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ACOUSTIC ASSESSMENT

OPERATIONAL NOISE IMPACT

PROPOSED ELGAS STORAGE FACILITY AT PART LOT 1 – 130 CORMORANT ROAD, KOORAGANG

Issue Date: Tuesday, 22 August 2017

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ACOUSTIC ASSESSMENT

ELGAS STORAGE, KOORAGANG

CONTENTS

1.0 INTRODUCTION

Koikas Acoustics Pty Ltd was commissioned by R.J. Sinclair Pty Ltd to undertake an acoustic assessment for the proposed operation of the Elgas Storage Facility at Kooragang as required for the Environmental Impact Statement (EIS) of this development.

The aim of this assessment is to ascertain if necessary, the type and extent of noise mitigation measures required to achieve relevant nominated noise criterion for the proposed warehouse operation. The assessment was undertaken in accordance with the assessment procedures of the ***EPA's Industrial Noise Policy (INP)***, relevant ***Australian Standards***.

All noise sources associated with the subject assessment site were quantified and assessed to the amenity noise criterion of the ***EPA Industrial Noise Policy (INP)***.

Briefly, the assessment considers the following:

- a discussion of the noise criteria applying to surrounding premises;
- presentation of the attended noise survey;
- the results of a desk top noise study that considers the operational noise impact from the proposed *Elgas Storage Facility* to surrounding premises, and
- where necessary, provide recommendations on noise mitigation measures to meet the relevant noise criteria.

2.0 SITE DESCRIPTION

2.1 SITE ADDRESS

The proposed Elgas Storage Facility (Site B) is located at Part Lot 1 DP 1195449 Cormorant Road corner Egret Street, Kooragang NSW

2.2 DESCRIPTION OF ASSESSMENT SITE

The subject site currently has a Service Station/Food Offer (Site A1) and Carwash (Site A2) and will expand to include the proposed Elgas Storage Facility (Site B) to the north of the Service Station/Food Offer. As per the architectural drawings provided, the proposed Elgas Storage Facility development site is approximately 7,958m^2 which will include one 50 tonne bulk LPG vessel, two cylinder storage areas, one cylinder filling dock, one office building and one open car park area.

The subject Elgas Storage Facility will be used for storage and filling of Gas Cylinders. Typical noisy activities may include:

- Truck deliveries with reversing alarms;
- Loading/off and loading of goods with forklifts or cranes;
- Cars entering and leaving the site;
- The use of plant and equipment within the storage facility area including pumps, motors, cleaning, filling and storage of gas cylinders, and use other general hand tools and power tools.

Other noise events observed in another existing storage facility were throwing/dropping of materials (mostly metal materials), warehouse personnel conveying instructions to each other, continuous radio operation in the background and forklifts traversing within the yard area.

2.3 HOURS OF OPERATION

The applicant is seeking to operate 6am – 6pm seven days per week.

2.4 AMBIENT NOISE PROFILE OF THE SITE

The general ambient noise levels are dominated by road traffic noise along Cormorant Road, operational noise of the service station and the carwash that operate 24/7 to the south, surrounding industrial noise from other existing factories/warehouse and ships docking to the south of the subject premise.

2.5 SURROUNDING PREMISES

The assessment site is surrounded by:

- Service station/food offer and carwash on the southern boundary;
- PWCS and NCIG coal loading berthing facilities on the southern boundary;
- BOC Industrial Gases and Sims Metal on the eastern boundary, and
- Boral Cement Works to the north.

The nearest noise-sensitive receiver locations are the Service station/food offer commercial premises located to the south of the assessment site. It is this noise-sensitive premise which will form the basis of noise calculations within this acoustic report. Compliance at this location, infers compliance to all other less noise sensitive premises.

An aerial photograph showing the assessment site and surrounding premises is attached as **Appendix A** to this report.

3.0 NOISE & VIBRATION CRITERIA

3.1 ENVIRONMENTAL IMPACT STATEMENT (EIS) REQUIREMENTS

The noise and vibration assessment requirements for the Environmental Impact Statement (EIS) were extracted and presented below:

- **Noise and Vibration** – including:
  - a quantitative assessment of potential construction, operational and transport noise and vibration impacts in accordance with relevant Environment Protection Authority guidelines; and
  - details and justification of the proposed noise mitigation and monitoring measures.

