



THE TOWN OF KINGSVILLE

# Stationary Noise Assessment

281 Main Street East, Kingsville, Ontario



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## 1.0

# Introduction

## 1.1

## Purpose and Objectives

Dillon Consulting Limited (Dillon) was retained by the Town of Kingsville (the Town) to complete a noise assessment of a car wash located at 281 Main Street East, in Town of Kingsville, Ontario. This study has been completed for the Town in response to ongoing noise complaints that has been received by the Town from the surrounding residential dwellings. As requested, this noise assessment only includes sources associated with the automatic car wash.

The noise assessment presented herein is prepared in accordance with the requirements of the Town's Site Plan Agreement prepared specifically for the said car wash, and that of the Ontario Ministry of Environment, Conservation and Parks (MECP) noise publication NPC-300. The assessment focuses on existing noise impact from the car wash on the surrounding sensitive receptors.

## 1.2

## Subject Lands and Surrounding Area

The car wash is located in the east end of the Town, at the southeast corner of Main Street East and Wigle Avenue. Immediately surrounding the car wash is a mix of residential and commercial lands, with single detached homes located directly to the west of the car wash, across Wigle Avenue. The subject site and surrounding area is shown in **Figure 1**.

The automatic car wash is an on-demand customer operated service, and has the ability to operate 24/7. The site plan of the car wash is provided in **Appendix A**.

## 2.0

# Stationary Noise Assessment

As part of this study, a review has been completed of the car wash operations, as well as the locations of the nearest sensitive receptors. This assessment investigates the existing noise impacts at the nearest and most impacted receptor (i.e., 259 Main St. East). It is noted that if the car wash can demonstrate compliance at this receptor location (i.e., subject receptor), compliance at all other neighbouring receptor locations would be a given.

## 2.1

## Stationary Noise Criteria

## 2.1.1

### Site Plan Agreement

The Site Plan Agreement (SPA) between The Corporation of the Town of Kingsville (the Town) and 2569299 Ontario Incorporated (Owner) specifies noise limits under *General Provisions 22 v*) as follows:

*“Noise Generation – noise levels generated by the carwash dryer and vacuum systems located on the property shall maintain an upper limit of 60 dBA maximum measured to the closest existing residential property line.”*

Based on our follow-up discussions with the Town, it is our understanding that the 60 dBA implies sound pressure level of 60 dBA. Furthermore, the closest existing residential property line would be that of the subject receptor, located at 259 Main St. East.

### 2.1.2 MECP NPC-300 Noise Criteria and Area Classification

MECP Publication NPC-300 outlines applicable noise criteria for sensitive receptors associated with surrounding industrial and commercial stationary noise sources. The noise criteria are defined using area classifications, which are based on the receptor’s existing acoustical environment. NPC-300 classification are as follows:

- Class 1 – Urban Area
- Class 2 – Suburban / Semi-Rural
- Class 3 – Rural Area
- Class 4 – Areas of Redevelopment and Infill

The guideline requires assessment at:

- Outdoor points of reception (i.e., backyards); and
- Façade points of reception – plane of window to sensitive spaces (i.e., living rooms, dens, eat-in kitchens, dining rooms, and bedrooms)

Different noise guideline limits apply to each area classification, as shown in **Table 1**.

Table 1: Stationary Noise Exclusionary Limits

Assessment Location	Time Period	Exclusionary Sound Level Limit - $L_{eq}$ 1hr			
		Class 1	Class 2	Class 3	Class 4
Plane of window for living area or sleeping quarters	Daytime (07:00 - 19:00)	50 dBA	<b>50 dBA</b>	45 dBA	60 dBA
	Evening (19:00 - 23:00)	50 dBA	<b>50 dBA</b>	40 dBA	60 dBA
	Night-time (23:00 - 07:00)	45 dBA	<b>45 dBA</b>	40 dBA	55 dBA
Outdoor points of reception	Daytime (07:00 - 19:00)	50 dBA	<b>50 dBA</b>	45 dBA	55 dBA
	Evening (19:00 - 23:00)	50 dBA	<b>45 dBA</b>	40 dBA	55 dBA

The NPC-300 exclusionary limits are based on a 1 hour  $L_{eq}$ . The A-weighted sound level of a steady sound carrying the same total energy in a 1-hour time period as the observed fluctuating sound.

