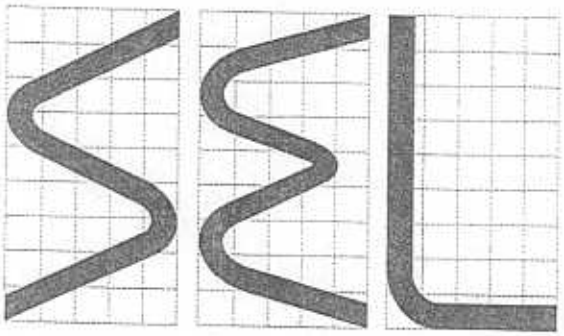

Spaarg Engineering Ltd.

Project No. SEL — W-03-04

TITLE

ENVIRONMENTAL NOISE IMPACT ASSESSMENT

FOR THE PROPOSED COUNTY ROAD No. 19 (MANNING ROAD)

MODIFICATIONS St. GREGORY'S ROAD TO COUNTY ROAD NO. 42

TOWN OF TECUMSEH

DATE APRIL 12, 2004

PREPARED BY Helen Ule BASc., supervised by Colin Novak MASc., P.Eng .

PREPARED FOR R. Lucente Engineering Inc.

Table of Contents

Statement of Liability

This report was prepared by SPAARG Engineering Limited for the account of R. Lucente Engineering Inc. The material in it reflects's Colin Novak's judgement in light of the information available to it at the time of preparation. Any use which a Third Party makes of this report, or any reliance on decisions to be made based on it, are the responsibility of such Third Parties. SPAARG Engineering Limited accepts no responsibility for damages, if any, suffered by any Third Party as a result of decisions made or actions based on this report.

Introduction

This is a report of the environmental noise assessment performed to evaluate the impact on residential and other properties resulting from the proposed widening of Manning Road. The proposed widening is to take place between St. Gregory's Road to the north and County Road 42 to the south. The assessment is required under the Environmental Assessment Act. The northern section of this roadway is located in the Town of Tecumseh, County of Essex while the section south of Country Road 22 is the division between Lakeshore Township to the east and the Town of Tecumseh to the west. Exhibit A1 has been included in the Appendix to illustrate the location of the roadway in relation to the local area features.

Ministry of the Environment Criteria

The Ministry of the Environment assessment of alternations to roadways is based on a 1986 protocol concerning a provincial policy agreement between the Ministry of Transportation and the Ministry of the Environment. A copy of this agreement has been included in the Appendix as Exhibit A2. The policy identifies noise sensitive areas as "residential areas" and "quiet zones" as defined in the Model Municipal Noise Control By-Law[1]. The By-Law introduction indicates that the local Municipality may chose the method of describing a "residential" and "quiet zone". It is indicated that a "residential area" is reasonably self-explanatory. The example used to illustrate the definition if a "quiet zone" is a site such as a hospital where quiet is of particular importance.

The protocol further establishes an objective for outdoor sound levels as the higher of 55 dBA or existing ambient level. The criterium which establishes the severity of the impact is whether the roadway modifications will result in sound level increases above the ambient level in excess of 5 dB. It has been indicated by the Approvals Branch of the Ministry that the assessment is to be performed for a time period 10 years in the future.

Noise Sources and Types of Receptors

The source of noise impact associated with this study is the road traffic generated noise from Manning Road. The noise from this roadway impacts on a mix of commercial and residential lands located adjacent to this roadway. Exhibits A3, A4 and A5, aerial photographs of the area, illustrate the locations of each of these land uses with respect to Manning Road.

The noise impact is evaluated for both the day and night time periods, where daytime refers to the period from 07:00 to 23:00, and nighttime refers to the period 23:00 to 07:00 hours. For the day period, the noise impact is evaluated for the outdoor living area (OLA) which refers to a location such as a patio, yard, or

---

[1] Model Municipal Noise Control By-Law, Final Report, August 1978

barbecue area which is typically taken as 3 metres from the wall of the residence. The night time period is evaluated at the plane of a representative bedroom window.

Prediction Model

The predicted sound levels, created by road traffic, have been determined through the application of the prediction program Stamson 5.0, a roadway noise software program developed by the Ontario Ministry of the Environment. The sound level exposures for the selected locations impacted by road traffic noise have been evaluated and examples of the input data and program output has been included in the Appendix. Field noise measurements were also taken to provide a comparison to the noise levels predicted on the basis of existing traffic volumes along this roadway. All measurements were conducted with a microphone height of 1.5 metres above existing grade.

Noise Source Data

Road traffic information was supplied from the results of a traffic volume study done by F. R. Berry and Associates. This information was used to predict traffic growth behaviour for the year 2014. Exhibit A6 illustrates the predicted traffic volume for the years 2006, 2011 and 2021 for this as predicted by Berry and Associates. Two sections of Manning Road were used in order to obtain an accurate traffic volume. The first being from St. Gregory's Road to Tecumseh Road and the second from County Road Number 22 to County Road Number 42. Since these sections of Manning Road have significantly different traffic volumes, the noise impact from each of the sections were considered independently to provide more accurate representation of the potential noise impact. Using this traffic information, a ten year forecast of road traffic for 2014 has been calculated using two different traffic growths extracted from the Berry traffic report. The first being derived from the period between the years 2001 to 2006 and the other between the years 2006 to 2021. Exhibit A6 illustrates the forecasted AADT traffic counts expected for the year 2014, for no significant change in traffic growth behaviour in the next ten years. This traffic data is used to predict the noise levels due to road traffic at the selected sites assuming no roadway reconstruction. It was assumed that the night time traffic volume is 15 percent of the daily traffic volumes for the purposes of night time noise prediction along the section south of County Road Number 22. It was also assumed for this section that 13.5 percent of the hourly volume was commercial traffic with 75 percent of the commercial vehicles being medium trucks and the remaining 25 percent heavy trucks. North of Tecumseh Road, it was assumed that 10 percent of the daily traffic occurred during the night time. The assumed hourly volume of commercial vehicles was 8.7 percent of the total hourly traffic volume with 95 percent of the commercial vehicles being medium trucks and the remaining 5 percent heavy trucks. This percentage of commercial vehicle information was based on turning information counts provided by the F. R. Berry and Associates report.

