

Noise and Vibration Impact Technical Report

Elizabeth Drive Landfill Expansion
Environmental Impact Statement

Prepared for:
SUEZ Recycling and Recovery Pty Ltd

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Executive Summary

This report provides an operational noise and vibration impact assessment for noise generated from the landfill operations as a result of the proposed extension of the operating life of the existing SUEZ facility. The Project involves modifying the currently approved landform from Reduced Level (RL) RL80 to RL95. The modification would occur fully within the existing landfill footprint (Project Area).

The report details appropriate environmental noise criteria based on NSW EPA Environment Protection Licence No. 4068 (EPL 4068) and the NSW EPA Noise Policy for Industry (NPfI) guidelines. The report considers both the EPL 4068 noise limits and NPfI derived project noise trigger levels for the assessment of the Project, however only the EPL 4068 noise limit were considered when determining noise compliance and mitigation measures.

Vibration was considered, however with the large distances (at least 100 metres) between the operations and nearby sensitive receivers, a detailed assessment was deemed not required as the safe working distances will not be encroached even at the nearest point of operations to the receivers. In addition, there are no blasting activities proposed to be carried out as part of the cell development/quarrying activities at the Site.

The landfill operations considered in this assessment consisted of two different elements which occur simultaneously:

- For the purpose of this assessment it was assumed that the EPL 4068 noise limits apply to all truck delivery of waste into landfill cells and to the SAWT facility
- Landfilling operations

No changes to the SAWT facility operations are proposed as part of this Project, hence it is assumed that the noise contribution from the SAWT is as per the relevant EPL 12889 noise limits.

A noise model was created using SoundPLAN 8.0 (industry standard) noise modelling software to represent 'reasonable' worst case operational activities. Noise levels due to the model activities were predicted at nearby noise sensitive receivers.

All operational activities were modelled five metres below the final landform elevation to represent a realistic landfilling scenario as only capping activities would occur at the final landform elevation. For example, for the approved landform (RL80), operational landfilling activities were modelled at RL75. Similarly for the proposed landform (RL95) the landfilling activities were modelled at RL90. A RL65 scenario was selected to assess an intermediate stage after the landform rises above natural ground level.

The noise impact assessment has identified potential noise exceedances of the Project noise criteria for both the approved and proposed landform assessment scenarios. The predicted noise levels at nearby sensitive receivers for the RL65 elevation are greater than the noise levels predicted for the RL90 elevation for both standard and noise-enhancing meteorological conditions. This is expected as a 25 meters increase in height equates to the landform itself providing greater barrier effect (i.e. increase noise attenuation) due to the loss of line-of-sight. In addition, the RL65 scenario uses the same noise sources though these are located 50 metres closer to noise sensitive receivers than the RL90 scenario.

The noise contribution of waste delivery is generally minimal compared to the landfilling operations for most receivers, with the exception of receivers R1 and R2, which are located approximately 100 metres from the landfill access truck route.

When the predicted noise results of the proposed landform (RL95) are compared to the results of the approved landform (RL80), the increase in noise levels from the RL75 to the RL90 operational scenarios is 1 dB(A) or less at all assessment locations under both standard and noise-enhancing meteorological conditions. For some receivers, the noise levels are predicted to be lower for the proposed landform at RL90 compared to the approved landform at RL75.

Noise protection berms were modelled to test their effectiveness at mitigating potential operational noise exceedances. The berms were modelled at five metres in height to wrap around the operating areas, to remove line-of-sight between residential receivers and the noise sources. Predicted noise

levels associated with the noise berm, indicates compliance with EPL 4068 noise limits at all assessment locations for the RL90 operational scenario, with the exemption of receiver R1, which exceeds by 1 dB(A). For RL65 operational scenario, the EPL 4068 noise limits are exceeded at receivers R1 by 3 dB(A) and at R2 and R4 by 2 dB(A). The NPfl considers the 2 dB(A) residual exceedances as negligible and goes on to say that *'The exceedances would not be discernible by the average listener and therefore would not warrant receiver-based treatments or controls'*. The 3 dB(A) exceedance is considered by the NPfl as marginal and presents examples of receiver-based mitigation treatment of *'Provide mechanical ventilation/comfort condition systems to enable windows to be closed without compromising internal air quality/amenity'*. It is also important to note that under standard meteorological conditions, there are no exceedances of EPL 4068 noise limits. Furthermore, the operational scenarios modelled were developed as 'reasonable' worst case scenarios and the activities would only temporarily take place in specific locations and elevations at a time.

The forecasted change in heavy vehicle trip volumes is minimal and will not cause any noticeable increase in existing road traffic noise in the vicinity of the landfill site. Therefore a detailed traffic noise impact assessment has not been carried out.

Consideration was given to the significant growth and development expected to occur in the immediate vicinity of the Site in the near future which will largely revolve around the new Western Sydney Airport, which is currently under construction. This growth and development is detailed in a number of NSW government strategy documents and plans.

The predicted noise levels for the proposed landform (RL90) indicate compliance with commercial (63 dB(A)) and industrial (68 dB(A)) noise trigger levels under likely changed land use scenario expected to happen in the future.

1.0 Introduction

1.1 Overview of the Project

SUEZ Recycling and Recovery Pty Ltd (SUEZ) owns and operates the Elizabeth Drive Landfill at Badgerys Creek, NSW (the Site). In response to future projected market demand for waste disposal in an area experiencing rapid growth, SUEZ is proposing to increase the capacity of the existing landfill by raising the currently approved finished cap height by 15 metres, from RL 80 to RL 95 (the Project). The Site includes the active landfill operation, as well as a landfill gas to energy facility and the SUEZ Advanced Waste Treatment (SAWT) facility, which operates concurrently and independently of the landfill. The operating landfill facility within the Site, and where the Project would occur, is referred to as the Project Area.

The existing landfill currently accepts on average approximately 750,000 tonnes per annum (tpa) of non-putrescible general solid waste and restricted solid waste. The Project proposes to increase this rate of filling would increase to take into account changes in the volume of waste being generated and disposed of in NSW and the industry capacity to receive the waste. Under the Project approximately 950,000 tpa of non-putrescible general solid waste and restricted solid waste is expected to be received during the proposed extended life of the landfill, extend the duration of filling by approximately five and a half years.

The Project would also involve raising the final capped height of the landfill from Reduced Level (RL) 80 to RL95. The raising would occur fully within the existing landfill footprint (the Project Area). Landfilling operations would generally be undertaken in a manner consistent with the current practices and as outlined in the existing Landfill Environmental Management Plan (LEMP) for the Site. Waste would continue to be deposited, spread and compacted in layers. At the end of each working day, exposed waste surfaces would be covered with tarps and/or virgin excavated natural material (VENM) to reduce environmental impacts such as the escape of litter, odour etc., in compliance with the NSW Environment Protection Authority (EPA) issued Environmental Protection Licence No. 4068 (EPL 4068) for the landfilling operations.

The landfill cap would be progressively constructed and stabilised as soon as practicable after reaching final landform levels. It is anticipated that capping material would be predominantly sourced from material stockpiled during historic quarrying activities within the site or imported from suitable external sources. At a minimum the final cap would be rehabilitated with grass cover to encourage binding and stabilisation of the soil.

The SAWT facility and landfill gas-powered electricity generation facility in the northwest of the Site would continue operating under their own existing separate consents (i.e. EPL 12880) and would not be affected by the Project.

SUEZ commissioned AECOM Australia PTY LTD (AECOM) to undertake a noise and vibration impact assessment of the Project. This report describes the findings of the noise and vibration impact assessment.

1.2 Project location

The Site is located at 1725 Elizabeth Drive in the suburb of Kemps Creek, approximately 41 kilometres west of the Sydney Central Business District (CBD), within the Penrith Local Government Area (LGA).

The Site is located on approximately 85 hectares of land owned by SUEZ, and is described as Lot 740 on DP810111 and Lot 1 on DP542395. Of the 85 hectares, the Project Area covers an area of approximately 60 hectares, the SAWT facility covers an area of approximately seven hectares, and the remainder of the Site is reserved for buffers and other facilities (such as the landfill gas-powered electricity generation facility, administration offices, staff amenities, car parking, equipment maintenance workshop and weighbridge). The Project is proposed to be contained wholly within the boundary of the existing landfill. The existing and active development consents for the SAWT and landfill gas power generation facility would not be affected by the Project.

The surrounding area is comprised of primarily rural and industrial land uses with smaller areas of residential and commercial development. This includes a variety of agricultural production including fruits, vegetables and grazing activity, as well as intensive poultry farming. Industrial activities include metal fabrication and quarrying, particularly for brick manufacture. The surrounding area is the subject of a number of significant proposed future infrastructure items and broad land use changes. Primary amongst these is the proposed and approved Western Sydney Airport, whose closest boundary is located approximately 600 metres to the south west of the Site. Stage 1 of the Western Sydney Airport was approved in December 2016, with construction expected to commence in late 2018. The airport is proposed to commence operations in December 2026.

1.3 Purpose of this report

This report provides an operational noise and vibration impact assessment for the Project. The noise and vibration impacts associated with the extension of the operating life of the landfill have been assessed, and the results are provided in the body of this report. Vibration is not expected to be an issue as a result of the Project as the distance between the operating equipment and nearby sensitive receivers is well beyond minimum safe working distances for the equipment which operates on the site. Current cell excavation on landfill operational activities do not create any vibration at nearby sensitive receivers or neighbours. In addition, there are no blasting activities scheduled to be carried out as part of any future cell development works. The overall operational activities are also not anticipated to change, therefore an assessment of the vibration impacts is not required.

This report only considers noise generated from the landfill operations as a result of the proposed extension of the operating life of the existing SUEZ facility located at 1725 Elizabeth Drive, Kemps Creek (the Site). The existing SAWT facility is assumed to be compliant with the relevant EPL 12889 noise limits and its contribution is minimal compared to the landfill activities. Therefore operational activities associated with the SAWT facility have not been included in the modelling for the assessment of the Project.

The Project includes the modification of the finished height and shape of the final landform. As such this report assesses the impact of the proposed change in the final landform.

A description of acoustic terminology is provided in **Annexure A**.

1.4 Secretary's Environmental Assessment Requirements

Table 1.1 sets out the Secretary's Environmental Assessment Requirements (SEARs) relevant to the noise and vibration impact assessment alongside the desired performance outcomes of the project, and identifies where the requirements have been addressed in this technical report.

Table 1.1 SEARs - Project description

SEARs	Where addressed in this report
Identify all noise sources or potential sources from the development (including both construction and operation phases). Detail all potentially noisy activities including ancillary activities such as transport of goods and raw materials.	Section 4.1
Specify the times of operation for all phases of the development and for all noise producing activities.	Section 3.2.1
For projects with a significant potential traffic noise impact provide details of road alignment (include gradients, road surface, topography, bridges, culverts etc), and land use along the proposed road and measurement locations – diagrams should be to a scale sufficient to delineate individual residential blocks.	Section 4.4

1.5 Structure of this technical report

This report has been structured as follows:

Section 1 – Introduction

Section 2 – Existing Acoustic Environment

Section 3 – Operational Noise Criteria

Section 4 – Operational Noise Assessment

Section 5 – Management of Impacts

Section 6 – Conclusion

2.0 Existing acoustic environment

2.1 Site description

The Project is located at the existing SUEZ Elizabeth Drive Landfill, Kemps Creek, NSW (the Site). The Site is located approximately 41 kilometres west of the Sydney Central Business District (CBD), within the Penrith Local Government Area (LGA) to which the *Penrith Local Environmental Plan 2010* (Penrith LEP 2010) applies. The Site is accessed from Elizabeth Drive and is located Approximately 500 metres from Elizabeth Drive, refer to **Figure 2.1** for Site location.

The Project is proposed to be contained wholly within the boundary of the Site. The existing sites and active consents for the SAWT and landfill gas power generation facility would not be affected by the Project.

Under the Penrith LEP 2010, the Site is primarily zoned as RU2 Rural Landscape. An area along the western boundary of the Site, adjacent to Badgerys Creek, is zoned as E2 Environmental Conservation. An overview of the Site layout and land zoning is provided in **Figure 2.2**.

Immediately north of the Site is a 300 metre wide corridor for the proposed M12 Motorway (to be reduced to 150 metres following detailed design). The M12 Motorway is proposed to connect the M7 Motorway to the Northern Road, west of the Site, along with the future Western Sydney Airport (Stage 1 was approved in December 2016). This means that the road traffic volumes on the surrounding road network are expected to grow, with a corresponding expected increase in background noise levels.

SUEZ Advanced Waste Treatment

Landfill gas to energy system

- Legend**
- ▭ Site Boundary
 - ▬ Site Access Road
 - - - Project Area

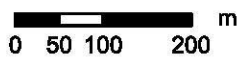


ELIZABETH DRIVE

LAWSON ROAD

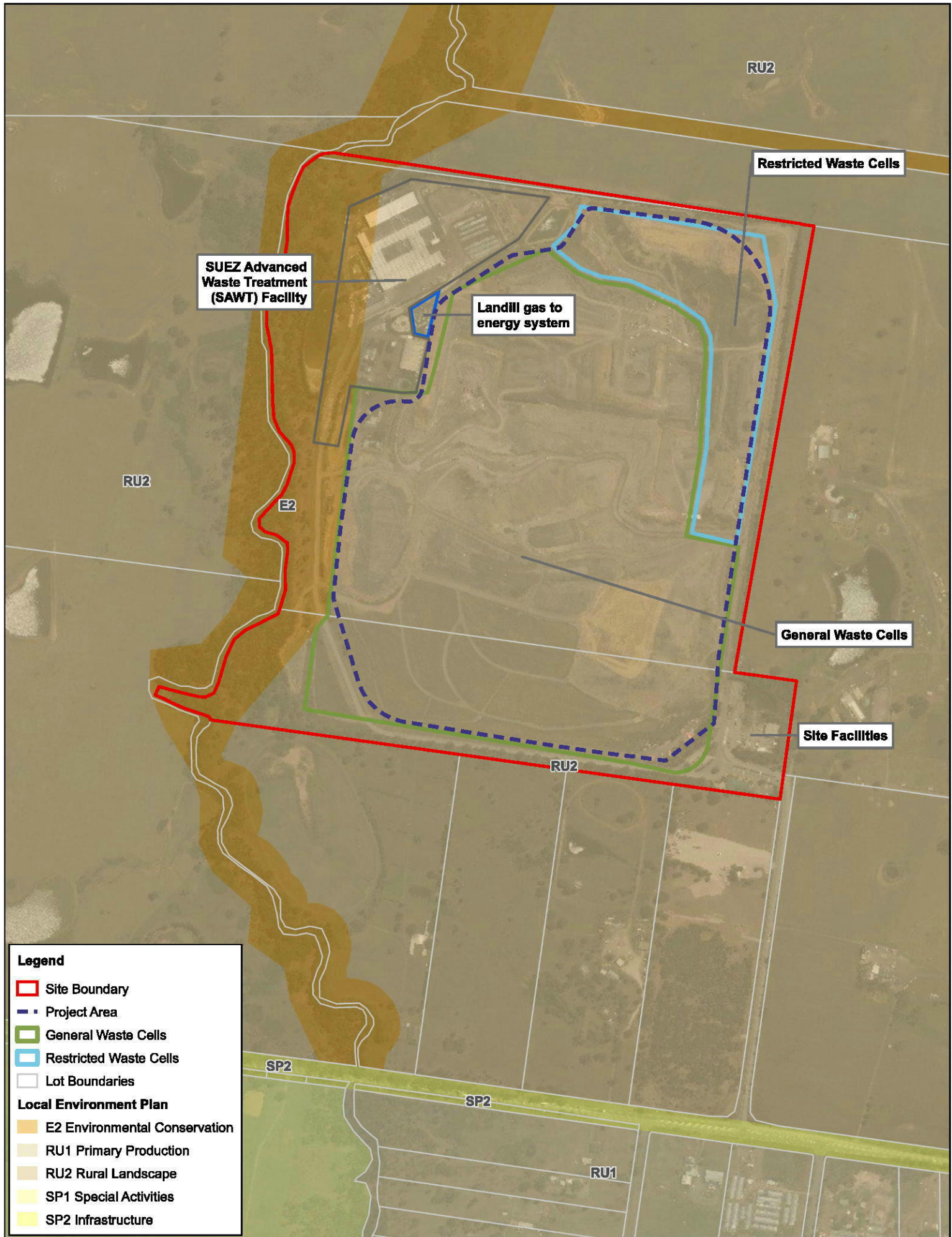
MARTIN ROAD

**SUEZ ELIZABETH DRIVE LANDFILL
FIGURE 2.1: SITE LOCATION**

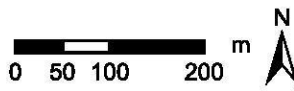


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DATE 10/07/2019
 SCALE 1:8,604
 PROJECT 60571292
 DRAWN CP



**SUEZ ELIZABETH DRIVE LANDFILL
FIGURE 2.2: SITE LAYOUT AND ZONING**



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2.2 Noise sensitive receivers

Noise sensitive receivers surrounding the Site are shown in **Figure 2.3**. The Site is surrounded mostly by rural receivers in all directions, albeit at varying distances. The residential receivers are zoned as 'RU2 Rural Landscape', with the exception of the Twin Creeks Estate, a new residential subdivision, approximately 650 metres to the north. This area is zoned as 'E4 Environmental Living'.

The acoustic environment is generally characteristic of a rural setting. In accordance with the NSW EPA Noise Policy for Industry (NPfI) the noise amenity for all residential receivers is classified as 'rural'.



SUEZ ELIZABETH DRIVE LANDFILL

FIGURE 2.3: REPRESENTATIVE NOISE SENSITIVE RECEIVER MAP

- NCA
- ★ Assessment location

Site Boundary
 Document Set ID: 8776908

Version: 1, Version Date: 18/07/2019



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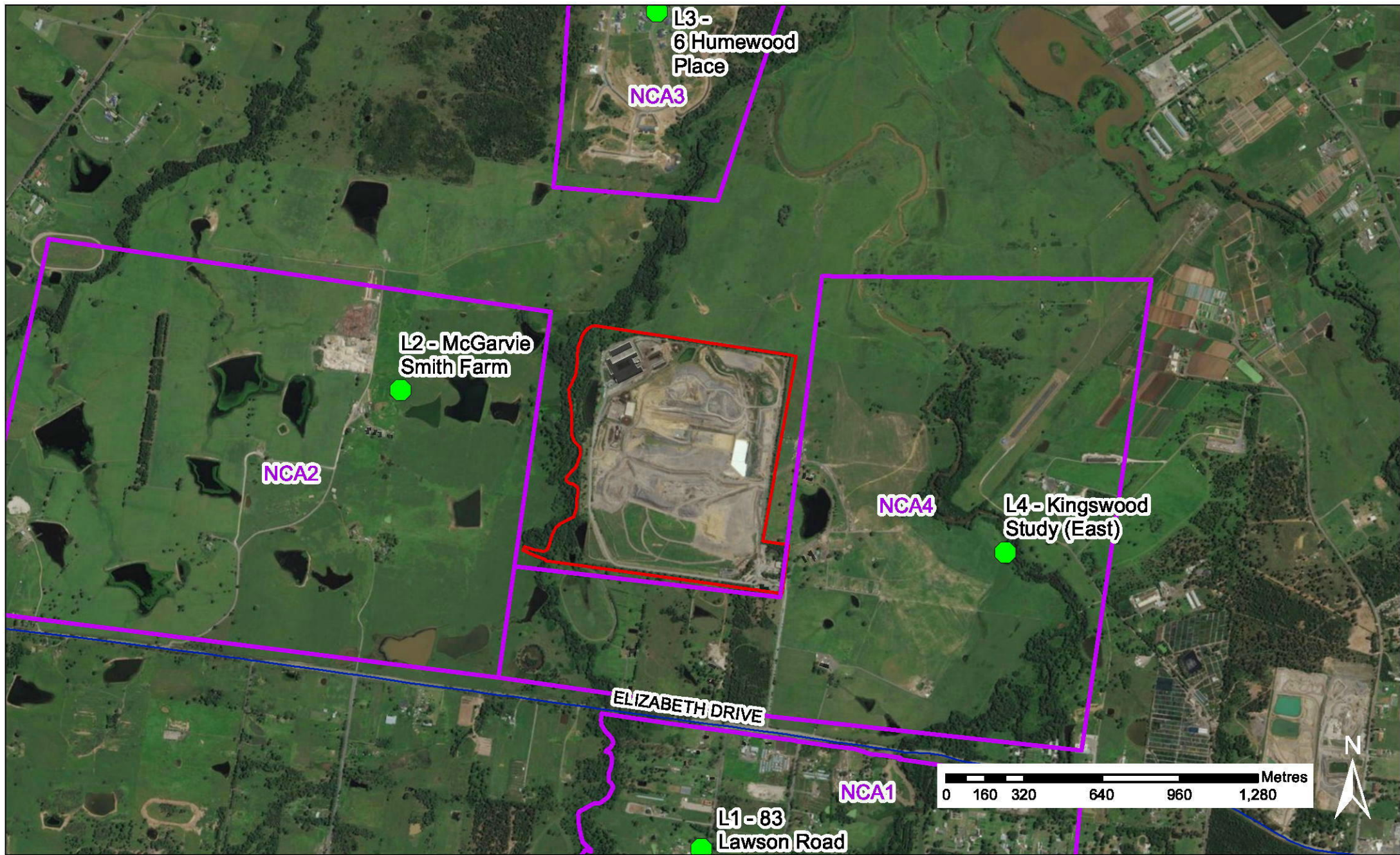
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 PROJECT 60571292
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2.2.1 Noise catchment areas

To assist in determining noise criteria for the receivers surrounding the Project, four Noise Catchment Areas (NCAs) were identified. The noise environment within each NCA is considered to be comparable and can be used to develop assessment criteria for all receivers within these similar noise environments. The NCAs are outlined in **Table 2.1** and shown in **Figure 2.4**. Note that land usage west of NCA1 is classified as SP1 (Commonwealth activities), and therefore not included in the NCAs being assessed.

Table 2.1 Noise catchment areas

NCA	Description
NCA1	Residences located south of Elizabeth Drive, adjacent to the eastern boundary of the Western Sydney Airport site
NCA2	Residences located to the west of the Site
NCA3	Residences to the north of the Site, located in the Twin Creeks Estate, Luddenham
NCA4	Residences located east of the Site



SUEZ ELIZABETH DRIVE LANDFILL

FIGURE 2.4: NCA MAP AND NOISE MONITING LOCATIONS

- NCA
- Loggers
- Site Boundary

Document Set ID: 8776908

Version: 1, Version Date: 18/07/2019



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DATE 13/11/2018
SCALE 1:20,000
PROJECT 60571292
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2.2.2 Representative receivers

Representative noise sensitive receivers that could potentially be affected by the Project are listed in **Table 2.2** and shown in **Figure 2.3**. These receivers are considered to be representative of other assessment locations within the area, as determined by Site inspection and from aerial photographs depicting land use surrounding the Site. Noise compliance at these receivers would indicate compliance at all other receivers. The nearest residential receivers are located to the east of the Site, approximately 120 metres from the Site boundary.

