

# **Noise Feasibility Study**

## **Proposed Residential Development**

### **Kemsley Farm**

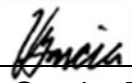
### **St. Thomas, Ontario**

Prepared for:

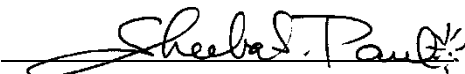
Doug Tarry Limited  
358 Elm Street  
St. Thomas, Ontario, N5R 1K1

Prepared by



  
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May 24, 2017

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**Figure 1: Key Plan**

**Figure 2: Proposed Draft Plan Showing Prediction Locations**

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**Appendix A: PSTR Spur Line Requirements**

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## 1 Introduction and Summary

HGC Engineering was retained by Doug Tarry Limited to perform a noise feasibility study for a proposed residential development located at Kemsley Farm, south of Southdale Line and west of the Port Stanley Terminal Rail (PSTR) railway, in St. Thomas, Ontario. The proposed development will consist of single family dwellings along with associated roadways. The analysis includes an assessment of rail traffic noise on the proposed residential dwellings in accordance with Ministry of the Environment and Climate Change (MOECC) and PSTR guidelines. The study is required by the municipality as part of the planning and approvals process.

Rail traffic data for the railway was obtained from PSTR personnel. Rail traffic data was used to predict future traffic sound levels at the façades of the proposed residential dwellings and in rear yard outdoor living areas. The predicted sound levels were compared to the guidelines of the MOECC and PSTR.

Sound levels are in excess of the MOECC limits at the first row of dwellings with exposure to the railway line due to the train whistle. Sound levels are below MOECC limits at the remaining dwellings further from the railway. Central air conditioning is required for dwellings in the first row from the railway. Brick exterior wall construction or an acoustical equivalent and upgraded window glazing constructions are required for the dwellings in the first row from the PSTR railway line. For the remaining dwellings, any double glazed window and wall construction meeting the minimum requirements of the Ontario Building Code (OBC) will provide adequate sound insulation. A warning clauses is required for all dwelling units within 300 m of the railway right-of-way to inform future residents of the presence of the nearby PSTR railway line.

Ground-borne vibration is not typically required for a spur line and therefore was not conducted. The PSTR has indicated that if the use of the railway line is increased from a tourist train operation to a railway line with freight and passenger trains occurs, further assessment of ground-borne vibration will be required at the closest proposed residential building façade.



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## 2 Site Description and Sources of Sound

Figure 1 shows a key plan which identifies the location of the proposed residential development. The development is located at Kemsley Farm, south of Southdale Line and west of the PSTR railway in St. Thomas, Ontario. The proposed development will consist of single family dwellings along with associated roadways. A proposed draft plan prepared by CJDL, dated March 31, 2017 is provided in Figure 2 also showing the prediction locations.

Rail traffic noise is the primary source of noise at the site. The surrounding lands are existing agricultural and residential lands. The PSTR railway line is located approximately 30 m east of the proposed site. There are no significant sources of stationary noise within 500 m of the subject site.

## 3 Criteria for Acceptable Sound Levels

### 3.1 Rail Traffic Noise Criteria

Guidelines for acceptable levels of rail traffic noise impacting residential developments are given in the MOECC publication NPC-300, “Environmental Noise Guideline Stationary and Transportation Sources – Approval and Planning”, Part C release date October 21, 2013 and are listed in Table 1 below. The values in Table 1 are energy equivalent (average) sound levels [ $L_{EQ}$ ] in units of A weighted decibels [dBA].

**Table 1: Rail Traffic Noise Criteria**

	<b>Daytime <math>L_{EQ}(16 \text{ hour})</math> Rail</b>	<b>Nighttime <math>L_{EQ}(8 \text{ hour})</math> Rail</b>
Outside Bedroom Windows	50 dBA	45 dBA
Outdoor Living Areas	55 dBA	--
Inside Living/Dining Rooms	40 dBA	40 dBA
Inside Bedrooms	40 dBA	35 dBA

These criteria apply to rail traffic operating on railway rights of way. Daytime refers to the period between 07:00 and 23:00, while nighttime refers to the period between 23:00 and 07:00. The term "Outdoor Living Area" (OLA) is used in reference to an outdoor patio, a backyard, a terrace or other

area where passive recreation is expected to occur. Balconies that are less than 4 m in depth are not considered to be outdoor living areas under MOECC guidelines.

