

# HARRIS MILLER MILLER & HANSON INC.

Northern Lights Express Noise Analysis Based on Minnesota Noise Standards

September 25, 2012

Page 1

## TECHNICAL MEMORANDUM

**Subject:** Northern Lights Express Noise Analysis Based on Minnesota Noise Standards

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**Reference:** HMMH Project No. 304250



### Introduction

This information included in this memorandum is intended to serve as an addendum to the report completed by Harris Miller Miller & Hanson Inc. (HMMH) titled “Northern Lights Express Environmental Assessment Noise and Vibration Technical Report” (May 5, 2011.) This memorandum summarizes a noise analysis comparing the projected sound levels from the Northern Lights Express (NLX) project to the Minnesota Noise Pollution Control Standards.

### Minnesota Noise Pollution Control Standards

Chapter 7030 of the Minnesota Administrative Rules includes the Noise Pollution Control Standards. The standards are intended to specify sound level limits according to various land use activity areas. Land use activities are separated into three Noise Area Classification (NAC) categories. NAC-1 includes mostly residential and institutional land uses, NAC-2 includes mostly commercial land uses, and NAC-3 includes mostly industrial land uses.

The noise standards are based on percentile sound levels,  $L_n$ , which refer to the sound level exceeded “n” percent of the time. The limits are based on the hourly L10 and L50, during both the daytime and nighttime hours. These metrics refer to the sound level that is exceeded 10% and 50% of the hour, respectively. Daytime hours are defined as 7:00 A.M. to 10:00 P.M. and nighttime hours are defined as 10:00 P.M. to 7:00 A.M. The noise standards are summarized in Table 1.

**Table 1. Minnesota Noise Pollution Control Standards**

Land Use	Noise Area Classification	Daytime		Nighttime	
		L10 <sup>1</sup>	L50 <sup>1</sup>	L10 <sup>1</sup>	L50 <sup>1</sup>
Residential	NAC-1	65	60	55	50
Commercial	NAC-2	70	65	70	65
Industrial	NAC3	80	75	80	75

<sup>1</sup> The noise limits are expressed in terms of the hourly A-weighted sound level (dBA).  
Source: Minnesota Administrative Rules, Chapter7030, Noise Pollution Control, 2003

# HARRIS MILLER MILLER & HANSON INC.

Northern Lights Express Noise Analysis Based on Minnesota Noise Standards

September 25, 2012

Page 2

The previous noise analysis for the NLX Environmental Assessment was conducted consistent with Federal Railroad Administration (FRA) methodology, and as such, assessed the potential for noise impact primarily at land uses that would fall under NAC-1. The limits for NAC-1 are the lowest and are therefore used in this analysis.

## NLX Existing Noise Conditions

The previous noise analysis summarized the existing noise measurements conducted throughout the NLX study area. At each of the ten long-term sites (denoted LT-1 through LT-10) the A-weighted sound level was monitored continuously over one 24-hour period. A comparison of the Minnesota noise standards to the measured sound levels is provided in Table 2.



As shown in bold in Table 2, the noise standards were exceeded at seven of the ten measurement sites. Most of the existing exceedances of the noise standards are due to relatively high L10 values during hours when freight trains passed by the noise monitor location.

**Table 2. Summary of Existing Noise Measurements**

Measurement Site	Measured Existing Range				Minnesota Noise Standards			
	Daytime		Nighttime		Daytime		Nighttime	
	L10 <sup>1</sup>	L50 <sup>1</sup>	L10 <sup>1</sup>	L50 <sup>1</sup>	L10 <sup>1</sup>	L50 <sup>1</sup>	L10 <sup>1</sup>	L50 <sup>1</sup>
LT-1	48-62	45-53	47-54	42- <b>52</b>	65	60	55	50
LT-2	<b>51-65</b>	43-56	45- <b>61</b>	40-50	65	60	55	50
LT-3	43-52	39-49	41-53	34-50	65	60	55	50
LT-4	44-60	41-50	39-50	34-47	65	60	55	50
LT-5	46-56	42-54	37-54	31- <b>51</b>	65	60	55	50
LT-6	50-64	45- <b>61</b>	40-52	34-46	65	60	55	50
LT-7	<b>48-68</b>	44-48	44- <b>69</b>	37-45	65	60	55	50
LT-8	42-61	39-47	44- <b>64</b>	40-50	65	60	55	50
LT-9	<b>43-66</b>	38-50	40- <b>64</b>	35-43	65	60	55	50
LT-10	45-52	41-47	45-50	40-44	65	60	55	50

<sup>1</sup> The noise limits are expressed in terms of the hourly A-weighted sound level (dBA).

