



Appendix O. Noise and Vibration Assessment (Sonus, 2021)

Buronga Landfill Expansion

Noise and Vibration Assessment

S6801C3

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sonus.

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TABLE OF CONTENTS

1	INTRODUCTION.....	4
2	THE PROPOSED DEVELOPMENT	5
3	SUBJECT SITE AND SURROUNDING LOCALITY.....	6
4	EXISTING ACOUSTIC ENVIRONMENT	6
5	OPERATIONAL NOISE ASSESSMENT	7
5.1	Criteria	7
5.2	Assessment	9
6	TRAFFIC NOISE ASSESSMENT	12
6.1	Criteria	12
6.2	Assessment	13
7	VIBRATION IMPACT ASSESSMENT.....	15
7.1	Criteria	15
7.2	Assessment	16
8	CONCLUSION	18
	APPENDIX A – Subject Site and Surrounding Locality	19
	APPENDIX B – Noise Level Data.....	20
	APPENDIX C – Background Noise Monitoring Results	21

1 INTRODUCTION

An environmental noise and vibration assessment has been made of the proposed Buronga Landfill expansion located on Arumpo Rd, Buronga, NSW.

The Buronga Landfill is owned and operated by the Wentworth Shire Council (**the Council**). Council is seeking Development Approval to expand the site with the extent and intensity of the works expected to gradually increase as a result. An overview of the subject site and surrounding locality is provided in Appendix A.

The proposed development is a State Significant Development and therefore requires preparation of an Environmental Impact Statement (**EIS**). A preliminary Scoping Report was submitted with the request for the Planning Secretary's Environmental Assessment Requirements (**SEARS**), which identified requirements for additional studies to inform the EIS, including an assessment of the potential noise impacts of the proposal.

Specifically, the SEARS identified the following information to be provided:

- An assessment of potential impacts due to noise sources associated with the proposed landfill expansion, in accordance with the EPA's 2017 *Noise Policy for Industry* (**the Policy**);
- An assessment of potential noise impacts associated with traffic movements in accordance with the Department of Environment, Climate Change and Water's (DECCW's) 2011 *NSW Road Noise Policy* (**the Road Noise Policy**);
- Include recommendations for any required mitigation measures (e.g. appropriate equipment to minimise noise levels) in noise assessment reporting;
- Identify and include all residential or noise sensitive premises likely to be impacted by the development in the noise assessments;
- An assessment of vibration from all proposed construction and operational activities, which should be assessed in accordance with DEC's 2006 *Assessing Vibration: a technical guideline* (**the Guideline**).

This report details the assessment of the noise and vibration impacts of the proposal in accordance with the SEARS requirements identified above.

The assessment is based on the following:

- *Buronga Landfill Approvals Support – Concept Layout*, prepared by Tonkin, job number 20180746, dated 7/10/2020;
- *Buronga Landfill Expansion – Environmental Impact Statement (draft) for State Significant Development (SSD)* 10096818, prepared by Tonkin, reference 202597R04, dated 28 September 2021;
- Noise measurements and observations at the current facility conducted on the 6th of May 2021;
- Background noise monitoring in the vicinity of the subject site between the 6th and 14th of May 2021;
- The understanding that the hours of operation of the expanded facility will be consistent with those of the existing facility.

2 THE PROPOSED DEVELOPMENT

The proposed development (**the Project**) is to expand the waste management services provided by WSC at the Buronga Landfill. The development is proposed to include:

- upgrading the existing recycling infrastructure to provide a dedicated recycling facility, community resource recovery area and bulking up areas to improve recycling rates and economics of recycling (the *Front End Recycling Facility (FERF)*);
- constructing new landfill cells to the north of the existing landfill area, increasing the landfill footprint from 19 ha to approximately 40 ha. The expansion is proposed to be undertaken in eleven stages with each stage providing 3-5 landfill cells;
- increasing maximum waste volumes from 30,000 tonnes per annum to 100,000 tonnes per annum. Current waste acceptance from within the Wentworth Shire Council area is nearing the limit of 30,000 tonnes per annum. It is also proposed to offer these services to the surrounding local government areas, such as Balranald, Central Darling and Murray River and potentially interstate;

This Project is proposed to be staged and is anticipated to result in the life of the landfill site extending for over 100 years.