Table 2.2 Representative residential receivers

Receiver ID	NCA	Receiver	Distance from Site (metres)	Comments
R1	NCA4	1669A Elizabeth Drive	120	Horse stud East of the Project Area
R2	NCA4	Caretakers Residence 1669A Elizabeth Drive	170	East of the Project Area
R3	NCA4	1669-1723 Elizabeth Drive	420	Horse stud East of the Project Area
R4	NCA4	1745 Elizabeth Drive	330	South of the Project Area
R5	NCA4	1783-1789 Elizabeth Drive	300	South of the Project Area
R6	NCA1	5 Lawson Road, Badgerys Creek	630	South of the Project Area, set back from Elizabeth Drive
R7	NCA1	35 Lawson Road, Badgerys Creek	790	South of the Project Area, set back from Elizabeth Drive
R8	NCA2	McGarvie Smith Farm	790	Owned by University of Sydney West of the Project Area
R9	NCA3	Farmingdale Court Luddenham	650	Residential subdivision as part of the Twin Creeks Estate, north of the Project Area

2.3 Noise monitoring results

Ambient noise monitoring was conducted at four representative locations around the Site during July and August 2018. The noise monitoring included both long term monitoring and short-term attended measurements.

2.3.1 Instrumentation

Details of the noise loggers used for long term monitoring are presented in **Table 2.3**. The noise logging locations are presented in **Figure 2.4**.

Table 2.3 Noise monitoring details

Logger	NCA	Address	Logger model	Serial number
NL1	NCA1	83 Lawson Street, Badgerys Creek	Rion NL-52	164395
NL2	NCA2	McGarvie Smith farm	Rion NL-52	386741
NL3	NCA3	6 Humewood Place, Luddenham	Rion NL-21	765701
NL4	NCA4	1669a Elizabeth Drive, Badgerys Creek	Rion NL-52	553967

The sound level meter used to conduct attended noise measurements was a Bruel & Kjaer 2250 (Serial Number 3009329). All the acoustic instrumentation employed during the noise measurements comply with the requirements of AS IEC 61672.1-2004 Electroacoustics – Sound level meters – Specifications. The noise loggers and sound level meter were calibrated prior to and after the monitoring session with a drift in calibration not exceeding ± 0.5 dB.

All instruments used were within their current National Association of Testing Authorities, Australia (NATA) certified in-calibration period (i.e. calibrated in the last two years).

2.3.2 Unattended continuous noise monitoring

A noise logger measures the noise level over the sample period and then determines L_{A1} , L_{A10} , L_{A90} , and L_{Aeq} levels of the noise environment. The L_{A1} , L_{A10} and L_{A90} levels are the levels exceeded for 1%, 10% and 90% of the sample period respectively. The L_{A1} is indicative of maximum noise levels due to individual noise events. The L_{A90} is taken as the background noise level. The L_{Aeq} is essentially the energy averaged sound level. It is defined as the steady sound level that contains the same amount of acoustical energy as a given time-varying sound.

Rating background levels (RBLs) for each NCA were determined by the method given in Fact Sheet B of the NPfl. The assessment background level (ABL) is established by determining the lowest tenth-percentile level of the L_{A90} noise data acquired over each period of interest. The RBL representing the day, evening and night-time assessment periods is based on the median of individual ABLs determined over the entire monitoring duration. The RBL is representative of the average minimum background sound level, or simply the background level.

Unattended noise monitoring was undertaken from 25 July 2018 to 3 August 2018 at four locations considered to be representative of the noise sensitive receivers within the vicinity of the Project Area. These locations are presented in **Table 2.3**.

Graphical representations of the logging results are provided in **Annexure B**.

A summary of the measured L_{A90} background noise levels and existing L_{Aeq} ambient noise levels is presented in **Table 2.4**.

Table 2.4 Existing RBL and ambient noise levels, dB(A)

Measurement location	Noise catchment area	RBL, dB(A)			Ambient noise level, L _{Aeq} dB(A)		
		Day ¹	Evening ¹	Night ¹	Day ¹	Evening ¹	Night ¹
NL1	NCA1	36	34	30	54	49	48
NL2	NCA2	31	32	30	46	39	41
NL3	NCA3	31	32	29	49	43	41
NL4	NCA4	34	33	31	47	40	42

Notes:

- In accordance with the NPfl, time of day is defined as follows :
Day – the period from 7 am to 6 pm Monday to Saturday or 8 am to 6 pm on Sundays and public holidays
Evening – the period from 6 pm to 10 pm.
Night – the remaining periods.

2.3.3 Attended noise monitoring

Attended monitoring was conducted at the four unattended monitoring locations on 25 July 2018. Each measurement was conducted over a 15 minute period. Weather conditions were overcast on the day of monitoring, with light to moderate winds. The attended measurement data are presented in **Table 2.5**.

Table 2.5 Attended noise monitoring results

Monitoring location / NCA	Date	Time	Description	L _{Amax} , 15min, dB(A)	L _{A10} , 15min, dB(A)	L _{Aeq} , 15min, dB(A)	L _{A90} , 15min, dB(A)
NL1 / NCA1	25/07/18	14:00	<ul style="list-style-type: none"> Wind noise in surrounding trees dominant. Bird noise audible in absence of wind. Occasional vehicle pass by along Lawson Road. Road traffic noise from Elizabeth Drive barely audible in the absence of wind. Occasional plane flyover, clearly audible. Equipment operating in the Site inaudible. 	84	54	56	43
NL2 / NCA2	25/07/18	14:50	<ul style="list-style-type: none"> Wind noise dominant. Line-of-sight to landfill, however equipment operating in the Site inaudible. Helicopter flyover, clearly audible. 	67	50	46	38

Monitoring location / NCA	Date	Time	Description	L _{Amax} , 15min, dB(A)	L _{A10} , 15min, dB(A)	L _{Aeq} , 15min, dB(A)	L _{A90} , 15min, dB(A)
NL3 / NCA3	25/07/18	15:50	<ul style="list-style-type: none"> • Wind noise dominant. • Bird noise audible. • Some construction noise from other sources audible in the distance (not associated with the Project), but not dominant. 	67	51	48	39
NL4 / NCA4	25/07/18	16:33	<ul style="list-style-type: none"> • Wind noise dominant. • Bird noise audible. • Traffic faintly audible, unable to attribute it to trucks entering the landfill site or travelling along Elizabeth Drive. 	68	48	45	40

3.0 Operational noise criteria

3.1 Site license and approval documents

The Site is subject to three licenses/approval documents that control its current operations, these being:

- The NSW Environment Protection Authority (EPA) issued Environment Protection Licence No. 4068 (EPL 4068), License version date 17 April 2014. EPL 4068 applies to the landfilling operations only.
- EPL 12889, License version date 4 February 2013. EPL 12889 applies to SAWT facility only. As discussed in **Section 1.3**, The SAWT facility is assumed to be compliant with the relevant EPL 12889 noise limits and its contribution is minimal compared to the landfill activities. Therefore the SAWT has not been included in the modelling for the assessment of the Project.
- Penrith City Council Development Consent number DA08/0958, as modified.

3.2 Relevant Environmental Protection Licence

3.2.1 EPL 4068 – Relevant conditions

This EPL 4068 applies to the quarrying and landfilling operations only. The requirements under condition 'L4 – Noise Limits' are reproduced below:

L4.1 *Noise from the premises must not exceed:*

- an LA10(15 minute) noise emission criterion of 50 dB(A) during the day (7am to 10pm);*
 - an LA10(15 minute) noise emission criterion of 45 dB(A) during the night (10pm to 7am);*
- except as expressly provided by this licence.'*

For the purpose of this assessment the 'LA10(15 minute)' noise level is taken to be equivalent to $L_{Aeq, 15min} + 3$ dB(A) to account for the transient nature of equipment operating on site.

L4.2 *Noise from the premises is to be measured at the most affected point on or within the residential property boundary to determine compliance with condition L4.1. If the most affected residential property boundary is greater than 30 metres from the premises, then the noise is to be measured at any point 30 metres from the nearest residence or noise sensitive area within the vicinity of the premises to determine compliance with condition L4.1. If the noise is substantially tonal, repetitive, frequency varying, or impulsive in character, 5 dB(A) must be added to the measured level for each characteristic, up to a maximum of 10 dB(A).*

The requirements of condition 'L6 – Hours of Operation' are reproduced below:

- L6.1** *All quarrying and waste compaction activities at the premises must only be conducted between the following hours: 7.00am to 6.00pm Monday to Friday; 7.00am to 5.00pm Saturdays; and 8.00am to 5.00pm Sundays and Public Holidays.*
- L6.2** *All waste receipt activities at the premises must only be conducted between the following hours: 6.00am to 6.00pm Monday to Friday; 7.00am to 5.00pm Saturdays; and 8.00am to 5.00pm Sundays and Public Holidays.*

These hours of operation are reflected in the Site's Development Consent (DA08/0958).

3.3 Penrith City Council development consent DA08/958 – relevant conditions

The conditions of consent for the existing quarrying and landfilling operations at the Site are outlined in the conditions of consent for DA08/0958 dated 9 November 2009 (as amended). Relevant conditions applicable to this assessment are reproduced below:

38(C) The noise control measures recommended in acoustic report NO 94152, revision, B, prepared by Wilkinson Murray Pty Ltd and dated June 1998, shall be implemented to control noise emissions. These are

- Establishment of a 60 km/hr speed limit along the access road from Elizabeth Drive;
- Establishment of a 30 km/hr speed limit along internal haul roads;
- Construction of noise bunds as part of the capping skirt along the eastern boundary of the site and adjacent to haul roads. Such bunds will be in accordance with figure 5, 6a and 6b attached to acoustic report no.94152'

75. The operation is not to cause an increase in the background L90 noise level of more than 5 dB(A) at the nearest residence.

Condition 38(C) has been addressed in this assessment as far as practical. The relevant detail in 'acoustic report no. 94152' referenced in this condition was not available at the time of preparing this assessment. As such, for the purpose of this assessment, a two meter-high noise bund was modelled on the eastern perimeter of the Site (refer to **Figure 4.1**), which is consistent with the height of the bund as built.

AECOM has reviewed condition of consent 75 and considers that there could have been an administration error when writing this condition. In NSW, operational noise emission criteria associated with industrial facilities are generally based on the L_{Aeq} descriptor and were previously assessed based on the L_{A10} descriptor.

In any case, the way this condition is written, would be impractical to implement. Prediction of noise emissions based on the L_{90} descriptor is difficult to establish given that there is limited L_{90} data available for plant and equipment.

3.4 EPA Noise Policy for Industry - Operational noise trigger levels

The NPfl provides noise trigger levels for assessing the potential impact of noise from industry and includes a framework for considering feasible and reasonable noise mitigation measures. The assessment procedure for industrial noise sources has two components that must be considered:

- Controlling intrusive noise impacts in the short term for residences; and
- Maintaining noise level amenity for residences and other land uses.

The NPfl also states that:

'Where there is inconsistency between this policy and the requirements of an environment protection licence or other instrument, the provisions of a licence or other instrument prevail.'

This report considers both the EPL 4068 noise limits and NPfl derived project noise trigger levels for the assessment of the Project, however only the EPL 4068 noise limit will be considered when determining noise compliance and mitigation measures, as per the statement above.

3.4.1 Project intrusiveness noise levels

The NPfl states that the intrusiveness of an industrial noise source may generally be considered acceptable if the level of noise from the source (L_{Aeq} level), measured over a 15 minute period, does not exceed the background noise level measured by more than 5 dB. The RBL is the background noise level to be used for assessment purposes. Adjustments are to be applied to the level of noise produced if the noise at the receiver contains annoying characteristics such as tonality or impulsiveness. The project intrusiveness noise levels are presented in **Table 3.2**.

Table 3.1 Project intrusiveness noise levels

Noise catchment area	Time of day ¹	RBL, dB(A)	Intrusiveness noise level RBL + 5, dB(A) ($L_{Aeq,15min}$)
NCA1	Day	36	41
	Evening	34	39
	Night	30	35
NCA2	Day	35(31 ²)	40 ³
	Evening	32	37
	Night	30	35
NCA3	Day	35(31 ²)	40 ³
	Evening	32	37
	Night	30(29 ²)	35 ³
NCA4	Day	35(34 ²)	40
	Evening	33	38
	Night	31	36

Notes:

- In accordance with the NPfl time of day is defined as follows :
 - Day – the period from 7 am to 6 pm Monday to Saturday or 8 am to 6 pm on Sundays and public holidays
 - Evening – the period from 6 pm to 10 pm
 - Night – the remaining periods.
- The RBL in brackets is the measured value, however in accordance with section 2.3 of the NPfl, the applicable RBL cannot be lower than the minimum assumed RBLs as specified in the NPfl.
- The intrusiveness noise level is based on the minimum assumed RBLs as specified in the NPfl.

3.4.2 Project amenity noise level

To limit continuing increases in noise levels, the maximum ambient noise level resulting from all industrial noise sources in an area should not normally exceed the acceptable levels specified in Table 2.2 of the NPfl. As per the definitions of receiver types in Table 2.3 of the NPfl, residences within each NCA are classed as being in the following receiver categories according to Table 3.2.

Table 3.2 Project noise amenity receiver categories

Noise catchment area	Receiver category
NCA1	Rural
NCA2	Rural
NCA3	Rural
NCA4	Industrial interface (rural)

The project amenity noise level for a project is equal to the recommended amenity level, as outlined in Table 2.2 of the NPfl, minus 5 dB. The 5 dB accounts for other industries that are likely to be introduced into the area in the future. In addition, the project amenity level is converted from an NPfl time of day period to 15 minutes by adding 3 dB. Therefore the relevant noise amenity level for each type of receiver as specified in the NPfl is shown below in Table 3.3.

Table 3.3 Recommended L_{Aeq} noise levels from industrial noise sources

Type of receiver	Indicative noise amenity area	Time of day	Recommended amenity noise level, L_{Aeq} (period)	Project amenity noise level, $L_{Aeq,15min}$
Residential	Rural	Day	50	48
		Evening	45	43
		Night	40	38
Residential	Industrial interface (rural)	Day	55	52
		Evening	50	48
		Night	45	43

3.4.3 Project noise trigger levels

The NPfl specifies the project noise trigger level as the lower (that is, the most stringent) value of the intrusiveness and amenity noise levels after conversion to $L_{Aeq, 15minute}$, dB(A) equivalent level. Provided in **Table 3.4** are the established project noise trigger levels for the assessment locations in close proximity to the Site. **Table 3.4** presents the project noise trigger levels for the day, evening and night-time periods and also the relevant EPL 4068 criteria for landfill operations. The EPL 4068 noise limit covers day (7:00 am to 10:00 pm) and night-time (10:00 pm to 7:00 am) and does not include an evening period.

Table 3.4 NPfl operational noise trigger levels and EPL 4068 noise limits

Noise catchment area	Assessment period	NPfl noise trigger levels, $L_{Aeq, 15min}$			EPL 4068 noise limits $L_{A10, 15min}$
		Intrusiveness noise levels	Amenity noise levels	Project noise trigger levels	
NCA1	Day	41	48	41	50
	Evening	39	43	39	50
	Night	35	38	35	45
NCA2	Day	40	48	40	50
	Evening	37	43	37	50
	Night	35	38	35	45
NCA3	Day	40	48	40	50
	Evening	37	43	37	50
	Night	35	38	35	45
NCA4	Day	40	52	40	50
	Evening	38	48	38	50
	Night	36	43	36	45

As discussed in Section 3.4, the report considers both the NPfl derived project noise trigger levels and EPL 4068 noise limits for the assessment of the Project, however only the EPL 4068 noise limit will be considered when determining noise compliance and mitigation measures.

3.4.4 Tonality and NPfl modifying factors

The NPfl provides guidance and project noise trigger levels for assessing noise emissions from sources with “annoying characteristics” such as tonality, impulsiveness, intermittency, irregularity or dominant low-frequency content. Penalties of up to a maximum of 10 dB(A) may be applied where the subject noise has such characteristics at the receiver.

3.4.5 Operational road traffic noise criteria

Table 3.5 present the road traffic noise criteria from the EPA's NSW Road Noise Policy (RNP) for land use developments with a potential to create additional traffic on existing freeways or motorways/arterial roads or sub-arterial roads. The external noise criteria are applied one metre from the external facade of the affected residential buildings. Elizabeth Drive is considered an arterial road.

Table 3.5 Road traffic noise criteria - arterial roads

Road category	Type of project/land use	Assessment criteria – dB(A)	
		Day (7 am–10 pm)	Night (10 pm–7 am)
Freeway/ arterial/ sub-arterial roads	3. Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments	L _{Aeq} , (15 hour) 60 (external)	L _{Aeq} , (9 hour) 55 (external)

To assess noise impacts from traffic generated by the Site, an initial screening test should be undertaken by evaluating whether existing road traffic noise levels will increase by more than 2 dB(A). Where the predicted noise increase is 2 dB(A) or less, then no further assessment is required. However, where the predicted noise level increase is equal to or greater than 2 dB(A), and the predicted road traffic noise level exceeds the road category specific criterion, then noise mitigation should be considered for those receivers affected. The RNP does not require assessment of noise impact to commercial or industrial receivers.

4.0 Operational noise assessment

4.1 Noise sources

The landfill operations considered in this assessment consist of two different elements which occur simultaneously:

- Truck delivery of waste into landfill cells and to the SAWT facility
- Landfilling operations

A list of operational plant equipment and applicable noise sources is presented in **Table 4.1**. For consistency with previous noise studies conducted for the Site, the plant and equipment and their associated sound power levels (SWL) were derived from Wilkinson Murray noise report (2013) and also through discussion with SUEZ. Note that to better reflect a realistic operating scenario, it has been assumed that only a quarter of the total equipment as presented in Table 12 are operating at the same time and as such a correction of 6 dB(A) has been applied.

No changes to the SAWT facility operations are proposed as part of this Project, hence it is assumed that the noise contribution from the SAWT is as per the relevant EPL 12889 noise limits. Therefore, noise contribution from the operation of the SAWT has not been included in the modelling in this assessment with the exception of waste delivery trucks going to the SAWT which was included in the noise model. Furthermore, the overall noise contribution from the SAWT is minimal compared to the landfill operations, as the majority of significant noise generating equipment associated with the SAWT is located inside the SAWT building.

Table 4.1 Landfill operations as per the Wilkinson Murray noise report (2013)

Plant	Capacity/ Model	Number	Sound power level (SWL), dB(A)
Landfill operations			
Dump truck	Cat 40 tonne	2	113
Bulldozer	Cat D7	1	111
Bulldozer	Cat D8	1	111
Waste compactor	Cat 836	2	112
Waste compactor	Cat 826	1	112
Roller	10 tonne	2	108
Grader	Cat 14G	1	114
Excavator	20 tonne	1	107
Excavator	36 tonne	1	110
Water cart	10 tonne	1	108
Water cart	20 tonne	1	108

Notes:

1. Only one excavator during landfill operations would operate at a given time.
2. The majority of the sound power levels are based on discussions with SUEZ and what was previously modelled in Wilkinson Murray report (2013).
3. The equipment listed in the landfill operations scenario is also considered representative of a landform capping scenario with the exception of it having only one waste compactor.

4.1.1 Landfill vehicle movements

Maximum peak hour truck traffic volumes entering and leaving the Site are provided in **Table 4.2**. The traffic volume numbers are based on the AECOM report "*Elizabeth Drive Landfill Expansion Environmental Impact Statement Traffic and Transport Impact Assessment*" dated June 2019, which

has been prepared for the Project. The waste delivery trucks have a sound power level of 104 dB(A). From discussions with SUEZ, 90% of waste delivery trucks go directly to the landfill site and the remainder 10% go to the SAWT facility. Truck movements have been modelled based on the landfill access road loop shown in **Annexure C**. This loop is considered to be a valid representation of truck movements to and from the active landfill face.

Table 4.2 Maximum peak hour traffic volumes of waste delivery trucks

Period	Maximum peak hour truck traffic volume (two way movements)
Day	70

4.2 Noise modelling methodology

Operational noise levels have been predicted at nearby noise sensitive receivers using SoundPLAN 8.0 (industry standard) noise modelling software based upon the list of equipment shown in **Table 4.1**. The noise levels were predicted using an implementation of CONCAWE¹ algorithms in the SoundPLAN noise propagation software.

The noise model was created to represent 'reasonable' worst periods of operation.

The following features were included in the noise model:

- Ground topography at the currently approved RL80 landform (baseline) and the proposed pre-settlement RL95 landform (referred to as the 'proposed landform') as shown in **Annexure C**
 - Topographical ground contours of the entire site (approved and existing landfill cells) has been provided by SUEZ.
 - Topographical ground contours of the proposed landform developed by AECOM in consultation with SUEZ.
- Existing buildings and structures within the Site
- Ground absorption and reflection
- Noise sensitive receivers around the Site see Section 2.2 of this report)
- Operational noise sources (as per Sections 4.1 and 4.2.2 of this report)
- The existing noise bund on the eastern perimeter of the Site as per condition 38(C) of the consolidated conditions to DA08/0958 (assumed to be two metres in height).

4.2.1 Meteorological conditions

Both standard and noise-enhancing (worst-case) meteorological conditions as defined in Fact Sheet D in the NPfI were considered as part of this assessment. The NPfI states:

"Certain meteorological/weather conditions may increase noise levels by focusing soundwave propagation paths at a single point. Such refraction of sound waves will occur during temperature inversions (atmospheric conditions where temperatures increase with height above ground level), and where there is a wind gradient (that is, wind velocities increasing with height) with wind direction from the source to the receiver."

The following parameters were used in the modelling:

- Standard meteorological conditions – Pasquill-Gillford stability category D with source to receiver wind speed up to 0.5 m/s at 10 metres above ground level
- Noise-enhancing meteorological conditions – Pasquill-Gillford stability category D with source to receiver wind speed up to 3 m/s at 10 metres above ground level.

¹ CONCAWE – The oil companies' international study group for conservation of clean air and water – Europe (established in 1963) Report 4/81 "The propagation of noise from petroleum and petrochemical complexes to neighbouring communities".

4.2.2 Scenarios modelled

The approach to noise modelling in this report has been based on certain operating scenarios. These scenarios seek to characterise activities being undertaken within the Site on a realistic worst case basis.

All sources are modelled assuming a 'reasonable' worst case 15 minute period scenario.

The landfilling activities will take place in specific locations and elevations at a time, which means that the noise impact of these activities on nearby sensitive receivers will change over time depending on the location of the working landfilling cells. As such interim and final scenarios are assessed for the proposed landform. In order to establish maximum noise emission at the assessment locations, working landfilling cells were developed and located at different locations at the extremities of the particular elevation. This is deemed appropriate as noise emissions from a particular working landfilling cells would have different noise impacts for individual assessment locations.

All operational activities were modelled five metres below the relevant final landform elevation to represent a realistic landfilling scenario. This is because the activities that would occur at the final landform elevation would be limited to cap installation only (rather than active landfilling). On this basis operational landfilling activities were modelled at RL75 for the RL80 scenario and at RL90 for the RL95 scenario.

It can be expected that there may be differences between predicted and measured noise levels due to variations in instantaneous operating conditions as well as the location and type of plant and equipment in operation during the measurement.

Area noise sources were developed to represent working landfilling cells. The location of the working cells were chosen to be able to assess potentially realistic worst noise impacts on surrounding residential receivers. The size of working landfilling cells in this assessment is representative of the sizes of existing cells within the Site.

