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**Draft Noise and Air Quality Impact Analysis**  
**Lake Elmo AUAR**  
**Lake Elmo, Minnesota**  
**August, 2008**

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## 1.0 INTRODUCTION

This report presents the results of the SBP Associates, Inc. (SBP) air quality and noise impact study for the Lake Elmo AUAR in Lake Elmo, Minnesota. This AUAR assesses the potential environmental impacts of four development scenarios. Three scenarios are based on the Village Master Plan (Scenarios A – 600 residential units, B – 1,000 residential units, and C – 1,600 residential units) and one scenario is based on the Comprehensive Plan (Scenario D - 906 units). The Village Master Plan was accepted by the City Council in April 2007. Each of the scenarios includes 300,000 ft<sup>2</sup> of commercial space (neighborhood-scale retail), 150,000 ft<sup>2</sup> of office space, and 200,000 ft<sup>2</sup> of institutional space (YMCA, library, City Hall).

The primary source of potential noise and air quality impacts of the proposed development scenarios result from the traffic generated by each scenario. This study also evaluates the implications of noise impacts from the Lake Elmo airport and the railroad that passes through the City.

## 2.0 TRAFFIC NOISE IMPACT ANALYSIS

SBP has conducted a traffic noise monitoring and modeling analysis for the proposed development. The modeling analysis used the MNDOT Minnoise computer model and traffic predictions prepared by Bonestroo. Additionally, SBP conducted noise monitoring at in the project area.

### 2.1 *Minnesota Noise Standards*

Minnesota Rules Chapter 7030 provide the Minnesota standards for noise. These standards describe the limiting levels of sound established on the basis of present knowledge for the preservation of health and welfare. These standards are designed to be consistent with sleep, speech, annoyance, and hearing conservation requirements for receivers within areas grouped according to land use activities. The Minnesota standards are as follows:

	<u>7:00 AM to 10:00 PM</u>		<u>10:00 PM to 7:00 AM</u>	
	L <sub>10</sub>	L <sub>50</sub>	L <sub>10</sub>	L <sub>50</sub>
NAC-1 (Residential)	65	60	55	50
NAC-2 (Commercial)	70	65	70	65
NAC-3 (Industrial)	80	75	80	75

L<sub>10</sub> means the sound level which is exceeded for 10 percent of the time for a one-hour period. L<sub>50</sub> means the sound level that is exceeded 50 percent of the time for a one-hour period. Sound levels are expressed in dBA. A dBA is a unit of sound level expressed in decibels and weighted for the purpose of approximating the human response to sound.

Minnesota Statutes, Section 116.07, Subd. 2a, exempt noise from local and county roads from the requirements of these noise rules unless full control of access to the road has been acquired.

## **2.2 Noise Monitoring and Modeling Comparisons**

In order to help define existing project-area noise levels, and to check calibration on the Minnoise computer model, SBP conducted monitoring at the following location:

- 100 feet from the center of Manning Avenue, north of TH 5.

Traffic counts were conducted during the monitoring periods and the data was entered into the Minnoise model to compare the actual monitored noise levels to the modeled noise levels. The following table presents the results of this comparison:

**Table 2-1-Noise Monitoring Results and Comparison to Modeling**

Location	Date	Time	Decibels, A-Weighted					
			Monitored		Modeled		Difference	
			L <sub>10</sub>	L <sub>50</sub>	L <sub>10</sub>	L <sub>50</sub>	L <sub>10</sub>	L <sub>50</sub>
M1 – Manning Ave.	7/21/08	6:00 – 7:00 am	65.0	58.0	64.2	56.1	0.8	1.9
M1 – Manning Ave.	7/21/08	7:00 – 8:00 am	67.5	62.0	67.1	59.6	0.4	2.4

The field monitoring and modeled noise levels show good agreement.

