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March 05, 2024

Craig Schroeder
Canyon Ridge Construction Ltd.
25143 Poplar Hill Rd.
Denfield, ON N0M 1P0
craig@canyonridge.ca
O: 519 614 2158

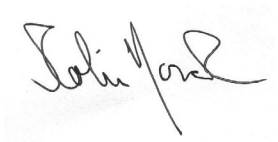
Re: Noise impact brief in support of a zoning by-law amendment application for a proposed residential development at 564 Dewan Street, Municipality of Strathroy-Caradoc

Dear Mr. Schroeder,

Please find enclosed a noise impact brief for the proposed residential development at 564 Dewan Street, in the Municipality of Strathroy-Caradoc. This assessment pertains to the potential noise impacts on existing residential dwellings from outdoor condenser units and a nearby driveway at a proposed adjacent residential development.

I trust that the enclosed information meets your requirements. Please do not hesitate to contact me if you have any questions.

Sincerely,



Colin Novak PhD, PEng

Noise Impact Brief in Support of a Zoning By-Law Amendment Application for a Proposed Residential Development at 564 Dewan Street, Municipality of Strathroy-Caradoc

Craig Schroeder
Canyon Ridge Construction Ltd.
25143 Poplar Hill Rd.
Denfield, ON N0M 1P0

March 05, 2024

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Statement of Liability

Akoustik Engineering Limited prepared this report for Canyon Ridge Construction Ltd.. The material in it reflects Dr. Helen Ule's and Dr. Colin Novak's judgement considering the information available to them and Akoustik Engineering Limited at the time of the measurements and report preparation, under the stated test conditions. Any use that a Third Party makes of this report, or any reliance on decisions made based on it, is the responsibility of such Third Parties. Akoustik Engineering Limited accepts no responsibility for damages, if any, suffered by any Third Party resulting from decisions made or actions based on this report.

Introduction

This report is a noise study for a proposed 6-unit townhouse development to be located at 564 Dewan Street, in the Municipality of Strathroy-Caradoc. The assessment pertains only to the potential noise impacts from the proposed outdoor condenser units (outdoor component of an air conditioner unit) and driveway associated with a proposed residential development. An illustration of the geographical area with the proposed development area and layout is given in Appendix A: Site Location. Any recommended abatement to control noise is included in this report.

Purpose of Noise Study

Middlesex County has requested that Technical Publication NPC-216 "Residential Air Conditioners" of the Toronto Municipal Code [1993] and the applicable Ministry of the Environment, Conservation and Parks (MECP) Guideline NPC-300 be considered for the study of the potential noise impacts from the outdoor HVAC condenser units and a driveway on existing adjacent residential homes from a proposed residential development. The located of the proposed residential development is 564 Dewan Street. The adjacent homes are immediately north of the proposed driveway and south of the proposed HVAC condenser units.

Ontario Ministry of Environment and Energy (NPC-216)

In accordance with the Ministry of Environment and Energy Guideline NPC-216, the following sound level limits for residential developments of a Class 2 area have been set and are shown in Table 1 below. Select pages from the NPC-216 guideline have been included in Appendix B: NPC-216 Reference Pages for reference. The proposed development is classified as a Class 2 area, given that the region exhibits features of both a Class 1 and a Class 3 area, based on the environmental noise characteristics. It is worth noting that when the sound level limits presented in Table 1 are exceeded, noise control abatement is required.

Table 1: Ministry of Environment and Energy Noise Criteria for a Class 2 Area

Point of Reception Location	One Hour LA_{eq} [dBA]
Outdoor (OLA)	45
Plane of Window	45

Ministry of the Environment and Climate Change Noise Criteria for Stationary Noise (NPC-300)

In accordance with the MECP Guideline NPC-300, the following sound level limits for residential developments of Class 2 have been set and are shown in Table 1 below. Select pages from the NPC-300 guideline have been included in Appendix C: NPC-300 Reference Pages for reference. It is worth noting that when the sound level limits presented in 2 are exceeded, noise control abatement is required. It should

be noted that residential HVAC is not defined by NPC-300 to be a stationary sources of noise since it is an industrial/commercial source. However, consideration of the noise limits given in NPC-300 are included in this study as a point of reference.

Table 2: Ministry of the Environment and Climate Change Noise Criteria for a Class 2 Area

Point of Reception Location	Daytime LA_{eq} [dBA]	Evening LA_{eq} [dBA]	Nighttime LA_{eq} [dBA]
Outdoor (OLA)	50	45	--
Plane of Window	50	50	45

From Table 2, daytime refers to the period from 07:00 to 19:00, evening refers to the period from 19:00 to 23:00 and nighttime refers to the period from 23:00 to 07:00 hours.

Assessment Approach

As seen in Tables 1 and 2 above, consideration of the noise limits given in NPC-216, compared to the provincial limits set in NPC-300, results in the a lower noise limit (45 dBA) in NPC-216 during the day/evening compared to a day/evening limit of 50 dBA prescribed by NPC-300. However, both guidelines have the same nighttime noise limit of 45 dBA. For this study, the noise limits set in NPC-216 will be used for the evaluation given that the HVAC units will operate at any time through a 24 hour period, and thus an operating limit of 45 dBA is necessary to meet both guidelines for day/evening/night hour operations.

HVAC Noise

To predict the noise impacts from the HVAC condenser units, the expected spectral sound power levels for the noise sources are used as input into a noise propagation model. The sound power levels for the air conditioning (AC) units for this study were taken from manufacturer data for three proposed manufacturer models proposed to be installed at the proposed townhouse development. Each townhouse was modelled to have one unit, totalling six identical AC units. The input sound power level data used for the models is included in Appendix D: Noise Source Sound Power. This report considers a worst-case hour occurring when all six air conditioner units operate simultaneously and at a 100% duty cycle.

For this study three proposed AC models are modelled, considered, and compared. A summary table showing the noise sources is given in Table 3.