The noise models take into account significant noise sources and locations, screening effects, receiver locations, ground topography and noise attenuation due to geometrical spreading, air absorption, ground absorption and the effects of the prevailing weather conditions.

All predicted noise levels are free field and 1.5 metres above ground level at the property boundary or at the most-affected point within a residential property boundary within 30 metres of the nearest façade (whichever is closer to the Site).

Further detail of the operational scenarios ultimately modelled and assessed is provided below.

4.2.2.1 Approved landform (RL80)

Landfilling operations for the currently approved RL80 landform were modelled at different locations within the Project Area at one elevation (RL75) (Figure 4.1). The worst case modelled for this landform assumed operational activities close to the centre of the Site (on the RL75 contour).



**SUEZ ELIZABETH DRIVE LANDFILL
NOISE SOURCE MAPS AT RL75 OF APPROVED LANDFORM**

- Two metre high berm
- Landfill operation areas
- Truck routes
- ★ Assessment location

Document Set ID: 8776908
Version: 1, Version Date: 18/07/2019



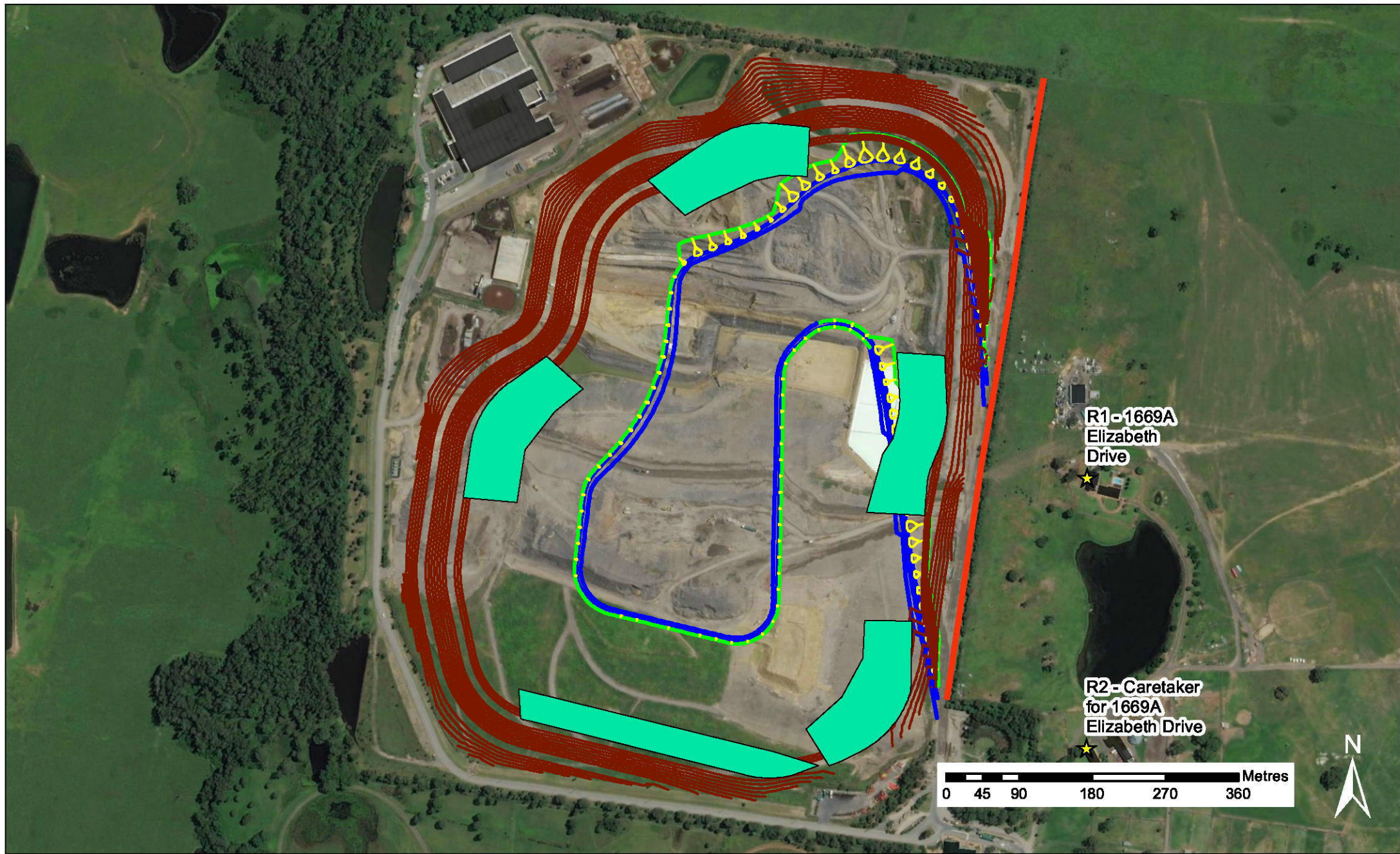
Disclaimer: Spatial data used under licence from Land and Property Management Authority, NSW © 2018.
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PROJECT 60571292
DRAWN PD

4.2.2.2 Proposed landform (RL95)

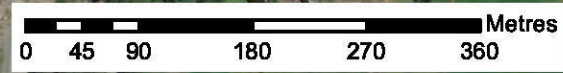
Landfilling operations for the proposed RL95 landform were modelled at different locations within the Project Area at two elevations RL65 and RL90 (**Figure 4.2** and **Figure 4.3**). This was undertaken to determine which operational location would be 'worst case' for noise impact.

The RL65 scenario was selected to assess an intermediate stage after the landform rises above natural ground level. Due to the nature of the batter slopes (1:3 vertical : horizontal) the assessment of an interim vertical scenario also means that a different horizontal location of activity must also be considered. As such the assessed RL65 operations are closer to nearby sensitive receivers. This interim scenario is deemed to be a representative realistic worst case for a mid-operation stage of the Project.



R1-1669A
Elizabeth
Drive

R2- Caretaker
for 1669A
Elizabeth Drive



**SUEZ ELIZABETH DRIVE LANDFILL
NOISE SOURCE MAPS AT RL65 OF PROPOSED LANDFORM**

— Two metre high berm ★ Assessment location

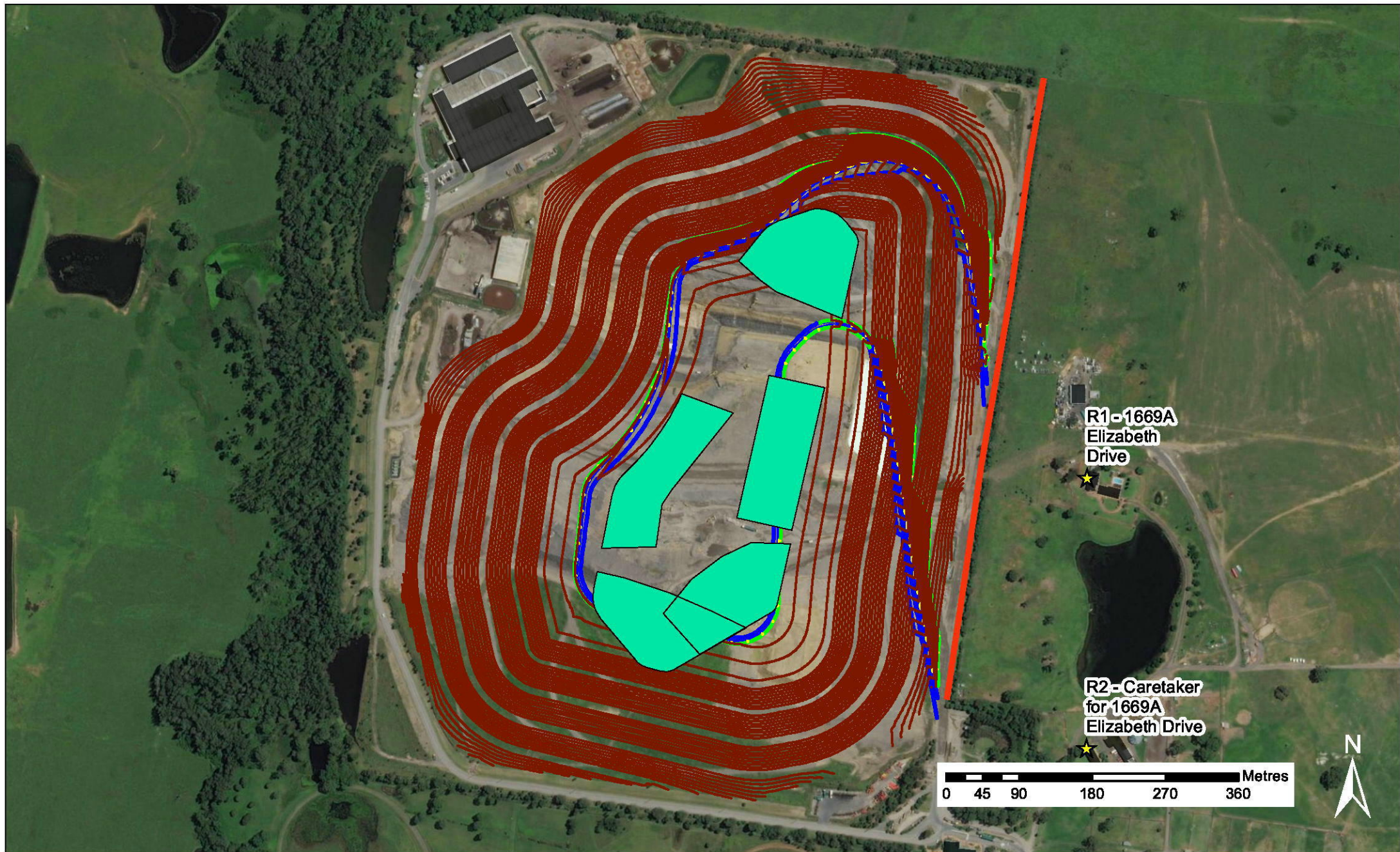
Landfill operation areas
Document Set ID: 8776908

Version: 1, Version Date: 18/07/2019



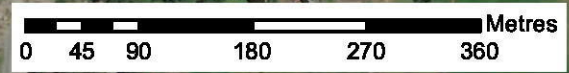
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DATE 19/02/2019
SCALE 1:6,000
PROJECT 60571292
DRAWN PD



R1-1669A
Elizabeth
Drive

R2 - Caretaker
for 1669A
Elizabeth Drive



**SUEZ ELIZABETH DRIVE LANDFILL
NOISE SOURCE MAPS AT RL90 OF PROPOSED LANDFORM**

 Two metre high berm  Assessment location

 Landfill operation areas
Document Set ID: 8776908

Version: 1, Version Date: 18/07/2019



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DATE 19/02/2019
SCALE 1:6,000
PROJECT 60571292
DRAWN PD

4.3 Predicted operational noise impacts

The following sections present the predicted noise levels associated with the Project.

Note that the EPL 4068 noise limits are based on the $L_{A10,15min}$ descriptor, therefore for the noise assessment against EPL 4068 noise limits, a 3 dB(A) correction has been made to the SoundPLAN predicted $L_{Aeq,15min}$ noise levels to convert them to $L_{A10,15min}$ levels; this is a widely accepted correction and is generally supported by empirical data.

Table 4.5 presents the difference in predicted noise levels between the above two scenarios. A discussion of the results is presented in Section 4.3.3.

Table 4.3 Predicted maximum noise levels at all representative receiver locations during daytime for approved landform scenario RL75 – without mitigation

Receiver	NPf Project noise trigger levels, dB(A)	EPL 4068 noise limits, dB(A)	Standard conditions				Noise enhancing meteorological conditions			
			Result, dB(A)		Exceedance, dB(A)		Result, dB(A)		Exceedance, dB(A)	
			L _{Aeq,15min}	L _{A10,15min}	L _{Aeq,15min}	L _{A10,15min}	NPf	EPL 4068	L _{Aeq,15min}	L _{A10,15min}
R1	40	50	52	55	12	5	55	58	15	8
R2	40	50	50	53	10	3	54	57	14	7
R3	40	50	44	47	4	-	49	52	9	2
R4	41	50	47	50	6	-	51	54	10	4
R5	41	50	47	50	6	-	51	54	10	4
R6	40	50	43	46	3	-	47	50	7	-
R7	40	50	41	44	1	-	46	49	6	-
R8	40	50	40	43	-	-	44	47	4	-
R9	40	50	41	44	1	-	45	48	5	-

Table 4.4 Predicted maximum noise levels at all representative receiver locations during daytime for proposed landform scenario RL90 – without mitigation

Receiver	NPf Project noise trigger levels, dB(A)	EPL 4068 noise limits, dB(A)	Standard conditions				Noise enhancing meteorological conditions			
			Result, dB(A)		Exceedance, dB(A)		Result, dB(A)		Exceedance, dB(A)	
			L _{Aeq,15min}	L _{A10,15min}	L _{Aeq,15min}	L _{A10,15min}	NPf	EPL 4068	L _{Aeq,15min}	L _{A10,15min}
R1	40	50	48	51	8	1	51	54	11	4
R2	40	50	49	52	9	2	52	55	12	5
R3	40	50	45	48	5	-	49	52	9	2
R4	41	50	47	50	6	-	51	54	10	4
R5	41	50	46	49	5	-	50	53	9	3
R6	40	50	43	46	3	-	48	51	8	1
R7	40	50	42	45	2	-	46	49	6	-
R8	40	50	41	44	1	-	45	48	5	-
R9	40	50	42	45	2	-	47	50	7	-

Table 4.5 Noise level difference between the proposed and approved landforms, note that the predicted levels have been rounded to the nearest decibel

Receiver	Standard meteorological conditions			Noise-enhancing meteorological conditions		
	Predicted maximum noise levels for approved landform scenario RL75, dB(A)	Predicted maximum noise levels for proposed landform scenario RL90, dB(A)	Noise level difference between the proposed and approved landforms (i.e. increase in noise levels), dB(A)	Predicted maximum noise levels for approved landform scenario RL75, dB(A)	Predicted maximum noise levels for proposed landform scenario RL90, dB(A)	Noise level difference between the proposed and approved landforms (i.e. increase in noise levels), dB(A)
	$L_{Aeq,15min}$	$L_{Aeq,15min}$		$L_{Aeq,15min}$	$L_{Aeq,15min}$	
R1	52	48	-	55	51	-
R2	50	49	-	54	52	-
R3	44	45	< 1	49	49	-
R4	47	47	-	51	51	-
R5	47	46	-	51	50	-
R6	43	43	-	47	48	< 1
R7	41	42	< 1	46	46	-
R8	40	41	1	44	45	1
R9	41	42	1	45	47	1

4.3.1 Proposed interim landform (RL65) predicted noise levels – without mitigation

The noise impact assessment has identified potential noise exceedances of the Project noise criteria for both the approved and proposed landforms. This section of the report presents predicted noise levels associated with the proposed interim landform (RL65) operational scenario without mitigation. This scenario relates to an interim position during filling to a final landform height of RL95.

The predicted noise levels and environmental noise criteria are presented in **Table 4.6**. A discussion of the results is presented in **Section 4.3.3**.

Table 4.6 Predicted maximum noise levels at all representative receiver locations during daytime for proposed landform operational scenario RL65 – without mitigation

Receiver	NPfl Project noise trigger levels, dB(A)	EPL 4068 noise limits, dB(A)	Standard conditions				Noise enhancing meteorological conditions			
			Result, dB(A)		Exceedance, dB(A)		Result, dB(A)		Exceedance, dB(A)	
			L _{Aeq,15min}	L _{A10,15min}	L _{Aeq,15min}	L _{A10,15min}	NPfl	EPL 4068	L _{Aeq,15min}	L _{A10,15min}
R1	40	50	57	60	17	10	59	62	19	12
R2	40	50	55	58	15	8	58	61	18	11
R3	40	50	47	50	7	-	51	54	11	4
R4	41	50	50	53	9	3	53	56	12	6
R5	41	50	51	54	10	4	54	57	13	7
R6	40	50	45	48	5	-	49	52	9	2
R7	40	50	43	46	3	-	47	50	7	-
R8	40	50	43	46	3	-	47	50	7	-
R9	40	50	44	47	4	-	48	51	8	1

4.3.2 Final proposed landform (RL95) versus interim proposed landform (RL65) predicted noise levels – with mitigation

As outlined in section 4.3 landfilling activities at RL90 and RL65, representing the final and interim proposed landform, would result in exceedances of the Project noise criteria. Various measures were explored during development of the Project to avoid, reduce or manage this impact. These investigations focused, in order, on managing noise at the source, followed by the pathway mitigation and then at receiver treatment. This section presents an assessment of the effectiveness of five metre high noise protection berms in reducing noise exceedances at nearby sensitive receivers. As discussed in **Section 3.4**, only the EPL 4068 noise limits were referenced when determining noise compliance. **Table 4.7** presents noise predictions with mitigation for the interim landfill scenario RL65 and **Table 4.8** presents noise predictions with mitigation for the final landform scenario RL90.

Noise protection berms were modelled on the horizontal edge of each contour at which the landfilling operational scenarios were modelled. The berms were modelled to wrap around the operating areas, to remove line-of-sight between residential receivers and the noise sources. The berms were modelled at five metres in height with a centre width of three metres and one to one slope on either side of the berm.

The berms have been modelled to test their effectiveness at mitigating potential operational noise exceedances. An example of these berms is shown in **Figure 4.4**.

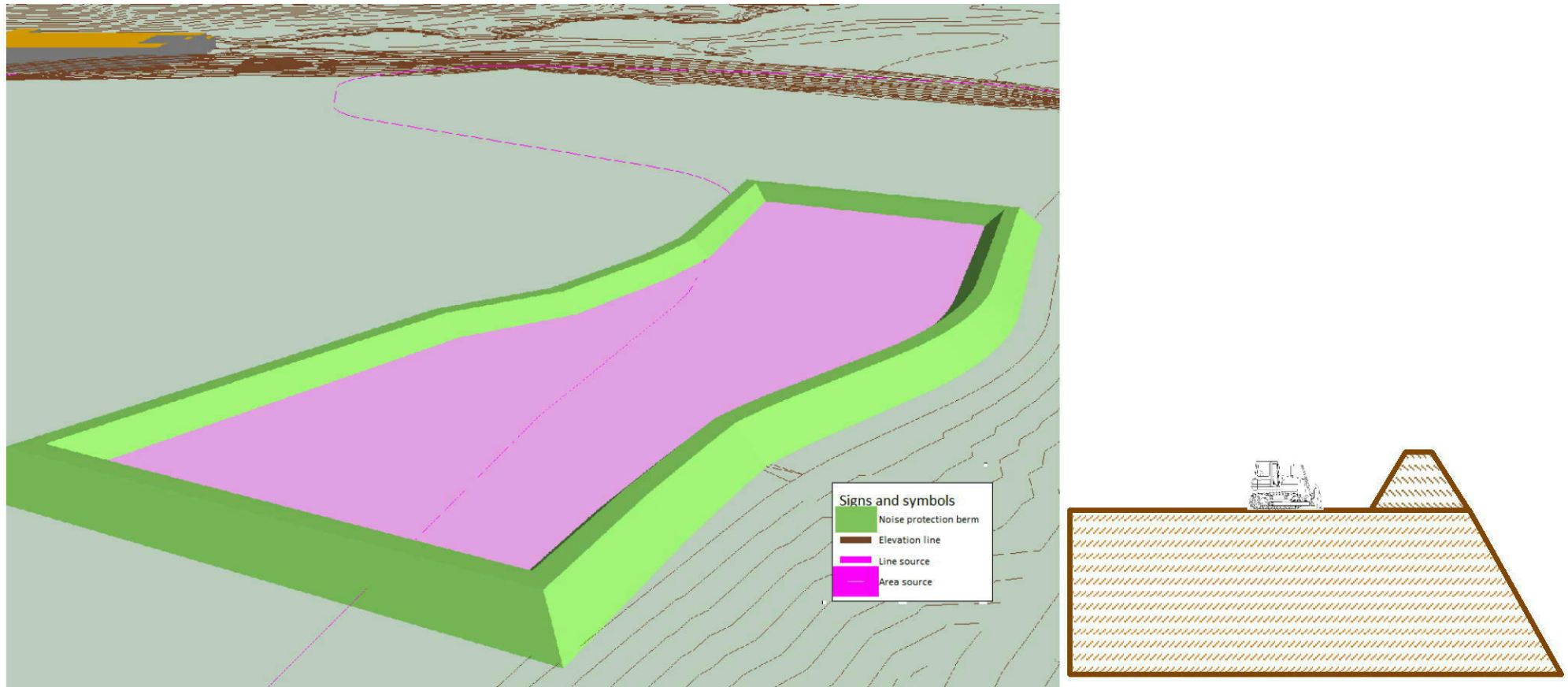


Figure 4.4 Image looking northwest showing the modelled noise protection berm positioned at the eastern edge of the RL65 contour line (left).Not to scale Cross section of berm (right)

Table 4.7 Predicted maximum noise levels at all representative receiver locations during daytime for proposed Interim landform scenario RL65 – with mitigation

Receiver	NPf Project noise trigger levels, dB(A)	EPL 4068 noise limits, dB(A)	Standard conditions				Noise enhancing meteorological conditions			
			Result, dB(A)		Exceedance, dB(A)		Result, dB(A)		Exceedance, dB(A)	
			L _{Aeq,15min}	L _{A10,15min}	L _{Aeq,15min}	L _{A10,15min}	NPf	EPL 4068	L _{Aeq,15min}	L _{A10,15min}
R1	40	50	47	50	7	-	50	53	10	3
R2	40	50	46	49	6	-	49	52	9	2
R3	40	50	42	45	2	-	46	49	6	-
R4	41	50	45	48	4	-	49	52	8	2
R5	41	50	41	44	-	-	45	48	4	-
R6	40	50	42	45	2	-	46	49	6	-
R7	40	50	40	43	-	-	44	47	4	-
R8	40	50	39	42	-	-	43	46	3	-
R9	40	50	38	41	-	-	42	45	2	-

Table 4.8 Predicted maximum noise levels at all representative receiver locations during daytime for proposed final landform scenario RL90 – with mitigation

Receiver	Project noise trigger levels, dB(A)	EPL 4068 noise limits, dB(A)	Standard conditions				Noise enhancing meteorological conditions			
			Result, dB(A)		Exceedance, dB(A)		Result, dB(A)		Exceedance, dB(A)	
			L _{Aeq,15min}	L _{A10,15min}	L _{Aeq,15min}	L _{A10,15min}	NPfl	EPL4068	L _{Aeq,15min}	L _{A10,15min}
R1	40	50	45	48	5	-	48	51	8	1
R2	40	50	43	46	3	-	46	49	6	-
R3	40	50	38	41	-	-	42	45	2	-
R4	41	50	39	42	-	-	43	46	2	-
R5	41	50	36	39	-	-	40	43	-	-
R6	40	50	38	41	-	-	42	45	2	-
R7	40	50	37	40	-	-	41	44	1	-
R8	40	50	37	40	-	-	41	44	1	-
R9	40	50	32	35	-	-	37	40	-	-

4.3.3 Discussion of results

4.3.3.1 No mitigation

The predicted noise levels at nearby sensitive receivers for the RL65 elevation are greater than the noise levels predicted for the RL90 elevation under both standard and noise-enhancing meteorological conditions. This is expected as a 25 meters increase in height equates to the landform itself providing greater barrier effect (i.e. increase noise attenuation) due to the loss of line-of-sight. In addition, the RL65 scenario uses the same noise sources though these are located 50 metres closer to noise sensitive receivers than the RL90 scenario (see **Figure 4.2** and **Figure 4.3**).