Indoor guidelines are 5 dBA more stringent for rail noise than for road noise, to account for the low frequency (rumbling) character of locomotive sound, and its greater potential to transmit through exterior wall/window assemblies. A central air conditioning system as an alternative means of ventilation to open windows is required for dwellings where future nighttime sound levels outside bedroom windows will exceed 60 dBA. The provision for the future installation of central air conditioning is required when nighttime sound levels at bedroom windows are in the range of 51 to 60 dBA or when daytime sound levels at living/dining room windows are in the range of 56 to 65 dBA.

Sound attenuating building constructions and the use of warning clauses to notify future residents of possible excesses are also required when nighttime sound levels exceed 55 dBA at the plane of the bedroom window due to rail traffic noise.

Warning clauses to notify future residents of possible excesses are also required when nighttime sound levels exceed 50 dBA at the plane of the bedroom window and daytime sound levels exceed 55 dBA in the outdoor living area and at the plane of the living/dining room window due to rail traffic.

PSTR has recommended list of generic conditions, including specific setbacks, berm heights, and warning clauses, to reduce the incompatibility of residential developments adjacent or in proximity to the railway right-of-way. A copy of this list is included in Appendix A of this report.

## **4 Traffic Sound Level Assessment**

### **4.1 Rail Traffic Data**

Rail traffic data for typical operations of the PSTR railway were obtained from PSTR personnel and is provided in Appendix B. The PSTR railway line is a spur line and is used for tourist trains with small lightweight locomotives and coaches. The maximum permissible train speed in the area of the site is 24 km/h (15 mph). This maximum speed, as well as the maximum number of cars and

locomotives per train were used in the traffic noise analysis to yield a worst cast estimate of train noise. Table 2 summarises the rail traffic data used in the analysis.

**Table 2: Projected Rail Traffic Data**

Type of Train	Number of locomotives Day/Night	Number of cars Day/Night	Max Speed (km/h)	Current Volume Day/Night	Projected Daytime (07:00-23:00) trains	Projected Night-time (23:00-07:00) train
Passenger	1	4	24	1 / 0	2	1

## 4.2 Traffic Noise Predictions

Future traffic sound levels were predicted using STAMSON version 5.04, a computer algorithm developed by the MOECC. Sample STAMSON output is included in Appendix C.

Sound levels were predicted at the plane of the living/dining room windows during the daytime and at the plane of the bedroom windows during nighttime hours to investigate ventilation requirements. Sound levels were also predicted in the rear yard outdoor amenity areas to investigate barrier requirements. Whistle noise at Southdale Line crossing was included in the analysis since there are no crossing arms at the roadway. Whistle noise is not included in the outdoor amenity area calculations as per the MOECC guidelines. The results of these predictions, without mitigation, are summarized in Table 3 below.

**Table 3: Future Road Traffic Sound Levels, [dBA], Without Mitigation**

Prediction Location	Description	Daytime at Façade L <sub>EQ-16 hr</sub> *	Nighttime at Façade L <sub>EQ-8 hr</sub> *	Daytime in OLA L <sub>EQ-16 hr</sub>
[A]	Lots backing onto the railway	62	62	<55
[B]	Lots in second row from the railway	<55	50	<55

Note: \* Whistle noise is included in the calculated sound levels at the façades to inform the design of the building façade components. Whistle noise is not included in the calculated sound levels in the OLA's.

## 5 Traffic Noise Recommendations

The predictions indicate that the future traffic sound levels will exceed MOECC guidelines at the proposed residential buildings closest to the railway line. Recommendations to address these excesses are discussed below.

### 5.1 Outdoor Living Areas

The predicted daytime sound level in the outdoor amenity areas of the dwellings backing onto the railway (prediction location [A]) will be less than 55 dBA meeting the MOECC criteria. Sound levels in the remaining rear yards will also be less than 55 dBA. No physical mitigation in the form of noise berms or walls is required for the proposed dwellings.

### 5.2 Indoor Living Areas

#### Central Air Conditioning

The predicted future nighttime sound levels outside the plane of the bedroom windows of the proposed dwellings adjacent to the railway line is greater than 60 dBA. Central air conditioning systems are required so that windows may remain closed. The location, installation and sound ratings of the outdoor air conditioning devices should minimize noise impacts and comply with criteria of MOECC publication NPC-300.

The predicted sound levels at the remaining dwellings will be less than 55 dBA during the daytime and less than 50 dBA during the nighttime. No specific ventilation requirements are required for the indoor living areas of the proposed dwellings.

Figure 3 identifies the blocks requiring central air conditioning.

### 5.3 Building Façade Constructions

Future rail traffic sound levels outside the dwellings adjacent to the railway will exceed 60 dBA during the nighttime. MOECC guidelines recommend that the windows, walls and doors be designed so that the indoor sound levels comply with the noise criteria.

