



Stationary Noise Feasibility Assessment

10 Cope Drive

Ottawa, Ontario

REPORT: GWE17-196 - Stationary Noise

Prepared For:

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EXECUTIVE SUMMARY

This document describes a stationary noise feasibility assessment performed for a proposed commercial development located at 10 Cope Drive in Ottawa, Ontario. The development consists of three, single-storey buildings including a grocery store (Block A), and two retail commercial buildings (Block C and D) divided into several units. Sources of stationary noise include rooftop air handling equipment, idling reefer trucks, and an emergency generator. Figure 1 illustrates a site plan with surrounding context.

The assessment is based on: (i) theoretical noise prediction methods that conform to the Ministry of the Environment and Climate Change (MOECC) and City of Ottawa requirements; (ii) noise level criteria as specified by the City of Ottawa's Environmental Noise Control Guidelines (ENCG); (iii) architectural drawings received from Hobin Architecture; and (iv) mechanical information provided by McKee Engineering,

Our stationary noise feasibility assessment for the proposed commercial development indicates that, provided our assumptions for noise control in Section 2.1 are adhered to in the detailed design process, noise levels at nearby points of reception are expected to fall below the ENCG noise criteria. As such, the proposed development is expected to be compatible with the existing noise sensitive land uses and will satisfy all site plan conditions. A review of final equipment selection and locations by a qualified acoustical engineer will be required prior to installation of the equipment.

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1. INTRODUCTION

Gradient Wind Engineering Inc. (GWE) was retained by Taggart Realty Management to undertake a stationary noise feasibility assessment of a proposed commercial development located at 10 Cope Drive in Ottawa, Ontario. This report summarizes the methodology, results, and recommendations related to a stationary noise feasibility assessment. GWE's scope of work involved assessing exterior noise levels generated by rooftop mechanical equipment, a loading dock and an emergency generator. The assessment was performed on the basis of theoretical noise calculation methods conforming to the City of Ottawa¹ and Ministry of the Environment and Climate Change (MOECC) NPC-300² guidelines. This study is based on architectural drawings received from Hobin Architecture, mechanical information provided by McKee Engineering, and surrounding street layouts obtained from the City of Ottawa and recent site imagery.

2. TERMS OF REFERENCE

The focus of this stationary noise feasibility assessment is a proposed commercial development. The site is located southwest of the Cope Drive & Eagleson Road intersection. The site is surrounded by mixed-use land, comprising residential, commercial, and business park zones. The nearest points of reception are the adjacent dwellings along Barrick Hill Road, Riding Way and Carronbridge Circle. Figure 1 illustrates the site plan and surrounding context.

The development consists of three single storey buildings including a grocery store (Block A as per site plan drawing), and two retail commercial buildings (Block C and D as per site plan drawing) divided into several units. The main operating hours of the facility are expected to occur during daytime hours between 07:00 and 23:00, however rooftop equipment is expected to operate during nighttime hours between 23:00 and 07:00. Sources of stationary noise include rooftop air handling equipment, an emergency generator, and operations of refrigerated trailers (reefers) associated with Block A grocery store. Figure 2 illustrates the location of all noise sources included in this study.

¹ City of Ottawa Environmental Noise Control Guidelines, January 2016

² Ministry of the Environment and Climate Change (MOECC), Environmental Noise Guideline – Publication NPC-300, August 2013

2.1 Assumptions

Preliminary mechanical information for the development has been based on information provided by McKee Engineering, as well as GWE's experience with similar developments. A review of final equipment selection and locations by a qualified acoustical engineer will be required prior to installation of the equipment. The following assumptions have been included in the analysis:

- (i) Idling reefer truck at loading dock for thirty minutes per hour during daytime period (07:00 – 23:00). No idling truck at loading dock during nighttime period (23:00 – 07:00). The City of Ottawa Noise By-law No.2017-255 prohibits deliveries during the nighttime period.
- (ii) Three truck movements per hour during the daytime period (07:00 – 23:00). One truck movement per hour during the nighttime period (23:00 – 07:00).
- (iii) Garbage compactor operates for six minutes per hour during daytime period (07:00 – 23:00). No garbage compactor operation during nighttime period (23:00 – 07:00).
- (iii) The locations, quantity and tonnage of rooftop units and emergency generator have been assumed based on information provided by McKee Engineering, as well as GWE's experience with similar developments.
- (iv) Sound data for rooftop units is based on manufacture's data.
- (v) Sound data for reefer units and truck movements is based on GWE's past experience.
- (vi) The rooftop mechanical units are assumed to operate continuously over a 1-hour period during the daytime, and at 50% operation during the nighttime period.
- (vii) The emergency generator shall only be operated during the daytime period (07:00 – 23:00) for non-emergency situations such as testing and maintenance.
- (viii) Screening effects of buildings and parapets have been considered in the modelling. The minimum parapet height assumed was 1 m above the roof deck.
- (ix) A number of off-site existing noise barriers have been considered, as per Figure 3.

The equipment considered in the model consisted of:

- (i) Lennox RTU 240 (S1,2) – Two Units
- (ii) CES RTU (S3)
- (iii) Lennox RTU 036 (S4, S10-20) – 12 Units
- (iv) Lennox RTU 060 (S5)
- (v) Ref Plus 2X4 Fan Dry Cooler (S6)
- (vi) Ref Plus 1X4 Fan Dry Cooler (S7)
- (vii) Emergency Generator (S8)
- (viii) Truck Reefer Unit (S9)
- (ix) Truck Route (S21)
- (x) Garbage Compactor (S22)

3. OBJECTIVES

The main goals of this work are to: (i) calculate the future noise levels on the surrounding dwellings produced by stationary sources and (ii) ensure that exterior noise levels do not exceed the allowable limits specified by the ENCG, as outlined in Section 4 of this report.

4. METHODOLOGY

The impact of the external stationary noise sources on the nearby residential areas was determined by computer modelling. Stationary noise source modelling is based on the software program *Predictor-Lima* developed from the International Standards Organization (ISO) standard 9613 Parts 1 and 2. This computer program is capable of representing three-dimensional surfaces and first reflections of sound waves over a suitable spectrum for human hearing. The methodology has been used on numerous assignments and has been accepted by the MOECC as part of Environmental Compliance Approvals applications. Twelve receptor locations were chosen around the site, as illustrated in Figure 3.

4.1 Perception of Noise

Noise can be defined as any obtrusive sound. It is created at a source, transmitted through a medium, such as air, and intercepted by a receiver. Noise may be characterized in terms of the power of the source or the sound pressure at a specific distance. While the power of a source is characteristic of that source, the sound pressure depends on the location of the receiver and the path that the noise takes to reach the

receiver. Its measurement is based on the decibel unit, dBA, which is a logarithmic ratio referenced to a standard noise level (2×10^{-5} Pascals). The 'A' suffix refers to a weighting scale, which represents the noise perceived by the human ear. With this scale, a doubling of sound power at the source results in a 3 dBA increase in measured noise levels at the receiver, and is just perceptible to most people. An increase of 10 dBA is often perceived to be twice as loud.

Stationary sources are defined in NPC-300 as: “a source of sound or combination of sources of sound that are included and normally operated within the property lines of a facility, and includes the premises of a person as one stationary source, unless the dominant source of sound on those premises is construction”³.

4.2 Stationary Noise Criteria

The equivalent sound energy level, L_{EQ} , provides a weighted measure of the time varying noise levels, which is well correlated with the annoyance of sound. It is defined as the continuous sound level, which has the same energy as a time varying noise level over a selected period of time. For stationary sources, the L_{EQ} is commonly calculated on an hourly interval, while for roadways, the L_{EQ} is calculated on the basis of a 16-hour daytime / 8-hour nighttime split.

Noise criteria taken from NPC-300 apply to outdoor points of reception (POR). A POR is defined under NPC-300 as “any location on a noise sensitive land use where noise from a stationary source is received”⁴. A POR can be located on an existing or zoned for future use premises of permanent or seasonal residences, hotels/motels, nursing/retirement homes, rental residences, hospitals, camp grounds, and noise sensitive buildings such as schools and places of worship. The recommended maximum noise levels for a Class 2 area in a suburban environment at a POR are outlined in Table 1 below.

TABLE 1: EXCLUSIONARY LIMITS FOR CLASS 2 AREA

Time of Day	Outdoor Points of Reception	Plane of Window
7:00 – 19:00	50	50
19:00 – 23:00	45	50
23:00 – 7:00	N/A	45

³ NPC – 300, page 16

⁴ NPC – 300, page 14

4.3 Determination of Noise Source Power Levels

Preliminary mechanical information for the development has been based on information provided by McKee Engineering, as well as GWE's experience with similar developments. Table 2 summarizes the sound power of each source used in the analysis.

TABLE 2: EQUIPMENT SOUND POWER LEVELS (dBA)

Source ID	Description	Height Above Grade/Roof (m)	Sound Power (dBA – re: picowatt)								
			63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	Total
S1-2	RTU-1 to 2	1.7	47	57	72	83	84	79	74	66	88
S3	RTU-3	1.7	78	83	86	91	89	87	84	81	96
S4	RTU-4	1.7	41	51	63	74	76	74	69	60	80
S5	RTU-5	1.7	37	47	57	67	71	69	63	52	75
S10-20	RTU-6 to 16	1.7	41	51	63	74	76	74	69	60	80
S6	Dry Cooler 1	2	-	-	-	-	89	-	-	-	89
S7	Dry Cooler 2	2	-	-	-	-	85	-	-	-	85
S8	Generator	2	85	93	99	97	98	97	96	91	105
S9	Reefer Unit	2.7	-	-	-	-	101	-	-	-	101
S21	Truck Route	2.7	80	90	97	101	102	97	91	82	106
S22	Garbage Compactor	.5	-	-	-	-	95	-	-	-	95

4.4 Stationary Source Noise Predictions

The impact of the stationary noise sources on the nearby residential areas was determined by computer modelling. Stationary noise source modelling is based on the software program Predictor-Lima developed from the International Standards Organization (ISO) standard 9613 Parts 1 and 2. This computer program is capable of representing three-dimensional surfaces and first reflections of sound waves over a suitable spectrum for human hearing. The methodology has been used on numerous assignments, and has been accepted by the Ministry of the Environment and Climate Change (MOECC) as part of Environmental Compliance Approvals applications.

A total of 12 receptor locations were chosen around the site to measure the noise impact at points of reception (POR) during the daytime and evening period (07:00 – 23:00), as well as the nighttime period

(23:00 – 07:00). POR locations included outdoor points of reception (OPOR) and the plane of windows (POW) of the adjacent residential properties. Sensor locations are described in Table 3 and illustrated in Figure 3. All units were represented as point sources in the Predictor model. Table 4 below contains Predictor-Lima calculation settings. These settings are typical and have been based on ISO 9613 standards and guidance from the MOECC.

Ground absorption over the study area was determined based on topographical features (such as water, concrete, grassland, etc.). An absorption value of 0 is representative of hard ground, while a value of 1 represents grass, and similar soft surface conditions. Existing and proposed buildings were added to the model to account for screening and reflection effects from building façades. A Predictor-Lima sample output is available in Appendix A, further modelling data is available upon request.