3.2 EPA'S INDUSTRIAL NOISE POLICY (INP)

In January 2000, the ***EPA*** produced a document entitled ***Industrial Noise Policy (INP)***, which is primarily used to assess noise from industrial extractive, commercial and warehousing industries, individual industrial sources such as rotating machinery, heating, ventilation and air conditioning.

The ***EPA*** specific objective is to assess noise from industrial noise sources scheduled under the new Protection of the Environment Act 1997. As a consequence, the ***INP's*** objectives are to protect the community from excessive intrusive noise, and preserve amenity from specific land uses.

In summary, the following steps are undertaken for the purpose of applying the ***INP***:

- determine the magnitude and nature of all relevant noise sources;
- measure the existing background and ambient noise levels. *Not necessary for industrial type premises;*
- determine project/specific noise levels from *amenity noise criteria for industrial premises;*
- compare the measured noise levels with the project specific noise levels, and
- consider cost effective and practical noise mitigation measures where noise levels exceed the nominated criteria.

3.2.1 Noise Amenity Criteria (EPA's INP)

In order to limit the continuing increase in noise, the ***EPA*** has nominated recommended acceptable and maximum ambient noise levels for various receiver sites from industrial noise.

Table 2.1 of the EPA's INP (below) specifies the following acceptable and maximum recommended $L_{Aeq,\ Period}$ noise levels for this project specific type of area.

			Recommended LAeq, Period	
Type of Receiver	**Indicative Noise Amenity**	**Time of Day**	**Acceptable**	**Recommended Maximum**
Residential	Urban	Day Evening Night	60 50 45	65 55 50
Commercial	**All Areas**	**Day Evening Night**	**65**	**70**
Industrial	**All Areas**	**Day Evening Night**	**70**	**75**

Generally, when the ***EPA's INP*** is complied with, offensive noise is unlikely to occur.

4.0 NOISE SURVEYS

4.1 ATTENDED NOISE SURVEY

4.1.1 Survey Dates and Meteorological Conditions

The attended noise monitoring survey was conducted by Koikas Acoustics to quantify the Elgas Storage Facility operational noise levels (including all the mechanical plant and servicing activities). The survey was conducted on Tuesday 1st August, 2017.

The meteorological conditions for the duration of the monitoring period did not adversely impact the noise survey results.

4.1.2 Monitoring Location

The attended noise survey was conducted within an existing Elgas Storage Facility in Blacktown during the normal operations. The activities to be carried in the proposed facility will be similar to this existing facility.

Microphone was placed at 1.5 meters above the facility's floor.

4.2 INSTRUMENTATION AND CALIBRATION

NTi XL2 Type 1 precision spectrum analyser S/N A2A-02545-D1 was used to measure noise of typical Elgas storage/cleaning activities. The equipment used for taking noise level measurements is traceable to NATA certification.

5.0 NOISE SURVEY RESULTS

5.1 ATTENDED NOISE SURVEY

The measured operational noise levels of a similar existing Elgas Storage Facility obtained from the attended noise surveys are as follow:

Table 2. Summary of Attended Noise Survey Results (1st August 2017)										
FREQUENCY	31.5	63	125	250	500	1k	2k	4k	8k	Total
L_{Aeq} Noise Level @ 2m from Pump/Motor 1 [dB]	36	44	50	60	67	69	69	68	66	**75**
L_{Aeq} Noise Level @ 2m from Pump/Motor 2 [dB]	34	47	54	62	78	73	75	72	63	**81**
Spatial Averaged (4m x 7m) L_{Aeq} Noise Level of Cleaning/Servicing/Transportation of cylinder onto conveyor belt [dB]	24	36	55	63	71	76	79	79	71	**84**
Spatial Averaged (6m x 16m) L_{Aeq} Noise Level of Filling/ Storing gas cylinders in metal cages [dB]	32	44	58	63	68	70	69	69	60	**75**

6.0 NOMINATED NOISE CRITERIA

6.1 WAREHOUSE OPERATION

Therefore the nominated Elgas Storage Facility operational noise criteria adopted for this assessment are:

- $L_{Aeq,15\ min\ (Anytime)} \leq$ **65 dB,** for commercial premises, and
- $L_{Aeq,15\ min\ (Anytime)} \leq$ **70 dB,** for industrial premises.