The required building components are selected based on the Acoustic Insulation Factor (AIF) value for rail traffic. To do so, calculations were performed to determine the AIF values required to maintain indoor sound levels within MOECC guidelines. The calculation methods were developed by the National Research Council (NRC). They are based on the predicted future sound levels at the building facades, and the anticipated area ratios of the facade components (walls, windows and doors) and the floor area of the adjacent room.

### ***Exterior Wall Construction***

According to railway guidelines, the dwellings in the row from the railway line will have sound levels exceeding 60 dBA during both nighttime hours. They will require brick or masonry exterior walls or the acoustical equivalent for all façades. Figure 3 indicates the blocks requiring brick exterior wall construction or an acoustical equivalent.

### ***Exterior Doors***

There may be glazed exterior doors (sliding or swing) for entry onto the balconies from living/dining rooms and some bedrooms. The glazing areas of the doors should be counted as part of the total window glazing area. All exterior doors should include good weather seals to reduce air infiltration to the minimum achievable levels.

### ***Acoustical Requirements for Glazing***

The minimum necessary specification for the east façade is Acoustical Insulation Factor, AIF-29 for bedrooms of the dwellings closest to the railway, based on the possibility of sound entering the dwelling through the windows only since the exterior wall is required to be brick. As a general guideline, a glazing construction with two panes of 3 mm glass and a 13 mm airspace will be sufficient for the dwelling units with exposure to the railway as long as the window to floor area ratio does not exceed 32% for bedrooms. If patio doors are to be used in the dwellings, they must be included in the window area.



For the remaining lots in the proposed development, any double glazed window and wall construction meeting the minimum requirements of the Ontario Building Code (OBC) will provide adequate sound insulation.

## 5.4 Warning Clauses

The MOECC guidelines recommend that warning clauses be included in the property and tenancy agreements and offers of purchase and sale for all units with anticipated traffic sound level excesses. Examples are provided below.

Suggested wording for the building with sound levels exceeding the MOECC criteria is given below:

Type A:

Purchasers/tenants are advised that despite the inclusion of noise control features in the development and within the building units, sound levels due to increasing rail traffic may on occasion interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the Municipality and the Ministry of the Environment and Climate Change.

Suitable wording for future dwellings requiring central air conditioning systems is given below.

Type B:

This unit has been supplied with a central air conditioning system which allows windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the noise criteria of the Municipality and the Ministry of the Environment and Climate Change.

These sample clauses are provided by the MOECC as examples and can be modified by the Municipality as required.

PSTR guidelines recommend that warning clauses be included in the property and tenancy agreements and offers of purchase and sale for all dwelling units located within 300 m near a spur lines will be required.

Type C:

Warning: Port Stanley Terminal Rail or its assigns or successors in interest has or have a rights-of-way within 300 metres from the land the subject hereof. There may be alterations to or expansions of the railway facilities on such rights-of-way in the future including the

possibility that the railway or its assigns or successors as aforesaid may expand its operations, which expansion may affect the living environment of the residents in the vicinity, notwithstanding the inclusion of any noise and vibration attenuating measures in the design of the development and individual dwelling(s). PSTR will not be responsible for any complaints or claims arising from use of such facilities and/or operations on, over or under the aforesaid rights-of-way.

## 6 Summary and Recommendations

The following recommendations are provided in regard to noise mitigation.

1. Central air conditioning, brick exterior walls or the acoustical equivalent and upgraded glazing constructions are required for the dwellings in the first row from the PSTR railway line.
2. Warning clauses are required to inform future residents of the sound level excesses and the presence of the nearby PSTR railway line to the east of the site.

The reader is referred to the previous sections of this report where these recommendations are discussed in more detail.

**Table 4: Summary of Noise Control Requirements and Noise Warning Clauses**

Prediction Locations	Acoustic Barrier	Ventilation Requirements*	Type of Warning Clause	Brick exterior wall construction +
[A] – blocks backing onto railway line	--	Central A/C	A, B, C	✓
Dwellings within 300 m of PSTR railway line	--	--	C	--
Remaining Dwellings	--	--	--	--

Notes: -- no specific requirement

\* The location, installation and sound rating of the air conditioning condensers must be compliant with MOE Guideline NPC-300, as applicable

LRDR – Living Room/Dining Room

BR – Bedroom

OBC – Ontario Building Code

+ or an acoustical equivalent

## 6.1 Implementation

To ensure that the noise control recommendations outlined above are fully implemented, it is recommended that:

1. Prior to the issuance of building permits for this development, the Municipality's building inspector or a Professional Engineer qualified to perform acoustical engineering services in the Province of Ontario should certify that the noise control measures have been properly incorporated in the design of the dwelling units.
2. Prior to assumption of the subdivision, the Municipality's building inspector or a Professional Engineer qualified to perform acoustical engineering services in the Province of Ontario should certify that the noise control measures have been properly installed and constructed.



