REPORT

OAKDALE WEST INDUSTRIAL ESTATE PRECINCTS 4C & 4D

KEMPS CREEK NSW

DEVELOPMENT APPLICATION

NOISE & VIBRATION ASSESSMENT
RWDI # 2102730
15 December 2022

SUBMITTED TO

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DOCUMENT CONTROL

Version	Status	Date	Prepared By	Reviewed By
A	Draft	14 November 2022	Adrian Pinto	Ben Lawrence
B	Final	15 December 2022	Adrian Pinto	Ben Lawrence

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GLOSSARY OF ACOUSTIC TERMS

Most environments are affected by environmental noise which continuously varies, largely as a result of road traffic. To describe the overall noise environment, a number of noise descriptors have been developed and these involve statistical and other analysis of the varying noise over sampling periods, typically taken as 15 minutes. These descriptors, which are demonstrated in the graph below, are here defined.

Maximum Noise Level (L_{Amax}) – The maximum noise level over a sample period is the maximum level, measured on fast response, during the sample period.

L_{A1} – The L_{A1} level is the noise level which is exceeded for 1% of the sample period. During the sample period, the noise level is below the L_{A1} level for 99% of the time.

L_{A10} – The L_{A10} level is the noise level which is exceeded for 10% of the sample period. During the sample period, the noise level is below the L_{A10} level for 90% of the time. The L_{A10} is a common noise descriptor for environmental noise and road traffic noise.

L_{A90} – The L_{A90} level is the noise level which is exceeded for 90% of the sample period. During the sample period, the noise level is below the L_{A90} level for 10% of the time. This measure is commonly referred to as the background noise level.

L_{Aeq} – The equivalent continuous sound level (L_{Aeq}) is the energy average of the varying noise over the sample period and is equivalent to the level of a constant noise which contains the same energy as the varying noise environment. This measure is also a common measure of environmental noise and road traffic noise.

ABL – The Assessment Background Level is the single figure background level representing each assessment period (daytime, evening and night time) for each day. It is determined by calculating the 10th percentile (lowest 10th percent) background level (L_{A90}) for each period.

RBL – The Rating Background Level for each period is the median value of the ABL values for the period over all of the days measured. There is therefore an RBL value for each period – daytime, evening and night time.

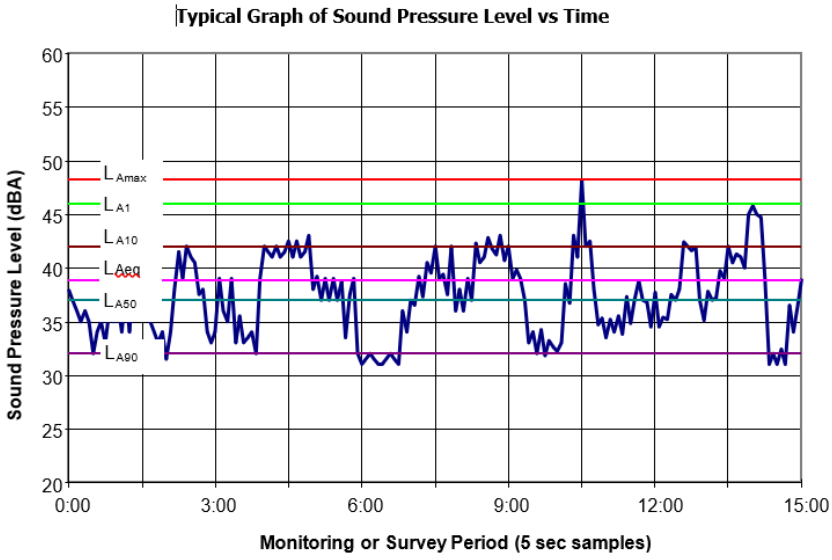

TABLE OF CONTENTS

1 INTRODUCTION

RWDI has been commissioned by Goodman Property Services (Aust) Pty Limited (Goodman) to undertake an operational and construction noise and vibration assessment for the Precincts 4C and 4D within the proposed Oakdale West Industrial Estate (OWIE), Kemps Creek NSW.

Goodman is currently developing the OWIE on a 154-ha site in Kemps Creek, NSW. The OWIE is comprised of warehousing and office facilities over five precincts totalling approximately 93.4 ha of developable area.

Figure 1-1 shows the Oakdale West Industrial Estate site layout and surrounding sensitive receivers. Buildings 4C and 4D are located centrally within the Estate and is outlined in a dotted blue line in **Figure 1-1**. **Figure 1-2** presents the site plan for the precincts.

1.1 Background

SLR Consulting Australia Pty Ltd (SLR) prepared the OWIE Noise & Vibration Impact Assessment (NVIA) for the State Significant Development Application (SSDA). The findings of this assessment are set out in the SLR report numbered 610.15617-R2, dated 16 February 2017.

DPE granted Development Consent SSD 7348 in September 2019 for the Oakdale West 'Concept Proposal' and 'Stage 1 Development'. The Concept Proposal comprises a 'Master Plan' to guide the staged development of Oakdale West and core development controls that will form the basis for design and assessment of future development applications for the site.

An overview of the approvals sought is set out in Section 1.2.

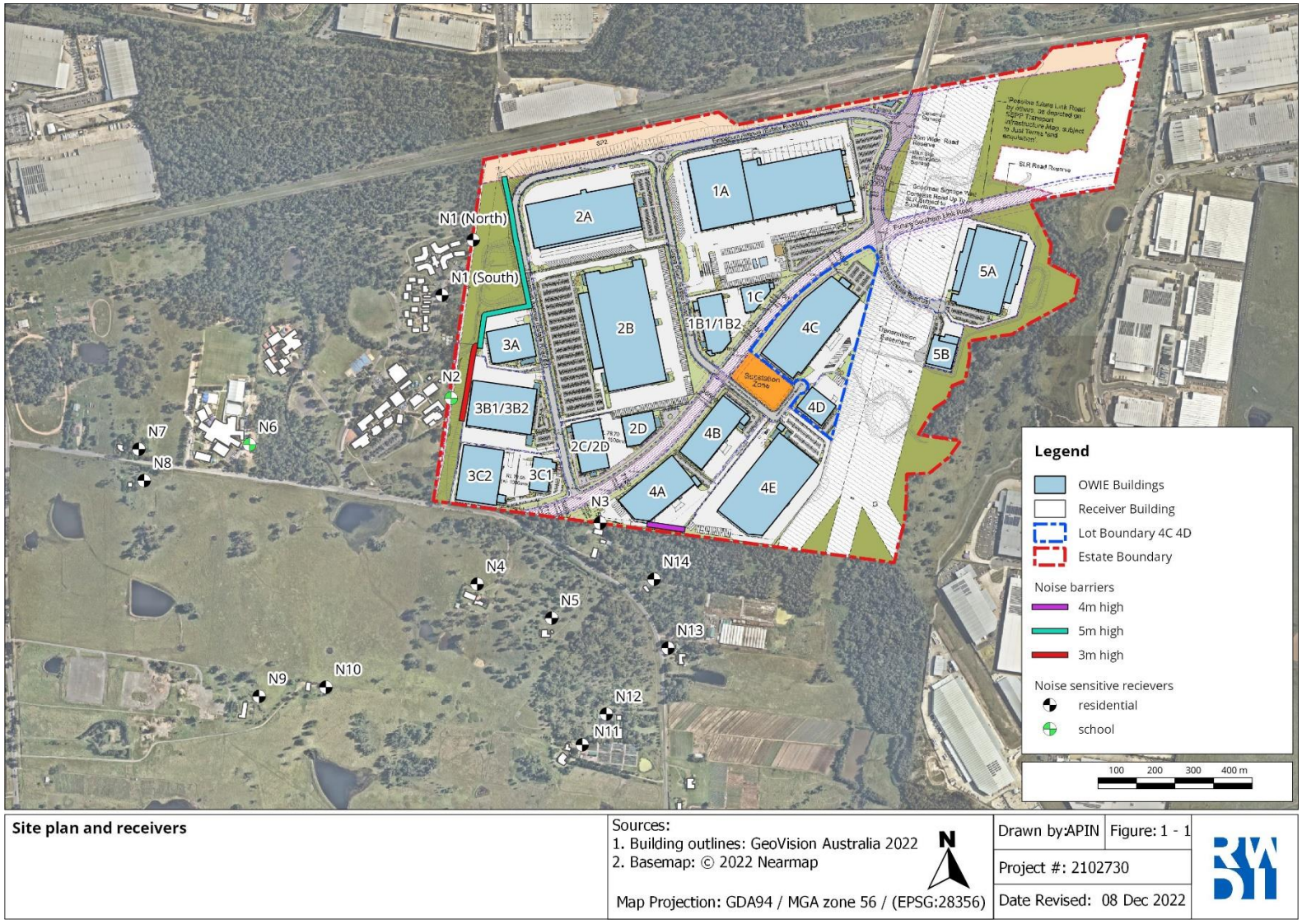

Figure 1-1 - Oakdale West Industrial Estate – Including latest updates to Buildings 4C and 4D

