

# Environmental Noise Analysis

## Joshua Creek Lands

**Proposed Residential Development**  
Dundas Street East and Ninth Line  
Town of Oakville

September 10, 2012  
Project: 112-242

Prepared for

**Mattamy Homes Corporation**

Prepared by

  
Guangsheng (Sam) Du, M.Sc., P. Eng.



  
**VALCOUSTICS**  
*Canada Ltd.*

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# Environmental Noise Analysis

## Joshua Creek Lands

### Proposed Residential Development Dundas Street East and Ninth Line Town of Oakville

#### 1.0 INTRODUCTION

Valcoustics Canada Ltd. has prepared this Environmental Noise Analysis as part of the Draft Plan application for the proposed Joshua Creek Lands development at the northwest corner of Dundas Street East and Ninth Line in the Town of Oakville. The proposed development will consist of three subdivisions: Bressa, Dryland and Dunoak.

The site is identified as:

Part of Lots 7, 8 and 9  
Concession 1  
North of Dundas Street  
Geographic Township of Trafalgar  
Now in the Town of Oakville  
Regional Municipality of Halton

The site is bounded by:

- Burnhamthorpe Road East, with existing farm lands and dwellings beyond, to the north;
- future residential development to the west;
- Dundas Street East, with existing residential development beyond, to the south; and
- an existing cemetery, with Ninth Line beyond, to the east.

Figure 1 shows a Key Plan of the area.

This report is based on the Development Plans, prepared by Korsiak & Company, provided by Mattamy Homes in an email of July 31, 2012. Figures 2A, 2B and 2C show the Development Plans in reduced forms.

## 2.0 ENVIRONMENTAL NOISE ASSESSMENT

### 2.1 NOISE SOURCES

The main noise sources with potential for impact on the proposed development will be road traffic on Dundas Street East, Burnhamthorpe Street East and the internal Streets A and K. Eighth Line and Ninth Line are about 400 m from the closest dwelling on the site and are not expected to create adverse noise impact on the proposed development. Similarly, Trafalgar Road, Highway 403 and Highway 407 are over 800 m from the site and are not expected to create adverse noise impact on the development.

Ultimate road traffic data for Dundas Street East, Burnhamthorpe Road East and Ninth Line was provided by the Regional Municipality of Halton. Future road traffic data for the internal Streets A and K was provided by RVA.

The road traffic data is summarized in Table 1 and Appendix A.

### 2.2 ENVIRONMENTAL NOISE GUIDELINES

The environmental noise guidelines of the Ministry of the Environment (MOE) for residential development have been used. See Appendix B.

If the nighttime sound energy exposure is more than 60 dBA at night or 65 dBA during the day, means must be provided so windows can be kept closed for noise control purposes and mandatory mechanical ventilation is required. This is usually in the form of central air conditioning. For sound exposures between 51 and 60 dBA ( $L_{eq\ Night}^{(1)}$ ) or 56 and 65 dBA ( $L_{eq\ Day}^{(2)}$ ), inclusive, there need only be the provision for adding mechanical ventilation. For single family and townhouse dwellings, the provision is typically in the form of a ducted ventilation system suitably sized to permit the addition of central air conditioning by the occupant. For high-rise buildings, central air conditioning is usually provided to satisfy the provision for adding requirement. A warning clause advising the occupant of potential interference with some activities is also required.

The MOE advocate a design goal of 55 dBA (0700 to 2300 hours) for the outdoor living area (OLA). When the sound exposure exceeds 55 dBA ( $L_{eq\ Day}$ ) in the OLA, a warning clause advising the occupant of the potential noise problem would be required. An excess of up to 5 dBA is considered acceptable by the MOE in cases where mitigation to 55 dBA is impractical.

Open balconies are currently proposed for some of the residential suites. Although located outdoors, open balconies are not considered to be an OLA if any of the following conditions are met:

- (1)  $L_{eq\ Night}$  - The nighttime (2300 to 0700) energy equivalent continuous level.
- (2)  $L_{eq\ Day}$  - The daytime (0700 to 2300) energy equivalent continuous sound level.

- the depth is less than 4m; and
- indoor amenity space is provided.

For indoor areas the daytime guidelines for living and dining rooms is  $L_{eq\ Day} = 45$  dBA for road traffic sound sources. The nighttime guideline for bedrooms is  $L_{eq\ Night} = 40$  dBA for road traffic sound sources.

### 2.3 NOISE IMPACT ASSESSMENT

Using the road data in Table 1, the sound energy exposures, in terms of  $L_{eq\ Day}$  and  $L_{eq\ Night}$ , were determined using STAMSON V5.04 – ORNAMENT, the computerized road traffic noise prediction model of the MOE.

Inherent screening of each building face due to its orientation to the noise source was taken into account.

