

Appendix C

Noise assessment

Genesis Xero Waste

Noise and Vibration Impact Assessment | Modification 6

Prepared for Dial A Dump Industries Pty Limited | 13 September 2017



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Final

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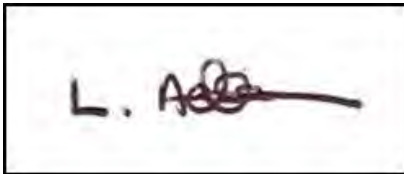
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Date 13 September 2017

Date 13 September 2017

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1 Introduction

1.1 Background

The Proponent operates the Genesis Xero Waste Facility (the Facility) at Eastern Creek in the Blacktown Local Government Area (LGA). The Facility is located at 1 Kangaroo Avenue and comprises a Resource Recovery Facility (RRF) and a general solid waste (non-putrescible) landfill. The RRF includes a Materials Processing Centre (MPC) and a Waste Transfer Station. The site currently operates under project approval MP 06_0139 and environment protection licences (EPLs) 13426 and 20121.

The proponent proposes to modify MP 06_0139 to alter the hours of operation and remove the yearly limit on the quantity of waste that can be landfilled (Modification 6). This will enable the Facility to accept the waste streams that will be generated during major construction projects, some of which will be generated outside standard construction hours. This would not necessitate any modifications/alterations to the existing site infrastructure, production equipment or approved Facility footprint.

This report presents the results and findings of a noise assessment which has been prepared to accompany the modification with reference to the following guidelines and policies:

- the *NSW Industrial Noise Policy* (EPA 2000) (INP);
- the *NSW Industrial Noise Policy Application Notes* (EPA 2013); and
- the *NSW Road Noise Policy* (EPA 2011) (RNP).

This noise assessment also evaluates the existing level of noise from the site in accordance with the methodology outlined in the INP and associated Application Notes for the assessment of noise from existing industrial premises.

1.2 Secretary's Environmental Assessment Requirements

Secretary's Environmental Assessment Requirements (SEARs) were issued for the proposed modification. The specific requirements and where they have been addressed in this NIA are provided in Table 1.1.

Table 1.1 SEARs

Key issue	Requirement	Section addressed
Department of Planning & Environment		
Noise	An assessment of any potential impacts as a result of noise and vibration on all surrounding receivers, and including an assessment based on the EPA's <i>NSW Road Noise Policy</i>	Section 5
NSW Environment Protection Authority		
Noise	Noise and vibration Impacts on all receivers from not only on site activities but also from traffic on local roads.	Section 5
Blacktown City Council		
Noise	An acoustic assessment must be conducted that explicitly outlines the expected noise levels at all affected receivers, and satisfies the noise criteria outlined in the EPA Licence 20121	Section 5

1.3 Glossary of acoustic terms

A number of technical terms are required for the discussion of noise. These are explained in Table 1.2.

Table 1.2 Glossary of acoustic terms

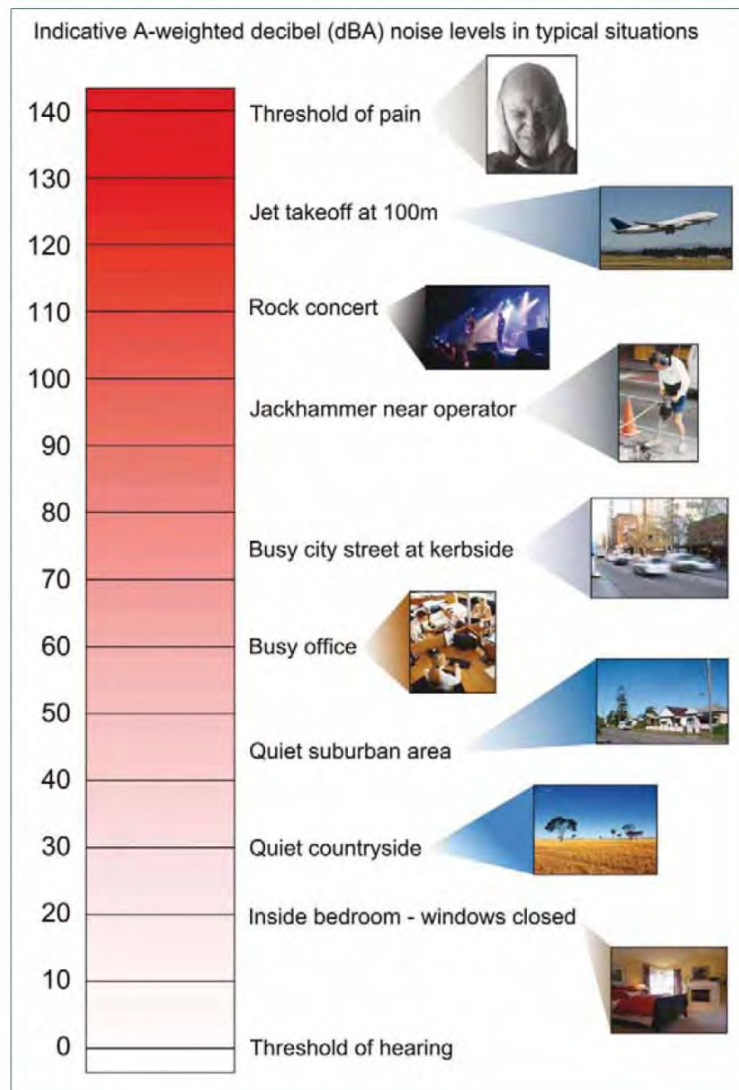
Term	Description
dB	Noise is measured in units called decibels (dB). There are several scales for describing noise, the most common being the 'A-weighted' scale. This attempts to closely approximate the frequency response of the human ear.
L_{A1}	The noise level exceeded for 1% of a measurement period.
L_{A10}	A noise level which is exceeded 10% of the time. It is approximately equivalent to the average of maximum noise levels.
L_{A90}	Commonly referred to as the background noise, this is the level exceeded 90% of the time.
L_{Aeq}	It is the energy average noise from a source, and is the equivalent continuous sound pressure level over a given period. The $L_{eq,15\text{ minute}}$ descriptor refers to an Leq noise level measured over a 15-minute period.
L_{Amax}	The maximum root mean squared sound pressure level received at the microphone during a measuring interval.
L_{Amin}	The minimum root mean squared sound pressure level received at the microphone during a measuring interval.
RBL	The Rating Background Level (RBL) is an overall single value background level representing each assessment period over the whole monitoring period.
Sound power level	This is a measure of the total power radiated by a source. The sound power of a source is a fundamental property of the source and is independent of the surrounding environment.
Temperature inversion	A positive temperature gradient. A meteorological condition where atmospheric temperature increases with altitude.

It is useful to have an appreciation of decibels, the unit of noise measurement. Table 1.3 gives an indication as to what an average person perceives about changes in noise levels.

Table 1.3 Perceived change in noise

Change in noise level (dB)	Perceived change in noise
Up to 2	typically indiscernible
3	just perceptible
5	noticeable difference
10	twice (or half) as loud
15	large change
20	four times (or quarter) as loud

Examples of common noise levels are provided in Figure 1.1.



Source: Road Noise Policy (Department of Environment, Climate Change and Water (DECCW) 2011).