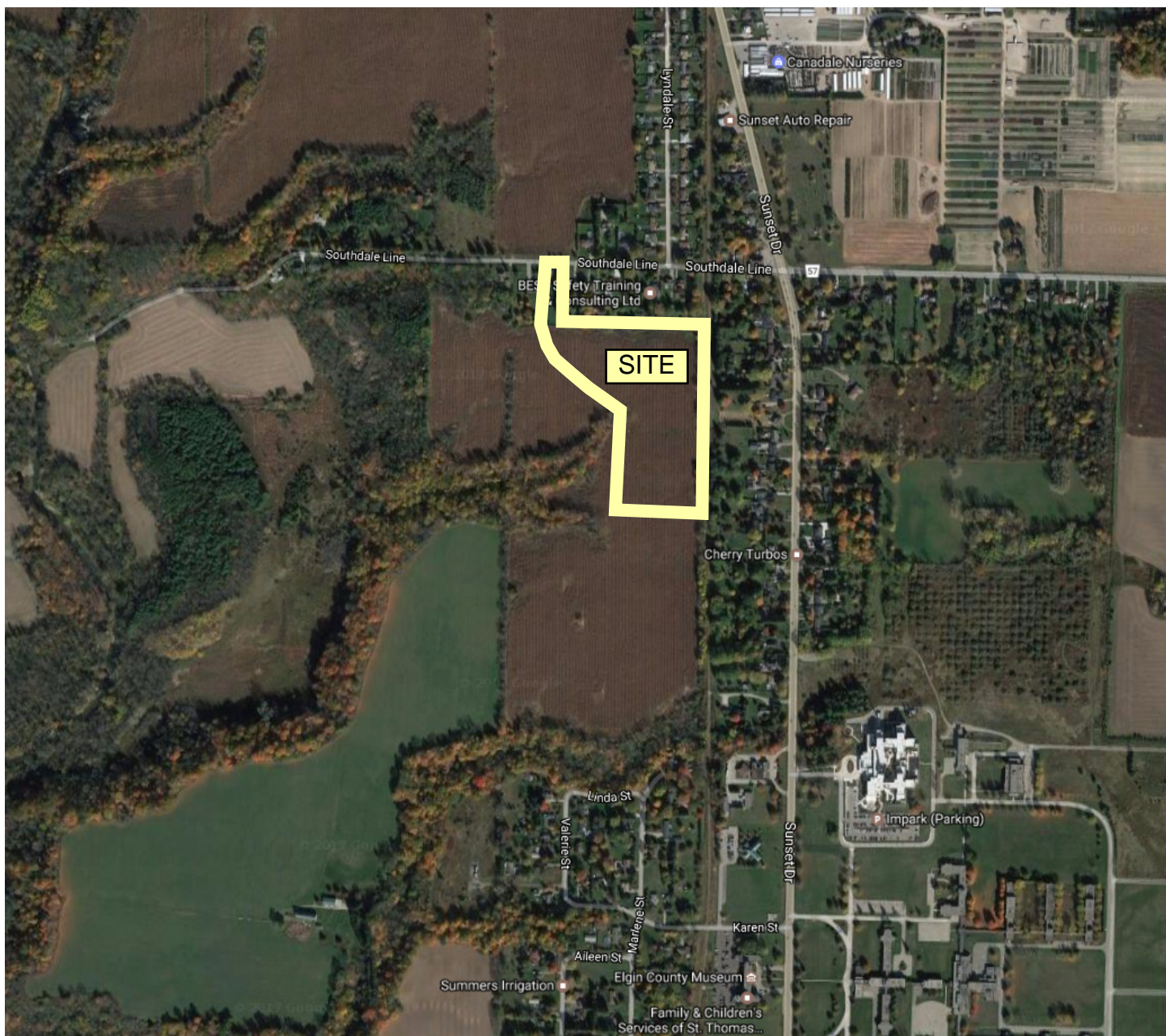