Based on the nature of the acoustic environment, the Class 2 area Suburban / Semi-Rural sound level limits apply at the surrounding sensitive receptors.

## 2.2 Car Wash Operation and Site Visit

The automatic car wash is an on-demand customer operated service, and has the ability to operate 24/7. A site visit was completed on June 19, 2019 to conduct sound level measurements at source and at the nearest residential property line.

The dominant on-site noise source was identified to be the drying blowers located at the west end of the car wash building and directly across from the subject receptor (i.e., dwelling at 259 Main St. East). It was noticed that the car wash exit bay door opens while the blowers (i.e., dryer system for the car wash) are in operation, resulting in blower noise dominating the noise environment in the vicinity of the car wash, including at the subject receptor.

Noise measurements were conducted while all the blowers at the car wash were operating. It is believed that the blowers have a singular operating mode (i.e., on or off) and there is no use of Variable Frequency Control to reduce or limit the blowers' air output and hence the noise. As such, the measured noise levels reflect the worst-case noise emission associated with the car wash under normal operating mode. The noise measurements were taken with a Norsonic N-140 Type I integrated sound level analyzer, equipped with 1/1 octave and 1/3 octave band filters (Serial No. 1403048). The laboratory Certificate of Calibration for the noise meter and field calibrator is provided in **Appendix B**.

The on-site noise source measurement program was carried out in accordance with the MECP publication NPC-103 *Noise Measurement Procedures*. Sound level measurements were completed by Dillon personnel on June 19<sup>th</sup>, 2019. The weather conditions consisted of no cloud cover, temperature ranging between 24°C and 27°C, low winds (< 5km/h), and a relative humidity of 60%. The sound level analyzer was calibrated in the field using a field calibrator before and after the measurements.

### 2.2.1 Predicted and Measured Sound Levels

The noise propagation analysis was completed using CADNA/A, an outdoor noise propagation model, based on ISO Standard 9613, Part 1: Calculation of the absorption of sound by the atmosphere, 1993 and Part 2: General method of calculation (ISO-9613-2:1996). The model is capable of incorporating various site specific features, such as elevation, berms, absorptive grounds (range between 0 and 1), and barriers to accurately predict noise levels at specific receptors, pertaining to noise emissions from a particular source / sources. The ISO based model accounts for reduction in sound level due to increased distance and geometrical spreading, air absorption, ground attenuation, and acoustical shielding by intervening structures and topography. The model is considered conservative since as it represents atmospheric conditions that promote propagation of sound from the source to the receiver.

The measured source specific noise data (i.e., data associated with the operation of car wash blowers) was input into the CADNA/A software to model the noise impacts at the subject receptor. The dominant noise source was modelled as a point source at the car wash exit with hemispherical spreading. The following assumptions were used in the modelling:

### Reflections

Conservatively, the noise source was modelled assuming a second order reflection. A building absorption coefficient of 0.37 was assumed to be representative of the brick façades present for the surrounding buildings, including the receptor buildings (i.e., the dwelling and the garage).

### Ground Absorption & Topography

A ground absorption coefficient of 0 was used to represent the mostly reflective (i.e., paved) surfaces that exist between the car wash and the receptor location. The area surrounding the car wash and the nearby receptors is characterized by generally flat. As such, topography was not incorporated in the noise modelling.

### Sound Quality

No tonal or annoyance characteristics were observed off-site surrounding the car wash.

The noise measurement data gathered on June 19, 2019 and the corresponding sound power level data (calculated from on-site noise measurements) used in this assessment are presented in **Appendix C**.

### Site Plan Agreement

Sound levels were modelled and measured at closest existing residential property line, as per the noise requirement under the Site Plan Agreement. Sound level measurements were taken to exclude vehicle pass-bys along Wigle Avenue, to ensure the measured sound levels were representative of the car wash operation. The predicted sound level from the operating car wash at the nearest property line of the subject residential receptor was found to be approximately **73 dBA** (excluding duty cycle for the blowers). This is in line with the value that was measured at said location during the June 19 site visit, which validates the modelling prediction. The measured sound pressure level and prediction modelling receptor location is provided in **Figure 2**.