TABLE 3: RECEPTOR LOCATIONS

Receptor Number	Location	Height Above Grade (m)
R1	POW – 556 Barrick Hill Road	4.5
R2	OPOR – 556 Barrick Hill Road	1.5
R3	POW – 550 Barrick Hill Road	4.5
R4	OPOR – 550 Barrick Hill Road	1.5
R5	POW – 2 Cadence Gate	4.5
R6	OPOR – 2 Cadence Gate	1.5
R7	POW – 36 Riding Way	4.5
R8	OPOR – 36 Riding Way	1.5
R9	POW – 1467 Carronbridge Circle	4.5
R10	OPOR – 1467 Carronbridge Circle	1.5
R11	POW – 1455 Carronbridge Circle	4.5
R12	OPOR – 1455 Carronbridge Circle	1.5

TABLE 4: CALCULATION SETTINGS

Parameter	Setting
Meteorological correction method	Single value for C0
Value C0	2.0
Default ground attenuation factor	1
Ground attenuation factor for roadways and paved areas	0
Temperature (K)	283.15
Pressure (kPa)	101.33
Air humidity (%)	70

5. RESULTS AND DISCUSSION

Noise levels at nearby sensitive receptors are below ENCG criteria for stationary noise, as summarized in Table 5 below. The sound levels listed in Table 5 are based on the assumptions outlined in Section 2.1. Since the generator is for emergency situations, it has been assessed separately from the other mechanical equipment, as per ENCG guidelines.

TABLE 5: NOISE LEVELS FROM STATIONARY SOURCES

Receptor Number	Plane of Window Receptor Location	Noise Level (dBA)		Sound Level Limits		Meets ENCG Criteria	
		Day	Night	Day	Night	Day	Night
R1	POW – 556 Barrick Hill Road	46	35	50	45	Yes	Yes
R2	OPOR – 556 Barrick Hill Road	40	31	45	N/A	Yes	Yes
R3	POW – 550 Barrick Hill Road	47	35	50	45	Yes	Yes
R4	OPOR – 550 Barrick Hill Road	39	30	45	N/A	Yes	Yes
R5	POW – 2 Cadence Gate	45	42	50	45	Yes	Yes
R6	OPOR – 2 Cadence Gate	43	40	45	N/A	Yes	Yes
R7	POW – 36 Riding Way	44	41	50	45	Yes	Yes
R8	OPOR – 36 Riding Way	44	41	45	N/A	Yes	Yes
R9	POW – 1467 Carronbridge Circle	46	42	50	45	Yes	Yes
R10	OPOR – 1467 Carronbridge Circle	40	36	45	N/A	Yes	Yes
R11	POW – 1455 Carronbridge Circle	46	42	50	45	Yes	Yes
R12	OPOR – 1455 Carronbridge Circle	45	41	45	N/A	Yes	Yes

As Table 5 summarizes, noise levels fall below ENCG criteria at all receptors. Noise contours at 1.5 m above grade can be seen in Figures 4 and 5 for daytime and nighttime conditions, respectively. The main contributor of noise at these locations is the reefer unit and truck route.

TABLE 6: NOISE LEVELS FROM EMERGENCY EQUIPMENT

Receptor Number	Plane of Window Receptor Location	Noise Level (dBA)	Sound Level Limits	Meets ENCG Criteria
		Day	Day	Day
R1	POW – 556 Barrick Hill Road	48	55	Yes
R2	OPOR – 556 Barrick Hill Road	43	50	Yes
R3	POW – 550 Barrick Hill Road	49	55	Yes
R4	OPOR – 550 Barrick Hill Road	43	50	Yes
R5	POW – 2 Cadence Gate	48	55	Yes
R6	OPOR – 2 Cadence Gate	43	50	Yes
R7	POW – 36 Riding Way	41	55	Yes
R8	OPOR – 36 Riding Way	43	50	Yes
R9	POW – 1467 Carronbridge Circle	40	55	Yes
R10	OPOR – 1467 Carronbridge Circle	38	50	Yes
R11	POW – 1455 Carronbridge Circle	47	55	Yes
R12	OPOR – 1455 Carronbridge Circle	43	50	Yes

Noise levels from the emergency generator fall below ENCG criteria during the daytime period, as shown in Table 6. Since the generator is an emergency unit, the noise criteria in Section 4.2 can be increased by 5 dB as outlined in the ENCG. With consideration of GWE’s recommendations, the proposed development is expected to be compatible with the existing land uses.


6. CONCLUSIONS AND RECOMMENDATIONS

Our stationary noise feasibility assessment for the proposed commercial development indicates that, provided our assumptions for noise control in Section 2.1 are adhered to in the detailed design process, noise levels at nearby points of reception are expected to fall below the ENCG noise criteria. As such, the proposed development is expected to be compatible with the existing noise sensitive land uses and will satisfy all site plan conditions. A review of final equipment selection and locations by a qualified acoustical engineer will be required prior to installation of the equipment.

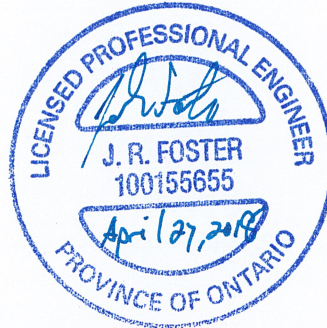
This concludes our assessment and report. If you have any questions or wish to discuss our findings, please advise us. In the interim, we thank you for the opportunity to be of service.

Yours truly,

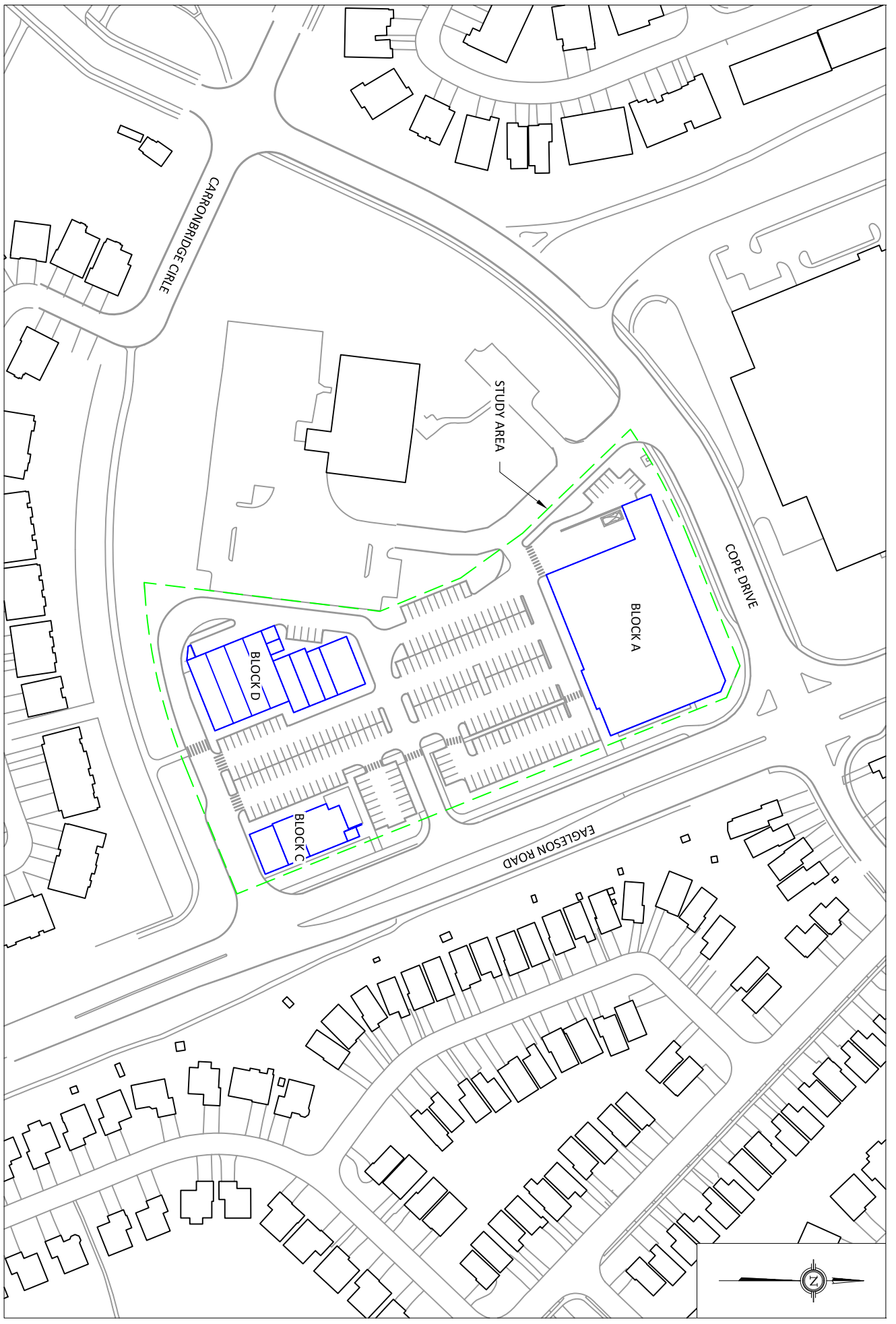
Gradient Wind Engineering Inc.

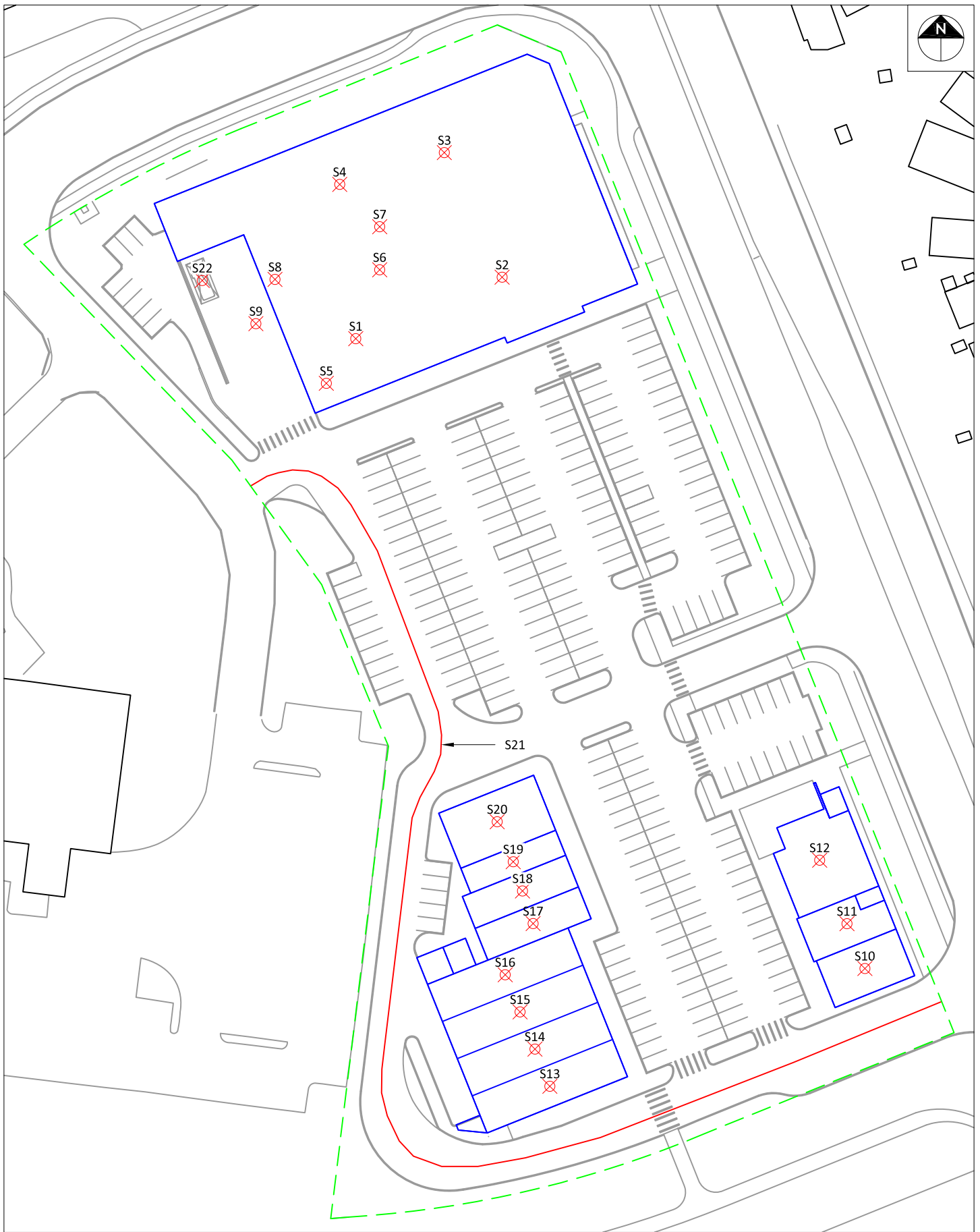


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PROJECT	10 COPE DRIVE STATIONARY NOISE FEASIBILITY ASSESSMENT	
SCALE	1:1000 (APPROX)	DRAWING NO. GWE17-196-2
DATE	APRIL 16, 2018	DRAWN BY M.L.