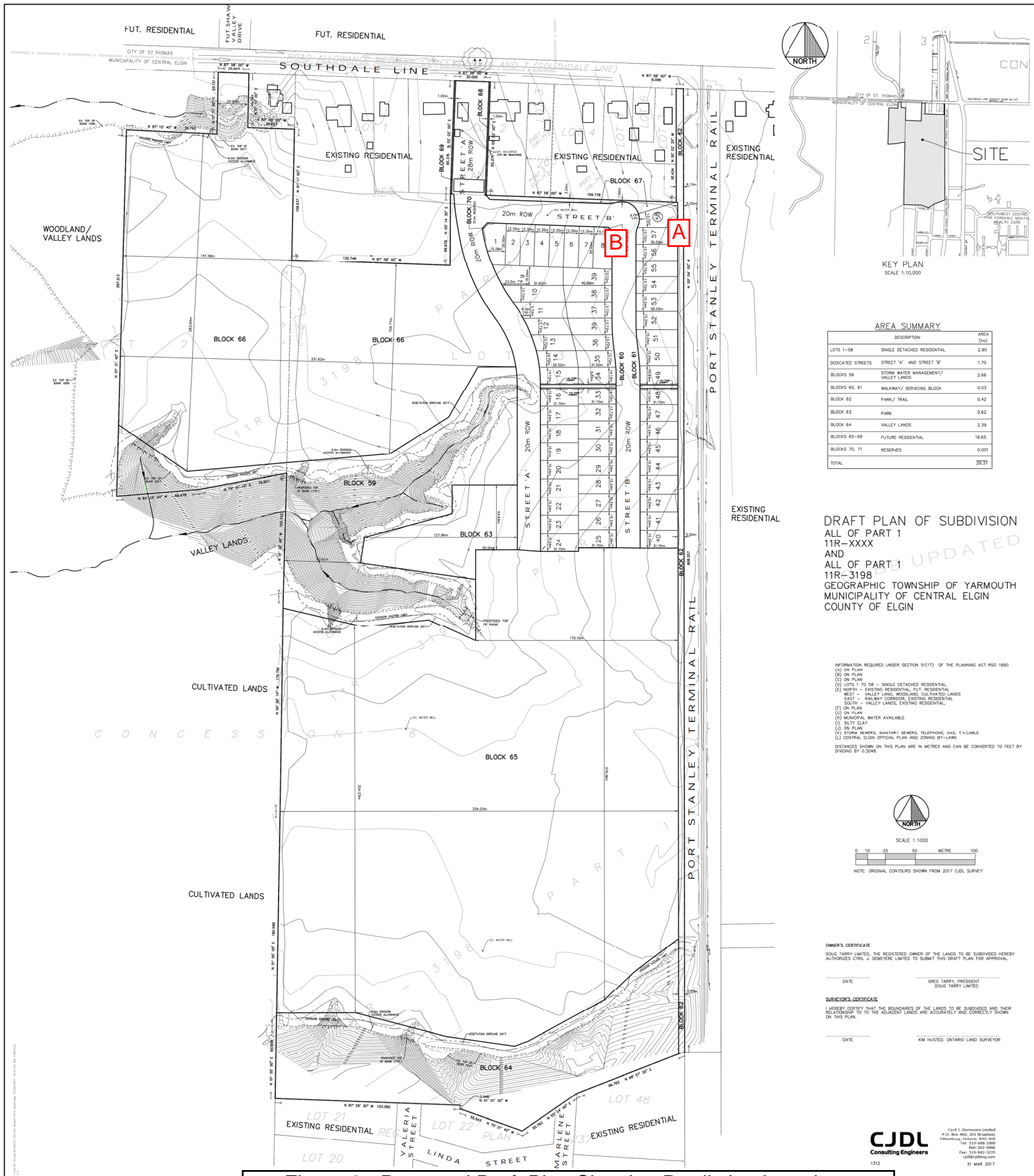