The daytime sound exposures were taken at 1.5 m above grade at the building facades and in the rear yard OLA's. The nighttime sound exposures were taken at 4.5 m above grade corresponding to a second storey bedroom windows.

Table 2 summarizes the predicted sound energy exposures outdoors at specific locations. A sample sound exposure calculation is contained in Appendix C.

The highest daytime/nighttime sound exposures of 73 dBA/67 dBA are predicted along south facades of the residential dwellings along Dundas Street East.

For the residential dwellings along Burnhamthorpe Road, the highest daytime and nighttime sound exposures of 66 dBA and 60 dBA are predicted to occur along the north facades.

For the residential dwellings along Streets A and K, the highest daytime and nighttime sound exposures of 59 dBA and 53 dBA are predicted.

### 3.0 NOISE ABATEMENT REQUIREMENTS

The noise control measures can generally be classified into two categories which are interrelated, but which can be treated separately for the most part:

- (a) Architectural elements (exterior wall, windows, doors) to achieve acceptable indoor noise guidelines; and
- (b) Sound barriers and/or site planning features to protect the OLA's.

Noise abatement requirements are summarized in Table 3 and the notes to Table 3.

### 3.1 INDOORS

For determining the worst-case architectural requirements, wall and window areas were assumed to be 80% and 30%, respectively, of the associated floor area, on the facades exposed to the road traffic noise sources. Since assumptions regarding the relative size of the windows and walls were used, the requirements should be checked once building plans become available. This is typically done as part of the building permit process.

For all residential units along Dundas Street East, window construction meeting the minimum non-acoustical standards of the Ontario Building Code (OBC) will be adequate to achieve the indoor noise guidelines assuming STC 54 wall construction will be provided.

For all the remaining residential units, wall and window construction complying with the minimum non-acoustical standards of the OBC will be adequate to achieve the indoor noise guidelines. Special upgraded construction for exterior walls or windows is not mandatory.

Where the sound exposure on the outside of a window is greater than 65 dBA during the day (60 dBA at night), ventilation provisions must be made to permit the windows to remain closed. A commonly used technique is to provide central air conditioning. Thus, all the residential units along Dundas Street East and Burnhamthorpe Road East require mandatory air conditioning.

Where the sound exposures are between 56 and 65 dBA daytime, or 51 dBA and 60 dBA nighttime, the requirement is the provision for adding air conditioning at a later date by the occupant. Thus, all units along Streets A and K and some internal units require the provision to allow the addition of central air conditioning at a later date. See Figures 2A, 2B and 2C.

Table 3 summarizes the ventilation requirements.

### 3.2 OUTDOORS

The unmitigated daytime sound exposures in the rear yard OLA's of the residential dwellings flanking or backing onto Burnhamthorpe Road East are predicted to exceed the 60 dBA upper limit of the MOE noise guidelines. Sound barriers are considered mandatory. Sound barriers 2.2 m in height will mitigate the daytime sound exposures to 60 dBA, which are within the maximum permitted by the MOE noise guidelines, provided a warning clause is registered on title.

It is understood that the blocks immediately adjacent to Dundas Street East will be townhouses, medium density residential and potentially some small commercial uses. Detailed designs and layouts for these blocks are not available at the time of preparing this report. Sound barrier requirements will be reviewed once the detailed designs and layouts are available.

For the remaining residential dwellings, the unmitigated sound levels in the rear yard OLA's are predicted to be within the maximum permitted by the MOE noise guidelines. Sound barriers are not considered mandatory.

See Figures 2A, 2B and 2C for sound barrier locations.

Sound barriers must be of solid construction with no gaps, cracks or holes and must have a minimum surface density of 20 kg/m<sup>2</sup>. A variety of materials are available, including wood, masonry, specialty composite materials, earth berms, or a combination of the above.

### **3.3 WARNING CLAUSES**

Where the sound exposure guidelines are exceeded, appropriate warning clauses should be registered on title and included in Offers of Purchase and Sale of all the proposed dwelling units, to make future occupants aware of the potential noise situation. Locations requiring warning clauses and the appropriate wording are given in Table 3 and in the notes to Table 3, respectively.

## **4.0 PROPOSED COMMERCIAL USES**

The proposed potential commercial uses will be located along Dundas Street East. Detailed designs are not available at the time preparing this noise report. The proposed commercial uses can be designed to comply with the MOE noise guideline limits outlined in NPC-205 at the proposed and existing residential uses. With proper engineering design, all requirements can be met and no adverse noise impact would be created for surrounding uses. Appropriate choice of location, equipment type, and noise control features such as acoustical enclosures, silencers and specific sound barriers are available as design measures.

These aspects should be addressed during the Site Plan Approval stage for the commercial uses.

