.05</b>
<u>Interpoll Bloomington</u>		
	<u>1-Hour</u>	<u>8-Hour</u>
Monitored Year	2000	2000
Future Year	2022	2022
Monitored Background CO	2.70	1.60
Annual Percentage Background Traffic Growth	1.50	1.50
Background Traffic Growth from 1999 to 2022	1.39	1.39
Emissions Factor reduction	0.82	0.82
Holzworth Factor	1.43	1.43
<b>Adjusted 2022 Average Background CO concentration (ppm)</b>	<b>4.40</b>	<b>2.61</b>

CO = Carbon Monoxide      ppm = parts per million

## Micro-Scale Carbon Monoxide Analysis and Results

The year 2022 is the design year for air quality analysis. MOBILE5a, the current EPA mobile-source emissions model, only produces emission factors up to the year 2020. Based on guidance from the MPCA, it is assumed that the projected trend of decreasing emission rates per vehicle-mile and vehicle-hour will continue, and use of MOBILE5a 2020 factors, thus, would represent conservative (high emission) conditions for 2022.

Forecast traffic data (year 2022) and either existing (“No-Build”) conditions or Preferred Build Alternative preliminary design layouts were used to model predicted No-Build and Build CO concentrations, respectively. Carbon monoxide modeling was performed using the most current versions of EPA CO emission and dispersion modeling software. All methods and procedures used in the air quality analyses are approved or industry standard analyses.

Carbon monoxide concentrations were calculated for year 2022 at key interchanges and freeway segments in the study area with the anticipated highest levels of congestion. MPCA staff reviewed and concurred with the intersections selected for analysis. The analyzed interchanges and freeway sections are as follows:

<u>Modeled Area</u>	<u>Analysis Type</u>	<u>Receptors</u>
• Portland Avenue at I-494	Intersection	Spot Receptors
• Lyndale Avenue at I-494	Intersection	Spot Receptors
• I-494 between Penn Avenue and York Avenue	Free-Flow	Spot Receptors
• France Avenue at I-494	Intersection	Spot Receptors
• TH 169 at I-494	Intersection	Spot Receptors
• TH 62 at I-494	Intersection	Spot Receptors
• I-494 between Minnetonka Boulevard and TH 7	Free-Flow	Spot Receptors

While the TH 100 interchange ramps at 77th Street are projected to operate at LOS D, this interchange was not analyzed for air quality. Intersections at the nearby France Avenue interchange are projected to operate at LOS F and carry more traffic than those at 77th Street, therefore the France Avenue analysis can be considered worst-case air quality analysis for this area.

Micro-scale analyses were performed for CO concentrations at the “worst-case” locations identified above for peak traffic conditions. Carbon monoxide concentrations near interchanges were predicted using forecast traffic volumes, existing or proposed (No-Build or Build) intersection geometrics, optimized signal timing, and calculated ramp meter queue times. Carbon monoxide concentrations near freeway segments were predicted using forecast traffic volumes and forecast peak hour (congested) speeds. Emission levels were calculated with the EPA MOBILE5A model and dispersion modeling using the EPA model CAL3QHC. The modeling assumptions used in this analysis are presented in Table 6.2.

Worst-case CO concentrations at spot receptors sites were calculated by the models. Specific spot receptors were chosen at each modeling location with guidance from MPCA staff. The modeling receptor locations used in this analysis are presented on Figure 6.1. These spots represent the nearest locations to the intersection where prolonged human activity is likely to occur. Modeled CO concentrations are reported at each spot individually along with the corresponding worst-case wind direction.

**TABLE 6.2  
CARBON MONOXIDE MODELING ASSUMPTIONS**

Analysis Year:	2022
Cold Start Percentage:	20.6 percent for all traffic
Hot Start Percentage:	27.3 percent for all traffic
Cruising Speed:	<ul style="list-style-type: none"> <li>• Posted Speed Limits for Streets</li> <li>• Modeled Peak Hour (Congested) Speeds for Freeways</li> <li>• Calculated Queue Speeds for Freeway Ramp Meters</li> </ul>
Traffic Mix:	National Default Values
Wind Speed:	1 meter/second (3.3 feet/second)
Temperature:	-6.6 degrees Celsius (20 degrees Fahrenheit)
Surface Roughness:	108 centimeters (42.5 inches)
Stability Class:	D
Inspection Maintenance:	No
Oxygenated Fuel:	Yes
8-Hour Persistence Factor:	0.7
Wind Direction:	36 directions at 10 degree increments

Notes:

The Surface Roughness, Stability Class and 8-Hour Persistence Factor are discussed in *Guidelines for Air Quality Maintenance Planning and Analysis Volume 9 (Revised): Evaluating Indirect Sources*, U.S. EPA, 1978, and are summarized below.

- (1) Surface Roughness indicates the initial ground level turbulence into which the exhaust plume will be released. Generally, the higher the roughness, the lower the concentration. The number used here is conservatively low for the I-494 corridor (results in a worst-case).
- (2) Stability Class characterizes the mixing potential of the atmosphere. Stability Class D is used as a worst-case in suburban and urban areas.
- (3) The 8-Hour Persistence Factor is used to determine 8-hour localized CO contributions, and takes into account fluctuating wind directions, temperature and traffic, which are more likely to occur over eight hours than during one hour. The factor is multiplied by the 1-hour modeling result.

The results of the CO modeling are presented for the No-Build Alternative in Table 6.3, and for the Preferred Alternative in Table 6.4. Receptor numbers on these tables correspond to the

Figure 6.1 11 x 17 2 pages



receptor locations shown in Figure 6.1. The results may be compared to federal and state standards for CO, presented at the bottom of each of these tables. Summary observations from this analysis are presented below:

- Concentrations of CO near key intersections in the study area remain below state and federal standards at all intersections examined for both the Preferred Alternative and the No-Build Alternative for 2022 conditions.
- For the majority of receptor locations modeled, the Preferred Alternative produces a slightly lower CO concentration than the No-Build due to better intersection operations and a consequent decrease in the number of idling vehicles.
- For the intersection of France Avenue and I-494, the Preferred Alternative produces a slightly higher CO concentration than the No-Build, primarily because the new intersection alignment moves the freeway ramps closer to the receptor locations. In addition, there are projected to be higher traffic levels on the south ramps under the Preferred Alternative than under No-Build.
- At the freeway segment between Penn Avenue and York Avenue, the increase in vehicle speeds lowers CO concentrations slightly in the Preferred Alternative compared to the No-Build.
- At the freeway segment between TH 7 and Minnetonka Boulevard, the increase in traffic volume and freeway width (bringing the roadway closer to the receptors) combine to raise CO concentrations slightly in the Preferred Alternative compared to the No-Build.
- For Receptor 19 at the intersection of Portland Avenue and I-494, the model predicts a higher CO concentration for the Preferred Alternative than for No-Build conditions. This is the result of higher traffic levels in the vicinity of this receptor due to elimination of the I-494/12th Avenue interchange with the Preferred Alternative.
- Modeled CO concentrations near the TH 62/I-494 interchange are slightly higher for the Preferred Alternative compared to the No-Build. This increase is due to the intersections being closer to the receptors in the Preferred Alternative condition.

It should be noted that existing (2000) CO concentrations measured at the three background monitoring locations are below state standards (refer to Table 6.1).

An air quality analysis was also independently performed for the City of Richfield in the vicinity of the Penn Avenue/I-494 interchange. This analysis was part of the *Best Buy Campus Draft EIS* (August 2000), and it assumed the construction of a single point intersection at the Penn Avenue/I-494 interchange ramps. The Penn Avenue/76th Street intersection was identified as having the greatest level of traffic delay in the overall interchange area, so it was used as a “worst-case” air quality analysis for the *Best Buy Draft EIS*. The projected year 2003 (one year after completion of the Best Buy Campus) 1-hour and 8-hour average CO concentrations for maximum proposed development conditions were 6.2 and 5.9 parts per million [ppm], respectively. These results are lower than the state standards (30.0 ppm for 1-hour average concentrations, and 9.0 ppm for 8-hour average concentrations).

**TABLE 6.3  
CARBON MONOXIDE MODELING RESULTS – NO-BUILD**

Interchange Area or Freeway Segment				2022 No-Build		
	Receptor	Background		One-Hour Average Total* Concentration	Eight-Hour Average Total* Concentration	Wind Angle
		1-hr.	8-hr.			
TH 169 at I-494	1	2.0	1.5	3.7	2.7	100
	2			3.6	2.6	230
	3			4.5	3.2	300
	4			3.6	2.6	80
France Avenue at I-494	5	2.1	1.4	5.0	3.4	220
	6			4.3	2.9	100
	7			4.0	2.7	90
	8			4.2	2.9	30
	9			3.5	2.4	350
	10			3.4	2.3	350
Lyndale Avenue at I-494	11	3.0	1.9	4.2	2.7	190
	12			6.2	4.1	140
	13			5.0	3.3	210
	14			4.7	3.1	20
	15			5.5	3.6	330
Portland Avenue at I-494	16	3.2	2.0	7.2	4.8	210
	17			7.0	4.7	170
	18			5.0	3.3	30
	19			5.1	3.3	290
Penn Avenue to York Avenue	20	2.3	1.5	4.6	3.1	100
	21			4.9	3.3	240
	22			4.2	2.8	70
	23			3.9	2.6	40
Minnetonka Boulevard to TH 7	24	2.3	1.7	3.3	2.4	180
	25			3.8	2.8	20
	26			4.0	2.9	180
	27			3.8	2.8	0
	28			3.4	2.5	0
TH 62 at I-494	29	2.3	1.7	5.1	3.7	250
	30			5.1	3.7	120
	31			4.5	3.2	310
	32			4.4	3.2	30
<b>State Standard</b>				<b>30</b>	<b>9</b>	
<b>Federal Standard</b>				<b>35</b>	<b>9</b>	

Note: All concentrations are in parts-per-million (ppm)

\* Total concentrations include background and Modeled CO concentrations.

**TABLE 6.4  
CARBON MONOXIDE MODELING RESULTS – PREFERRED ALTERNATIVE**

Interchange Area or Freeway Segment	Receptor	Background		2022 Build		
		1-hr.	8-hr.	One-Hour Average Total* Concentration	Eight-Hour Average Total* Concentration	Wind Angle
		TH 169 at I-494	1	2.0	1.5	3.6
	2			3.3	2.4	240
	3			4.3	3.1	290
	4			3.4	2.4	80
France Avenue at I-494	5			5.3	3.6	237
	6	2.1	1.4	4.3	2.9	100
	7			4.3	2.9	120
	8			4.9	3.4	50
	9			4.0	2.7	40
	10			4.0	2.7	350
Lyndale Avenue at I-494	11			4.1	2.6	210
	12	3.0	1.9	6.2	4.1	140
	13			5.0	3.3	210
	14			4.7	3.1	20
	15			5.5	3.6	330
Portland Avenue at I-494	16			6.0	4.0	240
	17	3.2	2.0	5.3	3.5	160
	18			4.9	3.2	20
	19			6.0	4.0	280
Penn Avenue to York Avenue	20			4.1	2.8	110
	21	2.3	1.5	4.1	2.8	110
	22			3.9	2.6	60
	23			3.8	2.5	290
Minnetonka Boulevard to TH 7	24			3.4	2.5	180
	25	2.3	1.7	4.0	2.9	20
	26			4.3	3.1	180
	27			3.9	2.8	0
	28			3.5	2.5	0
TH 62 at I-494**	29			5.2	3.7	240
	30	2.3	1.7	5.7	4.1	120
	31			4.5	3.2	300
	32			4.6	3.3	10
<b>State Standard</b>				<b>30</b>	<b>9</b>	
<b>Federal Standard</b>				<b>35</b>	<b>9</b>	

Note: All concentrations are in parts-per-million (ppm)

\* Total concentrations include background and Modeled CO concentrations.

\*\* Due to projected decreases in level of service for the intersections of Baker Road and Clearwater Road with TH 62 under the worst-case Preferred Alternative condition, air quality was analyzed for these intersections. Receptors were placed close to each corner of each intersection. The maximum CO concentration at Baker Road was 7.3 ppm for the one-hour condition and 5.2 ppm for the eight-hour condition with a wind angle of 280 degrees. The maximum CO concentration at Clearwater Drive was 5.9 ppm for the one-hour condition and 4.2 ppm for the eight-hour condition with a wind angle of 280 degrees. These concentrations all meet state and federal CO standards.

#### 6.1.4 MITIGATION MEASURES

No specific long-range mitigation measures for this project are necessary to maintain air quality standards because projected CO levels for the Preferred Alternative are below state and federal standards.

Air quality modeling will be required for Indirect Source Permits (ISPs) for the project. An individual Indirect Source Permit application will be filed with the MPCA for each project phase. The ISP modeling would project CO levels for one and ten years after project phase completion. It is not anticipated that carbon monoxide projections in the ISP applications will exceed state or federal standards.

### 6.2 NOISE

The Affected Environment for noise for the I-494 corridor reconstruction was described in Section 4.2.2 of the DEIS. Impacts and Mitigation Measures for noise were addressed in Section 5.3.4 of the DEIS.

#### 6.2.1 INFORMATION FROM THE DEIS THAT REMAINS UNCHANGED

The DEIS monitored existing (1990) noise levels and projected (2010) No-Build noise levels versus Build noise levels (all of the Build alternatives were considered to be equivalent regarding potential noise impacts). The monitoring and the results of the analysis in the DEIS were assessed relative to state noise regulations as administered by the Minnesota Pollution Control Agency (MPCA) and relative to the Federal Highway Administration (FHWA) noise abatement criteria.

The DEIS noise monitoring indicated that there were a number of locations where existing noise levels exceeded state noise standards and/or federal noise abatement criteria. This condition still exists (refer to Section 6.2.3.2 for year 2000 monitoring results). As was indicated in the DEIS, there are noise walls located on the east and west sides of I-494 between Excelsior Boulevard on the north and Baker Road on the south.

#### 6.2.2 CHANGES IN THE SETTING OR TECHNICAL ANALYSIS SINCE THE DEIS

For the I-35W/I-494 interchange area, the DEIS included by reference noise monitoring and analysis from the I-35W DEIS. Noise monitoring and analysis performed for this FEIS updates the I-35W DEIS information for the I-35W/I-494 interchange area, including I-35W from 92nd Street to 66th Street. Noise walls are currently in place on both sides of I-35W from 76th Street to Crosstown Avenue to the north, and between 82nd Street and 90th Street on the west side and 94th Street on the east side to the south. Since the I-35W and I-494 DEISs were published, a noise wall has also been constructed north of 77th Street between Nicollet Avenue and I-35W.

New noise monitoring and modeling were performed for the FEIS to reflect existing and 2022 (20 years after construction start) modeled conditions. The DEIS listed potential noise mitigation measures for locations where state noise standards are exceeded, but did not provide analysis of the noise reduction performance or cost effectiveness of providing mitigation. For

the FEIS, an analysis of mitigation reasonableness was prepared. The assessment of mitigation measures for the FEIS uses the methodological approach outlined in *Mn/DOT Noise Policy for Type I and Type II Federal-Aid Projects as per CFR 772*. The results of the updated noise monitoring and analysis of impacts and mitigation measures are discussed in greater detail in Sections 6.2.3 and 6.2.4.

The state statutes regulating noise standards have been amended since publication of the DEIS. Section 6.2.3.1, below, discusses the current state regulatory requirements.

### 6.2.3 NOISE IMPACTS

Traffic noise is produced by vehicular engine operation, exhaust and tire-to-roadway contact. The energy or “loudness” of sound waves is expressed in units called decibels (dB). When analyzing traffic-generated noise, the units of sound measurement are modified so that measured frequencies generally match those frequencies discernable to the human ear. These units of sound measurements are called “A-weighted” decibels, or dB(A). In this FEIS, any reference to “decibels” will be A-weighted decibels. Common noise levels from various indoor and outdoor sources are listed on Table 6.5.

**TABLE 6.5  
NOISE LEVEL COMPARISONS**

Common Outdoor Noise Levels	Noise Level dB(A)	Common Indoor Noise Levels
	-110-	Rock Band
Jet flying at 30.5 meters (100 feet)		
	-100-	Inside Subway Train (New York)
Gas Lawn Mower at 0.9 meters (3 feet)		
	-90-	Food Blender 0.9 meters (at 3 feet)
Diesel Truck at 15.2 meters (50 feet)		
Noisy Urban Daytime	-80-	Garbage Disposal at 0.9 meters (3 feet) Shouting at 0.9 meters (3 feet)
Gas Lawn Mower at 30.5 meters (100 feet)	-70-	Vacuum Cleaner at 3.0 meters (10 feet)
Commercial Area		Normal Speech at 0.9 meters (3 feet)
Heavy Traffic at 91.4 meters (300 feet)	-60-	
		Large Business Office
Quiet Urban Daytime	-50-	Dishwasher Next Room
Quiet Urban Nighttime	-40-	Small Theatre Large Conference Room (Background)
Quiet Suburban Nighttime		
	-30-	Library
Quiet Rural Nighttime		Bedroom at Night
	-20-	Concert Hall (Background) Broadcast and Recording Studio
	-10-	
		Threshold of Hearing
	-0-	

Source: *Noise Control – New Standards*: W.R. Green: California Department of Transportation, Paper presented at AASHTO Annual Meeting; November 14, 1973.