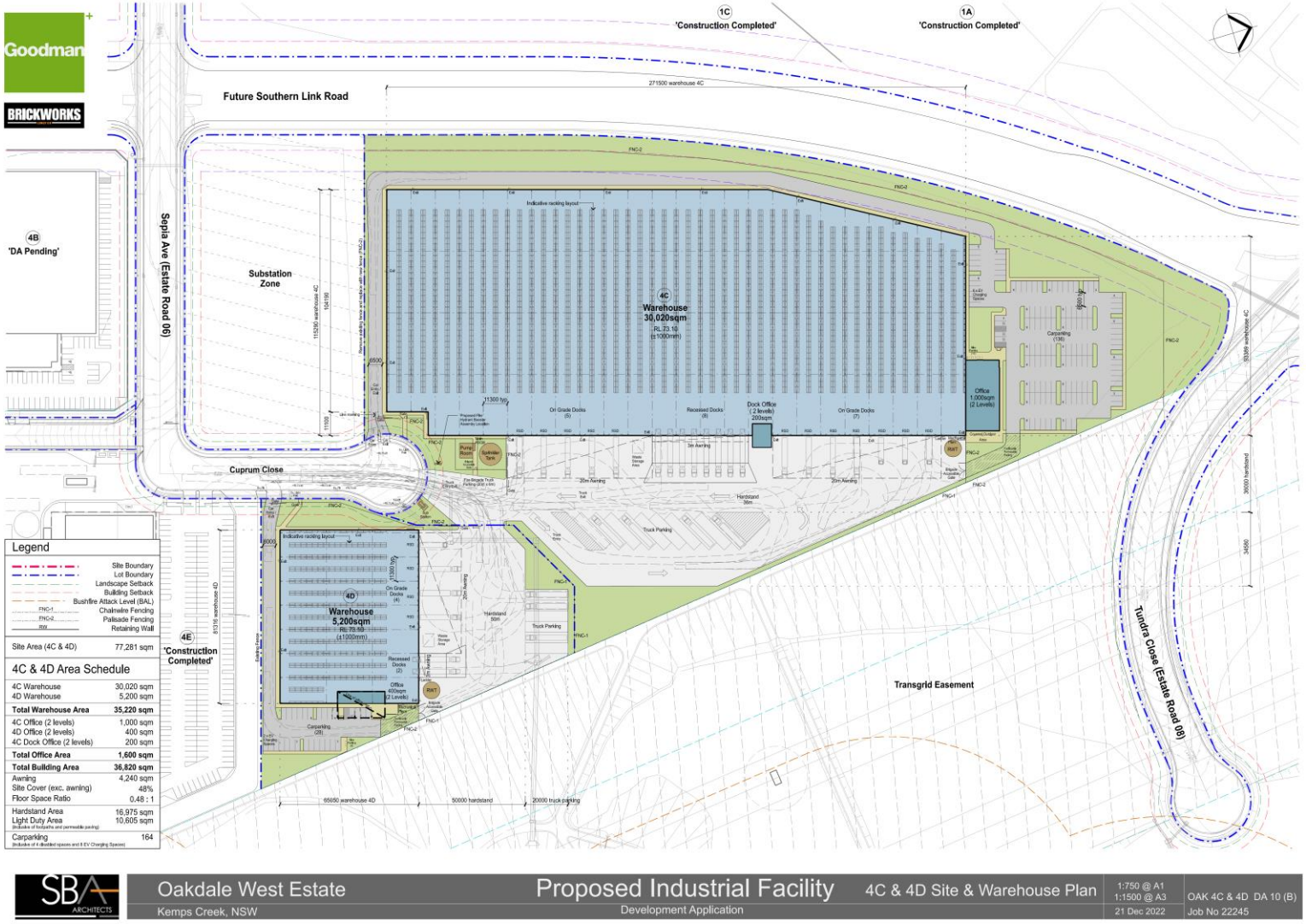

Figure 1-2 - Buildings 4C and 4D - Site & Warehouse Plan

1.2 Precincts 4C and 4D Proposal

The proposed development consists of two (2) new warehouse buildings each with ancillary office facilities, external hardstand spaces, staff carparking, landscaping and solar panels.

Approval is requested for the construction, operation, and fit-out of the buildings.

Building 4C spans 30,020 sqm of warehouse space and 1,200 sqm of office space, creating a total Gross Lettable Area of 31,220 sqm. The building has a proposed ridge height of 14.6m.

Building 4D spans 5,200 sqm of warehouse space and 400 sqm of office space, creating a total Gross Lettable Area of 5,600 sqm. The building has a proposed ridge height of 14.6m.

24/7 operations are proposed with a focus on warehouse and industrial use.

The proposed developments comply with MOD 12 of SSD 7348 Concept Plan that is currently with the Department of Planning & Environment for assessment.

This report is intended to form part of the application, to be submitted to Penrith City Council as a local council development application.

The proposed buildings form part of the larger OWIE which comprises 154 hectares of land within the Western Sydney Employment Area (WSEA) and is owned by a Joint Venture (JV) between Goodman and Brickworks Limited.

The subject sites are benched, serviced and ready for aboveground construction. SSD 7348 approved the infrastructure to these development pads.

Trucks will enter the 4C site via Cuprum Close (Estate Road 7) and proceed east along the shared access driveway. All heavy vehicles bound for 4C will pull up along the southern façade and either be unloaded by forklifts or utilise the recessed dock. All light vehicle parking is located adjacent to the eastern façade. No trucks will be refrigerated. The main warehouse area will not be temperature controlled resulting in only minor external mechanical plant for the offices.

Trucks will enter the 4D site directly via Cuprum Close (Estate Road 7) or the shared access driveway. All heavy vehicles bound for 4D will pull up along the western façade and either be unloaded by forklifts or utilise the recessed dock. All light vehicle parking is located adjacent to the eastern façade. No trucks will be refrigerated. The main warehouse area will not be temperature controlled resulting in only minor external mechanical plant for the offices.

1.3 Assessment Guidelines

The following NSW Environment Protection Authority (EPA) guidelines have been adopted.

- Noise from on-site operations (including on-site vehicle movements) has been assessed in accordance with the NSW *Noise Policy for Industry (NPfI)*, NSW EPA, 2000, with guidance on sleep disturbance criteria taken from this Policy.
- Noise from off-site vehicle movements has been assessed in accordance with guidance provided by the EPA in the NSW *Road Noise Policy (RNP),* NSW EPA, 2011.

- Construction noise has been assessed in accordance with the *Interim Construction Noise Guideline (ICNG)*, DECC, 2009.
- Vibration from construction has been considered in accordance with *Assessing Vibration: A Technical Guideline*, DEC, 2006.

2 OPERATIONAL NOISE CRITERIA

2.1 Approved Noise Limits (SSD 7348)

Conditions B18 and B19 of SSD 7348 include operational noise limits for OWIE as follows:

NOISE LIMITS

B18. The Applicant shall ensure the Development does not exceed the noise limits in **Table 3** at the receiver locations N1, N2, N3, N4 and N5 shown on the plan in **Appendix 5**.

***Table 3:** Noise Limits dB(A)*

Location	Day	Evening	Night	
	$L_{Aeq\ (15\ minute)}$	$L_{Aeq\ (15\ minute)}$	$L_{Aeq\ (15\ minute)}$	L_{AMax}
N1 Emmaus Village Residential	44	43	41	52
N3 Kemps Creek – nearest residential property	39	39	37	52
N4 & N5 Kemps Creek – other residences	39	39	37	52
All other non-associated residences	40[2]	35[2]	35[2]	52
N2 Emmaus Catholic College (school)	**When in use**: 45 $_{Leq\ (1h)}$			

Notes:

1. *Noise generated by the development is to be measured in accordance with the relevant procedures and modifications, including certain meteorological conditions, of the Noise Policy for Industry (EPA, 2017). Refer to the plan in Appendix 2 for the location of residential sensitive receivers.*
2. *or background + 5 dB, whichever is higher.*

B19. The noise limits in **Table 3** do not apply to receiver N3, N4 and N5 if the Applicant has a Noise Agreement with the relevant landowner to exceed the noise limits, and the Applicant has provided written evidence to the Planning Secretary that an agreement is in place.