## **5.0 CONCLUSIONS**

With appropriate acoustical design of the development, a suitable acoustical environment can be provided for the occupants and the applicable MOE noise guidelines met. Standard construction in compliance with the OBC is adequate with respect to achieving indoor noise criteria.

Sound barriers are required for the lots with their rear yards exposed to Burnhamthorpe Road East along the northerly end of the site.

Mandatory air conditioning is required for all lots along Dundas Street East and Burnhamthorpe Road East. The provision for adding air conditioning is required for all lots

along Streets A and K as well as for some internal units as shown on Figures 2A, 2B and 2C.

The approvals and administrative procedures are available to ensure that the noise requirements are implemented.

Noise from the proposed commercial uses should be reviewed during the Site Plan Approval stage.

## 6.0 REFERENCES

1. PC STAMSON V5.04, "Computer Program for Road Traffic Noise Assessment", Ontario Ministry of the Environment.
2. Building Practice Note No. 56: "Controlling Sound Transmission into Buildings", by J. D. Quirt, Division of Building Research, National Council of Canada, September 1985.
3. "Environmental Noise Assessment in Land-Use Planning 1987", Ontario Ministry of the Environment, February 1987, ISBN 0-7729-2804-5.
4. "Road and Rail Noise: Effects on Housing", Canada Mortgage and Housing Corporation, Publication NHA 5156, 81/10.
5. "Noise Assessment Criteria in Land Use Planning", Ontario Ministry of the Environment, Publication LU-131, October 1997.
6. "Sound Level Limits for Stationary Sources in Class 1 and 2 Areas (Urban)", Ontario Ministry of the Environment, Publication NPC-205, October 1995.
7. "Noise Assessment Criteria in Land Use Planning: Requirements, Procedures, and Implementation", Ontario Ministry of the Environment, October 1997.

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**TABLE 1**  
**YEAR 2031 ROAD TRAFFIC DATA**

Roadway	AADT <sup>(1)</sup>	% Trucks		Speed Limit (kph)
		Medium	Heavy	
Dundas Street East <sup>(2)</sup>	55 000	8	5	80
Burnhamthorpe Road East <sup>(2)</sup>	26 700	4	2	60
Street A <sup>(3)</sup>	5 350	3	2	50
Street K <sup>(3)</sup>	5 000	3	2	50

Notes:

- (1) AADT – Average Annual Daily Traffic volumes.  
 (2) Obtained from the Regional Municipality of Halton.  
 (3) Provided by RVA. Truck percentages and speed limits assumed.

**TABLE 2**  
**PREDICTED SOUND EXPOSURES OUTDOORS**

Location <sup>(1)</sup>	Source	Distance (m) <sup>(2)</sup>	L <sub>eq</sub> Day (dBA)	L <sub>eq</sub> Night (dBA)
A (South Face)	Dundas Street East Westbound	20	72	65
	Dundas Street East Eastbound	39	67	61
	<b>Total</b>	–	<b>73</b>	<b>67</b>
B (East Face)	Street A	15	60	53
C (East Face)	Street K	15	60	53
D (North Face)	Burnhamthorpe Road East	20	66	60

Notes:

- (1) Daytime sound exposures were taken at 1.5 m above grade. Nighttime sound exposures were taken at 4.5 m above grade. See Figures 2A, 2B and 2C.  
 (2) Distance indicated is from the centreline of the noise source to the receptors.