Figure 1.1 Common noise levels

2 Project and site description

2.1 Background

The site is located at the end of Honeycomb Drive on Lot 1 DP 1145808 and Lot 8 DP 1200048 in Eastern Creek, which is in the Blacktown LGA, as shown in Figure 2.1. The site is surrounded by Kangaroo Avenue to the east and north-east, the Western Motorway to the north, Archbold Road to the west and open grassland to the south.

Further afield there is residential development in Minchinbury beyond the Western Motorway to the north and in Erskine Park beyond Archbold Road to the west, and predominantly undeveloped land containing high voltage powerlines to the west and south-west.

The site is permitted to receive and process 2 million tonnes per annum (Mtpa) of construction, demolition, commercial and industrial waste and green waste clean ups for resource recovery and landfill. A total of 700,000 tpa of resource recovery process rejects and special waste (asbestos) are permitted to be sent to landfill at the site. The Facility comprises:

- access and internal roads;
- weighbridge and material inspection area;
- materials processing centre (MPC) and approved but yet to be constructed pre-sort enclosure (PSE) which are large sheds where material is unloaded and fed into the processing plant;
- segregated material area (SMA) where materials such as bricks, concrete and sand are stockpiled directly from client trucks or from the MPC and reprocessed into saleable products such as aggregates and sands; and
- asbestos discovered during pre-processing and landfill rejected during the resource recovery process are applied to the base of a former quarry. Incoming loads pre-classified as special waste are directed straight to the landfill for immediate disposal and covering.

2.2 The proposal

The purpose of Modification 6 is to modify the operational hours and to allow greater flexibility in relation to the waste volume permitted to landfill.

For the most part, operations at the Facility will continue in accordance with MP 06_0139, as amended. There will be no modification to the maximum volume of waste that may be accepted in a single year.

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The operating hours are proposed to be changed to meet the demand of large infrastructure 24-hour construction projects such as motorways and to enable maintenance and cleaning outside of standard hours so that plant is more available during standard hours. The approved and proposed operating hours are outlined in Table 2.1.

Table 2.1 **Approved and proposed hours**

Activity	Sub-activity	Approved hours		Proposed hours	
		Days	Hours	Days	Hours
Operations (waste deliveries, processing and landfilling)					
MPC and PSE	Receive materials	Monday-Friday Saturday, Sunday and public holidays	7am-6pm 8am-4pm	Monday-Sunday	24 hours
	Operations	Monday-Sunday Saturday, Sunday and public holidays	6am-10pm 6am-4pm	Monday-Sunday	24 hours
SMA	Receive materials	Monday-Friday Saturday, Sunday and public holidays	7am-6pm 8am-4pm	Monday-Sunday	24 hours
	Crushing and screening	Monday-Friday Saturday, Sunday and public holidays	7am-6pm 8am-4pm	Monday-Sunday	6am-6pm
Landfill	Receive materials by truck	Monday-Sunday Saturday, Sunday and public holidays	7am-6pm 8am-4pm	Monday-Sunday	5am-9pm
	Convey waste from MPC to landfill via chute	Monday-Friday Saturday, Sunday and public holidays	7am-6pm 8am-4pm	Monday-Sunday	24 hours
Maintenance					
MPC and PSE	Repair machinery	Not specified		Monday-Sunday	24 hours
SMA	Cleaning and machinery repairs	Not specified		Monday-Sunday	24 hours
Chute	Clearing of blockages and general repairs	Not specified		Monday-Sunday	24 hours

The limit on landfilling volumes of 700,000 tpa is proposed to be removed. This will not change the cap on volumes of 2 Mtpa approved to be received at Genesis. Removal of the cap will allow Genesis operational flexibility to meet the increased demand of more special waste during the aforementioned major construction projects.

2.3 Current noise limits

Noise assessment criteria for the site are stipulated in the sites development consent and two EPLs.

2.3.1 Project Approval MP 06_0139

Condition 38 of MP 06_0139 details noise impact assessment criteria for daytime, evening and morning shoulder periods. The condition regarding noise is reproduced as follows:

Noise Impact Assessment Criteria

38. The Proponent shall ensure that noise from the project does not exceed the noise limits in Table 4.

Table 4: Development Noise Limits (dBA)

Location	Day $L_{Aeq,15\text{ minute}}$ dB	Evening $L_{Aeq,15\text{ minute}}$ dB	Morning Shoulder $L_{Aeq,15\text{ minute}}$ dB
Any receiver	37	36	36

38a. Noise generated by the project is to be measured in accordance with the relevant requirements and exemptions (including certain meteorological conditions) of the latest version of the NSW Industrial Noise Policy.

MP 06_0139 defines day as the period from 7 am to 6 pm on Monday to Saturday, and 8 am to 6 pm on Sundays and Public Holidays, evening as the period from 6 pm to 10 pm and morning shoulder as the period from 6 am to 7 am on Monday to Saturday, and 6 am to 8 am on Sunday and Public Holidays.

2.3.2 EPL 13426 & EPL 20121

Condition L4.1 of EPLs 13426 and 20121 details the site generated noise limits for the nearest affected receivers in Minchinbury and Erskine Park.

Condition L4.1 of EPL 13426 regarding noise is reproduced as follows:

L4.1 Noise generated from the Landfill must not exceed the noise limits presented in the table below:

Residence Location	Day $L_{Aeq,15\text{ minute}}$ dB	Noise Criteria $L_{Aeq,15\text{ minute}}$ dB
Nearest affected receiver (Minchinbury)	36	36
Nearest affected receiver (Erskine Park)	36	36

Condition L4.1 of EPL 20121 regarding noise is reproduced as follows:

L4.1 Noise generated from the Landfill and Resource Recovery Facility must not exceed the noise limits presented in the table below:

Residence Location	Day $L_{Aeq,15\text{ minute}}$ dB	Night $L_{Aeq,15\text{ minute}}$ dB
Nearest affected receiver (Minchinbury)	36	35
Nearest affected receiver (Erskine Park)	36	35

It is of note that EPL 20121 specifies a night-time noise criteria of $L_{Aeq,15\text{ minute}}$ 35 dB while EPL 13426 has no mention of night-time noise criteria. The daytime noise criteria in both EPLs are consistent (ie $L_{Aeq,15\text{ minute}}$ 36 dB). It should also be noted that daytime and night-time are defined differently in the EPLs.

- In EPL 13426, daytime is defined as 7:00 am to 6:00 pm from Monday to Friday and 8:00 am to 4:00 pm on Saturdays, Sundays and public holidays. These hours are generally consistent with EPA policy. No night-time hours are specified.
- In EPL 20121, daytime is defined as 6:00 am to 6:00 pm from Monday to Friday and 8:00 am to 4:00 pm on Saturdays, Sundays and public holidays while night-time is defined as 6:00 pm to 6:00 am. This definition appears to include a morning shoulder period.

It is also of note that the noise limits in the project approval are inconsistent with those in the EPLs. Given that the Department of Planning & Environment (DP&E) is the approval authority, its consent should supersede the EPLs.



