221-227 and 289-317 Luddenham Road, Orchard Hills

Noise Impact Assessment

Prepared for HBB Property

January 2025

221-227 and 289-317 Luddenham Road, Orchard Hills

Noise Impact Assessment

HBB Property

E230918 RP2

January 2025

Version	Date	Prepared by	Reviewed by	Comments
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4	20/02/2025	R. Bruniges	R. Kirwan	Additional receivers added for Mandalong Close and Twin Creeks

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21 February 2025

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Executive Summary

EMM Consulting (EMM) was engaged by HBB Property to address potential noise impacts associated with the proposed Alspec Industrial Business Park (AIBP) to be located at 211-227 and 289-317 Luddenham Road, Orchard Hills NSW (the Site). This noise impact assessment (NIA) will support the development application (DA) for bulk earthworks and subdivision of the Site and be used to assess cumulative operational noise impact for the whole of site based on an indicative masterplan.

Noise from the operation of the indicative masterplan has been assessed against the EPA 2017, Noise Policy for Industry (NPfI). The NPfI provides a framework for addressing noise from multiple allotments within an industrial subdivision such that the cumulative impacts do not exceed recommended targets.

The potential for road traffic noise generation on Luddenham Road has been assessed using the guidance provided in the NSW Department of Environment Climate Change and Water (DECCW) 2011, Road Noise Policy (RNP).

The outcomes from the assessment of noise from the indicative masterplan indicates the following:

- Noise associated with operation of warehouses can be mitigated with the implementation of architectural acoustic treatments which would be formulated as part of each individual lot development application such that the treatment is consistent with the operational use.

- On-site vehicle noise (eg loading dock hardstand operations, carparks, etc.) is expected to be primarily responsible for operational noise from the Site. Noise mitigation measures have been incorporated into modelling including the masterplan layout which, where possible, has docks to the West of warehouse buildings, and a 3m noise barrier has been included around unshielded hardstand areas.

- Based on full site operations, noise predictions comply with recommended amenity noise levels at most residential receivers within the residential zoned NCA1 and NCA3, with the exception of R1 and R2 where a 1-2 dB exceedance of the night period amenity level is predicted during the morning shoulder period.

- Noise levels at R16, R17, R18, R19 and R20 are predicted to exceed the morning shoulder period and night period criteria by up to 8 dB. It should be noted these receptors are all in the zoned E4 General Industrial land. If these receivers were assessed against industrial noise amenity criteria, as is typical for isolated residences within an industrial zone, predicted noise impacts would comply with criteria.

- The exceedances at R18 - R20 are related to the immediately adjacent smaller warehouses (warehouse 14 – 32). It is likely that progressive development of the precinct will occur such that some warehouses would be developed prior to others and hence with the benefit of time, receptors R18 to R20 would not exist as residences at the time warehouses closest to them are developed.

- Noise from existing traffic on Luddenham Road is shown to be above the road noise policy planning levels. Additional road traffic noise on Luddenham Road generated by the development is predicted to exceed the relative increase criteria by 0.7 dB for Northbound traffic (location R1) during the night period. Compliance with the relative increase criterion is predicted at all other assessment locations. It is further noted that increased road traffic noise would be realised over several years and should be considered in the planned growth of the area (ie major transport infrastructure, industrial, retail, commercial and high density residential).

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1 Introduction

1.1 Project context and overview

EMM Consulting (EMM) was engaged by HBB Property to address potential noise impacts associated with the proposed Alspec Industrial Business Park (AIBP) to be located at 211-227 and 289-317 Luddenham Road, Orchard Hills NSW (the Site). This noise impact assessment (NIA) will support the development application (DA) for bulk earthworks and subdivision of the Site and be used to assess cumulative operational noise impact for the whole of site based on an indicative masterplan.

The proposal includes the subdivision of land into 9 lots and preparation works across the estate to facilitate future development. While the subdivision DA does not seek consent for the operation of industrial activities on the site, an updated noise impact assessment has been undertaken based on the site layout and finished ground levels provided in the bulk earthworks plan.

The purpose of this assessment is to determine whether the AIBP can achieve compliance with Environmental Protection Authority (EPA) guidelines and to provide a framework for assessing noise from each allotment within the development.

Noise from the operation of the precinct based on the indicative masterplan has been assessed against the EPA 2017, Noise Policy for Industry (NPfI). The NPfI provides a framework for addressing noise from multiple allotments within an industrial subdivision such that the cumulative impacts do not exceed recommended targets.

1.2 Previous assessments

EMM has undertaken the following assessments for the AlBP based on an indicative site masterplan:

- 221-227 & 289-317 Luddenham Road, Orchard Noise Impact Assessment (EMM report J200388_RP1) March 2022
- 221-227 & 289-317 Luddenham Road, Orchard Hills Construction Noise and Vibration Impact Assessment (EMM report E230636_RP2) July 2023.

1.3 Purpose of this report

This NIA provides an updated operational noise impact assessment based on changes to the masterplan and operational information provided by HBB. As there are no proposed changes to the disturbance area or methodology used for construction works, no additional construction assessment has been undertaken.

The NIA report has been prepared in general accordance with the following relevant guidelines and policies:

- Noise Policy for Industry (NPfI) (EPA 2017)
- Road Noise Policy (RNP) (DECCW 2011)

2 Project and site description

2.1 Site location

The Site is located at 221-227 & 289-317 Luddenham Road, Orchard Hills, NSW. The AIBP bulk earthworks and zoning plan are shown in Figure 2.1. An indicative masterplan is provided in Figure 2.2.

The total site area is approximately 125.3 hectares with road frontages to Luddenham Road. The proposed site and adjacent allotments are located within the Penrith City Council local government area (LGA). The site, including the immediately adjacent eastern and southern land parcels, are zoned E4 General Industrial. The area surrounding the site is zoned RU2 Rural Landscape or C2 Environmental Conservation.

2.2 AIBP masterplan

This NIA has been undertaken based on the AIBP masterplan and bulk earthworks plans provided by HBB on 4 July 2024, shown in Figure 2.1 and Figure 2.2. The subdivision proposes to divide the development into 9 allotments, of which Lot 1-5 are proposed for future industrial development. The indicative masterplan includes 10 large warehouses located on Lot 1-4, each with their own hardstand area, and 22 small warehouses/commercial spaces on Lot 5 and the eastern extent of Lot 4 to the south-east of the development.

The land immediately to the east of the site (between the development and Luddenham Road) and to the south of the site (319 Luddenham Road) has been rezoned E4 to allow for additional industrial development which is currently outside of this masterplan. A concept masterplan for these adjoining lots is shown in Figure 2.3.

2.2.1 Warehouse noise generating activities

Warehouses within the development are generally expected to be used for storage and distribution. Noise generated by the development will be generally associated with the use of loading docks, on-site vehicle movements, material handling and road traffic noise generation on Luddenham Road.

