

APPENDIX E

Noise Assessment

Acoustic Impact Assessment for the Proposed New East-West Road— Summary of Updated Evaluation (October 2009)

1. Introduction

As a result of the Northlawn Residents Meeting on September 9th, 2009, a request was made by the residents for a re-evaluation of the acoustic impacts and proposed mitigation in recognition of the following suggested changes:

1. Use of Summer Average Daily Traffic volumes as they will be higher than the Annual Average Daily Traffic volumes that have been used;
2. Assessment to 2023, 10 years after the scheduled completion date for the new road, rather than 2021;
3. Reduction of the posted speed on the New East-West Road segment between Centre Road and Parkside Drive to 50 km/h from 60 km/h;
4. Removal of the noise attenuating influence of the woodlot to the north of the residences on Northlawn Avenue;
5. Assessment of the noise impact if the new East-West Road was assumed to be a major carrier of truck traffic rather than using similar truck volumes to Parkside Drive (a designated truck route) as in the current assessment; and
6. Consideration of the noise impact and mitigation based on the difference between the future build scenario and the existing conditions rather than the future no-build scenario.

Items 1 through 3 are suggested changes to numerical model input and are appropriate for incorporation in the basic model. Incorporation of Items 4 through 6 is not standard practice when assessing the impact of a new transportation corridor. This updated summary report presents the assessment using standard assessment practices considering Items 1 to 3 above, and then presents the examination of the impact of the no-woodlot assumption and increasing the heavy truck volumes as sensitivity studies. A comparison of the future build noise levels (2023) against existing levels is also presented.

2. Noise Sensitive Receptors

The same 27 noise sensitive receptors used in the Acoustic Assessment Report of August 2009 were employed in this updated assessment. One additional sensitive receptor (EW28, a residence located mid-way between the western-most and eastern-most residence on Northlawn Ave. and backing the woodlot) was also selected for the assessment. **Table 2-1** below describes the noise sensitive receptors, and the distances to the primary road noise source under the current road configuration, the future condition in 2023 and the future build scenario in 2023.

Table 2-1. Selected Noise Sensitive Receptors

Receptors	Status	Associated Roadway	Distance to Centre of Nearest Lane (m)					
			Existing Road Configuration		2023 No-Build Configuration		2023 Mature State of Development	
			Lane 1	Lane 2	Lane 1	Lane 2	Lane 1	Lane 2
EW01	Existing Residence	Parkside Drive	36	39	36	39	36	39
EW02	Existing Residence	Parkside Drive	20	23	20	23	20	23
EW03	Existing Residence	Parkside Drive	25	28	25	28	25	28
EW04	Existing Residence	Parkside Drive	21	24	21	24	21	24
EW05	Existing Residence	Parkside Drive	20	23	20	23	20	23
EW06	Existing Residence	Parkside Drive	16	23	16	23	16	23
EW07	Existing Residence	Parkside Drive	14	17	14	17	14	17
EW08	Existing Residence	Parkside Drive	19	22	19	22	19	22
EW09	Existing Residence	Parkside Drive	20	23	20	23	20	23
EW10	Existing Residence	Parkside Drive	21	24	21	24	20	27
EW11	Existing Residence	Parkside Drive	23	26	23	26	20	27
EW12	Existing Residence	Parkside Drive	18	21	18	21	18	21
EW13	Existing Residence	Evans Road	23	26	23	26	23	26
EW14	Existing Residence	Dundas St. East	34	45	34	45	31	48
EW15	Existing Residence	Dundas St. East	29	38	29	38	25	42
EW16	Existing Residence	Dundas St. East	30	40	30	40	26	43
EW17	Existing Residence	Highway 6	20	31	20	31	20	31
EW18	Future Residence	New East-West Road	na	na	na	na	21	26
EW19	Future Residence	New East-West Road	na	na	na	na	18	23
EW20	Existing Residence	Centre Road	28	32	28	32	28	32
EW21	Existing Western-most Residence on Northlawn	Centre Road	30	34	30	34	30	34
EW22	Existing Eastern-most Residence on Northlawn	Centre Rd/New E-W Rd	228	232	228	232	128	133
EW23	Future Residence	Parkside Drive	na	na	na	na	20	27
EW24	Future Residence	New East-West Road	na	na	na	na	20	27
EW25	Future Residence	New East-West Road	na	na	na	na	18	24
EW26	Existing Nursing Home Southeast side	Parkside Drive	154	157	154	157	154	157
EW27	Existing Nursing Home Northeast side	Parkside Drive/ New East-West Road	228	231	228	231	225	232
EW28	Existing Middle Residence on Northlawn	Centre Rd/New E-W Rd	130	134	130	134	123	129

3. Impact Assessment Scenarios

Three scenarios were assessed for their acoustic impact on the sensitive receptors. These are described below as:

- *Scenario 1* – Current 2008 configuration, based on existing traffic volumes;
- *Scenario 2* – Future 2023 “no road-build” option, based on forecasted traffic volumes under the existing roadway configuration. This scenario assumes that currently planned future residential land developments (mature state) are in place; and
- *Scenario 3* – Future 2023 Mature State of Development based on forecasted traffic volumes with the proposed new land development and proposed road improvements in place. In generating future traffic volumes for this “future build” scenario, it was assumed that Parkside Drive would be closed at Highway 6. Note that at this time there are no plans / approvals in place to close Parkside Drive at Highway 6. This creates a more conservative scenario for modelling future noise levels along the new East-West Road as this assumption will result in greater traffic volumes along the new road.

Tables 3-1, 3-2, and 3-3 describe the traffic volumes on the roadways under Scenarios 1, 2, and 3, respectively. It should be noted that conventional Annual Average Daily Traffic (AADT) figures include the total of all weekday and weekend volumes throughout the year divided by 365 days. The City of Hamilton figures used in the noise assessment are based on week day counts which can be defined as Annual Average Weekday Traffic (AAWDT) volumes. For any road, these volumes are normally 5-10% greater than AADT figures. Using Summer Average Daily Traffic (SADT) figures instead of AADT figures would likely result in an increase of 5-10% for a road of this type. Therefore no adjustment to account for SADT figures was considered necessary as higher volumes have already been considered.

Table 3-1. Scenario 1 – 2008 Existing traffic data and road description

Road Segment	ID	Description	AADT (veh/day)*	%Med Truck	%Heavy Truck	D/N Split %
Highway 6	Hwy6	5-lane undivided road with centre turning lane; speed limit 80 km/h	35000	6	6	91% / 9%
Parkside Dr: Highway 6 to Hollybush Dr.	PS1	2-lane undivided road; speed limit 60 km/h	6000	4	1	91% / 9%
Parkside Dr: Hollybush Dr To Keewaydin St.	PS2	2-lane undivided road; speed limit 60 km/h Hollybush to Duncan; 50 km/h Duncan to Keewaydin	7500	4	1	91% / 9%
Parkside Dr: Keewaydin St To Hamilton St.N.	PS3	2-lane undivided road; speed limit 50 km/h Keewaydin to Hamilton	9500	4	1	91% / 9%
Parkside Dr: Hamilton St.N. To Grindstone Crk	PS4	2-lane undivided road; speed limit 50 km/h Hamilton to Mill St; 60 km/h Mill St. to Grindstone	7500	4	1	91% / 9%
Parkside Dr: Grindstone Crk To Evans Rd	PS5	2-lane undivided road; speed limit 60 km/h Grindstone to Evans	8000	4	1	91% / 9%
Hamilton St. N: N of Parkside	H1	3-lane undivided road centre lane turning; speed limit 60 km/h	7500	5	1	91% / 9%
Hamilton St. N: S of Parkside	H2	3-lane undivided road centre lane turning; speed limit 60 km/h	10500	4	1	91% / 9%
Main St N: Parkside to Centre	Main	2-lane undivided road; speed limit 50 km/h	2500	6	2	91% / 9%
Centre Rd: N of Hamilton	CRd	2-lane undivided road; speed limit 60 km/h	10000	5	1	91% / 9%
Evans Rd	E	2-lane undivided road; speed limit 60 km/h	7500	6	1	91% / 9%
Dundas St.E: Pamela to Evans	D1	5-lane undivided road with centre turning lane; speed limit 60 km/h	21500	6	2	91% / 9%
Dundas St.E: Evans to Brant/Cedar	D2	5-lane undivided road with centre turning lane; speed limit 60 km/h Evans to Kerns; 80 km/h Kerns to Brant/Cedar	28000	6	2	91% / 9%
Brant St	B	5-lane undivided road with centre turning lane; speed limit 60 km/h	16000	4	1	91% / 9%
Cedar Springs	CS	4-lane undivided road; speed limit 60 km/h	5500	3	1	91% / 9%

* AADT is over a 24-hr period and includes both directions. The AADT volumes were based on the City of Hamilton's Annual Average Weekday Traffic volumes.

Table 3-2. Scenario 2 – 2023 No-Build traffic data and road description.

Road Segment	ID	Description	AADT (veh/day)*	%Med Truck	%Heavy Truck	D/N Split %
Highway 6	Hwy6	5-lane undivided road with centre turning lane; speed limit 80 km/h	44000	6	6	91% / 9%
Parkside Dr: Highway 6 to Hollybush Dr.	PS1	2-lane undivided road; speed limit 60 km/h	16000	4	1	91% / 9%
Parkside Dr: Hollybush Dr To Keewaydin St.	PS2	2-lane undivided road; speed limit 60 km/h Hollybush to Duncan; 50 km/h Duncan to Keewaydin	17500	4	1	91% / 9%
Parkside Dr: Keewaydin St To Hamilton St.N.	PS3	2-lane undivided road; speed limit 50 km/h Keewaydin to Hamilton	18000	4	1	91% / 9%
Parkside Dr: Hamilton St.N. To Grindstone Crk	PS4	2-lane undivided road; speed limit 50 km/h Hamilton to Mill St; 60 km/h Mill St. to Grindstone	18000	4	1	91% / 9%
Parkside Dr: Grindstone Crk To Evans Rd	PS5	2-lane undivided road; speed limit 60 km/h Grindstone to Evans	15000	4	1	91% / 9%
Hamilton St. N: N of Parkside	H1	3-lane undivided road centre lane turning; speed limit 60 km/h	10000	5	1	91% / 9%
Hamilton St. N: S of Parkside	H2	3-lane undivided road centre lane turning; speed limit 60 km/h	15000	4	1	91% / 9%
Main St N: Parkside to Centre	Main	2-lane undivided road; speed limit 50 km/h	3500	6	2	91% / 9%
Centre Rd: N of Hamilton	CRd	2-lane undivided road; speed limit 60 km/h	13500	5	1	91% / 9%
Evans Rd	E	2-lane undivided road; speed limit 60 km/h	14000	6	1	91% / 9%
Dundas St.E: Pamela to Evans	D1	5-lane undivided road with centre turning lane; speed limit 60 km/h	34500	6	2	91% / 9%
Dundas St.E: Evans to Brant/Cedar	D2	5-lane undivided road with centre turning lane; speed limit 60 km/h Evans to Kerns; 80 km/h Kerns to Brant/Cedar	40500	6	2	91% / 9%
Brant St	B	5-lane undivided road with centre turning lane; speed limit 60 km/h	18500	4	1	91% / 9%
Cedar Springs	CS	4-lane undivided road; speed limit 60 km/h	8500	3	1	91% / 9%

* AADT is over a 24-hr period and includes both directions. The AADT volumes were based on the City of Hamilton's Annual Average Weekday Traffic volumes.

Table 3-3. Scenario 3 – 2023 Mature State of Development traffic data and road description

Road Segment	ID	Description	AADT (veh/day)*	%Med Truck	%Heavy Truck	D/N Split %
Highway 6	Hwy6	5-lane undivided road with centre turning lane; speed limit 80 km/h	44000	6	6	91% / 9%
Parkside Dr: Highway 6 to Hollybush Dr.	PS1	2-lane undivided road; speed limit 60 km/h	0	4	1	91% / 9%
Parkside Dr: Hollybush Dr To Keewaydin St.	PS2	2-lane undivided road; speed limit 60 km/h Hollybush to Duncan; 50 km/h Duncan to Keewaydin	7500	4	1	91% / 9%
Parkside Dr: Keewaydin St To Hamilton St.N.	PS3	2-lane undivided road; speed limit 50 km/h Keewaydin to Hamilton	14000	4	1	91% / 9%
Parkside Dr: Hamilton St.N. To Grindstone Crk	PS4	2-lane undivided road; speed limit 50 km/h Hamilton to Mill St; 60 km/h Mill St. to Grindstone	11500	4	1	91% / 9%
Parkside Dr: Grindstone Crk To New E-W Rd	S3	4-lane undivided road; speed limit 50 km/h Grindstone to New E-W Rd	15000	4	1	91% / 9%
Parkside Dr: New E-W Rd To Evans	S3B	2-lane undivided road; speed limit 60 km/h	4000	4	1	91% / 9%
Hamilton St. N: N of Parkside	H1	3-lane undivided road centre lane turning; speed limit 60 km/h	10500	5	1	91% / 9%
Hamilton St. N: S of Parkside	H2	3-lane undivided road centre lane turning; speed limit 60 km/h	16000	4	1	91% / 9%
Main St N: Parkside to Centre	Main	2-lane undivided road; speed limit 50 km/h	3500	6	2	91% / 9%
Centre Rd: N of Hamilton	CRd	2-lane undivided road; speed limit 60 km/h	14000	5	1	91% / 9%
Evans Rd	E	2-lane undivided road; speed limit 60 km/h	3000	6	1	91% / 9%
Dundas St.E: Pamela to New EW Rd	D1	5-lane undivided road with centre turning lane; speed limit 60 km/h	29000	6	2	91% / 9%
Dundas St.E: New EW Rd to Brant/Cedar	D2	5-lane undivided road with centre turning lane; speed limit 60 km/h	44000	6	2	91% / 9%
Brant St	B	5-lane undivided road with centre turning lane; speed limit 60 km/h	18500	4	1	91% / 9%
Cedar Springs	CS	4-lane undivided road; speed limit 60 km/h	8500	3	1	91% / 9%
New E-W Rd: Highway 6 to Centre Rd	S1	2-lane undivided road with speed limit 60 km/h Hwy 6 to Waterdown N Urban Development; 3-lane (one turning lane) undivided with	10500	4	1	91% / 9%

Road Segment	ID	Description	AADT (veh/day)*	%Med Truck	%Heavy Truck	D/N Split %
		speed limit 50 km/h Waterdown N Urban Dev To Centre Rd				
New E-W Rd: Centre Rd To Parkside Dr	S2	2-lane undivided road; speed limit 50 km/h	6500	4	1	91% / 9%
New E-W Rd: Parkside To Dundas	S4	3-lane (one turning lane) undivided road; speed limit 60 km/h	11500	4	1	91% / 9%

* AADT is over a 24-hr period and includes both directions. The AADT volumes were based on the City of Hamilton's Annual Average Weekday Traffic volumes.

4. Noise Impact Results

As described in the MTO (2006) guide to transportation noise assessments, the acoustic impact of a major transportation project is determined by predicting the future noise levels after the project is completed and comparing with the future noise levels without the project. The prediction is to be made with an approved MOE/MTO acoustic methodology or model (MTO, 2006). For this updated assessment and the Acoustic Impact Assessment Report, August 2009, the MOE/MTO approved road traffic noise prediction model STAMSON was used.

The same modelling assumptions and setting used in the August 2009 report were maintained in this updated assessment to 2023. In particular, the noise attenuating influence of the woodlot / wooded area to the north of the residents on Northlawn Ave. was maintained for as per standard practice. **Table 4-1** below summarises the results of this assessment. The impact of a no-woodlot scenario is addressed separately in the next section of this report.

All receptors, except for the eastern-most dwelling on Northlawn Ave. (EW22), were predicted to either experience a noticeable improvement or an imperceptible change in the traffic generated noise due to the proposed new East-West Road. The receptor EW22 is predicted to experience a daytime increase of approximately 7.7 dBA due to the proposed new East-West Road in 2023 over the future 2023 no-build scenario (**Table 4-1**). By comparison, this receptor was predicted to experience a daytime increase of 8.6 dBA in 2021 as reported in the August 2009 report. A reduction was predicted because the reduced speed limit of 50 km/h (down from 60 km/h) offset the increase in noise due to the increase in AADT volumes in 2023 for the new East-West Road alignment through the woodlot (6500 vehicles per day in 2023 compared to 6000 vehicles per day in 2021).

The residential receptor EW28 located in the middle of Northlawn Ave. and backing the woodlot was not predicted to experience a noticeable increase in the noise due to the future 2023 build scenario in comparison to the future 2023 no-build condition. The western-most residence, EW21 was also predicted to experience an insignificant increase in noise between the future build and future no-build scenario. This is due chiefly to the overriding influence of Centre Road traffic.

According to the MTO (2006) environmental noise guidance document, an increase of 5 dBA or greater warrants an investigation of noise mitigation options within the right of way of the roadway. The guidance document also notes that where noise mitigation investigation is justified due to the 5 dBA increase, a determination of significance must also be conducted. The MTO (2006) defines significance to mean the increase in the absolute noise level over 45.0 dBA sound level ten (10) years after construction. The levels of significance are grouped as follows: 45.0 to 49.9 dBA, 50.0 to 54.9 dBA, 55.0 to 59.9 dBA, etc. The predicted noise level at EW22, at the east end of Northlawn Avenue, is 44.8 dBA under the future 2023 build scenario. This is below the 45.0 dBA at which significance is determined, and therefore mitigation is not specifically required in accordance with the MTO (2006) noise guideline. Note that any noise mitigation measures would benefit only the four residences from the eastern-end of Northlawn Avenue because further to the west the influence of traffic on Centre Road becomes dominant.

Table 4-1. Predicted Daytime Leq (16) for the Three Scenarios

Receptor	Description	Day time Leq (16) dBA			Change Between Scenario 3 and Scenario 2	
		Scenario 1 2008 Existing Condition	Scenario 2 2023 No Build	Scenario 3 2023 Mature State	dBA	Impact
EW01	Existing Residence Parkside Drive	56.6	60.4	53.2	-7.2	Noticeable Improvement
EW02	Existing Residence Parkside Drive	58.6	64.0	42.4	-21.6	Noticeable Improvement
EW03	Existing Residence Parkside Drive	58.1	62.6	58.8	-3.8	Noticeable Improvement
EW04	Existing Residence Parkside Drive	59.3	62.2	58.5	-3.7	Noticeable Improvement
EW05	Existing Residence Parkside Drive	58.8	62.7	61.6	-1.1	Insignificant Improvement
EW06	Existing Residence Parkside Drive	61.3	64.9	63.9	-1.0	Insignificant Improvement
EW07	Existing Residence Parkside Drive	61.7	66.0	64.0	-2.0	Insignificant Improvement
EW08	Existing Residence Parkside Drive	59.9	64.9	63.0	-1.9	Insignificant Improvement
EW09	Existing Residence Parkside Drive	59.7	64.1	60.1	-4.0	Noticeable Improvement
EW10	Existing Residence Parkside Drive	59.5	63.3	61.3	-2.0	Insignificant Improvement
EW11	Existing Residence Parkside Drive	58.9	62.6	62.5	-0.1	Insignificant Improvement
EW12	Existing Residence Parkside Drive	63.5	66.9	60.8	-6.1	Noticeable Improvement
EW13	Existing Residence Evans Road	59.3	62.9	56.6	-6.3	Noticeable Improvement

Receptor	Description	Day time Leq (16) dBA			Change Between Scenario 3 and Scenario 2	
		Scenario 1 2008 Existing Condition	Scenario 2 2023 No Build	Scenario 3 2023 Mature State	dBA	Impact
EW14	Existing Residence Dundas St. East	65.3	67.6	65.6	-2.0	Insignificant Improvement
EW15	Existing Residence Dundas St. East	66.4	68.7	67.1	-1.6	Insignificant Improvement
EW16	Existing Residence Dundas St. East	66.1	68.4	66.6	-1.8	Insignificant Improvement
EW17	Existing Residence Highway 6	71.6	72.6	73.6	1.0	Insignificant
EW18	Future Residence New East-West Rd	NA	NA	58.6	NA	NA
EW19	Future Residence New East-West Rd	NA	NA	64.4	NA	NA
EW20	Existing Residence Centre Road	58.6	59.9	60.2	0.3	Insignificant
EW21	Existing Western-most Residence on Northlawn Ave.	58.2	59.5	59.8	0.3	Insignificant
EW28	Existing Middle Residence on Northlawn Ave.	43.4	44.7	46.5	1.8	Insignificant
EW22	Existing Eastern-most Residence on Northlawn Ave.	35.8	37.1	44.8	7.7	Noticeable
EW23	Future Residence Parkside Drive	NA	NA	60.3	NA	NA
EW24	Future Residence New East-West Rd	NA	NA	61.6	NA	NA
EW25	Future Residence New East-West Rd	NA	NA	65.8	NA	NA
EW26*	SE Area Existing Nursing Home Parkside Drive	44.9 at 1.5 m; 45.7 at 4.5 m	48.7 at 1.5 m; 49.5 at 4.5 m	47.3 at 1.5 m; 48.1 at 4.5 m	-1.4 at 1.5 m; -1.4 at 4.5 m	NA
EW27*	NE Area Existing Nursing Home Parkside Drive	39.5 at 1.5 m; 40.5 at 4.5 m	43.3 at 1.5 m; 44.3 at 4.5 m	43.5 at 1.5 m; 44.5 at 4.5 m	0.2 at 1.5 m; 0.2 at 4.5 m	NA

5. Sensitivity Analysis

As requested by the residents attending the September 2009 meeting, a sensitivity analysis was conducted in order to provide additional mitigation considerations over and above what is standard policy for such assessments. This sensitivity analysis involved examining the impact of the woodlot on the receptors on Northlawn Ave., and the noise impact if the new East-West Road were used as a major truck route. The following presents the examination of these two additional conditions in a cumulative manner, i.e., no attenuation by the woodlot, and no attenuation by the woodlot plus increased truck volumes. Note that the woodlot is provincially designated and as such is expected to remain. Acceptable noise modelling practise under the MOE guidelines is to include all influencing factors, such as the woodlot, as part of the noise evaluation.

5.1 *Removing the Impact of the Woodlot on Northlawn Ave. Receptors*

Propagation of sound in the atmosphere is attenuated by the travel distance through the atmosphere and by the presence of physical structures (barriers) in the propagation pathway. Such structures include buildings, walls, trees, berms and hills. Therefore, the noise being generated by the traffic on Centre Road under the existing conditions and the future 2023 no build scenario, will be attenuated to a certain degree by the woodlot. If there is no woodlot, then the noise would experience attenuation only due to the propagation distance from the roadway to the receptor.

With the woodlot ignored, the receptors on Northlawn Ave. under current conditions and the future 2023 no-build scenario experienced a higher noise level (by up to 5.2 dBA, **Table 5-1**) due to the traffic on Centre Road than when the woodlot was included in the estimate. Similarly, if the woodlot was not included, the noise levels predicted at the receptors under the future build scenario due to the traffic on Centre Road and the proposed new East-West Road was up to 1.7 dBA higher than the estimate with the woodlot.

In order to determine the level of impact due to the proposed new East-West Road, the difference or increase between the future build and no build conditions need to be calculated. Although the noise levels at the Northlawn receptors were higher under all scenarios when the woodlot was not included in the model, the maximum increase in the noise levels under the future build compared to the future no build scenarios was 3.7 dBA at EW22 (**Table 5-1**). This increase was less than 5 dBA and therefore no mitigation measures are required (**Table 5-1**).

When comparing the future build Scenario 3 with the current condition Scenario 1, the predicted increase was up to 5 dBA at EW22 with the noise level at EW22 under Scenario 3 estimated at 46.0 dBA. This daytime noise level is within the limits prescribed by the MTO (2006) and MOE for a suburban area which is 50 dBA.

Note that comparison of existing with the future build condition is not standard practice. It should also be noted that neglecting the influence of the woodlot on noise attenuation is not a conservative approach.

Table 5-1. Predicted Daytime Leq (16) with Woodlot

Receptor	Description	Day time Leq (16) dBA			Change Between Scenario 3 and Scenario 2		Change Between Scenario 3 and Scenario 1	
		Scenario 1 2008 Existing Condition	Scenario 2 2023 No Build	Scenario 3 2023 Mature State	dBA	Impact	dBA	Impact
EW21	Existing Western-most Residence on Northlawn Ave.	58.2	59.5	59.8	0.3	Insignificant	1.6	Insignificant
EW28	Existing Middle Residence on Northlawn	45.0	46.3	48.2	1.9	Insignificant	3.2	Noticeable
EW22	Existing Eastern-most Residence on Northlawn Ave.	41.0	42.3	46.0	3.7	Noticeable	5.0	Noticeable

5.2 Increasing Heavy Truck Volumes on New East-West Road

The impact of increasing the heavy truck volumes on the proposed new East-West Road was focussed on the Northlawn Ave. receptors / residences for this updated assessment. It was assumed that up to half of the truck traffic predicted on Dundas Street in 2023 would use the proposed new East-West Road for this assessment. This results in an approximate five fold increase in the heavy truck volumes over that which is predicted in the future 2023 build scenario for the new East-West Road. In determining the impact of the increased heavy truck traffic on the Northlawn receptors, the no woodlot condition was included.

This assumed increase in heavy truck traffic under the future 2023 build scenario is predicted to increase the daytime noise levels by up to 6 dBA over that predicted for the future 2023 no build scenario (**Table 5-2**). The greatest impact is predicted for the eastern-most residence on Northlawn Ave. (EW22) with a predicted daytime noise level of 48.3 dBA. Because the increase is greater than 5 dBA and the predicted level at EW22 under the future build scenario is above 45.0 dBA, investigation of mitigation measures is required.

When comparing the future build condition with the existing condition, an increase of up to 7.3 dBA was predicted as a result of the future build case with the increased truck volumes. . The resultant daytime noise level is the within the limits prescribed by the MTO (2006) and MOE for a suburban area which is 50 dBA. The absolute noise levels predicted for the receptors under the three scenarios are presented in **Table 5-2** below.

Table 5-2. Predicted Daytime Leq (16) with Increased Truck Traffic

Receptor	Description	Day time Leq (16) dBA			Change Between Scenario 3 and Scenario 2		Change Between Scenario 3 and Scenario 1	
		Scenario 1 2008 Existing Condition	Scenario 2 2023 No Build	Scenario 3 2023 Mature State	dBA	Impact	dBA	Impact
EW21	Existing Western-most Residence on Northlawn Ave.	58.2	59.5	59.9	0.4	Insignificant	1.7	Insignificant
EW28	Existing Middle Residence on Northlawn	45.0	46.3	49.7	3.4	Insignificant	4.7	Noticeable
EW22	Existing Eastern-most Residence on Northlawn Ave.	41.0	42.3	48.3	6.0	Noticeable	7.3	Noticeable

6. Summary

A re-evaluation of the acoustic study was conducted using the following assumptions:

1. Consideration of Summer Average Daily Traffic volumes;
2. Assessment to 2023;
3. Reduction of the speed limit on the New East-West Road segment between Centre Road and Parkside Drive to 50 km/h from 60 km/h;
4. Removal of the noise attenuating influence of the woodlot to the north of the residences on Northlawn Avenue;
5. Assessment of the noise impact if the new East-West Road was assumed to be a major truck route; and
6. Assessment of the noise impact between the future build scenario and the existing scenario rather than the future no-build scenario.

In conducting the noise impact assessment, an additional sensitive receptor (EW28) was selected to better capture the potential impact of the new East-West Road on the residential receptors along Northlawn Ave. This receptor represented the residence mid-way between the western and eastern residence on Northlawn Ave.

Under the standard assessment approach, (i.e, comparison between the future build and no-build scenarios), the eastern-most residence EW22 on Northlawn Ave. was the only sensitive receptor with an increase greater than 5 dBA. This increase was predicted to be 7.7 dBA due to the

proposed new East-West Road. No other receptor was predicted to have a noticeable increase in the noise levels (they were predicted to either experience a noticeable decrease in the noise or an imperceptible increase in the noise levels). The predicted noise level at EW22 under the future build scenario was 44.8 dBA and since significance is determined at 45.0 dBA under the MTO (2006) guideline, mitigation is not warranted.

The impact of the woodlot on the noise propagation from the roadways was examined on the residences along Northlawn Ave. Removing the influence of the woodlot resulted in an increase in the noise levels under all scenarios, however, the increase in the noise levels under the future build scenario over that of the future no build scenario was 3.7 dBA. This is a noticeable increase however it is less than the 5 dBA required to trigger a noise mitigation investigation. When comparing the increase of the future build condition with the existing condition, the increase was up to 5 dBA at EW22. Note that comparison of existing with the future build condition is not standard practice.

The impact of increasing the heavy truck volumes on the proposed new East-West Road was focussed on the Northlawn Ave. receptors / residences for this updated assessment. It was assumed that approximately half of the truck traffic predicted on Dundas Street in 2023 would use the proposed new East-West Road for this assessment thereby increasing the truck volumes by approximately five fold. This resulted in a daytime noise level of 48.3 dBA at the eastern-most residence EW22 on Northlawn Ave. This is an increase of 6 dBA over that predicted for the future 2023 no build scenario. This increase warrants noise mitigation measures to be investigated. When comparing the future build condition with the existing condition, an increase of up to 7.3 dBA was predicted as a result of the future build case with the increased truck volumes. However it should be noted that the noise level predicted at EW22 is less than the suburban limit of 50 dBA prescribed by the MTO / MOE.

In conclusion, the re-evaluation of the noise assessment based on items 4 to 6 as suggested by the Northlawn Residents is not standard practise. However, the evaluation was undertaken as a sensitivity exercise to illustrate the results of this analysis to the residents of Northlawn Avenue.

As a result of the further evaluation the project team will not be altering recommendations in the ESR.

***New East-West Road Corridor
(Highway 6 to Brant Street)
Acoustic Assessment
Draft Report***

August 2009

Project No. 08-9020

Submitted by

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Executive Summary

This acoustic assessment was undertaken for the proposed east-west roadway located north of the community of Waterdown. The new roadway includes a combination of new road sections and the widening of existing road sections (of Parkside Drive and Dundas Street). The eastern limit of the road improvements is Brant Street and the western limit is Highway 6.

The Ontario Ministry of Environment predictive road traffic noise model ORNAMENT/STAMSON was used to predict the acoustical impact of the proposed roadway. The 16-hour daytime outdoor equivalent sound levels (07:00 to 23:00 h), and 8-hour night-time outdoor equivalent sound levels (23:00 to 07:00 h) were predicted at selected existing and potential future noise sensitive receptors (i.e., residences) that were expected to be most impacted. In order to determine the impact of the proposed road redevelopment, the following three scenarios were modelled:

- Scenario 1 – Current 2008 configuration, based on existing traffic volumes;
- Scenario 2 – Future 2021 “no road-build” option, based on forecasted traffic volumes under the existing roadway configuration. This scenario assumes that anticipated future land development in Waterdown would be in place; and
- Scenario 3 – Future 2021 Mature State of Development based on forecasted traffic volumes with the proposed new land development and proposed road improvements in place. In generating future traffic volumes for this “future build” scenario, it was assumed that Parkside Drive would be closed at Highway 6. This creates a more conservative scenario for modelling future noise levels along the new East-West Road under this scenario.

The noise modelling work was based on traffic data forecasts that were generated through the Phase 2 traffic modelling results. Additional traffic modelling work was undertaken to produce traffic data appropriate for use in a noise study. It is noted that the same traffic volumes would be generated under the future no-build and future build scenarios (it is assumed that the same amount of future development would be in place by 2021). How these scenarios differ though is with respect to how the traffic volumes are distributed to existing and future roadways.

For receptors along sections of existing road, the acoustic modelling indicated that for the section of Parkside Drive between Highway 6 and Grindstone Creek, the future build scenario would result in sound levels decreasing by 1 to 21 dBA when compared to the future no-build scenario. The reason for

this decrease in sound levels is attributed to the redistribution of traffic volume to the new East-West Road and the assumed closure of the Parkside Drive/Highway 6 intersection by 2021.

For the section of Parkside Drive east of Grindstone Creek that would be improved (widened from two to four lanes) in the future build scenario, a decrease in the sound levels of up to 2 dBA is predicted in comparison to the future no-build scenario. It is noted that for both the future no-build and future build scenarios that a similar future volume of traffic is predicted for this section of Parkside Drive (despite it being only a 2-lane road under the future no-build scenario). This additional traffic volume is being generated by the future development that is assumed to be in place in the Waterdown area by 2021 and would be attracted to this roadway. The decrease in the posted speed limit from 60 km/h to 50 km/h for this section of Parkside Drive (under the "Future Build" scenario) contributes to the predicted sound level reductions. It is further noted that when sound levels for existing conditions are compared to sounds levels under the future build scenario that an increase of only 4 dBA is predicted for the receptors along this section of Parkside Drive that is to be improved. This increased level in sound does not typically warrant mitigation (although the basis as to whether mitigation is required is typically between the change in sound levels between the future no-build and future build scenarios).

Due to concerns expressed by residents regarding the potential for increase use of the road by heavy trucks, a sensitivity analysis was conducted on the noise impact from increasing the volume of heavy-truck traffic along this section of Parkside Drive that is to be improved. For this sensitivity analysis, it was assumed that heavy truck traffic volumes would increase by five times. An approximate 3 dBA increase in traffic noise (over the noise levels predicted for the future build scenario with a more moderate volume of heavy truck traffic) would result under this assumption. This increase in sound levels would typically not be perceptible.

The proposed new East-West Road would result in a significant reduction in traffic volumes on Evans Road. This would correspond to a noticeable reduction in sound levels for the selected receptors on Evans Road. The proposed project will also redevelop Dundas Street East which will result in a reduction in the posted speed limit to 60 km/h from 80 km/h for sections currently with the higher speed limit. This lowering of the speed limits contributed to a predicted lower road traffic sound levels compared to the future no-build scenario for this section of Dundas Street East. However, the predicted daytime sound levels were greater than 65 dBA which may require further investigation on the effectiveness of mitigation options.

Existing receptors that will be in proximity to the proposed new East-West Road will experience an increase in sound levels over sound levels for either the existing or future no-build scenarios. The

increases in sound levels are considered to be not significant or imperceptible for most of the receptors. The exception to this is for residential receptor EW22 (eastern end of Northlawn Ave.) in which the increase would be noticeable (an approximate 9 dBA increase). It should be noted that the daytime sound level at this receptor was still predicted to be relatively quiet at 46 dBA which is typical of suburban daytime levels as defined by the MOE. No mitigation is recommended as the noise levels are within the MOE limits for a suburban area. However as a result of the potential increase in estimated sound levels, monitoring of the traffic generated sound levels after the construction of the new East-West Road is recommended.

A sensitivity analysis was also conducted on the noise impact of increasing the heavy-truck traffic along this section of the new East-West Road on the noise sensitive area of Northlawn Avenue. An approximate 2 dBA increase (typically not perceptible) in traffic noise would result if the heavy-truck traffic were to be conservatively increased five-fold over that of the predicted future build heavy-truck volumes.