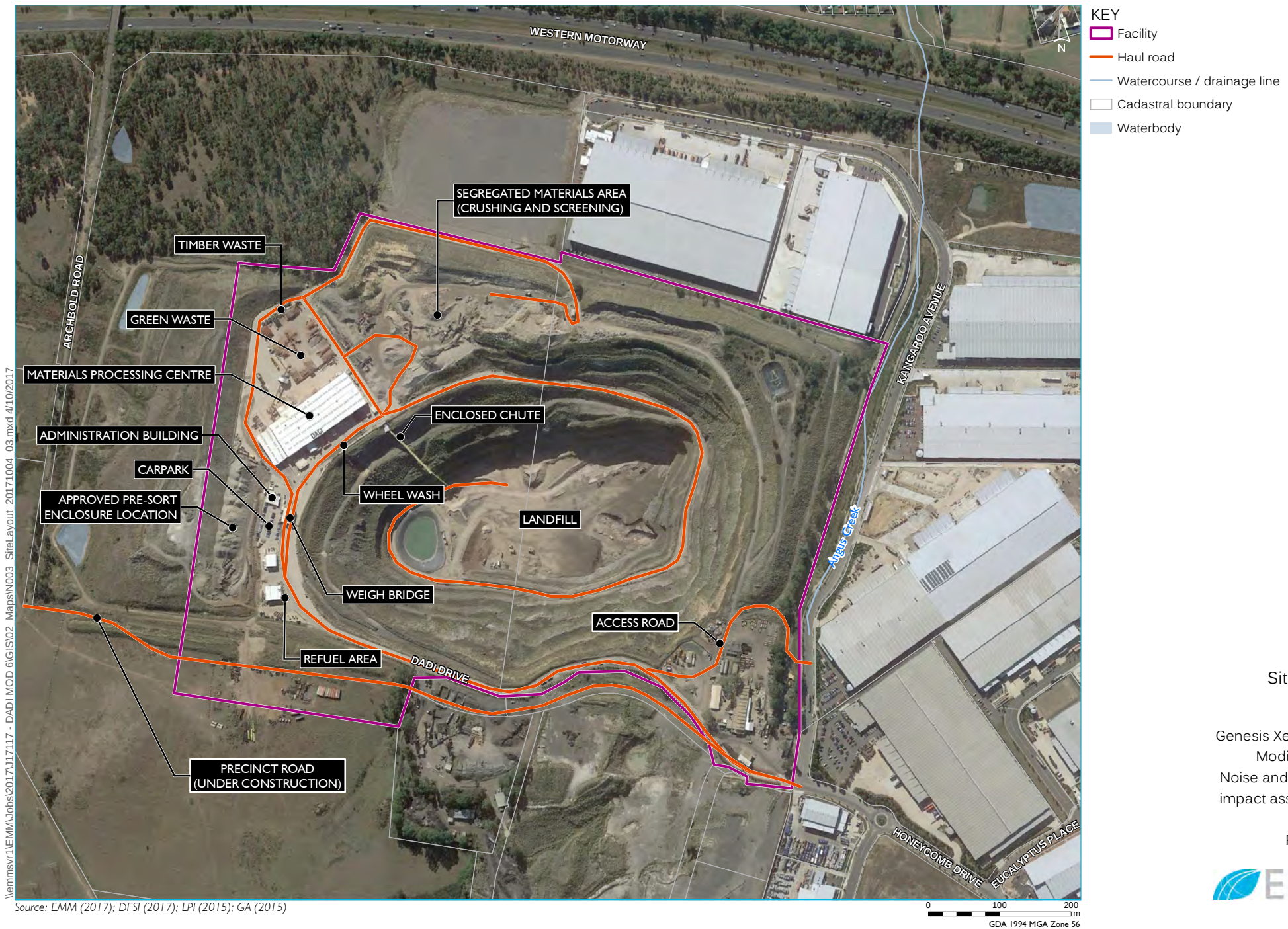
KEY

- Facility
- Assessment locations
- Monitoring location
- Main road
- Local road
- Watercourse

Noise monitoring and
assessment locations

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Figure 2.1



Site layout

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Figure 2.2



3 Existing environment

3.1 Noise sensitive receivers

The site is located within an industrial and commercial precinct. The closest residential properties are approximately 400 m to the north of the site on the opposite side of the M4 Motorway. Other surrounding land uses are industrial, with the site directly bounded by industrial properties on the north, east and south. The site's location in its regional setting and local context can be seen in Figure 2.1.

Nearest representative noise sensitive locations to the site have been identified and are provided in Table 3.1 hereafter referred to in this report as assessment locations. The assessment locations are shown in Figure 2.1.

Table 3.1 **Assessment locations**

ID	Type ¹	Address
1	Urban Residential	3-21 Cobbler Crescent, Minchinbury
2	Urban Residential	1-7 Tod Place, Minchinbury
3	Urban Residential	1-6 Eber Place, Minchinbury
4	Urban Residential	158-192 McFarlane Drive, Minchinbury
5	Urban Residential	1-10 Bergin Place, Minchinbury
6	Urban Residential	2-22 Barossa Drive, Minchinbury
7	Urban Residential	3-11 Rookin Place, Minchinbury
8	Urban Residential	1-8 Rutherglen Place, Minchinbury
9	Suburban Residential	2-44 Warbler Street, Erskine Park
10	Suburban Residential	1-19 Swamphen Street, Erskine Park
11	Suburban Residential	3-8 Blackbird Glen, Erskine Park
12	Industrial	21 Kangaroo Avenue, Eastern Creek
13	Industrial	17 Kangaroo Avenue, Eastern Creek
14	Industrial	16 Kangaroo Avenue, Eastern Creek
15	Industrial	12 Kangaroo Avenue, Eastern Creek
16	Industrial	4 Kangaroo Avenue, Eastern Creek
17	Industrial	1 Eucalyptus Place, Eastern Creek
18	Industrial	2 Grevillea Street, Eastern Creek
19	Industrial	Proposed Hanson Concrete & Asphalt Facility - Lot 1, Kangaroo Avenue, Eastern Creek
20	Industrial	Proposed Warehousing Facility - Lot 6, Kangaroo Avenue, Eastern Creek
21	Industrial	Fulton Hogan Asphalt - Dadi Drive, Eastern Creek

Notes: 1. As defined in the INP.

3.2 Existing noise levels

A key element in assessing potential noise impacts from industry is to quantify the existing ambient acoustic environment, including any existing industrial noise where present.

Existing ambient noise levels for the residential areas to the north (Minchinbury) and west (Erskine Park) of the site have previously been measured and reported in *Energy from waste Facility, Eastern Creek (SSD6236) – Noise Impact assessment* prepared by Pacific Environment (October 2016). These unattended noise monitoring locations are shown in Figure 2.1.

The existing ambient noise levels measured by Pacific Environment are presented in Table 3.2. The results are presented in the metrics of Rating Background Level (RBL) and L_{Aeq} . The RBL is an overall single value background level representing each assessment period (ie day, evening or night) over the whole monitoring period. It is an INP term and is used to represent the background noise level when assessing industrial noise. The L_{Aeq} is the A-weighted energy average noise level, and it represents the equivalent continuous sound pressure level over a given period.

Table 3.2 Summary of existing and ambient background noise levels

Monitoring Location (refer to Figure 2.1)	Period ¹	RBL ² , dB	Ambient $L_{Aeq, period}$ noise level ³ , dB
BG1 (24 Cobbler Crescent, Minchinbury)	Day	43	55
	Evening	48	54
	Night	41	51
BG2 (4 Blackbird Glen, Erskine Park)	Day	37	53
	Evening	44	57
	Night	35	46

Notes

1. Day: 7 am - 6 pm Monday - Saturday; 8 am - 6 pm Sundays and public holidays; Evening: 6 pm - 10 pm; Night: all remaining periods.
2. RBL is the overall single figure background level representing each assessment period (day/evening/night) over the whole monitoring period.
3. Represents the energy average noise level over the relevant period.