2.2.2 Alspec Warehouse

Lot 1 within the development is proposed to be occupied by Alspec Warehouse. This development will primarily be a manufacturer of aluminium projects and will include an extrusion press and paint line, storage and distribution and office space and will operate 24 hours a day, 7 days a week. Noise generating activities on site are expected to include operation of the extrusion press and paint line, onsite vehicle movements and handling of freight.

2.2.3 AIBP traffic generation

Traffic movements generated by the AIBP have been assessed in two different ways; road traffic noise impact while on public roads and an on-site operational noise impact as per current NSW noise assessment methodology. As the proponents for the majority of lots are unknown, where site specific data was unavailable, estimated traffic data has been sourced from the traffic noise assessment completed by Arcadis. Arcadis have advised they have estimated traffic movements in accordance with Transport for NSW guidelines for warehouse developments.

Table 2.1 details total daily traffic movements generated on Luddenham Road which has been used in the road traffic noise assessment.

Table 2.1 Expected AIBP traffic generation for Luddenham Rd

Vehicle movements north of Patons Lane (HV%)		Vehicle movements south of Patons Lane (HV%)		Total development movements
Day	**Night**	**Day**	**Night**	
4750 (14%)	1050 (22%)	2050 (14%)	460 (22%)	8310

Note: 1. Percentage heavy vehicles in brackets

2. Day – 7am to 10pm, Night - 10pm to 7am

Where development specific information was available, as it is for Lot 1 Alspec Warehouse and Lot 4 Cope Sensitive freight, this data has been used in-lieu of estimated volumes.

Table 2.2 provides a summary of traffic data used for the operational noise assessment. It includes total daily heavy vehicle (HV) movements, peak hour HV movements and an assumed worst case 15-minute period used for assessment of noise impact. Where peak hour data has been provided, half of these movements occurring within a 15 minute period has been assessed.

Table 2.2 AIBP estimated heavy vehicle (HV) movements

Period	Total daily HV movements	Peak hour	Peak hour HV movements	Worst case 15 min HV movements
AIBP Masterplan				
Morning shoulder	199	06:00 – 07:00	112	6[1]
Day	1409	07:00 – 08:00	300	15[1]
Evening	128	18:00 – 19:00	44	3[1]
Night	159	04:00 – 05:00	49	3[1]
Lot 1 – Alspec Warehouse				
Morning shoulder	17	NA	NA	12
Day	74	NA	NA	12
Evening	36	NA	NA	6
Night	2	NA	NA	2
Lot 2 – Speculative distribution warehouse				
Morning shoulder	17	06:00 – 07:00	10	5
Day	99	07:00 – 08:00	14	7
Evening	10	19:00 – 20:00	4	2
Night	17	04:00 – 05:00	5	3
Lot 3 – Cope Sensitive freight				
Morning shoulder	45	06:00 – 07:00	25	13
Day	266	07:00 – 08:00	37	19
Evening	29	18:00 – 19:00	10	5

Period	Total daily HV movements	Peak hour	Peak hour HV movements	Worst case 15 min HV movements
Night	38	22:00 – 23:00	12	6

1. Average movements per site, assuming AIBP masterplan total movements are evenly distributed between 10 large warehouses. This average has been used for all large warehouses where no specific data has been provided.
2. Morning shoulder is 5am to 7am, Day 7 am to 6 pm; evening 6 pm to 10 pm; night 10 pm to 5 am.

2.2.4 On-site Sewer management system

Alspec business park will include an on-site sewer management system (OSSM) used to recycle water on site. The OSSM will be to the north of the development, adjacent to warehouse 2. The proponent has provided details of noise generating equipment for inclusion in this assessment.

2.3 Southern and eastern land parcels

The land immediately to the east of the site (between the development and Luddenham Road) and to the south of the site (319 Luddenham Road) has been rezoned E4 to allow for additional industrial development which is currently outside of this masterplan. A concept masterplan for these adjoining lots is shown in Figure 2.3. Given there is no specific design, noise impacts associated with this rezoning is discussed in principle only.

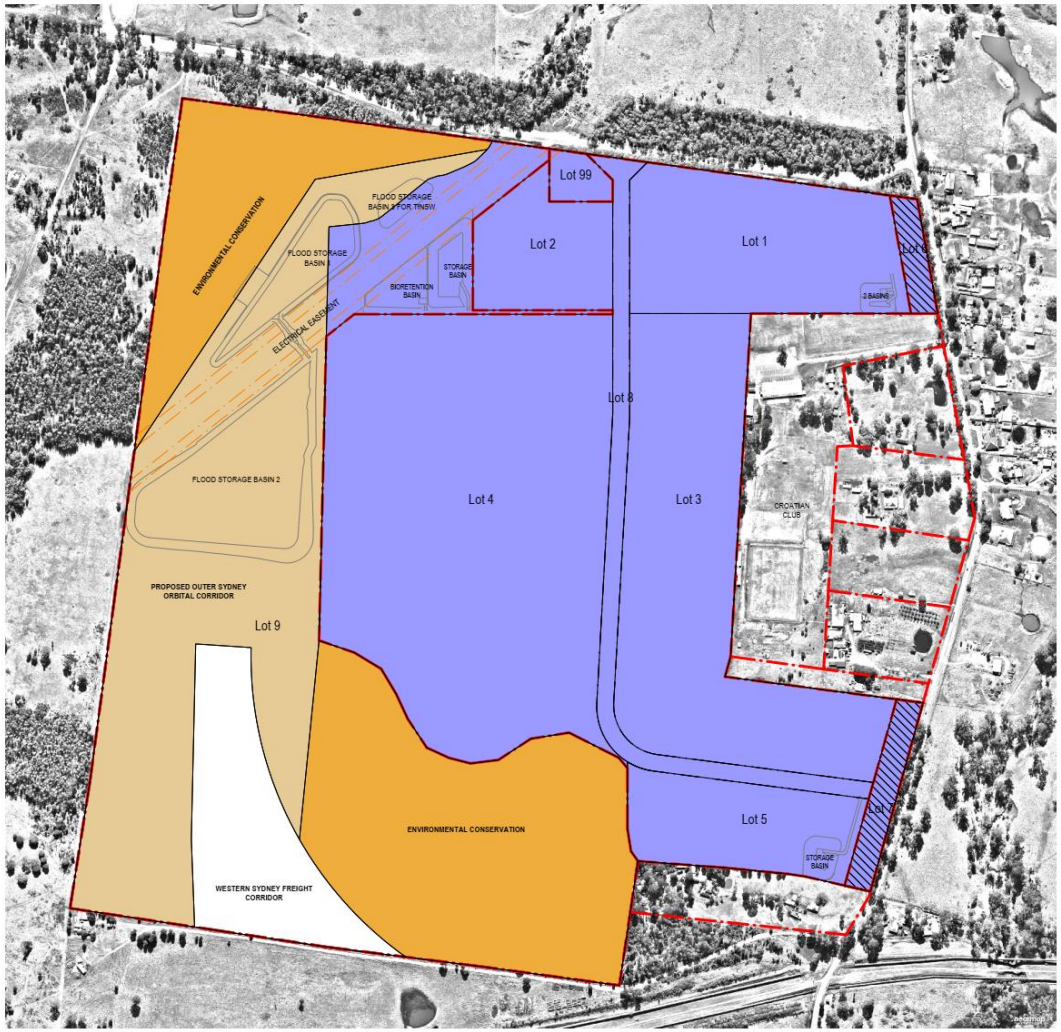
2.4 Future regional development

Whilst the Site is currently located in an area encompassing generally rural properties, the region has been marked for significant future industrial, commercial and infrastructure development with the site rezoned E4 General Industrial. A sample of such developments or areas marked for significant redevelopment include:

- Western Sydney Employment Area Precinct and Aerotropolis;
- Mamre Road Precinct – an 850 hectare industrial precinct approximately 1 km to the southeast of the Site
- Sydney Science Park – a $5 billion mixed-use smart city that will create an internationally recognised epicentre for research, development, commercialisation and innovation in the heart of Western Sydney. The development will incorporate commercial, education, residential and retail uses
- Western Sydney Freight Line– a new freight rail corridor adjoining the southern and western boundary of the site
- North South Rail Line – a new freight and passenger rail corridor adjoining the western boundary of the site
- Outer Sydney Orbital – new transport corridor incorporating a motorway and freight line, which will adjoin the western boundary of the site.
- Luddenham Road upgrade – an upgrade to Luddenham Road by Transport for NSW to service the Aerotropolis. It will be widened to a 60m corridor with two lanes in both direction with provisions for an additional third lane.

The development of these areas is significant and would ultimately result in increases ambient noise levels, particularly at assessment locations adjacent the Site.

ALSPEC INDUSTRIAL BUSINESS PARK		
14-Mar-24		DA103
TOTAL LANDTAKE (m²)		1,253,773
Zone Name		Zone Area (m²)
C2	Environmental Conservation	252,574
E4	General Industrial	664,317
RU2	Rural Landscape	248,738
TIA	Transport investigation area	22,091
TIN	SEPP (Transport and Infrastructure) 2021	66,054
Lot Subdivision Total		1,253,773



Project Name
Alspec Industrial Business Park
Project Address
Luddenham Road, Orchard Hills NSW

Key Plan

BULK EARTHWORKS PLANS - Zoning Plan Overlay

MJ | NG | A1 | 1:3000

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Figure 2.1 Bulk earthworks plan and zoning

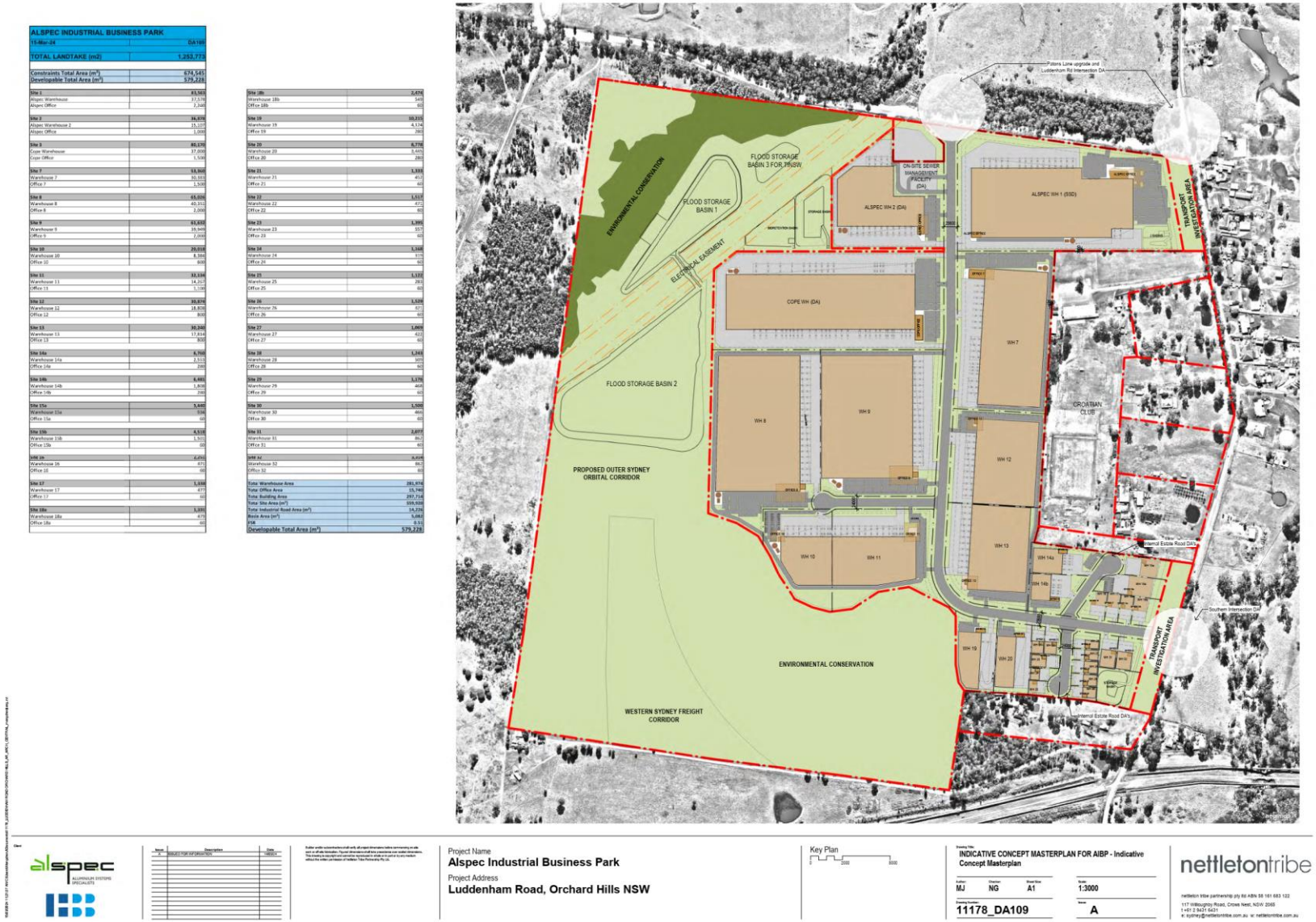


Figure 2.2 AIBP indicative masterplan

EASTERN LAND PARCEL	
15-Mar-24	DA110
TOTAL LANDTAKEA (m²)	184,905
Constraints Name	Constraints Area (m²)
Access Road Area (m²)	26,413
40m Luddenham Road Widening Corridor Area (m²)	24,130
Constraints Total Area (m²)	50,543
Site Name	Site Area (m²)
Site 41	3,519
Site 42	3,870
Site 43	1,744
Site 44	1,754
Site 45	1,754
Site 46	1,756
Site 47	1,760
Site 48	1,765
Site 49	1,769
Site 50	1,773
Site 51	1,777
Site 52	1,781
Site 53	1,785
Site 54	3,861
Site 55	5,073
Site 56	2,357
Site 57	2,337
Site 58	4,218
Site 59	1,737
Site 60	2,100
Site 61	2,100
Site 62	2,100
Site 63	2,100
Site 64	2,100
Site 65	2,101
Site 66	2,115
Site 67	2,460
Site 68	2,093
Site 69	2,036
Site 70	1,960
Site 71	1,897
Site 72	1,795
Site 73	4,196
Site 74	1,845
Site 75	2,024
Site 76	1,834
Site 77	1,924
Site 78	2,043
Site 79	2,098
Site 80	1,985
Site 81	1,817
Site 82	1,784
Site 83	1,795
Site 84	1,655
Site 85	1,517
Site 86	1,447
Site 87	1,203
Site 88	1,370
Site 89	1,455
Site 90	1,528
Site 91	1,607
Site 92	1,448
Site 93	2,306
Site 94	1,861
Site 95	1,803
Site 96	1,807
Site 97	1,731
Site 98	1,785
Site 99	6,552
Site 100	5,158
Total Site Number	60
Total Developable Area (m²)	134,362
Total Warehouse Area (m²)	53,745
Total Office Area (m²)	2,681