The noise contribution of waste delivery is generally minimal compared to the landfilling operations for most receivers, with the exception of R1 and R2, which are located approximately 100 metres from the landfill access truck route.

Operational scenario RL65 (interim landform)

The noise modelling undertaken as part of this assessment indicated that noise from the operational landfill at RL65 would result in exceedances of the Project noise criteria at nearby receivers under both standard and noise-enhancing meteorological conditions.

Under standard meteorological conditions, refer to **Table 4.6**, there would be nine exceedances of the NPfl criteria and four exceedances of the NPL 4068 noise limits. The maximum exceedance of the NPfl noise criteria would be 17 dB(A) and the maximum exceedance of the EPL 4068 noise limits would be 10 dB(A).

Under noise-enhancing meteorological conditions, refer to **Table 4.6**, there would be nine exceedances of the NPfl criteria and seven exceedances of the EPL 4068 noise limits. The maximum exceedance of the NPfl noise criteria would be 19 dB(A) and the maximum exceedance of the EPL 4068 noise limits would be 12 dB(A).

Operational scenario RL90

The noise modelling undertaken as part of this assessment indicated that noise from the operational landfill at RL90 would result in exceedances of the Project noise criteria at nearby receivers under both standard and noise-enhancing meteorological conditions.

Under standard meteorological conditions, refer to **Table 4.4**, there would be nine exceedances of the NPfl criteria and two exceedances of the NPL 4068 noise limits. The maximum exceedance of the NPfl noise criteria would be 9 dB(A) and the maximum exceedance of the EPL 4068 noise limits would be 2 dB(A) which is considered by the NPfl to be negligible.

Under noise-enhancing meteorological conditions refer to **Table 4.4**, there would be nine exceedances of the NPfl criteria and six exceedances of the NPL 4068 noise limits. The maximum exceedance of the NPfl noise criteria would be 12 dB(A) and the maximum exceedance of the EPL 4068 noise limits would be 5 dB(A).

Approved RL80 and proposed RL90

When the predicted noise results of the proposed landform (RL95) are compared to the results of the approved landform (RL80), refer to **Table 4.5**, the increase in noise levels from the RL75 to the RL90 operational scenarios is 1 dB(A) or less at all assessment locations under both standard and noise-enhancing meteorological conditions. Noise levels at R1, R2 and R5 are actually predicted to be lower under the proposed landform at RL90 compared to the approved landform at RL75. This is attributed to the enhanced barrier effect provided by the landform of the landfill.

The EPA's document '*Noise Guideline for Local Government*' (DECCW, 2010) mentions "*An increase in 2 dB is hardly perceptible*". In addition, the NPfl considers an increase in predicted noise levels, against the project noise trigger levels, of less than or equal to 2 dB(A) to be *negligible*. The NPfl then goes on to mention the following example of potential treatment for *negligible* impacts:

"The exceedances would not be discernible by the average listener and therefore would not warrant receiver-based treatments or controls."

Therefore the predicted increase in noise levels associated with the Project are considered inconsequential and would be imperceptible at all of the assessment locations **Table 4.5**.

4.3.3.2 With mitigation (noise berm)

Noise protection berms were modelled to test their effectiveness at mitigating potential operational noise exceedances. The berms were modelled at five metres in height to wrap around the operating areas, to remove line-of-sight between residential receivers and the noise sources.

As discussed in **Section 3.4**, only the EPL 4068 noise limits were referenced when determining noise compliance with the implementation of the noise mitigation (noise berm).

Operational scenario RL65 (interim landform)

Under standard meteorological conditions, refer to **Table 4.7**, predicted noise levels associated with the noise berm, indicates compliance with EPL 4068 noise limits at all assessment locations.

Under noise-enhancing meteorological conditions refer to **Table 4.7**, there would be three exceedance of the EPL 4068 noise limits. Receivers R1, R2 and R4 would exceed by 3 dB(A), 2 dB(A) and 2 dB(A) respectively.

As discussed previously, the NPfI considers a 2 dB(A) exceedance to be negligible and does not warrant receiver-based treatments or controls.

The 3 dB(A) exceedance is considered by the NPfI as *marginal* and presents examples of receiver-based mitigation treatment of '*Provide mechanical ventilation/comfort condition systems to enable windows to be closed without compromising internal air quality/amenity*'. It is also important to note that under standard meteorological conditions, there are no exceedances of EPL 4068 noise limits.

Furthermore, the operational scenarios modelled were developed as 'reasonable' worst case scenarios and the activities would only temporarily take place in specific locations and elevations at a time. The results of this assessment do not represent the noise levels across the entire operational period of the landfilling site.

Operational scenario RL90

Under standard meteorological conditions, refer to **Table 4.8**, predicted noise levels associated with the noise berm, indicates compliance with EPL 4068 noise limits at all assessment locations.

Under noise-enhancing meteorological conditions refer to **Table 4.8**, there would be one exceedance of the EPL 4068 noise limits at receiver R1, which exceeds by 1 dB(A). As discussed previously, the NPfI considers a 1 dB(A) exceedance to be negligible and does not warrant receiver-based treatments or controls.

4.4 Predicted traffic noise impacts

The forecasted change in heavy vehicle trip volumes as presented in the AECOM report *Traffic and Transport Impact Assessment* is minimal and will not cause any noticeable increase in existing road traffic noise in the vicinity of the landfill site. Therefore a detailed traffic noise impact assessment is not required.

4.5 Future land zoning

It is clear from various NSW government strategy documents that the area in which the landfill is located will be subject to significant additional future development. This will largely revolve around the new Western Sydney Airport, which is currently under construction. The airport is expected to be operational by 2026 with flight paths planned directly over the landfill site and existing nearby residential receivers.

The landfill site is also located within the Western Sydney Priority Growth Area/Western Sydney Aerotropolis as designated by the NSW Department of Planning and Environment (DPE). According to the *Western Sydney Aerotropolis Land Use and Infrastructure Implementation Plan, Stage 1 Initial Precincts*, the land surrounding the landfill site is proposed to be categorised as 'Flexible employment'.

Furthermore, all the residences which have been assessed to in this study are located within 'higher noise zones' according to the Plan where new residences will be prevented from being developed. The 'higher noise zones' correspond to areas above "ANEC/ANEF 20²". The Plan mentions that existing residences and residential subdivisions will still be permitted but will be required to incorporate acoustic design to manage aircraft noise intrusion.

The Roads and Maritime Services (RMS) Western Sydney Infrastructure Plan (WSIP) dated February 2018, indicates that the Site will be bordered to the north and west by the planned M9 Outer Sydney Orbital and the M12 Motorway. The M9 and M12 are both planned to have interchanges approximately one kilometre west of the Site which will also coincide with the proposed North South Rail link which runs generally parallel to the M9 at this interchange.

Given these impending changes to the Site it is highly likely that the future noise environment will change dramatically. It is likely that the area will generally become significantly noisier, with much of this noise related to major new transport and industrial noise sources. Additionally, the land immediately around the Elizabeth Drive landfill is likely to be zoned for commercial or industrial purposes, which would raise the noise criteria (commercial and industrial developments would have noise criteria of $L_{Aeq,15\text{ minute}}$ 63 dB(A) and 68 dB(A), respectively, under the NPfl).

The exceedances of applicable noise criteria predicted in this assessment are likely to become irrelevant under the above scenario as it is expected that the vast majority of nearby residential receivers will not exist beyond the airport's opening date of 2026. Further to this, **Table 4.9** presents predicted noise levels associated with landfilling activities at RL90 and RL65, representing the final and interim proposed landforms. The results indicated that none of the future commercial and industrial receivers adjacent to the Site would be subject to noise levels exceeding the 63 dB(A) and 68 dB(A) noise limit for commercial and industrial receivers respectively under the NPfl.

² The DP&E document *Western Sydney Aerropolis Land Use and Infrastructure Implementation Plan, Stage 1 Initial Precincts* defines the following:

Australian Noise Exposure concept (ANEC) Anticipated forecasts of future noise exposure patterns based on indicative flight paths around an airport that constitute the contours.

Australian Noise Exposure Forecast (ANEF) Approved forecasts of future noise exposure patterns around an airport that constitute the contours on which land use planning authorities base their controls.

Table 4.9 Predicted maximum noise levels at all potential future commercial receiver locations during daytime for proposed landform operational scenario RL90 and RL65 – without mitigation

Receiver	Project noise trigger levels (commercial receivers), dB(A)	Standard conditions				Noise enhancing meteorological conditions			
		Result, dB(A)		Exceedance, dB(A)		Result, dB(A)		Exceedance, dB(A)	
		L _{Aeq,15min}	RL90 L _{Aeq,15min}	RL65 L _{Aeq,15min}	RL90	RL65	RL90 L _{Aeq,15min}	RL65 L _{Aeq,15min}	RL90
R1	63	48	57	-	-	51	59	-	-
R2	63	49	55	-	-	52	58	-	-
R3	63	45	47	-	-	49	51	-	-
R4	63	47	50	-	-	51	53	-	-
R5	63	46	51	-	-	50	54	-	-
R6	63	43	45	-	-	48	49	-	-
R7	63	42	43	-	-	46	47	-	-
R8	63	41	43	-	-	45	47	-	-
R9	63	42	44	-	-	47	48	-	-

5.0 Management of impacts

The currently approved landfilling operations are not expected to change as a result of the Project and have been modelled to be as close as possible to current operations. The modelling undertaken as part of this assessment indicates that increases in noise levels associated with the Project are at most 1 dB(A) at all assessment locations under standard and noise enhancement meteorological conditions. In addition, the predicted noise levels for the proposed landform (RL95) would comply with the NPfI noise trigger levels for commercial premises ($L_{Aeq,15 \text{ minute}}$ 63 dB(A)) and industrial premises ($L_{Aeq,15 \text{ minute}}$ 68 dB(A)) under a future land use scenario as shown in **Table 4.9**.

The NPfI recognises that a marginally reduced acoustic amenity is acceptable for existing residences co-located with existing industry, and that the availability of noise mitigation measures might be limited in these circumstances.

Although the predicted noise levels exceed the Project noise criteria (for both the approved and proposed landform operational scenarios) it is noted that SUEZ has not received any noise complaints associated with the operation of the landfill site on the SUEZ integrated management system (SIMS) from the surrounding sensitive receivers (R1 to R9) since at least 2011. It should be also noted that Annual Environmental Monitoring Reports have not identified any noise non-compliance in the past.

Given the significant growth expected to occur in the immediate vicinity in the near future and the fact that the actual noise impacts of the landfilling operations will vary overtime, it is proposed that SUEZ develop a noise mitigation action plan that would trigger a management response for the investigation and consideration of noise mitigations measures.

There are a range of factors and considerations that would need to be taken into account prior to the implementation of noise mitigation measures, including:

- The type of noise-affected receiver (e.g. residential, commercial, light industrial, etc.) and nature of the area
- The receiver's background noise environment. Land uses in an area are undergoing significant change, for example, residential subdivisions, Western Sydney Airport with associated flight paths, and development of local and regional road and rail corridors. Therefore, the background noise levels would be expected to change significantly in the future
- Degree of exceedance of noise limits. This could be based on:
 - Measured noise levels as part of SUEZ regular compliance noise monitoring program
 - Noise complaints
 - Prediction of noise emissions based on noise modelling simulations.
- Location of operational activities within the Project Area
- Prevailing meteorological conditions
- Consultation with affected residences.

Detailed assessment should consider feasible and reasonable noise mitigation measures with a goal of achieving the applicable noise limits.

Mitigation strategies should be considered in a hierarchical approach:

- controlling noise at the source
- once the controls at the source are exhausted, controlling the transmission of noise
- once source and transmission controls are exhausted, considering mitigation measures at the noise-sensitive receivers.

The modelling of noise protection bunds, as proposed by SUEZ, indicates that they are effective in reducing the noise impact of the landfilling operations when they are used in the line-of-sight between receivers and the noise sources. The noise berms would reduce landfill operational noise levels at receivers such that they comply with the EPL 4068 noise limits. The predicted noise levels for the

proposed landform (RL90) would comply with commercial (63 dB(A)) and industrial receivers (68 dB(A)) noise trigger levels under likely changed land use scenario expected to happen in the future.

A noise mitigation action plan should be developed and included as a subplan to the existing Landfill Environmental Management Plan. The Plan would identify 'triggers levels' that would need to be considered prior to the implementation of noise mitigation measures.

6.0 Conclusion

This report presents the results of an operational noise and vibration impact assessment for the proposed expansion of the existing SUEZ Elizabeth Drive landfill. The Project includes an increase to the finished height and shape of the final landform.

This acoustic assessment details the appropriate environmental noise criteria and presents the predicted maximum noise levels from the Project for the currently approved landform (RL80), and the proposed landform (RL95) operational scenarios.

Vibration was considered, however with the large distances (at least 100 metres) between the operations and nearby sensitive receivers, a detailed assessment was deemed not required as the safe working distances will not be encroached even at the nearest point of operations to the receivers. In addition, there are no blasting activities proposed to be carried out as part of the cell development/quarrying activities at the Site.

The predicted noise levels at nearby sensitive receivers for the RL65 elevation are greater than the noise levels predicted for the RL90 elevation for both standard and noise-enhancing meteorological conditions. This is expected as a 25 metre increase in height equates to the landform itself providing greater barrier effect (i.e. increase noise attenuation) due to the loss of line-of-sight. In addition, the RL65 scenario uses the same noise sources though these are located 50 metres closer to noise sensitive receivers than the RL90 scenario.

The noise contribution of waste delivery is generally minimal compared to the landfilling operations for most receivers, with the exception of receivers R1 and R2, which are located approximately 100 metres from the landfill access truck route.

When the predicted noise results of the proposed landform (RL95) are compared to the results of the approved landform (RL80), the increase in noise levels from the RL75 to the RL90 operational scenarios is 1 dB(A) or less at all assessment locations under both standard and noise-enhancing meteorological conditions. For some receivers, the noise levels are predicted to be lower for the proposed landform at RL90 compared to the approved landform at RL75.

The forecasted change in heavy vehicle trip volumes is minimal and will not cause any noticeable increase in existing road traffic noise in the vicinity of the landfill site. Therefore a detailed traffic noise impact assessment has not been carried out.

Consideration was given to the significant growth and development expected to occur in the immediate vicinity of the Site in the near future which will largely revolve around the new Western Sydney Airport, currently under construction. This growth and development is detailed in a number of NSW government strategy documents and plans.

The predicted noise levels for the proposed landform (RL90) indicate compliance with commercial (63 dB(A)) and industrial (68 dB(A)) noise trigger levels under likely changed land use scenario expected to happen in the future.

On this basis no additional project-specific noise mitigation measures are proposed.

Given the significant growth expected to occur in the immediate vicinity in the near future and the fact that the actual noise impacts of the landfilling operations will vary overtime, it is proposed that SUEZ develop a noise mitigation action plan that would trigger a management response for the investigation and consideration of noise mitigations measures.

7.0 References

Noise Policy for Industry (EPA, 2017)

Annexure A – Acoustic Terminology

The following is a brief description of acoustic terminology used in this report.

Sound power level	The total sound emitted by a source
Sound pressure level	The amount of sound at a specified point
Decibel [dB]	The measurement unit of sound
A Weighted decibels [dB(A)]	The A weighting is a frequency filter applied to measured noise levels to represent how humans hear sounds. The A-weighting filter emphasises frequencies in the speech range (between 1kHz and 4 kHz) which the human ear is most sensitive to, and places less emphasis on low frequencies at which the human ear is not so sensitive. When an overall sound level is A-weighted it is expressed in units of dB(A).
Decibel scale	The decibel scale is logarithmic in order to produce a better representation of the response of the human ear. A 3 dB increase in the sound pressure level corresponds to a doubling in the sound energy. A 10 dB increase in the sound pressure level corresponds to a perceived doubling in volume. Examples of decibel levels of common sounds are as follows: <ul style="list-style-type: none"> 0dB(A) Threshold of human hearing 30dB(A) A quiet country park 40dB(A) Whisper in a library 50dB(A) Open office space 70dB(A) Inside a car on a freeway 80dB(A) Outboard motor 90dB(A) Heavy truck pass-by 100dB(A) Jackhammer/Subway train 110 dB(A) Rock Concert 115dB(A) Limit of sound permitted in industry 120dB(A) 747 take off at 250 metres
Frequency [f]	The repetition rate of the cycle measured in Hertz (Hz). The frequency corresponds to the pitch of the sound. A high frequency corresponds to a high pitched sound and a low frequency to a low pitched sound.
Equivalent continuous sound level [Leq]	The constant sound level which, when occurring over the same period of time, would result in the receiver experiencing the same amount of sound energy.
Lmax	The maximum sound pressure level measured over the measurement period
Lmin	The minimum sound pressure level measured over the measurement period
L10	The sound pressure level exceeded for 10% of the measurement period. For 10% of the measurement period it was louder than the L10.

L90	The sound pressure level exceeded for 90% of the measurement period. For 90% of the measurement period it was louder than the L90.
Ambient noise	The all-encompassing noise at a point composed of sound from all sources near and far.
Background noise	The underlying level of noise present in the ambient noise when extraneous noise (such as transient traffic and dogs barking) is removed. The L90 sound pressure level is used to quantify background noise.
Traffic noise	The total noise resulting from road traffic. The Leq sound pressure level is used to quantify traffic noise.
Day	The period from 0700 to 1800 h Monday to Saturday and 0800 to 1800 h Sundays and Public Holidays.
Evening	The period from 1800 to 2200 h Monday to Sunday and Public Holidays.
Night	The period from 2200 to 0700 h Monday to Saturday and 2200 to 0800 h Sundays and Public Holidays.
Assessment background level [ABL]	The overall background level for each day, evening and night period for each day of the noise monitoring.
Rating background level [RBL]	The overall background level for each day, evening and night period for the entire length of noise monitoring.
Pasquill-Gillford stability categories	A classification scheme to describe atmospheric stability. Refer to Fact Sheet D: Accounting for noise-enhancing weather conditions of the NPfl for further information on the categories.

*Definitions of a number of terms have been adapted from Australian Standard AS1633:1985 "Acoustics – Glossary of terms and related symbols", the EPA's Noise Policy for Industry and the EPA's Road Noise Policy

Annexure B – Unattended Noise Monitoring Summaries

NL1 - 83 Lawson Street, Badgerys Creek - 25/07/18 - 03/08/18

Logger Setup

Logger Type: Rion NL52
Serial No : 164395
Address: 83 Lawson Road , Badgerys Creek
Location: Front Yard
Facade / Free Field: Free Field
Environment: Wind noise and leaves rustling dominant at location. Bird noise audible. Line of site to traffic on Elizabeth Drive, however it is inaudible.

Logger Setup Photo



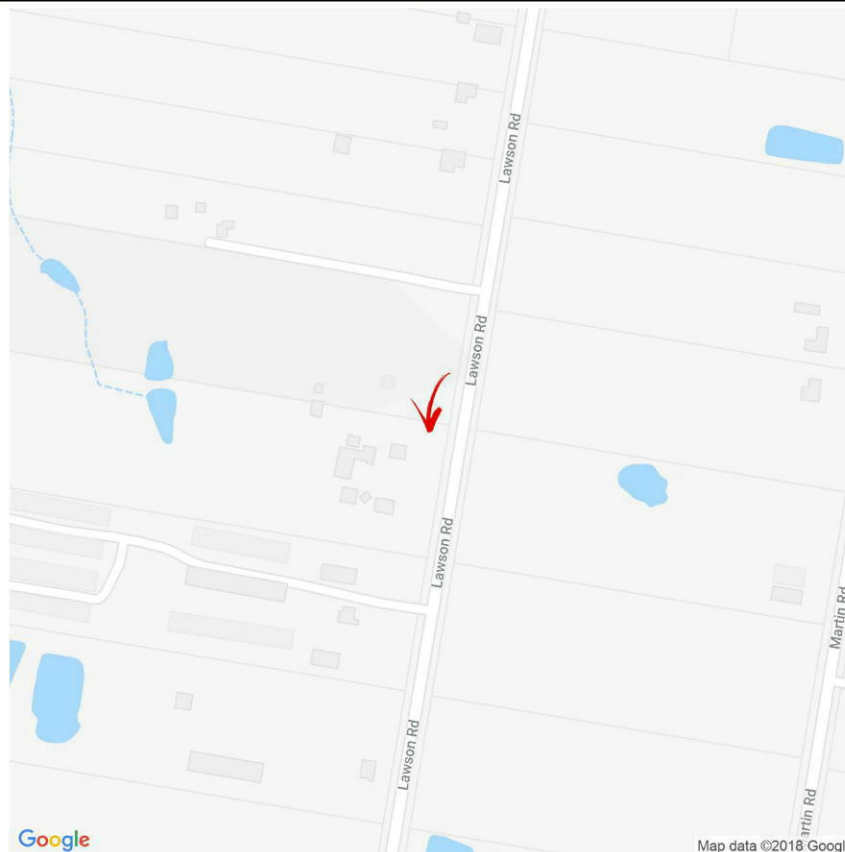
INP Noise Level, dB(A)