It is understood that a Noise Agreement between the applicant and receiver N3, N4 and N5 has been made. As such, the criteria in Condition B18 of the Development Consent SSD 7348 are not applicable at receivers N3, N4 and N5.

The locations of receivers N1, N2, N3, N4 and N5 are shown in Appendix 5 of the Development Consent SSD 7348 and in **Figure 1-1**.

Condition C10 of SSD 7348 also states the following:

NOISE AND VIBRATION

C10. Future DAs shall be accompanied by a noise and vibration impact assessment. The assessment must:

(a) identify the noise and vibration impacts during construction and operation;

(b) demonstrate compliance with the noise limits in Condition B18;

(c) provide an analysis of all external plant and equipment, including but not limited to, forklifts, air conditioners and refrigeration systems;

(d) incorporate noise mitigation measures, such as increased building setbacks, building insulation, noise barriers, layout of truck loading areas or source controls, to demonstrate the noise limits in Condition B18 can be achieved;

(e) detail the timing to construct the noise walls shown in **Appendix 5**, to ensure noise from operation of the Development does not exceed the noise limits in Condition B18; and

(f) recommend mitigation and management measures to be implemented to minimise noise during construction.

It should be noted that the noise walls, as per Appendix 5, have already been installed.

2.2 Noise Limits for Additional Receivers N6 to N14

Currently, noise levels on site are recorded 24/7 by an unattended noise monitoring system. Locations of the noise monitors are shown in **Figure 2-1**.

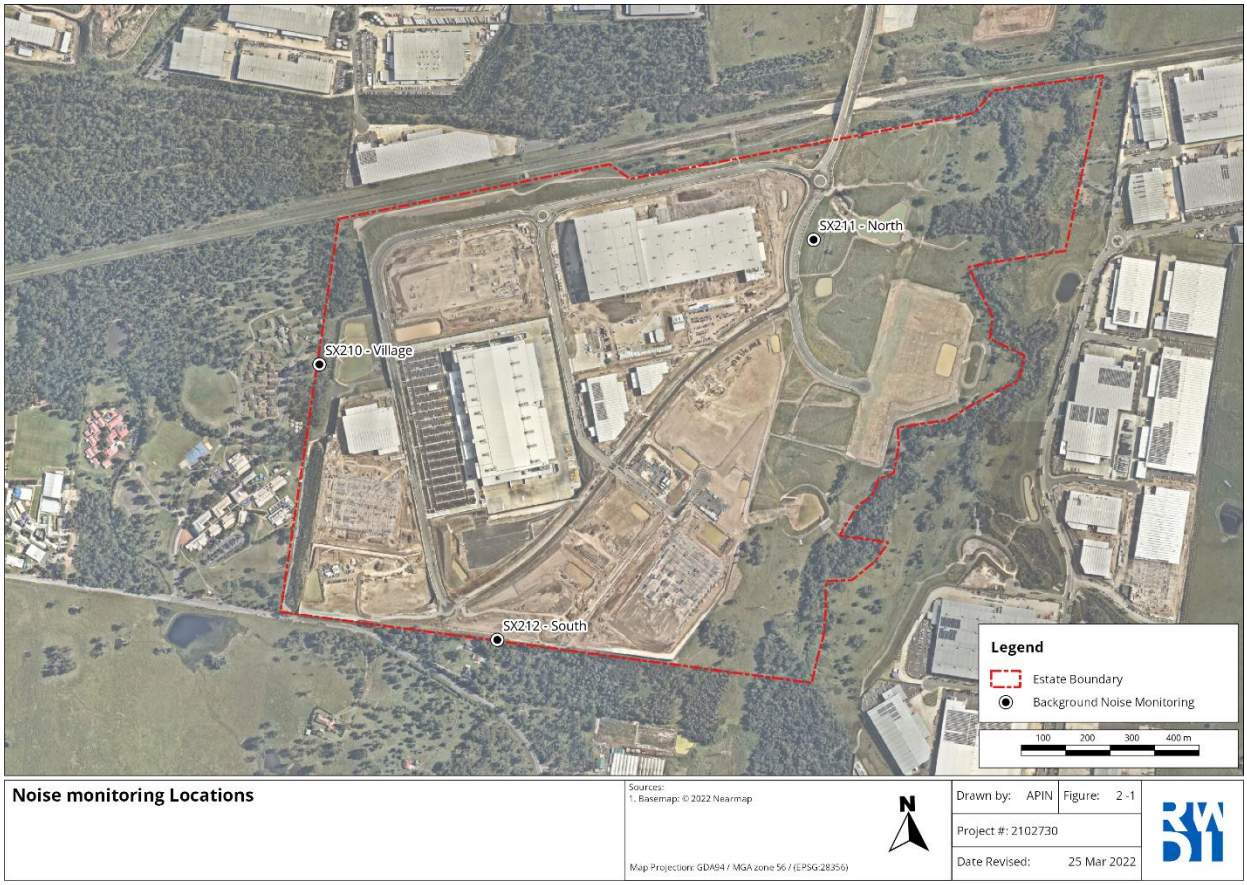

Figure 2-1 - Noise Monitoring Locations

The 'South' location is representative of residential receivers N7 to N14. The 'Village' location is representative of residential location N1 (presented for information only).

We have re-analysed this data between 1 May 2021 and 29 June 2021 for these two locations to determine the Rating Background Levels (RBLs) in accordance with the *NPfI* (calculated ABLs are attached in **Appendix A**). This process avoids any potential influence from daytime construction noise on site. The resulting background levels are shown in **Table 2-1**. These are consistent with our expectations given the site conditions.

Table 2-1 - Calculated RBLs

Location	RBL (dBA)		
	Day	Evening	Night
South	42	37	37
Village	39	38	37

The corresponding calculated Intrusiveness Criteria (Background +5) is presented in **Table 2-2**.

Table 2-2 - Intrusiveness Criteria (Background +5)

Location	Criteria (dBA)		
	Day	Evening	Night
Receivers N7 to N14 (South)	47	42	42
Receivers N1 (Village)	44	43	42

As per Condition B18, all other 'non-associated residences' can be evaluated using background plus 5 criteria. The criteria determined in Table 2-2 above have been adopted for receivers N7 to N14.

Receiver N6 is Mamre Anglican College which will have the same noise criteria as N2 – Emmaus Catholic College (school).

3 OPERATIONAL NOISE ASSESSMENT

Operational noise emissions from the site have been predicted with a model prepared using the SoundPLAN V8.2 noise modelling software, implementing the CONCAWE prediction method. The model incorporates the OWIE MOD 11 Masterplan design, including the updated civil design, buildings, and sensitive receivers shown in **Figure 1-1.** Operational noise sources included in the model comprise fixed rooftop plant, loading activities (forklifts) and on-site light and heavy vehicles movements.

Consistent with the previous MOD 3 assessment undertaken by SLR, predictions have been undertaken with consideration to neutral meteorological conditions for the daytime, evening and night time periods and additionally under adverse meteorological conditions during the night time period (F-class temperature inversion with a 2 m/s 'worst case' source to receiver drainage flow).

3.1 Traffic Generation

The Traffic Impact Assessment prepared by Ason Group (Report No: P1640r01) identifies the estimated OWIE traffic generation that may be expected, as set out in **Table 3-1**. This table has been updated with revised traffic volumes as included in traffic report for Precinct 4C and 4D by Ason Group (Report No: P2157r01v2 *Transport Assessment Lot 4C & 4D – Oakdale West Industrial Estate dated 13 December 2022*).

Table 3-1 - Precinct Traffic Generation

Precinct	GFA (m^2)	AM	PM	Daily
Precinct 1	125,198	108	83	2,562
Precinct 2	269,390	925	634	4,962
Precinct 3	57,204	93	93	1,082
Precinct 4	111,678	142	161	1,968
Precinct 5	35,640	58	58	674
Total	**599,455**	**1,326**	**1,209**	**11,249**

The identified vehicle movements have been apportioned across the relevant estate roads. Consistent with previous assessments, the night time vehicle volumes have been assumed to comprise 30% of day volume and heavy vehicles have been assumed to comprise 25% of total movements.