3.3 Attended noise monitoring

3.3.1 Methodology

Operator attended noise measurements are used to quantify and qualify the existing noise sources including the existing industrial noise contribution during the relevant periods. Operator attended noise measurements have previously been measured and reported in the *Energy from waste Facility, Eastern Creek (SSD6236) – Noise Impact assessment* prepared by Pacific Environment (October 2016). These attended noise monitoring locations are shown in Figure 2.1 and are consistent with the unattended noise monitoring locations.

3.3.2 Attended noise monitoring results

The attended noise monitoring results from the Pacific Environment report are summarised in Table 3.3.

Table 3.3 Attended noise measurements

Location	Time	Period	Noise measurement, dB		Existing industrial noise contribution, dB	Comments
			L _{Aeq,15 minute}	L _{A90,15 minute}	L _{Aeq,period}	
BG1	18/3/14 11:57	Day	50	47	Nil	Noise environment dominated by road traffic from M4. Other sources included some community noise (hammering and dog barking) and occasional bird calls. Industrial noise was not noted.
BG1	18/3/14 20:20	Evening	47	45	Nil	Noise environment dominated by road traffic noise from M4, distant traffic on the Great Western Highway and insect noise. Industrial noise was not noted.
BG1	19/3/14 00:37	Night	51	48	<41	Noise environment dominated by road traffic noise from M4. Some distant industrial noise from directly west of monitoring location estimated at <41 dB. Insect noise was also audible.
BG2	18/3/14 13:03	Day	47	40	Nil	Noise environment consisted of constant distant road traffic noise from M4, occasional community noise and birds, frogs and insects and cicadas. Industrial noise was not noted.
BG2	18/3/14 19:34	Evening	55	53	Nil (See comments)	Noise environment dominated by frogs and insects, road traffic noise. Other sources noted included community noise and one occurrence of tonal reversing alarm at <47 dB.
BG2	19/3/14 00:05	Night	50	49	Nil	Noise environment dominated by frogs and insects. Other sources noted included road traffic and community noise. Industrial noise was not noted.

Several industrial developments currently operate in the area surrounding the site. Observations outlined in the Pacific Environment report suggest the noise environment at BG1 is dominated by road traffic on the M4 Motorway during all periods. An industrial noise contribution (unrelated to the subject site) was noted to be present and was estimated at L_{Aeq,period} <41 dB during the night-time period.

The noise environment at BG2 was noted to consist of distant road traffic noise from the M4 Motorway and noise from birds, frogs and insects. No industrial contribution was noted at this location.

3.4 Meteorology

Noise propagation over distance can be significantly affected by the prevailing weather conditions. Of most interest are source to receiver winds, the presence of temperature inversions and drainage flow effects, as these conditions can enhance received noise levels. To account for these phenomena, the INP specifies meteorological analysis procedures to determine the prevalent weather conditions.

3.4.1 Prevailing winds

The INP recommends consideration of wind effects if they are a “feature” of the area. The INP defines “feature” as the presence of source-to-receiver winds at speeds up to 3 m/s (measured at 10 m above ground level), occurring for 30% of the time in any assessment period and season.

This is further clarified by defining source-to-receiver wind direction as being the directional component of wind. The INP states that where wind is identified to be a feature of the area then assessment of noise impacts should consider the highest wind speed below 3 m/s, which is considered to prevail for at least 30% of the time.

A thorough review of the vector components of the 15-minute wind data was undertaken using 5 years of data (2012-2017) from the Bureau of Meteorology (BoM) Horsley Park AWS (Station 067119), located approximately 6 km south-south-east of the subject site. The analysis shows that the frequency of occurrence of winds up to 3 m/s triggers the 30% INP assessment requirement for all assessment periods (ie day, evening and night). These can be seen in Table 3.4.

3.4.2 Temperature inversions

Temperature inversions (ie where atmospheric temperature increases with altitude) typically occur during the night-time period in the winter months and can also increase (ie focus) noise levels at surrounding assessment locations. As per the INP, temperature inversions are to be assessed when they are found to occur for 30% of the time (about two nights per week) or greater during the winter months. The INP also states that the assessment of the impact of temperature inversions be confined to the night-time noise assessment period where temperature inversions occur.

The frequency of temperature inversions was determined based on sigma-theta data obtained from the BoM Horsley Park AWS. Analysis of the data found that F or G stability class (temperature inversions) may occur for greater than 30% of the night-time period and, as such, have been considered in the prediction and assessment of noise emissions for the night-time period.

3.4.3 Drainage winds

The INP states that a default drainage wind value should be applied where sources are at a higher altitude than the assessment location with no intervening topography. All assessment locations are at a similar or higher elevation than the subject site. Therefore, drainage winds have not been adopted in this assessment.

3.4.4 Assessed meteorological conditions

Predicted operational noise levels from the site have been calculated based on the meteorological parameters shown in Table 3.4.

Table 3.4 Weather conditions considered in noise modelling

Assessment period	Meteorological condition	Air temperature	Relative humidity	Wind speed ¹	Direction	Stability category (temperature gradient)
Day	Calm	20 °C	70%	0 m/s	n/a	D class
Day	Winds	20 °C	70%	1.9 m/s	292.5° to 315°	D class
Evening	Calm	10 °C	90%	0 m/s	n/a	D class
Evening	Winds	10 °C	90%	2.4 m/s	67.5° to 292.5°	D class
Night/Morning shoulder	Calm	10 °C	90%	0 m/s	n/a	D class
Night/Morning shoulder	Winds	10 °C	90%	2.5 m/s	157.5° to 315°	D class
Night/Morning shoulder	Temp. inversion	10 °C	90%	0 m/s	n/a	F class

Note 1. Based on the 10th percentile wind speed of all winds present for 30% of the time during the relevant period.

4 Assessment criteria

4.1 Industrial noise

Noise from industrial sites or processes in NSW are regulated by the local council, DP&E and/or the NSW Environment Protection Authority (EPA) and usually have a licence and/or approval conditions stipulating noise limits. These limits are normally derived from operational noise criteria applied at assessment locations. They are based on INP guidelines (EPA 2000) or noise levels that can be achieved at a specific site following the application of all reasonable and feasible noise mitigation.

The INP guidelines for assessing industrial facilities have been used for this assessment. With respect to the criteria, the guidelines state:

They are not mandatory, and an application for a noise producing development is not determined purely on the basis of compliance or otherwise with the noise criteria. Numerous other factors need to be taken into account in the determination. These factors include economic consequences, other environmental effects and the social worth of the development.

The objectives of noise assessment criteria for industry are to protect the community from excessive intrusive noise and to preserve amenity for specific land uses.

To ensure these objectives are met, the EPA provides two separate criteria: intrusiveness criteria and amenity criteria. The fundamental difference being intrusiveness criteria apply over 15 minutes in any period (day, evening or night), whereas the amenity criteria apply to the entire assessment period (day, evening or night).

4.1.1 Intrusiveness

The intrusiveness criteria require that $L_{Aeq,15 \text{ minute}}$ noise levels from the subject site during the relevant operational periods (ie day, evening and night) do not exceed the RBL by more than 5 dB.