DESCRIPTION	FIGURE 2: SOURCE LOCATIONS
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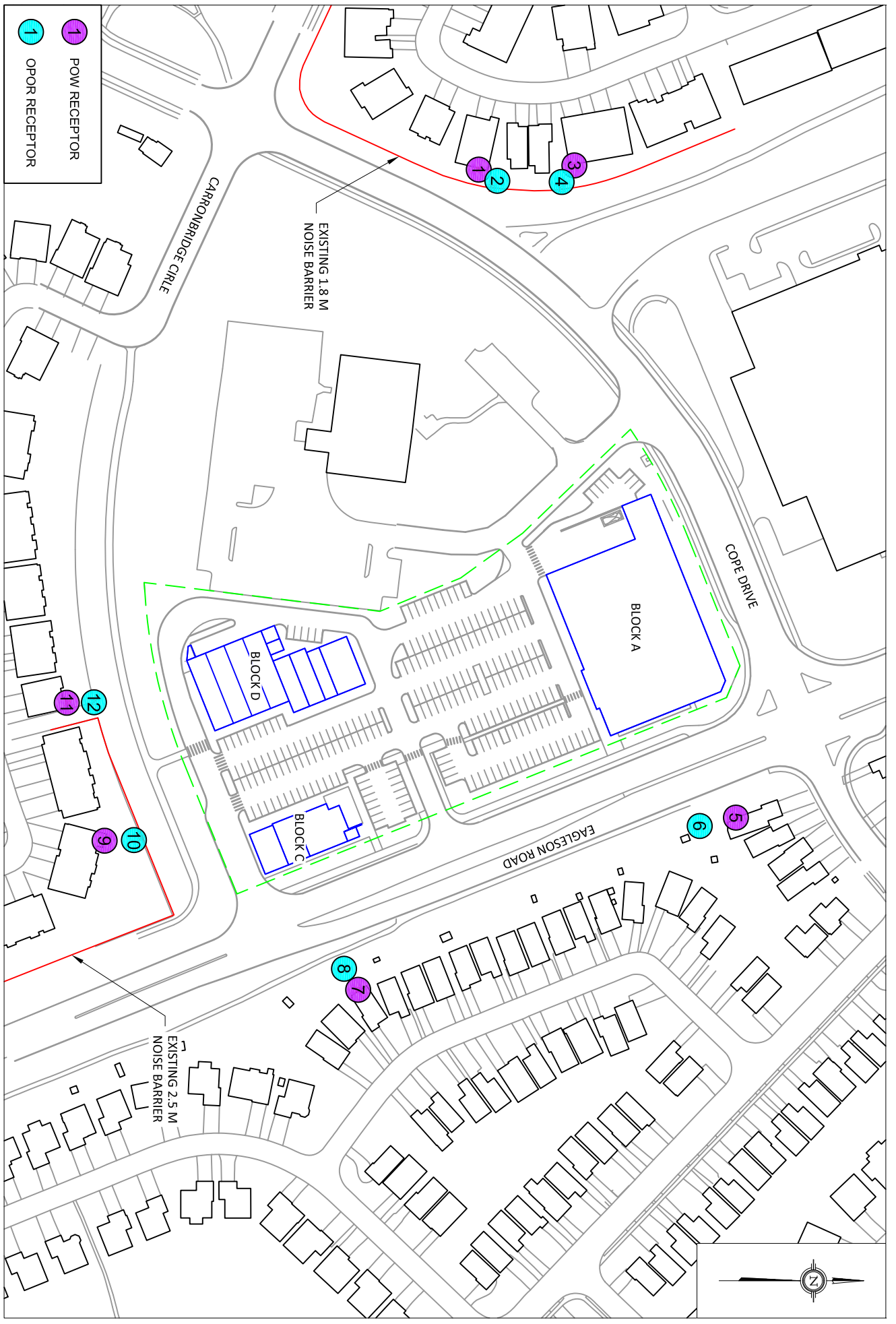


FIGURE 3:
RECEPTOR LOCATIONS

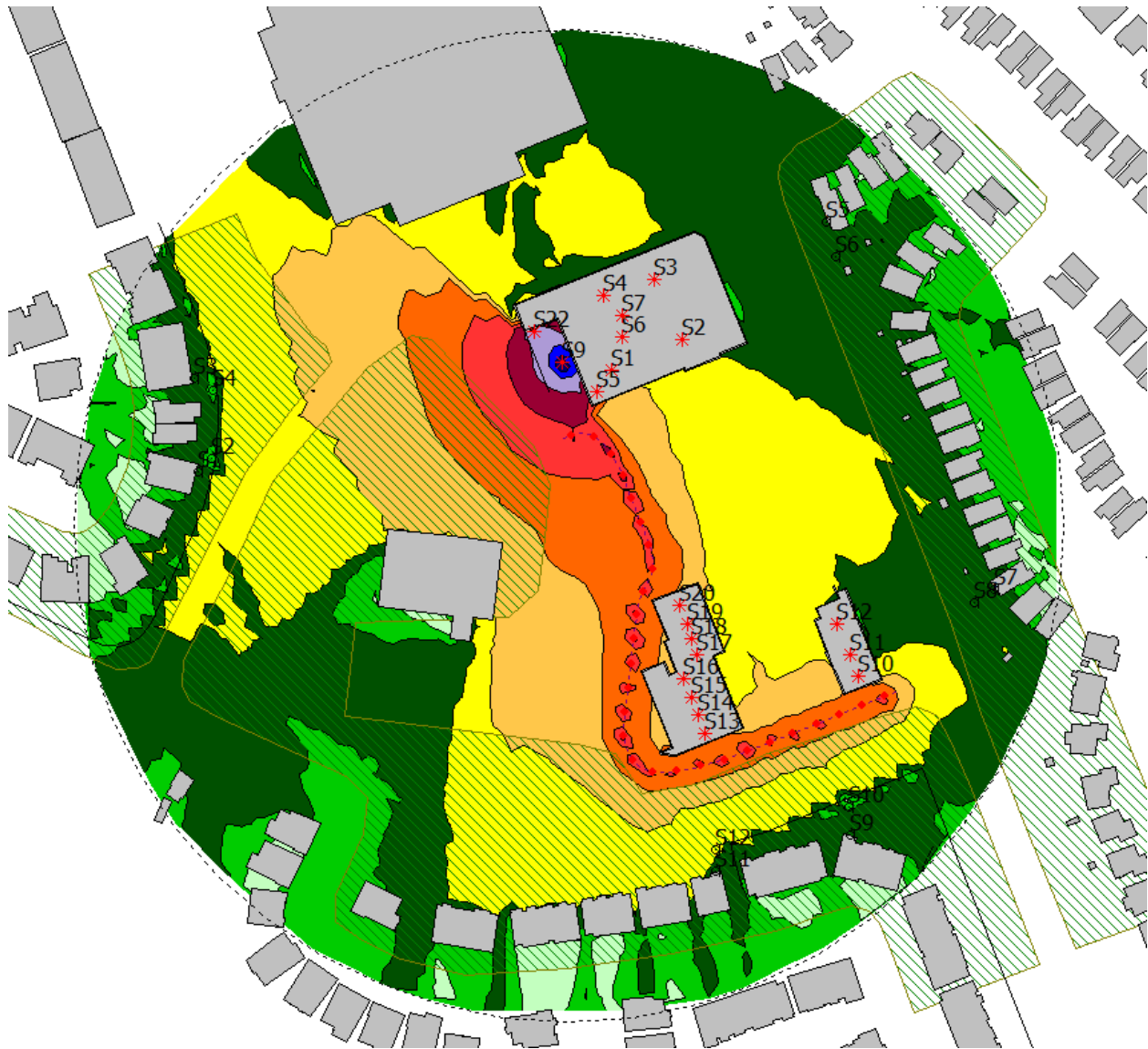
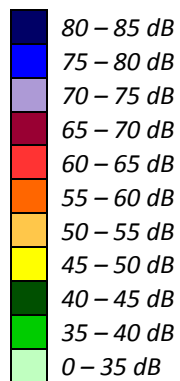


FIGURE 4: DAYTIME STATIONARY NOISE CONTOURS (1.5 METERS ABOVE GRADE)



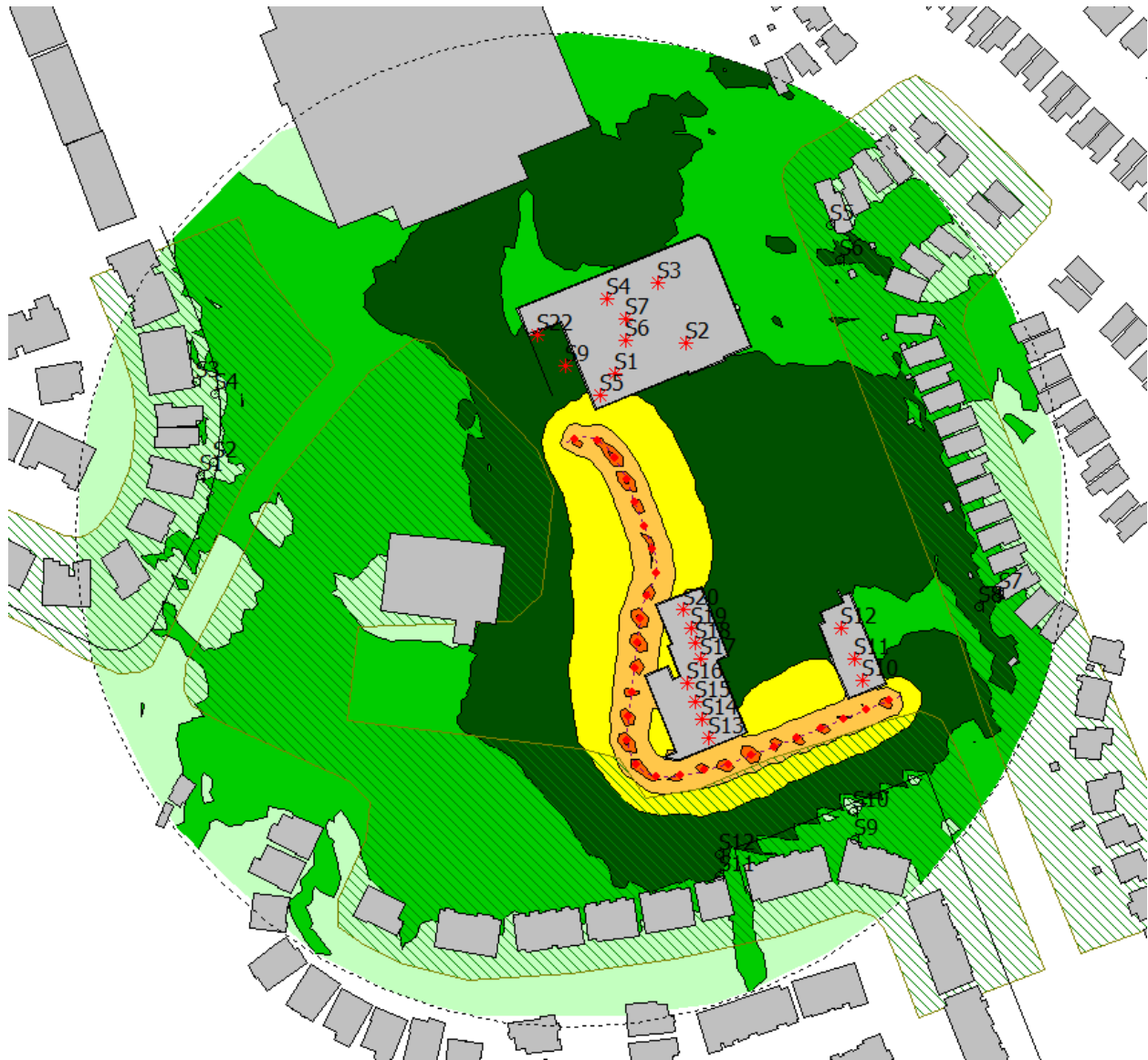
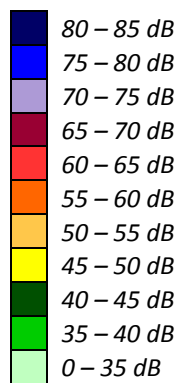