3 SUBJECT SITE AND SURROUNDING LOCALITY

The subject site is located at 258 Arumpo Road, Buronga. The existing operations are concentrated in the south-western portion of the site, with the proposed development seeking to significantly expand the area operations to the north and north-west.

The locality is sparsely populated, with nearby noise sensitive premises comprising rurally located residences predominantly to the south-west of the subject site at distances of at least approximately 750 metres from the boundary of the licensed area. Additional rurally located residences are also located to the south-east and north-east of the site at distances in excess of 900 metres and 2 kilometres respectively from the boundary of the licensed area.

Other existing noise sources within the locality comprise the existing landfill operations, a Bentonite clay mining operation opposite the subject site to the west across Arumpo Road, a gypsum operation (Morello gypsum) further north opposite the facility across Arumpo Road, farming activity to the south-west of the subject site (primarily to the west of Arumpo Road), and road traffic on Arumpo Road serving these facilities and as general transit.

An overview of the locality showing the licensed area, nearby noise sensitive receivers (residences) and other existing noise sources is provided in Appendix A.

4 EXISTING ACOUSTIC ENVIRONMENT

Background noise monitoring was conducted in the vicinity of the subject site between the 6th and 14th of May 2021, with the aim of characterising the existing ambient noise environment. The noise logger was sited to characterise the noise impact from other noise sources (as identified above) within the locality on nearby noise sensitive premises (existing residences), while avoiding the influence of the existing operations on the measured noise levels as far as practicable.

The results of the monitoring were used to derive *Project Intrusiveness Noise Levels* to inform the assessment of operational noise from the facility against the Policy (refer to Section 5 below). The location of the noise monitor is shown in Appendix A, with the results of the background noise monitoring presented in Appendix C.

5 OPERATIONAL NOISE ASSESSMENT

5.1 Criteria

Noise from industry within New South Wales is subject to the requirements of the *Noise Policy for Industry (the Policy)*. The Policy establishes the NSW Environment Protection Authority's (EPA's) requirements for the assessment and management of noise from industry in NSW. It aims to ensure that noise is kept to acceptable levels in balance with the social and economic value of industry in NSW.

5.1.1 Project Noise Trigger Levels

The Policy sets out the procedure to determine the *Project Noise Trigger Levels* relevant to a particular industrial development. The project noise trigger levels are the lower (that is, the more stringent) value of the *Project Intrusiveness Noise Levels* and *Project Amenity Noise Levels*. A Project Trigger Noise Level is applicable to each of the day (7:00am to 6:00pm), evening (6:00pm to 10:00pm) and night (10:00pm to 7:00am) periods.

The Project Noise Trigger Levels are levels that, if exceeded, would indicate a potential noise impact on the community, and so 'trigger' a management response; for example, further investigation of mitigation measures.

5.1.2 Project Intrusiveness Noise Levels

The intrusiveness of an industrial noise source is considered acceptable if the level of noise from the source (represented by the L_{Aeq} descriptor), measured over a 15-minute period, does not exceed the background noise level (represented by the L_{A90} descriptor) by more than 5 dB (when that background noise level is beyond a minimum threshold).

To account for the temporal variation of background noise levels, the *Rating Background Level (RBL)* is used in the assessment. The outcome of this approach aims to ensure that the intrusiveness noise level is being met for at least 90% of the time periods over which annoyance reactions can occur (taken to be periods of 15 minutes).

To inform calculation of the RBL applicable to the assessment, background noise monitoring was conducted in the vicinity of the site over a period of approximately 9 days between the 6th and 14th of June 2021. The results of the background noise monitoring are presented in Appendix C.

Based on the above, the *Project Intrusiveness Noise Levels* are as follows:

Table 1: Project Intrusiveness Noise Levels

Period	Measured RBL dB(A)	Minimum RBL dB(A)	Project Intrusiveness Noise Levels ($L_{Aeq,15min}$ dB(A))
Daytime (7:00am to 6:00pm)	26	35	40
Evening (6:00pm to 10:00pm)	17	30	35
Night-time (10:00pm to 7:00am)	16	30	35

Daytime – 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-time – the remaining periods.