The RBLs for the evening period have been adjusted in accordance with the INP application notes. In this regard, the INP application notes state:

In determining project-specific noise levels from the RBLs, the community's expectations also need to be considered. The community generally expects greater control of noise during the more sensitive evening and night-time periods than the less sensitive daytime period. Therefore, in determining project-specific noise levels for a particular development, it is generally recommended that the intrusive noise level for evening be set at no greater than the intrusive noise level for daytime. The intrusive noise level for night-time should be no greater than the intrusive noise level for day or evening.

Table 4.1 presents the intrusive noise criteria determined for the site based on the adopted RBLs.

Table 4.1 Intrusive noise criteria

Location	Period ¹	Measured RBL, dB(A)	Adopted RBL, dB(A)	Intrusive criteria dB, L _{Aeq,15 minute}
Residential assessment locations (Minchinbury) (1-8)	Day	43	43	48
	Evening	48	43 ²	48
	Night	41	41	46
	Morning Shoulder ³	N/A	42	47
Residential assessment locations (Erskine Park) (9-11)	Day	37	37	42
	Evening	44	37 ²	42
	Night	35	35	40
	Morning Shoulder ³	N/A	36	41

Notes: 1. Day: 7 am - 6 pm Monday - Saturday; 8 am - 6 pm Sundays and public holidays; Evening: 6 pm - 10 pm; Night: all remaining periods.
 2. The RBL measured for day has been adopted for the evening period in accordance with the INP Application Notes procedures.
 3. The RBL adopted for the morning shoulder period has been taken as the midpoint of the RBLs determined for day and night-time periods in accordance with the INP Application Notes.

4.1.2 Amenity

The assessment of amenity is based on noise criteria specific to the land use. The criteria relate only to industrial noise and exclude road or rail noise. Where the measured existing industrial noise approaches recommended amenity criteria, it needs to be demonstrated that noise levels from new industry will not contribute to existing industrial noise.

Residential assessment locations in Minchinbury (assessment locations 1-8) that are potentially affected by the modification have been categorised in the INP (EPA 2000) urban amenity category as they are dominated by 'urban hum' and through traffic with heavy and continuous traffic flows during peak periods, while residential assessment locations in Erskine Park (assessment locations 9-11) have been categorised in the INP (EPA 2000) suburban amenity category due to its intermittent traffic flows and limited commerce/industry along with evening ambient noise levels defined by the natural environment. The corresponding recommended amenity criteria for the project are given in Table 4.2.

Table 4.2 Amenity criteria

Assessment location	Indicative area	Time period	Recommended noise level dB, L _{Aeq,period}	
			Acceptable	Maximum
All residential areas	Urban	Day	60	65
		Evening	50	55
		Night	45	50
	Suburban	Day	55	60
		Evening	45	50
		Night	40	45
Commercial Premises	All	When in use	65	70
Industrial Premises	All	When in use	70	75

Notes: 1. Day: 7 am - 6 pm Monday - Saturday; 8 am - 6 pm Sundays and public holidays; Evening: 6 pm - 10 pm; Night: all remaining periods.

If existing industrial noise approaches the acceptable amenity criteria in Table 4.2, the criteria for the project is to be adjusted to ensure the total industrial level does not exceed the acceptable amenity criteria. This is achieved by applying modification factors to the recommended criteria which are reproduced from Table 2.2 of the INP in Table 4.3 below.

Table 4.3 **Modification to acceptable noise level (ANL)* to account for existing levels of industrial noise**

Total existing L_{Aeq} noise level from industrial noise sources	Maximum L_{Aeq} noise level for noise from new sources alone, dB
≥ Acceptable noise level plus 2 dB	If existing noise level is likely to decrease in future acceptable noise level minus 10 dB If existing noise level is unlikely to decrease in future existing noise level minus 10 dB
Acceptable noise level plus 1 dB	Acceptable noise level minus 8 dB
Acceptable noise level	Acceptable noise level minus 8 dB
Acceptable noise level minus 1 dB	Acceptable noise level minus 6 dB
Acceptable noise level minus 2 dB	Acceptable noise level minus 4 dB
Acceptable noise level minus 3 dB	Acceptable noise level minus 3 dB
Acceptable noise level minus 4 dB	Acceptable noise level minus 2 dB
Acceptable noise level minus 5 dB	Acceptable noise level minus 2 dB
Acceptable noise level minus 6 dB	Acceptable noise level minus 1 dB
< Acceptable noise level minus 6 dB	Acceptable noise level

Notes: * ANL = recommended acceptable L_{Aeq} noise level for the specific receiver, area and time of day from Table 4.2

4.1.3 Project specific noise level

The project specific noise level (PSNL) is the most stringent of either the calculated intrusive or amenity criteria. The PSNL for the daytime, evening and night periods are indicated in Table 4.4.

Table 4.4 **Project specific noise levels**

Assessment location	Period	Intrusive criteria, dB, $L_{Aeq,15\text{ minute}}$	Amenity criteria, dB, $L_{Aeq,period}$	PSNL, dB
Assessment locations 1-8 (Minchinbury)	Day	48	60	48 $L_{Aeq,15\text{ minute}}$
	Evening	48	50	48 $L_{Aeq,15\text{ minute}}$
	Night	46	43 ¹	46 $L_{Aeq,15\text{ minute}}$ ⁴²
	Morning Shoulder	47	N/A	47 $L_{Aeq,15\text{ minute}}$
Assessment locations 9-11 (Erskine Park)	Day	42	55	42 $L_{Aeq,15\text{ minute}}$
	Evening	42	45	42 $L_{Aeq,15\text{ minute}}$
	Night	40	40	40 $L_{Aeq,15\text{ minute}}$
	Morning Shoulder	41	N/A	41 $L_{Aeq,15\text{ minute}}$
Commercial premises	When in use	-	65	65 $L_{Aeq,period}$
Industrial premises	When in use	-	70	70 $L_{Aeq,period}$

Notes: 1. The amenity criteria have been adjusted using INP methods reproduced in Table 4.3 and the measured existing industrial noise contribution.

2. It has been conservatively assumed that $L_{Aeq,period}$ noise levels from site are 3 dB less than the $L_{Aeq,15\text{ minute}}$ noise level. On this basis, the intrusive criteria of $L_{Aeq,15\text{ minute}}$ 46 dB is equal to the adjusted amenity criteria of $L_{Aeq,period}$ 43 dB. For the purposes of the noise assessment, the intrusive criteria of $L_{Aeq,15\text{ minute}}$ 46 dB has been applied here forth.

4.2 Applying INP criteria to existing noise sources

The INP also provides guidance on the application of noise criteria to existing operations such as the Genesis Eastern Creek Facility. Chapter 10 of the INP states:

The application of the criteria to existing sources of noise would occur where significant modifications (such as to warrant serious and/or ongoing development consent or EPA approval) are made to existing developments or where complaints are received. In applying the policy to existing operations it is acknowledged that the scope for applying reasonable and feasible mitigation measures to existing noise sources is usually far more limited than for new developments. Careful consideration of noise impacts and the feasible and reasonable mitigation measures available at these sites may result in less stringent noise limits than would ideally apply. Sometimes the resultant noise limits will be above the criteria.

The INP Application Notes state that if PSNLs are not achieved from existing operations, a preliminary review of feasible and reasonable mitigation measures should be undertaken to identify potential opportunities to reduce existing operational noise levels.

The INP Application Notes state that if the existing premises cannot achieve PSNLs after the feasible and reasonable noise mitigation review, the proposed modification should not significantly increase the existing noise emissions.