FIGURE 5: NIGHTTIME STATIONARY NOISE CONTOURS (1.5 METERS ABOVE GRADE)



APPENDIX A

SAMPLE CALCULATION INPUT/OUTPUT

=====
 Testfile openend: ##### 11:09:26 AM
 =====

 Cross section for receiver S9 and source S4

ItemType	Id	Distance	X	Y	Hgrnd	Height
Receiver	S9	0	354667	5015756	97	4.5
Barrier	LWPOLYLIN	13.981	354661.2	5015768	96.92	2
Ground	LWPOLYLIN	41.538	354649.7	5015794	44.89	0
Heightline	LWPOLYLIN	87.007	354630.8	5015835	96	0
Heightline	SPLINE	185.02	354590	5015924	97	0
Cluster	545	199.678	354583.9	5015937	97.4	10.68
Barrier	LWPOLYLIN	200.179	354583.6	5015938	108.08	1
Heightline	LWPOLYLIN	233.754	354569.7	5015968	98	0
Pointsourc	S4	239.581	354567.2	5015974	108.08	1.7

L(wr)	41	41	51	63	74	76	74	69	60
A(ground)	-3	-3	-1.82	-1.43	-2.05	-2.49	-2.54	-2.54	-2.54
A(barrier)	7.28	7.52	6.5	6.15	6.8	7.25	7.31	7.31	7.32
A(veg)	0	0	0	0	0	0	0	0	0
A(sit)	0	0	0	0	0	0	0	0	0
A(bld)	0	0	0	0	0	0	0	0	0
A(air)	0.01	0.03	0.1	0.25	0.46	0.88	2.32	7.86	28.02
A(geo)	58.59	58.59	58.59	58.59	58.59	58.59	58.59	58.59	58.59
C(meteo)	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48

 L(p) -23.36 -23.62 -13.84 -2.05 8.72 10.3 6.85 -3.7 -32.87 | 13.82

 Cross section for receiver S9 and source S4
 Reflection calculation in facade LWPOLYLIN

ItemType	Id	Distance	X	Y	Hgrnd	Height
Receiver	S9	0	354667	5015756	97	4.5
Barrier	LWPOLYLIN	19.794	354674.8	5015774	96.95	2
Ground	LWPOLYLIN	54.457	354688.4	5015806	44.89	0
Heightline	SPLINE	65.611	354692.7	5015816	97	0
Heightline	SPLINE	80.228	354698.5	5015830	98	0
Ground	LWPOLYLIN	98.201	354705.5	5015846	44.89	0
Heightline	SPLINE	108.915	354709.7	5015856	99	0
Cluster	103	116.212	354712.6	5015863	99	2.5
Cluster	103	116.694	354712.8	5015863	99	2.5
Cluster	148	128.932	354717.6	5015874	99	7
Cluster	148	135.942	354720.3	5015881	99	7
Cluster	98	137.684	354721	5015882	99	7.11
Cluster	98	148.108	354725.1	5015892	99.15	6.96
Ground	LWPOLYLIN	166.103	354732.2	5015909	44.89	0
Heightline	LWPOLYLIN	186.506	354740.2	5015927	100	0
Building(R)	LWPOLYLIN	190.933	354741.9	5015931	100	7
Heightline	LWPOLYLIN	197.241	354735.8	5015933	100	0
Ground	LWPOLYLIN	212.645	354720.8	5015936	44.89	0
Heightline	LWPOLYLIN	217.937	354715.7	5015938	100	0
Cluster	152	224.67	354709.1	5015939	100	7
Cluster	152	226.444	354707.4	5015940	100	7
Cluster	153	228.393	354705.5	5015940	100	7
Cluster	153	241.247	354693	5015943	100	7
Heightline	LWPOLYLIN	266.621	354668.4	5015949	100	0
Ground	LWPOLYLIN	270.587	354664.5	5015950	44.89	0
Heightline	LWPOLYLIN	282.411	354653	5015953	100	0
Heightline	LWPOLYLIN	284.913	354650.6	5015953	100	0
Heightline	SPLINE	305.648	354630.4	5015958	99	0
Cluster	545	313.042	354623.2	5015960	98.66	9.42
Barrier	LWPOLYLIN	313.655	354622.6	5015960	108.08	1
Pointsourc	S4	370.656	354567.2	5015974	108.08	1.7

L(wr)	41	41	51	63	74	76	74	69	60
A(ground)	-4.5	-4.5	-0.05	0.15	-1.76	-2.85	-2.97	-2.97	-2.97
A(barrier)	8.71	9.02	4.78	4.6	6.51	7.61	7.74	7.74	7.74
A(veg)	0	0	0	0	0	0	0	0	0
A(sit)	0	0	0	0	0	0	0	0	0
A(bld)	0	0	0	0	0	0	0	0	0
A(air)	0.01	0.05	0.15	0.39	0.71	1.36	3.58	12.15	43.33
A(geo)	62.37	62.37	62.37	62.37	62.37	62.37	62.37	62.37	62.37
A(refl)	--	--	--	--	--	--	-0.97	-0.97	-0.97
C(meteo)	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48

L(p) -- -- -- -- -- -- 0.83 -12.74 -52.93 | 1.01

Cross section for receiver S9 and source S4
Reflection calculation in facade LWPOLYLINE

ItemType	Id	Distance	X	Y	Hgrnd	Height
Receiver	S9	0	354667	5015756	97	4.5
Barrier	LWPOLYLI	17.883	354672.1	5015773	96.94	2
Ground	LWPOLYLI	50.329	354681.4	5015804	44.89	0
Heightline	SPLINE	72.001	354687.6	5015825	97	0
Heightline	SPLINE	82.851	354690.7	5015835	98	0
Ground	LWPOLYLI	111.664	354699	5015863	44.89	0
Heightline	SPLINE	122.368	354702	5015873	99	0
Cluster	104	137.99	354706.5	5015888	99.38	2.87
Cluster	104	138.574	354706.7	5015889	99.42	2.83
Building(R)	LWPOLYLI	145.821	354708.7	5015895	99.87	7
Heightline	LWPOLYLI	161.523	354695	5015903	100	0
Heightline	LWPOLYLI	166.947	354690.2	5015906	100	0
Ground	LWPOLYLI	178.952	354679.7	5015911	44.89	0
Heightline	SPLINE	217.832	354645.7	5015930	99	0
Heightline	LWPOLYLI	224.87	354639.5	5015934	98	0
Cluster	545	254.382	354613.7	5015948	98	10.08
Barrier	LWPOLYLI	255.028	354613.1	5015948	108.08	1
Heightline	LWPOLYLI	255.686	354612.6	5015949	98	0
Heightline	LWPOLYLI	272.428	354597.9	5015957	98	0
Heightline	LWPOLYLI	292.625	354580.2	5015966	98	0
Pointsourc	S4	307.447	354567.2	5015974	108.08	1.7

L(wr)	41	41	51	63	74	76	74	69	60
A(ground)	-3	-3	0.71	1.28	-0.45	-1.54	-1.66	-1.66	-1.66
A(barrier)	7.13	7.43	3.99	3.46	5.2	6.29	6.42	6.43	6.43
A(veg)	0	0	0	0	0	0	0	0	0
A(sit)	0	0	0	0	0	0	0	0	0
A(bld)	0	0	0	0	0	0	0	0	0
A(air)	0.01	0.04	0.13	0.32	0.59	1.12	2.97	10.08	35.95
A(geo)	60.75	60.75	60.75	60.75	60.75	60.75	60.75	60.75	60.75
A(refl)	--	--	--	--	--	--	-0.97	-0.97	-0.97
C(meteo)	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48

L(p) -- -- -- -- -- -- -9.05 -43.92 | -9.05

Cross section for receiver S9 and source S4
Reflection calculation in facade LWPOLYLINE

ItemType	Id	Distance	X	Y	Hgrnd	Height
Receiver	S9	0	354667	5015756	97	4.5
Barrier	LWPOLYLI	19.592	354674.5	5015774	96.95	2
Ground	LWPOLYLI	54.021	354687.7	5015806	44.89	0
Heightline	SPLINE	66.115	354692.3	5015817	97	0
Heightline	SPLINE	80.306	354697.7	5015830	98	0
Ground	LWPOLYLI	99.247	354705	5015847	44.89	0
Heightline	SPLINE	109.968	354709.1	5015857	99	0
Cluster	148	130.279	354716.9	5015876	99	7

Cluster	148	134.544	354718.5	5015880	99	7			
Cluster	98	136.312	354719.2	5015882	99	7.11			
Cluster	98	146.609	354723.1	5015891	99.14	6.97			
Cluster	149	151.125	354724.9	5015895	99.35	7.53			
Cluster	149	152.677	354725.5	5015897	99.38	7.5			
Ground	LWPOLYLIN	167.836	354731.3	5015911	44.89	0			
Heightline	LWPOLYLIN	186.835	354738.5	5015928	100	0			
Cluster	123	192.632	354740.8	5015934	100.03	6.97			
Cluster	123	194.112	354741.3	5015935	100.07	6.93			
Cluster	122	194.593	354741.5	5015936	100.09	7.07			
Cluster	122	210.089	354747.4	5015950	100.53	6.63			
Cluster	121	213.624	354748.8	5015953	100.61	6.67			
Cluster	121	217.699	354750.4	5015957	100.7	6.58			
Heightline	LWPOLYLIN	231.048	354755.5	5015969	101	0			
Cluster	119	231.173	354755.5	5015969	101	7			
Cluster	119	239.208	354758.6	5015977	101	7			
Cluster	120	240.276	354759	5015978	101	7			
Cluster	120	248.401	354762.1	5015985	101	7			
Cluster	365	284.351	354775.9	5016018	101.71	7			
Cluster	365	291.464	354778.6	5016025	101.83	6.88			
Cluster	364	294.669	354779.8	5016028	101.89	7.11			
Cluster	364	301.744	354782.6	5016034	102.01	6.99			
Heightline	LWPOLYLIN	316.228	354788.1	5016048	103	0			
Building(R)	LWPOLYLIN	324.146	354791.1	5016055	103.08	7			
Cluster	341	325.701	354789.7	5016055	103.09	6.99			
Cluster	341	326.089	354789.3	5016055	103.08	7			
Heightline	LWPOLYLIN	335.183	354780.8	5016051	103	0			
Cluster	362	349.297	354767.5	5016047	102.31	6.69			
Cluster	362	363.865	354753.8	5016042	102	6.99			
Heightline	LWPOLYLIN	365.239	354752.5	5016041	102	0			
Ground	LWPOLYLIN	391.306	354728	5016032	44.89	0			
Cluster	369	413.651	354707	5016025	101.57	7.43			
Cluster	369	416.767	354704.1	5016023	101.54	7.46			
Cluster	374	450.326	354672.6	5016012	101.47	7.53			
Cluster	374	458.115	354665.3	5016009	101.48	7.52			
Cluster	516	459.882	354663.6	5016009	101.45	6.61			
Cluster	516	467.193	354656.7	5016006	101.3	6.77			
Heightline	SPLINE	476.354	354648.1	5016003	101	0			
Ground	LWPOLYLIN	480.555	354644.2	5016002	44.89	0			
Heightline	LWPOLYLIN	509.417	354617.1	5015992	100	0			
Cluster	545	515.461	354611.4	5015990	99.79	8.29			
Barrier	LWPOLYLIN	515.961	354610.9	5015990	108.08	1			
Heightline	LWPOLYLIN	537.919	354590.3	5015982	99	0			
Pointsources	S4	562.44	354567.2	5015974	108.08	1.7			