For receptor EW17 on Highway 6 and near the intersection with the new East-West Road, the daytime and night-time sound levels were predicted to be greater than 65 dBA for the existing, future no-build, and future build scenarios. The primary noise source is traffic on Highway 6. As EW17 and other dwellings in proximity of the intersection of the proposed new East-West Road with Highway 6 are fronting Highway 6, abating the noise due to this source with a sound barrier may not be feasible.

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1. Introduction

Dillon Consulting Limited has been retained by The City of Hamilton in coordination with the City of Burlington and Halton Region to conduct an acoustic impact assessment of the proposed new East-West Road Corridor development. This project is comprised of the following components:

- 1) A new road way north of Parkside Drive starting at Highway 6 and extending east through the North Waterdown Development, crossing Centre Road and then connecting to Parkside Drive just west of Grindstone Creek;
- 2) The widening of Parkside Drive from approximately the Grindstone Creek Crossing to a point east of Robson Road;
- 3) A new north-south connector road between Parkside Drive and Dundas Street; and
- 4) Widening of Dundas Street East between the new east-west road and Brant Street which will result in the widening of Dundas Street to six lanes.

The following are other roads/segments that will experience changes in traffic volume:

- Parkside Drive west of Hamilton Street North;
- Hamilton Street North north and south of Parkside Drive;
- Centre Road north of Main Street North and Hamilton Street North;
- Evans Road which currently links Parkside Drive (east of Robson Road) to Dundas Street East; and
- Dundas Street East between Pamela Street and Brant Street/Cedar Springs Road.

The purpose of this acoustic assessment was to consider the impacts of road traffic generated noise on current and future noise sensitive land uses such as residences in the vicinity of the proposed new road sections and sections of existing roads to be improved.

1.1 Study Area

The study considered the impact on existing and future noise sensitive land uses adjacent to the sections of the proposed new road and existing roads that are to be improved. The 2021 Mature State of Development concept plan which illustrates the scope of the project is presented in *Figure A-1 in Appendix A*.

The new East-West Road Corridor project spans across the municipalities of the City of Hamilton and the City of Burlington. Dundas Street East from Kerns Road to Brant Street/Cedar Springs Road is in the City of Burlington.

There are currently several detached residential dwellings and subdivisions along Parkside Drive from Highway 6 eastward to Evans Road, along Evans Road, and Dundas Street East from Evans Road eastward to Brant Street/Cedar Springs Road. Other land uses along the road corridors include commercial, industrial, institutional, agricultural, open spaces, and conservation areas. One noise sensitive institution that was considered in this assessment was the Alexander Place nursing home/long-term-care facility located at 329 Parkside Drive opposite the intersection of Victoria Street and Parkside Drive. For the lands surrounding the new sections of the East-West Road, the current landuse is primarily agricultural with residences located along Highway 6 near the intersection with the new East-West Road, near the intersection with Centre Road, and along Northlawn Avenue.

The affected lands located in the municipality of the City of Hamilton, are zoned according to designations of the former Town of Flamborough (City of Hamilton, 2008). The figures in *Appendix B* show the zoning designation along the section of the new East-West Road, Parkside Drive, the new north-south connector road and Dundas Street East.

Landuse along Parkside Drive from Highway 6 to Evans Road, including Evans Road, comprises of:

- Residential (R1, single detached urban residential);
- Institutional (I, institutional zone);
- Commercial (AC, HC, NC automotive, highway, neighbourhood, commercial respectively);
- Industrial (M1, M2, M3, are prestige, general and rural industrial, respectively);
- Agricultural (A, agricultural zone);
- Open spaces (O2, park open space); and
- Conservation (CM, conservation management zone).

Land use along Dundas Street East from Evans Road to Kerns Road comprises of:

- Residential (R1);
- Commercial (AC, HC, UC, automotive, highway and urban commercial, respectively);
- Agricultural (A, agricultural zone); and
- Conservation (CM, conservation management zone).

The land surrounding the proposed East-West roadway from Highway 6 extending east and crossing Centre Road and connecting to Parkside Drive near Grindstone Creek, and Parkside Drive east to Robson Road is currently designated as residential (R1), agricultural (A) and conservation management zone (CM). The land adjacent to the proposed north-south link of Parkside Drive and Dundas Street East is currently a mix of residential (R1) and agricultural (A) landuses.

Landuse along Dundas Street East from Kerns Road to Brant Street/Cedar Springs Road is governed by the City of Burlington (2008) and comprises of:

- Residential (R1, detached low density);
- Commercial (AC and HC, Automotive and Highway Commercial, respectively); and
- Niagara Escarpment Commission (NEC) Development control area.

1.2 Noise Sensitive Receptors

Twenty-seven noise sensitive residential receptors were selected for this assessment and are identified in *Figure A-1 in Appendix A*. Descriptions of the receptors and distances from roadways are presented in *Table 1-1, Table 1-2*, respectively. The noise sensitive receptors were chosen for their potential to be impacted by road traffic noise sources based on their relative location (proximity) to the new or improved roads, and the configuration of the roadways.

Thirteen residential receptors were selected along Parkside Drive and identified as EW01 to EW12 for the existing dwellings and EW23 representing a future potential dwelling on Parkside Drive in the Upcountry designated development area. The receptors are all detached two storey dwellings which are located approximately 14 m to 36 m from Parkside Drive relative to the centre of the nearest lane and are primarily influenced by road traffic noise along Parkside Drive. Receptor EW01 located closest to Highway 6 was approximately 345 m from the highway. Noise levels at receptor EW06 near the junction of Parkside Drive and Hamilton Street North are also impacted by traffic along Hamilton Street North and Main Street North. Existing residential receptor EW09 was selected due to its location opposite the proposed new East-West intersection with Parkside Drive. Dwelling EW10 was selected to assess the impact of Parkside Drive slated to be expanded under this project. Receptor EW12 is at the junction of Parkside Drive and Evans Road and could also be impacted by road traffic noise on Evans Road.

Alexander Place is a large two storey nursing home/long-term-care facility. It was assessed using two receptor locations: one on the southeast corner of the institution EW26 and the other on the northeast corner of the building EW27. Of all other locations on the facility perimeter, these two were considered to be impacted the most by the cumulative noise from Parkside Drive and the proposed new East-West Road. EW26 and EW27 were located approximately 155 m and 230 m from Parkside Drive, respectively; and 287 m and 229 m from the proposed new East-West Road, respectively.

A detached two storey dwelling receptor EW13 was selected to be representative of sound levels primarily due to traffic on Evans Road. It is located approximately 23 m from the roadway. Three dwellings EW14, EW 15, and EW16 were selected as noise receptors along Dundas Street East from Evans Road eastward to Brant Street. These receptors are located 29 m to 34 m from Dundas Street East. EW14 is also impacted by traffic sources on Evans Road as it is located near the junction of Evans Road and Dundas Street East. EW16 is approximately 250 m from Brant Street/Cedar Springs Road.

Six residential receptors EW17 to EW22 were selected to assess the noise impact of the proposed East-West Road between Highway 6 and its connection with Parkside Drive under the mature state of development scenario in 2021. Receptor EW17 is an existing dwelling and will be impacted by the intersection proposed for Highway 6 and the East-West Road. EW18 represents a potential future dwelling in the middle of the proposed subdivision of the Waterdown North development area. EW19 is also a potential future residence adjacent to the junction of the East-West Road with Centre Road and has the potential to be impacted by traffic noise from both roads. Existing residence EW20 is located approximately 106 m north of the proposed East-West Road on Centre Road (28 m from Centre Road) and is surrounded by the wooded conservation area. Receptor EW21 is a residence located at Northlawn Avenue and Centre Road approximately 134 m south of the East-West Road and 30 m from Centre Road (distances with respect to centre of nearest lane). Receptor EW22 is at the eastern end of Northlawn Avenue approximately 228 m from Centre Road (centre of nearest lane).

The East-West Road corridor also consists of a new roadway that links Parkside Drive with Dundas Street East on the eastern border of the Upcountry development area. The new roadway is approximately 480 m west of Evans Road and will run parallel to it. Two receptors EW24 and EW25 represent potential residences in the subdivision development mid-way along the new roadway between Parkside Drive and Dundas Street East, and at the junction of the new roadway with Dundas Street East, respectively. These receptors will be used to assess the noise impact due to estimated traffic on the new roadway during the mature stage of development in 2021.

Table 1-1. Selected Noise Sensitive Receptors

Receptors	UTM Coordinates (m)		Status	Associated Roadway
	Easting	Northing		
EW01	587134	4797163	Existing Residence	Parkside Drive
EW02	587631	4797587	Existing Residence	Parkside Drive
EW03	587787	4797740	Existing Residence	Parkside Drive
EW04	588049	4798017	Existing Residence	Parkside Drive
EW05	588634	4798683	Existing Residence	Parkside Drive
EW06	588830	4798880	Existing Residence	Parkside Drive
EW07	589228	4799245	Existing Residence	Parkside Drive
EW08	589224	4799293	Existing Residence	Parkside Drive
EW09	589562	4799585	Existing Residence	Parkside Drive
EW10	589993	4800100	Existing Residence	Parkside Drive
EW11	590075	4800117	Existing Residence	Parkside Drive
EW12	590780	4800861	Existing Residence	Parkside Drive
EW13	591117	4800524	Existing Residence	Evans Road
EW14	591425	4800323	Existing Residence	Dundas St. East
EW15	592216	4801274	Existing Residence	Dundas St. East
EW16	592582	4801627	Existing Residence	Dundas St. East
EW17	586365	4797455	Existing Residence	Highway 6
EW18	587998	4798767	Future Residence	New East-West Road
EW19	588446	4799243	Future Residence	New East-West Road
EW20	588390	4799372	Existing Residence	Centre Road
EW21	588569	4799203	Existing Residence	Northlawn/Centre Road
EW22	588704	4799350	Existing Residence	Northlawn/Centre Rd/New E-W Rd
EW23	590306	4800363	Future Residence	Parkside Drive
EW24	590740	4800188	Future Residence	New East-West Road
EW25	591052	4799916	Future Residence	New East-West Road
EW26	589156	4799416	Existing Nursing Home Southeast side	Parkside Drive
EW27	589102	4799473	Existing Nursing Home Northeast side	Parkside Drive/ New East-West Road

Table 1-2. Separation Distances of Receptors from Road Laneways

Receptors	Associated Roadway	Distance to Centre of Nearest Lane (m)					
		Existing Road Configuration		2021 No-Build Configuration		2021 Mature State of Development	
		Lane 1	Lane 2	Lane 1	Lane 2	Lane 1	Lane 2
EW01	Parkside Drive	36	39	36	39	36	39
EW02	Parkside Drive	20	23	20	23	20	23
EW03	Parkside Drive	25	28	25	28	25	28
EW04	Parkside Drive	21	24	21	24	21	24
EW05	Parkside Drive	20	23	20	23	20	23
EW06	Parkside Drive	16	23	16	23	16	23
EW07	Parkside Drive	14	17	14	17	14	17
EW08	Parkside Drive	19	22	19	22	19	22
EW09	Parkside Drive	20	23	20	23	20	23
EW10	Parkside Drive	21	24	21	24	20	27
EW11	Parkside Drive	23	26	23	26	20	27
EW12	Parkside Drive	18	21	18	21	18	21
EW13	Evans Road	23	26	23	26	23	26
EW14	Dundas St. East	34	45	34	45	31	48
EW15	Dundas St. East	29	38	29	38	25	42
EW16	Dundas St. East	30	40	30	40	26	43
EW17	Highway 6	20	31	20	31	20	31
EW18	New East-West Road	na	na	na	na	21	26
EW19	New East-West Road	na	na	na	na	18	23
EW20	Centre Road	28	32	28	32	28	32
EW21	Centre Road	30	34	30	34	30	34
EW22	Centre Rd/New E-W Rd	228	232	228	232	128	133
EW23	Parkside Drive	na	na	na	na	20	27
EW24	New East-West Road	na	na	na	na	20	27
EW25	New East-West Road	na	na	na	na	18	24
EW26	Parkside Drive	154	157	154	157	154	157
EW27	Parkside Drive/ New East-West Road	228	231	228	231	225	232

2. Regulatory Requirements

2.1 Basic Acoustic Concepts

2.1.1 Human Perception of Sound

We hear sound or noise due to the ear's ability to detect changes in atmospheric pressure caused by the propagation of sound waves through the atmosphere. The intensity of sound is therefore interpreted as a form of pressure. The healthy human ear can generally detect sounds in the frequency range of 20 Hz to 20 000 Hz which is known as the audible frequency range. Our hearing is less sensitive to sound with frequencies outside of this range. Below this range, and with some overlap with the lower frequencies of the audible range, is the infra sound spectrum which ranges from 5 – 50 Hz. Sound that has frequencies above the audible range is known as ultra sound.

Within the audible range, our hearing is most sensitive to the higher frequencies and our response peaks for sound in the frequency of around 2 500 to 3 000 Hz. We therefore interpret sound with higher frequencies to be louder than sound of lower frequencies.

Since our response to sound is frequency dependant, our threshold of hearing which is the lowest or weakest sound the ear can detect is dependant on the frequency of the sound. Lower frequency sounds require higher sound pressure levels to be audible than sound made of higher frequencies. By convention, the threshold of hearing for a frequency of 1 000 Hz is 10^{-9} (one-billionth) of atmospheric pressure or zero decibels (dB). By contrast the upper hearing threshold where we experience pain is 10^{13} times the threshold of hearing (10^4 of atmospheric pressure) or 130 dB.

The decibel is therefore on a logarithmic scale and as a result, a change in sound level by 1 dB is not perceptible to the human ear. For changes in sound to be perceptible, the change must be 3 dB or greater and a 5 dB change is clearly noticeable. We respond to a 10 dB change as a doubling in the sound level and a 20 dB change as being four times as loud.

2.1.2 A-Weighting Scale of Sound

Because of the human ear's response to sound at different frequencies, the A-weighted scale, dB(A), was developed to represent the audible frequency range in terms of our perception and correlates well with our judgment of relative loudness. Therefore the weighting scale de-emphasizes sound levels in lower frequency bands (below 1000 Hz) and weights the measured or predicted sound level to those frequencies in the middle and high frequency bands that humans are sensitive to. The A-weighted sound

level is widely used to assess the acoustical impact on humans, however, there are limitations in that it does not provide any information on the spectral balance of the noise i.e., whether it is rumbly, hissy, or tonal in character (ASHRAE, 2001).

Typical sound levels for various common noise sources taken from ASHRAE (2001) are listed below in *Table 2-1* to provide a reference.

Table 2-1 Typical sound pressure levels for various sources

Sound Source	Sound pressure Level (dBA)
Military jet take off at 30 m	140
Artillery fire at 3 m	130
Passenger jet take off at 30 m	120
Loud rock band concert	110
Platform of subway station	100
Unmuffled large diesel engine at 40 m	90
Freight train at 30 m	70
Conversation speech at 1 m	60
Window air conditioner at 1 m	50
Quiet residential area	40
Whispered conversation at 2 m	30
Buzzing insect at 1 m	20
Threshold of good hearing	10
Threshold of excellent hearing	0

Table 1, Chapter 7, Sound and Vibration, 2001 ASHRAE Handbook Fundamentals (SI).

2.1.3 Definition of Sound Descriptors

The use of time averaged statistics is needed to describe sound and to provide some meaning to the measured sound levels. Some of the statistical descriptors commonly used to describe measured sound levels are briefly defined:

- L_{eq} is the equivalent sound level in dBA and this is the value of a constant sound level which would be equivalent to a continuous time-varying sound if the constant sound level were to persist over an equal time interval;
- L_5 is the sound level expressed in dBA, that is exceeded 5% of the time for a one hour survey;
- L_{10} is the sound level expressed in dBA, that is exceeded 10% of the time for a one hour survey;
- L_{90} is the sound level expressed in dBA, that is exceeded 90% of the time for a one hour survey;
- L_{95} is the sound level expressed in dBA, that is exceeded 95% of the time for a one hour survey.

The statistical descriptor which is most commonly used in environmental noise impact assessments is the Leq.

2.2 Provincial

The Ministry of Transportation Ontario (MTO) provides guidance on the assessment and mitigation of highway generated noise on noise sensitive land use areas. This guidance document is entitled *Environmental Guide for Noise* (MTO, 2006). The noise impact is determined by comparing the future sound levels with and without the proposed road improvements for the Outdoor Living Areas (OLA) of noise sensitive areas. *Table 2-2* below summarises the mitigation efforts that are to be applied for the predicted change in noise levels above the ambient and the projected noise level with the proposed improvements.

Table 2-2. Outdoor Living Area Criterion for Road Traffic Noise – Mitigation Effort Required for Projected Noise Level with Proposed Improvements above the Ambient

Change in Noise Level Above Ambient/ Projected Noise Levels with Proposed Improvements	Mitigation Effort Required
< 5 dBA change and < 65 dBA	None
≥ 5 dBA change OR ≥ 65 dBA	<ul style="list-style-type: none"> ▪ Investigate noise control measures on right-of-way; ▪ Introduce noise control measures within right-of-way and mitigate to ambient if technically feasible; and ▪ Noise control measures, where introduced, should achieve a minimum of 5 dBA attenuation, over first row of receivers.

Table 2.1 in MTO (2006).

The *Environmental Guide for Noise* (MTO, 2006) notes that mitigation measures must attempt to achieve noise levels as close to, or lower than, the future predicted ambient without the proposed improvements as is technically, economically, and administratively feasible. Mitigation measures within the right-of-way include:

- Acoustical barriers;
- Berms;
- Vertical and horizontal alignments; and
- Pavement surfaces.

The *Environmental Guide for Noise* (MTO, 2006) also provides guidance on minimizing the noise generated by highway construction. Construction operations must also abide by municipal noise control bylaws. Where activities contravene the bylaw, exemptions must be obtained prior to construction. The municipal noise control bylaws of the respective municipalities are discussed in their relevant sections below.

The Ontario Ministry of Environment (MOE) provides guidance under its existing legislation, i.e. the *Environmental Protection Act* (EPA) and the *Environmental Assessment Act* (EAA), on the noise criteria for planning of **proposed new** sensitive land uses adjacent but not limited to industrial, aggregate, commercial, sewage and waste management facilities, airports, and road and rail transportation corridors (MOE, 1997a, b, and c).

The *Noise Assessment Criteria in Land Use Planning* guidance document prepared by the MOE (MOE, 1997a) identifies noise sensitive land uses as:

- residential developments;
- seasonal residential developments;
- hospitals, nursing/retirement homes;
- schools, day-care centres, etc.

In order to determine whether proposed new noise sensitive land uses are impacted by a noise source such as a transportation corridor, the MOE requires that a feasibility or detailed noise impact study be carried out as outlined in the *Noise Assessment Criteria in Land Use Planning: Requirements, Procedures and Implementation* (MOE, 1997b). *Table 2-3* summarises the MOE (1997a) outdoor living area criterion for daytime and night-time.

Table 2-3. Outdoor Living Area Criterion for Road Traffic Noise

Time Period	Leq	Assessment
07:00 – 23:00	Leq (16), 55 dBA	Outdoor Living Area and Plane of Bedroom Window
23:00 – 07:00	Leq (8), 50 dBA	Plane of Bedroom Window

The guideline (MOE, 1997b) further outlines the outdoor living area daytime and night-time noise criteria for new residences and the recommended noise control measures. These control measures

include outdoor minimum noise control, ventilation, and building code requirements for road, rail and aircraft noise (Tables 1, 2, 3 and 4 in MOE, 1997b). For outdoor living areas during daytime hours (07:00 – 23:00 h), when the Leq (16 h) is greater than 55 dBA warning clauses of *Type A* and *B* are required of new residential developments. These warning clauses indicate to purchasers or tenants that sound levels may on occasion interfere with activities of the dwelling occupants. These warning clauses are defined in the MOE (1997b) guideline. Noise mitigation measures (barriers) are also required if the sound levels are predicted to be greater than 60 dBA. This measure should reduce the Leq (16 h) to below 60 dBA and as close as possible to 55 dBA as is technically, economically and administratively feasible. At the plane of the bedroom window, if the Leq (16 h) exceeds 55 dBA control measures are not required however, developers are required to have the dwellings fitted to accommodate and/or installed central air systems with clauses noting this, and buildings built to the latest Ontario building code.

2.3 The Regional Municipality of Halton

The Region of Halton's *Noise Abatement Policy for Regional Roads and New Developments* (Regional Municipality of Halton, 2000), provides guidance on the assessment of noise impacts on noise sensitive areas due to existing and new road developments. For a new development road that will be constructed past existing residences, where the noise level generated by the proposed new road results in a change of 5 dBA over current conditions, then noise abatement features must be incorporated into the new roadway design. The impact criterion is only applied to existing dwellings.

For new residential developments, the developer is required to abate the noise originating from traffic and other industrial and commercial noise sources based on the following criteria. During daytime hours of 0700 – 2300 h, the outdoor living area Leq (16 h) limit is 55 dBA, and the indoor living area limit is 45 dBA. During night-time (2300 – 0700 h) the indoor bedroom area limit is 40 dBA. These criteria will be used to a design noise barrier where required.

2.4 Municipality of The Corporation of The City of Burlington

Waterdown Road is in the jurisdiction of the City of Burlington. The City's Nuisance and Noise Control By-Law, By-Law No. 19-2003, amended by By-Law 49-2008, states qualitative prohibitions for activities that can cause a nuisance, i.e. Section 4(2):

“No noise or vibrations shall be made, caused or created so as to be heard or felt or otherwise perceived outside the property and which are, in the view of all the circumstances including the nature of the neighbourhood and the use to which adjoining properties are put and the time of day during which such noise or vibrations are made, caused or created excessive or which are, or may cause a nuisance to the public generally or to others residing or carrying on a manufacture, trade or business in the vicinity.”

The City relies on MOE noise guidelines for much of the limitations and performance standards. Limitations on sound emissions specific to construction activities of the roadway, Section 6(2) states that:

“No person shall emit or cause or permit the emission of any sound: from any piece of construction equipment of a type referred to in Schedule 4 – Publications, Publication NPC-115, at a work site, any part of which is located within 600m of a residential area, unless;

a) the piece of construction equipment was put into use prior to January 1, 1979; or

b) the piece of construction equipment bears a label affixed by the manufacturer or distributor which states;

(i) the year of manufacture, and

(ii) that the item of equipment complies with the residential sound emission standards set out in Schedule 4 – Publications, Publication NPC-115, as applicable to that type of equipment and date of manufacture; or

c) the owner, operator, manufacturer or distributor provides proof that the item of equipment complies with the residential sound emission standard set out in Schedule 4 – Publications, Publication NPC-115, as applicable to that type of equipment and date of manufacture.”

Furthermore, under Schedule 2 – Time and Place Prohibitions, the operation of any construction equipment during construction is limited to the hours of 07:00 h to 21:00 h from Monday to Saturday and from 12:00 h to 21:00 h on Sundays.

2.5 Municipality of The City of Hamilton

Dundas Street East is under the jurisdiction of the City of Hamilton. The City’s draft *Transportation and Noise Policy Paper* (City of Hamilton, 2005) is based on the change in the mean 24-hour noise level from the future “no-build” to the future “build” condition. Increases of less than 5 dBA due to the build

condition are considered as low impact, increases between 5 dBA and 10 dBA are deemed as moderate impact, and increases greater than 10 dBA are considered as high impacts. The draft policy paper suggests the adoption of the MOE limit for continuous noise sources of 55 dBA when considering mitigation measures.

For new housing developments, the draft guideline suggests that developers provide noise mitigation measures such as noise barriers and the implementation of land use strategies so that there is sufficient distance between the transportation noise source and the noise sensitive areas of residential developments.

The City's Noise By-Law, By-Law No. 03-020, Bill 020, provides qualitative prohibitions for activities that can cause a nuisance. The City relies on MOE noise guidelines for much of the limitations and performance standards.

Section 7(3) of the Noise By-Law provides prohibitions by time and place on sound emissions specific to construction activities of the roadway. The following quotes Section 7 of the Noise By-Law:

“ 7 No person shall emit or cause or permit the emission of sound resulting from the following which sound is clearly audible at a Point of Reception located in Quiet Areas (7:00 pm - 7:00 am) or Residential Areas (7:00 pm - 7:00 am):

- (1) The operation of a commercial car wash with air drying equipment.*
- (2) The operation of Construction Equipment in connection with Construction.*
- (3) The operation of any powered or non-powered tool for purposes other than snow removal.”*

The noise performance standard for construction equipment is defined in Section 11(2):

“ 11 No person shall emit or cause or permit the emission of sound resulting from:
(2) Construction Equipment such that the level of resultant sound at a Point of Reception exceeds the applicable sound level limit prescribed in Publication - N.P.C. 115 - Construction Equipment.”

MOE document NPC 115 provides sound performance ratings for various construction equipment and these are listed below in *Figures 2-1, 2-2, 2-3 and 2-4.*

TABLE 115-1

Quiet Zone and Residential Area Sound Emission Standards for Excavation Equipment, Dozers, Loaders, Backhoes or Other Equipment Capable of Being Used for Similar Application

Maximum Sound Level (dBA) as determined using Publication NPC - 103 - Procedures, section 6		
	dBA	
Date of Manufacture	Power Rating Less than 75 kW	Power Rating 75 kW and Larger
January 1, 1979 to December 31, 1980	85	88
January 1, 1981 and after	83	85

Figure 2-1. Sound performance standards for excavators, dozers, loaders, backhoes or other similar equipment as defined in NPC 115.

TABLE 115-2

Sound Emission Standards for Pneumatic Pavement Breakers

Standard	Date of Manufacture	Maximum Sound Level (dBA) as measured using Publication NPC - 103
Quiet Zone Sound Emission	January 1, 1979 and after	85
Residential Area Sound Emission Standard	January 1, 1979 to December 31, 1980	90
	January 1, 1981 and after	85

Figure 2-2. Sound performance standards for pneumatic pavement breakers as defined in NPC 115.

TABLE 115-3		
Sound Emission Standards for Portable Air Compressors		
Standard	Date of Manufacture	Maximum Sound Level (dBA) as measured using Publication NPC - 103
Quiet Zone Sound Emission Standard	January 1, 1979 to December 31, 1980	76
	January 1, 1981 and after	70
Residential Area Sound Emission	January 1, 1979 and after	76

Figure 2-3. Sound performance standards for portable air compressors as defined in NPC 115.

TABLE 115-4		
Sound Emission Standard for Tracked Drills		
Standard	Date of Manufacture	Maximum Sound Level (dBA) as measured using Publication NPC - 103 Procedures, section 6
Quiet Zone and Residential Area Sound Emission Standard	January 1, 1981 and after	100

Figure 2-4. Sound performance standard for tracked drills as defined in NPC 115.

3. Noise Impact Assessment Methodology

In order to study the noise impact of the proposed East-West Road corridor project, the predicted noise levels at sensitive receptors for a future baseline scenario without the road project was compared to the future scenario with the project (at the mature state of development). An assessment of the current noise impact at the same receptors due to existing traffic conditions was also performed to establish present-day ambient acoustic conditions. These scenarios are summarised below:

- Scenario 1 – Current 2008 configuration, based on existing traffic volumes;
- Scenario 2 – Future 2021 “no road-build” option, based on forecasted traffic volumes under the existing roadway configuration. This scenario assumes that anticipated future land development in Waterdown would be in place; and
- Scenario 3 – Future 2021 Mature State of Development based on forecasted traffic volumes with the proposed new land development and proposed road improvements in place. In generating future traffic volumes for this “future build” scenario, it was assumed that Parkside Drive would be closed at Highway 6. This creates a more conservative scenario for modelling future noise levels along the new East-West Road under this scenario.

3.1 Scenario 1 - Current 2008 Configuration

Scenario 1 consists of the current road configuration and traffic volumes for Parkside Drive, Hamilton Street North, Centre Road, Main Street North, Evans Road, and Dundas Street East.

The City of Hamilton and Halton Region conducted traffic turning movement counts in 2007 and 2008 in order to estimate the Average Annual Daily Traffic (AADT) for the road segments identified above. These surveys were performed at various intersections on Parkside Drive, Dundas Street East, and Centre Road. A 24-hour traffic count survey was also conducted on Dundas Street East at Kerns Road which provided the day (D) versus night-time (N) split in traffic volumes of 91% and 9%, respectively. This is comparable to the 90/10 split recommended by the MOE for regional roads (MOE, 1998). It was assumed that the D/N split at Dundas and Kerns would be applicable to all of Dundas Street and Parkside Drive and that it would apply as well to both Scenario 2 and 3 including the proposed East-West Road. *Table 3-1* below summarises the traffic data for the roads under consideration. These surveys conducted by the city and region also provided the truck ratios with respect to the total vehicular volume for the various segments under study. These data were then used to estimate the future truck traffic volumes.

Table 3-1. Scenario 1 – 2008 Existing traffic data and road description

Road Segment	ID	Description	AADT (veh/day)*	%Med Truck	%Heavy Truck	D/N Split %
Highway 6	Hwy6	5-lane undivided road with centre turning lane; speed limit 80 km/h	35000	6	6	91% / 9%
Parkside Dr: Highway 6 to Hollybush Dr.	PS1	2-lane undivided road; speed limit 60 km/h	6000	4	1	91% / 9%
Parkside Dr: Hollybush Dr To Keewaydin St.	PS2	2-lane undivided road; speed limit 60 km/h Hollybush to Duncan; 50 km/h Duncan to Keewaydin	7500	4	1	91% / 9%
Parkside Dr: Keewaydin St To Hamilton St.N.	PS3	2-lane undivided road; speed limit 50 km/h Keewaydin to Hamilton	9500	4	1	91% / 9%
Parkside Dr: Hamilton St.N. To Grindstone Crk	PS4	2-lane undivided road; speed limit 50 km/h Hamilton to Mill St; 60 km/h Mill St. to Grindstone	7500	4	1	91% / 9%
Parkside Dr: Grindstone Crk To Evans Rd	PS5	2-lane undivided road; speed limit 60 km/h Grindstone to Evans	8000	4	1	91% / 9%
Hamilton St. N: N of Parkside	H1	3-lane undivided road centre lane turning; speed limit 60 km/h	7500	5	1	91% / 9%
Hamilton St. N: S of Parkside	H2	3-lane undivided road centre lane turning; speed limit 60 km/h	10500	4	1	91% / 9%
Main St N: Parkside to Centre	Main	2-lane undivided road; speed limit 50 km/h	2500	6	2	91% / 9%
Centre Rd: N of Hamilton	CRd	2-lane undivided road; speed limit 60 km/h	10000	5	1	91% / 9%
Evans Rd	E	2-lane undivided road; speed limit 60 km/h	7500	6	1	91% / 9%
Dundas St.E: Pamela to Evans	D1	5-lane undivided road with centre turning lane; speed limit 60 km/h	21500	6	2	91% / 9%
Dundas St.E: Evans to Brant/Cedar	D2	5-lane undivided road with centre turning lane; speed limit 60 km/h Evans to Kerns; 80 km/h Kerns to Brant/Cedar	28000	6	2	91% / 9%
Brant St	B	5-lane undivided road with centre turning lane; speed limit 60 km/h	16000	4	1	91% / 9%
Cedar Springs	CS	4-lane undivided road; speed limit 60 km/h	5500	3	1	91% / 9%

* AADT is over a 24-hr period and includes both directions.

3.2 Scenario 2 - Future 2021 No-Build

Scenario 2 assumes the current road configuration as described in Scenario 1 but with the projected increased traffic volumes that would prevail in 2021. This scenario assumes that anticipated future land development in Waterdown would be in place.

Estimates of future traffic volumes under both road network scenarios (i.e., Scenario 2 and Scenario 3) were obtained from traffic modelling undertaken as part of the Waterdown Aldershot Transportation Master Plan (WATMP) Phase 2 study. Additional traffic modelling work was undertaken to produce traffic data appropriate for use in a noise study. The traffic model provided projections for AM peak hour traffic volumes at the 2021 horizon based on anticipated future development levels. PM peak hour volumes and AADT volumes were then estimated assuming a similar hourly distribution as under existing conditions.

It was assumed that all road laneway configurations, truck volume fractions, day/night splits and speed limits for the above study roads would remain the same in 2021 but with the changed AADT volume. *Table 3-2* summarises the traffic data for the future no-build scenario.

Table 3-2. Scenario 2 – 2021 No-Build traffic data and road description.

Road Segment	ID	Description	AADT (veh/day)*	%Med Truck	%Heavy Truck	D/N Split %
Highway 6	Hwy6	5-lane undivided road with centre turning lane; speed limit 80 km/h	42000	6	6	91% / 9%
Parkside Dr: Highway 6 to Hollybush Dr.	PS1	2-lane undivided road; speed limit 60 km/h	15000	4	1	91% / 9%
Parkside Dr: Hollybush Dr To Keewaydin St.	PS2	2-lane undivided road; speed limit 60 km/h Hollybush to Duncan; 50 km/h Duncan to Keewaydin	17000	4	1	91% / 9%
Parkside Dr: Keewaydin St To Hamilton St.N.	PS3	2-lane undivided road; speed limit 50 km/h Keewaydin to Hamilton	17500	4	1	91% / 9%
Parkside Dr: Hamilton St.N. To Grindstone Crk	PS4	2-lane undivided road; speed limit 50 km/h Hamilton to Mill St; 60 km/h Mill St. to Grindstone	17000	4	1	91% / 9%
Parkside Dr: Grindstone Crk To Evans Rd	PS5	2-lane undivided road; speed limit 60 km/h Grindstone to Evans	14500	4	1	91% / 9%
Hamilton St. N: N of Parkside	H1	3-lane undivided road centre lane turning; speed limit 60 km/h	10000	5	1	91% / 9%
Hamilton St. N: S of Parkside	H2	3-lane undivided road centre lane turning; speed limit 60 km/h	14500	4	1	91% / 9%
Main St N: Parkside to Centre	Main	2-lane undivided road; speed limit 50 km/h	3000	6	2	91% / 9%
Centre Rd: N of Hamilton	CRd	2-lane undivided road; speed limit 60 km/h	13000	5	1	91% / 9%
Evans Rd	E	2-lane undivided road; speed limit 60 km/h	13500	6	1	91% / 9%
Dundas St.E: Pamela to Evans	D1	5-lane undivided road with centre turning lane; speed limit 60 km/h	33000	6	2	91% / 9%
Dundas St.E: Evans to Brant/Cedar	D2	5-lane undivided road with centre turning lane; speed limit 60 km/h Evans to Kerns; 80 km/h Kerns to Brant/Cedar	39000	6	2	91% / 9%
Brant St	B	5-lane undivided road with centre turning lane; speed limit 60 km/h	17500	4	1	91% / 9%
Cedar Springs	CS	4-lane undivided road; speed limit 60 km/h	8000	3	1	91% / 9%

* AADT is over a 24-hr period and includes both directions.

3.3 Scenario 3 - Future 2021 Mature State of Development

Scenario 3 entails the construction of a new road way starting at Highway 6 and extending east through the North Waterdown Development, crossing Centre Road and then connecting to Parkside Drive. Parkside Drive will be widened to 4 lanes between the new road's interchange (near Grindstone Creek) and a new north-south connector road linking Parkside Drive to Dundas Street East along the east boundary of the Upcountry development area. Dundas Street East will be widened to seven lanes (which included a centre turning lane) from the intersection of the new connector road to Brant Street/Cedar Springs Road.

