

ACOUSTIC ASSESSMENT REPORT

Windlectric Inc.

Proposed Temporary Ready-Mix Concrete Batching Plant


Amherst Island, Ontario

Prepared for

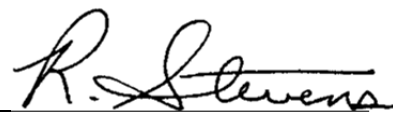
Windlectric Inc.
354 Davis Road
Oakville, Ontario
L6J 2X1

Prepared by




Corey Kinart, PEng

Reviewed by


Robert D. Stevens, MAsc, PEng

March 11, 2015

VERSION CONTROL

Windlectric Inc., Proposed Temporary Ready-Mix Concrete Batching Plant
Amherst Island, Ontario

Ver.	Date	Version Description	Prepared By
1	25-Feb-15	Original Acoustic Assessment Report in support of an application for a Renewable Energy Approval	C. Kinart
2	11-Mar-15	Updated report to incorporate comments from MOECC regarding Ver. 1	C. Kinart



EXECUTIVE SUMMARY

Algonquin Power Co., on behalf of Windlectric Inc., retained HGC Engineering to undertake an Acoustic Assessment of a proposed temporary ready-mix concrete batching plant on Amherst Island in Loyalist Township, Ontario. The assessment has been prepared in support of a Renewable Energy Approval Application to the Ontario Ministry of the Environment and Climate Change (“MOECC”, reference number 1271-96VNH3) for the Amherst Island Wind Energy Project.

Sound emissions from key items of equipment associated with the site were based on measurements of the same type of equipment conducted by HGC Engineering at numerous other ready-mix concrete batching plants. The source sound levels were used to develop an acoustical model of the plant in order to prepare a sound source inventory, and thereby determine the contribution of each individual source to the overall offsite sound levels. Acoustic assessment criteria were established in accordance with the sound level limits in MOECC guideline NPC-300.

The measurements and analysis indicate that the sound emissions of the proposed plant will be within the sound level limits as set out in MOECC guideline NPC-300 during normal ‘predictable worst case’ operations at the nearest noise-sensitive points of reception.

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ACOUSTIC ASSESSMENT REPORT CHECK-LIST

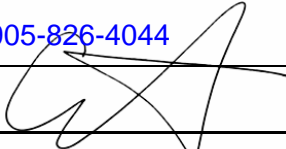
Company Name: Windlectric Inc.

Company Address: 354 Davis Road
Oakville, Ontario L6J 2X1

Location of Facility: Part of Lots 35 – 37, Concession 1
Loyalist Township, Ontario

The attached Acoustic Assessment Report was prepared in accordance with the guidance in the ministry document "Information to be Submitted for Approval of Stationary Source of Sound" (NPC 233) dated October 1995 and the minimum required information identified in the check-list on the reverse of this sheet has been submitted.

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Signature:	<u></u>
Date:	<u>March 11, 2015</u>

ACOUSTIC ASSESSMENT REPORT CHECK-LIST

Required Information		Submitted	Explanation/Reference
1.0	Introduction (Project Background and Overview)	<input checked="" type="checkbox"/> Yes	Section 1
2.0	Facility Description		
	2.1 Operating hours of facility and significant Noise Sources	<input checked="" type="checkbox"/> Yes	Section 2
	2.2 Site Plan identifying all significant Noise Sources	<input checked="" type="checkbox"/> Yes	Figure 3
3.0	Noise Source Summary		
	3.1 Noise Source Summary Table	<input checked="" type="checkbox"/> Yes	Appendix A
	3.2 Source noise emissions specifications	<input checked="" type="checkbox"/> Yes	Appendix A
	3.3 Source power/capacity ratings	<input checked="" type="checkbox"/> Yes	Appendix A
	3.4 Noise control equipment description and acoustical specifications	<input checked="" type="checkbox"/> Yes	Section 3
4.0	Point of Reception Noise Impact Calculations		
	4.1 Point of Reception Noise Impact Table	<input checked="" type="checkbox"/> Yes	Appendix A
	4.2 Point(s) of Reception (POR) list and description	<input checked="" type="checkbox"/> Yes	Section 4
	4.3 Land-use Zoning Plan	<input type="checkbox"/> Yes	
	4.4 Scaled Area Location Plan	<input checked="" type="checkbox"/> Yes	Figures 1 & 2
	4.5 Procedure used to assess noise impacts at each POR	<input checked="" type="checkbox"/> Yes	Appendix B
	4.6 List of parameters/assumptions used in calculations	<input checked="" type="checkbox"/> Yes	Appendix B
5.0	Acoustic Assessment Summary		
	5.1 Acoustic Assessment Summary Table	<input checked="" type="checkbox"/> Yes	Appendix A
	5.2 Rationale for selecting applicable noise guideline limits	<input checked="" type="checkbox"/> Yes	Appendix C
	5.3 Predictable Worst Case Impacts Operating Scenario	<input checked="" type="checkbox"/> Yes	Tables 1 & A3 Figures 4 & 5
6.0	Conclusions		
	6.1 Statement of compliance with selected noiseperformance limits	<input checked="" type="checkbox"/> Yes	Section 7
7.0	Appendices (provide details such as)	<input checked="" type="checkbox"/> Yes	
	Listing of Insignificant Noise Sources	<input checked="" type="checkbox"/> Yes	Section 3
	Manufacturer's Noise Specifications	<input type="checkbox"/> Yes	N/A
	Calculations	<input checked="" type="checkbox"/> Yes	Appendices D & E
	Instrumentation	<input type="checkbox"/> Yes	N/A
	Meteorology during Sound Level Measurements	<input type="checkbox"/> Yes	N/A
	Raw Data from Measurements	<input checked="" type="checkbox"/> Yes	Appendices D & E
	Drawings (Facility / Equipment)	<input checked="" type="checkbox"/> Yes	Figure 3

1 INTRODUCTION

The proposed temporary ready-mix concrete batching plant is to be located on Part of Lots 35-37 Concession 1 on Amherst Island in Loyalist Township, Ontario. A scaled location map of the surrounding area is included as Figure 1. The purpose of this assessment is to evaluate the overall sound emissions of the proposed plant during a predictable worst case hour, which is defined as an hour when typically busy operation of the stationary sources under consideration could coincide with an hour of low background sound.

This report has been prepared in accordance with the MOECC guideline documents NPC-233 “Information to be Submitted for Approval of Stationary Sources of Sound” [1], and Appendix A of “Basic Comprehensive Certificates of Approval (Air): User Guide” [2]. The three Acoustic Assessment summary tables are presented in Appendix A, in the standardized format required by the MOECC.

The nearest sound sensitive points of reception to the proposed plant are single family homes located northwest and southwest of the subject site, labelled as receptors R122, R611 and R166 in Figure 2. This assessment also considers two additional points of reception northwest of the proposed ready-mix concrete plant, representing vacant lots, labelled as R328 and R573 in Figure 2. Note that locations R328 and R573 are on the same property as the proposed ready-mix concrete plant, and are thus not points of reception as defined in MOECC guideline NPC-300 [3], but have been included herein for completeness.

During a visit to the vicinity by HGC Engineering on January 12, 2015, the background sound was observed to be dominated by natural sounds. The area surrounding the subject site is best categorized as a Class 3 (“rural”) acoustical environment, under MOECC noise assessment guidelines.

2 FACILITY DESCRIPTION

The proposed plant will be of a portable nature, furnished by a ready-mix concrete supplier, and will supply concrete to support construction of the Amherst Island Wind Energy Project (and will cease operations prior to commissioning of the wind energy project). Cementitious materials (e.g., Portland



cement) will be delivered to the plant by road tankers which will transfer the materials into storage silos using truck-mounted blowers. Aggregate materials will be delivered to the site by trucks and deposited into above grade stockpiles. A front end loader will be used to transfer the coarse aggregate and sand from the stockpiles to a hopper. From the hopper, aggregate materials will be transferred by conveyor to material storage compartments integral to the plant. The aggregate and cementitious materials will be proportionately loaded into ready-mix trucks along with water containing small quantities of admixtures (aqueous solutions). If necessary, the water will be heated by an onsite hot water/steam boiler to raise the temperature of the concrete mix. Once loaded, ready-mix trucks will move to the “slump-up” area immediately northwest of the loading point, where the consistency of the concrete mix will be refined with the addition of small amounts of water while mixing before the trucks leave the site.

The plant will operate during daytime hours only (07:00 to 19:00), Monday to Saturday. During winter months, an 81 kW diesel-fired generator will operate during evening/nighttime hours (19:00 to 07:00) to power the hot water/steam boiler; no other equipment will be operated during evening/nighttime hours. The primary sound sources associated with the ready-mix plant will be the various vehicles that will enter the site to deliver aggregate and cementitious materials, off-load those materials and depart, as well as vehicles that will enter and depart to take away ready-mix concrete. Additional sources include a front end loader that will be used to transfer coarse aggregate and sand from above grade stockpiles to the hoppers, as well as a diesel-fired generator.

3 SOUND SOURCE SUMMARY

A Sound Source Summary is included as Table A1 in Appendix A, which lists the sources associated with the plant, in the standard format required by the MOECC. A complimentary Emission Summary and Dispersion Modeling (“ESDM”) report was prepared for the subject plant by BCX Environmental Consulting. The modeling methodology and assignment of source identifiers in the ESDM differs sufficiently from that employed for the acoustic assessment that coordinating the numbering scheme used in the two assessments was not found to be practical or necessary. All noise sources have been given an identification number herein of the form NS-## (e.g. NS-01).

Figure 3 shows the locations of each source associated with the proposed plant. Because the plant has not yet been located at the subject site, sound emissions from key items of equipment were based on measurements gathered by HGC Engineering for past assessments of numerous similar ready-mix concrete batching plants. In the context of the subject site, acoustically negligible sources include the hot water/steam boiler, air compressor and aggregate conveyor. All mobile equipment (e.g. trucks and the front end loader) were assumed to be equipped with standard exhaust silencers, as is typical of such equipment.

3.1 Tanker Trucks & Auxiliary Silo

Tanker trucks delivering cementitious materials to the site will enter the north end of the site from Front Road, travel to and around the south side of the ready-mix plant and park on the west side, facing north (NS-01). At this location, the cementitious materials will be unloaded from the tanker truck using a truck-mounted blower (NS-02). This assessment also considers sound emissions from the truck engine (NS-03) and exhausts (NS-04 and NS-05), which will idle during unloading. Once unloading is completed, the tanker trucks will exit the property back onto Front Road at the north end of the property (also represented by NS-01). Windlectric personnel indicate that, during a predictable worst case hour, one tanker truck could enter and exit the site. One tanker truck was assumed to be operating continuously during a predictable worst case hour of plant operation.

An auxiliary silo (“pig”), located on the west side of the plant, will be used to replenish Silo #1 (with air emissions controlled by the Silo #1 baghouse, discussed below). The auxiliary silo will be equipped with a pneumatic blower (NS-20) that will be used to transfer cementitious materials into Silo #1, which will be similar to the truck-mounted blower mentioned above. Windlectric personnel indicate that only one pneumatic blower will operate at a time. Therefore, a predictable worst case hour was assumed to include one active pneumatic blower, represented herein as NS-02.

Restricting operation of pneumatic blowers to not more than one at a time will be maintained as an administrative noise control measure. In addition, the blower associated with the auxiliary silo (NS-20) should be selected or equipped with noise control measures if and as required to yield a sound pressure level of not greater than 90 dBA measured at a distance of 5 metres in the direction of receptor R166.

3.2 Ready-Mix Trucks

Ready-mix trucks will enter the south side of the site from Concession Road 2 and travel to the loading point, which they will back under while facing north (NS-06). At this location, ready-mix trucks will be loaded while operating at an elevated engine idle (NS-07). This assessment also considers sound emitted from the engine exhaust of the ready-mix trucks (NS-08). Once loading is completed, ready-mix trucks will move immediately northwest of the loading point, where they will operate at an elevated idle to complete raw material mixing and to adjust for product consistency as required, in a process known as “slumping” (represented by NS-09 and NS-10). Once slumping is completed, ready-mix trucks will exit the south end of the site back onto Concession Road 2 (movements also represented by NS-06). Windlectric personnel indicate that, during a predictable worst case hour, up to eight ready-mix trucks will enter and exit the site. Each ready-mix truck was assumed to require five minutes to load and five minutes to slump, based on typical site observations.

3.3 Aggregate/Sand Trucks & Front End Loader

Aggregate and sand trucks will enter the north side of the site from Front Road and travel to the stockpiles east of the plant (with movements represented by NS-11). The coarse aggregate and sand will be unloaded into the stockpiles (NS-12) before the trucks depart the north end of the site (movements also represented by NS-11). Windlectric personnel indicate that coarse aggregate and sand trucks will be delivered to the site in batches, with up to 20 trucks entering and exiting the site during a predictable worst case hour. Each truck was assumed to require 30 seconds to unload, based on typical site observations.