L(wr)	41	41	51	63	74	76	74	69	60
A(ground)	-5.01	-5.01	0.84	0.87	-1.44	-2.96	-3.13	-3.13	-3.13
A(barrier)	1.82	2.38	1.12	1.8	4.02	5.89	6.78	7.28	7.57
A(veg)	0	0	0	0	0	0	0	0	0
A(sit)	0	0	0	0	0	0	0	0	0
A(bld)	0	0	0	0	0	0	0	0	0
A(air)	0.02	0.07	0.23	0.59	1.08	2.06	5.44	18.43	65.75
A(geo)	65.99	65.99	65.99	65.99	65.99	65.99	65.99	65.99	65.99
A(refl)	--	--	--	--	--	--	--	--	--
C(meteo)	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48

L(p) -- -- -- -- -- -- -- -- -- -- |

-200

Cross section for receiver S9 and source S4
Reflection calculation in facade LWPOLYLIN

ItemType	Id	Distance	X	Y	Hgrnd	Height
Receiver	S9	0	354667	5015756	97	4.5
Barrier	LWPOLYLIN	17.905	354672.1	5015773	96.94	2
Ground	LWPOLYLIN	50.375	354681.5	5015804	44.89	0
Heightline	SPLINE	71.901	354687.7	5015825	97	0

Heightline	SPLINE	82.722	354690.8	5015835	98	0			
Ground	LWPOLYLIN	111.452	354699.1	5015862	44.89	0			
Heightline	SPLINE	122.157	354702.1	5015873	99	0			
Cluster	104	138.165	354706.7	5015888	99.38	2.87			
Cluster	104	138.329	354706.8	5015888	99.39	2.86			
Cluster	149	145.55	354708.9	5015895	99.74	7.14			
Cluster	149	148.792	354709.8	5015898	99.84	7.03			
Cluster	150	150.214	354710.2	5015900	99.87	7.13			
Cluster	150	159.862	354713	5015909	99.95	7.05			
Heightline	LWPOLYLIN	161.824	354713.6	5015911	100	0			
Cluster	151	163.271	354714	5015912	100	7			
Cluster	151	173.649	354717	5015922	100	7			
Heightline	SPLINE	175.259	354717.4	5015924	100	0			
Ground	LWPOLYLIN	188.021	354721.1	5015936	44.89	0			
Heightline	LWPOLYLIN	205.323	354726.1	5015952	100	0			
Ground	LWPOLYLIN	257.803	354741.2	5016003	44.89	0			
Heightline	LWPOLYLIN	258.722	354741.4	5016004	101	0			
Ground	LWPOLYLIN	270.4	354744.8	5016015	44.89	0			
Building(R)	LWPOLYLIN	296.136	354752.2	5016039	101.99	7			
Ground	LWPOLYLIN	320.639	354729.1	5016031	44.89	0			
Cluster	369	345.967	354705.3	5016023	101.48	7.52			
Cluster	369	346.202	354705	5016023	101.47	7.53			
Cluster	374	380.218	354673	5016011	101.43	7.57			
Cluster	374	388.015	354665.6	5016009	101.45	7.55			
Cluster	516	389.89	354663.9	5016008	101.41	6.65			
Cluster	516	397.2	354657	5016006	101.27	6.8			
Heightline	SPLINE	406.346	354648.4	5016002	101	0			
Ground	LWPOLYLIN	410.54	354644.4	5016001	44.89	0			
Heightline	LWPOLYLIN	439.269	354617.3	5015991	100	0			
Cluster	545	445.452	354611.5	5015989	99.77	8.3			
Barrier	LWPOLYLIN	445.952	354611	5015989	108.08	1			
Heightline	LWPOLYLIN	467.634	354590.6	5015982	99	0			
Pointsources	S4	492.444	354567.2	5015974	108.08	1.7			

L(wr)	41	41	51	63	74	76	74	69	60
A(ground)	-4.87	-4.87	0.75	1.2	-0.99	-2.52	-2.69	-2.69	-2.69
A(barrier)	9.39	9.53	4.01	3.56	5.76	7.3	7.47	7.49	7.52
A(veg)	0	0	0	0	0	0	0	0	0
A(sit)	0	0	0	0	0	0	0	0	0
A(bld)	0	0	0	0	0	0	0	0	0
A(air)	0.02	0.06	0.2	0.51	0.95	1.8	4.76	16.14	57.57
A(geo)	64.84	64.84	64.84	64.84	64.84	64.84	64.84	64.84	64.84
A(refl)	--	--	--	--	--	--	-0.97	-0.97	-0.97
C(meteo)	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48

L(p) -- -- -- -- -- -- -- -2.84 -19.23 -69.68 | -2.74

Cross section for receiver S9 and source S4
Reflection calculation in facade LWPOLYLINE

ItemType	Id	Distance	X	Y	Hgrnd	Height
Receiver	S9	0	354667	5015756	97	4.5
Barrier	LWPOLYLIN	16.794	354670.4	5015772	96.94	2
Ground	LWPOLYLIN	47.974	354676.7	5015803	44.89	0
Cluster	547	64.001	354680	5015818	96.68	6.2
Cluster	547	64.052	354680	5015818	96.68	6.2
Heightline	SPLINE	78.48	354682.9	5015833	97	0
Heightline	SPLINE	91.356	354685.5	5015845	98	0
Ground	LWPOLYLIN	125.856	354692.6	5015879	44.89	0
Heightline	SPLINE	133.893	354694.2	5015887	99	0
Heightline	LWPOLYLIN	141.586	354695.7	5015894	100	0
Heightline	LWPOLYLIN	144.828	354696.4	5015898	100	0
Heightline	LWPOLYLIN	159.397	354699.4	5015912	100	0
Cluster	99	166.981	354700.9	5015919	100	7
Cluster	99	173.363	354702.2	5015926	100	7
Cluster	152	177.455	354703	5015930	100	7

Cluster	152	186.838	354704.9	5015939	100	7			
Cluster	153	188.212	354705.2	5015940	100	7			
Cluster	153	189.161	354705.4	5015941	100	7			
Cluster	153	192.907	354706.2	5015945	100	7			
Cluster	153	194.236	354706.4	5015946	100	7			
Heightline	LWPOLYLI	250.257	354717.8	5016001	101	0			
Cluster	368	255.1	354718.8	5016006	101.04	6.96			
Cluster	368	262.735	354720.4	5016013	101.15	6.85			
Building(R)	LWPOLYLI	263.784	354720.6	5016014	101.37	7			
Cluster	368	264.841	354719.5	5016014	101.17	6.83			
Cluster	368	271.994	354712.6	5016012	101.1	6.9			
Heightline	SPLINE	279.456	354705.4	5016010	101	0			
Heightline	LWPOLYLI	289.1	354696.1	5016008	101	0			
Heightline	LWPOLYLI	294.36	354691	5016006	101	0			
Heightline	LWPOLYLI	309.652	354676.2	5016002	101	0			
Heightline	SPLINE	335.7	354651	5015996	101	0			
Ground	LWPOLYLI	339.929	354646.9	5015995	44.89	0			
Heightline	LWPOLYLI	367.706	354620.1	5015988	100	0			
Cluster	545	375.043	354613	5015986	99.63	8.44			
Barrier	LWPOLYLI	375.547	354612.5	5015986	108.08	1			
Heightline	LWPOLYLI	394.092	354594.6	5015981	99	0			
Pointsourc	S4	422.356	354567.2	5015974	108.08	1.7			

L(wr)	41	41	51	63	74	76	74	69	60
A(ground)	-4.68	-4.68	1.87	3.14	0.75	-1.13	-1.34	-1.34	-1.34
A(barrier)	9.25	9.35	2.89	1.63	4.02	5.9	6.11	6.11	6.11
A(veg)	0	0	0	0	0	0	0	0	0
A(sit)	0	0	0	0	0	0	0	0	0
A(bld)	0	0	0	0	0	0	0	0	0
A(air)	0.01	0.05	0.17	0.44	0.81	1.55	4.08	13.84	49.38
A(geo)	63.51	63.51	63.51	63.51	63.51	63.51	63.51	63.51	63.51
A(refl)	--	--	--	--	-0.97	-0.97	-0.97	-0.97	-0.97
C(meteo)	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48

L(p) -- -- -- -- 2.46 3.73 -0.81 -15.57 -60.11 | 6.97

Cross section for receiver S9 and source S4
Reflection calculation in facade LWPOLYLINE

ItemType	Id	Distance	X	Y	Hgrnd	Height
Receiver	S9	0	354667	5015756	97	4.5
Barrier	LWPOLYLI	16.531	354669.9	5015772	96.94	2
Ground	LWPOLYLI	47.352	354675.5	5015802	44.89	0
Cluster	547	63.006	354678.3	5015818	96.63	6.25
Barrier	LWPOLYLI	63.597	354678.4	5015818	102.88	1
Barrier	LWPOLYLI	65.565	354678.7	5015820	102.88	1
Cluster	547	66.505	354678.9	5015821	96.7	6.19
Heightline	SPLINE	80.641	354681.4	5015835	97	0
Heightline	SPLINE	94.219	354683.9	5015848	98	0
Ground	LWPOLYLI	130.732	354690.4	5015884	44.89	0
Heightline	SPLINE	137.034	354691.6	5015891	99	0
Heightline	LWPOLYLI	146.218	354693.2	5015900	100	0
Heightline	LWPOLYLI	152.405	354694.3	5015906	100	0
Heightline	LWPOLYLI	158.046	354695.3	5015911	100	0
Cluster	152	174.737	354698.3	5015928	100	7
Cluster	152	183.901	354700	5015937	100	7
Cluster	153	185.331	354700.2	5015938	100	7
Cluster	153	194.086	354701.8	5015947	100	7
Cluster	107	197.384	354702.4	5015950	100	2.5
Cluster	108	197.384	354702.4	5015950	100	2.5
Cluster	109	197.384	354702.4	5015950	100	7
Cluster	107	199.83	354702.8	5015952	100	2.5
Cluster	108	199.83	354702.8	5015952	100	2.5
Cluster	109	199.83	354702.8	5015952	100	7
Cluster	220	238.27	354709.7	5015990	100.94	7.06
Cluster	220	243.452	354710.6	5015995	100.99	7.01

