

Noise Verification Report

Rosehill Sustainable Road Resource Centre
Rosehill, NSW
October 2022



Document Information

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October 2022

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1 Introduction

Muller Acoustic Consulting Pty Ltd (MAC) has been commissioned by Downer EDI Works Pty Ltd (Downer) to complete a Noise Verification Report (NVR) for Central Sydney Industrial Estate incorporating the Sustainable Road Resource Centre (the 'site'), Rosehill, NSW.

The NVR involved quantifying the noise contribution of the site by direct attended measurements to determine noise emissions so that effective management and controls can be implemented where required. The monitoring has been conducted in accordance with Condition B16 and B17 of the Conditions of Consent (CoC) for the project, and in general accordance with Conditions L4 of the EPL at seven representative receiver locations. **Table 1** lists individual requirements of the CoC relevant to this NVR and where they are addressed in this report.

Table 1 Specific Environmental Conditions - Noise	
Conditions of Consent – SSD-10459	Section
<i>B17. A Noise Verification Report (NVR) must be submitted to the EPA and the Planning Secretary within three months of the commencement of operation of the DSRPC. The NVR must be prepared by a suitably qualified and experienced acoustic consultant and include:</i>	
<i>(a) an analysis of compliance with noise limits specified in condition B16, undertaken to the satisfaction of the Planning Secretary and in accordance with the Noise Policy for Industry (EPA, 2017);</i>	Section 7.1
<i>(b) demonstrate that all reasonable and feasible mitigation measures have been incorporated into the development;</i>	Section 7.3
<i>(c) reference manufacturer's specifications and/or performance guarantees for the asphalt plant;</i>	Appendix C
<i>(d) an outline of management actions to be taken to where the limits specified in condition B16 have been exceeded; and</i>	Section 7.5
<i>(e) describe the contingency measures and the timing of their implementation in the event the management actions are not effective in reducing the noise impacts to an acceptable level.</i>	Section 7.5

The assessment has been conducted in accordance with the following documents:

- NSW Environment Protection Authority (EPA), Noise Policy for Industry (NPI), 2017;
- Muller Acoustic Consulting Pty Ltd (MAC), Noise and Vibration Impact Assessment (NVIA) Central Sydney Industrial Estate, Rosehill, NSW, 2020 (MAC 2020);
- Environment Protection Licence EPL 21611 (EPL); and
- Australian Standard AS 1055:2018 - Acoustics - Description and measurement of environmental noise - General Procedures.

A glossary of terms, definitions and abbreviations used in this report is provided in **Appendix A**.

2 Noise Criteria

The EPL (EPL #21611) for the site categorise receivers into several monitoring points and derives noise emissions based on previous assessment.

Table 2 reproduces the operational and sleep disturbance noise limits for assessed receivers referenced from the EPL that have been adopted for this assessment, as well as the corresponding receiver naming convention adopted in the NVIA completed by MAC in September, 2020 (MAC, 2020).

Table 2 Noise Limits, dBA					
EPA Identification No.	Location Description	Day	Evening	Night	
		LAeq(15min)	LAeq(15min)	LAeq(15min)	L _A max
Point 3	R1A - 72 River Road, Ermington	30	30	33	52
Point 4	R1B - 530 John Street, Rydalmere	31	31	34	52
Point 5	R2A - 86 Carnarvon Street, Silverwater	34	34	37	53
Point 6	R2B - 101 Beaconsfield Street, Silverwater	36	35	38	53
Point 7	R3A, FR01 - 71 Penelope Lucas Lane, Rosehill	30	30	30	55
Point 8	R3B - 88 James Ruse Drive, Rosehill	30	32	30	55
Point 9	FR01 - 181 James Ruse Drive, Camellia	30	30	30	55

Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

Additionally, conditions L4.4 to L4.9 of the EPL apply to the monitoring of these locations. These conditions are reproduced below:

L4.4 Meteorological Conditions

- The noise emission limits set out in Condition L4.1 apply under the following meteorological conditions referred to in the table below.*
- For those meteorological conditions not referred to in the table below, the noise limits that apply are the noise limits in condition L4.1 plus 5dB.*

Table 3 Meteorological Conditions

Assessment Period	Meteorological Conditions
Day	Stability Categories A, B, C and D with wind speeds up to and including 0.5m/s at 10m above ground level.
Evening	Stability Categories A, B, C and D with wind speeds up to and including 3m/s at 10m above ground level.
Night	Stability Categories A, B, C and D with wind speeds up to and including 3m/s at 10m above ground level; or Stability category E and F with wind speeds up to and including 2m/s at 10m above ground level.

L4.5 For the purposes of condition L4.4:

- a) The meteorological conditions are to be determined from meteorological data obtained from the meteorological weather station identified as Sydney Olympic Park AWS (Archery Centre); and*
- b) Stability category shall be determined using the following method from Fact Sheet D of the Noise Policy for Industry (NSW EPA, 2017):*
 - i. Use of sigma-theta data (section D1.4).*

L4.6 For the purpose of determining the noise generated from the premises, the modifying factor corrections in Table C1 in Fact Sheet C of the Noise Policy for Industry (NSW EPA, 2017) should be applied, if appropriate, to the noise level determined at locations L4.1.