A front end loader (NS-13) will be used to transfer coarse aggregate and sand between the stockpiles and the hopper. Although a front end loader at a ready-mix concrete batching plant typically operates for five minutes per ready-mix truck, in this instance the front end loader was conservatively assumed to operate continuously during a predictable worst case hour of plant operation, given the rate of aggregate/sand truck deliveries possible.



3.4 Silo Baghouse

A baghouse outlet is located atop each of the cement silos which will operate during unloading of tanker trucks to a respective silo. One baghouse (NS-14) was assumed to operate continuously during a predictable worst case hour of operation.

3.5 Cement & Aggregate Scale Vibrators

During loading of ready-mix trucks, a cement scale vibrator and an aggregate scale vibrator, both located at the loading point, will operate for short periods to loosen clumping materials (NS-15 and NS-16, respectively). Each of these units was assumed to operate for four seconds per ready-mix truck based on typical site observations.

3.6 Loading Point Horn

Ready-mix trucks departing from the loading point will be signalled by a short duration horn (NS-17) which was assumed to operate for two seconds per ready-mix truck based on typical site observations.

3.7 Diesel-Fired Generators

Electrical power for the plant will be provided by a 148 kW diesel-fired generator (NS-18), which was assumed to operate continuously during a predictable worst case hour of operation.

During winter months, an 81 kW diesel-fired generator (NS-19) will operate during evening/nighttime hours to power the onsite hot water/steam boiler.

Both diesel generators were assumed to be equipped with combustion exhaust silencers (typical of such equipment); the source sound levels assumed herein are based on measurements of similar sized equipment for past projects, which were equipped with standard exhaust silencers.

3.8 Summary of Predictable Worst Case Hour Activities

The following table summarizes the predictable worst case hours of operation of the subject plant considered for the purposes of this assessment.

Table 1: Summary of Predictable Worst Case Hours of Operation

Source ID	Source Description	Quantity and/or Operating Time/Hr	
		Daytime (07:00 to 19:00)	Evening/Nighttime (19:00 to 07:00)
NS-01	Arriving/Departing Tanker Truck	1 at 35 km/hr	--
NS-02	Unloading Tanker Truck (Blower)	60 min/hr	--
NS-03	Unloading Tanker Truck (Engine)	60 min/hr	--
NS-04	Unloading Tanker Truck (Exhaust 1)	60 min/hr	--
NS-05	Unloading Tanker Truck (Exhaust 2)	60 min/hr	--
NS-06	Arriving/Departing Ready-Mix Trucks	8 at 35 km/hr	--
NS-07	Loading Ready-Mix Trucks (Engine)	40 min/hr	--
NS-08	Loading Ready-Mix Trucks (Exhaust)	40 min/hr	--
NS-09	Slumping Ready-Mix Trucks (Engine)	40 min/hr	--
NS-10	Slumping Ready-Mix Trucks (Exhaust)	40 min/hr	--
NS-11	Arriving/Departing Aggregate Trucks	20 at 35 km/hr	--
NS-12	Unloading Aggregate Trucks	10 min/hr	--
NS-13	Front End Loader	60 min/hr	--
NS-14	Silo #1 Baghouse Exhaust	60 min/hr	--
NS-15	Cement Scale Vibrator	32 sec/hr	--
NS-16	Aggregate Scale Vibrator	32 sec/hr	--
NS-17	Loading Point Signal Horn	16 sec/hr	--
NS-18	Diesel-Fired Generator (148 kW)	60 min/hr	--
NS-19	Diesel-Fired Generator (81 kW)	--	60 min/hr

The source sound levels outlined above were used to develop the sound source inventory included as Table A1 in Appendix A, and were input to a predictive computer model (see Appendix B) to quantify the sound emissions of the subject operation during the predictable worst case hours outlined in Table 1 above.

4 POINT OF RECEPTION SUMMARY

Five key receptors were chosen to represent the nearest noise sensitive points of reception to the subject site, which are shown as locations R122, R166 and R611, R328 and R573 in Figures 2, 4 and 5. These receptors and their respective identifiers were selected to be consistent with the assessment locations included in the Acoustic Assessment Report prepared for the Amherst Island Wind Energy Project, prepared by others [4].

Locations R122, R166 and R611 represent upper storey windows of two storey residential dwellings approximately 1,030 metres northwest, 670 metres southwest and 885 metres north-northwest of the proposed ready-mix concrete plant. Locations R328 and R573 represent upper storey windows of assumed two storey homes on currently vacant lots approximately 970 metres northwest and 815 metres north-northwest of the proposed ready-mix concrete plant. The upper storey windows were chosen at each location as they represent the most-potentially impacted points on the respective properties since they are most exposed to elevated sources at proposed plant and benefit least from ground absorption and intervening shielding. The selected points of reception are described briefly in Table A3, the Acoustic Assessment Summary Table.

5 ASSESSMENT CRITERIA

The relevant document for defining the applicable sound level limits for the subject plant is MOECC guideline NPC-300 [3]. The details by which the applicable sound level limits were established for the assessment of this plant are provided in Appendix C. For the purposes of this assessment, the applicable sound level limits are 45 dBA during daytime hours (07:00 to 19:00) and 40 dBA during evening/nighttime hours (19:00 to 07:00). These limits are included in Table A3 of Appendix A.

Some types of sound have a distinctive character which may tend to increase their audibility and potential for disturbance or annoyance. For tonal sound, MOECC guideline NPC-104 [5] stipulates that an adjustment of +5 dBA is to be added to the measured source level. A tonal sound is defined as one which has a “pronounced audible tonal quality such as a whine, screech, buzz or hum.” In the subsequent analysis, the tonal adjustment has been applied to the sound of the truck-mounted pneumatic blowers (NS-02), the cement and aggregate scale vibrators (NS-15/16) and the loading point signal horn (NS-17), which typically exhibit a tonal characteristic based on observations of similar equipment at other facilities.

6 IMPACT ASSESSMENT

The one-hour L_{EQ} sound level of the plant was predicted to range between 43 and 44 dBA during daytime hours and between 29 and 35 dBA during evening/nighttime hours at locations R122, R166 and R611, R328 and R573, which is within the applicable limits at those locations. The results of the

analysis are summarized in Table A3 of Appendix A. Details of the prediction methods are summarized in Appendix B, and sample calculation results are included as Appendices D and E. The results are shown in graphical form in Figures 4 and 5, as sound level contours overlaid on a scaled satellite image of the area surrounding the subject site.

7 CONCLUSIONS

The acoustical measurements and analysis indicate that sound emissions from the proposed temporary ready-mix concrete batching plant will comply with the applicable sound level criteria under typical “predictable worst case” operating conditions.



REFERENCES

1. Ontario Ministry of Environment Publication NPC-233, *Information to be Submitted for Approval of Stationary Sources of Sound*, October, 1995.
2. Ontario Ministry of Environment Guide, *Basic Comprehensive Certificates of Approval (Air): User Guide*, March 2011.
3. Ontario Ministry of the Environment Publication NPC-300, *Environmental Noise Guideline, Stationary and Transportation Sources – Approval and Planning*, August, 2013.
4. Hatch, *Noise Assessment Report for Amherst Island Wind Project*, July 14, 2014.
5. Ontario Ministry of the Environment Publication NPC-104, *Sound Level Adjustments*, August, 1978.
6. International Organization for Standardization, “Acoustics – Attenuation of Sound during Propagation Outdoors – Part 2: General Method of Calculation,” ISO-9613-2, Switzerland, 1996.
7. Google Maps Aerial Imagery, Internet application: *maps.google.com*.



