Appendix G: Noise Impact Study

SS WILSON ASSOCIATES
Consulting Engineers

REPORT NO. WA07-001

NOISE IMPACT STUDY
PRELIMINARY DESIGN SERVICES
HIGHWAY 6 (HANLON EXPRESSWAY) IMPROVEMENT
FROM MALTBY ROAD TO THE SPEED RIVER
CITY OF GUELPH
MTO GWP #3022-05-00

SUBMITTED TO:

STANTEC CONSULTING LTD.
1400 RYMAL ROAD EAST
HAMILTON, ONTARIO
L8W 3N9

PREPARED BY:

TAREK ZAYED, P.ENG.
SENIOR PROJECT ENGINEER

APPROVED BY:

HAZEM GIDAMY, P.ENG.
PRINCIPAL

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SSWA INC. 15 Wertheim Court, Suite 211, Richmond Hill, Ontario, L4B 3H7
Tel: (905) 707-5800 Fax: (905) 707-5801
website: www.sswilsonassociates.com e-mail: info@sswilsonassociates.com

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1.0 INTRODUCTION

The services of SS Wilson Associates were retained by Stantec Consulting Ltd. to prepare a Noise Impact Study as part of the Preliminary Design Report for Highway 6 (Hanlon Expressway) Improvement from Maltby Road to the Speed River in the City of Guelph.

The project limits for this study include the above-noted Highway 6 (Hanlon Expressway) corridor with reasonable distances (i.e. within 600m from the highway's right-of-way) to the east and west in order to include all the noise impacts on the surrounding areas. For locations located further than these distances, the effect of Highway 6 traffic noise is deemed to be insignificant when considered in the context of the prevailing ambient noise.

The proposed undertaking calls for the upgrade of Hanlon Expressway from south of Maltby Road to the Speed River to a freeway with access restricted to interchange locations only. The removal of the existing at-grade intersections will improve the safety and operations on the Hanlon Expressway.

The preferred plan includes the following:

- Parclo A interchange at Laird Road crossing over the Hanlon Expressway
- Partial diamond interchange at Kortright Road/Downey Road crossing under the Hanlon Expressway
- Parclo A interchange at Stone Road crossing over the Hanlon Expressway
- Grade-separation at College Avenue under the Hanlon Expressway
- Maintaining the existing four-lane cross-section with open an median

Figure 1 shows the location and limits of the study area.

The objectives of the Noise Study are as follows:

- To predict the existing (year 2007) and the future with the undertaking (year 2027) sound levels at all the noise sensitive locations along the subject corridor of Highway 6 within the study area.
- To assess the noise impacts and the potential for mitigation at all the noise sensitive locations that may be subject to increases in traffic noise levels of 5 dBA or greater as well as to future sound levels of 65 dBA or greater. The evaluation will be based on the new MTO Environmental Guideline for Noise and will include details on the proposed noise control measures; where warranted.
- To document the measures that may be considered to minimize the noise impacts generated by noise producing operations that may be required as part of the construction of the subject undertaking.

This Noise Study represents a joint effort with the consulting engineering firm Stantec Consulting Ltd. who provided the necessary road traffic data and overall project direction.

2.0 MINISTRY OF TRANSPORTATION GUIDELINES FOR PROVINCIAL HIGHWAY NOISE

In 2006 and 2007, the MTO published several guideline documents for noise impact assessment and control of Provincial Highways under their jurisdiction. These guidelines were developed with input from the MOE and they essentially supersede all MTO noise related documents and in particular MTO Quality and Standards Directive A-1.

This section is not intended to be a substitute for the relevant MTO noise guidelines, but to essentially summarize the most important aspects related to the applicable sound level criteria.

1. Environmental Protection Requirements: Planning & Design

The following statements are taken from the guideline documents:

a. In order to determine a noise impact, a comparison shall be made for future sound levels with and without the proposed improvements at Noise Sensitive Areas.
b. The objective for outdoor sound levels is to achieve the future ambient that would occur without the proposed improvements.
c. The significance of a noise impact is quantified by using the objective in addition to the change in sound levels above the future ambient (i.e. the future sound level without the proposed improvements, compared to the future sound level with the proposed improvements)
d. Mitigation efforts will still be applied for various noise increases. New mitigation efforts are summarized as follows:

MITIGATION EFFORT REQUIRED FOR THE PROJECTED NOISE LEVELS WITH THE PROPOSED IMPROVEMENTS

CHANGE IN NOISE LEVEL ABOVE AMBIENT/PROJECTED NOISE LEVELS WITH PROPOSED IMPROVEMENTS	MITIGATION EFFORT REQUIRED)
Change: < 5 dBA And/or Level: <65 dBA	- None
Change: ≥ 5 dBA And/or Level: ≥ 65 dBA	- Investigate noise control measures on R.O.W. - Introduce noise control measure within R.O.W. and mitigate to ambient if technically, economically and administratively feasible. - Noise control measures where introduced, should achieve a minimum of 5 dBA attenuation, over first row receivers.

e. Mitigation measures must attempt to achieve levels as close to, or lower than the objective level (i.e. future predicted ambient without the proposed improvement) as is technically (achieved a 5 dBA reduction), economically and administratively feasible.
f. Mitigation measures are those identified to be within provincial or municipal right of way based on technical, economic and administrative feasibility assessments.

2. Environmental Protection Requirements: Construction

Construction activities must be undertaken in a manner to minimize noise levels and identify a process for dealing with public complaints during construction.

In general, construction operations must abide by the local municipal noise by-laws and the necessary exemptions must be applied for, where required. For pile driving and blasting operations, reference should be made to the applicable criteria in OPSS120 and the MOE NPC-119 publications, respectively.

3.0 TRAFFIC DATA

All traffic data has been provided by Stantec Consulting Ltd. The SADT/AADT traffic volumes for the year 2007 were provided for the existing ambient conditions, while the SADT/AADT traffic volumes for the year 2027 were provided for the future project conditions.

SADT and AADT were available for existing and FDN cases. In the study area, AADT and SADT are not significantly different (i.e. within 5%). This is due to the nature of the study area, which includes several schools and a university. As required by MTO, in this study we used SADT in our sound level calculations for the Hanlon Expressway (Highway 6) and we used the AADT for all other roads.

Appendix A includes the traffic data used in this Noise Study.

4.0 SELECTED RECEPTOR LOCATIONS

For the purpose of this Noise Study, thirty-nine receptor locations (denoted R1 to R37) have been selected to represent the Noise Sensitive Areas surrounding the subject Highway 6 corridor within the study area, which may be potentially affected by noise due to their proximity and exposure to Highway 6. The selected receptors represent the worst case noise assessment locations, beyond which the predicted sound levels are lower due to increased distance setback and reduced exposure to Highway 6.

The following defines the selected receptor locations

Laird Road to Kortright Road (R1 to R10)

R1: House, west of Highway 6, near the north-west corner of Laird Road and McWilliams Road
R2: House, west of Highway 6, east of Milson Crescent
R2B: House, west of Highway 6, east of Milson Crescent
R2C: House, west of Highway 6, east of Milson Crescent
R3: House, west of Highway 6, west of Milson Crescent
R4: House, east of Highway 6, west of Ironwood Drive
R5: House, east of Highway 6, west of Shadybrook Crescent
R6: House, east of Highway 6, east of Shadybrook Crescent
R7: House, east of Highway 6, west of Shadybrook Crescent
R8: House, east of Highway 6, north of Shadybrook Crescent
R9: House, east of Highway 6, west of Ironwood Road
R10: House, east of Highway 6, west of Ironwood Road.

Kortright Road to Stone Road (R11 to R23)

R11: House, east of Highway 6, west of Ironwood Road
R12: House, east of Highway 6, south of Cole Road
R13: House, east of Highway 6, west of Cole Road.
R14: House, west of Highway 6, north of Woodland Glen Drive
R15: House, west of Highway 6, east of Old Colony Trail
R16: House, east of Highway 6, west of Cole Road
R17: House, east of Highway 6, west of Cole Road
R18: House, east of Highway 6, west of Cole Road
R19: Apartment building, east of Highway 6, west of Cole Road

R20: Seniors residence building, east of Highway 6, west of Cole Road
R21: House, west of Highway 6, east of Old Colony Trail
R22: House, west of Highway 6, north of Woodland Glen Drive
R23: House, west of Highway 6, north of Woodland Glen Drive

Stone Road to Collage Avenue (R24 to R35)

R24: House, west of Highway 6, south of Coventry Drive
R25: House, west of Highway 6, south of Flanders Road
R26: House, west of Highway 6, west of Hanlon Road
R27: House, east of Highway 6, west of Janefield Avenue.
R28: Townhouse, east of Highway 6, west of Janefield Avenue
R29: House, west of Highway 6, north of Crane Avenue
R30: House, west of Highway 6, west of Hanlon Road
R31: House, west of Highway 6, at south west corner of College Avenue and Hanlon Road
R32: House, west of Highway 6, south of College Avenue
R33: House, west of Highway 6, south of College Avenue
R34: House, east of Highway, east of Highway 6 and south of College Avenue
R35: House, east of Highway 6, at south-west corner of College Avenue and Janefield Avenue

Collage Avenue to Wellington Street (R36 and R37)

R36: House, east of Highway 6, south of Municipal Street.
R37: House, east of Highway 6, west of Municipal Street.

Figures 2.1 to 2.7 show the selected receptor locations used in this Noise Study.

5.0 METHODOLOGY

Road traffic sound levels in this study have been predicted using the technique developed by the U.S. Federal Highway Administration (FHWA) and enhanced by the Ministry of Transportation and the Ministry of the Environment.

The computerised version of the ORNAMENT MOE noise prediction model, STAMSON Version 5.04 (2000) was used for calculating the sound levels due to the proposed undertaking.

The sound level calculations are primarily based on the following parameters:

(i) Summer Average Daily Traffic (SADT) volumes for highways and Annual Average Daily Traffic (AADT) volumes for other roads.
(ii) Percentages of medium and heavy trucks.
(iii) Day and night split of traffic volumes.
(iv) Posted speed limits.

(v) Longitudinal gradient of the highway/roadway alignment.
(vi) Surface type of pavement.
(vii) Type of topography between the subject highway/roadway and the receptors of concern.
(viii) Presence of vegetation areas in the intervening lands between the subject highway/roadway and the receptors of concern
(ix) Type of ground cover over the intervening lands, i.e. whether acoustically "soft" (i.e. absorptive) or acoustically "hard" (i.e. reflective).
(x) Receiver height above ground. For this study and in accordance with the MTO guidelines, all receivers have a height of 1.2 m above ground level.
(xi) Distance between the subject highway/roadway and the receptors of concern.

Based on the MTO guidelines, the equivalent sound levels in dBA; Leq corresponding to the average hourly volume of traffic based on the SADT for highways and the AADT for roadways was used, i.e. Leq (24h) in dBA.

The environmental noise impact assessment in this study is based on the excesses of the future with the undertaking (Year 2027) above the existing ambient (Year 2007) sound levels, as well as on the absolute future with the undertaking sound levels as compared to MTO sound level Cap of 65 dBA.

6.0 EXISTING SOUND BARRIERS

There are existing sound barriers shielding the backyards of the houses located along the east side of Milson Crescent with heights ranging from 2.5m to 3.0m above ground level.

Based on our site visits, field inspections and the noise analysis, it is our finding that the existing sound barriers are in good condition and provide sound level reductions in the Outdoor Living Areas in the range of 4 dBA to 8 dBA, which are considered to be acoustically noticeable to significant reductions.

Figure 3 shows the locations of the existing sound barriers.

7.0 SOURCES OF AMBIENT NOISE

Ambient noise used in the context of this report is the existing (year 2007) sound levels at the selected receptor locations without the additional noise generated by the proposed undertaking.

The ambient sound levels are established in this study using STAMSON Version 5.04 (2000), the computerized version of the MOE noise prediction model "ORNAMENT" which is acceptable to the MTO.

The dominant source of ambient noise in the study area is vehicular traffic movements on the existing Highway 6 corridor and the intersecting roads.

Table 1 lists the existing ambient sound levels at the most exposed facades, which are predicted to be in the range of 45 dBA to 67 dBA.

Table 2 lists the existing ambient sound levels at the Outdoor Living Areas, which are predicted to be in the range of 45 dBA to 65 dBA.

Appendix B includes sample ambient sound level calculations.

8.0 NOISE IMPACT ASSESSMENT

In accordance with the MOE Environmental Guide for Noise, dated October 2006, residences that are exposed to sound level increases of 5 dBA or higher in the future and/or to future sound levels of 65 dBA or higher warrant investigation to establish their eligibility for noise controls at their Outdoor Living Areas (OLA's).

Table 1 lists the future project sound levels at the most exposed facades, which are predicted to be in the range of 48dBA to 72 dBA.

Table 2 lists the future project sound levels at the Outdoor Living Areas, which are predicted to be in the range of 48 dBA to 69 dBA.

The listed sound level data in Tables 1 and 2 can be summarized as follows:

Highway 6 from Laird Road to Kortright Road (Receptors R1 to R8)

- Existing sound levels are in the range of 51 to 61 dBA at the most exposed façades and 48 to 59 dBA at the OLA's.
- Future sound levels (with the project) are in the range of 56 to 64 dBA at the most exposed façades and 52 to 64 dBA at the OLA's.

Ironwood Road Residences (Receptors R9 to R11)

- Existing sound levels are in the range of 45 to 61 dBA at the most exposed façades and 45 to 54 dBA at the OLA's.
- Future sound levels (with the project) are in the range of 48 to 61 dBA at the most exposed façades and 48 to 54 dBA at the OLA's.

Highway 6 from Kortright Avenue to Stone Road (Receptors R11 to R23)

- Existing sound levels are in the range of 52 to 64 dBA at the most exposed façades and 49 to 64 dBA at the OLA's.

- Future sound levels (with the project) are in the range of 59 to 69 dBA at the most exposed façades and 56 to 69 dBA at the OLA's.

Highway 6 from Stone Road to College Avenue (Receptors R24 to R35)

- Existing sound levels are in the range of 49 to 67 dBA at the most exposed façades and 49 to 65 dBA at the OLA's.
- Future sound levels (with the project) are in the range of 52 to 72 dBA at the most exposed façades and 52 to 69 dBA at the OLA's.

Highway 6 from College Avenue to Wellington Street (Receptors R36 & R37)

- Existing sound levels are in the range of 57 to 61 dBA at the most exposed façade and 47 to 55 dBA at the OLA's.
- Future sound levels (with the project) are in the range of 59 to 63 dBA at the most exposed façade and 49 to 57 dBA at the OLA's.

The relevant comparisons of the sound level data listed in Tables 1 and 2 are as follows:

- Receptors R1 to R12, R24, R26, and R31 to R33 and R35 to R37 will experience future OLA sound levels that are less than 5 dBA than the existing sound levels and will have future OLA sound levels that are less than 65 dBA.
- Receptors R14 to R18, R20 to R23, R25, R27 to R30 and R34 will experience future OLA sound levels that are 5 dBA or higher than the existing sound levels
- Receptors R13 to R16, R21, R28, R29 and R34 will have future OLA sound levels that are 65 dBA or higher.

Based on the above comparisons and in accordance with the MTO sound level criteria, Receptors R13 to R18, R20 to R23, R25, R27 to R30 and R34 warrant investigation of the feasibility of applying noise control measures to reduce their OLA sound levels.

Receptor R19 represents an apartment building located at Cole Road, which does not have a Common Outdoor Living Area. Therefore, a sound barrier does not need to be investigated for this property.

9.0 MITIGATION

Mitigation is investigated if the future noise levels exceed the ambient noise levels by 5dBA or greater and if the future sound levels are equal or greater than 65 dBA. The purpose of mitigation is to achieve a minimum attenuation of 5 dBA in the OLA averaged over the first row receivers.

The MTO's noise guidelines require that only "on right-of-way" mitigation be investigated, and only where technically, economically and administratively feasible.

The most practical noise control measure to evaluate is sound barriers at appropriate locations to shield the outdoor living areas of the receptors of concern. A sound barrier may take the form of a berm, acoustic wall or a combination thereof.

In accordance with the MTO's noise guidelines, noise mitigation is to be investigated at receptors R13 to R18, R20 to R23, R25, R27 to R30 and R34.

Table 3 shows the sound levels achieved at the OLA's with the use of sound barriers having heights in the range of 3m to 5m in 1m increments as well as the sound barrier heights required to achieve the MTO's minimum barrier attenuation of 5 dBA.

Figures 4.1 and 4.2 show schematic alignments of the investigated sound barriers.

Based on the data listed in Table 3, the following conclusions can be made:

- At receptors R13 to R17, R20 to R23, R25, R27 to R30 and R34, the required barrier heights to achieve the minimum 5 dBA reduction are in the range of 3m to 5m, which are technically feasible.
- At receptor R18, the sound barrier height required to achieve the minimum 5 dBA reduction in the OLA sound levels is 7m. This height is in excess of the 5m technical height limit for noise walls. To install such a sound barrier, the structure may be composed of a 2m high base berm coupled with a 5m high noise wall on top provided that adequate space is available within the MTO's r-o-w to accommodate the 2.0m high base berm.

It should be noted that other non-acoustic considerations such as economic and administrative feasibility must be considered before a definite commitment is made with regards to installing any sound barriers within the limits of the study area.

Table 4 shows a summary of the noise impact assessment throughout the study area.

10.0 CONSTRUCTION NOISE

In addition to the noise emitted by the operation of vehicles on the proposed Highway 6 undertaking, noise during the construction phase is an issue that should also be addressed.

Unlike operational noise, construction noise is temporary in nature depending on the type of work required and its location relative to the noise-sensitive receptors.

The significance of the construction noise impact depends on the number of pieces of equipment, their types, type and time of operation and their proximity to the receptors in question.

This section covers the requirements for control of construction noise produced by the Contractor's Operations. With the exception of any exemptions from municipal noise control by-laws that may be indicated elsewhere in the Contract, these requirements do not relieve the Contractor of other obligations imposed by statute or by municipal by-laws.

The following is a brief outline of the procedures to be followed in handling construction noise during the construction phase:

a. The Contractor to note the location of the residences as shown in Figures 2.1 to 2.7.

b. Typical noise constraints in noise sensitive areas are as follows:

NOISE SENSITIVE AREA LIMITS WITHIN THE CONTRACT LIMITS	
CONSTRAINT	**CONSTRAINT DETAILS**
Equipment Maintenance	Equipment shall be maintained in an operating condition that prevents unnecessary noise, including but not limited to non-defective muffler systems, properly secured components, and the lubrication of moving parts.
Equipment Operation	Idling of equipment shall be restricted to the minimum necessary to perform the specified work.
Rock Drilling, Blasting and Crushing Operations/Pile Driving Operation	These operations shall be limited to 07:00-19:00 hours. Drilling to be carried out with hydraulic drills with dust collectors.
Blasting Operations	The contractor shall conduct pre-blast survey to determine the extent of the air concussion and ground borne vibration levels so that the levels do not exceed the following: 120 dBA Linear on a peak level detector for air concussion and a peak particle velocity of 10mm/sec for the ground borne vibration as predicted and/or measured at the closest residential dwelling. In the event of the potential for exceedances of the above limits, the contractor shall be responsible for conducting pre-blast surveys within the homes of concern to document the condition of the house including structural and plaster cracks that is prior to and following each blast that may exceed the stated limits.
Pile Driving Operations	The contractor shall attempt to minimize the noise/vibration impacts at sensitive receptors due to pile driving operations. In the event of persistent complaints, the contractor shall apply alternative control measures wherever technically feasible in an attempt to further reduce these impacts. These operations shall be limited to 0700 to 1900 hours.

c. The Contractor shall obtain copies of the most recent noise control by by-law from the Municipalities and enforce all the by-law provisions for this contract.

d. Any initial complaint from the public will require verification by MTO that the general noise control measures agreed to are in effect; MTO 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.

11.0 ADDITIONAL WORK (JANUARY 2008 TO MAY 2009)

Following the completion of the original Noise Study (January 2008), the Preferred Plan was modified, including a smaller interchange configuration at Stone Road and a Service Road between Downey Road and Stone Road on the west side of Highway 6. The City of Guelph also updated traffic volumes in the City's traffic model, including the removal of the Stone Road extension from the future traffic predictions and distribution of future traffic volumes on the proposed Service Road. The following work was carried out to update the Noise Study to reflect the project changes and to respond to issues from the public.

1. Existing Ambient Sound Levels Measurements

Long term, unattenuated sound level measurements were taken at selected locations to represent the residences of concern in the study area. The location of the measurements was selected in consultation with the Ministry of Transportation (MTO). A separate report was prepared for the existing ambient sound level measurements dated October 2, 2008. Appendix C includes our report.

2. Update Existing Traffic Volume

The MTO undertook the existing traffic count in September, 2008. Also, the City of Guelph provided the updated Future Do Nothing and Future traffic data. Sound level calculations have been carried out based on the updated traffic data. The updated traffic data is included in Appendix D.

3. Comparison of Predicted and Monitored Sound Levels

Existing and Future sound levels were predicted at monitor locations M1 to M8. The results have been plotted to show the comparison of predicted and measured sound levels. In addition, the predicted changes to the sound levels and excesses above the sound level criteria are shown. These results are presented in Appendix E. A sample sound level calculation is also included in

Appendix E. This information has been presented in the Public Information Center (PIC).

4. Preliminary Sound Barrier Calculation for West Service Road (November, 2008)

The results of preliminary sound barrier calculations for the West Service Road at Section E-E indicate that the FDU sound level is predicted to be 63 dBA, future sound level is predicted to be 67 dBA, and a four meter sound barrier will provide a 5 dB reduction, i.e. the sound level will be 62 dBA.

It should be noted that the sound level is dominated by traffic on Highway 6. The contribution of the West Service Road is minimal. A cross-section and sample calculation is included in Appendix F.

5. Feasible Sound Barrier for West Service Road (March, 2009)

Revised sound level calculations without and with a sound barrier have been carried out for several locations along Old Colony Road, the results of which are shown in a table included in Appendix G. The table also shows alternative locations and heights of the possible berm and wall. Sample sound level calculations are also included in Appendix G.

6. Recommended Plan

The Preferred Plan was modified, including a smaller interchange configuration at Stone Road and a Service Road between Downey Road and Stone Road on the west side of Highway 6.The sound barriers alignments are shown on the recommended plan, which is included in Appendix H. The possible barrier heights are included in this document.

TABLES

TABLE 1
HIGHWAY ENVIRONMENTAL NOISE IMPACT ASSESSMENT
SOUND LEVELS AT MOST EXPOSED BUILDING FAÇADE
HIGHWAY 6 (HANLON EXPRESSWAY)
FROM MALTBY ROAD TO THE SPEED RIVER
GWP # 3002-05-00

Receptor Code	Existing (Year 2007) Leq dBA	Future Undertaking (Year 2027) Leq dBA	Warrant for Mitigation - dBA Increase	Future Undertaking (Year 2027) Leq Minus Existing (Year 2007) Leq	Significance of The Change due to the Future Undertaking (Year 2027) Leq Minus Existing (Year 2007) Leq	Need for noise Control measures Based on Excess of 5 dBA or Higher	Need for noise Control measures Based on Leq Levels of 65 dBA or Higher
R1	59.7	64.0	5	4.3	Noticeable	Not required	Not Required
R2	55.0	59.2	5	4.2	Noticeable	Not required	Not Required
R2B	55.9	60.0	5	4.1	Noticeable	Not required	Not Required
R2C	59.1	63.3	5	4.2	Noticeable	Not required	Not Required
R3	51.9	56.1	5	4.2	Noticeable	Not required	Not Required
R4	54.5	58.8	5	4.3	Noticeable	Not required	Not Required
R5	58.8	63.1	5	4.3	Noticeable	Not required	Not Required
R6	51.0	55.5	5	4.5	Noticeable	Not required	Not Required
R7	59.0	63.1	5	4.1	Noticeable	Not required	Not Required
R8	61.0	60.7	5	-0.3	Reduction	Not required	Not Required
R9	51.7	52.5	5	0.8	Insignificant	Not required	Not Required
R10	44.9	48.2	5	3.3	Noticeable	Not required	Not Required
R11	60.8	60.7	5	-0.1	Reduction	Not required	Not Required
R12	61.1	63.5	5	2.4	Insignificant	Not required	Not Required
R13	61.0	65.7	5	4.7	Noticeable	Not required	To Be Investigated
R14	64.1	68.8	5	4.7	Noticeable	Not required	To Be Investigated
R15	63.3	68.6	5	5.3	Significant	To Be Investigated	To Be Investigated
R16	60.3	65.4	5	5.1	Significant	To Be Investigated	To Be Investigated
R17	58.5	63.6	5	5.1	Significant	To Be Investigated	Not Required
R18	55.4	60.5	5	5.1	Significant	To Be Investigated	Not Required
R19	61.8	67.1	5	5.3	Significant	To Be Investigated	To Be Investigated
R20	55.5	61.0	5	5.5	Significant	To Be Investigated	Not Required
R21	59.5	64.7	5	5.2	Significant	To Be Investigated	Not Required
R22	53.3	58.7	5	5.4	Significant	To Be Investigated	Not Required
R23	52.0	58.5	5	6.5	Significant	To Be Investigated	Not Required
R24	50.8	53.7	5	2.9	Insignificant	Not required	Not Required
R25	55.8	60.5	5	4.7	Noticeable	Not required	Not Required
R26	60.7	63.2	5	2.5	Insignificant	Not required	Not Required
R27	56.5	61.7	5	5.2	Significant	To Be Investigated	Not Required
R28	64.2	69.4	5	5.2	Significant	To Be Investigated	To Be Investigated
R29	60.7	65.9	5	5.2	Significant	To Be Investigated	To Be Investigated
R30	60.4	65.7	5	5.3	Significant	To Be Investigated	To Be Investigated
R31	60.5	64.6	5	4.1	Noticeable	Not required	Not Required
R32	55.8	58.1	5	2.3	Insignificant	Not required	Not Required
R33	49.1	52.4	5	3.3	Noticeable	Not required	Not Required
R34	67.4	72.0	5	4.6	Noticeable	Not required	To Be Investigated
R35	60.3	60.1	5	-0.2	Reduction	Not required	Not Required
R36	56.9	58.9	5	2.0	Insignificant	Not required	Not Required
R37	61.2	63.2	5	2.0	Insignificant	Not required	Not Required
						Upper Limit For Mitigation :	65

Impact Assessment Rating :