**TABLE 3**


**MINIMUM NOISE ABATEMENT MEASURES FOR TRAFFIC NOISE**

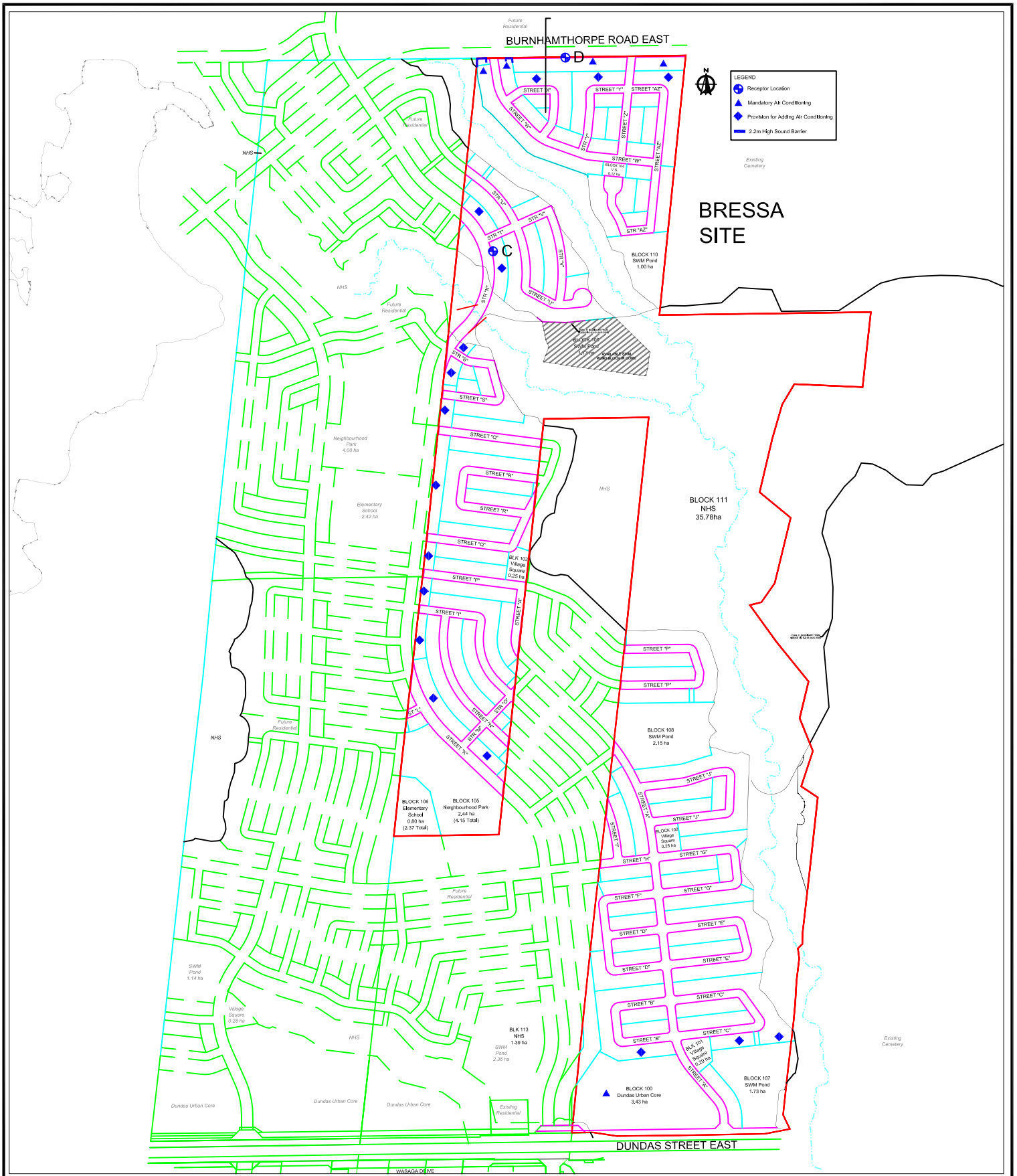
Units	Air Conditioning <sup>(1)</sup>	Exterior Wall <sup>(2)</sup>	Window STC Rating <sup>(3)</sup>	Sound Barrier <sup>(4)</sup>	Warning Clauses <sup>(5)</sup>
All residential units flanking or backing onto Burnhamthorpe Road East	Mandatory	OBC	OBC	2.2 m high	A + B
Remaining units along Burnhamthorpe Road East	Mandatory	OBC	OBC	None	A + B
All residential units along Dundas Street East	Mandatory	STC 54	OBC	See text (Section 3.2)	A + B
All residential units along Streets A and K, as well as some internal units as shown on Figures 2A, 2B and 2C	Provision for adding	OBC	OBC	None	A + C
All residential units adjacent to the proposed schools	–	–	–	–	As above + D
All remaining units	No special acoustical requirements				

**Notes:**

- (1) Provision for adding air conditioning means some form of ducted heating system which would allow the addition of central air conditioning at a later date by the occupant.
- (2) STC – Sound Transmission Class Rating (Reference ASTM-E413). Values shown are based on assumed areas. Requirements should be reviewed when building plans are available.  
  
OBC indicates construction meeting the minimum structural and safety requirements of the Ontario Building Code would provide adequate sound isolation.
- (3) Values shown are based on assumed areas. Requirements should be reviewed when building plans are available. A sliding glass walkout door should be considered as a window and be included in the percentage of glazing.  
  
OBC indicates construction meeting the minimum structural and safety requirements of the Ontario Building Code would provide adequate sound isolation.
- (4) Sound barriers must be of solid construction with no gaps, cracks or holes and must have a minimum surface density of 20 kg/m<sup>2</sup>. A variety of materials are available, including wood, masonry, specialty composite materials, earth berms, or a combination of the above.
- (4) Warning clauses to be registered on title and be included in Offers of Purchase and Sale and Leases on designated units:
  - A. "Purchasers are advised that despite the inclusion of noise control features in the development and within the building units, sound levels due to increasing road and/or air traffic, may occasionally interfere with some activities of the dwelling occupants as the sound level may exceed the noise guidelines of the Municipality and the Ministry of the Environment."
  - B. "This dwelling unit has been fitted with a forced air heating system and the ducting, etc. was sized to accommodate central air conditioning. Installation of central air conditioning will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the Municipality's and the Ministry of the Environment's noise criteria. (Note: The location and installation of the outdoor air conditioning device should be done so as to minimize the noise impacts and must not exceed an ARI rating of 7.6 bels.)"
  - C. "This dwelling unit has been supplied with an air conditioning system which will allow windows and exterior doors to remain closed thereby reducing the indoor sound levels to within the Municipality's and the Ministry of the Environment's noise criteria."
  - D. "Purchasers/tenants are advised that due to the proximity to the proposed school development, sound from this establishment may, at times, be audible."
- (5) All exterior doors shall be fully weatherstripped.