Table 3: Noise Source Data Summary

Source ID	Source Description	Sound Power Level (dBA)	Sound Characteristics	Noise Control Measures
AC unit	AC Unit – Tempstar Deluxe TVA9	64	S	U
AC unit	AC Unit – Kerr Energy A-KCD24SA-1	72	S	U
AC unit	AC Unit – Lennox 13ACX	84	S	U

where:

N/N	No noise	C	Cyclic
N/A	Not available	Si	Silencer, acoustic louver, muffler
O	Located/installed outside the building	A	Acoustic lining, plenum
I	Located/installed inside building	Ba	Barrier, berm, screening
S	Steady	L	Lagging
Q	Quasi steady impulsive	E	Acoustic Enclosure
Im	Impulsive	Ot	Other
B	Buzzing	U	Uncontrolled
T	Tonal		

Identification of the Representative Receptor Locations

Upon examination of the proposed townhouse development, the nearest receptor to the condenser units is to the south of the development at 560 Dewan Street. The evaluated receptor locations are as follows:

- POR 1 on north façade at 560 Dewan Street, 1.5 m (no second storey windows)
- OLA 1 at north/rear of POR1, 1.5 m

The noise impacts are predicted at both the plane of the window and applicable outdoor living areas (OLA) for each POR. For the choosing of the representative OLAs, NPC-300 states:

> *"outdoor living area (OLA)" (applies to impact assessments of transportation sources) means that part of a noise sensitive land use that is:*
>
> - *intended and designed for the quiet enjoyment of the outdoor environment; and*
> - *readily accessible from the building*
>
> *The OLA includes:*
>
> - *backyards, front yards, gardens, terraces or patios;*
> - *balconies and elevated terraces (e.g., rooftops), with a minimum depth of 4 metres, that are not enclosed, provided they are the only outdoor living area (OLA) for the occupant; or*
> - *common outdoor living areas (OLAs) associated with high-rise multi-unit buildings.*

A zoning map of the area is given in Appendix A: Land-use and Transportation Plan. The proposed development is currently zoned residential and is surrounded by residential land.

Evaluation of HVAC Noise at Identified Points of Reception

Table 4 shows the Noise Impact Table for the worst case one hour period at the adjacent POR and OLA locations at 560 Dewan Street without the implementation of noise attenuation measures. The purpose of this table is to report the predicted unattenuated noise emission levels from the identified significant noise

sources identified in the Noise Source Summary Table (Table 3) at the identified points of reception. Noise impacts which exceed the NPC-216 guideline are highlighted in red.

The software used to model the predicted noise impacts is the Brüel & Kjær Predictor Type 7810 software. This software complies with the procedure specified by ISO 9613. As such, the prediction model considers the sound level attenuation of the inputted sound power data with distance as well as any attenuation provided by shielding, absorption etc. Any assumptions used in the development of the noise propagation model, including source heights, operating hours and duty cycles, acoustic ground absorption coefficient, etc. are identified in Appendix E. Appendix F has the input data used for the Predictor models, including the scaled aerial maps which illustrate the relative locations for the significant sources of noise.

For the identified sources of noise, the measured source sound pressures are corrected for distance, directional characteristics, and other absorption effects before estimation of sound power and subsequent prediction of the sound level at the points of reception. For this, the model uses the following general equation:

$$L_w = L_P + 20\log(r) + 11 \pm DI_\theta \pm ground\ \&\ atmospheric\ corrections$$

Results and Noise Control Requirements

The following section is a summary and assessment of the modeled results for the representative unit with respect to stationary sources of noise.

HVAC Noise

Using the Brüel & Kjær Predictor software, the impacts on the identified POR from the noise sources, in absence of any ambient noise contributors from nearby road and rail traffic or other stationary noise sources was calculated. Appendix G gives the Predictor model outputs, which includes the identifying labels for the representative point of reception (POR).

Table 4: POR/OLA Noise Levels Worst Case Hour (dBA) – No Noise Barrier

POR/OLA	Tempstar Deluxe TVA9	Kerr Energy A-KCD24SA-1	Lennox 13ACX
POR	40.1	48.1	60.1
OLA	40.3	48.4	60.1

*red text denotes exceedance

The predicted noise level impacts for the representative levels with no control measures are given in Table 4 above. From this table, it is seen that the NPC-216 noise limits are exceeded at both the plane of window and OLA locations if the Kerr Energy A-KCD24SA-1 or Lennox 13ACX model AC units are installed. No abatement is required if the Tempstar Deluxe TVA9 unit is installed.

It should be further noted that the Tempstar Deluxe TVA9 unit includes features such as an acoustic absorbing compressor blanket, a variable speed fan that reduces vibration, and a soft mount pad for the

compressor. These features provide the necessary reduction in noise levels to eliminate the need for the installation of a noise barrier.

Noise Barrier Details

If the Kerr Energy A-KCD24SA-1 or Lennox 13ACX model AC units are chosen to be installed, a noise barrier in front of the units is required to bring the noise levels at the identified sensitive points of reception within compliance of the NPC-216 guideline. No barrier is required for the Tempstar model. For the case of installing a barrier, a 1.83 metre [6 foot] tall (length of approximately 2.44 metres [8 feet]) noise barrier located 1 metre away (to the south of) each AC unit is required to bring the Kerr Energy A-KCD24SA-1 units into compliance. The Lennox 13 ACX would require a barrier height that is not feasible and therefore this unit is not recommended as it is not a viable option. The location of the barriers are illustrated in the sketch given in Appendix H.

Table 5 summarizes the barrier requirements depending on the AC unit chosen.

Table 5: Barrier Requirements Based on AC Model

AC Model	Barrier Requirement (located 1 m away from each AC unit)
Tempstar Deluxe TVA9	None
Kerr Energy A-KCD24SA-1	1.83 m [6'] tall, 2.44 m [8'] long
Lennox 13ACX	Not feasible

Care must be given to the design and construction of the noise barrier to meet the MECP guidelines for a noise attenuation barrier. That is, it must be constructed to have a minimum surface mass density of 20 kg/m^2 and have no gaps within the fence or between the fence and the ground other than 0.05 m to allow for drainage. If constructed of wood, it may not have any gaps between adjacent boards which can be accomplished by having the material on each side of the fence overlap one other.