The predicted and measured sound levels at the closest residential property line exceed the upper limit of 60 dBA outlined in the Site Plan Agreement.

### NPC-300

The acoustic model was developed based information obtained during the site visit, including the dominant onsite noise source and the location, sound power levels, building geometries, operation times, and duty cycle.

The blowers (primary source of noise) operate on a 90 second cycle, every 150 seconds. When assessed based on NPC-300 exclusionary limits, this equates to an hourly duty-cycle of 22.5 minutes during the worst-case hour, corresponding to a maximum of 15 cars per hour. As such, for modelling purposes, the daytime and evening operations (07:00-23:00) was determined to consist of 15 cars, or 22.5 minutes of blower operation, over the worst-case hour. For the night-time operations (23:00-7:00) 3 cars per worst-case hour (4.5 minutes of operation) was assumed for the purposes of this assessment.

The 1-hour Leq (dBA) noise levels were predicted at the subject receptor, which is a two-storey residential home located at 259 Main street East. Receptor sound levels associated with the operation



of the car wash were predicted during the daytime / evening and night-time periods at the closest plane of second-storey window and the backyard outdoor living area of the subject receptor.

**Table 2** summarizes the predicted sound levels at the subject receptor's building façades and OLAs associated with the car wash operations.

Table 2: Noise Prediction Summary Table

Assessment Location	Predicted Noise Impacts - $L_{eq}$ 1hr (dBA)			Meets Class 2 Limits? (Yes/No)
	Plane of Window <sup>[1]</sup>		Outdoor POR	
	Daytime / Evening	Night-time	Daytime Evening	
259 Main Street East	65	58	64	No

Note: [1]  $L_{eq}$  represents maximum predicted impacts along façade.

Noise level contours for the car wash operations are presented graphically in **Figure 3** and **Figure 4**, for daytime / evening and night-time operations, respectively.

As shown above in **Table 2**, and in **Figure 3 and 4**, the MECP Class 2 exclusionary limits are exceeded at the plane of window and the outdoor living area (i.e., the backyard) at 259 Main Street East.

### 2.2.2

### Noise Control Measures

Measured sound levels at the nearest residential property line (259 Main Street East) from the car wash exceed the upper limit specified in the SPA. Additionally, as predicted noise levels at the plane of window and the backyard outdoor living area of 259 Main Street East exceed the NPC-300 Class 2 exclusionary limits, noise mitigation is warranted. As such, noise mitigation measures are required in order for the car wash to operate in accordance with applicable noise limits.

## 3.0

# Conclusions

Dillon Consulting Limited (Dillon) was retained by the Town of Kingsville to complete a noise assessment of the car wash located at 281 Main Street East. This study has been completed in response to ongoing noise complaints from the surrounding residential dwellings.

The noise assessment presented herein is prepared in accordance with the requirements of the Town of Kingsville, the Site Plan Agreement, and that of the Ontario Ministry of Environment, Conservation and Parks (MECP) noise publication NPC-300. The assessment focuses on determining the existing noise impacts from the operations at the car wash on the nearest noise-sensitive residential dwelling located at 259 Main St. East.

This assessment confirms through noise propagation modelling and spot noise measurements that the operation of the car wash is resulting in exceedances of applicable daytime/evening and nighttime noise criteria set in MECP's noise publication NPC-300 as well as the Town's site-specific Site Plan Agreement.

To achieve compliance with the SPA and/or NPC-300, noise mitigation measures will be required. It is anticipated that source-based mitigation measures would be required to achieve compliance.

## Closure

This Noise Study has been prepared based on the information provided and/or approved by the Town of Kingsville. This report is intended to provide a reasonable review of available information within an agreed work scope, schedule, and budget. This report was prepared by Dillon for the sole benefit of the Town of Kingsville. The material in the report reflects Dillon's judgement in light of the information available to Dillon at the time of this report preparation. Any use which a third party makes of this report, or any reliance on or decisions made based on it, are the responsibilities of such third parties. Dillon accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

We trust that the report is to your satisfaction. Please do not hesitate to contact the undersigned if you have any further questions on this report.