Sound energy from roadway traffic is roughly proportional to the volume of traffic on the roadway. However, because noise is measured on a logarithmic scale, increases of a few decibels of noise are measurable with instrumentation but are barely perceptible to the human ear in an outdoor setting. For example, a doubling of traffic volume (doubling sound energy) results in a noise level increase of approximately 3 decibels. A tenfold increase in traffic volume, resulting in an increase of 10 decibels, sounds to the average person as if the noise has become about twice as loud. According to the MPCA publication, *An Introduction to Sound Basics*, noise level changes of 3 decibels in an outdoor setting are barely perceptible, and changes of less than 3 decibels are imperceptible to most people.

### 6.2.3.1 Regulatory Background

There are state and federal noise standards for transportation projects. The MPCA is the primary governmental regulatory agency responsible for administering noise regulations in Minnesota. Under Minnesota Statute 116.07, Subdivisions 2 and 4, the MPCA has developed Noise Pollution Rules (Minnesota Rules Chapters 7030.001-7030.1060). The standards established for different Noise Area Classification (NAC) categories in the Noise Pollution Rules are summarized in Table 6.6.

**TABLE 6.6  
MINNESOTA POLLUTION CONTROL AGENCY STATE NOISE STANDARDS**

Code	Day (7:00 a.m. – 10:00 p.m.)		Night (10:00 p.m. – 7:00 a.m.)	
	dBA		dBA	
NAC-1	L <sub>10</sub> of 65	L <sub>50</sub> of 60	L <sub>10</sub> of 55	L <sub>50</sub> of 50
NAC-2	L <sub>10</sub> of 70	L <sub>50</sub> of 65	L <sub>10</sub> of 70	L <sub>50</sub> of 65
NAC-3	L <sub>10</sub> of 80	L <sub>50</sub> of 75	L <sub>10</sub> of 80	L <sub>50</sub> of 75

The NAC-1 category in the above table includes the most sensitive receptors, such as residential, medical, and religious uses. The NAC-2 category generally includes commercial or other land uses which are less sensitive to noise conditions than NAC-1 uses. NAC-2 standards apply for hotels where the building has adequate acoustic insulation, year-round climate control, and has no accommodations that are intended for outdoor use. NAC-3 land uses are generally industrial uses.

In 1995, Minnesota Statute 116.07 was amended. This amendment provided certain exemptions to the state noise standards referenced above. Relevant to the I-494 reconstruction, the 1995 amendment exempts roadway projects from the state noise standards if all reasonably available noise mitigation measures, as approved by commissioners of the Mn/DOT and the MPCA, are utilized in the project to abate noise. This approval process includes a Noise Exemption process, which is discussed further in Section 6.2.4.

As long as a project employs all reasonably available noise mitigation measures, the amended statutes do not necessarily require attainment of the noise standards identified in Table 6.6. To define mitigation measures which are appropriate on a project-specific basis, the Mn/DOT has developed a methodology to evaluate noise barrier implementation. This methodology is summarized in *Mn/DOT Noise Policy for Type I and Type II Federal-Aid Projects as per 23 CFR 772*. The Mn/DOT, in cooperation with the MPCA, uses this methodology to determine the conditions under which exemptions from the state noise standards are justified under the amended Minnesota Statute 116.07.

At the federal level, the FHWA has established Noise Abatement Criteria for given land use categories. FHWA does not view these criteria as absolute and enforceable limits. Rather, the federal regulations require that every reasonable and feasible effort be made to provide noise mitigation when the applicable abatement criteria levels are approached or exceeded.

Within the FHWA system, the applicable land use classification for the I-494 reconstruction is “Category B” (residential and recreational areas). The Category B criteria threshold is 70 dB(A) ( $L_{10}$ ). From the information provided above, it can be seen that the comparable MPCA standard is 65 decibels (more restrictive). For projects in Minnesota, FHWA has determined that the Mn/DOT noise mitigation evaluation methodology as discussed above is an acceptable method to define reasonable and feasible mitigation measures for situations in which the applicable federal Noise Abatement Criteria are approached or exceeded.

In addition to the federal Noise Abatement Criteria discussed above, the FHWA defines noise impacts as a “substantial increase” in future noise levels over existing conditions. There is no mandated definition of what constitutes a “substantial increase.” In Minnesota, an increase of five decibels or greater is considered to be a “substantial increase.” In the event of such a projected increase associated with a roadway project, the Mn/DOT noise mitigation evaluation methodology is used to study feasibility and reasonableness of providing noise mitigation.

### **6.2.3.2 Noise Analysis**

#### Monitoring of Existing Noise Levels

Noise level monitoring is commonly performed during a noise study to document existing noise levels. Existing levels may be used as a baseline against which future scenarios are compared, and also to validate the modeling methods and inputs utilized. Thirty-three sites (see Figure 6.2) were chosen for the monitoring of existing noise levels in the project corridor. The locations were discussed with MPCA staff prior to the field monitoring.

Noise levels were monitored between June 28, 2000 and July 24, 2000. Noise levels were monitored twice for each receptor location, once in the morning, and once in the afternoon. The results, indicated on Table 6.7, are the averages of these morning and afternoon levels for each site.

**TABLE 6.7  
NOISE MONITORING AND MODELING RESULTS**

		Modeled Daytime L10 Noise Levels			Modeled Nighttime L10 Noise Levels		
Neighborhood and	Monitored	Existing	No Build	Build 2022	Existing	No Build	Build 2022
Receptors	L10	2000	2022	no wall	2000	2022	no wall
<b>A - East of 494, between 394 and Stone Road</b>							
2 (R)	<b>69</b>	<b>70</b>	<b>71</b>	<b>71</b>	<b>69</b>	<b>70</b>	<b>70</b>
3 (R)		<b>69</b>	<b>70</b>	<b>71</b>	<b>68</b>	<b>69</b>	<b>70</b>
3a (R)		<b>66</b>	<b>67</b>	<b>68</b>	<b>66</b>	<b>66</b>	<b>67</b>
5 (R)	62	<b>67</b>	<b>67</b>	<b>68</b>	<b>66</b>	<b>67</b>	<b>67</b>
6 (R)		<b>73</b>	<b>74</b>	<b>75</b>	<b>72</b>	<b>73</b>	<b>73</b>
6a (R)		<b>68</b>	<b>69</b>	<b>70</b>	<b>67</b>	<b>68</b>	<b>69</b>
<b>B - West of 494, between 394 and Stone Road</b>							
1 (R)	<b>68</b>	<b>66</b>	<b>67</b>	<b>67</b>	<b>65</b>	<b>66</b>	<b>66</b>
4 (R)		<b>66</b>	<b>67</b>	<b>68</b>	<b>66</b>	<b>66</b>	<b>67</b>
7 (R)		<b>68</b>	<b>69</b>	<b>70</b>	<b>68</b>	<b>68</b>	<b>69</b>
7a (R)		<b>68</b>	<b>69</b>	<b>70</b>	<b>68</b>	<b>68</b>	<b>69</b>
8 (R)	57	<b>66</b>	<b>67</b>	<b>68</b>	<b>65</b>	<b>66</b>	<b>67</b>
8a (R)		<b>67</b>	<b>68</b>	<b>68</b>	<b>66</b>	<b>67</b>	<b>67</b>
<b>C - East of 494, between Stone Road and Minnetonka</b>							
9 (R)		<b>73</b>	<b>74</b>	<b>75</b>	<b>72</b>	<b>73</b>	<b>74</b>
9a (R)		<b>70</b>	<b>71</b>	<b>72</b>	<b>69</b>	<b>70</b>	<b>71</b>
10 (R)	<b>70</b>	<b>75</b>	<b>76</b>	<b>77</b>	<b>74</b>	<b>75</b>	<b>76</b>
10a (R)		<b>68</b>	<b>69</b>	<b>70</b>	<b>67</b>	<b>68</b>	<b>69</b>
12 (R)		<b>73</b>	<b>74</b>	<b>75</b>	<b>72</b>	<b>73</b>	<b>73</b>
12A (R)	60	63	64	64	<b>62</b>	<b>63</b>	<b>63</b>
12b (R)		64	65	<b>66</b>	<b>64</b>	<b>64</b>	<b>65</b>
<b>D - West of 494, between Stone Road and Minnetonka</b>							
11 (R)	<b>73</b>	<b>73</b>	<b>74</b>	<b>74</b>	<b>72</b>	<b>73</b>	<b>73</b>
13 (R)		<b>71</b>	<b>72</b>	<b>73</b>	<b>71</b>	<b>71</b>	<b>72</b>
13a (R)		<b>66</b>	<b>67</b>	<b>68</b>	<b>65</b>	<b>66</b>	<b>67</b>
14 (R)		<b>68</b>	<b>69</b>	<b>69</b>	<b>67</b>	<b>68</b>	<b>68</b>
<b>E - East of 494, between Minnetonka and TH 7</b>							
15 (R)		<b>69</b>	<b>70</b>	<b>71</b>	<b>69</b>	<b>70</b>	<b>70</b>
15a (R)		<b>68</b>	<b>69</b>	<b>70</b>	<b>67</b>	<b>68</b>	<b>69</b>
17 (R)	<b>69</b>	<b>69</b>	<b>70</b>	<b>70</b>	<b>68</b>	<b>69</b>	<b>69</b>
17a (R)		<b>68</b>	<b>69</b>	<b>70</b>	<b>67</b>	<b>68</b>	<b>69</b>
19 (R)		<b>72</b>	<b>73</b>	<b>74</b>	<b>71</b>	<b>72</b>	<b>73</b>
23 (R)		<b>71</b>	<b>72</b>	<b>73</b>	<b>71</b>	<b>72</b>	<b>72</b>
23a (R)		<b>67</b>	<b>68</b>	<b>69</b>	<b>67</b>	<b>68</b>	<b>68</b>
25 (R)	63	<b>67</b>	<b>68</b>	<b>69</b>	<b>66</b>	<b>67</b>	<b>68</b>
<b>State Standards (R)</b>	<b>65</b>	<b>65</b>	<b>65</b>	<b>65</b>	<b>55</b>	<b>55</b>	<b>55</b>
<b>State Standards (H)</b>	<b>70</b>	<b>70</b>	<b>70</b>	<b>70</b>	<b>70</b>	<b>70</b>	<b>70</b>
(R) - Residence (H) - Hotel (A) - Apartment							
<b>Bold numbers are above state standards</b>							

**TABLE 6.7 continued**  
**NOISE MONITORING AND MODELING RESULTS**

		Modeled Daytime L10 Noise Levels			Modeled Nighttime L10 Noise Levels		
Neighborhood and	Monitored	Existing	No Build	Build 2022	Existing	No Build	Build 2022
Receptors	L10	2000	2022	no wall	2000	2022	no wall
<b>F - West of 494, between Minnetonka and TH 7</b>							
16 (R)	<b>66</b>	71	72	73	70	71	72
16a (R)		68	69	70	68	68	69
18 (R)		73	74	75	73	73	74
18a (R)		70	71	72	70	70	71
20 (R)	<b>76</b>	74	75	76	74	75	75
20a (R)		69	70	71	69	69	70
21 (R)		69	70	71	69	70	70
21a (R)		68	69	70	68	68	69
22 (R)		76	77	78	76	76	77
22a (R)		69	70	71	69	70	71
24 (R)		70	71	72	70	71	71
24a (R)		68	69	70	68	68	69
26 (R)		70	71	72	69	70	70
26a (R)		64	65	66	63	64	64
27 (R)		70	71	72	68	69	70
27a (R)		65	66	66	63	64	65
<b>G - East of 494, between TH 7 and TH 62</b>							
30 (R)	<b>69</b>	69	70	71	68	70	70
30a (R)		66	67	68	65	66	67
32 (R)		73	74	75	72	74	74
32a (R)		68	68	69	67	68	69
34 (R)		65	66	67	64	66	66
37 (R)		70	71	72	70	71	71
<b>H - West of 494, between TH 7 and TH 62</b>							
28 (R)	<b>67</b>	70	71	72	71	71	72
28a (R)		68	69	70	67	68	69
29 (R)		67	68	69	67	68	68
29a (R)		64	64	65	63	64	65
31 (R)		71	72	73	71	73	73
31a (R)		68	68	69	67	68	69
33 (R)		70	71	72	70	71	71
33a (R)		63	64	65	63	63	64
35 (R)		69	70	70	69	70	70
36 (R)		68	69	70	68	70	70
38 (R)		68	69	70	68	69	69
<b>State Standards (R)</b>	<b>65</b>	<b>65</b>	<b>65</b>	<b>65</b>	<b>55</b>	<b>55</b>	<b>55</b>
<b>State Standards (H)</b>	<b>70</b>	<b>70</b>	<b>70</b>	<b>70</b>	<b>70</b>	<b>70</b>	<b>70</b>
(R) - Residence (H) - Hotel (A) - Apartment							
<b>Bold numbers are above state standards</b>							

**TABLE 6.7 continued**  
**NOISE MONITORING AND MODELING RESULTS**

		Modeled Daytime L10 Noise Levels			Modeled Nighttime L10 Noise Levels		
Neighborhood and	Monitored	Existing	No Build	Build 2022	Existing	No Build	Build 2022
Receptors	L10	2000	2022	no wall	2000	2022	no wall
<b>I - East of 494, between TH 62 and TH 212/Flying Cloud Drive</b>							
39 (R)		63	64	64	<b>62</b>	<b>64</b>	<b>64</b>
41 (R)		64	65	<b>66</b>	<b>63</b>	<b>65</b>	<b>65</b>
41a (R)		63	64	65	<b>62</b>	<b>63</b>	<b>64</b>
44 (R)		64	65	<b>66</b>	<b>64</b>	<b>65</b>	<b>65</b>
46 (R)		<b>67</b>	<b>67</b>	<b>68</b>	<b>66</b>	<b>67</b>	<b>67</b>
47 (R)	<b>67</b>	65	65	<b>66</b>	<b>64</b>	<b>65</b>	<b>65</b>
<b>J - West of 494, between TH 62 and TH 212/Flying Cloud Drive</b>							
40 (R)		51	52	53	51	52	52
42 (R)		60	61	62	<b>59</b>	<b>61</b>	<b>61</b>
43 (R)		<b>70</b>	<b>70</b>	<b>71</b>	<b>69</b>	<b>71</b>	<b>71</b>
43a (R)		64	65	<b>66</b>	<b>64</b>	<b>64</b>	<b>65</b>
45 (R)	62	63	64	64	<b>63</b>	<b>65</b>	<b>65</b>
45a (R)		63	64	65	<b>63</b>	<b>63</b>	<b>64</b>
48 (R)		<b>67</b>	<b>68</b>	<b>69</b>	<b>67</b>	<b>69</b>	<b>69</b>
48a (R)		<b>67</b>	<b>68</b>	<b>69</b>	<b>67</b>	<b>67</b>	<b>68</b>
49 (R)	<b>67</b>	<b>68</b>	<b>68</b>	<b>69</b>	<b>67</b>	<b>69</b>	<b>69</b>
49a (R)		<b>68</b>	<b>69</b>	<b>70</b>	<b>68</b>	<b>68</b>	<b>70</b>
50 (R)		<b>67</b>	<b>67</b>	<b>68</b>	<b>66</b>	<b>68</b>	<b>68</b>
<b>K - TH 212/Flying Cloud Drive</b>							
51 (H)		56	58	58	<b>56</b>	<b>57</b>	<b>57</b>
52 (H)		70	<b>71</b>	<b>72</b>	<b>69</b>	<b>69</b>	<b>70</b>
53 (H)		<b>73</b>	<b>74</b>	<b>75</b>	<b>73</b>	<b>74</b>	<b>74</b>
<b>L - South of 494 at 169</b>							
54 (R)		63	64	65	<b>62</b>	<b>63</b>	<b>63</b>
55 (A)		64	65	<b>66</b>	<b>64</b>	<b>64</b>	<b>65</b>
56 (R)	<b>68</b>	<b>70</b>	<b>71</b>	<b>72</b>	<b>69</b>	<b>70</b>	<b>70</b>
56a (R)		65	<b>66</b>	<b>67</b>	<b>65</b>	<b>65</b>	<b>66</b>
57 (R)		<b>66</b>	<b>67</b>	<b>69</b>	<b>66</b>	<b>66</b>	<b>68</b>
58 (R)	<b>69</b>	<b>67</b>	<b>68</b>	<b>68</b>	<b>66</b>	<b>67</b>	<b>67</b>
58a (R)		<b>71</b>	<b>72</b>	<b>72</b>	<b>70</b>	<b>71</b>	<b>71</b>
61 (R)		<b>71</b>	<b>72</b>	<b>71</b>	<b>70</b>	<b>71</b>	<b>70</b>
<b>M - North of 494 between 169 and E. Bush Lake Rd.</b>							
59 (R)		<b>68</b>	<b>69</b>	<b>69</b>	<b>67</b>	<b>67</b>	<b>68</b>
60 (R)		<b>69</b>	<b>69</b>	<b>70</b>	<b>68</b>	<b>68</b>	<b>69</b>
State Standards (R)	<b>65</b>	<b>65</b>	<b>65</b>	<b>65</b>	<b>55</b>	<b>55</b>	<b>55</b>
State Standards (H)	<b>70</b>	<b>70</b>	<b>70</b>	<b>70</b>	<b>70</b>	<b>70</b>	<b>70</b>
(R) - Residence (H) - Hotel (A) - Apartment							
<b>Bold numbers are above state standards</b>							