Where further information has been received from the tenant or traffic consultant relating to actual use, these figures have been updated accordingly. The above vehicle movements have been derived from a mixture of first principles traffic generation assessment and where there are committed customers and relevant information available, the customers proposed vehicles movements has been adopted. This results in the following assumed peak hourly movements for each lot.

Table 3-2 - Peak Hourly Assumed Traffic Movements

Precinct	Lot	Day (7am -6pm)		Evening (6pm-10pm)		Night (10pm -7am)	
		LV	HV	LV	HV	LV	HV
1	1A	377	54	377	54	216	54
	1B1	7	5	7	5	2	1
	1B2	7	5	7	5	2	1
	1C	14	-	14	-	4	-
2	2A	220	48	150	58	290	43
	2B	805	22	842	24	515	28
	2C-1	17	-	5	-	5	-
	2C-2	16	-	4	-	5	-
	2D	33	11	33	11	10	3
3	3A	13	3	-	-	-	-
	3B1	7	3	-	-	-	-
	3B2	6	3	-	-	-	-
	3C1	3	1	3	1	1	1
	3C2	10	2	10	2	4	1
4	4A	28	9	28	9	8	3
	4B	22	7	22	7	7	2
	4C	38	10	38	10	12	3
	4D	9	2	9	2	3	2
	4E	84	28	33	6	117	34
5	5A	171	12	171	12	11	3
	5B	32	2	32	2	2	1

3.2 Acoustic Data

The following noise level data for vehicle-related noise sources has been used for the assessment. These noise levels are taken from RWDI's internal database and external assessments and measurements of similar subject sites.

Table 3-3 - Sound Power Reference Levels

Noise Source	Noise Characteristic	Sound Power Level SWL, dBA
Forklift operational on hardstand[3]	Quasi-steady	93 L_{Aeq}
Light Vehicles[6] on site, up to speed of 40 km/h	Quasi-steady	90 L_{Aeq}
Heavy Vehicle[1] @25 km/h	Quasi-steady	106 L_{Aeq}
Heavy Vehicle[1], unloaded @ 10 km/h	Quasi-steady	106 L_{Aeq}
Heavy Vehicle[1], loaded @ 10 km/h	Quasi-steady	107 L_{Aeq}
Heavy Vehicle[1], reversing[4] @ 5 km/h	Quasi-steady	111 L_{Aeq}
Truck Idling[5]	Quasi-steady	95 L_{Aeq}
Truck Engine Starting	Instantaneous	100 L_{Amax}
Truck Airbrake Release[2]	Instantaneous	115 L_{Amax}

Note 1: Heavy vehicle defined as any cargo vehicle with three or more axles with gross vehicle weight > 12,000 kg.

Note 2: Consistent with measurements taken at Woolworths Customer Fulfillment Centre Brookvale by Renzo Tonin and Associates (Report: TL496-03F03 FP3 Wetherill Park NVIA R5), 16 March 2021.

Note 3: Consistent with assessment of Woolworths Moorebank Distribution Centre by Renzo Tonin and Associates (Report: TL265-01F04 DA ACOUSTIC ASSESSMENT _CONSTRUCTION AND OPERATION R10), 16 October 2020.

Note 4: Assume that reversing operation will not take more than 30 seconds for each vehicle, includes reversing alarm and air brake release.

Note 5: Consistent with measurements taken at Woolworths Distribution Centre Minchinbury by Renzo Tonin and Associates (Report: TL496-03F03 FP3 Wetherill Park NVIA R5), 1 April 2021.

Note 6: Considered conservative when compared to previous assessment of Woolworths Moorebank Distribution Centre by Renzo Tonin and Associates (Report: TL265-01F04 DA ACOUSTIC ASSESSMENT _CONSTRUCTION AND OPERATION R10).

The noise levels presented above are consistent with US-FHWA-TNM 2.5 technical model and are considered to be conservative for the purposes of this assessment. Note the increased level for a truck reversing is to account for audible reversing alarms and air brake releases.

A noise survey of a similar facility, Bevchain, located at 2 Tyrone Place, Erskine Park, was conducted on Friday, 27 August 2021. The purpose of this survey was to confirm the sound power levels presented in **Table 3-3** for heavy vehicle activities are appropriate. Sound power levels of the various heavy vehicle activities measured were found to be at or below the levels presented in this table.

3.3 Mechanical Services and Fixed Plant

Table 3-4 presents the mechanical services/fixed plant noise source assumptions for the OWIE Lots. The assumptions have been updated having regard to the operational requirements of the committed customers, some of which have changed since the initial masterplan approval. Where there are no customers committed to development lots, assumptions have been made that are consistent with other industrial estates given the size and type of customer likely to be attracted to the building. These assumptions are consistent with previous assessments.

Table 3-4 - Mechanical Services/Fixed Plant Noise Sources throughout OWIE

Precinct	Lot	Day (7am -6pm)	Evening (6pm-10pm)	Night (10pm -7am)
Precinct 1	1A	Refer to Table 4 of the MOD 2 Noise Assessment prepared by SLR (SLR Ref: 610.15617-L04-v1.5.doc)		
	1B1	No Operation	No Operation	No Operation
	1B2	No Operation	No Operation	No Operation
	1C	No Operation	No Operation	No Operation
Precinct 2	2A	SWL 90 dBA Cumulative	SWL 90 dBA Cumulative	SWL 85 dBA Cumulative
	2B	Refer Table 4-2 of Oakdale West Industrial Estate (OWIE) Noise & Vibration Assessment Report (Report No. 19940 Version F)		
	2C-1	No Operation	No Operation	No Operation
	2C-2	No Operation	No Operation	No Operation
	2D	No Operation	No Operation	No Operation
Precinct 3	3A	No Operation	No Operation	No Operation
	3B	No Operation	No Operation	No Operation
	3C1	SWL 85 dBA Cumulative	SWL 85 dBA Cumulative	SWL 85 dBA Cumulative
	3C2	SWL 91 dBA Cumulative	SWL 91 dBA Cumulative	SWL 88 dBA Cumulative
Precinct 4	4A	SWL 90 dBA Cumulative	SWL 90 dBA Cumulative	SWL 85 dBA Cumulative
	4B	SWL 90 dBA Cumulative	SWL 90 dBA Cumulative	SWL 85 dBA Cumulative
	4C	SWL 93 dBA Cumulative	SWL 93 dBA Cumulative	SWL 88 dBA Cumulative
	4D	SWL 90 dBA Cumulative	SWL 90 dBA Cumulative	SWL 85 dBA Cumulative
	4E	No Operation	No Operation	No Operation
Precinct 5	5A	SWL 85 dBA Cumulative	SWL 85 dBA Cumulative	SWL 85 dBA Cumulative
	5B	SWL 85 dBA Cumulative	SWL 85 dBA Cumulative	SWL 85 dBA Cumulative

3.4 Forklift Loading Activities

On-site forklift loading activities have been assumed to be consistent with previous assessments and further information provided by Goodman. Table 3-5 shows the number of forklifts assumed to be operating for each lot, where information is available from the customer these have been included. Remaining assumptions are consistent with other industrial estates. Majority of the forklift movements occurring at Night represent an early start for those particular users.

Table 3-5 - Number of Operational Forklifts Assumed for each Lot

Precinct	Lot	Day (7am -6pm)	Evening (6pm-10pm)	Night (10pm -7am)
Precinct 1	1A	4	4	4
	1B1	2	No Operation	No Operation
	1B2	1	No Operation	No Operation
	1C	1	No Operation	No Operation
Precinct 2	2A	2	No Operation	2
	2B	7	7	7
	2C-1	1	No Operation	No Operation
	2C-2	1	No Operation	No Operation
	2D	1	No Operation	No Operation
Precinct 3	3A	1	No Operation	No Operation
	3B	1	No Operation	No Operation
	3C1	1	1	1
	3C2	2	2	2
Precinct 4	4A	1	No Operation	No Operation
	4B	1	No Operation	No Operation
	4C	2	2	2
	4D	2	2	2
	4E	1	No Operation	1
Precinct 5	5A	2	2	2
	5B	1	1	1

3.5 Noise Barrier

The MOD 2 and MOD 3 noise assessment determined that noise walls to the west and south of the site were required and have been installed, as indicated in **Figure 1-1**.