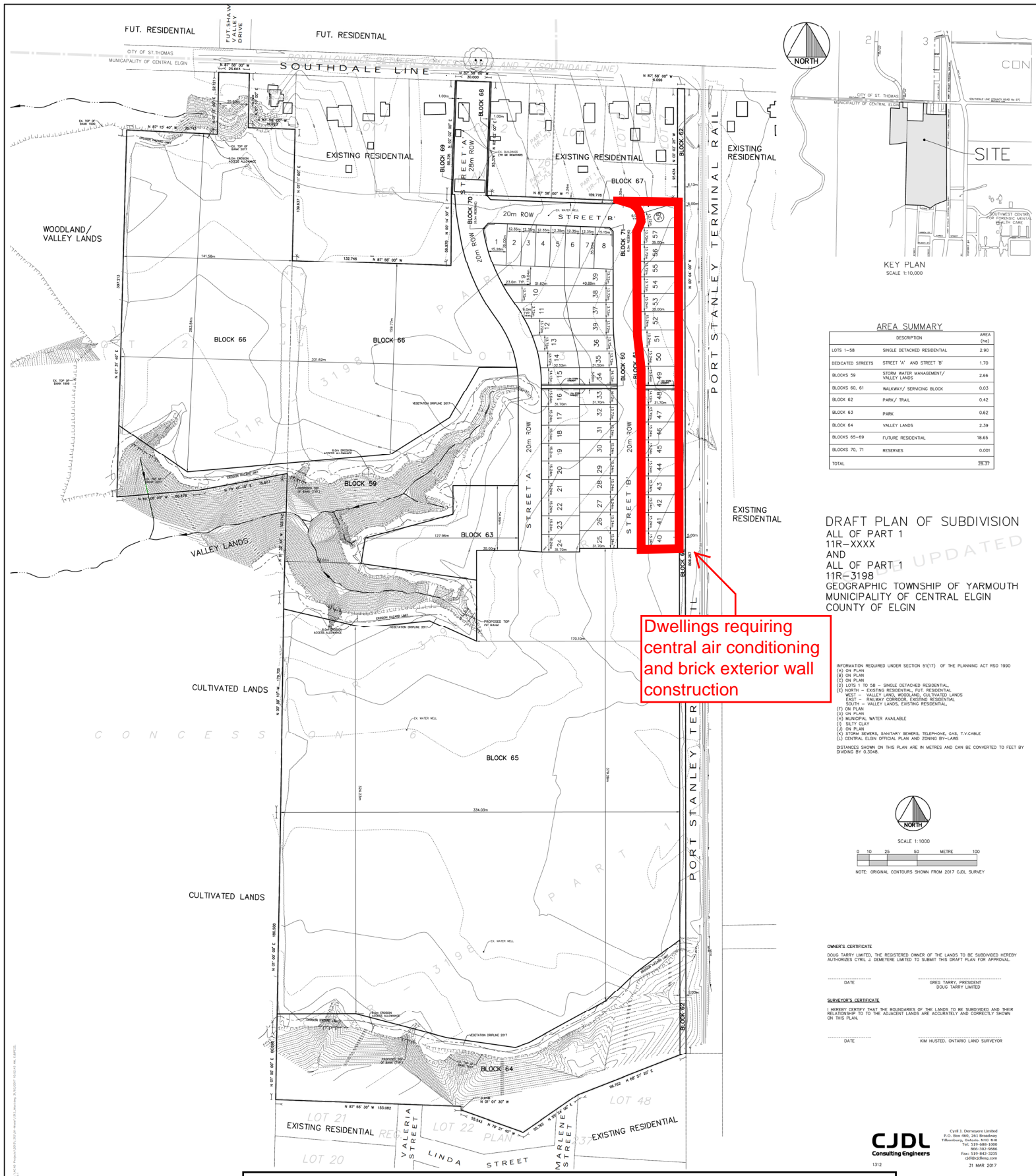