Driveway Noise Discussion

The MECP Noise Pollution Control documents (NPC-300) provides limits and guidelines which are applied to planning decisions concerning noise sensitive land uses that are proposed adjacent to road transportation corridors and other facilities such as, but not limited to, airports, industrial facilities, railway yards, aggregate facilities and major commercial facilities. Parking lots and residential driveways are not considered in this guideline, and therefore no limits for noise are given. In fact, in order to be able to use the MECP protocol for predicting automobile noise, the traffic must have a minimum of 40 vehicles per hour of traffic, travelling at a minimum 40 km/hr, and the distance from the vehicle pathway to the nearest point of reception must be at least 15 metres. These criteria do not apply to a residential driveway, particularly one immediately adjacent to the property line. In fact, consideration of passenger vehicle noise is exempt in NPC-300 in the consideration of industrial/commercial sites. As such, the evaluation of the residential driveway noise is not further considered in this noise assessment.

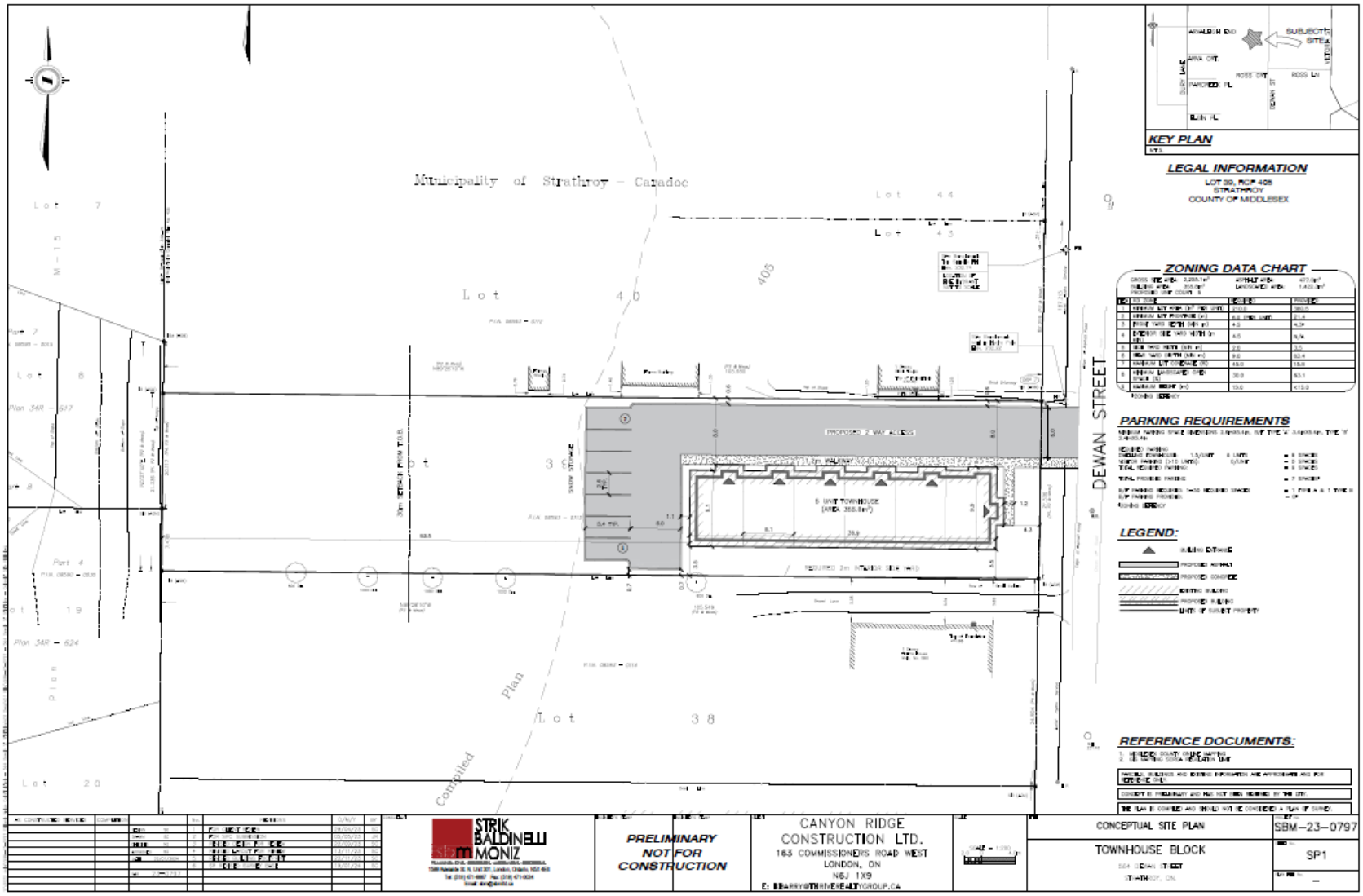
Conclusion

The noise impact on the nearest point of reception has been shown in this report to meet the limits set by the Ministry of Environment and Energy given the appropriate selection of air conditioner (outdoor condenser unit) and barrier combination. Residential driveway noise is not applicable to the MECP protocols for traffic noise or the limits and guidelines given in NPC-300. It is recommended that the development be given approval with the understanding that the above recommendations for the installation and abatement of the AC condenser units are implemented.