The urban segment along the new East-West Road (Waterdown North urban development area) and Parkside Drive will have a speed limit of 50 km/h, while the speed limit for the rural segments will be at 60 km/h. The widened segment of Dundas Street East will have a speed limit of 60 km/h. Dundas Street East currently has posted speed limits of 60 km/h from Pamela Street to Kerns Road and 80 km/h from Kerns Road to Brant Street/Cedar Springs Road. The project also assumed the closure of the Parkside Drive access to Highway 6 resulting in reduced traffic volumes along Parkside Drive.

It was assumed that changes in AADT volumes would not result in changes to the day/night ratios. Traffic volumes would increase in Scenario 3 when compared to the 2021 no-build Scenario 2 for the new East-West Road and the redeveloped Dundas Street East. Volumes would decrease for the segment of Parkside Drive from Highway 6 to the new road interchange, for the Parkside Drive segment east of the new north-south road linking Parkside Drive with Dundas Street East, and for Evans Road. The traffic modelling of the Parkside Road segment between Highway 6 and Hollybush Drive estimated that the AADT would be zero due to the assumed closure of the Parkside Drive intersection to Highway 6. This assumption would represent the worst-case scenario for the noise impact assessment along the new East-West Road. The projected changes in volumes were based on traffic modelling undertaken as part of the WATMP Phase 1 and 2. Additional traffic modelling work was undertaken to produce traffic data appropriate for use in a noise study. *Table 3-3* summarises the traffic data for the future mature state of development scenario (Scenario 3); the table also includes the traffic volumes, in parentheses, if the access of Parkside Drive to Highway 6 were to remain open.

Table 3-3. Scenario 3 – 2021 Mature State of Development traffic data and road description

Road Segment	ID	Description	AADT (veh/day)*	%Med Truck	%Heavy Truck	D/N Split %
Highway 6	Hwy6	5-lane undivided road with centre turning lane; speed limit 80 km/h	42000 (42000)	6	6	91% / 9%
Parkside Dr: Highway 6 to Hollybush Dr.	PS1	2-lane undivided road; speed limit 60 km/h	0 (10000)	4	1	91% / 9%
Parkside Dr: Hollybush Dr To Keewaydin St.	PS2	2-lane undivided road; speed limit 60 km/h Hollybush to Duncan; 50 km/h Duncan to Keewaydin	7500 (11500)	4	1	91% / 9%
Parkside Dr: Keewaydin St To Hamilton St.N.	PS3	2-lane undivided road; speed limit 50 km/h Keewaydin to Hamilton	13500 (13000)	4	1	91% / 9%
Parkside Dr: Hamilton St.N. To Grindstone Crk	PS4	2-lane undivided road; speed limit 50 km/h Hamilton to Mill St; 60 km/h Mill St. to Grindstone	11000 (11500)	4	1	91% / 9%
Parkside Dr: Grindstone Crk To New E-W Rd	S3	4-lane undivided road; speed limit 50 km/h Grindstone to New E-W Rd	14500 (14500)	4	1	91% / 9%
Parkside Dr: New E-W Rd To Evans	S3B	2-lane undivided road; speed limit 60 km/h	4000 (4000)	4	1	91% / 9%
Hamilton St. N: N of Parkside	H1	3-lane undivided road centre lane turning; speed limit 60 km/h	10500 (10500)	5	1	91% / 9%
Hamilton St. N: S of Parkside	H2	3-lane undivided road centre lane turning; speed limit 60 km/h	15000 (15000)	4	1	91% / 9%
Main St N: Parkside to Centre	Main	2-lane undivided road; speed limit 50 km/h	3000 (3000)	6	2	91% / 9%
Centre Rd: N of Hamilton	CRd	2-lane undivided road; speed limit 60 km/h	13500 (13500)	5	1	91% / 9%
Evans Rd	E	2-lane undivided road; speed limit 60 km/h	2500 (2500)	6	1	91% / 9%
Dundas St.E: Pamela to New EW Rd	D1	5-lane undivided road with centre turning lane; speed limit 60 km/h	28000 (28000)	6	2	91% / 9%
Dundas St.E: New EW Rd to Brant/Cedar	D2	5-lane undivided road with centre turning lane; speed limit 60 km/h	42000 (42000)	6	2	91% / 9%
Brant St	B	5-lane undivided road with centre turning lane; speed limit 60 km/h	17500 (17500)	4	1	91% / 9%
Cedar Springs	CS	4-lane undivided road; speed limit 60 km/h	8000 (8000)	3	1	91% / 9%

Road Segment	ID	Description	AADT (veh/day)*	%Med Truck	%Heavy Truck	D/N Split %
New E-W Rd: Highway 6 to Centre Rd	S1	2-lane undivided road with speed limit 60 km/h Hwy 6 to Waterdown N Urban Development; 3-lane (one turning lane) undivided with speed limit 50 km/h Waterdown N Urban Dev To Centre Rd	10000 (5500)	4	1	91% / 9%
New E-W Rd: Centre Rd To Parkside Dr	S2	2-lane undivided road; speed limit 60 km/h	6000 (6000)	4	1	91% / 9%
New E-W Rd: Parkside To Dundas	S4	3-lane (one turning lane) undivided road; speed limit 60 km/h	11000 (11000)	4	1	91% / 9%

* AADT is over a 24-hr period and includes both directions.

AADT volumes as a result of Parkside Drive remaining open to Highway 6 are given in parentheses.

3.4 Traffic Noise Modelling

The traffic noise impact was modelled using the MOE's STAMSON modelling program, which follows the ORNAMENT methodology for road traffic noise impact prediction (MOE, 1989). The following outlines the assumptions and model settings that were used.

- For residential receptors, predictions were made for 16-hr daytime (07:00 – 23:00 h) equivalent sound levels for outdoor living areas and 8-hr night-time (23:00 – 07:00 h) equivalent sound levels for the plane-of-a-bedroom-window, respectively. The point of assessment was 1.5 m above grade for outdoor living areas and 4.5 m above grade for a bedroom window.
- For the nursing home (EW26 and EW27), predictions were made for 16-hr daytime (07:00 – 23:00 h) equivalent sound levels and 8-hr night-time (23:00 – 07:00 h) equivalent sound levels for outdoor living areas and in the plane of residential unit windows. The point of assessment was 1.5 m above grade for outdoor living areas, 1.5 m for the ground floor residential units' windows, and 4.5 m above grade for the second floor residential units' windows. Essentially the heights of the points of assessment were 1.5 m and 4.5 m for both daytime and night-time.
- For all roadways, traffic was modelled as two lanes and the AADT volume divided equally between the lanes. For certain night-time volumes on individual lanes that fell below the minimum 40 vehicles per hour required by STAMSON, it was necessary to combine the two lanes into one so that

the night-time impact of the traffic from that source could be accounted for. Some segments had to be omitted entirely from the night-time assessment since combining both lanes did not meet the criterion.

- The MOE's STAMSON model has a receptor-to-source separation range of 15 m to 500 m. Therefore, roadways closer than 15 m to the receptor were assumed to be at 15 m separation distance. Roadways further than 500 m were not considered in the assessment.
- The terrain was assumed to be essentially flat with little change in elevation between road source and receptor.
- The ground between the roadways and point of reception was assumed to be acoustically absorptive. This is a typical assumption for residences with lawns and shrubs in the verges.
- Depending on the configuration of a roadway with respect to a given receptor, the roadway was divided into segments to better model the orientation of the traffic flow. The appropriate angular relationships to the segments and distances were used in the modelling.
- The attenuating influence of heavy woods was accounted in noise impact model for receptors EW13, EW21 and EW22 under Scenario 1 and 2 and for receptors EW12, EW13, EW20, EW21 and EW22 under Scenario 3.
- When there were intervening dwellings between the receptor and the noise source, the sound attenuating influence of these dwellings was considered. For receptor EW22 under Scenarios 1 and 2, the sound attenuating impact of dwellings shielding the noise from Centre Road south of Northlawn Avenue was estimated to be that of 7 rows of houses with an approximate density of 50%. Future receptor EW23 was assumed to be shielded by five rows at 85% density for noise originating from the new north-south link between Parkside Drive and Dundas Street East, and future receptor EW24 shielded by seven rows at 90% density for noise generated by traffic on the redeveloped Parkside Drive and Dundas Street East.

4. Modelling Results & Discussion

The predicted daytime Leq (16) and night-time Leq (8) for the three scenarios are summarised below in *Table 4-1* and illustrated in *Figures C-1 to C-6* in *Appendix C*.

4.1 Scenario 1 - Existing 2008 Conditions

The noise levels predicted under existing conditions ranged from 36 dBA to 72 dBA during the daytime (Leq(16)) for outdoor living areas and from 30 dBA to 65 dBA during night-time (Leq(8)) in the plane of a bedroom window. *Figures A-3 and A-4* illustrate the daytime and night-time noise levels, respectively at the receptors. Higher sound levels impact the receptors (EW12, EW14, EW15, EW16, and EW17) located within 40 m of the high traffic volume roadways Dundas Street East and Highway 6. The lowest daytime (36 dBA) and night-time (30 dBA) noise levels were predicted for receptor EW22 located at the eastern end of Northlawn Avenue approximately 228 m from Centre Road.

The STAMSON model has a limitation in that it cannot resolve the noise impacts for roadways with traffic volumes less than 40 vehicles per hour. Therefore, since the night-time traffic volume on Main Street North was less than 40 vehicles per hour, there was no noise contribution from traffic during this period from this source for receptor EW06. The added impact from traffic on Main Street North was not considered to be significant as the receptor is impacted primarily from road traffic sources on Parkside Drive and Hamilton Street North.

4.2 Scenario 2 - 2021 No Build

By 2021, the increase in traffic volumes from present day volumes resulted in an increase in noise levels being predicted at all receptors. Receptor EW02 was predicted to have the greatest increase of approximately 5 dBA in daytime noise levels and approximately 4 dBA in night-time noise levels. A change in sound level that is greater than 3 dB is typically perceptible to a majority of people. Such changes were predicted during the daytime for receptors EW01 to EW03, EW05 to EW13, and EW26 and EW27. Receptors that were predicted to experience a noticeable increase in night-time noise levels were EW02, EW03, EW07 to EW09, and EW26 and EW27.

As in Scenario 1, night-time volume on Main Street North is expected to be less than the STAMSON criterion of 40 vehicles per hour. Therefore, its impact was not considered when assessing the night-time sound levels at receptor EW06. *Figures A-5 and A-6* illustrate the daytime and night-time noise levels, respectively at the receptors under this scenario.

Table 4-1. Predicted Daytime Leq (16) and Night-time Leq (8) for the Three Scenarios

Receptor	Description	Scenario 1 2008 Existing Condition		Scenario 2 2021 No Build		Scenario 3 2021 Mature State	
		Day time Leq (16) dBA	Night time Leq(8) dBA	Day time Leq (16) dBA	Night time Leq(8) dBA	Day time Leq (16) dBA	Night time Leq(8) dBA
EW01	Existing Residence Parkside Drive	56.6	50.5	60.1	52.9	53.0	47.4
EW02	Existing Residence Parkside Drive	58.6	52.1	63.7	55.9	42.4	35.1
EW03	Existing Residence Parkside Drive	58.1	51.3	62.5	54.9	58.8	51.1
EW04	Existing Residence Parkside Drive	59.3	52.4	62.1	54.3	58.5	50.5
EW05	Existing Residence Parkside Drive	58.8	52.0	62.6	54.7	61.5	53.6
EW06	Existing Residence Parkside Drive	61.3	54.4	64.7	57.2	63.7	56.1
EW07	Existing Residence Parkside Drive	61.7	54.8	65.7	58.4	63.8	56.5
EW08	Existing Residence Parkside Drive	59.9	53.1	64.7	56.8	62.8	54.8
EW09	Existing Residence Parkside Drive	59.7	53.0	63.9	56.1	59.9	52.1
EW10	Existing Residence Parkside Drive	59.5	52.9	63.2	55.4	61.2	53.5
EW11	Existing Residence Parkside Drive	58.9	52.3	62.5	54.8	62.4	55.2
EW12	Existing Residence Parkside Drive	63.5	56.5	66.8	59.2	60.4	50.1
EW13	Existing Residence Evans Road	59.3	52.4	62.8	55.1	55.8	40.4
EW14	Existing Residence Dundas St. East	65.3	58.7	67.4	60.2	65.4	57.9
EW15	Existing Residence Dundas St. East	66.4	56.8	68.6	58.2	66.9	56.2
EW16	Existing Residence Dundas St. East	66.1	59.4	68.2	60.9	66.4	58.9
EW17	Existing Residence Highway 6	71.6	64.9	72.4	65.6	73.4	65.7
EW18	Future Residence New East-West Rd	NA	NA	NA	NA	58.4	51.8
EW19	Future Residence New East-West Rd	NA	NA	NA	NA	64.4	57.6
EW20	Existing Residence Centre Road	58.6	52.0	59.7	53.0	60.0	53.3
EW21	Existing Residence Northlawn Ave.	58.2	51.6	59.3	52.7	59.6	52.9
EW22	Existing Residence Northlawn Ave.	35.8	30.1	37.0	31.1	45.6	39.7
EW23	Future Residence Parkside Drive	NA	NA	NA	NA	60.1	53.4

Receptor	Description	Scenario 1 2008 Existing Condition		Scenario 2 2021 No Build		Scenario 3 2021 Mature State	
		Day time Leq (16) dBA	Night time Leq(8) dBA	Day time Leq (16) dBA	Night time Leq(8) dBA	Day time Leq (16) dBA	Night time Leq(8) dBA
EW24	Future Residence New East-West Rd	NA	NA	NA	NA	61.4	54.6
EW25	Future Residence New East-West Rd	NA	NA	NA	NA	65.7	59.0
EW26*	SE Area Existing Nursing Home Parkside Drive	44.9 at 1.5 m; 45.7 at 4.5 m	37.8 at 1.5 m; 38.6 at 4.5 m	48.4 at 1.5 m; 49.3 at 4.5 m	41.4 at 1.5 m; 42.3 at 4.5 m	47.2 at 1.5 m; 48.1 at 4.5 m	40.2 at 1.5 m; 41.1 at 4.5 m
EW27*	NE Area Existing Nursing Home Parkside Drive	39.5 at 1.5 m; 40.5 at 4.5 m	32.4 at 1.5 m; 33.4 at 4.5 m	43.0 at 1.5 m; 44.0 at 4.5 m	36.1 at 1.5 m; 37.1 at 4.5 m	44.0 at 1.5 m; 45.0 at 4.5 m	37.1 at 1.5 m; 38.1 at 4.5 m

* Noise levels assessed for outdoor living space and window of ground floor both of which were at 1.5 m, and at the plane of window of second floor at a height of 4.5 m.

4.3 Noise Impact of Scenario 3 - Mature State of Development

The predicted daytime Leq(16) and night-time Leq(8) levels are presented in *Table 4-1* above. *Figures A-7 and A-8* illustrates the daytime and night-time noise levels, respectively at the receptors under Scenario 3. *Table 4-2* below summarises the changes and expected impact the new East-West Road will present.

Under Scenario 3, there is a predicted increase in sound levels at:

- the northeast area of the nursing home EW27 due to the new East-West Road;
- receptor EW11 on the redeveloped Parkside Drive at night-time only;
- receptor EW17 near the intersection of the new East-West Road and Highway 6;
- receptor EW20 on Centre Road; and
- receptors EW21 and EW22 on Northlawn Avenue.

The sound level increase at EW27 was higher at the second floor units of the nursing home than the ground floor units or the outdoor living area due to less ground attenuation. The increases over Scenario 2 were deemed imperceptible during the daytime and night-time periods as they were all 1 dBA (i.e., less than 3 dBA). The daytime Leq(16) and night-time Leq(8) were only 45 dBA and 38 dBA at the second floor level, respectively which can be considered similar to a quiet residential area as per *Table 2-1*. The southeastern side of the nursing home facility modelled by EW26 was not influenced by the

new East-West Road but dominated by noise generated by traffic on Parkside Drive. It was predicted to have lower noise levels in comparison to Scenario 2.

The increases in sound were considered not to be perceptible for receptors EW11 (night-time), EW17, EW20 and EW21 as they were less than 3 dBA. For EW22, the increase in sound levels due to traffic on the new East-West Road was predicted to be noticeable over that of Scenario 2 no-build case, with daytime and night-time levels increasing by approximately 9 dBA. However, the daytime Leq(16) and night-time Leq(8) were predicted to remain fairly quiet at only 46 dBA and 40 dBA, respectively similar to a residential area as per *Table 2-1* and within the ambient daytime and night-time limits for suburban areas as defined by the MOE. For receptor EW22, there was generally a direct-line-of-sight to the new East-West Road segment that is east of the wooded conservation area. No mitigation is recommended as the noise levels are within the MOE limits for a suburban area. However as a result of the potential increase in estimated sound levels, monitoring of the traffic generated sound levels after the construction of the new East-West Road is recommended.

As a result of the reduced volumes on Parkside Road and the closure of its access to Highway 6, the predicted sound levels at receptors EW01 to EW10 along Parkside Drive were lower than those predicted for Scenario 2. For EW01 and EW02 located between Highway 6 and Hollybush Drive, the predicted sound levels were significantly lower (as much as 21 dBA lower at EW02) than the predicted sound levels under the no-build Scenario 2 condition. This was due to the traffic volumes being assumed to be insignificant on this segment of Parkside Drive under Scenario 3. For the section of Parkside Drive east of Grindstone Creek that would be improved (widened from two to four lanes) in Scenario 3, a decrease in the sound levels of up to 2 dBA is predicted in comparison to Scenario 2. It should be noted that for both the future no-build and future build scenarios that a similar future volume of traffic is predicted for this section of Parkside Drive (despite it being only a 2-lane road under the future no-build scenario). This additional traffic volume is being generated by the future development that is assumed to be in place in the Waterdown area by 2021 and which would potentially utilise this roadway. The decrease in the posted speed limit from 60 km/h to 50 km/h for this section of Parkside Drive (Scenario 3) contributes to the predicted sound level reductions. It is further noted that when sound levels for existing conditions are compared to sound levels under the future build scenario that an increase of only 4 dBA is predicted for the receptors along this section of Parkside Drive that is to be improved. This increased level in sound does not typically warrant mitigation (although the basis as to whether mitigation is required is typically between the change in sound levels between the future no-build and future build scenarios).

The predicted traffic volumes on Evans Road for the Scenario 3 condition were significantly lower (by approximately 81%) than the volume predicted for the Scenario 2 no-build condition. This resulted in a noticeable reduction (more than 6 dBA) in sound levels for receptors EW12 and EW13 under Scenario 3 when compared to the Scenario 2 condition. Night-time sound levels were predicted to be significantly lower (by more than 9 dBA) under Scenario 3 since the night-time volume along Evans Road was below the minimum 40 vehicles per hour requirement for the STAMSON model and were therefore not included in the modelling. The impact of excluding the night-time traffic noise source on Evans Road at receptor EW14 (Evans Road and Dundas Street East) was not as significant since Dundas Street was also a significant noise source for this receptor. It should be noted that due to this limitation of the STAMSON model, the actual night-time noise levels at receptors along Evans Road may be higher than predicted.

The predicted noise levels under Scenario 3 for receptors EW14, EW15, and EW16 along Dundas Street East were 65 to 67 dBA during the daytime (*Table 4-1*). Since the projected noise level with the proposed development was predicted to be 65 dBA or greater, the MTO (2006) recommends that mitigation measures be investigated. However, the majority of existing sensitive receptors along this segment of Dundas Street East, including EW14 to EW16, are fronting Dundas Street. Therefore, abating road generated noise levels such that impacts at receptors are less than 65 dBA may potentially be challenging. It should be noted that the receptors EW14 to EW16 along Dundas Street East were predicted to have lower ambient sound levels under Scenario 3 than under Scenario 2 by approximately 2 dBA (*Table 4-2*). This reduction in sound levels was as a result of the reduction in speed limit to 60 km/h from the current and the future no-build scenario of 80 km/h.

For receptor EW17 on Highway 6 and near the intersection with the new East-West Road, daytime and night-time sound levels were predicted to be approximately 73 dBA and 66 dBA, respectively under Scenario 3 (*Table 4-1*). This corresponded to an insignificant increase (1 dBA and less) in the predicted sound levels over those predicted under Scenario 2 (*Table 4-2*). The primary noise source was Highway 6. Since the predicted noise levels are greater than 65 dBA, investigating options for road noise mitigation is recommended by the MTO (2006). However, existing dwellings along Highway 6 near the intersection with the proposed new East-West Road are fronting the highway and abating road generated noise levels may potentially be challenging. It should be noted that for EW17, the daytime and night-time sound levels under the existing condition and future no-build scenario were also predicted to be greater than 65 dBA.

The potential future residential receptors along the new East-West Road represented by EW18 and EW19 indicated that daytime Leq(16) levels ranged from 58 to 64 dBA and night-time Leq(8) levels

from 51 to 57 dBA. For **proposed new** noise sensitive land uses such as residential subdivisions, when the daytime Leq (16) are above 60 dBA, the MOE (1997b) recommends that outdoor noise control measures such as barriers be considered in order to reduce the Leq (16) to below 60 dBA and as close as possible to 55 dBA as technically and economically feasible. A noise barrier and further site mitigation measures may be required for any proposed development in the area currently identified as Waterdown North, particularly near the intersection with Centre Road. These lands are currently zoned for agricultural use with no development and therefore not defined as noise sensitive receptors. It is recommended that noise impact at potential receptors be re-assessed as part any proposed development in order to incorporate site specific characteristics into the model.

Future potential residential receptors modelled by EW23, EW24 and EW25 were predicted to have daytime Leq(16) that range from 60 to 66 dBA, and night-time Leq(8) levels of 53 to 59 dBA. As noted above, noise barriers may be required for any developments along the new East-West Road linking Parkside Drive to Dundas Street East to reduce noise levels to below 60 dBA during the daytime.

Scenario 3 entails the closure of Parkside Drive to Highway 6 (i.e., Parkside Drive without access to Highway 6). If the access of Parkside Drive to Highway 6 were maintained (i.e., Parkside Drive with access to Highway 6), then the predicted AADT traffic volumes under this Scenario 3 condition would be those provided in parentheses in *Table 3-3*. Traffic volumes along Parkside Drive from Highway 6 to Grindstone Creek under this modified Scenario 3 were predicted to be 67% to 74% of the volumes under Scenario 2. Therefore, sensitive noise receptors along this segment of Parkside Drive would also experience an improvement in the traffic generated noise due to this reduction in predicted traffic volumes.

The change in traffic volumes that were predicted for the segments of Parkside Drive east of Grindstone Creek, Hamilton Street North, Main Street, Centre Road, Evans Road, Dundas Street East, and Brant/Cedar Springs Road, were the same under Scenario 3 with and without access of Parkside drive to Highway 6. The noise impact at the sensitive receptors along these road segments would therefore be the same in either forms of Scenario 3 (i.e., with or without the closure of Parkside Drive to Highway 6). Traffic volumes along the new East-West Road would change only between Highway 6 and Centre Road when the Parkside Drive access to Highway 6 was maintained. The AADT volume was predicted to be approximately 55% of the volume under the Scenario 3 without Parkside Drive access to Highway 6. This would result in a lower noise impact at receptors along this segment of the new East-West Road in comparison to Scenario 3 without the Parkside Drive access to Highway 6.

Overall, Scenario 3 without Parkside Drive access to Highway 6 represents a more conservative or worst-case scenario for noise impacts at sensitive receptors since there is a predicted greater change in AADT volumes in comparison to Scenario 2 than the change in AADT volumes under a Scenario 3 with Parkside Drive accessing Highway 6 when compared to Scenario 2.

In the event that daytime heavy truck volumes on the new East-West Road were to increase beyond the predicted levels, this effect on the noise levels at receptors along the new East-West Road including the segment of redeveloped Parkside Drive was assessed. Conservatively, a five-fold increase in the heavy truck volumes was assumed which was equivalent to 5% of the AADT volumes along the study route. The increase in the heavy truck volumes along the new East-West Road was also assumed to increase the daytime heavy truck volumes on Dundas Street East from the new East-West Road to Brant/Cedar Springs Road. For all receptors (EW09 to EW27) along the study route that would be impacted by this increase in daytime heavy truck volumes, a maximum increase of approximately 3 dBA was predicted (over the noise levels predicted for Scenario 3 which entails a more moderate volume of heavy truck traffic). The impact of increasing the heavy truck volumes by five-fold on the sound levels of the selected receptors can be regarded as being low.

**Table 4-2. Change in Noise Impact Due to
 New East-West Road Corridor Development at Mature State 2021**

Receptor	Change		Impact
	Day (dBA)	Night (dBA)	
EW01	-7.1	-5.5	Noticeable Improvement
EW02	-21.3	-20.8	Significant Improvement
EW03	-3.7	-3.8	Noticeable Improvement
EW04	-3.6	-3.8	Noticeable Improvement
EW05	-1.1	-1.1	Insignificant Improvement
EW06	-1.0	-1.1	Insignificant Improvement
EW07	-1.9	-1.9	Insignificant Improvement
EW08	-1.9	-2.0	Insignificant Improvement
EW09	-4.0	-4.0	Noticeable Improvement
EW10	-2.0	-1.9	Insignificant Improvement
EW11	-0.1	0.4	Insignificant
EW12	-6.4	-9.1	Noticeable Improvement Day/ Significant Improvement Nighttime
EW13	-7.0	-14.7	Noticeable Improvement Day/ Significant Improvement Nighttime
EW14	-2.0	-2.3	Insignificant Improvement
EW15	-1.7	-2.0	Insignificant Improvement
EW16	-1.8	-2.0	Insignificant Improvement
EW17	1.0	0.1	Insignificant
EW18	NA	NA	NA – New Receptor
EW19	NA	NA	NA – New Receptor
EW20	0.3	0.3	Insignificant
EW21	0.3	0.2	Insignificant
EW22	8.6	8.6	Noticeable Increase
EW23	NA	NA	NA – New Receptor
EW24	NA	NA	NA – New Receptor
EW25	NA	NA	NA – New Receptor
EW26*	-1.2 at 1.5 m -1.2 at 4.5 m	-1.2 at 1.5 m -1.2 at 4.5 m	Insignificant Improvement
EW27*	1.0 at 1.5 m 1.0 at 4.5 m	1.0 at 1.5 m 1.0 at 4.5 m	Insignificant

* Noise levels assessed for outdoor living space and window of ground floor both of which were at 1.5 m, and at the plane of window of second floor at a height of 4.5 m.

5. Noise Impact During Construction Phase

The construction phase of the proposed East-West Road Corridor redevelopment has the potential to affect the local ambient sound levels in the vicinity of the construction site. However, construction activities are non-stationary and variable so that noise sources are non-stationary and can vary depending on time of day and from day-to-day. Activities are influenced by the progression in construction phases, type of construction, weather, season, terrain and time of day.

Typical road construction related noise sources are:

- Tracked excavators
- Road graders
- Dozers and front-end loaders
- Dump trucks
- Rollers and vibratory rollers
- Pavers
- Mobile cranes

In an effort to minimise noise and vibration impacts during the construction phase, construction activities of the roadways will act in accordance with the City of Burlington’s Nuisance and Noise Control By-Law (By-Law No. 19-2003, amended by By-Law 49-2008) and the City of Hamilton’s Noise By-Law (By-Law No. 03-020), and follow construction industry best management practices. *Table 5-1* summarises the procedures to mitigate noise and vibration impacts.

Table 5-1. Mitigation Measures to Limit Construction Related Noise

Expected Onsite Impact	Mitigation Measures
Increase in noise levels from the use of machinery on site, delivery of materials, and general construction.	<ul style="list-style-type: none"> • Ensure that City of Burlington and City of Hamilton noise by-laws are followed. • Limit construction to between the hours of 07:00 h and 19:00 h. • Ensure that all equipment is well maintained. • Employ construction best management practices.

In addition to the noise generated by construction activities, road noise may increase temporarily due to traffic congestion and re-routing of the traffic during the construction phase. This may be more noticeable during the widening of Parkside Drive and Dundas Street East. During the widening of Parkside Drive between Grindstone Creek and the new East-West Road linking Parkside to Dundas Street, there is a potential for increased traffic and therefore road noise along Hamilton Street North, Main Street North, Mill Street North, Dundas Street between Hamilton Street and Evans Road, and Evans Road as traffic may be re-directed along these routes. During the widening of Dundas Street, there is a potential for increased traffic and road noise along Side Road 1/Millborough Line, Parkside Drive, Kerns Road, Waterdown Road/Mill Street South, Hamilton Street North, Main Street North, Mill Street North, and Dundas Street west of Pamela Street.

6. Conclusion

The noise impact of the new East-West Road Corridor project defined as Scenario 3 was assessed by comparing the predicted noise levels of the mature state of development in 2021 to that under the future no-build condition (Scenario 2). For the “future build” scenario, it was assumed that Parkside Drive’s access to Highway 6 would be closed. This represents a more conservative or worst-case scenario for noise impacts at sensitive receptors along the new/improved sections of roadway than if the Parkside Drive access to Highway 6 is assumed to remain open.

For Parkside Drive between Highway 6 and the Grindstone Creek, there is a decrease in predicted sound levels in comparing the future 2021 build scenario to the future 2021 no-build scenario as volume along this segment of Parkside Drive is expected to remain the same or lower at the mature state of development of the project. Sound level reductions ranged from not perceptible (less than 3 dBA decrease) to a significant improvement (more than 10 dBA decrease) from the traffic source. Receptors along Evans Road were predicted to experience noticeable decreases (greater than 3 dBA decrease) in traffic generated noise as a result of reduced traffic volume on Evans Road at the project’s mature state of development.

For the section of Parkside Drive east of Grindstone Creek that would be improved (widened from two to four lanes) in the future build scenario, a decrease in the sound levels of up to 2 dBA is predicted in comparison to the future no-build scenario. It is noted that for both the future no-build and future build scenarios that a similar future volume of traffic is predicted for this section of Parkside Drive (despite it being only a 2-lane road under the future no-build scenario). This additional traffic volume is being generated by the future development that is assumed to be in place in the Waterdown area by 2021 and would be attracted to this roadway. The decrease in the posted speed limit from 60 km/h to 50 km/h for this section of Parkside Drive (under the “Future Build” scenario) contributes to the predicted sound level reductions. Noise mitigation is not warranted for this section of Parkside Drive as there is a reduction in sound levels due to the future build scenario in comparison to the future no-build scenario, and that the predicted sound levels are less than 65 dBA.

The sound level impact from the widened Dundas Street East will decrease at receptors along this segment of the roadway due to the proposed reduced speed limit of 60 km/h from 80 km/h for sections currently with the higher speed limit. However, the predicted daytime sound levels were greater than 65 dBA which may require further investigation on the effectiveness of mitigation options.

Sound levels were predicted to increase at existing dwellings EW17 (proposed new East-West Road an Highway 6), and EW20, EW21, and EW22 (Centre Road and Northlawn Avenue), and the northeastern side of the nursing home (EW27) that will be in proximity to the new East-West Road. All increases were not considered to be perceptible except for EW22 where the increase would be noticeable (approximately 9 dBA greater). However it should be noted that the resultant daytime and night-time sound levels at EW22 were approximately 46 dBA and 40 dBA, respectively which are within the ambient sound limits defined by the MOE for a suburban area. No mitigation is recommended as the noise levels are within the MOE limits for a suburban area. However as a result of the potential increase in estimated sound levels, monitoring of the traffic generated sound levels after the construction of the new East-West Road is recommended. In contrast to the northeastern side of the nursing home, the southeastern side modelled by EW26 was not significantly influenced by traffic noise from the new East-West Road but more so by the noise generated by traffic on Parkside Drive. EW26 therefore was predicted to have a decrease in noise levels as a result of the project in comparison to the no-build scenario. Shielding by the building was not assumed in the assessment at EW26.

New residences in the subdivisions of Waterdown North and Upcountry urban development areas may need sound barriers to be installed to mitigate potential noise generated by traffic along new East-West Road and Centre Road, and the new north-south link between Parkside Drive and Dundas Street East serving the Upcountry area.