5.1.3 Project Amenity Noise Level

The *Project Amenity Noise Level* is independent of the existing background noise environment and is aligned with the planning zone in which nearby noise sensitive premises with the potential to be impacted by the proposed development are located.

The *Project Amenity Noise Level* applicable to a new industrial development is 5dB(A) less than the applicable *Recommended Amenity Noise Level* which would otherwise apply. In this instance, all nearby noise sensitive premises are located within the “Rural 1” zone. As such, the following *Recommended Amenity Noise Levels* (as listed in Table 2.2 of the Policy), and the resulting *Project Amenity Noise Levels* applicable to the development apply to the development:

Table 2: Project Amenity Noise Levels

Receiver	Period	Recommended amenity noise level ($L_{Aeq,15min}$, dB[A])	Project amenity noise level ($L_{Aeq,15min}$, dB[A])
Residential	Daytime (7:00am to 6:00pm)	53	48
	Evening (6:00pm to 10:00pm)	48	43
	Night-time (10:00pm to 7:00am)	43	38

The Policy notes that the *Project Intrusiveness Noise Levels* are only applied to residential receivers (residences). For other receiver types identified in Table 2.2 of the Policy, only the amenity levels apply.

5.1.4 Criteria Summary

Based on the above, the following *Project Noise Trigger Levels* are applicable to the development, and have been used in the assessment. Note that as the hours of operation of the expanded facility are proposed to remain consistent with the current hours of operation (8:00am to 4:45pm Monday to Friday, and 9:00am to 4:45pm Saturday and Sunday), it is the daytime criterion that is most relevant to the assessment.

Table 3: Project Noise Trigger Levels summary

Receiver	Period	Project Trigger Level ($L_{Aeq,15min}$ dB[A])
Residential	Daytime (7:00am to 6:00pm)	40
	Evening (6:00pm to 10:00pm)	35
	Night-time (10:00pm to 7:00am)	35

5.2 Assessment

The noise levels at nearby residences resulting from the proposed site activity have been predicted based on noise measurements of the current operations at the existing facility on the 6/5/2021, and supplemented by a range of previous noise measurements and observations at other similar facilities. These include:

- operation of civil earthmoving equipment at the site, including a wheeled loader and an excavator;
- road truck movements;
- articulated dump truck movements;
- a road truck depositing waste material at the site;
- a dump truck depositing fill at the site; and,
- an air compressor.

Sound power levels for the above activities are provided in Appendix B.

The predictions have been made using the CONCAWE¹ noise propagation model implemented in the SoundPLAN computer noise modelling suite. Default noise-enhancing meteorological conditions consistent with those presented in Table D1 of Fact Sheet D of the Policy (stability category D, 2.5m/s from source to receiver) have been used for the assessment.

The predictions of noise from use of the facility have also been based on the following operational assumptions for the level of activity in any 15-minute² period. The below assumptions are based on the level of activity observed during the site visit on 6th May 2021 and adjusted to account for the increased intensity of operations expected to be associated with the expansion:

- Up to 2 road trucks accessing the site and depositing waste material;
- An additional road truck accessing the *front end recycling facility (FERF)* near the site entrance;
- Continuous operation of a wheeled loader processing waste throughout the assessment period;
- A single return dump truck movement between the excavator site, and the waste processing area;
- Continuous operation of an excavator throughout the assessment period;
- Continuous operation of the air compressor throughout the assessment period; and,
- Sound power levels presented in Appendix B.

Note that it has also been assumed that the mobile equipment fleet will be fitted with broadband reversing alarms.

To provide a conservative assessment, the above operations have been assumed to occur at the top of the cap within the first landfill cell to be developed (Stage 1A) located in the south-west corner of the expanded landfill footprint (and therefore closest to the nearest residences to the site). Lower noise levels would be expected to occur for later stages (which place operations further from the nearest residences), and for operations occurring at the bottom of the cell (where they will benefit from screening by previously developed landfill cells).

¹ Manning CJ 1981, "*Report no. 4/81: The propagation of noise from petrochemical complexes to neighbouring communities*", the oil companies' international study group for conservation of clean air and water in Europe (CONCAWE), Den Haag.