**TABLE 6.7 continued  
NOISE MONITORING AND MODELING RESULTS**

		Modeled Daytime L10 Noise Levels			Modeled Nighttime L10 Noise Levels		
Neighborhood and	Monitored	Existing	No Build	Build 2022	Existing	No Build	Build 2022
Receptors	L10	2000	2022	no wall	2000	2022	no wall
<b>N - TH 100</b>							
62 (H)		<b>68</b>	<b>68</b>	<b>69</b>	<b>67</b>	<b>68</b>	<b>68</b>
63 (H)	65	<b>69</b>	<b>69</b>	<b>69</b>	<b>68</b>	<b>69</b>	<b>69</b>
64 (H)		<b>70</b>	<b>70</b>	<b>70</b>	<b>69</b>	<b>70</b>	<b>69</b>
65 (H)	62	<b>68</b>	<b>69</b>	<b>69</b>	<b>67</b>	<b>68</b>	<b>68</b>
102 (R)		<b>70</b>	<b>71</b>	<b>71</b>	<b>68</b>	<b>68</b>	<b>69</b>
103 (R)		<b>75</b>	<b>76</b>	<b>76</b>	<b>73</b>	<b>73</b>	<b>74</b>
<b>O - North of 494 between France and Penn</b>							
66 (H)	62	63	63	64	<b>62</b>	<b>62</b>	<b>63</b>
67 (H)		66	66	67	<b>65</b>	<b>66</b>	<b>66</b>
68 (R)		<b>73</b>	<b>73</b>	<b>74</b>	<b>72</b>	<b>72</b>	<b>72</b>
69 (R)		<b>75</b>	<b>75</b>	<b>76</b>	<b>74</b>	<b>74</b>	<b>74</b>
70 (R)		<b>73</b>	<b>74</b>	<b>74</b>	<b>72</b>	<b>73</b>	<b>73</b>
71 (A)		<b>74</b>	<b>76</b>	<b>76</b>	<b>73</b>	<b>75</b>	<b>75</b>
72 (A)	<b>72</b>	<b>73</b>	<b>76</b>	<b>76</b>	<b>73</b>	<b>74</b>	<b>74</b>
73 (A/C)		<b>71</b>	<b>72</b>	<b>73</b>	<b>71</b>	<b>72</b>	<b>71</b>
<b>P - 35W north of 494, existing noise walls</b>							
96 (R)		59	60	62	<b>58</b>	<b>59</b>	<b>62</b>
97 (R)		60	61	62	<b>60</b>	<b>60</b>	<b>62</b>
98 (R)		63	64	60	<b>62</b>	<b>63</b>	<b>59</b>
<b>Q - 35W at 494</b>							
99 (A)		<b>67</b>	<b>67</b>	<b>70</b>	<b>66</b>	<b>67</b>	<b>69</b>
74 (A)		<b>69</b>	<b>70</b>	<b>70</b>	<b>69</b>	<b>69</b>	<b>69</b>
75 (A)		<b>69</b>	<b>69</b>	<b>70</b>	<b>68</b>	<b>69</b>	<b>68</b>
<b>R - 35W south of 494, existing noise walls</b>							
100 (R)		62	63	64	<b>62</b>	<b>63</b>	<b>63</b>
101 (R)		62	63	64	<b>62</b>	<b>63</b>	<b>63</b>
<b>S - North of 494, between Lyndale and Nicollet</b>							
76 (H)	64	<b>71</b>	<b>71</b>	<b>72</b>	<b>69</b>	<b>70</b>	<b>71</b>
77 (A)	65	<b>71</b>	<b>71</b>	<b>71</b>	<b>69</b>	<b>69</b>	<b>69</b>
<b>State Standards (R)</b>	<b>65</b>	<b>65</b>	<b>65</b>	<b>65</b>	<b>55</b>	<b>55</b>	<b>55</b>
<b>State Standards (H)</b>	<b>70</b>	<b>70</b>	<b>70</b>	<b>70</b>	<b>70</b>	<b>70</b>	<b>70</b>
(R) - Residence (H) – Hotel (A) - Apartment ((R or A)/C) - Current residential area (R) or apartment (A) guided to commercial land use in City Comp. Plan							
<b>Bold numbers are above state standards</b>							

**TABLE 6.7 continued  
NOISE MONITORING AND MODELING RESULTS**

		Modeled Daytime L10 Noise Levels			Modeled Nighttime L10 Noise Levels		
Neighborhood and	Monitored	Existing	No Build	Build 2022	Existing	No Build	Build 2022
Receptors	L10	2000	2022	no wall	2000	2022	no wall
<b>T - North of 494, between Nicollet and TH 77</b>							
79 (H)		77	78	78	76	77	77
80 (A/C)	71	75	76	72	74	75	71
81 (A/C)		72	74	73	72	73	72
82 (A)		76	77	79	75	76	77
83 (A)		74	75	76	73	74	74
85 (A)	71	74	75	77	73	74	76
86 (A/C)	67	73	75	75	73	74	74
88 (H)	74	76	76	77	75	75	75
90 (H)		69	69	72	68	69	71
<b>U - South of 494, between Nicollet and TH 77</b>							
78 (H)	65	70	71	73	69	70	72
84 (H)	74	73	75	77	73	74	76
87 (H)		72	73	74	71	72	72
89 (H)	64	69	70	70	68	68	68
<b>V - South of 494, between TH 77 and 24th Ave.</b>							
91 (H)	72	71	72	74	71	71	73
92 (H)		69	69	69	68	68	68
93 (H)	74	75	76	77	74	75	76
94 (H)		71	72	73	70	71	72
95 (H)		68	69	70	67	68	69
<b>State Standards (R)</b>	<b>65</b>	<b>65</b>	<b>65</b>	<b>65</b>	<b>55</b>	<b>55</b>	<b>55</b>
<b>State Standards (H)</b>	<b>70</b>	<b>70</b>	<b>70</b>	<b>70</b>	<b>70</b>	<b>70</b>	<b>70</b>
(R) - Residence (H) – Hotel (A) - Apartment ((R or A)/C) - Current residential area (R) or apartment (A) guided to commercial land use in City Comp. Plan							
<b>Bold numbers are above state standards</b>							

Figure 6.2 11 x 17 2 pages

Figure 6.2 11 x 17 page 2

## Noise Modeling

Noise modeling was performed to project future sound levels associated with the changes in roadway configurations and projected traffic levels. One hundred and thirty-six noise level modeling locations were chosen to model traffic noise levels for the project corridor (the monitoring locations discussed above were a subset of these 136 modeling locations). The noise modeling locations are depicted on Figure 6.2. Minnesota Pollution Control Agency staff provided input into the selection of the modeling locations.

Noise levels were modeled using MINNOISE, a computer software model utilized by Mn/DOT and approved by MPCA staff for traffic noise modeling. MINNOISE uses STAMINA 2.0 (developed by FHWA) as a base, but has been modified by Mn/DOT to reflect conditions in Minnesota and regional emission levels for heavy trucks. Data input to the MINNOISE model included existing and 2022 forecast traffic volumes, vehicular mix, speeds, roadway alignments, and receptor locations. Noise modeling was completed for existing conditions (year 2000) and for the No-Build and Preferred Alternative conditions (both year 2022). Noise levels were modeled for both the  $L_{10}$  and  $L_{50}$  daytime and nighttime peak traffic hours.

Daytime hours, as defined by state noise regulations, run from 7:00 a.m. to 10:00 p.m. The daytime peak traffic hour within this timeframe is generally within the 4:00 p.m. to 6:00 p.m. range. Nighttime hours, as defined by noise regulations, run from 10:00 p.m. to 7:00 a.m. The nighttime peak traffic hour for the I-494 corridor is 6:00 a.m. to 7:00 a.m.

It should be noted that existing noise walls and berms were programmed into the noise model used for the FEIS analysis. Where the Preferred Alternative that would affect existing noise walls, noise walls of the same height as existing walls were assumed and programmed at the likely location of the replacement noise walls.

The results of the noise modeling analysis are presented in Table 6.7. Receptors are grouped by “neighborhood” areas. To simplify the presentation in this table, only the results of the  $L_{10}$  noise level analyses are shown.  $L_{10}$  and  $L_{50}$  levels are similar to each other within the corridor. As discussed in Section 6.2.4, the Mn/DOT noise mitigation analysis methodology uses daytime  $L_{10}$  levels to determine cost effectiveness. The full data set, including daytime and nighttime  $L_{10}$  and  $L_{50}$  modeled results is available for review from Mn/DOT.

From Table 6.7, it can be seen that modeled existing noise levels exceed  $L_{10}$  state daytime noise standards at 102 of the 136 receptor sites. Daytime  $L_{10}$  standards are projected to be exceeded at 107 receptors under No-Build, and 114 receptors under the Preferred Alternative. Nighttime  $L_{10}$  standards are currently exceeded at 135 of the 136 receptor sites, and are projected to be exceeded at 135 receptors for both No-Build and Preferred Alternative conditions. Daytime and nighttime peak hour noise levels in the I-494 corridor are similar (typically within 0 to 3 decibels).

In general, noise levels projected for the Preferred Alternative are 0 to 4 decibels higher than existing noise levels and 0 to 3 decibels higher than the noise levels predicted for the No-Build Alternative. The majority of receptors show only a 0 to 1 decibel increase from No-Build to Build conditions. Noise levels predicted for the No-Build Alternative are 0 to 3 decibels higher than existing noise levels. As described in the background discussion of noise units provided at the beginning of Section 6.2.3, changes in traffic noise levels of 3 decibels are barely perceptible. Increases in noise levels from existing to either the No-Build or Preferred Alternative would be less than 5 decibels. Based on Mn/DOT policy, noise level increases less than 5 decibels would not be considered “substantial.”

In areas where the Preferred Alternative road alignment moves I-494 farther away from receptors (i.e. receptors 71, 72, and 73 in Neighborhood O, and receptors 80, 81, and 82 in Neighborhood T), the projected noise levels for the Preferred Alternative are anticipated to be 0 to 4 decibels lower than noise levels predicted for the No-Build conditions and 0 to 3 decibels lower than existing noise levels. Noise at receptor 98 is projected to decrease by 4 decibels with the Preferred Alternative relative to No-Build. This is likely due to the noise wall being moved closer to this receptor.

To characterize noise levels at locations in the corridor where noise walls currently exist (between Excelsior Boulevard and Baker Road), noise monitoring was conducted behind the noise walls on October 3, 2000 near the pedestrian overpass west of I-494. Daytime L<sub>10</sub> and L<sub>50</sub> noise levels were 61 and 59, respectively, both below state standards.

#### 6.2.4 MITIGATION

Because federal noise abatement criteria and/or state noise standards would be exceeded along the project corridor, measures to mitigate traffic noise were studied. The most common traffic noise mitigation is construction of a barrier (“noise wall”) between the roadway and receiver. Other noise abatement measures such as traffic control devices and signing for prohibition of certain vehicle types, time-use restrictions for certain vehicle types, modified speed limits, exclusive land designations, etc. as listed in CFR 23, 772.13(c) were not considered feasible or practical for this project. The I-494 corridor is part of the interstate highway system. It is an important truck route. Restricting vehicle types, time of use and reducing speed limits would not be consistent with the required functions of I-494. Therefore, noise mitigation measures studied in this document are limited to noise barriers.

Noise mitigation measures (noise walls) were studied where year 2022 Preferred Alternative noise levels were projected to exceed state standards in residential areas. This analysis included the evaluation of feasibility, noise reduction performance and cost effectiveness, based on currently available preliminary project layouts. As stated previously, state daytime L<sub>10</sub> standards are projected to be exceeded at 114 of the 136 receptors modeled with Preferred Alternative conditions.

Noise mitigation decisions were based on a study of the feasibility and reasonableness of noise walls. Feasibility is determined by physical and/or engineering constraints, i.e. whether a noise wall could feasibly be constructed on the site. Reasonableness addresses the setting and

effectiveness of a noise wall; for a noise wall to be considered effective, at least a 5-decibel decrease in daytime L<sub>10</sub> noise levels needs to be achieved. Economic reasonableness or cost effectiveness is determined by the following formula:

$$\frac{\text{Cost of noise wall}^1}{\text{Average decibel reduction} \times \text{total number of residences affected}}$$

<sup>1</sup>The cost of a noise wall is calculated using \$161 per square meter (\$15 per square foot) of wall.

Only residences that experience a 5 or greater decibel decrease in noise following construction of a noise wall are considered in this analysis. Noise reduction at apartment buildings is calculated using the average reduction of all ground floor units receiving a 5-decibel or greater reduction. The result of the above formula is a cost per decibel per residence; Mn/DOT has established \$3,250 per decibel per residence as the limit for noise wall cost effectiveness. This overall approach is outlined in *Mn/DOT Noise Policy for Type I and Type II Federal-Aid Projects as per 23 CFR 772*. The MPCA concurs with the methodological approach established in this document and with the monetary threshold of \$3,250 per decibel per residence referenced above.

Results of the noise mitigation study, including neighborhood areas and cost effectiveness of each noise wall segment, are shown in Table 6.8. Cost-effectiveness numbers are based on preliminary design information that could change as designs are finalized. Prior to construction of each phase of the project, Mn/DOT will perform a more detailed analysis of cost-effectiveness, utilizing final design plans, including additional receptors and multiple iterations of noise wall length and height to find the most cost-effective barrier for each area. The results of this analysis will then be reviewed to determine if the most cost-effective barrier for each area meets the cost-effectiveness criteria. If it does, then the local government officials (with input from residents) will be given the opportunity to approve/deny construction of noise wall mitigation, and if they are to be built, what wall design is appropriate. If, following identification of all feasible and cost-effective mitigation locations, there are still areas along the corridor that would exceed state noise standards for the existing land use type, a “Noise Reasonableness and Exemption Request” will be prepared and would be reviewed and subject to final approval by the commissioners of Mn/DOT and the MPCA.

In addition to cost effectiveness, other reasonableness issues such as current and future land use and the desires of adjacent residential and commercial property owners must be taken into account. Commercial property owners (such as with businesses and hotels) may prefer to remain visible to adjacent roads, and this possibility would be considered during the design of any potential noise barriers. In addition, noise barriers would not likely be built in residential areas where future land use is guided for commercial.

While engineering constraints were not studied in detail, it was assumed that construction of noise walls would be feasible at all locations that were found to be cost effective.

As Table 6.8 shows, analysis for the FEIS indicate that five areas potentially qualify for noise walls based on Mn/DOT’s cost effectiveness criteria of \$3,250 per decibel per residence. These

five potential mitigation areas are discussed in the following paragraphs. As noted previously, noise mitigation analyses will be performed in greater detail during the final design and approval process for each phase of the project.

Neighborhood N – East of TH 100 North of 77th Street (Receptors 102 and 103)

This neighborhood consists of single-family residences. A 6.1-meter (20-foot) wall would provide up to 16 dBA in noise reduction. The projected cost per decibel per residence (\$2,615) meets Mn/DOT’s reasonableness criterion.