		 30 Wertheim Court, Unit 25 Richmond Hill, Ontario Canada L4B 1B9 solutions@valcoustics.com Phone: (905) 764-5223 Fax: (905) 764-6813	<b>Title</b> Key Plan	<b>Project No.</b> 112-242	<b>Date</b> Sept. 10, 2012
			<b>Project Name</b> Joshua Creek Lands	<b>Scale</b> N.T.S.	<b>Figure</b> 1
<b>No.</b>	<b>Revision/Issue</b>	<b>Date</b>			



No.	Revision/Issue	Date

**VALCOUSTICS**  
Canada Ltd.

30 Wertheim Court, Unit 25  
Richmond Hill, Ontario  
Canada L4B 1B9  
solutions@valcoustics.com  
Phone: (905) 764-5223  
Fax: (905) 764-6813

**Title**  
Development Plan

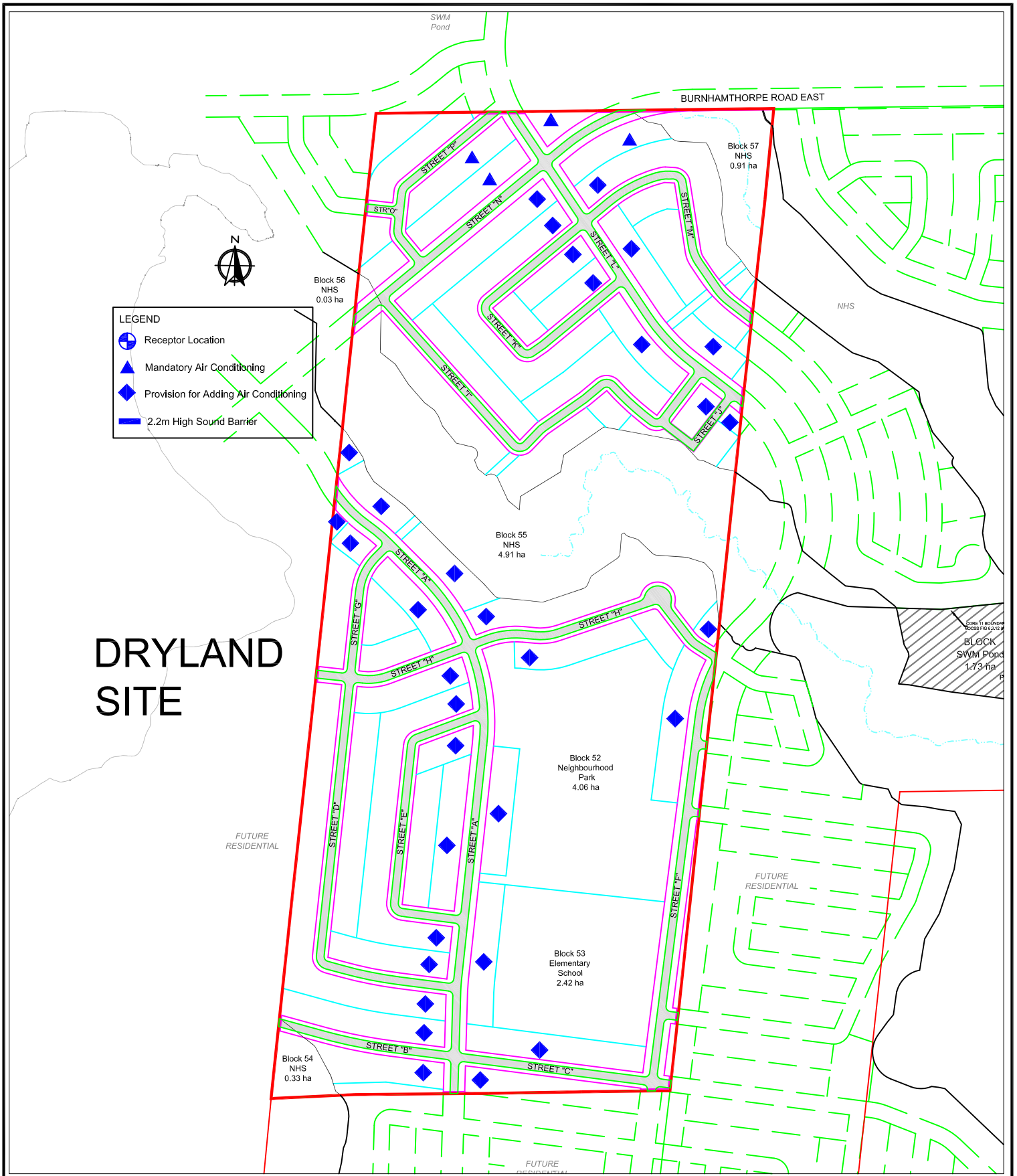
**Project Name**  
Joshua Creek Lands  
Bressa Site