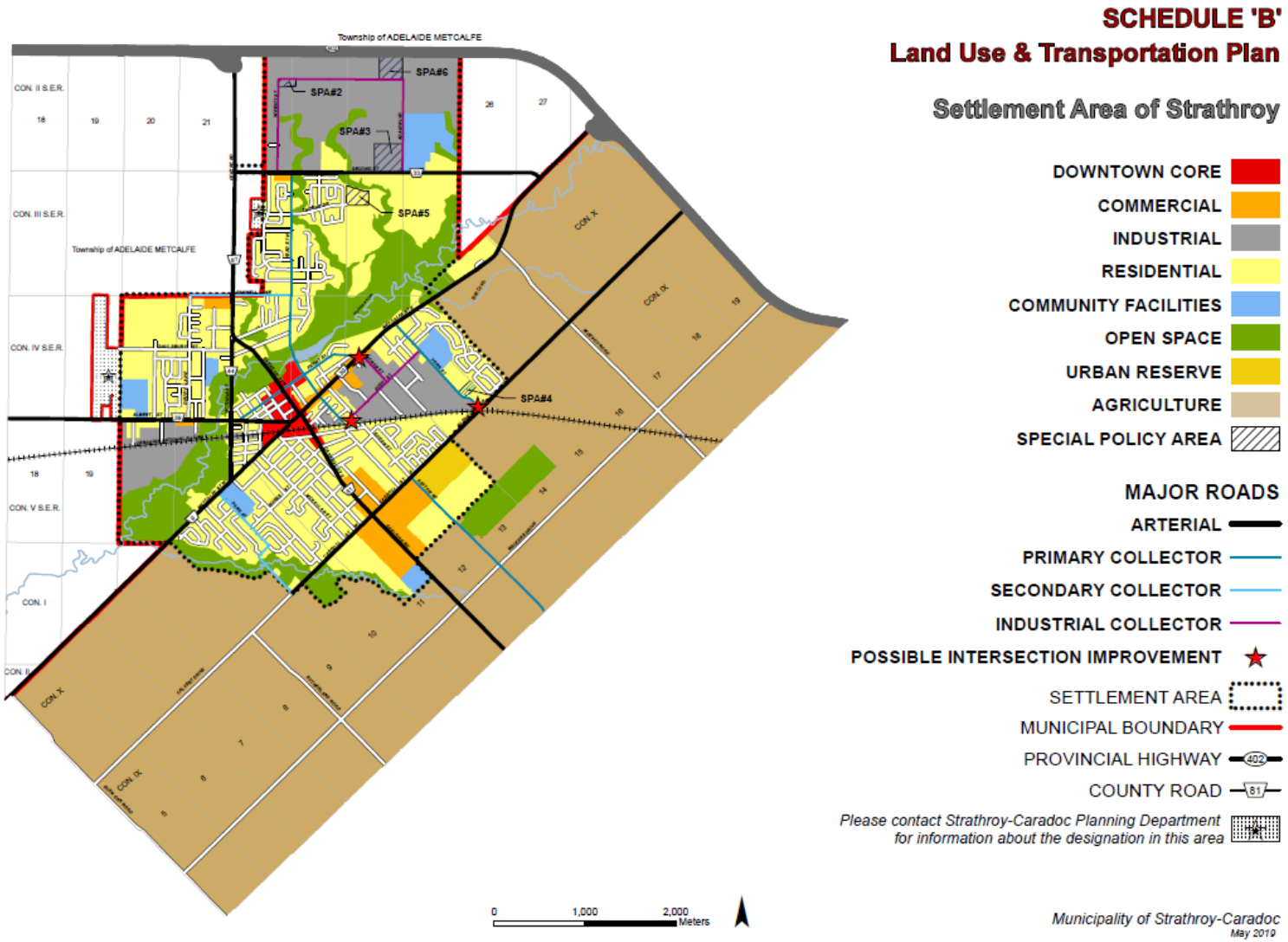
For akoustik engineering limited		
	Prepared by: **Helen Ule, Ph.D., PEng**	**Reviewed by:** **Colin Novak, Ph.D., PEng**

Appendix A: Site Location

A 1: General Location of Proposed Development and Surrounding Area



A 2:Proposed Development Site Plan



A 3:Land Use and Transportation Plan; Municipality of Strathroy-Caradoc

Appendix B: NPC-216 Reference Pages

(2) Establishment of the General Sound Level Limit

The general sound level limit shall be established through measurements or calculation of the One Hour Equivalent Sound Level (L_{eq}) caused by road traffic as obtained pursuant to Reference [6] at the point of reception.

(3) Specific Sound Level Limits

Specific sound level limits are identified in Table 216-2 for two types of residential air conditioning devices as minimum limits of compliance.

TABLE 216-2
SPECIFIC SOUND LEVEL LIMITS

Central Air Conditioning Devices	
Area Type	One Hour L_{eq} (dBA)
Class 2	45
Class 1	50*
Window or Through-the-Wall Air Conditioning Devices	
Area Type	One Hour L_{eq} (dBA)
Class 2	45
Class 1	50

* When the devices are mandatory requirements for noise control in the interior living spaces of new land use developments, the specific sound level limit is one hour L_{eq} = 55 dBA.

B 1: Specific Sound Level Limits

Appendix C: NPC-300 Reference Pages

for that point of reception. The outdoor sound level limits for stationary sources apply only to daytime and evening (07:00 – 23:00 hours). Sound level limits apply during the nighttime period (23:00 – 07:00) for the plane of the window of a noise sensitive space. In general, the outdoor points of reception will be protected during the nighttime as a consequence of meeting the sound level limits at the adjacent plane of window of noise sensitive spaces.

Note that for Class 1, 2 and 3 areas, the plane of window limits apply to a window that is assumed to be open. For Class 4 areas, the plane of window limits apply to a window which is assumed to be closed. This distinction does not affect the prediction of plane of window sound levels.

