Highway Traffic Noise Analysis

WIN 18129
Trafton Road Interchange Environmental Assessment

May 30, 2013
Prepared by:

Maine Department of Transportation
Bureau of Transportation Systems Planning
Office of Highway and Bridge Planning
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INTRODUCTION

This highway traffic noise analysis was prepared to determine the potential noise impacts associated with the construction of a new full-service I-95 interchange at Trafton Road in Waterville. The highway traffic noise levels were predicted for the existing condition (2011) and the future No-Build and Build Alternatives for the design year (2036).

The noise analysis was conducted in accordance with the following Federal Highway Administration (FHWA) and Maine Department of Transportation (MaineDOT) regulatory and policy guidelines:


The purpose of a highway traffic noise analysis is to identify impacted land uses (homes, schools, business, etc) and determine the feasibility and reasonableness of abatement measures. The terms “feasibility” and “reasonableness” are terms commonly used in highway traffic noise analysis to determine, among other things, the effectiveness (in terms of noise reduction) and the acceptable cost for any noise abatement measure. All noise abatement measures are evaluated based on the feasibility and reasonableness criteria identified in MaineDOT’s noise policy.
1.0 NOISE ABATEMENT CRITERIA

The FHWA and MaineDOT Noise Abatement Criteria (NAC) were used to determine traffic noise impacts at all receptors within the study area. The NAC are FHWA-established noise levels for activities or land uses that identify traffic noise impacts during the loudest hour. As shown in Table 2-1, the criteria vary according to a property’s activity category.

MaineDOT evaluates noise abatement measures when predicted future noise levels “approach” within 1 dBA or “exceed” the NAC; thus abatement measures will be evaluated for any residential homes (NAC Activity Category B) with predicted noise levels of 66 dBA or greater.

<table>
<thead>
<tr>
<th>Activity Category</th>
<th>Leq(h) dBA</th>
<th>Description of Activity Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>57</td>
<td>Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.</td>
</tr>
<tr>
<td>B</td>
<td>67</td>
<td>Residential</td>
</tr>
<tr>
<td>C</td>
<td>67</td>
<td>Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.</td>
</tr>
<tr>
<td>D</td>
<td>52</td>
<td>Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios.</td>
</tr>
<tr>
<td>E</td>
<td>72</td>
<td>Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D or F.</td>
</tr>
<tr>
<td>F</td>
<td>----------</td>
<td>Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing</td>
</tr>
<tr>
<td>E</td>
<td>----------</td>
<td>Undeveloped lands.</td>
</tr>
</tbody>
</table>

2.0 METHODOLOGY

Noise levels were established using a combination of traffic noise modeling and field measurements for the existing condition (2011) and design-year (2036) no-build and build conditions. The results of the noise analysis are presented in Section 3.
The prediction of traffic noise levels was performed using FHWA’s Highway Traffic Noise Model Version 2.5 (TNM 2.5). TNM 2.5 predicts traffic noise levels between highways and nearby receptors taking the intervening ground’s acoustical characteristics, topography, and rows of buildings into account.

The noise levels presented in this report are expressed in decibels (dB) on the A-weighted scale (dBA). This scale most closely approximates the response characteristics of the human ear to low level sound. All noise levels are reported as equivalent level, Leq(h), values which contain the same amount of acoustic energy as an actual time-varying A-weighted sound level over a period of 1 hour.

Traffic data for the study area was obtained from the Interchange justification Report and the Sidney Automated Traffic Recorder (ATR). Afternoon peak-hour traffic data was used to replicate loudest hour conditions for all receptors located near the proposed interchange.

Noise measurements were performed on the afternoon of May 28, 2013. These measured noise levels were used to validate the accuracy of TNM 2.5 calculations.

3.0 NOISE ANALYSIS

The traffic noise analysis was performed using TNM 2.5. The model was validated using field measurements from Type II Quest Sound Level Meters. The purpose of the noise analysis was to predict existing noise levels and determine noise levels for all receptors within the study area.

3.1 Receptors

A “receptor” is a technical term used to describe the location of any properties included in the noise analysis. In determining traffic noise impacts, primary consideration is given to exterior areas where frequent human use occurs such as patios, porches, swimming pools, playgrounds, etc. If no exterior areas are present, the interior NAC is used as the basis for determining noise impacts.

Various factors affect the “transmittal” of sound from a source to a receptor. These factors include vegetation, intervening structures, elevation of the source and/or the receptor, surrounding topography and the type of ground surface between the source and the receptor. The attenuation (reduction) of sound levels due to intervening structures occurs when a receptor’s view (line-of-sight) is obstructed or partially obstructed by dense objects (i.e. rows of buildings, barriers, etc).