0 to < 3 dB change : Insignificant
=>3 to < 5 dB change : Noticeable
=> 5 to < 10 dB change: Significant
=> 10 dB change : Very Significant

TABLE 2
HIGHWAY ENVIRONMENTAL NOISE IMPACT ASSESSMENT
SOUND LEVELS AT OUTDOOR LIVING AREA
HIGHWAY 6 (HANLO EXPRESSWAY)
FROM MALTBY ROAD TO THE SPEED RIVER
GWP # 3002-05-00

Receptor Code	Existing (Year 2007) Leq dBA	Future Undertaking (Year 2027) Leq dBA	Warrant for Mitigation:dBA Increase	Future Undertaking (Year 2027) Leq Minus Existing (Year 2007) Leq	Significance of the Change due to the Future Undertaking (Year 2027) Leq Minus Existing (Year 2007) Leq	Need for noise Control measures Based on Excess of 5 dBA or Higher	Need for noise Control measures Based on Leq Levels of 65 dBA or Higher
R1	52.5	54.9	5	2.4	Insignificant	Not required	Not Required
R2	54.4	58.6	5	4.2	Noticeable	Not required	Not Required
R2B	55.4	59.6	5	4.2	Noticeable	Not required	Not Required
R2C	59.3	63.5	5	4.2	Noticeable	Not required	Not Required
R3	49.4	53.6	5	4.2	Noticeable	Not required	Not Required
R4	54.6	58.9	5	4.3	Noticeable	Not required	Not Required
R5	59.0	63.3	5	4.3	Noticeable	Not required	Not Required
R6	48.0	51.8	5	3.8	Noticeable	Not required	Not Required
R7	59.2	64.0	5	4.8	Noticeable	Not required	Not Required
R8	55.2	56.2	5	1.0	Insignificant	Not required	Not Required
R9	51.7	52.5	5	0.8	Insignificant	Not required	Not Required
R10	45.0	48.3	5	3.3	Noticeable	Not required	Not Required
R11	53.6	54.1	5	0.5	Insignificant	Not required	Not Required
R12	57.1	60.3	5	3.2	Noticeable	Not required	Not Required
R13	61.2	65.9	5	4.7	Noticeable	Not required	To Be Investigated
R14	63.7	69.1	5	5.4	Significant	To Be Investigated	To Be Investigated
R15	63.6	68.8	5	5.2	Significant	To Be Investigated	To Be Investigated
R16	60.6	65.7	5	5.1	Significant	To Be Investigated	To Be Investigated
R17	58.6	63.8	5	5.2	Significant	To Be Investigated	Not Required
R18	55.6	60.7	5	5.1	Significant	To Be Investigated	Not Required
N/A - NO OUTDOOR LIVING AREA							
R19	52.1	57.5	5	5.4	Significant	To Be Investigated	Not Required
R20	59.7	65.0	5	5.3	Significant	To Be Investigated	To Be Investigated
R21	53.0	61.9	5	8.9	Significant	To Be Investigated	Not Required
R22	49.3	55.6	5	6.3	Significant	To Be Investigated	Not Required
R23	51.2	53.9	5	2.7	Insignificant	Not required	Not Required
R24	54.8	60.1	5	5.3	Significant	To Be Investigated	Not Required
R25	51.2	53.9	5	2.7	Insignificant	Not required	Not Required
R26	56.7	61.8	5	5.1	Significant	To Be Investigated	Not Required
R27	64.6	69.8	5	5.2	Significant	To Be Investigated	To Be Investigated
R28	60.9	66.2	5	5.3	Significant	To Be Investigated	To Be Investigated
R29	50.2	55.3	5	5.1	Significant	To Be Investigated	Not Required
R30	58.2	63.0	5	4.8	Noticeable	Not required	Not Required
R31	49.1	52.4	5	3.3	Noticeable	Not required	Not Required
R32	49.1	52.4	5	3.3	Noticeable	Not required	Not Required
R33	64.0	69.0	5	5.0	Significant	Not required	To Be Investigated
R34	52.4	51.8	5	-0.6	Reduction	Not required	Not Required
R35	55.0	57.0	5	2.0	Insignificant	Not required	Not Required
R36	47.4	49.4	5	2.0	Insignificant	Not required	Not Required
R37			5			Upper Limit For Mitigation :	65

Impact Assessment Rating :
0 to < 3 dB change : Insignificant
=>3 to < 5 dB change : Noticeable
=> 5 to < 10 dB change: Significant
=> 10 dB change : Very Significant

TABLE 3

INVESTIGATED SOUND BARRIER HEIGHTS AND OLA SOUND LEVELS WITH AND WITHOUT SOUND BARRIERS

Receptor	Future (2027) OLA Sound Levels Without Barrier, dBA	Future (2027) OLA Sound Levels Achieved With Barrier Heights, dBA			Sound Barrier Height to Achieve Minimum 5 dBA Reduction, m
		3.0m	4.0m	5.0m	
R13	65.9	62.1	61.3	60.2	5.0
R14	69.1	62.7	60.8	59.3	3.0
R15	68.8	61.8	60.6	59.8	3.0
R16	65.7	61.9	61.1	60.0	5.0
R17	63.8	59.1	58.2	57.4	4.0
R18	60.7	58.4	57.6	56.7	7.0
R20	57.5	53.7	52.9	51.7	5.0
R21	65.0	59.3	58.2	57.4	3.0
R22	61.6	55.1	54.2	53.3	3.0
R23	56.0	47.2	45.6	44.3	3.0
R25	60.1	55.7	54.8	54.0	4.0
R27	61.8	56.1	54.5	53.1	3.0
R28	69.8	64.8	62.9	61.3	3.0
R29	66.2	61.3	60.6	59.5	4.0
R30	55.3.	55.3	50	48	4.0
R34	69.0	69.0	65.3	62.3	5.0

TABLE 4
SUMMARY OF NOISE IMPACT ASSESSMENT
HIGHWAY 6 (HANLON EXPRESSWAY) FROM MALTBY ROAD TO SPEED RIVER
MTO GWP #3002-05-00

AREA	NO. OF HOUSES AFFECTED				FUTURE SOUND LEVELS OVER 65 dBA	OPPORTUNITY FOR NOISE CONTROL	TYPE OF MITIGATION	RATIONALE/COMMENTS
	0-5 dBA DECREASE	0-<5 dBA INCREASE	5-10 dBA INCREASE	>10 dBA INCREASE				
R1		1			NO	N/A	N/A	Excess <5 dBA and future sound level < 65 dBA - mitigation not warranted
R2		15			NO	N/A	N/A	Excess <5 dBA and future sound level < 65 dBA - mitigation not warranted
R2b		17			NO	N/A	N/A	Excess <5 dBA and future sound level < 65 dBA - mitigation not warranted
R2c		21			NO	N/A	N/A	Excess <5 dBA and future sound level < 65 dBA - mitigation not warranted
R3		16			NO	N/A	N/A	Excess <5 dBA and future sound level < 65 dBA - mitigation not warranted
R4		11			NO	N/A	N/A	Excess <5 dBA and future sound level < 65 dBA - mitigation not warranted
R5		10			NO	N/A	N/A	Excess <5 dBA and future sound level < 65 dBA - mitigation not warranted
R6		12			NO	N/A	N/A	Excess <5 dBA and future sound level < 65 dBA - mitigation not warranted
R7		9			NO	N/A	N/A	Excess <5 dBA and future sound level < 65 dBA - mitigation not warranted
R8		7			NO	N/A	N/A	Excess <5 dBA and future sound level < 65 dBA - mitigation not warranted
R9		6			NO	N/A	N/A	Excess <5 dBA and future sound level < 65 dBA - mitigation not warranted
R10		11			NO	N/A	N/A	Excess <5 dBA and future sound level < 65 dBA - mitigation not warranted
R11		7			NO	N/A	N/A	Excess <5 dBA and future sound level < 65 dBA, mitigation – not warranted
R12		4			NO	N/A	N/A	Excess <5 dBA and future sound level < 65 dBA - mitigation not warranted
R13		8			YES	YES	SOUND BARRIER	Future sound level ≥ 65 dBA - mitigation to be investigated
R14			10		YES	YES	SOUND BARRIER	Excess ≥ 5 dBA and future sound level ≥ 65 dBA - mitigation to be investigated

TABLE 4 (Cont'd)
SUMMARY OF NOISE IMPACT ASSESSMENT
HIGHWAY 6 (HANLON EXPRESSWAY) FROM MALTBY ROAD TO SPEED RIVER
MTO GWP #3002-05-00

AREA	NO. OF HOUSES AFFECTED				FUTURE SOUND LEVELS OVER 65 dBA	OPPORTUNITY FOR NOISE CONTROL	TYPE OF MITIGATION	RATIONALE/COMMENTS
	0-5 dBA DECREASE	0-<5 dBA INCREASE	5-10 dBA INCREASE	>10 dBA INCREASE				
R15			10		YES	YES	SOUND BARRIER	Excess ≥ 5 dBA and future sound level ≥ 65 dBA - mitigation to be investigated
R16			22		YES	YES	SOUND BARRIER	Excess ≥ 5 dBA and future sound level ≥ 65 dBA - mitigation to be investigated
R17			10		NO	YES	SOUND BARRIER	Excess ≥ 5 dBA - mitigation to be investigated
R18			16		NO	YES	SOUND BARRIER	Excess ≥ 5 dBA - mitigation to be investigated
R19	N/A – NO OUTDOOR LIVING AREA				--		--	
R20[1]			1		NO	YES	SOUND BARRIER	Excess ≥ 5 dBA - mitigation to be investigated
R21			9		NO	YES	SOUND BARRIER	Excess ≥ 5 dBA and future sound level ≥ 65 dBA - mitigation to be investigated
R22			15		NO	YES	SOUND BARRIER	Excess ≥ 5 dBA - mitigation to be investigated
R23			10		NO	YES	SOUND BARRIER	Excess ≥ 5 dBA - mitigation to be investigated
R24		16			NO	NO	NA	Excess <5 dBA and future sound level < 65 dBA - mitigation not warranted
R25			4		NO	YES	SOUND BARRIER	Excess ≥ 5 dBA - mitigation to be investigated
R26		10			NO	NO	N/A	Excess <5 dBA and future sound level < 65 dBA - mitigation not warranted
R27[2]			3		NO	YES	SOUND BARRIER	Excess ≥ 5 dBA - mitigation to be investigated
R28[2]			4		YES	YES	SOUND BARRIER	Excess ≥ 5 dBA and future sound level ≥ 65 dBA - mitigation to be investigated
R29			3		YES	YES	SOUND BARRIER	Excess ≥ 5 dBA and future sound level ≥ 65 dBA - mitigation to be investigated
R30			7		NO	YES	SOUND BARRIER	Excess ≥ 5 dBA - mitigation to be investigated

TABLE 4 (Cont'd)
SUMMARY OF NOISE IMPACT ASSESSMENT
HIGHWAY 6 (HANLON EXPRESSWAY) FROM MALTBY ROAD TO SPEED RIVER
MTO GWP #3002-05-00

AREA	NO. OF HOUSES AFFECTED				FUTURE SOUND LEVELS OVER 65 dBA	OPPORTUNITY FOR NOISE CONTROL	TYPE OF MITIGATION	RATIONALE/COMMENTS
	0-5 dBA DECREASE	0-<5 dBA INCREASE	5-10 dBA INCREASE	>10 dBA INCREASE				
R31		1			NO	NO	N/A	Excess <5 dBA and future sound level < 65 dBA - mitigation not warranted
R32		13			NO	NO	N/A	Excess <5 dBA and future sound level < 65 dBA - mitigation not warranted
R33		13			NO	NO	N/A	Excess <5 dBA and future sound level < 65 dBA - mitigation not warranted
R34			6		YES	YES	SOUND BARRIER	Excess ≥ 5 dBA and future sound level ≥ 65 dBA - mitigation to be investigated
R35	4				NO	NO	N/A	Excess <5 dBA and future sound level < 65 dBA - mitigation – not warranted
R36			5		NO	NO	N/A	Excess <5 dBA and future sound level < 65 dBA - mitigation – not warranted
R37			29		NO	NO	N/A	Excess <5 dBA and future sound level < 65 dBA - mitigation – not warranted

Notes:

1 Senior Building (multi-residential units)
2 Townhouse blocks (multi-residential units)

FIGURES

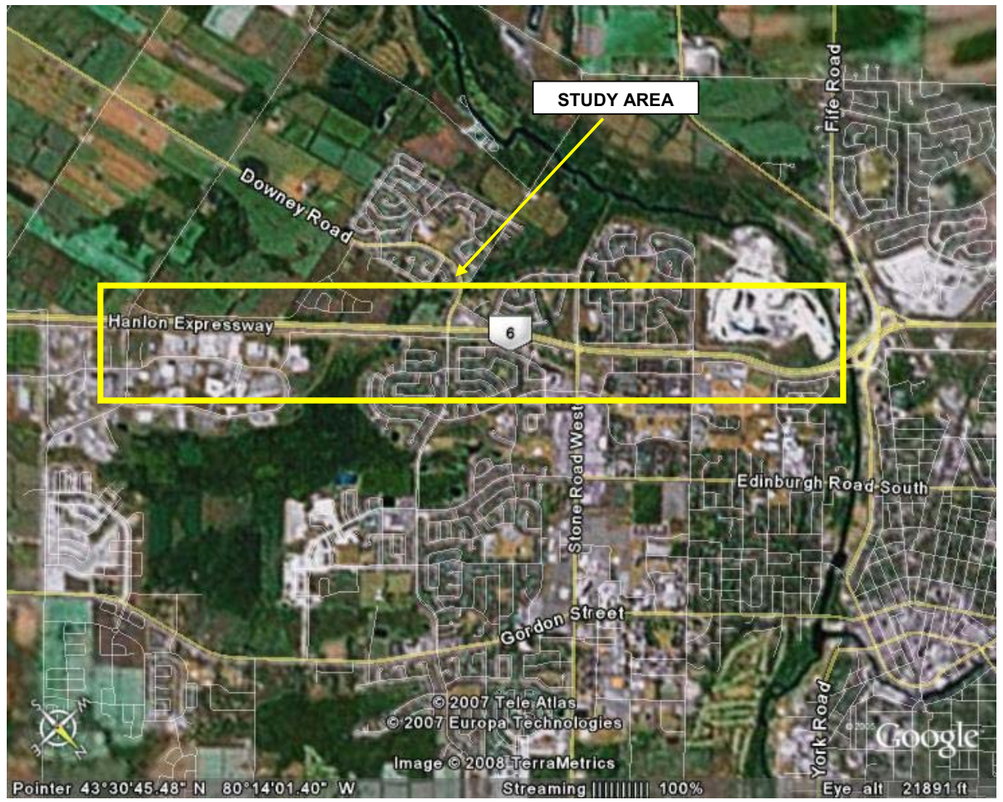


FIGURE 1
STUDY AREA

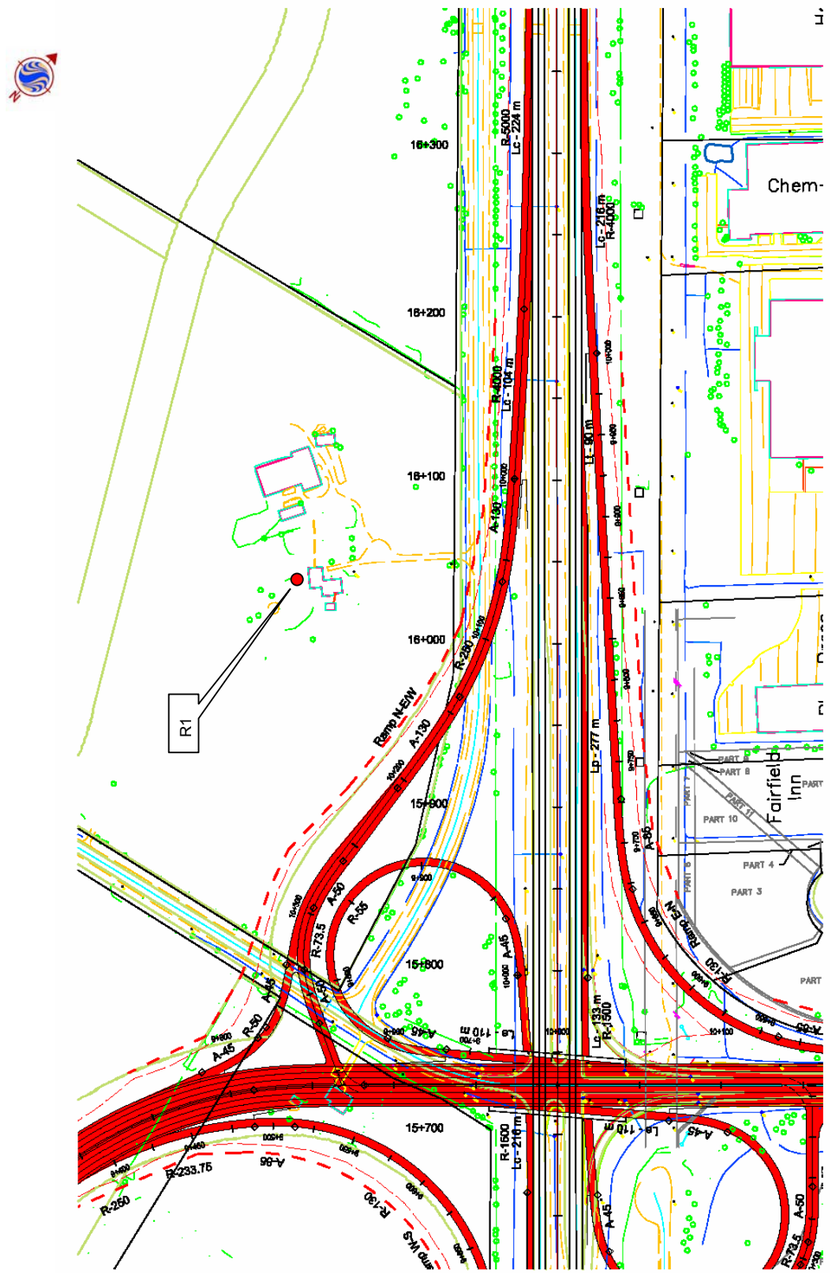


FIGURE 2.1
SELECTED RECEPTOR LOCATIONS

FIGURE 2.2
SELECTED RECEPTOR LOCATIONS

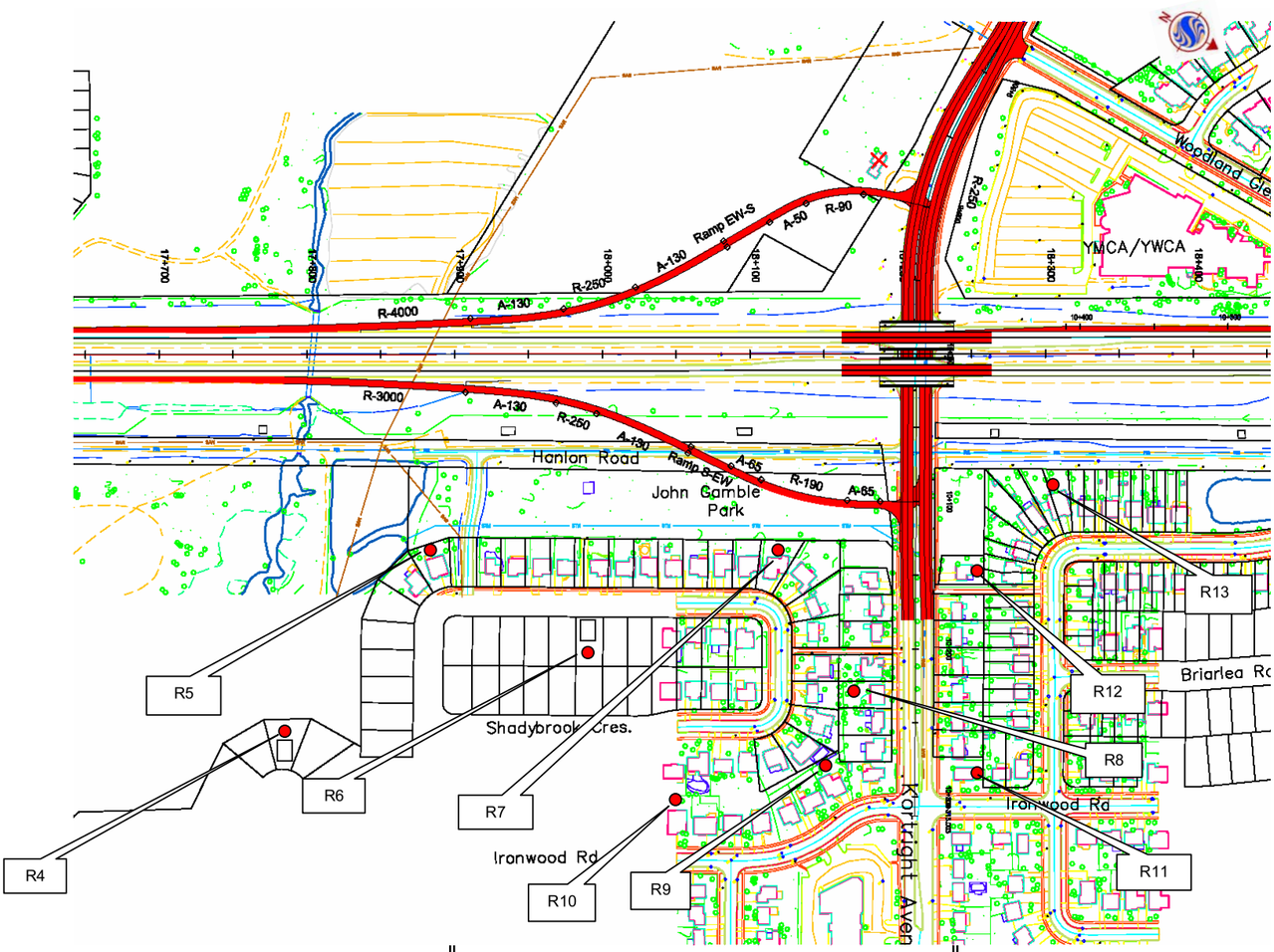


FIGURE 2.3
SELECTED RECEPTOR LOCATIONS

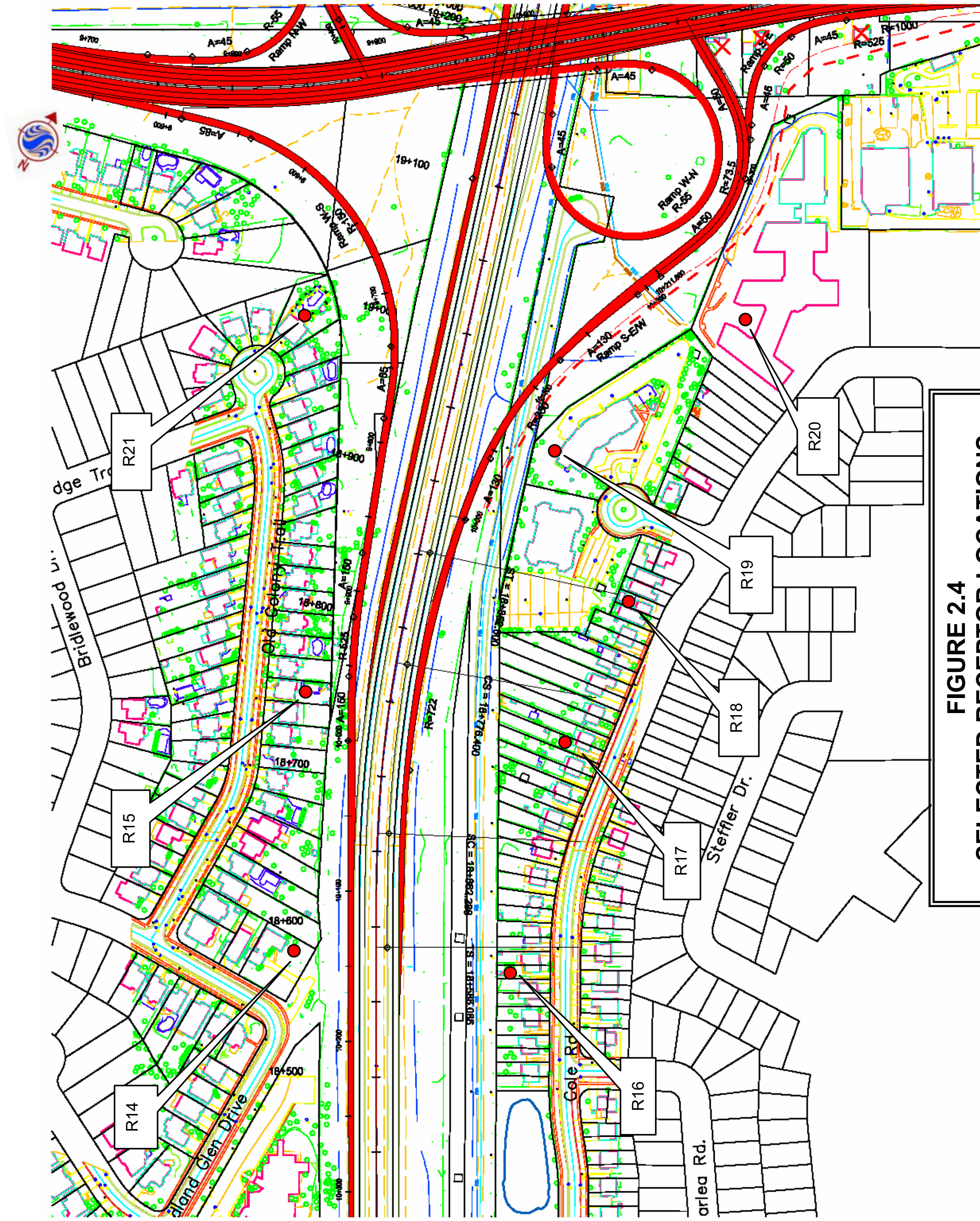


FIGURE 2.4
SELECTED RECEPTOR LOCATIONS

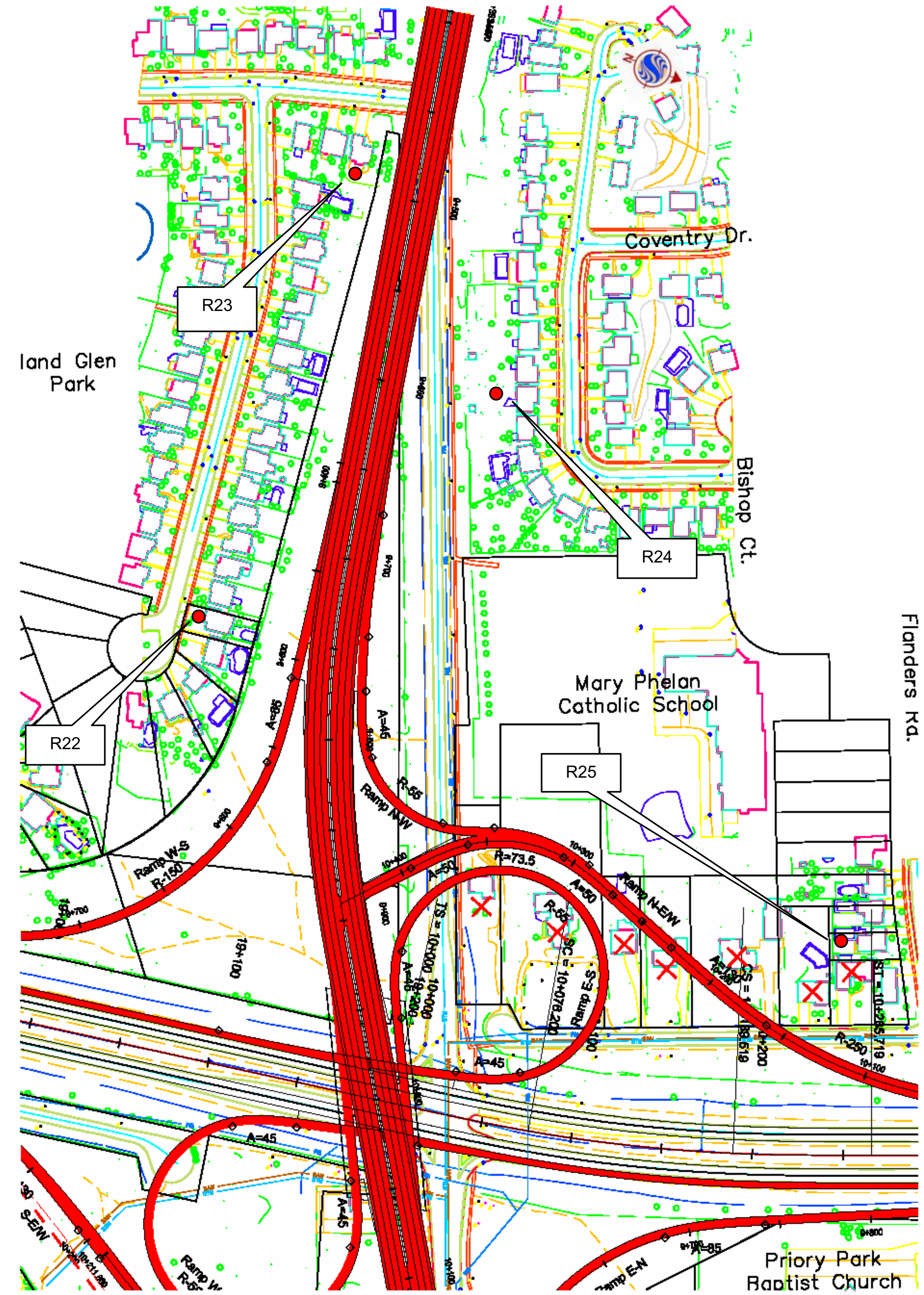


FIGURE 2.5
SELECTED RECEPTOR LOCATIONS

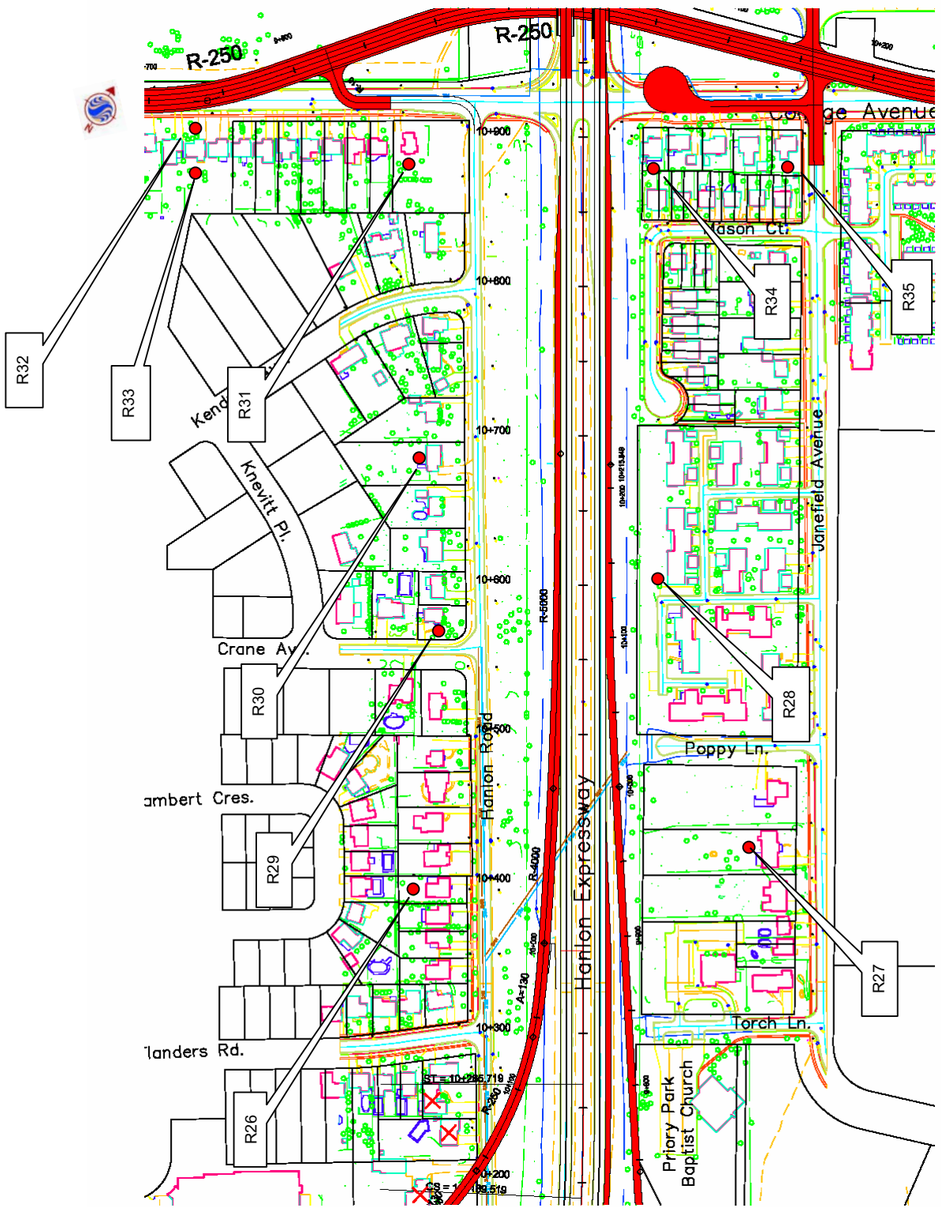


FIGURE 2.6
SELECTED RECEPTOR LOCATIONS

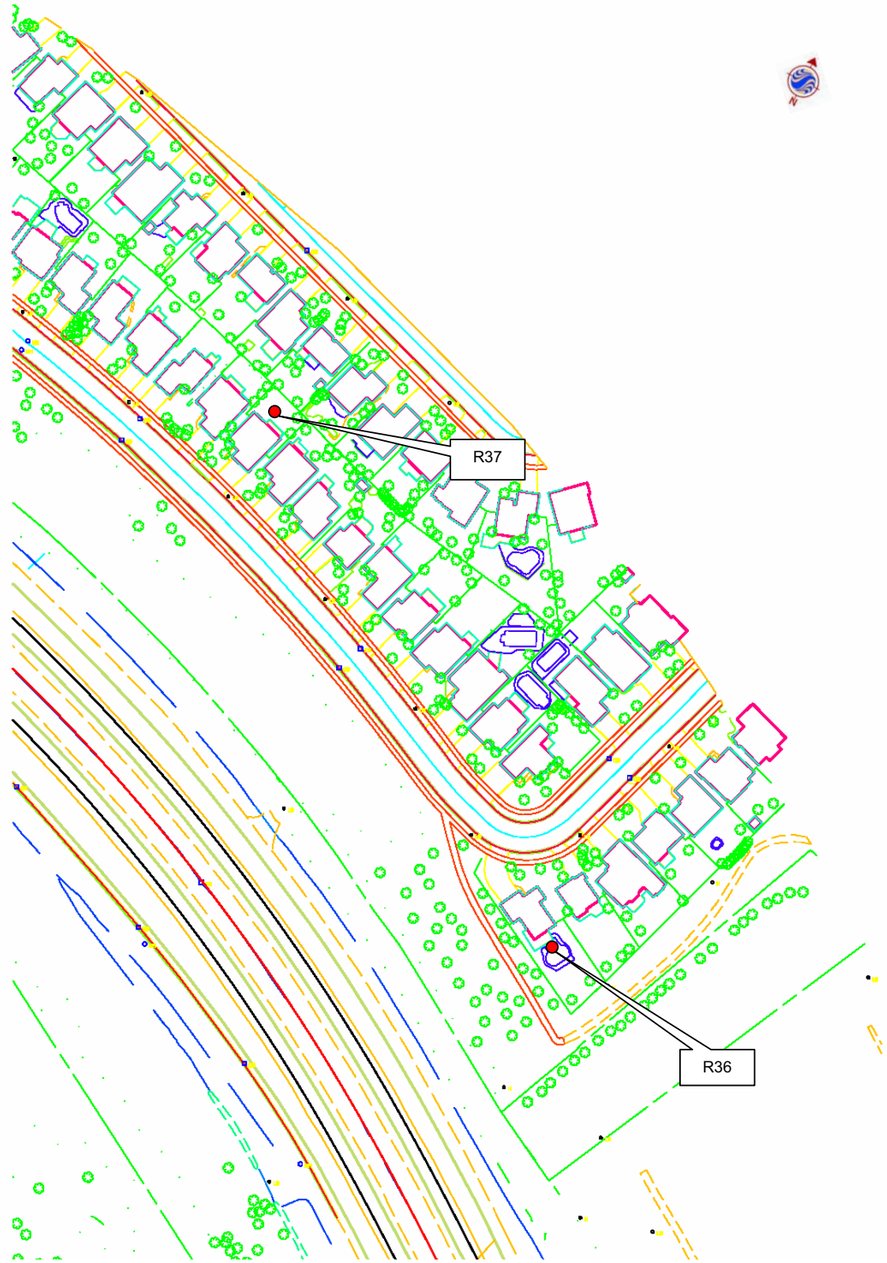


FIGURE 2.7
SELECTED RECEPTOR LOCATIONS

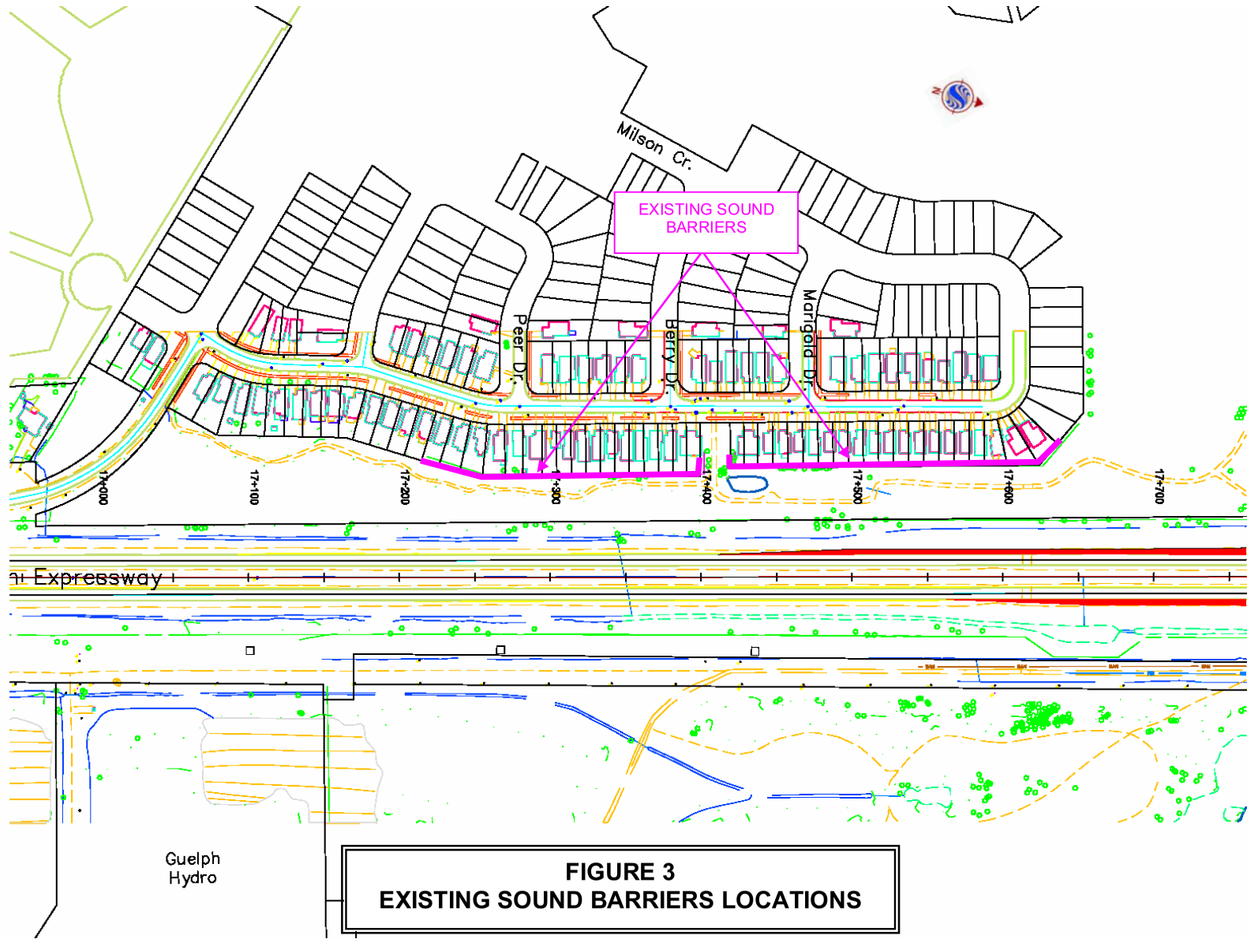


FIGURE 3
EXISTING SOUND BARRIERS LOCATIONS

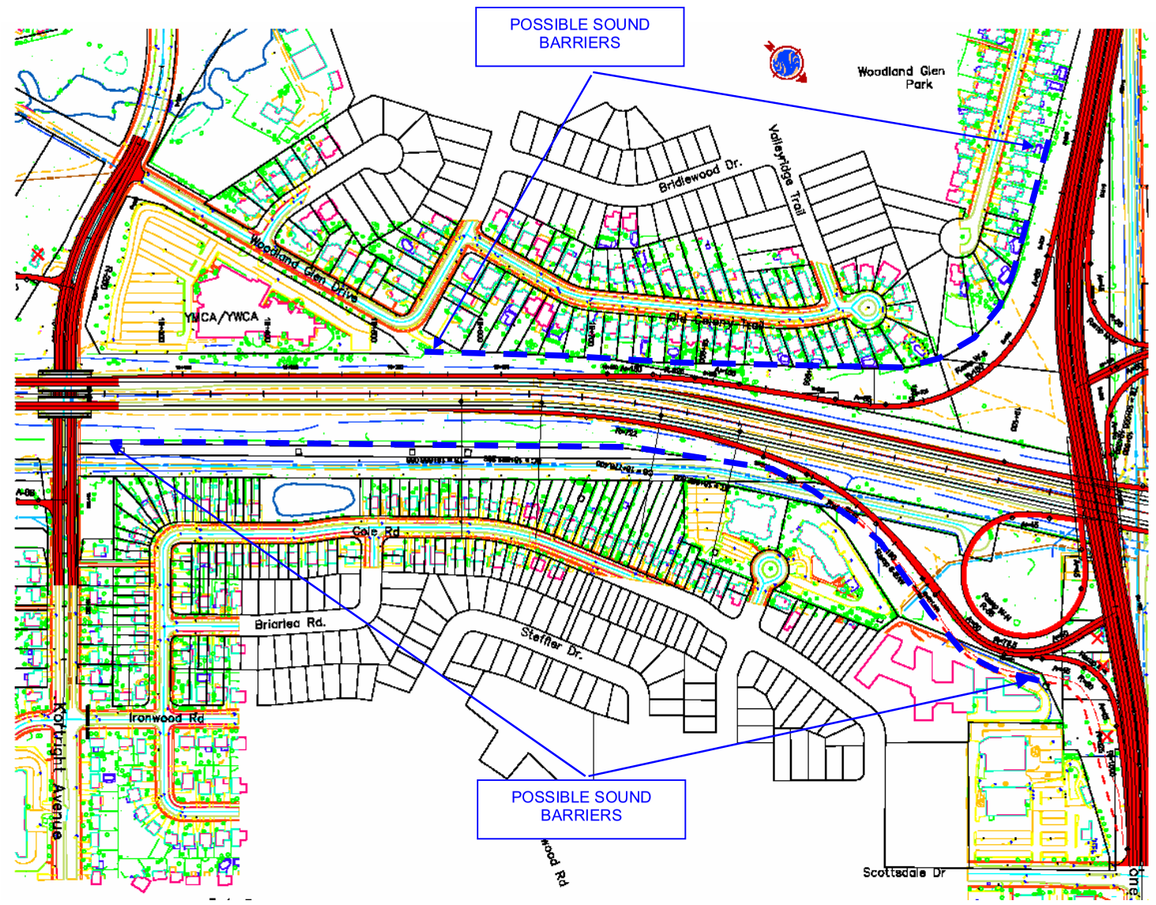


FIGURE 4.1
SCHEMATIC ALIGNMENTS OF
THE INVESTIGATED SOUND BARRIERS

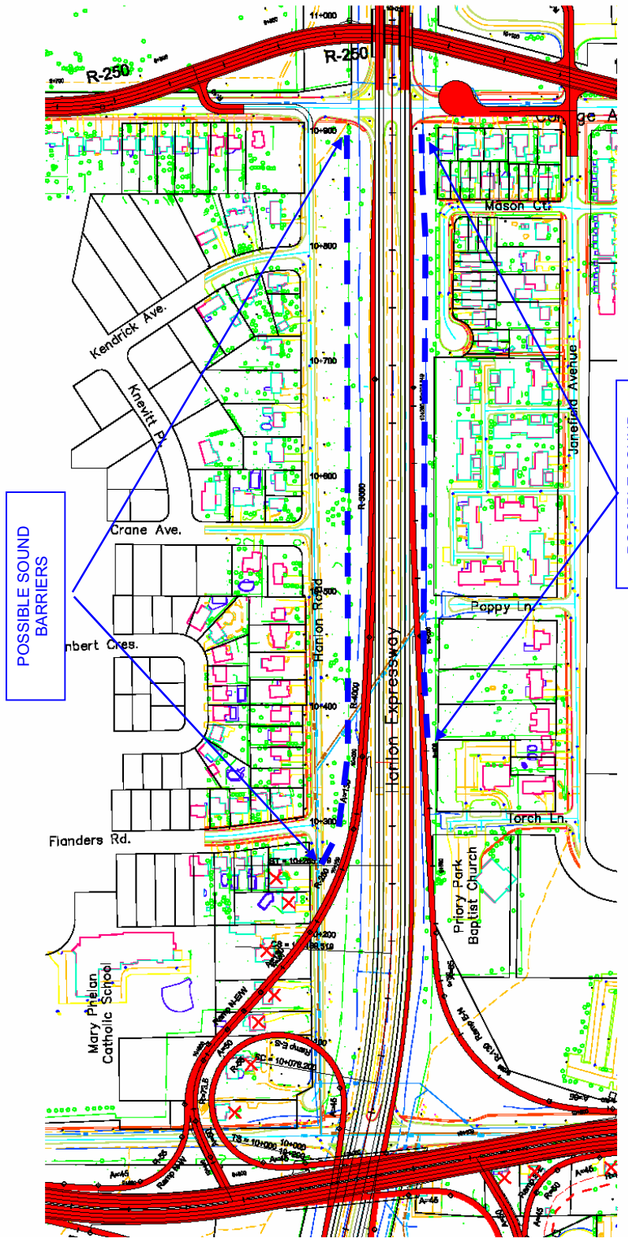


FIGURE 4.1
SCHEMATIC ALIGNMENTS OF THE INVESTIGATED SOUND BARRIERS

APPENDIX A

ROAD TRAFFIC DATA

LOCATION: Highway 6 from South of Clair Road

TRAFFIC DATA	EXISTING CONDITIONS (YEAR)	F-D-N CONDITIONS (YEAR……..)	FUTURE CONDITIONS (YEAR…….)
AADT	26,900	58,600	58,600
SADT	30,100	65,700	65,700
No. Of Lanes	4	4	4
% Of Trucks	15.2	15.2	15.2
Ratio Of Medium to Heavy Trucks	--	--	--
Day/Night Traffic Split	--	--	--
Posted Speed Limit	80	80	90
Gradient Of Road	<2%	<2%	<2%
R.O.W.	--	--	--

LOCATION: Highway 6 from Clair Road to Kortright Road

TRAFFIC DATA	EXISTING CONDITIONS (YEAR 2007)	F-D-N CONDITIONS (YEAR 2027)	FUTURE CONDITIONS (YEAR 2027)
AADT	29,700	62,700	62,700
SADT	31,200	65,900	65,900
No. Of Lanes	4	4	4
% Of Trucks	13.1	13.1	13.1
Ratio Of Medium to Heavy Trucks	--	--	--
Day/Night Traffic Split	--	--	--
Posted Speed Limit	80	80	90
Gradient Of Road	<2%	<2%	<2%
R.O.W.	--	--	--

LOCATION: Highway 6 from Kortright Road to College Avenue

TRAFFIC DATA	EXISTING CONDITIONS (YEAR 2007)	F-D-N CONDITIONS (YEAR 2027)	FUTURE CONDITIONS (YEAR 2027)
AADT	35,800	72,800	72,800
No. Of Lanes	4	4	4
% Of Trucks	10.3	10.3	10.3
SADT	37,500	76,300	76,300
Day/Night Traffic Split	--	--	--
Posted Speed Limit	70	70	90
Gradient Of Road	<2%	<2%	<2%

1) Medium Trucks : 2 axles and 6 wheels, gross weight between 4,500 lb and 12,000 lb (includes city buses);
2) Heavy Trucks : 3 or more axles, gross weight greater than 12,000 lb (includes inter-city buses).
3) Day: 07:00 – 23:00 & Night: 23:00 – 07:00

LOCATION: Highway 6 from College Avenue to Wellington Street

TRAFFIC DATA	EXISTING CONDITIONS (YEAR 2007)	F-D-N CONDITIONS (YEAR 2027)	FUTURE CONDITIONS (YEAR 2027)
AADT	49,500	82,000	82,000
SADT	52,500	86,900	86,900
No. Of Lanes	4	4	4
% Of Trucks	8.5%	8.5%	8.5%
Ratio Of Medium to Heavy Trucks	--	--	--
Day/Night Traffic Split	--	--	--
Posted Speed Limit	70	70	90
Gradient Of Road	<2%	<2%	<2%
R.O.W.	--	--	--

LOCATION: Laird Road – East of Highway 6

TRAFFIC DATA	EXISTING CONDITIONS (YEAR 2007)	F-D-N CONDITIONS (YEAR 2027)	FUTURE CONDITIONS (YEAR 2027)
AADT	12,000	18,000	24,000
SADT	--	--	--
No. Of Lanes	2	2	6
% Of Trucks	12%	12%	12%
Ratio Of Medium to Heavy Trucks	--	--	--
Day/Night Traffic Split	55/45	55/45	55/45
Directional Split	50/50	50/50	50/50
Posted Speed Limit	60	60	60
Gradient Of Road	0%	0%	3%
R.O.W.	--	--	--

LOCATION: Laird Road – West of Highway 6

TRAFFIC DATA	EXISTING CONDITIONS (YEAR 2007)	F-D-N CONDITIONS (YEAR 2027)	FUTURE CONDITIONS (YEAR 2027)
AADT	2,500	3,800	12,500
SADT	--	--	--
No. Of Lanes	2	2	6
% Of Trucks	10%	10%	20%
Ratio Of Medium to Heavy Trucks	--	--	--
Day/Night Traffic Split	50/50	50/50	50/50
Directional Split	60	60	60
Posted Speed Limit	0%	0%	3%
Gradient Of Road	--	--	--
R.O.W.			

1) Medium Trucks : 2 axles and 6 wheels, gross weight between 4,500 lb and 12,000 lb (includes city buses);
2) Heavy Trucks : 3 or more axles, gross weight greater than 12,000 lb (includes inter-city buses).
3) Day: 07:00 – 23:00 & Night: 23:00 – 07:00

LOCATION: Laird Road I/C – N-E/W Ramp

TRAFFIC DATA	EXISTING CONDITIONS (YEAR)	F-D-N CONDITIONS (YEAR)	FUTURE CONDITIONS (YEAR 2027)
AADT			11,000
SADT			--
No. Of Lanes			2
% Of Trucks			10%
Ratio Of Medium to Heavy Trucks			--
Day/Night Traffic Split			65/35
Directional Split			N/A
Posted Speed Limit			60
Gradient Of Road			3%--
R.O.W.			