Figure 1 - Key Plan







# **APPENDIX A**

## **PSTR Spur Line Requirments**



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## SPUR REQUIREMENTS

- A. Safety setback of dwellings from the railway rights-of-way to be a minimum of 15 metres.
- B. The Developer/Owner shall, as a minimum, install and maintain a chain link fence of minimum 1.83 metre height along the mutual property line. The Developer/Owner may conduct this work up to 3 metres on the PSTR side of the mutual property line as to not interfere with normal train operations.
- C. The following clause should be inserted in all development agreements, offers to purchase, and agreements of Purchase and Sale or Lease of each dwelling unit within 300m of the railway right-of-way: "Warning: Port Stanley Terminal Rail or its assigns or successors in interest has or have a rights-of-way within 300 metres from the land the subject hereof. There may be alterations to or expansions of the railway facilities on such rights-of-way in the future including the possibility that the railway or its assigns or successors as aforesaid may expand its operations, which expansion may affect the living environment of the residents in the vicinity, notwithstanding the inclusion of any noise and vibration attenuating measures in the design of the development and individual dwelling(s). PSTR will not be responsible for any complaints or claims arising from use of such facilities and/or operations on, over or under the aforesaid rights-of-way."
- D. Any proposed alterations to the existing drainage pattern affecting railway property must receive prior concurrence from the Railway and be substantiated by a drainage report to the satisfaction of the Railway.
- E. The Developer/Owner shall through restrictive covenants to be registered on title and all agreements of purchase and sale or lease provide notice to the public that the fencing, and if necessary the safety berm, and vibration isolation measures implemented are not to be tampered with or altered and further that the Developer/Owner shall have sole responsibility for and shall maintain these measures to the satisfaction of PSTR.
- F. The Developer/Owner enter into an Agreement stipulating how PSTR's concerns will be resolved and will pay PSTR's reasonable costs in preparing and negotiating the agreement.
- G. The Developer/Owner may be required to grant PSTR an environmental easement for operational noise and vibration emissions, registered against the subject property in favour of PSTR.
- H. The owner acknowledges that should the usage on the Right of Way change the following caveats are in place.
  - 1. The fence as noted in paragraph B may be augmented with a safety berm. The safety berm shall be adjoining and parallel to the railway rights-of-way with returns at the ends, 2.0 metres above grade at the property line, with side slopes not steeper than 2.5 to 1
  - 2. Ground-borne vibration transmission to be evaluated in a report through site testing to determine if dwellings within 75 metres of the railway rights-of-way will be impacted by vibration conditions in excess of 0.14 mm/sec RMS between 4 Hz and 200 Hz. The monitoring system should be capable of measuring frequencies between 4 Hz and 200 Hz,  $\pm 3$  dB with an RMS averaging time constant of 1 second. If in excess, isolation measures will be required to ensure living areas do not exceed 0.14 mm/sec RMS on and above the first floor of the dwelling.
- I. The cost of all measures above will be borne by the Developer/Owner.



## **APPENDIX B**

### Rail Traffic Data



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## Victor Garcia

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**From:** Deren Lyle <dlyle@cjd leng.com>  
**Sent:** January-23-17 8:30 AM  
**To:** Bill Gastmeier; Sheeba Paul; Jim Mallett; Heather Goodman  
**Cc:** Nicole Ooms  
**Subject:** FW: Kemsley Farm, DTL - PSTR Background Info Request

Hi Bill/Sheeba and Jim/Heather,

See response below received from Dan Vernackt of PSTR.

Dan did not directly answer question regarding anticipated train traffic. For now, please assume that the train traffic volumes of: "one train out and back each day for 50 days in the summer consisting of 1 yard engine and up to 4 cars" remains valid.

Please feel free to contact Dan directly if further information is required. If there are any questions, please do not hesitate to contact this office.

Regards,

Deren Lyle, P. Eng.  
Design Engineer



Cyril J. Demeyere Limited  
Consulting Engineers  
261 Broadway, P.O. Box 460  
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---

**From:** Dan Vernackt [mailto:[Dan@PSTR.on.ca](mailto:Dan@PSTR.on.ca)]  
**Sent:** January-21-17 10:15 AM  
**To:** 'Deren Lyle' <[dlyle@cjd leng.com](mailto:dlyle@cjd leng.com)>  
**Subject:** FW: Kemsley Farm, DTL - PSTR Background Info Request

Deren, In response to your questions :

The track speed remains at 15 MPH. Trains are comprised of different locomotives we own and / or operate along with a variation of passenger coaches depending on our needs. The schedule can also change along with destination. As more trackage opens up in the St. Thomas area, we could see the possibility of more traffic. All OMB orders were superseded by the passing of the Ontario Provincial shortline railways act in 1996. Therefore PSTR is now a 24 hour seven day per week operation.

Hopefully this answers some of your questions.

Regards,

Dan Vernackt  
President, PSTR

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**From:** Deren Lyle [<mailto:dlyle@cjdeng.com>]  
**Sent:** Tuesday, January 17, 2017 1:23 PM  
**To:** Dan Vernackt  
**Cc:** Nicole Ooms; Greg Tarry; John D. Wiebe; Heather Goodman  
**Subject:** Kemsley Farm, DTL - PSTR Background Info Request

Hi Dan,

In advance of our meeting on 23 January 2017, we are passing on a few questions received from the Noise and Vibration consultant. The consultant retained to complete this study is HGC Engineering, who you may recall worked on this project for Springwater Developments Inc. c. 2006 when they were exploring development of the Kemsley lands.

If you have time, we would appreciate if you could review and provide answers to the questions below in advance of the meeting to allow time for HGC to complete background research and calculations:

- i. In 2006 we had understood that the maximum speed was 15 miles per hour, there was typically one train out and back each day for 50 days in the summer consisting of 1 yard engine and up to 4 cars.
- ii. Have rail speeds, daily/weekly volumes or the numbers of locomotives and cars making up each train changed since 2006? Has there been any nighttime traffic (ie between 11:00 pm and 7:00 am)? In 2006, there was a possibility of operating until midnight on weekends – still possible?
- iii. Is the OMB order that PSTR was currently operating under still valid?