Identification of Representative Receptor Locations

The locations selected for field noise measurements and assessment calculations for this report are noted as location 1, south of St. Gregory's Road, and location 2, south of County Road 22, as illustrated in Exhibits A3 and A4. Location 1 is identified by lot number 640 Juniper Court, and location 2 is identified by Municipal Number 1784, along the east side of Manning Road. For location 1, the meter was located 3 metres from the rear of the house, in the outside living area (OLA) which refers to a location such as a patio, yard, or barbecue area. For location 2, the meter was located 18 metres from the front of the identified residential receptor. Here, the microphone was also at a distance of 14 metres from the existing centre line of Manning Road. Since the noise must be measured in the outdoor living area the final measured values were corrected to reflect the noise levels at a location 3 metres from the house. The results of these noise measurements are included in the Appendix as Exhibit A7. In keeping with the conditions specified in the Ministry of the Environment's Noise Control Document, NPC-105, the weather conditions during the time period that noise data was collected has also been included in the appendix in Exhibit A7. The noise measurements that do and do not meet the MOE criteria for weather have been indicated. A third location for which only modelled results will be presented, is identified as Municipal Number 1951 located along the west side of Manning Road, as illustrated in Exhibit A5. For assessment calculations, the distance from the centreline of the roadway, with and without the proposed widening, to the assessment locations is illustrated in the Appendix as Exhibit A8. The average roadway elevation for all locations is taken to be the same with respect to the assessment locations.

Results of Noise Assessment

Table 1 illustrates the average day and night time results of the measurements at locations 1 and 2. Where required, any adjustments for distance attenuation have been considered. Also shown is a prediction of the expected noise at all three locations based on traffic predictions for these same time periods. As per the Ministry of the Environment definitions, daytime refers to the period from 07:00 to 23:00, and nighttime refers to the period 23:00 to 07:00 hours. Daytime exposure is assessed at the outdoor living area and nighttime exposure is assessed at the plane of a bedroom window. It can be seen that good correlation between the modelled and measured noise levels exists for the locations south of County Road 22. For the location north of Tecumseh Road, the measured results are more conservative than the modelled noise levels.

Table 1: Corrected Measured and Modelled Present Day Noise Levels

Location	Measured Noise Level (dBA)	Modelled Noise Level (dBA
1 - Day	54.8	57.9

1 - Night	49.6	51.6
2 - Day	70.2	70.0
2 - Night	63.3	64.5
3 - Day	-	68.1
3 - Night	-	63.0

In order to determine the noise impact that the proposed widening of Manning Road would have on the representative receptors, predictive modelling was carried out. These noise calculations were based on the forecasted traffic volumes, with and without road reconstruction, expected by the year 2014 for locations 1, 2, and 3. Table 2 provides the information for the assessment for both the day and night noise levels expected at the selected locations with and without the option of the widening of the roadway for the year 2014. An example of the roadway noise calculations for the day assessment period for the year 2014 are included for each of the design options at location 2 as Exhibits A9 and A10.

Table 2: Predicted Day and Night Time Noise Levels for Each Design Option in 2014

Location	Predicted Noise Level (dBA) Without Road Widening	Predicted Noise Level (dBA) With Road Widening
1 - Day	59.1	59.7
1 - Night	52.8	53.3
2 - Day	71.5	70.1
2 - Night	66.1	64.9
3 - Day	69.6	71.5
3 - Night	64.5	66.5

Inspection of the sound levels presented in Table 2 indicates that given the predicted traffic volumes for the year 2014, very little difference in noise levels are expected at the representative receptors whether the roadway is widened or not. Also, when comparing Table 1 and Table 2, none of the predicted noise levels in Table 2 exceed the MTO criterium which specifies that the roadway modifications should not result in sound level increases above the ambient level in excess of 5 dB. Irrespective of which location is considered, this information

illustrates the fact that the proposed widening of the roadway does not create changes in noise level which exceed the 5 dB difference specified by the MTO and MOE for the selected locations.

Recommendations

In consideration of the fact that the differences in predicted future noise levels resulting from an unmodified or modified roadway are less than the MOE/MTO protocol criterion, it is the opinion of the author that increases in road traffic noise levels caused by the proposed roadway modifications do not provide a reason to withhold permission to proceed. Therefore, it is recommended that concern regarding possible road traffic noise impacts not be considered an impediment to the proposed roadway modifications.

For Spaarg Engineering Limited

C. Novak MASc., PEng

Appendix

Contents:

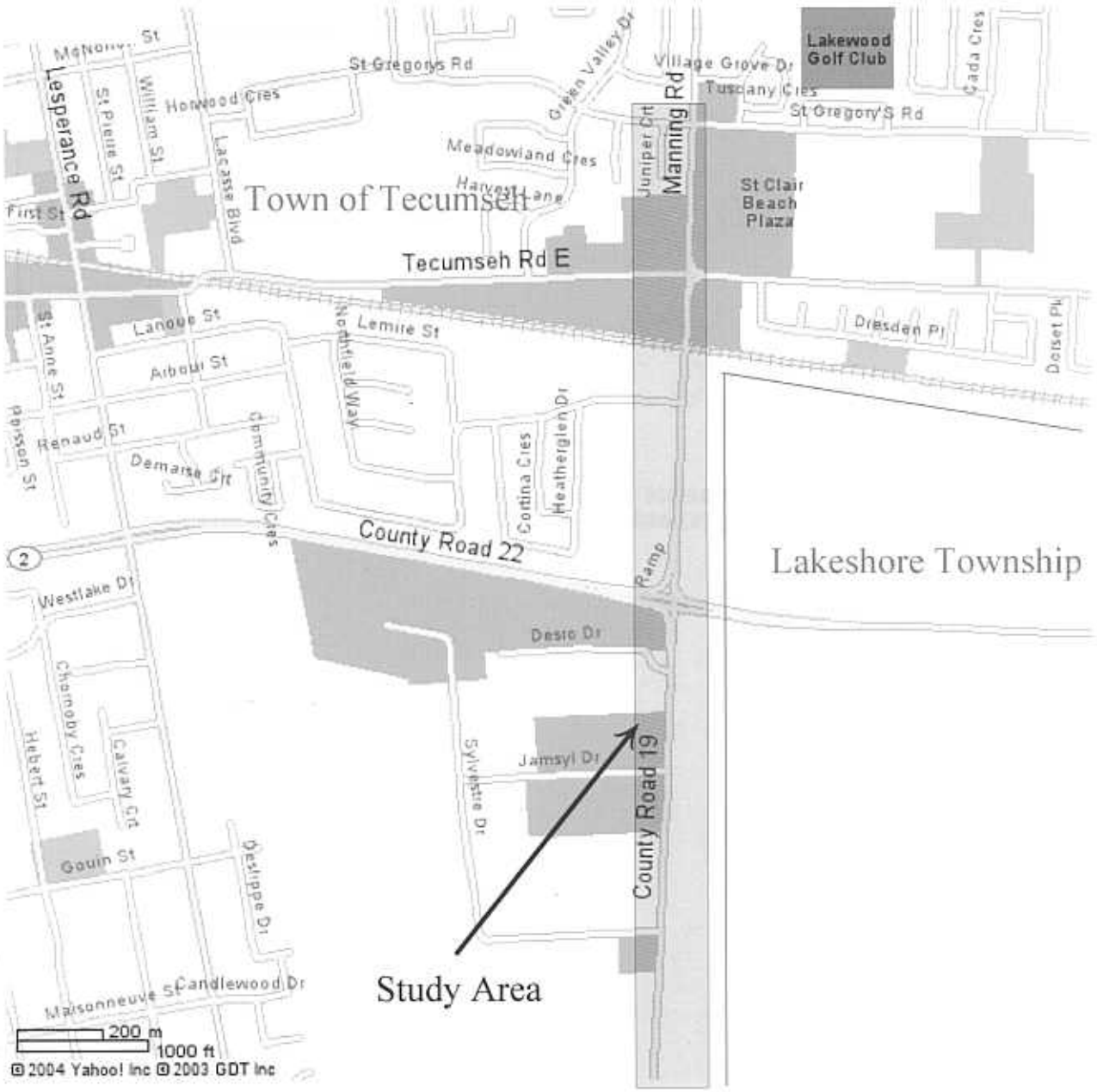

Exhibit A1: Map Showing Location of Roadway

A PROTOCOL FOR DEALING WITH NOISE CONCERNS DURING THE PREPARATION, REVIEW AND EVALUATION OF PROVINCIAL HIGHWAYS ENVIRONMENTAL ASSESSMENTS.

Exhibit A2: Protocol Document Department .

This Protocol contains areas of policy agreement between the Ministries of Transportation and Communications, and Environment for dealing with noise concerns during the preparation, review and evaluation of environmental assessments for Provincial Highway undertakings.

As common understandings are resolved for any outstanding issues, these will be added to the Protocol by formal agreement.

D.P. Caplice
Assistant Deputy Minister
Operations Division
Ministry of Environment

J.R. Barr
Assistant Deputy Minister
Engineering and Construction
Ministry of Transportation
and Communications

1. Retrofit The MTC policy for retrofit of existing freeways with sound barriers will remain in effect and unchanged.

2. Scope of Protocol

This protocol applies to the MTC Capital Construction Program for all classes of MTC Provincial roads, both urban and rural. The policy for each situation may require different noise control measures and further, that an assessment of the feasibility of providing noise control measures includes technical and economic considerations.

3. Definition of Noise Sensitive Areas

To be clearly defined, as guided by the One-Stage Procedural Guidelines and the specific definitions of "residential areas" and "quiet zones" found in the municipal noise control by-laws, approved by MOE under the Environmental Protection Act.

4. Establishing Existing and Future Noise Levels

Presently used prediction methodologies and measurement procedures are satisfactory. Any future changes, in noise prediction methodologies or measurement procedures, shall be compatible with those of both MOE and MTC.

Staff of MTC and MOE together shall set a standard for ambient noise levels in rural areas where predictions cannot be done.

5. Impact Assessment

Noise impacts for all MTC Provincial roads will be predicted based on traffic projections ten years after completion, or best available data when 10-year projections are not available.

The study area shall be defined using the smaller of one of the two following methods; using 5 decibel contour lines extending from the source to the point where there is no increase above the ambient level, or a distance of 600 m from the source.

The noise impact on noise-sensitive land uses will be determined for outdoor spaces.

All reference to 65 dBA as a "target" and 70 dBA as a "maximum" will be removed from MTC directives A-1 and B-94. Further, reference to a 70 dBA maximum should be removed from the Provincial Policy. The objective for outdoor sound levels is the higher of the Leq 55 dBA or the existing ambient. The significance of a noise impact will be quantified by using this objective in addition to the change in noise level above the ambient.

Exhibit A2: Continued

Mitigation will attempt to achieve levels as close to, or lower than, the objective level as is technically, economically, and administratively feasible.

6. Noise Control Measures

The attached Table summarizes the degree of mitigation effort to be applied for various noise level increases.

On right-of-way mitigation measures will be identified, considered and implemented where warranted.

Mitigation measures within the right-of-way include: barriers, berms, vertical and horizontal alignments, pavement surfaces, etc.

Where noise increases above the ambient do not exceed 5 dBA no mitigation is required.

Where noise increases above the ambient exceed 5 dBA MTC will:
- investigate noise control measures within the right-of-way
- if project costs are not significantly affected and where averaged over first row receivers, a minimum attenuation of 5 dBA can be achieved, MTC will introduce the selected measures within the right-of-way.

Where a freeway is to be expanded through an existing residential area that has been included on the retrofit priority list, noise attenuation measures should be considered as part of the freeway expansion project when the MTC policy for Retrofit of Existing Freeways can be satisfied.

7. Documentation

MTC will increase its E.A. documentation with respect to the feasibility of all potential mitigation measures within the right-of-way. The feasibility of each measure would be evaluated by such factors as effectiveness and technical and economic feasibility.

8. Construction Noise

The following is a brief outline of the procedures to be followed in handling construction noise during the Environmental Assessment process and during the construction phase. Commitment to the following shall be made in all E.A. Documents:

(a) Noise sensitive areas will be identified;

(b) Applicable municipal noise control by-laws will be identified and obeyed. Where timing constraints, or any other municipal by-law may cause hardship to MTC, an explanation of this will be outlined in the EA document, and an exemption from such by-law will be sought directly from the municipality in question.

Exhibit A2: Continued

(c) General noise control measures (not sound level criteria) will be referred to, or placed into MTC contract documents;

(d) Any initial complaint from the public will require verification by MTC that the general noise control measures agreed to are in effect; MTC will investigate any noise concerns, warn the contractor of any problems, and enforce its contract;

(e) Notwithstanding compliance with the "general noise control measures", a persistent complaint will require a contractor to comply with MOE sound level criteria for construction equipment contained in the MOE Model Municipal Noise Control By-Law. Subject to the results of field investigation, alternative noise control measures will be required, where these are reasonably available; and

(f) In selecting the appropriate construction noise control and mitigation measures, MTC will give consideration to the technical, administrative, and economic feasibility of the various alternatives.

9. Miscellaneous

(a) All future technical documents referred to in this agreement and prepared to become part of the Protocol shall be jointly approved by MOE and MTC. These include:

- o ambient levels in Rural Areas where predictions cannot be done;
- o general construction noise control measures; and
- o any other alterations to this Protocol.

(b) As the intent of this Protocol will be followed during their preparation, joint MOE/MTC approval is not required for MOE or MTC procedural/operational documents such as:

- o internal directives;
- o contract documents; and
- o E.A. procedural/technical guidelines.

Exhibit A2: Continued

TABLE 1: SUMMARY OF MITIGATION EFFORT

CHANGE IN NOISE LEVEL ABOVE AMBIENT	MITIGATION EFFORT
0 - 5 dBA	- None
> 5 dBA	- Investigate noise control measures on R.O.W. - If project cost is not significantly affected introduce noise control measure within R.O.W. - Noise control measures, where introduced, should achieve a minimum of 5 dBA attenuation, over first row receivers. - Mitigate to ambient, as administratively, economically, and technically feasible.