7. References

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Appendix A – Road Corridor Concept Plan

Figure A-1 East-West Road Corridor Mature State of Development with Noise Receptors



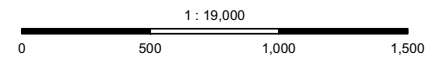
East - West Road Class EA

Legend

- Receptor Locations
- Proposed East - West Corridor Alignment Option

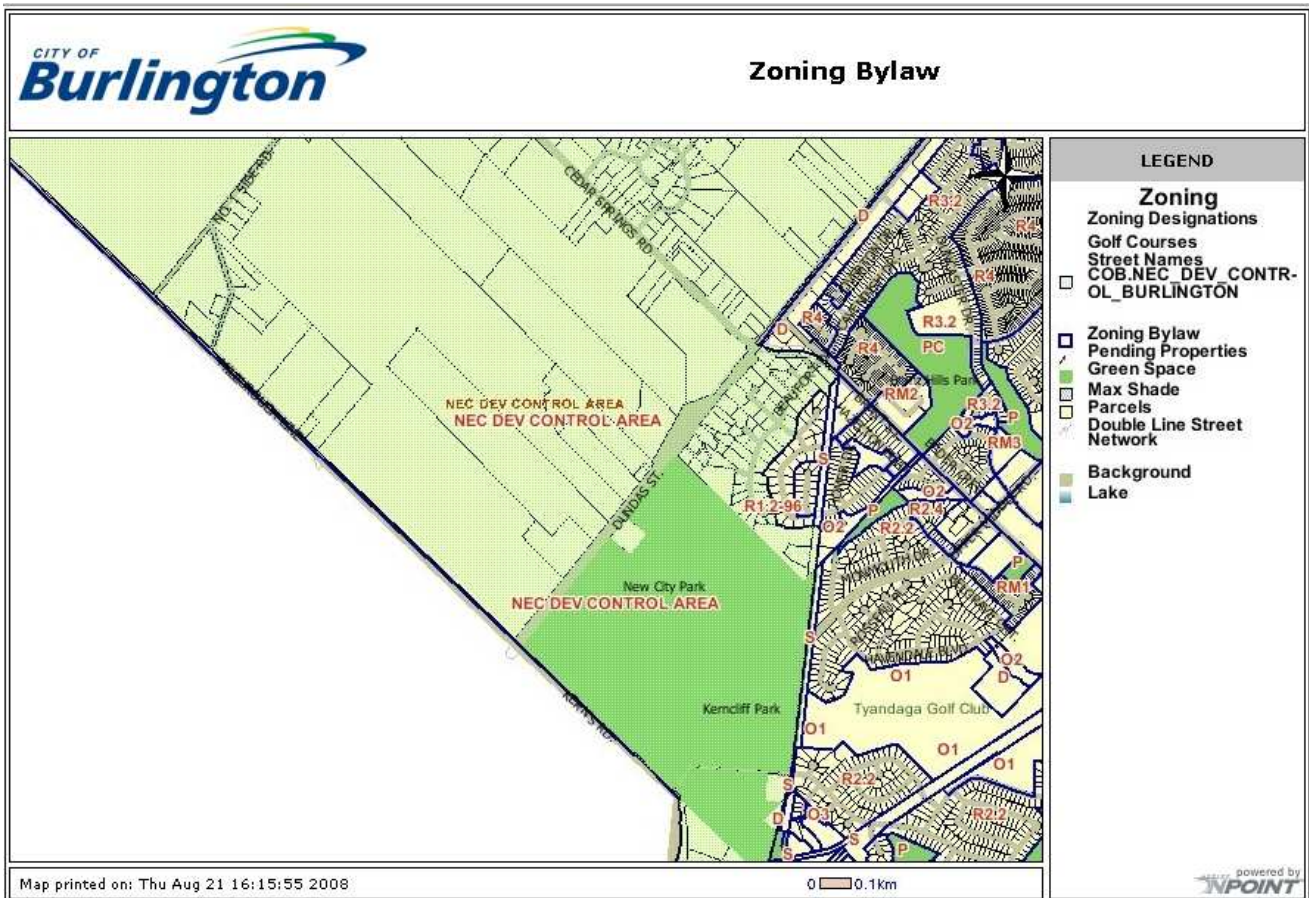


**East - West Road Class
Environmental Assessment**



Appendix B – Municipal Zoning Maps

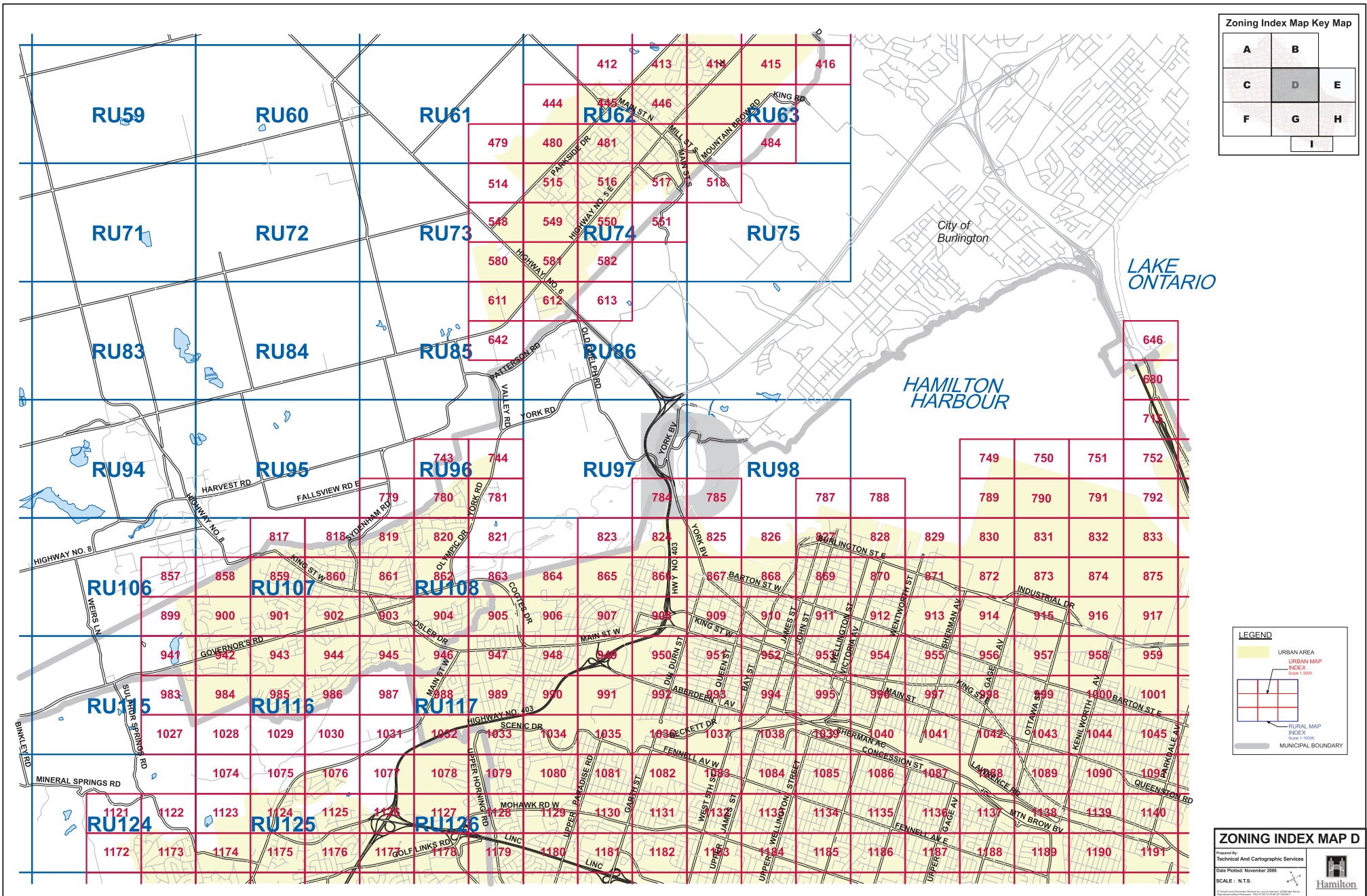
Figure B-1 City of Burlington Zoning Map



Land use along designations (City of Burlington, 2008)

- RNA1 and RNA2: Residential
- H-RNA1 and H-RNA2: Holding Residential
- O3: open space (defined as municipal and provincial parks, public and private open spaces, cultural heritage resources, archaeological restoration, walking trails and nature viewing, forest, wildlife and fisheries management, transportation and utilities, agriculture except within woodlot, and storm water management and erosion control excluding permanent detention and retention ponds)
- S: utility services land use (defined as any transportation, communication or utility use)

Click on the index number for a detailed zoning map.





Legend
●●●● Urban Boundary

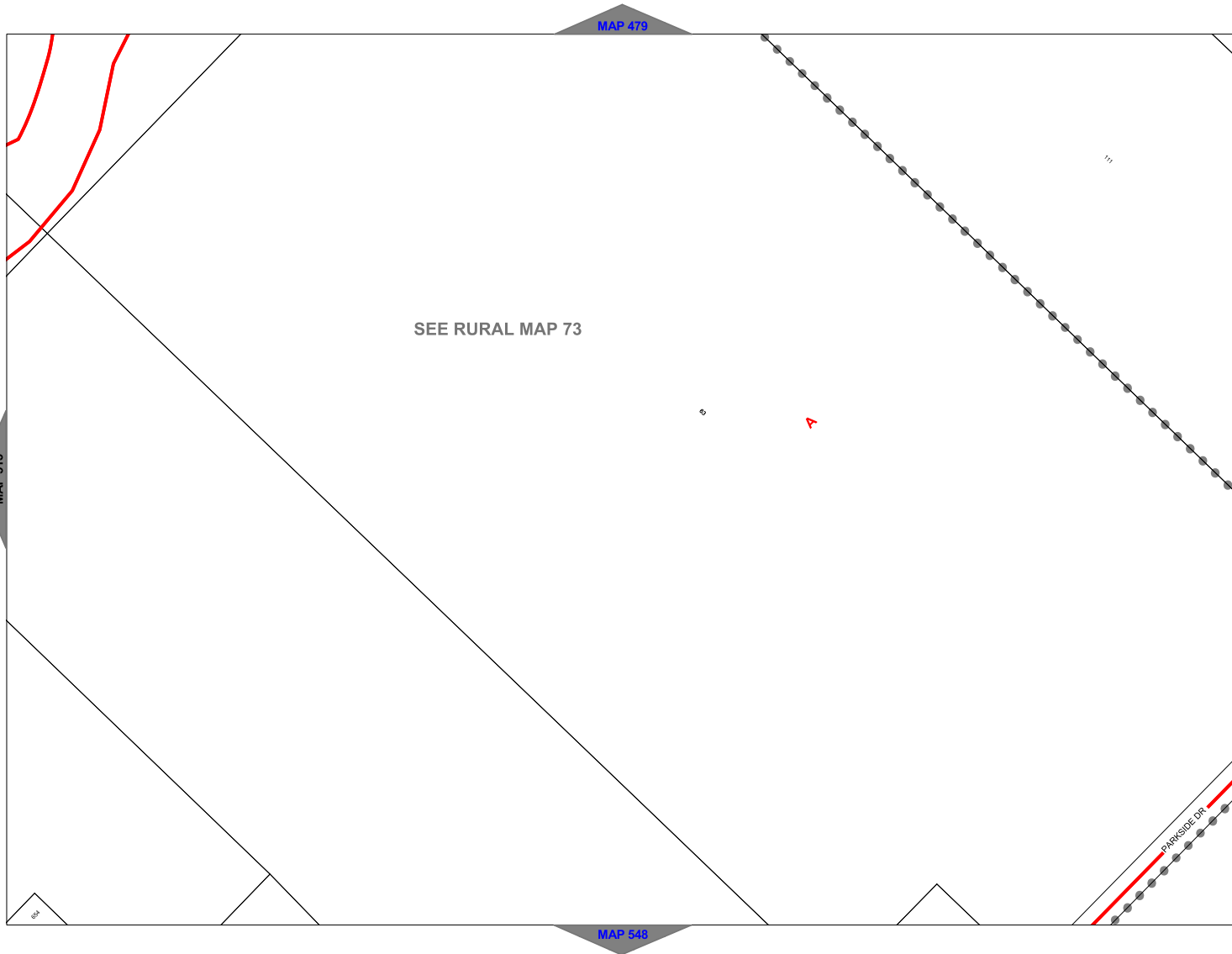


ZONING MAP 548

Plot Date: 4/27/2007



Hamilton



Legend

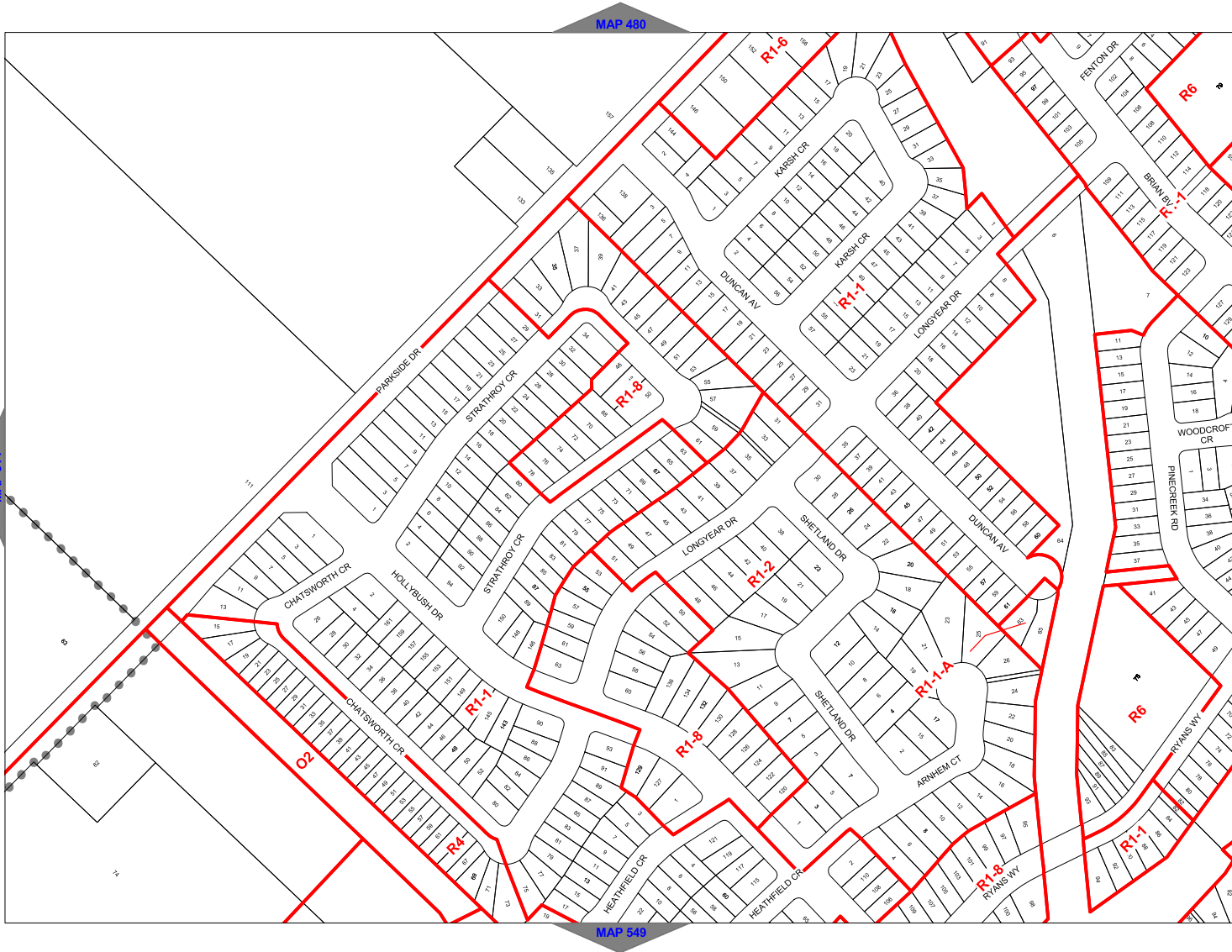
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NORTH
SCALE 1 : 3,000

ZONING MAP 514

Plot Date: 4/27/2007

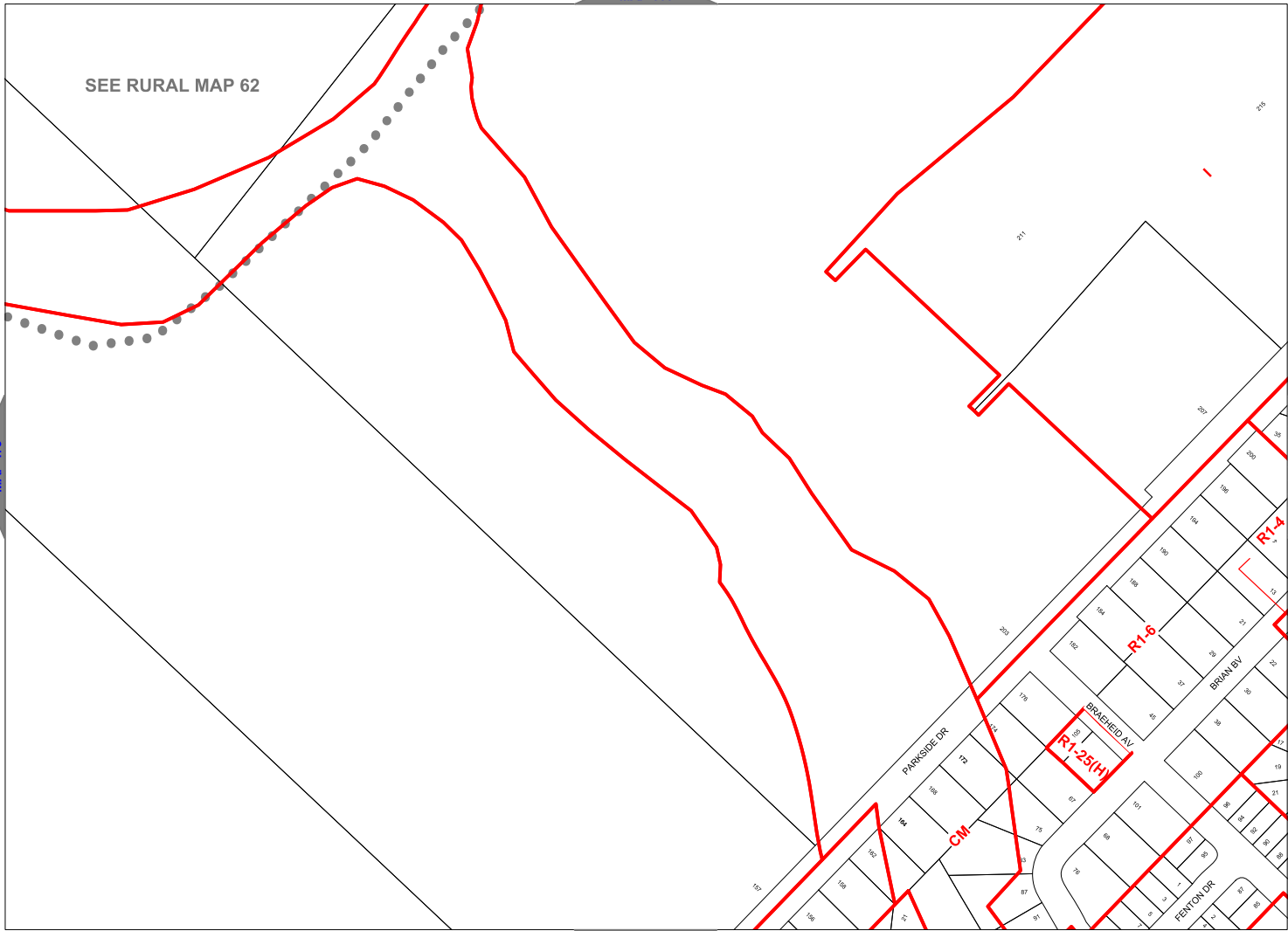


Legend
 ●●● Urban Boundary



ZONING MAP 515

Plot Date: 4/27/2007



SEE RURAL MAP 62

MAP 444

MAP 479

MAP 515

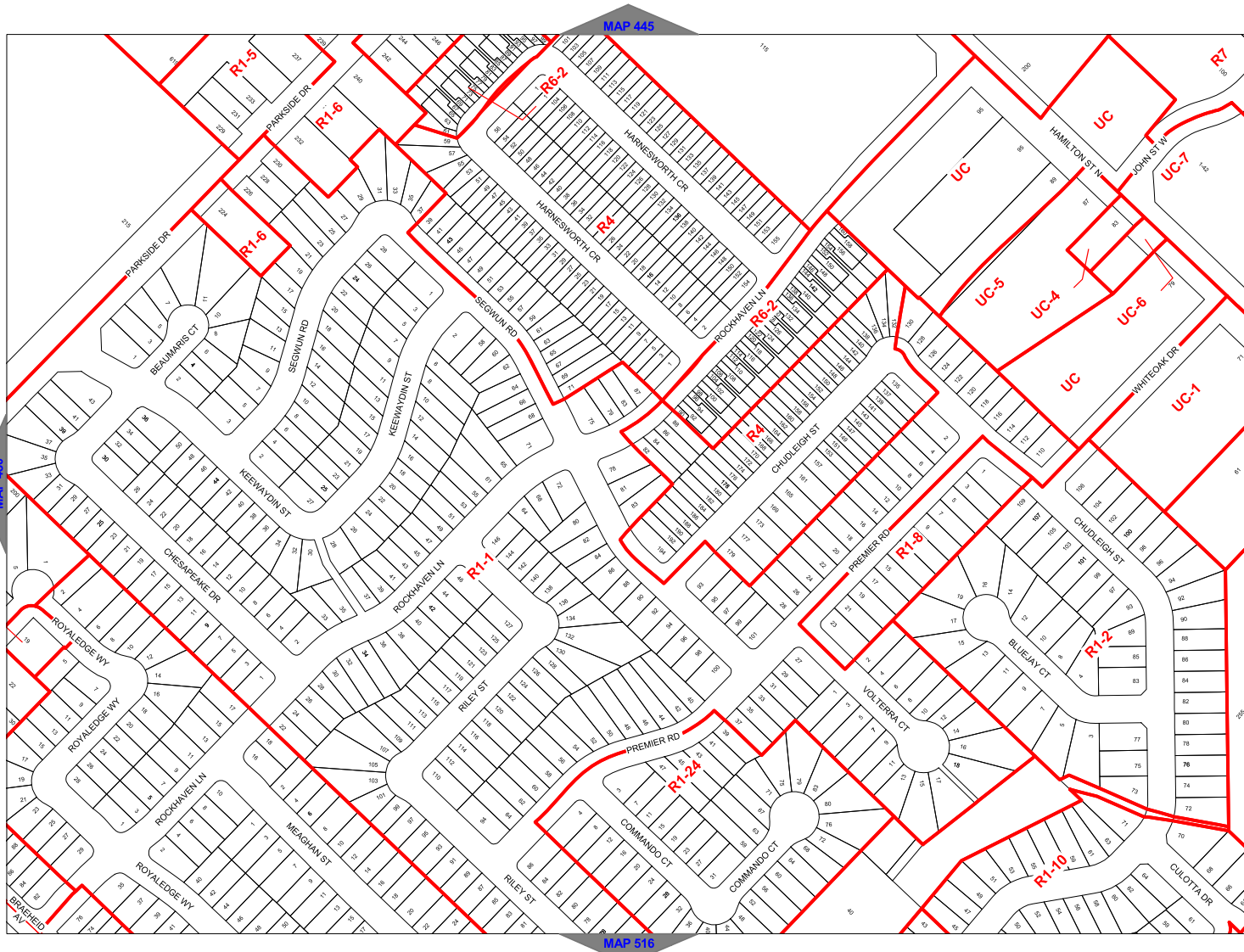
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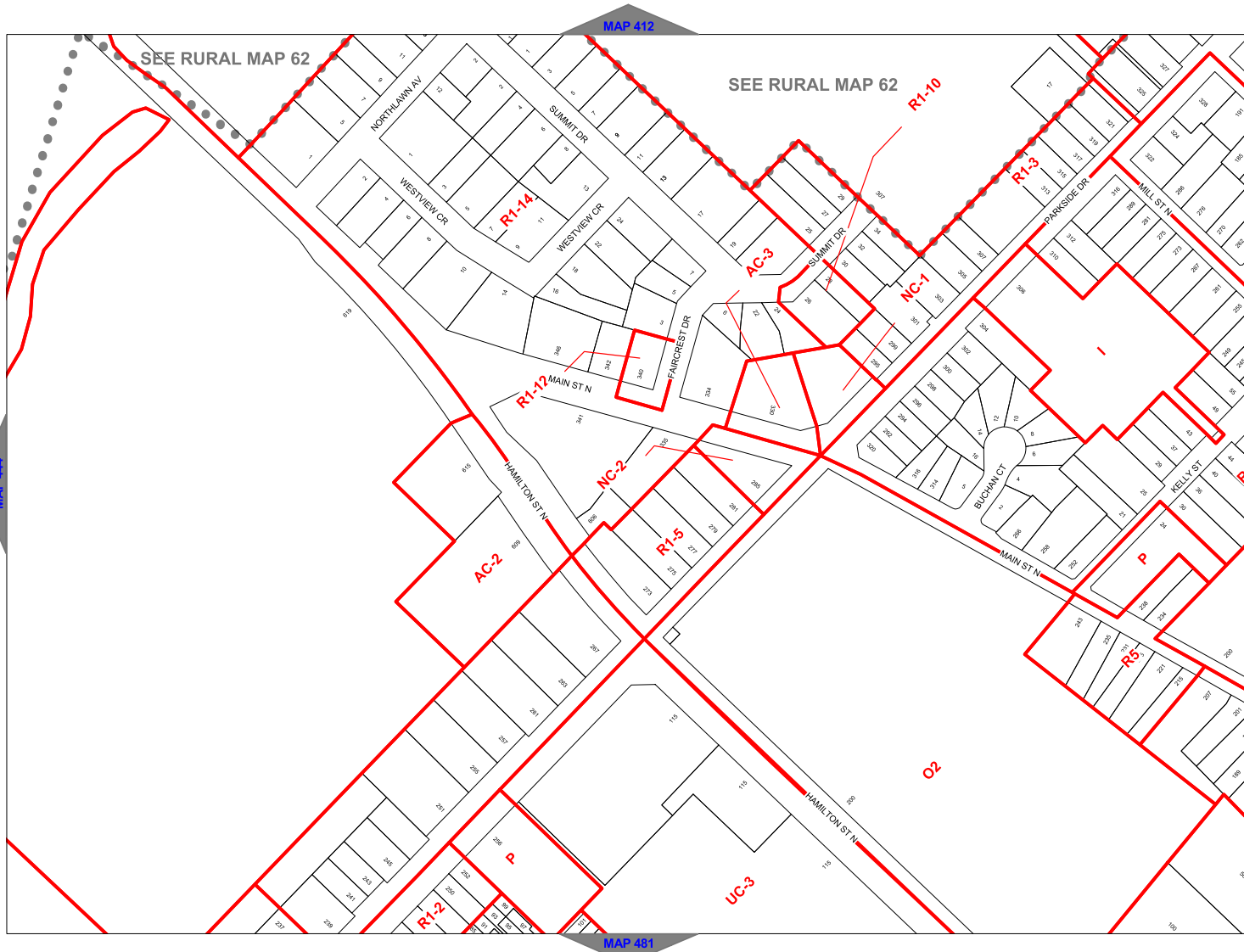
ZONING MAP 480

Plot Date: 4/27/2007



ZONING MAP 481

Plot Date 4/30/2007



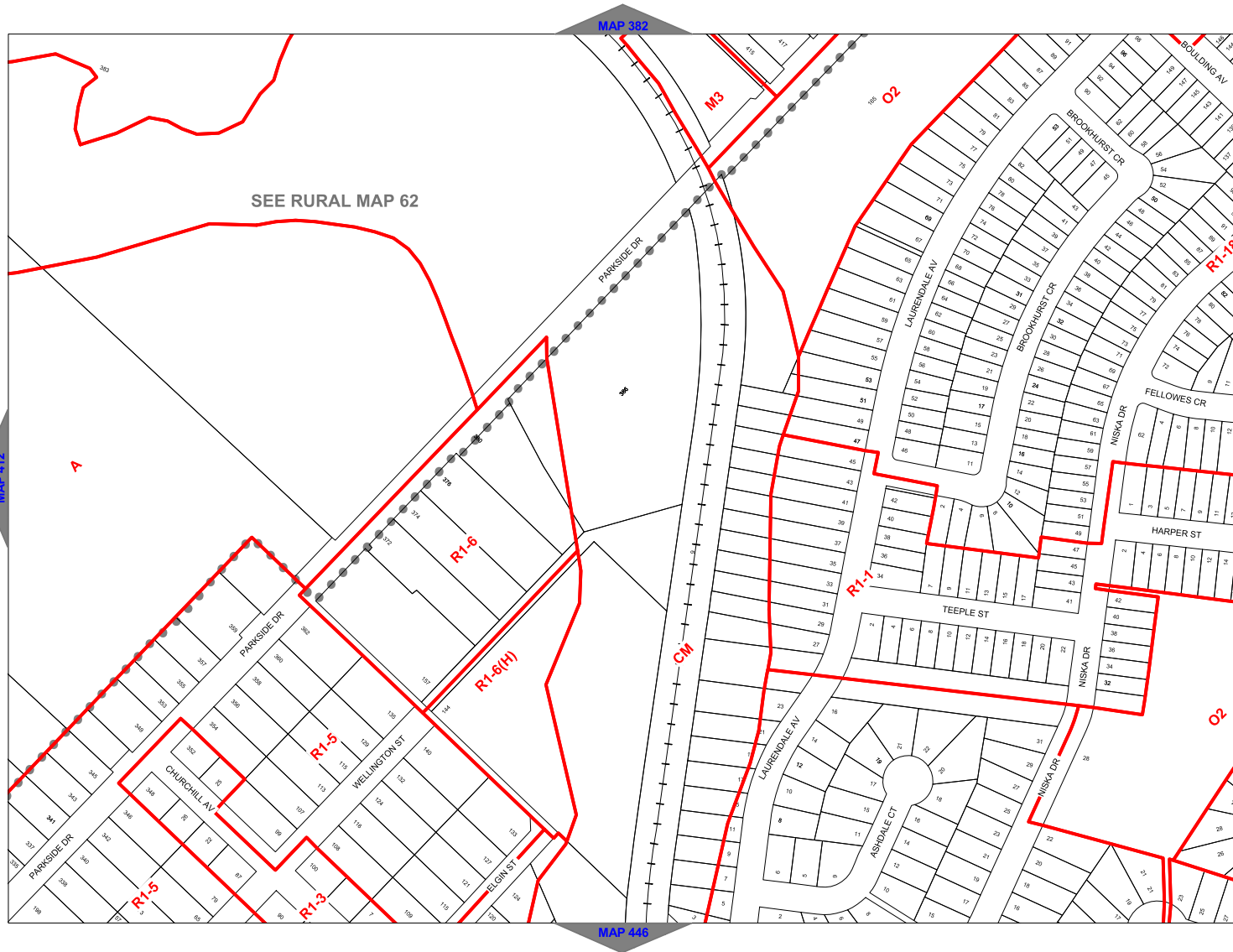
Legend

- Urban Boundary



ZONING MAP 445

Plot Date: 4/27/2007



Legend

●●●● Urban Boundary



ZONING MAP 413

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Plot Date: 4/27/2007

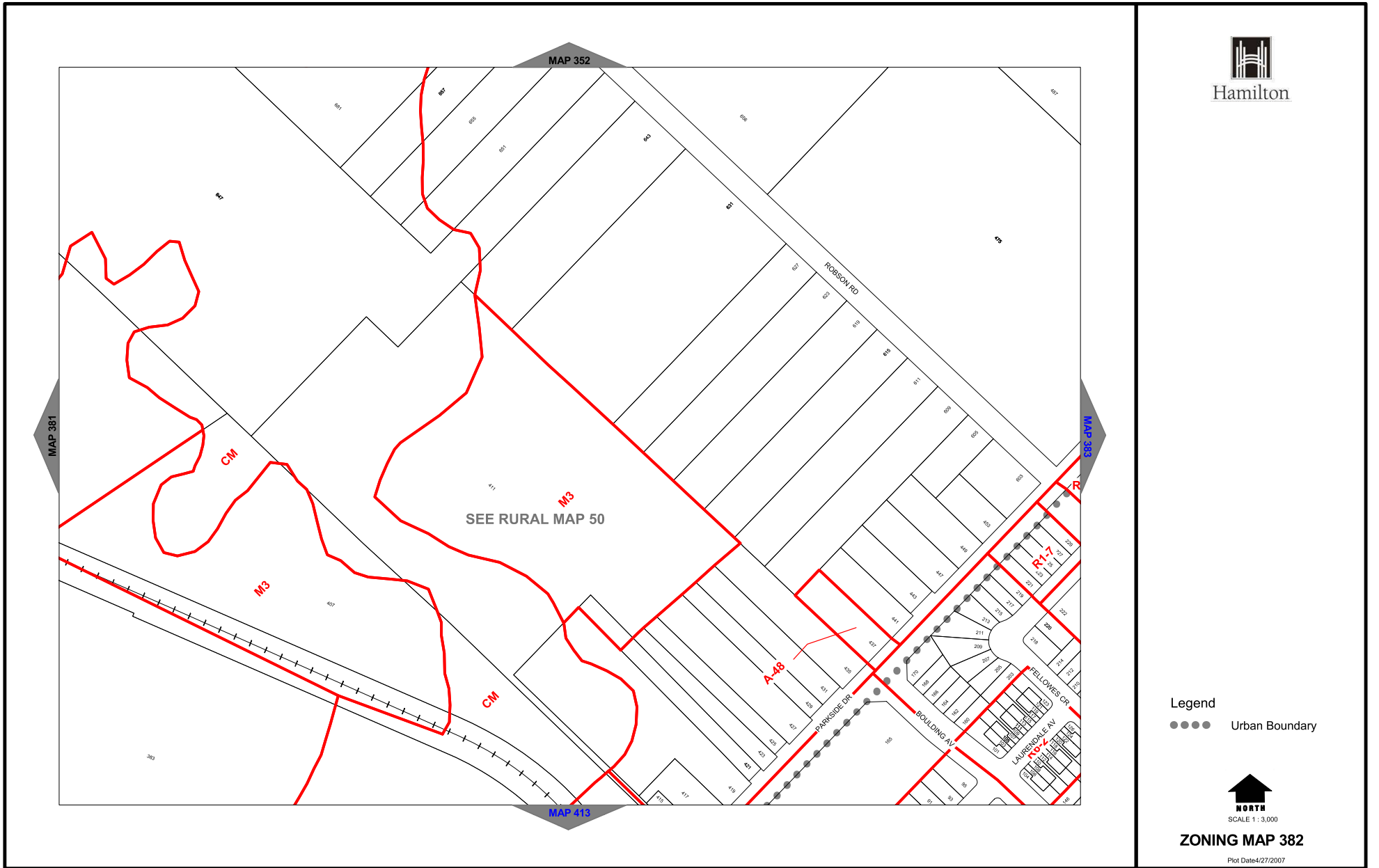


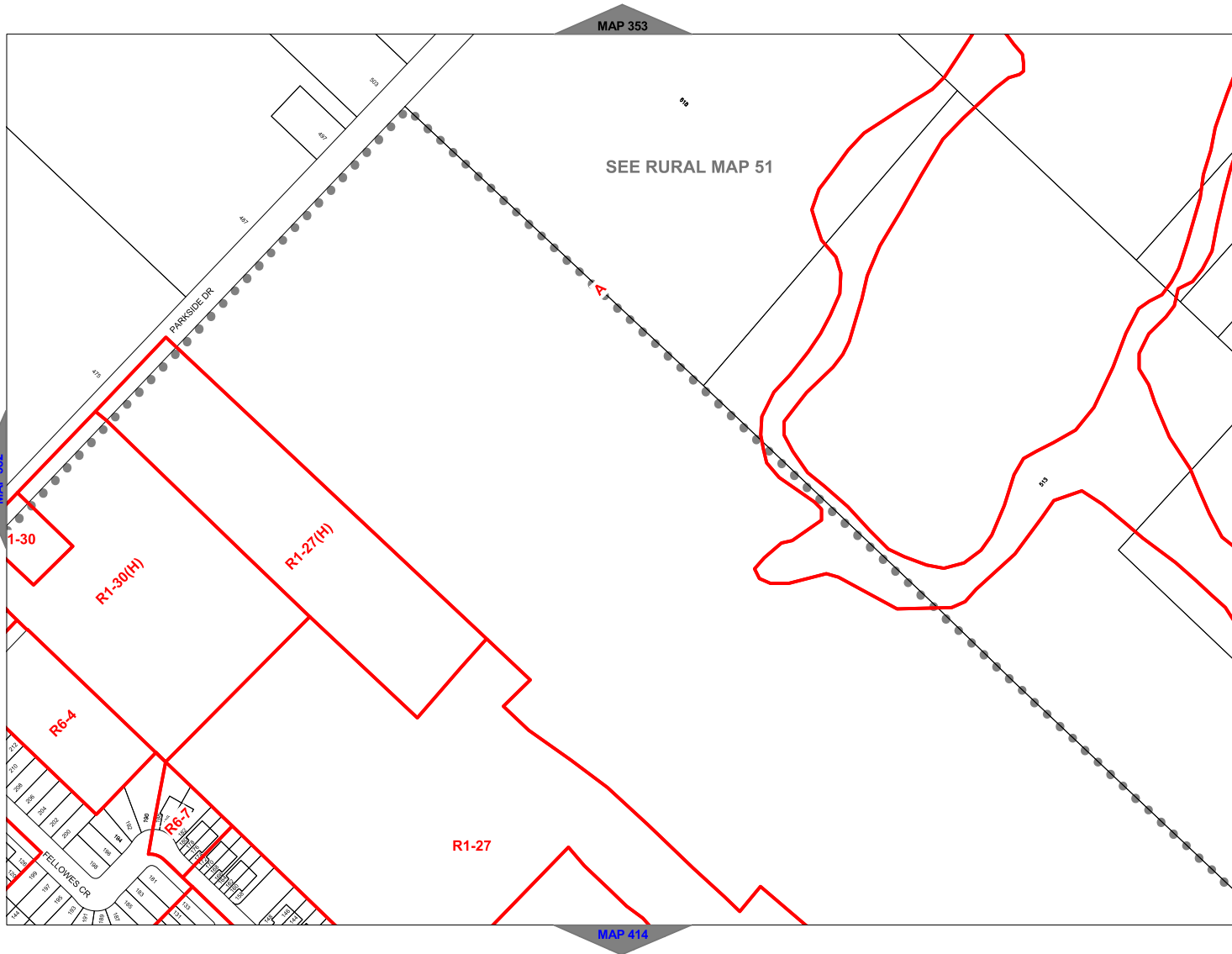
Legend
●●●● Urban Boundary



ZONING MAP 382

Plot Date: 4/27/2007





Legend

●●●● Urban Boundary



NORTH
SCALE 1 : 3,000

ZONING MAP 383

Plot Date: 4/27/2007



Legend

●●●● Urban Boundary



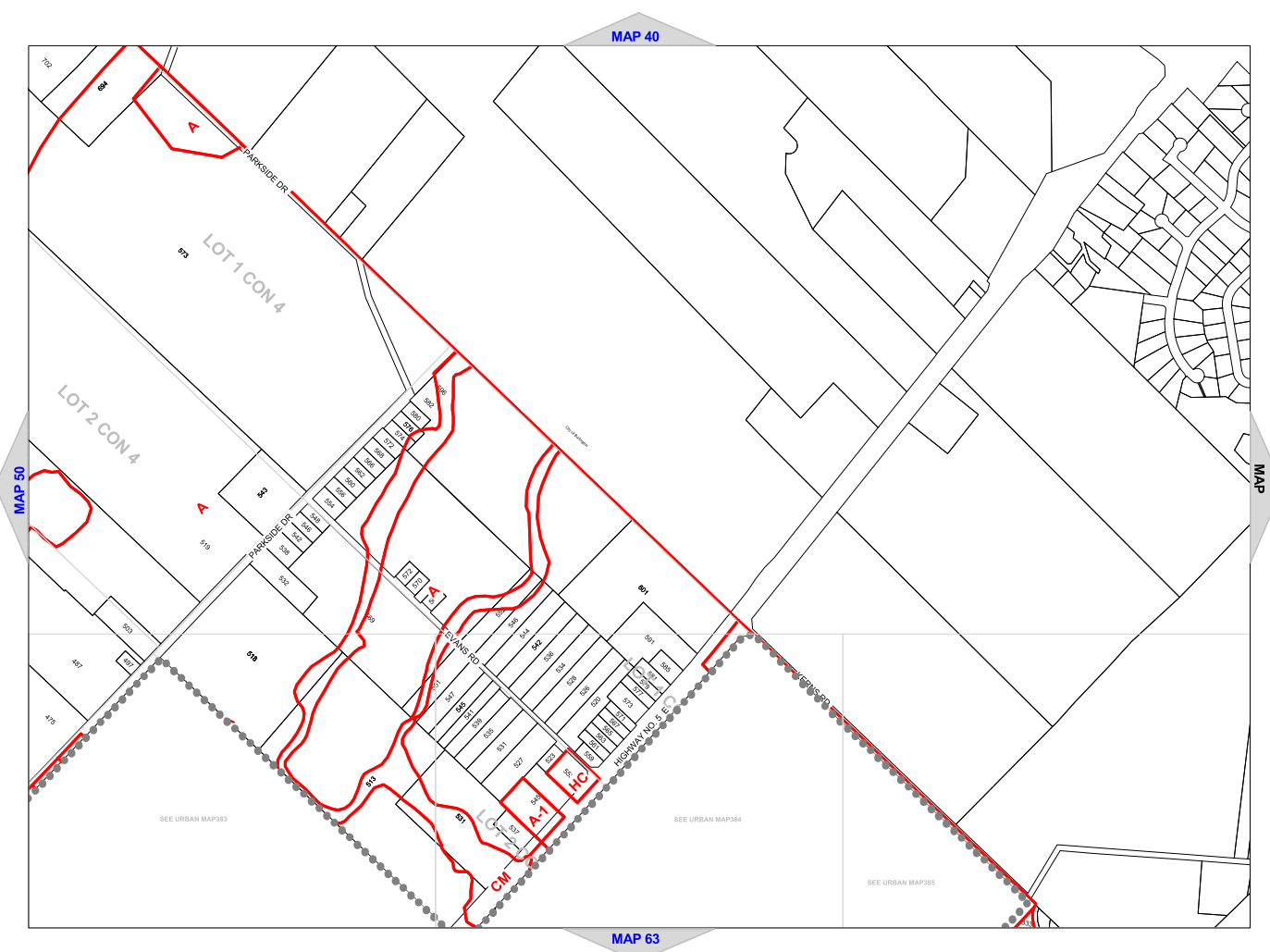
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ZONING MAP 384