7.0 SOURCE SOUND POWER

The following noise sources were used to calculate the maximum noise to the surrounding commercial/industrial premises:

- 2 x per week - B-Double Trucks travelling at 5km/hr (moving stationary source);
- 12 x per day - Bobtail Trucks travelling at 5km/hr (moving stationary source);
- 12 x per day - Diesel Vehicle travelling at 5km/hr (moving stationary source);
- 12 x per day - Trucks idling (single event);
- 12 x per day - Truck engine starting (single event);
- 12 x per day - Truck air brakes (single event);
- 12 x per day - Truck reversing alarm (single event);
- 24 x per day - Doors opening/closing (single event);
- 12 x per day - Vehicle engine starting (single event);
- 1 x Air compressor unit (continuous event);
- 5 x AC condenser units (continuous event);
- 2 x Pump/motor measured from existing Elgas Storage Facility (continuous event);
- Cleaning/Servicing/Transportation of cylinder onto conveyor belt measured from existing Elgas Storage Facility (Spatial Averaged: 4m x 7m) (continuous event), and
- Filling/ Storing gas cylinders in metal cages measured from existing Elgas Storage Facility (Spatial Averaged: 6m x 16m) (continuous event).

Table 4 and 5 provides a summary of the sound power levels and corrections of the noise sources associated with the acoustic assessment.

Table 4. Sound Power Levels of Warehouse Operation [dB]										
FREQUENCY [Hz]	31.5	63	125	250	500	1k	2k	4k	8k	Total
Truck idling (event only) LwAeq	70	69	71	75	85	92	90	85	75	**95**
Truck Engine Starting (event only) LwAeq	66	68	74	80	93	98	94	93	91	**102**
Truck Air Brakes (event only) LwAeq	74	84	85	92	104	107	109	106	95	**113**
Truck Reversing Alarm (event only) LwAeq	54	61	69	72	79	93	84	78	66	**94**
Vehicle engine start (event only) LwAeq	46	61	65	64	72	75	78	77	72	**82**
Vehicle door open/closed (event only) LwAeq	53	67	75	74	79	77	79	73	64	**84**
B-Double Truck Movement Noise @ 5 km/hr * (Measured As a Stationary Source) LwAeq	65	65	70	75	82	87	86	81	70	**91**
Truck Movement Noise @ 5 km/hr (Measured As a Stationary Source) LwAeq	63	63	68	73	80	85	84	79	68	**89**
Diesel Vehicle Movement Noise @ 5 km/hr (Measured As a Stationary Source) LwAeq	49	62	68	71	75	77	72	67	59	**81**
Noise Level from Pump/Motor 1 LwAeq - continuous	50	58	64	74	81	83	83	82	80	**89**
Noise Level from Pump/Motor 2 LwAeq - continuous	48	61	68	76	92	87	89	86	77	**95**
Spatial Averaged (4m x 7m) Noise Level of Cleaning/Servicing/Transportation of cylinder onto conveyor belt (Activity 1) LwAeq - continuous	24	36	55	63	71	76	79	79	71	**84**
Spatial Averaged (6m x 16m) Noise Level of Filling/ Storing gas cylinders in metal cages (Activity 2) LwAeq - continuous	32	44	58	63	68	70	69	69	60	**75**
AC Condenser Unit LwAeq - continuous **Mitsubishi SUZ-KA71VA2**	-	40	54	57	58	58	57	49	40	**64**
Air Compressor LwAeq - continuous	61	70	77	83	92	92	90	87	79	**97**

* The noise from the 25 m trucks (B-double) are approximately 2 dB higher than the Bobtail trucks.

Adjustments were also made to account for the expected noise source durations over a 60 minute period.

Table 5. Sound Power Level Correction Factors	
NOISE SOURCE	**Duration Correction**
B-Double Truck Movement Noise @ 5 km/hr	-7.8
Truck idling (20 seconds)	-22.6
Truck Engine Starting (2 seconds)	-32.6
Truck Air Brakes (2 seconds)	-32.6
Truck Reversing Alarm (10 seconds)	-25.6
Vehicle engine start (1.5 seconds)	-33.8
Vehicle door open/closed (1 seconds)	-35.6

The sound power levels were calculation based on the attended noise survey conducted by Koikas Acoustics for previous projects.

8.0 NOISE MODELLING

8.1 CADNA (A) NOISE MODEL

The noise sources were modelled in a computer program called Cadna/A, which is a software package developed by DataKustik. Cadna/A incorporates a computer aided drafting (CAD) program that utilises the height of the ground, the position of buildings and other structures to run through a set of algorithms and calculate at user defined grid points and user input receiver locations the overall sound pressure level and frequency dependant noise level spectrum. It then interpolates the calculated noise levels at each of the grid points to produce noise level contours.