	Log Average	RBL
Day	54	36
Evening	49	34
Night	48	30

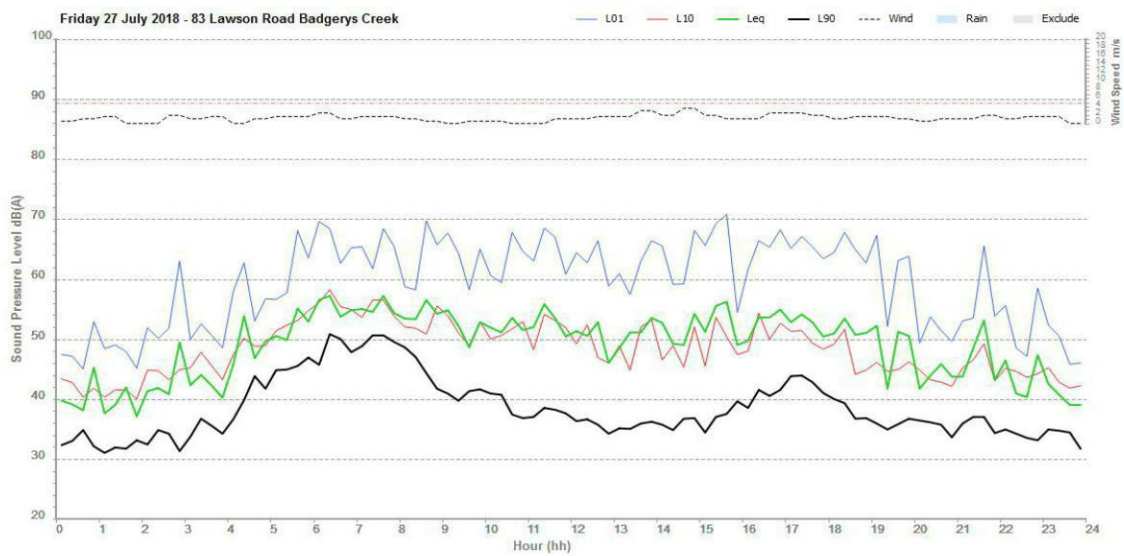
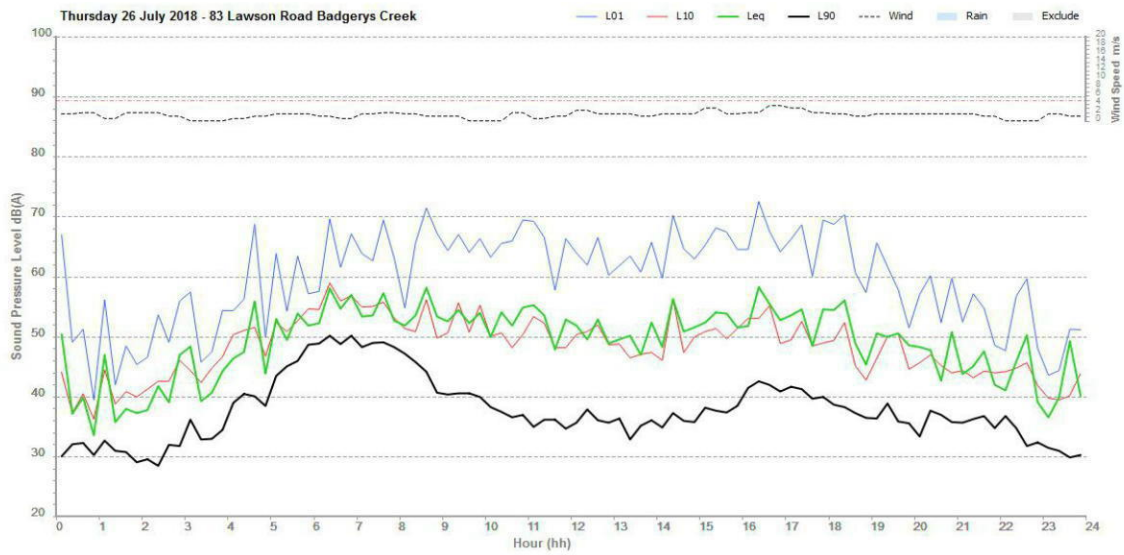
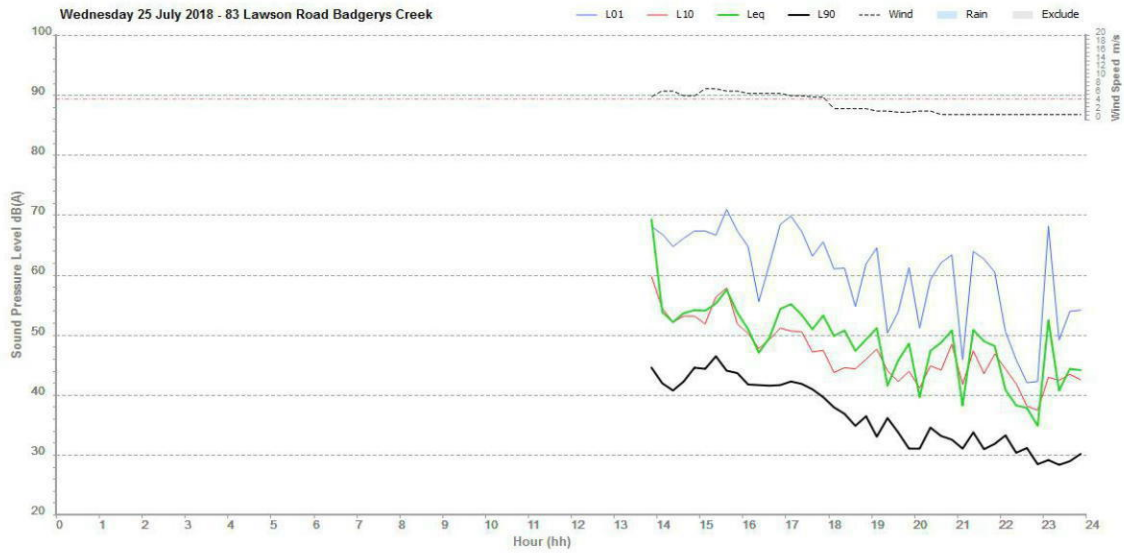
RNP Noise Level, dB(A)

	L_{Aeq(1hr)}	L_{Aeq(period)}
Day (7am - 10 pm)	-	-
Night (10pm - 7am)	-	-

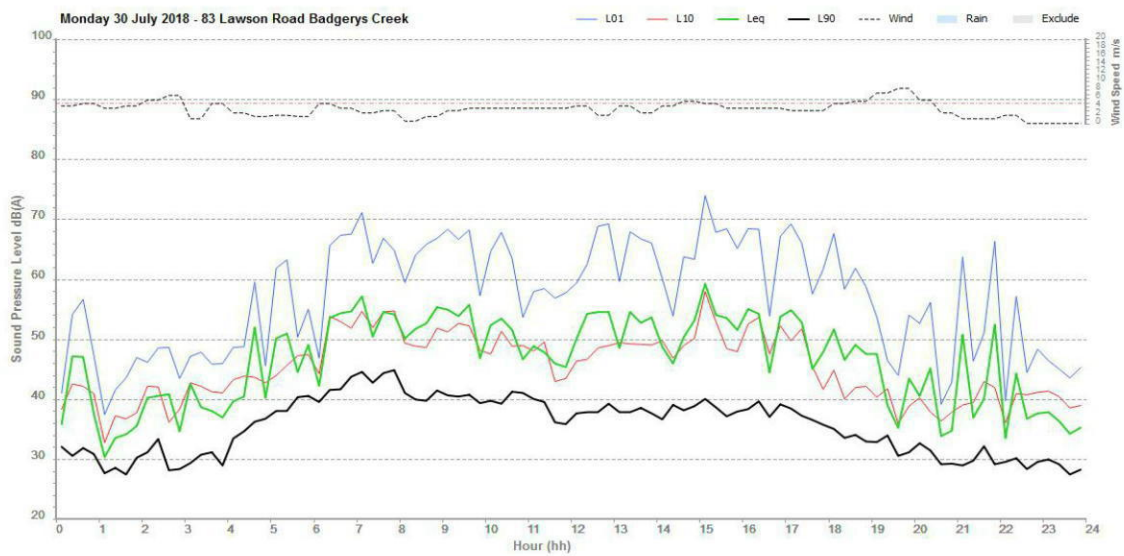
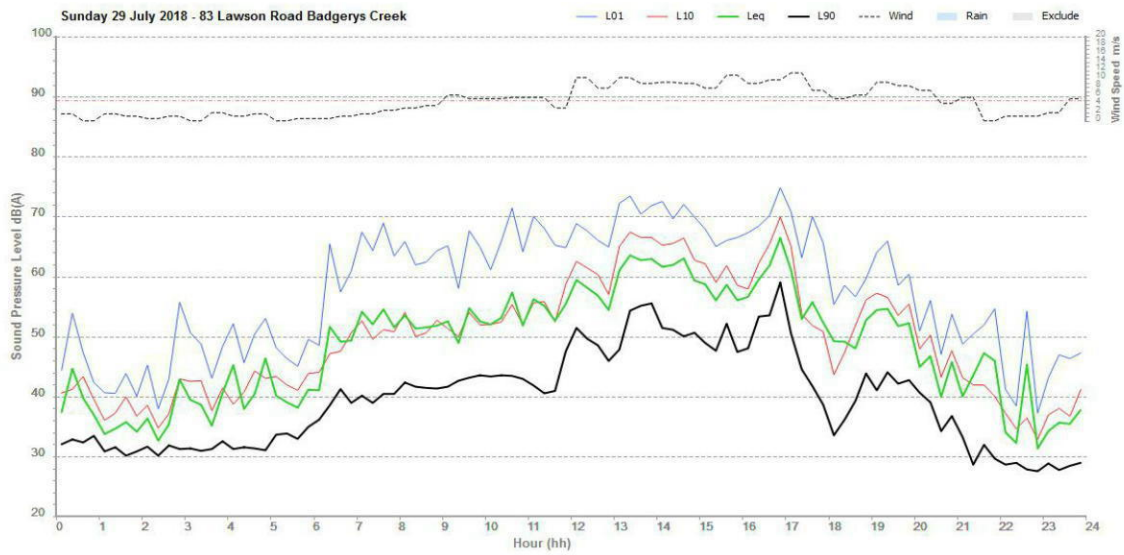
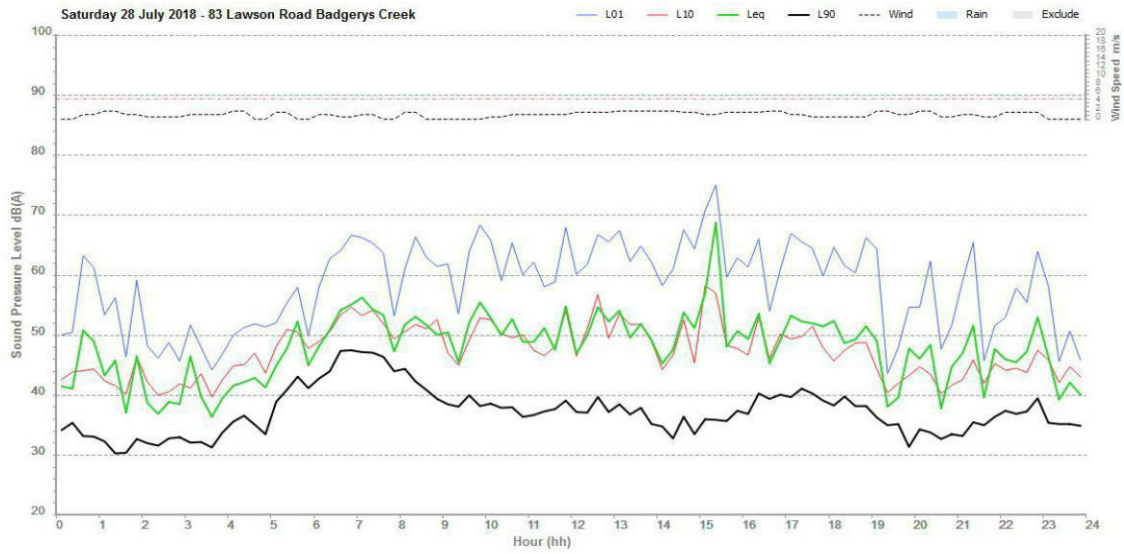
Logger Location Map



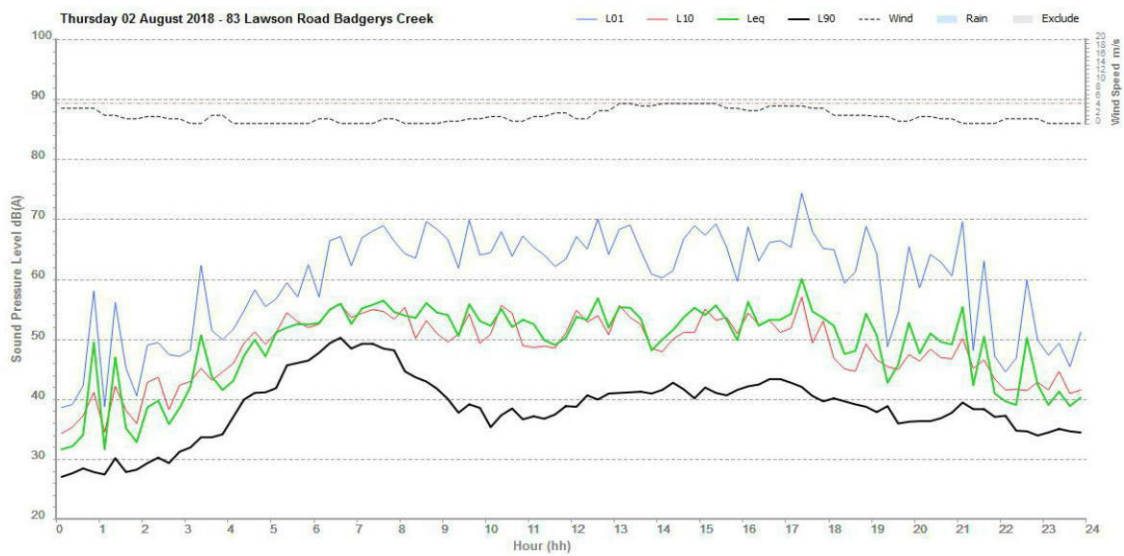
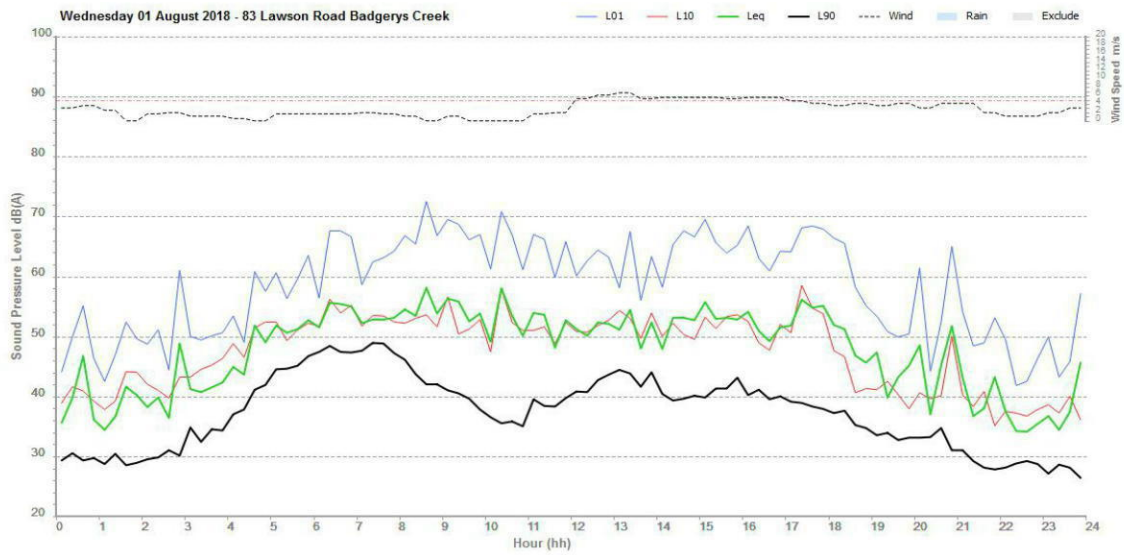
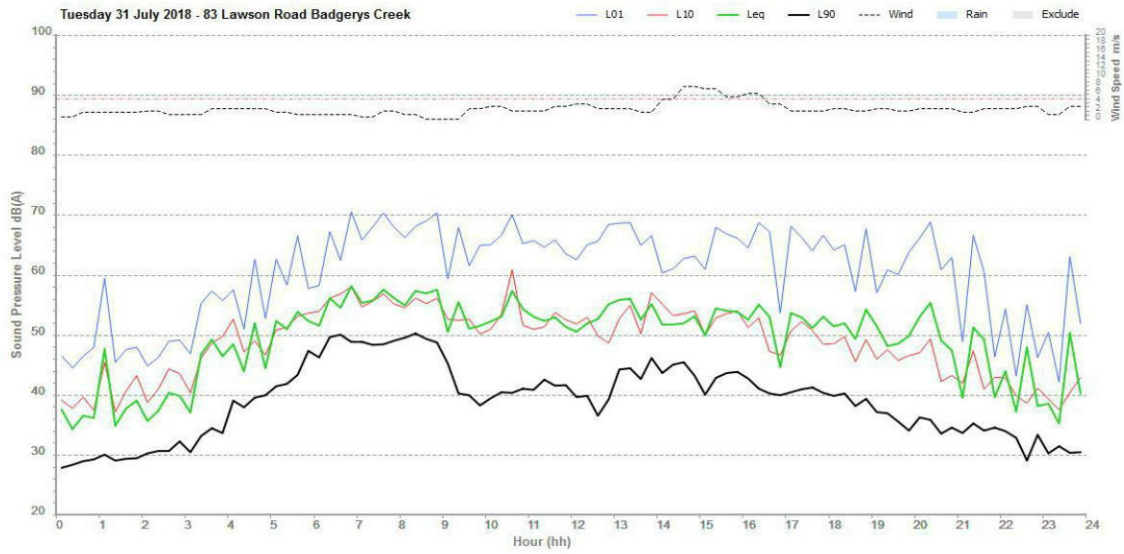
Logger Graphs



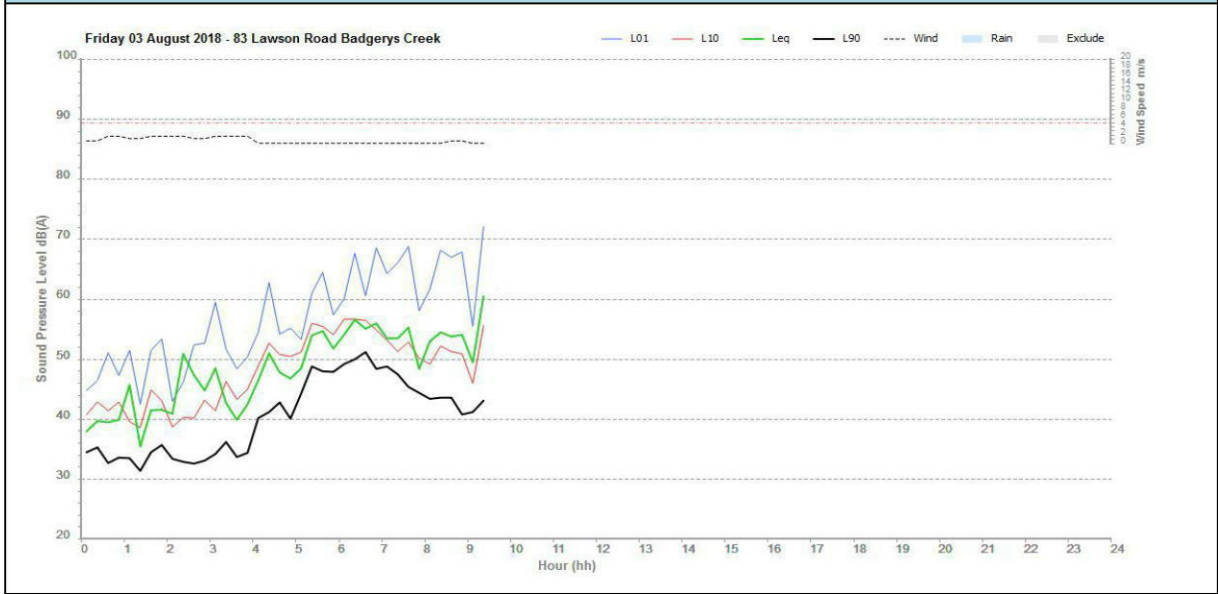
Logger Graphs



Logger Graphs



Logger Graphs



NL2 - McGarvie Smith Farm - 25/07/18 - 03/08/18

Logger Setup

Logger Type: Rion NL52
 Serial No : 386741
 Address: 2280 Elizabeth Drive , Badgerys Creek
 Location: Paddock
 Facade / Free Field: Free Field
 Environment: wind noise dominant at location. Bird noise audible. Line of sight to landfill and trucks operating, however they are inaudible

Logger Setup Photo



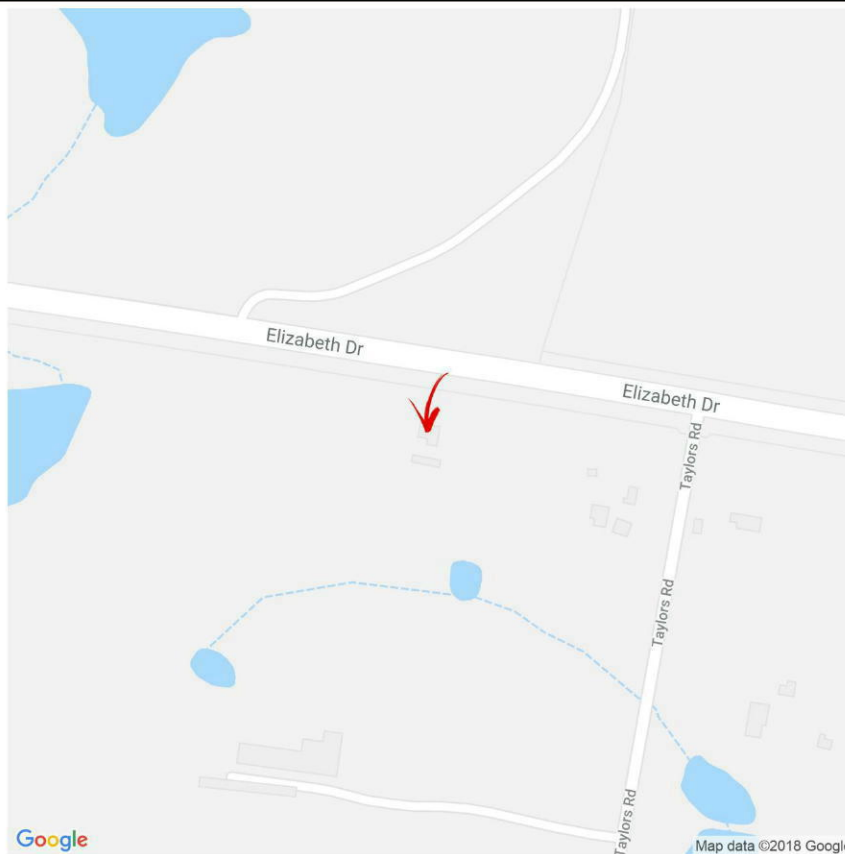
INP Noise Level, dB(A)