Exhibit A2: Continued

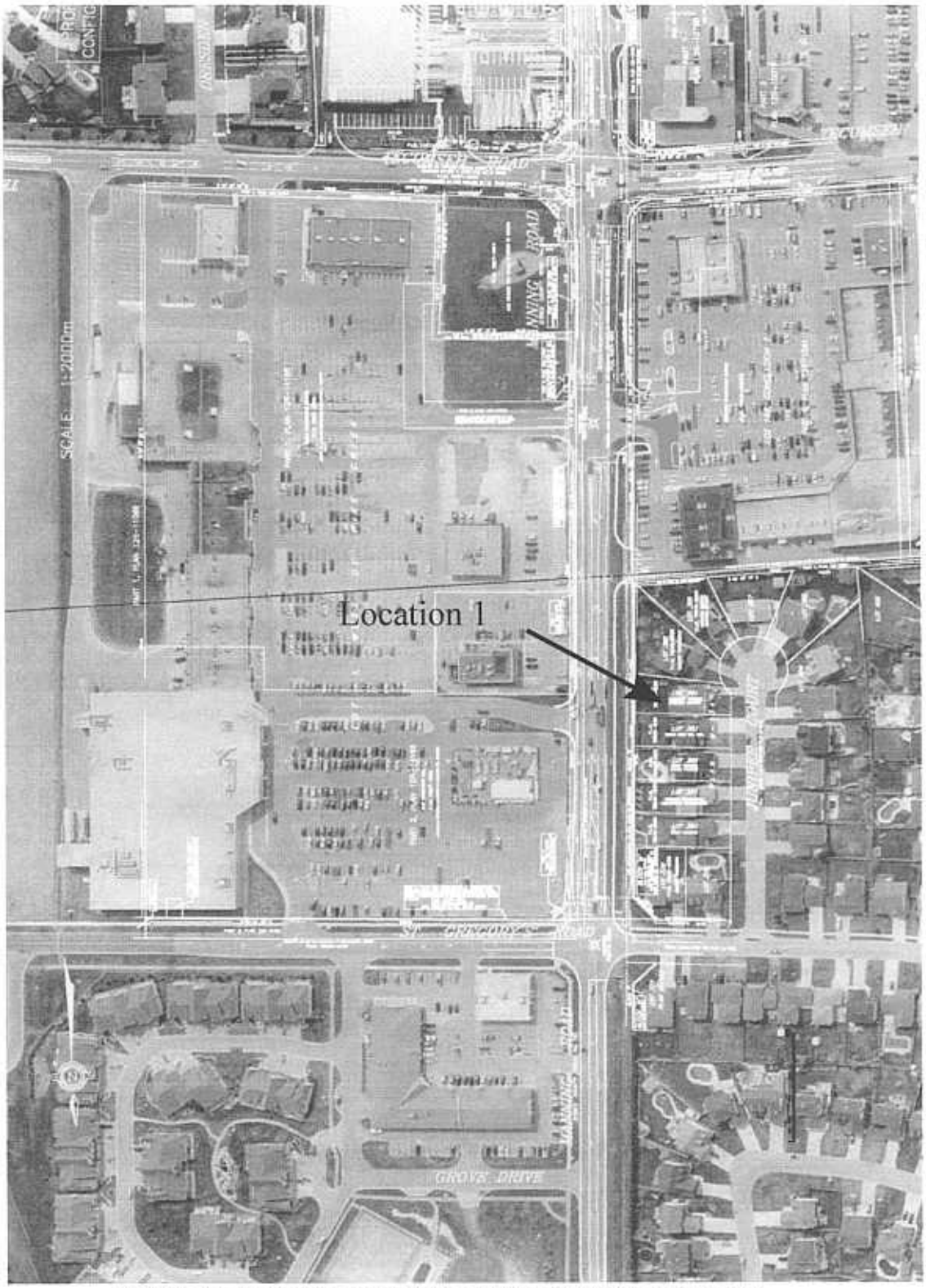

Exhibit A3: Aerial Photograph Illustrating Study Area and Location 1

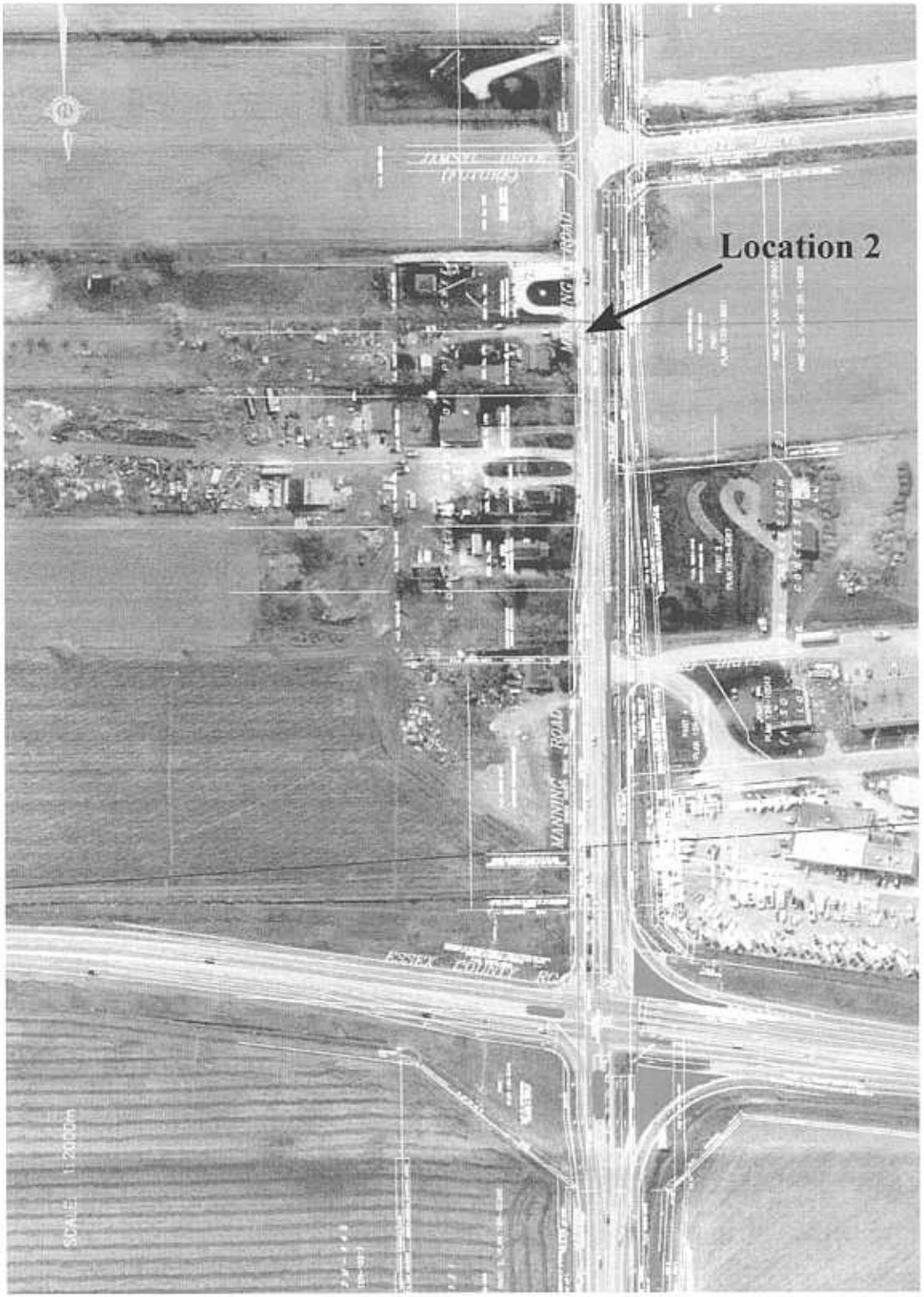

Exhibit A4: Aerial Photograph Illustrating Representative Location 2.

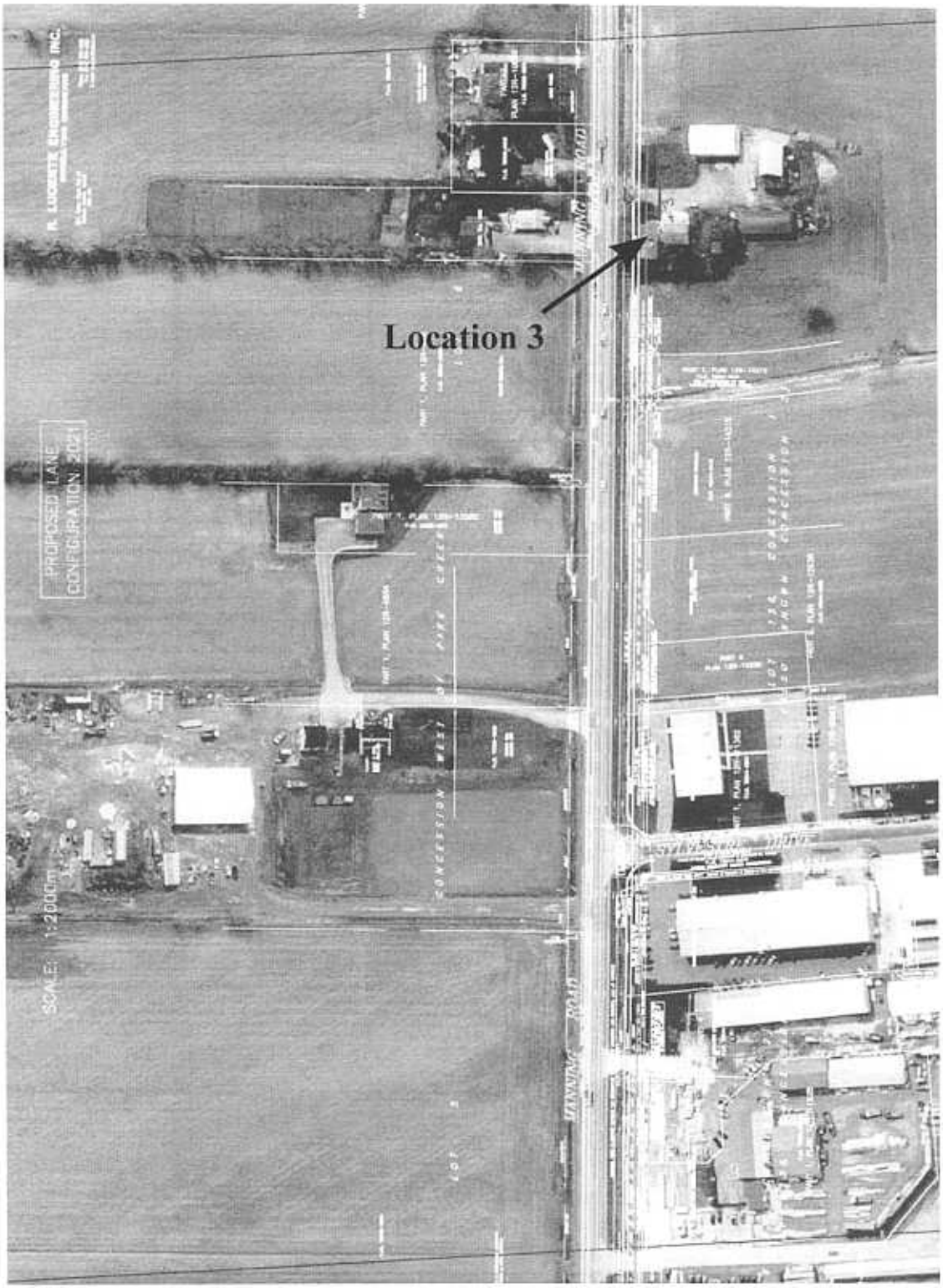

Exhibit A5: Aerial Photograph Illustrating Representative Location 3.

Exhibit A6: Table of Roadway Volumes

Year	Manning Road North of Tecumseh Road	Manning Road South of County Road 22
2001	10000	13500
2004	12316	16416
2006	14150	18700
2011	15750	22250
2014	16179	23328
2021	16450	24400