Southern Land Parcel	
15-Mar-24	DA110
TOTAL LANDTAKE (m²)	27,352
Constraints Name	Constraints Area (m²)
Access Road Area (m²)	3,209
40m Luddenham Road Widening Corridor Area (m²)	3,144
Constraints Total	6,353
Site Name	Site Area (m²)
Site 33	3,480
Site 34	2,764
Site 35	1,335
Site 36	1,667
Site 37	1,852
Site 38	1,939
Site 39	2,108
Site 40	5,850
Total Site Number	8
Total Developable Area (m²)	20,999
Total Warehouse Area (m²)	8,400
Total Office Area (m²)	420
Total Building Area (m²)	8,820

Figure 2.3 Indicative concept masterplan for adjacent properties

2.5 Assessment locations

Noise assessment locations were considered as part of the previous AIBP masterplan assessment. Off site assessment locations that could potentially experience noise from the development have been separated into three noise catchment areas (NCAs) which have been derived based on noise environments and are discussed as follows:

- NCA1 represents residential assessment locations on the eastern side of Luddenham Road. The dwelling façades face the development and Luddenham Road; they are exposed to road traffic noise.
- NCA2 represents residential assessment locations on the western side of Luddenham Road. These properties are all set back from Luddenham Road and would be expected to experience lower noise from existing road traffic which is consistent with noise monitoring conducted at the site. It is noted that these residential properties have been included in the precinct structure plan and rezoned to E4 General Industrial.
- NCA3 represents remote assessment locations which are well removed from Luddenham Road.

The existing acoustic environment for relevant assessment locations is dominated by road traffic noise from Luddenham Road. Traffic volumes are expected to increase in coming years due to the proposed regional development, discussed in Section 2.3, including the proposed widening of the Luddenham Road corridor. Assessment locations are provided in Table 2.3 and are shown on Figure 3.1.

Table 2.3 Assessment locations

Noise catchment area	Assessment location ID	Address	MGA 56 coordinate		Land use
			Easting	Northing	
NCA1	R1	182 Luddenham Road, Orchard Hills	292707	6255864	Residential
NCA1	R2	202 Luddenham Road, Orchard Hills	292718	6255742	Residential
NCA1	R3	212 Luddenham Road, Orchard Hills	292729	6255685	Residential
NCA1	R4	216 Luddenham Road, Orchard Hills	292737	6255636	Residential
NCA1	R5	222 Luddenham Road, Orchard Hills	292745	6255592	Residential
NCA1	R6	226 Luddenham Road, Orchard Hills	292752	6255550	Residential
NCA1	R7	230 Luddenham Road, Orchard Hills	292760	6255500	Residential
NCA1	R8	236 Luddenham Road, Orchard Hills	292768	6255452	Residential
NCA1	R9	240 Luddenham Road, Orchard Hills	292782	6255398	Residential
NCA1	R10	246 Luddenham Road, Orchard Hills	292786	6255352	Residential
NCA1	R11	250 Luddenham Road, Orchard Hills	292797	6255301	Residential
NCA1	R12	256 Luddenham Road, Orchard Hills	292804	6255252	Residential
NCA1	R13	262 Luddenham Road, Orchard Hills	292802	6255208	Residential
NCA1	R14	268 Luddenham Road, Orchard Hills	292750	6255017	Residential
NCA1	R21	320 Luddenham Road, Orchard Hills	292641	6254644	Residential

Noise catchment area	Assessment location ID	Address	MGA 56 coordinate		Land use
			Easting	Northing	
NCA2	R15	229 Luddenham Road, Orchard Hills	292458	6255431	Commercial /Active recreation
NCA2	R16	233 Luddenham Road, Orchard Hills	292603	6255351	Residential
NCA2	R17	251 Luddenham Road, Orchard Hills	292575	6255258	Residential
NCA2	R18	275 Luddenham Road, Orchard Hills	292561	6255025	Residential
NCA2	R19	287 Luddenham Road Orchard Hills	292552	6254987	Residential
NCA2	R20	319 Luddenham Road, Orchard Hills	292377	6254700	Residential
NCA2	R22	339 Luddenham Road, Orchard Hills	292428	6254440	Residential
NCA3	R23	405 Luddenham Road, Orchard Hills	291959	6254260	Residential
NCA3	R24	327 Luddenham Road, Orchard Hills	291497	6254625	Residential

HBB Property entered into a sales agreement for the residential dwelling at R19 (287 Luddenham Road). This is significant as this dwelling is the closest receiver to the project and adjoins a future driveway to the development. The dwelling is expected to be vacated prior to Project construction work starting.

2.6 Regional assessment locations

As part of the response to submissions Penrith City Council requested further information to demonstrate operation of the AIBP will not adversely affect other surrounding residential receivers including the Twin Creeks neighbourhood and along Mandalong Close. Additional regional assessment locations were added to the assessment and are detailed in Table 2.4.

Table 2.4 Regional assessment locations

Noise catchment area	Assessment location ID	Address	MGA 56 coordinate		Land use
			Easting	Northing	
NCA4	R25	10 Comargo Lane, Luddenham (Twin Creeks)	292573	6254250	Residential
NCA4	R26	75-77 Mandalong Close, Orchard Hills	293395	6255782	Residential

3 Existing environment

Noise monitoring was done to quantify the existing noise environment around the proposed development site. Four unattended noise loggers were deployed at locations representative of the acoustic environment at the nearest assessment locations close to Luddenham Road and at locations representative of receivers further removed from it.

3.1 Measurement equipment and locations

Noise monitoring was carried out using three Acoustic Research Labs (ARL) NGARA environmental noise loggers and one Svantek 979 environmental noise logger. The details of each noise monitoring location are provided in Table 3.1 and illustrated on Figure 3.1.