	Log Average	RBL
Day	46	31
Evening	39	32
Night	41	30

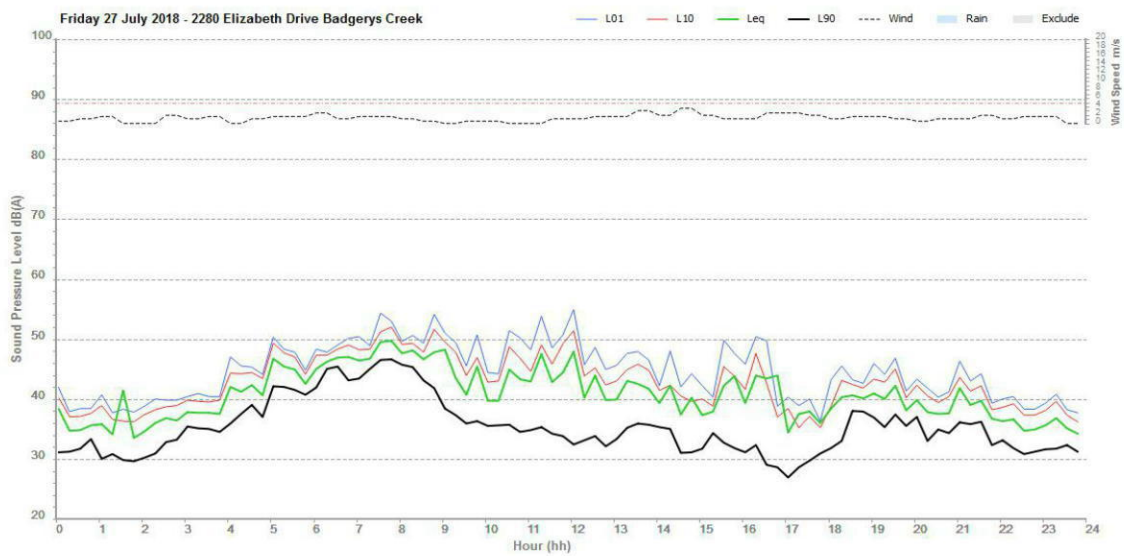
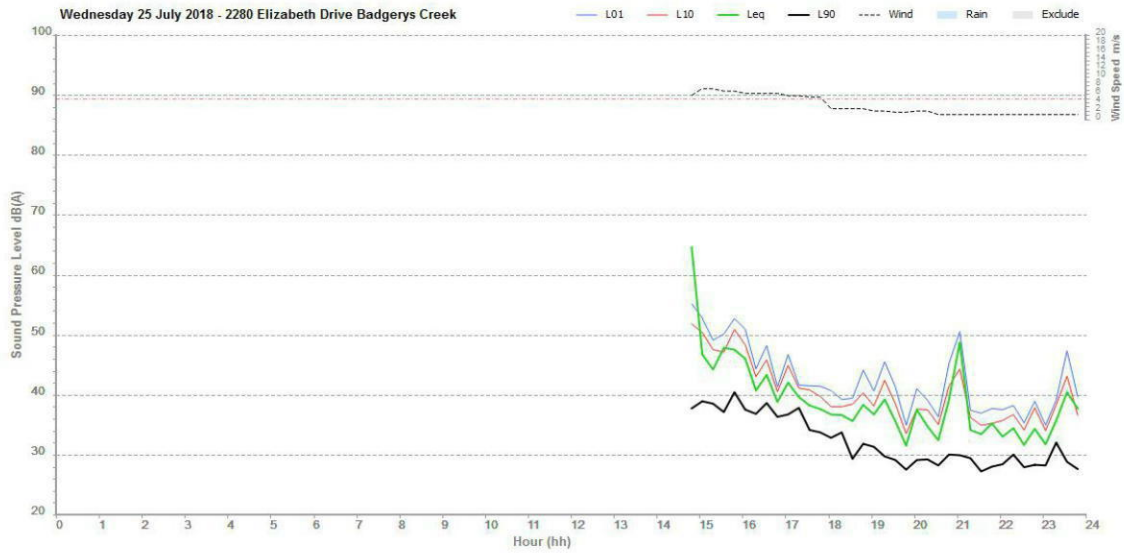
RNP Noise Level, dB(A)

	L_{Aeq(1hr)}	L_{Aeq(period)}
Day (7am - 10 pm)	-	-
Night (10pm - 7am)	-	-

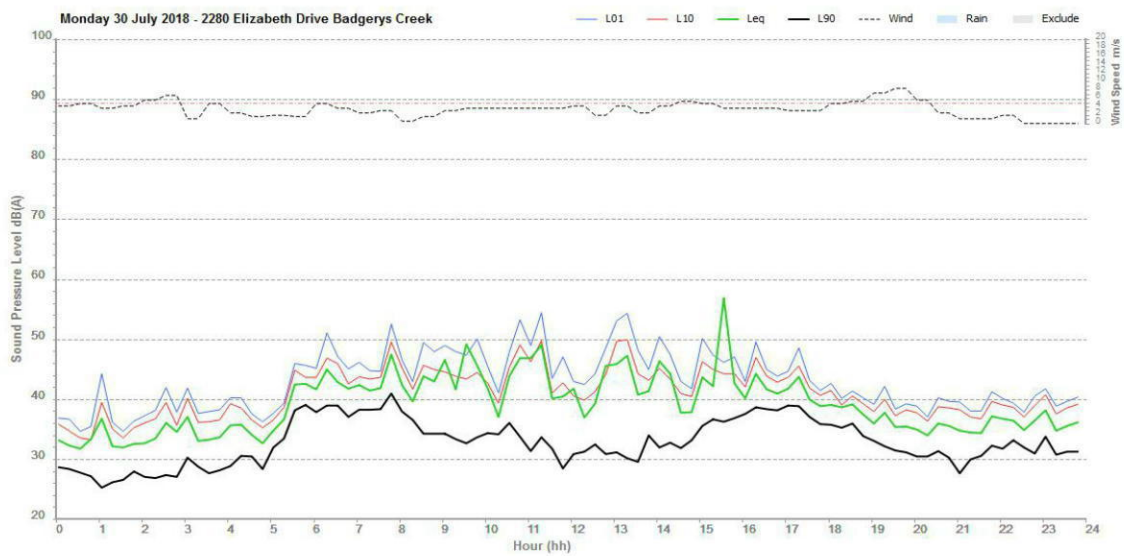
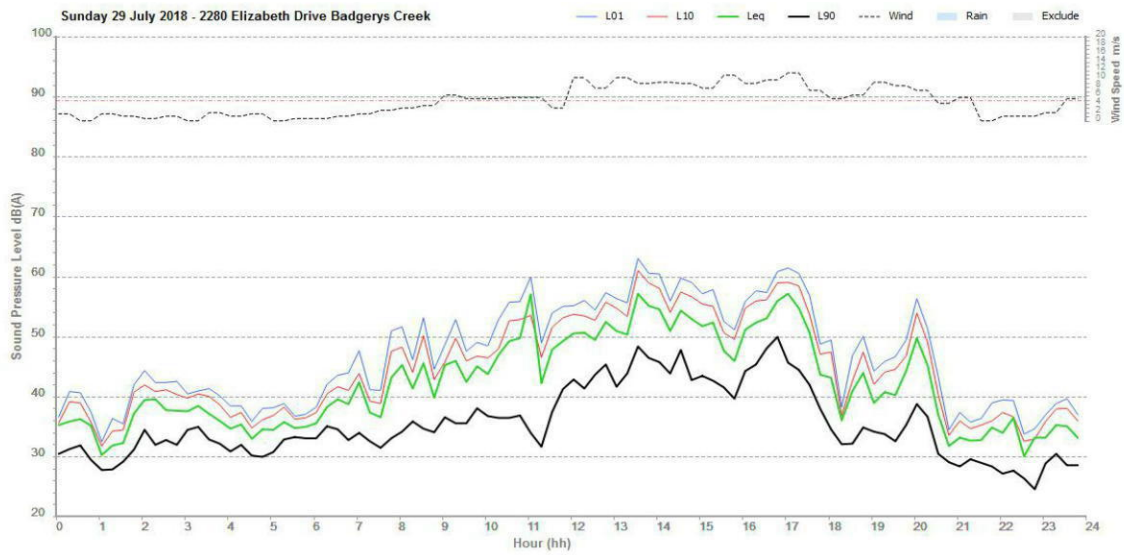
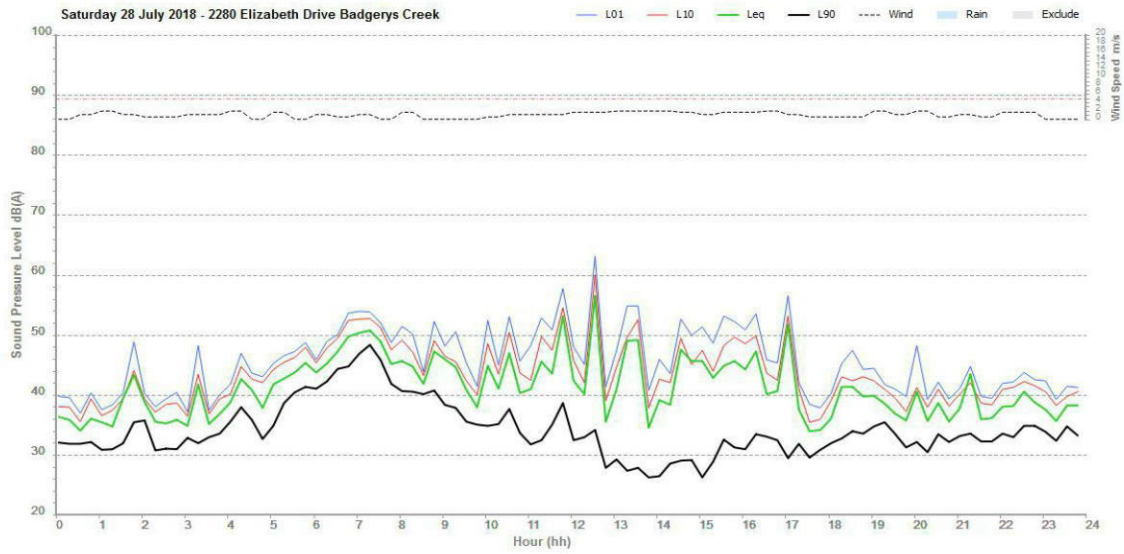
Logger Location Map



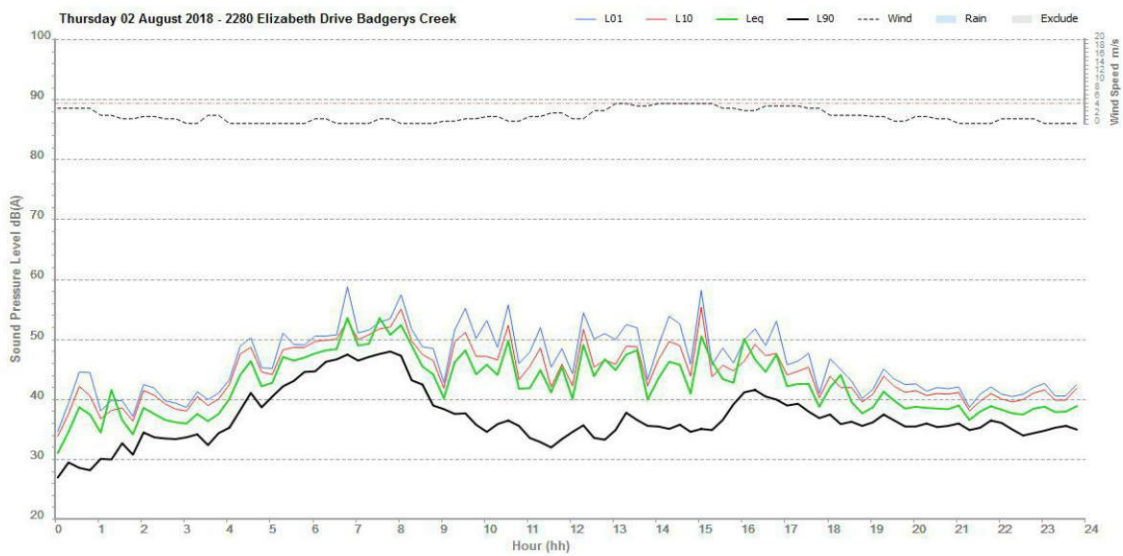
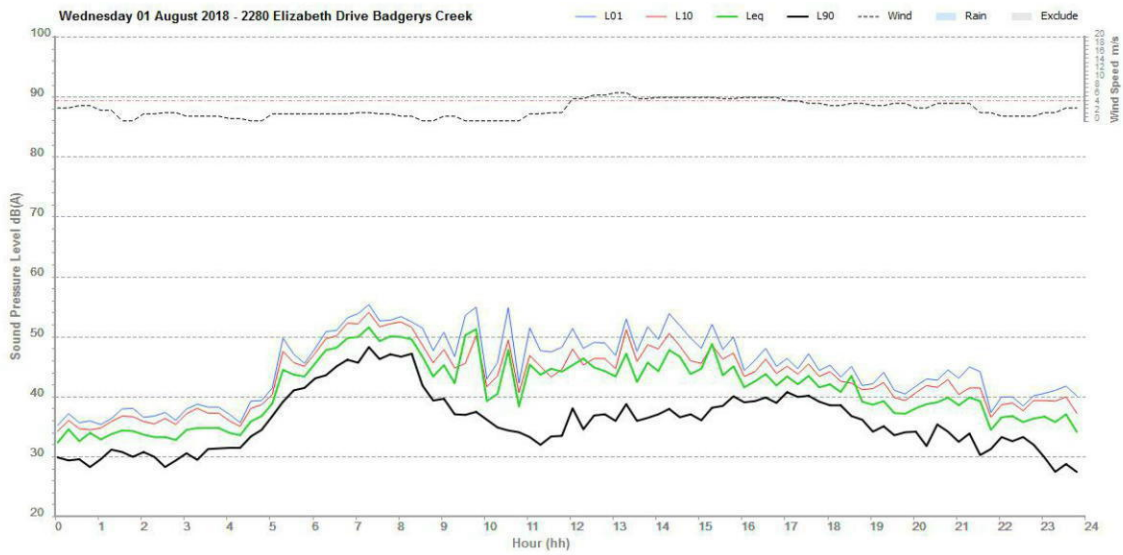
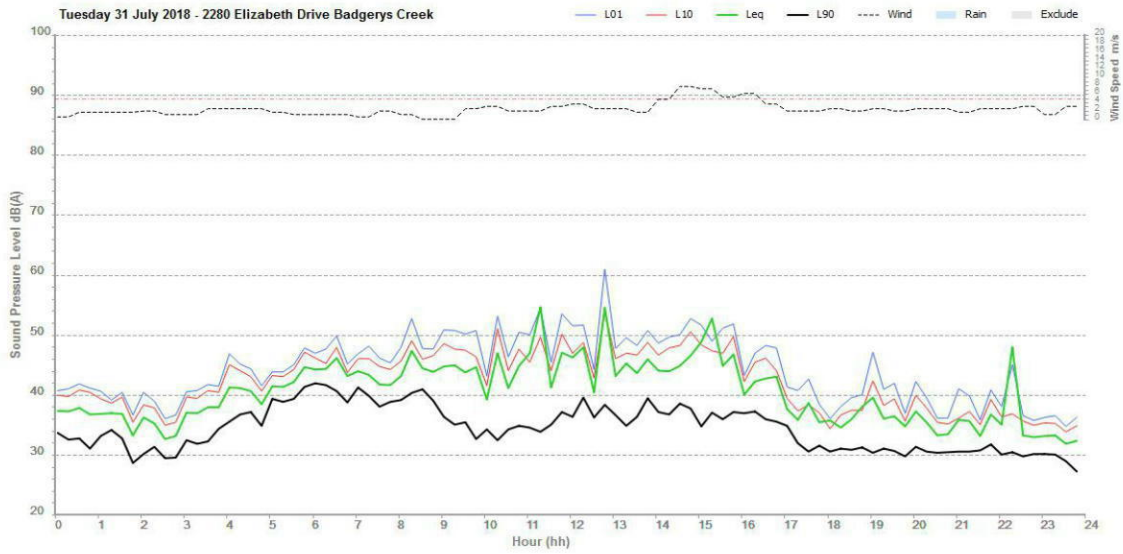
Logger Graphs



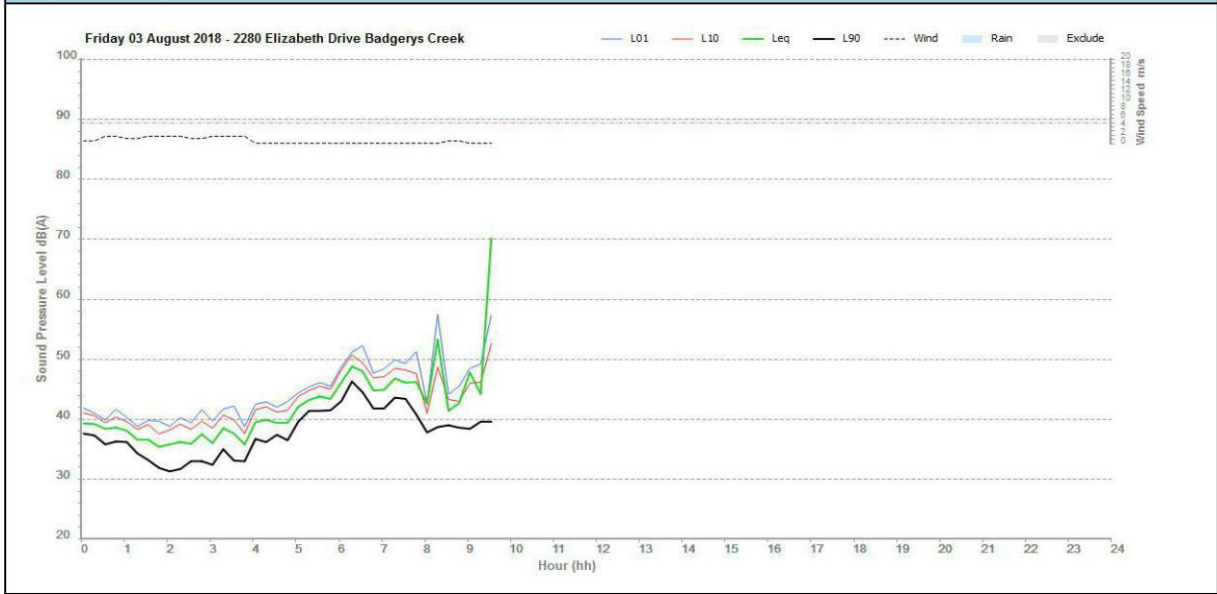
Logger Graphs



Logger Graphs



Logger Graphs



NL3 - 6 Humewood Place Luddeham - 25/07/18 - 03/08/18

Logger Setup

Logger Type: Rion NL21
Serial No : 00765701
Address: 6 Humewood Place , Luddeham
Location: Front yard
Facade / Free Field: Free Field
Environment: Wind noise dominant at location. Bird noise audible. Some construction noise audible in distance, but not dominant.

Logger Setup Photo



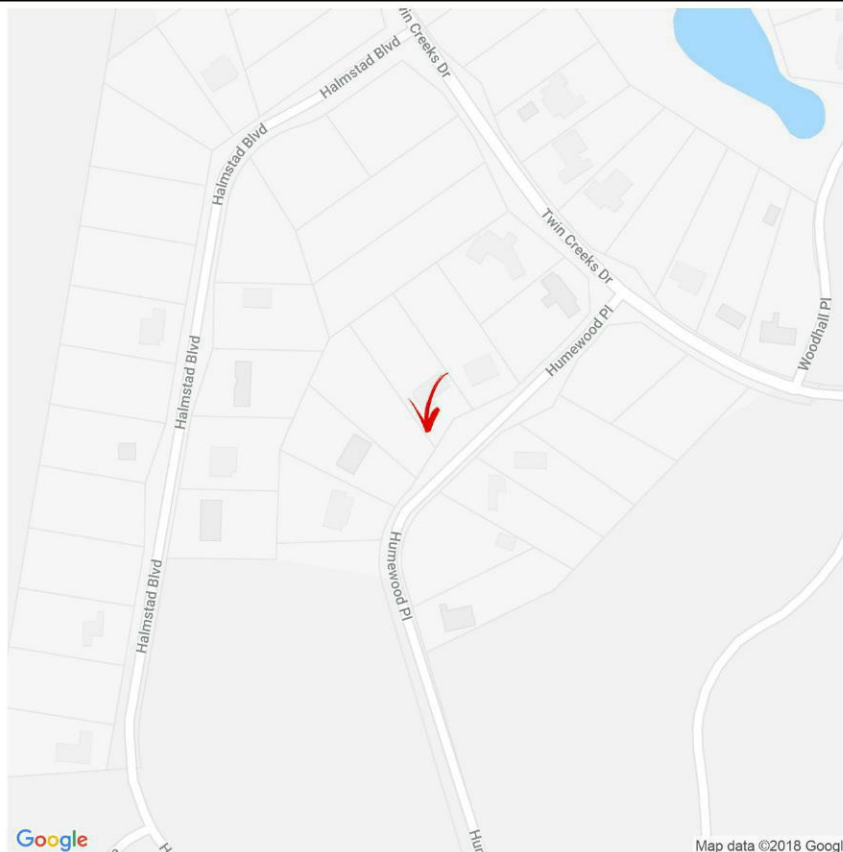
INP Noise Level, dB(A)

	Log Average	RBL
Day	49	31
Evening	43	32
Night	41	29

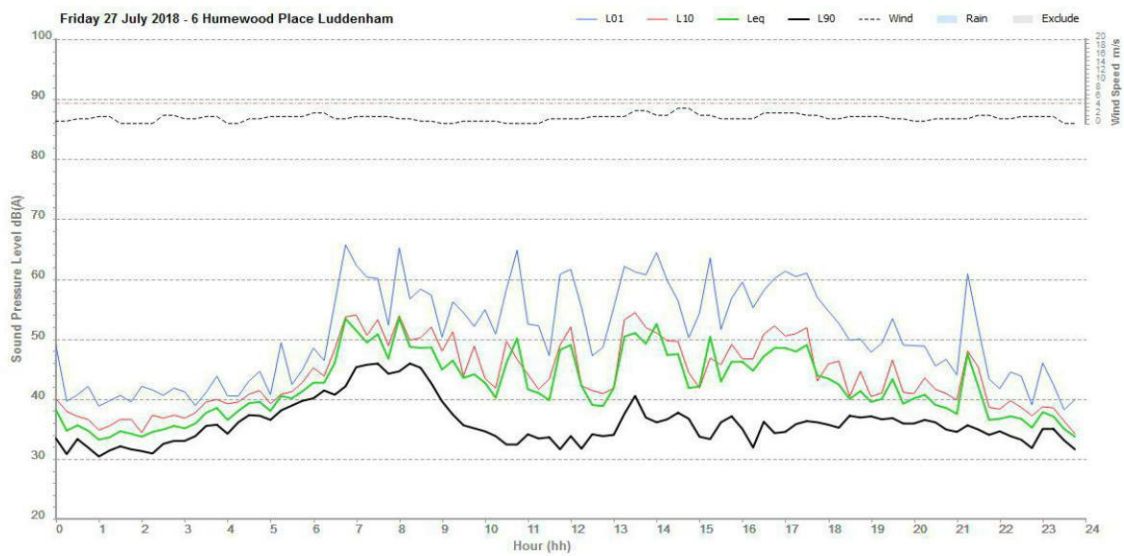
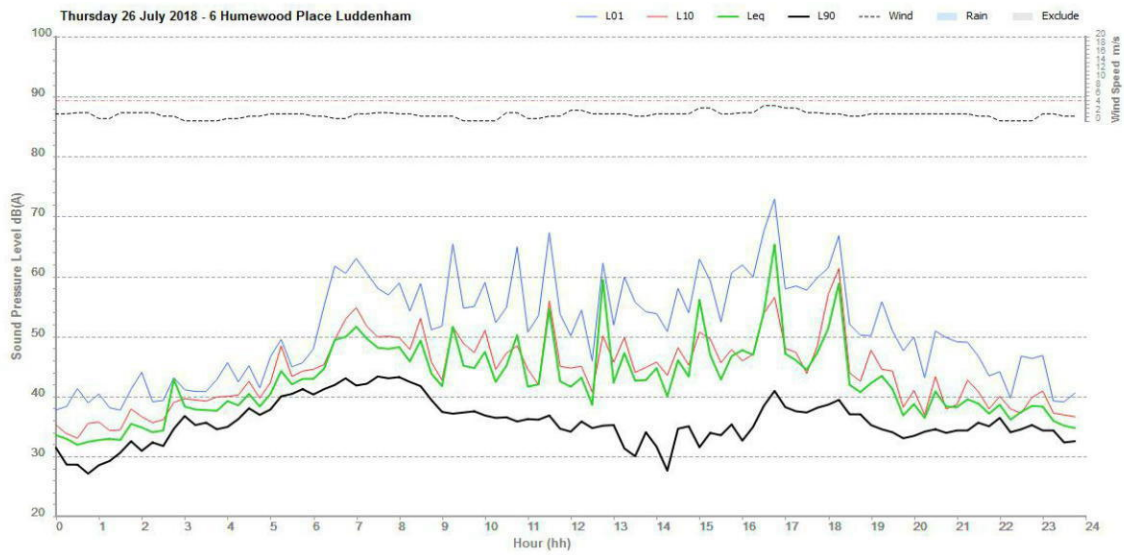
RNP Noise Level, dB(A)