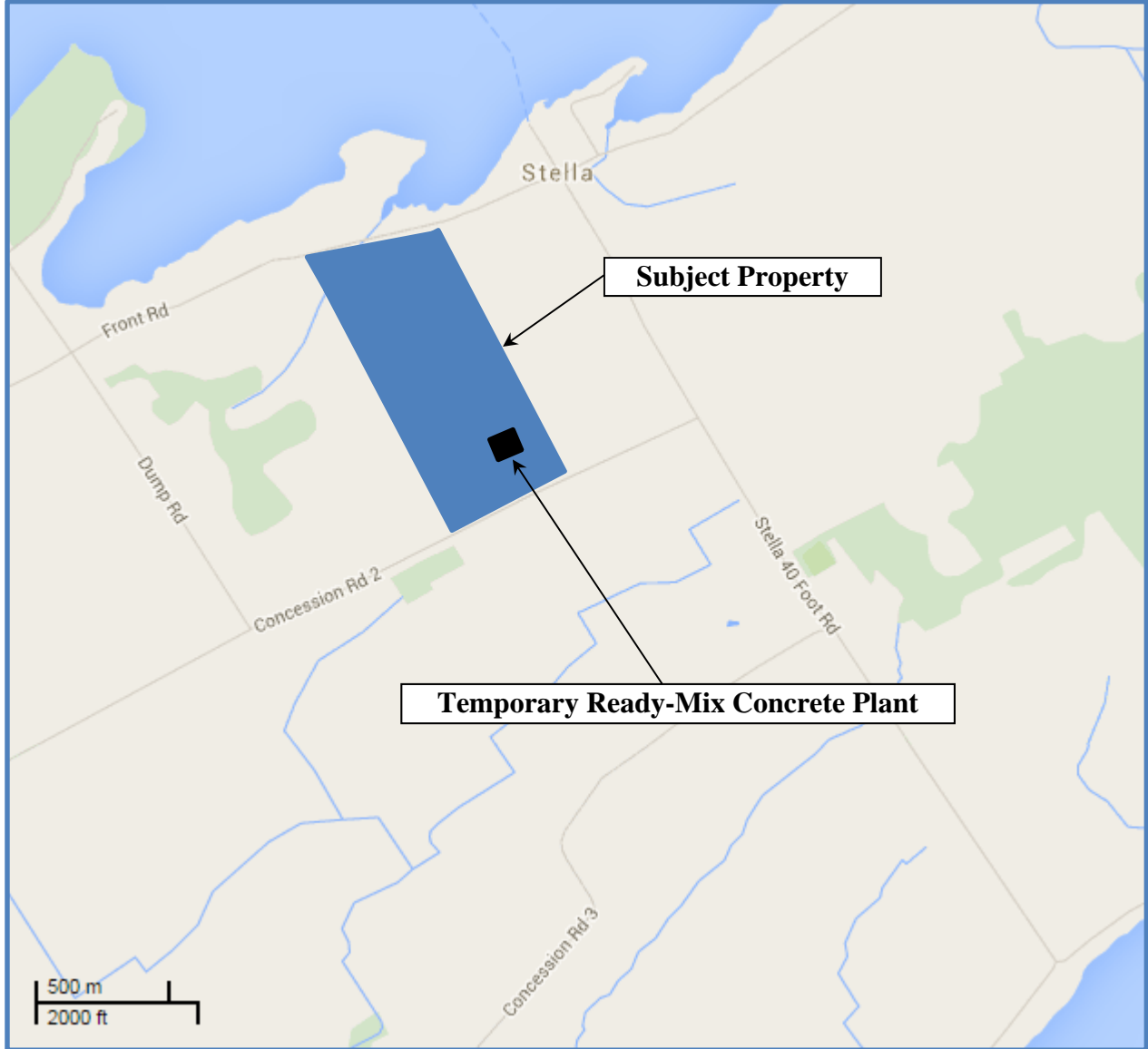


Figure 1: Location Map

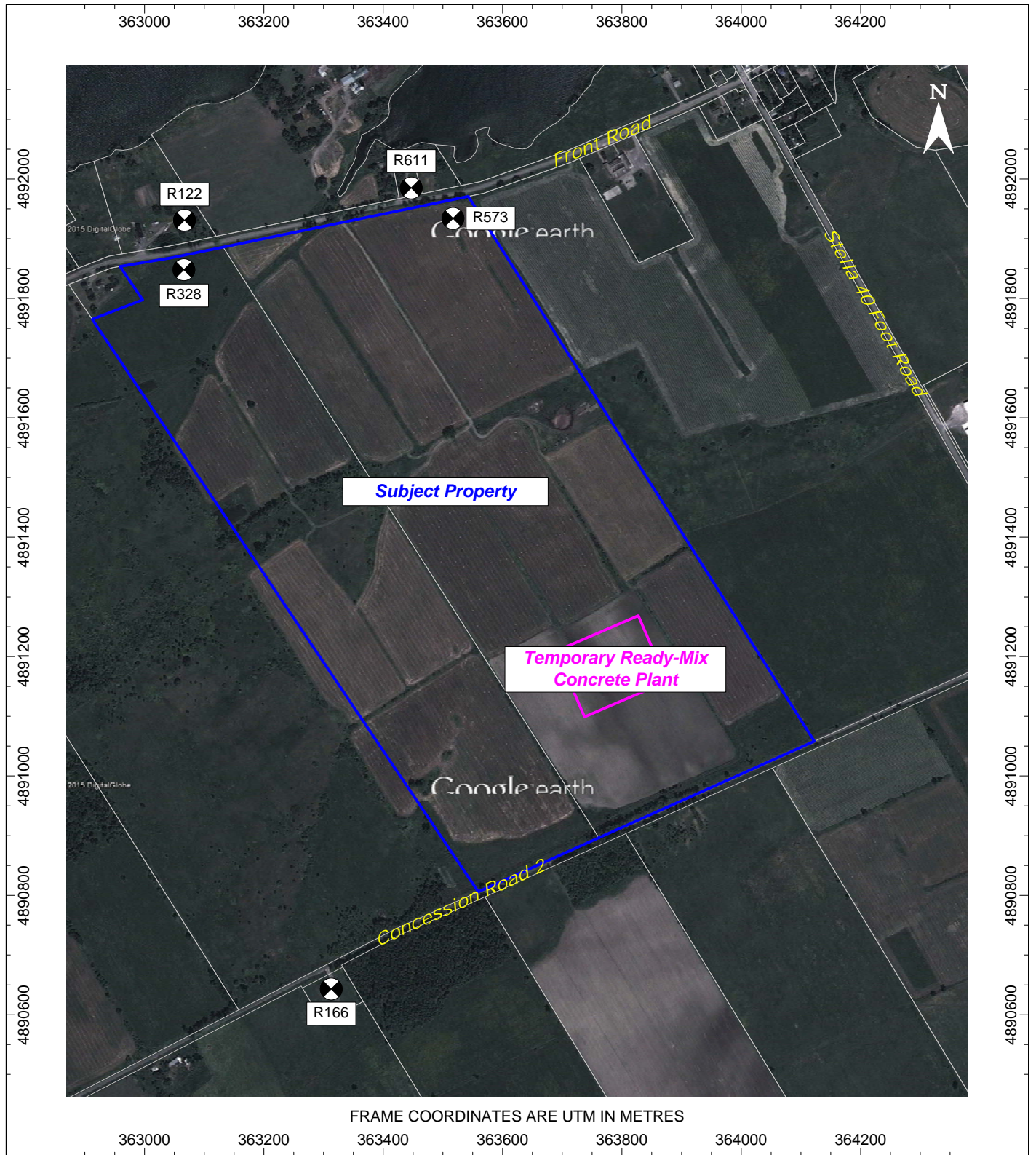


Figure 2: Satellite Image Showing Subject Property, Location of Proposed Ready-Mix Concrete Batching Plant and Points of Reception

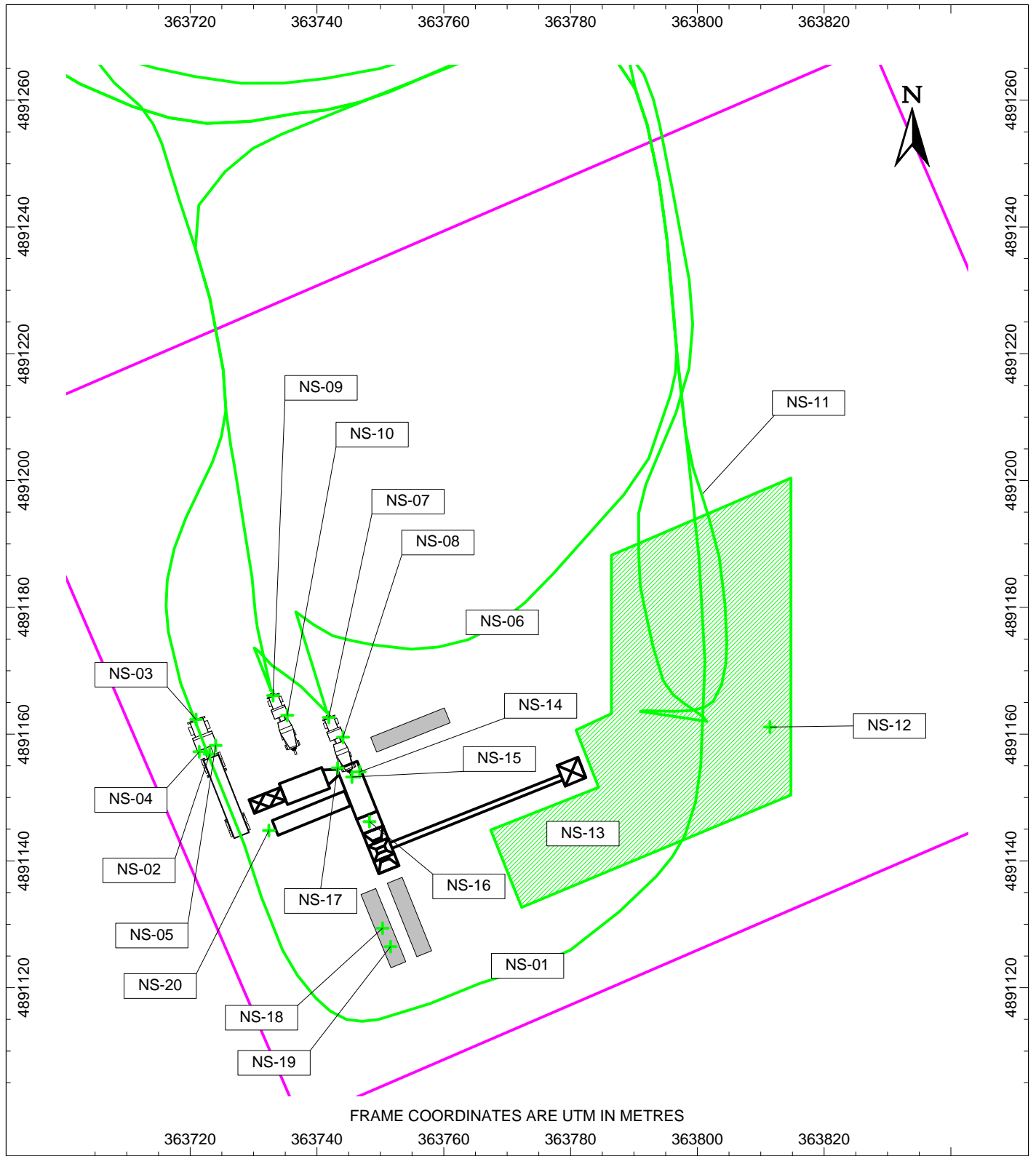


Figure 3: Site Plan Showing Locations of Sound Sources

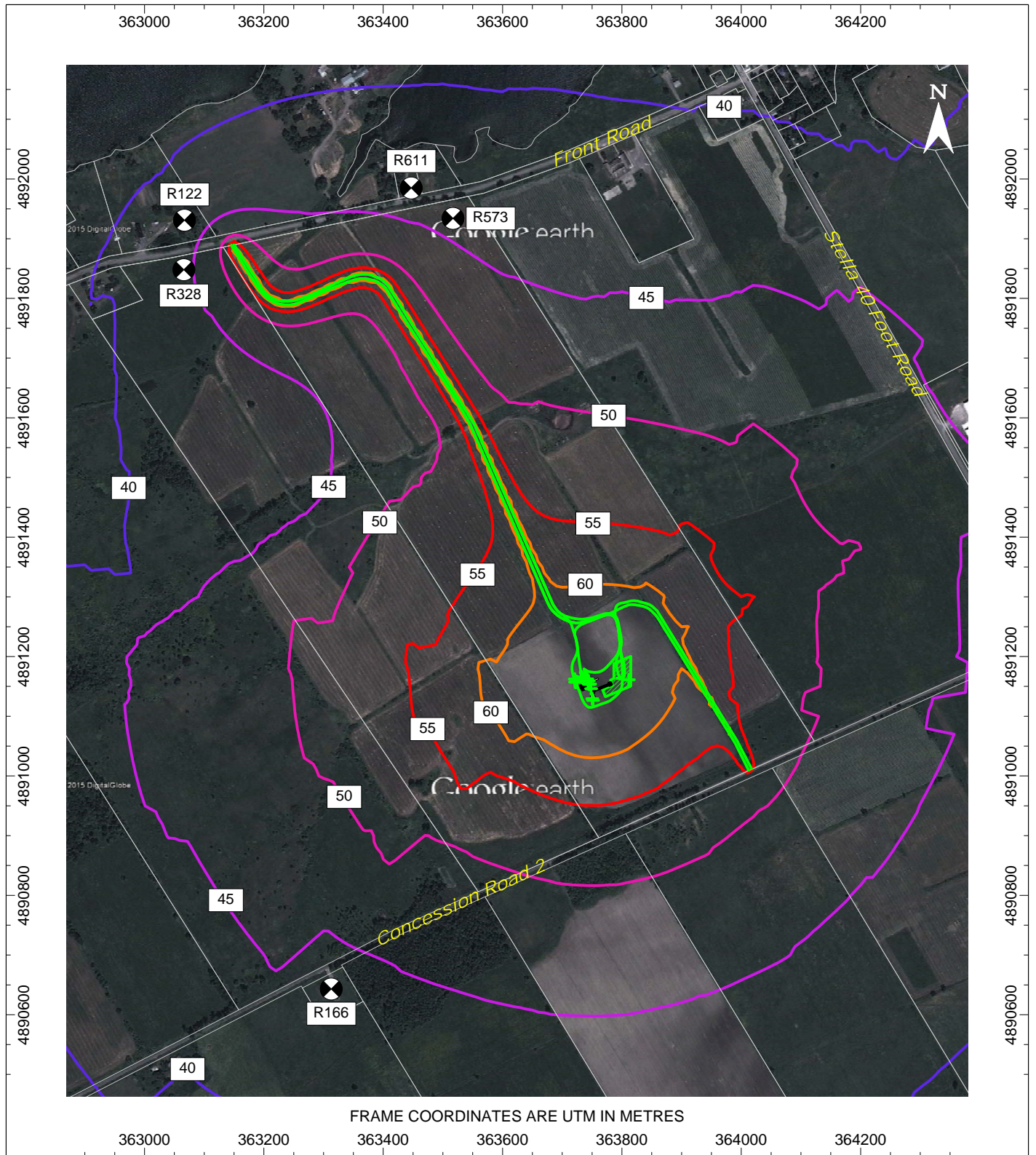


Figure 4: Satellite Image Showing Proposed Ready-Mix Concrete Batching Plant, Points of Reception and Predicted Daytime Sound Level Contours, L_{eq} [dBA]
 Prediction Elevation = 4.5 metres Above Grade

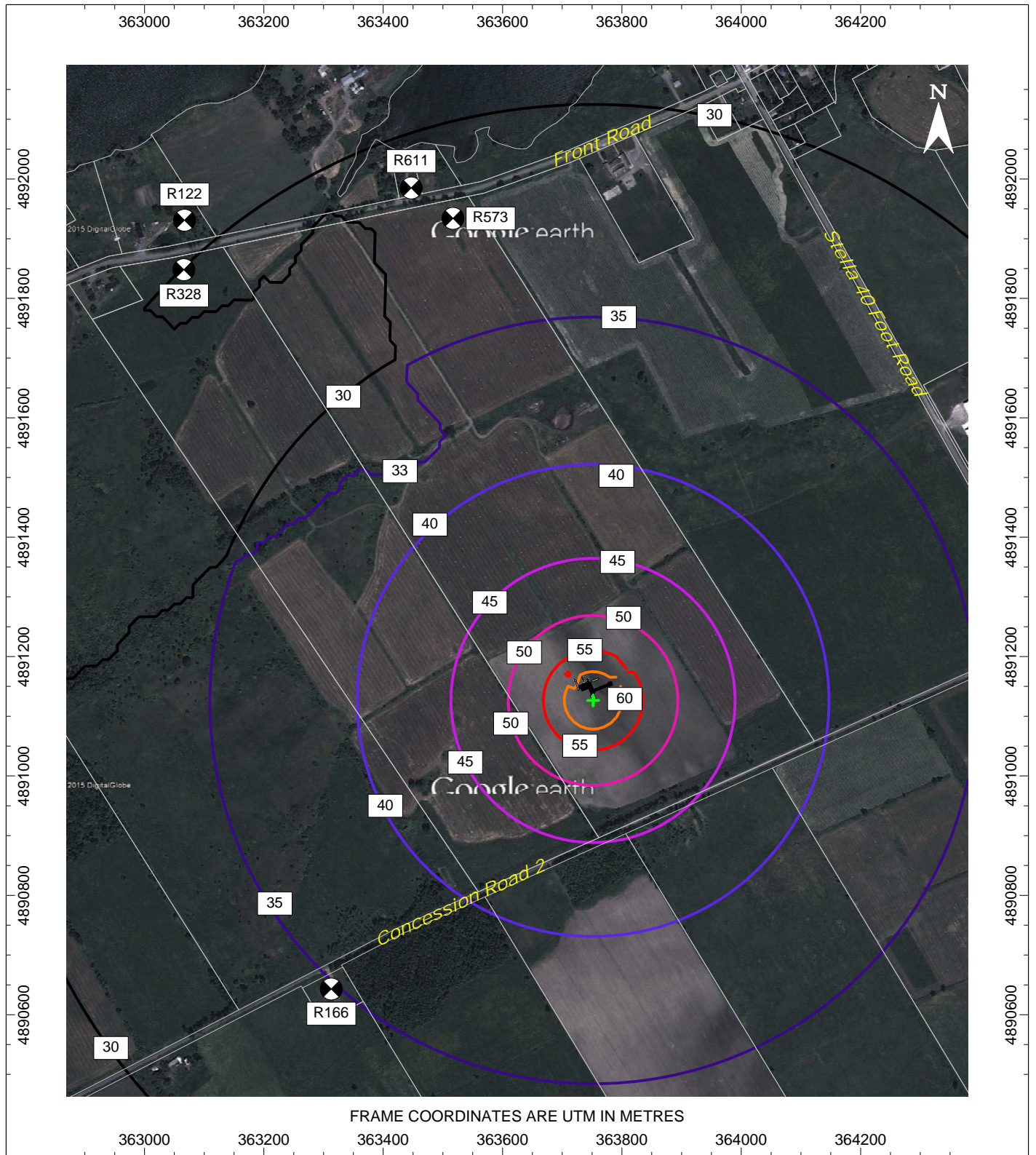


Figure 5: Satellite Image Showing Proposed Ready-Mix Concrete Batching Plant, Points of Reception and Predicted Evening/Nighttime Sound Level Contours, Leq [dBA]
 Prediction Elevation = 4.5 metres Above Grade