This assessment has adopted the procedures outlined in the INP Application Notes for existing industrial sites.

4.3 Sleep disturbance criteria

The subject site does not currently operate during the night-time period (10 pm to 7 am) however the Proponent is seeking to modify the existing project approval to allow limited 24 hour operations. Therefore, assessment of sleep disturbance is required in accordance with EPA procedures.

The operational criteria described in Section 4.1, which consider the average noise emission of a source over 15 minutes, are appropriate for assessing noise from generally steady-state sources, such as conveyor noise. However transient noise from sources such as truck movements is intermittent (rather than continuous) and needs to be assessed using the L_1 or $L_{\max}$ noise metrics.

The INP Application Notes (last updated June 2013) recognise that the current sleep disturbance criteria is not ideal. The assessment of potential sleep disturbance is complex and poorly understood and the EPA believes that there is insufficient information to determine a suitable alternative criteria.

Prior to the EPA determining a standard method to assess the potential for sleep disturbance, the INP application notes suggests that $L_{A1,1 \text{ minute}}$ level of 15 dB above the RBL is a suitable screening criteria for the night-time period. Guidance regarding potential for sleep disturbance is also provided in the *NSW Road Noise Policy* (RNP) (DECCW 2011). The RNP calls upon a number of studies that have been conducted into the effect of maximum noise levels on sleep. The RNP acknowledges that, at the current level of understanding, it is not possible to establish absolute noise level criteria that would correlate to an acceptable level of sleep disturbance. However, the RNP provides the following conclusions from the research on sleep disturbance:

- maximum internal noise levels ($L_{A\max}$) below 50 to 55 dB are unlikely to awaken people from sleep; and

- one or two noise events per night, with maximum internal noise levels (L_{Amax}) of 65 to 70 dB, are not likely to affect health and wellbeing significantly.

It is commonly accepted by acoustic practitioners and regulatory bodies that a facade including a partially open window will reduce external noise levels by 10 dB. Therefore, external L_{Amax} noise levels in the order of 60 to 65 dB calculated at the facade of a residence are unlikely to cause awakening.

The descriptors L_{max} and L_1 may be considered interchangeable; this approach is accepted by the EPA.

If noise levels over the screening criteria are identified, then additional analysis would consider factors such as:

- how often the events would occur;
- the time the events would occur (between 10 pm and 7 am); and
- whether there are times of day when there is a clear change in the noise environment (such as during early morning shoulder periods).

Table 4.5 provides the sleep disturbance screening criteria for the residential assessment locations.

Table 4.5 Sleep disturbance screening criteria, residential assessment locations

Assessment location	Adopted RBL, dB	Sleep disturbance criteria dB, L_{Amax}
Assessment locations 1-8 (Minchinbury)	41	56
Assessment locations 9-11 (Erskine Park)	35	50

Notes: 1. The sleep disturbance assessment applies to residential assessment locations only.

4.4 Road traffic noise criteria

Project related traffic is proposed to travel on existing project traffic routes. Project traffic currently travels directly between the site and the arterial road network (M4 and M7 motorways) via Kangaroo Avenue, Honeycomb Drive and Wonderland Drive.

The principle guidance for assessing the impact of road traffic noise is the RNP. Table 4.6 presents the road noise assessment criteria reproduced from Table 3 of the RNP.

Table 4.6 Road traffic noise assessment criteria for residential land uses

Road category	Type of project/development	Assessment criteria, dB	
		Day (7 am to 10 pm)	Night (10 pm to 7 am)
Freeway/arterial/sub-arterial roads	Existing residences affected by additional traffic on existing freeway/arterial/sub-arterial roads generated by land use developments.	$L_{Aeq(15-hr)}$ 60 (external)	$L_{Aeq(9-hr)}$ 55 (external)

Source: EPA (2011).

The RNP states that where existing road traffic noise criteria are already exceeded, any additional increase in total traffic noise level should be limited to 2 dB, after consideration of all feasible and reasonable mitigation measures.

In addition to meeting the assessment criteria, any significant increase in total traffic noise at assessment locations must be considered. Table 4.7 presents the relative increase assessment criteria reproduced from Table 6 of the RNP. Assessment locations experiencing increases in total traffic noise levels above those outlined in Table 4.7 should be considered for mitigation.

Table 4.7 **Relative increase criteria for residential land uses**

Road category	Type of project/development	Total traffic noise level increase, dB	
		Day (7 am to 10 pm)	Night (10 pm to 7 am)
Freeway/arterial/sub-arterial roads and transitways	New road corridor/redevelopment of existing road/land use development with the potential to generate additional traffic on existing road.	Existing traffic $L_{Aeq(15-hr)} + 12$ dB (external)	Existing traffic $L_{Aeq(9-hr)} + 12$ dB (external)

Road traffic generated by the proposal travels directly between the site and the arterial road network (M4 and M7 motorways) via Kangaroo Avenue, Honeycomb Drive and Wonderland Drive. There are no residential or other noise sensitive assessment locations located along Kangaroo Avenue, Honeycomb or Wonderland Drives. The proportion of site traffic on the M4 and M7 are inconsequential to average noise levels. Therefore, road traffic noise has not been considered further.

5 Operational noise assessment

5.1 Noise modelling method

This section presents the methods and base parameters used to model and assess the site's predicted noise emissions.

Quantitative modelling of noise emissions was undertaken using Brüel & Kjær Predictor Version 11.00 noise prediction software. This software calculates total noise levels at receptors from the concurrent operation of multiple noise sources. The model incorporates factors such as:

- the lateral and vertical location of plant and equipment;
- source-to-receptor distances;
- ground effects;
- atmospheric absorption;
- topography; and
- meteorological conditions.

Two scenarios were modelled to compare the noise levels from approved and proposed operations for daytime, evening, night-time and morning shoulder periods under calm and prevailing meteorological conditions. Operational modelling scenarios represent a worst-case 15 minute period, with peak truck volumes assumed and all approved/proposed plant and equipment operating concurrently.

5.1.1 Plant and equipment sound power levels

Table 5.1 summarises the operational noise sources and associated sound power levels used in the noise model. The equipment items and quantities are based on the current equipment inventory provided by the Proponent. The sound power levels are based on attended measurements at the site and an EMM database of similar plant and equipment. A map of on-site plant and equipment locations is presented in Appendix A.

Table 5.1 Operational plant and equipment sound power levels

Plant and equipment	Quantity (per worst-case 15 minute period)								Sound power level (L _w) per unit, L _{Aeq,15 minute} , dB
	Existing operations				Proposed operations				
	Day	Even -ing	Night	Morning Shoulder	Day	Even -ing	Night	Morning Shoulder	
MPC ^{1, 3}	1	1	0	1	1	1	1	1	103
Dozer ²	1	0	0	0	1	1	0	1	116
Front end loader ²	6	0	0	0	6	6	4	6	105
Crusher/Screen/Stacker/Excavator ¹	3	0	0	0	3	0	0	3	113
Compactor ²	3	0	0	0	3	3	0	3	116
Conveyor ²	2	0	0	0	2	2	2	2	102
Truck & Dog/Haul Truck ²	4 5	0	0	0	5 8	29	9	29	105 (Driving)/97 (Idling)

Notes: 1. L_w calculated from direct measurement during site visit.