	L_{Aeq(1hr)}	L_{Aeq(period)}
Day (7am - 10 pm)	-	-
Night (10pm - 7am)	-	-

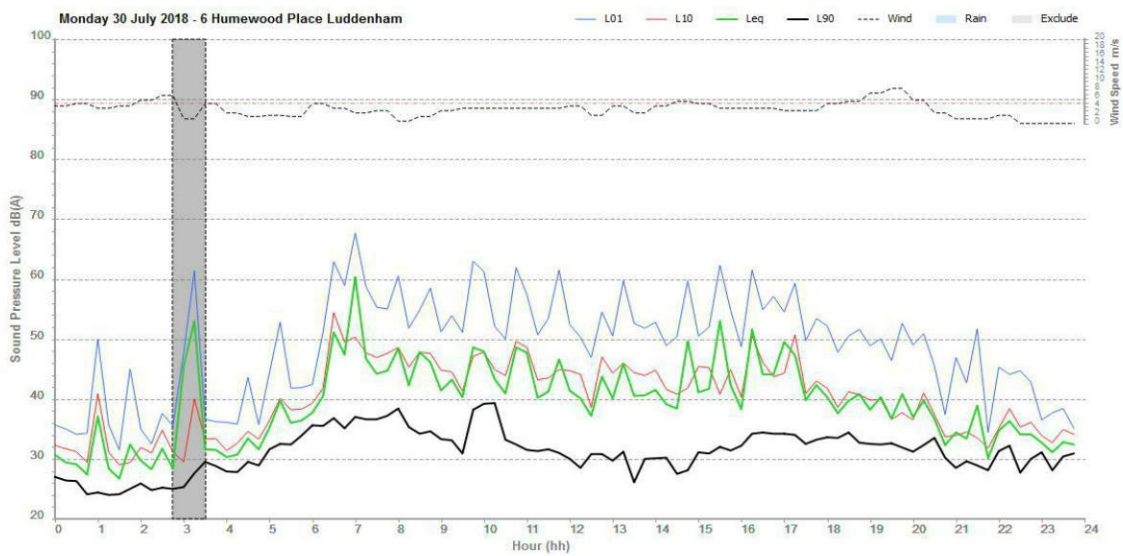
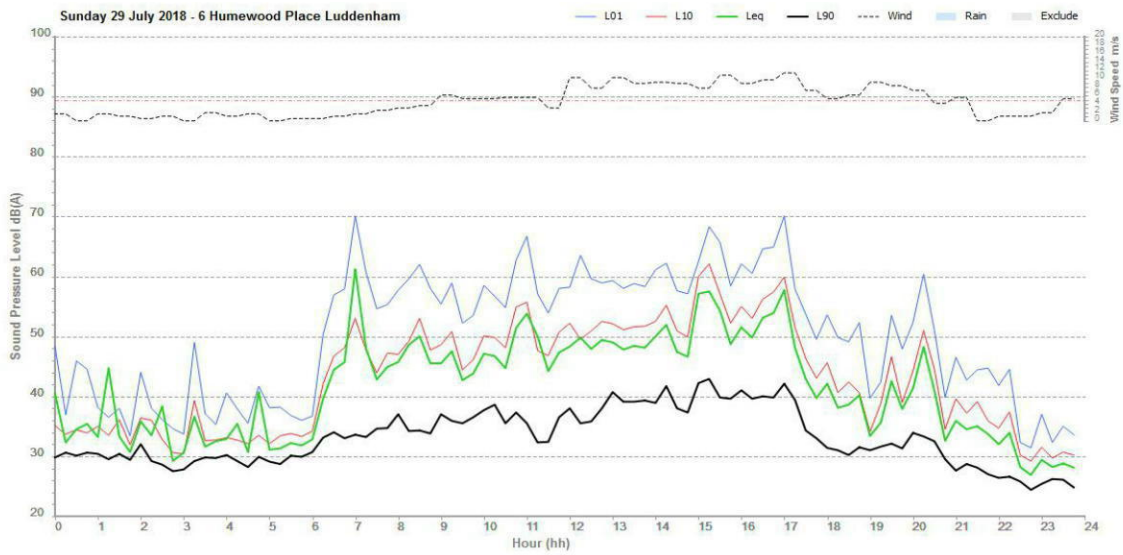
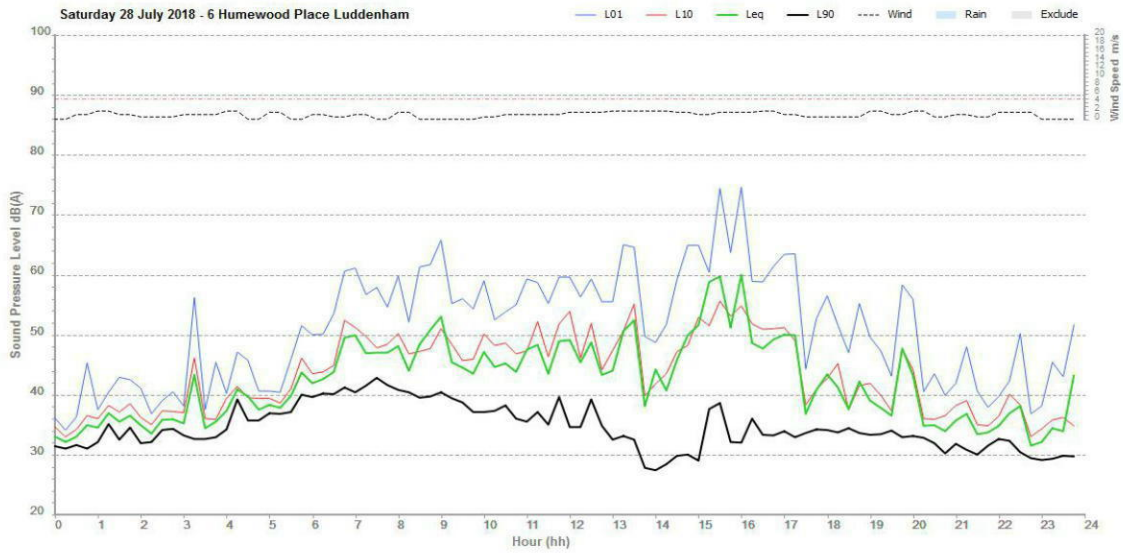
Logger Location Map



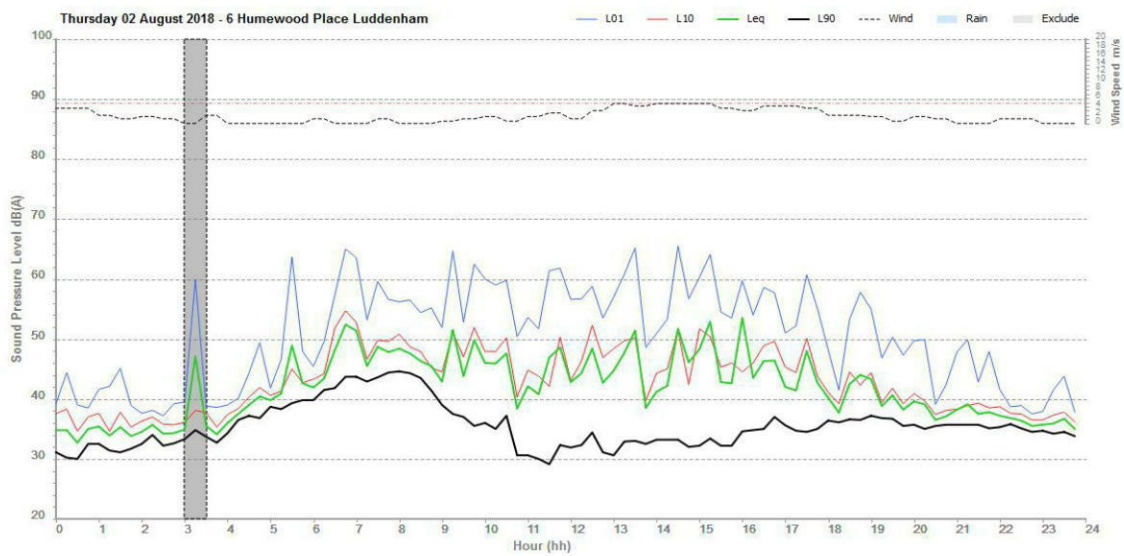
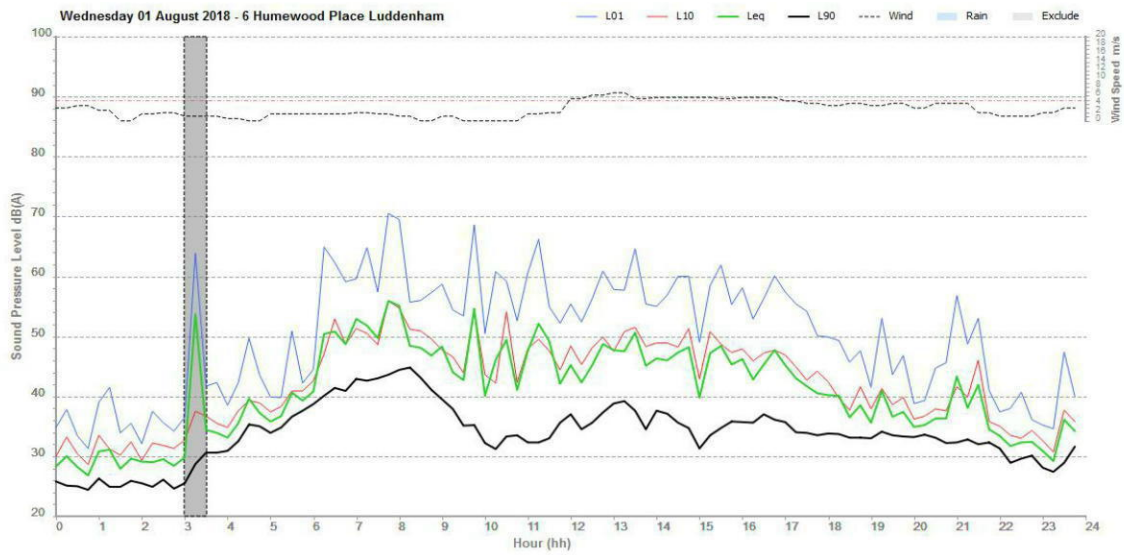
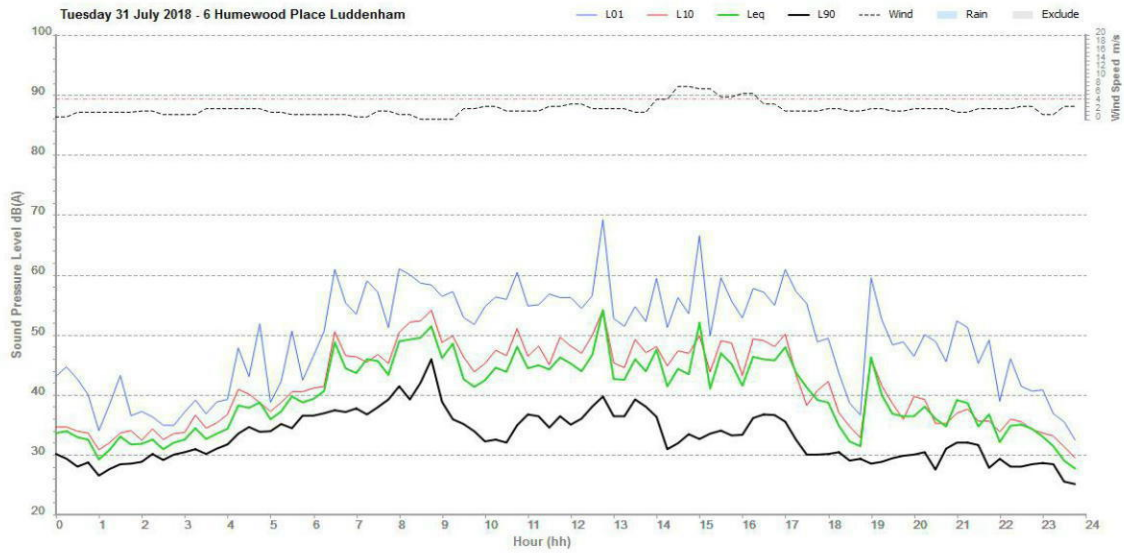
Logger Graphs



Logger Graphs



Logger Graphs



Logger Graphs



NL4 - Kingsfield stud eastern border - 25/07/18 - 03/08/18

Logger Setup

Logger Type: Rion NL52
 Serial No : 553967
 Address: 1669A Elizabeth Drive , Badgerys Creek
 Location: Paddock
 Facade / Free Field: Free Field
 Environment: Background noise dominated by environment. Bird noise audible. Traffic faintly audible, cannot determine if is from Elizabeth drive or vehicles entering landfill site

Logger Setup Photo



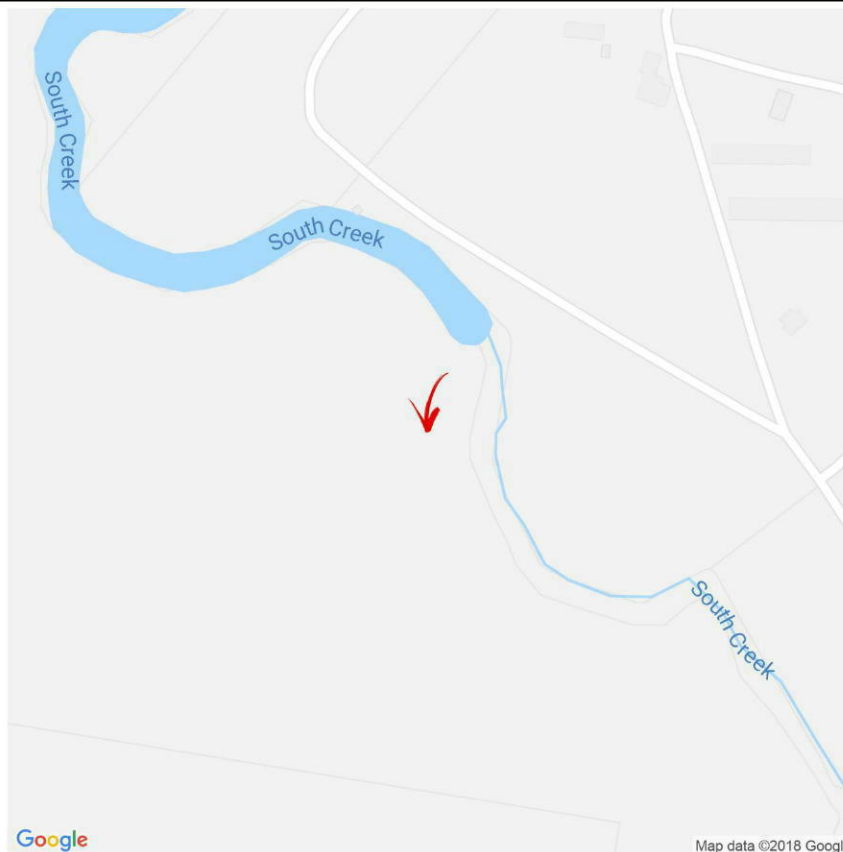
INP Noise Level, dB(A)

	Log Average	RBL
Day	47	34
Evening	40	33
Night	42	31

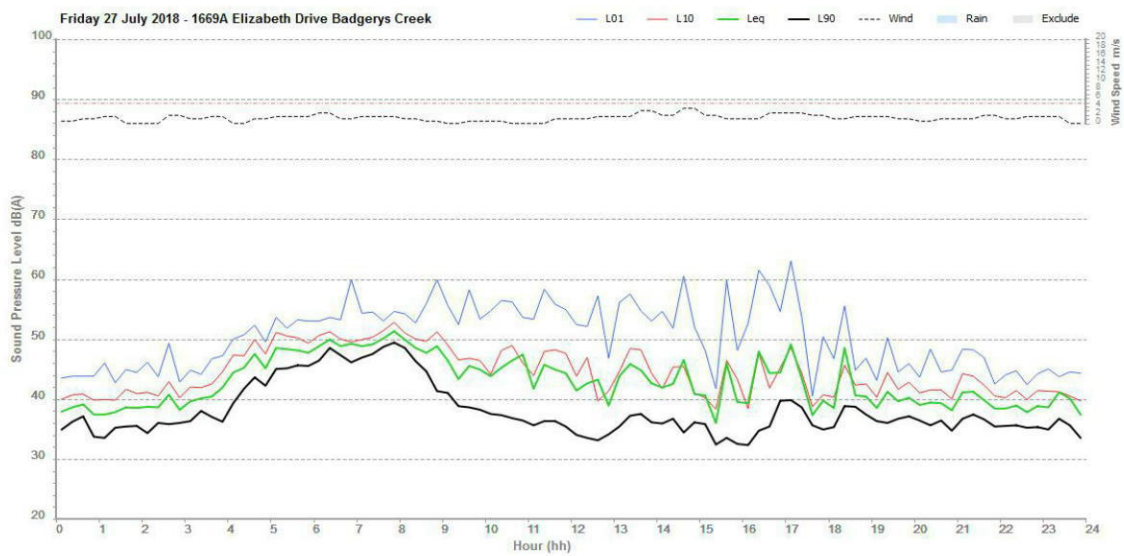
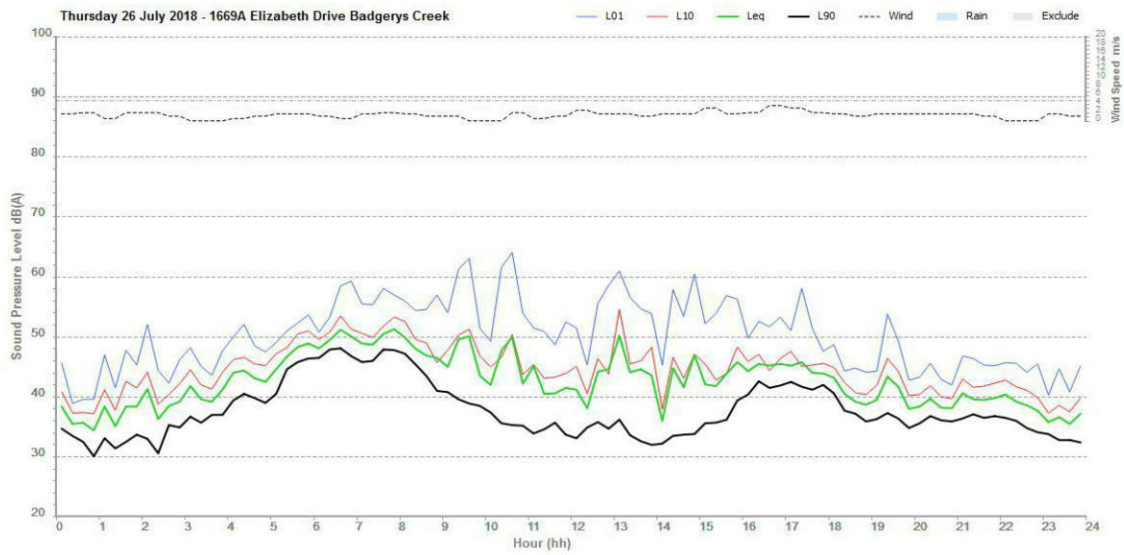
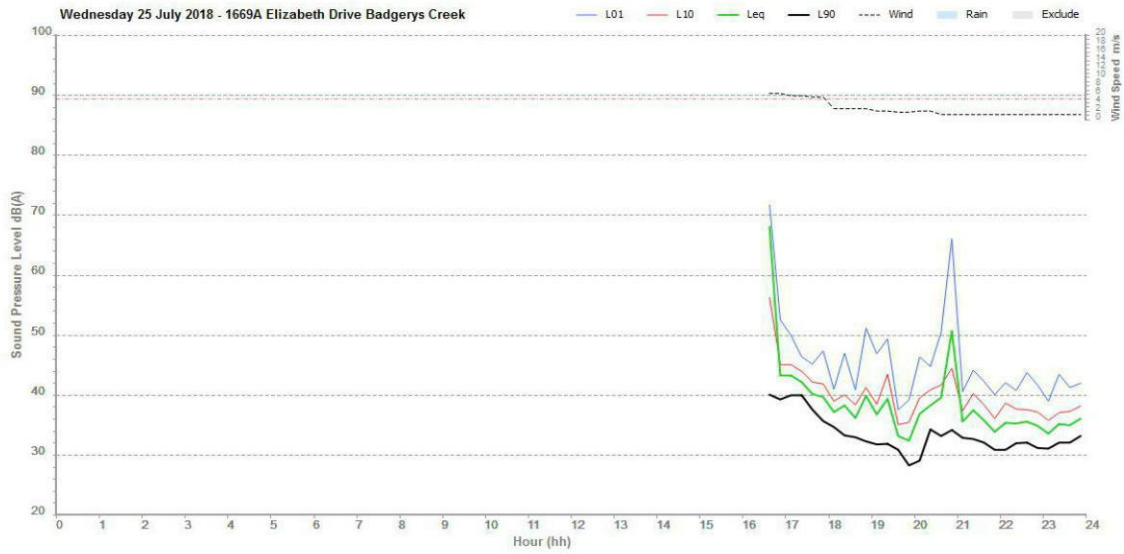
RNP Noise Level, dB(A)