APPENDIX A

Acoustic Assessment Summary Tables



ACOUSTICS



NOISE



VIBRATION

ACOUSTIC ASSESSMENT SUMMARY TABLES

VERSION CONTROL

Windlectric Inc., Proposed Temporary Ready-Mix Concrete Batching Plant
Amherst Island, Ontario

Ver.	Date	Issued as Part of AAR?	Version Description	Prepared By
1.0	25-Feb-15	Y	Original version of tables as part of Ver. 1 of Acoustic Assessment Report	C. Kinart
2.0	11-Mar-15	Y	Updated version of tables as part of Ver. 2 of Acoustic Assessment Report	C. Kinart



ACOUSTICS



NOISE



VIBRATION

Table A1: Noise Source Summary Table

Source ID	Source Name	Sound Power Level [dBA re 10 ⁻¹² W]	Source Location	Sound Characteristic	Noise Control Measure
NS-01	Arriving/Departing Tanker Truck	99*	O	S	U
NS-02	Unloading Tanker Truck (Blower)	114	O	S, T	O
NS-03	Unloading Tanker Truck (Engine)	103	O	S	U
NS-04	Unloading Tanker Truck (Exhaust 1)	80	O	S	S
NS-05	Unloading Tanker Truck (Exhaust 2)	80	O	S	S
NS-06	Arriving/Departing Ready-Mix Trucks (each)	102*	O	S	U
NS-07	Loading Ready-Mix Trucks (Engine)	106*	O	S	U
NS-08	Loading Ready-Mix Trucks (Exhaust)	96*	O	S	S
NS-09	Slumping Ready-Mix Trucks (Engine)	106*	O	S	U
NS-10	Slumping Ready-Mix Trucks (Exhaust)	96*	O	S	S
NS-11	Arriving/Departing Aggregate Trucks (each)	102*	O	S	U
NS-12	Unloading Aggregate Trucks	104*	O	S	U
NS-13	Front End Loader	106	O	S	U
NS-14	Silo #1 Baghouse Exhaust	96	O	S	U
NS-15	Cement Scale Vibrator	117*	O	S, T	U
NS-16	Aggregate Scale Vibrator	108*	O	S, T	U
NS-17	Loading Point Signal Horn	128*	O	S, T	U
NS-18	Diesel-Fired Generator (148 kW)	108	O	S	S
NS-19	Diesel-Fired Generator (81 kW)	104	O	S	S
NS-20 ¹	Auxilliary Silo Pneumatic Blower	112	O	S, T	O

* Time weighted source. Reported sound power level does not include time weighted factor.

¹ Not included in predictable worst case hour.

Legend

Sound Characteristics

S: Steady
 Q: Quasi-steady impulsive
 I: Impulsive
 B: Buzzing
 T: Tonal
 C: Cyclically varying
 O: Occasional

Noise Control Measures

S: Silencer, Acoustic Louvre, Muffler
 A: Acoustic Lining, Plenum
 B: Barrier, Berm, Screening
 L: Lagging (Acoustical Wrapping)
 E: Acoustic Enclosure
 O: Other
 U: Currently Uncontrolled

Source Location

O: Outdoors
 I: Indoors



ACOUSTICS



NOISE



VIBRATION

Table A2: Point of Reception Noise Impact Table

Source ID	Source Name	Point of Reception														
		R122 L _{EQ} [dBA]			R166 L _{EQ} [dBA]			R328 L _{EQ} [dBA]			R573 L _{EQ} [dBA]			R611 L _{EQ} [dBA]		
		Dist [m]	Day	Eve/ Night	Dist [m]	Day	Eve/ Night	Dist [m]	Day	Eve/ Night	Dist [m]	Day	Eve/ Night	Dist [m]	Day	Eve/ Night
NS-01	Arriving/Departing Tanker Truck	617	26	--	854	16	--	563	27	--	386	26	--	445	25	--
NS-02	Unloading Tanker Truck (Blower)	1015	19	--	657	38	--	954	28	--	804	28	--	873	27	--
NS-03	Unloading Tanker Truck (Engine)	1009	27	--	661	27	--	948	28	--	798	30	--	867	29	--
NS-04	Unloading Tanker Truck (Exhaust 1)	1014	7	--	656	15	--	953	7	--	804	9	--	873	8	--
NS-05	Unloading Tanker Truck (Exhaust 2)	1015	7	--	659	13	--	953	7	--	803	9	--	872	8	--
NS-06	Arriving/Departing Ready-Mix Trucks	571	21	--	848	26	--	529	21	--	338	22	--	394	21	--
NS-07	Loading Ready-Mix Trucks (Engine)	1023	27	--	674	17	--	963	28	--	804	30	--	874	29	--
NS-08	Loading Ready-Mix Trucks (Exhaust)	1027	15	--	673	24	--	966	16	--	807	18	--	877	17	--
NS-09	Slumping Ready-Mix Trucks (Engine)	1014	28	--	671	22	--	954	28	--	798	30	--	868	29	--
NS-10	Slumping Ready-Mix Trucks (Exhaust)	1018	20	--	670	20	--	957	16	--	801	18	--	871	17	--
NS-11	Arriving/Departing Aggregate Trucks	581	41	--	855	31	--	539	43	--	346	41	--	402	41	--
NS-12	Unloading Aggregate Trucks	1071	11	--	719	20	--	1014	12	--	828	14	--	901	13	--
NS-13	Front End Loader	1063	26	--	699	35	--	1005	27	--	828	29	--	900	28	--
NS-14	Silo #1 Baghouse Exhaust	1032	22	--	670	27	--	972	23	--	813	25	--	884	24	--
NS-15	Cement Scale Vibrator	1033	19	--	668	24	--	972	20	--	814	17	--	884	21	--
NS-16	Aggregate Scale Vibrator	1039	9	--	665	19	--	979	10	--	821	12	--	891	11	--
NS-17	Loading Point Signal Horn	1030	30	--	668	35	--	969	31	--	812	28	--	882	32	--
NS-18	Diesel-Fired Generator (148 kW)	1053	33	--	654	39	--	992	34	--	838	36	--	908	35	--
NS-19	Diesel-Fired Generator (81 kW)	1056	--	29	653	--	35	995	--	30	841	--	32	911	--	31
NS-20	Auxilliary Silo Pneumatic Blower	Not included in predictable worst case hour														

Note: Reported sound levels include all adjustment factors (time weighting, tonal penalty), as applicable.



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Table A3: Acoustic Assessment Summary Table

Point of Reception	Point of Reception Description	Sound Level at Point of Reception, L_{EQ} [dBA]		Verified by Acoustic Audit	Performance Limit, L_{EQ} [dBA]		Compliance with Performance Limit
		Day	Eve/Night		Day	Eve/Night	
R122	Receptor R122	43	29	No	45	40	Yes/Yes
R166	Receptor R166	44	35	No	45	40	Yes/Yes
R328	Receptor R328	44	30	No	45	40	Yes/Yes
R573	Receptor R573	44	32	No	45	40	Yes/Yes
R611	Receptor R611	43	31	No	45	40	Yes/Yes



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APPENDIX B

Details of Predictive Acoustical Modelling



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The source sound power levels were used as input to a predictive computer model (*Cadna-A version 4.4.145*). The model is based on the methods from ISO Standard 9613-2.2 “Acoustics - Attenuation of Sound During Propagation Outdoors” [6], which accounts for reduction in sound level with distance due to geometrical spreading, air absorption, ground attenuation and acoustical shielding by intervening structures (or by topography and foliage where applicable). This modeling technique is acceptable to the MOECC.

Topographical data for the subject site and surrounding area were provided in digital form by Windlectric Inc. and incorporated into the acoustical model. In general, the site and surrounding area are relatively flat, generally sloping northward toward the waterline. Approximately 510 metres northwest of the proposed plant, there is a more pronounced elevation drop of approximately five metres. Ground attenuation was assumed to be spectral for all sources, with the ground factor (G) assumed to be 0.7 globally based on instruction from the MOE following issuance of the original Acoustic Assessment Report (dated February 25, 2015). The temperature and relative humidity were assumed to be 10° C and 70%, respectively.

The predictive modeling considered one order of reflection, with shielding/reflections afforded by buildings both on and off the subject site. Spectral absorptive characteristics were applied to each structure as appropriate, typically with values representative of corrugated metal, concrete block or steel.

The majority of sound sources were modeled as point sources of sound (shown as crosses in Figures 3 through 5). Sound emissions from the front end loader were modeled as an area source (shown as a hatched area in Figures 3 through 5). Movements of all trucks were modeled as line sources. Time weighting factors were applied to the sound from vehicles, which were assumed to travel at a speed of 35 km/hr on the access road and 10 km/h on the site of the ready-mix plant itself. The vehicle trajectories are shown as thin lines in Figures 3 through 5.

APPENDIX C

Acoustic Assessment Criteria



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MOECC Publication NPC-300, “Environmental Noise Guideline, Stationary and Transportation Sources – Approval and Planning” [3] draws a distinction between sound produced by traffic sources and that produced by industrial or commercial activities, which are classified as *stationary sources of sound*. In general, the acceptability limits for stationary sources are site dependent, and are based on the existing ambient background sound levels in the area of the subject site. In essence, the sound from the stationary sources is evaluated against (i.e. compared to) the typical background sound at any potentially impacted, sound-sensitive points of reception (e.g., residences). Background sound is considered to include road traffic and other typical sounds, but excludes the sound of the facility under assessment.

Publication NPC-300 states that the sound level limit for a stationary source which operates in a Class 3 (“rural”) area is the greater of the minimum one-hour L_{EQ} ambient sound level or the exclusionary minimum limit of 45 dBA during daytime hours (07:00 to 19:00) and 40 dBA during evening/nighttime hours (19:00 to 07:00) at a point of reception in the plane of an outdoor window (the most impacted location, for the subject site). The MOECC guidelines also stipulate that the noise assessment shall consider a *predictable worst-case hour*, which is defined as an hour when typically busy operation of the stationary sources under consideration could coincide with an hour of low background sound. The characteristic background sound level can be determined through automated long-term measurement, or by predictive analysis based on road traffic volume counts, in cases where the background sound is dominated by road traffic.

Observations and measurements conducted in the vicinity of the subject site indicate that background sound levels are likely to fall below the exclusionary minimum level set out by NPC-300 during the quietest hours of the day and evening/night. Therefore, the applicable criteria at locations R122, R166 and R611, R328 and R573 are the exclusionary minimums of 45 dBA during daytime hours (07:00 to 19:00) and 40 dBA during evening/nighttime hours (19:00 to 07:00).



APPENDIX D

Sample Calculation Results - Condensed, Overall dBA Format

In the following tables of calculation results, the column headings for the various sound attenuation mechanisms follow the terminology of ISO Standard 9613-2. LxD and LxN are the A-weighted, one-hour energy-equivalent source sound power levels for day and night, respectively, which include the effects of any source-abatement measures included in the model, and any time-averaging effects for intermittent sources. LrD and LrN are the A-weighted, one-hour energy-equivalent sound levels at the points of reception. The results are presented in terms of overall A-weighted results, at the most impacted off-site points of reception.