The noise level calculations take into account the propagation of sound from a sound source as a function of its distance, the shielding effects of barriers and buildings, the attenuation and reflection off the ground and buildings.

Receiver locations were assigned in the computer model at representative positions to determine the resultant noise levels at each facade and floor level for the proposed development and surrounding premises. The predicted noise levels at these locations were used to provide recommendations on appropriate noise mitigation measures that would minimise the noise impact.

Noise level contours were produced where necessary to illustrate the propagation of sound from the noise sources to the most noise affected areas of the building. The noise level contour maps are attached in **Appendix** B.

8.2 ARCHITECTURAL DRAWINGS PROVIDED

The architectural drawings provided by R.J. Sinclair Pty Ltd (Project No.: 14-002) were used in this assessment. The drawing references are detailed below:

Drawing title	Drawing No.	Date
Overall Site Plan	GA-00	-
Site Plan	GA-01	27/06/2017
Site Pavement Finishes Plan	GA-02	27/06/2017
Site Dimensioning Plan	GA-03	27/06/2017
Office Building Floor Plan	GA-10	06/06/2017
Office Building Dimensioning Plan	GA-11	06/06/2017
Roof Plan	GA-12	06/06/2017
Office Building Elevations	GA-20	06/06/2017
Office Building Sections	GA-21	06/06/2017
Cylinder Filling Dock Plan, Section and Elevations	GA-30	28/06/2017

Turning Study – 26m B-Double	TS-01	27/06/2017
Turning Study – 12.5m Rigid	TS-02	27/06/2017
Turning Study – Delivery Bay	TS-03	06/06/2017

8.3 CALCULATED NOISE LEVEL CONTOUR RESULTS

Scenario 1: Elgas Storage Facility Operational Noise Model

$L_{Aeq,Period\ (Anytime)} \leq 65$ dB, for commercial premises

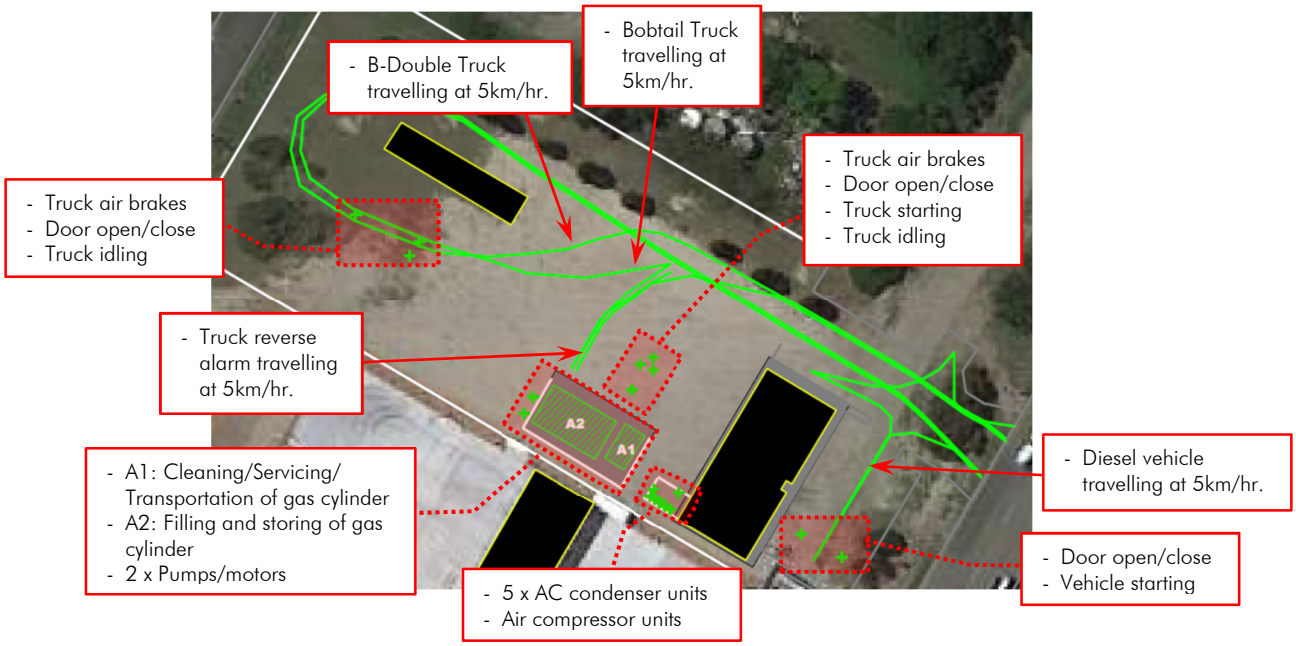
$L_{Aeq,Period\ (Anytime)} \leq 70$ dB, for industrial premises