**TABLE 6.8  
NOISE MITIGATION COST EFFECTIVENESS ANALYSIS**

Neighborhood and Receptors	Daytime L10 Noise		Reduction (in		Number of	Length	Total cost of	Cost per
	Build 2022	Build 2022	dBA) with 6	Number of	affected	of wall	wall [\$161/sq	decibel per
	no wall	6 m wall	m noise wall	residences	residences	m (ft)	m[\$15/sq ft])	residence*
<b>A - East of 494, between 394 and Stone Road</b>								
2 (R)	<b>71</b>	<b>70</b>	1	5	0	643 (2108)	\$632,400	\$21,080
3 (R)	<b>71</b>	<b>66</b>	5	6	6			
3a (R)	<b>68</b>	64	4	2	0			
5 (R)	<b>68</b>	64	4	4	0	818 (2682)	\$804,600	\$4,598
6 (R)	<b>75</b>	<b>68</b>	7	13	13			
6a (R)	<b>70</b>	63	7	12	12			
<b>B - West of 494, between 394 and Stone Road</b>								
1 (R)	<b>67</b>	<b>67</b>	0	9	0	774 (2539)	\$761,700	< 5 dB reduction
7 (R)	<b>70</b>	63	7	5	5	377 (1236)	\$370,800	\$7,416
7a (R)	<b>70</b>	<b>68</b>	2	2	0			
8 (R)	<b>68</b>	63	5	3	3			
8a (R)	<b>68</b>	<b>67</b>	1	2	0			
<b>C - East of 494, between Stone Road and Minnetonka</b>								
9 (R)	<b>75</b>	<b>67</b>	8	5	5	1348 (4423)	\$1,326,900	\$6,702
9a (R)	<b>72</b>	<b>69</b>	3	5	0			
10 (R)	<b>77</b>	62	15	4	4			
10a (R)	<b>70</b>	60	10	3	3			
12 (R)	<b>75</b>	<b>67</b>	8	6	6			
12A (R)	64	63	1	4	0			
12b (R)	<b>66</b>	61	5	4	4			
<b>State Standards (R)</b>	<b>65</b>	<b>65</b>						
<b>State Standards (H)</b>	<b>70</b>	<b>70</b>						
(R) - Residence (H) - Hotel (A) - Apartment								
<b>Bold</b> numbers are above state standards								
* calculated by: Total cost of Noise Wall/(Total number of affected residences x average decibel reduction)								
Affected residences only include those experiencing ≥ 5 dBA reduction								

**TABLE 6.8 continued**  
**NOISE MITIGATION COST EFFECTIVENESS ANALYSIS**

Neighborhood and Receptors	Daytime L10 Noise		Reduction (in	Number of residences	Number of affected residences	Length of wall m (ft)	Total cost of wall [\$161/sq m(\$15/sq ft)]	Cost per decibel per residence*
	Build 2022	Build 2022	dBA) with 6					
	no wall	6 m wall	m noise wall					
<b>D - West of 494, between Stone Road and Minnetonka</b>								
11 (R)	<b>74</b>	<b>70</b>	4	5	0	1016 (3334)	\$1,000,200	\$22,227
13 (R)	<b>73</b>	<b>68</b>	5	4	4			
13a (R)	<b>68</b>	63	5	5	5			
14 (R)	<b>69</b>	<b>68</b>	1	2	0			
<b>E - East of 494, between Minnetonka and TH 7</b>								
15 (R)	<b>71</b>	65	6	5	5	665 (2181)	\$654,300	\$9,347
15a (R)	<b>70</b>	<b>68</b>	2	3	0			
17 (R)	<b>70</b>	62	8	5	5			
17a (R)	<b>70</b>	<b>66</b>	4	2	0			
19 (R)	<b>74</b>	<b>70</b>	4	2	0			
23 (R)	<b>73</b>	62	11	5	5	717 (2352)	\$705,600	\$12,829
23a (R)	<b>69</b>	<b>67</b>	2	4	0			
25 (R)	<b>69</b>	65	4	4	0			
<b>F - West of 494, between Minnetonka and TH 7</b>								
16 (R)	<b>73</b>	61	12	4	4	608 (1995)	\$598,500	\$3,541
16a (R)	<b>70</b>	61	9	1	1			
18 (R)	<b>75</b>	61	14	5	5			
18a (R)	<b>72</b>	<b>66</b>	6	7	7			
20 (R)	<b>76</b>	<b>67</b>	9	4	4	1260 (4134)	\$1,240,200	\$6,493
20a (R)	<b>71</b>	64	7	3	3			
21 (R)	<b>71</b>	65	6	3	3			
21a (R)	<b>70</b>	63	7	2	2			
22 (R)	<b>78</b>	62	16	2	2			
22a (R)	<b>71</b>	64	7	1	1			
24 (R)	<b>72</b>	65	7	3	3			
24a (R)	<b>70</b>	<b>69</b>	1	4	0			
26 (R)	<b>72</b>	63	9	2	2			
26a (R)	<b>66</b>	65	1	3	0			
27 (R)	<b>72</b>	60	12	2	2			
27a (R)	<b>66</b>	64	2	1	0			
<b>State Standards (R)</b>	<b>65</b>	<b>65</b>						
<b>State Standards (H)</b>	<b>70</b>	<b>70</b>						
(R) - Residence (H) – Hotel (A) - Apartment								
<b>Bold</b> numbers are above state standards								
* calculated by: Total cost of Noise Wall/(Total number of affected residences x average decibel reduction)								
Affected residences only include those experiencing ≥ 5 dBA reduction								

**TABLE 6.8 continued  
NOISE MITIGATION COST EFFECTIVENESS ANALYSIS**

Neighborhood and Receptors	Daytime L10 Noise		Reduction (in	Number of residences	Number of affected residences	Length of wall (m (ft))	Total cost of wall [\$161/sq m (\$15/sq ft)]	Cost per decibel per residence*
	Build 2022 no wall	Build 2022 6 m wall	dBA) with 6 m noise wall					
<b>G - East of 494, between TH 7 and TH 62</b>								
30 (R)	<b>71</b>	63	8	9	9	708 (2322)	\$696,600	\$3,913
30a (R)	<b>68</b>	64	4	8	0			
32 (R)	<b>75</b>	64	11	6	6			
32a (R)	<b>69</b>	64	5	8	8			
37 (R)	<b>72</b>	<b>72</b>	0	2	0	161 (527)	\$158,100	< 5 dB reduction
<b>H - West of 494, between TH 7 and TH 62</b>								
28 (R)	<b>72</b>	60	12	3	3	1294 (4243)	\$1,272,900	\$5,217
28a (R)	<b>70</b>	<b>69</b>	1	2	0			
29 (R)	<b>69</b>	<b>68</b>	1	6	0			
29a (R)	65	62	3	2	0			
31 (R)	<b>73</b>	64	9	8	8			
31a (R)	<b>69</b>	62	7	10	10			
33 (R)	<b>72</b>	61	11	6	6			
33a (R)	65	61	4	4	0			
35 (R)	<b>70</b>	<b>69</b>	1	2	0			
38 (R)	<b>70</b>	64	6	2	2	256 (841)	\$252,300	\$21,025
<b>I - East of 494, between TH 62 and TH 212/Flying Cloud Drive</b>								
41 (R)	<b>66</b>	58	8	3	3	1146 (3760)	\$1,128,000	\$10,846
41a (R)	65	65	0	1	0			
44 (R)	<b>66</b>	58	8	5	5			
46 (R)	<b>68</b>	58	10	4	4			
47 (R)	<b>66</b>	62	4	2	0			
<b>J - West of 494, between TH 62 and TH 212/Flying Cloud Drive</b>								
43 (R)	<b>71</b>	60	11	4	4	348 (1141)	\$342,300	\$3,721
43a (R)	<b>66</b>	63	3	4	0			
45 (R)	64	56	8	6	6			
45a (R)	65	65	0	6	0			
<b>State Standards (R)</b>	<b>65</b>	<b>65</b>						
<b>State Standards (H)</b>	<b>70</b>	<b>70</b>						
(R) - Residence (H) - Hotel (A) - Apartment <b>Bold</b> numbers are above state standards * calculated by: Total cost of Noise Wall/(Total number of affected residences x average decibel reduction) Affected residences only include those experiencing ≥ 5 dBA reduction								

**TABLE 6.8 continued  
NOISE MITIGATION COST EFFECTIVENESS ANALYSIS**

Neighborhood and Receptors	Daytime L10 Noise		Reduction	Number of residences	Number of affected residences	Length of wall of m (ft)	Total cost of wall [\$161/sq m(\$15/sq ft)]	Cost per decibel per residence*
	Build 2022	Build 2022	(in					
	no wall	6 m wall	dB) with 6 m noise wall					
<b>J – West of 494, between TH 62 and TH 212/Flying Cloud Drive continued</b>								
48 (R)	<b>69</b>	63	6	7	7	637 (2091)	\$627,300	\$4,267
48a (R)	<b>69</b>	65	4	4	0			
49 (R)	<b>69</b>	59	10	7	7			
49a (R)	<b>70</b>	63	7	5	5			
50 (R)	<b>68</b>	<b>68</b>	0	2	0			
<b>L - South of 494 at 169</b>								
55 (A)	<b>66</b>	60-65**	5***	5	5	537 (1760)	\$528,000	\$10,560
56 (R)	<b>72</b>	<b>67</b>	5	5	5			
56a (R)	<b>67</b>	63	4	7	0			
58 (R)	<b>68</b>	65	3	3	0	418 (1372)	\$411,600	\$51,450
58a (R)	<b>72</b>	64	8	1	1			
61 (R)	<b>71</b>	<b>67</b>	4	1	0			
<b>N - TH 100</b>								
102 (R)	<b>71</b>	58	13	4	4	308 (1011)	\$303,300	\$2,615
103 (R)	<b>76</b>	60	16	4	4			
<b>O - North of 494 between Xerxes and Penn</b>								
68 (R)	<b>74</b>	<b>72</b>	2	3	0	732 (2400)	\$720,000	\$2,257
69 (R)	<b>76</b>	<b>70</b>	6	6	6			
70 (R)	<b>74</b>	<b>69</b>	5	2	2			
71 (A)	<b>76</b>	62- <b>68</b> **	13***	8	8			
72 (A)	<b>76</b>	62-65**	12***	8	8			
73 (A/C)	<b>73</b>	63-64**	10***	8	8			
<b>Q - 35W at 494</b>								
75 (A)	<b>70</b>	64- <b>66</b> **	6***	6	6	152 (500)	\$150,000	\$4,286
<b>S - North of 494, between Lyndale and Nicollet</b>								
77 (A)	<b>71</b>	62-64**	7***	4	4	102 (335)	\$100,500	\$3,466
<b>State Standards (R)</b>	<b>65</b>	<b>65</b>						
<b>State Standards (H)</b>	<b>70</b>	<b>70</b>						
(R) - Residence (H) - Hotel (A) - Apartment (A/C) - Current apartment guided to commercial land use in City Comp. Plan								
<b>Bold</b> numbers are above state standards								
* calculated by: Total cost of Noise Wall/(Total number of affected residences x average decibel reduction)								
Affected residences only include those experiencing ≥ 5 dBA reduction								
** Range given is noise levels modeled at each apartment unit within the complex; takes into account edge effects								
*** The average decibel reduction of all groundfloor units receiving ≥ 5 dBA reduction								

**TABLE 6.8 continued  
NOISE MITIGATION COST EFFECTIVENESS ANALYSIS**

Neighborhood and Receptors	Daytime L10 Noise		Reduction (in	Number of residences	Number of affected residences	Length of wall m (ft)	Total cost of wall [\$161/sq m(\$15/sq ft)]	Cost per decibel per residence*
	Build 2022 no wall	Build 2022 6 m wall	dBA) with 6 m noise wall					
	<b>T - North of 494, between Nicollet and TH 77</b>							
80 (A/C)	<b>72</b>	63-64**	9***	3	3	70 (230)	\$69,000	\$2,654
81 (A/C)	<b>73</b>	<b>67-70**</b>	7***	7	7	684 (2247)	\$674,100	\$2,182
82 (A)	<b>79</b>	<b>67-69**</b>	10***	8	8			
83 (A)	<b>76</b>	62-65**	7***	10	10			
85 (A)	<b>77</b>	63-64**	15***	8	8			
86 (A/C)	<b>75</b>	62- <b>66**</b>	12***	4	4	122 (399)	\$119,700	\$2,602
<b>State Standards (R)</b>	<b>65</b>	<b>65</b>						
<b>State Standards (H)</b>	<b>70</b>	<b>70</b>						
(R) - Residence (H) - Hotel (A) - Apartment (A/C) - Current apartment guided to commercial land use in City Comp. Plan <b>Bold</b> numbers are above state standards * calculated by: Total cost of Noise Wall/(Total number of affected residences x average decibel reduction) Affected residences only include those experiencing ≥ 5 dBA reduction ** Range given is noise levels modeled at each apartment unit within the complex; takes into account edge effects *** The average decibel reduction of all groundfloor units receiving ≥ 5 dBA reduction								

Neighborhood O – North of 494 between Xerxes and Penn (Receptors 68 – 73)

This neighborhood consists of single-family residences with three apartment buildings on the eastern portion (near Penn Avenue). The easternmost apartment building is designated in the *Richfield Comprehensive Plan* (1997) for future commercial land use. A 6.1-meter (20-foot) wall would provide up to 12 dBA in noise reduction. The projected cost per decibel per residence (\$2,257) meets Mn/DOT’s reasonableness criterion. If the land use at the easternmost portion of the neighborhood has converted to commercial at the time of project construction, a noise barrier would not be proposed for this area because it would be incompatible with the land use.

Neighborhood T – North of 494 between Nicollet and TH 77

Receptor 80

This receptor represents one apartment building north of I-494 and west of Portland Avenue. The cost effectiveness of a noise wall in this area is projected to be \$2,654 per decibel per residence. The city of *Richfield’s Comprehensive Plan* (1997) has designated this area for commercial land use in the future. If, at the time of project construction, residential use is still in place, a public involvement process including neighborhood meetings would be carried out

before final decisions are made on whether to build noise barriers and if they are to be built, what wall design is appropriate. If the land use has converted to commercial at the time of project construction, a noise barrier would not be proposed for this area because it would be incompatible with the land use.

#### Receptors 81, 82, 83 and 85

These receptors represent eleven apartment complexes north of I-494 between Portland Avenue and 12th Avenue. The westernmost section of this area (represented by Receptor 81) is designated in the *Richfield Comprehensive Plan* (1997) for future commercial land use. A 6.1-meter (20-foot) wall in this area would provide 7 dBA in noise reduction. If, at the time of project construction, residential use is still in place, the City of Richfield will be requested to provide input before final decisions are made on whether to build noise barriers and if they are to be built, what wall design is appropriate. If the land use has converted to commercial at the time of project construction, a noise barrier would not be proposed for this area because it would be incompatible with the land use.

For the remainder of this area, a 6.1-meter (20-foot) wall would provide up to 15 dBA in noise reduction. The projected cost per decibel per residence (\$2,182) meets Mn/DOT reasonableness criterion.

#### Receptor 86

This receptor represents one apartment building north of I-494 and east of 12th Avenue. The cost per decibel per residence is projected to be \$2,602. The *City of Richfield's Comprehensive Plan* (1997) has designated this area for commercial land use in the future. If, at the time of project construction, residential use is still in place, the City of Richfield will be requested to provide input before final decisions are made on whether to build noise barriers and if they are to be built, what wall design is appropriate. If the land use has converted to commercial at the time of project construction, a noise barrier would not be proposed for this area because it would be incompatible with the land use.

### 6.2.5 SUMMARY OF RESULTS

Modeled existing noise levels exceed  $L_{10}$  daytime noise standards at 102 of the 136 receptor sites. Daytime  $L_{10}$  standards are projected to be exceeded at 107 receptors under No-Build, and 114 receptors under the Preferred Alternative. Nighttime  $L_{10}$  standards are currently exceeded at 135 of the 136 receptor sites, and are projected to be exceeded at 135 receptors for both No-Build and Preferred Alternative conditions. No-Build noise levels are 0 to 3 decibels higher than existing noise levels. In general, noise levels under the Preferred Alternative are 0 to 4 decibels higher than existing noise levels and 0 to 3 decibels higher than the noise levels predicted for the No-Build Alternative, except in areas where the Preferred Alternative road alignment moves I-494 farther away from receptors; in this case noise levels are 0 to 4 decibels lower than existing or No-Build noise levels.

Analyses performed for the FEIS indicate that Mn/DOT cost-effectiveness criteria for noise mitigation would be met at five areas within the project area: east of TH 100 north of 77th Street, north of I-494 between Xerxes and Penn Avenue, an apartment complex north of I-494 and west of Portland Avenue, north of I-494 between Portland Avenue and 12th Avenue, and an apartment complex north of I-494 and east of 12th Avenue. All other noise wall segments analyzed for the FEIS did not meet Mn/DOT's cost-effectiveness criteria. For areas designated by the *City of Richfield's Comprehensive Plan* (1997) as commercial land use in the future (the apartment complexes west of Portland Avenue and east of 12th Avenue), noise walls will be proposed if residential land use is still present at the time of project construction. If the area has converted to commercial land use, noise barriers will not be proposed. Prior to construction of each phase of the project, Mn/DOT will perform a more detailed analysis of cost-effectiveness, utilizing final design plans, including additional receptors and multiple iterations of noise wall length and height to find the most cost-effective barrier for each area. The results of this analysis will then be reviewed to determine if the most cost-effective barrier for each area meets the cost-effectiveness criteria. If it does, then the local government officials (with input from residents) will be given the opportunity to approve/deny construction of noise wall mitigation, and if they are to be built, what wall design is appropriate. If, following identification of all feasible and cost-effective mitigation locations, there are still areas along the corridor that would exceed state noise standards for the existing land use type, a "Noise Reasonableness and Exemption Request" will be prepared and would be reviewed and subject to final approval by the commissioners of Mn/DOT and the MPCA.

## **6.3 SURFACE WATER DRAINAGE**

The Affected Environment for surface water drainage for the I-494 corridor reconstruction was described in Section 4.2.6 of the DEIS. Impacts and mitigation measures were addressed in Section 5.3.5 of the DEIS.

### **6.3.1 INFORMATION FROM THE DEIS THAT REMAINS UNCHANGED**

The general descriptions of existing watershed boundaries found in the DEIS, except for one realignment that is discussed in Section 6.3.2.1 below, remain unchanged. Watershed districts and management organizations through which the I-494 corridor from I-394 to the Minnesota River passes are as follows:

- Minnehaha Creek Watershed District (MCWD)
- Nine Mile Creek Watershed District (NMCWD)
- Riley-Purgatory-Bluff Creek Watershed District (RPBCWD)
- Bloomington-Richfield Watershed Management Organization (BRWMO)
- Lower Minnesota River Watershed District (LMRWD)

Project terminus boundaries and, therefore, the northernmost (at I-394) and easternmost (at the bridge across the Minnesota River) drainage boundaries have not changed. General existing flow directions and outlet locations from the I-494 corridor to receiving waters have not changed since the DEIS was completed. See Figure 6.3 for watershed district and watershed management organization boundaries and Figure 6.4 for existing surface water flow directions and outlets.