Table 3.1 Monitoring locations

Monitor ID	Equipment type and serial number	Period of measurement (2020)	Monitoring location		
			Address	Easting (MGA)	Northing (MGA)
NM1	Svantek 979, 21095	24 July to 4 August	221-227 Luddenham Road, Orchard Hills	292703	6255625
NM2	ARL NGARA, 878125	1 July to 13 July	221-227 Luddenham Road, Orchard Hills	292376	6254999
NM3	ARL NGARA, 878123	1 July to 13 July	221-227 Luddenham Road, Orchard Hills	291825	6255085
NM4	ARL NGARA, 878138	1 July to 13 July	221-227 Luddenham Road, Orchard Hills	291902	6255708

Loggers were programmed to record statistical noise level indices continuously in 15 minute intervals in accordance with the requirements of the NPfI, including the L_{Amax}, L_{A1}, L_{A10}, L_{A50}, L_{A90}, L_{A99}, L_{Amin} and the L_{Aeq}. Calibration of all instrumentation was checked prior to and following measurements. All equipment had current NATA (or manufacturer) calibration status.

3.2 Weather affected noise data

Weather data for the survey period was obtained from the BOM weather station at Badgerys Creek (ID 067108). Wind speed and the rainfall data were used to exclude noise data during periods of any rainfall and/or wind speed in excess of 5 metres per second (m/s) in accordance with NPfI requirements.

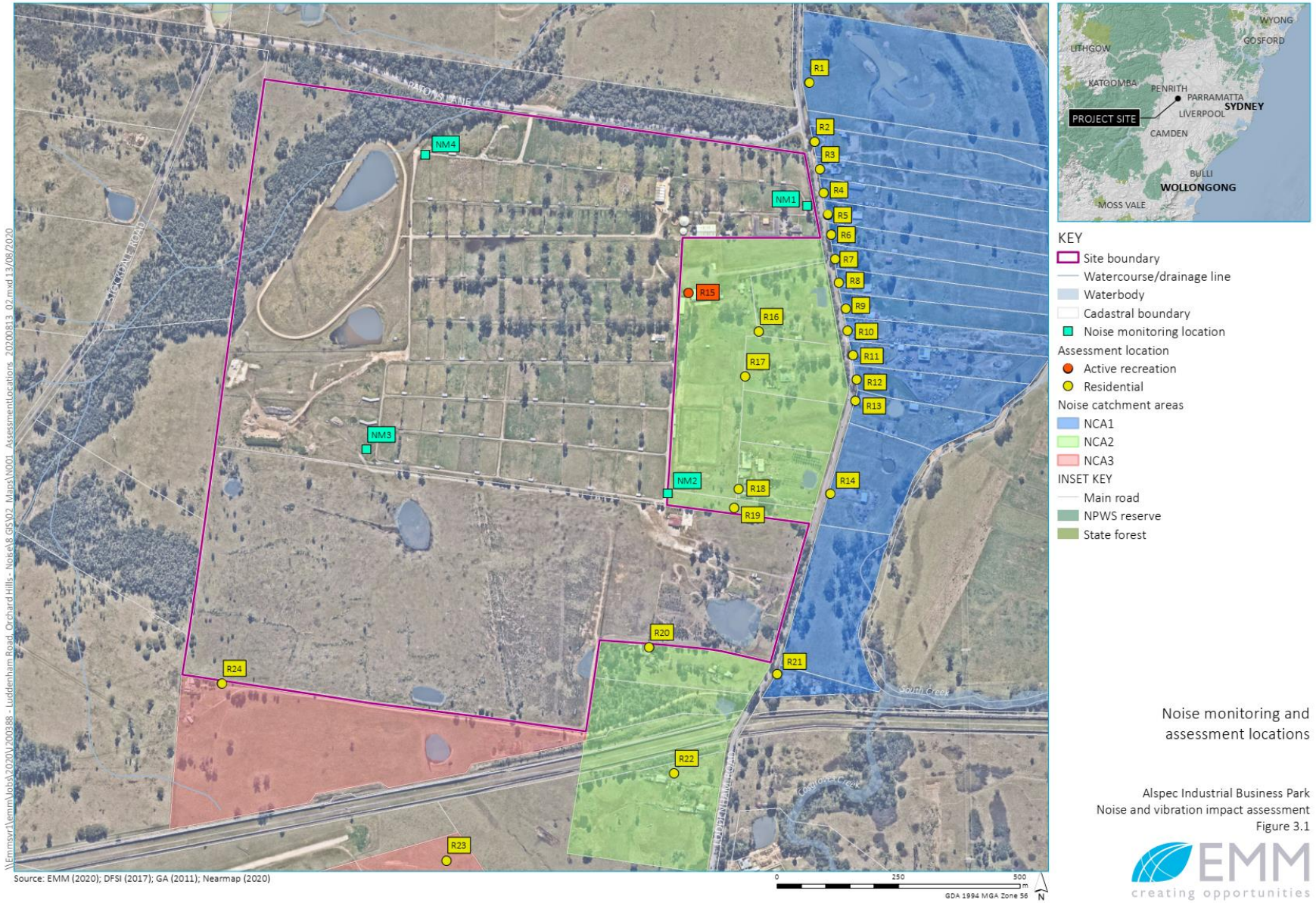


Figure 3.1 Noise monitoring and assessment locations

3.3 Measured noise levels

A summary of the existing background and ambient noise levels is provided in Table 3.2.

Table 3.2 Summary of unattended ambient noise monitoring

Noise monitoring location	Time period[1]	Existing noise levels, dB	
		$L_{Aeq,period}$	Rating background level (RBL)
NM1	Morning shoulder	58	37
	Day	58	40
	Evening shoulder	59	44
	Evening	56	39
	Night	53	34
NM2	Morning shoulder	46	32
	Day	52	34
	Evening shoulder	52	36
	Evening	43	35
	Night	41	30
NM3	Morning shoulder	42	30
	Day	47	29
	Evening shoulder	46	31
	Evening	41	34
	Night	39	30
NM4	Morning shoulder	46	32
	Day	50	29
	Evening shoulder	43	31
	Evening	41	36
	Night	40	33

1. Morning shoulder is 5am to 7am, Day 7 am to 6 pm; evening shoulder 4pm to 6pm, evening 6 pm to 10 pm; night 10 pm to 7 am. On Sundays and Public Holidays, day is 8 am to 6 pm; night 10 pm to 8 am.

Noise levels measured at NM2, NM3 and NM4 indicate that the evening RBL is consistently higher than the day RBL. Monitoring was done during the colder winter months which would typically negate insect noise which more commonly contributes to higher evening noise levels. Monitoring locations were also far removed from each other and thus removed from a possible singular extraneous noise source which may impact the data. Further analysis of this data and additional attended measurements were undertaken at the request of regulators with results presented in (EMM letter E230918_RP3_ABP_AdditionalMonitoring_V1).

Analysis of data for NM1 and NM2 show noise levels typical of regular morning and afternoon peak traffic flows. Given their proximity to Luddenham Road it is clear this is the source of elevated evening background noise. As

the source of elevated evening background noise levels at location NM3 and NM4 is less clear minimum background levels will be used for the evening at these locations.

Section 2.3 of the NPfI provides guidance where the recorded RBL is below the minimum assumed background noise level and is reproduced in Table 3.3. In these cases, the minimum background noise level is adopted for assessment purposes in accordance with the NPfI.