Table B-1
Exclusion Limit Values of One-Hour Equivalent Sound Level (L_{eq}, dBA)
Outdoor Points of Reception

Time of Day	Class 1 Area	Class 2 Area	Class 3 Area	Class 4 Area
07:00 – 19:00	50	50	45	55
19:00 – 23:00	50	45	40	55

Table B-2
Exclusion Limit Values of One-Hour Equivalent Sound Level (L_{eq}, dBA)
Plane of Window of Noise Sensitive Spaces

Time of Day	Class 1 Area	Class 2 Area	Class 3 Area	Class 4 Area
07:00 – 19:00	50	50	45	60
19:00 – 23:00	50	50	40	60
23:00 – 07:00	45	45	40	55

B7.2 Impulsive Sound – Outdoors and Plane of Window

For impulsive sound, other than Quasi-Steady Impulsive Sound, from a stationary source, the sound level limit at a point of reception expressed in terms of the Logarithmic Mean Impulse Sound Level (L_{LM}) is the higher of the applicable exclusion limit value given in Table B-3 or Table B-4, or the background sound level for that point of reception. The outdoor sound level limits for stationary sources apply only to daytime and evening (07:00 – 23:00 hours). Sound level limits apply during the nighttime period (23:00 – 07:00) for the plane of the window of a noise sensitive space. In general, the outdoor points of reception will be protected during the nighttime as a consequence of meeting the sound level limits at the adjacent plane of window of noise sensitive spaces.

Notwithstanding Publication NPC-103, Reference [29], the following sound level limits in Table B-3 and Table B-4 below apply to impulsive sound:

C 1: Exclusion Limit Values for Stationary Sources

In addition, sound level limits do not apply to emergency equipment operating in emergency situations.

B7.4 Sound Level Limits for Layover Sites

The sound level limit for noise from a layover site in any hour, expressed in terms of the One-Hour Equivalent Sound Level (L_{eq}) is the higher of either 55 dBA or the background sound level.

B8 Noise Impact Assessment – Multiple Sources

Impulse sources, non-impulse sources and emergency equipment are to be analyzed separately. Where there are multiple, non-impulse sources at a stationary source, the noise assessment needs to be based on the combined effect of all sources comprising the stationary source, added together on an energy basis.

B9 Determination of Area Class

Area classification refers to the receptor location.

B9.1 Class 1, 2 and 3 Areas

Determination of whether an area is Class 1, 2 or 3 can usually be done by determining the proximity of the point of reception to roads, the volumes of road traffic (and associated sound levels), and the nature of land uses and activities (or lack thereof) in the area, as a function of time.

B9.2 Class 4 Area

Class 4 area classification is based on the principle of formal confirmation of the classification by the land use planning authority. Such confirmation would be issued at the discretion of the land use planning authority and under the procedures developed by the land use planning authority, in the exercise of its responsibility and authority under the Planning Act.

The following considerations apply to new noise sensitive land uses proposed in a Class 4 area:

- an appropriate noise impact assessment should be conducted for the land use planning authority as early as possible in the land use planning process that verifies that the applicable sound level limits will be met;
- noise control measures may be required to ensure the stationary source complies with the applicable sound level limits at the new noise sensitive land use;

C 2: Determination of Area Class

Appendix D: Noise Source Sound Power Data

D 1: Sound Power Level

Model	Sound Power Level (dBA)
Tempstar Deluxe TVA9	64
Kerr Energy A-KCD24SA-1	72
Lennox 13ACX	84

Appendix E: List of Assumptions

List of Assumptions

General:

- Ground attenuation factor 0.7 (with 1 being absorbent and 0 being reflective)
- Height of AC noise source is 0.8 metre
- Worst case hour evaluation
- Duty cycle of 100%

TVA9

Ion™ Variable-Speed Air Conditioner

Enjoy comfort without compromise, thanks to our variable-speed air conditioner with SmartSense™ technology. This whisper-quiet system senses changing conditions and adapts so you can stay comfy with outstanding efficiency. And when it gets extra hot and sticky outside, you'll feel the difference with enhanced dehumidification inside. For maximum performance along with the convenience of remote access, pair it with a complete communicating system, including the energy-smart Ion™ System Control with Wi-Fi® capability.

Let's take a closer look

Variable-speed compressor
5 stages of variable-speed compressor operation, providing our best temperature and summer humidity control

Variable-speed fan
High-efficiency variable-speed fan works with compressor for our best levels of quiet, efficient operation

Weather and debris protection
Durably built with tight wire grille and protective corner posts to withstand bad weather and debris

Durable design for lasting performance
Designed for corrosion resistance and lasting performance

ion Wi-Fi® enabled remote access with the Ion System Control[1]

E 1: Tempstar Deluxe TVA9 Manufacturer Specifications

Specifications

Product Details

Efficiency Rating	Up to 19 SEER2 cooling / Up to 13 EER2 cooling
Sound level	As low as 56 decibels
Communicating Capability	Wi-Fi® enabled remote access with the Ion™ System Control
No Hassle Replacement™ Limited Warranty	10-Year No Hassle Replacement™ Limited Warranty÷
Parts Warranty	10-Year Parts Limited Warranty±
Energy Star® Qualified	U.S. Environmental Protection Agency voluntary program that helps protect climate through energy efficiency
Fan Motor	Variable-speed operation
Compressor	5 stages of variable-speed compressor operation, providing our best temperature and summer humidity control
Cooling capacity	2-5 tons
Refrigerant	Non-ozone depleting R-410A

Documents

*Quietest size within each model group during most common cooling operating condition.

÷No Hassle Replacement™ Limited Warranty: If compressor, coil or heat exchanger fails due to defect during the applicable No Hassle Replacement limited warranty time period, a one-time replacement with a comparable unit will be provided.

±10-Year Parts Limited Warranty: Timely registration required for 10-year parts limited warranty. Limited warranty period is 5 years if not registered within 90 days of installation. Jurisdictions where warranty benefits cannot be conditioned on registration will receive the registered limited warranty periods. Please see warranty certificate for further details and restrictions.

[1]Wi-Fi® is a registered trademark of the Wi-Fi Alliance Corporation.