Heightline	LWPOLYLIN	253.894	354712.5	5016006	101	0			
Building(R)	LWPOLYLIN	259.003	354713.4	5016011	101	7			
Heightline	SPLINE	265.517	354707.1	5016009	101	0			
Heightline	LWPOLYLIN	276.927	354696.1	5016006	101	0			
Heightline	LWPOLYLIN	282.387	354690.8	5016005	101	0			
Heightline	SPLINE	300.317	354673.4	5016000	101	0			
Heightline	SPLINE	323.021	354651.4	5015995	101	0			
Ground	LWPOLYLIN	327.263	354647.3	5015994	44.89	0			
Heightline	LWPOLYLIN	355.01	354620.4	5015987	100	0			
Cluster	545	362.418	354613.2	5015985	99.62	8.46			
Barrier	LWPOLYLIN	362.923	354612.7	5015985	108.08	1			
Heightline	LWPOLYLIN	381.229	354594.9	5015981	99	0			
Pointsource	S4	409.794	354567.2	5015974	108.08	1.7			

L(wr)	41	41	51	63	74	76	74	69	60
A(ground)	-4.64	-4.64	1.71	3.06	0.7	-1.17	-1.37	-1.37	-1.37
A(barrier)	9.21	9.31	3.05	1.71	4.07	5.93	6.14	6.14	6.14
A(veg)	0	0	0	0	0	0	0	0	0
A(sit)	0	0	0	0	0	0	0	0	0
A(bld)	0	0	0	0	0	0	0	0	0
A(air)	0.01	0.05	0.17	0.43	0.79	1.5	3.96	13.43	47.91
A(geo)	63.25	63.25	63.25	63.25	63.25	63.25	63.25	63.25	63.25
A(refl)	--	--	--	--	-0.97	-0.97	-0.97	-0.97	-0.97
C(meteo)	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48

L(p) -- -- -- -- 2.74 4.03 -0.43 -14.9 -58.38 | 7.28

Cross section for receiver S9 and source S4
Reflection calculation in facade LWPOLYLINE

ItemType	Id	Distance	X	Y	Hgrnd	Height
Receiver	S9	0	354667	5015756	97	4.5
Barrier	LWPOLYLIN	26.031	354682.1	5015777	96.96	2
Heightline	SPLINE	57.871	354700.6	5015803	97	0
Ground	LWPOLYLIN	59.225	354701.4	5015804	44.89	0
Ground	LWPOLYLIN	81.001	354714.1	5015822	44.89	0
Heightline	SPLINE	86.14	354717.1	5015826	98	0
Heightline	LWPOLYLIN	92.664	354720.8	5015831	99	0
Heightline	LWPOLYLIN	95.914	354722.7	5015834	99	0
Cluster	145	111.45	354731.8	5015846	99	7
Cluster	145	117.506	354735.3	5015851	99	7
Cluster	146	128.146	354741.5	5015860	99	7
Cluster	146	128.619	354741.8	5015860	99	7
Heightline	LWPOLYLIN	135.616	354745.8	5015866	99	0
Ground	LWPOLYLIN	139.578	354748.1	5015869	44.89	0
Heightline	SPLINE	157.802	354758.7	5015884	99	0
Cluster	126	172.659	354767.4	5015896	99.07	6.93
Cluster	126	184.441	354774.2	5015906	99.34	6.66
Heightline	LWPOLYLIN	200.942	354783.8	5015919	100	0
Heightline	SPLINE	208.2	354788	5015925	101	0
Cluster	116	217.532	354793.4	5015933	101	7
Cluster	116	220.499	354795.2	5015935	101	7
Heightline	LWPOLYLIN	243.884	354808.8	5015954	101	0
Heightline	LWPOLYLIN	247.618	354810.9	5015957	101	0
Heightline	LWPOLYLIN	253.258	354814.2	5015962	101	0
Heightline	LWPOLYLIN	258.177	354817.1	5015966	101	0
Cluster	159	273.167	354825.8	5015978	101.45	6.91
Cluster	159	284.392	354832.3	5015987	101.79	6.57
Heightline	SPLINE	291.446	354836.4	5015993	102	0
Heightline	LWPOLYLIN	325.515	354856.2	5016021	103	0
Heightline	LWPOLYLIN	356.281	354874.1	5016046	104	0
Heightline	SPLINE	370.756	354882.5	5016057	105	0
Heightline	LWPOLYLIN	403.933	354901.8	5016084	105	0
Cluster	406	429.004	354916.4	5016105	105.02	7.07
Cluster	406	441.978	354923.9	5016115	105.2	6.89
Heightline	SPLINE	457.904	354933.2	5016128	106	0

Cluster	415	465.98	354937.9	5016135	106.18	7
Cluster	415	477.289	354944.4	5016144	106.44	6.74
Heightline	LWPOLYLIN	501.642	354958.6	5016164	107	0
Building(R)	LWPOLYLIN	509.269	354963	5016170	107.2	7
Heightline	LWPOLYLIN	517.047	354956.1	5016167	107	0
Cluster	414	543.746	354932.1	5016155	106.4	6.76
Cluster	414	547.759	354928.6	5016153	106.31	6.85
Heightline	SPLINE	561.747	354916	5016147	106	0
Cluster	408	583.462	354896.6	5016137	105.32	7
Cluster	408	591.026	354889.8	5016134	105.1	7.22
Heightline	SPLINE	594.408	354886.8	5016132	105	0
Heightline	SPLINE	615.036	354868.3	5016123	105	0
Cluster	322	622.984	354861.2	5016120	105	7
Cluster	322	636.389	354849.2	5016114	105	7
Heightline	SPLINE	646.031	354840.5	5016109	104	0
Cluster	336	659.833	354828.2	5016103	103.99	6.93
Cluster	336	670.519	354818.6	5016098	103.91	7
Cluster	342	705.937	354786.9	5016083	103.55	6.87
Cluster	342	720.264	354774	5016076	103.42	7
Heightline	SPLINE	732.649	354763	5016071	103	0
Cluster	360	746.265	354750.8	5016065	102.28	7.02
Cluster	360	748.009	354749.2	5016064	102.24	7.06
Cluster	359	758.478	354739.8	5016059	102.07	7.27
Cluster	359	761.682	354737	5016058	102	7.34
Ground	LWPOLYLIN	788.028	354713.4	5016046	44.89	0
Cluster	370	799.242	354703.3	5016041	102	7
Cluster	370	811.463	354692.4	5016036	102	7
Heightline	SPLINE	816.158	354688.2	5016034	102	0
Cluster	373	820.186	354684.6	5016032	101.99	7.01
Cluster	373	827.66	354677.9	5016029	101.96	7.04
Cluster	371	828.608	354677	5016028	101.96	7.04
Cluster	371	836.989	354669.5	5016024	101.95	7.05
Cluster	374	839.302	354667.4	5016023	101.93	7.07
Cluster	374	845.609	354661.8	5016021	101.92	7.08
Cluster	516	849.809	354658	5016019	101.92	6.14
Cluster	516	856.407	354652.1	5016016	101.6	6.46
Heightline	SPLINE	864.687	354644.7	5016012	101	0
Ground	LWPOLYLIN	869.015	354640.8	5016010	44.89	0
Heightline	LWPOLYLIN	903.977	354609.5	5015995	100	0
Cluster	545	904.062	354609.4	5015995	99.97	8.1
Barrier	LWPOLYLIN	904.564	354609	5015994	108.08	1
Heightline	LWPOLYLIN	938.127	354578.9	5015979	99	0
Pointsources	S4	951.169	354567.2	5015974	108.08	1.7

L(wr)	41	41	51	63	74	76	74	69	60
A(ground)	-5.41	-5.41	1.44	0.13	-2.15	-3.42	-3.56	-3.56	-3.56
A(barrier)	10.18	10.18	3.33	4.64	6.92	8.19	8.34	8.34	8.34
A(veg)	0	0	0	0	0	0	0	0	0
A(sit)	0	0	0	0	0	0	0	0	0
A(bld)	0	0	0	0	0	0	0	0	0
A(air)	0.03	0.12	0.39	0.99	1.83	3.48	9.19	31.17	111.18
A(geo)	70.56	70.56	70.56	70.56	70.56	70.56	70.56	70.56	70.56
A(refl)	--	--	--	--	--	--	-0.97	-0.97	-0.97
C(meteo)	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48

L(p) -- -- -- -- -- -- -- -12.97 -39.95 -128.96 | -12.96

Cross section for receiver S9 and source S4
Reflection calculation in facade LWPOLYLINE

ItemType	Id	Distance	X	Y	Hgrnd	Height
Receiver	S9	0	354667	5015756	97	4.5
Barrier	LWPOLYLIN	24.519	354680.4	5015776	96.96	2
Heightline	SPLINE	58.945	354699.3	5015805	97	0
Ground	LWPOLYLIN	59.019	354699.4	5015805	44.89	0
Ground	LWPOLYLIN	83.443	354712.8	5015826	44.89	0

A(sit)	0	0	0	0	0	0	0	0	0
A(bld)	0	0	0	0	0	0	0	0	0
A(air)	0.03	0.1	0.33	0.84	1.54	2.93	7.74	26.24	93.59
A(geo)	69.06	69.06	69.06	69.06	69.06	69.06	69.06	69.06	69.06
A(refl)	--	--	--	--	--	-0.97	-0.97	-0.97	-0.97
C(meteo)	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48

L(p)	--	--	--	--	--	-1.69	-9.13	-33.04	-109.62 -0.97

Cross section for receiver S9 and source S4
Reflection calculation in facade LWPOLYLINE

ItemType	Id	Distance	X	Y	Hgrnd	Height
Receiver	S9	0	354667	5015756	97	4.5
Barrier	LWPOLYLI	25.524	354681.6	5015777	96.96	2
Heightline	SPLINE	58.2	354700.2	5015804	97	0
Ground	LWPOLYLI	59.149	354700.8	5015804	44.89	0
Ground	LWPOLYLI	81.751	354713.7	5015823	44.89	0
Heightline	SPLINE	86.736	354716.5	5015827	98	0
Heightline	LWPOLYLI	93.368	354720.3	5015832	99	0
Heightline	LWPOLYLI	96.942	354722.3	5015835	99	0
Heightline	LWPOLYLI	114.44	354732.3	5015850	99	0
Cluster	146	124.035	354737.8	5015858	99	7
Cluster	146	129.255	354740.8	5015862	99	7
Heightline	LWPOLYLI	138	354745.8	5015869	99	0
Ground	LWPOLYLI	140.719	354747.3	5015871	44.89	0
Heightline	SPLINE	157.544	354756.9	5015885	99	0
Heightline	SPLINE	169.104	354763.5	5015895	99	0
Cluster	126	169.161	354763.6	5015895	99.01	6.99
Cluster	126	182.87	354771.4	5015906	99.28	6.72
Cluster	125	186.321	354773.4	5015909	99.39	7.01
Cluster	125	186.652	354773.6	5015909	99.4	7
Heightline	LWPOLYLI	201.07	354781.8	5015921	100	0
Heightline	SPLINE	208.294	354785.9	5015927	101	0
Cluster	157	223.699	354794.7	5015939	101	7
Cluster	157	231.168	354799	5015946	101	7
Heightline	LWPOLYLI	244.452	354806.6	5015956	101	0
Heightline	LWPOLYLI	247.594	354808.3	5015959	101	0
Heightline	LWPOLYLI	255.537	354812.9	5015966	101	0
Heightline	LWPOLYLI	257.611	354814.1	5015967	101	0
Cluster	159	268.422	354820.2	5015976	101.3	7.06
Cluster	159	284.919	354829.7	5015990	101.79	6.56
Heightline	SPLINE	291.805	354833.6	5015995	102	0
Heightline	LWPOLYLI	314.043	354846.3	5016014	103	0
Cluster	382	350.873	354867.3	5016044	103.78	7.01
Cluster	382	353.974	354869.1	5016046	103.89	6.91
Cluster	383	357.959	354871.4	5016050	104	7
Cluster	383	371.298	354879	5016061	104.03	6.97
Heightline	SPLINE	372.088	354879.4	5016061	104	0
Cluster	384	381.398	354884.7	5016069	104.98	7.02
Cluster	384	399.113	354894.9	5016083	105	7
Heightline	LWPOLYLI	404.249	354897.8	5016088	105	0
Cluster	406	428.573	354911.7	5016108	105	7.09
Cluster	406	443.452	354920.2	5016120	105.25	6.84
Heightline	SPLINE	459.132	354929.1	5016133	106	0
Building(R)	LWPOLYLI	474.285	354937.8	5016145	106.17	7
Cluster	414	477.404	354934.9	5016144	106.28	6.89
Cluster	414	482.262	354930.5	5016142	106.17	7
Heightline	SPLINE	489.856	354923.6	5016139	106	0
Cluster	407	505.108	354909.8	5016132	105.43	6.63
Cluster	407	518.418	354897.7	5016127	105.11	6.96
Heightline	SPLINE	522.168	354894.3	5016125	105	0
Heightline	SPLINE	543.826	354874.7	5016116	105	0
Heightline	LWPOLYLI	558.666	354861.2	5016110	105	0
Heightline	SPLINE	574.612	354846.7	5016103	104	0
Cluster	336	588.695	354833.9	5016097	103.97	6.95