L4.7 To determine compliance with the noise limits in condition L4.1 the noise measurement equipment must be located at:

- the most affected point within an area at a location prescribed by condition L4.1; and/or*
- the most affected point other than where there is no dwelling at the location.*

L4.8 A non-compliance of condition L4.1 will still occur where noise generated from the premises in excess of the appropriate limit is measured:

- at a location other than those described by condition L4.1; and/or*
- at a point other than the most affected point at a location.*

L4.9 For the purpose of determining the noise generated at the premises, the modification factors in Section 4 of the NSW Industrial Noise Policy must be applied, as appropriate, to the noise levels measured by the noise monitoring equipment.

3 Methodology

3.1 Locality

The site is located on the Camellia Peninsula of Rosehill, within the City of Parramatta Local Government Area (LGA), approximately 16km west of the Sydney Central Business District (CBD). The project site, known as the Central Sydney Industrial Estate, is a 40ha parcel of land formally identified as Lot 100 of DP 1168951, within the former Clyde Refinery site (refer to **Figure 1**).

The project site is zoned IN3 Heavy Industry under the Paramatta Local Environment Plan (2011) (Parramatta LEP), and is bounded by industrial developments to the north, east and west, and by Duck River to the south. Other land uses within the locality include IN1 General Industrial, RE2 Private Recreation, B5 Business Development, and Low (R2), Medium (R3) and High (R4) Density Residential.

3.2 Noise Monitoring Locations

Seven monitoring locations have been selected to undertake noise measurements and determine compliance with the Project Noise Trigger Levels (PNTLs). The locations are in **Table 4** summarised below:

Table 4 Monitoring Locations, dBA			
Receivers	Address	MGA56 Coordinates	
		Easting	Northing
R1A	72 River Road, Ermington	319702	6255731
R1B	530 John Street, Rydalmere	319373	6255955
R2A	86 Carnavon Street, Silverwater	318567	6254254
R2B	101 Beaconsfield Street Silverwater	318474	6254098
R3A	71 Penelope Lucas Lane, Rosehill	316815	6255157
R3B	88 James Ruse Drive, Rosehill	316835	6255357
FR01	18 James Ruse Drive, Rosehill	317126	6256418

3.3 Assessment Methodology

Attended noise surveys were conducted in general accordance with the procedures described in Australian Standard AS 1055:2018, "Acoustics - Description and Measurement of Environmental Noise" and the EPL. Measurements were carried out using a Svantek Type 1, 971 noise analyser on Wednesday 10 August 2022 and Thursday 11 August 2022. The acoustic instrumentation used carries current NATA calibration and complies with AS IEC 61672.1-2019-Electroacoustics - Sound level meters - Specifications. Calibration of all instrumentation was checked prior to and following measurements. Drift in calibration did not exceed ± 0.5 dBA.

Noise measurements were of 15 minutes in duration and where possible, throughout each survey the operator quantified the contribution of each significant noise source. One measurement was conducted at each monitoring location during the day, evening, and night periods during calm and clear meteorological conditions.

To address conditions L4.4 and L4.5 of the EPL, atmospheric conditions were determined from the meteorological weather station identified as Sydney Olympic Park AWS and assessed in accordance with Fact Sheet D of the NPI. Analysed data from Sydney Olympic Park AWS (presented in **Appendix B**). The analysis identified that meteorological conditions during the time of monitoring are outside the meteorological conditions listed in L4.4 of the EPL (**Table 3**). Under L4.4 b). For meteorological conditions not referred to in the table, the noise limits that apply are the noise limits in condition L4.1 plus 5dB. For a conservative assessment 5dB was not applied to the noise limits in condition L4.1.

Extraneous noise sources were excluded from the analysis to calculate the $L_{Aeq}(15min)$ plant noise contribution for comparison against the relevant criteria.

Where the plant is inaudible, the contribution is estimated to be at least 10dBA below the ambient noise level.



FIGURE 1
Locality Plan
MAC201090-06
Central Sydney
Industrial Estate
Rosehill

KEY

-  Project Boundary
-  Receiver



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4 Results

The monitoring and assessment results are presented in individual tables for each assessment location.

4.1 Assessment Results - Location R1A

The results of the attended noise measurements at location R1A for the survey are summarised in **Table 5** with the relevant EPL limits. **Section 7.2** provides a compliance summary with respect to site noise contributions and relevant criteria. Locally observed meteorological conditions at the time of each measurement have been included in the results table. Analysed meteorological data from Sydney Olympic Park AWS is presented in **Appendix B**.

Table 5 Operator-Attended Noise Survey Results – Location R1A							
Date	Time (hrs)	Descriptor (dBA re 20 µPa)			EPL Limit (dBA) LAeq/LAmax	Local Meteorology ¹	Description and SPL dBA
		LAmax	LAeq	LA90			
11/08/2022	07:46 (Day)	68	58	55	30	WD: SW	Traffic 51-68
						WS: 0.1m/s	Ferry 50-62
						Rain: Nil	Birds 48-55
						Stability: A	Site inaudible
10/08/2022	19:05 (Evening)	77	57	52	30	WD: SW	Traffic 46-78
						WS: 0.1m/s	Birds 43-61
						Rain: Nil	Residential Noise 50-68
						Stability: F	Site inaudible
11/08/2022	01:05 (Night)	65	50	42	33/52	WD: W	Traffic 41-65
						WS: 0.1m/s	Birds 38-45
						Rain: Nil	Site inaudible
						Stability: F	

Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

Note 1: Measurement at microphone height (1.5m).