E 2: Tempstar Deluxe TVA9 Manufacturer Specifications continued

SINGLE ZONE

FEATURES	A-KCD24SA-1	A-KCD30SA-1	A-KCD36SA-1	A-KCD48SA-1
Power Supply	208/230V,1Ph,60Hz	208/230V,1Ph, 60Hz	208/230V,1Ph, 60Hz	208/230V,1Ph, 60Hz
Cooling Capacity (BTUH)	24,000	30,000	36,000	48,000
SEER	20	18	18	16
EER	12.50	11	10.50	8.50
HSPF[4]	12.00	10.50	10.50	10.00
COP	3.45	3.48	3.45	3.00
Cooling Amps	9.40	12.40	14.80	24.20
Heating Cap. (BTUH) @ 47°F	31,000	37,000	57,200	55,000
Heating Amps	9.13	12.50	14.80	21.50
Outdoor DBA	64	61.50	64	64
OUTDOOR UNIT DIMENSIONS				
Width (inches)	37.24	37.24	.37.48	37.48
Height (inches)	31.89	31.89	52.48	52.48
Depth (inches)	16.14	16.14	16.34	16.34
Net Wt/Shipping Wt (lbs.)	136.69	159.83	227.07	220.24
ELECTRICAL DATA OUTDOOR UNIT [‡]				
Main Power Connection	Outdoor Unit 208/230-1-60			
Min. Circuit Ampacity	20.5	23	41	42
Max. Fuse/HACR Circuit Breaker	35	35	50	50
Indoor/Outdoor Connecting Cable Type	14AWG / 4 conductor 600V THHN unshielded stranded bare copper			
LINE SETS O.D. (inch)				
LINE SETS O.D. (inch)	3/8 x 3/4	3/8 x 3/4	3/8 x 3/4	3/8 x 3/4
Max. Line Set Length[1]	164	213	213	213
Max. Elevation (outdoor)[2]	82	98	98	98

[‡] Always follow local, state and national electrical codes
[1] Min. 10 ft. line set recommended
[2] Oil traps should be installed every 16.5 to 23 feet (5-7m) when the outdoor unit is installed above the indoor unit

KERR Controls Limited • 125 Polymer Drive • Truro, NS B2N 5V2 Canada • (902)895-9281 • Fax (902) 893-4942 • www.kerrsmartenergy.com
5/22

E 3: Kerr Energy A-KCD24SA-1 Manufacturer Specifications

MERIT® SERIES

Air Conditioners

LENNOX

Merit® air conditioners come appointed with:

Precision-balanced, direct drive fan to keep the noise low and the savings high

Reinforced with a PermaGuard™ cabinet for long-lasting protection against rust and corrosion

Cabinets built using superior materials and proprietary designs make Lennox® units more durable, safer and easier to install

Fan and blades enhance air circulation and decrease noise from the unit

	Mid-Efficiency, Two-Stage Air Conditioner ML18XC2	Mid-Efficiency, Two-Stage Air Conditioner 16ACX**	Mid-Efficiency, Single-Stage Air Conditioner ML17XC1	Standard-Efficiency, Single-Stage Air Conditioner ML14XC1*	Standard-Efficiency, Single-Stage Air Conditioner 13ACX**
Energy Efficiency	Up To 18.00 SEER, 17.80 SEER2	Up To 18.00 SEER	Up To 17.00 SEER, 16.20 SEER2	Up To 17.00 SEER, 15.20 SEER2	Up To 13.00 SEER
Quantum™ Coil	✓		✓	✓	
Stages Of Cooling	Two-Stage Compressor	Two-Stage Compressor	Single-Stage Compressor	Single-Stage Compressor	Single-Stage Compressor
Sound Rating†	As Low As 75 dB	As Low As 75 dB	As Low As 73 dB	As Low As 73 dB	As Low As 76 dB
ENERGY STAR® Certified[6]	✓	✓	✓	✓	
Removes Humidity From The Home	Higher Removal Rate	Higher Removal Rate	High Removal Rate	High Removal Rate	High Removal Rate
5-Year Limited Warranty On Covered Components[9]	✓	✓	✓	✓	✓

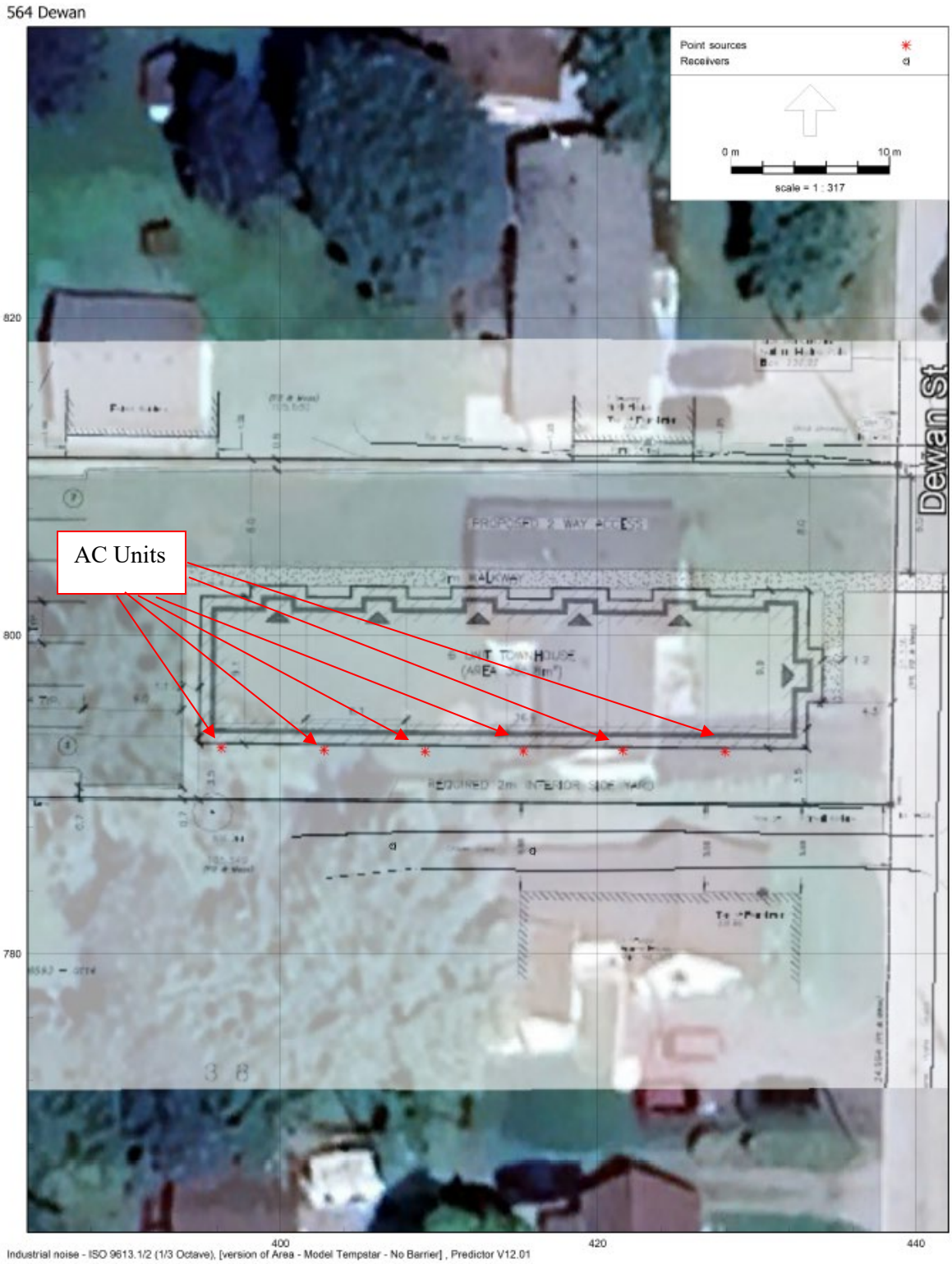
Contact your local utility company to determine if there are available rebates.