² Default assessment period of the Policy.

5.2.1 Corrections for Annoying Characteristics

The dominant noise sources are the excavator, front end loader and road trucks moving within the site. Review of the measurement data for these noise sources (including overall A and C-weighted levels and one-third octave band levels) indicates the potential for a low frequency characteristic to be associated with noise from the facility at nearby residences (as per Fact Sheet C of the Policy).

A low frequency character associated with a source will generally become more prominent with increasing distance from the source (such as at a distant receiver location) due to the lesser effect of atmospheric absorption on lower frequencies in comparison to higher frequencies. As such, a low frequency character would likely also be present at noise sensitive receiver locations where these sources are dominant.

In accordance with Fact Sheet C of the Policy, where any one-third octave band noise level exceeds the thresholds defined in Table C2 of the Policy by more than 5dB(A) a 5dB(A) positive adjustment applies to the evening/night periods and a 2dB(A) penalty applies to the daytime period.

On this basis a 2dB(A) positive adjustment has been applied to the predicted levels during the daytime period (noting that the existing and proposed hours of operation fall entirely within this period).

5.2.2 Predicted Noise Levels

Based on the above, the highest noise level predicted at an existing residence is 38dB(A) (including a 2dB(A) correction for a low frequency characteristic as discussed above) at the nearest residence to the south-west, achieving compliance with the project noise trigger level of 40dB(A).

Note that this outcome is based on the conservative scenario described above which places all activities at the top of the landfill cell closest to residences to the south-west (where operations will not be screened from nearby residences). Lower noise levels are predicted at other residences further from the site, and for other operational scenarios which place noise sources further from the nearest residence or lower in the landfill cell such that they benefit from screening by the previously completed landfill cells.

6 TRAFFIC NOISE ASSESSMENT

6.1 Criteria

Road traffic noise associated with new road projects, redevelopment of existing road corridors or land use changes associated with a significant increase in traffic on the existing road network is subject to the *NSW Road Noise Policy (the Road Noise Policy)*. The Road Noise Policy establishes the NSW *Department of Environment, Climate Change and Water's* (DECCW's) requirements for the assessment of noise impacts associated with road projects. The primary purpose of the Road Noise Policy is to provide assessment criteria for road traffic noise based on protecting amenity and wellbeing.

The noise descriptors used by the Road Noise Policy in assessment of road traffic noise are based on average equivalent noise levels (L_{Aeq}) for the day (15-hour period between 7am and 10pm) and for the night (9-hour period between 10pm and 7am). Different criteria apply depending on the type of road (freeway/arterial/sub-arterial road or local road), type of noise sensitive receiver (residential or non-residential), and whether the assessment relates to a new or an existing road (either redevelopment of an existing road or additional traffic on an existing road).

The relevant assessment criteria based on the road category (local road), receiver type (existing residences) and project type (non-road project contributing to increased traffic on the road network) are presented below:

Table 4: Road noise criteria

Road Category	Type of project / land use	Assessment criteria [dB(A)]	
		Day (7:00am to 10:00pm)	Night (10:00pm to 7:00am)
Local roads	6. Existing residences affected by additional traffic on existing local roads generated by land use developments	$L_{Aeq, 1 \text{ hour}} \leq 55$ (external)	$L_{Aeq, 1 \text{ hour}} \leq 50$ (external)

Relative Increase Criterion

In addition to the assessment criteria outlined in the above table, any increase in the total traffic noise level at a location due to a proposed project or traffic-generating development would usually be considered against the Relative Increase Criterion (RIC). However; as the only road expected to be impacted by the proposed land use change is categorised as a 'local road', the RIC does not apply and is therefore not relevant to this assessment.

6.2 Assessment

An assessment has been made of the road traffic noise impacts expected to be associated with the proposed development.

The primary access route to the expanded facility will remain consistent with the existing facility. That is, access to the site will be via Arumpo Road. As the majority of the major population centres serviced by the facility are located to the south, consistent with the current facility the majority of the vehicles accessing the site would be expected to travel to/from the site along Arumpo Road to the south.