The predicted Elgas Storage Facility operational noise impact from the subject development to the surrounding premises are summarised below.

Table 6. Elgas Storage Facility Operational Noise Levels at the Surrounding Premises – Scenario 1

Receivers	Calculated Maximum External Noise Level $L_{Aeq,Period}$ [dB]	Noise Criterion $L_{Aeq,Period}$ [dB]	Exceeding [dB]
R1	42	65	-
R2	59		-
R3	59		-
R4	49		-
R5	44	70	-
R6	37		-
R7	46		-
R8	47		-
R9	38		-
R10	36		-

Refer to **Appendix** B for the receiver locations and noise level contour maps. This scenario predicate that all related noise-generating events occur in one period. There are no noise mitigation measures warranted for this site as compliance will be satisfactorily achieved. Refer to the below screenshot outlining the relevant noise sources.



9.0 SUMMARY AND CONCLUSION

Koikas Acoustics Pty Ltd was requested by R.J. Sinclair Pty Ltd to conduct an acoustic assessment for the Elgas Storage Facility at Kooragang, which includes the following:

- An attended noise survey was also conducted by Koikas Acoustics on Tuesday 1st August, 2017 to quantify the operational noise levels of an existing Elgas Storage Facility which were used to determine the noise source levels from the subject warehouse to surrounding premises.

- Sound power levels of warehouse operation and vehicle movements determined from the noise measurements taken and other similar projects were used in conjunction with software program Cadna/A noise modelling to predict the likely noise impact to the surrounding premises of subject warehouse development.

- The nominated noise criteria will be achieved at all surrounding premises including commercial and industrial premises as shown in Table 6 of this report.

- No noise mitigation recommendations are provided in this report as full compliance will be achieved at all noise-sensitive receiver locations as shown in Table 6 of this report. A 1.8 metres high barrier is proposed along the boundary of the subject premise. In addition, a 1.8 m high barrier is to be provided for the outdoor AC condenser units and compressor units. These barriers were considered in the noise modelling as per the architectural drawings and are to be constructed of Colorbond type fence that is vapour sealed.

Based on the predicted/calculated noise levels, it is expected that the proposed Elgas Storage Facility at Kooragang will comply with the nominated noise criteria of the ***EPA's Industrial Noise Policy*** and therefore satisfy the Environmental Impact Statement (EIS). No further noise mitigation measures are required.

APPENDIX A

APPENDIX A

APPENDIX A

AERIAL VIEW

JOB NUMBER: 3250
CLIENT: R.J. Sinclair Pty Ltd
SITE ADDRESS: Elgas Storage Facility at Part Lot 1 Dp 1195449
Cormorant Road corner Egret Street, Kooragang NSW