4.2 Assessment Results - Location R1B

The results of the attended noise measurements at location R1B for the survey are summarised in **Table 6** with the relevant EPL limits. **Section 7.2** provides a compliance summary with respect to site noise contributions and relevant criteria. Locally observed meteorological conditions at the time of each measurement have been included in the results table. Analysed meteorological data from Sydney Olympic Park AWS is presented in **Appendix B**.

Table 6 Operator-Attended Noise Survey Results – Location R1B

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			EPL Limit (dBA) LAeq/LAmax	Local Meteorology ¹	Description and SPL dBA
		LAmax	LAeq	LA90			
11/08/2022	08:08 (Day)	73	57	52	31	WD: SW	Traffic 50-73
						WS: 0.1m/s	Aircraft 50-69
						Rain: Nil	Birds 45-58
						Stability: A	Site inaudible
10/08/2022	19:27 (Evening)	66	57	54	31	WD: SW	Traffic 51-66
						WS: 0.1m/s	Aircraft <50
						Rain: Nil	Site inaudible
						Stability: F	
11/08/2022	00:40 (Night)	60	48	44	34/52	WD: W	Traffic 42-60
						WS: 0.1m/s	Industrial Noise 40-42
						Rain: Nil	Site inaudible
						Stability: F	

Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

Note 1: Measurement at microphone height (1.5m).

4.3 Assessment Results - Location R2A

The results of the attended noise measurements at location R2A for the survey are summarised in **Table 7** with the relevant EPL limits. **Section 7.2** provides a compliance summary with respect to site noise contributions and relevant criteria. Locally observed meteorological conditions at the time of each measurement have been included in the results table. Analysed meteorological data from Sydney Olympic Park AWS is presented in **Appendix B**.

Table 7 Operator-Attended Noise Survey Results – Location R2A							
Date	Time (hrs)	Descriptor (dBA re 20 µPa)			EPL Limit (dBA) LAeq/LAmax	Local Meteorology ¹	Description and SPL dBA
		LAmax	LAeq	LA90			
11/08/2022	08:37 (Day)	84	68	52	34	WD: W	Traffic 47-84
						WS: 0.1m/s	Birds <45
						Rain: Nil	Aircraft 50-73
						Stability: A	Site inaudible
10/08/2022	21:30 (Evening)	82	57	42	34	WD: W	Traffic 40-82
						WS: 0.1m/s	Aircraft 40-62
						Rain: Nil	Site inaudible
						Stability: F	
10/08/2022	22:00 (Night)	75	53	43	37/53	WD: W	Traffic 40-73
						WS: 0.1m/s	Aircraft 40-57
						Rain: Nil	Sirens 40-48
						Stability: F	Site inaudible

Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

Note 1: Measurement at microphone height (1.5m).

4.4 Assessment Results - Location R2B

The results of the attended noise measurements at location R2B for the survey are summarised in **Table 8** with the relevant EPL limits. **Section 7.2** provides a compliance summary with respect to site noise contributions and relevant criteria. Locally observed meteorological conditions at the time of each measurement have been included in the results table. Analysed meteorological data from Sydney Olympic Park AWS is presented in **Appendix B**.

Table 8 Operator-Attended Noise Survey Results – Location R2B							
Date	Time (hrs)	Descriptor (dBA re 20 µPa)			EPL Limit (dBA) LAeq/LAmax	Local Meteorology ¹	Description and SPL dBA
		LAmax	LAeq	LA90			
11/08/2022	08:55 (Day)	78	62	55	36	WD: W WS: 0.1m/s Rain: Nil Stability: A	Traffic 50-78 Aircraft 50-61 Site inaudible
10/08/2022	21:12 (Evening)	81	61	44	35	WD: W WS: 0.1m/s Rain: Nil Stability: F	Traffic 42-81 Residential Noise 58-60 Site inaudible
10/08/2022	22:21 (Night)	82	58	43	38/53	WD: W WS: 0.1m/s Rain: Nil Stability: F	Traffic 41-82 Site inaudible

Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

Note 1: Measurement at microphone height (1.5m).

4.5 Assessment Results - Location R3A

The results of the attended noise measurements at location R3A for the survey are summarised in **Table 9** with the relevant EPL limits. **Section 7.2** provides a compliance summary with respect to site noise contributions and relevant criteria. Locally observed meteorological conditions at the time of each measurement have been included in the results table. Analysed meteorological data from Sydney Olympic Park AWS is presented in **Appendix B**.

Table 9 Operator-Attended Noise Survey Results – Location R3A

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			EPL Limit (dBA) LAeq/LAmax	Local Meteorology ¹	Description and SPL dBA
		LAmax	LAeq	LA90			
11/08/2022	09:24 (Day)	71	60	55	30	WD: SW	Traffic 51-71
						WS: 0.1m/s	Birds 50-55
						Rain: Nil	Aircraft 50-65
						Stability: A	Site inaudible
10/08/2022	20:42 (Evening)	67	55	51	30	WD: SW	Traffic 49-67
						WS: 0.1m/s	Aircraft 50-65
						Rain: Nil	Site inaudible
						Stability: F	
10/08/2022	23:08 (Night)	69	52	47	30/55	WD: SW	Traffic 44-69
						WS: 0.1m/s	Site inaudible
						Rain: Nil	
						Stability: F	

Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

Note 1: Measurement at microphone height (1.5m).