Plot Date: 4/27/2007



Hamilton



Legend

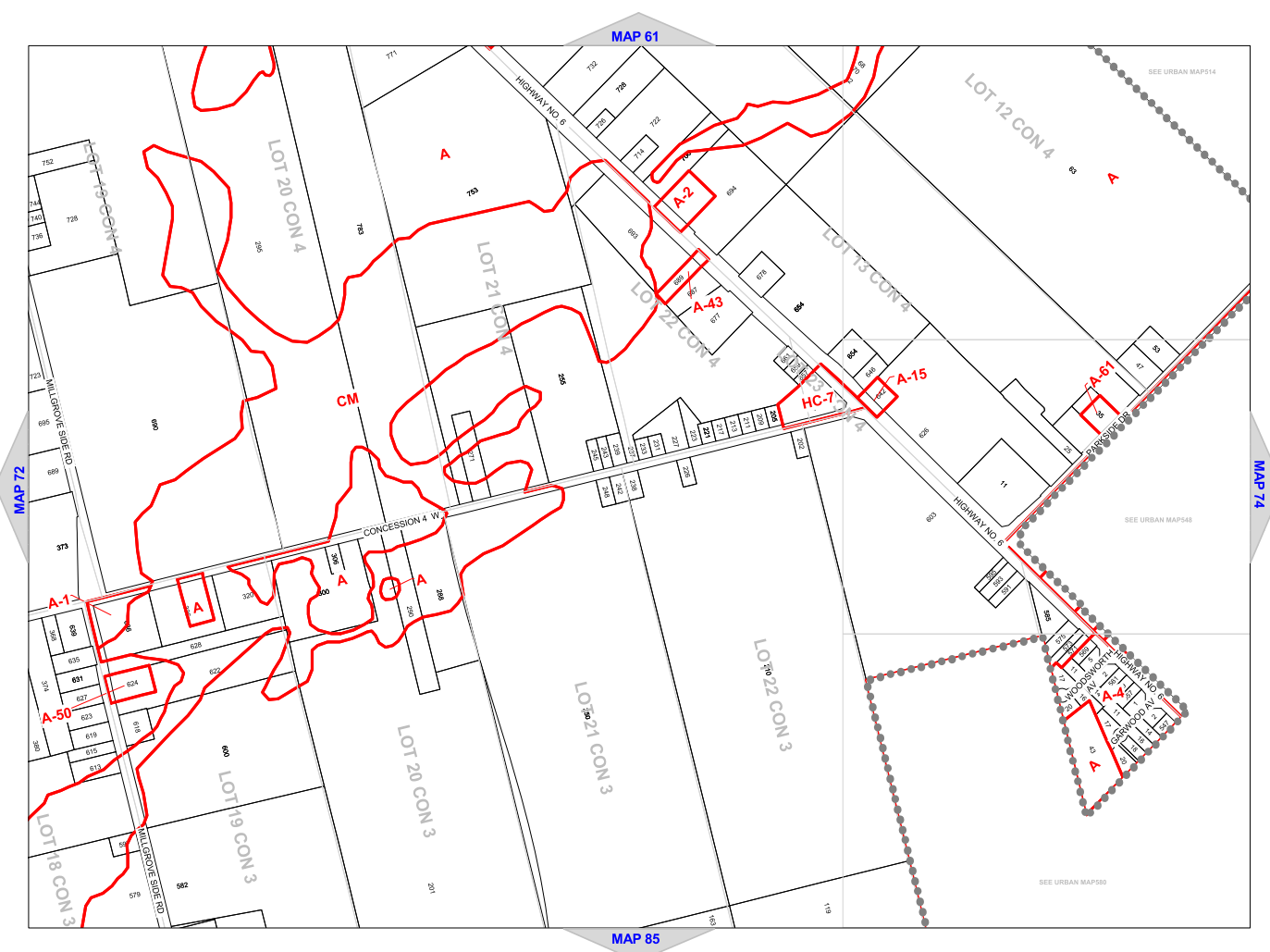
●●●● Urban Boundary



SCALE 1 : 10,000

RURAL ZONING MAP 51

Plot Date 4/30/2007



Legend

- Urban Boundary



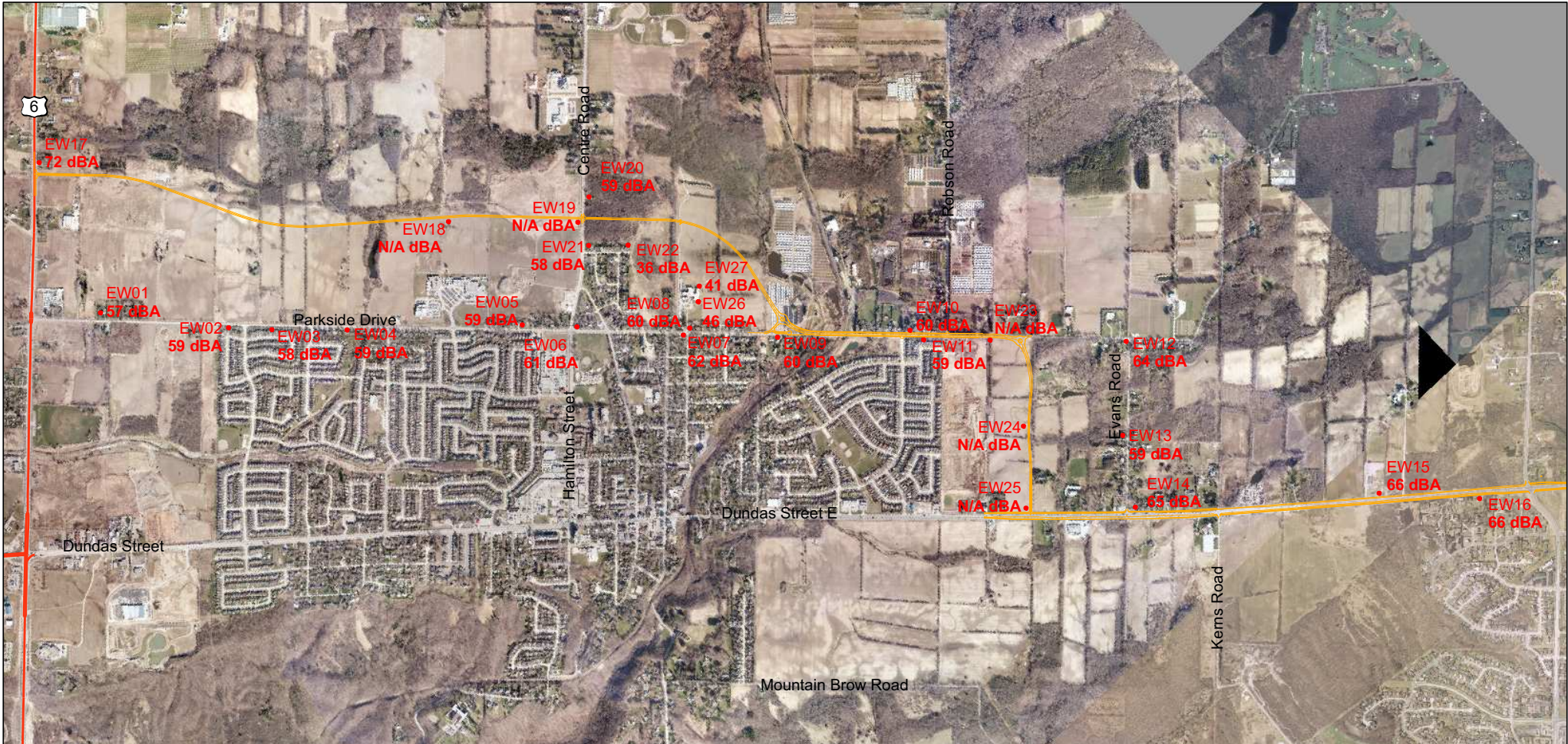
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RURAL ZONING MAP 73

Plot Date 4/30/2007

Appendix C – Predicted Noise Levels

Figure C-1 Scenario 1 – Existing 2008 Daytime Noise Levels



**East - West Road Class EA
Scenario 1 2008 - Day**

Legend

- Receptor Locations
- Proposed East - West Corridor Alignment Option



**East - West Road Class
Environmental Assessment**

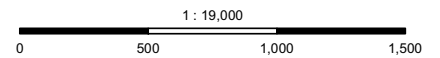
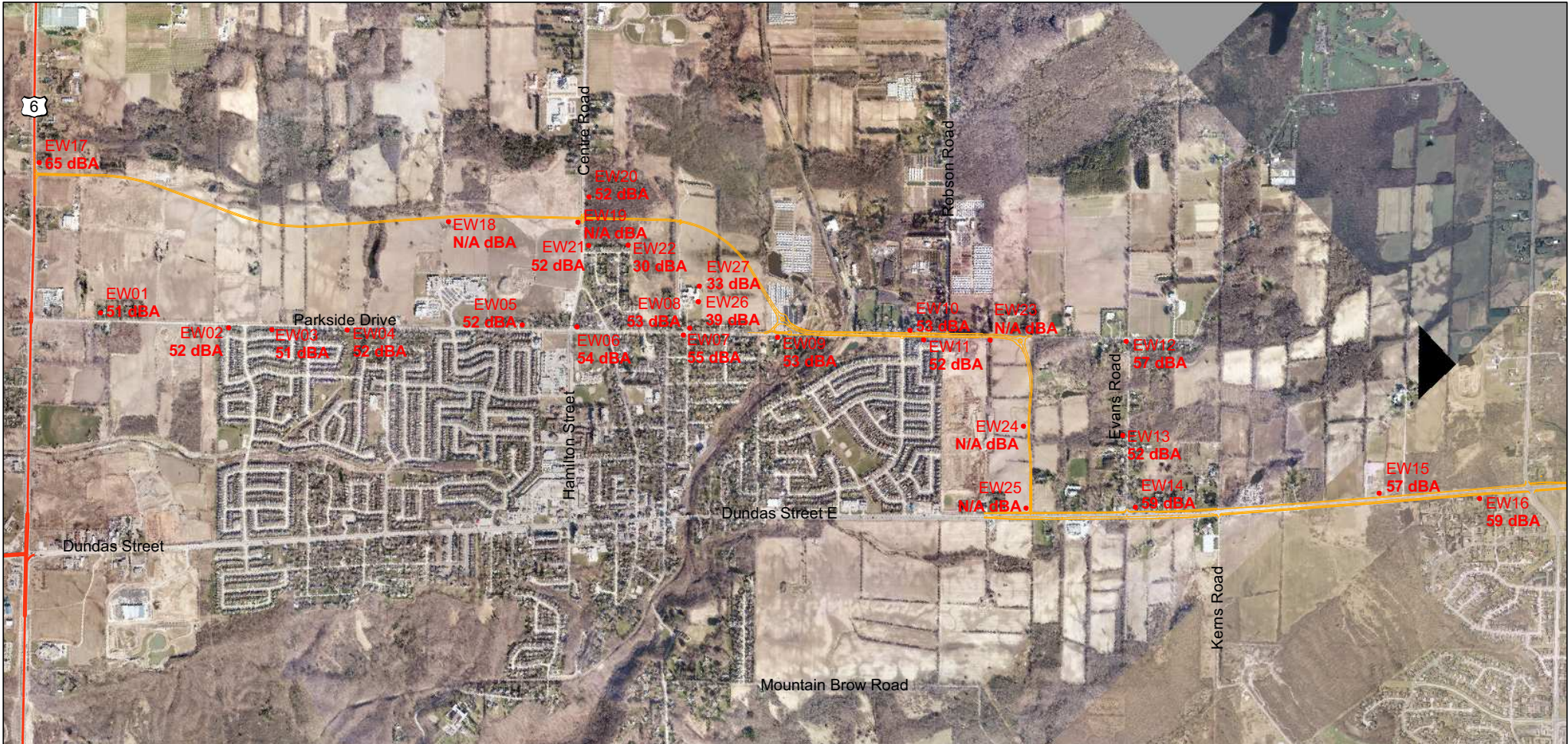


Figure C-2 Scenario 1 – Existing 2008 Nighttime Noise Levels



**East - West Road Class EA
Scenario 1 2008 - Night**

Legend

- Receptor Locations
- Proposed East - West Corridor Alignment Option



**East - West Road Class
Environmental Assessment**

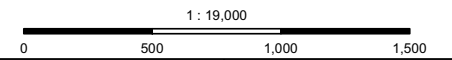
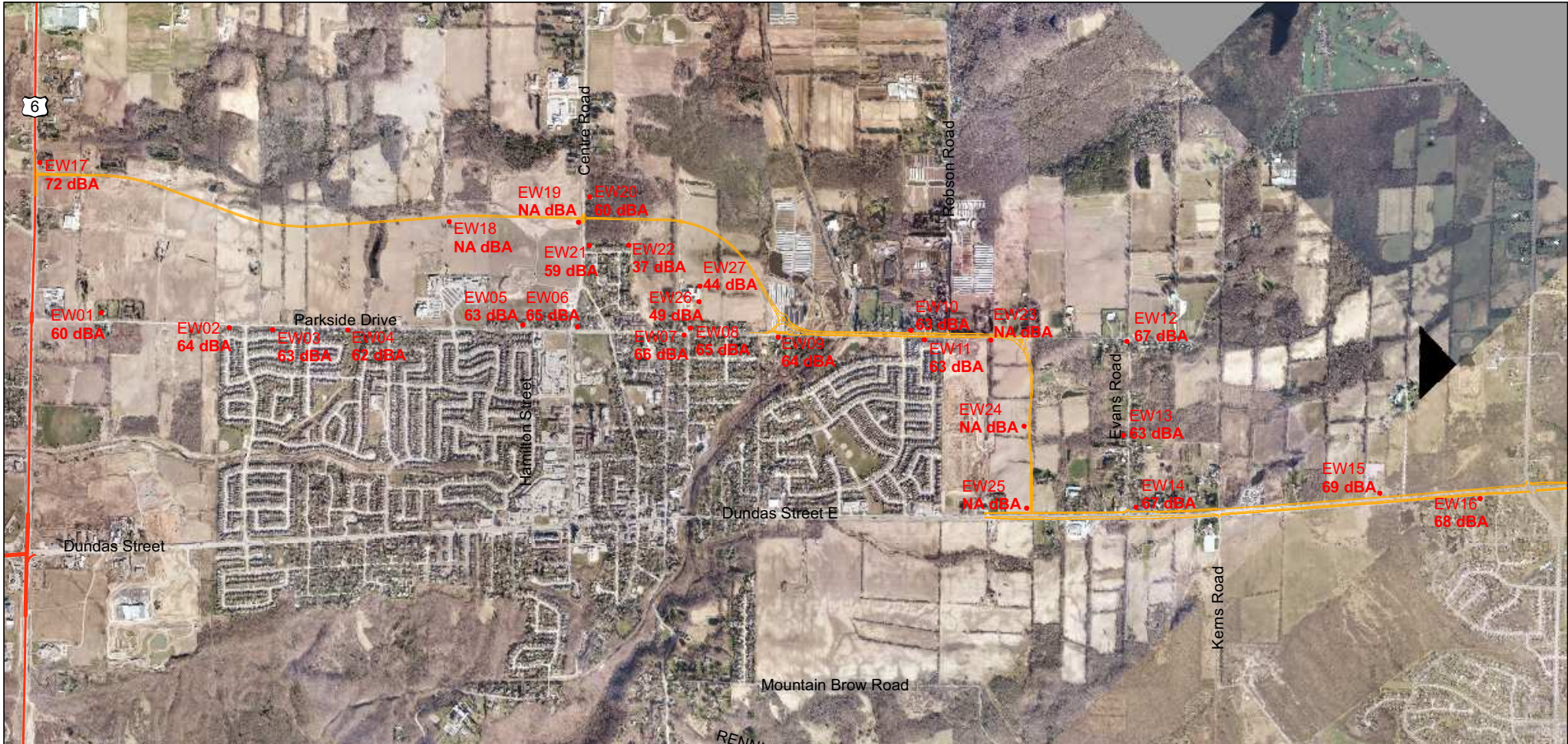


Figure C-3 Scenario 2 – 2021 No-Build Daytime Noise Levels



**East - West Road Class EA
Scenario 2 2021 - Day**

Legend

- Receptor Locations
- Proposed East - West Corridor Alignment Option



**East - West Road Class
Environmental Assessment**

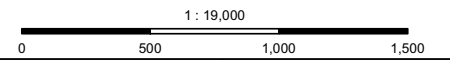
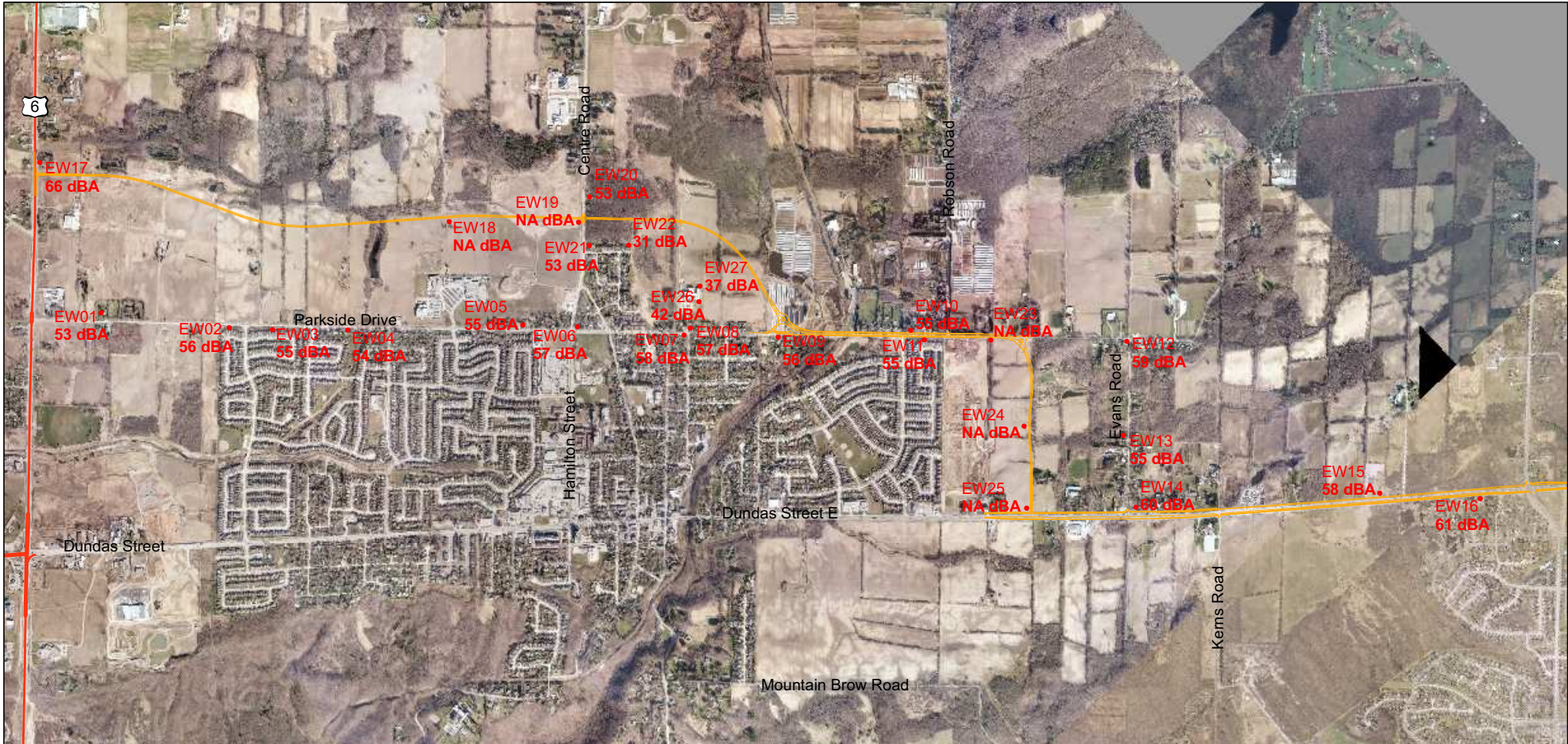


Figure C-4 Scenario 2 – 2021 No-Build Nighttime Noise Levels



**East - West Road Class EA
Scenario 2 2021 - Night**

Legend

- Receptor Locations
- Proposed East - West Corridor Alignment Option



**East - West Road Class
Environmental Assessment**

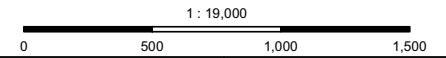
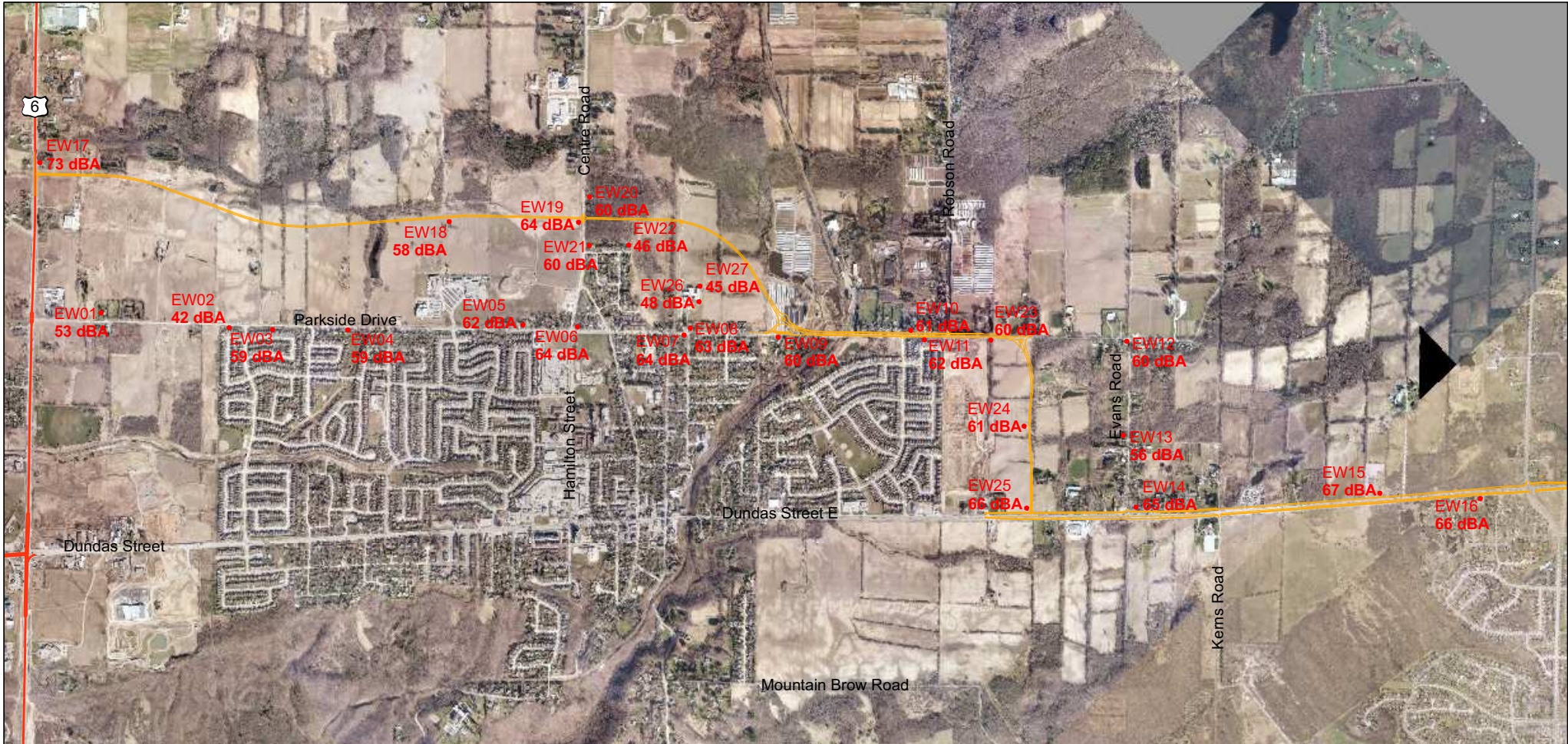


Figure C-5 Scenario 3 – 2021 Mature State of Development Daytime Noise Levels



**East - West Road Class EA
Scenario 3 2021 Mature State - Day**

Legend

- Receptor Locations
- Proposed East - West Corridor Alignment Option



**East - West Road Class
Environmental Assessment**

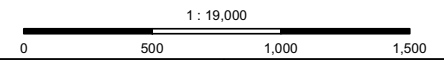
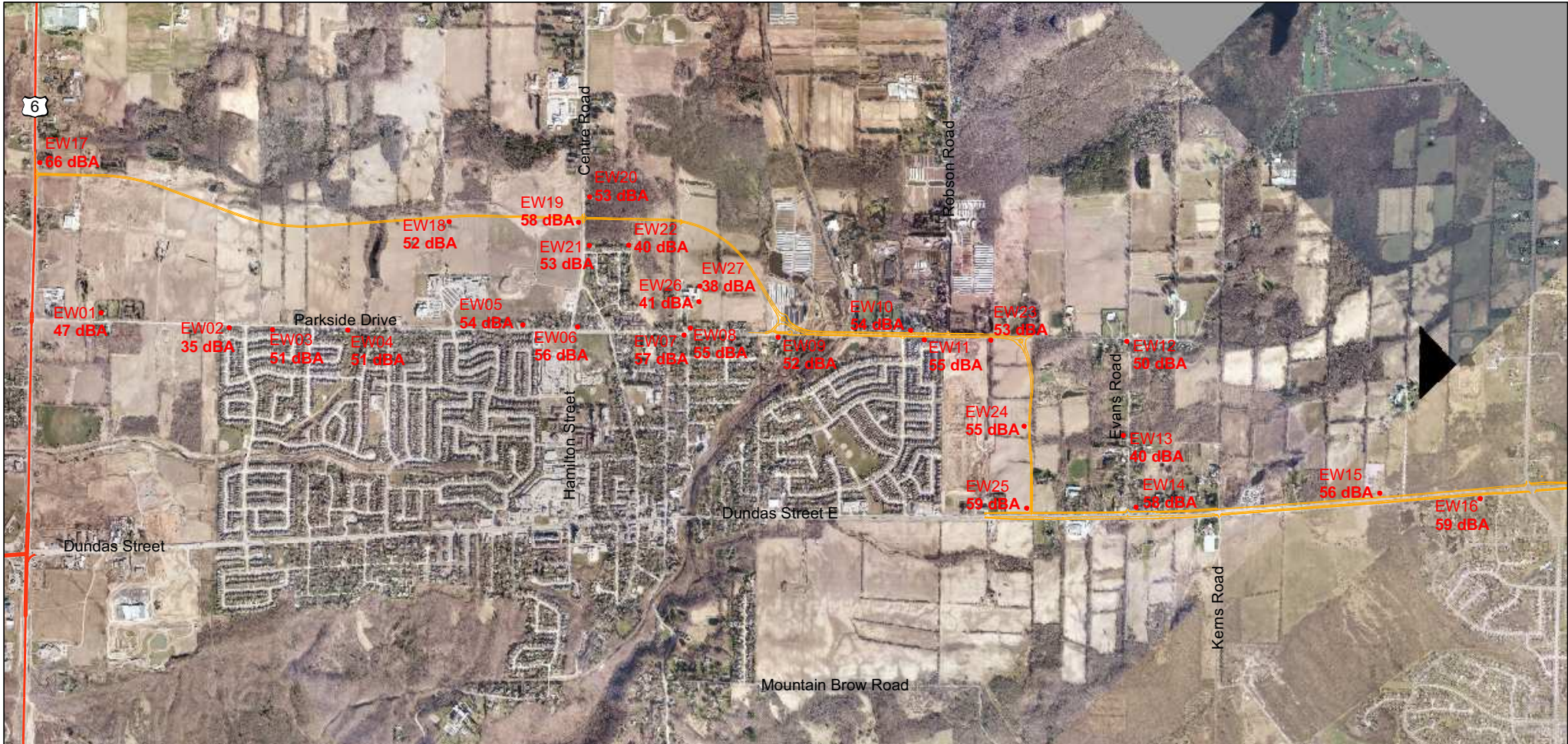


Figure C-6 Scenario 3 – 2021 Mature State of Development Nighttime Noise Levels



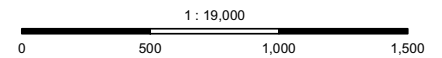
**East - West Road Class EA
Scenario 3 2021 Mature State - Night**

Legend

- Receptor Locations
- Proposed East - West Corridor Alignment Option



**East - West Road Class
Environmental Assessment**



Appendix D – Selected STAMSON Output Files

Receptors:

EW04 Existing Residence on Parkside Drive

EW06 Existing Residence on Parkside Drive at Hamilton Street North

EW09 Existing Residence on Parkside Drive

EW15 Existing Residence on Dundas Street East

EW18 Potential New Residence on New East-West Road in Waterdown North Development Area

EW21 Existing Residence on Northlawn Avenue and Centre Road

EW22 Existing Residence on Northlawn Avenue

EW24 Potential New Residence on New East-West Road in Upcountry Development Area

Scenario 1- Existing 2008

STAMSON 5.0 NORMAL REPORT Date: 18-08-2008 10:39:46
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 08ew04d.te Time Period: 16 hours
Description: 2008 EW04 DAY

Road data, segment # 1: PS2 L1

```
-----
Car traffic volume : 3242 veh/TimePeriod
Medium truck volume : 137 veh/TimePeriod
Heavy truck volume : 34 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)
```

Data for Segment # 1: PS2 L1

```
-----
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 : 21.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00
```

Road data, segment # 2: PS2 L2

```
-----
Car traffic volume : 3242 veh/TimePeriod
Medium truck volume : 137 veh/TimePeriod
Heavy truck volume : 34 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)
```

Data for Segment # 2: PS2 L2

```
-----
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 : 24.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00
```

Results segment # 1: PS2 L1

Source height = 1.00 m

ROAD (0.00 + 56.71 + 0.00) = 56.71 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	60.59	0.00	-2.43	-1.46	0.00	0.00	0.00	56.71

Segment Leq : 56.71 dBA

Results segment # 2: PS2 L2

Source height = 1.00 m

ROAD (0.00 + 55.74 + 0.00) = 55.74 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	60.59	0.00	-3.39	-1.46	0.00	0.00	0.00	55.74