* Available in the North Region only.
** Available in the North Region only, while supplies last.
† Equivalent to the sound of an average radio or tv-audio at 76 dB.
For a full list of product details and warranty information, visit Lennox.com/terms-and-conditions.

www.lennox.com 1-800-9-LENNOX

E 4: Lennox 13ACX Manufacturer Specifications

Appendix F: Predictor Input Data



F 1: Source and Receptor Locations

```
Model:        Model Tempstar
              version of Area - Area
Group:        (main group)
Listing of:   Point sources, for method Industrial noise - ISO 9613.1/2 (1/3 Octave)
```

Name	Desc.	Height	Terrain L	HDef.	Type	DI	DI_Horz	DI_Vert	DI(0)	DI(10)	DI(20)
AC Unit	Tempstar	0.80	0.00	Relative	Normal point source	none	0	0	0.0	0.0	0.0
AC Unit	Tempstar	0.80	0.00	Relative	Normal point source	none	0	0	0.0	0.0	0.0
AC Unit	Tempstar	0.80	0.00	Relative	Normal point source	none	0	0	0.0	0.0	0.0
AC Unit	Tempstar	0.80	0.00	Relative	Normal point source	none	0	0	0.0	0.0	0.0
AC Unit	Tempstar	0.80	0.00	Relative	Normal point source	none	0	0	0.0	0.0	0.0
AC Unit	Tempstar	0.80	0.00	Relative	Normal point source	none	0	0	0.0	0.0	0.0

Name	DI(30)	DI(40)	DI(50)	DI(60)	DI(70)	DI(80)	DI(90)	DI(100)	DI(110)	DI(120)	DI(130)	DI(140)	DI(150)
AC Unit	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AC Unit	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AC Unit	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AC Unit	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AC Unit	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AC Unit	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Name	DI(160)	DI(170)	DI(180)	Ca(D)	Ca(E)	Ca(N)	Ca(P4)	No refl.	No building	No ind.site	Lw 25	Lw 31
AC Unit	0.0	0.0	0.0	0.00	0.00	3.98	0.00	No	No	No	--	--
AC Unit	0.0	0.0	0.0	0.00	0.00	3.98	0.00	No	No	No	--	--
AC Unit	0.0	0.0	0.0	0.00	0.00	3.98	0.00	No	No	No	--	--
AC Unit	0.0	0.0	0.0	0.00	0.00	3.98	0.00	No	No	No	--	--
AC Unit	0.0	0.0	0.0	0.00	0.00	3.98	0.00	No	No	No	--	--
AC Unit	0.0	0.0	0.0	0.00	0.00	3.98	0.00	No	No	No	--	--

Name	Lw 40	Lw 50	Lw 63	Lw 80	Lw 100	Lw 125	Lw 160	Lw 200	Lw 250	Lw 315	Lw 400	Lw 500	Lw 630	Lw 800
AC Unit	--	--	--	--	--	--	--	--	--	--	--	64.00	--	--
AC Unit	--	--	--	--	--	--	--	--	--	--	--	64.00	--	--
AC Unit	--	--	--	--	--	--	--	--	--	--	--	64.00	--	--
AC Unit	--	--	--	--	--	--	--	--	--	--	--	64.00	--	--
AC Unit	--	--	--	--	--	--	--	--	--	--	--	64.00	--	--
AC Unit	--	--	--	--	--	--	--	--	--	--	--	64.00	--	--

Name	Lw 1k	Lw 1.25k	Lw 1.6k	Lw 2k	Lw 2.5k	Lw 3.1k	Lw 4k	Lw 5k	Lw 6.3k	Lw 8k	Lw 10k	Red 25	Red 31
AC Unit	--	--	--	--	--	--	--	--	--	--	--	0.00	0.00
AC Unit	--	--	--	--	--	--	--	--	--	--	--	0.00	0.00
AC Unit	--	--	--	--	--	--	--	--	--	--	--	0.00	0.00
AC Unit	--	--	--	--	--	--	--	--	--	--	--	0.00	0.00
AC Unit	--	--	--	--	--	--	--	--	--	--	--	0.00	0.00
AC Unit	--	--	--	--	--	--	--	--	--	--	--	0.00	0.00