4.6 Assessment Results - Location R3B

The results of the attended noise measurements at location R3B for the survey are summarised in **Table 10** with the relevant EPL limits. **Section 7.2** provides a compliance summary with respect to site noise contributions and relevant criteria. Locally observed meteorological conditions at the time of each measurement have been included in the results table. Analysed meteorological data from Sydney Olympic Park AWS is presented in **Appendix B**.

Table 10 Operator-Attended Noise Survey Results – Location R3B							
Date	Time (hrs)	Descriptor (dBA re 20 µPa)			EPL Limit (dBA) LAeq/LAmax	Local Meteorology ¹	Description and SPL dBA
		LAmax	LAeq	LA90			
11/08/2022	09:43 (Day)	75	64	58	30	WD: W WS: 0.1m/s Rain: Nil Stability: A	Traffic 52-75 Birds 50-64 Site inaudible
10/08/2022	20:24 (Evening)	74	54	45	32	WD: W WS: 0.1m/s Rain: Nil Stability: F	Traffic 43-74 Aircraft 45-61 Site inaudible
10/08/2022	23:12 (Night)	78	63	50	30/55	WD: W WS: 0.1m/s Rain: Nil Stability: F	Traffic 43-78 Residential noise 40-42 Site inaudible

Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

Note 1: Measurement at microphone height (1.5m).

4.7 Assessment Results - Location FR01

The results of the attended noise measurements at location FR01 for the survey are summarised in **Table 10** with the relevant EPL limits. **Section 7.2** provides a compliance summary with respect to site noise contributions and relevant criteria. Locally observed meteorological conditions at the time of each measurement have been included in the results table. Analysed meteorological data from Sydney Olympic Park AWS is presented in **Appendix B**.

Table 11 Operator-Attended Noise Survey Results – Location FR01

Date	Time (hrs)	Descriptor (dBA re 20 µPa)			EPL Limit (dBA) LAeq/LAmax	Local Meteorology ¹	Description and SPL dBA
		LAmax	LAeq	LA90			
11/08/2022	10:05 (Day)	83	68	53	30	WD: SW	
						WS: 0.1m/s	Traffic 46-83
						Rain: Nil	Site inaudible
						Stability: A	
10/08/2022	19:55 (Evening)	86	65	48	30	WD: SW	
						WS: 0.1m/s	Traffic 45-86
						Rain: Nil	Site inaudible
						Stability: F	
10/08/2022	23:37 (Night)	81	61	45	30/55	WD: SW	
						WS: 0.1m/s	Traffic 43-81
						Rain: Nil	Site inaudible
						Stability: F	

Note: Day - the period from 7am to 6pm Monday to Saturday or 8am to 6pm on Sundays and public holidays; Evening - the period from 6pm to 10pm; Night - the remaining periods.

Note 1: Measurement at microphone height (1.5m).

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5 Discussion

5.1 Discussion of Results - Location R1A

Monitoring between Wednesday 10 August 2022 and Thursday 11 August 2022 identified that site activities were inaudible at all times, including during short breaks in traffic during all measurements at location R1A with noise from nearby Silverwater Road dominating the acoustic environment. Extraneous sources such as road traffic and residential noise were audible during the measurement period.

5.2 Discussion of Results - Location R1B

Monitoring between Wednesday 10 August 2022 and Thursday 11 August 2022 identified that site activities were inaudible at all times, including short breaks in traffic during all measurements at location R1B with noise from nearby Silverwater Road dominating the acoustic environment. Extraneous sources such as road traffic and residential noise were audible during the measurement period.

5.3 Discussion of Results - Location R2A

Monitoring between Wednesday 10 August 2022 and Thursday 11 August 2022 identified that site activities were inaudible at all times, including short breaks in traffic during all measurements at location R2A with noise from nearby Parramatta Road and M4 Motorway dominating the acoustic environment. Extraneous sources such as road traffic and residential noise were audible during the measurement period.

5.4 Discussion of Results - Location R2B

Monitoring between Wednesday 10 August 2022 and Thursday 11 August 2022 identified that site activities were inaudible at all times, including short breaks in traffic during all measurements at location R2B with noise from nearby Parramatta Road and M4 Motorway dominating the acoustic environment. Extraneous sources such as road traffic and residential noise were audible during the measurement period.

5.5 Discussion of Results - Location R3A

Monitoring between Wednesday 10 August 2022 and Thursday 11 August 2022 identified that site activities were inaudible at all times, including short breaks in traffic during all measurements at location R3A with noise from nearby James Ruse Drive dominating the acoustic environment. Extraneous sources such as road traffic and residential noise were audible during the measurement period.

5.6 Discussion of Results - Location R3B

Monitoring between Wednesday 10 August 2022 and Thursday 11 August 2022 identified that site activities were inaudible at all times, including short breaks in traffic during all measurements at location R3B with noise from nearby James Ruse Drive dominating the acoustic environment. Extraneous sources such as road traffic and residential noise were audible during the measurement period.

5.7 Discussion of Results - Location FR01

Monitoring between Wednesday 10 August 2022 and Thursday 11 August 2022 identified that site activities were inaudible at all times, including short breaks in traffic during all measurements at location FR01 with noise from nearby James Ruse Drive dominating the acoustic environment. Extraneous sources such as road traffic and residential noise were audible during the measurement period.