**Project No.**  
112-242

**Scale**  
N.T.S.

**Date**  
Sept 10, 2012

**Figure**  
**2A**



No.	Revision/Issue	Date

**VALCOUSTICS**  
Canada Ltd.

30 Wertheim Court, Unit 25  
Richmond Hill, Ontario  
Canada L4B 1B9  
solutions@valcoustics.com  
Phone: (905) 764-5223  
Fax: (905) 764-6813

**Title**  
Development Plan

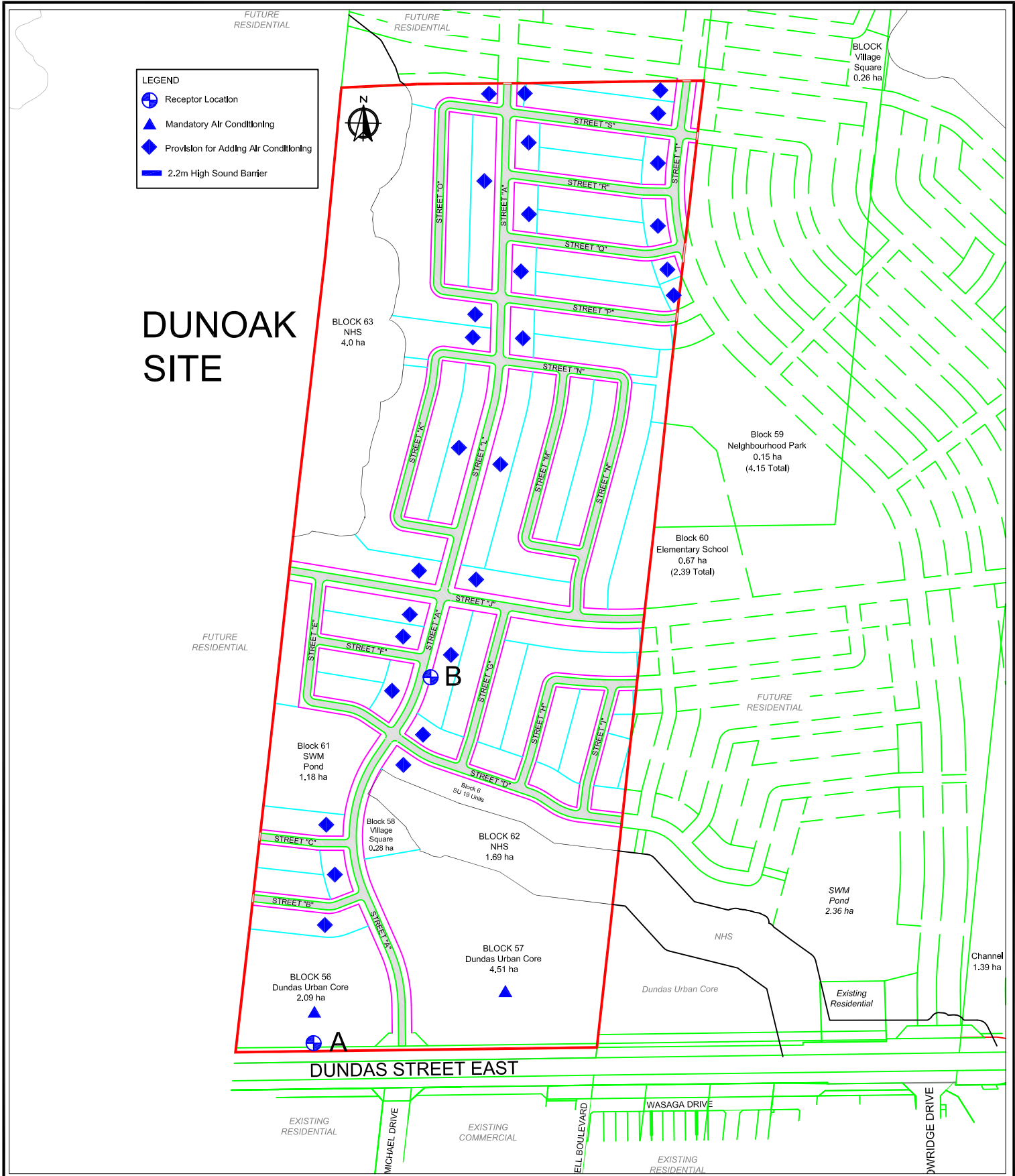
**Project Name**  
Joshua Creek Lands  
Dryland Site