LOCATION: Laird Road I/C – E-S Ramp

TRAFFIC DATA	EXISTING CONDITIONS (YEAR)	F-D-N CONDITIONS (YEAR)	FUTURE CONDITIONS (YEAR 2027)
AADT			1,500
SADT			--
No. Of Lanes			1
% Of Trucks			10%
Ratio Of Medium to Heavy Trucks			--
Day/Night Traffic Split			45/55
Directional Split			N/A
Posted Speed Limit			60
Gradient Of Road			4%
R.O.W.			--

LOCATION: Laird Road I/C – W-S Ramp

TRAFFIC DATA	EXISTING CONDITIONS (YEAR)	F-D-N CONDITIONS (YEAR)	FUTURE CONDITIONS (YEAR 2027)
AADT			1,500
SADT			--
No. Of Lanes			1
% Of Trucks			10%
Ratio Of Medium to Heavy Trucks			--
Day/Night Traffic Split			30/70
Directional Split			N/A
Posted Speed Limit			60
Gradient Of Road			4%
R.O.W.			--

1) Medium Trucks : 2 axles and 6 wheels, gross weight between 4,500 lb and 12,000 lb (includes city buses);
2) Heavy Trucks : 3 or more axles, gross weight greater than 12,000 lb (includes inter-city buses).
3) Day: 07:00 – 23:00 & Night: 23:00 – 07:00

LOCATION: Laird Road I/C S-E/W Ramp

TRAFFIC DATA	EXISTING CONDITIONS (YEAR)	F-D-N CONDITIONS (YEAR……..)	FUTURE CONDITIONS (YEAR 2027)
AADT			2,500
SADT			--
No. Of Lanes			1
% Of Trucks			10%
Ratio Of Medium to Heavy Trucks			--
Day/Night Traffic Split			50/50
Directional Split			N/A
Posted Speed Limit			60
Gradient Of Road			2%
R.O.W.			--

LOCATION: Laird Road I/C – W-N Ramp

TRAFFIC DATA	EXISTING CONDITIONS (YEAR)	F-D-N CONDITIONS (YEAR……..)	FUTURE CONDITIONS (YEAR 2027)
AADT			3,000
SADT			--
No. Of Lanes			1
% Of Trucks			10%
Ratio Of Medium to Heavy Trucks			--
Day/Night Traffic Split			30/70
Directional Split			N/A
Posted Speed Limit			60
Gradient Of Road			4%
R.O.W.			--

LOCATION: Laird Road I/C – E-N Ramp

TRAFFIC DATA	EXISTING CONDITIONS (YEAR)	F-D-N CONDITIONS (YEAR)	FUTURE CONDITIONS (YEAR 2027)
AADT			10,000
SADT			--
No. Of Lanes			1
% Of Trucks			10%
Ratio Of Medium to Heavy Trucks			--
Day/Night Traffic Split			40/60
Directional Split			N/A
Posted Speed Limit			60
Gradient Of Road			3%
R.O.W.			--

1) Medium Trucks : 2 axles and 6 wheels, gross weight between 4,500 lb and 12,000 lb (includes city buses);
2) Heavy Trucks : 3 or more axles, gross weight greater than 12,000 lb (includes inter-city buses).
3) Day: 07:00 – 23:00 & Night: 23:00 – 07:00

LOCATION: Kortright Avenue

TRAFFIC DATA	EXISTING CONDITIONS (YEAR 2007)	F-D-N CONDITIONS (YEAR 2027)	FUTURE CONDITIONS (YEAR 2027)
AADT	12,000	18,000	15,000
SADT	--	--	--
No. Of Lanes	4	4	4
% Of Trucks	4%	4%	2%
Ratio Of Medium to Heavy Trucks	--	--	--
Day/Night Traffic Split	50/50	50/50	50/50
Directional Split	--	--	--
Posted Speed Limit	50	50	50
Gradient Of Road	5%	5%	5%
R.O.W.	--	--	--

LOCATION: Downey Drive

TRAFFIC DATA	EXISTING CONDITIONS (YEAR 2007)	F-D-N CONDITIONS (YEAR 2027)	FUTURE CONDITIONS (YEAR 2027)
AADT	13,000	19,000	15,000
SADT	--	--	--
No. Of Lanes	4	4	4
% Of Trucks	2%	2%	2%
Ratio Of Medium to Heavy Trucks	--	--	--
Day/Night Traffic Split	50/50	50/50	50/50
Directional Split	50/50	50/50	50/50
Posted Speed Limit	50	50	50
Gradient Of Road	5%	5%	1%
R.O.W.	--	--	--

LOCATION: Kortright I/C – W/W-S Ramp

TRAFFIC DATA	EXISTING CONDITIONS (YEAR)	F-D-N CONDITIONS (YEAR……..)	FUTURE CONDITIONS (YEAR 2027)
AADT			5,000
SADT			--
No. Of Lanes			1
% Of Trucks			5%
Ratio Of Medium to Heavy Trucks			--
Day/Night Traffic Split			--
Directional Split			N/A
Posted Speed Limit			60
Gradient Of Road			1%
R.O.W.			--

1) Medium Trucks : 2 axles and 6 wheels, gross weight between 4,500 lb and 12,000 lb (includes city buses);
2) Heavy Trucks : 3 or more axles, gross weight greater than 12,000 lb (includes inter-city buses).
3) Day: 07:00 – 23:00 & Night: 23:00 – 07:00

LOCATION: Kortright I/C – S-E/W Ramp

TRAFFIC DATA	EXISTING CONDITIONS (YEAR)	F-D-N CONDITIONS (YEAR……..)	FUTURE CONDITIONS (YEAR 2027)
AADT			8,000
SADT			--
No. Of Lanes			1
% Of Trucks			5%
Ratio Of Medium to Heavy Trucks			--
Day/Night Traffic Split			--
Directional Split			--
Posted Speed Limit			N/A (assume 60)
Gradient Of Road			2%
R.O.W.			--

LOCATION: Stone Road – West of Highway 6

TRAFFIC DATA	EXISTING CONDITIONS (YEAR 2007)	F-D-N CONDITIONS (YEAR 2027)	FUTURE CONDITIONS (YEAR 2027)
AADT	4,500	6,700	15,000
SADT	--	--	--
No. Of Lanes	2	2	6
% Of Trucks	2%	2%	2%
Ratio Of Medium to Heavy Trucks	--	--	--
Day/Night Traffic Split	--	--	--
Directional Split	--	--	--
Posted Speed Limit	50	50	50
Gradient Of Road	2%	2%	4%
R.O.W.	--	--	--

LOCATION: Stone Road – East of Highway 6

TRAFFIC DATA	EXISTING CONDITIONS (YEAR 2007)	F-D-N CONDITIONS (YEAR 2027)	FUTURE CONDITIONS (YEAR 2027)
AADT	18,000	27,000	37,000
SADT	--	--	--
No. Of Lanes	4	4	6
% Of Trucks	4%	4%	4%
Ratio Of Medium to Heavy Trucks	--	--	--
Day/Night Traffic Split	--	--	--
Directional Split	--	--	--
Posted Speed Limit	50	50	50
Gradient Of Road	4%	4%	2%
R.O.W.	--	--	--

1) Medium Trucks : 2 axles and 6 wheels, gross weight between 4,500 lb and 12,000 lb (includes city buses);
2) Heavy Trucks : 3 or more axles, gross weight greater than 12,000 lb (includes inter-city buses).
3) Day: 07:00 – 23:00 & Night: 23:00 – 07:00

LOCATION: Stone Road I/C – W/S Ramp

TRAFFIC DATA	EXISTING CONDITIONS (YEAR)	F-D-N CONDITIONS (YEAR……..)	FUTURE CONDITIONS (YEAR 2027)
AADT			2,600
SADT			--
No. Of Lanes			1
% Of Trucks			2%
Ratio Of Medium to Heavy Trucks			--
Day/Night Traffic Split			--
Directional Split			N/A
Posted Speed Limit			60
Gradient Of Road			3%
R.O.W.			--

LOCATION: Stone Road I/C – N-E/W Ramp

TRAFFIC DATA	EXISTING CONDITIONS (YEAR)	F-D-N CONDITIONS (YEAR)	FUTURE CONDITIONS (YEAR 2027)
AADT			15,000
SADT			--
No. Of Lanes			2
% Of Trucks			2%
Ratio Of Medium to Heavy Trucks			--
Day/Night Traffic Split			--
Directional Split			N/A
Posted Speed Limit			60
Gradient Of Road			3%
R.O.W.			--

LOCATION: Stone Road I/C – E-S Ramp

TRAFFIC DATA	EXISTING CONDITIONS (YEAR)	F-D-N CONDITIONS (YEAR……..)	FUTURE CONDITIONS (YEAR 2027)
AADT			8,000
SADT			--
No. Of Lanes			1
% Of Trucks			2%
Ratio Of Medium to Heavy Trucks			--
Day/Night Traffic Split			--
Directional Split			N/A
Posted Speed Limit			60
Gradient Of Road			3.5%
R.O.W.			--

1) Medium Trucks : 2 axles and 6 wheels, gross weight between 4,500 lb and 12,000 lb (includes city buses);
2) Heavy Trucks : 3 or more axles, gross weight greater than 12,000 lb (includes inter-city buses).
3) Day: 07:00 – 23:00 & Night: 23:00 – 07:00

LOCATION: Stone Road I/C – W-N Ramp

TRAFFIC DATA	EXISTING CONDITIONS (YEAR)	F-D-N CONDITIONS (YEAR……..)	FUTURE CONDITIONS (YEAR 2027)
AADT			2,000
SADT			--
No. Of Lanes			1
% Of Trucks			2%
Ratio Of Medium to Heavy Trucks			--
Day/Night Traffic Split			--
Directional Split			N/A
Posted Speed Limit			60
Gradient Of Road			4%
R.O.W.			--

LOCATION: Stone Road I/C – S-E/W Ramp

TRAFFIC DATA	EXISTING CONDITIONS (YEAR)	F-D-N CONDITIONS (YEAR)	FUTURE CONDITIONS (YEAR 2027)
AADT			7,000
SADT			--
No. Of Lanes			1
% Of Trucks			2%
Ratio Of Medium to Heavy Trucks			--
Day/Night Traffic Split			--
Directional Split			N/A
Posted Speed Limit			60
Gradient Of Road			5%
R.O.W.			--

LOCATION: Stone Road I/C – E-N Ramp

TRAFFIC DATA	EXISTING CONDITIONS (YEAR)	F-D-N CONDITIONS (YEAR……..)	FUTURE CONDITIONS (YEAR 2027)
AADT			7,000
SADT			--
No. Of Lanes			1
% Of Trucks			2%
Ratio Of Medium to Heavy Trucks			--
Day/Night Traffic Split			--
Directional Split			N/A
Posted Speed Limit			60
Gradient Of Road			4%
R.O.W.			--

1) Medium Trucks : 2 axles and 6 wheels, gross weight between 4,500 lb and 12,000 lb (includes city buses);
2) Heavy Trucks : 3 or more axles, gross weight greater than 12,000 lb (includes inter-city buses).
3) Day: 07:00 – 23:00 & Night: 23:00 – 07:00

LOCATION: College Avenue – West of Highway 6

TRAFFIC DATA	EXISTING CONDITIONS (YEAR 2007)	F-D-N CONDITIONS (YEAR.2027)	FUTURE CONDITIONS (YEAR 2027)
AADT	5,100	7,700	7,000
SADT	--	--	--
No. Of Lanes	4	4	4
% Of Trucks	2%	2%	2%
Ratio Of Medium to Heavy Trucks	--	--	--
Day/Night Traffic Split	--	--	--
Directional Split	50/50	50/50	50/50
Posted Speed Limit	50	50	50
Gradient Of Road	0%	0%	4%
R.O.W.	--	--	--

LOCATION: College Avenue – East of Highway 6

TRAFFIC DATA	EXISTING CONDITIONS (YEAR 2007)	F-D-N CONDITIONS (YEAR 2027)	FUTURE CONDITIONS (YEAR 2027)
AADT	10,000	15,000	5,000
SADT	--	--	--
No. Of Lanes	4	4	4
% Of Trucks	2%	2%	2%
Ratio Of Medium to Heavy Trucks	--	--	--
Day/Night Traffic Split	--	--	--
Directional Split	50/50	50/50	50/50
Posted Speed Limit	50	50	50
Gradient Of Road	0%	0%	4%
R.O.W.	--	--	--

1) Medium Trucks : 2 axles and 6 wheels, gross weight between 4,500 lb and 12,000 lb (includes city buses);
2) Heavy Trucks : 3 or more axles, gross weight greater than 12,000 lb (includes inter-city buses).
3) Day: 07:00 – 23:00 & Night: 23:00 – 07:00

APPENDIX B

SAMPLE SOUND LEVEL CALCULATIONS (ON FILE WITH MTO)

APPENDIX C

EXISTING SOUND LEVEL MEASUREMENTS

November 17, 2008

Ms. Maya Caron
Stantec Consulting Ltd.

BY E-MAIL: maya.caron@stantec.com

Dear Ms. Caron,

RE: Existing Ambient Sound Level Measurements
Highway 6 (Hanlon Expressway) Improvements
From Maltby Road to the Speed River
City of Guelph, Ontario
MTO GWP #3022-05-00
SSWA File Number WA07-01

This study letter is prepared as per the request made by the MTO and deals with the ambient sound level measurements at the Outdoor Living Areas (OLA's) of the residences along both sides of the above noted Highway 6 corridor in the City of Guelph.

The measured existing day and night ambient sound levels over a period of five days (September 15 – 19, 2008) are in the range of Leq (16h) 50 to 63 dBA day and Leq (8h) 45 to 59 dBA night.

The following paragraphs include all the details pertaining to the ambient noise measurements.

General

The overall existing ambient sound levels are largely due to vehicular traffic movements on the existing Highway 6 corridor and on the intersecting roads.

The scope of the ambient noise measurements is to conduct actual field testing in order to:

- provide factual information on the present ambient sound levels
- support and enhance the calculated levels
- indicate if and where anomalies exist in the corresponding predicted levels

Instrumentation

The ambient sound level measurements were performed using the following equipment:

- Eight Rion NL-22 Integrating Sound Level Meters fitted with 1/2" condenser microphones c/w windscreens. The sound level meters were contained in weather-protected environmental casings.
- Bruel & Kjaer Precision Calibrator Model B&K 4231.
- Ancillary field equipment including tripods and telescopic poles

Procedures

Long term (un-attenuated) sound level readings were taken for a period of 5 days from Monday, September 15 to Friday, September 19, 2008.

The sound level measurement procedures were primarily based on the Ministry of Environment procedures in their Publications NPC-102 "Instrumentation" and NPC-103 "Procedures", the recommendations of the instrument manufactures and the best engineering practices to suit site specific conditions. The sound level meters were checked and calibrated before and following completion of the measurement sessions without any appreciable change in the sound levels.

The weather conditions during the measurement sessions were favourable for measurements as the local wind speed did not exceed 20 km/hr and there was no precipitation.

Locations

Eight locations were selected by MTO staff for noise measurements. The following gives a brief description of the measurements locations:

- Location M1 – House at #6 Deerchase Road
- Location M2 – House at #18 Shadybrook Crescent
- Location M3 – House at #41 Shadybrook Crescent
- Location M4 – House at #259 Cole Road
- Location M5 – House at #27 Old Colony Trail
- Location M6 – House at #38 Wagoners Trail
- Location M7 – House at #30 Mason Court
- Location M8 – House at #659 Hanlon Road

Results

The measured existing ambient sound levels are in the range of Leq (16h) 50 to 63 dBA day and Leq(8h) 45 to 59 dBA night. It should be noted that the data collected during the first and last day of the measurements are not complete 24 hour data and therefore, this data was not included in the reported levels. (The data reported pertain to Tuesday, September 16 to Thursday, September 18, 2008).

Tables A.1 to A.8 include the measured ambient sound levels during the day and night (i.e. Leq (16h) and Leq (8h).

Figures A.1 to A.3 show the ambient noise measurement locations denoted as M1 to M8.

The noise measurements are attached.

The above information will be included as a new section in our revised Noise Study Report (to be prepared shortly) for Highway 6 (Hanlon Expressway) Improvements.

I trust the above will be of assistance to you.

If you have any questions, please contact our office.

Yours truly,

T. Zayed

Tarek Zayed, P.Eng.
Senior Project Engineer

TABLE A.1
LOCATION M1
HOUSE AT #6 DEERCHASE ROAD

Date	Leq (16h) Day	Leq (8h) Night
Monday, September 15, 2008	52 dBA	40 dBA
Tuesday September 16, 2008	57 dBA	53 dBA
Wednesday September 17, 2008	57 dBA	56 dBA
Thursday, September 18, 2008	56 dBA	53 dBA
Friday, September 19, 2008	54 dBA	54 dBA

TABLE A.2
LOCATION M2
HOUSE AT #18 SHADYBROOK CRESCENT

Date	Leq Day	Leq Night
Monday, September 15, 2008	54 dBA	44 dBA
Tuesday September 16, 2008	59 dBA	55 dBA
Wednesday September 17, 2008	59 dBA	56 dBA
Thursday, September 18, 2008	59 dBA	55 dBA
Friday, September 19, 2008	57 dBA	57 dBA

TABLE A.3
LOCATION M3
HOUSE AT 41 SHADYBROOK CRESCENT

Date	Leq Day	Leq Night
Monday, September 15, 2008	48 dBA	44 dBA
Tuesday September 16, 2008	50 dBA	45 dBA
Wednesday September 17, 2008	52 dBA	49 dBA
Thursday, September 18, 2008	50 dBA	46 dBA
Friday, September 19, 2008	47 dBA	43 dBA

TABLE A.4
LOCATION M4
HOUSE AT 259 COLE ROAD

Date	Leq Day	Leq Night
Monday, September 15, 2008	58 dBA	47 dBA
Tuesday September 16, 2008	62 dBA	58 dBA
Wednesday September 17, 2008	62 dBA	59 dBA
Thursday, September 18, 2008	61 dBA	59 dBA
Friday, September 19, 2008	59 dBA	58 dBA

TABLE A.5
LOCATION M5
HOUSE AT 27 OLD COLONY TRAIL

Date	Leq Day	Leq Night
Monday, September 15, 2008	59 dBA	49 dBA
Tuesday September 16, 2008	63 dBA	59 dBA
Wednesday September 17, 2008	63 dBA	59 dBA
Thursday, September 18, 2008	63 dBA	59 dBA
Friday, September 19, 2008	60 dBA	59 dBA

TABLE A.6
LOCATION M6,
HOUSE AT 38 WAGONERS TRAIL

Date	Leq Day	Leq Night
Monday, September 15, 2008	48 dBA	41 dBA
Tuesday September 16, 2008	51 dBA	52 dBA
Wednesday September 17, 2008	53 dBA	50 dBA
Thursday, September 18, 2008	52 dBA	53 dBA
Friday, September 19, 2008	48dBA	49dBA

TABLE A.7
LOCATION M7
HOUSE AT 30 MASON COURT

Date	Leq Day	Leq Night
Monday, September 15, 2008	53 dBA	44 dBA
Tuesday September 16, 2008	57 dBA	53 dBA
Wednesday September 17, 2008	58 dBA	54 dBA
Thursday, September 18, 2008	56 dBA	54 dBA
Friday, September 19, 2008	55dBA	52dBA

TABLE A.8
LOCATION M8
HOUSE AT 659 HANLON ROAD

Date	Leq Day	Leq Night
Monday, September 15, 2008	51 dBA	42 dBA
Tuesday September 16, 2008	54 dBA	52 dBA
Wednesday September 17, 2008	55 dBA	52 dBA
Thursday, September 18, 2008	56 dBA	52 dBA
Friday, September 19, 2008	53 dBA	52 dBA