6 Noise Monitoring Validation

Section 7.1.1 of the NPI states:

"Where direct measurement of noise at a compliance location is not practical because of poor signal to –noise ratios (that is, extraneous noise is louder than the noise under investigation), or where access to the location has been denied or is unavailable, measurements at intermediate locations between the source and the receiver location, where signal – to – noise ratios are higher, may be a viable option."

To generate a more accurate contribution from site where noise levels at the nominated receivers are dominated by passing traffic and significantly above noise limits proposed in the EPL, a computer model was developed to quantify site noise emissions to neighbouring receivers using DGMR (iNoise, Version 2022) noise modelling software. iNoise is an intuitive and quality assured software for industrial noise calculations in the environment. 3D noise modelling is considered industry best practice for assessing noise emissions from projects.

The model incorporated a three-dimensional digital terrain map giving all relevant topographic information used in the modelling process. Additionally, the model uses relevant noise source data, ground type, attenuation from barrier or buildings and atmospheric information to predict noise levels at the nearest potentially affected receivers. Where relevant, modifying factors in accordance with Fact Sheet C of the NPI have been applied to calculations.

The model calculation method used to predict noise levels was in accordance with ISO 9613:1 and ISO 9613:2 including corrections for meteorological conditions using CONCAWE¹. The ISO 9613 standards are the most used noise prediction method worldwide. Many countries refer to ISO 9613 in their noise legislation. However, the ISO 9613 standard does not contain guidelines for quality assured software implementation, which leads to differences between applications in calculated results. In 2015 this changed with the release of ISO/TR 17534-3. This quality standard gives clear recommendations for interpreting the ISO 9613 method. iNoise fully supports these recommendations. The models and results for the 19 test cases are included in the software.

¹ Report no. 4/18, "the propagation of noise from petroleum and petrochemical complexes to neighbouring communities", Prepared by C.J. Manning, M.Sc., M.I.O.A. Acoustic Technology Limited (Ref.AT 931), CONCAWE, Den Haag May 1981

7.1 Onsite Attended Monitoring Results

Measurements were conducted at the eastern, western, northern and southern site boundary to derive a representative sound power level (SWL) from the site. These measurements are presented in **Table 12**.

Table 12 Onsite Operator-Attended Noise Survey Results

Location	Date/ Time	Descriptor (dBA re 20 µPa)			Meteorology ^{1,2}	Description and SPL, dBA
		L _A max	L _A eq	L _A 90		
Western boundary (14m from site sources)	11/08/2022	84	66	63	WD: SW WS: 0.1m/s Rain: Nil	Aircraft 60-68
	11:08					Site- RAP Plant 62-64 (constant)
						Site -Truck Pass 60-84 (5 movements, 20s each)
						Site - Truck Idle <60 (approx. 5 min total duration)
Site L _A eq(15min) Contribution						63
Northern boundary (50m from site sources)	11/08/2022	73	58	53	WD: SW WS: 0.1m/s Rain: Nil	Aircraft 50-70
	11:27					Traffic 50-66
						Other Industrial Noise 50-53 (not site)
						Site- Asphalt Plant 50 (constant) Site -Truck idle 50-53 (approx. 90s total duration)
Site L _A eq(15min) Contribution						50
Eastern boundary (32m from site sources)	11/08/2022	86	70	68	WD: SW WS: 0.1m/s Rain: Nil	Site - Reconomy Plant 68-70
	11:54					(Constant) Site – Loader Bucket 70-86
						(infrequent -3-5s durations)(
Site L _A eq(15min) Contribution						69
Southern boundary (116m from site sources)	11/08/2022	77	62	54	WD: SW WS: 0.1m/s Rain: Nil	Site - RAP Plant 53-55 (constant)
	12:14					Site – Bobcat/Excavator 50-68 (1-2 min total duration)
						Site – Loader 50-65 (1-2 min total duration)
						Site - Trucks Pass (3 movements, 20s each)
Site L _A eq(15min) Contribution						54
Overall Site L _A eq(15min) Contribution						63

Note 1: Measurement at microphone height (1.5m).

Note 2: Analysed meteorological data from Sydney Olympic Park AWS (Station ID 066212) is presented in **Appendix B**.

7.2 Noise Monitoring Validation Results

A conservative SWL of 108dBA based on a measurement of 70dBA at 32 metres from the acoustic centre of the site was derived, assuming calm meteorological conditions. Noise predictions from site have been quantified at all noise sensitive receivers surrounding the project site with results presented in **Table 13**. The received noise levels from operational activities have been predicted to satisfy the relevant criteria at all assessed receivers.

Table 13 Estimated/Modelled Site Noise Contributions, dBA

Receiver	Estimated/Modelled LAeq(15min) Contribution	EPL Criteria				Complaint
		Day	Evening	Night		
		LAeq(15min)	LAeq(15min)	LAeq(15min)	LAm _{ax}	
R1A	24	30	30	33	52	✓
R1B	28	31	31	34	52	✓
R2A	13	34	34	37	53	✓
R2B	15	36	35	38	53	✓
R3A	24	30	30	30	55	✓
R3B	28	30	32	30	55	✓
FR01	24	30	30	33	52	✓

7.3 Review of Mitigation Measures Incorporated into the Development

In accordance with Condition B17(b) of the CoC a review was undertaken to demonstrate that all reasonable and feasible mitigation measures have been incorporated into the development. Mitigation measures confirmed on the site visit are as follows:

- vehicles onsite utilise a broadband reverse alarm in lieu of the traditional hi frequency type reverse alarm;
- a 3 sided Colourbond shed has been constructed to house the reclaimed asphalt pavement facility, to maximising attenuation benefits to surrounding receivers; and
- acoustic hoods have been applied to conveyor and elevator tops.