Cluster	336	603.809	354820.2	5016091	103.8	7.11			
Cluster	342	635.14	354791.8	5016078	103.47	6.96			
Cluster	342	648.625	354779.6	5016072	103.26	7.17			
Heightline	LWPOLYLIN	660.863	354768.5	5016067	103	0			
Cluster	360	675.502	354755.2	5016061	102.3	7			
Cluster	360	687.834	354744	5016055	102	7.3			
Ground	LWPOLYLIN	717.757	354716.8	5016043	44.89	0			
Cluster	369	729.75	354705.9	5016038	101.99	7.01			
Cluster	369	735.983	354700.3	5016035	102	7			
Cluster	370	738.405	354698.1	5016034	102	7			
Cluster	370	741.495	354695.3	5016033	102	7			
Heightline	SPLINE	746.157	354691.1	5016031	102	0			
Cluster	373	750.952	354686.7	5016029	101.98	7.02			
Cluster	373	758.464	354679.9	5016026	101.88	7.12			
Cluster	371	759.401	354679	5016025	101.89	7.11			
Cluster	371	767.359	354671.8	5016022	101.91	7.09			
Cluster	374	770.656	354668.8	5016021	101.87	7.13			
Cluster	374	776.968	354663.1	5016018	101.84	7.16			
Cluster	516	781.535	354659	5016016	101.85	6.21			
Cluster	516	788.114	354653	5016013	101.56	6.51			
Heightline	SPLINE	796.316	354645.5	5016010	101	0			
Ground	LWPOLYLIN	800.607	354641.6	5016008	44.89	0			
Heightline	LWPOLYLIN	833.175	354612.1	5015994	100	0			
Cluster	545	835.579	354609.9	5015993	99.93	8.15			
Barrier	LWPOLYLIN	836.08	354609.5	5015993	108.08	1			
Heightline	LWPOLYLIN	868.712	354579.8	5015979	99	0			
Pointsources	S4	882.601	354567.2	5015974	108.08	1.7			

L(wr)	41	41	51	63	74	76	74	69	60
A(ground)	-5.37	-5.37	1.46	0.27	-2.04	-3.36	-3.51	-3.51	-3.51
A(barrier)	10.14	10.14	3.31	4.51	6.82	8.13	8.28	8.28	8.28
A(veg)	0	0	0	0	0	0	0	0	0
A(sit)	0	0	0	0	0	0	0	0	0
A(bld)	0	0	0	0	0	0	0	0	0
A(air)	0.03	0.11	0.36	0.92	1.7	3.23	8.53	28.92	103.17
A(geo)	69.91	69.91	69.91	69.91	69.91	69.91	69.91	69.91	69.91
A(refl)	--	--	--	--	--	--	--	--	--
C(meteo)	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48

L(p) -- -- -- -- -- -- -- -- -- -- |

Cross section for receiver S9 and source S4
Reflection calculation in facade LWPOLYLINE

ItemType	Id	Distance	X	Y	Hgrnd	Height
Receiver	S9	0	354667	5015756	97	4.5
Barrier	LWPOLYLIN	14.125	354663.7	5015769	96.92	2
Ground	LWPOLYLIN	41.4	354657.4	5015796	44.89	0
Heightline	LWPOLYLIN	53.671	354654.5	5015808	96	0
Heightline	LWPOLYLIN	67.673	354651.3	5015822	96	0
Heightline	SPLINE	141.09	354634.2	5015893	97	0
Heightline	LWPOLYLIN	196.8	354621.3	5015947	98	0
Cluster	545	201.608	354620.2	5015952	98.26	9.82
Barrier	LWPOLYLIN	202.114	354620.1	5015952	108.08	1
Heightline	LWPOLYLIN	231.934	354613.2	5015981	99	0
Barrier	LWPOLYLIN	238.37	354611.7	5015988	108.08	1
Cluster	545	241.791	354610.9	5015991	99.83	8.24
Heightline	LWPOLYLIN	245.48	354610	5015995	100	0
Heightline	SPLINE	285.495	354600.7	5016033	101	0
Heightline	LWPOLYLIN	334.521	354589.4	5016081	102	0
Heightline	SPLINE	371.951	354580.7	5016118	103	0
Heightline	SPLINE	402.938	354573.5	5016148	104	0
Heightline	LWPOLYLIN	475.285	354556.7	5016218	105	0
Heightline	LWPOLYLIN	525.89	354544.9	5016267	105	0
Heightline	SPLINE	531.434	354543.7	5016273	105	0

Heightline	SPLINE	579.065	354532.6	5016319	106	0
Heightline	SPLINE	606.924	354526.1	5016346	106	0
Cluster	498	616.125	354524	5016355	106	7
Cluster	498	624.312	354522.1	5016363	106	7
Heightline	SPLINE	635.798	354519.4	5016374	106	0
Heightline	SPLINE	640.518	354518.3	5016379	106	0
Building(R)	LWPOLYLIN	669.296	354511.7	5016407	105	7
Heightline	SPLINE	699.211	354515.5	5016377	106	0
Heightline	SPLINE	702.762	354515.9	5016374	106	0
Cluster	498	713.648	354517.3	5016363	106	7
Cluster	498	720.5	354518.2	5016356	106	7
Heightline	SPLINE	736.705	354520.2	5016340	106	0
Heightline	SPLINE	748.237	354521.7	5016328	106	0
Heightline	LWPOLYLIN	875.557	354537.9	5016202	105	0
Heightline	SPLINE	920.459	354543.6	5016158	104	0
Heightline	SPLINE	930.807	354544.9	5016147	103	0
Heightline	LWPOLYLIN	937.624	354545.8	5016141	102	0
Heightline	SPLINE	974.849	354550.5	5016104	101	0
Cluster	543	1027.026	354557.2	5016052	100.1	7.39
Cluster	543	1037.18	354558.5	5016042	99.95	7.55
Heightline	SPLINE	1038.614	354558.7	5016040	100	0
Cluster	545	1095.669	354565.9	5015984	99.07	9.01
Barrier	LWPOLYLIN	1096.186	354566	5015983	108.08	1
Heightline	LWPOLYLIN	1100.65	354566.6	5015979	99	0
Pointsource	S4	1106.039	354567.2	5015974	108.08	1.7

L(wr)	41	41	51	63	74	76	74	69	60
A(ground)	-5.5	-5.5	-4.22	-4.8	-5.14	-5.14	-5.14	-5.14	-5.14
A(barrier)	10.27	10.27	8.99	9.57	9.91	9.91	9.91	9.91	9.91
A(veg)	0	0	0	0	0	0	0	0	0
A(sit)	0	0	0	0	0	0	0	0	0
A(bld)	0	0	0	0	0	0	0	0	0
A(air)	0.04	0.13	0.45	1.15	2.13	4.05	10.69	36.25	129.28
A(geo)	71.87	71.87	71.87	71.87	71.87	71.87	71.87	71.87	71.87
A(refl)	--	--	--	--	--	-0.97	-0.97	-0.97	-0.97
C(meteo)	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48

L(p) -- -- -- -- -- -7.14 -15.78 -46.34 -148.37 | -6.58

Cross section for receiver S9 and source S4
Reflection calculation in facade LWPOLYLINE

ItemType	Id	Distance	X	Y	Hgrnd	Height
Receiver	S9	0	354667	5015756	97	4.5
Barrier	LWPOLYLIN	14.135	354663.8	5015770	96.92	2
Ground	LWPOLYLIN	41.42	354657.6	5015796	44.89	0
Heightline	LWPOLYLIN	54.293	354654.6	5015809	96	0
Heightline	LWPOLYLIN	67.228	354651.7	5015821	96	0
Heightline	SPLINE	140.269	354635.1	5015892	97	0
Heightline	LWPOLYLIN	196.552	354622.3	5015947	98	0
Cluster	545	201.75	354621.1	5015952	98.29	9.79
Barrier	LWPOLYLIN	202.255	354621	5015953	108.08	1
Barrier	LWPOLYLIN	231.08	354614.4	5015981	108.08	1
Heightline	LWPOLYLIN	232.562	354614.1	5015982	99	0
Cluster	545	234.396	354613.7	5015984	99.57	8.51
Heightline	LWPOLYLIN	245.103	354611.2	5015994	100	0
Heightline	SPLINE	285.032	354602.1	5016033	101	0
Heightline	LWPOLYLIN	332.738	354591.3	5016080	102	0
Heightline	SPLINE	370.53	354582.7	5016117	103	0
Heightline	SPLINE	402.085	354575.5	5016147	104	0
Heightline	SPLINE	403.885	354575.1	5016149	104	0
Heightline	SPLINE	409.271	354573.9	5016154	104	0
Heightline	LWPOLYLIN	467.601	354560.6	5016211	105	0
Heightline	LWPOLYLIN	521.496	354548.3	5016264	105	0
Heightline	SPLINE	530.531	354546.3	5016272	105	0
Heightline	SPLINE	581.573	354534.7	5016322	106	0

Heightline	SPLINE	608.251	354528.6	5016348	106	0
Cluster	498	616.348	354526.7	5016356	106	7
Cluster	498	624.538	354524.9	5016364	106	7
Heightline	SPLINE	635.621	354522.4	5016375	106	0
Heightline	SPLINE	641.435	354521	5016380	106	0
Cluster	497	650.315	354519	5016389	105.65	7.19
Cluster	497	661.606	354516.5	5016400	105.19	7.65
Cluster	422	669.137	354514.7	5016407	105	7
Cluster	422	684.558	354511.2	5016422	105	7
Building(R)	LWPOLYLIN	686.917	354510.7	5016425	105	7
Cluster	422	689.276	354511	5016422	105	7
Cluster	422	704.704	354512.9	5016407	105	7
Heightline	SPLINE	734.188	354516.6	5016378	106	0
Heightline	SPLINE	738.186	354517.1	5016374	106	0
Cluster	498	748.916	354518.4	5016363	106	7
Cluster	498	756.057	354519.3	5016356	106	7
Heightline	SPLINE	771.025	354521.2	5016341	106	0
Heightline	SPLINE	791.79	354523.7	5016321	106	0
Heightline	LWPOLYLIN	902.67	354537.5	5016211	105	0
Heightline	LWPOLYLIN	906.47	354538	5016207	105	0
Heightline	LWPOLYLIN	910.641	354538.5	5016203	105	0
Heightline	SPLINE	956.118	354544.2	5016158	104	0
Heightline	SPLINE	966.296	354545.4	5016147	103	0
Heightline	LWPOLYLIN	973.339	354546.3	5016140	102	0
Heightline	SPLINE	1011.133	354551	5016103	101	0
Cluster	543	1063.351	354557.5	5016051	100.09	7.4
Cluster	543	1072.604	354558.7	5016042	99.95	7.54
Heightline	SPLINE	1074.366	354558.9	5016040	100	0
Cluster	545	1131.139	354566	5015984	99.07	9.01
Barrier	LWPOLYLIN	1131.656	354566	5015983	108.08	1
Heightline	LWPOLYLIN	1136.129	354566.6	5015979	99	0
Pointsources	S4	1141.516	354567.2	5015974	108.08	1.7