Segment Leq : 55.74 dBA

Total Leq All Segments: 59.26 dBA

TOTAL Leq FROM ALL SOURCES: 59.26

STAMSON 5.0 NORMAL REPORT Date: 18-08-2008 10:41:30
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 08ew04n.te Time Period: 8 hours
Description: 2008 EW04 NIGHT

Road data, segment # 1: PS2 L1

```
-----
Car traffic volume : 321 veh/TimePeriod
Medium truck volume : 14 veh/TimePeriod
Heavy truck volume : 3 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)
```

Data for Segment # 1: PS2 L1

```
-----
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 : 21.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00
```

Road data, segment # 2: PS2 L2

```
-----
Car traffic volume : 321 veh/TimePeriod
Medium truck volume : 14 veh/TimePeriod
Heavy truck volume : 3 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)
```

Data for Segment # 2: PS2 L2

```
-----
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 : 24.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00
```

Results segment # 1: PS2 L1

Source height = 0.97 m

ROAD (0.00 + 49.83 + 0.00) = 49.83 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.59	53.48	0.00	-2.32	-1.33	0.00	0.00	0.00	49.83

Segment Leq : 49.83 dBA

Results segment # 2: PS2 L2

Source height = 0.97 m

ROAD (0.00 + 48.91 + 0.00) = 48.91 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.59	53.48	0.00	-3.24	-1.33	0.00	0.00	0.00	48.91

Segment Leq : 48.91 dBA

Total Leq All Segments: 52.40 dBA

TOTAL Leq FROM ALL SOURCES: 52.40

STAMSON 5.0 NORMAL REPORT Date: 18-08-2008 11:14:50

MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 08EW06D.te Time Period: 16 hours
Description: 2008 EW06 DAY

Road data, segment # 1: PS4 L1

Car traffic volume : 3242 veh/TimePeriod
Medium truck volume : 137 veh/TimePeriod
Heavy truck volume : 34 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: PS4 L1

Angle1 Angle2 : -90.00 deg 55.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 16.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: PS4 L2

Car traffic volume : 3242 veh/TimePeriod
Medium truck volume : 137 veh/TimePeriod
Heavy truck volume : 34 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: PS4 L2

Angle1 Angle2 : -90.00 deg 55.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 23.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 3: PS3 L1

Car traffic volume : 4106 veh/TimePeriod
Medium truck volume : 173 veh/TimePeriod
Heavy truck volume : 43 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 3: PS3 L1

Angle1 Angle2 : 55.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 16.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 4: PS3 L2

Car traffic volume : 4106 veh/TimePeriod
Medium truck volume : 173 veh/TimePeriod
Heavy truck volume : 43 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 4: PS3 L2

Angle1 Angle2 : 55.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)

Receiver source distance : 23.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00
Road data, segment # 5: H1 L1

Car traffic volume : 3208 veh/TimePeriod
Medium truck volume : 171 veh/TimePeriod
Heavy truck volume : 34 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 5: H1 L1

Angle1 Angle2 : -30.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 25.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 6: H1 L2

Car traffic volume : 3208 veh/TimePeriod
Medium truck volume : 171 veh/TimePeriod
Heavy truck volume : 34 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 6: H1 L2

Angle1 Angle2 : -30.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 33.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 7: H2 L1

Car traffic volume : 4539 veh/TimePeriod
Medium truck volume : 191 veh/TimePeriod
Heavy truck volume : 48 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 7: H2 L1

Angle1 Angle2 : -90.00 deg -30.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 25.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 8: H2 L2

Car traffic volume : 4539 veh/TimePeriod
Medium truck volume : 191 veh/TimePeriod
Heavy truck volume : 48 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 8: H2 L2

Angle1 Angle2 : -90.00 deg -30.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 33.00 m
Receiver height : 1.50 m

Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 9: MAIN L1

Car traffic volume : 1047 veh/TimePeriod
Medium truck volume : 68 veh/TimePeriod
Heavy truck volume : 23 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 9: MAIN L1

Angle1 Angle2 : -60.00 deg 40.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 126.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 10: MAIN L2

Car traffic volume : 1047 veh/TimePeriod
Medium truck volume : 68 veh/TimePeriod
Heavy truck volume : 23 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 10: MAIN L2

Angle1 Angle2 : -60.00 deg 40.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 129.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: PS4 L1

Source height = 1.00 m

ROAD (0.00 + 56.28 + 0.00) = 56.28 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 55 0.66 58.74 0.00 -0.47 -1.99 0.00 0.00 0.00 56.28

Segment Leq : 56.28 dBA

Results segment # 2: PS4 L2

Source height = 1.00 m

ROAD (0.00 + 53.67 + 0.00) = 53.67 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 55 0.66 58.74 0.00 -3.08 -1.99 0.00 0.00 0.00 53.67

Segment Leq : 53.67 dBA

Results segment # 3: PS3 L1

Source height = 1.00 m

ROAD (0.00 + 48.49 + 0.00) = 48.49 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

55 90 0.66 59.76 0.00 -0.47 -10.81 0.00 0.00 0.00 48.49

Segment Leq : 48.49 dBA

Results segment # 4: PS3 L2

Source height = 1.00 m

ROAD (0.00 + 45.87 + 0.00) = 45.87 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
55	90	0.66	59.76	0.00	-3.08	-10.81	0.00	0.00	0.00	45.87

Segment Leq : 45.87 dBA

Results segment # 5: H1 L1

Source height = 1.00 m

ROAD (0.00 + 54.33 + 0.00) = 54.33 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-30	90	0.66	60.86	0.00	-3.68	-2.85	0.00	0.00	0.00	54.33

Segment Leq : 54.33 dBA

Results segment # 6: H1 L2

Source height = 1.00 m

ROAD (0.00 + 52.32 + 0.00) = 52.32 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-30	90	0.66	60.86	0.00	-5.68	-2.85	0.00	0.00	0.00	52.32

Segment Leq : 52.32 dBA

Results segment # 7: H2 L1

Source height = 1.00 m

ROAD (0.00 + 49.44 + 0.00) = 49.44 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-30	0.66	60.21	0.00	-3.68	-7.08	0.00	0.00	0.00	49.44

Segment Leq : 49.44 dBA

Results segment # 8: H2 L2

Source height = 1.00 m

ROAD (0.00 + 47.44 + 0.00) = 47.44 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-30	0.66	60.21	0.00	-5.68	-7.08	0.00	0.00	0.00	47.44

Segment Leq : 47.44 dBA

Results segment # 9: MAIN L1

Source height = 1.19 m

ROAD (0.00 + 37.16 + 0.00) = 37.16 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-60	40	0.66	55.48	0.00	-15.34	-2.98	0.00	0.00	0.00	37.16

Segment Leq : 37.16 dBA

Results segment # 10: MAIN L2

Source height = 1.19 m

ROAD (0.00 + 36.99 + 0.00) = 36.99 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-60 40 0.66 55.48 0.00 -15.51 -2.98 0.00 0.00 0.00 36.99

Segment Leq : 36.99 dBA

Total Leq All Segments: 61.34 dBA

TOTAL Leq FROM ALL SOURCES: 61.34

STAMSON 5.0 NORMAL REPORT Date: 18-08-2008 11:19:48
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 08EW06N.te Time Period: 8 hours

Description: 2008 EW06 NIGHT

Road data, segment # 1: PS4 L1

Car traffic volume : 321 veh/TimePeriod
Medium truck volume : 14 veh/TimePeriod
Heavy truck volume : 3 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: PS4 L1

Angle1 Angle2 : -90.00 deg 55.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 16.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: PS4 L2

Car traffic volume : 321 veh/TimePeriod
Medium truck volume : 14 veh/TimePeriod
Heavy truck volume : 3 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: PS4 L2

Angle1 Angle2 : -90.00 deg 55.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 23.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 3: PS3 L1

Car traffic volume : 406 veh/TimePeriod
Medium truck volume : 17 veh/TimePeriod
Heavy truck volume : 4 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 3: PS3 L1

Angle1 Angle2 : 55.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 16.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 4: PS3 L2

Car traffic volume : 406 veh/TimePeriod
Medium truck volume : 17 veh/TimePeriod
Heavy truck volume : 4 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 4: PS3 L2

Angle1 Angle2 : 55.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 23.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 5: H1 L1

Car traffic volume : 317 veh/TimePeriod
Medium truck volume : 17 veh/TimePeriod
Heavy truck volume : 3 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 5: H1 L1

Angle1 Angle2 : -30.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 25.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 6: H1 L2

Car traffic volume : 317 veh/TimePeriod
Medium truck volume : 17 veh/TimePeriod
Heavy truck volume : 3 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 6: H1 L2

Angle1 Angle2 : -30.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 33.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 7: H2 L1

Car traffic volume : 449 veh/TimePeriod
Medium truck volume : 19 veh/TimePeriod
Heavy truck volume : 5 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 7: H2 L1

Angle1 Angle2 : -90.00 deg -30.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 25.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 8: H2 L2

```
-----
Car traffic volume : 449 veh/TimePeriod
Medium truck volume : 19 veh/TimePeriod
Heavy truck volume : 5 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)
```

Data for Segment # 8: H2 L2

```
-----
Angle1 Angle2 : -90.00 deg -30.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 33.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00
```

Results segment # 1: PS4 L1

Source height = 0.97 m

```
ROAD (0.00 + 49.26 + 0.00) = 49.26 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
-----
-90 55 0.59 51.61 0.00 -0.44 -1.90 0.00 0.00 0.00 49.26
-----
```

Segment Leq : 49.26 dBA

Results segment # 2: PS4 L2

Source height = 0.97 m

```
ROAD (0.00 + 46.76 + 0.00) = 46.76 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
-----
-90 55 0.59 51.61 0.00 -2.94 -1.90 0.00 0.00 0.00 46.76
-----
```

Segment Leq : 46.76 dBA

Results segment # 3: PS3 L1

Source height = 0.98 m

```
ROAD (0.00 + 41.76 + 0.00) = 41.76 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
-----
55 90 0.59 52.64 0.00 -0.44 -10.44 0.00 0.00 0.00 41.76
-----
```

Segment Leq : 41.76 dBA

Results segment # 4: PS3 L2

Source height = 0.98 m

```
ROAD (0.00 + 39.26 + 0.00) = 39.26 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
-----
55 90 0.59 52.64 0.00 -2.94 -10.44 0.00 0.00 0.00 39.26
-----
```

Segment Leq : 39.26 dBA

Results segment # 5: H1 L1

Source height = 0.97 m

```
ROAD (0.00 + 47.44 + 0.00) = 47.44 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
-----
-30 90 0.59 53.71 0.00 -3.52 -2.76 0.00 0.00 0.00 47.44
-----
```

Segment Leq : 47.44 dBA

Results segment # 6: H1 L2

Source height = 0.97 m

ROAD (0.00 + 45.53 + 0.00) = 45.53 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-30	90	0.59	53.71	0.00	-5.43	-2.76	0.00	0.00	0.00	45.53

Segment Leq : 45.53 dBA

Results segment # 7: H2 L1

Source height = 1.01 m

ROAD (0.00 + 42.87 + 0.00) = 42.87 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-30	0.58	53.24	0.00	-3.52	-6.86	0.00	0.00	0.00	42.87

Segment Leq : 42.87 dBA

Results segment # 8: H2 L2

Source height = 1.01 m

ROAD (0.00 + 40.96 + 0.00) = 40.96 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-30	0.58	53.24	0.00	-5.43	-6.86	0.00	0.00	0.00	40.96

Segment Leq : 40.96 dBA

Total Leq All Segments: 54.44 dBA

TOTAL Leq FROM ALL SOURCES: 54.44

STAMSON 5.0 NORMAL REPORT Date: 18-08-2008 11:39:17
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 08ew09d.te Time Period: 16 hours
Description: 2008 EW09 DAY

Road data, segment # 1: PS4 L1

Car traffic volume : 3242 veh/TimePeriod
Medium truck volume : 137 veh/TimePeriod
Heavy truck volume : 34 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: PS4 L1

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

Road data, segment # 2: PS4 L2

Car traffic volume : 3242 veh/TimePeriod
Medium truck volume : 137 veh/TimePeriod
Heavy truck volume : 34 veh/TimePeriod
Posted speed limit : 60 km/h

Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: PS4 L2

Angle1 Angle2 : -90.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 23.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 3: PS5 L1

Car traffic volume : 3458 veh/TimePeriod
Medium truck volume : 146 veh/TimePeriod
Heavy truck volume : 36 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 3: PS5 L1

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

Road data, segment # 4: PS5 L2

Car traffic volume : 3458 veh/TimePeriod
Medium truck volume : 146 veh/TimePeriod
Heavy truck volume : 36 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 4: PS5 L2

Angle1 Angle2 : 0.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 23.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: PS4 L1

Source height = 1.00 m

ROAD (0.00 + 54.05 + 0.00) = 54.05 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 0 0.66 60.59 0.00 -2.07 -4.47 0.00 0.00 0.00 54.05

Segment Leq : 54.05 dBA

Results segment # 2: PS4 L2

Source height = 1.00 m

ROAD (0.00 + 53.04 + 0.00) = 53.04 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 0 0.66 60.59 0.00 -3.08 -4.47 0.00 0.00 0.00 53.04

Segment Leq : 53.04 dBA

Results segment # 3: PS5 L1

Source height = 1.00 m
ROAD (0.00 + 54.32 + 0.00) = 54.32 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

0 90 0.66 60.86 0.00 -2.07 -4.47 0.00 0.00 0.00 54.32

Segment Leq : 54.32 dBA

Results segment # 4: PS5 L2

Source height = 1.00 m

ROAD (0.00 + 53.31 + 0.00) = 53.31 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.66	60.86	0.00	-3.08	-4.47	0.00	0.00	0.00	53.31

Segment Leq : 53.31 dBA

Total Leq All Segments: 59.73 dBA

TOTAL Leq FROM ALL SOURCES: 59.73

STAMSON 5.0 NORMAL REPORT Date: 18-08-2008 11:41:49
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 08ew09N.te Time Period: 8 hours

Description: 2008 EW09 NIGHT

Road data, segment # 1: PS4 L1

Car traffic volume : 321 veh/TimePeriod
Medium truck volume : 14 veh/TimePeriod
Heavy truck volume : 3 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: PS4 L1

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

Road data, segment # 2: PS4 L2

Car traffic volume : 321 veh/TimePeriod
Medium truck volume : 14 veh/TimePeriod
Heavy truck volume : 3 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: PS4 L2

Angle1 Angle2 : -90.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 23.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 3: PS5 L1

Car traffic volume : 342 veh/TimePeriod
Medium truck volume : 14 veh/TimePeriod
Heavy truck volume : 4 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 3: PS5 L1

Angle1 Angle2 : 0.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 20.00 m

Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 4: PS5 L2

Car traffic volume : 342 veh/TimePeriod
Medium truck volume : 14 veh/TimePeriod
Heavy truck volume : 4 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 4: PS5 L2

Angle1 Angle2 : 0.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 23.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: PS4 L1

Source height = 0.97 m

ROAD (0.00 + 47.16 + 0.00) = 47.16 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.59	53.48	0.00	-1.98	-4.34	0.00	0.00	0.00	47.16

Segment Leq : 47.16 dBA

Results segment # 2: PS4 L2

Source height = 0.97 m

ROAD (0.00 + 46.19 + 0.00) = 46.19 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.59	53.48	0.00	-2.94	-4.34	0.00	0.00	0.00	46.19

Segment Leq : 46.19 dBA

Results segment # 3: PS5 L1

Source height = 1.03 m

ROAD (0.00 + 47.60 + 0.00) = 47.60 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.58	53.92	0.00	-1.98	-4.34	0.00	0.00	0.00	47.60

Segment Leq : 47.60 dBA

Results segment # 4: PS5 L2

Source height = 1.03 m

ROAD (0.00 + 46.64 + 0.00) = 46.64 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.58	53.92	0.00	-2.94	-4.34	0.00	0.00	0.00	46.64

Segment Leq : 46.64 dBA

Total Leq All Segments: 52.95 dBA

TOTAL Leq FROM ALL SOURCES: 52.95

STAMSON 5.0 NORMAL REPORT Date: 18-08-2008 12:54:34
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 08ew15d.te Time Period: 16 hours
Description: 2008 EW15 DAY

Road data, segment # 1: DUNDAS2 L1

```
-----
Car traffic volume : 11721 veh/TimePeriod
Medium truck volume : 764 veh/TimePeriod
Heavy truck volume : 255 veh/TimePeriod
Posted speed limit : 80 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)
```

Data for Segment # 1: DUNDAS2 L1

```
-----
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 : 29.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00
```

Road data, segment # 2: DUNDAS2 L2

```
-----
Car traffic volume : 11721 veh/TimePeriod
Medium truck volume : 764 veh/TimePeriod
Heavy truck volume : 255 veh/TimePeriod
Posted speed limit : 80 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)
```

Data for Segment # 2: DUNDAS2 L2

```
-----
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 : 38.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00
```

Results segment # 1: DUNDAS2 L1

Source height = 1.19 m

ROAD (0.00 + 64.27 + 0.00) = 64.27 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	70.48	0.00	-4.75	-1.46	0.00	0.00	0.00	64.27

Segment Leq : 64.27 dBA

Results segment # 2: DUNDAS2 L2

Source height = 1.19 m

ROAD (0.00 + 62.32 + 0.00) = 62.32 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	70.48	0.00	-6.70	-1.46	0.00	0.00	0.00	62.32

Segment Leq : 62.32 dBA

Total Leq All Segments: 66.41 dBA

TOTAL Leq FROM ALL SOURCES: 66.41

STAMSON 5.0 NORMAL REPORT Date: 18-08-2008 12:55:57

MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 08ew15n.te Time Period: 16 hours
Description: 2008 EW15 NIGHT

Road data, segment # 1: DUNDAS2 L1

Car traffic volume : 1159 veh/TimePeriod
Medium truck volume : 76 veh/TimePeriod
Heavy truck volume : 25 veh/TimePeriod
Posted speed limit : 80 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: DUNDAS2 L1

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 : 29.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: DUNDAS2 L2

Car traffic volume : 1159 veh/TimePeriod
Medium truck volume : 76 veh/TimePeriod
Heavy truck volume : 25 veh/TimePeriod
Posted speed limit : 80 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: DUNDAS2 L2

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 : 38.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: DUNDAS2 L1

Source height = 1.19 m

ROAD (0.00 + 54.59 + 0.00) = 54.59 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 90 0.58 60.43 0.00 -4.52 -1.32 0.00 0.00 0.00 54.59

Segment Leq : 54.59 dBA

Results segment # 2: DUNDAS2 L2

Source height = 1.19 m

ROAD (0.00 + 52.73 + 0.00) = 52.73 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 90 0.58 60.43 0.00 -6.38 -1.32 0.00 0.00 0.00 52.73

Segment Leq : 52.73 dBA

Total Leq All Segments: 56.77 dBA

TOTAL Leq FROM ALL SOURCES: 56.77

STAMSON 5.0 NORMAL REPORT Date: 18-08-2008 13:39:46
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 08ew21d.te Time Period: 16 hours

Description: 2008 EW21 DAY

Road data, segment # 1: CENTRE L1

```
-----
Car traffic volume : 4277 veh/TimePeriod
Medium truck volume : 228 veh/TimePeriod
Heavy truck volume : 46 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)
```

Data for Segment # 1: CENTRE L1

```
-----
Angle1 Angle2 : -90.00 deg 80.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 30.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00
```

Road data, segment # 2: CENTRE L2

```
-----
Car traffic volume : 4277 veh/TimePeriod
Medium truck volume : 228 veh/TimePeriod
Heavy truck volume : 46 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)
```

Data for Segment # 2: CENTRE L2

```
-----
Angle1 Angle2 : -90.00 deg 80.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 34.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00
```

Results segment # 1: CENTRE L1

Source height = 1.00 m

ROAD (0.00 + 55.60 + 0.00) = 55.60 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	80	0.66	62.12	0.00	-5.00	-1.52	0.00	0.00	0.00	55.60

Segment Leq : 55.60 dBA

Results segment # 2: CENTRE L2

Source height = 1.00 m

ROAD (0.00 + 54.70 + 0.00) = 54.70 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	80	0.66	62.12	0.00	-5.90	-1.52	0.00	0.00	0.00	54.70

Segment Leq : 54.70 dBA

Total Leq All Segments: 58.18 dBA

TOTAL Leq FROM ALL SOURCES: 58.18

STAMSON 5.0 NORMAL REPORT Date: 18-08-2008 13:41:12
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 08ew21n.te Time Period: 8 hours
Description: 2008 EW21 NIGHT

Road data, segment # 1: CENTRE L1

```
-----
Car traffic volume : 423 veh/TimePeriod
Medium truck volume : 23 veh/TimePeriod
Heavy truck volume : 5 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)
```

Data for Segment # 1: CENTRE L1

```
-----
Angle1 Angle2 : -90.00 deg 80.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 30.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00
```

Road data, segment # 2: CENTRE L2

```
-----
Car traffic volume : 423 veh/TimePeriod
Medium truck volume : 23 veh/TimePeriod
Heavy truck volume : 5 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)
```

Data for Segment # 2: CENTRE L2

```
-----
Angle1 Angle2 : -90.00 deg 80.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 34.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00
```

Results segment # 1: CENTRE L1

Source height = 1.03 m

ROAD (0.00 + 49.04 + 0.00) = 49.04 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	80	0.58	55.21	0.00	-4.77	-1.40	0.00	0.00	0.00	49.04

Segment Leq : 49.04 dBA

Results segment # 2: CENTRE L2

Source height = 1.03 m

ROAD (0.00 + 48.18 + 0.00) = 48.18 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	80	0.58	55.21	0.00	-5.63	-1.40	0.00	0.00	0.00	48.18

Segment Leq : 48.18 dBA

Total Leq All Segments: 51.64 dBA

TOTAL Leq FROM ALL SOURCES: 51.64

STAMSON 5.0 NORMAL REPORT Date: 18-08-2008 13:47:39
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 08ew22d.te Time Period: 16 hours
Description: 2008 EW22 DAY

Road data, segment # 1: CENTRE L1

```
-----
Car traffic volume : 4277 veh/TimePeriod
```

Medium truck volume : 228 veh/TimePeriod
Heavy truck volume : 46 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: CENTRE1 L1

Angle1 Angle2 : -90.00 deg 5.00 deg
Wood depth : 0 (No woods.)
No of house rows : 7
House density : 50 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 228.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: CENTRE1 L2

Car traffic volume : 4277 veh/TimePeriod
Medium truck volume : 228 veh/TimePeriod
Heavy truck volume : 46 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: CENTRE1 L2

Angle1 Angle2 : -90.00 deg 5.00 deg
Wood depth : 0 (No woods.)
No of house rows : 7
House density : 50 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 232.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 3: CENTRE2 L1

Car traffic volume : 4277 veh/TimePeriod
Medium truck volume : 228 veh/TimePeriod
Heavy truck volume : 45 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 3: CENTRE2 L1

Angle1 Angle2 : 5.00 deg 90.00 deg
Wood depth : 2 (Wood depth 60 metres or more)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 228.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 4: CENTRE2 L2

Car traffic volume : 4277 veh/TimePeriod
Medium truck volume : 228 veh/TimePeriod
Heavy truck volume : 46 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 4: CENTRE2 L2

Angle1 Angle2 : 5.00 deg 90.00 deg
Wood depth : 2 (Wood depth 60 metres or more)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 232.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: CENTRE1 L1

Source height = 1.00 m

ROAD (0.00 + 26.85 + 0.00) = 26.85 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	5	0.66	62.12	0.00	-19.62	-4.14	0.00	-11.51	0.00	26.85

Segment Leq : 26.85 dBA

Results segment # 2: CENTRE1 L2

Source height = 1.00 m

ROAD (0.00 + 26.73 + 0.00) = 26.73 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	5	0.66	62.12	0.00	-19.74	-4.14	0.00	-11.51	0.00	26.73

Segment Leq : 26.73 dBA

Results segment # 3: CENTRE2 L1

Source height = 1.00 m

ROAD (0.00 + 31.60 + 0.00) = 31.60 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
5	90	0.38	62.10	0.00	-16.25	-4.25	-10.00	0.00	0.00	31.60

Segment Leq : 31.60 dBA

Results segment # 4: CENTRE2 L2

Source height = 1.00 m

ROAD (0.00 + 31.52 + 0.00) = 31.52 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
5	90	0.37	62.12	0.00	-16.35	-4.25	-10.00	0.00	0.00	31.52

Segment Leq : 31.52 dBA

Total Leq All Segments: 35.82 dBA

TOTAL Leq FROM ALL SOURCES: 35.82

Scenario 2 – 2021 No-Build

STAMSON 5.0 NORMAL REPORT Date: 02-03-2009 12:09:17
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 21ew04d.te Time Period: 16 hours
Description: 2021 NO BUILD EW04 DAY

Road data, segment # 1: PS2 L1

Car traffic volume : 7348 veh/TimePeriod
Medium truck volume : 309 veh/TimePeriod
Heavy truck volume : 77 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: PS2 L1

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 : 18.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: PS2 L2

Car traffic volume : 7348 veh/TimePeriod
Medium truck volume : 309 veh/TimePeriod
Heavy truck volume : 77 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: PS2 L2

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 : 21.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: PS2 L1

Source height = 1.00 m

ROAD (0.00 + 59.52 + 0.00) = 59.52 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 90 0.66 62.29 0.00 -1.31 -1.46 0.00 0.00 0.00 59.52

Segment Leq : 59.52 dBA

Results segment # 2: PS2 L2

Source height = 1.00 m

ROAD (0.00 + 58.41 + 0.00) = 58.41 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 90 0.66 62.29 0.00 -2.43 -1.46 0.00 0.00 0.00 58.41

Segment Leq : 58.41 dBA

Total Leq All Segments: 62.01 dBA

TOTAL Leq FROM ALL SOURCES: 62.01

STAMSON 5.0 NORMAL REPORT Date: 02-03-2009 12:06:24
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 21ew04n.te Time Period: 8 hours
Description: 2021 NO BUILD EW04 NIGHT

Road data, segment # 1: PS2 L1

```
-----
Car traffic volume : 727 veh/TimePeriod
Medium truck volume : 31 veh/TimePeriod
Heavy truck volume : 8 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)
```

Data for Segment # 1: PS2 L1

```
-----
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 : 21.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00
```

Road data, segment # 2: PS2 L2

```
-----
Car traffic volume : 727 veh/TimePeriod
Medium truck volume : 31 veh/TimePeriod
Heavy truck volume : 8 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)
```

Data for Segment # 2: PS2 L2

```
-----
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 : 24.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00
```

Results segment # 1: PS2 L1

Source height = 1.01 m

ROAD (0.00 + 51.69 + 0.00) = 51.69 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.58	55.33	0.00	-2.32	-1.33	0.00	0.00	0.00	51.69

Segment Leq : 51.69 dBA

Results segment # 2: PS2 L2

Source height = 1.01 m

ROAD (0.00 + 50.77 + 0.00) = 50.77 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.58	55.33	0.00	-3.23	-1.33	0.00	0.00	0.00	50.77

Segment Leq : 50.77 dBA

Total Leq All Segments: 54.26 dBA

TOTAL Leq FROM ALL SOURCES: 54.26

STAMSON 5.0 NORMAL REPORT Date: 26-02-2009 16:39:57
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 21ew06d.te Time Period: 16 hours
Description: 2021 NO BUILD EW06 DAY

Road data, segment # 1: PS4 L1

Car traffic volume : 7348 veh/TimePeriod
Medium truck volume : 309 veh/TimePeriod
Heavy truck volume : 77 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: PS4 L1

Angle1 Angle2 : -90.00 deg 55.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 15.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: PS4 L2

Car traffic volume : 7348 veh/TimePeriod
Medium truck volume : 309 veh/TimePeriod
Heavy truck volume : 77 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: PS4 L2

Angle1 Angle2 : -90.00 deg 55.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 20.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 3: PS3 L1

Car traffic volume : 7564 veh/TimePeriod
Medium truck volume : 319 veh/TimePeriod
Heavy truck volume : 80 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 3: PS3 L1

Angle1 Angle2 : 55.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 15.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 4: PS3 L2

Car traffic volume : 7564 veh/TimePeriod
Medium truck volume : 319 veh/TimePeriod
Heavy truck volume : 80 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 4: PS3 L2

Angle1 Angle2 : 55.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 20.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)

Reference angle : 0.00

Road data, segment # 5: H1 L1

Car traffic volume : 4277 veh/TimePeriod
Medium truck volume : 228 veh/TimePeriod
Heavy truck volume : 46 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 5: H1 L1

Angle1 Angle2 : -30.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 22.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 6: H1 L2

Car traffic volume : 4277 veh/TimePeriod
Medium truck volume : 228 veh/TimePeriod
Heavy truck volume : 46 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 6: H1 L2

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

Road data, segment # 7: H2 L1

Car traffic volume : 6268 veh/TimePeriod
Medium truck volume : 264 veh/TimePeriod
Heavy truck volume : 66 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 7: H2 L1

Angle1 Angle2 : -90.00 deg -30.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 22.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 8: H2 L2

Car traffic volume : 6268 veh/TimePeriod
Medium truck volume : 264 veh/TimePeriod
Heavy truck volume : 66 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 8: H2 L2

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

Road data, segment # 9: MAIN L1

Car traffic volume : 1256 veh/TimePeriod
Medium truck volume : 82 veh/TimePeriod
Heavy truck volume : 27 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 9: MAIN L1

Angle1 Angle2 : -60.00 deg 40.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 123.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 10: MAIN L2

Car traffic volume : 1256 veh/TimePeriod
Medium truck volume : 82 veh/TimePeriod
Heavy truck volume : 27 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 10: MAIN L2

Angle1 Angle2 : -60.00 deg 40.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 126.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: PS4 L1

Source height = 1.00 m

ROAD (0.00 + 60.29 + 0.00) = 60.29 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 55 0.66 62.29 0.00 0.00 -1.99 0.00 0.00 0.00 60.29

Segment Leq : 60.29 dBA

Results segment # 2: PS4 L2

Source height = 1.00 m

ROAD (0.00 + 58.22 + 0.00) = 58.22 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 55 0.66 62.29 0.00 -2.07 -1.99 0.00 0.00 0.00 58.22

Segment Leq : 58.22 dBA

Results segment # 3: PS3 L1

Source height = 1.00 m

ROAD (0.00 + 51.62 + 0.00) = 51.62 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

55 90 0.66 62.43 0.00 0.00 -10.81 0.00 0.00 0.00 51.62

Segment Leq : 51.62 dBA

Results segment # 4: PS3 L2

Source height = 1.00 m

ROAD (0.00 + 49.55 + 0.00) = 49.55 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
55	90	0.66	62.43	0.00	-2.07	-10.81	0.00	0.00	0.00	49.55

Segment Leq : 49.55 dBA

Results segment # 5: H1 L1

Source height = 1.00 m

ROAD (0.00 + 56.51 + 0.00) = 56.51 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-30	90	0.66	62.12	0.00	-2.76	-2.85	0.00	0.00	0.00	56.51

Segment Leq : 56.51 dBA

Results segment # 6: H1 L2

Source height = 1.00 m

ROAD (0.00 + 54.28 + 0.00) = 54.28 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-30	90	0.66	62.12	0.00	-5.00	-2.85	0.00	0.00	0.00	54.28

Segment Leq : 54.28 dBA

Results segment # 7: H2 L1

Source height = 1.00 m

ROAD (0.00 + 51.76 + 0.00) = 51.76 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-30	0.66	61.61	0.00	-2.76	-7.08	0.00	0.00	0.00	51.76

Segment Leq : 51.76 dBA

Results segment # 8: H2 L2

Source height = 1.00 m

ROAD (0.00 + 49.53 + 0.00) = 49.53 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-30	0.66	61.61	0.00	-5.00	-7.08	0.00	0.00	0.00	49.53

Segment Leq : 49.53 dBA

Results segment # 9: MAIN L1

Source height = 1.19 m

ROAD (0.00 + 38.09 + 0.00) = 38.09 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-60	40	0.66	56.24	0.00	-15.17	-2.98	0.00	0.00	0.00	38.09

Segment Leq : 38.09 dBA

Results segment # 10: MAIN L2

Source height = 1.19 m

ROAD (0.00 + 37.91 + 0.00) = 37.91 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-60 40 0.66 56.24 0.00 -15.34 -2.98 0.00 0.00 0.00 37.91

Segment Leq : 37.91 dBA

Total Leq All Segments: 64.68 dBA

TOTAL Leq FROM ALL SOURCES: 64.68

STAMSON 5.0 NORMAL REPORT Date: 26-02-2009 16:47:26
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 21ew06n.te Time Period: 8 hours
Description: 2021 NO BUILD EW06 NIGHT

Road data, segment # 1: PS4 L1

Car traffic volume : 727 veh/TimePeriod
Medium truck volume : 31 veh/TimePeriod
Heavy truck volume : 8 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: PS4 L1

Angle1 Angle2 : -90.00 deg 55.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 16.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: PS3 L1

Car traffic volume : 748 veh/TimePeriod
Medium truck volume : 32 veh/TimePeriod
Heavy truck volume : 8 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: PS3 L1

Angle1 Angle2 : 55.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 16.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 3: PS3 L2

Car traffic volume : 748 veh/TimePeriod
Medium truck volume : 32 veh/TimePeriod
Heavy truck volume : 8 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 3: PS3 L2

Angle1 Angle2 : 55.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 23.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 4: H1 L1

Car traffic volume : 423 veh/TimePeriod
Medium truck volume : 23 veh/TimePeriod
Heavy truck volume : 5 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 4: H1 L1

Angle1 Angle2 : -30.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 25.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 5: H1 L2

Car traffic volume : 423 veh/TimePeriod
Medium truck volume : 23 veh/TimePeriod
Heavy truck volume : 5 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 5: H1 L2

Angle1 Angle2 : -30.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 33.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 6: H2 L1

Car traffic volume : 620 veh/TimePeriod
Medium truck volume : 26 veh/TimePeriod
Heavy truck volume : 7 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 6: H2 L1

Angle1 Angle2 : -90.00 deg -30.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 25.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 7: H2 L2

Car traffic volume : 620 veh/TimePeriod
Medium truck volume : 26 veh/TimePeriod
Heavy truck volume : 7 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 7: H2 L2

Angle1 Angle2 : -90.00 deg -30.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 33.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 8: PS4 L2

Car traffic volume : 727 veh/TimePeriod
Medium truck volume : 31 veh/TimePeriod
Heavy truck volume : 8 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 8: PS4 L2

Angle1 Angle2 : -90.00 deg 55.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 23.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: PS4 L1

Source height = 1.01 m

ROAD (0.00 + 52.99 + 0.00) = 52.99 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 55 0.58 55.33 0.00 -0.44 -1.90 0.00 0.00 0.00 52.99

Segment Leq : 52.99 dBA

Results segment # 2: PS3 L1

Source height = 1.00 m

ROAD (0.00 + 44.54 + 0.00) = 44.54 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

55 90 0.58 55.42 0.00 -0.44 -10.43 0.00 0.00 0.00 44.54

Segment Leq : 44.54 dBA

Results segment # 3: PS3 L2

Source height = 1.00 m

ROAD (0.00 + 42.05 + 0.00) = 42.05 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