7.4 Asphalt Plant Manufacturers Specifications

In accordance with Condition B17(c) of the CoC, manufacturer's specifications and performance guarantees for the asphalt plant is provided in **Appendix C**.

7.5 Additional Management Actions

Condition B17(c) of the CoC states that where the noise limits in Condition B16 are exceeded at any of the receiver locations in Table 2 of the Conditions of Consent, management measures to mitigate the project noise levels will be identified for inclusion in the Operational Environmental Management Plan (OEMP). As it has been demonstrated that the noise limits in Condition B16 have not been exceeded during the monitoring activities associated with this NVR, additional management actions are not required. Following that condition B17 (d) is satisfied, it infers that conditions B17 (e) is also satisfied.

8 Conclusion

Muller Acoustic Consulting Pty Ltd (MAC) has completed an NVR for the Central Sydney Industrial Estate incorporating the Sustainable Road Resource Centre located in Rosehill, NSW. The NVR involved quantifying the noise contribution of the site by direct attended measurements and 3D predictive modelling to determine noise emissions so that effective management and controls can be implemented where required. The monitoring has been conducted in accordance with the CoC for the project, and in general accordance with Conditions L4 of the EPL.

Attended monitoring was undertaken on Wednesday 10 August 2022 and Thursday 11 August 2022 at seven representative monitoring locations. The assessment identified that noise emissions generated by the CSIE comply with the relevant criteria specified in the EPL at all assessed residential and industrial receivers.

Additionally, Conditions B17 (a)-(e) of the CoC have been satisfied for the project.

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Appendix A - Glossary of Terms

Table A1 provides a number of technical terms have been used in this report.

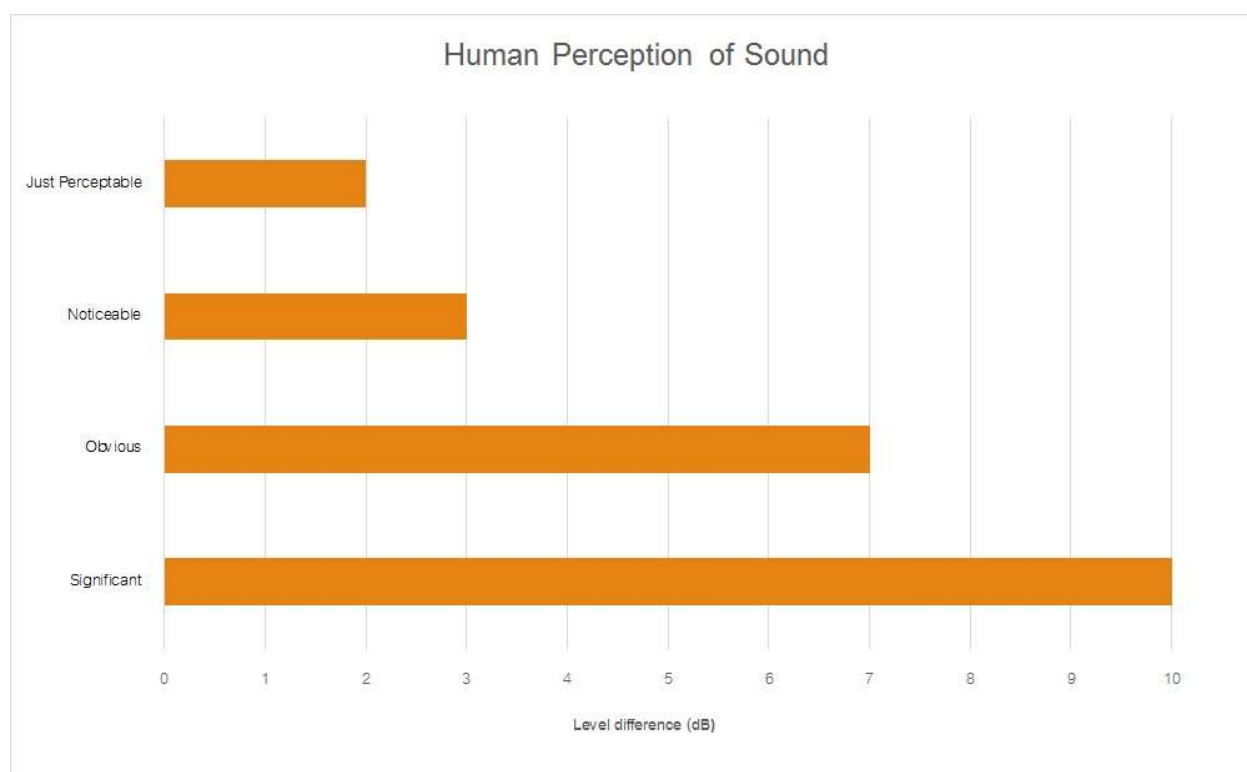
Table A1 Glossary of Terms	
Term	Description
1/3 Octave	Single octave bands divided into three parts
Octave	A division of the frequency range into bands, the upper frequency limit of each band being twice the lower frequency limit.
ABL	Assessment Background Level (ABL) is defined in the NPI as a single figure background level for each assessment period (day, evening and night). It is the tenth percentile of the measured LA90 statistical noise levels.
Adverse Weather	Weather effects that enhance noise (that is, wind and temperature inversions) that occur at a site for a significant period of time (that is, wind occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter).
Ambient Noise	The noise associated with a given environment. Typically a composite of sounds from many sources located both near and far where no particular sound is dominant.
A Weighting	A standard weighting of the audible frequencies designed to reflect the response of the human ear to noise.
dBA	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.
dB(Z), dB(L)	Decibels Linear or decibels Z-weighted.
Hertz (Hz)	The measure of frequency of sound wave oscillations per second - 1 oscillation per second equals 1 hertz.
LA10	A noise level which is exceeded 10 % of the time. It is approximately equivalent to the average of maximum noise levels.
LA90	Commonly referred to as the background noise, this is the level exceeded 90 % of the time.
LAeq	The summation of noise over a selected period of time. It is the energy average noise from a source, and is the equivalent continuous sound pressure level over a given period.
LAm _{ax}	The maximum root mean squared (rms) sound pressure level received at the microphone during a measuring interval.
RBL	The Rating Background Level (RBL) is an overall single figure background level representing each assessment period over the whole monitoring period. The RBL is used to determine the intrusiveness criteria for noise assessment purposes and is the median of the ABL's.
Sound power level (LW)	This is a measure of the total power radiated by a source. The sound power of a source is a fundamental location of the source and is independent of the surrounding environment. Or a measure of the energy emitted from a source as sound and is given by : $= 10 \cdot \log_{10} (W/W_0)$ Where : W is the sound power in watts and W₀ is the sound reference power at 10-12 watts.