Respectfully Submitted:

DILLON CONSULTING LIMITED



Lucas Arnold, P.Eng.  
Associate

A handwritten signature in black ink, appearing to read "Amir A. Iravani".

Amir A. Iravani, Ph.D., P.Eng.  
Associate

## Figures



Figure 1: Site and Surrounding Area



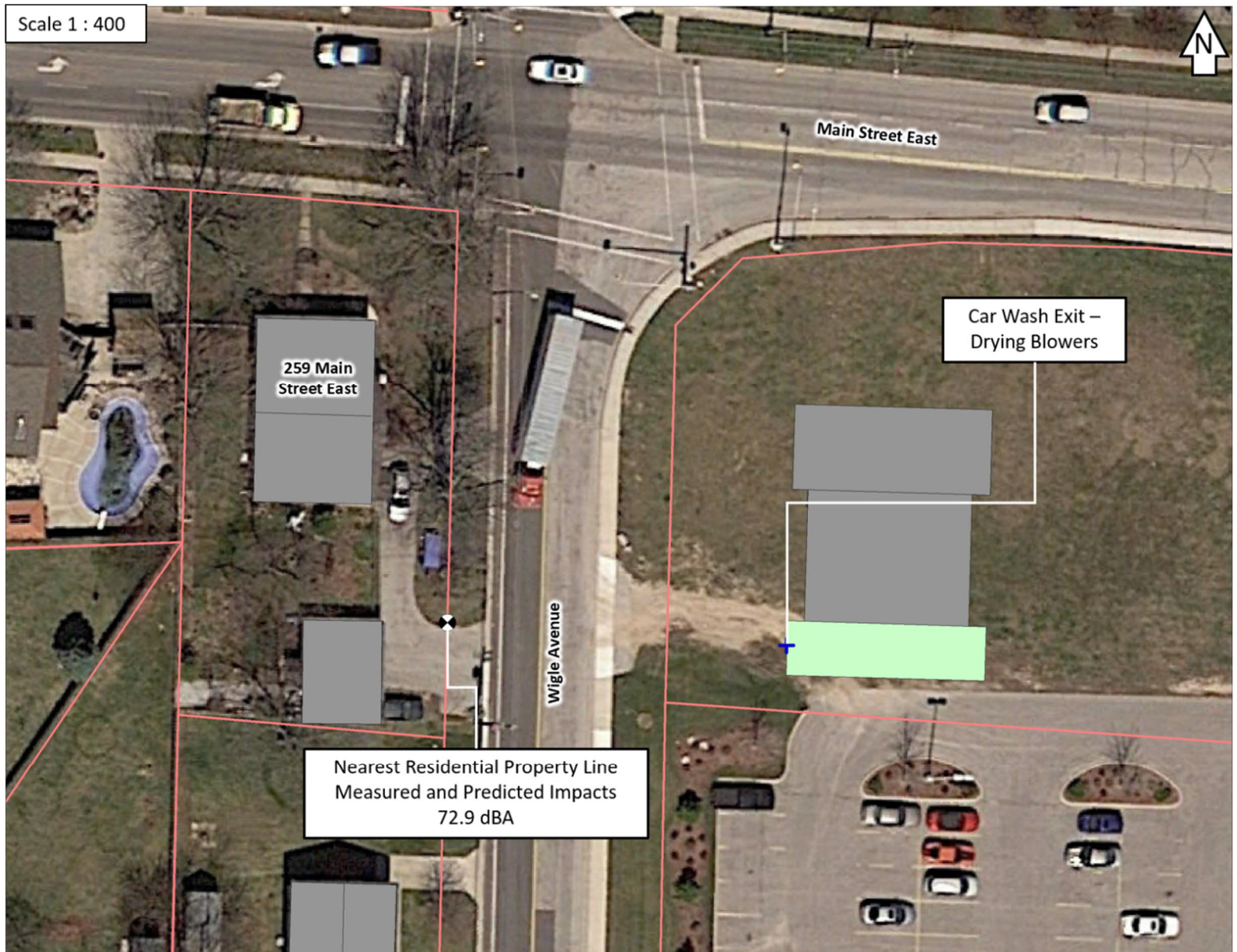


Figure 2: Property Line Sound Pressure Level Measurement Location



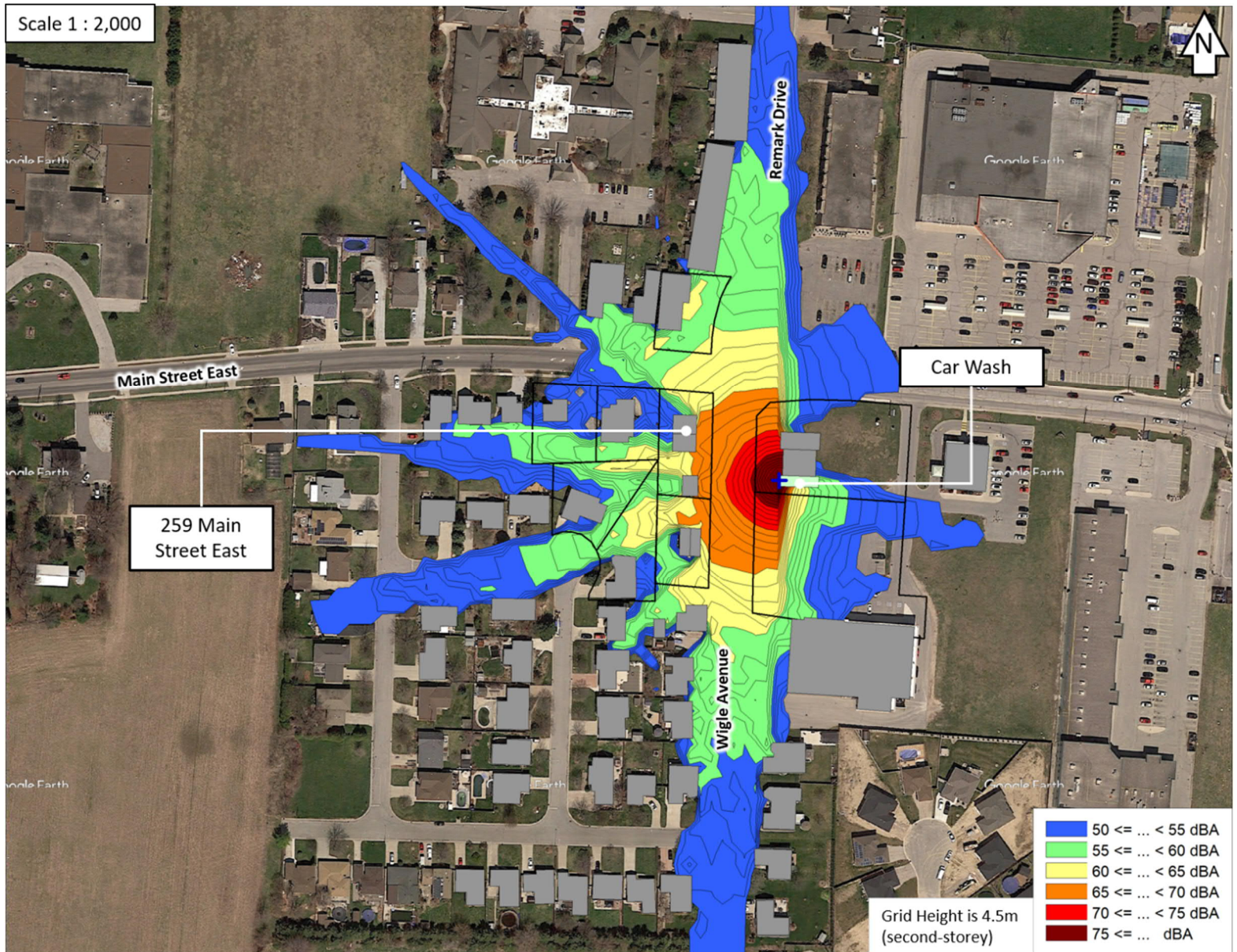


Figure 3: Noise Level Contours and Predicted Receptor Noise Levels (dBA) – Daytime / Evening Operations