Table 3.3 Minimum RBLs

Time of day	Minimum rating background noise level, dBA
Day	35
Evening	30
Night	30

3.4 Attended noise monitoring

To further understand and demonstrate the noise environment present in the study area, EMM conducted additional attended noise monitoring at a selection of residential assessment locations to the east of the AIBP. The measurements were conducted during the morning shoulder period of 8 November 2024 and the evening and night periods of 14 November 2024. Further details of the assessment and methodology can be found in (EMM letter E230918_RP3_ABP_AdditionalMonitoring_V1).

Attended noise measurements were taken to delineate the impact of current industrial operations. EMM conducted measurements during the following periods:

- Morning shoulder: where industry is expected to be most significant,
- Evening: where traffic was believed to dominate the noise environment
- Night: where noise from existing traffic is expected to be lowest.

Industrial noise was audible at low levels (up to L_{Aeq} 28 dB) on Luddenham Road during the evening and night periods and Mandalong Close (up to L_{Aeq} 26 dB) during the night period only. Measured industrial noise levels were more than 10 dB below amenity criteria at each location and would be considered insignificant in the context of existing road traffic noise.

Given the proximity of the AIBP to Luddenham Road and the relatively low noise contribution from existing industrial activity during the evening and night, the Alspec Warehouse would likely be the only significant industrial noise contribution at residences in this area.

4 Assessment criteria

4.1 Operational noise

Noise from development in NSW is regulated by the local council, DPHI and/or the EPA, and sites generally have environmental protection licence and/or development consent conditions stipulating noise limits. These limits are typically derived from project specific trigger or operational noise levels predicted at assessment locations. They are based on EPA guidelines (e.g. NPfI) or noise levels that can be achieved by a specific site following the application of all feasible and reasonable noise mitigation.

The objectives of noise trigger levels for industry established in accordance with the NPfI are to protect the community from excessive intrusive noise and preserve amenity for specific land uses. It should be noted that the audibility of a noise source does not necessarily equate to non-compliance at an assessment location.

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).

Amenity criteria are used to assess cumulative impacts from industrial noise and as such are relevant to assessment of operational noise from the masterplan. Given the rezoning of the site, and the absence of any existing major industrial noise source in the area, assessment against the intrusiveness criteria would be overly restrictive at this time particularly given the planned growth of the area (ie major transport infrastructure, industrial, retail, commercial and high density residential).

Assessment against intrusive criteria is typically applicable to individual industrial sites and should be assessed at the DA stage once all noise sources are known for each individual development.

4.1.1 Amenity noise levels

The assessment of amenity is based on noise criteria specific to the land use. The amenity criteria are used to assess the cumulative impacts of industrial 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 such that criteria are exceeded.

To ensure that industrial noise levels (existing plus new) remain within the recommended amenity noise levels for an area, the project amenity noise level for a new development is the recommended amenity noise level (outlined in Table 2.2 of the NPfI) minus 5 dB.

The proposal includes a significant cluster of industrial sites. The amenity noise target for multiple industrial sources is based on contribution from three to four sites [2.4.2 para 2]. As such direction is taken from Section 2.4.2 of the NPfI which provides guidance for greenfield sites where a cluster of industrial sites are proposed.

Noise from each industrial site should not exceed the individual project amenity noise level which is described by the following equation:

$$Individual\ project\ amenity\ noise\ level = 10\log\left(\frac{10^{ANL-\frac{5dB}{10}}}{N}\right) \qquad Equation\ 1$$

Where:

ANL = relevant recommended amenity noise level from Table 2.2 (NPfI); and

N = number of proposed additional premises.

EMM has undertaken background assessment and attended noise monitoring which demonstrate the existing acoustic environment is dominated by road traffic noise from Luddenham Road. Industrial noise from the Mamre Road precinct was audible at times at low levels; more than 10 dB below project amenity noise levels. Given the proximity of AIBP to receivers and that receivers surrounding the site are not impacted by existing or likely future industrial sources, the ANL – 5dB can be substituted by the ANL only for assessment locations in Table 2.3.

It should be noted that Equation 1 is a strict division of the project amenity noise level (ie an allotment farthest away from assessment locations would be proportioned the same criteria as those closest to assessment locations). In practice, a larger portion of the development cumulative noise criteria may be proportioned to lots which are closer to sensitive land uses and avoid unnecessary acoustic treatment to achieve the overall cumulative noise target. This has been considered as part of the development masterplan such that suitable noise targets may be proportioned to each allotment whilst achieving the cumulative project amenity noise target.

Table 2.3 of the NPfI provides guidance on the selection of amenity noise categories based on land zoning, existing background noise and qualitative description. Rural residential areas are characterised in the NPfI as 'an acoustic environment that is dominated by natural sounds, having little or no road traffic noise and generally characterised by low background noise levels'. Suburban residential areas are characterised in the NPfI as '….

In this regard, the following categories are considered by EMM to be most representative of locations in the vicinity of the site:

- assessment locations on the eastern side of Luddenham Road have been considered as 'suburban' based on noise monitoring conducted at NM1; and
- assessment locations on the western side of Luddenham Road, where the rear of the property faces the Site, have been considered 'rural' based on noise monitoring conducted at NM2. It should be noted that this area has been rezoned E4 General Industrial. For these residences the NPfI states "for isolated residences within an industrial zone the industrial amenity level would usually apply".

For the purpose of this assessment all receivers have been conservatively assessed as rural residential although it should be noted the region is in transition.

As part of the response to submissions Penrith City Council requested further information to demonstrate operation of the AIBP will not adversely affect other surrounding residential receivers including the Twin Creeks neighbourhood and along Mandalong Close. Regional assessment locations shown in Table 2.4 have been added to noise modelling and will be assessed against ANL – 5dB

The corresponding recommended amenity targets for the proposed development are given in Table 4.1. It is commonly acknowledged and accepted amongst regulators and industry that average noise levels are typically 3 dB higher over a 15-minute worst case assessment period when compared to an entire (eg day 11 hour) assessment period. This is outlined in the NPfI and has been used in this assessment to standardise the time period to 15 minutes for assessment.

Table 4.1 Amenity noise levels dB

Assessment location	Assessment period[1]	PANL $L_{Aeq,period}$	PANL $L_{Aeq,15minute}$
R1-R14 & R21 (NCA1) Rural	Day	50	53
	Evening	45	48
	Night	40	43
R16-R20 & R22 (NCA2) Rural	Day	50	53
	Evening	45	48
	Night	40	43
R23, R24 (NCA3) Rural	Day	50	53
	Evening	45	48
	Night	40	43
Active recreation	When in use	55	58
R25-R26 (NCA4) Rural	Day	45	48
	Evening	40	43
	Night	35	38

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

The only non-residential use near the site is the Bosna Croatian Club at 229 Luddenham Road (Receiver 15). This receiver is considered both active recreation (soccer oval) and commercial premises (club) in accordance with the NPfI. For this assessment operational noise will be assessed against the more conservative project amenity noise level for active recreation areas of $L_{Aeq,15minute}$ 58 dB.