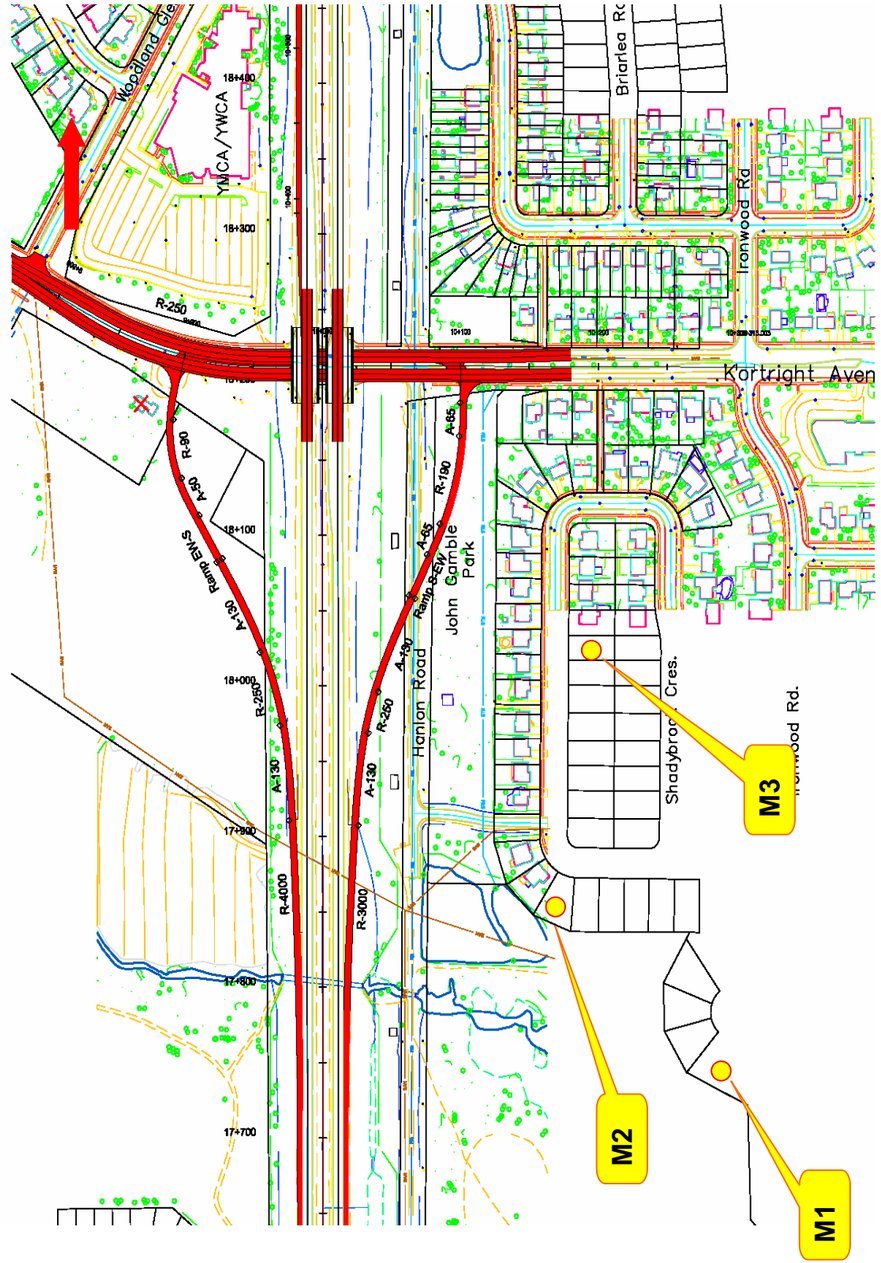


FIGURE A.1
APROXIMATE NOISE MONITOR LOCATIONS

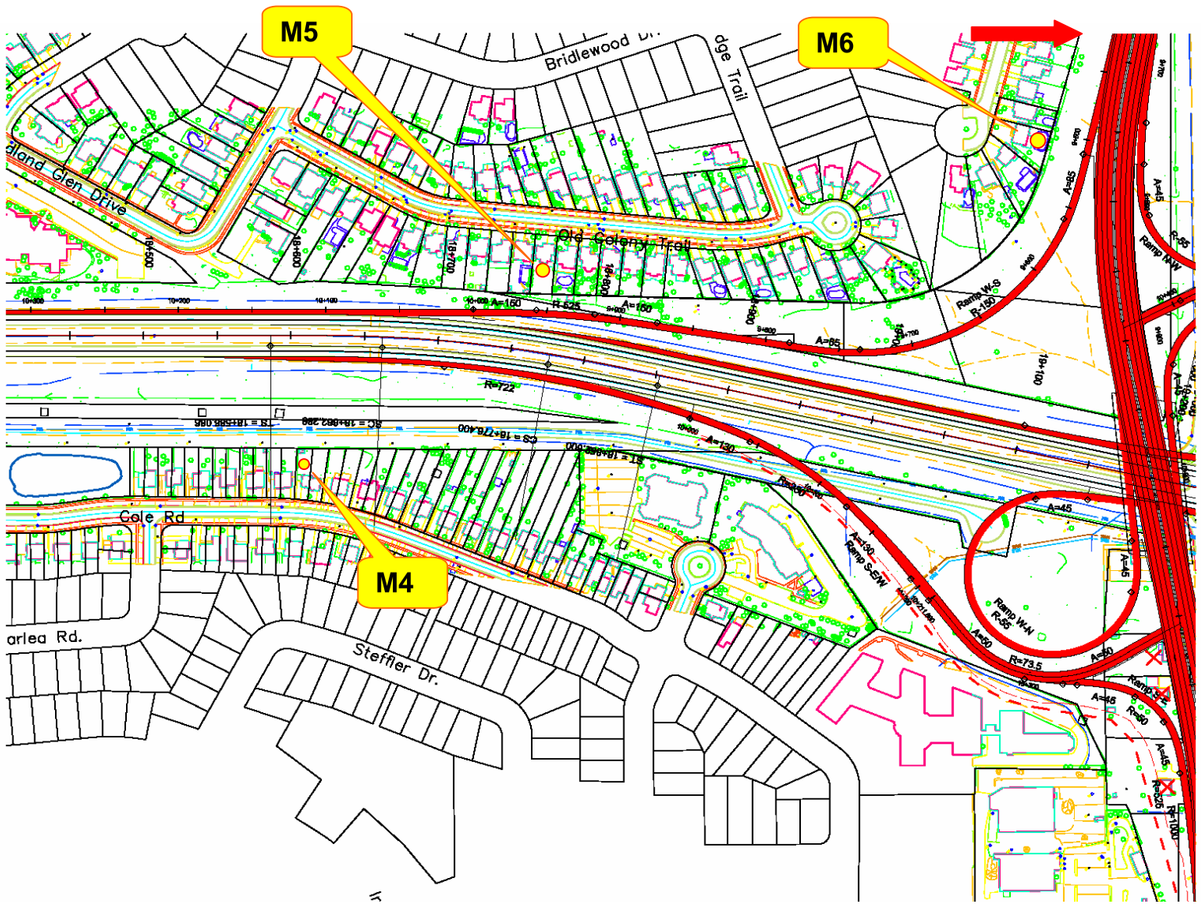


FIGURE A.2
APROXIMATE NOISE MONITOR LOCATIONS

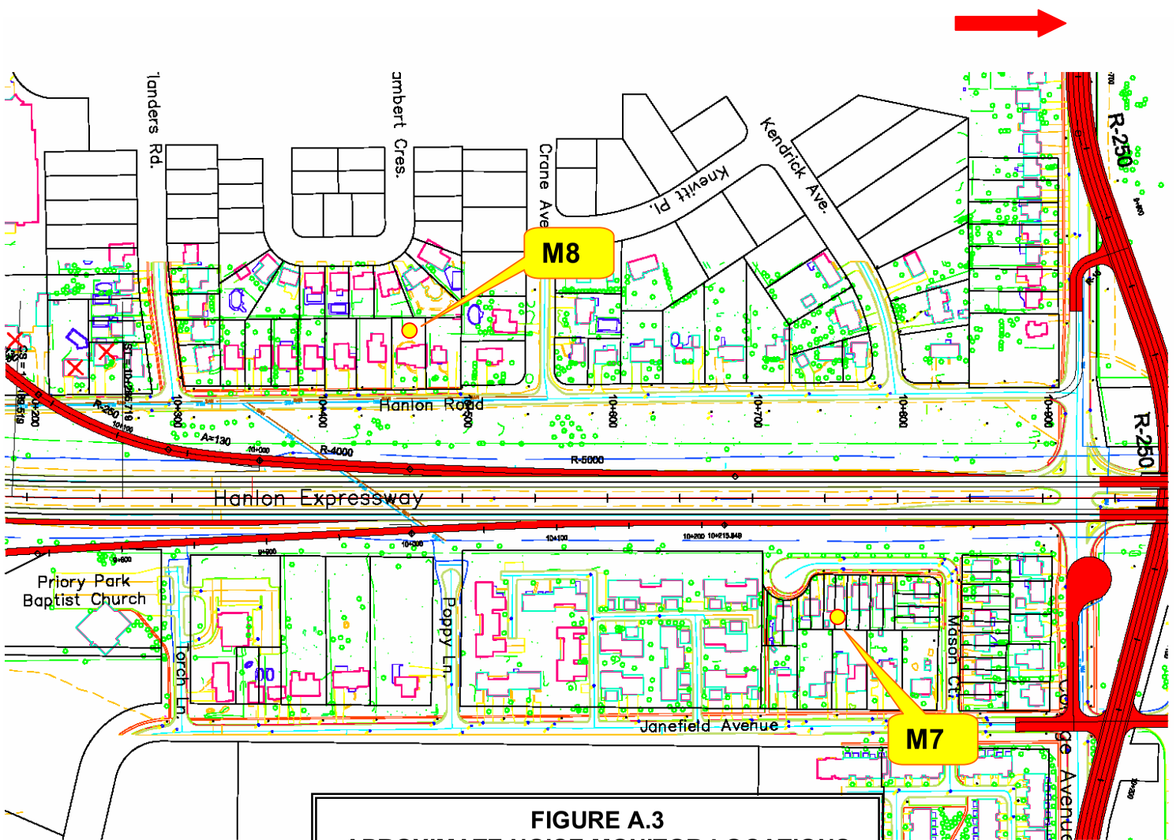
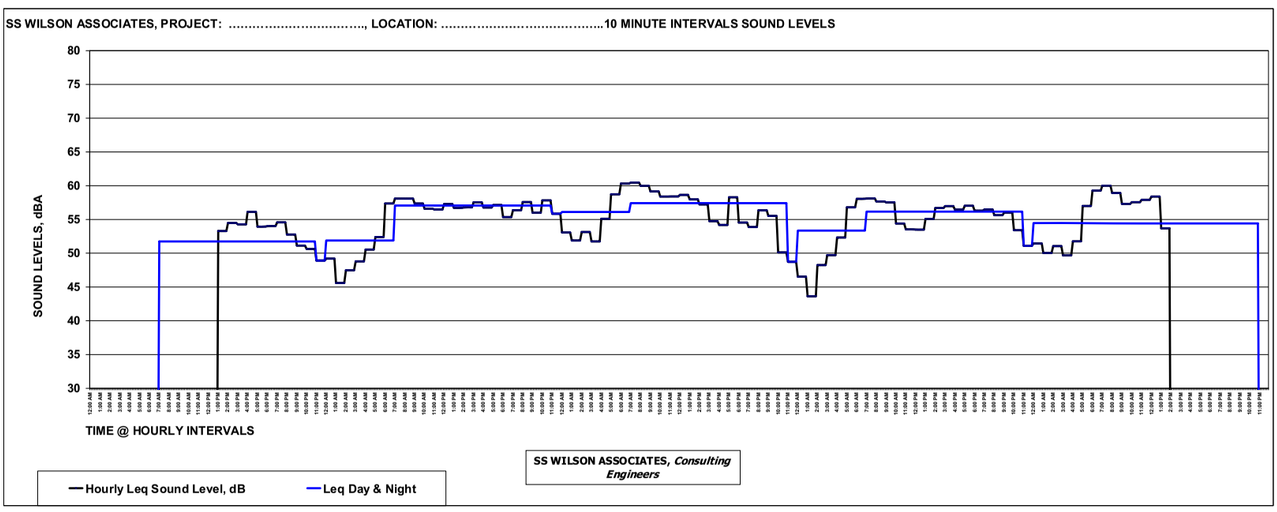
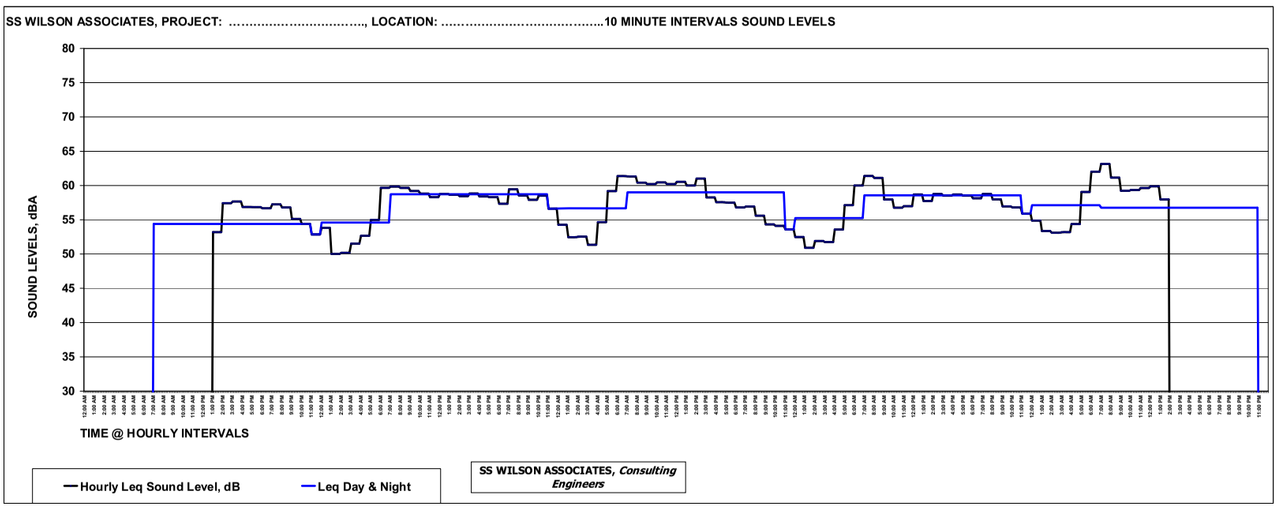


FIGURE A.3
APROXIMATE NOISE MONITOR LOCATIONS

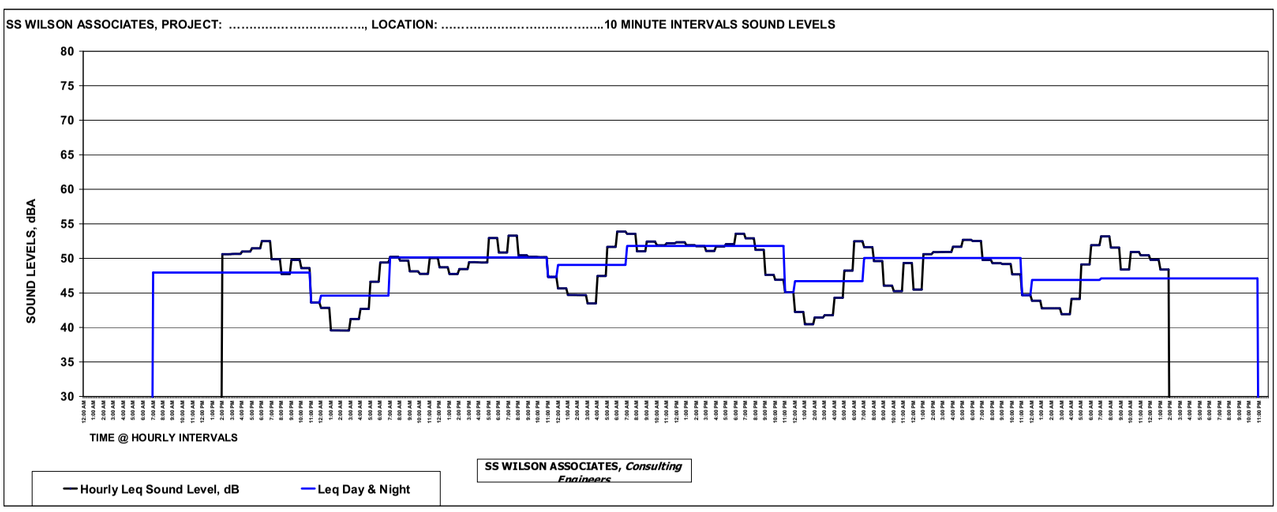
NOISE MEASUREMENTS



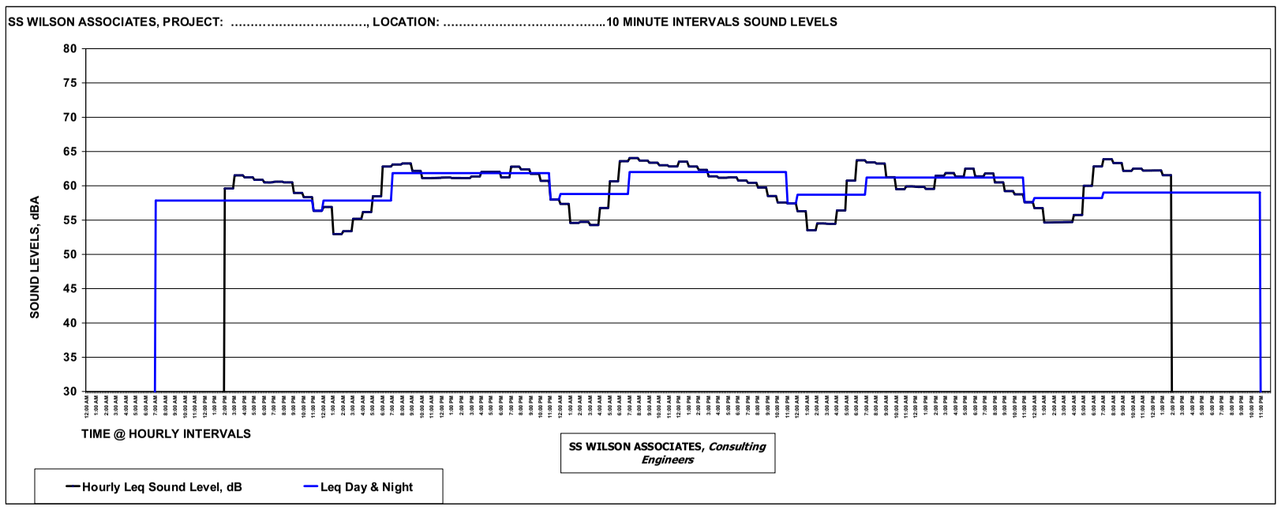
LOCATION M1
HOUSE AT #6 DEERCHASE ROAD



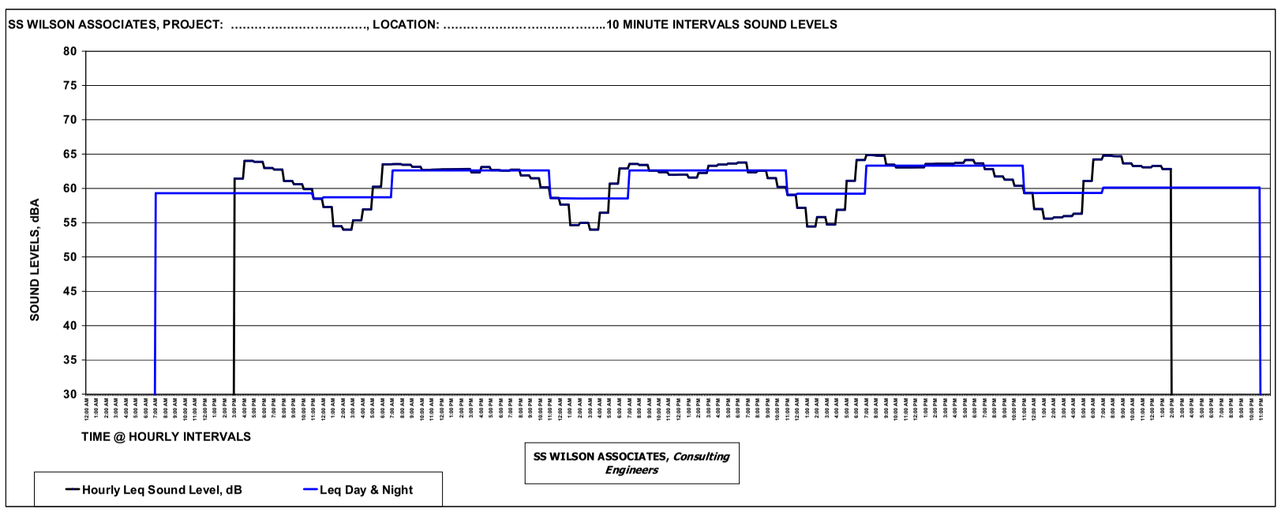
LOCATION M2
HOUSE AT #18 SHADYBROOK CRESCENT



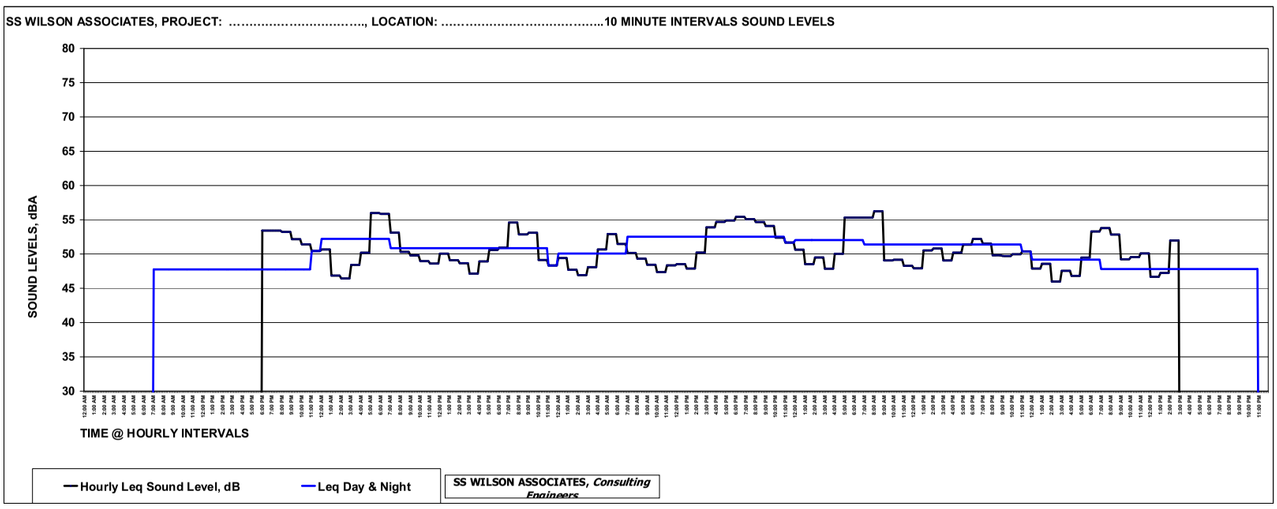
LOCATION M3
HOUSE AT 41 SHADYBROOK CRESCENT



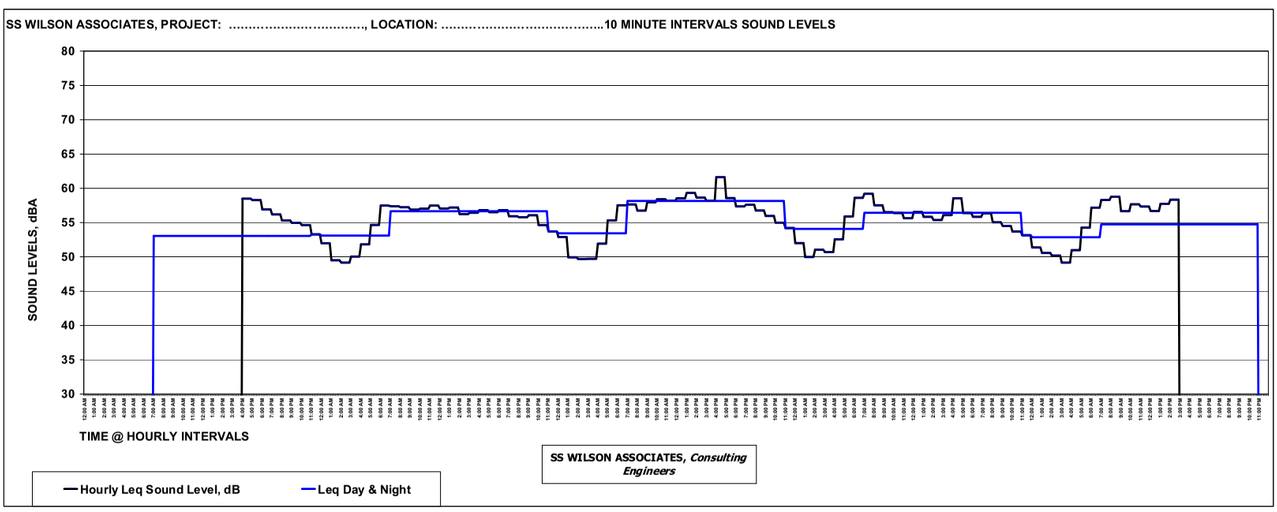
LOCATION M4
HOUSE AT 259 COLE ROAD



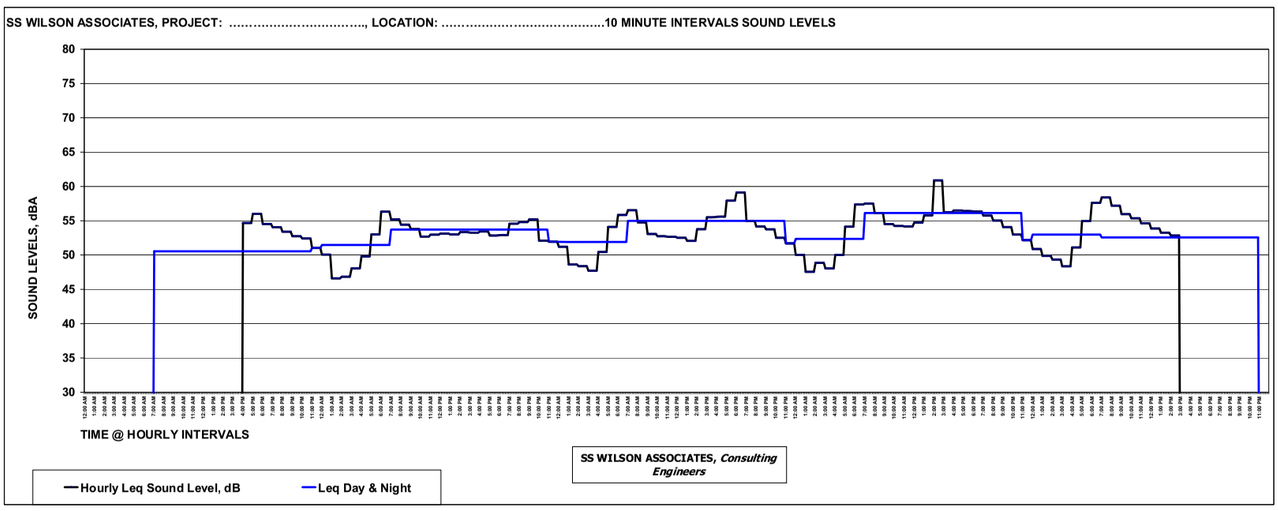
LOCATION M5
HOUSE AT 27 OLD COLONY TRAIL



LOCATION M6
HOUSE AT 38 WAGONERS TRAIL



LOCATION M7
HOUSE AT 30 MASON COURT



LOCATION M8
HOUSE AT 659 HANLON ROAD

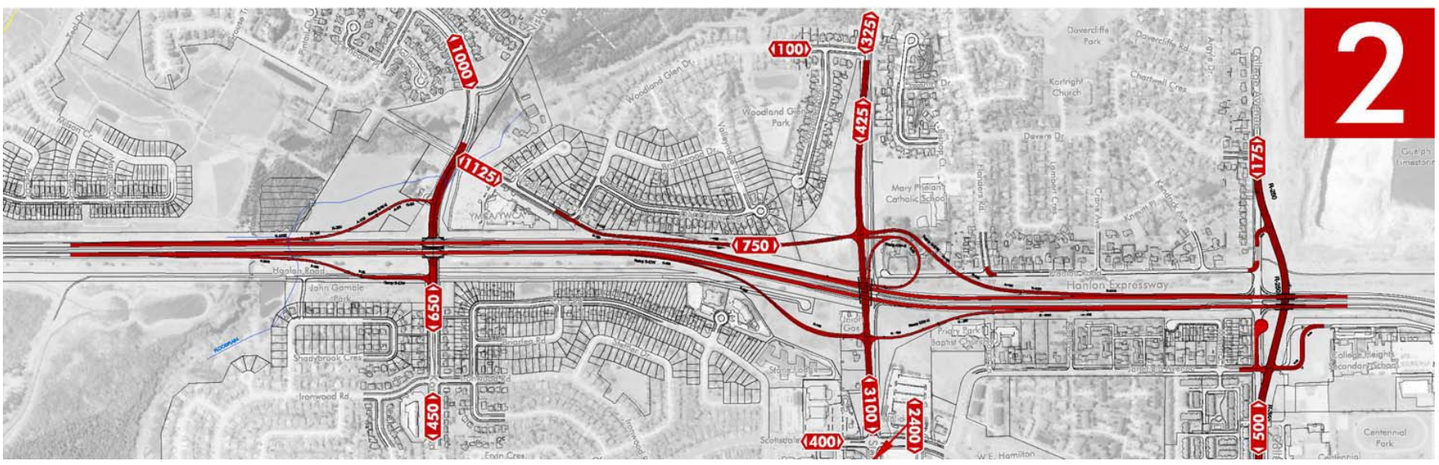
APPENDIX D

UPDATED TRAFFIC DATA

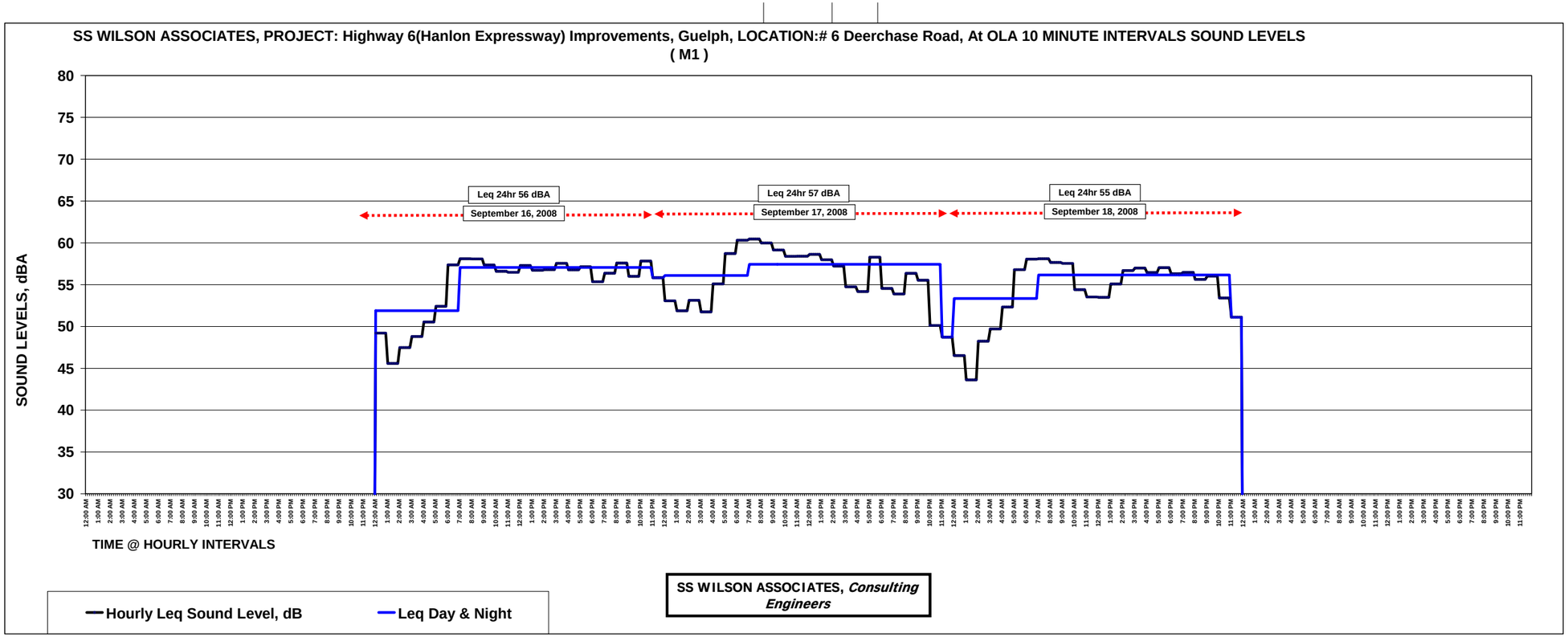
MTO EXISTING TAFFIC DATA COUNTS
OCTOBER 2008
(ON FILE WITH MTO)