2. Taken from EMM database of similar equipment.

3. MPC comprises numerous activities including loading and unloading of trucks, sorting, stockpiling and processing of materials. As these processes occur in an enclosed building, the MPC has been modelled as a single source of noise.

5.1.2 Operating assumptions

In addition to the sound power levels and quantities provided, main operating assumptions adopted for a worst-case 15 minute period are as follows:

- for existing operations:
 - all equipment on-site are assumed to operate continuously in any 15 minutes during the daytime period;
 - only the MPC is assumed to operate continuously in any 15 minutes during the evening and morning shoulder periods;
- for proposed operations:
 - all equipment on-site are assumed to operate continuously in any 15 minutes during the daytime and morning shoulder periods;
 - all equipment on-site with the exception of crushers, screens and associated stackers are assumed to operate continuously in any 15 minutes during the evening period;
 - all equipment on-site with the exception of crushers, screens, associated stackers and trucks running to landfill are assumed to operate continuously in any 15 minutes during the night-time period;
- all onsite vehicle movements are 20 kilometres per hour (km/hr) or less;
- all trucks on-site are assumed to idle for at least 10% of the 15 minute period; and

- it has been conservatively assumed that $L_{Aeq,period}$ noise levels are 3 dB below the $L_{Aeq,15\text{ minute}}$ noise level.

5.2 Noise modelling results

The predicted approved and proposed noise levels at each assessment location for each assessment period are provided in Table 5.2.

Table 5.2 Predicted site noise emissions - approved and proposed operations

Assessment location	Period	Approved operations, dB		Proposed operations, dB		PSNL, dB
		Calm	Adverse ¹	Calm	Adverse ¹	
1	Day	46	46	47	47	48 $L_{Aeq,15\text{ minute}}$
	Evening	<35	<35	43	46	48 $L_{Aeq,15\text{ minute}}$
	Night	N/A	N/A	40	43	46 $L_{Aeq,15\text{ minute}}$
	Morning Shoulder	<35	<35	43	46	47 $L_{Aeq,15\text{ minute}}$
2	Day	46	46	47	47	48 $L_{Aeq,15\text{ minute}}$
	Evening	<35	<35	44	47	48 $L_{Aeq,15\text{ minute}}$
	Night	N/A	N/A	41	43	46 $L_{Aeq,15\text{ minute}}$
	Morning Shoulder	<35	<35	44	47	47 $L_{Aeq,15\text{ minute}}$
3	Day	47	46	48	48	48 $L_{Aeq,15\text{ minute}}$
	Evening	<35	<35	44	47	48 $L_{Aeq,15\text{ minute}}$
	Night	N/A	N/A	41	44	46 $L_{Aeq,15\text{ minute}}$
	Morning Shoulder	<35	<35	44	47	47 $L_{Aeq,15\text{ minute}}$
4	Day	44	46	45	47	48 $L_{Aeq,15\text{ minute}}$
	Evening	<35	<35	42	45	48 $L_{Aeq,15\text{ minute}}$
	Night	N/A	N/A	39	42	46 $L_{Aeq,15\text{ minute}}$
	Morning Shoulder	<35	<35	42	45	47 $L_{Aeq,15\text{ minute}}$
5	Day	45	46	45	47	48 $L_{Aeq,15\text{ minute}}$
	Evening	<35	<35	43	45	48 $L_{Aeq,15\text{ minute}}$
	Night	N/A	N/A	39	42	46 $L_{Aeq,15\text{ minute}}$
	Morning Shoulder	<35	<35	43	45	47 $L_{Aeq,15\text{ minute}}$
6	Day	43	45	43	46	48 $L_{Aeq,15\text{ minute}}$
	Evening	<35	<35	40	43	48 $L_{Aeq,15\text{ minute}}$
	Night	N/A	N/A	37	39	46 $L_{Aeq,15\text{ minute}}$
	Morning Shoulder	<35	<35	40	43	47 $L_{Aeq,15\text{ minute}}$
7	Day	45	47	45	47	48 $L_{Aeq,15\text{ minute}}$
	Evening	<35	<35	42	45	48 $L_{Aeq,15\text{ minute}}$
	Night	N/A	N/A	38	41	46 $L_{Aeq,15\text{ minute}}$
	Morning Shoulder	<35	<35	42	45	47 $L_{Aeq,15\text{ minute}}$
8	Day	44	47	45	47	48 $L_{Aeq,15\text{ minute}}$
	Evening	<35	<35	42	45	48 $L_{Aeq,15\text{ minute}}$
	Night	N/A	N/A	38	41	46 $L_{Aeq,15\text{ minute}}$
	Morning Shoulder	<35	<35	42	45	47 $L_{Aeq,15\text{ minute}}$
9	Day	39	39	39	39	42 $L_{Aeq,15\text{ minute}}$
	Evening	<35	<35	37	40	42 $L_{Aeq,15\text{ minute}}$

Table 5.2 Predicted site noise emissions - approved and proposed operations

Assessment location	Period	Approved operations, dB		Proposed operations, dB		PSNL, dB
		Calm	Adverse ¹	Calm	Adverse ¹	
10	Night	N/A	N/A	35	37	40 L _{Aeq,15 minute}
	Morning Shoulder	<35	<35	37	40	41 L _{Aeq,15 minute}
	Day	38	38	39	39	42 L _{Aeq,15 minute}
	Evening	<35	<35	37	40	42 L _{Aeq,15 minute}
	Night	N/A	N/A	<35	37	40 L _{Aeq,15 minute}
11	Morning Shoulder	<35	<35	37	40	41 L _{Aeq,15 minute}
	Day	38	38	39	39	42 L _{Aeq,15 minute}
	Evening	<35	<35	37	40	42 L _{Aeq,15 minute}
	Night	N/A	N/A	<35	37	40 L _{Aeq,15 minute}
	Morning Shoulder	<35	<35	37	40	41 L _{Aeq,15 minute}
12	Day	52	52	52	52	70 L _{Aeq,period}
	Evening	<35	<35	49	50	70 L _{Aeq,period}
	Night	N/A	N/A	46	47	70 L _{Aeq,period}
	Morning Shoulder	<35	<35	49	50	70 L _{Aeq,period}
	Day	41	43	41	44	70 L _{Aeq,period}
13	Evening	<35	<35	38	40	70 L _{Aeq,period}
	Night	N/A	N/A	35	38	70 L _{Aeq,period}
	Morning Shoulder	<35	<35	38	40	70 L _{Aeq,period}
	Day	39	42	40	42	70 L _{Aeq,period}
	Evening	<35	<35	37	40	70 L _{Aeq,period}
14	Night	N/A	N/A	<35	37	70 L _{Aeq,period}
	Morning Shoulder	<35	<35	37	40	70 L _{Aeq,period}
	Day	39	41	39	42	70 L _{Aeq,period}
	Evening	<35	<35	37	39	70 L _{Aeq,period}
	Night	N/A	N/A	<35	36	70 L _{Aeq,period}
15	Morning Shoulder	<35	<35	37	39	70 L _{Aeq,period}
	Day	45	47	46	48	70 L _{Aeq,period}
	Evening	<35	<35	43	45	70 L _{Aeq,period}
	Night	N/A	N/A	38	41	70 L _{Aeq,period}
	Morning Shoulder	<35	<35	43	45	70 L _{Aeq,period}
16	Day	46	48	47	49	70 L _{Aeq,period}
	Evening	<35	<35	44	46	70 L _{Aeq,period}
	Night	N/A	N/A	39	42	70 L _{Aeq,period}
	Morning Shoulder	<35	<35	44	46	70 L _{Aeq,period}
	Day	48	50	49	51	70 L _{Aeq,period}
17	Evening	<35	<35	46	48	70 L _{Aeq,period}
	Night	N/A	N/A	41	43	70 L _{Aeq,period}
	Morning Shoulder	<35	<35	46	48	70 L _{Aeq,period}
	Day	50	52	51	53	70 L _{Aeq,period}
	Evening	<35	<35	48	50	70 L _{Aeq,period}
18	Night	N/A	N/A	43	45	70 L _{Aeq,period}
	Day	50	52	51	53	70 L _{Aeq,period}
	Evening	<35	<35	48	50	70 L _{Aeq,period}
19	Night	N/A	N/A	43	45	70 L _{Aeq,period}
	Day	50	52	51	53	70 L _{Aeq,period}
	Evening	<35	<35	48	50	70 L _{Aeq,period}