**Project No.**  
112-242

**Scale**  
N.T.S.

**Date**  
Sept 10, 2012

**Figure**  
**2B**



No.	Revision/Issue	Date

**VALCOUSTICS**  
Canada Ltd.

30 Wertheim Court, Unit 25  
Richmond Hill, Ontario  
Canada L4B 1B9  
solutions@valcoustics.com  
Phone: (905) 764-5223  
Fax: (905) 764-6813

<b>Title</b>	Development Plan
<b>Project Name</b>	Joshua Creek Lands Dunoak Site

<b>Project No.</b>	112-242
<b>Scale</b>	N.T.S.

<b>Date</b>	Sept 10, 2012
<b>Figure</b>	<b>2C</b>

# **APPENDIX A**

## **TRAFFIC DATA**

## Sam Du

---

**From:** Monaghan, Patrick - Transportation Services <Patrick.Monaghan@halton.ca>  
**Sent:** August 15, 2012 9:59 AM  
**To:** Sam Du  
**Cc:** Merritt, Rob; Krusto, Matt; Reid, Jeffrey  
**Subject:** RE: Road Traffic Data for Burnhamthorpe Road, Ninth Line and Dundas Street West (VCL File: 112-242)  
**Attachments:** Invoice Sam Du - Aug 2012.pdf

Below is requested 2031 model information.

### Burnhamthorpe Road East between Ninth Line and Trafalgar Road

- AADT (ultimate) = 26,700
- Medium Trucks = 4%
- Heavy Trucks = 2%
- Number of Lanes = 4
- Posted Speed Limit = 60 km/h
- Day/Night split = 90%/10%
- Ultimate year to 2031

### Ninth Line between Burnhamthorpe road East and Dundas Street East

- AADT (ultimate) = 21,600
- Medium Trucks = 6%
- Heavy Trucks = 3%
- Number of Lanes = 4
- Posted Speed Limit = 80 km/h (or 60 km/h if existing now)
- Day/Night split = 90%/10%
- Ultimate year to 2031

### Dundas Street East between Ninth Line and Trafalgar Road

- AADT (ultimate) = 55,000
- Medium Trucks = 8%
- Heavy Trucks = 5%
- Number of Lanes = 6
- Posted Speed Limit = 80 km/h (or 60 km/h if existing now)
- Day/Night split = 90%/10%
- Ultimate year to 2031

Regards,

**Patrick Monaghan**

Transportation Planner  
Transportation Services  
Public Works  
Halton Region  
Ph: (905) 825-6000 ext.7213



# **APPENDIX B**

## **ENVIRONMENTAL NOISE GUIDELINES**

## APPENDIX B

### ENVIRONMENTAL NOISE GUIDELINES

#### MINISTRY OF THE ENVIRONMENT (MOE)

Reference: MOE Publication LU-131, October 1997: "Noise Assessment Criteria in Land Use Planning".

SPACE	SOURCE	TIME PERIOD	CRITERION	
Living/dining areas of residences, hospitals, schools, nursing/retirement homes, day-care centres, etc.	Road	07:00 to 23:00	45 dBA	
	Rail	07:00 to 23:00	40 dBA	
	Aircraft	24-hour period	NEF/NEP 5	
Sleeping quarters	Road	23:00 to 07:00	40 dBA	
	Rail	23:00 to 07:00	35 dBA	
	Aircraft	24-hour period	NEF/NEP 0	
Outdoor Living Areas	Road and Rail	07:00 to 23:00	55 dBA	
Outdoor Point of Reception	Aircraft	24-hour period	NEF/NEP 30 <sup>#</sup>	
	Stationary Source			
	Class 1 Area	07:00 to 23:00 <sup>(1)</sup>	50 <sup>+</sup> dBA	
	Class 2 Area	07:00 to 19:00 <sup>(2)</sup>	50 <sup>+</sup> dBA	
Plane of a Window	Stationary Source	Class 2 Area	19:00 to 23:00 <sup>(2)</sup>	45 <sup>+</sup> dBA
		Class 1 Area	07:00 to 23:00 <sup>(1)</sup>	50 <sup>+</sup> dBA
		Class 2 Area	07:00 to 19:00 <sup>(2)</sup>	50 <sup>+</sup> dBA
Plane of a Bedroom Window	Stationary Source	23:00 to 07:00	45 <sup>+</sup> dBA	

# may not apply to in-fill or re-development.

\* or the minimum hourly background sound exposure  $L_{eq}(1)$ , due to road traffic, if higher.