4.2 Road traffic noise

Construction and operational traffic require consideration for potential noise impacts. The principal guidance to assess the impact of road traffic noise on assessment locations is in the RNP. Table 4.2 presents the road noise assessment criteria for residential land uses (i.e. assessment locations), reproduced from Table 3 of the RNP for road categories relevant to construction and use of the Project.

Table 4.2 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.	$L_{Aeq,15hour}$ 60 (external)	$L_{Aeq,9hour}$ 55 (external)
Freeway/arterial/ sub-arterial roads	Active recreation area affected by traffic generating development	$L_{Aeq,15hour}$ 60 (external)	NA

Additionally, 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 an increase of up to 2 dB.

In addition to meeting the assessment criteria in Table 4.2, any significant increase in total traffic noise at the relevant residential assessment locations must be considered. Residential assessment locations experiencing increases in total traffic noise levels above those presented in Table 4.3 should be considered for mitigation.

Table 4.3 Road traffic 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 transit ways	New road corridor/redevelopment of existing road/land use development with the potential to generate additional traffic on existing road.	Existing traffic $L_{Aeq,15hour}$ +12 dB (external)	Existing traffic $L_{Aeq,9hour}$ + 12 dB (external)

Appendix B of the RNP states that noise levels shall be rounded to the nearest integer, whilst difference between two noise levels are to be rounded to a single decimal place.

5 Assessment

5.1 Assessment methodology

Noise generated by the development will be generally associated with the use of loading docks, on-site vehicle movements and road traffic noise generation on Luddenham Road. This assessment will consider operations from the whole of AIBP concurrently and compare predicted noise emissions against recommended amenity noise levels.

The indicative masterplan and structure plan in Figure 2.2 and has been utilised as a basis for the assessment to determine likely levels of noise at surrounding assessment locations from the use of the Site as proposed. This may be used to inform:

- Site and building layouts for the development of the masterplan;
- acoustic treatment which may be employed to reduce noise emissions from the site; and
- noise management which may be employed to reduce noise from the use as practically possible.

5.2 Noise modelling methodology

Road traffic noise levels were predicted using DataKustik CadnA noise prediction software implementing the US EPA Federal Highways (FHWA) Traffic Noise Model TNM.

Operational noise levels were predicted using DGMR Software proprietary modelling software, iNoise, implementing international standard ISO 9613-2:1996 'Acoustics – Attenuation of sound during propagation outdoors' algorithms. As per Section 1 of the Standard:

> The method predicts the equivalent continuous A-weighted sound pressure level (as described in parts 1 to 3 of ISO 1996) under meteorological conditions favourable to propagation from sources of known sound emission.
>
> These conditions are for downwind propagation, as specified in 5.4.3.3 of ISO 1996-2:1987 or, equivalently, propagation under a well-developed moderate ground-based temperature inversion, such as commonly occurs at night.

The model calculates total noise levels at assessment locations from concurrent operation of multiple noise sources. It considers factors that influence noise propagation such as the lateral and vertical location of plant, source-to-receptor distances, ground effects, atmospheric absorption, topography of the site and surrounding area and applicable meteorological conditions.

The model was populated with 3-D topography of the project and surrounding area, extending out past all assessment locations. Plant and equipment representing the range of proposed operation scenarios were placed at locations that would represent worst case noise levels during operation.

Table 5.1 Modelling Standard Parameters

Modelling Parameter	Input/s
Model	ISO 9613-2:1996
Environmental conditions	Humidity 70% Temperature 10°C Air pressure [mbar] 1013.3
Elevation contours	Regional contours adopted from NSW Elevation Data Services

Modelling Parameter	Input/s
	Final site ground levels taken from bulk earthworks plan as provided by HBB
Receiver height	1.5m above ground for single storey
Ground absorption factor	0.7 over open grass 0.0 for concrete and paved industrial area
Warehouse building height	14.6m for larger warehouses 10m for small and medium warehouses

5.3 Mitigation measures

5.3.1 Masterplan design

The design of the Alspec masterplan is such that it will allow for internal access to eastern parcel and southern parcel expansions. By incorporating loading docks or openings facing onto the internal roadway, the built form structures would create a noise barrier between the noisier areas and sensitive noise receptors across Luddenham Road. With appropriate planning of site layout, it is envisaged that minimal additional acoustic treatment by way of acoustic screens would be required to address vehicle noise on loading dock hardstands or similar.

5.3.2 Noise barriers

Cumulative operational noise impact from the development has been modelled using the indicative masterplan provided. Hardstand areas have been oriented, where possible, away from noise assessment locations. Warehouse buildings have been included in the noise model so their acoustic shielding is considered.

Where hardstand areas could not be shielded by the building layout, a 3m perimeter barrier around hardstand areas has been included. This includes the northern and southern hardstand of warehouse 1 (Alspec Warehouse and hardstand areas of warehouse 14a, 15a, 19, 20, 25 and 30,

5.4 Operational noise

5.4.1 Traffic movements

On-site vehicle movements and material handling on loading docks are expected to be the primary noise generating activities from the development.

There are a total of 32 warehouses proposed in the AIBP masterplan including 10 large warehouses (Warehouse 1 – 13) and 22 small warehouses/commercial spaces (warehouse 14a-32). Based on the methodology of the traffic assessment it has been assumed the 10 large warehouses, will generate the vast majority of heavy vehicle movements from the development. It has been assumed the 22 small warehouses/commercial spaces are likely to generate predominantly light vehicle movements, with an occasional heavy vehicle. A breakdown of heavy vehicle movements is provided in Table 2.2.

Each truck has been modelled as arriving at or departing from site and idling on-site for 10 minutes. Sound power of L_{Aeq} 95 dB has been used for an idling HV and L_{Aeq} 105 dB has been used to represent trucks traveling approximately 10km/hr, manoeuvring and reversing while on site.

Each warehouse will include staff parking. For the most part, these carparks are typically located away from the precinct boundaries and are shielded from surrounding assessment locations due to intervening structures (ie warehouses).

The assessment of noise from carparks have been based on each carpark emptying within a 1-hour period consistent with shift change. An assumption of 100 light vehicles movements for each of the 10 larger warehouses and 10 light vehicle movements for each of the 22 smaller warehouses/commercial spaces has been made.

5.4.2 Alspec Warehouse

Alspec Warehouse is proposed to occupy warehouse 1 within the AIBP. This development will be a manufacturer of aluminium products. Noise generating activities on site are expected to include operation of the aluminium extrusion press and paint line, onsite vehicle movements and handling of freight.

The site layout includes heavy vehicle entry to the west accessing hardstand areas to the north and south of the main warehouse building. The vast majority of heavy vehicle movements will be to the northern hardstand area with approximately 2-3 heavy vehicles per day accessing the southern hardstand area for delivery of raw material (billet) and collection of waste, typically during the day period only. One heavy vehicle and forklift operating at the southern hardstand area has been assessed for each assessment period, with all other heavy vehicles detailed in Table 2.2 accessing the northern hardstand.