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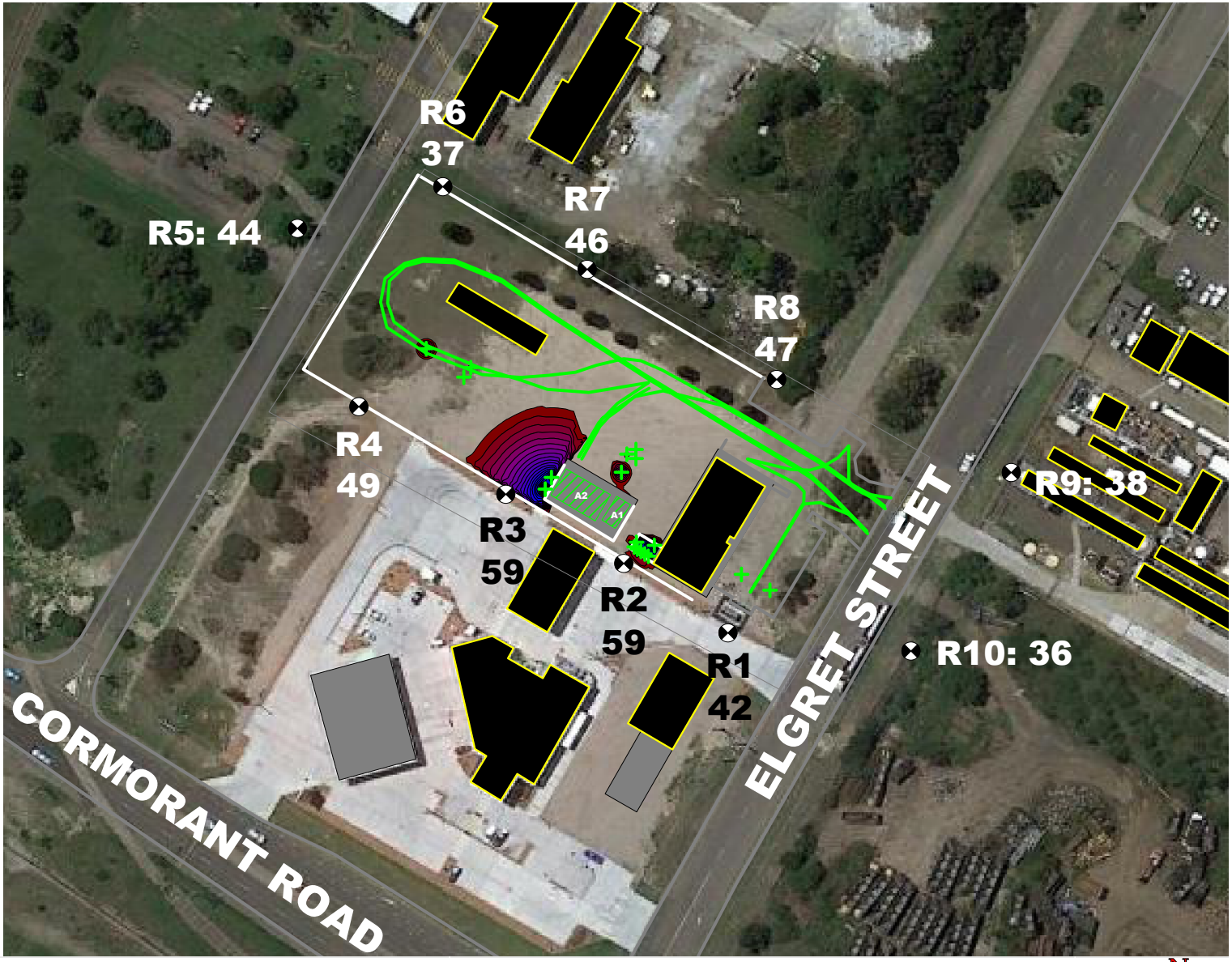
APPENDIX B

APPENDIX B

APPENDIX B



Scenario 1
**** NOISE SOURCES ****

~ 1 x B-Double truck @ 5km/r.
~ 1 x Bobtail truck @ 5km/r.
~ 1 x Diesel vehicle @ 5km/r.
~ 1 x Truck reversing alarm @ 5km/r.
~ 2 x Truck idling.
~ 1 x Truck engine starting.
~ 2 x Truck air brakes.
~ 3 x Vehicle door open/close.
~ 1 x Vehicle engine starting.
~ 2 x Pumps/motors.
~ 1 x Air Compressor unit
~ 5 x AC condenser units
~ A1: Cleaning/Servicing/ transportation of gas cylinders.
~ A2: Filling/Storing of gas cylinders.

Note:
- LAeq,Period noise level contours shown are at a height of 1.5 m above the ground and end at the limiting criteria of 65db(A).

- Receiver points are at a height of 1.5m above the ground.

- The maximum reading at the nearest resident is 59 dB(A).

PRINT DATE: 21/08/17

- Point Source
- Line Source
- Area Source
- Building
- Barrier
- 3D-Reflector
- Contour Line
- Receiver
- Calculation Area

- > 65.0 dB
- > 70.0 dB
- > 80.0 dB
- > 90.0 dB
- > 100.0 dB

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JOB NUMBER: 3250
CLIENT: R.J. Sinclair Pty Ltd
SITE ADDRESS: Elgas Storage Facility at Kooragang
ASSESSED TO: EPA's Industrial Noise Policy
LIMITING CRITERIA: 65 dB(A) - Commercial Premises
70 dB(A) - Industrial Premises

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