L(wr)	41	41	51	63	74	76	74	69	60
A(ground)	-5.51	-5.51	-4.23	-4.81	-5.15	-5.15	-5.15	-5.15	-5.15
A(barrier)	10.28	10.28	9	9.59	9.92	9.93	9.93	9.94	9.96
A(veg)	0	0	0	0	0	0	0	0	0
A(sit)	0	0	0	0	0	0	0	0	0
A(bld)	0	0	0	0	0	0	0	0	0
A(air)	0.04	0.14	0.47	1.19	2.2	4.18	11.03	37.41	133.43
A(geo)	72.14	72.14	72.14	72.14	72.14	72.14	72.14	72.14	72.14
A(refl)	--	--	--	--	--	--	-0.97	-0.97	-0.97
C(meteo)	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48

L(p) -- -- -- -- -- -- -16.41 -47.8 -152.84 | -16.41

Cross section for receiver S9 and source S4
Reflection calculation in facade LWPOLYLINE

ItemType	Id	Distance	X	Y	Hgrnd	Height
Receiver	S9	0	354667	5015756	97	4.5
Barrier	LWPOLYLIN	14.805	354666.3	5015771	96.93	2
Ground	LWPOLYLIN	42.978	354665	5015799	44.89	0
Cluster	547	56.534	354664.4	5015812	96.2	6.69
Barrier	LWPOLYLIN	58.054	354664.3	5015814	102.88	1
Barrier	LWPOLYLIN	95.094	354662.6	5015851	102.88	1
Barrier	LWPOLYLIN	95.886	354662.6	5015852	102.88	1
Barrier	LWPOLYLIN	98.195	354662.5	5015854	102.88	1
Cluster	547	98.724	354662.4	5015854	96.79	6.09
Heightline	SPLINE	112.459	354661.8	5015868	97	0
Heightline	SPLINE	138.156	354660.6	5015894	98	0
Heightline	SPLINE	148.074	354660.2	5015904	99	0
Heightline	LWPOLYLIN	212.527	354657.2	5015968	100	0
Ground	LWPOLYLIN	213.11	354657.2	5015969	44.89	0
Heightline	SPLINE	235.459	354656.2	5015991	101	0
Cluster	516	254.831	354655.3	5016010	101.49	6.58

Cluster	516	265.375	354654.8	5016021	101.88	6.18
Heightline	LWPOLYLI	265.759	354654.8	5016021	102	0
Heightline	SPLINE	282.118	354654	5016038	101	0
Heightline	SPLINE	282.558	354654	5016038	101	0
Ground	LWPOLYLI	283.172	354654	5016039	44.89	0
Cluster	297	309.683	354652.7	5016065	101.66	7.04
Cluster	297	311.683	354652.7	5016067	101.71	6.99
Cluster	310	319.677	354652.3	5016075	101.91	7.09
Cluster	310	321.839	354652.2	5016077	101.95	7.05
Cluster	307	326.08	354652	5016081	102	7
Cluster	307	340.119	354651.3	5016096	102	7
Heightline	SPLINE	397.789	354648.7	5016153	102	0
Heightline	LWPOLYLI	430.182	354647.2	5016185	103	0
Heightline	LWPOLYLI	430.195	354647.2	5016185	103	0
Heightline	LWPOLYLI	431.44	354647.2	5016187	103	0
Cluster	492	442.723	354646.6	5016198	103.39	7.01
Cluster	492	454.489	354646.1	5016210	103.75	6.65
Heightline	LWPOLYLI	463.032	354645.7	5016218	104	0
Heightline	LWPOLYLI	468.483	354645.4	5016224	105	0
Cluster	468	483.21	354644.8	5016238	105.9	7.1
Cluster	468	485.615	354644.7	5016241	106	7
Heightline	LWPOLYLI	493.117	354644.3	5016248	106	0
Heightline	SPLINE	513.756	354643.4	5016269	106	0
Heightline	LWPOLYLI	519.07	354643.1	5016274	107	0
Cluster	465	527.294	354642.7	5016282	107.29	6.84
Cluster	465	537.194	354642.3	5016292	107.53	6.6
Heightline	LWPOLYLI	550.557	354641.7	5016306	108	0
Heightline	SPLINE	554.924	354641.5	5016310	109	0
Heightline	SPLINE	558.753	354641.3	5016314	110	0
Heightline	SPLINE	587.602	354640	5016343	110	0
Heightline	SPLINE	623.244	354638.3	5016378	109	0
Heightline	LWPOLYLI	628.301	354638.1	5016383	108	0
Heightline	LWPOLYLI	628.963	354638.1	5016384	108	0
Heightline	LWPOLYLI	631.049	354638	5016386	108	0
Heightline	SPLINE	642.957	354637.4	5016398	107	0
Heightline	SPLINE	647.945	354637.2	5016403	107	0
Heightline	SPLINE	668.01	354636.3	5016423	107	0
Heightline	SPLINE	683.206	354635.6	5016438	107	0
Cluster	453	691.022	354635.2	5016446	107.02	7.51
Cluster	453	699.271	354634.8	5016454	106.9	7.63
Cluster	452	711.806	354634.3	5016467	106.07	6.93
Cluster	452	716.072	354634.1	5016471	106.09	6.91
Cluster	451	717.293	354634	5016472	106.09	7.52
Cluster	451	721.547	354633.8	5016477	106.09	7.52
Building(R)	LWPOLYLI	729.054	354633.5	5016484	106.24	7
Cluster	451	736.747	354632.5	5016476	106.05	7.56
Cluster	451	741.107	354631.9	5016472	106.01	7.6
Cluster	452	742.369	354631.8	5016471	106	7
Cluster	452	742.721	354631.7	5016470	106	7
Heightline	SPLINE	746.912	354631.2	5016466	106	0
Heightline	LWPOLYLI	763.224	354629.1	5016450	107	0
Heightline	LWPOLYLI	767.296	354628.5	5016446	107	0
Heightline	LWPOLYLI	862.421	354616.3	5016352	106	0
Heightline	LWPOLYLI	902.579	354611.1	5016312	105	0
Heightline	SPLINE	963.864	354603.3	5016251	104	0
Heightline	SPLINE	986.219	354600.4	5016229	104	0
Cluster	478	1000.326	354598.6	5016215	104	7
Cluster	478	1004.447	354598	5016211	104	7
Cluster	478	1005.565	354597.9	5016210	104	7
Heightline	SPLINE	1009.645	354597.4	5016206	104	0
Cluster	478	1009.7	354597.4	5016206	103.99	7.01
Cluster	479	1013.438	354596.9	5016202	103.89	6.75
Cluster	479	1021.354	354595.9	5016194	103.65	6.98
Cluster	480	1022.877	354595.7	5016193	103.6	6.73
Cluster	480	1031.243	354594.6	5016184	103.37	6.97
Cluster	481	1035.886	354594	5016180	103.24	6.76
Cluster	481	1036.239	354593.9	5016179	103.23	6.77

Heightline	LWPOLYLIN	1050.42	354592.1	5016165	103	0
Heightline	LWPOLYLIN	1056.825	354591.3	5016159	103	0
Heightline	SPLINE	1101.216	354585.6	5016115	103	0
Heightline	LWPOLYLIN	1136.821	354581	5016080	102	0
Heightline	SPLINE	1157.035	354578.4	5016060	101	0
Heightline	SPLINE	1199.677	354572.9	5016017	100	0
Cluster	545	1232.282	354568.7	5015985	99.14	8.94
Barrier	LWPOLYLIN	1232.855	354568.6	5015984	108.08	1
Heightline	LWPOLYLIN	1238.342	354567.9	5015979	99	0
Pointsourc	S4	1243.783	354567.2	5015974	108.08	1.7

L(wr)	41	41	51	63	74	76	74	69	60
A(ground)	-5.55	-5.55	-3.81	-4.51	-4.92	-4.92	-4.92	-4.92	-4.92
A(barrier)	10.32	10.32	8.58	9.29	9.69	9.69	9.69	9.69	9.69
A(veg)	0	0	0	0	0	0	0	0	0
A(sit)	0	0	0	0	0	0	0	0	0
A(bld)	0	0	0	0	0	0	0	0	0
A(air)	0.04	0.15	0.51	1.3	2.4	4.55	12.02	40.76	145.38
A(geo)	72.89	72.89	72.89	72.89	72.89	72.89	72.89	72.89	72.89
A(refl)	--	--	--	--	--	--	--	--	-0.97
C(meteo)	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48

L(p) -- -- -- -- -- -- -- -- -- -165.49 | -165.49

Cross section for receiver S9 and source S4
Reflection calculation in facade LWPOLYLINE

ItemType	Id	Distance	X	Y	Hgrnd	Height
Receiver	S9	0	354667	5015756	97	4.5
Barrier	LWPOLYLIN	14.109	354663.6	5015769	96.92	2
Ground	LWPOLYLIN	41.369	354657.1	5015796	44.89	0
Heightline	LWPOLYLIN	52.682	354654.4	5015807	96	0
Heightline	LWPOLYLIN	68.421	354650.6	5015822	96	0
Heightline	SPLINE	142.685	354632.8	5015894	97	0
Heightline	LWPOLYLIN	197.217	354619.8	5015947	98	0
Cluster	545	201.387	354618.8	5015951	98.21	9.87
Barrier	LWPOLYLIN	201.892	354618.6	5015952	108.08	1
Heightline	LWPOLYLIN	230.921	354611.7	5015980	99	0
Heightline	LWPOLYLIN	245.724	354608.1	5015994	100	0
Barrier(R)	LWPOLYLIN	248.604	354607.4	5015997	108.08	1
Heightline	LWPOLYLIN	259.801	354597.8	5015991	100	0
Heightline	LWPOLYLIN	283.846	354577	5015979	99	0
Pointsourc	S4	295.189	354567.2	5015974	108.08	1.7

Height	Source	Per	LAeq	32	63	125	250	500	1000	2000	4000	8000
4.5	S4	1	15.73	-23.36	-23.62	-13.84	-2.05	10.45	12.17	9.31	-1.69	-32.48
4.5	S4	2	--	--	--	--	--	--	--	--	--	--
4.5	S4	3	12.72	-26.37	-26.63	-16.85	-5.06	7.44	9.16	6.3	-4.7	-35.49
4.5	S4	4	--	--	--	--	--	--	--	--	--	--

Height	Per	LAeq	32	63	125	250	500	1000	2000	4000	8000
4.5	1	15.73	-23.36	-23.62	-13.84	-2.05	10.45	12.17	9.31	-1.69	-32.48
4.5	2	--	--	--	--	--	--	--	--	--	--
4.5	3	12.72	-26.37	-26.63	-16.85	-5.06	7.44	9.16	6.3	-4.7	-35.49
4.5	4	--	--	--	--	--	--	--	--	--	--

Testfile closed: ##### 11:09:26 AM