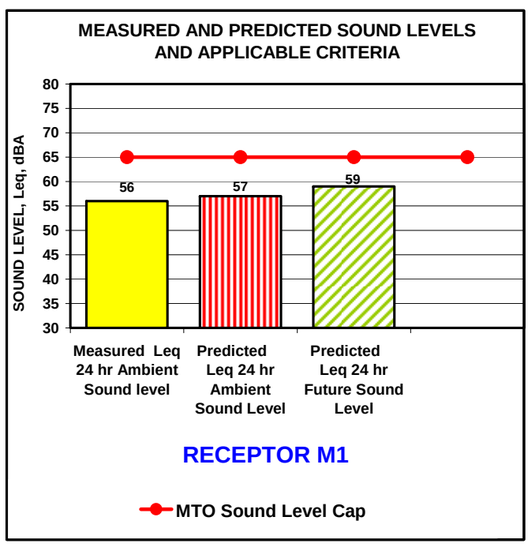
UP DATED FUTURE - DO - NOTHING AND FUTURE TRAFFIC DATA
CITY OF GUELPH

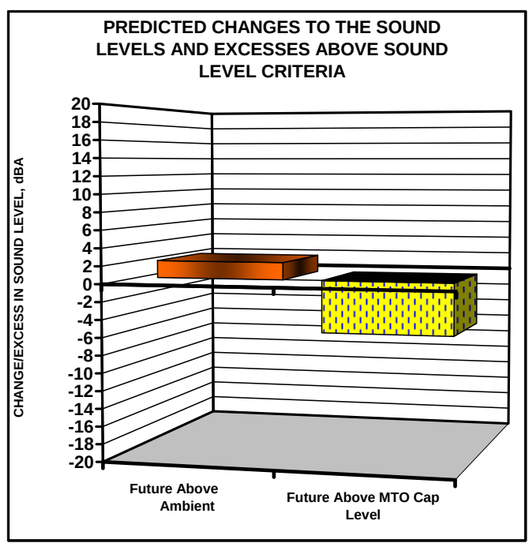

volume
Projected peak hour volume
for the year 2031
FUTURE
"Do Nothing"
Hanlon Expressway

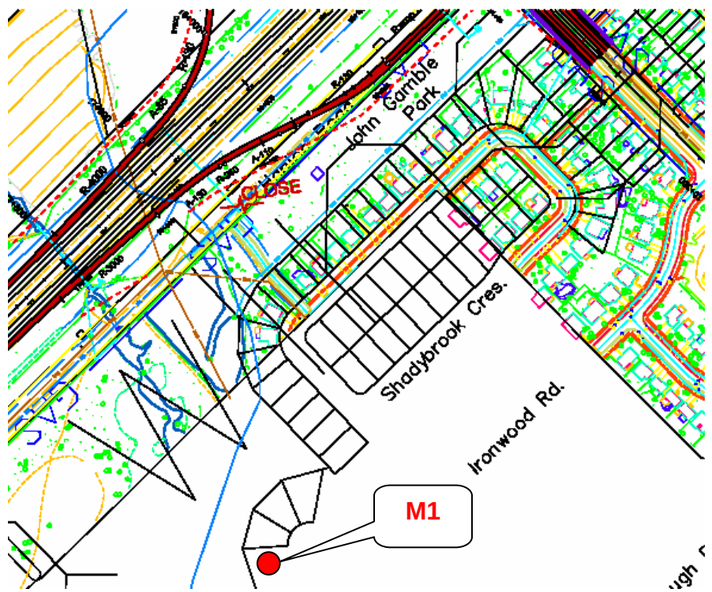

2
Hanlon Expressway

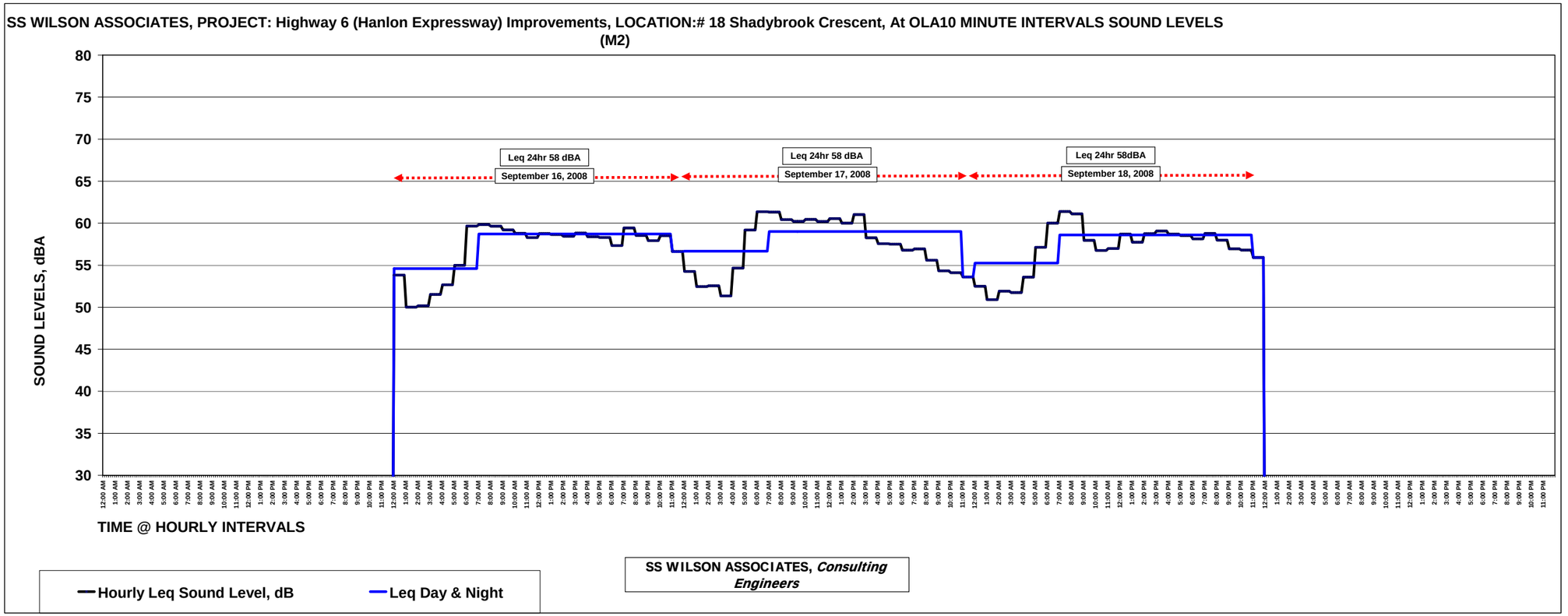
APPENDIX E
MEASURED SOUND LEVEL VS. PREDICTED SOUND LEVEL AT M1 TO M8

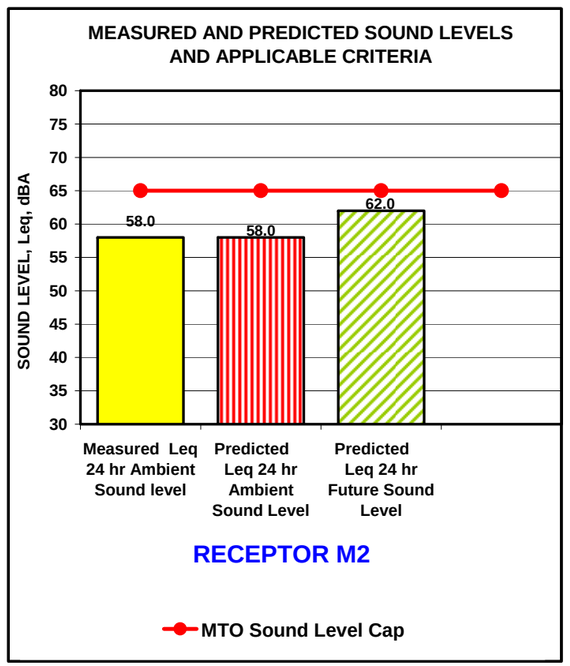

SS WILSON ASSOCIATES, PROJECT: Highway 6(Hanlon Expressway) Improvements, Guelph, LOCATION:# 6 Deerchase Road, At OLA 10 MINUTE INTERVALS SOUND LEVELS
(M1)
SOUND LEVELS, dBA
80
75
70
65
60
55
50
45
40
35
30
Leq 24hr 56 dBA
September 16, 2008
Leq 24hr 57 dBA
September 17, 2008
Leq 24hr 55 dBA
September 18, 2008
TIME @ HOURLY INTERVALS
Hourly Leq Sound Level, dB
Leq Day & Night
SS WILSON ASSOCIATES, Consulting Engineers

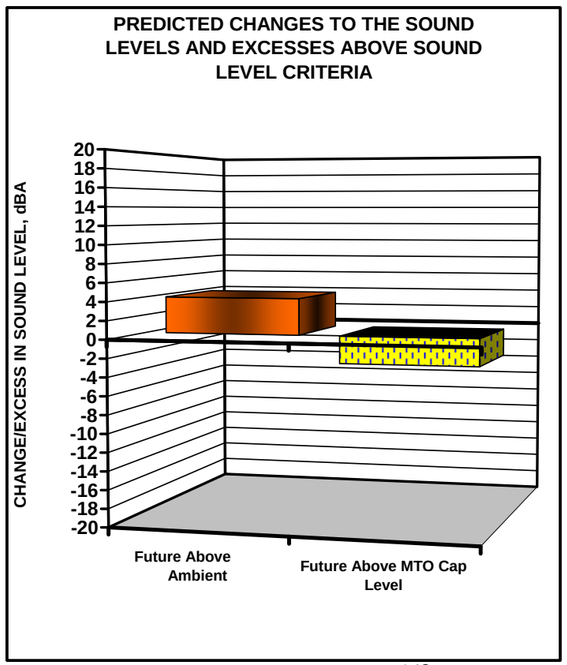

MEASURED AND PREDICTED SOUND LEVELS AND APPLICABLE CRITERIA
SOUND LEVEL, Leq, dBA
80
75
70
65
60
55
50
45
40
35
30
56
57
59
Measured Leq 24 hr Ambient Sound level
Predicted Leq 24 hr Ambient Sound Level
Predicted Leq 24 hr Future Sound Level
RECEPTOR M1
MTO Sound Level Cap

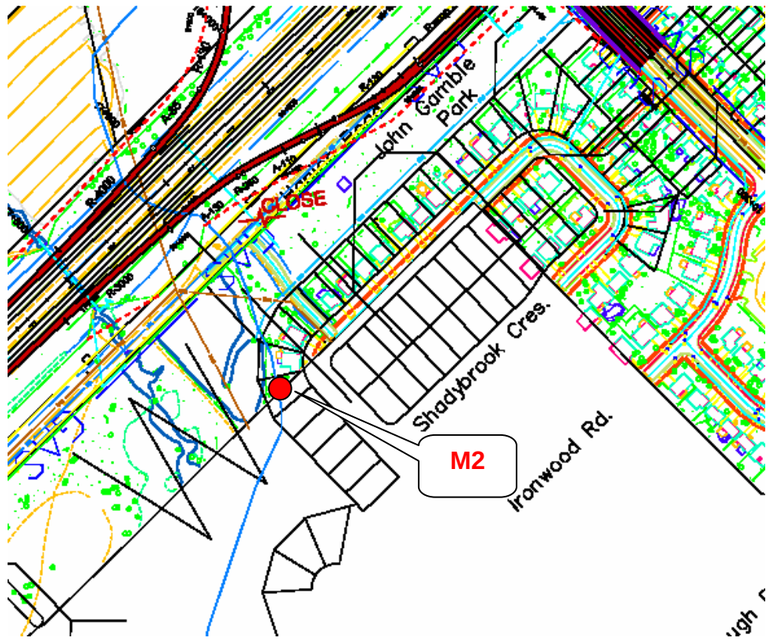

PREDICTED CHANGES TO THE SOUND LEVELS AND EXCESSES ABOVE SOUND LEVEL CRITERIA
CHANGE/EXCESS IN SOUND LEVEL, dBA
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
Future Above Ambient
Future Above MTO Cap Level

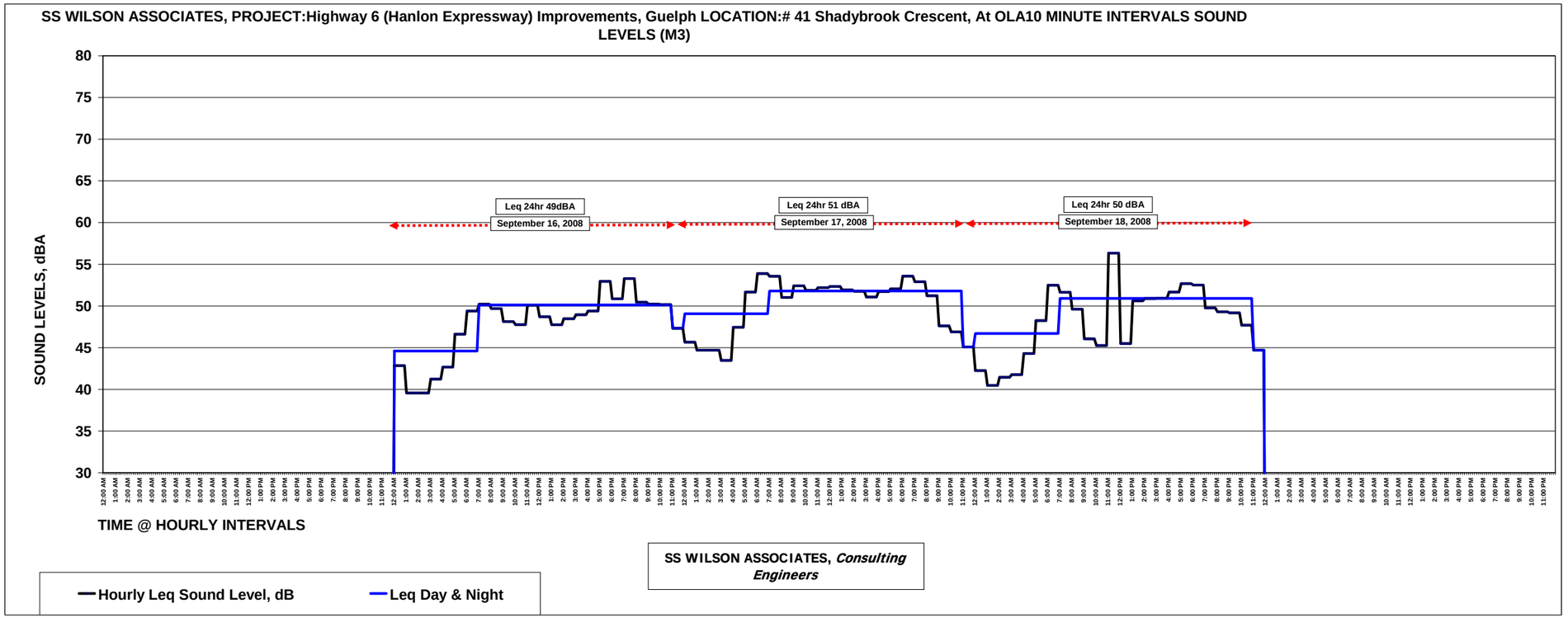

John Gamble Park
CLOSE
Shadybrook Cres.
Ironwood Rd.
M1

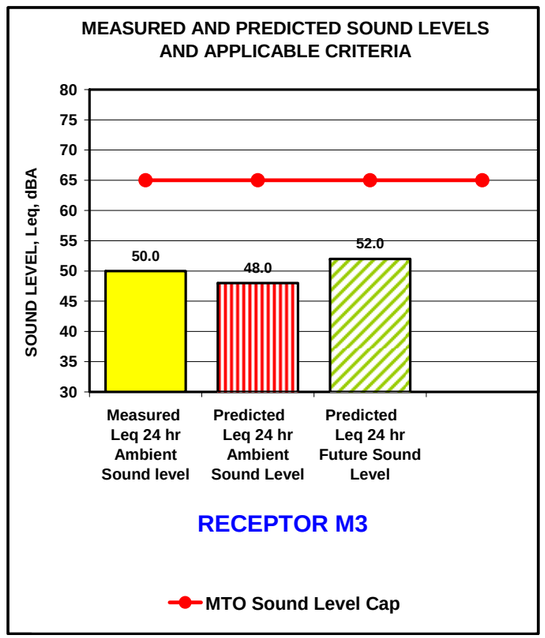

SS WILSON ASSOCIATES, PROJECT: Highway 6 (Hanlon Expressway) Improvements, LOCATION:# 18 Shadybrook Crescent, At OLA10 MINUTE INTERVALS SOUND LEVELS
(M2)
SOUND LEVELS, dBA
80
75
70
65
60
55
50
45
40
35
30
Leq 24hr 58 dBA
September 16, 2008
Leq 24hr 58 dBA
September 17, 2008
Leq 24hr 58dBA
September 18, 2008
TIME @ HOURLY INTERVALS
Hourly Leq Sound Level, dB
Leq Day & Night
SS WILSON ASSOCIATES, Consulting Engineers

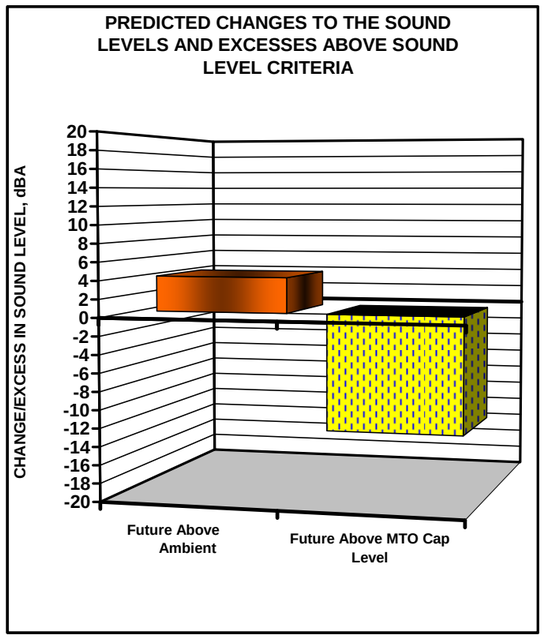

MEASURED AND PREDICTED SOUND LEVELS
AND APPLICABLE CRITERIA
SOUND LEVEL, Leq, dBA
80
75
70
65
60
55
50
45
40
35
30
58.0
58.0
62.0
Measured Leq 24 hr Ambient Sound level
Predicted Leq 24 hr Ambient Sound Level
Predicted Leq 24 hr Future Sound Level
RECEPTOR M2
MTO Sound Level Cap

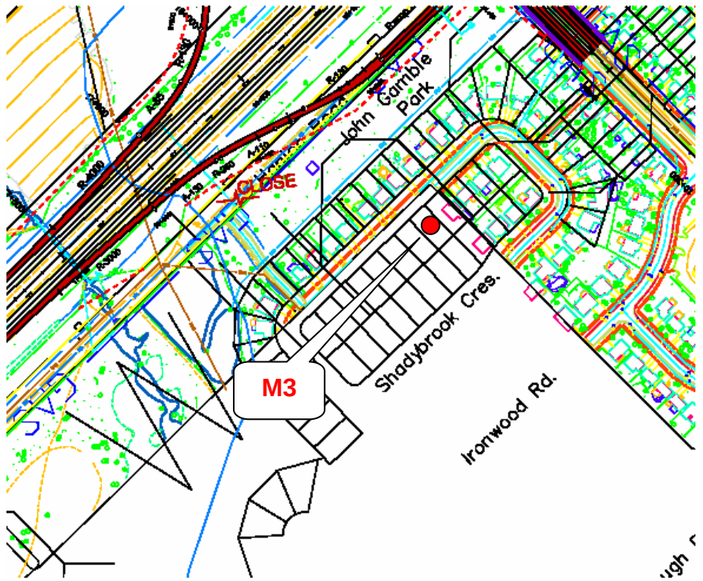

PREDICTED CHANGES TO THE SOUND
LEVELS AND EXCESSES ABOVE SOUND
LEVEL CRITERIA
CHANGE/EXCESS IN SOUND LEVEL, dBA
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
Future Above Ambient
Future Above MTO Cap Level

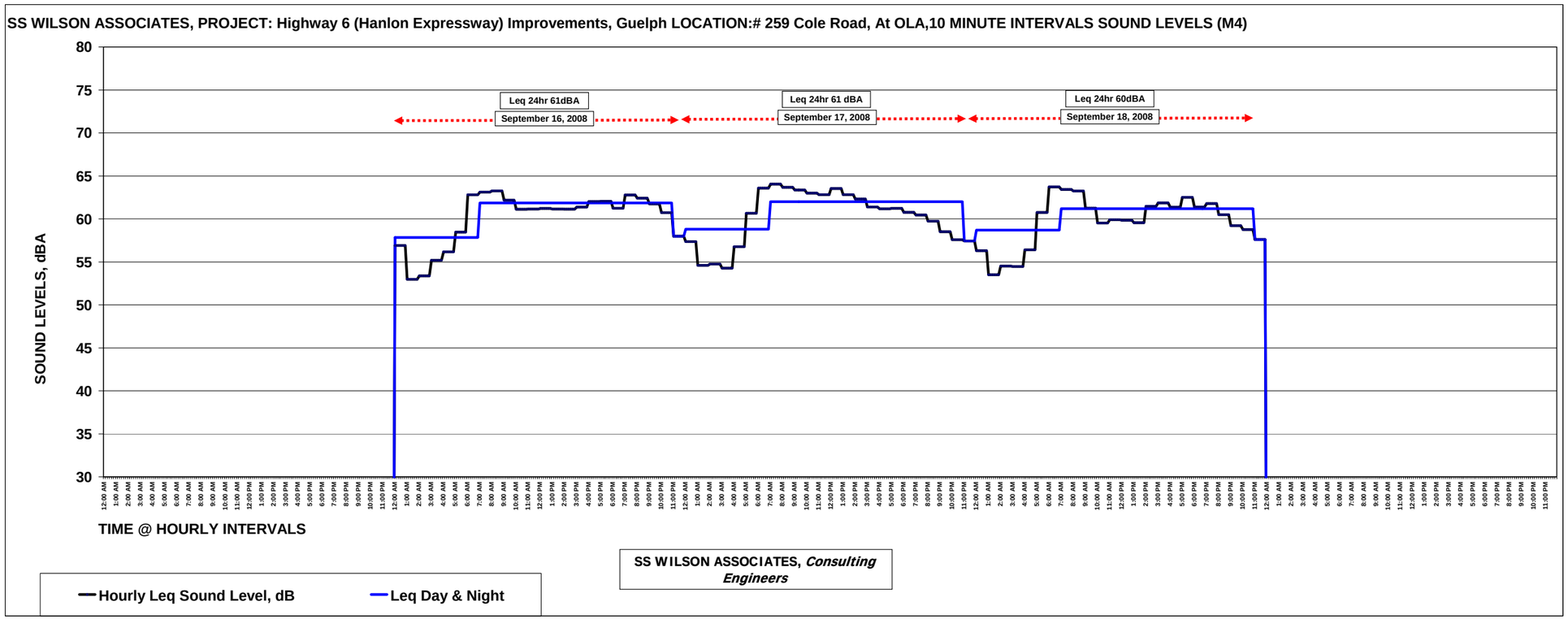

John Gamble Park
CLOSE
Shadybrook Cres.
Ironwood Rd.
M2

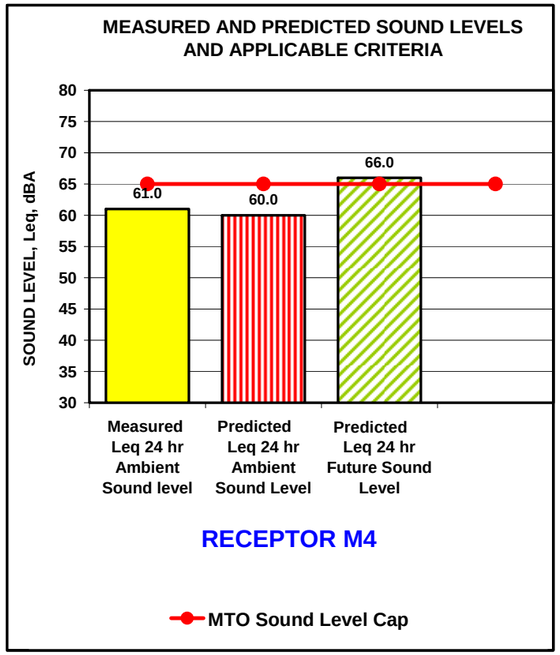

SS WILSON ASSOCIATES, PROJECT:Highway 6 (Hanlon Expressway) Improvements, Guelph LOCATION:# 41 Shadybrook Crescent, At OLA10 MINUTE INTERVALS SOUND LEVELS (M3)
SOUND LEVELS, dBA
80
75
70
65
60
55
50
45
40
35
30
Leq 24hr 49dBA
September 16, 2008
Leq 24hr 51 dBA
September 17, 2008
Leq 24hr 50 dBA
September 18, 2008
TIME @ HOURLY INTERVALS
SS WILSON ASSOCIATES, Consulting Engineers
Hourly Leq Sound Level, dB
Leq Day & Night

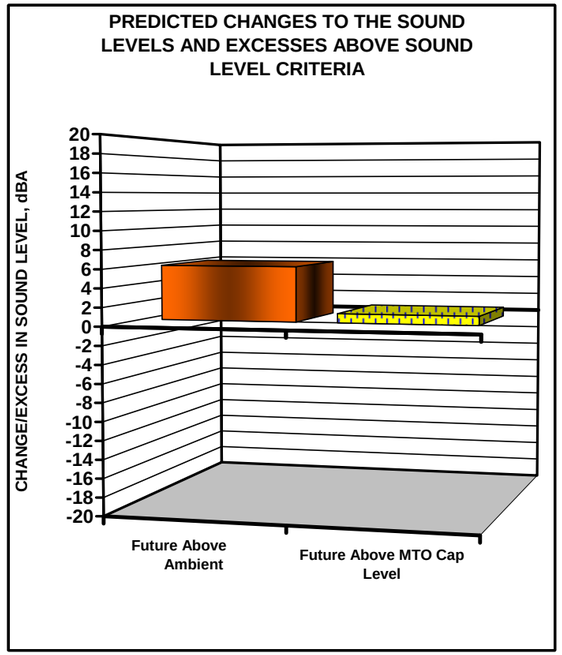

MEASURED AND PREDICTED SOUND LEVELS AND APPLICABLE CRITERIA
SOUND LEVEL, Leq, dBA
80
75
70
65
60
55
50
45
40
35
30
50.0
48.0
52.0
Measured Leq 24 hr Ambient Sound level
Predicted Leq 24 hr Ambient Sound Level
Predicted Leq 24 hr Future Sound Level
RECEPTOR M3
MTO Sound Level Cap

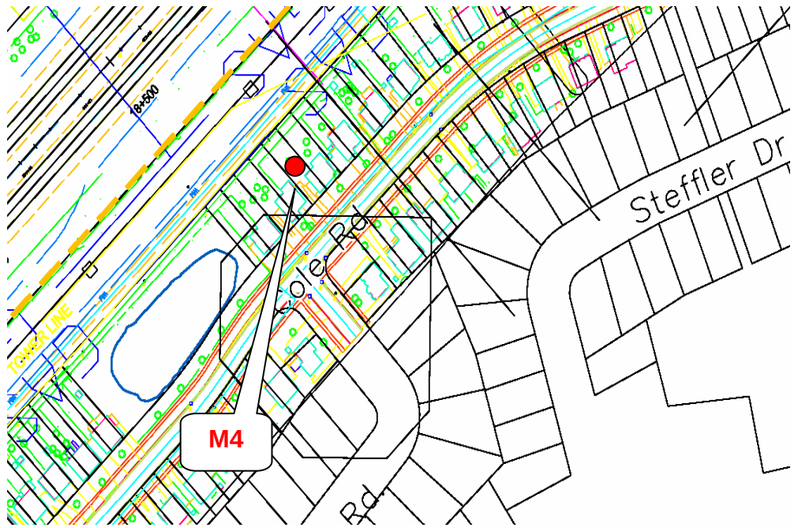

PREDICTED CHANGES TO THE SOUND LEVELS AND EXCESSES ABOVE SOUND LEVEL CRITERIA
CHANGE/EXCESS IN SOUND LEVEL, dBA
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
Future Above Ambient
Future Above MTO Cap Level


John Gamble Park
CLOSE
Shadybrook Cres.
M3
Ironwood Rd.