Table A2 provides a list of common noise sources and their typical sound level.

Table A2 Common Noise Sources and Their Typical Sound Pressure Levels (SPL), dBA

Source	Typical Sound Level
Threshold of pain	140
Jet engine	130
Hydraulic hammer	120
Chainsaw	110
Industrial workshop	100
Lawn-mower (operator position)	90
Heavy traffic (footpath)	80
Elevated speech	70
Typical conversation	60
Ambient suburban environment	40
Ambient rural environment	30
Bedroom (night with windows closed)	20
Threshold of hearing	0

Figure A1 – Human Perception of Sound



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Appendix B - Analysed Meteorological Data

Table B1 Meteorological Conditions – Sydney Olympic Park Station ID (066212)

Date	Time	Wind 10m AGL (m/s)	Standard Deviation σ_A	Stability Class ¹
Day				
10/08/2022	07:30	2	34	A
10/08/2022	07:45	2	29	A
10/08/2022	08:00	2	40	A
10/08/2022	08:15	2	33	A
10/08/2022	08:30	2	34	A
10/08/2022	08:45	2	32	A
10/08/2022	09:00	2	42	A
10/08/2022	09:15	2	49	A
10/08/2022	09:30	2	37	A
10/08/2022	09:45	2	46	A
10/08/2022	10:00	3	46	A
Evening				
10/08/2022	19:00	0	0	F
10/08/2022	19:15	0	0	F
10/08/2022	19:30	0	0	F
10/08/2022	19:45	0	0	F
10/08/2022	20:00	0	0	F
10/08/2022	20:15	0	0	F
10/08/2022	20:30	0	0	F
10/08/2022	20:45	0	0	F
10/08/2022	21:00	0	0	F
10/08/2022	21:15	0	0	F
10/08/2022	21:30	0	0	F
10/08/2022	21:45	0	0	F
Night				
10/08/2022	22:00	0	0	F
10/08/2022	22:15	0	0	F
10/08/2022	22:30	0	0	F
10/08/2022	22:45	0	0	F
10/08/2022	23:00	0	0	F
10/08/2022	23:15	0	0	F
10/08/2022	23:30	0	0	F
10/08/2022	23:45	0	0	F
11/08/2022	00:00	0	0	F
11/08/2022	00:15	0	0	F
11/08/2022	00:30	0	0	F
11/08/2022	00:45	0	0	F
11/08/2022	01:00	0	0	F
11/08/2022	01:15	0	0	F

Note: Standard deviation of the horizontal wind direction fluctuations assessed against a surface roughness of 0.6m.

Note 1: Use of stability class G requires consideration as to whether the very specific atmospheric conditions are actually possible for the location. Accordingly, stability class F has been adopted as the preferred stability category in low wind speed, evening and night time conditions.