As the purpose of the development is to realise additional landfill capacity due to the site approaching capacity, it is not anticipated that the development would result in a significant increase in traffic on the local road network in the short to medium term, even with a gradual increase in intensity of the works on-site.

Nonetheless, an assessment of the road traffic noise impacts associated with the proposal has been undertaken based on the peak site traffic generation predicted in the Traffic Impact Assessment (TIA) prepared for the project and detailed within the EIS. The TIA predicts the following traffic volumes to be associated with the project:

Table 5: Daily traffic volumes (vehicles/day) generated by the Project

Vehicle Type	Daily Traffic Volumes (vehicles/day) for Each Scenario							
	Current Operation		Current Operation + Construction		Future Operation		Future Operation + Construction	
	Average	Peak	Average	Peak	Average	Peak	Average	Peak
Light Vehicles	30	48	45	72	46	74	61	98
Light Rigid Trucks	4	6	5	8	15	24	16	26
Heavy Rigid Trucks	21	34	22	35	81	130	82	131
Articulated Trucks	1	2	3	5	2	3	4	6
TOTAL	56	90	75	120	144	230	163	261

Based on the above, a peak daily traffic volume of 261 vehicles per day is associated with the 'Future Operation plus Construction' scenario, representing the 'worst case' scenario in terms of road traffic noise generated by the Project.

To enable a comparison of the above scenario against the requirements of the Road Noise Policy, road traffic noise levels associated with the above scenario have been predicted at residences in the vicinity of Arumpo Road to the south of the site have been predicted using the SoundPLAN noise modelling suite. The predictions have been generated based on the posted speed limit of 100km/h which applies to Arumpo Road for the 600 metres south of the site entrance gate (and 80km/h beyond this point), and take into account the mix of vehicle types presented for the 'peak' Future Operation plus Construction scenario provided in Table 5 above.

Based on the predictions, a 1-hour average noise level ($L_{Aeq, 1 \text{ hour}}$) of 51 dB(A) is predicted at the most affected house, comfortably in compliance with the 55 dB(A) criterion applicable under the Road Noise Policy.

For residences further from Arumpo Road, or those in the vicinity of Arumpo Road to the north of the site entrance lower noise levels are predicted.

Based on the above, the proposed development will comfortably achieve the assessment criteria, and therefore satisfy the Road Noise Policy.

7 VIBRATION IMPACT ASSESSMENT

7.1 Criteria

Vibration assessments are typically separated into two categories, comprising levels at which the vibration might be felt to cause annoyance and concern, and levels at which building or infrastructure damage might occur.

The vibration levels associated with human annoyance occurs at a lower threshold than those associated with structural damage. As such, vibration which achieves compliance with human annoyance criteria will also achieve structural damage criteria. Ongoing vibration impacts from the operational phase of a project are typically assessed against human annoyance criteria.

For construction activities, vibration impacts are typically assessed in terms of structural damage criteria. This approach acknowledges that vibration from construction usually occurs over a limited timeframe, and that achieving human perception criteria which seek to minimise vibration impacts to imperceptible levels may be difficult or impractical to achieve in some circumstances.

As identified by the SEARS, an assessment of vibration from all proposed construction and operational activities against DEC's 2006 *Assessing Vibration: a technical guideline* (**the Guideline**) is required.

The Guideline presents preferred and maximum vibration values for use in assessing human responses to vibration and provides recommendations for measurement and evaluation techniques. The Guideline is based on guidance contained in BS 6472:1992 "*Guide to Evaluation of Human Exposure to Vibration in Buildings (1 Hz To 80 Hz)*", and is widely used both within NSW and interstate for the assessment of vibration impacts.

The Guideline provides the following criteria to be met at nearby vibration sensitive locations (residences) for continuous and impulsive vibration:

Table 6: Summary of Guideline vibration criteria applicable to the assessment

	x and y axes rms acceleration (m/s ²)		z axis rms acceleration (m/s ²)	
	Preferred	Preferred	Preferred	Maximum
Continuous vibration				
Residences – Daytime	0.0071	0.014	0.010	0.020
Residences – Night-time	0.005	0.010	0.007	0.014
Impulsive vibration				
Residences – Daytime	0.21	0.42	0.30	0.60
Residences – Night-time	0.071	0.14	0.10	0.20

As the above criteria are based around human annoyance, compliance with the above will also ensure that structural damage is unlikely to occur.