Source: Harris Miller Miller & Hanson Inc., 2012

# HARRIS MILLER MILLER & HANSON INC.

Northern Lights Express Noise Analysis Based on Minnesota Noise Standards

September 25, 2012

Page 3

## Noise Analysis Based on Minnesota Noise Standards

It is important to clarify that the Minnesota Noise Pollution Control Standards are intended to be measurement standards for an acceptable noise environment rather than criteria for a specific noise source. For this analysis, the future NLX train noise has been modelled and combined with the measured ambient sound levels at each long-term measurement site.

The projections of future NLX train noise have been conducted for a sample receptor located near an at-grade crossing where the locomotive horn would be sounded. The receptor was assumed to be located 50 feet from the center of the crossing road and 50 feet from the centerline of the track. This receptor location represents a “worst-case” scenario, where the future sound levels from the train passby would be relatively high. The projections of the sound level from the train passby were made in accordance with the methodology in Appendix C of the FRA’s “High-Speed Ground Transportation Noise and Vibration Impact Assessment” (October 2005) guidance manual.



The analysis added the noise of a train passby to the measured one-hour data at each measurement site. The hour with the highest measured L10 and L50 levels was used. As a conservative assumption, it was assumed that a total of two train passbys occurred during each hour. For this analysis, the future sound levels were calculated for trains operating at two speeds, 20 mph and 110 mph. These two speeds represent the range of speeds throughout the study area.

Table 3 summarizes the results of the projected future sound levels compared to the Minnesota noise standards. Noise levels that exceed the noise standards are shown in bold. Except for site LT-10, all of the future exceedances of the noise standards occur where the measured existing noise levels already exceed the standards. At site LT-10, the nighttime L10 level would exceed the standards only for 20 mph speeds. This is because slower moving trains take a greater amount of time to passby a receptor, therefore contributing more to the percentile sound levels.

**Table 3. Minnesota Noise Standards Analysis**

Measurement Site	Future Projected at 20 mph				Future Projected at 110 mph				Minnesota Noise Standards			
	Daytime		Nighttime		Daytime		Nighttime		Daytime		Nighttime	
	L10 <sup>1</sup>	L50 <sup>1</sup>	L10 <sup>1</sup>	L50 <sup>1</sup>	L10 <sup>1</sup>	L50 <sup>1</sup>	L10 <sup>1</sup>	L50 <sup>1</sup>	L10 <sup>1</sup>	L50 <sup>1</sup>	L10 <sup>1</sup>	L50 <sup>1</sup>
LT-1	64	54	55	<b>52</b>	63	53	54	<b>52</b>	65	60	55	50
LT-2	<b>67</b>	56	<b>62</b>	50	<b>66</b>	56	<b>62</b>	50	65	60	55	50
LT-3	53	49	53	50	52	49	53	50	65	60	55	50
LT-4	61	50	52	47	60	50	50	47	65	60	55	50
LT-5	57	54	55	<b>51</b>	56	54	54	<b>51</b>	65	60	55	50
LT-6	64	<b>61</b>	54	47	64	<b>61</b>	52	46	65	60	55	50
LT-7	<b>72</b>	49	<b>70</b>	45	<b>70</b>	48	<b>69</b>	45	65	60	55	50
LT-8	62	48	<b>65</b>	50	61	47	<b>64</b>	50	65	60	55	50
LT-9	<b>66</b>	52	<b>64</b>	44	<b>66</b>	50	<b>64</b>	43	65	60	55	50

# HARRIS MILLER MILLER & HANSON INC.

Northern Lights Express Noise Analysis Based on Minnesota Noise Standards

September 25, 2012

Page 4

Measurement Site	Future Projected at 20 mph				Future Projected at 110 mph				Minnesota Noise Standards			
	Daytime		Nighttime		Daytime		Nighttime		Daytime		Nighttime	
	L10 <sup>1</sup>	L50 <sup>1</sup>	L10 <sup>1</sup>	L50 <sup>1</sup>	L10 <sup>1</sup>	L50 <sup>1</sup>	L10 <sup>1</sup>	L50 <sup>1</sup>	L10 <sup>1</sup>	L50 <sup>1</sup>	L10 <sup>1</sup>	L50 <sup>1</sup>
LT-10	58	47	57	44	53	47	53	44	65	60	55	50

<sup>1</sup> The noise limits are expressed in terms of the hourly A-weighted sound level (dBA).  
Source: Harris Miller Miller & Hanson Inc., 2012

## Conclusions

The analysis indicates that for a sample receptor (of type NAC-1) located 50 feet from the center of an at-grade road crossing and 50 feet from the centerline of the track near measurement sites LT-1 through LT-9, the future NLX operations are not predicted to cause any additional exceedances of the Minnesota noise standards compared to the existing ambient conditions. For the sample receptor (of type NAC-1) located near measurement site LT-10, it is predicted that an additional exceedance of the Minnesota noise standards could occur under certain conditions.