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R122 Receptor R122		363067	4891931	84.6														
Src ID	Src Name	Easting	Northing	Elevation	LxD	LxN	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahaus	Cmet	Refl	LrD	LrN
NS-01	Arriving/Departing Tanker Truck	363548	4891545	85.3	89	--	60	0	0.0	-0.8	0.1	3.7	0.0	0.0	0.0	0.0	26	--
NS-02	Unloading Tanker Truck (Blower)	363723	4891157	87.0	114	--	71	0	0.0	3.8	17.9	2.7	0.0	0.0	0.0	0.0	19	--
NS-03	Unloading Tanker Truck (Engine)	363721	4891163	87.5	103	--	71	3	0.0	1.1	3.8	3.1	0.0	0.0	0.0	0.0	27	--
NS-04	Unloading Tanker Truck (Exhaust 1)	363721	4891157	90.0	80	--	71	0	0.0	-1.3	3.3	0.5	0.0	0.0	0.0	0.0	7	--
NS-05	Unloading Tanker Truck (Exhaust 2)	363724	4891158	90.0	80	--	71	0	0.0	-1.3	3.3	0.5	0.0	0.0	0.0	0.0	7	--
NS-06	Arriving/Departing Ready-Mix Trucks	363534	4891603	85.2	99	--	71	0	0.0	-1.2	2.8	5.1	0.0	0.0	0.0	0.0	21	--
NS-07	Loading Ready-Mix Trucks (Engine)	363742	4891163	87.4	104	--	71	3	0.0	0.6	4.0	3.9	0.0	0.0	0.0	0.0	27	--
NS-08	Loading Ready-Mix Trucks (Exhaust)	363744	4891160	89.9	94	--	71	0	0.0	-1.1	4.6	4.4	0.0	0.0	0.0	0.0	15	--
NS-09	Slumping Ready-Mix Trucks (Engine)	363733	4891166	87.5	104	--	71	3	0.0	0.2	4.2	4.1	0.0	0.0	0.0	0.0	28	--
NS-10	Slumping Ready-Mix Trucks (Exhaust)	363735	4891164	90.0	94	--	71	0	0.0	-1.4	0.0	4.7	0.0	0.0	0.0	0.0	20	--
NS-11	Arriving/Departing Aggregate Trucks	363544	4891600	85.2	104	--	61	0	0.0	-0.4	0.1	3.0	0.0	0.0	0.0	0.0	41	--
NS-12	Unloading Aggregate Trucks	363811	4891161	86.0	96	--	72	0	0.0	2.1	3.7	7.4	0.0	0.0	0.0	0.0	11	--
NS-13	Front End Loader	363786	4891148	88.1	106	--	71	0	0.0	-0.6	4.5	4.3	0.0	0.0	0.0	0.0	26	--
NS-14	Silo #1 Baghouse Exhaust	363747	4891154	96.6	96	--	71	0	0.0	-1.4	0.0	4.0	0.0	0.0	0.0	0.0	22	--
NS-15	Cement Scale Vibrator	363746	4891153	90.8	96	--	71	0	0.0	-1.3	0.0	7.1	0.0	0.0	0.0	0.0	19	--
NS-16	Aggregate Scale Vibrator	363748	4891146	87.8	87	--	71	0	0.0	-0.8	4.5	3.5	0.0	0.0	0.0	0.0	9	--
NS-17	Loading Point Signal Horn	363743	4891155	90.9	105	--	71	0	0.0	-1.5	0.0	4.9	0.0	0.0	0.0	0.0	30	--
NS-18	Diesel-Fired Generator (148 kW)	363750	4891130	91.7	108	--	71	0	0.0	-1.4	0.0	4.7	0.0	0.0	0.0	0.0	33	--
NS-19	Diesel-Fired Generator (81 kW)	363752	4891127	91.7	--	104	71	0	0.0	-1.0	0.0	4.3	0.0	0.0	0.0	0.0	--	29

R166 Receptor R166		363313	4890643	89.1														
Src ID	Src Name	Easting	Northing	Elevation	LxD	LxN	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahaus	Cmet	Refl	LrD	LrN
NS-01	Arriving/Departing Tanker Truck	363546	4891465	85.3	89	--	69	0	0.0	-1.1	1.1	4.6	0.0	0.0	0.0	0.0	16	--
NS-02	Unloading Tanker Truck (Blower)	363723	4891157	87.0	114	--	67	0	0.0	1.3	4.5	3.6	0.0	0.0	0.0	0.0	38	--
NS-03	Unloading Tanker Truck (Engine)	363721	4891163	87.5	103	--	67	3	0.0	1.1	8.8	2.3	0.0	0.0	0.0	0.0	27	--
NS-04	Unloading Tanker Truck (Exhaust 1)	363721	4891157	90.0	80	--	67	0	0.0	-2.1	0.0	0.5	0.0	0.0	0.0	0.0	15	--
NS-05	Unloading Tanker Truck (Exhaust 2)	363724	4891158	90.0	80	--	67	0	0.0	-1.7	1.5	0.3	0.0	0.0	0.0	0.0	13	--
NS-06	Arriving/Departing Ready-Mix Trucks	363552	4891457	85.5	99	--	69	0	0.0	-1.2	1.3	3.7	0.0	0.0	0.0	0.0	26	--
NS-07	Loading Ready-Mix Trucks (Engine)	363742	4891163	87.4	104	--	68	3	0.0	1.7	18.1	2.3	0.0	0.0	0.0	0.0	17	--
NS-08	Loading Ready-Mix Trucks (Exhaust)	363744	4891160	89.9	94	--	68	0	0.0	-1.2	0.0	3.3	0.0	0.0	0.0	0.0	24	--
NS-09	Slumping Ready-Mix Trucks (Engine)	363733	4891166	87.5	104	--	68	3	0.0	0.7	13.8	2.7	0.0	0.0	0.0	0.0	22	--
NS-10	Slumping Ready-Mix Trucks (Exhaust)	363735	4891164	90.0	94	--	68	0	0.0	-1.2	4.3	3.4	0.0	0.0	0.0	0.0	20	--
NS-11	Arriving/Departing Aggregate Trucks	363564	4891461	85.4	104	--	69	0	0.0	-0.6	1.3	3.7	0.0	0.0	0.0	0.0	31	--
NS-12	Unloading Aggregate Trucks	363811	4891161	86.0	96	--	68	0	0.0	0.2	0.0	7.5	0.0	0.0	0.0	0.0	20	--
NS-13	Front End Loader	363790	4891154	88.1	106	--	68	0	0.0	-1.0	0.9	3.5	0.0	0.0	0.0	0.0	35	--
NS-14	Silo #1 Baghouse Exhaust	363747	4891154	96.6	96	--	68	0	0.0	-1.1	0.0	2.9	0.0	0.0	0.0	0.0	27	--
NS-15	Cement Scale Vibrator	363746	4891153	90.8	96	--	68	0	0.0	-1.2	0.0	5.8	0.0	0.0	0.0	0.0	24	--
NS-16	Aggregate Scale Vibrator	363748	4891146	87.8	87	--	67	0	0.0	-1.3	0.0	2.6	0.0	0.0	0.0	0.0	19	--
NS-17	Loading Point Signal Horn	363743	4891155	90.9	105	--	68	0	0.0	-1.4	0.0	3.5	0.0	0.0	0.0	0.0	35	--
NS-18	Diesel-Fired Generator (148 kW)	363750	4891130	91.7	108	--	67	0	0.0	-1.3	0.0	3.2	0.0	0.0	0.0	0.0	39	--
NS-19	Diesel-Fired Generator (81 kW)	363752	4891127	91.7	--	104	67	0	0.0	-0.9	0.0	2.8	0.0	0.0	0.0	0.0	--	35

R328 Receptor R328		363066	4891848	85.0														
Src ID	Src Name	Easting	Northing	Elevation	LxD	LxN	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahaus	Cmet	Refl	LrD	LrN
NS-01	Arriving/Departing Tanker Truck	363545	4891552	85.3	89	--	59	0	0.0	-0.8	0.1	3.6	0.0	0.0	0.0	0.0	27	--
NS-02	Unloading Tanker Truck (Blower)	363723	4891157	87.0	114	--	71	0	0.0	2.8	10.2	3.3	0.0	0.0	0.0	0.0	28	--
NS-03	Unloading Tanker Truck (Engine)	363721	4891163	87.5	103	--	71	3	0.0	1.0	3.8	2.9	0.0	0.0	0.0	0.0	28	--
NS-04	Unloading Tanker Truck (Exhaust 1)	363721	4891157	90.0	80	--	71	0	0.0	-1.3	3.3	0.5	0.0	0.0	0.0	0.0	7	--
NS-05	Unloading Tanker Truck (Exhaust 2)	363724	4891158	90.0	80	--	71	0	0.0	-1.3	3.3	0.5	0.0	0.0	0.0	0.0	7	--
NS-06	Arriving/Departing Ready-Mix Trucks	363534	4891603	85.2	99	--	71	0	0.0	-1.2	3.0	4.8	0.0	0.0	0.0	0.0	21	--
NS-07	Loading Ready-Mix Trucks (Engine)	363742	4891163	87.4	104	--	71	3	0.0	0.6	4.1	3.7	0.0	0.0	0.0	0.0	28	--
NS-08	Loading Ready-Mix Trucks (Exhaust)	363744	4891160	89.9	94	--	71	0	0.0	-1.1	4.3	4.5	0.0	0.0	0.0	0.0	16	--
NS-09	Slumping Ready-Mix Trucks (Engine)	363733	4891166	87.5	104	--	71	3	0.0	0.2	4.3	3.9	0.0	0.0	0.0	0.0	28	--
NS-10	Slumping Ready-Mix Trucks (Exhaust)	363735	4891164	90.0	94	--	71	0	0.0	-1.3	4.5	4.6	0.0	0.0	0.0	0.0	16	--
NS-11	Arriving/Departing Aggregate Trucks	363544	4891600	85.2	104	--	59	0	0.0	-0.4	0.0	2.9	0.0	0.0	0.0	0.0	43	--
NS-12	Unloading Aggregate Trucks	363811	4891161	86.0	96	--	71	0	0.0	2.0	3.7	7.2	0.0	0.0	0.0	0.0	12	--
NS-13	Front End Loader	363784	4891145	88.1	106	--	71	0	0.0	-0.6	4.5	4.1	0.0	0.0	0.0	0.0	27	--
NS-14	Silo #1 Baghouse Exhaust	363747	4891154	96.6	96	--	71	0	0.0	-1.3	0.0	3.9	0.0	0.0	0.0	0.0	23	--
NS-15	Cement Scale Vibrator	363746	4891153	90.8	96	--	71	0	0.0	-1.3	0.0	6.9	0.0	0.0	0.0	0.0	20	--
NS-16	Aggregate Scale Vibrator	363748	4891146	87.8	87	--	71	0	0.0	-0.9	4.3	3.4	0.0	0.0	0.0	0.0	10	--
NS-17	Loading Point Signal Horn	363743	4891155	90.9	105	--	71	0	0.0	-1.5	0.0	4.7	0.0	0.0	0.0	0.0	31	--
NS-18	Diesel-Fired Generator (148 kW)	363750	4891130	91.7	108	--	71	0	0.0	-1.4	0.0	4.5	0.0	0.0	0.0	0.0	34	--
NS-19	Diesel-Fired Generator (81 kW)	363752	4891127	91.7	--	104	71	0	0.0	-1.0	0.0	4.1	0.0	0.0	0.0	0.0	--	30

Where: Lr = Lx - Adiv + K0 + Dc - Agnd - Abar - Aatm - Afol - Ahous + Cmet + Refl