3.2 Highway Traffic Noise Model Validation

Traffic noise model validation is typically done as an initial step in traffic noise modeling to insure that predictions of existing and future traffic noise are reasonably accurate. Essentially, modeled results of existing traffic conditions are compared with measured noise levels at various receptor locations. Generally, if modeled noise levels are within ± 3 dBA of measured levels, no additional modifications to the traffic noise model are necessary.

Noise measurements were performed on the afternoon of May 28, 2013 for selected receptors throughout the study area. These measured noise levels were compared to modeled levels to validate the accuracy of TNM 2.5 predictions.
### Table 3-1 Results of Traffic Noise Model Validation (dBA)

<table>
<thead>
<tr>
<th>Receptor ID</th>
<th>Location</th>
<th>Property Description</th>
<th>Measured Noise Levels</th>
<th>Modeled Noise Levels</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td>255 Trafton Rd</td>
<td>Commercial (vacant)</td>
<td>56</td>
<td>59</td>
<td>-3</td>
</tr>
<tr>
<td>R2</td>
<td>263 Trafton Rd</td>
<td>Residential</td>
<td>---</td>
<td>56</td>
<td>---</td>
</tr>
<tr>
<td>R3</td>
<td>229 Trafton Rd</td>
<td>Residential</td>
<td>61</td>
<td>59</td>
<td>2</td>
</tr>
<tr>
<td>R4</td>
<td>599 8 Rod Rd</td>
<td>Residential</td>
<td>56</td>
<td>54</td>
<td>2</td>
</tr>
<tr>
<td>R5</td>
<td>102 Junction Rd</td>
<td>Residential</td>
<td>---</td>
<td>55</td>
<td>---</td>
</tr>
</tbody>
</table>

Average Difference 2

As shown in Table 3.1, the average difference between modeled and measured results for all measurement locations was within ± 3 dBA of measured levels. These results indicate that the traffic noise model is predicting accurately for existing and future conditions.

### 3.3 Determination of Impacts

Traffic noise levels were predicted at 5 receptors within the study area for the existing condition (2011) and design-year (2036) no-build and build conditions. As shown in Table 3-2, the results of the traffic noise analysis demonstrate that traffic noise impacts are not expected at any receptors under all 3 modeled scenarios.

### Table 3-2 Results of Traffic Noise Analysis (dBA)

<table>
<thead>
<tr>
<th>Receptor ID</th>
<th>Impact Criteria</th>
<th>Existing 2011 Noise Levels</th>
<th>No-Build 2036 Noise Levels</th>
<th>Build 2036 Noise Levels</th>
<th>Impacts?</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td>71</td>
<td>59</td>
<td>61</td>
<td>64</td>
<td>No</td>
</tr>
<tr>
<td>R2</td>
<td>66</td>
<td>56</td>
<td>59</td>
<td>61</td>
<td>No</td>
</tr>
<tr>
<td>R3</td>
<td>66</td>
<td>56</td>
<td>62</td>
<td>64</td>
<td>No</td>
</tr>
<tr>
<td>R4</td>
<td>66</td>
<td>59</td>
<td>62</td>
<td>55</td>
<td>No</td>
</tr>
<tr>
<td>R5</td>
<td>66</td>
<td>55</td>
<td>56</td>
<td>56</td>
<td>No</td>
</tr>
</tbody>
</table>

### 4.0 CONCLUSION

Based on the results of the results of the traffic noise analysis in Section 3, highway traffic noise impacts are not expected and evaluation of abatement measures is not warranted.
Appendix A: Noise Monitoring Data
Highway Noise Monitoring Sheet

DATE: 5/28/13
PROJECT: Taflon Rd
JOB #: 18/29
SITE ID: R1
ADDRESS: 255 Taflon Rd
Weldville, ME
Gannett Fleming, Inc.

TYPE: □ Residential □ Commercial □ Religion □ Educational □ Other

Measurement Data

SLM Calibration before 113.4 after 113.4

Weather:
Temperature 70°
Wind speed 18 mph
Cloud cover Clear

Time:
1st start 8:48 stop 9:07
2nd start 8:54 stop 9:13

Data:
1st Leq 62.8 Lmax 70.7
2nd Leq 55.8 Lmax 70.8

Traffic Data

Roadway#1
Direction
1st 2nd
auto
med. trk.
hvy trk.
bus
motorcycle

Roadway#2
Direction
1st 2nd
auto
med. trk.
hvy trk.
bus
motorcycle

Roadway#3
Direction
1st 2nd
auto
med. trk.
hvy trk.
bus
motorcycle

Roadway#4
Direction
1st 2nd
auto
med. trk.
hvy trk.
bus
motorcycle

Notes: Comment: Project / W/ all

SITE SKETCH

[Diagram of site sketch]

Stone
Patio
Parking
Gravel
I-95 SB
I-95 NB
Overpass
Taflon
Highway Noise Monitoring Sheet

DATE: 5/12/19
PROJECT: Trafion
JOB #: 18129
SITE ID: K3

ADDRESS:

Gannett Fleming, Inc.