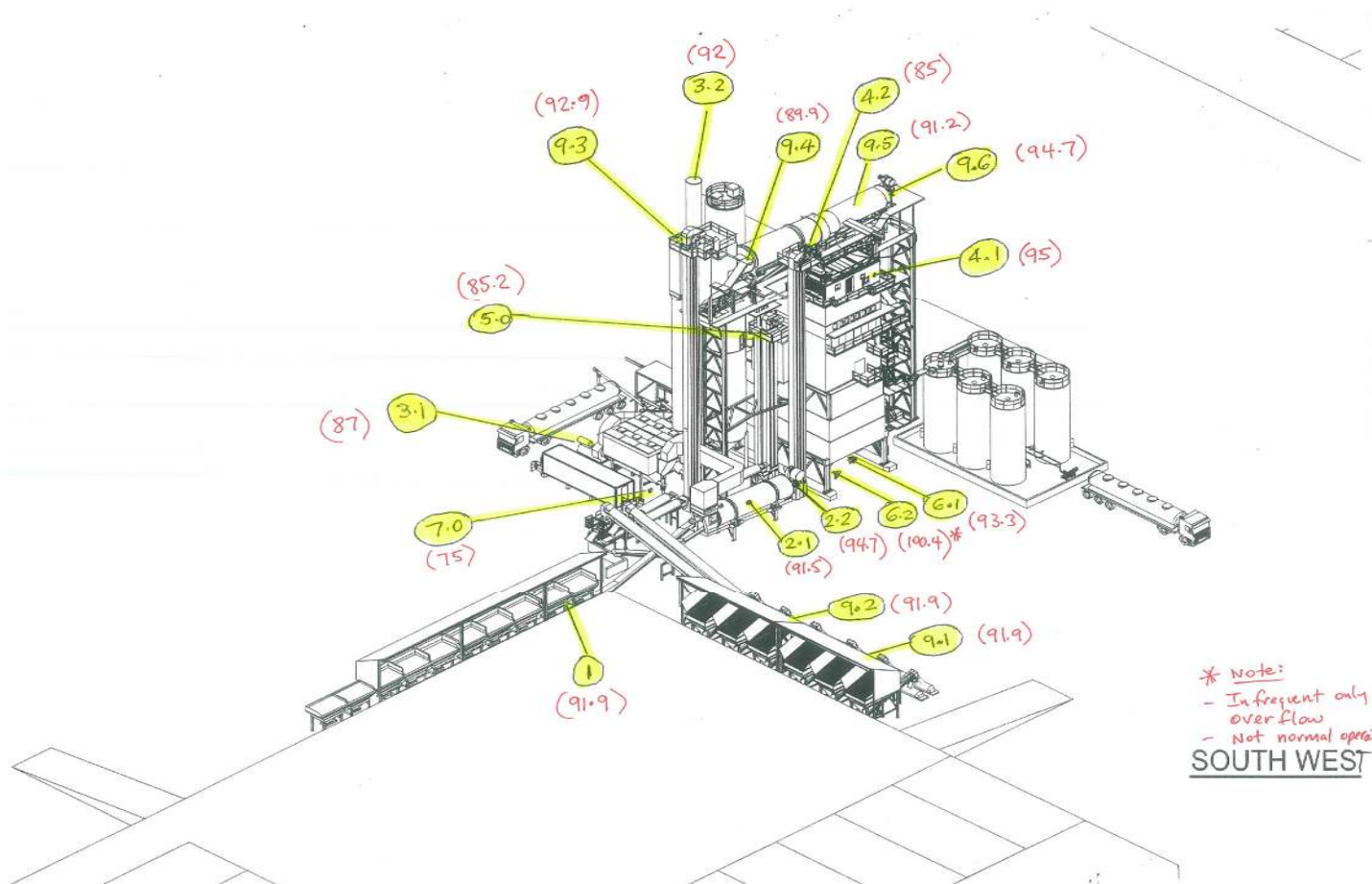
Appendix C - Asphalt Plant Manufacturers Specifications

Asphalt Facility								
Noise Source	Ammann Data SWL dB(A)	Lp in 1 m Abstand [dB(A)]	Summenpegel Lp [-]	Attenuation dB	SWL with AttenuationB(A)	Lp in 1 m Abstand [dB(A)]	Summenpegel Lp [-]	Ammann Comment
Cold Feed System w Drive 1	94.9					-8	0.159154943	Insert rubber liners in feeders
Dryer counterflow with drive 2.1	91.5					-8	0.159154943	
Burner Device 2.2	100.7					-8	0.159154943	Frequency drive (already included in offer)
VentilatorFanWDrive 3.1	113					-8	0.159154943	Sound protection walls + frequency drive (already included in offer)
StackOutlet 3.2	112	104	2.5E+10	-20	92	84	252243585.9	Stack Silencer
MixingTower 4.1	95	87	5.0E+08	0	95	87	503292121	
HotElevateWDrive 4.2	95	87	5.0E+08	-10	85	77	503292121	with insulated headstation
FillerElevateWDrive 5	85.2	77	5.3E+07	0	85.2	77	52701154.8	(louder) and with headstation
CoarseGrainOverflow 6.2						-8	0.159154943	Insulted channel rubber liners inside
LoadcontainerCompressor 7	75					-8	0.159154943	
PropMachineWDrive 9.1	94.9					-8	0.159154943	Insert rubber liners in feeders
PropMachineWDrive 9.2	94.9					-8	0.159154943	Insert rubber liners in feeders
ElevatorWDrive 9.3	92.9	85	3.1E+08	0	92.9	85	310327406.3	
TransferChuteDrum 9.4	92.9	85	3.1E+08	-3	89.9	82	155532134.3	Insulated chute
ParallelDrum 9.5	91.2	83	2.1E+08	0	91.2	83	209807076.2	
Burner Device 9.6	100.7	93	1.9E+09	-16	84.7	77	46969953.65	Frequency drive (already included in offer) and 3 sound deflector walls around burner
TOTAL for Asphalt Facility	112.6	104.6	2.9E+10		100.0	92.0	1581202646	

Disclaimer
Values based on experience, not actual. May vary from part to part.
Sound power of plant varies from operating conditions and from site to site.

116.06491

99.971674



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