The noise barrier to the west has a maximum height of 5 meters, of which sits on top of a circa 10m retaining wall that is in excess of 40m away from the estate's western boundary. The proposed MOD 3 barrier layouts are shown in **Figure 1-1**.

3.6 Operational Noise Scenarios

Table 3-6 presents the assumptions for each noise prediction scenarios.

Table 3-6 - Noise Prediction Scenarios

Scenario	Lot Operation	Description
All OWIE Precincts	All Lots listed in Table 3-4	Light and Heavy onsite vehicle movements. All Lots Mechanical Operation as per Table 3-4. Loading Activities as per Section 3.4 Barrier as per Section 3.5

Light vehicle and heavy vehicle traffic movements have been modelled as line sources with varying speed. Heavy vehicles are expected to enter the estate at 50 km/h, reduce speed to 25 km/h on estate roads, and reduce speed again to 10 km/h when manoeuvring on site. For instances where heavy vehicles will be side loaded, these will park up within the bays allocated with engine off whilst loading/unloading. For rear loaded semi-trailers, these will reverse into the recessed docks where indicated. Sound power levels have been applied as per **Table 3-3**, accounting for reversing alarms.

This modelling strategy as used for Buildings 4C and 4D is presented in **Figure 3-1** below.

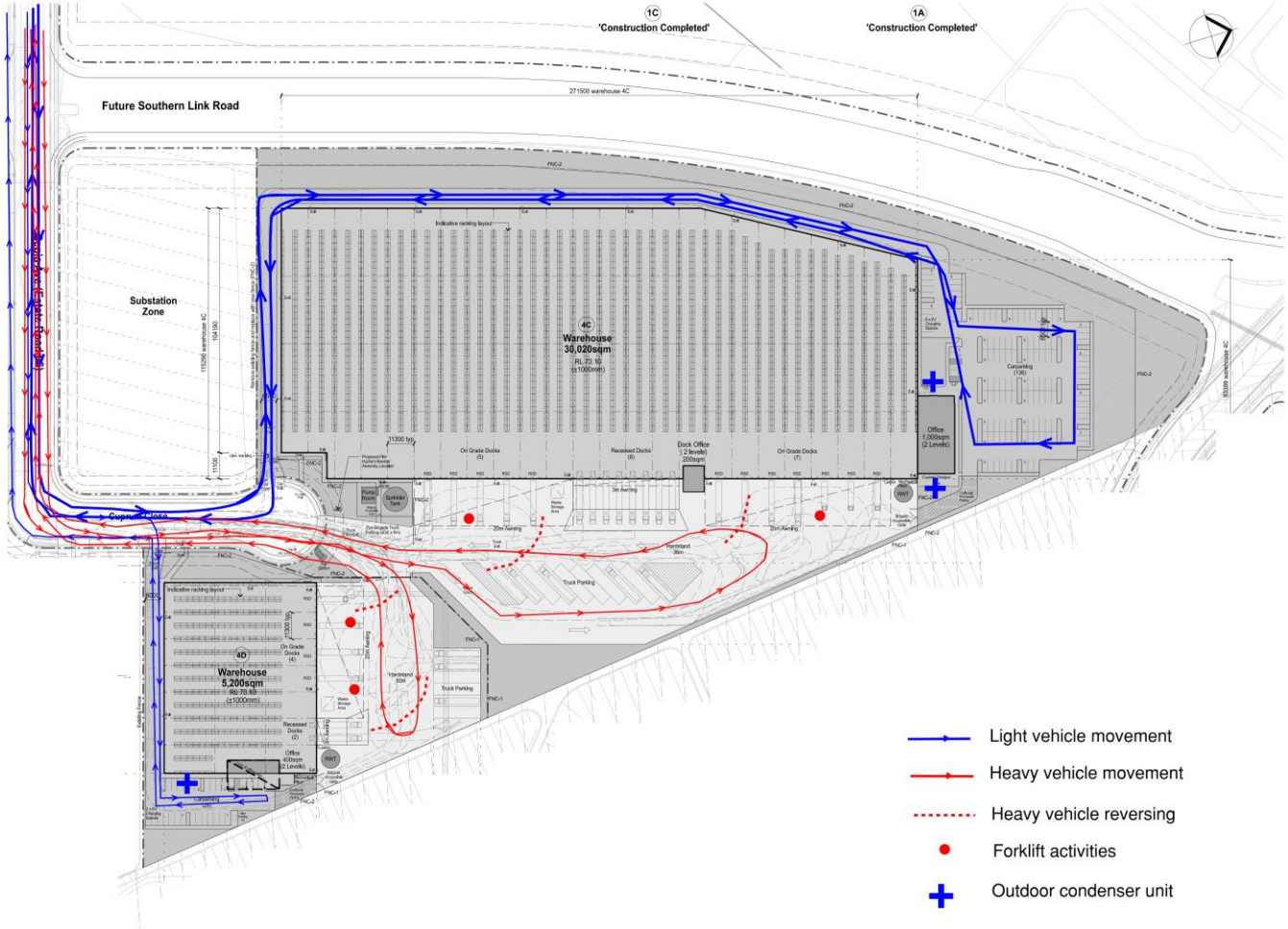

Figure 3-1 Source Layout for Buildings 4C and 4D

3.7 Operational Noise Predictions

Table 3-7 shows the $L_{Aeq,15min}$ operational noise predictions for operational scenarios as outlined in **Table 3-6** above. This includes confirmation of compliance with limits and notes any exceedances. The fourth column highlights any differences in the predicted noise levels between MOD 11 and MOD 7.

Table 3-7 - Predicted $L_{Aeq,15min}$ Operational Noise Levels

Receiver	Period (weather)	$L_{Aeq,15min}$ Noise Level (dBA)		Compliance
		Approved Noise Limits	All Precincts (MOD 12)[4]	
N1 – Emmaus Village Residential	Day	44	37 (1)	Yes
	Eve	43	36 (0)	Yes
	Night	41	38 (1)	Yes
	Night(Adverse)	41	41 (0)	Yes
N2 – Emmaus College (School)	Day	45	41 (-2)	Yes
	Eve	n/a	37 (5)	Yes
	Night	n/a	39 (5)	Yes
	Night(Adverse)	n/a	43 (5)	Yes
N6 – Mamre Anglican College	Day	45	30 (2)	Yes
	Eve	n/a	30 (3)	Yes
	Night	n/a	31 (3)	Yes
	Night(Adverse)	n/a	37 (3)	Yes
N7 – 21-42 Bakers Ln, Kemps Creek	Day	47	28 (-1)	Yes
	Eve	42	28 (0)	Yes
	Night	42	29 (-2)	Yes
	Night(Adverse)	42	35 (-1)	Yes
N8 – 706-752 Mamre Rd, Kemps Creek	Day	47	28 (0)	Yes
	Eve	42	28 (1)	Yes
	Night	42	29 (0)	Yes
	Night(Adverse)	42	35 (1)	Yes
N9 – 754-770 Mamre Rd, Kemps Creek	Day	47	<20 (-)	Yes
	Eve	42	<20 (-)	Yes
	Night	42	<20 (-)	Yes
	Night(Adverse)	42	23 (1)	Yes

Receiver	Period (weather)	$L_{Aeq,15min}$ Noise Level (dBA)		Compliance
		Approved Noise Limits	All Precincts (MOD 12)[4]	
N10 – 784-786 Mamre Rd, Kemps Creek	Day	47	28 (1)	Yes
	Eve	42	27 (0)	Yes
	Night	42	29 (1)	Yes
	Night(Adverse)	42	35 (2)	Yes
N11 – 99-111 Aldington Rd, Kemps Creek	Day	47	34 (0)	Yes
	Eve	42	33 (-1)	Yes
	Night	42	34 (1)	Yes
	Night(Adverse)	42	40 (1)	Yes
N12 – 53 Aldington Rd, Kemps Creek	Day	47	33 (0)	Yes
	Eve	42	33 (-1)	Yes
	Night	42	33 (0)	Yes
	Night(Adverse)	42	39 (0)	Yes
N13 – 54-72 Aldington Rd, Kemps Creek	Day	47	32 (-1)	Yes
	Eve	42	31 (-1)	Yes
	Night	42	33 (0)	Yes
	Night(Adverse)	42	38 (0)	Yes
N14 – 74-88 Aldington Rd, Kemps Creek	Day	47	35 (0)	Yes
	Eve	42	35 (-1)	Yes
	Night	42	35 (1)	Yes
	Night(Adverse)	42	40 (1)	Yes

Note 1: The approved noise limit for N2 is L_{Aeq} 35 dBA which applies internally and is only applicable when the school is in use. For the purpose of this assessment a conservative inside to outside correction of +10 dBA has been applied to the internal limit for N2 to allow for comparison with the external noise predictions. An inside to outside correction of +10 dBA is typical of a building with partially open windows.