7.2 Assessment

As the activities currently conducted on-site (and expected to continue on-site following the expansion) are generally continuous sources of vibration, the vibration expected to arise from these activities has been assessed against the continuous vibration criteria presented in the above table using the ‘screening method’ detailed in Appendix A of the Guideline. The Guideline notes that the use of the screening represents a conservative approach to demonstrating compliance or the need to use the more precise approach using appropriate frequency weightings. As the hours of operation of the expanded facility will be between 8:00am and 4:45pm, only the ‘daytime’ criteria are relevant to the assessment.

Vibration in terms of acceleration (in m/s²) was measured for the processes currently occurring on-site (and proposed to continue following the expansion) expected to generate the highest levels of vibration, including the following:

- Wheeled loader operating at high and low power settings at a distance of 100 metres;
- Dump truck moving and dumping fill at a distance of 50 metres.

Given the nature of the project (being expansion of a landfill site), there will not be a defined construction phase (rather the existing operations comprising placement of waste material and capping with fill derived from elsewhere within the site will be relocated into the expanded footprint). As such, the above activities are expected to be representative of those associated with all phases of the project, albeit closer to the

nearest vibration sensitive receiver locations (residences) than activities within the expanded site footprint to the north.

The results of the measurements and the corresponding 'preferred' acceleration criteria are presented below:

Table 7: Summary of vibration monitoring results

Vibration Source	X axis		Y axis		Z axis	
	Measured (rms, m/s ²)	Criteria (rms, m/s ²)	Measured (rms, m/s ²)	Criteria (rms, m/s ²)	Measured (rms, m/s ²)	Criteria (rms, m/s ²)
Loader – lower power	0.001	0.0071	0.003	0.0071	0.001	0.01
Loader – higher power	0.001	0.0071	0.002	0.0071	0.001	0.01
Dump truck	0.002	0.0071	0.002	0.0071	0.001	0.01

Based on the above, the 'preferred' rms acceleration levels are comfortably achieved for the processes currently occurring on-site at distances in the order of 50-100 metres (noting that assessment of unweighted vibration levels against the Guideline preferred levels represents a conservative approach). As the nearest residence is greater than 900 metres from the existing operations (and will be even further from the expanded operations), vibration levels at nearby residences will be even lower than those measured.

As the expanded operations will utilise the same processes as the existing operations, and will occur further from the nearest vibration sensitive receivers to the south-west, even lower levels of vibration are anticipated to result from the expansion. On this basis, vibration from the proposed expansion will comfortably meet the requirements of the Guideline.

8 CONCLUSION

An environmental noise and vibration assessment has been made of the proposed Buronga Landfill expansion located on Arumpo Rd, Buronga, NSW.