	L_{Aeq(1hr)}	L_{Aeq(period)}
Day (7am - 10 pm)	-	-
Night (10pm - 7am)	-	-

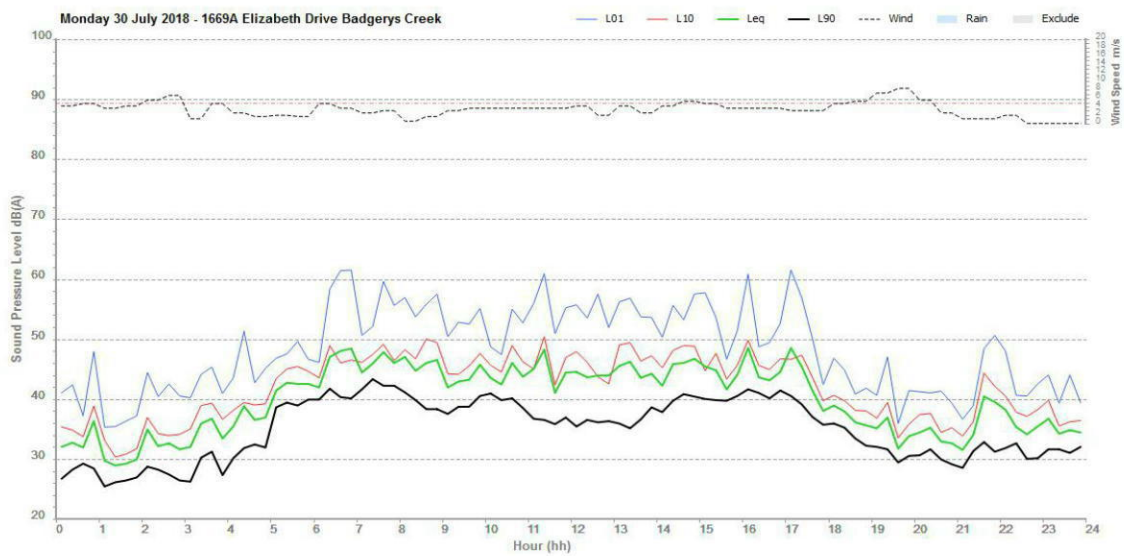
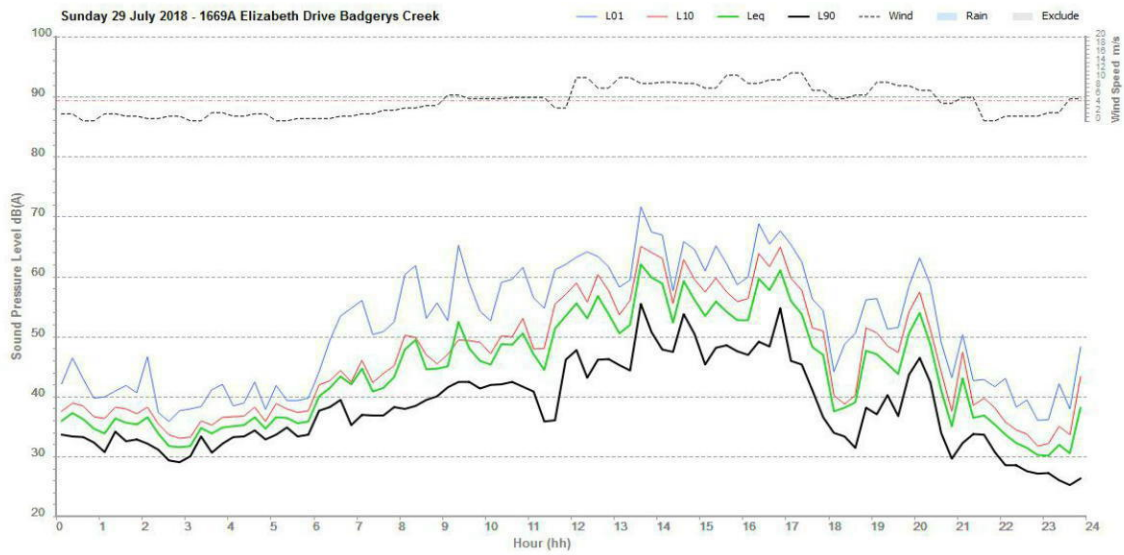
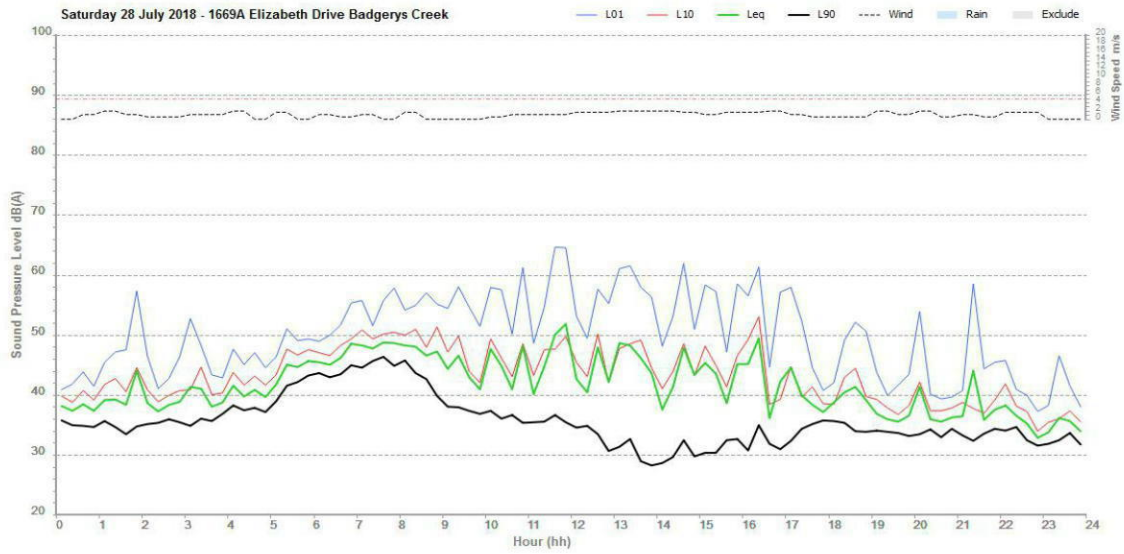
Logger Location Map



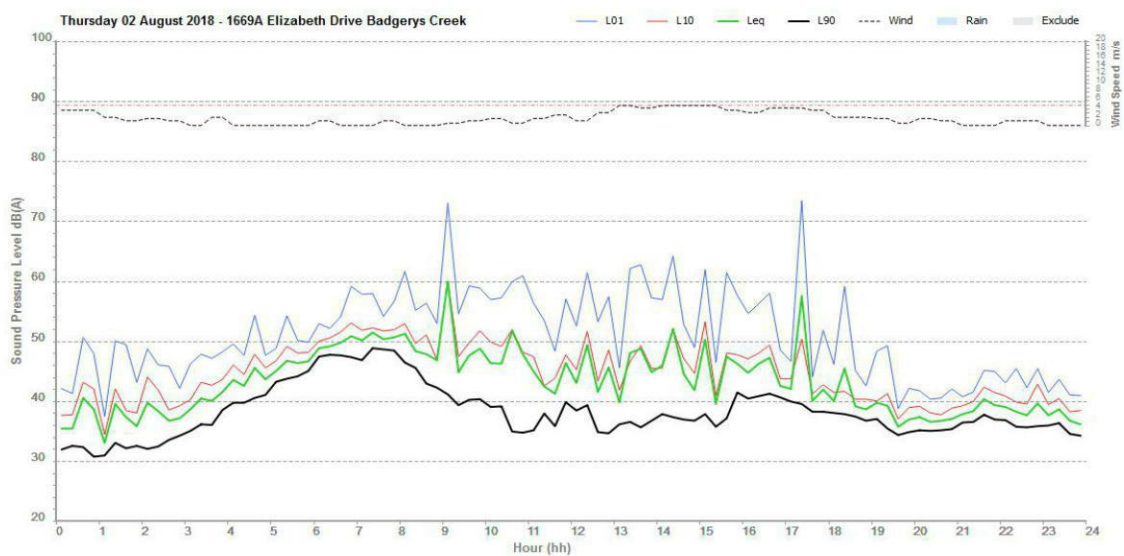
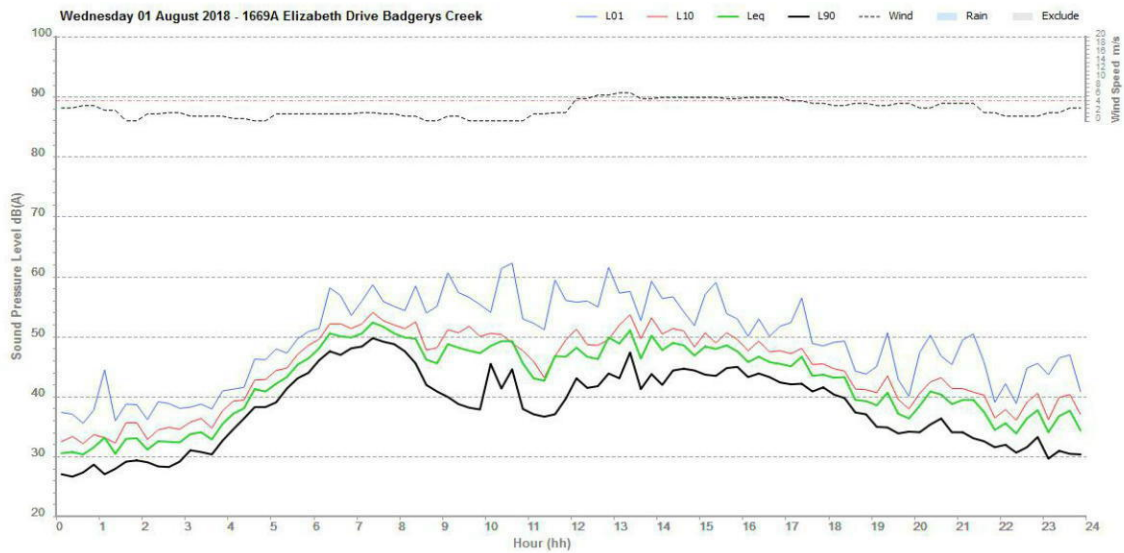
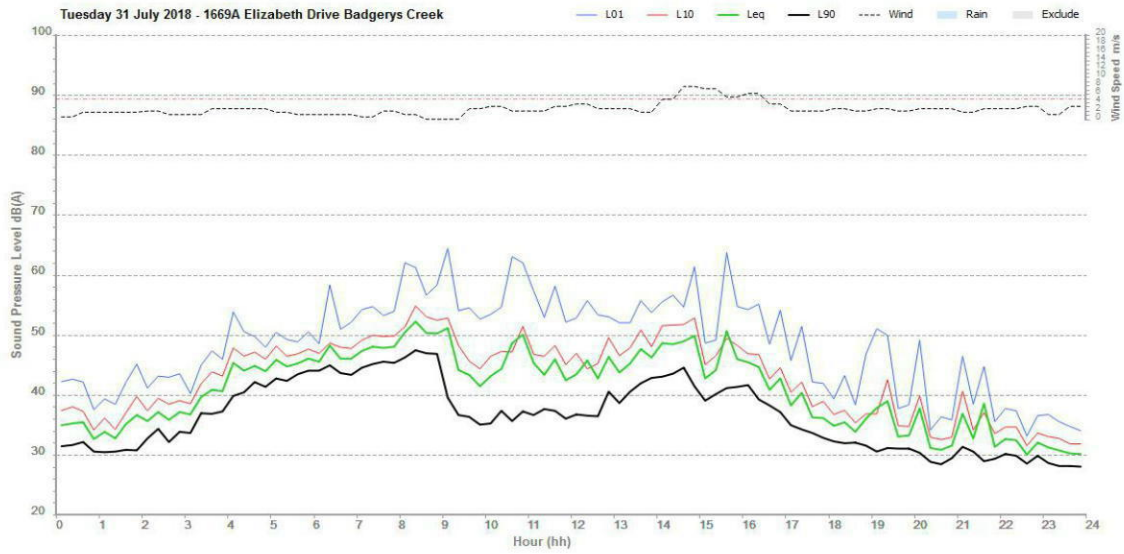
Logger Graphs



Logger Graphs



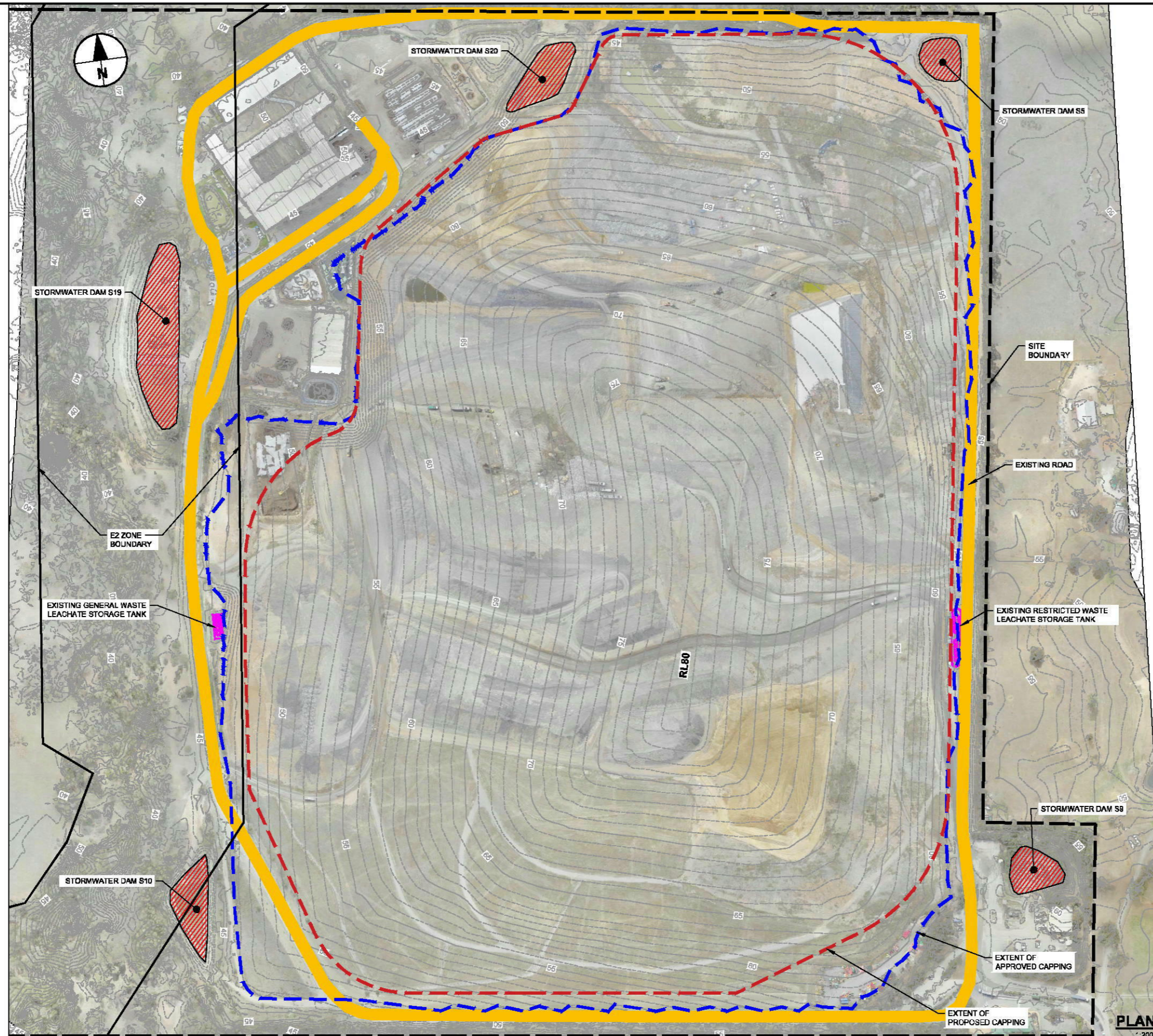
Logger Graphs



Logger Graphs



Annexure C – Approved (RL80) and Proposed (RL95) Ground Topography



- LEGEND:**
- 20 — EXISTING GROUND CONTOURS MAJOR (5m)
 - - - - - EXISTING GROUND CONTOURS MINOR (1m)
 - 20 — PROPOSED DESIGN CAP CONTOURS MAJOR (5m)
 - — — — — PROPOSED DESIGN CAP CONTOURS MINOR (1m)
 - — — — — SITE BOUNDARY
 - — — — — EXTENT OF APPROVED CAPPING
 - — — — — EXISTING ROAD
 - — — — — EXISTING STORMWATER POND
 - — — — — EXISTING LEACHATE STORAGE TANKS
 - — — — — EXTENT OF PROPOSED NEW CAPPING
 - — — — — EXTENT OF FUTURE PARKING/STORAGE AREA
 - — — — — EXTENT OF APPROXIMATE CATCHMENT
 - — — — — EXTENT OF STAGE FILLING BOUNDARY
 - — — — — PROPOSED ROAD
 - — — — — DIRECTION OF SHEET FLOW
 - — — — — BENCH DRAIN
 - — — — — SLOPE / SWALE DRAIN

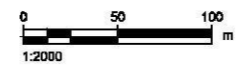
NOTE:
 EXISTING GROUND SURVEY IS A COMBINED SURVEY BASED ON SEPT 2018 SURVEY AND CURRENT APPROVED CAPPING SURFACE.

This drawing is confidential and shall only be used for the purpose of this project. The signing of this title block confirms the design and drafting of this project have been prepared and checked in accordance with the AECOM quality assurance system to ISO 9001-2000.

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 CONSULTANT
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 www.aecom.com

PROJECT
 SUEZ BADGERYS CREEK
 LANDFILL EXPANSION
 PROJECT

CLIENT
 SUEZ



PROJECT MANAGEMENT INITIALS

QL	CHECKED	APPROVED
DESIGNER		

PROJECT DATA

DATUM	AHD	SURVEY	MGA 56
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ISSUE/REVISION

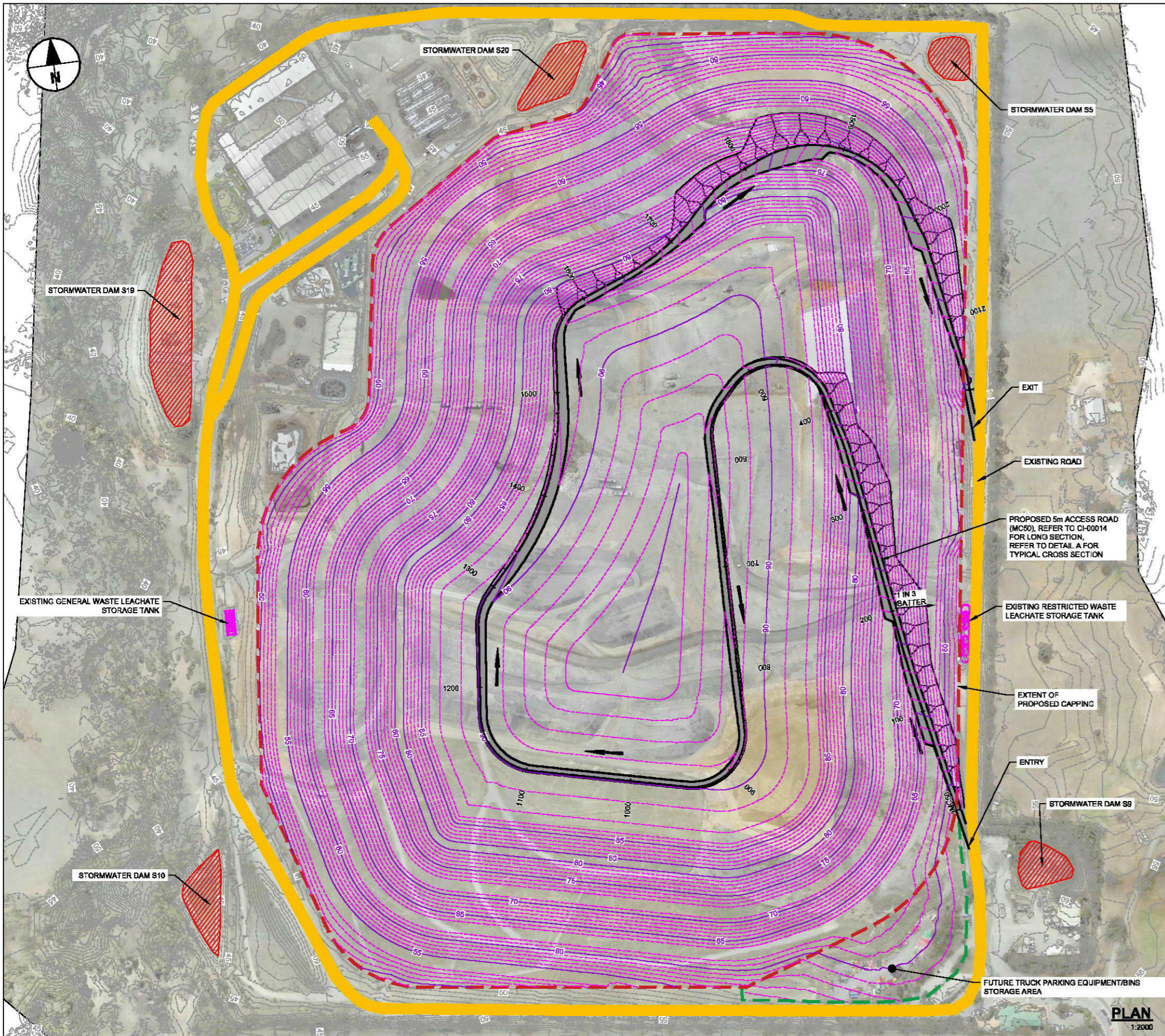
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A	01.11.2018	FINAL DRAFT
I/R	DATE	DESCRIPTION

PROJECT NUMBER
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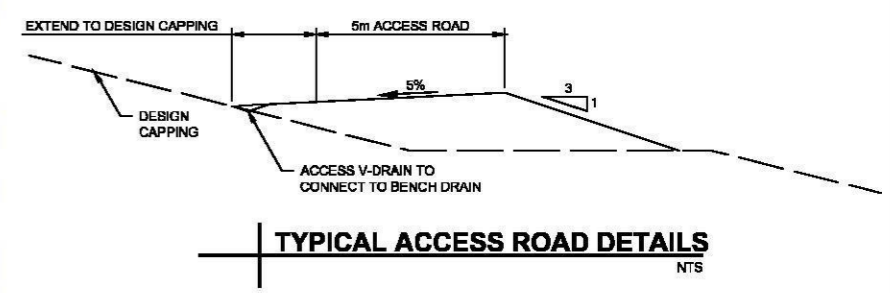
SHEET TITLE
 BADGERYS CREEK LANDFILL
 APPROVED FINAL LANDFORM

SHEET NUMBER
 60571292-SHT-CI-00003

PLAN
 2000



- LEGEND:**
- 20 — EXISTING GROUND CONTOURS MAJOR (5m)
 - - - - - EXISTING GROUND CONTOURS MINOR (1m)
 - 20 — PROPOSED DESIGN CAP CONTOURS MAJOR (5m)
 - - - - - PROPOSED DESIGN CAP CONTOURS MINOR (1m)
 - SITE BOUNDARY
 - EXTENT OF APPROVED CAPPING
 - EXISTING ROAD
 - EXISTING STORMWATER POND
 - EXISTING LEACHATE STORAGE TANKS
 - EXTENT OF PROPOSED NEW CAPPING
 - EXTENT OF FUTURE PARKING/STORAGE AREA
 - EXTENT OF APPROXIMATE CATCHMENT
 - EXTENT OF STAGE FILLING BOUNDARY
 - PROPOSED ROAD
 - DIRECTION OF SHEET FLOW
 - BENCH DRAIN
 - SLOPE / SWALE DRAIN



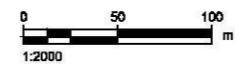
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PROJECT
 SUEZ BADGERYS CREEK
 LANDFILL EXPANSION
 PROJECT

CLIENT
 SUEZ



PROJECT MANAGEMENT INITIALS

QL		
DESIGNER	CHECKED	APPROVED

PROJECT DATA

DATUM	AHD	SURVEY	MGA 56
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ISSUE/REVISION

IR	DATE	DESCRIPTION
B	04.02.2019	FINAL DRAFT REVISED
A	01.11.2018	FINAL DRAFT

PROJECT NUMBER
 60571292

SHEET TITLE
 BADGERYS CREEK LANDFILL
 PROPOSED FINAL ACCESS ROAD
 ON PROPOSED FINAL LANDFORM

SHEET NUMBER
 60571292-SHT-CI-00013