## 6.3.2 CHANGES IN THE SETTING, REGULATORY FRAMEWORK OR TECHNICAL ANALYSIS THAT HAVE OCCURRED SINCE THE DEIS

### 6.3.2.1 Setting

Figure 6.3 shows the most recent watershed district and WMO boundaries. The only change in boundaries involved the realignment of the Bloomington/Richfield Watershed Management Organization boundaries to include Wood and Richfield Lakes which introduces additional flow into the I-494 corridor trunk storm sewer (see further information under Bloomington-Richfield Watershed Management Organization heading below). The two lakes were previously landlocked and included in the MCWD.

A number of changes have occurred since the DEIS in 1992 along the I-494 corridor that have impacted internal drainage boundaries. Of note, five interchanges have been reconstructed. These reconstruction projects have increased storm water runoff which in turn has been mitigated, in most cases, through the construction of ponds. These interchanges include, from northwest to southeast, Minnetonka Boulevard (two new ponds), TH 62 (one new pond), Valley View Road (one new pond), TH 5 (one new pond), TH 169 (two new ponds).

These changes in setting are discussed below in the context of their respective watershed.

#### Minnehaha Creek Watershed District (MCWD)

Currently, I-494 drainage comprises median and outside ditch flow that periodically empties via culverts into off-line areas either through grassed ditches or through constructed ponds. Rate and quality control ponds have been constructed in the Minnetonka Boulevard interchange and where Stone Road passes under I-494. The Stone Road pond (Stone Pond) currently accepts limited flow from within the I-494 right-of-way and from a housing development to the northeast. During the reconstruction of the Minnetonka Boulevard interchange two ponds were added that provide rate control for runoff from the interchange into Minnehaha Creek.

#### Nine Mile Creek Watershed District (NMCWD)

Changes to I-494 within the NMCWD include the reconstruction of the TH 62, Valley View Road ramps, TH 5, and TH 169 interchanges. Wet detention basins, providing both water quality and rate control, have been provided as part of these construction projects in accordance with applicable regulations. The ponding areas have been designed to accommodate the future expansion of I-494.

### Riley-Purgatory-Bluff Creek Watershed District (RPBCWD)

Changes to I-494 within the RPBCWD include the reconstruction of the TH 312/TH 5 interchange area. Detention basins, providing both water quality and rate control, have been provided as part of the reconstruction project, in accordance with regulatory requirements.

### Bloomington-Richfield Watershed Management Organization (WMO)

A substantial change to the WMO's boundaries was put into effect in October 2000. These boundaries now include Richfield and Wood Lakes that were previously in the MCWD. In the mid-1990's, a pumped connection from Wood Lake south to the I-494 storm sewer trunk was established to provide an outlet for the lake. In addition, a connection was made between Richfield and Wood Lakes to provide an outlet for Richfield and Grass Lakes' drainage areas.

### Lower Minnesota River Watershed District

No changes have been made in the LMRWD portion of the I-494 corridor.

#### **6.3.2.2 Regulatory Framework**

Water quantity control regulations, including both runoff volume and discharge rates, have been in effect since before the DEIS. Storm water discharge from the highway corridor would typically use existing conveyance systems or would be required to construct new systems. Recent municipal storm water management plans include more stringent regulations for development in an effort to utilize existing systems and provide flood protection. Recent storm events have also heightened awareness of existing system deficiencies. Additional discharge requirements have created considerable added challenges to the design of control and treatment schemes, including accommodation of differences in quantity and quality requirements among the watershed regulators along the I-494 corridor. Table 6.9 provides a brief summary of watershed regulations for the major surface water management components.

In the process of defining the overall surface water management system for the Preferred Alternative as presented in the following sections, Mn/DOT and its representatives have had extensive contact with the cities, watershed districts, and the watershed management organization within the corridor, as well as the Metropolitan Airports Commission. These meetings and discussions have been very beneficial in terms of exchanging information and ideas to incorporate into appropriate surface water management and control features.

#### **6.3.2.3 Technical Analysis**

A number of municipal storm water management plans, updates and drainage studies have been completed since the DEIS and utilized in preparation of this FEIS<sup>1</sup>. They include plans from the cities of Bloomington, Richfield, Minnetonka and Eden Prairie.

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<sup>1</sup> See City of Eden Prairie, *Local Drainage Plan Update*, (Eden Prairie, August 1999). See also studies completed by Richfield and Bloomington on the Best Buy campus development (WSB, 2000) and Upper and Lower Penn Lakes respectively (Barr, 2000), and MAC studies of the joint ponding area located on MAC and VA properties (BRW, 2000; Leisch, 1999).

Figure 6.3 11 x 17

Figure 6.4 11 x 17

**TABLE 6.9  
SUMMARY OF I-494 WATERSHED STORM WATER REQUIREMENTS<sup>(1)</sup>**

Watershed District / City	Water Quality	Water Quantity	BMPs/Pond geometrics	Floodplain	Erosion Control	Other
<b>Riley-Purgatory-Bluff Creek Watershed District</b>	<ul style="list-style-type: none"> <li>• “Water quality basins” must meet NURP Guidelines;</li> <li>• Skimming of floatable materials.</li> </ul>	<ul style="list-style-type: none"> <li>• Rate control not required except where downstream system can not convey higher rates;</li> <li>• Discharge velocity &lt; 5 fps.</li> </ul>	<ul style="list-style-type: none"> <li>• Pond must provide active storage for 100-year storm;</li> <li>• Manhole sump may be used together with ponds. Sump to be 1,524-millimeter (60-inch) diameter, 0.9-meter (3 feet) deep.</li> </ul>	<ul style="list-style-type: none"> <li>• Development permitted within 100-year floodplain, but &lt; 0.2-meter (&lt;0.5-foot) stage increase required based on volume;</li> </ul>	<ul style="list-style-type: none"> <li>• Plan required to submit with permit application.</li> </ul>	<ul style="list-style-type: none"> <li>• Setback 31-meter (100-foot) minimum from creek centerline.</li> </ul>
<b>Nine Mile Creek Watershed District</b>	<ul style="list-style-type: none"> <li>• As per MPCA guidelines<sup>(2)</sup>.</li> </ul>	<ul style="list-style-type: none"> <li>• No increase in peak rate for 100-year storm.</li> </ul>	<ul style="list-style-type: none"> <li>• As per MPCA guidelines<sup>(2)</sup>;</li> <li>• Manhole sump size for pond outlets = 1,524-millimeter (60-inch) diameter.</li> </ul>	<ul style="list-style-type: none"> <li>• Development permitted within 100-year floodplain, but &lt; 0.2-meter (&lt;0.5-foot) stage increase required based on volume.</li> </ul>	<ul style="list-style-type: none"> <li>• As per MPCA erosion control BMPs (NPDES permit).</li> </ul>	
<b>Minnehaha Creek Watershed District</b>	<ul style="list-style-type: none"> <li>• &gt; 20 acres – BMPs for 50 percent TP<sup>(3)</sup> removal (average annual);</li> <li>• Skimmer required for 1-year event.</li> </ul>	<ul style="list-style-type: none"> <li>• No peak rate increase for 1-, 10- and 100-year storms;</li> <li>• If landlocked, runoff volume must not increase. Back-to-back 100-year events used to analyze;</li> <li>• &gt;8.1 hectares (&gt;20 acres) – no increase in rate for 10- and 100-year storms.</li> </ul>	<ul style="list-style-type: none"> <li>• In general, as per MPCA guidelines;</li> <li>• Natural existing low areas to be used for ponding;</li> <li>• &gt;8.1 hectares (&gt;20 acres) – Drainage area used to size dead pool. Pond needs 3.1-meter (10-foot) bench and 0.6-meter (2-foot) freeboard above 100-year high water level (HWL);</li> <li>• &gt;3.2 hectares (&gt;8 acres) – wet pond + BMPs;</li> <li>• &lt;3.2 hectares (&lt;8 acres) – other BMPs.</li> </ul>	<ul style="list-style-type: none"> <li>• Development permitted within 100-year floodplain, but with no net decrease in flood storage.</li> </ul>	<ul style="list-style-type: none"> <li>• See Rule B<sup>(4)</sup> (no specific quantitative requirements).</li> <li>• Detailed plan required.</li> </ul>	

<sup>(1)</sup> References: Watershed District Water Management Plans, Watershed District, Government internet web sites, NPDES Phase I Rule, MPCA Permits, NURP Guidelines, Met Council Strategy for Non-point Source Pollution Reduction.

<sup>(2)</sup> MPCA, *Protecting Water Quality in Urban Areas*, (2000).

<sup>(3)</sup> Total Phosphorus

<sup>(4)</sup> The MCWD has issued a general permitting and licensing rule that is supplemented by individual rules, numbered A through N, which govern specific improvements and impacts within the watershed district.

**TABLE 6.9 continued**  
**SUMMARY OF I-494 WATERSHED STORM WATER REQUIREMENTS<sup>(1)</sup>**

<b>Watershed District / City</b>	<b>Water Quality</b>	<b>Water Quantity</b>	<b>BMPs/Pond geometrics</b>	<b>Floodplain</b>	<b>Erosion Control</b>	<b>Other</b>
<b>Lower Minnesota River Watershed District</b>	<ul style="list-style-type: none"> <li>• See Plan for detailed list of water quality requirements per sub-watershed per pollutant;</li> <li>• Dependent upon sub-watershed's water quality category (see Water Management Plan Section 5.13.3 for specific design criteria).</li> </ul>	<ul style="list-style-type: none"> <li>• Requires Runoff Management Plan;</li> <li>• No increase in peak flow rate for 5 or 10- and 100-year storm.</li> </ul>	<ul style="list-style-type: none"> <li>• Encourages storm water storage facilities and infiltration techniques;</li> <li>• Supports regional detention and treatment facilities;</li> <li>• Use NURP or MPCA design criteria. Type is BMP dependent upon sub-watershed's water quality category (see Water Management Plan section 5.13.3 for specific design criteria).</li> </ul>		<ul style="list-style-type: none"> <li>• Plan required as per MPCA's general permit to discharge storm water from construction sites (NPDES Phase 1 permit).</li> </ul>	<ul style="list-style-type: none"> <li>• See Water Management Plan for detailed list of water quality categories for sub-watersheds.</li> </ul>
<b>Bloomington-Richfield WMO</b>	<ul style="list-style-type: none"> <li>• No I-494 storm water detention/treatment required, since corridor storm water flows through, but is not discharged, within WMO boundaries.</li> </ul>	<ul style="list-style-type: none"> <li>• No I-494 storm water detention/treatment required, since corridor storm water flows through, but is not discharged, within WMO boundaries.</li> </ul>	<ul style="list-style-type: none"> <li>• No I-494 storm water detention/treatment required, since corridor storm water flows through, but is not discharged, within WMO boundaries.</li> </ul>	<ul style="list-style-type: none"> <li>• Not applicable for I-494 project.</li> </ul>	<ul style="list-style-type: none"> <li>• As per MPCA erosion control BMPs (NPDES permit).</li> </ul>	<ul style="list-style-type: none"> <li>• No I-494 storm water detention/treatment required, since corridor storm water flows through, but is not discharged, within WMO boundaries.</li> </ul>

As described in the previous sections, much of the roadway includes rural ditches and medians. Two terms used to describe impacts of the Preferred Alternative require definition:

- “Within-crown” refers to drainage area that discharges toward the center of the roadway inside the crowns of each directional road alignment.
- “Outside-crown” refers to the drainage area that discharges from the crowns toward the shoulder of the roadway.

### 6.3.3 IMPACTS ASSOCIATED WITH THE PREFERRED ALTERNATIVE

This section provides information pertaining to the locations and volumes of surface water that will have to be managed with the proposed project. Mitigation measures that are intended to be used with the Preferred Alternative to address surface water quantity control requirements are more specifically addressed in Section 6.3.4. Water quality impacts and mitigation are discussed in Section 6.4 of this FEIS.

At present, the I-494 corridor segment under study comprises both urban and rural roadway sections. An urban section from the high point between Xerxes and Penn Avenues east to the Minnesota River incorporates curb and storm sewer that conveys storm water to either Upper Penn Lake or the Minnesota River. The rural section from Xerxes Avenue west and then north to I-394 incorporates a combination of grass ditches and culverts.

It is proposed that the rural section from Xerxes Avenue west to a point between Prairie Center Drive and TH 5 be converted to an urban section. Thus, curb, gutter and storm sewer together with surface water management will be required. An expected increase in runoff flow rate at defined discharge points along the new urban section necessitates careful attention to both rate control and water quality measures.

The corridor segment from I-394 to a point south of the TH 5 interchange will remain a rural roadway design. Two methods of storm water conveyance for within-crown runoff are utilized: 1) storm sewer located in the center median with outlets into treatment areas, and 2) periodic drop inlets that outlet into ditches or water quality swales that, in turn, lead either to an outfall or a treatment area. Where outside-crown runoff is not conveyed into treatment areas, existing patterns have generally been maintained.

Drainage boundaries for the Preferred Alternative are similar to existing conditions. Figures 6.5 through 6.15 show proposed drainage areas and patterns along the highway. Table 6.10 summarizes drainage area characteristics, comparing existing conditions to the Preferred Alternative. A segment-by-segment discussion follows.



**TABLE 6.10 continued**  
**DRAINAGE AREA ANALYSIS – EXISTING CONDITION AND PREFERRED ALTERNATIVE**

Watershed District	Drainage Area Location and Description	EXISTING CONDITION							PREFERRED ALTERNATIVE							Notes	
		Total Area (2)		Highway R/W		Highway Imperv.		Percent Imperv.	Total Area (2)		Highway R/W		Highway Impervious		Percent Impervious		Preferred Alternative Proposed Receiving Water
		(hectares)	(acres)	(hectares)	(acres)	(hectares)	(acres)	(R/W Only)	(hectares)	(acres)	(hectares)	(acres)	(hectares)	(acres)	(R/W Only)		
Nine Mile Creek	<b>TH 212/Flying Cloud Drive to TH 100</b>																
	NM 200	11.7	28.8	11.6	28.7	4.70	11.6	40%	10	24.7	10.0	24.7	5.06	12.5	51%	Lake Smetana	
	NM 203	0.97	2.4	0.97	2.4	0.3	0.7	29%	1.1	2.6	1.1	2.6	0.3	0.7	27%	Lake Smetana	
	NM 202	2.7	6.6	1.1	2.8	0.57	1.4	50%	2.4	5.9	0.85	2.1	0.3	0.7	33%	Anderson Lake	
	NM 201	3.1	7.7	2.9	7.1	1.4	3.4	48%	5.87	14.5	5.63	13.9	4.37	10.8	78%	Anderson Lake	
	NM 204	4.09	10.1	3.5	8.6	1.3	3.2	37%	2.1	5.2	1.5	3.7	0.4	1	27%	Anderson Lake	
	NM 205	21.2	52.4	17.5	43.3	8.38	20.7	48%	23.9	59.1	20.6	50.9	10	24.7	49%	Nine Mile Creek	
		4.5		2		0			4.5		2		0				
	NM 206		11		5		0	0%		11		5		0	0%	Nine Mile Creek	
	NM 207	8.95	22.1	2.1	5.2	1	2.5	48%	9.07	22.4	2.2	5.5	1.0	2.5	45%	Nine Mile Creek	
	Wetland @ 494/169 NE Quadrant	2.9		2.9													
			7.1		7.1		2.6	37%								Nine Mile Creek	
									3.5		3.5						
	NM 211									8.7		8.7					
	NM 208	4.58	11.3	4.58	11.3	1.4	3.4	30%	5.35	13.2	5.35	13.2	3.2	7.8	59%	Nine Mile Creek	
		13.2		5.35		1.6											
Northwest Athletic Club		32.6		13.2		4	30%								Nine Mile Creek		
	9.44		7.33		2.5												
Low point		23.3		18.1		6.2	34%								Nine Mile Creek		
NM 209	12.2							7.3	18.0						Nine Mile Creek		
NM 210		30.1	7.41	18.3	2.4	5.9	32%	21.7	53.6	21.7	53.6	15	38	71%	Nine Mile Creek		
NM 212								2.2	5.5								
NM 213								4.66	11.5								
NM 214								4.13	10.2								
NM 215								1.5	3.6								
<b>Totals</b>	99.53	245.5	69.24	171.1	26.65	65.6	38%	109.28	269.7	74.43	183.9	39.63	98.7	54%			
	<b>TH 100 - 70th to 494</b>																
	NM 216	18.1	44.6		44	9.6	23.7	54%	22.8	56.3	22.4	55.2	11.8	29.1	53%		
	NM 217								1.1		1.1		0.3				
	NM 218	1.1	2.8		2.8			0%	1.1	2.8	1.1	2.8		0.8	29%		
														0%		Lake Edina	
	<b>TH 100 to Xerxes Ave</b>																
	NM300	5.75	142		99	15	37	37%	62.2	161	50.2	124	26	63	51%	Nine Mile Creek	
Nine Mile Creek	<b>Xerxes Ave to I-35W</b>																
	NM 400	7.57	18.7		17.6	3.1	7.7	44%	7.57	18.7	71.3	17.6	6.24	15.4	88%	Upper Penn Lake	
	NM 401	45.4	112.0		72.0	8.9	22.0	31%	47.4	117.0	37	92.0	22	54.0	59%	Upper Penn Lake	
	<b>Totals</b>	52.97	130.7		89.6	12	29.7	33%	54.97	135.7	44.13	109.6	28.24	69.4	63%		