(1) Class 1 Area : Urban

(2) Class 2 Area : Urban during day; rural-like evening and night

...../cont'd.

Reference: MOE Publication ISBN 0-7729-2804-5, 1987: "Environmental Noise Assessment in Land-Use Planning".

<b>EXCESS ABOVE RECOMMENDED SOUND LEVEL LIMITS (dBA)</b>	<b>CHANGE IN SUBJECTIVE LOUDNESS ABOVE</b>	<b>MAGNITUDE OF THE NOISE PROBLEM</b>	<b>NOISE CONTROL MEASURES (OR ACTION TO BE TAKEN)</b>
No excess (<55 dBA)	—	No expected noise problem	None
1 to 5 inclusive (56 to 60 dBA)	Noticeably louder	Slight noise impact	If no physical measures are taken, then prospective purchasers or tenants should be made aware by suitable warning clauses.
6 to 10 inclusive (61 - 65 dBA)	Almost twice as loud	Definite noise impact	Recommended.
11 to 15 inclusive (66 - 70 dBA)	Almost three times as loud	Serious noise impact	Strongly Recommended.
16 and over (>70 dBA)	Almost four times as loud	Very serious noise impact	Strongly Recommended (may be mandatory).

# **APPENDIX C**

## **SAMPLE ROAD TRAFFIC SOUND LEVEL CALCULATION**

STAMSON 5.04                      NORMAL REPORT                      Date: 10-09-2012 14:52:18  
 MINISTRY OF THE ENVIRONMENT / NOISE ASSESSMENT

Filename: arev.te                      Time Period: Day/Night 16/8 hours  
**Description:                      Day & Night Sound Exposures at Location A**

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

-----  
 Car traffic volume    : 21533/2393    veh/TimePeriod    \*  
 Medium truck volume : 1980/220    veh/TimePeriod    \*  
 Heavy truck volume   : 1238/138    veh/TimePeriod    \*  
 Posted speed limit   :     80 km/h  
 Road gradient         :     0 %  
 Road pavement        :     1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 27500  
 Percentage of Annual Growth        : 0.00  
 Number of Years of Growth         : 0.00  
 Medium Truck % of Total Volume    : 8.00  
 Heavy Truck % of Total Volume      : 5.00  
 Day (16 hrs) % of Total Volume    : 90.00

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

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

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

-----  
 Car traffic volume    : 21533/2393    veh/TimePeriod    \*  
 Medium truck volume : 1980/220    veh/TimePeriod    \*  
 Heavy truck volume   : 1238/138    veh/TimePeriod    \*  
 Posted speed limit   :     80 km/h  
 Road gradient         :     0 %  
 Road pavement        :     1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 27500  
 Percentage of Annual Growth        : 0.00  
 Number of Years of Growth         : 0.00  
 Medium Truck % of Total Volume    : 8.00  
 Heavy Truck % of Total Volume      : 5.00  
 Day (16 hrs) % of Total Volume    : 90.00

Data for Segment # 2: Dundas 2 (day/night)

-----  
 Angle1    Angle2                    : -90.00 deg    90.00 deg  
 Wood depth                         :     0        (No woods.)  
 No of house rows                   :     0 / 0  
 Surface                              :     1        (Absorptive ground surface)  
 Receiver source distance           : 39.00 / 39.00 m  
 Receiver height                    :    1.50 / 4.50 m  
 Topography                         :     1        (Flat/gentle slope; no barrier)  
 Reference angle                    :     0.00

Results segment # 1: Dundas 1 (day)

Source height = 1.50 m

ROAD (0.00 + 71.63 + 0.00) = 71.63 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	75.16	0.00	-2.07	-1.46	0.00	0.00	0.00	71.63

Segment Leq : 71.63 dBA

Results segment # 2: Dundas 2 (day)

Source height = 1.50 m

ROAD (0.00 + 66.82 + 0.00) = 66.82 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	75.16	0.00	-6.89	-1.46	0.00	0.00	0.00	66.82

Segment Leq : 66.82 dBA

Total Leq All Segments: 72.87 dBA

Results segment # 1: Dundas 1 (night)

Source height = 1.50 m

ROAD (0.00 + 65.37 + 0.00) = 65.37 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	68.64	0.00	-1.96	-1.30	0.00	0.00	0.00	65.37

Segment Leq : 65.37 dBA

Results segment # 2: Dundas 2 (night)

Source height = 1.50 m

ROAD (0.00 + 60.82 + 0.00) = 60.82 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	68.64	0.00	-6.52	-1.30	0.00	0.00	0.00	60.82

Segment Leq : 60.82 dBA

Total Leq All Segments: 66.68 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 72.87  
(NIGHT): 66.68