55 90 0.58 55.42 0.00 -2.94 -10.43 0.00 0.00 0.00 42.05

Segment Leq : 42.05 dBA

Results segment # 4: H1 L1

Source height = 1.03 m

ROAD (0.00 + 48.94 + 0.00) = 48.94 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-30 90 0.58 55.21 0.00 -3.51 -2.75 0.00 0.00 0.00 48.94

Segment Leq : 48.94 dBA

Results segment # 5: H1 L2

Source height = 1.03 m

ROAD (0.00 + 47.03 + 0.00) = 47.03 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-30 90 0.58 55.21 0.00 -5.42 -2.75 0.00 0.00 0.00 47.03

Segment Leq : 47.03 dBA

Results segment # 6: H2 L1

Source height = 1.02 m

ROAD (0.00 + 44.28 + 0.00) = 44.28 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-30	0.58	54.65	0.00	-3.52	-6.86	0.00	0.00	0.00	44.28

Segment Leq : 44.28 dBA

Results segment # 7: H2 L2

Source height = 1.02 m

ROAD (0.00 + 42.37 + 0.00) = 42.37 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-30	0.58	54.65	0.00	-5.43	-6.86	0.00	0.00	0.00	42.37

Segment Leq : 42.37 dBA

Results segment # 8: PS4 L2

Source height = 1.01 m

ROAD (0.00 + 50.49 + 0.00) = 50.49 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	55	0.58	55.33	0.00	-2.94	-1.90	0.00	0.00	0.00	50.49

Segment Leq : 50.49 dBA

Total Leq All Segments: 57.23 dBA

TOTAL Leq FROM ALL SOURCES: 57.23

STAMSON 5.0 NORMAL REPORT Date: 26-02-2009 22:13:38
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 21ew09d.te Time Period: 16 hours

Description: 2021 NO BUILD EW09 DAY

Road data, segment # 1: PS4 L1

Car traffic volume : 7348 veh/TimePeriod
 Medium truck volume : 309 veh/TimePeriod
 Heavy truck volume : 77 veh/TimePeriod
 Posted speed limit : 60 km/h
 Road gradient : 0 %
 Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: PS4 L1

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

Road data, segment # 2: PS4 L2

Car traffic volume : 7348 veh/TimePeriod
 Medium truck volume : 309 veh/TimePeriod
 Heavy truck volume : 77 veh/TimePeriod
 Posted speed limit : 60 km/h
 Road gradient : 0 %
 Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: PS4 L2

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

Road data, segment # 3: PS5 L1

```
-----
Car traffic volume : 6268 veh/TimePeriod
Medium truck volume : 264 veh/TimePeriod
Heavy truck volume : 66 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient      : 0 %
Road pavement     : 1 (Typical asphalt or concrete)
```

Data for Segment # 3: PS5 L1

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

Road data, segment # 4: PS5 L2

```
-----
Car traffic volume : 6268 veh/TimePeriod
Medium truck volume : 264 veh/TimePeriod
Heavy truck volume : 66 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient      : 0 %
Road pavement     : 1 (Typical asphalt or concrete)
```

Data for Segment # 4: PS5 L2

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

Results segment # 1: PS4 L1

Source height = 1.00 m

ROAD (0.00 + 58.77 + 0.00) = 58.77 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.66	64.14	0.00	-0.90	-4.47	0.00	0.00	0.00	58.77

Segment Leq : 58.77 dBA

Results segment # 2: PS4 L2

Source height = 1.00 m

ROAD (0.00 + 57.60 + 0.00) = 57.60 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.66	64.14	0.00	-2.07	-4.47	0.00	0.00	0.00	57.60

Segment Leq : 57.60 dBA

Results segment # 3: PS5 L1

Source height = 1.00 m

ROAD (0.00 + 58.08 + 0.00) = 58.08 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.66	63.45	0.00	-0.90	-4.47	0.00	0.00	0.00	58.08

Segment Leq : 58.08 dBA

Results segment # 4: PS5 L2

Source height = 1.00 m

ROAD (0.00 + 56.91 + 0.00) = 56.91 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.66	63.45	0.00	-2.07	-4.47	0.00	0.00	0.00	56.91

Segment Leq : 56.91 dBA

Total Leq All Segments: 63.91 dBA

TOTAL Leq FROM ALL SOURCES: 63.91

STAMSON 5.0 NORMAL REPORT Date: 26-02-2009 22:19:43
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 21ew09n.te Time Period: 8 hours

Description: 2021 NO BUILD EW09 NIGHT

Road data, segment # 1: PS4 L1

Car traffic volume : 727 veh/TimePeriod
 Medium truck volume : 31 veh/TimePeriod
 Heavy truck volume : 8 veh/TimePeriod
 Posted speed limit : 60 km/h
 Road gradient : 0 %
 Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: PS4 L1

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

Road data, segment # 2: PS5 L1

Car traffic volume : 620 veh/TimePeriod
 Medium truck volume : 26 veh/TimePeriod
 Heavy truck volume : 7 veh/TimePeriod
 Posted speed limit : 60 km/h
 Road gradient : 0 %
 Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: PS5 L1

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

Road data, segment # 3: PS5 L2

Car traffic volume : 620 veh/TimePeriod
 Medium truck volume : 26 veh/TimePeriod
 Heavy truck volume : 7 veh/TimePeriod
 Posted speed limit : 60 km/h

Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 3: PS5 L2

Angle1 Angle2 : 0.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 23.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 4: PS4 L2

Car traffic volume : 727 veh/TimePeriod
Medium truck volume : 31 veh/TimePeriod
Heavy truck volume : 8 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 4: PS4 L2

Angle1 Angle2 : -90.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 23.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: PS4 L1

Source height = 1.01 m

ROAD (0.00 + 50.85 + 0.00) = 50.85 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.58	57.17	0.00	-1.98	-4.34	0.00	0.00	0.00	50.85

Segment Leq : 50.85 dBA

Results segment # 2: PS5 L1

Source height = 1.02 m

ROAD (0.00 + 50.17 + 0.00) = 50.17 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.58	56.49	0.00	-1.98	-4.34	0.00	0.00	0.00	50.17

Segment Leq : 50.17 dBA

Results segment # 3: PS5 L2

Source height = 1.02 m

ROAD (0.00 + 49.21 + 0.00) = 49.21 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.58	56.49	0.00	-2.94	-4.34	0.00	0.00	0.00	49.21

Segment Leq : 49.21 dBA

Results segment # 4: PS4 L2

Source height = 1.01 m

ROAD (0.00 + 49.89 + 0.00) = 49.89 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.58	56.49	0.00	-2.94	-4.34	0.00	0.00	0.00	49.89

-90 0 0.58 57.17 0.00 -2.94 -4.34 0.00 0.00 0.00 49.89

Segment Leq : 49.89 dBA

Total Leq All Segments: 56.09 dBA

TOTAL Leq FROM ALL SOURCES: 56.09

STAMSON 5.0 NORMAL REPORT Date: 26-02-2009 23:13:47
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 21ew15d.te Time Period: 16 hours
Description: 2021 NO BUILD EW15 DAY

Road data, segment # 1: DUNDAS2 L1

Car traffic volume : 16325 veh/TimePeriod
Medium truck volume : 1065 veh/TimePeriod
Heavy truck volume : 355 veh/TimePeriod
Posted speed limit : 80 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: DUNDAS2 L1

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 : 26.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: DUNDAS2 L2

Car traffic volume : 16325 veh/TimePeriod
Medium truck volume : 1065 veh/TimePeriod
Heavy truck volume : 355 veh/TimePeriod
Posted speed limit : 80 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: DUNDAS2 L2

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 : 35.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: DUNDAS2 L1

Source height = 1.19 m

ROAD (0.00 + 66.49 + 0.00) = 66.49 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	71.92	0.00	-3.97	-1.46	0.00	0.00	0.00	66.49

Segment Leq : 66.49 dBA

Results segment # 2: DUNDAS2 L2

Source height = 1.19 m

ROAD (0.00 + 64.35 + 0.00) = 64.35 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	71.92	0.00	-6.11	-1.46	0.00	0.00	0.00	64.35

Segment Leq : 64.35 dBA

Total Leq All Segments: 68.56 dBA

TOTAL Leq FROM ALL SOURCES: 68.56

STAMSON 5.0 NORMAL REPORT Date: 26-02-2009 23:17:48
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 21ew15n.te Time Period: 16 hours
Description: 2021 NO BUILD EW15 NIGHT

Road data, segment # 1: DUNDAS2 L1

Car traffic volume : 1615 veh/TimePeriod
Medium truck volume : 105 veh/TimePeriod
Heavy truck volume : 35 veh/TimePeriod
Posted speed limit : 80 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: DUNDAS2 L1

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 : 29.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: DUNDAS2 L2

Car traffic volume : 1615 veh/TimePeriod
Medium truck volume : 105 veh/TimePeriod
Heavy truck volume : 35 veh/TimePeriod
Posted speed limit : 80 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: DUNDAS2 L2

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 : 38.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: DUNDAS2 L1

Source height = 1.19 m

ROAD (0.00 + 56.02 + 0.00) = 56.02 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 90 0.58 61.86 0.00 -4.52 -1.32 0.00 0.00 0.00 56.02

Segment Leq : 56.02 dBA

Results segment # 2: DUNDAS2 L2

Source height = 1.19 m

ROAD (0.00 + 54.17 + 0.00) = 54.17 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 90 0.58 61.86 0.00 -6.38 -1.32 0.00 0.00 0.00 54.17

Segment Leq : 54.17 dBA

Total Leq All Segments: 58.20 Dba

TOTAL Leq FROM ALL SOURCES: 58.20

STAMSON 5.0 NORMAL REPORT Date: 18-08-2008 17:29:13
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 21ew21d.te Time Period: 16 hours

Description: 2021 NO BUILD EW21 DAY

Road data, segment # 1: CENTRE L1

Car traffic volume : 5560 veh/TimePeriod
Medium truck volume : 296 veh/TimePeriod
Heavy truck volume : 59 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: CENTRE L1

Angle1 Angle2 : -90.00 deg 80.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 30.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: CENTRE L2

Car traffic volume : 5560 veh/TimePeriod
Medium truck volume : 296 veh/TimePeriod
Heavy truck volume : 59 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: CENTRE L2

Angle1 Angle2 : -90.00 deg 80.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 34.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: CENTRE L1

Source height = 1.00 m

ROAD (0.00 + 56.73 + 0.00) = 56.73 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	80	0.66	63.24	0.00	-5.00	-1.52	0.00	0.00	0.00	56.73

Segment Leq : 56.73 dBA

Results segment # 2: CENTRE L2

Source height = 1.00 m

ROAD (0.00 + 55.82 + 0.00) = 55.82 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	80	0.66	63.24	0.00	-5.90	-1.52	0.00	0.00	0.00	55.82

Segment Leq : 55.82 dBA

Total Leq All Segments: 59.31 dBA

TOTAL Leq FROM ALL SOURCES: 59.31

STAMSON 5.0 NORMAL REPORT Date: 18-08-2008 17:30:28
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 21ew21n.te Time Period: 8 hours
Description: 2021 NO BUILD EW21 NIGHT

Road data, segment # 1: CENTRE L1

```
-----
Car traffic volume : 550 veh/TimePeriod
Medium truck volume : 29 veh/TimePeriod
Heavy truck volume : 6 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)
```

Data for Segment # 1: CENTRE L1

```
-----
Angle1 Angle2 : -90.00 deg 80.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 30.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00
```

Road data, segment # 2: CENTRE L2

```
-----
Car traffic volume : 550 veh/TimePeriod
Medium truck volume : 29 veh/TimePeriod
Heavy truck volume : 6 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)
```

Data for Segment # 2: CENTRE L2

```
-----
Angle1 Angle2 : -90.00 deg 80.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 34.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00
```

Results segment # 1: CENTRE L1

Source height = 1.01 m

ROAD (0.00 + 50.05 + 0.00) = 50.05 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	80	0.58	56.22	0.00	-4.77	-1.40	0.00	0.00	0.00	50.05

Segment Leq : 50.05 dBA

Results segment # 2: CENTRE L2

Source height = 1.01 m

ROAD (0.00 + 49.19 + 0.00) = 49.19 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	80	0.58	56.22	0.00	-5.63	-1.40	0.00	0.00	0.00	49.19

Segment Leq : 49.19 dBA

Total Leq All Segments: 52.65 dBA

TOTAL Leq FROM ALL SOURCES: 52.65

STAMSON 5.0 NORMAL REPORT Date: 18-08-2008 17:33:02
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 21ew22d.te Time Period: 16 hours
Description: 2021 NO BUILD EW22 DAY

Road data, segment # 1: CENTRE1 L1

Car traffic volume : 5560 veh/TimePeriod
Medium truck volume : 296 veh/TimePeriod
Heavy truck volume : 59 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: CENTRE1 L1

Angle1 Angle2 : -90.00 deg 5.00 deg
Wood depth : 0 (No woods.)
No of house rows : 7
House density : 50 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 228.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: CENTRE1 L2

Car traffic volume : 5560 veh/TimePeriod
Medium truck volume : 296 veh/TimePeriod
Heavy truck volume : 59 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: CENTRE1 L2

Angle1 Angle2 : -90.00 deg 5.00 deg
Wood depth : 0 (No woods.)
No of house rows : 7
House density : 50 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 232.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 3: CENTRE2 L1

Car traffic volume : 5560 veh/TimePeriod
Medium truck volume : 296 veh/TimePeriod
Heavy truck volume : 59 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 3: CENTRE2 L1

Angle1 Angle2 : 5.00 deg 90.00 deg
Wood depth : 2 (Wood depth 60 metres or more)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 228.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 4: CENTRE2 L2

Car traffic volume : 5560 veh/TimePeriod
Medium truck volume : 296 veh/TimePeriod
Heavy truck volume : 59 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 4: CENTRE2 L2

Angle1 Angle2 : 5.00 deg 90.00 deg
Wood depth : 2 (Wood depth 60 metres or more)
No of house rows : 0

Surface : 1 (Absorptive ground surface)
Receiver source distance : 232.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: CENTRE1 L1

Source height = 1.00 m

ROAD (0.00 + 27.97 + 0.00) = 27.97 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 5 0.66 63.24 0.00 -19.62 -4.14 0.00 -11.51 0.00 27.97

Segment Leq : 27.97 dBA

Results segment # 2: CENTRE1 L2

Source height = 1.00 m

ROAD (0.00 + 27.85 + 0.00) = 27.85 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 5 0.66 63.24 0.00 -19.74 -4.14 0.00 -11.51 0.00 27.85

Segment Leq : 27.85 dBA

Results segment # 3: CENTRE2 L1

Source height = 1.00 m

ROAD (0.00 + 32.74 + 0.00) = 32.74 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

5 90 0.38 63.24 0.00 -16.25 -4.25 -10.00 0.00 0.00 32.74

Segment Leq : 32.74 dBA

Results segment # 4: CENTRE2 L2

Source height = 1.00 m

ROAD (0.00 + 32.64 + 0.00) = 32.64 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

5 90 0.38 63.24 0.00 -16.35 -4.25 -10.00 0.00 0.00 32.64

Segment Leq : 32.64 dBA

Total Leq All Segments: 36.95 dBA

TOTAL Leq FROM ALL SOURCES: 36.95

STAMSON 5.0 NORMAL REPORT Date: 18-08-2008 17:35:33
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 21ew22n.te Time Period: 8 hours
Description: 2021 NO BUILD EW22 NIGHT

Road data, segment # 1: CENTRE1 L1

Car traffic volume : 550 veh/TimePeriod
Medium truck volume : 29 veh/TimePeriod
Heavy truck volume : 6 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: CENTRE1 L1

Angle1 Angle2 : -90.00 deg 5.00 deg
Wood depth : 0 (No woods.)
No of house rows : 7
House density : 50 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 228.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: CENTRE1 L2

Car traffic volume : 550 veh/TimePeriod
Medium truck volume : 29 veh/TimePeriod
Heavy truck volume : 6 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: CENTRE1 L2

Angle1 Angle2 : -90.00 deg 5.00 deg
Wood depth : 0 (No woods.)
No of house rows : 7
House density : 50 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 232.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 3: CENTRE2 L1

Car traffic volume : 550 veh/TimePeriod
Medium truck volume : 29 veh/TimePeriod
Heavy truck volume : 6 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 3: CENTRE2 L1

Angle1 Angle2 : 5.00 deg 90.00 deg
Wood depth : 2 (Wood depth 60 metres or more)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 228.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 4: CENTRE2 L2

Car traffic volume : 550 veh/TimePeriod
Medium truck volume : 29 veh/TimePeriod
Heavy truck volume : 6 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 4: CENTRE2 L2

Angle1 Angle2 : 5.00 deg 90.00 deg
Wood depth : 2 (Wood depth 60 metres or more)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 232.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: CENTRE1 L1

Source height = 1.01 m

ROAD (0.00 + 21.96 + 0.00) = 21.96 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 5 0.58 56.22 0.00 -18.73 -4.02 0.00 -11.51 0.00 21.96

Segment Leq : 21.96 dBA

Results segment # 2: CENTRE1 L2

Source height = 1.01 m

ROAD (0.00 + 21.84 + 0.00) = 21.84 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	5	0.58	56.22	0.00	-18.85	-4.02	0.00	-11.51	0.00	21.84

Segment Leq : 21.84 dBA

Results segment # 3: CENTRE2 L1

Source height = 1.01 m

ROAD (0.00 + 27.00 + 0.00) = 27.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
5	90	0.28	56.22	0.00	-15.18	-4.04	-10.00	0.00	0.00	27.00

Segment Leq : 27.00 dBA

Results segment # 4: CENTRE2 L2

Source height = 1.01 m

ROAD (0.00 + 26.90 + 0.00) = 26.90 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
5	90	0.28	56.22	0.00	-15.28	-4.04	-10.00	0.00	0.00	26.90

Segment Leq : 26.90 dBA

Total Leq All Segments: 31.14 dBA

TOTAL Leq FROM ALL SOURCES: 31.14

Scenario 3 – 2021 Mature State of Development

STAMSON 5.0 NORMAL REPORT Date: 27-02-2009 10:45:49
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 21eew04d.te Time Period: 16 hours
Description: 2021 EXPANSION EW04 DAY

Road data, segment # 1: PS2 L1

Car traffic volume : 3242 veh/TimePeriod
Medium truck volume : 137 veh/TimePeriod
Heavy truck volume : 34 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: PS2 L1

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 : 18.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: PS2 L2

Car traffic volume : 3242 veh/TimePeriod
Medium truck volume : 137 veh/TimePeriod
Heavy truck volume : 34 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: PS2 L2

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 : 21.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: PS2 L1

Source height = 1.00 m

ROAD (0.00 + 55.97 + 0.00) = 55.97 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 90 0.66 58.74 0.00 -1.31 -1.46 0.00 0.00 0.00 55.97

Segment Leq : 55.97 dBA

Results segment # 2: PS2 L2

Source height = 1.00 m

ROAD (0.00 + 54.86 + 0.00) = 54.86 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 90 0.66 58.74 0.00 -2.43 -1.46 0.00 0.00 0.00 54.86

Segment Leq : 54.86 dBA

Total Leq All Segments: 58.46 dBA

TOTAL Leq FROM ALL SOURCES: 58.46

STAMSON 5.0 NORMAL REPORT Date: 27-02-2009 10:57:16
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 21eew04N.te Time Period: 8 hours
Description: 2021 EXPANSION EW04 NIGHT

Road data, segment # 1: PS2 L1

Car traffic volume : 321 veh/TimePeriod
Medium truck volume : 14 veh/TimePeriod
Heavy truck volume : 3 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: PS2 L1

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 : 21.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: PS2 L2

Car traffic volume : 321 veh/TimePeriod
Medium truck volume : 14 veh/TimePeriod
Heavy truck volume : 3 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: PS2 L2

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 : 24.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: PS2 L1

Source height = 0.97 m

ROAD (0.00 + 47.96 + 0.00) = 47.96 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 90 0.59 51.61 0.00 -2.32 -1.33 0.00 0.00 0.00 47.96

Segment Leq : 47.96 dBA

Results segment # 2: PS2 L2

Source height = 0.97 m

ROAD (0.00 + 47.04 + 0.00) = 47.04 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 90 0.59 51.61 0.00 -3.24 -1.33 0.00 0.00 0.00 47.04

Segment Leq : 47.04 dBA

Total Leq All Segments: 50.53 dBA

TOTAL Leq FROM ALL SOURCES: 50.53

STAMSON 5.0 NORMAL REPORT Date: 27-02-2009 11:19:39
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 21eew06d.te Time Period: 16 hours
Description: 2021 EXPANSION EW06 DAY

Road data, segment # 1: PS4 L1

Car traffic volume : 4755 veh/TimePeriod
Medium truck volume : 200 veh/TimePeriod
Heavy truck volume : 50 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: PS4 L1

Angle1 Angle2 : -90.00 deg 55.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 15.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: PS4 L2

Car traffic volume : 4755 veh/TimePeriod
Medium truck volume : 200 veh/TimePeriod
Heavy truck volume : 50 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: PS4 L2

Angle1 Angle2 : -90.00 deg 55.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 20.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 3: PS3 L1

Car traffic volume : 5835 veh/TimePeriod
Medium truck volume : 246 veh/TimePeriod
Heavy truck volume : 61 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 3: PS3 L1

Angle1 Angle2 : 55.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 15.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 4: PS3 L2

Car traffic volume : 5835 veh/TimePeriod
Medium truck volume : 246 veh/TimePeriod
Heavy truck volume : 61 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 4: PS3 L2

Angle1 Angle2 : 55.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 20.00 m
Receiver height : 1.50 m

Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 5: H1 L1

Car traffic volume : 4491 veh/TimePeriod
Medium truck volume : 239 veh/TimePeriod
Heavy truck volume : 48 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 5: H1 L1

Angle1 Angle2 : -30.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 22.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 6: H1 L2

Car traffic volume : 4491 veh/TimePeriod
Medium truck volume : 239 veh/TimePeriod
Heavy truck volume : 48 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 6: H1 L2

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

Road data, segment # 7: H2 L1

Car traffic volume : 6484 veh/TimePeriod
Medium truck volume : 273 veh/TimePeriod
Heavy truck volume : 68 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 7: H2 L1

Angle1 Angle2 : -90.00 deg -30.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 22.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 8: H2 L2

Car traffic volume : 6484 veh/TimePeriod
Medium truck volume : 273 veh/TimePeriod
Heavy truck volume : 68 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 8: H2 L2

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

Reference angle : 0.00

Road data, segment # 9: MAIN L1

```
-----
Car traffic volume : 1256 veh/TimePeriod
Medium truck volume : 82 veh/TimePeriod
Heavy truck volume : 27 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)
```

Data for Segment # 9: MAIN L1

```
-----
Angle1 Angle2 : -60.00 deg 40.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 123.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00
```

Road data, segment # 10: MAIN L2

```
-----
Car traffic volume : 1256 veh/TimePeriod
Medium truck volume : 82 veh/TimePeriod
Heavy truck volume : 27 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)
```

Data for Segment # 10: MAIN L2

```
-----
Angle1 Angle2 : -60.00 deg 40.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 126.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00
```

Results segment # 1: PS4 L1

Source height = 1.00 m

ROAD (0.00 + 58.41 + 0.00) = 58.41 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	55	0.66	60.40	0.00	0.00	-1.99	0.00	0.00	0.00	58.41

Segment Leq : 58.41 dBA

Results segment # 2: PS4 L2

Source height = 1.00 m

ROAD (0.00 + 56.34 + 0.00) = 56.34 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	55	0.66	60.40	0.00	-2.07	-1.99	0.00	0.00	0.00	56.34

Segment Leq : 56.34 dBA

Results segment # 3: PS3 L1

Source height = 1.00 m

ROAD (0.00 + 50.48 + 0.00) = 50.48 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
55	90	0.66	61.29	0.00	0.00	-10.81	0.00	0.00	0.00	50.48

Segment Leq : 50.48 dBA

Results segment # 4: PS3 L2

Source height = 1.00 m

ROAD (0.00 + 48.41 + 0.00) = 48.41 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
55	90	0.66	61.29	0.00	-2.07	-10.81	0.00	0.00	0.00	48.41

Segment Leq : 48.41 dBA

Results segment # 5: H1 L1

Source height = 1.00 m

ROAD (0.00 + 56.72 + 0.00) = 56.72 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-30	90	0.66	62.32	0.00	-2.76	-2.85	0.00	0.00	0.00	56.72

Segment Leq : 56.72 dBA

Results segment # 6: H1 L2

Source height = 1.00 m

ROAD (0.00 + 54.48 + 0.00) = 54.48 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-30	90	0.66	62.32	0.00	-5.00	-2.85	0.00	0.00	0.00	54.48

Segment Leq : 54.48 dBA

Results segment # 7: H2 L1

Source height = 1.00 m

ROAD (0.00 + 51.91 + 0.00) = 51.91 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-30	0.66	61.75	0.00	-2.76	-7.08	0.00	0.00	0.00	51.91

Segment Leq : 51.91 dBA

Results segment # 8: H2 L2

Source height = 1.00 m

ROAD (0.00 + 49.67 + 0.00) = 49.67 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-30	0.66	61.75	0.00	-5.00	-7.08	0.00	0.00	0.00	49.67

Segment Leq : 49.67 dBA

Results segment # 9: MAIN L1

Source height = 1.19 m

ROAD (0.00 + 38.09 + 0.00) = 38.09 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-60	40	0.66	56.24	0.00	-15.17	-2.98	0.00	0.00	0.00	38.09

Segment Leq : 38.09 dBA

Results segment # 10: MAIN L2

Source height = 1.19 m

ROAD (0.00 + 37.91 + 0.00) = 37.91 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-60	40	0.66	56.24	0.00	-15.34	-2.98	0.00	0.00	0.00	37.91

Segment Leq : 37.91 dBA

Total Leq All Segments: 63.65 dBA

TOTAL Leq FROM ALL SOURCES: 63.65

STAMSON 5.0 NORMAL REPORT Date: 27-02-2009 11:28:05
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 21eew06N.te Time Period: 8 hours

Description: 2021 EXPANSION EW06 NIGHT

Road data, segment # 1: PS4 L1

Car traffic volume : 470 veh/TimePeriod
Medium truck volume : 20 veh/TimePeriod
Heavy truck volume : 5 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: PS4 L1

Angle1 Angle2 : -90.00 deg 55.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 16.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: PS4 L2

Car traffic volume : 470 veh/TimePeriod
Medium truck volume : 20 veh/TimePeriod
Heavy truck volume : 5 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: PS4 L2

Angle1 Angle2 : -90.00 deg 55.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 23.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 3: PS3 L1

Car traffic volume : 577 veh/TimePeriod
Medium truck volume : 24 veh/TimePeriod
Heavy truck volume : 6 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 3: PS3 L1

Angle1 Angle2 : 55.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 16.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)

Reference angle : 0.00

Road data, segment # 4: PS3 L2

Car traffic volume : 577 veh/TimePeriod
Medium truck volume : 24 veh/TimePeriod
Heavy truck volume : 6 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 4: PS3 L2

Angle1 Angle2 : 55.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 23.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 5: H1 L1

Car traffic volume : 444 veh/TimePeriod
Medium truck volume : 24 veh/TimePeriod
Heavy truck volume : 5 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 5: H1 L1

Angle1 Angle2 : -30.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 25.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 6: H1 L2

Car traffic volume : 444 veh/TimePeriod
Medium truck volume : 24 veh/TimePeriod
Heavy truck volume : 5 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 6: H1 L2

Angle1 Angle2 : -30.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 33.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 7: H2 L1

Car traffic volume : 641 veh/TimePeriod
Medium truck volume : 27 veh/TimePeriod
Heavy truck volume : 7 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 7: H2 L1

Angle1 Angle2 : -90.00 deg -30.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 25.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 8: H2 L2

Car traffic volume : 641 veh/TimePeriod
Medium truck volume : 27 veh/TimePeriod
Heavy truck volume : 7 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 8: H2 L2

Angle1 Angle2 : -90.00 deg -30.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 33.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: PS4 L1

Source height = 1.00 m

ROAD (0.00 + 51.05 + 0.00) = 51.05 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 55 0.58 53.39 0.00 -0.44 -1.90 0.00 0.00 0.00 51.05

Segment Leq : 51.05 dBA

Results segment # 2: PS4 L2

Source height = 1.00 m

ROAD (0.00 + 48.55 + 0.00) = 48.55 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 55 0.58 53.39 0.00 -2.94 -1.90 0.00 0.00 0.00 48.55

Segment Leq : 48.55 dBA

Results segment # 3: PS3 L1

Source height = 1.00 m

ROAD (0.00 + 43.35 + 0.00) = 43.35 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

55 90 0.59 54.23 0.00 -0.44 -10.43 0.00 0.00 0.00 43.35

Segment Leq : 43.35 dBA

Results segment # 4: PS3 L2

Source height = 1.00 m

ROAD (0.00 + 40.85 + 0.00) = 40.85 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

55 90 0.59 54.23 0.00 -2.94 -10.43 0.00 0.00 0.00 40.85

Segment Leq : 40.85 dBA

Results segment # 5: H1 L1

Source height = 1.01 m

ROAD (0.00 + 49.09 + 0.00) = 49.09 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-30 90 0.58 55.36 0.00 -3.52 -2.75 0.00 0.00 0.00 49.09

Segment Leq : 49.09 dBA

Results segment # 6: H1 L2

Source height = 1.01 m

ROAD (0.00 + 47.18 + 0.00) = 47.18 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-30	90	0.58	55.36	0.00	-5.43	-2.75	0.00	0.00	0.00	47.18

Segment Leq : 47.18 dBA

Results segment # 7: H2 L1

Source height = 1.01 m

ROAD (0.00 + 44.38 + 0.00) = 44.38 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-30	0.58	54.76	0.00	-3.52	-6.86	0.00	0.00	0.00	44.38

Segment Leq : 44.38 dBA

Results segment # 8: H2 L2

Source height = 1.01 m

ROAD (0.00 + 42.47 + 0.00) = 42.47 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-30	0.58	54.76	0.00	-5.43	-6.86	0.00	0.00	0.00	42.47

Segment Leq : 42.47 dBA

Total Leq All Segments: 56.14 dBA

TOTAL Leq FROM ALL SOURCES: 56.14

STAMSON 5.0 NORMAL REPORT Date: 27-02-2009 12:42:38
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 21eew09d.te Time Period: 16 hours
Description: 2021 EXPANSION EW09 DAY

Road data, segment # 1: PS4 L1

Car traffic volume : 4755 veh/TimePeriod
Medium truck volume : 200 veh/TimePeriod
Heavy truck volume : 50 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: PS4 L1

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

Road data, segment # 2: PS4 L2

Car traffic volume : 4755 veh/TimePeriod
Medium truck volume : 200 veh/TimePeriod
Heavy truck volume : 50 veh/TimePeriod
Posted speed limit : 60 km/h

Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: PS4 L2

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

Road data, segment # 3: NEW S2 L1

Car traffic volume : 2594 veh/TimePeriod
Medium truck volume : 109 veh/TimePeriod
Heavy truck volume : 27 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 3: NEW S2 L1

Angle1 Angle2 : -90.00 deg -48.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 47.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 4: NEW S2 L2

Car traffic volume : 2594 veh/TimePeriod
Medium truck volume : 109 veh/TimePeriod
Heavy truck volume : 27 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 4: NEW S2 L2

Angle1 Angle2 : -90.00 deg -48.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 54.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 5: NEW S3 L1

Car traffic volume : 6268 veh/TimePeriod
Medium truck volume : 264 veh/TimePeriod
Heavy truck volume : 66 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 5: NEW S3 L1

Angle1 Angle2 : -10.00 deg 57.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 60.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 6: NEW S3 L2

Car traffic volume : 6268 veh/TimePeriod
Medium truck volume : 264 veh/TimePeriod
Heavy truck volume : 66 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %

Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 6: NEW S3 L2

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Angle1 Angle2 : -10.00 deg 57.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 67.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00
    