**TABLE 6.10 continued  
DRAINAGE AREA ANALYSIS – EXISTING CONDITION AND PREFERRED ALTERNATIVE**

Watershed District	Drainage Area Location and Description	EXISTING CONDITION							PREFERRED ALTERNATIVE							Notes	
		Total Area (2)		Highway R/W		Highway Imperv.		Percent Imperv.	Total Area (2)		Highway R/W		Highway Impervious		Percent Impervious		Preferred Alternative Proposed
		(hectares)	(acres)	(hectares)	(acres)	(hectares)	(acres)	(R/W Only)	(hectares)	(acres)	(hectares)	(acres)	(hectares)	(acres)	(R/W Only)		Receiving Water
Bloomington - Richfield WMO/Lower Minnesota WD	<b>I-35W to Minnesota River</b>																
	BR 100	27.3	67.3	15.5	38.2	5.75	14.2	37%	27.3	67.3	15.9	39.2	9.8	24.3	62%	Minnesota River	All Drainage Areas – first 200 cfs treated in Almaz Pond
	BR 101	25.0	61.7	12.7	31.3	7.17	17.7	57%	25	61.7	14.3	35.3	8.18	20.2	57%	Minnesota River	
	BR 102	14	34.5	8.14	20.1	5.02	12.4	62%	14	34.5	8.14	20.1	5.35	13.2	66%	Minnesota River	
	BR 103	16.7	41.2	7.0	17.2	5.31	13.1	76%	16.7	41.2	7.53	18.6	5.71	14.1	76%	Minnesota River	
	BR 104	14	34	6.56	16.2	5.18	12.8	79%	14	34	7.13	17.6	5.35	13.2	75%	Minnesota River	
	LMR 100	34.5	85.1	31.1	76.7	17.9	44.3	58%	34.5	85.1	31.1	76.7	21.5	53.1	69%	Minnesota River	
	LMR 101	43.62	107.7	26.9	66.4	18.1	44.7	67%	59.82	147.7	26.9	66.4	17.5	43.1	65%	Minnesota River	
Totals	175.12	431.5	107.9	266.1	64.434	159.2	60%	181.32	471.5	111	273.9	73.39	181.2	66%		VA 40 acres added	
<sup>1</sup> Numbers as per Minnetonka Water Resources Management Plan watershed ID numbers.																	

Figure 6.5 11 x 17

Figure 6.6 11 x 17

Figure 6.7 11 x 17

Figure 6.8 11 x 17

Figure 6.9 11 x 17

Figure 6.10 11 x 17

Figure 6.11

11 x 17

Figure 6.12

11 x 17

Figure 6.13

11 x 17

Figure 6.14

11 x 17

Figure 6.15

11 x 17

### 6.3.3.1 Minnehaha Creek Watershed District (I-394 to TH 7)

Preferred Alternative improvements consist of adding two lanes (one in each direction) on the inside of the highway converting the existing pervious grassed median to impervious surface, resulting in an increase in runoff volume and peak discharge. Widening the highway by as much as 3.4 meters (11.0 feet) on each side is also envisioned in this segment, although the actual impervious areas outside of the crowns will increase very little. A net increase from existing to the Preferred Alternative of approximately eighteen percent impervious area within the highway right-of-way is expected.

- **I-394 to TH 7 (Figures 6.5 and 6.6):** Based upon an assessment of the physical nature of the area, the overall approach of leaving outside-crown drainage generally unchanged has been taken. Inside-crown storm water runoff from MC100 will be directed to a storm sewer trunk line that will discharge into an expanded Stone Pond (an existing pond in the northwest quadrant of Minnetonka Boulevard), and MC102 will flow into McGinty and Guz Ponds (proposed new ponds).

### 6.3.3.2 Nine Mile Creek Watershed District (from TH 7 to I-35W)

Preferred Alternative improvements within the Nine Mile Creek Watershed District include both rural and urban sections. Drainage area numbers are identified in Figures 6.6 through 6.11. A net increase of approximately nineteen percent impervious area within the highway right-of-way is anticipated as a result of Preferred Alternative construction.

- **Excelsior Boulevard to Valley View Road (Figures 6.7 and 6.8):** Improvements to the highway include the addition of two inside lanes and improving the TH 62 interchange. From the TC&W Railroad south to the TH 62 interchange, outside-crown drainage will continue to flow overland to a variety of wetland complexes, or be collected in ditches prior to discharging to the wetlands. For inside-crown drainage in this stretch, the proposed trunk line will discharge into two wetlands on the east side, as it does now. Though the TH 62 interchange will be modified to some extent, Grasshopper Pond will still provide adequate rate control into the Minnetonka storm water system. Drainage for outside-crown runoff (NM104-113) would continue to flow overland to existing ditches and wetland complexes. Catalina Pond is proposed to accept storm water runoff for NM100 – NM103 while Delray Pond is proposed to accept runoff for NM114 – NM116.
- **Trunk Highway 5/312 to Prairie Center Drive (Figure 6.8 and 6.9):** Drainage from TH 5/312 to the Prairie Center Drive interchange (NM200), will continue to be directed either to Schooner Pond, located at the northwest end of Smetana Lake or through grassed swales to Anderson Lake, located along the south edge of I-494. City of Eden Prairie staff have indicated that Schooner Pond has limited capacity to accept additional storm runoff. Therefore, additional runoff volumes to the pond have been limited by directing additional runoff volume to other locations (Leapfrog Pond and Capitol Pond, for example).
- **Prairie Center Drive to TH 100 (Figures 6.9 and 6.10):** The drainage area characteristics along this segment of the corridor (NM201-NM215 drainage areas) will see notable changes.

Much of the highway will be urban section, with some rural sections intertwined. The roadway will incorporate storm sewer with specific discharge points, water quality swales where appropriate, and ditches. Several drainage areas will continue to discharge through grassed swales into existing water bodies as they do today. However, most storm water runoff will be collected and conveyed to treatment areas. In two locations, Nine Mile Creek crosses under I-494 – the South Fork crossing just east of West Bush Lake Road and the North Fork crossing just west of TH 100.

The greatest changes to the Nine Mile Creek drainage system configuration are in the vicinity of East Bush Lake Road. In 1987, a six-hour storm produced 25 centimeters (10 inches) of rainfall in the Minneapolis-St. Paul Metropolitan Area. This storm resulted in serious flooding at several low points in the project corridor from East Bush Lake Road to the Minnesota River. Of particular concern was that Nine Mile Creek flooded onto I-494 at East Bush Lake Road and did not recede for several days, closing the freeway. As a result, Mn/DOT studied the Nine Mile Creek crossings, and has recommended several changes to drainage patterns in this area. These proposed changes will be discussed in Section 6.3.4.

Another important change results from the proposed reconfiguration of the TH 100/I-494 interchange area (including the East Bush Lake Road/I-494 and TH 100/77th Street interchanges). The interchange design concept includes the proposed construction of a westbound entrance ramp from East Bush Lake Road to I-494. With the Preferred Alternative, an important pond located between the I-494 right-of-way and Normandale Technical Center that provides rate control for storm water from the immediate vicinity and from 140 hectares (346 acres) in Edina will likely be impacted by the East Bush Lake Road interchange construction. The functions of this pond would be replaced by the proposed Ballpark Pond and Porkchop Pond. Further east, the North Fork of Nine Mile Creek abuts TH 100 at 77th Street (north of I-494) and travels south along the west side of TH 100 and the TH 100 to I-494 westbound ramp until it crosses underneath I-494. Several alternatives have been assessed for the reconstruction of the TH 100/I-494 interchange. The alternative selected includes an extension of the TH 100 southbound to I-494 westbound ramp over the southbound TH 100 ramp from 77th Street. Both ramps would be constructed on bridge structures over Nine Mile Creek between 77th Street and I-494. This area is also described in Section 6.12 (Stream and Water Body Modification) of this FEIS.

- **Trunk Highway 100 to Xerxes Avenue (Figures 6.10 and 6.11):** Between TH 100 and the high point that exists between Xerxes and Penn Avenues (NM300 drainage area), the existing semi-urban section will be converted to a fully urban section necessitating the construction of additional storm sewer and treatment facilities. Storm water will continue to be directed west to Normandale Boulevard, then south to Nine Mile Creek south of 84th Street through the proposed Goldman Pond.
- **Xerxes Avenue to I-35W (Figure 6.11):** Currently, a lift station located at Penn Avenue dewateres the low point and directs storm water (from NM400 drainage area) into a trunk storm sewer that discharges into Upper Penn Lake. This lift station has failed a number of times in the past, flooding the interchange. The existing lift station will be replaced in conjunction with the planned reconstruction of the Penn Avenue interchange

(2001 construction). This new lift station should improve the reliability of the system. In addition, the possibility of providing a gravity feed line for this area is being considered as part of the I-494 east end high-flow analysis currently underway (see Section 6.3.4.4).

- **Interstate 35W Interchange (Figures 6.11 and 6.15):** Improvements along I-35W from 66th Street to 90th Street are also included in this FEIS. The area from 66th Street to 76th Street has already been reconstructed, with the highway runoff directed towards a ponding system within the Wood Lake Nature Area. The northern portion of the interchange (NM401) currently drains to the storm sewer system that conveys runoff down Penn Avenue to Upper Penn Lake. The southern portion of the interchange drains south to a storm sewer system that conveys runoff to Upper Penn Lake along 82nd Street/84th Street. According to the *I-35W FEIS*, “the proposed drainage plan includes routing the I-35W/I-494 interchange runoff south and constructing a new outlet to Upper Penn Lake along 84th Street.”<sup>2</sup> Since notable increases in impervious areas are proposed within the I-35W/I-494 interchange, corresponding increased runoff rates and volumes are anticipated. The planned construction of Irving Pond (south of I-494 on I-35W) and NE and SE ponds (at the interchange loops) will provide detention treatment prior to surface water discharge to Upper Penn Lake.

### 6.3.3.3 Riley-Purgatory-Bluff Creek Watershed District

- **Trunk Highway 5 Interchange (Figure 6.8):** Reconstruction of the I-494/TH 5 interchange was recently completed. With the proposed addition of two internal lanes along I-494 for the Preferred Alternative construction, an increase in quantity and runoff rate is expected for drainage areas RPB100 and RPB101. This increase was anticipated in the design of storm water treatment west of the interchange and has been addressed in the design and permitting of the interchange. However, additional detention capacity will be needed to provide adequate rate control for the proposed I-494 reconstruction roadway areas. Leapfrog Pond, located in the southeast quadrant of Prairie Center Drive and TH 5, accepts and treats storm water runoff from the TH 5 interchange improvements. However, due to complex soil conditions, neither pond size nor depth can be increased to accept additional runoff volume associated with Preferred Alternative improvements. Thus, additional flow attenuation would be provided in drainage swales upstream of the pond. Construction of a water quality swale is proposed within the southeast TH 5/I-494 loop to attenuate flows and treat drainage from RPB101.

### 6.3.3.4 Lower Minnesota River Watershed District/Bloomington – Richfield WMO (From I-35W to the Minnesota River)

Two additional lanes in each direction and a 7.9-meter (26-foot) median are proposed to be added to I-494 from I-35W to 34th Avenue, with the corresponding width adjustment of between 31 and 37 meters (100 and 120 feet). The entire section of roadway is proposed as urban

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<sup>2</sup> Mn/DOT, *I-35W Final Environmental Impact Statement*, (January, 1995).

section design consistent with current conditions. No roadway construction is proposed east of the 34th Avenue interchange; however, storm sewer improvements will likely extend to the Minnesota River.

- **I-35W to the Minnesota River (Figures 6.11 to 6.13):** This drainage area begins just east of the I-35W/I-494 interchange and encompasses areas along the corridor from I-35W east to 34th Avenue (areas BR100-BR103, LMR100 and LMR101). The I-494 storm sewer also conveys 16.2 ha (40 acres) of drainage area from the National Cemetery. A trunk storm sewer, beginning at Humboldt Avenue, receives and discharges storm water from this section of the I-494 corridor into a flume located on the Fort Snelling National Cemetery property. The flume conveys the water for a distance of 275 meters (900 feet) along the bottom of a ravine to a 1.8-meter (72-inch) conduit that passes underneath TH 5 to the Minnesota River. Analysis (modeling) and field observation have confirmed that this storm sewer currently carries up to a 5.1-centimeter (2-inch) rainfall event before it begins to flood onto the highway mainline. This condition would worsen with the increased impervious area resulting from the proposed I-494 reconstruction, making improvements in drainage to the entire trunk line critical. Section 6.3.4.4 describes options being considered to address this issue.

A regulated discharge from Wood Lake into the storm sewer and a high flow discharge near 12th Avenue are two additional existing offsite connections made to the I-494 watershed in this area. Runoff from the Wood Lake connection is treated prior to being pumped into the system during off-peak times. During the I-494 reconstruction, this is proposed to become a gravity connection.

#### 6.3.4 MITIGATION OF IMPACTS

The mitigation of water quantity impacts involves limiting discharge rates as closely as possible to existing rates for a variety of storm events. Since watershed districts and municipalities may have different requirements for a given drainage location, the most restrictive has been assumed for the assessment in this FEIS. For water quantity this implies an overall goal of maintaining the proposed peak discharge from the corridor to the existing rates for the 1-, 10- and 100-year storms. Rate control will allow existing infrastructure to be utilized without reconstructing offsite conveyance systems. Methods of accomplishing rate control involve both wet and dry detention basins and storage within water quality swales.

As with any project that involves conversion of pervious areas to impervious surface, an increase in runoff volume is also likely to occur. Maintaining rural roadway sections and subsequent overland flow provides for some opportunities for infiltration, as does rural drainage within some of the interchanges. In addition, there are occasions where a particular ponding area cannot be expanded and is particularly sensitive to additional runoff volume. In one such case, Schooner Pond in Eden Prairie has been noted by the City to be particularly susceptible to problems given increased volumes of runoff. In this case, a portion of the drainage area has been routed south to Capitol Pond.

#### 6.3.4.1 Minnehaha Creek Watershed District (from I-394 to TH 7)

Two major drainage areas exist along I-494 in the Minnehaha Creek Watershed District that discharge from Stone Pond near Stone Road and McGinty Pond within the Minnetonka Boulevard interchange. In both cases, the ultimate receiving water is Minnehaha Creek. Rate control will be addressed according to the requirements found in the MCWD Rule N<sup>3</sup>.

- **Interstate 394 to Stone Road (Stone Pond):** In order to provide adequate drainage for the two additional lanes throughout this segment, inside-crown storm water runoff is directed to a wet detention basin (Stone Pond) either through a centrally located trunk storm sewer or by conveying it through one of the outside ditch systems. Stone Pond, located in the northwest quadrant of I-494 and Stone Road, will need to be expanded to include runoff from the center of the road. Outside-crown runoff would continue to discharge into ditches that would, in turn, discharge into existing open channels. Portions of the outside ditches will be directed towards the various ponding areas.
- **Stone Road to TH 7 (northwest pond, McGinty and Guz Ponds):** As with the Stone Pond drainage area, a centrally located trunk line is proposed in this segment that would direct storm water runoff from inside the highway crowns to a wet detention basin. Storm water runoff from north of Minnetonka Boulevard will be directed to an existing pond in the northwest quadrant of the interchange. A small berm that exists today will be removed to allow more efficient flow from the north into this pond. McGinty Pond is proposed as a regional rate control and treatment facility that would accept storm water from both the I-494 corridor south of Minnetonka Boulevard and the Minnetonka Storm Water Management System. Currently, runoff from as far south as the TH 7 interchange is directed north into a wetland located in the southwest quadrant of the Minnetonka Boulevard interchange. The proposed condition will redirect this runoff into McGinty Pond and then into Minnehaha Creek.

It is proposed that Guz Pond be constructed in the northwest loop of the TH 7 interchange, to be utilized to treat most storm water runoff from the interchange. The pond would outlet into a ditch that would then convey the water into McGinty Pond together with all runoff from outside the southbound (west side) highway crown. Along the north-bound (east side) portion of the highway, ditch flow would convey storm water north from the TH 7 interchange to a point just prior to Minnetonka Boulevard where it would enter a culvert, as it does today, to be discharged into McGinty Pond.