Note 2: Consistent with the MOD 2 assessment, noise-enhancing weather conditions during the daytime and evening periods have not been included in the assessment as these are not considered prevailing conditions for the site.

Note 3: This assessment has applied a revised sound power level of 90 dBA to represent a light vehicle movement. MOD 2 applied a sound power level of 96 dBA, which is considered overly conservative.

Compliance is achieved at all receivers. The latest additions included for the proposed buildings 4C and 4D do not give rise to any significant increases when compared to the previous modelling results.

We do not believe that a modifying factor correction is warranted at this stage. We would normally apply an intermittent modifying factor to $L_{Aeq,15min}$ noise levels where all noise being assessed suddenly increases or reduces where the difference between the total $L_{Aeq,15min}$ (including all other non-industrial sources) at the receiver with the source present and not present results in a difference in L_{Aeq} of 5dB or more during a

15-minute period. It should be noted that given the number of sources at OWIE, total noise emissions will not suddenly change.

Further, we believe air brake releases and reversing beepers would be defined as 'Impulsive noise' under the following *NPfI* definition:

Noise with a high peak of short duration, or a sequence of such peaks.

An impulsive correction was dropped from the *NPfI* in favour of the Maximum Noise Level Event Assessment (MNLEA), included in Section 3.8 below.

We have consulted with the Noise Policy Section of the EPA. Mr Gordon Downey (Principal Technical Advisor – Noise) has advised that the intermittency modifying factor applies to a step change in continuous or quasi-continuous noise (which these sources are not).

If a modifying factor for intermittency was applied to these results, we note the following points.

- This would result in negligible exceedances during the night time period at locations N13 (1dB exceedance) and N14 (2dB exceedance).
- This would result in a moderate exceedance during the night time period of 5dB at location N1.
- We have incorporated all reasonable and feasible noise mitigation measures (noise barriers, and orientation of noise sources).
- If an intermittency correction was to be applied, this would be undoing or contradicting the basis for the assessments that DPE have previously approved including SSD 10397 and the modifications to SSD 7348.
- The dominant source of the potential exceedance at receiver N1 is from Precinct 2 operations.

3.8 Sleep Disturbance Assessment

An assessment of potential sleep disturbance has been undertaken considering heavy vehicle brake releases and reversing alarms (non-tonal) modelled in the hardstand areas of the development with a sound power level of SWL 115 dBA.

Table 3-8 identifies the $L_{A1,1min}$ typical maximum operational noise predictions in comparison with the adopted L_{AMax} noise criteria. Note that the difference between the L_{AMax} and $L_{A1,1min}$ descriptor for reversing alarms and air brake releases is negligible. The table shows the $L_{A1,1min}$ maximum noise predictions in comparison with the approved noise limits for 'All OWIE Precincts' scenario. Compliance with the adopted criteria is predicted at all receivers. The latest additions included for the proposed 4C and 4D buildings do not change the predicted maximum noise levels as these are governed by sources at other lots.

Table 3-8 - Predicted Maximum Operational Noise Levels – All Precincts

Receiver	Period	$L_{A1,1min}$ Noise Level (dBA)		Compliance
		Adopted Criteria (Approved Limit)	All Precincts (MOD 12)[4]	
N1 – Emmaus Village Residential	Night	52 (51)	44	Yes
	Night^{Adverse}	52 (51)	48	Yes
N2 – Emmaus College (School)	Night	n/a	n/a	Yes
	Night^{Adverse}	n/a	n/a	Yes
N6 – Mamre Anglican College	Night	n/a	n/a	Yes
	Night^{Adverse}	n/a	n/a	Yes
N7 – 21-42 Bakers Ln, Kemps Creek	Night	52 (51)	34	Yes
	Night^{Adverse}	52 (51)	38	Yes
N8 – 706-752 Mamre Rd, Kemps Creek	Night	52 (51)	34	Yes
	Night^{Adverse}	52 (51)	39	Yes
N9 – 754-770 Mamre Rd, Kemps Creek	Night	52 (51)	20	Yes
	Night^{Adverse}	52 (51)	24	Yes
N10 – 784-786 Mamre Rd, Kemps Creek	Night	52 (51)	41	Yes
	Night^{Adverse}	52 (51)	46	Yes
N11 – 99-111 Aldington Rd, Kemps Creek	Night	52 (51)	42	Yes
	Night^{Adverse}	52 (51)	46	Yes
N12 – 53 Aldington Rd, Kemps Creek	Night	52 (51)	42	Yes
	Night^{Adverse}	52 (51)	46	Yes
N13 – 54-72 Aldington Rd, Kemps Creek	Night	52 (51)	40	Yes
	Night^{Adverse}	52 (51)	45	Yes
N14 – 74-88 Aldington Rd, Kemps Creek	Night	52 (51)	47	Yes
	Night^{Adverse}	52 (51)	50	Yes

Note 1: The approved noise limit for N2 is L_{Aeq} 35 dBA which applies internally and is only applicable when the school is in use. For the purpose of this assessment a conservative inside to outside correction of +10 dBA has been applied to the internal limit for N2 to allow for comparison with the external noise predictions. An inside to outside correction of +10 dBA is typical of a building with partially open windows.

Note 2: Consistent with the MOD2 assessment, noise-enhancing weather conditions during the daytime and evening periods have not been included in the assessment as these are not considered prevailing conditions for the site.

Note 3: This assessment has applied a revised sound power level of 90 dBA to represent a light vehicle movement. MOD2 applied a sound power level of 96 dBA, which is considered overly conservative.

4 OFF-SITE TRAFFIC NOISE IMPACTS

4.1 Off-Site Traffic Noise Impact Assessment

The *RNP* requires noise mitigation where new land use developments increase road traffic noise by more than 2 dB. An increase of greater than 2 dB requires an increase in traffic volumes of approximately 60% or higher.

The main access route to the development site is via Compass Drive then the arterial road of Lenore Drive. The forecast traffic daily traffic volumes on Lenore Drive are approximately 28,000 vehicles (refer to SLR report 610.16083-R1), including vehicle movements from the OWIE. The daily traffic volume from the OWIE is estimated to be approximately 11,249 vehicles, which equates to an increase in traffic volumes of approximately 45%.

Therefore, an increase in traffic noise due to the OWIE of greater than 2 dB is not considered likely. No mitigation is likely to be required as a result.

5 CONSTRUCTION NOISE AND VIBRATION ASSESSMENT

Construction noise and vibration impacts from the OWIE have previously been assessed by SLR (610.15617-R2). With respect to the subject DA, this assessment considers the potential construction noise and vibration impacts from the development of Buildings 4C and 4D.

The construction works are proposed to be undertaken between normal operating hours (7.00am-6.00pm Monday to Friday and 8.00am-1.00pm Saturdays).

The following scenarios have been assessed for each building:

- Earthworks;
- Pad and hardstand works, including concrete pours; and
- Construction of warehouse and office structures.

The use of the site access road for the delivery of materials to the site is assumed in all construction work scenarios.

5.1 Construction Noise Criteria

Construction works will be undertaken within the standard construction hours (7.00am-6.00pm Monday to Friday and 8.00am-1.00pm Saturdays).

Adopting the measured background noise levels determined by SLR (SLR report 610.15617-R2), the Construction Noise Management Levels NMLs derived for the project in accordance with the NSW *Interim Construction Noise Guideline (ICNG)* are detailed in **Table 5-1**.

Table 5-1 - *ICNG* Construction Noise Management Levels (CNMLs)

Receiver	Period	$L_{Aeq,15min}$ Construction NMLs (dBA)	
		Standard Hours	Highly Noise Affected
N1, N7 & N8	Day	49	75
N9 – N14	Day	44	75
N2 & N6	Day	55*	n/a

* Noise level of L_{Aeq} 55 dBA has been adopted, with consideration to the generally accepted 10 dB noise reduction typically achieved through a partially open window.