R573 Receptor R573		363517	4891934	80.9														
Src ID	Src Name	Easting	Northing	Elevation	LxD	LxN	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	Cmet	Refl	LrD	LrN
NS-01	Arriving/Departing Tanker Truck	363538	4891549	85.2	89	--	60	0	0.0	-0.8	0.2	3.4	0.0	0.0	0.0	0.0	26	--
NS-02	Unloading Tanker Truck (Blower)	363723	4891157	87.0	114	--	69	0	0.0	2.8	11.6	2.6	0.0	0.0	0.0	0.0	28	--
NS-03	Unloading Tanker Truck (Engine)	363721	4891163	87.5	103	--	69	3	0.0	1.0	2.9	3.4	0.0	0.0	0.0	0.0	30	--
NS-04	Unloading Tanker Truck (Exhaust 1)	363721	4891157	90.0	80	--	69	0	0.0	-1.2	3.3	0.4	0.0	0.0	0.0	0.0	9	--
NS-05	Unloading Tanker Truck (Exhaust 2)	363724	4891158	90.0	80	--	69	0	0.0	-1.2	3.3	0.4	0.0	0.0	0.0	0.0	9	--
NS-06	Arriving/Departing Ready-Mix Trucks	363534	4891596	85.2	99	--	69	0	0.0	-1.1	4.5	4.1	0.0	0.0	0.0	0.0	22	--
NS-07	Loading Ready-Mix Trucks (Engine)	363742	4891163	87.4	104	--	69	3	0.0	0.5	4.1	3.2	0.0	0.0	0.0	0.0	30	--
NS-08	Loading Ready-Mix Trucks (Exhaust)	363744	4891160	89.9	94	--	69	0	0.0	-1.1	4.4	3.9	0.0	0.0	0.0	0.0	18	--
NS-09	Slumping Ready-Mix Trucks (Engine)	363733	4891166	87.5	104	--	69	3	0.0	0.1	3.5	4.2	0.0	0.0	0.0	0.0	30	--
NS-10	Slumping Ready-Mix Trucks (Exhaust)	363735	4891164	90.0	94	--	69	0	0.0	-1.2	4.5	4.0	0.0	0.0	0.0	0.0	18	--
NS-11	Arriving/Departing Aggregate Trucks	363544	4891590	85.2	104	--	60	0	0.0	-0.4	0.2	2.9	0.0	0.0	0.0	0.0	41	--
NS-12	Unloading Aggregate Trucks	363811	4891161	86.0	96	--	69	0	0.0	1.8	3.9	6.5	0.0	0.0	0.0	0.0	14	--
NS-13	Front End Loader	363790	4891153	88.1	106	--	69	0	0.0	-0.6	4.0	4.1	0.0	0.0	0.0	0.0	29	--
NS-14	Silo #1 Baghouse Exhaust	363747	4891154	96.6	96	--	69	0	0.0	-1.3	0.0	3.4	0.0	0.0	0.0	0.0	25	--
NS-15	Cement Scale Vibrator	363746	4891153	90.8	96	--	69	0	0.0	-1.0	4.6	6.0	0.0	0.0	0.0	0.0	17	--
NS-16	Aggregate Scale Vibrator	363748	4891146	87.8	87	--	69	0	0.0	-0.8	4.7	2.9	0.0	0.0	0.0	0.0	11	--
NS-17	Loading Point Signal Horn	363743	4891155	90.9	105	--	69	0	0.0	-1.4	4.7	4.1	0.0	0.0	0.0	0.0	28	--
NS-18	Diesel-Fired Generator (148 kW)	363750	4891130	91.7	108	--	69	0	0.0	-1.3	0.0	3.9	0.0	0.0	0.0	0.0	36	--
NS-19	Diesel-Fired Generator (81 kW)	363752	4891127	91.7	--	104	70	0	0.0	-1.0	0.0	3.6	0.0	0.0	0.0	0.0	--	32

R611 Receptor R611		363447	4891985	80.5														
Src ID	Src Name	Easting	Northing	Elevation	LxD	LxN	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	Cmet	Refl	LrD	LrN
NS-01	Arriving/Departing Tanker Truck	363540	4891550	85.3	89	--	60	0	0.0	-0.8	0.2	3.5	0.0	0.0	0.0	0.0	25	--
NS-02	Unloading Tanker Truck (Blower)	363723	4891157	87.0	114	--	70	0	0.0	2.9	11.6	2.8	0.0	0.0	0.0	0.0	27	--
NS-03	Unloading Tanker Truck (Engine)	363721	4891163	87.5	103	--	70	3	0.0	1.0	2.9	3.6	0.0	0.0	0.0	0.0	29	--
NS-04	Unloading Tanker Truck (Exhaust 1)	363721	4891157	90.0	80	--	70	0	0.0	-1.3	3.3	0.4	0.0	0.0	0.0	0.0	8	--
NS-05	Unloading Tanker Truck (Exhaust 2)	363724	4891158	90.0	80	--	70	0	0.0	-1.3	3.3	0.4	0.0	0.0	0.0	0.0	8	--
NS-06	Arriving/Departing Ready-Mix Trucks	363534	4891601	85.2	99	--	70	0	0.0	-1.1	4.5	4.4	0.0	0.0	0.0	0.0	21	--
NS-07	Loading Ready-Mix Trucks (Engine)	363742	4891163	87.4	104	--	70	3	0.0	0.5	4.1	3.4	0.0	0.0	0.0	0.0	29	--
NS-08	Loading Ready-Mix Trucks (Exhaust)	363744	4891160	89.9	94	--	70	0	0.0	-1.1	4.4	4.2	0.0	0.0	0.0	0.0	17	--
NS-09	Slumping Ready-Mix Trucks (Engine)	363733	4891166	87.5	104	--	70	3	0.0	0.1	4.3	3.6	0.0	0.0	0.0	0.0	29	--
NS-10	Slumping Ready-Mix Trucks (Exhaust)	363735	4891164	90.0	94	--	70	0	0.0	-1.3	4.5	4.3	0.0	0.0	0.0	0.0	17	--
NS-11	Arriving/Departing Aggregate Trucks	363544	4891595	85.2	104	--	61	0	0.0	-0.4	0.2	3.0	0.0	0.0	0.0	0.0	41	--
NS-12	Unloading Aggregate Trucks	363811	4891161	86.0	96	--	70	0	0.0	1.9	3.8	6.8	0.0	0.0	0.0	0.0	13	--
NS-13	Front End Loader	363787	4891152	88.1	106	--	70	0	0.0	-0.6	3.9	4.3	0.0	0.0	0.0	0.0	28	--
NS-14	Silo #1 Baghouse Exhaust	363747	4891154	96.6	96	--	70	0	0.0	-1.3	0.0	3.6	0.0	0.0	0.0	0.0	24	--
NS-15	Cement Scale Vibrator	363746	4891153	90.8	96	--	70	0	0.0	-1.3	0.0	6.6	0.0	0.0	0.0	0.0	21	--
NS-16	Aggregate Scale Vibrator	363748	4891146	87.8	87	--	70	0	0.0	-0.8	5.1	2.8	0.0	0.0	0.0	0.0	10	--
NS-17	Loading Point Signal Horn	363743	4891155	90.9	105	--	70	0	0.0	-1.4	0.0	4.3	0.0	0.0	0.0	0.0	32	--
NS-18	Diesel-Fired Generator (148 kW)	363750	4891130	91.7	108	--	70	0	0.0	-1.4	0.0	4.2	0.0	0.0	0.0	0.0	35	--
NS-19	Diesel-Fired Generator (81 kW)	363752	4891127	91.7	--	104	70	0	0.0	-1.0	0.0	3.8	0.0	0.0	0.0	0.0	--	31

Where: Lr = Lx - Adiv + K0 + Dc - Agnd - Abar - Aatm - Afol - Ahous + Cmet + Refl

APPENDIX E

Sample Calculation Results – Octave Band Format

In the following tables of calculation results, the column headings for the various sound attenuation mechanisms follow the terminology of ISO Standard 9613-2. LxD and LxN are the A-weighted, one-hour energy-equivalent source sound power levels for day and night, respectively, which include the effects of any source-abatement measures included in the model, and any time-averaging effects for intermittent sources. LrD and LrN are the A-weighted, one-hour energy-equivalent sound levels at the points of reception. The results are presented in terms of full octave band sound levels, at the most impacted off-site points of reception.