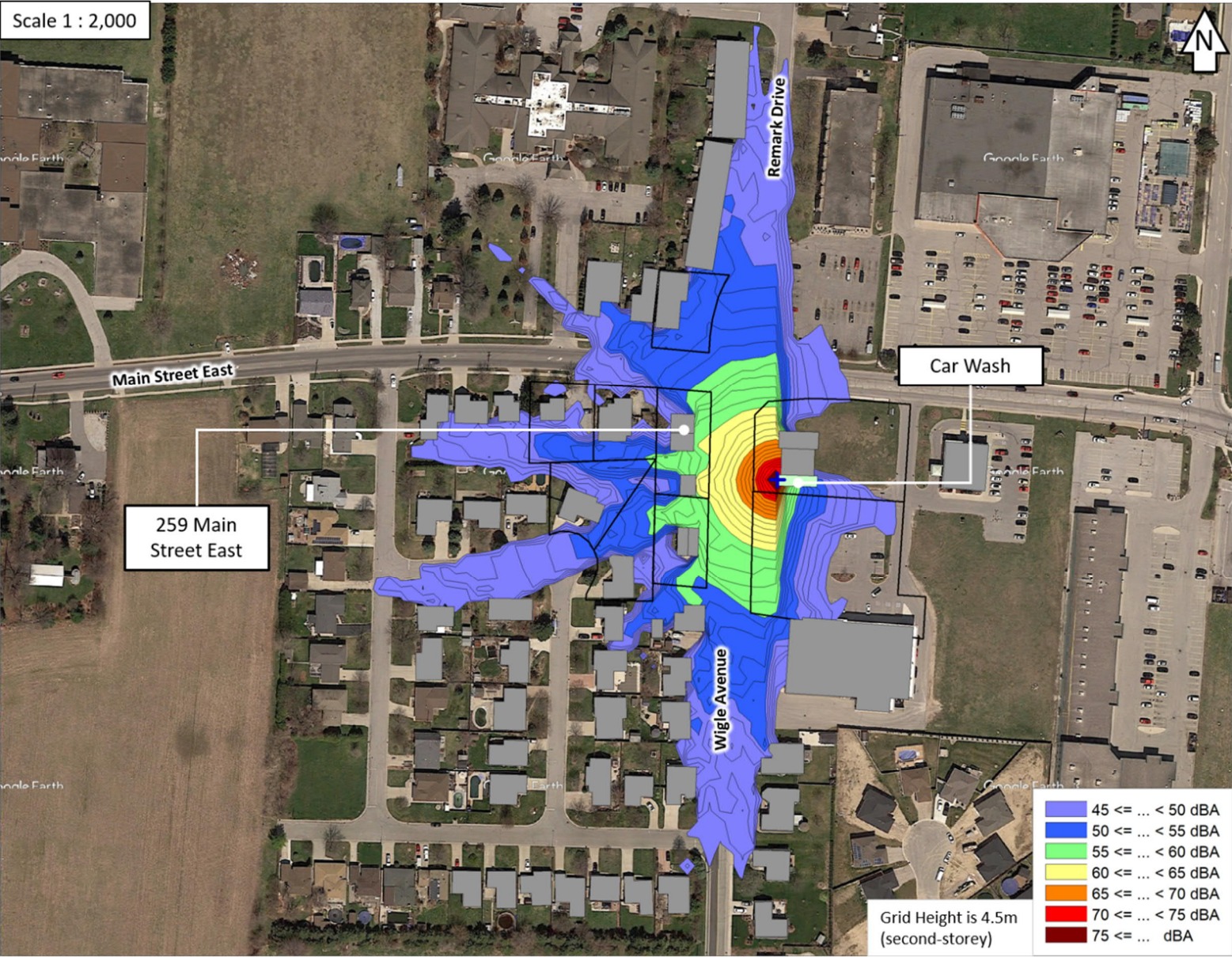


Figure 4: Noise Level Contours and Predicted Receptor Noise Levels (dBA) – Night-time Operations



## Appendix A

### Car Wash Site Plan

## Site Plan



1 SITE PLAN  
A00.2 1" = 25'-0"

## Appendix B

### Calibration Certificate

# ***CERTIFICATE of CALIBRATION***

Make : Norsonic

Reference # : 156546

Model : NOR140

Customer : Dillon Consulting Limited  
Oakville, ON

Descr. : Sound Level Meter Type 1

Serial # : 1403048

P. Order :

Asset # : NAN

Cal. status : Received in spec's, no adjustment made.