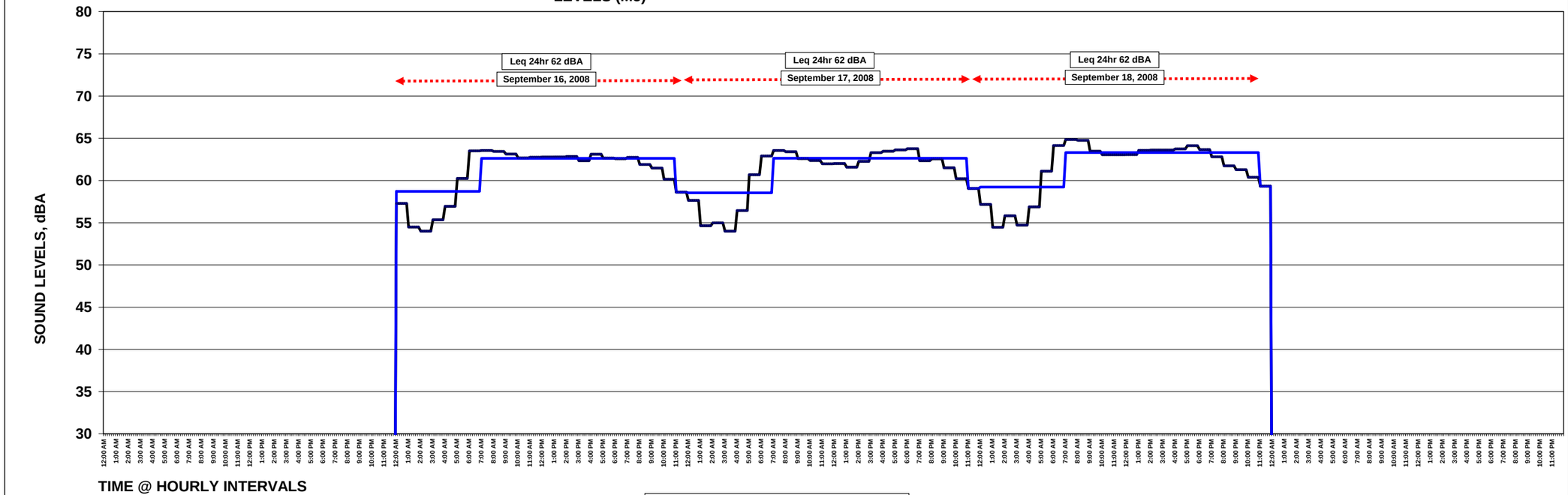

SS WILSON ASSOCIATES, PROJECT: Highway 6 (Hanlon Expressway) Improvements, Guelph LOCATION:# 259 Cole Road, At OLA,10 MINUTE INTERVALS SOUND LEVELS (M4)
SOUND LEVELS, dBA
80
75
70
65
60
55
50
45
40
35
30
Leq 24hr 61dBA
September 16, 2008
Leq 24hr 61 dBA
September 17, 2008
Leq 24hr 60dBA
September 18, 2008
TIME @ HOURLY INTERVALS
SS WILSON ASSOCIATES, Consulting Engineers
Hourly Leq Sound Level, dB
Leq Day & Night


MEASURED AND PREDICTED SOUND LEVELS AND APPLICABLE CRITERIA
SOUND LEVEL, Leq, dBA
80
75
70
65
60
55
50
45
40
35
30
61.0
60.0
66.0
Measured Leq 24 hr Ambient Sound level
Predicted Leq 24 hr Ambient Sound Level
Predicted Leq 24 hr Future Sound Level
RECEPTOR M4
MTO Sound Level Cap

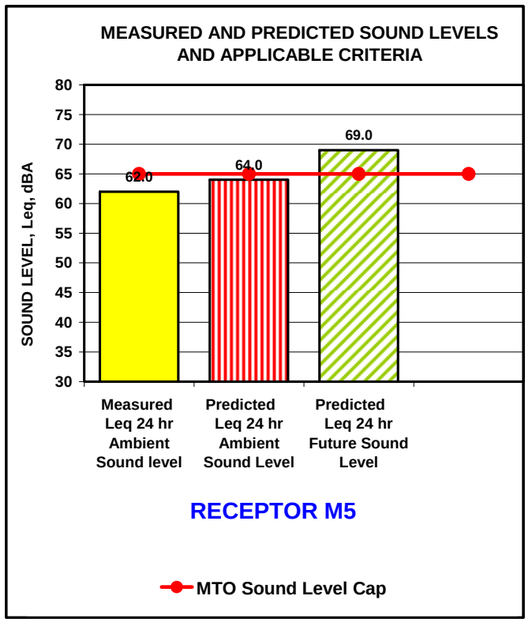

PREDICTED CHANGES TO THE SOUND LEVELS AND EXCESSES ABOVE SOUND LEVEL CRITERIA
CHANGE/EXCESS IN SOUND LEVEL, dBA
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
Future Above Ambient
Future Above MTO Cap Level

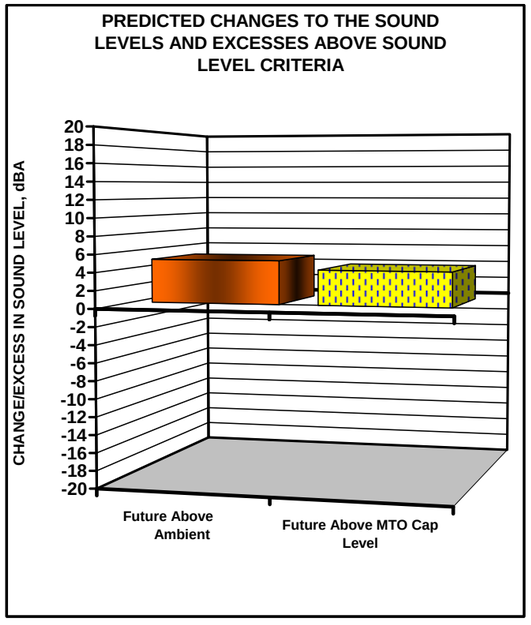

M4
Steffler Dr
Cole Rd
Rd

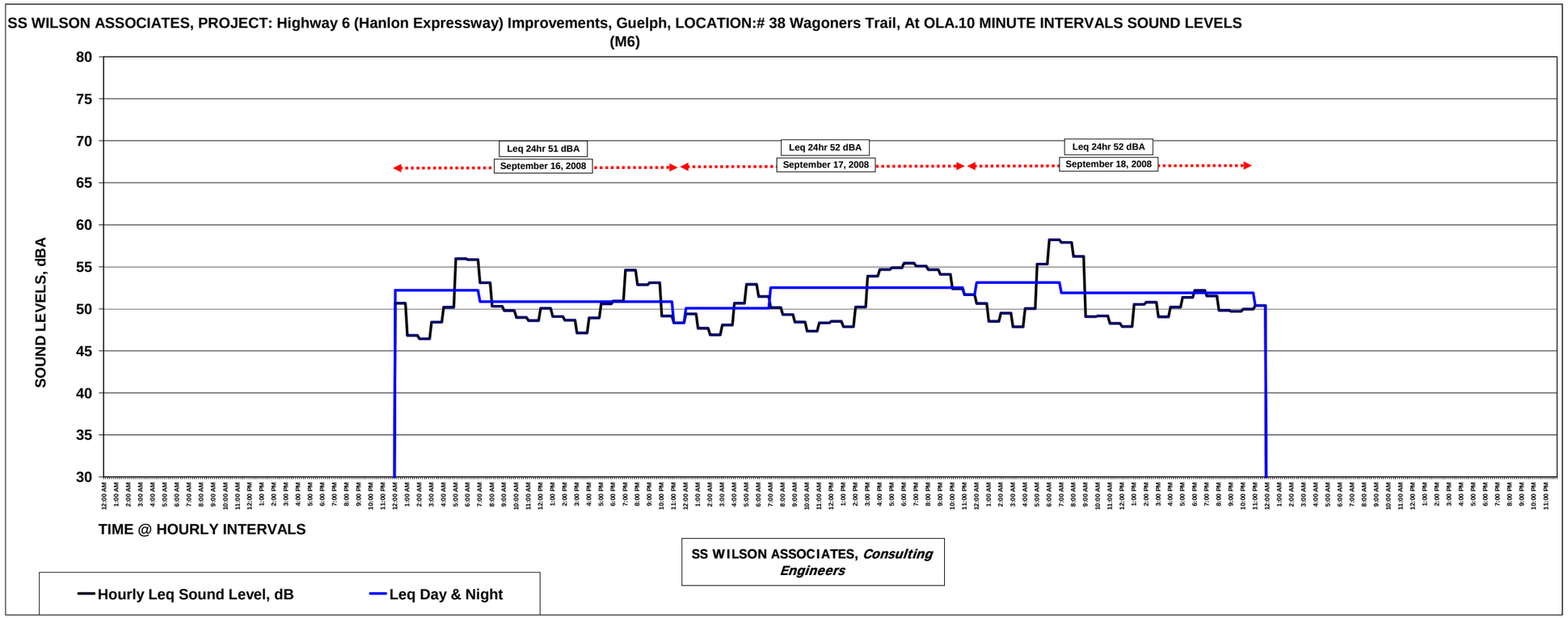
SS WILSON ASSOCIATES, PROJECT:Highway 6 (Hanlon Expressway) Improvements, Guelph. LOCATION: # 27 Old Colony Trail, At OLA.10 MINUTE INTERVALS SOUND LEVELS (M5)

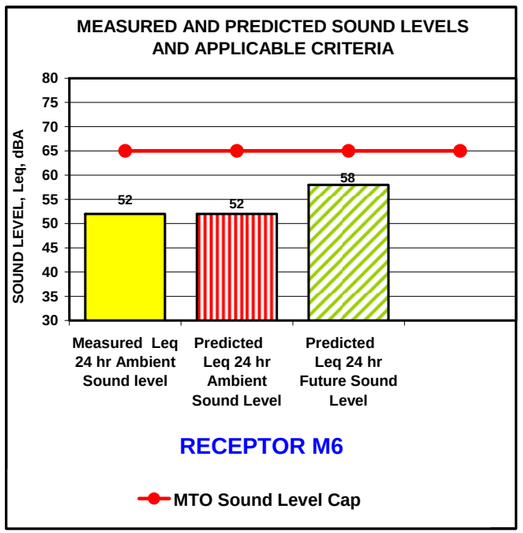


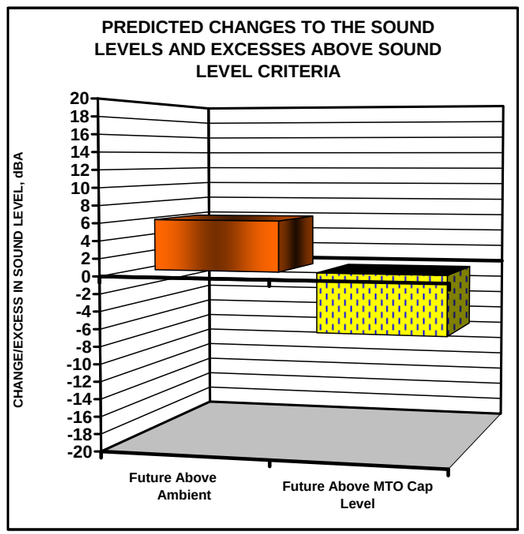
SS WILSON ASSOCIATES, *Consulting Engineers*

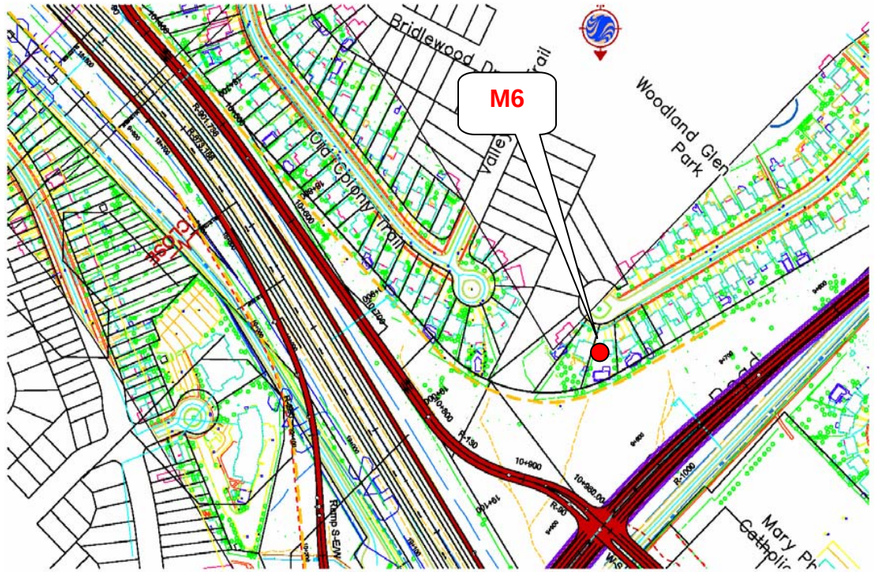


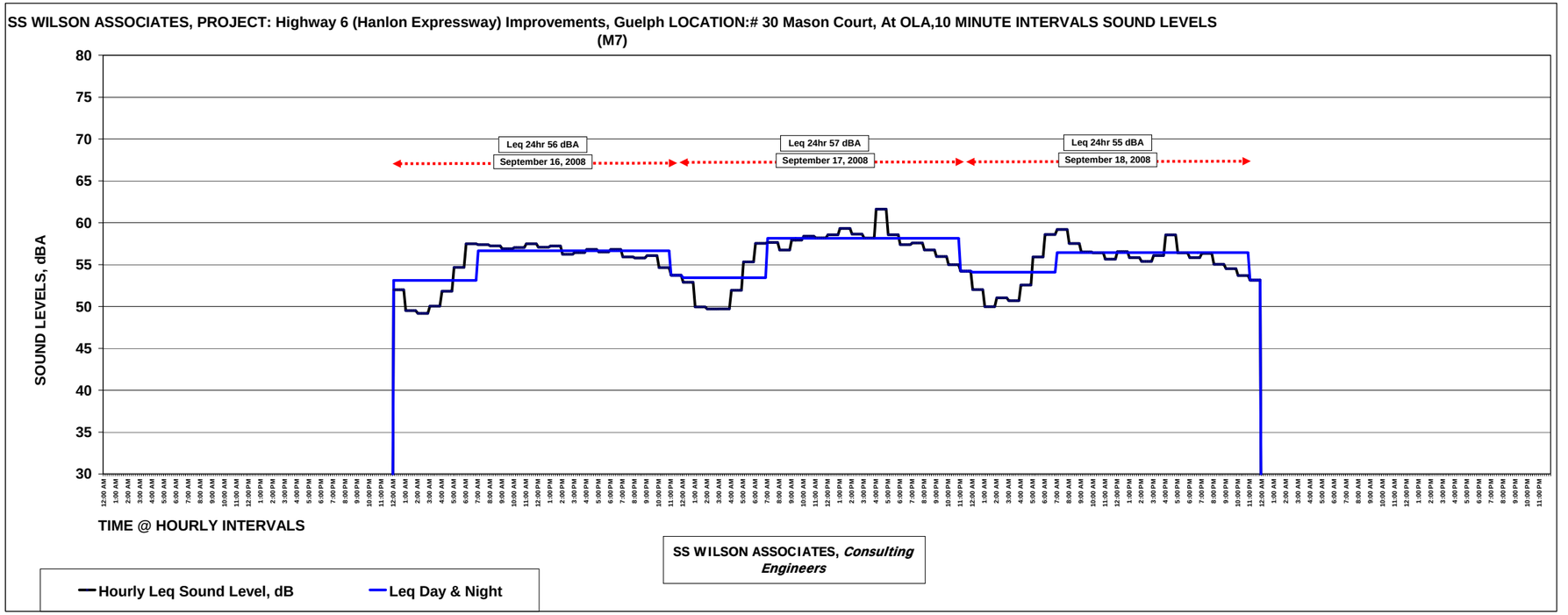


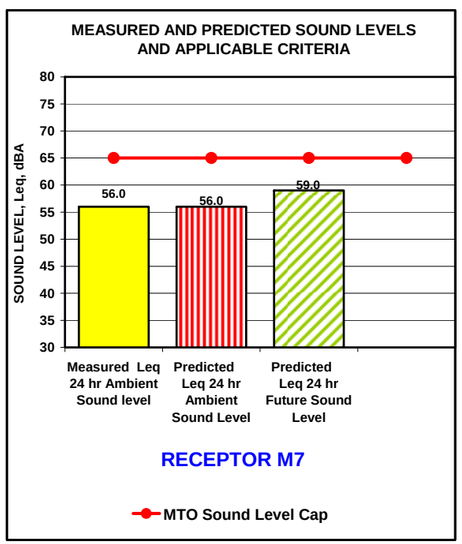

SS WILSON ASSOCIATES, PROJECT: Highway 6 (Hanlon Expressway) Improvements, Guelph, LOCATION:# 38 Wagoners Trail, At OLA.10 MINUTE INTERVALS SOUND LEVELS
(M6)
SOUND LEVELS, dBA
80
75
70
65
60
55
50
45
40
35
30
Leq 24hr 51 dBA
September 16, 2008
Leq 24hr 52 dBA
September 17, 2008
Leq 24hr 52 dBA
September 18, 2008
TIME @ HOURLY INTERVALS
SS WILSON ASSOCIATES, Consulting Engineers
Hourly Leq Sound Level, dB
Leq Day & Night

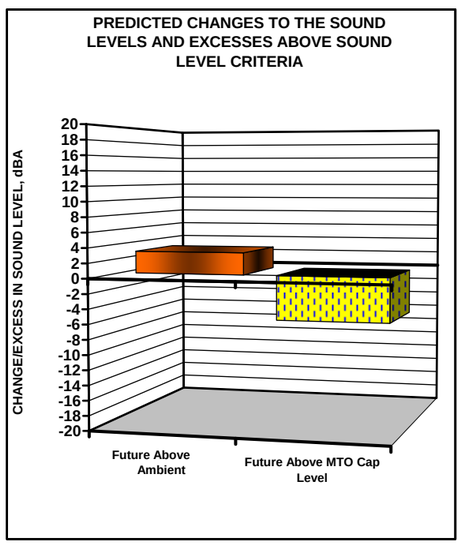

MEASURED AND PREDICTED SOUND LEVELS
AND APPLICABLE CRITERIA
SOUND LEVEL, Leq, dBA
80
75
70
65
60
55
50
45
40
35
30
52
52
58
Measured Leq 24 hr Ambient Sound level
Predicted Leq 24 hr Ambient Sound Level
Predicted Leq 24 hr Future Sound Level
RECEPTOR M6
MTO Sound Level Cap


PREDICTED CHANGES TO THE SOUND
LEVELS AND EXCESSES ABOVE SOUND
LEVEL CRITERIA
CHANGE/EXCESS IN SOUND LEVEL, dBA
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
Future Above Ambient
Future Above MTO Cap Level

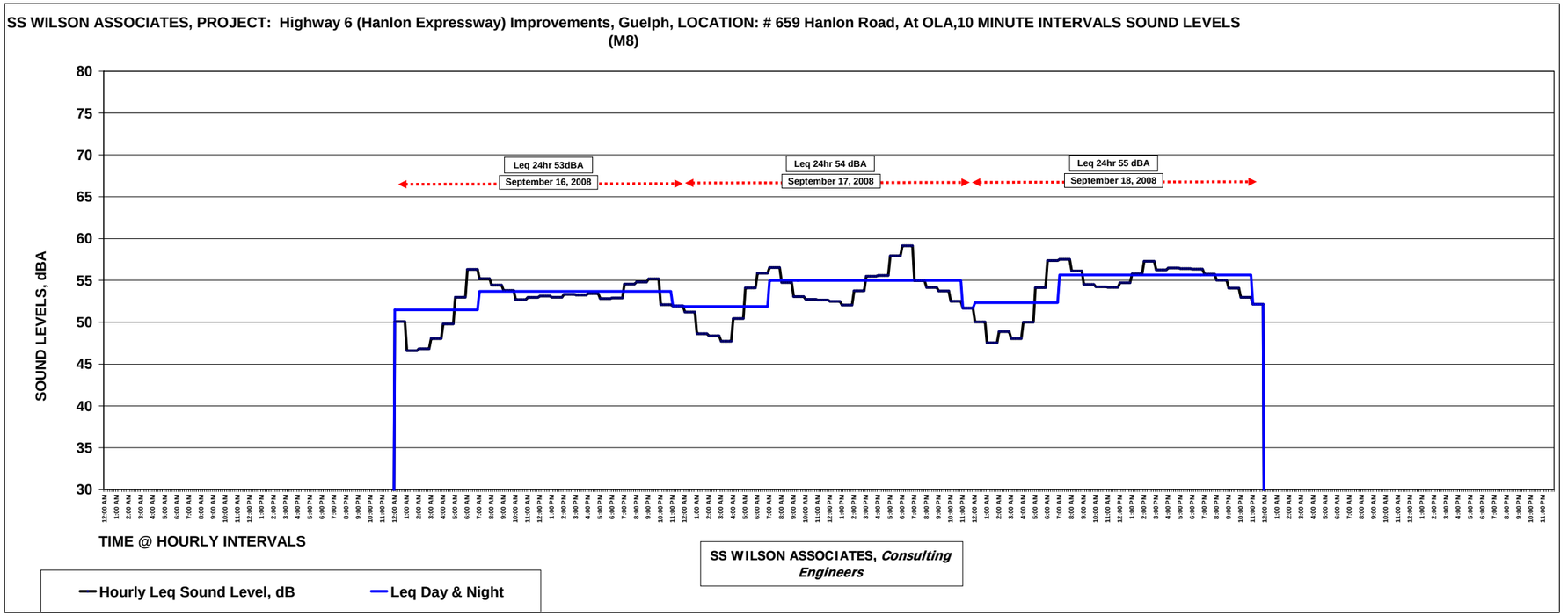

M6
Woodland Glen Park
Old Quarry Trail
Bridlewood
Mary

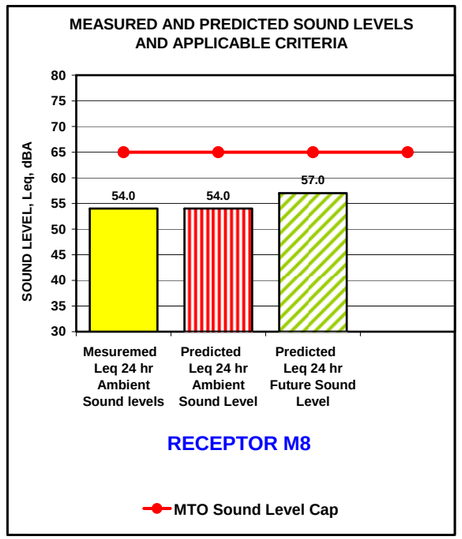

SS WILSON ASSOCIATES, PROJECT: Highway 6 (Hanlon Expressway) Improvements, Guelph LOCATION:# 30 Mason Court, At OLA,10 MINUTE INTERVALS SOUND LEVELS (M7)
SOUND LEVELS, dBA
Leq 24hr 56 dBA
September 16, 2008
Leq 24hr 57 dBA
September 17, 2008
Leq 24hr 55 dBA
September 18, 2008
TIME @ HOURLY INTERVALS
SS WILSON ASSOCIATES, Consulting Engineers
Hourly Leq Sound Level, dB
Leq Day & Night

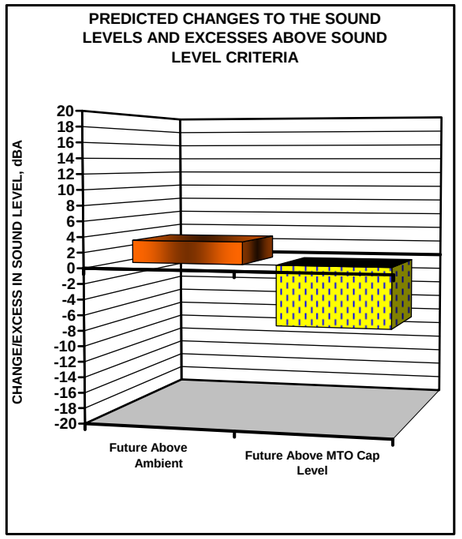

MEASURED AND PREDICTED SOUND LEVELS AND APPLICABLE CRITERIA
SOUND LEVEL, Leq, dBA
56.0
56.0
59.0
Measured Leq 24 hr Ambient Sound level
Predicted Leq 24 hr Ambient Sound Level
Predicted Leq 24 hr Future Sound Level
RECEPTOR M7
MTO Sound Level Cap


PREDICTED CHANGES TO THE SOUND LEVELS AND EXCESSES ABOVE SOUND LEVEL CRITERIA
CHANGE/EXCESS IN SOUND LEVEL, dBA
Future Above Ambient
Future Above MTO Cap Level