#### 6.3.4.2 Nine Mile Creek Watershed District (from TH 7 to Nicollet Avenue)

- **Trunk Highway 7 to TC&W Railroad (Catalina Pond):** Along the northbound (east of the highway) side of I-494 between TH 7 and Baker Road, ditch flow and a center trunk storm sewer are proposed to discharge drainage areas NM100-NM103 into a new pond (Catalina Pond) located 214 meters (700 feet) north of the Baker Road crossing on the east side of I-494 (see Figure 6.7). From Baker Road to the Soo Line Railroad, inside-crown

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<sup>3</sup> Minnehaha Creek Watershed District, "Rule N", in *Watershed Management Plan*, (Minnehaha Creek Watershed District, 2000).

storm water would be directed into a trunk line and then discharged directly into the Minnetonka Storm Water Management System. If rate control is required, an outlet structure could be installed. Catalina Pond and the drainage area between Baker Road and the railroad discharge into the Minnetonka Storm Water Management System and ultimately into Minnetoga Lake.

- **NM104 – NM109 (Bryant Lake):** Runoff from these two areas comprises within-crown and outside-crown flow. Within-crown runoff will be collected by a drop inlet and conveyed via a culvert to the east side of the highway where it will exit into a filter strip and grassed swale system, eventually leading to a storm water wetland 107 meters (350 feet) east of the highway.
- **NM113 (Grasshopper Pond):** Drainage from the TH 62 roadway and ramps is currently directed into several small depressions that then flow via culverts into Grasshopper Pond. Grasshopper Pond can be expanded to the south for additional capacity that would be able to accommodate higher discharges from an expanded interchange.
- **NM114 – NM116 (Delray Pond, Cardinal Creek Conservation Area):** Bryant Lake watershed is considered by the NMCWD to be one of their most sensitive, and measures will be taken to treat storm water adequately prior to discharging into the lake. Between the Soo Line Railroad and TH 62, a small drainage area is proposed to be directed into wetland # 623-A1, similar to existing drainage routing. Beginning at the high point located 61 meters (200 feet) south of the I-494/TH 62 bridge and ending at Valley View Road, all inside-crown runoff would be directed into Delray Pond, located just north of County Ditch 34 along Beach Road east of I-494 (see Figures 6.7 and 6.8). Outside-crown runoff will not be altered from existing patterns and will continue to drain to existing wetland complexes including Cardinal Creek Conservation Area via existing grassed swales with ditch blocks.
- **NM200 – NM203 (Schooner Pond, Capitol Pond):** NM200 has been reduced in area in order to minimize runoff volumes being conveyed to Schooner Pond. Capitol Pond will receive runoff from NM201. NM202 and NM203 will retain their current runoff patterns.
- **NM204 – NM215 (Porkchop, Ballpark, Banana and Picture Ponds):** From midway between Prairie Center Drive and TH 169 to TH 100, the roadway will be an urban section, with a storm sewer trunk line periodically discharging into a variety of ponding areas for treatment. These ponding areas (Molar, Ballpark, Porkchop) discharge into Nine Mile Creek at their respective locations. The roadway expansion is expected to be pushed to the south between West Bush Lake Road and TH 100 in order to eliminate any impact to the South Fork of Nine Mile Creek where it enters the I-494 right-of-way along the north side.

Following Mn/DOT's analysis of the 1987 "super-storm," (a 500-year storm event), it was recommended that drainage from the low point east of East Bush Lake Road be isolated from the northern portions of the corridor, and be redirected east around the interchange to a point downstream of the East Bush Lake Road Nine Mile Creek crossing. Currently, a berm

isolates the highway from a large wetland complex that carries Nine Mile Creek (located southwest of the interchange) along the south side of I-494. The berm has an opening to allow storm water flow to enter the wetland through a culvert from north of I-494. Storm water backed up through this opening into the I-494 corridor during the super-storm. According to Mn/DOT recommendations, this opening would be closed, the existing culvert under I-494 removed and the berm and highway grade raised approximately 0.6 meters (2 feet) in order to fully isolate the highway from flooding. Storm water runoff would then be directed along the north of I-494 to a point east of the interchange upon which it would be directed under the highway, into Porkchop and Ballpark Ponds (see Figure 6.10) and then into Nine Mile Creek. These two ponds are designed to function as a two-cell system for quality and rate control prior to discharging in the Creek.

East Bush Lake Road and Green Valley Drive are both proposed to be reconstructed under the Preferred Alternative. Both roads are proposed as urban sections with curb and gutter. Banana Pond, located in the northeast quadrant of East Bush Lake and 84th Street, is proposed to accept runoff from East Bush Lake Road south of I-494 and from Green Valley Drive. Storm sewer along Green Valley Drive and East Bush Lake Road would convey storm water runoff south to Banana Pond. A small drainage area of the TH 100/I-494 interchange west along I-494 will be redirected from direct discharge into Nine Mile Creek to Picture Pond, located in the northwest loop. Picture Pond will then discharge directly into Nine Mile Creek upstream of the I-494 crossing.

- **TH 100 to Xerxes (NM300 [Goldman Pond]):** Runoff from this drainage area will be conveyed to Goldman Pond (located south of 84th Avenue and east of Normandale Boulevard) prior to discharge to Nine Mile Creek.
- **Xerxes Avenue to I-35W Interchange (Upper Penn Lake):** Runoff from this segment of I-494 will continue to collect at Penn Avenue and be pumped via lift station to Upper Penn Lake through an existing trunk storm sewer. Current plans to reconstruct the interchange at Penn Avenue include construction of a new lift station as well as portions of the upstream system north of I-494. These measures should reduce the risk of flooding seen at this location in the past. In addition, there is the potential of providing a gravity connection to this interchange via a potential new trunk storm sewer east to the Minnesota River, as described in Section 6.3.4.4.
- **Intersection 35W Interchange (Upper and Lower Penn Lakes):** Along the I-35W/I-494 interchange, most flow that currently enters Lower Penn Lake would be diverted along 84th Street to Upper Penn Lake. Re-evaluation of the *I-35W FEIS and Preliminary Design Report* from 60th to 90th Street, which includes the I-35W/I-494 interchange, resulted in a recommendation that the proposed ponding within the interchange continue to be utilized but that only two ponds are needed at the interchange loops (NE and SE Ponds) due to changes from recent construction. Irving Pond, also recommended by the previous I-494 drainage design, is still included in the proposed I-494 reconstruction improvements.

### 6.3.4.3 Riley-Purgatory Creek Watershed District (TH 5 Interchange)

- **Trunk Highway 5 Interchange (Leapfrog Pond, Purgatory Creek):** As discussed in Section 6.3.3.3, the Preferred Alternative modifications have not been accommodated in the recently-completed interchange reconstruction project, and Leapfrog Pond is unable to be enlarged to accept a greater runoff volume for treatment. However, it is anticipated that with a water quality swale constructed in the southeast loop of the TH 5 interchange, the treatment and attenuation provided by the swale will adequately mitigate peak flow rates into Leapfrog Pond and the pond will operate with flows as originally designed.

### 6.3.4.4 Lower Minnesota River Watershed District/Bloomington – Richfield WMO (From I-35W to the Minnesota River)

- **Interstate 35W to 34th Avenue (Almaz Pond, Minnesota River):** As noted in Section 6.3.3.4, the trunk sewer in this segment of the I-494 corridor is severely under capacity for the existing conditions, and therefore will require a new system to supplement or replace the existing system.

A study is currently underway to determine the feasibility of constructing a system that would provide the Wood Lake outlet with a gravity connection to replace the existing pump station. The study also includes investigating the feasibility of constructing a gravity outfall for the Penn Avenue interchange. If this is possible, the interchange area (approximately 7.7 hectares or 19 acres) would be redirected from Upper Penn Lake to the Minnesota River.

- **Thirty-Fourth Avenue to the Minnesota River (Minnesota River):**

At 34th Avenue, the existing system discharges to a flume system where storm water is combined with the Metropolitan Airports Commission (MAC) runoff. The MAC has proposed a series of ponds and a conveyance system that would provide conveyance and treatment for various expansion projects (see Figure 6.13). The middle pond, Almaz Pond, is designed to provide treatment for I-494 runoff. The conveyance connection into Almaz pond is designed for I-494 “low flow” drainage of up to 5.6 cms or 200 cfs (i.e. less than a 5.1 cm (2-inch) 24-hour storm event). Flows from 5.6 cms (200 cfs) up to 16.8 cms (600 cfs) would be routed directly to discharge to the river. Extensive coordination has occurred with the MAC to provide for both the planned airport expansion projects as well as the future highway corridor.

Almaz Pond and the 5.6 cms (200 cfs) to 16.8 cms (600 cfs) bypass system for I-494 drainage is scheduled to be constructed in 2001/02 as part of a larger MAC project covered in an Environmental Assessment Worksheet prepared by the MAC in 2000. This proposed storm sewer system will require additional overflow capacity to adequately drain the roadway for flows greater than 16.8 cms (600 cfs).

A study is currently being conducted by Mn/DOT to evaluate drainage issues for I-494 from the I-494/Penn Avenue and I-494/I-35W interchange areas east to the Minnesota River. One of the issues being addressed is the preferred alignment, design, and outfall location for the overflow capacity east of 34th Avenue referenced above. While this study has not been completed, work performed to date has narrowed down discharge and associated alignment options for an overflow line east of 34th Avenue to the following:

- Outlet to Military Reservation Pond (see Figure 6.16)—under this option, the conveyance alignment would stay within Mn/DOT right-of-way or Mn/DOT-owned land. It is anticipated that a forebay pond for treatment upstream of Military Reservation Pond would be utilized. From Military Reservation Pond, discharge would be routed to the Minnesota River.
- Outlet to MAC treatment pond “040” north of the I-494 Bridge (see Figure 6.16)—under this option, the conveyance alignment could stay within Mn/DOT right-of-way except possibly for a portion south and east of TH 5 where easement would have to be obtained from the United States Air Force and/or the MAC. The Minnesota Department of Transportation would work with the MAC to enhance treatment pond “040” as appropriate. From this pond, discharge is routed to the Minnesota River.

Until the Mn/DOT water resources study referenced above is completed, the preferred outlet location and conveyance alignment for the east overflow line will not be known. However, it is anticipated that one of the above approaches will be utilized and, thus, that the system will be within the boundaries of the “review area” as identified on Figure 6.16. Since the specific location of this line is not known at the time of the completion of the FEIS, impact assessments for relevant environmental parameters in subsequent sections of this FEIS use the inclusive review area identified on Figure 6.16. Once the water resources study is complete and recommendations are made, design concept decisions can be made and further environmental review and documentation can be prepared if needed.

## **6.4 WATER QUALITY**

The Affected Environment for water quality for the I-494 reconstruction was addressed in Section 4.2.6 of the DEIS. Impacts and mitigation measures for water quality were discussed in Section 5.3.6

### **6.4.1 INFORMATION FROM THE DEIS THAT REMAINS UNCHANGED**

Criteria for the design of wet detention basins (storm water treatment ponds) as promulgated and administered by the Minnesota Pollution Control Agency (MPCA) has not changed since the DEIS. In addition, MPCA water quality standards for pollutants of the most potential concern as promulgated in Minnesota Rules Chapter 7050.0220 remain unchanged, and are presented in Table 6.11.

**TABLE 6.11  
MPCA STANDARDS FOR CLASS 2Bd WATERS**

Item	MPCA Standards for Class 2Bd Waters (total hardness = 100)	
	Chronic Standard <sup>(1)</sup>	Maximum Standard <sup>(2)</sup>
Copper, µg/l	9.8	18
Lead, µg/l	3.2	82
Zinc, µg/l	106	117
Chloride, mg/l	230	860

<sup>(1)</sup>Highest concentration allowed on average.

<sup>(2)</sup>Greatest peak concentration allowable.

Lake impact analyses in the DEIS utilized a FHWA procedure to predict whether phosphorus is likely to contribute to eutrophication. The FHWA procedure was also used to determine resulting concentrations of soluble portions of metals in river or streams. The overall results of the DEIS analysis for the Build alternatives addressed in that document may be summarized as follows:

- There would be no adverse impacts to the water quality of Minnehaha Creek.
- With the implementation of appropriate best management practices (BMPs) no adverse water quality impacts to Bryant Lake were anticipated.
- Concentrations of phosphorus in Lake Smetana would remain well below the target levels.
- With recently constructed and proposed ponding in several locations along the corridor, all pollutant concentrations were anticipated to be well below the threshold criteria for storm water entering Nine Mile Creek.

In general, the Preferred Alternative has been reduced in scale relative to the most extensive Build Alternative considered in the DEIS (refer to Section 1.2.1 discussion), so the water quality impacts of the current Preferred Alternative would likely be less than those identified for the Build Alternatives in the DEIS analysis. In several locations additional ponds are being proposed relative to the DEIS analysis that are deemed necessary due to changes in proposed roadway geometrics or drainage patterns<sup>4</sup>. With the proposed surface water drainage design summarized in Section 6.3 of this FEIS, and the water quality mitigation information presented in Sections 6.4.3 and 6.4.4 of this FEIS, it is concluded that the findings of the DEIS as summarized above remain valid for the Preferred Alternative.

<sup>4</sup> Locations include Prairie Center Drive, East Bush Lake Road, TH100 and I-35W (between 83<sup>rd</sup> and 85<sup>th</sup> Streets).

Figure 6.16

11 x 17

## 6.4.2 CHANGES IN THE SETTING, REGULATORY FRAMEWORK OR TECHNICAL ANALYSIS THAT HAVE OCCURRED SINCE THE DEIS

### 6.4.2.1 Setting

A number of interchanges and new ponds have been constructed since the DEIS was published. Information on these changes is provided in Section 6.3.2 of this FEIS.

### 6.4.2.2 Regulatory Framework

Over the time that has ensued since the DEIS, municipalities have become more proactive regarding their role in ensuring that high levels of water quality are maintained for storm water runoff within their jurisdictions. In response, substantive dialogue and a great deal of information and input regarding surface water quantity and quality has been gathered from the municipalities through which the Preferred Alternative passes. Furthermore, the cities of Minnetonka, Eden Prairie, Richfield and Bloomington have all updated their storm water management plans since the DEIS<sup>5</sup>.

New and often innovative Best Management Practices (BMPs) that improve water quality are seen by municipalities as increasingly important. Moreover, the most recent edition of the MPCA's, *Protecting Water Quality in Urban Areas*, includes a new chapter on vegetative, bio-engineered and structural embankment and stream bank stabilization techniques that utilize sustainable, environmentally sound BMP designs<sup>6</sup>. Though storm water detention ponds remain the most accepted treatment method, other structural BMPs such as infiltration basins and trenches, vegetated swales and filter strips are becoming increasingly accepted active methods for nutrient, heavy metal and sediment removal.

The watershed districts in the project area have also updated their water management plans<sup>7</sup>. These updates include, among other matters, an expanded treatment of BMPs together with endorsement of a number of BMPs as alternatives to traditional ponding. Moreover, non-structural BMPs such as storm water wetlands, street sweeping and fertilizer management are becoming more and more important in the overall reduction of pollutants. (see Rule N, Minnehaha Creek Watershed District, for an example of a BMP selection criteria table that includes innovative structural and non-structural BMPs for storm water treatment.)

Watershed districts continue to place increasingly rigorous quality requirements on storm water runoff over and above the current National Pollutant Discharge Elimination System (NPDES) requirements as administered by the MPCA<sup>8</sup>. In areas where especially sensitive water bodies

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<sup>5</sup> Minnetonka (1996), Eden Prairie (2000), Richfield (1995), Bloomington (2000).

<sup>6</sup> Minnesota Pollution Control Agency, *Protecting Water Quality in Urban Areas*, (Minneapolis, March 2000), Chapter 4.

<sup>7</sup> Nine Mile Creek (1996), Minnehaha Creek Watershed District (1997) (Rule N, which addresses storm water management, was updated May 25, 2000), Riley-Purgatory-Bluff Creek Watershed District (1996), Lower Minnesota River Watershed District (1999).

<sup>8</sup> MPCA, *General Permit Authorization To Discharge Storm Water Associated With A Construction Activity Under The National Pollutant Discharge Elimination System/State Disposal System Permit Program*, (MPCA, St. Paul, 1998), Appendix A and B.

(e.g. Waters of the State) are located (Bryant Lake in Minnetonka, Smetana Lake in Eden Prairie, Minnehaha Creek, Nine Mile Creek and the Minnesota River, in particular), loading reductions of suspended solids, phosphorus, certain heavy metals and sediment load have become high priorities.

### 6.4.2.3 Technical Analysis

Further refinement by the EPA<sup>9</sup>, MPCA<sup>10</sup> and NRCS<sup>11</sup> of design and expected treatment efficiencies of specific BMPs have provided the foundation upon which BMPs have been selected for the Preferred Alternative.