Exhibit A7: Measurement Data

Date	Time	Leq (dBA)	L(90) (dBA)	Leq (dBA)	L(90) (dBA)	Temperature (°C)	Humidity (%)	Wind Speed (km/h)	Criteria
		Location 1		Location 2					
18 Feb 04	15:00:00	68.8	49.5	74.8	37.5	-1	72	26	wind
18 Feb 04	16:00:00	57.1	48.6	71.9	60.2	-0.7	70	26	wind
18 Feb 04	17:00:00	54.6	49.2	72.7	60.2	-0.1	70	22	wind
18 Feb 04	18:00:00	63.1	49.4	71.5	59.2	0.4	69	26	wind
18 Feb 04	19:00:00	54.3	48.0	68.9	53.5	0.9	69	35	wind
18 Feb 04	20:00:00	52.1	45.9	67.7	52.5	1.1	69	30	wind
18 Feb 04	21:00:00	50.1	44.3	67.5	50.2	1.3	72	19	wind
18 Feb 04	22:00:00	51.6	43.6	67.7	51.5	2.2	66	24	wind
18 Feb 04	23:00:00	50.5	43.1	66.8	49.5	2	67	19	wind
19 Feb 04	00:00:00	45.9	39.8	64.1	46.8	1.7	69	17	wind
19 Feb 04	01:00:00	43.8	38.1	63.0	44.4	1.7	70	22	wind
19 Feb 04	02:00:00	44.4	37.7	64.4	44.1	1.4	72	22	wind
19 Feb 04	03:00:00	42.3	37.0	63.5	43.5	0.9	74	15	
19 Feb 04	04:00:00	42.1	38.0	63.3	45.4	0.5	77	15	
19 Feb 04	05:00:00	45.6	38.6	64.7	46.7	0.2	78	15	
19 Feb 04	06:00:00	54.1	43.3	69.6	56.0	-0.3	80	9	
19 Feb 04	07:00:00	53.7	45.8	71.7	59.2	-0.3	81	7	
19 Feb 04	08:00:00	56.3	46.8	77.1	58.0	-0.1	82	7	
19 Feb 04	09:00:00	53.1	45.1	71.2	56.8	0.5	81	6	
19 Feb 04	10:00:00	52.7	43.7	71.4	55.8	1.6	79	11	
19 Feb 04	11:00:00	53.2	45.1	71.3	53.4	3.5	71	4	
19 Feb 04	12:00:00	55.2	45.8	71.3	53.4	3.9	67	4	
19 Feb 04	13:00:00	53.6	46.8	71.2	52.0	5.1	64	7	
19 Feb 04	14:00:00	54.8	47.7	71.8	54.6	5.5	63	7	
19 Feb 04	15:00:00	60.5	48.3	72.0	57.2	6.3	61	11	
19 Feb 04	16:00:00	54.7	48.9	71.2	55.2	5.8	65	9	
19 Feb 04	17:00:00	56.1	50.4	71.1	58.9	5.3	66	9	
19 Feb 04	18:00:00	55.6	49.8	70.2	55.9	3	74	11	
19 Feb 04	19:00:00	55.4	48.1	68.5	53.5	2.3	77	4	
19 Feb 04	20:00:00	56.1	47.4	68.4	51.2	1.9	78	9	
19 Feb 04	21:00:00	52.4	45.4	67.1	49.7	1.3	78	11	
19 Feb 04	22:00:00	50.7	44.3	67.7	50.0	0.9	81	11	
19 Feb 04	23:00:00	54.0	43.0	66.8	48.1	0.9	82	9	

20 Feb 04	00:00:00	48.5	41.5	65.7	45.6	0.9	82	9	
20 Feb 04	01:00:00	47.3	41.8	63.1	45.3	0.9	82	13	
20 Feb 04	02:00:00	45.7	41.6	62.6	45.4	1.2	82	15	
20 Feb 04	03:00:00	46.4	41.3	63.7	45.0	1.7	80	15	
20 Feb 04	04:00:00	50.0	41.7	62.2	46.1	1.3	80	17	wind
20 Feb 04	05:00:00	48.6	43.1	64.5	48.2	1.3	82	15	
20 Feb 04	06:00:00	53.6	47.4	69.4	54.8	1.6	80	15	
20 Feb 04	07:00:00	56.6	49.3	71.6	58.2	1.6	79	13	
20 Feb 04	08:00:00	56.9	51.7	72.6	60.2	1.5	80	11	
20 Feb 04	09:00:00	54.5	49.0	70.9	57.7	3.7	73	4	
20 Feb 04	10:00:00	54.9	49.1	71.2	58.4	7.7	62	7	
20 Feb 04	11:00:00	55.7	49.6	71.0	59.9	8.3	59	6	
20 Feb 04	12:00:00	54.0	49.8	71.5	59.2	8.3	59	24	wind
20 Feb 04	13:00:00	54.7	50.4	71.1	59.0	7.9	64	22	wind
20 Feb 04	14:00:00	56.7	51.7	73.2	62.0	6.5	70	19	wind
20 Feb 04	15:00:00	59.3	55.8	73.9	63.2	5.7	84	20	wind
20 Feb 04	16:00:00	62.5	57.1	74.4	64.3	5.3	89	20	wind
20 Feb 04	17:00:00	58.3	53.1	73.2	61.2	5.3	93	19	wind
20 Feb 04	18:00:00	56.6	52.0	71.8	57.0	5.6	100	22	wind
20 Feb 04	19:00:00	56.2	50.1	70.9	55.4	5.4	100	20	wind
20 Feb 04	20:00:00	55.1	47.6	69.8	52.7	5.9	100	20	wind
20 Feb 04	21:00:00	52.5	47.0	68.6	56.4	5.3	100	41	wind
20 Feb 04	22:00:00	54.4	46.7	70.0	57.7	3.9	100	48	wind
20 Feb 04	23:00:00	55.7	46.0	69.3	57.5	2.7	92	54	wind
21 Feb 04	00:00:00	53.2	43.9	67.3	54.6	2.4	92	35	wind
21 Feb 04	01:00:00	50.3	42.1	66.3	51.6	2.5	87	30	wind
21 Feb 04	02:00:00	50.6	41.4	65.1	51.9	2.2	92	37	wind
21 Feb 04	03:00:00	50.9	41.3	65.0	50.8	2	75	37	wind
21 Feb 04	04:00:00	46.6	38.6	62.5	47.4	0.3	86	37	wind
21 Feb 04	05:00:00	49.3	39.8	63.4	50.2	0.5	80	33	wind
21 Feb 04	06:00:00	49.5	40.3	63.9	50.9	-0.1	84	33	wind
21 Feb 04	07:00:00	51.4	42.4	65.5	53.1	-0.4	88	35	wind
21 Feb 04	08:00:00	52.4	44.0	68.2	56.1	-0.5	88	37	wind
21 Feb 04	09:00:00	53.0	47.4	69.9	57.7	-0.4	80	32	wind
21 Feb 04	10:00:00	55.5	49.5	70.9	58.4	-0.1	74	41	wind
21 Feb 04	11:00:00	59.4	50.8	71.9	62.7	0.1	67	44	wind
21 Feb 04	12:00:00	57.1	51.6	71.3	60.5	0.4	68	30	wind
21 Feb 04	13:00:00	55.5	50.0	71.2	61.4	0.3	67	35	wind
21 Feb 04	14:00:00	56.0	49.1	71.4	59.3	0.3	63	37	wind