5.2 Construction Noise Impact Assessment

For the identified construction activities, this assessment considers the construction equipment and sound power levels set out in **Table 5-2**.

Predicted $L_{Aeq,15min}$ construction noise levels are compared with the *ICNG* criteria in **Table 5-3**.

Table 5-2 - Sound Power Levels for Construction Equipment

Construction Activity	Equipment	Operating Minutes in 15-min period	No. of Items in each Work Area	Sound Power Level (dBA)		
				$L_{Aeq,15min}$		L_{Amax}
				Item	Activity	Activity
Earthworks	Dozer	15	1	110	116	121
	Dump Truck	15	3	100		
	Excavator	15	1	102		
	Front End Loader (FEL) 962	15	1	112		
	Grader	15	1	108		
Pad & Hardstand Works	Concrete Pump	7.5	1	106	113	118
	Concrete Truck/Agitator	7.5	1	106		
	Concrete Truck movements	15	2	106		
	Concrete Vibrator	15	1	102		
	Paving Machine	15	1	104		
	Plate Compactor	5	1	108		
	Vibratory Roller (12 tonne)	15	1	109		
Construction of Warehouse & Office Structures	Elevated Working Platform	15	2	97	111	118
	Flatbed Truck	15	1	100		
	Hand Tools (electric)	7.5	4	108		
	Mobile Crane (100 tonne)	15	1	101		
	Welding Equipment	15	1	97		

Note 1: In accordance with the *ICNG*, for activities identified as particularly annoying (such as jackhammering, rock breaking and power saw operations), a 5 dB 'penalty' is added to the source sound power level when predicting noise using the quantitative method.

5.2.1 Building 4C

Table 5-3 - Prediction $L_{Aeq,15min}$ Construction Noise Levels Building 4C

Receiver	Period (weather)	$L_{Aeq,15min}$ Noise Level (dBA)				
		CNML	Highly Affected NML	Predicted		
				Earthworks	Hardstand	Construction
N1 – Emmaus Village Residential	Day (Standard)	49	75	23-27	25-27	21-22
N2 – Emmaus Catholic College (School)	Day (Standard)	55*	n/a	21-24	21-24	<20
N6 – Mamre Anglican College	Day (Standard)	55*	n/a	<20	<20	<20
N7 – 21-42 Bakers Ln, Kemps Creek	Day (Standard)	49	75	<20	<20	<20
N8 – 706-752 Mamre Rd, Kemps Creek	Day (Standard)	49	75	<20	<20	<20
N9 – 754-770 Mamre Rd, Kemps Creek	Day (Standard)	44	75	<20	<20	<20
N10 – 784-786 Mamre Rd, Kemps Creek	Day (Standard)	44	75	<20	<20	<20
N11 – 99-111 Aldington Rd, Kemps Creek	Day (Standard)	44	75	30-33	29-31	25-27
N12 – 53 Aldington Rd, Kemps Creek	Day (Standard)	44	75	31-33	29-31	25-28
N13 – 54-72 Aldington Rd, Kemps Creek	Day (Standard)	44	75	31-35	30-33	26-29
N14 – 74-88 Aldington Rd, Kemps Creek	Day (Standard)	44	75	33-35	31-34	27-32

Note 1: The *ICNG* criterion for N2 is L_{Aeq} 45 dBA which applies internally and is only applicable when the school is in use. For the purpose of this assessment, a conservative inside to outside correction of +10 dBA has been applied to the internal limit for N2 to allow for comparison with the external noise predictions. An inside to outside correction of +10 dBA is typical of a building with partially open windows.

Note 2: Bold text indicates an exceedance of the *ICNG* CNML.

Note 3: The predictions assume the western and the southern site boundary noise wall, as shown in Figure 1-1.

Construction noise scenarios are predicted to be within the daytime CNML at all receiver locations.

5.2.2 Building 4D

Table 5-4 - Predicted $L_{Aeq,15min}$ Construction Noise Levels for Building 4D

Receiver	Period (weather)	$L_{Aeq,15min}$ Noise Level (dBA)				
		CNML	Highly Affected NML	Predicted		
				Earthworks	Hardstand	Construction
N1 – Emmaus Village Residential	Day (Standard)	49	75	20-22	21- 25	<21
N2 – Emmaus Catholic College (School)	Day (Standard)	55*	n/a	24-25	22-23	<20
N6 – Mamre Anglican College	Day (Standard)	55*	n/a	<20	<20	<20
N7 – 21-42 Bakers Ln, Kemps Creek	Day (Standard)	49	75	<20	<20	<20
N8 – 706-752 Mamre Rd, Kemps Creek	Day (Standard)	49	75	<20	<20	<20
N9 – 754-770 Mamre Rd, Kemps Creek	Day (Standard)	44	75	<20	<20	<20
N10 – 784-786 Mamre Rd, Kemps Creek	Day (Standard)	44	75	<20	<20	<20
N11 – 99-111 Aldington Rd, Kemps Creek	Day (Standard)	44	75	32-34	30-31	26-28
N12 – 53 Aldington Rd, Kemps Creek	Day (Standard)	44	75	35-38	33-35	28-31
N13 – 54-72 Aldington Rd, Kemps Creek	Day (Standard)	44	75	35-37	32-34	29-31

Receiver	Period (weather)	$L_{Aeq,15min}$ Noise Level (dBA)				
		CNML	Highly Affected NML	Predicted		
				Earthworks	Hardstand	Construction
N14 – 74-88 Aldington Rd, Kemps Creek	Day (Standard)	44	75	37-40	35-37	31-33

Note 1: The *ICNG* criterion for N2 is L_{Aeq} 45 dBA which applies internally and is only applicable when the school is in use. For the purpose of this assessment, a conservative inside to outside correction of +10 dBA has been applied to the internal limit for N2 to allow for comparison with the external noise predictions. An inside to outside correction of +10 dBA is typical of a building with partially open windows.

Note 2: Bold text indicates an exceedance of the *ICNG* CNML.

Note 3: The predictions assume the western and the southern site boundary noise walls, as shown in Figure 1-1.

Construction noise scenarios are predicted to be within the daytime CNML at all receivers

5.3 Construction Noise Mitigation

The *ICNG* describes strategies for construction noise mitigation and control that are applicable to this proposal. The strategies are designed to minimise, to the fullest extent practicable, noise during construction.

Currently the construction noise for all scenarios will comply at all receivers. These predictions should be reviewed prior to an issue of a construction certificate with the nominated contractor. If revised predictions are found to exceed the NML's the following mitigation measures should apply:

- Minimising the coinciding use of multiple noisy plant items;
- Equipment which is used intermittently is to be shut down when not in use;
- Equipment with directional noise emissions would be oriented away from sensitive receivers as much as practicable;
- Regular compliance checks on the noise emissions of all plant and machinery used for the proposal would indicate whether noise emissions from plant items were higher than predicted. This also identifies defective silencing equipment on the items of plant;
- Non-tonal reversing alarms should be used on all items of plants and heavy vehicles used for construction; and
- Goodman would undertake pre-construction community consultation with affected receivers in order clearly and transparently explain the proposed works and the potential for construction noise impacts. Regular on-going updates would be provided throughout the works in order to understand and address as far as practicable any noise related concerns of the receivers.

The identified measures would be carried out to ensure the works are undertaken with minimal noise impact.

5.4 Construction Vibration Impact Assessment

The vibration generating plant items would be set back from the site boundaries by several hundreds of metres. Given this setback distance, vibration levels would not be discernible off-site, therefore no vibration impacts would be expected.

5.5 Construction Noise and Vibration Management Plan

A Construction Noise and Vibration Management Plan will be developed prior to commencement of works. Indicative construction noise and vibration mitigation measures have been recommended in Section 5 of SLR report 610.15617-R2 and above.

6 CONCLUSION

RWDI has undertaken an operational noise and construction noise & vibration assessment of Buildings 4C and 4D within the approved Oakdale West Industrial Estate (OWIE) in Kemps Creek, NSW.

6.1 Operational Noise

The principal OWIE operational noise sources comprise light and heavy vehicle movements, loading activities and fixed mechanical service plant. Noise modelling of these sources has been undertaken to determine potential noise impacts associated with the proposed staged operation of the modified OWIE.

The following outcomes have been found during the assessment:

- The operation of full development of the OWIE is predicted to comply with the operational noise criteria during the day, evening and night time periods.
- An assessment of potential sleep disturbance has been undertaken considering heavy vehicle brake releases and reverse alarms. Sleep disturbance prediction indicate that noise impact would comply with the relevant criterion.