Table 5.2 Predicted site noise emissions - approved and proposed operations

Assessment location	Period	Approved operations, dB		Proposed operations, dB		PSNL, dB
		Calm	Adverse ¹	Calm	Adverse ¹	
20	Morning Shoulder	<35	<35	48	50	70 L _{Aeq,period}
	Day	57	58	58	59	70 L _{Aeq,period}
	Evening	<35	<35	55	56	70 L _{Aeq,period}
	Night	N/A	N/A	50	50	70 L _{Aeq,period}
21	Morning Shoulder	<35	<35	55	56	70 L _{Aeq,period}
	Day	57	57	58	58	70 L _{Aeq,period}
	Evening	<35	<35	55	56	70 L _{Aeq,period}
	Night	N/A	N/A	50	51	70 L _{Aeq,period}
	Morning Shoulder	<35	<35	55	56	70 L _{Aeq,period}

Notes: 1. Adverse is the worst case result from prevailing winds or temperature inversion conditions at each assessment location.

5.3 Discussion of results

Site noise emissions during proposed operations are predicted to comply with the relevant PSNLs at all assessment locations considered as part of this assessment.

The results of the noise modelling showed that the main noise source emanating from the site was trucking movements. Further, the noise contribution of the plant and equipment located in the landfill tipping area (ie the “pit”) was found to be negligible at the nearest assessment locations.

In addition, current and future noise levels are predicted to be significantly less than existing ambient noise levels at the residential assessment locations which are primarily dictated by road traffic noise from the M4 motorway. Hence, noise levels from the modification are not expected to cause adverse impacts at any assessment location.

5.4 Sleep disturbance assessment

The predicted L_{Amax} noise levels from the site at the nearest residential assessment locations are presented in Table 5.3 for worst-case meteorological conditions (ie temperature inversions). The predictions are for the night period only (10 pm to 7 am) coinciding with the typical sleep period and in accordance with the INP.

Typical maximum noise level events include trucks dumping or a front end loader or excavator scraping concrete. The sound power level of this type of event has been measured to be L_{Amax} 126 dB and represents the likely highest maximum noise level events from the site.

Table 5.3 Predicted L_{Amax} noise levels during night period

Assessment location ¹	Predicted L_{Amax} noise levels, dB	L_{Amax} screening criteria, dB
	Worst-case meteorological conditions	
1	51	56
2	51	56
3	53	56
4	48	56
5	49	56
6	44	56
7	47	56
8	47	56
9	44	50
10	42	50
11	41	50

Notes: 1. The sleep disturbance assessment applies to residential assessment locations only.

Noise modelling predicts that L_{Amax} noise levels will satisfy the INP sleep disturbance screening criteria at all residential assessment locations.

5.5 Cumulative noise assessment

Potential cumulative noise impacts from existing and successive developments are considered by the INP procedures by ensuring that the appropriate noise criteria are established with a view to maintaining acceptable noise *amenity* levels. Therefore, the cumulative impact of the Facility with existing industrial noise sources has been assessed in the determination of the acceptable amenity levels at the assessment locations.

It is of note that Hanson currently has approval for the construction and operation of a concrete and asphalt Facility on a site to the south east. *Construction, Operating and Traffic Noise Assessment – Concept Plan for the redevelopment of Lot 11 DP558723, Lot 1 DP200697 and Lot 2 DP262213* (Heggies 2006) indicates that Hanson site noise levels are predicted to comply with all amenity criteria. Further, the site is located in an industrial area and is located further away from residential assessment locations. Thus, the combined impact of this project is predicted to have a negligible impact on the existing ambient amenity of the area.

On this basis, the project is predicted to have a negligible impact on the existing ambient acoustic amenity and is not predicted to increase industrial noise levels above the relevant amenity criteria.

6 Conclusion

EMM has completed a noise assessment for the modification. This noise assessment has been prepared in accordance with the methodology outlined in the INP and associated Application Notes for the assessment of noise from industrial premises.

The Proponent proposes to modify the project approval to alter the hours of operation and to improve flexibility in relation to the waste volume permitted to be landfilled, by removing the annual cap. This would not necessitate any modifications/alterations to the existing site infrastructure, production equipment or approved Facility footprint.

A noise model was developed to compare noise levels from existing approved and proposed operations. The model adopted sound power levels of key acoustically significant plant and equipment derived from attended measurements and a database of similar equipment.

For the assessment of proposed operations, all equipment was assumed to operate during the daytime and morning shoulder periods, all equipment excluding the crushers, screens and associated stackers was assumed to operate during the evening period and all equipment excluding crushers, screens, associated stackers and trucks running to landfill was assumed to operate during the night-time period.

Findings of the assessment are summarised below:

- Operational noise levels were assessed for the daytime, evening, night-time and morning shoulder periods during calm and prevailing weather conditions. The assessment found that operating noise from the site during both existing and proposed operations satisfies relevant INP PSNLs for all periods at all assessment locations.
- The potential for sleep disturbance from the modification during the night-time period has been assessed. The highest predicted external maximum noise level from site is L_{Amax} 53 dB in Minchinbury and L_{Amax} 44 dB in Erskine Park which is below the noise levels likely to cause sleep disturbance affects. Hence, it is unlikely that night-time operations from the project will cause sleep disturbance at the residential assessment locations.
- Road traffic generated by the proposal travels directly between the site and the arterial road network via Kangaroo Avenue, Honeycomb Drive and Wonderland Drive. There are no residential assessment locations located along nearby roads and, therefore, the potential for the road traffic noise or relative increase criteria to be exceeded is highly unlikely.
- An assessment of cumulative industrial noise from the Facility together with other industrial noise sources in the vicinity was also conducted. The Facility is not predicted to increase industrial noise levels above the relevant amenity criteria.

References

Australian Standard AS 1055-1997, *Acoustics - Description and Measurement of Environmental Noise – Parts 1, 2 and 3*.

Heggies Australia 2006, Noise Assessment – Concept Plan for the redevelopment of Lot 11 DP558723, Lot 1 DP200697 and Lot 2 DP262213.

NSW Department of Environment, Climate Change and Water (DECCW) 2011, *Road Noise Policy*.

NSW Environmental Protection Authority (EPA) 2000, *Industrial Noise Policy*.

NSW Environmental Protection Authority (EPA) 2013, *Industrial Noise Policy Application Notes*.

Appendix A

On-site plant and equipment locations



SYDNEY

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NEWCASTLE

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