Type: ☑ Residential ☐ Commercial ☐ Religion ☐ Educational ☐ Other

Measurement Data

SLM Calibration: before 113.4, after 113.4

Weather:
- Temperature: 65
- Wind Speed: 3.30 (16 min total), 2.51 (15 min total)
- Cloud Cover: Clear

Time:
1st: start 3:14, stop 3:50
2nd: start 3:51, stop 4:06

Data:
- 1st: leq 60.7, lmax 77.5
- 2nd: leq 61.1, lmax 76.8

Traffic Data

Roadway #1: Direction
- Auto: 1st, 2nd
- Med. Trk.: 1st, 2nd
- Hvy Trk.: 1st, 2nd
- Bus: 1st, 2nd
- Motorcycle: 1st

Roadway #2: Direction
- Auto: 1st
- Med. Trk.: 2nd
- Hvy Trk.: 1st
- Bus: 2nd
- Motorcycle: 1st

Roadway #3: Direction
- Auto: 1st
- Med. Trk.: 2nd
- Hvy Trk.: 1st
- Bus: 2nd
- Motorcycle: 1st

Roadway #4: Direction
- Auto: 1st
- Med. Trk.: 2nd
- Hvy Trk.: 1st
- Bus: 2nd
- Motorcycle: 1st

Notes: 1st reading intimated tallin, 2nd near home owner's neighbor

(F. Pelotte, 2/29 Trafion Wilson)

Site Sketch:

[Diagram showing site layout with buildings and street signs]
Highway Noise Monitoring Sheet

DATE: 5/28/97
PROJECT: Traffic
JOB #: 18129
SITE ID: RH

ADDRESS: 599 Rte. 1
Waterville, ME

Gannett Fleming, Inc.

Type: ☑ Residential □ Commercial □ Religion □ Educational □ Other

Measurement Data

<table>
<thead>
<tr>
<th>SLM Calibration</th>
<th>before</th>
<th>after</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>65</td>
<td></td>
</tr>
<tr>
<td>Wind Speed</td>
<td>4.21</td>
<td>4.32</td>
</tr>
<tr>
<td>Lmax</td>
<td>87.5</td>
<td>84.4</td>
</tr>
</tbody>
</table>

Traffic Data

<table>
<thead>
<tr>
<th>Roadway#1 Direction</th>
<th>1st</th>
<th>2nd</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auto</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Med. Trk.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hvy Trk.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bus</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motorcycle</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Roadway#2 Direction</th>
<th>1st</th>
<th>2nd</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auto</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Med. Trk.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hvy Trk.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bus</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motorcycle</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Roadway#3 Direction</th>
<th>1st</th>
<th>2nd</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auto</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Med. Trk.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hvy Trk.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bus</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motorcycle</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Roadway#4 Direction</th>
<th>1st</th>
<th>2nd</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auto</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Med. Trk.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hvy Trk.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bus</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motorcycle</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NOTES:

SITE SKETCH

[Site sketch with annotations]
Appendix B: TNM Sound Levels
<table>
<thead>
<tr>
<th>#</th>
<th>DUS</th>
<th>Noise Reduction</th>
<th>Dwelling Units</th>
<th>Avg.</th>
<th>Min.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>0.0</td>
<td>7</td>
<td>0.0</td>
<td>55.8</td>
<td>66</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>0.0</td>
<td>7</td>
<td>0.0</td>
<td>64.3</td>
<td>71</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>0.0</td>
<td>7</td>
<td>0.0</td>
<td>65.9</td>
<td>71</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>0.0</td>
<td>7</td>
<td>0.0</td>
<td>66.6</td>
<td>71</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>0.0</td>
<td>7</td>
<td>0.0</td>
<td>69.9</td>
<td>71</td>
</tr>
</tbody>
</table>

**Soundproofing: 66 dB F 50% RH**

**Average pavement Type shall be used unless**

**NOTES:**
- Calculated with TMM 2.5
- TMM 2.5
- 29 May 2013

**RESULTS:**
- Sound Level