## **2.3 Noise Modeling Results**

Using the Minnoise computer model and traffic and roadway information provided by Bonestroo, SBP estimated existing and post-development noise levels generated by traffic on roadways serving the project area. Noise impacts were estimated for hypothetical

receptor locations at intervals from 50 to 2500 feet from the center of the following roadways:

- TH 5
- 30<sup>th</sup> Street
- CSAH 17 (Lake Elmo Road)
- Manning Avenue

### **2.3.1 Minnoise Model**

The Minnoise model is a modified (modified by the Minnesota Department of Transportation) version of the Federal Highway Administration's Optima/Stamina model that is used to predict noise levels from highway projects and to assist with the development of noise barriers.

### **2.3.2 Model Assumptions**

Noise level predictions were based on the following data and assumptions:

- The noise analysis was completed for the peak afternoon rush hour and the peak nighttime hour (6:00 am to 7:00 am).
- Traffic data for existing and year 2030 for the study was generated by Bonestroo.
- Shielding from natural or man-made barriers was not considered.
- The analysis assumed acoustically soft ground cover between the roadway and all receiver locations.
- Vehicle mix was provide by Bonestroo. Two percent heavy trucks was used for TH 5 and 1 percent was used for other roadways. Medium trucks were modeled at 2.6 percent.

### **2.3.3 Modeled Existing and 2030 Noise Levels**

A noise modeling analysis was conducted for the existing and 2030 traffic volumes for each scenario. Noise Impacts were determined at intervals from 50 feet to 2500 feet from each roadway. Tables 2-2 and 2-3 show the distance from each roadway where traffic noise impacts drop to below Minnesota residential daytime and nighttime compliance levels, respectively.

Complete model results for the existing and 2030 conditions are provided in Appendix A.

## **3.0 Lake Elmo Airport Noise**

The Federal Aviation Administration (FAA) requires the DNL (Day Night Sound Level) noise metric to determine and analyze noise exposure and aid in the determination of aircraft noise and land use compatibility issues around United States airports. The DNL



metric is calculated by cumulatively averaging sound levels over a twenty four-hour period. This average cumulative sound exposure includes the application of a 10-decibel penalty to sound exposures occurring during the nighttime (10:00 PM to 7:00 AM). The night sound exposures are increased by 10 decibels because nighttime noise is more intrusive.

The projected 2025 DNL noise contours for the Lake Elmo Airport are provided in Appendix B. In the case of airports located in the Minneapolis/St. Paul Metropolitan Area, the Metropolitan Council Development Guidelines in relation to airport noise exposure need to be considered. The Metropolitan Council Transportation Policy Plan (TPP) provides land use guidelines based on 4 noise zones around an airport. The following provides the Metropolitan Council's description of each noise zone:

- Zone 1 – Occurs on and immediately adjacent to the airport property. Existing and projected noise intensity in the zone is severe and permanent. It is an area affected by frequent landings and takeoffs and subjected to aircraft noise greater than 75 DNL. Proximity of the airfield operating area, particularly runway thresholds, reduces the probability of relief resulting from changes in the operating characteristics of either the aircraft or the airport. Only new, non-sensitive, land uses should be considered – in addition to preventing future noise problems the severely noise-impacted areas should be fully evaluated to determine alternative land use strategies including eventual changes in existing land uses.
- Zone 2 – Noise impacts are generally sustained, especially close to runway ends. Noise levels are in the 70 to 74 DNL range. Based upon proximity to the airfield the seriousness of the noise exposure routinely interferes with sleep and speech activity. The noise intensity in this area is generally serious and continuing. New development should be limited to uses that have been constructed to achieve certain exterior-to-interior noise attenuation and that discourage certain outdoor uses.
- Zone 3 – Noise impacts can be categorized as sustaining. Noise levels are in the 65 to 69 DNL range. In addition to the intensity of the noise, location of buildings receiving the noise must also be fully considered. Aircraft and runway use operational changes can provide some relief for certain uses in this area. Residential development may be acceptable if it is located outside areas exposed to frequent landings and takeoffs, is constructed to achieve certain exterior-to-interior noise attenuation, and is restrictive as to outdoor use. Certain medical and educational facilities that involve permanent lodging and outdoor use should be discouraged.