Janefield Avenue
M7


SS WILSON ASSOCIATES, PROJECT: Highway 6 (Hanlon Expressway) Improvements, Guelph, LOCATION: # 659 Hanlon Road, At OLA,10 MINUTE INTERVALS SOUND LEVELS (M8)
SOUND LEVELS, dBA
80
75
70
65
60
55
50
45
40
35
30
Leq 24hr 53dBA
September 16, 2008
Leq 24hr 54 dBA
September 17, 2008
Leq 24hr 55 dBA
September 18, 2008
TIME @ HOURLY INTERVALS
SS WILSON ASSOCIATES, Consulting Engineers
Hourly Leq Sound Level, dB
Leq Day & Night


MEASURED AND PREDICTED SOUND LEVELS AND APPLICABLE CRITERIA
SOUND LEVEL, Leq, dBA
80
75
70
65
60
55
50
45
40
35
30
54.0
54.0
57.0
Mesuremed Leq 24 hr Ambient Sound levels
Predicted Leq 24 hr Ambient Sound Level
Predicted Leq 24 hr Future Sound Level
RECEPTOR M8
MTO Sound Level Cap


PREDICTED CHANGES TO THE SOUND LEVELS AND EXCESSES ABOVE SOUND LEVEL CRITERIA
CHANGE/EXCESS IN SOUND LEVEL, dBA
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
Future Above Ambient
Future Above MTO Cap Level


Crane Ave.
Knevitt Pl.
Kendrick Ave.
Foppy Ln.
M8
N

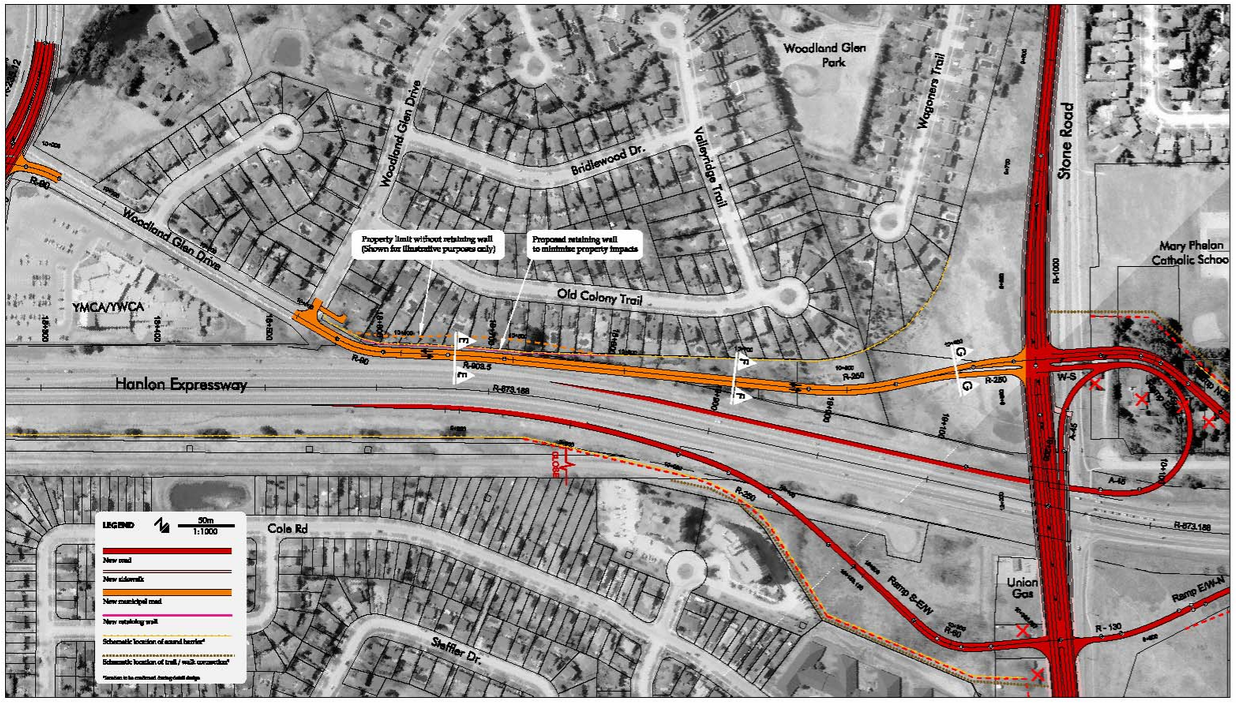
SAMPLE SOUND LEVEL CALCULATIONS AT MEASUREMENT LOCATIONS

(ON FILE WITH MTO)

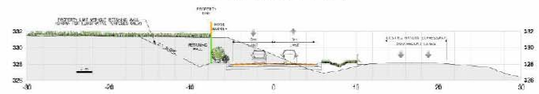
APPENDIX F.

PRELIMINARY CALCULATION FOR SOUND BARRIER

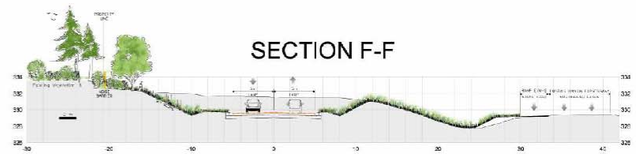
West Service Road Plan and Cross Sections



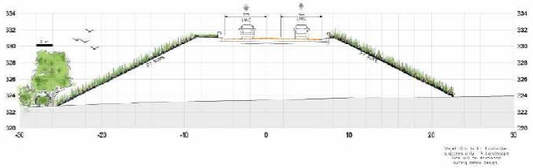
SECTION E-E



SECTION F-F



SECTION G-G



Memo

Stantec

To:	File Toronto	From:	Maya Caron Toronto (Wellington) Office
File:	1650 00631	Date:	November 17, 2008

Reference: Highway 6 (Hanlon Expressway) Improvements (GWP 3002-05-00)
West Service Road

Tarek Zayad telephoned on Monday, November 17, 2008 to provide the preliminary results of a review of the required sound barrier height for the proposed West Service Road. Results at Section E – E indicate that:

- Future Do-Nothing Sound Levels are predicted to be 63 dBA
- Future with the project (including Retaining Wall) Sound Levels are predicted to be 67 dBA
- A four metre sound barrier (above the retaining wall) would provide a future reduction to 62 dBA

The increased sound levels are primarily due to the 'cut' for the proposed service road, since there is less ground sound absorption between the highway and Old Colony Trail.

Tarek also noted that the majority of the noise is from the highway (due to the reduced ground adsorption), not from the proposed Service Road.

STANTEC CONSULTING LTD.

Maya Caron, B. Sc., MCIP, RPP
Environmental Planner
Maya.Caron@stantec.com

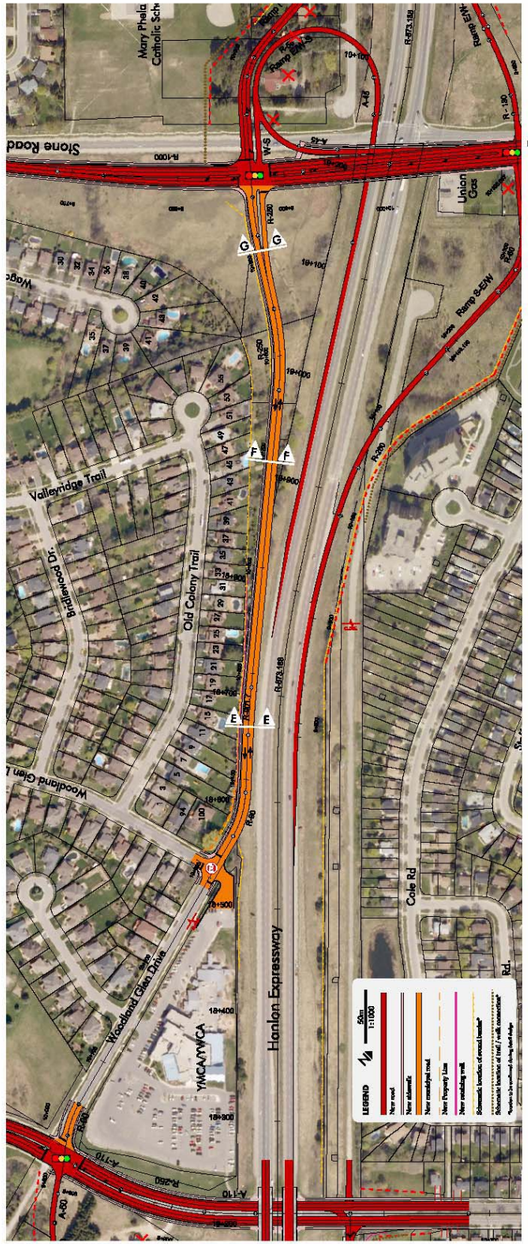
SAMPLE SOUND LEVEL CALCULATION

```
STAMSON 5.0        SUMMARY REPORT        Date: 20-05-2009 15:25:14

MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: eefut.te              Time Period: 24 hours

Description: SECTION EE-FDN SOUND LEVELS


Road data, segment # 1: HWY 6
-----------------------------
Car traffic volume  : 30388 veh/TimePeriod  *
Medium truck volume :  1743 veh/TimePeriod  *
Heavy truck volume  :  2051 veh/TimePeriod  *
Posted speed limit  :    70 km/h
Road gradient       :     2 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 1: HWY 6
---------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  61.00 m
Receiver height           :   1.20 m
Topography                :      4       (Elevated; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : 90.00 deg
Barrier height            :   0.00 m
Elevation                 :   4.00 m
Barrier receiver distance :  22.00 m
Source elevation          : 328.00 m
Receiver elevation        : 332.00 m
Barrier elevation         : 328.00 m
Reference angle           :   0.00


Result summary
--------------

                   !  source  !   Road   !  Total
                   !  height  !   Leq    !   Leq
                   !   (m)    !  (dBA)   !  (dBA)
-------------------+---------+---------+---------
 1.HWY 6           !     1.57 !    63.61 !    63.61 *
-------------------+---------+---------+---------
                     Total                 63.61 dBA

  * Bright Zone  !


TOTAL Leq FROM ALL SOURCES:       63.61
```

APPENDIX G

FINAL CALCULATIONS FOR WEST SERVICE ROAD

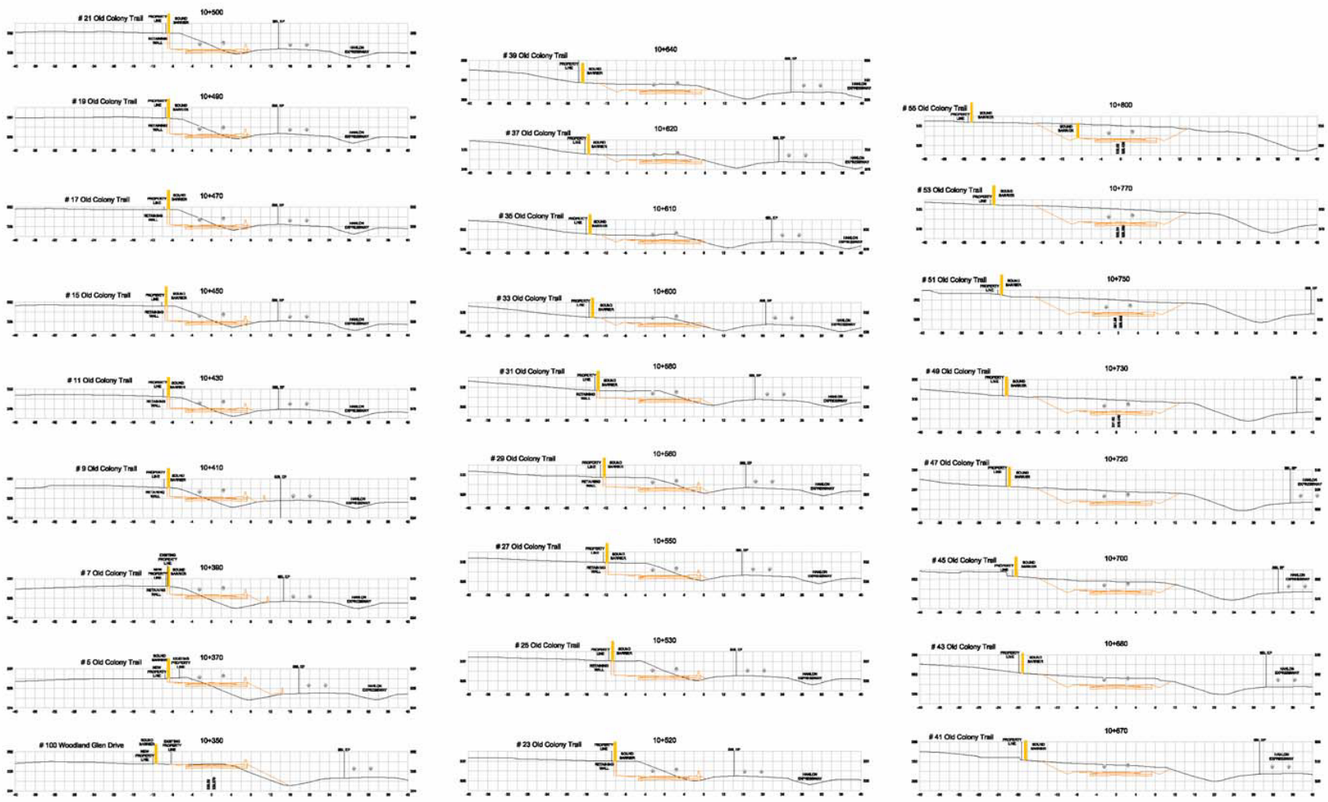
West Service Road Plan, Profile and Cross Sections



Ontario Neighbourhood Meeting
February 11, 2009

West Service Road Cross Sections

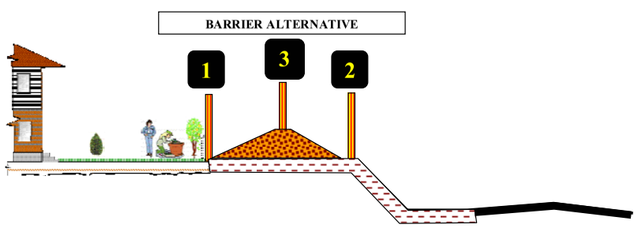
HIGHWAY 6 (HANLON EXPRESSWAY)
from Maltby Road to the Speed River
GWP 3002-05-00



Sound Levels Without and With Barrier Location Alternatives
(A barrier is in reference to a berm, wall or a combination thereof)

Address	Unattenuated Sound Levels, (Without Barrier), dBA	Attenuated Sound Levels (With 3m High Sound Barrier), dBA	Barrier Height and Location Alternatives			Height of Possible Berm + Wall	
			(1) Wall at House Property Line.	(2) Wall on East End of Buffer Space (MTO Lands)	(3) Berm + Wall on MTO Lands	Berm Height	Wall Height
55 Old Colony Road	65 dBA	59 dBA	3.0m	3.0m	3.0m	1.50m	1.50m
51Old Colony Road	66 dBA	60 dBA	3.0m	3.0m	3.0m	1.00m	2.00m
49 Old Colony Road	66 dBA	60 dBA	3.0m	3.0m	3.0m	1.00m	2.00m
47Old Colony Road	67dBA	60dBA	3.0m	3.0m	3.0m	0.75m	2.25m
45 Old Colony Road	68 dBA	61 dBA	3.0m	3.0m	3.0m	0.75m	2.25m
37 Old Colony Road	68 dBA	63 dBA	3.0m	3.0m	3.0m	0. 50m	2.50m
27 Old Colony Road	68 dBA	63 dBA	3.0m	3.0m	No space for berm	No space for berm	No space fo berm

NOTE: All above barriers have been designed to achieve a minimum Insertion Loss (reduction) of 5 dBA



```
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   0.50
    Heavy Truck  % of Total Volume     :   1.50
    Day (16 hrs) % of Total Volume     :  66.67

Data for Segment # 2: SERVICE RD (day/night)
---------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  36.00 / 58.00  m
Receiver height           :   1.20 / 4.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : 90.00 deg
Barrier height            :   3.00 m
Barrier receiver distance :  12.50 / 55.00  m
Source elevation          : 330.00 m
Receiver elevation        : 332.00 m
Barrier elevation         : 331.00 m
Reference angle           :   0.00


Road data, segment # 3: E/W-S RAMP (day/night)
---------------------------------------------
Car traffic volume  :  2777/1388  veh/TimePeriod  *
Medium truck volume :    14/7     veh/TimePeriod  *
Heavy truck volume  :    43/21    veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     4 %
Road pavement       :     1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

    24 hr Traffic Volume (AADT or SADT):   4250
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   0.50
    Heavy Truck  % of Total Volume     :   1.50
    Day (16 hrs) % of Total Volume     :  66.67

Data for Segment # 3: E/W-S RAMP (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  :  53.00 / 62.00  m
Receiver height           :   1.20 / 4.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : 90.00 deg
Barrier height            :   3.00 m
Barrier receiver distance :  12.50 / 10.00  m
Source elevation          : 330.00 m
Receiver elevation        : 332.00 m
Barrier elevation         : 331.00 m
Reference angle           :   0.00


Result summary (day)
--------------------
```


	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.HWY 6	1.67	62.62	62.62
2.SERVICE RD	1.11	50.29	50.29
3.E/W-S RAMP	1.11	43.17	43.17
Total			62.91 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.HWY 6	1.67	62.15	62.15
2.SERVICE RD	1.10	42.79	42.79
3.E/W-S RAMP	1.10	48.64	48.64 *
Total			62.39 dBA

* Bright Zone !

TOTAL Leq FROM ALL SOURCES (DAY): 62.91
(NIGHT): 62.39

STAMSON 5.0 SUMMARY REPORT Date: 21-05-2009 10:09:01
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: NO49.te Time Period: Day/Night 16/8 hours

Description: SOUND LEVELS WITH 3.0m HIGH SOUND ARRIER AT 49 OLD COLONY RD

Road data, segment # 1: HWY 6 (day/night)

Car traffic volume : 45625/22809 veh/TimePeriod *
Medium truck volume : 1312/656 veh/TimePeriod *
Heavy truck volume : 3932/1966 veh/TimePeriod *
Posted speed limit : 90 km/h
Road gradient : 2 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 76300
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 2.58
Heavy Truck % of Total Volume : 7.73
Day (16 hrs) % of Total Volume : 66.67

Data for Segment # 1: HWY 6 (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 : 90.00 / 108.00 m
Receiver height : 1.20 / 4.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : 90.00 deg
Barrier height : 3.00 m
Barrier receiver distance : 19.00 / 70.00 m
Source elevation : 330.00 m
Receiver elevation : 333.00 m
Barrier elevation : 332.50 m
Reference angle : 0.00

Road data, segment # 2: SERVICE RD (day/night)

Car traffic volume : 4900/2450 veh/TimePeriod *
Medium truck volume : 25/12 veh/TimePeriod *
Heavy truck volume : 75/37 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 3 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 7500 Percentage of Annual Growth
: 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 0.50
Heavy Truck % of Total Volume : 1.50

Day (16 hrs) % of Total Volume : 66.67

Data for Segment # 2: SERVICE RD (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 53.00 / 58.00 m
Receiver height : 1.20 / 4.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : 90.00 deg
Barrier height : 3.00 m
Barrier receiver distance : 19.00 / 55.00 m
Source elevation : 330.00 m
Receiver elevation : 333.00 m
Barrier elevation : 332.50 m
Reference angle : 0.00

Road data, segment # 3: E/W-S RAMP (day/night)

Car traffic volume : 2777/1388 veh/TimePeriod *
Medium truck volume : 14/7 veh/TimePeriod *
Heavy truck volume : 43/21 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 4 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 4250
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 0.50
Heavy Truck % of Total Volume : 1.50
Day (16 hrs) % of Total Volume : 66.67

Data for Segment # 3: E/W-S RAMP (day/night)

Angle1 Angle2 : -65.00 deg 60.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 75.00 / 75.00 m
Receiver height : 1.20 / 4.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -65.00 deg Angle2 : 60.00 deg
Barrier height : 3.00 m
Barrier receiver distance : 19.00 / 19.00 m
Source elevation : 329.00 m
Receiver elevation : 333.00 m
Barrier elevation : 332.50 m
Reference angle : 0.00

Result summary (day)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)

1.HWY 6	1.67	59.91	59.91
2.SERVICE RD	1.11	47.42	47.42
3.E/W-S RAMP	1.11	37.18	37.18
Total			60.17 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.HWY 6	1.67	60.70	60.70
2.SERVICE RD	1.10	40.47	40.47
3.E/W-S RAMP	1.10	46.53	46.53 *
Total			60.90 dBA

* Bright Zone !

TOTAL Leq FROM ALL SOURCES (DAY): 60.17
(NIGHT): 60.90

STAMSON 5.0 SUMMARY REPORT Date: 21-05-2009 10:07:56
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: no55.te Time Period: Day/Night 16/8 hours

Description: SOUND LEVELS WITH 3.0m HIGH SOUND ARRIER AT 55 OLD COLONY RD

Road data, segment # 1: HWY 6 (day/night)

Car traffic volume : 45625/22809 veh/TimePeriod *
Medium truck volume : 1312/656 veh/TimePeriod *
Heavy truck volume : 3932/1966 veh/TimePeriod *
Posted speed limit : 90 km/h
Road gradient : 2 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 76300
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 2.58
Heavy Truck % of Total Volume : 7.73
Day (16 hrs) % of Total Volume : 66.67

Data for Segment # 1: HWY 6 (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 : 106.00 / 108.00 m
Receiver height : 1.20 / 4.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : 90.00 deg
Barrier height : 3.00 m
Barrier receiver distance : 22.00 / 70.00 m
Source elevation : 330.00 m
Receiver elevation : 333.00 m
Barrier elevation : 332.50 m
Reference angle : 0.00

Road data, segment # 2: STONE ROAD (day/night)

Car traffic volume : 13230/1470 veh/TimePeriod *
Medium truck volume : 135/15 veh/TimePeriod *
Heavy truck volume : 135/15 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 4 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 15000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 1.00
Heavy Truck % of Total Volume : 1.00
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 2: STONE ROAD (day/night)

```
-------------------------------------------
Angle1   Angle2           : -90.00 deg   40.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 184.00 / 184.00 m
Receiver height           :   1.20 / 4.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : 40.00 deg
Barrier height            :   3.00 m
Barrier receiver distance : 140.00 / 140.00 m
Source elevation          : 333.00 m
Receiver elevation        : 333.00 m
Barrier elevation         : 332.50 m
Reference angle           :   0.00


Road data, segment # 3: SERVICE RD (day/night)
-------------------------------------------
Car traffic volume  :  4900/2450  veh/TimePeriod  *
Medium truck volume :    25/12    veh/TimePeriod  *
Heavy truck volume  :    75/37    veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     3 %
Road pavement       :     1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

    24 hr Traffic Volume (AADT or SADT):   7500
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   0.50
    Heavy Truck  % of Total Volume     :   1.50
    Day (16 hrs) % of Total Volume     :  66.67

Data for Segment # 3: SERVICE RD (day/night)
-------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  65.00 / 58.00  m
Receiver height           :   1.20 / 4.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : 90.00 deg
Barrier height            :   3.00 m
Barrier receiver distance :  22.00 / 55.00  m
Source elevation          : 329.00 m
Receiver elevation        : 333.00 m
Barrier elevation         : 332.50 m
Reference angle           :   0.00


Road data, segment # 4: E/W-S RAMP (day/night)
-------------------------------------------
Car traffic volume  :  2777/1388  veh/TimePeriod  *
Medium truck volume :    14/7     veh/TimePeriod  *
Heavy truck volume  :    43/21    veh/TimePeriod  *
Posted speed limit  :    60 km/h
Road gradient       :     4 %
Road pavement       :     1 (Typical asphalt or concrete)
```



```
* Refers to calculated road volumes based on the following input:

    24 hr Traffic Volume (AADT or SADT):   4250
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   0.50
    Heavy Truck  % of Total Volume     :   1.50
    Day (16 hrs) % of Total Volume     :  66.67

Data for Segment # 4: E/W-S RAMP (day/night)
-------------------------------------------
Angle1   Angle2           : -65.00 deg   60.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  90.00 / 90.00  m
Receiver height           :   1.20 / 4.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -65.00 deg   Angle2 : 60.00 deg
Barrier height            :   3.00 m
Barrier receiver distance :  22.00 / 22.00  m
Source elevation          : 329.00 m
Receiver elevation        : 333.00 m
Barrier elevation         : 332.50 m
Reference angle           :   0.00


Result summary (day)
--------------------

                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.HWY 6            !     1.67 !    59.15 !    59.15
 2.STONE ROAD       !     1.00 !    39.47 !    39.47
 3.SERVICE RD       !     1.11 !    46.44 !    46.44
 4.E/W-S RAMP       !     1.11 !    36.58 !    36.58
--------------------+---------+---------+---------
                     Total                  59.44 dBA
```

Result summary (night)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)	
1.HWY 6	1.67	60.70	60.70	
2.STONE ROAD	1.00	34.97	34.97	
3.SERVICE RD	1.10	39.66	39.66	
4.E/W-S RAMP	1.10	45.27	45.27	*
Total			60.87	dBA

* Bright Zone !

TOTAL Leq FROM ALL SOURCES (DAY): 59.44
(NIGHT): 60.87

SAMPLE SOUND LEVEL CALCULATION

STAMSON 5.0 SUMMARY REPORT Date: 21-05-2009 10:08:22
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: NO27.te Time Period: Day/Night 16/8 hour
s
Description: SOUND LEVELS WITH 3.0m HIGH SOUND ARRIER AT 27 OLD COLONY RD

Road data, segment # 1: HWY 6 (day/night)

Car traffic volume : 45625/22809 veh/TimePeriod *
Medium truck volume : 1312/656 veh/TimePeriod *
Heavy truck volume : 3932/1966 veh/TimePeriod *
Posted speed limit : 90 km/h
Road gradient : 2 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 76300
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 2.58
Heavy Truck % of Total Volume : 7.73
Day (16 hrs) % of Total Volume : 66.67

Data for Segment # 1: HWY 6 (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 : 70.00 / 108.00 m
Receiver height : 1.20 / 4.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : 90.00 deg
Barrier height : 3.00 m
Barrier receiver distance : 12.50 / 70.00 m
Source elevation : 330.00 m
Receiver elevation : 332.00 m
Barrier elevation : 331.00 m
Reference angle : 0.00

Road data, segment # 2: SERVICE RD (day/night)

Car traffic volume : 4900/2450 veh/TimePeriod *
Medium truck volume : 25/12 veh/TimePeriod *
Heavy truck volume : 75/37 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 3 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 7500
Percentage of Annual Growth : 0.00

APPENDIX H

RECOMMENDED PLAN