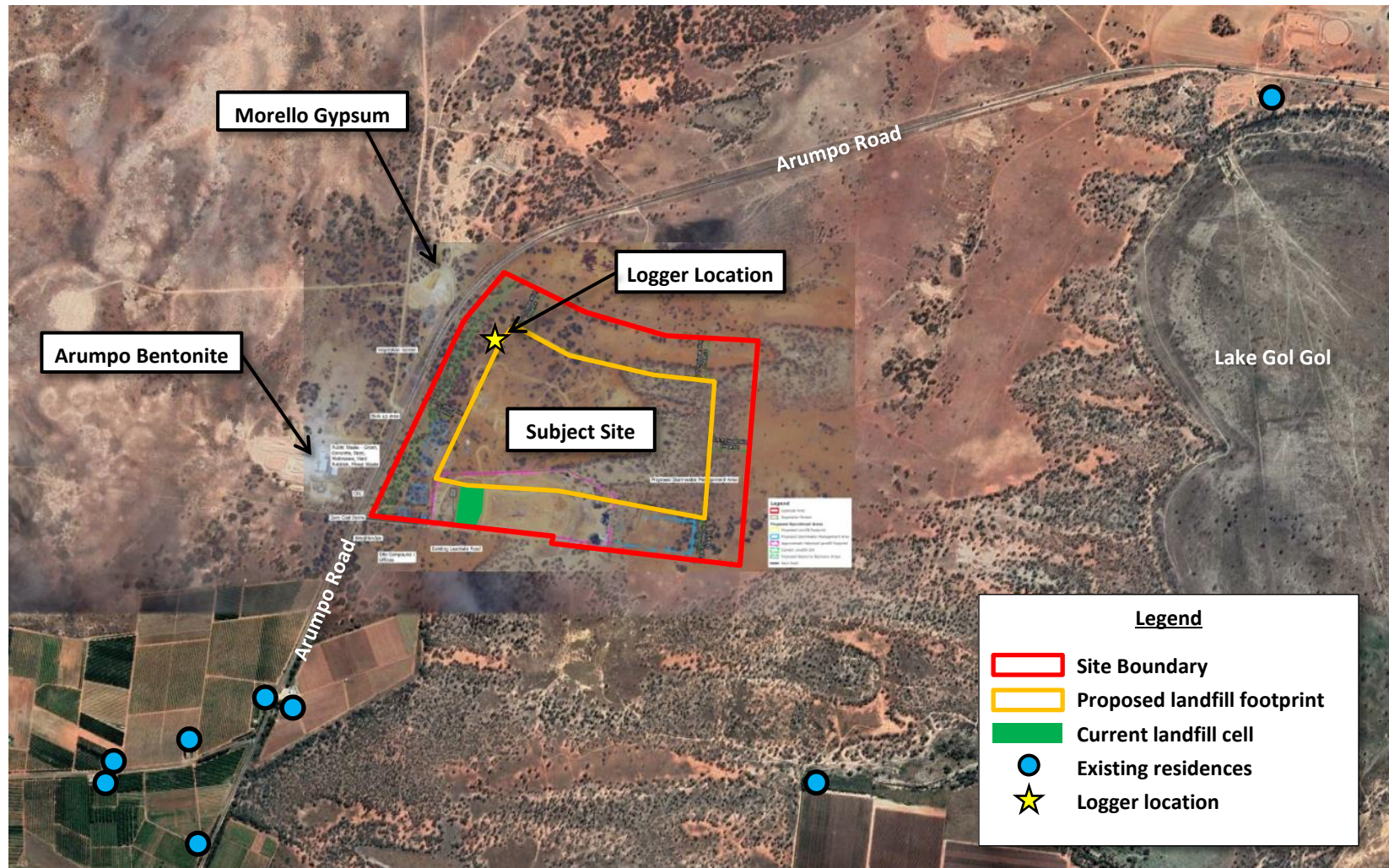
The expansion seeks to realise additional landfill capacity due to the current site footprint approaching its capacity. The intensity of the works currently being undertaken on-site is therefore expected to increase gradually as a result of the expansion.

The noise and vibration assessment has comprised the following:

- Establishment of objective noise and vibration criteria in accordance with the requirements of the SEARS;
- Identification of the sources of noise and vibration associated with the expansion;
- Prediction of operational noise and vibration impacts, and prediction of road traffic noise impacts associated with the expansion (as required by the SEARS);
- Evaluation of the predicted impacts against the established criteria.

Based on the assessment, noise and vibration impacts are predicted to achieve the objective criteria established in accordance with the relevant policies and guidelines as required by the SEARS without the requirement for any noise or vibration mitigation measures.

APPENDIX A – Subject Site and Surrounding Locality



APPENDIX B – Noise Level Data

Activity		Sound Power Level
Operational noise sources	Road truck moving within site at 20 km/h	112 dB(A)
	Truck unloading skip	116 dB(A)
	Front End Loader – high power	113 dB(A)
	Front End Loader – low power	107 dB(A)
	Dump Truck moving within site at 20 km/h	112 dB(A)
	Dump Truck reversing and dumping fill	101 dB(A)
	Excavator	108 dB(A)
	Compressor	99 dB(A)
Road traffic noise sources	Peak <i>Future Operation + Construction</i> (TNM, per metre 80km/h)	63 dB(A)
	Peak <i>Future Operation + Construction</i> (TNM, per metre 100km/h)	65 dB(A)
	Road truck moving on road at 80 km/h	111 dB(A)

APPENDIX C – Background Noise Monitoring Results