Thanks for your consideration of the above. Any other information you are able to share in advance of the meeting is of course welcome.

If there are any questions, please do not hesitate to contact this office.

Regards,

Deren Lyle, P. Eng.  
Design Engineer



Cyril J. Demeyere Limited  
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Phone: 519-688-1000 / 866-302-9886  
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E-mail: [dlyle@cjdeng.com](mailto:dlyle@cjdeng.com)

No virus found in this message.

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Version: 2016.0.7996 / Virus Database: 4749/13788 - Release Date: 01/17/17

## **APPENDIX C**

Sample STAMSON 5.04 Output



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

Description: Lots backing onto the railway

Rail data, segment # 1: PSTR (day/night)

Train Type	! Trains ! (Left)	! Trains ! (Right)	! Speed ! (km/h)	! # Loc ! /Train!	! # Cars ! /Train!	! Eng type !	! Cont ! weld
1. Tour	1.0/0.5	1.0/0.5	24.0	1.0	4.0	Diesel	No

Data for Segment # 1: PSTR (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	:	29.80 / 29.80 m		
Receiver height	:	4.50 / 4.50 m		
Topography	:	1	(Flat/gentle slope; no barrier)	
Whistle Angle	:	-85 deg	Track 1	
Reference angle	:	0.00		

Results segment # 1: PSTR (day)

LOCOMOTIVE (0.00 + 44.85 + 0.00) = 44.85 dBA

Angle1	Angle2	Alpha	RefLeq	D. Adj	F. Adj	W. Adj	H. Adj	B. Adj	SubLeq
-90	90	0.50	50.47	-4.46	-1.17	0.00	0.00	0.00	44.85

WHEEL (0.00 + 33.41 + 0.00) = 33.41 dBA

Angle1	Angle2	Alpha	RefLeq	D. Adj	F. Adj	W. Adj	H. Adj	B. Adj	SubLeq
-90	90	0.60	39.53	-4.77	-1.35	0.00	0.00	0.00	33.41

LEFT WHISTLE (0.00 + 39.21 + 0.00) = 39.21 dBA

Angle1	Angle2	Alpha	RefLeq	D. Adj	F. Adj	W. Adj	H. Adj	B. Adj	SubLeq
-88	-85	0.50	67.86	-4.46	-24.19	0.00	0.00	0.00	39.21

RIGHT WHISTLE (0.00 + 61.80 + 0.00) = 61.80 dBA

Angle1	Angle2	Alpha	RefLeq	D. Adj	F. Adj	W. Adj	H. Adj	B. Adj	SubLeq
-85	63	0.50	67.86	-4.46	-1.60	0.00	0.00	0.00	61.80

Segment Leq : 61.92 dBA

Total Leq All Segments: 61.92 dBA

Results segment # 1: PSTR (night)

LOCOMOTIVE (0.00 + 44.85 + 0.00) = 44.85 dBA

Angle1	Angle2	Alpha	RefLeq	D. Adj	F. Adj	W. Adj	H. Adj	B. Adj	SubLeq
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# A. TXT

-90	90	0.50	50.47	-4.46	-1.17	0.00	0.00	0.00	44.85
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WHEEL (0.00 + 33.41 + 0.00) = 33.41 dBA  
 Angle1 Angle2 Alpha RefLeq D. Adj F. Adj W. Adj H. Adj B. Adj SubLeq

-90	90	0.60	39.53	-4.77	-1.35	0.00	0.00	0.00	33.41
-----	----	------	-------	-------	-------	------	------	------	-------

LEFT WHISTLE (0.00 + 39.21 + 0.00) = 39.21 dBA  
 Angle1 Angle2 Alpha RefLeq D. Adj F. Adj W. Adj H. Adj B. Adj SubLeq

-88	-85	0.50	67.86	-4.46	-24.19	0.00	0.00	0.00	39.21
-----	-----	------	-------	-------	--------	------	------	------	-------

RIGHT WHISTLE (0.00 + 61.80 + 0.00) = 61.80 dBA  
 Angle1 Angle2 Alpha RefLeq D. Adj F. Adj W. Adj H. Adj B. Adj SubLeq

-85	63	0.50	67.86	-4.46	-1.60	0.00	0.00	0.00	61.80
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Segment Leq : 61.92 dBA

Total Leq All Segments: 61.92 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 61.92 dBA  
 (NIGHT): 61.92 dBA