ACOUSTICS



NOISE



VIBRATION

R166	Receptor R166		363313	4890643	89.1														
Src ID	Src Name	Band	Easting	Northing	Elevation	LxD	LxN	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahou	Cmet	Refl	LrD	LrN
NS-01	Arriving/Departing Tanker Truck	32	363546	4891503	85.2	51	--	69	0	0.0	-5.2	1.7	0.0	0.0	0.0	0.0	0.0	--	--
NS-01	Arriving/Departing Tanker Truck	63	363546	4891503	85.2	63	--	69	0	0.0	-5.2	1.7	0.1	0.0	0.0	0.0	0.0	--	--
NS-01	Arriving/Departing Tanker Truck	125	363546	4891503	85.2	73	--	69	0	0.0	4.0	0.3	0.3	0.0	0.0	0.0	0.0	--	--
NS-01	Arriving/Departing Tanker Truck	250	363546	4891503	85.2	71	--	69	0	0.0	3.2	0.6	0.8	0.0	0.0	0.0	0.0	--	--
NS-01	Arriving/Departing Tanker Truck	500	363546	4891503	85.2	80	--	69	0	0.0	-1.0	1.2	2.2	0.0	0.0	0.0	0.0	9	--
NS-01	Arriving/Departing Tanker Truck	1000	363546	4891503	85.2	85	--	69	0	0.0	-1.5	1.1	3.7	0.0	0.0	0.0	0.0	13	--
NS-01	Arriving/Departing Tanker Truck	2000	363546	4891503	85.2	84	--	68	0	0.0	-1.5	1.0	8.6	0.0	0.0	0.0	0.0	8	--
NS-01	Arriving/Departing Tanker Truck	4000	363546	4891503	85.2	76	--	68	0	0.0	-1.5	0.7	25.9	0.0	0.0	0.0	0.0	--	--
NS-01	Arriving/Departing Tanker Truck	8000	363546	4891503	85.2	64	--	68	0	0.0	-1.5	0.7	83.8	0.0	0.0	0.0	0.0	--	--
NS-02	Unloading Tanker Truck (Blower)	32	363723	4891157	87.0	62	--	67	0	0.0	-5.3	2.9	0.0	0.0	0.0	0.0	0.0	--	--
NS-02	Unloading Tanker Truck (Blower)	63	363723	4891157	87.0	84	--	67	0	0.0	-5.3	3.6	0.1	0.0	0.0	0.0	0.0	18	--
NS-02	Unloading Tanker Truck (Blower)	125	363723	4891157	87.0	102	--	67	0	0.0	3.8	3.4	0.3	0.0	0.0	0.0	0.0	27	--
NS-02	Unloading Tanker Truck (Blower)	250	363723	4891157	87.0	100	--	67	0	0.0	4.9	3.9	0.7	0.0	0.0	0.0	0.0	23	--
NS-02	Unloading Tanker Truck (Blower)	500	363723	4891157	87.0	107	--	67	0	0.0	4.6	4.6	1.3	0.0	0.0	0.0	0.0	29	--
NS-02	Unloading Tanker Truck (Blower)	1000	363723	4891157	87.0	110	--	67	0	0.0	-0.2	5.4	2.4	0.0	0.0	0.0	0.0	35	--
NS-02	Unloading Tanker Truck (Blower)	2000	363723	4891157	87.0	108	--	67	0	0.0	-1.6	6.2	6.3	0.0	0.0	0.0	0.0	30	--
NS-02	Unloading Tanker Truck (Blower)	4000	363723	4891157	87.0	105	--	67	0	0.0	-1.6	7.2	21.5	0.0	0.0	0.0	0.0	11	--
NS-02	Unloading Tanker Truck (Blower)	8000	363723	4891157	87.0	95	--	67	0	0.0	-1.6	8.8	76.8	0.0	0.0	0.0	0.0	--	--
NS-03	Unloading Tanker Truck (Engine)	32	363721	4891163	87.5	55	--	67	3	0.0	-5.2	3.1	0.0	0.0	0.0	0.0	0.0	--	--
NS-03	Unloading Tanker Truck (Engine)	63	363721	4891163	87.5	73	--	67	3	0.0	-5.2	4.0	0.1	0.0	0.0	0.0	0.0	10	--
NS-03	Unloading Tanker Truck (Engine)	125	363721	4891163	87.5	84	--	67	3	0.0	3.7	4.1	0.3	0.0	0.0	0.0	0.0	11	--
NS-03	Unloading Tanker Truck (Engine)	250	363721	4891163	87.5	91	--	67	3	0.0	4.3	5.5	0.7	0.0	0.0	0.0	0.0	16	--
NS-03	Unloading Tanker Truck (Engine)	500	363721	4891163	87.5	98	--	67	3	0.0	1.9	7.9	1.3	0.0	0.0	0.0	0.0	23	--
NS-03	Unloading Tanker Truck (Engine)	1000	363721	4891163	87.5	99	--	67	3	0.0	-1.1	10.3	2.4	0.0	0.0	0.0	0.0	23	--
NS-03	Unloading Tanker Truck (Engine)	2000	363721	4891163	87.5	97	--	67	3	0.0	-1.6	12.7	6.4	0.0	0.0	0.0	0.0	15	--
NS-03	Unloading Tanker Truck (Engine)	4000	363721	4891163	87.5	90	--	67	3	0.0	-1.6	15.2	21.6	0.0	0.0	0.0	0.0	--	--
NS-03	Unloading Tanker Truck (Engine)	8000	363721	4891163	87.5	79	--	67	3	0.0	-1.6	17.6	77.2	0.0	0.0	0.0	0.0	--	--
NS-04	Unloading Tanker Truck (Exhaust 1)	32	363721	4891157	90.0	46	--	67	0	0.0	-4.8	0.0	0.0	0.0	0.0	0.0	0.0	--	--
NS-04	Unloading Tanker Truck (Exhaust 1)	63	363721	4891157	90.0	76	--	67	0	0.0	-4.8	0.0	0.1	0.0	0.0	0.0	0.0	13	--
NS-04	Unloading Tanker Truck (Exhaust 1)	125	363721	4891157	90.0	75	--	67	0	0.0	3.6	0.0	0.3	0.0	0.0	0.0	0.0	4	--
NS-04	Unloading Tanker Truck (Exhaust 1)	250	363721	4891157	90.0	74	--	67	0	0.0	0.9	0.0	0.7	0.0	0.0	0.0	0.0	5	--
NS-04	Unloading Tanker Truck (Exhaust 1)	500	363721	4891157	90.0	68	--	67	0	0.0	-1.4	0.0	1.3	0.0	0.0	0.0	0.0	1	--
NS-04	Unloading Tanker Truck (Exhaust 1)	1000	363721	4891157	90.0	67	--	67	0	0.0	-1.5	0.0	2.4	0.0	0.0	0.0	0.0	--	--
NS-04	Unloading Tanker Truck (Exhaust 1)	2000	363721	4891157	90.0	62	--	67	0	0.0	-1.5	0.0	6.3	0.0	0.0	0.0	0.0	--	--
NS-04	Unloading Tanker Truck (Exhaust 1)	4000	363721	4891157	90.0	40	--	67	0	0.0	-1.5	0.0	21.5	0.0	0.0	0.0	0.0	--	--
NS-04	Unloading Tanker Truck (Exhaust 1)	8000	363721	4891157	90.0	--	--	67	0	0.0	-1.5	0.0	-65.9	0.0	0.0	0.0	0.0	--	--
NS-05	Unloading Tanker Truck (Exhaust 2)	32	363724	4891158	90.0	46	--	67	0	0.0	-4.8	1.8	0.0	0.0	0.0	0.0	0.0	--	--
NS-05	Unloading Tanker Truck (Exhaust 2)	63	363724	4891158	90.0	76	--	67	0	0.0	-4.8	1.9	0.1	0.0	0.0	0.0	0.0	11	--
NS-05	Unloading Tanker Truck (Exhaust 2)	125	363724	4891158	90.0	75	--	67	0	0.0	3.6	0.0	0.3	0.0	0.0	0.0	0.0	4	--
NS-05	Unloading Tanker Truck (Exhaust 2)	250	363724	4891158	90.0	74	--	67	0	0.0	1.0	1.8	0.7	0.0	0.0	0.0	0.0	3	--
NS-05	Unloading Tanker Truck (Exhaust 2)	500	363724	4891158	90.0	68	--	67	0	0.0	-1.4	2.7	1.3	0.0	0.0	0.0	0.0	--	--
NS-05	Unloading Tanker Truck (Exhaust 2)	1000	363724	4891158	90.0	67	--	67	0	0.0	-1.5	3.1	2.4	0.0	0.0	0.0	0.0	--	--
NS-05	Unloading Tanker Truck (Exhaust 2)	2000	363724	4891158	90.0	62	--	67	0	0.0	-1.5	3.7	6.4	0.0	0.0	0.0	0.0	--	--
NS-05	Unloading Tanker Truck (Exhaust 2)	4000	363724	4891158	90.0	40	--	67	0	0.0	-1.5	4.2	21.6	0.0	0.0	0.0	0.0	--	--
NS-05	Unloading Tanker Truck (Exhaust 2)	8000	363724	4891158	90.0	--	--	67	0	0.0	-1.5	4.7	-70.6	0.0	0.0	0.0	0.0	--	--
NS-06	Arriving/Departing Ready-Mix Trucks	32	363536	4891523	88.6	50	--	69	0	0.0	-5.2	0.6	0.0	0.0	0.0	0.0	0.0	--	--
NS-06	Arriving/Departing Ready-Mix Trucks	63	363536	4891523	88.6	71	--	69	0	0.0	-5.2	0.7	0.1	0.0	0.0	0.0	0.0	7	--
NS-06	Arriving/Departing Ready-Mix Trucks	125	363536	4891523	88.6	75	--	69	0	0.0	3.8	0.1	0.3	0.0	0.0	0.0	0.0	3	--
NS-06	Arriving/Departing Ready-Mix Trucks	250	363536	4891523	88.6	82	--	69	0	0.0	2.8	0.4	0.8	0.0	0.0	0.0	0.0	10	--
NS-06	Arriving/Departing Ready-Mix Trucks	500	363536	4891523	88.6	90	--	69	0	0.0	-1.0	1.2	1.4	0.0	0.0	0.0	0.0	20	--
NS-06	Arriving/Departing Ready-Mix Trucks	1000	363536	4891523	88.6	95	--	69	0	0.0	-1.5	1.3	2.7	0.0	0.0	0.0	0.0	24	--
NS-06	Arriving/Departing Ready-Mix Trucks	2000	363536	4891523	88.6	94	--	69	0	0.0	-1.6	1.5	7.2	0.0	0.0	0.0	0.0	18	--
NS-06	Arriving/Departing Ready-Mix Trucks	4000	363536	4891523	88.6	88	--	68	0	0.0	-1.5	2.0	24.3	0.0	0.0	0.0	0.0	--	--
NS-06	Arriving/Departing Ready-Mix Trucks	8000	363536	4891523	88.6	78	--	68	0	0.0	-1.5	3.3	84.5	0.0	0.0	0.0	0.0	--	--
NS-07	Loading Ready-Mix Trucks (Engine)	32	363742	4891163	87.4	53	--	68	3	0.0	-5.2	4.5	0.0	0.0	0.0	0.0	0.0	--	--
NS-07	Loading Ready-Mix Trucks (Engine)	63	363742	4891163	87.4	69	--	68	3	0.0	-5.2	7.1	0.1	0.0	0.0	0.0	0.0	2	--
NS-07	Loading Ready-Mix Trucks (Engine)	125	363742	4891163	87.4	86	--	68	3	0.0	3.8	8.2	0.3	0.0	0.0	0.0	0.0	9	--
NS-07	Loading Ready-Mix Trucks (Engine)	250	363742	4891163	87.4	90	--	68	3	0.0	4.3	11.7	0.7	0.0	0.0	0.0	0.0	9	--
NS-07	Loading Ready-Mix Trucks (Engine)	500	363742	4891163	87.4	96	--	68	3	0.0	1.9	16.9	1.3	0.0	0.0	0.0	0.0	11	--
NS-07	Loading Ready-Mix Trucks (Engine)	1000	363742	4891163	87.4	100	--	68	3	0.0	-1.1	21.4	2.5	0.0	0.0	0.0	0.0	13	--
NS-07	Loading Ready-Mix Trucks (Engine)	2000	363742	4891163	87.4	99	--	68	3	0.0	-1.6	23.5	6.5	0.0	0.0	0.0	0.0	5	--
NS-07	Loading Ready-Mix Trucks (Engine)	4000	363742	4891163	87.4	94	--	68	3	0.0	-1.6	24.2	22.1	0.0	0.0	0.0	0.0	--	--
NS-07	Loading Ready-Mix Trucks (Engine)	8000	363742	4891163	87.4	85	--	68	3	0.0	-1.6	24.6	78.7	0.0	0.0	0.0	0.0	--	--
NS-08	Loading Ready-Mix Trucks (Exhaust)	32	363744	4891160	89.9	43	--	68	0	0.0	-4.9	0.0	0.0	0.0	0.0	0.0	0.0	--	--
NS-08	Loading Ready-Mix Trucks (Exhaust)	63	363744	4891160	89.9	59	--	68	0	0.0	-4.9	0.0	0.0	0.0	0.0	0.0	0.0	--	--
NS-08	Loading Ready-Mix Trucks (Exhaust)	125	363744	4891160	89.9	76	--	68	0	0.0	3.5	0.0	0.3	0.0	0.0	0.0	0.0	5	--
NS-08	Loading Ready-Mix Trucks (Exhaust)	250	363744	4891160	89.9	80	--	68	0	0.0	0.9	0.0	0.7	0.0	0.0	0.0	0.0	11	--
NS-08	Loading Ready-Mix Trucks (Exhaust)	500	363744	4891160	89.9	86	--	68	0	0.0	-1.5	0.0	1.3	0.0	0.0	0.0	0.0	19	--
NS-08	Loading Ready-Mix Trucks (Exhaust)	1000	363744	4891160	89.9	90	--	68	0	0.0	-1.5	0.0	2.4	0.0	0.0	0.0	0.0	22	--
NS-08	Loading Ready-Mix Trucks (Exhaust)	2000	363744	4891160	89.9	89	--	68	0	0.0	-1.5	0.0	6.5	0.0	0.0	0.0	0.0	16	--
NS-08	Loading Ready-Mix Trucks (Exhaust)	4000	363744	4891160	89.9	84	--	68	0	0.0	-1.5	0.0	22.0	0.0	0.0	0.0	0.0	--	--
NS-08	Loading Ready-Mix Trucks (Exhaust)	8000	363744	4891160	89.9	75	--	68	0	0.									