*Navair Technologies certifies that the above listed instrument was calibrated on date noted and was released from this laboratory performing in accordance with the specifications set forth by the manufacturer.*

*Unless otherwise noted in the calibration report a 4:1 accuracy ratio was maintained for this calibration.*

*Our calibration system complies with the requirements of ISO-17025 standard, working standards used for calibration are certified by or traceable to the National Research Council of Canada or the National Institute of Standards and Technology.*

Calibrated : Apr 08, 2019

By :



T. Beilin

Cal. Due : Apr 08, 2020

Temperature : 23 °C ± 2 °C    Relative Humidity : 30% to 70%

Standards used : J-216 J-303 J-512

## ***Navair Technologies***

**REPAIR AND CALIBRATION TRACEABLE TO NRC AND NIST**

6375 Dixie Rd. Mississauga, ON, L5T 2E7  
Phone : 905 565 1584

Fax: 905 565 8325

<http://www.navair.com>  
e-Mail: [service@navair.com](mailto:service@navair.com)

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# ***CERTIFICATE of CALIBRATION***

Make : Norsonic

Reference # : 156547

Model : 1251

Customer : Dillon Consulting Limited  
Oakville, ON

Descr. : Sound cal 114dB 1KHz

Serial # : 31746

P. Order :

Asset # : NAN

Cal. status : Received in spec's, no adjustment made.

*Navair Technologies certifies that the above listed instrument was calibrated on date noted and was released from this laboratory performing in accordance with the specifications set forth by the manufacturer.*

*Unless otherwise noted in the calibration report a 4:1 accuracy ratio was maintained for this calibration.*

*Our calibration system complies with the requirements of ISO-17025 standard, working standards used for calibration are certified by or traceable to the National Research Council of Canada or the National Institute of Standards and Technology.*

Calibrated : Apr 12, 2019

By :



J. Raposo

Cal. Due : Apr 12, 2020

Temperature : 23 °C ± 2 °C    Relative Humidity : 30% to 70%

Standards used : J-163 J-261 J-282 J-508

## ***Navair Technologies***

**REPAIR AND CALIBRATION TRACEABLE TO NRC AND NIST**

6375 Dixie Rd. Mississauga, ON, L5T 2E7

Phone : 800-668-7440

Fax: 905 565 8325

[http:// www.navair.com](http://www.navair.com)

e-Mail: [service@navair.com](mailto:service@navair.com)

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## Appendix C

### Noise Source Data

Source Description	Sound Power Level									Overall dBA
	Octave Spectrum dB									
	31.5	63	125	250	500	1000	2000	4000	8000	
Car Wash Exit (Drying Blowers)	106.5	108.9	103.8	103.6	104.2	101.5	99.3	94.7	89.8	106.7

Measurement Location	Sound Pressure Level									Overall dBA
	Octave Spectrum dB									
	31.5	63	125	250	500	1000	2000	4000	8000	
Nearest Residential Property Line (Figure 2)	74.5	69.2	69.0	70.2	71.9	66.0	65.6	60.4	54.2	72.9

## References

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International Organization for Standardization, ISO 9613-2: Acoustics – Attenuation of Sound During Propagation Outdoors Part 2: General Method of Calculation, Geneva, Switzerland, 1996.

Ministry of Environment Publication NPC-300, Environmental Noise Guideline, Stationary and Transportation Sources – Approval and Planning, October 2013.

Ontario Ministry of the Environment, Publication NPC-103, Procedures

Ontario Ministry of the Environment, Publication NPC-104, Sound Level Adjustments