The cumulative effect of noise from all industrial sources has been considered in assessing potential noise impacts.

6.2 Construction Phase

This assessment has considered construction noise and vibration impacts that have potential to arise during the development of Buildings 4C and 4D.

The key construction works would involve earthworks, pad and hardstand works at each lot and the construction of the building warehouse and office structures at each lot in question. All construction work scenarios include the use of the site access road for the delivery of materials to the site. The construction works are proposed to be undertaken between normal operating hours (7.00am-6.00pm Monday to Friday and 8.00am-1.00pm Saturdays).

Construction noise scenarios are predicted to be within the daytime CNML at all receiver locations.

No vibration impacts are anticipated during the proposed works.

6.3 Off-Site Traffic Noise Impact

An increase in traffic noise due to the OWIE of greater than 2 dB is not considered likely. No mitigation is likely to be required as a result.

APPENDIX A – NOISE LOGGING DATA

‘South’ Location

Descriptor	Date	Day	Evening	Night
ABL	01-May-21	38.0	38.4	36.1
ABL	02-May-21	34.7	38.1	34.3
ABL	03-May-21	46.4	40.3	33.9
ABL	04-May-21	37.4	35.8	35.4
ABL	05-May-21	38.5	37.8	35.0
ABL	06-May-21	38.3	39.2	35.2
ABL	07-May-21	36.5	40.1	39.1
ABL	08-May-21	35.4	38.6	32.1
ABL	09-May-21	33.3	39.1	37.0
ABL	10-May-21	45.8	39.7	37.1
ABL	11-May-21	42.1	35.7	33.4
ABL	12-May-21	47.5	37.4	34.4
ABL	13-May-21	54.6	38.0	38.0
ABL	14-May-21	49.7	37.2	37.3
ABL	15-May-21	39.6	34.2	31.1
ABL	16-May-21	32.0	33.2	34.0
ABL	17-May-21	46.0	32.8	35.9
ABL	18-May-21	49.5	42.3	38.7
ABL	19-May-21	41.4	41.0	38.3
ABL	20-May-21	40.8	37.0	35.0
ABL	21-May-21	37.8	35.4	34.3
ABL	22-May-21	34.9	35.2	34.0
ABL	23-May-21	31.8	33.3	34.3
ABL	24-May-21	42.1	39.9	40.1
ABL	25-May-21	44.8	44.0	43.1
ABL	26-May-21	43.2	36.3	32.7
ABL	27-May-21	42.5	35.8	33.7
ABL	28-May-21	40.8	34.8	33.8
ABL	29-May-21	37.0	34.4	32.6
ABL	30-May-21	33.3	32.4	33.6
ABL	31-May-21	43.4	40.6	40.5
ABL	01-Jun-21	43.9	39.5	40.0
ABL	02-Jun-21	44.0	39.5	39.8
ABL	03-Jun-21	44.3	33.0	34.5

Descriptor	Date	Day	Evening	Night
ABL	04-Jun-21	41.0	35.1	32.4
ABL	05-Jun-21	35.1	39.1	36.4
ABL	06-Jun-21	31.8	37.1	37.8
ABL	07-Jun-21	45.0	42.4	43.4
ABL	08-Jun-21	48.6	42.3	34.6
ABL	09-Jun-21	43.7	42.3	43.1
ABL	10-Jun-21	45.0	36.3	37.0
ABL	11-Jun-21	41.2	36.1	41.6
ABL	12-Jun-21	38.1	35.4	37.8
ABL	13-Jun-21	33.7	32.9	38.0
ABL	14-Jun-21	32.4	33.9	35.0
ABL	15-Jun-21	41.5	38.1	39.4
ABL	16-Jun-21	43.8	42.3	36.5
ABL	17-Jun-21	43.5	40.1	38.4
ABL	18-Jun-21	41.3	39.4	35.8
ABL	19-Jun-21	44.4	37.0	34.4
ABL	20-Jun-21	34.4	36.5	35.0
ABL	21-Jun-21	41.6	37.1	38.2
ABL	22-Jun-21	42.3	41.2	41.5
ABL	23-Jun-21	45.1	44.2	43.7
ABL	24-Jun-21	49.2	42.1	37.9
ABL	25-Jun-21	44.6	41.9	41.2
ABL	26-Jun-21	37.5	38.8	38.7
ABL	27-Jun-21	33.5	32.2	34.3
ABL	28-Jun-21	40.0	37.0	37.0
ABL	29-Jun-21	39.1	38.2	37.7
RBL	**ALL**	**41.5**	**37.2**	**37.0**

Note: Data shown as shaded has been excluded from the analysis due to non-compliant meteorological conditions.

'Village' Location

Descriptor	Date	Day	Evening	Night
ABL	01-May-21	36.5	37.2	31.1
ABL	02-May-21	33.4	37.5	34.4
ABL	03-May-21	40.3	39.4	35.5
ABL	04-May-21	37.6	35.2	34.0
ABL	05-May-21	39.6	38.5	35.5
ABL	06-May-21	40.4	40.2	36.6
ABL	07-May-21	39.9	38.9	37.4
ABL	08-May-21	35.8	37.9	36.1
ABL	09-May-21	33.5	37.0	36.0
ABL	10-May-21	38.7	40.1	37.0
ABL	11-May-21	39.2	35.3	34.4
ABL	12-May-21	40.8	36.3	35.4
ABL	13-May-21	39.8	37.1	37.1
ABL	14-May-21	42.8	39.0	40.7
ABL	15-May-21	38.7	34.4	32.2
ABL	16-May-21	32.0	34.1	33.9
ABL	17-May-21	39.5	34.8	37.8
ABL	18-May-21	39.2	42.7	38.3
ABL	19-May-21	38.2	40.2	39.0
ABL	20-May-21	39.1	37.1	35.4
ABL	21-May-21	38.9	36.8	35.7
ABL	22-May-21	34.0	36.6	34.3
ABL	23-May-21	31.3	35.2	34.6
ABL	24-May-21	37.7	36.4	35.3
ABL	25-May-21	40.0	43.3	41.7
ABL	26-May-21	40.0	35.6	34.3
ABL	27-May-21	43.3	36.3	34.6
ABL	28-May-21	42.4	38.1	34.5
ABL	29-May-21	38.4	35.3	33.1
ABL	30-May-21	34.8	33.9	35.0
ABL	31-May-21	38.2	41.1	40.0
ABL	01-Jun-21	38.6	39.3	38.6
ABL	02-Jun-21	38.2	40.3	38.7
ABL	03-Jun-21	42.2	32.3	34.1

Descriptor	Date	Day	Evening	Night
ABL	04-Jun-21	41.3	36.3	35.3
ABL	05-Jun-21	34.2	39.3	41.6
ABL	06-Jun-21	30.5	38.2	41.3
ABL	07-Jun-21	39.9	42.3	44.3
ABL	08-Jun-21	44.2	39.6	37.1
ABL	09-Jun-21	42.1	42.6	43.2
ABL	10-Jun-21	44.8	37.5	42.4
ABL	11-Jun-21	40.1	38.2	43.8
ABL	12-Jun-21	36.8	35.8	42.5
ABL	13-Jun-21	33.3	35.3	38.1
ABL	14-Jun-21	32.4	34.2	34.2
ABL	15-Jun-21	35.0	37.9	40.7
ABL	16-Jun-21	39.0	41.2	41.2
ABL	17-Jun-21	41.8	40.7	40.8
ABL	18-Jun-21	40.3	41.3	38.3
ABL	19-Jun-21	43.6	37.0	36.1
ABL	20-Jun-21	35.1	37.0	36.2
ABL	21-Jun-21	39.7	38.1	38.7
ABL	22-Jun-21	39.5	41.7	40.5
ABL	23-Jun-21	41.3	42.8	43.0
ABL	24-Jun-21	44.7	41.5	38.2
ABL	25-Jun-21	42.4	41.0	41.3
ABL	26-Jun-21	38.7	38.5	41.4
ABL	27-Jun-21	33.5	33.5	36.3
ABL	28-Jun-21	39.2	38.8	39.7
ABL	29-Jun-21	38.5	37.1	36.4
RBL	**ALL**	**39.1**	**37.5**	**37.1**

Note: Data shown as shaded has been excluded from the analysis due to non-compliant meteorological conditions.