21 Feb 04	15:00:00	53.5	48.3	70.8	58.6	0.7	60	33	wind
21 Feb 04	16:00:00	54.2	48.4	70.7	58.1	1.2	60	32	wind
21 Feb 04	17:00:00	53.3	46.7	70.5	57.5	0.9	57	33	wind
21 Feb 04	18:00:00	52.0	45.7	69.4	54.4	0.9	59	24	wind
21 Feb 04	19:00:00	52.5	46.0	69.2	54.7	1.1	60	24	wind
21 Feb 04	20:00:00	55.9	44.2	68.0	51.2	1.4	59	20	wind
21 Feb 04	21:00:00	50.7	41.6	67.0	50.7	1.3	61	19	wind
21 Feb 04	22:00:00	52.3	40.8	67.1	51.0	1.3	64	19	wind
21 Feb 04	23:00:00	48.6	39.5	66.6	49.7	1.1	67	15	
22 Feb 04	00:00:00	48.2	39.1	64.6	47.6	1.3	68	15	
22 Feb 04	01:00:00	45.5	38.0	64.3	45.2	1.3	69	13	
22 Feb 04	02:00:00	44.7	37.4	62.3	45.0	1.1	69	11	
22 Feb 04	03:00:00	42.8	36.7	59.3	42.3	1.3	65	13	
22 Feb 04	04:00:00	43.6	36.6	57.8	41.5	1.1	66	13	
22 Feb 04	05:00:00	43.0	36.5	60.2	41.7	1	67	11	
22 Feb 04	06:00:00	51.0	37.3	62.9	43.8	1	69	11	
22 Feb 04	07:00:00	48.0	38.5	64.2	45.8	1.1	70	11	
22 Feb 04	08:00:00	52.3	39.6	65.4	45.2	1.1	71	9	
22 Feb 04	09:00:00	51.5	41.4	67.5	47.7	1.5	70	9	
22 Feb 04	10:00:00	52.4	44.6	67.5	47.5	2.2	61	11	
22 Feb 04	11:00:00	54.1	48.6	68.6	47.6	2.5	56	9	
22 Feb 04	12:00:00	54.2	48.3	69.0	47.2	2.7	50	9	
22 Feb 04	13:00:00	55.2	49.3	69.3	49.8	2.8	52	7	
22 Feb 04	14:00:00	55.2	49.4	68.9	49.9	2.9	50	7	
22 Feb 04	15:00:00	55.6	48.9	69.2	50.4	3.3	49	6	
22 Feb 04	16:00:00	55.2	50.0	69.6	55.2	3.2	52	9	
22 Feb 04	17:00:00	54.7	48.5	69.5	55.4	2	71	17	wind
22 Feb 04	18:00:00	53.0	47.1	69.4	53.7	1	78	15	
22 Feb 04	19:00:00	54.3	46.8	69.0	52.7	0.3	76	7	
22 Feb 04	20:00:00	54.5	45.6	68.2	51.9	-0.5	82	13	
22 Feb 04	21:00:00	50.3	43.7	67.3	49.6	-0.7	86	9	
22 Feb 04	22:00:00	50.3	44.0	67.6	48.4	-0.7	84	9	
22 Feb 04	23:00:00	51.9	42.8	66.7	47.1	-1.1	86	6	
23 Feb 04	00:00:00	46.8	41.2	65.1	44.7	-1.2	87	6	
23 Feb 04	01:00:00	45.0	40.3	64.0	42.3	-1	86	7	
23 Feb 04	02:00:00	44.4	40.1	62.5	41.4	-0.8	85	6	
23 Feb 04	03:00:00	51.5	39.6	61.7	41.3	-0.6	86	9	
23 Feb 04	04:00:00	44.1	39.8	63.0	42.3	-0.5	85	7	
23 Feb 04	05:00:00	48.1	41.4	67.3	46.6	-0.6	84	6	

23 Feb 04	06:00:00	54.5	46.1	70.7	55.1	-0.8	83	6	
23 Feb 04	07:00:00	55.5	48.5	71.8	57.5	-1	84	7	
23 Feb 04	08:00:00	56.0	51.0	72.2	58.1	-0.5	83	13	
23 Feb 04	09:00:00	54.0	48.3	71.8	57.0	0.2	79	15	
23 Feb 04	10:00:00	55.6	49.0	72.5	56.4	0.8	76	13	
23 Feb 04	11:00:00	56.3	49.1	72.0	56.6	1.8	73	17	wind
23 Feb 04	12:00:00	56.5	49.5	71.8	56.9	1.8	71	17	wind
23 Feb 04	13:00:00	54.4	49.0	71.5	57.0	2.2	68	17	wind
23 Feb 04	14:00:00	55.5	50.4	71.5	57.2	2.5	67	15	
23 Feb 04	15:00:00	57.3	50.0	71.8	58.0	2	69	13	
23 Feb 04	16:00:00	57.5	50.9	72.0	58.5	2.3	68	13	
23 Feb 04	17:00:00	56.3	51.1	71.7	56.5	1.5	70	17	wind
23 Feb 04	18:00:00	56.4	50.0	70.0	52.1	0.7	70	17	wind
23 Feb 04	19:00:00	55.3	47.9	68.6	49.2	0.2	71	17	wind
23 Feb 04	20:00:00	53.6	47.5	67.6	48.2	-0.4	77	17	wind
23 Feb 04	21:00:00	54.4	44.2	65.0	45.1	-1	82	15	
23 Feb 04	22:00:00	51.3	43.5	69.5	46.9	-1.2	85	11	
23 Feb 04	23:00:00	51.6	41.5	67.1	44.4	-1.5	86	15	
24 Feb 04	00:00:00	48.9	39.4	64.2	40.8	-1.7	86	15	
24 Feb 04	01:00:00	42.6	38.7	61.4	40.2	-1.7	86	9	
24 Feb 04	02:00:00	41.8	37.5	62.4	39.4	-1.5	86	9	
24 Feb 04	03:00:00	41.7	37.2	62.1	40.0	-1.3	86	13	
24 Feb 04	04:00:00	43.5	37.8	62.8	41.7	-1.3	84	19	wind
24 Feb 04	05:00:00	46.1	38.3	65.2	45.9	-1.5	82	20	wind
24 Feb 04	06:00:00	50.5	41.0	68.2	51.1	-1.7	82	19	wind
24 Feb 04	07:00:00	54.2	45.8	70.2	54.2	-1.7	81	24	wind
24 Feb 04	08:00:00	55.6	50.1	71.2	55.3	-1.5	75	20	wind
24 Feb 04	09:00:00	53.3	46.2	70.5	54.0	-1.8	76	15	
24 Feb 04	10:00:00	52.5	45.5	70.4	53.4	-1.4	69	26	wind
24 Feb 04	11:00:00	53.8	47.8	71.2	53.9	-1.4	71	24	wind
24 Feb 04	12:00:00	54.9	49.2	72.2	54.5	-0.1	66	26	wind
24 Feb 04	13:00:00	53.8	47.3	70.9	53.7	0.6	68	26	wind
24 Feb 04	14:00:00	55.1	48.7	72.5	56.2	0.7	63	28	wind
24 Feb 04	15:00:00	55.8	49.5	71.9	56.5	1.2	62	30	wind
24 Feb 04	16:00:00	55.4	49.3	71.4	55.3	1.2	61	24	wind
24 Feb 04	17:00:00	55.7	50.1	71.3	54.9	1.1	61	20	wind
24 Feb 04	18:00:00	61.1	52.7	70.1	54.0	0.2	66	15	
24 Feb 04	19:00:00	56.4	47.0	69.2	51.7	-0.5	61	17	wind
24 Feb 04	20:00:00	53.1	44.8	68.0	50.0	-1.1	65	13	