```

Results segment # 1: PS4 L1

Source height = 1.00 m

ROAD (0.00 + 56.88 + 0.00) = 56.88 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.66	62.25	0.00	-0.90	-4.47	0.00	0.00	0.00	56.88

Segment Leq : 56.88 dBA

Results segment # 2: PS4 L2

Source height = 1.00 m

ROAD (0.00 + 55.71 + 0.00) = 55.71 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.66	62.25	0.00	-2.07	-4.47	0.00	0.00	0.00	55.71

Segment Leq : 55.71 dBA

Results segment # 3: NEW S2 L1

Source height = 1.00 m

ROAD (0.00 + 41.84 + 0.00) = 41.84 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-48	0.66	59.61	0.00	-8.23	-9.53	0.00	0.00	0.00	41.84

Segment Leq : 41.84 dBA

Results segment # 4: NEW S2 L2

Source height = 1.00 m

ROAD (0.00 + 40.84 + 0.00) = 40.84 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-48	0.66	59.61	0.00	-9.23	-9.53	0.00	0.00	0.00	40.84

Segment Leq : 40.84 dBA

Results segment # 5: NEW S3 L1

Source height = 1.00 m

ROAD (0.00 + 46.89 + 0.00) = 46.89 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-10	57	0.66	61.61	0.00	-9.99	-4.72	0.00	0.00	0.00	46.89

Segment Leq : 46.89 dBA

Results segment # 6: NEW S3 L2

Source height = 1.00 m

ROAD (0.00 + 46.10 + 0.00) = 46.10 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-10	57	0.66	61.61	0.00	-10.79	-4.72	0.00	0.00	0.00	46.10

Segment Leq : 46.10 dBA

Total Leq All Segments: 59.90 dBA

TOTAL Leq FROM ALL SOURCES: 59.90

STAMSON 5.0 NORMAL REPORT Date: 27-02-2009 12:51:51
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 21eew09N.te Time Period: 8 hours
Description: 2021 EXPANSION EW09 NIGHT

Road data, segment # 1: PS4 L1

 Car traffic volume : 470 veh/TimePeriod
 Medium truck volume : 20 veh/TimePeriod
 Heavy truck volume : 4 veh/TimePeriod
 Posted speed limit : 60 km/h
 Road gradient : 0 %
 Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: PS4 L1

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

Road data, segment # 2: PS4 L2

 Car traffic volume : 470 veh/TimePeriod
 Medium truck volume : 20 veh/TimePeriod
 Heavy truck volume : 5 veh/TimePeriod
 Posted speed limit : 60 km/h
 Road gradient : 0 %
 Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: PS4 L2

 Angle1 Angle2 : -90.00 deg 0.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 23.00 m
 Receiver height : 4.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

Road data, segment # 3: NEW S2 L12

 Car traffic volume : 514 veh/TimePeriod
 Medium truck volume : 22 veh/TimePeriod
 Heavy truck volume : 6 veh/TimePeriod
 Posted speed limit : 60 km/h
 Road gradient : 0 %
 Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 3: NEW S2 L12

 Angle1 Angle2 : -90.00 deg -48.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 54.00 m
 Receiver height : 4.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

Road data, segment # 4: NEW S3 L1

Car traffic volume : 620 veh/TimePeriod
Medium truck volume : 26 veh/TimePeriod
Heavy truck volume : 7 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 4: NEW S3 L1

Angle1 Angle2 : -10.00 deg 57.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 63.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 5: NEW S3 L2

Car traffic volume : 620 veh/TimePeriod
Medium truck volume : 26 veh/TimePeriod
Heavy truck volume : 7 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 5: NEW S3 L2

Angle1 Angle2 : -10.00 deg 57.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 70.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: PS4 L1

Source height = 0.95 m

ROAD (0.00 + 48.69 + 0.00) = 48.69 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 0 0.59 55.02 0.00 -1.98 -4.34 0.00 0.00 0.00 48.69

Segment Leq : 48.69 dBA

Results segment # 2: PS4 L2

Source height = 1.00 m

ROAD (0.00 + 47.95 + 0.00) = 47.95 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 0 0.58 55.24 0.00 -2.94 -4.34 0.00 0.00 0.00 47.95

Segment Leq : 47.95 dBA

Results segment # 3: NEW S2 L12

Source height = 1.03 m

ROAD (0.00 + 37.72 + 0.00) = 37.72 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 -48 0.58 55.74 0.00 -8.81 -9.21 0.00 0.00 0.00 37.72

Segment Leq : 37.72 dBA

Results segment # 4: NEW S3 L1

Source height = 1.02 m

ROAD (0.00 + 40.11 + 0.00) = 40.11 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-10	57	0.58	54.65	0.00	-9.88	-4.67	0.00	0.00	0.00	40.11

Segment Leq : 40.11 dBA

Results segment # 5: NEW S3 L2

Source height = 1.02 m

ROAD (0.00 + 39.38 + 0.00) = 39.38 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-10	57	0.58	54.65	0.00	-10.60	-4.67	0.00	0.00	0.00	39.38

Segment Leq : 39.38 dBA

Total Leq All Segments: 52.07 dBA

TOTAL Leq FROM ALL SOURCES: 52.07

STAMSON 5.0 NORMAL REPORT Date: 27-02-2009 15:28:00
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 21eew15d.te Time Period: 16 hours

Description: 2021 EXPANSION EW15 DAY

Road data, segment # 1: DUNDAS2 L1

Car traffic volume : 17581 veh/TimePeriod
 Medium truck volume : 1147 veh/TimePeriod
 Heavy truck volume : 382 veh/TimePeriod
 Posted speed limit : 60 km/h
 Road gradient : 0 %
 Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: DUNDAS2 L1

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 : 21.00 m
 Receiver height : 1.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

Road data, segment # 2: DUNDAS2 L2

Car traffic volume : 17581 veh/TimePeriod
 Medium truck volume : 1147 veh/TimePeriod
 Heavy truck volume : 382 veh/TimePeriod
 Posted speed limit : 60 km/h
 Road gradient : 0 %
 Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: DUNDAS2 L2

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 : 39.00 m
 Receiver height : 1.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

Results segment # 1: DUNDAS2 L1

Source height = 1.19 m

ROAD (0.00 + 65.55 + 0.00) = 65.55 dBA
 Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

 -90 90 0.66 69.43 0.00 -2.43 -1.46 0.00 0.00 0.00 65.55

Segment Leq : 65.55 dBA

Results segment # 2: DUNDAS2 L2

Source height = 1.19 m

ROAD (0.00 + 61.09 + 0.00) = 61.09 dBA
 Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

 -90 90 0.66 69.43 0.00 -6.89 -1.46 0.00 0.00 0.00 61.09

Segment Leq : 61.09 dBA

Total Leq All Segments: 66.88 dBA

TOTAL Leq FROM ALL SOURCES: 66.88

STAMSON 5.0 NORMAL REPORT Date: 27-02-2009 15:31:08
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 21eew15n.te Time Period: 16 hours

Description: 2021 EXPANSION EW15 NIGHT

Road data, segment # 1: DUNDAS2 L1

Car traffic volume : 1739 veh/TimePeriod
 Medium truck volume : 113 veh/TimePeriod
 Heavy truck volume : 38 veh/TimePeriod
 Posted speed limit : 60 km/h
 Road gradient : 0 %
 Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: DUNDAS2 L1

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 : 25.00 m
 Receiver height : 4.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

Road data, segment # 2: DUNDAS2 L2

Car traffic volume : 1739 veh/TimePeriod
 Medium truck volume : 113 veh/TimePeriod
 Heavy truck volume : 38 veh/TimePeriod
 Posted speed limit : 60 km/h
 Road gradient : 0 %
 Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: DUNDAS2 L2

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 : 42.00 m
 Receiver height : 4.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

Results segment # 1: DUNDAS2 L1

Source height = 1.19 m

ROAD (0.00 + 54.57 + 0.00) = 54.57 dBA
 Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 90 0.58 59.39 0.00 -3.50 -1.32 0.00 0.00 0.00 54.57

Segment Leq : 54.57 dBA

Results segment # 2: DUNDAS2 L2

Source height = 1.19 m

ROAD (0.00 + 51.01 + 0.00) = 51.01 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.58	59.39	0.00	-7.06	-1.32	0.00	0.00	0.00	51.01

Segment Leq : 51.01 dBA

Total Leq All Segments: 56.16 dBA

TOTAL Leq FROM ALL SOURCES: 56.16

STAMSON 5.0 NORMAL REPORT Date: 27-02-2009 16:33:38
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 21eew18d.te Time Period: 16 hours
Description: 2021 EXPANSION EW18 DAY

Road data, segment # 1: NEW S1 L1

Car traffic volume : 4323 veh/TimePeriod
Medium truck volume : 182 veh/TimePeriod
Heavy truck volume : 46 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: NEW S1 L1

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 : 21.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: NEW S1 L2

Car traffic volume : 4323 veh/TimePeriod
Medium truck volume : 182 veh/TimePeriod
Heavy truck volume : 46 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: NEW S1 L2

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 : 26.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: NEW S1 L1

Source height = 1.00 m

ROAD (0.00 + 56.12 + 0.00) = 56.12 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	60.00	0.00	-2.43	-1.46	0.00	0.00	0.00	56.12

Segment Leq : 56.12 dBA

Results segment # 2: NEW S1 L2

Source height = 1.00 m

ROAD (0.00 + 54.58 + 0.00) = 54.58 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 90 0.66 60.00 0.00 -3.97 -1.46 0.00 0.00 0.00 54.58

Segment Leq : 54.58 dBA

Total Leq All Segments: 58.43 dBA

TOTAL Leq FROM ALL SOURCES: 58.43

TAMSON 5.0 NORMAL REPORT Date: 27-02-2009 16:34:09
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 21eew18n.te Time Period: 8 hours
Description: 2021 EXPANSION EW18 NIGHT

Road data, segment # 1: NEW S1 L1

Car traffic volume : 428 veh/TimePeriod
Medium truck volume : 18 veh/TimePeriod
Heavy truck volume : 5 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: NEW S1 L1

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 : 21.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: NEW S1 L2

Car traffic volume : 428 veh/TimePeriod
Medium truck volume : 18 veh/TimePeriod
Heavy truck volume : 5 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: NEW S1 L2

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 : 26.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: NEW S1 L1

Source height = 1.03 m

ROAD (0.00 + 49.45 + 0.00) = 49.45 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 90 0.58 53.09 0.00 -2.31 -1.33 0.00 0.00 0.00 49.45

Segment Leq : 49.45 dBA

Results segment # 2: NEW S1 L2

Source height = 1.03 m

ROAD (0.00 + 47.98 + 0.00) = 47.98 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.58	53.09	0.00	-3.78	-1.33	0.00	0.00	0.00	47.98

Segment Leq : 47.98 dBA

Total Leq All Segments: 51.79 dBA

TOTAL Leq FROM ALL SOURCES: 51.79

STAMSON 5.0 NORMAL REPORT Date: 27-02-2009 17:07:27
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 21eew21d.te Time Period: 16 hours

Description: 2021 EXPANSION EW21 DAY

Road data, segment # 1: NEW S1 L1

Car traffic volume : 4323 veh/TimePeriod
Medium truck volume : 182 veh/TimePeriod
Heavy truck volume : 46 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: NEW S1 L1

Angle1 Angle2 : -90.00 deg -10.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 134.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: NEW S1 L2

Car traffic volume : 4323 veh/TimePeriod
Medium truck volume : 182 veh/TimePeriod
Heavy truck volume : 46 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: NEW S1 L2

Angle1 Angle2 : -90.00 deg -10.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 139.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 3: NEW S2 L1

Car traffic volume : 2594 veh/TimePeriod
Medium truck volume : 109 veh/TimePeriod
Heavy truck volume : 27 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 3: NEW S2 L1

Angle1 Angle2 : -10.00 deg 90.00 deg
Wood depth : 1 (Wood depth 30 to less than 60 metres)
No of house rows : 0
Surface : 1 (Absorptive ground surface)

Receiver source distance : 134.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 4: NEW S2 L2

Car traffic volume : 2594 veh/TimePeriod
Medium truck volume : 109 veh/TimePeriod
Heavy truck volume : 27 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 4: NEW S2 L2

Angle1 Angle2 : -10.00 deg 90.00 deg
Wood depth : 1 (Wood depth 30 to less than 60 metres)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 139.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 5: CENTRE L1

Car traffic volume : 5774 veh/TimePeriod
Medium truck volume : 307 veh/TimePeriod
Heavy truck volume : 61 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 5: CENTRE L1

Angle1 Angle2 : -90.00 deg 80.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 30.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 6: CENTRE L2

Car traffic volume : 5774 veh/TimePeriod
Medium truck volume : 307 veh/TimePeriod
Heavy truck volume : 61 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 6: CENTRE L2

Angle1 Angle2 : -90.00 deg 80.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 34.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: NEW S1 L1

Source height = 1.00 m

ROAD (0.00 + 39.02 + 0.00) = 39.02 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 -10 0.66 60.00 0.00 -15.79 -5.20 0.00 0.00 0.00 39.02

Segment Leq : 39.02 dBA

Results segment # 2: NEW S1 L2

Source height = 1.00 m

ROAD (0.00 + 38.76 + 0.00) = 38.76 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-10	0.66	60.00	0.00	-16.05	-5.20	0.00	0.00	0.00	38.76

Segment Leq : 38.76 dBA

Results segment # 3: NEW S2 L1

Source height = 1.00 m

ROAD (0.00 + 38.15 + 0.00) = 38.15 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-10	90	0.38	59.61	0.00	-13.08	-3.38	-5.00	0.00	0.00	38.15

Segment Leq : 38.15 dBA

Results segment # 4: NEW S2 L2

Source height = 1.00 m

ROAD (0.00 + 37.93 + 0.00) = 37.93 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-10	90	0.38	59.61	0.00	-13.30	-3.38	-5.00	0.00	0.00	37.93

Segment Leq : 37.93 dBA

Results segment # 5: CENTRE L1

Source height = 1.00 m

ROAD (0.00 + 56.88 + 0.00) = 56.88 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	80	0.66	63.40	0.00	-5.00	-1.52	0.00	0.00	0.00	56.88

Segment Leq : 56.88 dBA

Results segment # 6: CENTRE L2

Source height = 1.00 m

ROAD (0.00 + 55.98 + 0.00) = 55.98 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	80	0.66	63.40	0.00	-5.90	-1.52	0.00	0.00	0.00	55.98

Segment Leq : 55.98 dBA

Total Leq All Segments: 59.60 dBA

TOTAL Leq FROM ALL SOURCES: 59.60

STAMSON 5.0 NORMAL REPORT Date: 27-02-2009 17:10:42
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 21eew21n.te Time Period: 8 hours
Description: 2021 EXPANSION EW21 NIGHT

Road data, segment # 1: NEW S1 L1

Car traffic volume	: 428 veh/TimePeriod
Medium truck volume	: 18 veh/TimePeriod
Heavy truck volume	: 5 veh/TimePeriod
Posted speed limit	: 50 km/h
Road gradient	: 0 %

Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: NEW S1 L1

Angle1 Angle2 : -90.00 deg -10.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 134.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: NEW S1 L2

Car traffic volume : 428 veh/TimePeriod
Medium truck volume : 18 veh/TimePeriod
Heavy truck volume : 5 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: NEW S1 L2

Angle1 Angle2 : -90.00 deg -10.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 139.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 3: NEW S2 L12

Car traffic volume : 514 veh/TimePeriod
Medium truck volume : 22 veh/TimePeriod
Heavy truck volume : 6 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 3: NEW S2 L12

Angle1 Angle2 : -10.00 deg 90.00 deg
Wood depth : 1 (Wood depth 30 to less than 60 metres)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 137.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 4: CENTRE L1

Car traffic volume : 571 veh/TimePeriod
Medium truck volume : 30 veh/TimePeriod
Heavy truck volume : 6 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 4: CENTRE L1

Angle1 Angle2 : -90.00 deg 80.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 30.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 5: CENTRE L2

Car traffic volume : 571 veh/TimePeriod
Medium truck volume : 30 veh/TimePeriod
Heavy truck volume : 6 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 5: CENTRE L2

```

-----
Angle1  Angle2      : -90.00 deg   80.00 deg
Wood depth      :      0      (No woods.)
No of house rows :      0
Surface         :      1      (Absorptive ground surface)
Receiver source distance : 34.00 m
Receiver height :   4.50 m
Topography      :      1      (Flat/gentle slope; no barrier)
Reference angle :   0.00
    
```

Results segment # 1: NEW S1 L1

Source height = 1.03 m

```

ROAD (0.00 + 32.98 + 0.00) = 32.98 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-----
-90   -10    0.58  53.09   0.00 -15.07 -5.05   0.00   0.00   0.00  32.98
    
```

Segment Leq : 32.98 dBA

Results segment # 2: NEW S1 L2

Source height = 1.03 m

```

ROAD (0.00 + 32.73 + 0.00) = 32.73 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-----
-90   -10    0.58  53.09   0.00 -15.32 -5.05   0.00   0.00   0.00  32.73
    
```

Segment Leq : 32.73 dBA

Results segment # 3: NEW S2 L12

Source height = 1.03 m

```

ROAD (0.00 + 35.19 + 0.00) = 35.19 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-----
-10    90    0.28  55.74   0.00 -12.34 -3.21  -5.00   0.00   0.00  35.19
    
```

Segment Leq : 35.19 dBA

Results segment # 4: CENTRE L1

Source height = 1.00 m

```

ROAD (0.00 + 50.17 + 0.00) = 50.17 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-----
-90    80    0.59  56.34   0.00  -4.77 -1.40   0.00   0.00   0.00  50.17
    
```

Segment Leq : 50.17 dBA

Results segment # 5: CENTRE L2

Source height = 1.00 m

```

ROAD (0.00 + 49.30 + 0.00) = 49.30 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-----
-90    80    0.59  56.34   0.00  -5.63 -1.40   0.00   0.00   0.00  49.30
    
```

Segment Leq : 49.30 dBA

Total Leq All Segments: 52.93 dBA

TOTAL Leq FROM ALL SOURCES: 52.93

STAMSON 5.0 NORMAL REPORT Date: 27-02-2009 17:14:47
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 21ew22d.te Time Period: 16 hours
Description: 2021 EXPANSION EW22 DAY

Road data, segment # 1: CENTRE1 L1

Car traffic volume : 5774 veh/TimePeriod
Medium truck volume : 307 veh/TimePeriod
Heavy truck volume : 61 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: CENTRE1 L1

Angle1 Angle2 : -90.00 deg 5.00 deg
Wood depth : 0 (No woods.)
No of house rows : 7
House density : 50 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 228.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: CENTRE1 L2

Car traffic volume : 5774 veh/TimePeriod
Medium truck volume : 307 veh/TimePeriod
Heavy truck volume : 61 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: CENTRE1 L2

Angle1 Angle2 : -90.00 deg 5.00 deg
Wood depth : 0 (No woods.)
No of house rows : 7
House density : 50 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 232.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 3: CENTRE2 L1

Car traffic volume : 5774 veh/TimePeriod
Medium truck volume : 307 veh/TimePeriod
Heavy truck volume : 61 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 3: CENTRE2 L1

Angle1 Angle2 : 5.00 deg 90.00 deg
Wood depth : 1 (Wood depth 30 to less than 60 metres)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 228.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 4: CENTRE2 L2

Car traffic volume : 5774 veh/TimePeriod
Medium truck volume : 307 veh/TimePeriod
Heavy truck volume : 61 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 4: CENTRE2 L2

Angle1 Angle2 : 5.00 deg 90.00 deg

Wood depth : 1 (Wood depth 30 to less than 60 metres)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 232.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 5: NEW S2A L1

Car traffic volume : 2594 veh/TimePeriod
Medium truck volume : 109 veh/TimePeriod
Heavy truck volume : 27 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 5: NEW S2A L1

Angle1 Angle2 : -60.00 deg 30.00 deg
Wood depth : 1 (Wood depth 30 to less than 60 metres)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 128.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 6: NEW S2A L2

Car traffic volume : 2594 veh/TimePeriod
Medium truck volume : 109 veh/TimePeriod
Heavy truck volume : 27 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 6: NEW S2A L2

Angle1 Angle2 : -60.00 deg 30.00 deg
Wood depth : 1 (Wood depth 30 to less than 60 metres)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 133.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 7: NEW S2B L1

Car traffic volume : 2594 veh/TimePeriod
Medium truck volume : 109 veh/TimePeriod
Heavy truck volume : 27 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 7: NEW S2B L1

Angle1 Angle2 : 30.00 deg 70.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 128.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 8: NEW S2B L2

Car traffic volume : 2594 veh/TimePeriod
Medium truck volume : 109 veh/TimePeriod
Heavy truck volume : 27 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 8: NEW S2B L2

Angle1 Angle2 : 30.00 deg 70.00 deg
Wood depth : 0 (No woods.)

No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 133.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 9: NEW S2C L1

Car traffic volume : 2594 veh/TimePeriod
Medium truck volume : 109 veh/TimePeriod
Heavy truck volume : 27 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 9: NEW S2C L1

Angle1 Angle2 : 40.00 deg 65.00 deg
Wood depth : 1 (Wood depth 30 to less than 60 metres)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 394.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 10: NEW S2C L2

Car traffic volume : 2594 veh/TimePeriod
Medium truck volume : 109 veh/TimePeriod
Heavy truck volume : 27 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 10: NEW S2C L2

Angle1 Angle2 : 40.00 deg 65.00 deg
Wood depth : 1 (Wood depth 30 to less than 60 metres)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 400.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: CENTRE1 L1

Source height = 1.00 m

ROAD (0.00 + 28.13 + 0.00) = 28.13 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 5 0.66 63.40 0.00 -19.62 -4.14 0.00 -11.51 0.00 28.13

Segment Leq : 28.13 dBA

Results segment # 2: CENTRE1 L2

Source height = 1.00 m

ROAD (0.00 + 28.01 + 0.00) = 28.01 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 5 0.66 63.40 0.00 -19.74 -4.14 0.00 -11.51 0.00 28.01

Segment Leq : 28.01 dBA

Results segment # 3: CENTRE2 L1

Source height = 1.00 m

ROAD (0.00 + 37.90 + 0.00) = 37.90 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

5 90 0.38 63.40 0.00 -16.25 -4.25 -5.00 0.00 0.00 37.90

Segment Leq : 37.90 dBA

Results segment # 4: CENTRE2 L2

Source height = 1.00 m

ROAD (0.00 + 37.80 + 0.00) = 37.80 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
5	90	0.38	63.40	0.00	-16.35	-4.25	-5.00	0.00	0.00	37.80

Segment Leq : 37.80 dBA

Results segment # 5: NEW S2A L1

Source height = 1.00 m

ROAD (0.00 + 38.55 + 0.00) = 38.55 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-60	30	0.38	59.61	0.00	-12.80	-3.25	-5.00	0.00	0.00	38.55

Segment Leq : 38.55 dBA

Results segment # 6: NEW S2A L2

Source height = 1.00 m

ROAD (0.00 + 38.32 + 0.00) = 38.32 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-60	30	0.38	59.61	0.00	-13.03	-3.25	-5.00	0.00	0.00	38.32

Segment Leq : 38.32 dBA

Results segment # 7: NEW S2B L1

Source height = 1.00 m

ROAD (0.00 + 36.26 + 0.00) = 36.26 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
30	70	0.66	59.61	0.00	-15.46	-7.89	0.00	0.00	0.00	36.26

Segment Leq : 36.26 dBA

Results segment # 8: NEW S2B L2

Source height = 1.00 m

ROAD (0.00 + 35.99 + 0.00) = 35.99 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
30	70	0.66	59.61	0.00	-15.73	-7.89	0.00	0.00	0.00	35.99

Segment Leq : 35.99 dBA

Results segment # 9: NEW S2C L1

Source height = 1.00 m

ROAD (0.00 + 25.68 + 0.00) = 25.68 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
40	65	0.38	59.61	0.00	-19.52	-9.41	-5.00	0.00	0.00	25.68

Segment Leq : 25.68 dBA

Results segment # 10: NEW S2C L2

Source height = 1.00 m

ROAD (0.00 + 25.59 + 0.00) = 25.59 dBA
 Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

 40 65 0.38 59.61 0.00 -19.61 -9.41 -5.00 0.00 0.00 25.59

Segment Leq : 25.59 dBA

Total Leq All Segments: 45.61 dBA

TOTAL Leq FROM ALL SOURCES: 45.61

STAMSON 5.0 NORMAL REPORT Date: 27-02-2009 17:17:49
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 21eew22n.te Time Period: 8 hours
Description: 2021 EXPANSION EW22 NIGHT

Road data, segment # 1: CENTRE1 L1

 Car traffic volume : 571 veh/TimePeriod
 Medium truck volume : 30 veh/TimePeriod
 Heavy truck volume : 6 veh/TimePeriod
 Posted speed limit : 60 km/h
 Road gradient : 0 %
 Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: CENTRE1 L1

 Angle1 Angle2 : -90.00 deg 5.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 7
 House density : 50 %
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 228.00 m
 Receiver height : 4.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

Road data, segment # 2: CENTRE1 L2

 Car traffic volume : 571 veh/TimePeriod
 Medium truck volume : 30 veh/TimePeriod
 Heavy truck volume : 6 veh/TimePeriod
 Posted speed limit : 60 km/h
 Road gradient : 0 %
 Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: CENTRE1 L2

 Angle1 Angle2 : -90.00 deg 5.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 7
 House density : 50 %
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 232.00 m
 Receiver height : 4.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

Road data, segment # 3: CENTRE2 L1

 Car traffic volume : 571 veh/TimePeriod
 Medium truck volume : 30 veh/TimePeriod
 Heavy truck volume : 6 veh/TimePeriod
 Posted speed limit : 60 km/h
 Road gradient : 0 %
 Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 3: CENTRE2 L1

 Angle1 Angle2 : 5.00 deg 90.00 deg

Wood depth : 1 (Wood depth 30 to less than 60 metres)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 228.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 4: CENTRE2 L2

Car traffic volume : 571 veh/TimePeriod
Medium truck volume : 30 veh/TimePeriod
Heavy truck volume : 6 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 4: CENTRE2 L2

Angle1 Angle2 : 5.00 deg 90.00 deg
Wood depth : 1 (Wood depth 30 to less than 60 metres)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 232.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 5: NEW S2A L12

Car traffic volume : 514 veh/TimePeriod
Medium truck volume : 22 veh/TimePeriod
Heavy truck volume : 6 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 5: NEW S2A L12

Angle1 Angle2 : -60.00 deg 30.00 deg
Wood depth : 1 (Wood depth 30 to less than 60 metres)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 131.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 6: NEW S2B L12

Car traffic volume : 514 veh/TimePeriod
Medium truck volume : 22 veh/TimePeriod
Heavy truck volume : 6 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 6: NEW S2B L12

Angle1 Angle2 : 30.00 deg 70.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 131.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 7: NEW S2C L12

Car traffic volume : 514 veh/TimePeriod
Medium truck volume : 22 veh/TimePeriod
Heavy truck volume : 6 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 7: NEW S2C L12

Angle1 Angle2 : 40.00 deg 65.00 deg
Wood depth : 1 (Wood depth 30 to less than 60 metres)

No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 397.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: CENTRE1 L1

Source height = 1.00 m

ROAD (0.00 + 22.07 + 0.00) = 22.07 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 5 0.59 56.34 0.00 -18.73 -4.02 0.00 -11.51 0.00 22.07

Segment Leq : 22.07 dBA

Results segment # 2: CENTRE1 L2

Source height = 1.00 m

ROAD (0.00 + 21.96 + 0.00) = 21.96 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 5 0.59 56.34 0.00 -18.85 -4.02 0.00 -11.51 0.00 21.96

Segment Leq : 21.96 dBA

Results segment # 3: CENTRE2 L1

Source height = 1.00 m

ROAD (0.00 + 32.11 + 0.00) = 32.11 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

5 90 0.29 56.34 0.00 -15.19 -4.04 -5.00 0.00 0.00 32.11

Segment Leq : 32.11 dBA

Results segment # 4: CENTRE2 L2

Source height = 1.00 m

ROAD (0.00 + 32.01 + 0.00) = 32.01 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

5 90 0.29 56.34 0.00 -15.28 -4.04 -5.00 0.00 0.00 32.01

Segment Leq : 32.01 dBA

Results segment # 5: NEW S2A L12

Source height = 1.03 m

ROAD (0.00 + 35.45 + 0.00) = 35.45 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-60 30 0.28 55.74 0.00 -12.09 -3.20 -5.00 0.00 0.00 35.45

Segment Leq : 35.45 dBA

Results segment # 6: NEW S2B L12

Source height = 1.03 m

ROAD (0.00 + 33.09 + 0.00) = 33.09 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

30 70 0.58 55.74 0.00 -14.91 -7.74 0.00 0.00 0.00 33.09

Segment Leq : 33.09 dBA

Results segment # 7: NEW S2C L12

Source height = 1.03 m

ROAD (0.00 + 23.26 + 0.00) = 23.26 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
40	65	0.28	55.74	0.00	-18.27	-9.21	-5.00	0.00	0.00	23.26

Segment Leq : 23.26 dBA

Total Leq All Segments: 39.68 dBA

TOTAL Leq FROM ALL SOURCES: 39.68

STAMSON 5.0 NORMAL REPORT Date: 27-02-2009 17:27:36
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 21eew24d.te Time Period: 16 hours
Description: 2021 EXPANSION EW24 DAY

Road data, segment # 1: NEW S4 L1

Car traffic volume : 4655 veh/TimePeriod
Medium truck volume : 300 veh/TimePeriod
Heavy truck volume : 50 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: NEW S4 L1

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 : 20.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: NEW S4 L2

Car traffic volume : 4655 veh/TimePeriod
Medium truck volume : 300 veh/TimePeriod
Heavy truck volume : 50 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: NEW S4 L2

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 : 27.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 3: NEW S3 L1

Car traffic volume : 6268 veh/TimePeriod
Medium truck volume : 264 veh/TimePeriod
Heavy truck volume : 66 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 3: NEW S3 L1

Angle1 Angle2 : -90.00 deg 0.00 deg

Wood depth : 0 (No woods.)
No of house rows : 7
House density : 90 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 430.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 4: NEW S3 L2

Car traffic volume : 6268 veh/TimePeriod
Medium truck volume : 264 veh/TimePeriod
Heavy truck volume : 66 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 4: NEW S3 L2

Angle1 Angle2 : -90.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 7
House density : 90 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 436.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 5: DUNDAS2 L1

Car traffic volume : 17581 veh/TimePeriod
Medium truck volume : 1147 veh/TimePeriod
Heavy truck volume : 382 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 5: DUNDAS2 L1

Angle1 Angle2 : -90.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 445.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 6: DUNDAS2 L2

Car traffic volume : 17581 veh/TimePeriod
Medium truck volume : 1147 veh/TimePeriod
Heavy truck volume : 382 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 6: DUNDAS2 L2

Angle1 Angle2 : -90.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 455.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 7: DUNDAS1 L1

Car traffic volume : 11721 veh/TimePeriod
Medium truck volume : 764 veh/TimePeriod
Heavy truck volume : 255 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 7: DUNDAS1 L1

Angle1 Angle2 : 0.00 deg 90.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 7
 House density : 90 %
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 445.00 m
 Receiver height : 1.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

Road data, segment # 8: DUNDAS1 L2

 Car traffic volume : 11721 veh/TimePeriod
 Medium truck volume : 764 veh/TimePeriod
 Heavy truck volume : 255 veh/TimePeriod
 Posted speed limit : 60 km/h
 Road gradient : 0 %
 Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 8: DUNDAS1 L2

 Angle1 Angle2 : 0.00 deg 90.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 7
 House density : 90 %
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 455.00 m
 Receiver height : 1.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

Results segment # 1: NEW S4 L1

 Source height = 1.00 m
 ROAD (0.00 + 59.24 + 0.00) = 59.24 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	62.77	0.00	-2.07	-1.46	0.00	0.00	0.00	59.24

Segment Leq : 59.24 dBA

Results segment # 2: NEW S4 L2

 Source height = 1.00 m
 ROAD (0.00 + 57.08 + 0.00) = 57.08 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	62.77	0.00	-4.24	-1.46	0.00	0.00	0.00	57.08

Segment Leq : 57.08 dBA

Results segment # 3: NEW S3 L1

 Source height = 1.00 m
 ROAD (0.00 + 17.70 + 0.00) = 17.70 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.66	61.61	0.00	-24.19	-4.47	0.00	-15.25	0.00	17.70

Segment Leq : 17.70 dBA

Results segment # 4: NEW S3 L2

 Source height = 1.00 m
 ROAD (0.00 + 17.62 + 0.00) = 17.62 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.66	61.61	0.00	-24.29	-4.47	0.00	-15.23	0.00	17.62

Segment Leq : 17.62 dBA

Results segment # 5: DUNDAS2 L1

Source height = 1.19 m

ROAD (0.00 + 40.53 + 0.00) = 40.53 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.66	69.43	0.00	-24.44	-4.47	0.00	0.00	0.00	40.53

Segment Leq : 40.53 dBA

Results segment # 6: DUNDAS2 L2

Source height = 1.19 m

ROAD (0.00 + 40.37 + 0.00) = 40.37 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.66	69.43	0.00	-24.60	-4.47	0.00	0.00	0.00	40.37

Segment Leq : 40.37 dBA

Results segment # 7: DUNDAS1 L1

Source height = 1.19 m

ROAD (0.00 + 23.56 + 0.00) = 23.56 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.66	67.67	0.00	-24.44	-4.47	0.00	-15.20	0.00	23.56

Segment Leq : 23.56 dBA

Results segment # 8: DUNDAS1 L2

Source height = 1.19 m

ROAD (0.00 + 23.43 + 0.00) = 23.43 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.66	67.67	0.00	-24.60	-4.47	0.00	-15.17	0.00	23.43

Segment Leq : 23.43 dBA

Total Leq All Segments: 61.38 dBA

TOTAL Leq FROM ALL SOURCES: 61.38

STAMSON 5.0 NORMAL REPORT Date: 27-02-2009 17:30:47
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 21eew24n.te Time Period: 8 hours

Description: 2021 EXPANSION EW24 NIGHT

Road data, segment # 1: NEW S4 L1

Car traffic volume : 460 veh/TimePeriod
 Medium truck volume : 30 veh/TimePeriod
 Heavy truck volume : 5 veh/TimePeriod
 Posted speed limit : 60 km/h
 Road gradient : 0 %
 Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: NEW S4 L1

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 : 20.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: NEW S4 L2

Car traffic volume : 460 veh/TimePeriod
Medium truck volume : 30 veh/TimePeriod
Heavy truck volume : 5 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 2: NEW S4 L2

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 : 27.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 3: NEW S3 L1

Car traffic volume : 620 veh/TimePeriod
Medium truck volume : 26 veh/TimePeriod
Heavy truck volume : 7 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 3: NEW S3 L1

Angle1 Angle2 : -90.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 7
House density : 90 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 430.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 4: NEW S3 L2

Car traffic volume : 620 veh/TimePeriod
Medium truck volume : 26 veh/TimePeriod
Heavy truck volume : 7 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 4: NEW S3 L2

Angle1 Angle2 : -90.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 7
House density : 90 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 436.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 5: DUNDAS2 L1

Car traffic volume : 1739 veh/TimePeriod
Medium truck volume : 113 veh/TimePeriod
Heavy truck volume : 38 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 5: DUNDAS2 L1

Angle1 Angle2 : -90.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0

Surface : 1 (Absorptive ground surface)
Receiver source distance : 445.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 6: DUNDAS2 L2

Car traffic volume : 1739 veh/TimePeriod
Medium truck volume : 113 veh/TimePeriod
Heavy truck volume : 38 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 6: DUNDAS2 L2

Angle1 Angle2 : -90.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 455.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 7: DUNDAS1 L1

Car traffic volume : 1159 veh/TimePeriod
Medium truck volume : 76 veh/TimePeriod
Heavy truck volume : 25 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 7: DUNDAS1 L1

Angle1 Angle2 : 0.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 7
House density : 90 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 445.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 8: DUNDAS1 L2

Car traffic volume : 1159 veh/TimePeriod
Medium truck volume : 76 veh/TimePeriod
Heavy truck volume : 25 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 8: DUNDAS1 L2

Angle1 Angle2 : 0.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 7
House density : 90 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 455.00 m
Receiver height : 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: NEW S4 L1

Source height = 1.00 m

ROAD (0.00 + 52.45 + 0.00) = 52.45 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 90 0.58 55.76 0.00 -1.98 -1.33 0.00 0.00 0.00 52.45

Segment Leq : 52.45 dBA

Results segment # 2: NEW S4 L2

Source height = 1.00 m

ROAD (0.00 + 50.38 + 0.00) = 50.38 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.58	55.76	0.00	-4.05	-1.33	0.00	0.00	0.00	50.38

Segment Leq : 50.38 dBA

Results segment # 3: NEW S3 L1

Source height = 1.02 m

ROAD (0.00 + 11.98 + 0.00) = 11.98 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.58	54.65	0.00	-23.09	-4.34	0.00	-15.25	0.00	11.98

Segment Leq : 11.98 dBA

Results segment # 4: NEW S3 L2

Source height = 1.02 m

ROAD (0.00 + 11.90 + 0.00) = 11.90 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.58	54.65	0.00	-23.19	-4.34	0.00	-15.23	0.00	11.90

Segment Leq : 11.90 dBA

Results segment # 5: DUNDAS2 L1

Source height = 1.19 m

ROAD (0.00 + 34.82 + 0.00) = 34.82 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.58	62.40	0.00	-23.25	-4.33	0.00	0.00	0.00	34.82

Segment Leq : 34.82 dBA

Results segment # 6: DUNDAS2 L2

Source height = 1.19 m

ROAD (0.00 + 34.67 + 0.00) = 34.67 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.58	62.40	0.00	-23.40	-4.33	0.00	0.00	0.00	34.67

Segment Leq : 34.67 dBA

Results segment # 7: DUNDAS1 L1

Source height = 1.19 m

ROAD (0.00 + 17.84 + 0.00) = 17.84 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.58	60.63	0.00	-23.25	-4.33	0.00	-15.20	0.00	17.84

Segment Leq : 17.84 dBA

Results segment # 8: DUNDAS1 L2

Source height = 1.19 m

ROAD (0.00 + 17.72 + 0.00) = 17.72 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.58	60.63	0.00	-23.41	-4.33	0.00	-15.17	0.00	17.72

Segment Leq : 17.72 dBA

Total Leq All Segments: 54.64 dBA

TOTAL Leq FROM ALL SOURCES: 54.64