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

Noise Buffer Zones are additional areas that can be protected at option of the affected community; generally, the buffer zone becomes an extension of noise zone 4. A buffer zone, out to DNL55 is optional at those reliever airports with noise policy areas outside the MUSA.

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

The Metropolitan Council suggests that the 60 DNL contour be used for planning purposes in areas inside the MUSA. However, Lake Elmo Airport is located outside the MUSA, as such the 55 DNL contour is provided in the context of evaluating Land Use Compatibility considerations.

## **4.0 Railroad Noise**

A Union Pacific rail line runs through the proposed development site. According to Union Pacific, the rail line has an average use of 5 trains per day at 30 miles per hour (mph), with two trains operating at night. The trains have two to four diesel engines and 20 – 100 cars per train. In order to evaluate the noise impact of this rail line, SBP used the methodology prescribed by the US Department of Housing and Urban Development (HUD) in “The Noise Guidebook”, (September 1991 HUD-953-CPD(1)). HUD requires that projects developed with HUD assistance evaluate expected project noise levels at residences and compare them to HUD standards.

**Table 4-1**

**HUD SITE ACCEPTABILITY STANDARDS**

	DNL	Special approvals and requirements
<b>Acceptable</b>	Not exceeding 65 dB <sup>(1)</sup>	None
<b>Normally Unacceptable</b>	Above 65 dB but not exceeding 75 dB	Special Approvals Environmental Review Attenuation
<b>Unacceptable</b>	Above 75 dB <sup>(1)</sup>	Special Approvals Environmental Reviews Attenuation

Notes:  
<sup>(1)</sup> Acceptable threshold may be shifted to 70 dB in special circumstances. The attenuation measures in **Unacceptable** cases are granted on a case-by-case basis.

In conducting the impact assessment for this project, SBP used the following assumptions:

- 60 cars per train
- 3 diesel locomotives per train
- Average train speed of 30 mph
- Bolted tracks (not welded)
- Night operations (10:00 p.m. to 7:00 a.m.) are 40 percent of the 24-hour total

SBP used the HUD methodology to define the extent of the “Unacceptable” and “Normally Unacceptable” zones for 10 (current number) and 20 trains per day and for areas where whistles are used (defined as areas perpendicular to any point on the track between the whistle posts). The results of this analysis are summarized in the following table.

**Table 4-2  
 Railroad Noise Impact**

No Whistle Zone		Whistle Zone	
Extent of Unacceptable Zone	Extent of Normally Unacceptable Zone	Extent of Unacceptable Zone	Extent of Normally Unacceptable Zone
Less than 50 feet from track.*	Less than 50 feet from track.*	120-140 feet from track.	520-540 feet from track.

\*Homes less than 100 feet from the tracks often experience vibration issues.

## 5.0 Air Quality Impact Analysis

Carbon monoxide (CO) levels are elevated near roadway intersections due to the emission of this pollutant from the vehicles idling and passing by. The State of Minnesota has ambient CO standards that are designed to protect human health and the environment. The Standards are:

- 1-hour average: 30 parts per million (ppm); and
- 8-hour average: 9 ppm.

Concentrations near or above these levels are most likely to occur near intersections that are congested and have high traffic volumes. The Minnesota Department of transportation has developed a screening method designed to identify intersections that may cause a CO impact above the State standards. This method requires an intersection to be heavily congested (Level of Service F) and have a traffic volume of greater than 77,200 vehicles per day in order to be considered to have the potential for causing CO air pollution problems. None of the intersections in the study area exceed these criteria under any of the scenarios. Therefore, no violation of the standards is anticipated.

# **Appendix A**

## **Noise Modeling Results**





















**Appendix B**  
**Airport Noise Contours and**  
**Development Guidelines**



Table 6.2

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

Table Key

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

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

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