24 Feb 04	21:00:00	51.7	43.4	68.4	50.0	-1.9	65	13	
24 Feb 04	22:00:00	50.7	41.2	68.7	50.3	-2.5	62	13	
24 Feb 04	23:00:00	49.0	39.2	66.0	47.5	-3.3	65	9	
25 Feb 04	00:00:00	47.7	38.4	64.0	44.4	-3.3	64	7	
25 Feb 04	01:00:00	42.9	37.3	62.3	42.3	-3.5	66	7	
25 Feb 04	02:00:00	41.1	37.1	62.1	41.6	-3.7	70	6	
25 Feb 04	03:00:00	41.6	37.3	63.9	41.5	-3.8	73	7	
25 Feb 04	04:00:00	42.7	37.3	63.8	42.7	-4	73	7	
25 Feb 04	05:00:00	47.0	38.5	65.8	46.2	-3.9	72	7	
25 Feb 04	06:00:00	50.6	40.4	70.2	53.4	-4.3	72	7	
25 Feb 04	07:00:00	54.5	46.9	72.1	55.2	-4.1	76	15	
25 Feb 04	08:00:00	55.6	47.4	72.5	55.5	-3.6	83	15	
25 Feb 04	09:00:00	54.4	44.4	72.1	54.4	-2.6	83	13	
25 Feb 04	10:00:00	53.6	43.4	71.4	53.1	-0.8	78	9	
25 Feb 04	11:00:00	55.9	45.4	72.3	51.5	0.6	73	9	
25 Feb 04	12:00:00	55.3	47.7	71.9	53.4	2.1	68	7	
25 Feb 04	13:00:00	54.0	47.9	71.5	53.1	2.2	70	9	
25 Feb 04	14:00:00	55.1	48.7	71.9	53.7	2.3	69	13	
25 Feb 04	15:00:00	55.4	49.2	72.0	57.4	2.5	64	13	
25 Feb 04	16:00:00	56.6	49.6	71.9	55.2	2.5	63	17	wind
25 Feb 04	17:00:00	55.3	49.1	71.8	55.6	2.7	66	20	wind

Exhibit A8: Distances For Designated Locations from source to Receptor Location

Location	Distance From Centreline of Noise Source (m)		
	Option - Without Road Widening	Option - With Road Widening	
		N. Bound	S. Bound
1 - Day	30.0	31.0	25.0
1 - Night	30.0	31.0	25.0
2 - Day	17.0	17.0	27.0
2 - Night	20.0	20.0	30.0
3 - Day	22.0	23.0	16.0
3 - Night	25.0	20.0	15.0

Note: Day time receptor locations are taken at the outdoor living area (OLA).
Night time receptor locations are taken at the plane of a bedroom window.

STAMSON 5.0 NORMAL REPORT Date: 05-04-2004 16:17:40
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT
Filename: manlot2n.te Time Period: Day/Night 16/8 hours
Description:
Road data, segment # 1: Manning (day/night)

Car traffic volume : 17146/3026 veh/TimePeriod
Medium truck volume : 2014/358 veh/TimePeriod
Heavy truck volume : 670/120 veh/TimePeriod
Posted speed limit : 80 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Manning (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 17.00 / 20.00 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Manning (day)

Source height = 1.36 m

ROAD (0.00 + 71.47 + 0.00) = 71.47 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	73.83	0.00	-0.90	-1.46	0.00	0.00	0.00	71.47

Segment Leq : 71.47 dBA
Total Leq All Segments: 71.47 dBA

Results segment # 1: Manning (night)

Source height = 1.36 m
ROAD (0.00 + 66.07 + 0.00) = 66.07 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	69.34	0.00	-1.97	-1.31	0.00	0.00	0.00	66.07

Segment Leq : 66.07 dBA
Total Leq All Segments: 66.07 dBA
TOTAL Leq FROM ALL SOURCES (DAY): 71.47
(NIGHT): 66.07

Exhibit A9: Printout of 2014 Day Calculations for Location 2 With No Road Reconstruction

STAMSON 5.0 NORMAL REPORT Date: 05-04-2004 16:22:10
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT
Filename: manlot2.te Time Period: Day/Night 16/8 hours
Road data, segment # 1: Manning N (day/night)

Car traffic volume : 8573/1513 veh/TimePeriod
Medium truck volume : 1007/179 veh/TimePeriod
Heavy truck volume : 335/60 veh/TimePeriod
Posted speed limit : 80 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)
Data for Segment # 1: Manning N (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 17.00 / 20.00 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: Manning S (day/night)

Car traffic volume : 8573/1513 veh/TimePeriod
Medium truck volume : 1007/179 veh/TimePeriod
Heavy truck volume : 335/60 veh/TimePeriod
Posted speed limit : 80 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)
Data for Segment # 2: Manning S (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 27.00 / 30.00 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Exhibit A10: Printout of 2014 Day Calculations for Location 2 With Road Reconstruction

Results segment # 1: Manning N (day)

Source height = 1.36 m
ROAD (0.00 + 68.46 + 0.00) = 68.46 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	70.82	0.00	-0.90	-1.46	0.00	0.00	0.00	68.46

Segment Leq : 68.46 dBA

Results segment # 2: Manning S (day)

Source height = 1.36 m
ROAD (0.00 + 65.13 + 0.00) = 65.13 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	70.82	0.00	-4.24	-1.46	0.00	0.00	0.00	65.13

Segment Leq : 65.13 dBA

Total Leq All Segments: 70.12 dBA

Results segment # 1: Manning N (night)

Source height = 1.36 m
ROAD (0.00 + 63.06 + 0.00) = 63.06 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	66.33	0.00	-1.97	-1.31	0.00	0.00	0.00	63.06

Segment Leq : 63.06 dBA

Results segment # 2: Manning S (night)

Source height = 1.36 m
ROAD (0.00 + 60.29 + 0.00) = 60.29 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	66.33	0.00	-4.74	-1.31	0.00	0.00	0.00	60.29

Segment Leq : 60.29 dBA

Total Leq All Segments: 64.90 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 70.12
(NIGHT): 64.90

Exhibit A10: Continued