Name	Red 40	Red 50	Red 63	Red 80	Red 100	Red 125	Red 160	Red 200	Red 250	Red 315	Red 400	Red 500
AC Unit	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AC Unit	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AC Unit	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AC Unit	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AC Unit	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AC Unit	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Name	Red 630	Red 800	Red 1k	Red 1.25k	Red 1.6k	Red 2k	Red 2.5k	Red 3.1k	Red 4k	Red 5k	Red 6.3k
AC Unit	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AC Unit	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AC Unit	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AC Unit	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AC Unit	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AC Unit	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Model: Model Tempstar
version of Area - Area
Group: (main group)
Listing of: Point sources, for method Industrial noise - ISO 9613.1/2 (1/3 Octave)

Name	Red 8k	Red 10k
AC Unit	0.00	0.00
AC Unit	0.00	0.00
AC Unit	0.00	0.00
AC Unit	0.00	0.00
AC Unit	0.00	0.00
AC Unit	0.00	0.00

Model: Model Tempstar
version of Area - Area
Group: (main group)
Listing of: Receivers, for method Industrial noise - ISO 9613.1/2 (1/3 Octave)

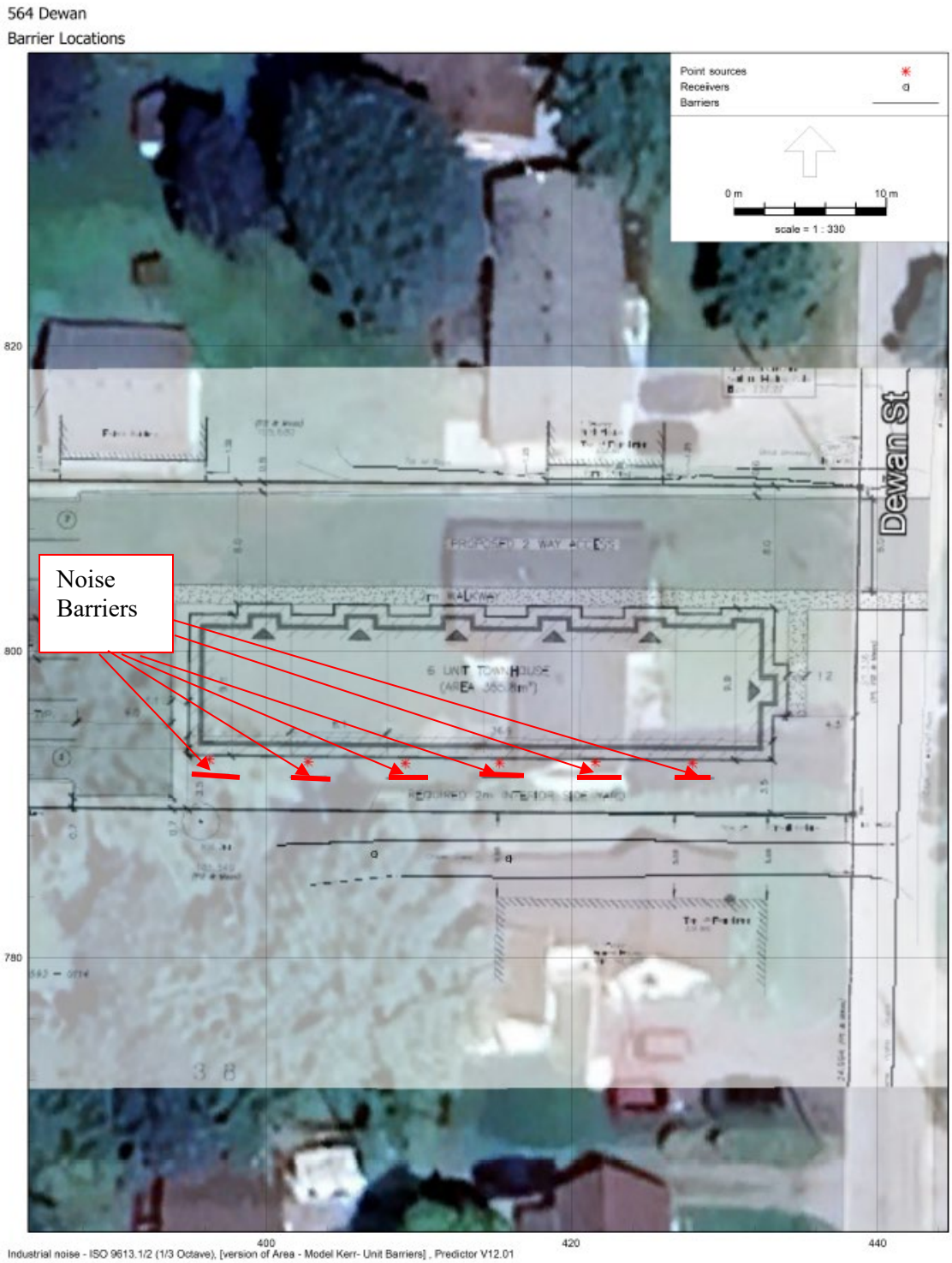
Name	Desc.	Terrain L	HDef.	Height A	Height B	Height C	Height D	Height E	Height F	Façade
POR1OLA	POR1 OLA	0.00	Relative	1.50	--	--	--	--	--	Yes
POR1	POR1 POW	0.00	Relative	1.50	--	--	--	--	--	Yes

Appendix G: Predictor Output Results

G1: Table of Predictor Results (Worst Case Hour)

POR/OLA	Height (m)	Tempstar TVA9	Kerr Energy A-KCD24SA-1	Lennox 13ACX
POR1	1.5	40.1	48.1	60.1
OLA1	1.5	40.4	48.4	60.1

Appendix H: Location of Barrier



H 1: Barrier Location