## 6.4.3 IMPACTS ASSOCIATED WITH THE PREFERRED ALTERNATIVE

### 6.4.3.1 Pollutant Sources

Highway storm water runoff may contain a number of pollutants including particulates, heavy metals, organic matter, pesticides, nutrients and chlorides (from winter de-icing). Phosphorus, copper, lead and zinc have been identified by the FHWA as the four major pollutants in highway runoff<sup>12</sup>. Sources and characteristics of each of these pollutants follow:

- **Heavy metals – paint, atmospheric deposition, tire and brake wear, rust:** The primary heavy metal pollutants attributed to highway storm water runoff are copper, zinc, and lead. The total concentration of these metals in water includes a portion in particulate form, due to being affixed to soil particles, and a portion in soluble form. The variance in the percentage of soluble metals can be substantial, up to 50 percent for copper and zinc, and approximately ten percent for lead. Wet detention basins will remove the majority of the pollutants in particulate form. Wetland complexes have been found to remove some of the soluble form of the metals. While lead continues to be attributed to highway runoff, lead levels are expected to continue to steadily decline, as they have over the past ten years due to the elimination of the use of leaded fuel.
- **Nutrients – fertilizers, leaf litter, organic matter:** Nutrients of primary concern with respect to water quality are phosphorus and nitrogen. Phosphorus and nitrogen can enter waterways via runoff from fertilizers, agricultural wastes and soil erosion, direct discharges from municipal and industrial wastewater treatment facilities, livestock feedlots, precipitation

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<sup>9</sup> See EPA Storm Water Technology Fact Sheets for Vegetative Covers, Floatables Control, Flow Diversions, Storm Water Wetlands and Infiltration Trenches as examples. See also EPA, Source Water Protection Technologies Environmental Technology Verification (ETV) pilot program begun in 2000 to assess structural storm water BMP technologies.

<sup>10</sup> MPCA, *Protecting Water Quality in Urban Areas*, Chapters 4,5.

<sup>11</sup> See NRCS Conservation Practice Standards for Channel Vegetation (code 322), Filter Strips (code 393), and Lined Waterways (code 468). See also NRCS, *Ponds – Planning, Design, Construction*, Handbook no. 590 (NRCS, revised 11/1997).

<sup>12</sup> FHWA, *Design Procedure for Pollutant Loadings from Highway Runoff* as quoted in I-494 DEIS (1992), 4-66.

(including runoff from roadways) and from groundwater inflow. Increasing the levels of these nutrients over the natural levels can cause increases in weed growth and algae blooms that can decrease both the clarity of water and the dissolved oxygen content.

Mean pollutant concentrations in runoff from urban and rural highways contain nitrogen and phosphorous as byproducts of combustion and from atmospheric deposition, in precipitation or as dust. Studies published in 1990 by the FHWA (*Pollutant Loadings and Impacts from Highway Storm Water Runoff*) show that in urban areas with average daily traffic counts above 30,000 vehicles per day, concentrations of nitrogen and phosphorous are sufficient to promote eutrophication (1.83 mg/l total nitrogen and 0.40 mg/l phosphorous [as PO<sub>4</sub>]). In rural areas, concentrations are much lower (0.87 mg/l total nitrogen and 0.16 mg/l phosphorous). Typical “background” concentrations in streams predominantly draining forests and rangelands are 0.6 mg/l nitrogen and less than 0.1 mg/l phosphorous.

Fortunately, phosphorus in its usable form (as a nutrient) is highly reactive, and will chemically form a settleable particulate—especially in oxygen-rich environments. Nitrogen, on the other hand, occurs more often in a soluble form than in a particulate form. However, phosphorus availability is usually the limiting nutrient for plant growth. Therefore, the control of phosphorus is most important from a water quality perspective.

- **Chlorides – winter de-icing:** De-icing agents placed on the roadway surface during the winter driving season create seasonal fluctuations of chloride loadings to roadway runoff. The Preferred Alternative will result in increased impervious surfaces and associated deicing chemical usage relative to existing conditions and, thus, annual mass loading of chlorides may increase. However, the enhanced treatment measures associated with the Preferred Alternative (measures such as detention ponds and biofiltration techniques as discussed in Section 6.4.4) should provide attenuation and dilution of snowmelt runoff. Overall seasonal fluctuations are not expected to change considerably from existing conditions.
- **Particulates – sediment from erosion, winter sanding:** Particulates in storm water can result from a variety of sources. Many methods for removing particulates from storm water (grit chambers, screens, detention ponds and overland or swale flow) have been developed and are common in storm water systems.

Of particular concern in this study is the potential increase of and thus need for removal of phosphorus, since this nutrient has been linked most directly to the lake eutrophication process. Copper and zinc are considered to be the primary concern for streams. Lead is also of concern although lead levels are expected to decline due to decreasing use of leaded gasoline as a fuel.

#### **6.4.3.2 Assessment of Impacts**

As discussed in Section 6.4.1, the analysis presented in the DEIS concluded that the Build Alternatives reviewed in that document were not anticipated to result in adverse impacts to the water quality of receiving waters. Due to the fact that the Preferred Alternative is reduced in scale relative to the most extensive Build Alternative considered in the DEIS, and with the

mitigation measures anticipated to be implemented (as discussed in Section 6.4.4 below), the conclusion that no substantial water quality impacts to receiving waters would result from the proposed I-494 reconstruction project is still valid.

#### 6.4.4 MITIGATION OF IMPACTS

Most heavy metals, nutrients, chlorides and particulate matter (sediment) can be removed through the use of some type of passive treatment involving either a settling or filtering process. According to the MPCA, “in addition to the physical sedimentation process, pollutants associated with urban runoff ... will accumulate in sediments.”<sup>13</sup> Thus, when sediment is removed from storm water, pollutants will also be removed albeit at a lower rate. As a benchmark, then, BMPs for the I-494 project will be selected based upon Total Suspended Solids (TSS) removal efficiency assuming that with sediment removal, adequate removal of other relevant pollutants (in particular phosphorus, copper and zinc) will occur.

Wet detention basins (ponds) are the primary form of water quality treatment utilized for storm water runoff, since TSS removal is relatively high (as much as 90 percent)<sup>14,15</sup> and maintenance requirements are relatively low. In most cases they also provide the rate control into receiving waters such as lakes, wetlands and creeks. Other BMPs such as filter strips and water quality swales—otherwise known as biofiltration techniques<sup>16</sup>—or infiltration basins and trenches will work either in concert with or function independently of wet detention ponds for sediment removal.

For the I-494 reconstruction project, storm water will be treated with dry or extended wet detention, biofiltration or infiltration techniques. For storm water ponds, removal rates for TSS and phosphorus are expected to be 80 and 50 percent respectively. The TSS removal efficiency of vegetated or water quality swales is expected to be between 75 and 80 percent during the design storm event with a corresponding phosphorus removal rate of about 40 percent assuming no fertilizer utilization within the drainage area. Removal rates for zinc and copper are expected to reach 60 and 50 percent respectively. With this overall treatment approach, the water quality of discharge from the project area to receiving waters (lakes and creeks) is expected to remain unchanged or be improved relative to existing conditions, since there are currently few storm water detention/treatment facilities within the I-494 corridor.

Consistent with standard Mn/DOT procedures, the ponds associated with the I-494 reconstruction project will be constructed with a 25-year design life, accounting for sedimentation. After 25 years, the ponds will be dredged per standard Mn/DOT management practices. Skimmer structures and trash racks will be cleared every one or two years.

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<sup>13</sup> MPCA, *Protecting Water Quality in Urban Areas*, (Minneapolis, 2000), 5.08.

<sup>14</sup> *Ibid*, 5.02-2.

<sup>15</sup> It should also be noted here that infiltration when all storm water is treated results in the highest removal efficiencies for all pollutants. However, there are inherent challenges in the design and maintenance of infiltration basins and trenches that may restrict their use. These will be considered in depth and applied during final design.

<sup>16</sup> Washington State Department of Ecology, *Storm Water Management Manual for Western Washington Volume V – Runoff Treatment BMPs*, (2000), 253.

Table 6.9 (in Section 6.3) lists current water quality requirements for each watershed district in the project corridor. Sections 6.4.4.1 through 6.4.4.4 describe—for each watershed area—proposed BMPs intended to meet water quality standards.

#### **6.4.4.1 Minnehaha Creek Watershed District (Figures 6.5 – 6.6)**

As noted in Section 6.3 of this FEIS, runoff from the inside-crown drainage area and portions of the outside-crown area will be collected and taken via storm sewer to specific treatment areas. The remainder of the runoff will continue to drain as it does today. Within the Minnehaha Creek Watershed District (MCWD), these include Stone Pond (existing, proposed to be enlarged), Northwest Pond (existing), McGinty Pond (proposed) and Guz Pond (proposed). It should be noted that McGinty Pond is also intended to be utilized as a sedimentation pond by the City of Minnetonka. Ultimate design of all three ponds will meet MCWD water quality criteria established at the time when final design is performed. A portion of the existing rural section will remain, with treatment of outside-crown runoff comprising biofiltration methods such as filter strips (overland flow) and water quality swales. Ultimate discharge is directed to Minnehaha Creek.

#### **6.4.4.2 Nine Mile Creek Watershed District (Figures 6.6 – 6.12)**

With the exception of two locations to be discussed below, areas for proposed ponds have already been identified and discussed in Section 6.3.3. The two exceptions involve utilizing existing outfalls into the Minnetonka Storm Water Management System that do not require pre-treatment. These are referred to as storm water wetlands, design of which will conform either to Minnetonka or EPA criteria, whichever is more rigorous. Of greatest concern is the Bryant Lake drainage area. Bryant Lake is considered to be a Level I, pristine water body with a shoreline classification by the DNR as a recreational development lake. Even though storm water is neither currently nor proposed to be discharged directly into Bryant Lake, the Nine Mile Creek Watershed District (NMCWD) staff have requested that any additional runoff be treated prior to entering the Bryant Lake system. Delray Pond is proposed to treat all water draining from within the highway crowns thus adequately satisfying the watershed district request. Further south at the Valley View Road interchange, all runoff from the northbound high occupancy vehicle (HOV) bypass ramp will be treated in Francis Pond as it is today.

For the urban section of I-494, from Prairie Center Drive to Xerxes Avenue, storm water runoff will be treated as follows:

- **Prairie Center Drive/TH 212/Flying Cloud Drive interchange:** Runoff will continue to discharge into Schooner Pond for treatment. Through a reduction in drainage area, storm water volumes conveyed to Schooner Pond have been limited. East of the interchange, runoff from the additional lanes will be diverted to the proposed Capitol Pond. A small area of 2.0 hectares (4.9 acres) outside of the eastbound highway crown will continue to discharge into a natural swale and then into a wetland attached to Anderson Lake as it does today.
- **TH 169:** This interchange was rebuilt recently together with the construction of two ponds: Molar and Tadpole. Expected additional runoff from the I-494 expansion was incorporated

into the TH 169 final design of Molar Pond. However, changes to the I-494 geometrics have increased impervious areas and more than absorbed the additional dead pool already present in Molar Pond. Additional dead pool volume will be constructed in conjunction with the I-494 reconstruction, to provide adequate treatment capacity.

- **East Bush Lake Road:** The drainage area from 366 meters (1,200 feet) west of West Bush Lake Road to a point within the TH 100/I-494 interchange is quite complex. The background of this area and the effect of the 1987 super-storm has been dealt with Section 6.3 of this FEIS. To mitigate for water quality, all runoff from the highway internal to the crowns will be captured in a storm sewer trunk line which will then discharge into Porkchop and Ballpark ponds located southeast of the interchange. Runoff from portions of East Bush Lake Road (from 78th Street to the I-494 bridge) will also be captured in this storm sewer. Runoff along East Bush Lake Road south of Green Valley Drive will be conveyed via storm sewer to Banana Pond, located just north of 84th Street and East Bush Lake Road. A small drainage area west along I-494 from the TH100 interchange will drain and be treated in Picture Pond.
- **TH 100:** Curb and gutter along TH 100 from 77th Street north to 83rd Street south is expected to keep runoff from entering directly into Nine Mile Creek. Storm water will be directed into storm sewer and will be discharged in Goldman Pond located on the southeast quadrant of Normandale Boulevard and 84th Street.
- **TH 100 to Xerxes Avenue:** This section is currently a semi-urban highway comprising internal storm sewer that conveys runoff from within the crowns to a trunk line that then turns and parallels Normandale Boulevard. A fully urban section is proposed under the Preferred Alternative that necessitates additional storm sewer capacity. All storm water will be directed west along I-494 and then south along the east side of Normandale Boulevard to Goldman Pond. The pond will then discharge into Nine Mile Creek.
- **Xerxes Avenue to I-35W:** This section of roadway drains to the low point at Penn Avenue, and is pumped and discharged into a southbound trunk storm sewer that conveys the water to Upper Penn Lake. The northern portion of the I-35W/I-494 interchange is drained by gravity to the same southbound trunk storm sewer and into Upper Penn Lake. Likewise, the southern portion of the interchange together with I-35W from the interchange to 86th Street drains to either Upper or Lower Penn Lakes. The Preferred Alternative may include changes to this system, most notably by directing the Penn Avenue interchange runoff via gravity flow directly to the Minnesota River. As noted Section 6.3 of this FEIS, the proposed storm sewer for the corridor could be extended west to Penn Avenue and lowered to provide a gravity connection for the Penn Avenue low point. South along I-35W from the interchange to 86th Street, drainage would be directed into a proposed pond (Irving Pond) and then into Upper Penn Lake, diverting much of the Lower Penn Lake discharge to Upper Penn Lake. The northern portion of the I-35W/I-494 interchange would be ponded within the loop's NE and SE Ponds and discharged into Upper Penn Lake.

#### **6.4.4.3 Riley-Purgatory-Bluff Creek Watershed District (Figure 6.8)**

Treatment for the two drainage systems within this area of I-494 drainage will be provided by: a) Leapfrog Pond (existing), built during the reconstruction of TH 5/I-494 interchange and located in the southeast quadrant of Prairie Center Drive and TH 5, and b) a proposed water quality swale located in the southeast TH 5 loop.

#### **6.4.4.4 Lower Minnesota River Watershed District and Bloomington-Richfield Watershed Management Organization (Figures 6.11–6.13, 6.15)**

Beginning at Humboldt Avenue, a large trunk storm sewer currently conveys runoff between Humboldt and 34th Avenues directly to the Minnesota River. The TH 5/I-494 interchange also currently discharges directly to the River. Mn/DOT has coordinated with the Metropolitan Airports Commission (MAC) on implementation of joint water quality improvement facilities for this drainage area. As discussed in Section 6.3.4.4, 5.6 cms (200 cfs) “low flows” (less than the 5.1 cm [2-inch] 24-hour storm event) from these areas (and potentially the I-494/Penn Avenue interchange) will soon be routed through Almaz Pond, located on MAC property (see Figure 6.13) prior to discharge to the Minnesota River.

Almaz Pond has been designed utilizing the Pitt method and conforms to an 80 percent TSS removal efficiency. While it is substantially smaller than what would normally be required under the Walker Pond Design Protocol, a careful design and analysis has been completed that shows adequate TSS removal given the pond’s 1.2-ha (3.0-acre) size and two-cell treatment system<sup>17</sup>. Limited ponding area and steep slopes compelled the use of the Pitt method rather than the Walker method. This method of pond design has been accepted by the Minnehaha Creek Watershed District under a permit for water quality treatment utilizing two ponds – an upper MAC pond and Almaz Pond – issued to the MAC. The LMRWD has also agreed to this design and treatment approach.

There will be a net gain in water quality treatment under the proposed approach. Currently, there is no treatment of runoff coming from the I-494 corridor east of Humboldt Avenue. For the Preferred Alternative, the 5.1 cm (2.0-inch) 24-hour storm (i.e. the first 5.6 cms [200 cfs]), representing approximately the six-month 24-hour or one-year 12-hour storm frequency, would be treated with Almaz Pond, with higher flows (5.6 to 16.8 cms or 200-600 cfs) being conveyed directly to the Minnesota River. This pond layout has been proposed and coordinated with MAC to account for both the I-494 reconstruction and MAC expansion plans, and will be constructed by the end of 2002 by MAC.

As discussed in Sections 6.3.3.4 and 6.3.4.4, the existing storm water line from Humboldt Avenue to the Minnesota River is undersized, and additional capacity will be required for Mn/DOT flows greater than 16.8 cms (600 cfs). Mn/DOT is currently studying alternatives to address this need. The ultimate design for these high flow capacity and discharge requirements will be coordinated with applicable regulatory bodies including the Lower Minnesota River Watershed District.

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<sup>17</sup> Liesch Associates, Inc., *Preliminary Design of Retention Pond for I-494 Watershed at Fort Snelling National Cemetery*, (1999).

#### **6.4.4.5 Erosion and Sediment Control and Permit (NPDES)**

Sections 6.4.4.1 through 6.4.4.4 describe the surface water routing and water quality mitigation strategies proposed for each of the watershed areas along the I-494 corridor. Final construction plans for each phase of the project will include more detailed surface water drainage analysis and mitigation plans, incorporating detention/treatment facilities, erosion and sedimentation controls and other BMPs. These plans will be coordinated with and reviewed by local watersheds for conformance to their plans and requirements at the time of permitting and project construction. Mitigation measures will also conform to National Pollutant Discharge Elimination System (NPDES) permit<sup>18</sup> requirements at the time each project phase is constructed.

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<sup>18</sup> MPCA, *General Permit Authorization to Discharge Storm Water Associated with a Construction Activity Under the National Pollutant Discharge Elimination System/State Disposal System Permit Program*, (1998).