Src ID	Src Name	Band	Easting	Northing	Elevation	LxD	LxN	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahou	Cmet	Refl	LrD	LrN
NS-09	Slumping Ready-Mix Trucks (Engine)	1000	363733	4891166	87.5	101	--	68	3	0.0	-1.1	15.1	2.5	0.0	0.0	0.0	0.0	20	--
NS-09	Slumping Ready-Mix Trucks (Engine)	2000	363733	4891166	87.5	99	--	68	3	0.0	-1.6	17.8	6.5	0.0	0.0	0.0	0.0	11	--
NS-09	Slumping Ready-Mix Trucks (Engine)	4000	363733	4891166	87.5	94	--	68	3	0.0	-1.6	20.0	22.0	0.0	0.0	0.0	0.0	--	--
NS-09	Slumping Ready-Mix Trucks (Engine)	8000	363733	4891166	87.5	83	--	68	3	0.0	-1.6	21.8	78.4	0.0	0.0	0.0	0.0	--	--
NS-10	Slumping Ready-Mix Trucks (Exhaust)	32	363735	4891163	90.0	42	--	68	0	0.0	-4.9	1.5	0.0	0.0	0.0	0.0	0.0	--	--
NS-10	Slumping Ready-Mix Trucks (Exhaust)	63	363735	4891163	90.0	56	--	68	0	0.0	-4.9	2.2	0.1	0.0	0.0	0.0	0.0	--	--
NS-10	Slumping Ready-Mix Trucks (Exhaust)	125	363735	4891163	90.0	73	--	68	0	0.0	3.5	0.4	0.3	0.0	0.0	0.0	0.0	2	--
NS-10	Slumping Ready-Mix Trucks (Exhaust)	250	363735	4891163	90.0	79	--	68	0	0.0	0.9	2.9	0.7	0.0	0.0	0.0	0.0	7	--
NS-10	Slumping Ready-Mix Trucks (Exhaust)	500	363735	4891163	90.0	85	--	68	0	0.0	-1.5	4.1	1.3	0.0	0.0	0.0	0.0	14	--
NS-10	Slumping Ready-Mix Trucks (Exhaust)	1000	363735	4891163	90.0	91	--	68	0	0.0	-1.5	4.5	2.5	0.0	0.0	0.0	0.0	18	--
NS-10	Slumping Ready-Mix Trucks (Exhaust)	2000	363735	4891163	90.0	89	--	68	0	0.0	-1.5	4.7	6.4	0.0	0.0	0.0	0.0	11	--
NS-10	Slumping Ready-Mix Trucks (Exhaust)	4000	363735	4891163	90.0	84	--	68	0	0.0	-1.5	5.0	21.9	0.0	0.0	0.0	0.0	--	--
NS-10	Slumping Ready-Mix Trucks (Exhaust)	8000	363735	4891163	90.0	73	--	68	0	0.0	-1.5	5.3	78.3	0.0	0.0	0.0	0.0	--	--
NS-11	Arriving/Departing Aggregate Trucks	32	363547	4891523	85.2	54	--	69	0	0.0	-5.2	1.8	0.0	0.0	0.0	0.0	0.0	--	--
NS-11	Arriving/Departing Aggregate Trucks	63	363547	4891523	85.2	80	--	69	0	0.0	-5.2	1.8	0.1	0.0	0.0	0.0	0.0	14	--
NS-11	Arriving/Departing Aggregate Trucks	125	363547	4891523	85.2	88	--	70	0	0.0	4.1	0.2	0.3	0.0	0.0	0.0	0.0	14	--
NS-11	Arriving/Departing Aggregate Trucks	250	363547	4891523	85.2	95	--	69	0	0.0	3.2	0.6	0.9	0.0	0.0	0.0	0.0	21	--
NS-11	Arriving/Departing Aggregate Trucks	500	363547	4891523	85.2	98	--	69	0	0.0	-1.0	1.4	2.2	0.0	0.0	0.0	0.0	26	--
NS-11	Arriving/Departing Aggregate Trucks	1000	363547	4891523	85.2	99	--	69	0	0.0	-1.6	1.4	3.7	0.0	0.0	0.0	0.0	27	--
NS-11	Arriving/Departing Aggregate Trucks	2000	363547	4891523	85.2	98	--	69	0	0.0	-1.6	1.3	8.8	0.0	0.0	0.0	0.0	21	--
NS-11	Arriving/Departing Aggregate Trucks	4000	363547	4891523	85.2	93	--	69	0	0.0	-1.6	1.1	27.1	0.0	0.0	0.0	0.0	--	--
NS-11	Arriving/Departing Aggregate Trucks	8000	363547	4891523	85.2	82	--	68	0	0.0	-1.5	1.1	90.2	0.0	0.0	0.0	0.0	--	--
NS-12	Unloading Aggregate Trucks	32	363811	4891161	86.0	34	--	68	0	0.0	-5.4	0.0	0.0	0.0	0.0	0.0	0.0	--	--
NS-12	Unloading Aggregate Trucks	63	363811	4891161	86.0	75	--	68	0	0.0	-5.4	0.0	0.1	0.0	0.0	0.0	0.0	12	--
NS-12	Unloading Aggregate Trucks	125	363811	4891161	86.0	70	--	68	0	0.0	4.1	0.0	0.3	0.0	0.0	0.0	0.0	--	--
NS-12	Unloading Aggregate Trucks	250	363811	4891161	86.0	77	--	68	0	0.0	5.2	0.0	0.8	0.0	0.0	0.0	0.0	3	--
NS-12	Unloading Aggregate Trucks	500	363811	4891161	86.0	83	--	68	0	0.0	7.1	0.0	1.4	0.0	0.0	0.0	0.0	6	--
NS-12	Unloading Aggregate Trucks	1000	363811	4891161	86.0	86	--	68	0	0.0	1.2	0.0	2.6	0.0	0.0	0.0	0.0	14	--
NS-12	Unloading Aggregate Trucks	2000	363811	4891161	86.0	91	--	68	0	0.0	-1.6	0.0	6.9	0.0	0.0	0.0	0.0	17	--
NS-12	Unloading Aggregate Trucks	4000	363811	4891161	86.0	91	--	68	0	0.0	-1.6	0.0	23.5	0.0	0.0	0.0	0.0	1	--
NS-12	Unloading Aggregate Trucks	8000	363811	4891161	86.0	88	--	68	0	0.0	-1.6	0.0	84.0	0.0	0.0	0.0	0.0	--	--
NS-13	Front End Loader	32	363783	4891147	88.1	57	--	68	0	0.0	-5.1	0.3	0.0	0.0	0.0	0.0	0.0	--	--
NS-13	Front End Loader	63	363783	4891147	88.1	84	--	68	0	0.0	-5.1	0.4	0.1	0.0	0.0	0.0	0.0	20	--
NS-13	Front End Loader	125	363783	4891147	88.1	88	--	68	0	0.0	3.7	0.0	0.3	0.0	0.0	0.0	0.0	16	--
NS-13	Front End Loader	250	363783	4891147	88.1	94	--	68	0	0.0	2.9	0.2	0.7	0.0	0.0	0.0	0.0	22	--
NS-13	Front End Loader	500	363783	4891147	88.1	97	--	68	0	0.0	-1.0	0.9	1.4	0.0	0.0	0.0	0.0	28	--
NS-13	Front End Loader	1000	363783	4891147	88.1	102	--	68	0	0.0	-1.5	1.0	2.6	0.0	0.0	0.0	0.0	32	--
NS-13	Front End Loader	2000	363783	4891147	88.1	101	--	68	0	0.0	-1.5	1.0	6.9	0.0	0.0	0.0	0.0	27	--
NS-13	Front End Loader	4000	363783	4891147	88.1	94	--	68	0	0.0	-1.5	1.1	23.3	0.0	0.0	0.0	0.0	3	--
NS-13	Front End Loader	8000	363783	4891147	88.1	87	--	68	0	0.0	-1.5	0.9	82.8	0.0	0.0	0.0	0.0	--	--
NS-14	Silo #1 Baghouse Exhaust	32	363747	4891154	96.6	45	--	68	0	0.0	-4.0	0.0	0.0	0.0	0.0	0.0	0.0	--	--
NS-14	Silo #1 Baghouse Exhaust	63	363747	4891154	96.6	60	--	68	0	0.0	-4.0	0.0	0.1	0.0	0.0	0.0	0.0	--	--
NS-14	Silo #1 Baghouse Exhaust	125	363747	4891154	96.6	69	--	68	0	0.0	1.4	0.0	0.3	0.0	0.0	0.0	0.0	--	--
NS-14	Silo #1 Baghouse Exhaust	250	363747	4891154	96.6	80	--	68	0	0.0	-0.2	0.0	0.7	0.0	0.0	0.0	0.0	12	--
NS-14	Silo #1 Baghouse Exhaust	500	363747	4891154	96.6	91	--	68	0	0.0	-1.2	0.0	1.3	0.0	0.0	0.0	0.0	23	--
NS-14	Silo #1 Baghouse Exhaust	1000	363747	4891154	96.6	92	--	68	0	0.0	-1.2	0.0	2.5	0.0	0.0	0.0	0.0	23	--
NS-14	Silo #1 Baghouse Exhaust	2000	363747	4891154	96.6	89	--	68	0	0.0	-1.2	0.0	6.5	0.0	0.0	0.0	0.0	16	--
NS-14	Silo #1 Baghouse Exhaust	4000	363747	4891154	96.6	85	--	68	0	0.0	-1.2	0.0	22.0	0.0	0.0	0.0	0.0	--	--
NS-14	Silo #1 Baghouse Exhaust	8000	363747	4891154	96.6	79	--	68	0	0.0	-1.2	0.0	78.4	0.0	0.0	0.0	0.0	--	--
NS-15	Cement Scale Vibrator	32	363746	4891153	90.8	53	--	68	0	0.0	-4.7	0.0	0.1	0.0	0.0	0.0	0.0	--	--
NS-15	Cement Scale Vibrator	63	363746	4891153	90.8	75	--	68	0	0.0	-4.7	0.0	0.1	0.0	0.0	0.0	0.0	12	--
NS-15	Cement Scale Vibrator	125	363746	4891153	90.8	80	--	68	0	0.0	3.5	0.0	0.3	0.0	0.0	0.0	0.0	8	--
NS-15	Cement Scale Vibrator	250	363746	4891153	90.8	80	--	68	0	0.0	0.2	0.0	0.7	0.0	0.0	0.0	0.0	12	--
NS-15	Cement Scale Vibrator	500	363746	4891153	90.8	85	--	68	0	0.0	-1.4	0.0	1.3	0.0	0.0	0.0	0.0	18	--
NS-15	Cement Scale Vibrator	1000	363746	4891153	90.8	89	--	68	0	0.0	-1.4	0.0	2.5	0.0	0.0	0.0	0.0	20	--
NS-15	Cement Scale Vibrator	2000	363746	4891153	90.8	90	--	68	0	0.0	-1.4	0.0	6.5	0.0	0.0	0.0	0.0	17	--
NS-15	Cement Scale Vibrator	4000	363746	4891153	90.8	91	--	68	0	0.0	-1.4	0.0	21.9	0.0	0.0	0.0	0.0	3	--
NS-15	Cement Scale Vibrator	8000	363746	4891153	90.8	87	--	68	0	0.0	-1.4	0.0	78.2	0.0	0.0	0.0	0.0	--	--
NS-16	Aggregate Scale Vibrator	32	363748	4891146	87.8	39	--	67	0	0.0	-5.1	0.0	0.1	0.0	0.0	0.0	0.0	--	--
NS-16	Aggregate Scale Vibrator	63	363748	4891146	87.8	73	--	67	0	0.0	-5.1	0.0	0.1	0.0	0.0	0.0	0.0	11	--
NS-16	Aggregate Scale Vibrator	125	363748	4891146	87.8	72	--	67	0	0.0	3.7	0.0	0.3	0.0	0.0	0.0	0.0	1	--
NS-16	Aggregate Scale Vibrator	250	363748	4891146	87.8	73	--	67	0	0.0	3.6	0.0	0.7	0.0	0.0	0.0	0.0	1	--
NS-16	Aggregate Scale Vibrator	500	363748	4891146	87.8	78	--	67	0	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0	9	--
NS-16	Aggregate Scale Vibrator	1000	363748	4891146	87.8	85	--	67	0	0.0	-1.4	0.0	2.4	0.0	0.0	0.0	0.0	16	--
NS-16	Aggregate Scale Vibrator	2000	363748	4891146	87.8	80	--	67	0	0.0	-1.5	0.0	6.4	0.0	0.0	0.0	0.0	7	--
NS-16	Aggregate Scale Vibrator	4000	363748	4891146	87.8	74	--	67	0	0.0	-1.5	0.0	21.8	0.0	0.0	0.0	0.0	--	--
NS-16	Aggregate Scale Vibrator	8000	363748	4891146	87.8	62	--	67	0	0.0	-1.5	0.0	77.8	0.0	0.0	0.0	0.0	--	--
NS-17	Loading Point Signal Horn	32	363743	4891155	90.9	44	--	68	0	0.0	-4.7	0.0	0.0	0.0	0.0	0.0	0.0	--	--
NS-17	Loading Point Signal Horn	63	363743	4891155	90.9	55	--	68	0	0.0	-4.7	0.0	0.1	0.0	0.0	0.0	0.0	--	--
NS-17	Loading Point Signal Horn	125	363743	4891155	90.9	66	--	68	0	0.0	3.5	0.0	0.3	0.0	0.0	0.0	0.0	--	--
NS-17	Loading Point Signal Horn	250	363743	4891155	90.9	88	--	68	0	0.0	0.2	0.0	0.7	0.0	0.0	0.0	0.0	20	--
NS-17	Loading Point Signal Horn	500	363743	4891155	90.9	97	--	68	0	0.0	-1.4	0.0	1.3	0.0	0.0	0.0	0.0	30	--
NS-17	Loading Point Signal Horn	1000	363743	4891155	90.9	100	--	68	0	0.0	-1.4	0.0	2.4	0.0	0.0	0.0	0.0	32	--
NS-17	Loading Point Signal Horn	2000	363743	4891155	90.9	100	--	68	0	0.0	-1.								

Src ID	Src Name	Band	Easting	Northing	Elevation	LxD	LxN	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahaus	Cmet	Refl	LrD	LrN	
NS-18	Diesel-Fired Generator (148 kW)	125	363750	4891130	91.7	91	--	67	0	0.0	3.1	0.0	0.3	0.0	0.0	0.0	0.0	0.0	21	--
NS-18	Diesel-Fired Generator (148 kW)	250	363750	4891130	91.7	93	--	67	0	0.0	-0.2	0.0	0.7	0.0	0.0	0.0	0.0	0.0	25	--
NS-18	Diesel-Fired Generator (148 kW)	500	363750	4891130	91.7	100	--	67	0	0.0	-1.4	0.0	1.3	0.0	0.0	0.0	0.0	0.0	33	--
NS-18	Diesel-Fired Generator (148 kW)	1000	363750	4891130	91.7	104	--	67	0	0.0	-1.4	0.0	2.4	0.0	0.0	0.0	0.0	0.0	35	--
NS-18	Diesel-Fired Generator (148 kW)	2000	363750	4891130	91.7	104	--	67	0	0.0	-1.4	0.0	6.3	0.0	0.0	0.0	0.0	0.0	31	--
NS-18	Diesel-Fired Generator (148 kW)	4000	363750	4891130	91.7	94	--	67	0	0.0	-1.4	0.0	21.4	0.0	0.0	0.0	0.0	0.0	6	--
NS-18	Diesel-Fired Generator (148 kW)	8000	363750	4891130	91.7	83	--	67	0	0.0	-1.4	0.0	76.5	0.0	0.0	0.0	0.0	0.0	--	--
NS-19	Diesel-Fired Generator (81 kW)	32	363752	4891127	91.7	--	65	67	0	0.0	-4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	--	2
NS-19	Diesel-Fired Generator (81 kW)	63	363752	4891127	91.7	--	82	67	0	0.0	-4.5	0.0	0.1	0.0	0.0	0.0	0.0	0.0	--	20
NS-19	Diesel-Fired Generator (81 kW)	125	363752	4891127	91.7	--	88	67	0	0.0	3.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	--	17
NS-19	Diesel-Fired Generator (81 kW)	250	363752	4891127	91.7	--	89	67	0	0.0	-0.2	0.0	0.7	0.0	0.0	0.0	0.0	0.0	--	21
NS-19	Diesel-Fired Generator (81 kW)	500	363752	4891127	91.7	--	96	67	0	0.0	-1.4	0.0	1.2	0.0	0.0	0.0	0.0	0.0	--	29
NS-19	Diesel-Fired Generator (81 kW)	1000	363752	4891127	91.7	--	100	67	0	0.0	-1.4	0.0	2.4	0.0	0.0	0.0	0.0	0.0	--	31
NS-19	Diesel-Fired Generator (81 kW)	2000	363752	4891127	91.7	--	100	67	0	0.0	-1.4	0.0	6.3	0.0	0.0	0.0	0.0	0.0	--	28
NS-19	Diesel-Fired Generator (81 kW)	4000	363752	4891127	91.7	--	90	67	0	0.0	-1.4	0.0	21.4	0.0	0.0	0.0	0.0	0.0	--	2
NS-19	Diesel-Fired Generator (81 kW)	8000	363752	4891127	91.7	--	80	67	0	0.0	-1.4	0.0	76.3	0.0	0.0	0.0	0.0	0.0	--	--

Where: Lr = Lx - Adiv + K0 + Dc - Agnd - Abar - Aatm - Afol - Ahous + Cmet + Refl