Noise from hydraulic pumps, saws, fans, compressors and a cooling tower that make up the manufacturing process will be assessed for the manufacturing operations. Sound power data for these sources has been measured at an existing aluminium manufacturer. A building acoustics model incorporating the above workshop sources was developed to calculate the external sound power of each façade and opening of the warehouse, which have then been included in the environmental noise model. All roller doors have been assumed to be open for this assessment.

There are no significant impact noise events expected to be associated with the manufacturing process. Raw material (billet) is delivered to and stored at the southern hardstand on pallets. The pallets are moved inside the warehouse where the billet is handled with an overhead crane system.

Waste aluminium is generated throughout the extrusion process. Small amounts of waste material fall into bins at the end of the extrusions press within the workshop. These waste bins are collected regularly and removed from site.

5.4.3 Storage and distribution warehouses (WH2 – 32)

At the time of this assessment, the internal use of the majority of warehouses is unknown. A development application has been lodged for Warehouse 3 for a distribution warehouse. It is expected that typical uses for other lots within the development would include storage and distribution and commercial spaces.

It is noted that noise breakout from internal activities can be controlled by acoustically treating the building façade including any ventilation systems and openings.

The limiting factor for any industrial development will typically be due to the on-site vehicle movements such as heavy vehicles on a loading dock hardstand. Given that noise from internal warehouse operations can be suitably managed with appropriate architectural treatment to the warehouse structure, contribution from this noise source has not been included in this broad assessment.

5.4.4 Material handling

The client has advised that the electric forklifts will be the predominant means of material handling on site, but there may be the occasional requirement for a gas forklift, fork truck or franna crane. As the tenants for the majority of warehouses is unknown at the time of this assessment, a forklift operating for 15 minutes to load or

unload each heavy vehicle was assumed. A sound power of $L_{Aeq,15min}$ 90 dB has been used for each forklift. This sound power represents general operation of the forklift including manoeuvring and impact noise association with material handling.

5.4.5 Mechanical plant

The location and detail of mechanical plant required for each warehouse is not known at the time of this assessment. Mechanical plant details for Cope Sensitive freight have been provided by the client and include main office condensing units with a total sound power of <95 dBA and warehouse rooftop ventilation with a total sound power of 95 dBA. A limiting sound power of L_{Aeq} 95 dB has been used to represent condensing units and rooftop ventilation on all warehouses.

The client has advised that each warehouse will have a plantroom which will most likely be located at ground level adjacent to office spaces for ease of access. The exception to this is Alspec warehouse which has a plant room on the roof of the office space.

Typical noise sources associated with aluminium manufacturing, vehicle movements, material handling, mechanical plant and the OSSM are provided in Table 5.2.

Table 5.2 Equipment sound power levels $L_{Aeq,15minute}$ dB

Plant Item	Quantity	L_{WA}	Note
Alspec warehouse noise sources			
Hydraulic pumps	1	107	Continuous operation
Disc saw	2	107	5 seconds every minute
Spray booth and oven fans	2	88	Continuous operation
Compressor	1	98	Continuous operation
Forklift	4	90	Continuous operation
Cooling tower	1	90	Continuous operation, external to warehouse
Traffic noise sources			
Heavy vehicle	each	105	Travelling at 10km/hr
Heavy vehicle	each	95	Idling for 10 minutes
Light vehicle	each	85	Travelling at 10km/hr
Warehouse noise sources			
Forklift	each	90	15 minutes operation per heavy vehicle on hardstand
Mechanical plant	each	95	Continuous operation, external to warehouse
On site sewer management system			
Plant room	1	88	Continuous operation
Odour scrubber fan	1	90	Continuous operation

5.4.6 Operational scenarios

Typical operating scenarios have been developed to assess worst-case operations for the morning shoulder, day, evening and night periods.

i Morning shoulder

- Continuous operation of all sources from Alspec warehouse and the OSSM
- Heavy vehicle movements to or from each of the 10 larger warehouses as per the 15 min worst case movements in Table 2.3
- 15 minutes operation of forklift operation for each heavy vehicle on hardstand
- 100 light vehicle movements to or from each of the 10 larger warehouses and 10 light vehicle movements to or from each of the 22 smaller warehouses/commercial spaces to represent the morning peak period.
- Mechanical plant operating at each of the 32 warehouses.

ii Day period

- Continuous operation of all sources from Alspec warehouse and the OSSM
- Heavy vehicle movements to or from each of the 10 larger warehouses as per the 15 min worst case movements in Table 2.3
- 15 minutes operation of forklift operation for each heavy vehicle on hardstand
- 100 light vehicle movements to or from each of the 10 larger warehouses and 10 light vehicle movements to or from each of the22 smaller warehouses/commercial spaces to represent the afternoon peak period.
- Mechanical plant operating at each of the 32 warehouses.

iii Evening period

- Continuous operation of all sources from Alspec warehouse and the OSSM
- Heavy vehicle movements to or from each of the 10 larger warehouses as per the 15 min worst case movements in Table 2.3
- 15 minutes operation of forklift operation for each heavy vehicle on hardstand
- Mechanical plant operating at each of the 32 warehouses.

iv Night period

- Continuous operation of all sources from Alspec warehouse and the OSSM

- Heavy vehicle movements to or from each of the 10 larger warehouses as per the 15 min worst case movements in Table 2.3
- 15 minutes operation of forklift operation for each heavy vehicle on hardstand
- Mechanical plant operating at each of the 32 warehouses.

5.4.7 Predicted operational noise levels

Predicted operational levels are provided in Table 5.3. Results for each assessment location representing cumulative noise impact from the AIBP are provided for the morning shoulder, day, evening and night periods. Results have been compared against project amenity noise targets. Morning shoulder noise levels have been assessed against the night period amenity noise target.

Individual lot contributions have been provided in Appendix A.2.

Table 5.3 Predicted operational noise levels, $L_{Aeq,15minute}$ dB

Assessment location	Amenity noise level(MS/D/E/N)	Operational noise level				Exceedance
		Morning shoulder	Day	Evening	Night	
R1	43/53/48/43	45	46	42	40	Yes (+2 during MS)
R2	43/53/48/43	44	44	41	41	Yes (+1 during MS
R3	43/53/48/43	41	42	39	40	Nil
R4	43/53/48/43	40	41	38	39	Nil
R5	43/53/48/43	40	42	39	40	Nil
R6	43/53/48/43	41	43	40	40	Nil
R7	43/53/48/43	41	43	39	40	Nil
R8	43/53/48/43	41	42	40	40	Nil
R9	43/53/48/43	40	42	39	39	Nil
R10	43/53/48/43	40	42	39	39	Nil
R11	43/53/48/43	40	42	39	39	Nil
R12	43/53/48/43	40	42	39	39	Nil
R13	43/53/48/43	40	42	39	39	Nil
R14	43/53/48/43	40	42	39	39	Nil
R15	58/58/58/58	44	45	44	44	Nil
R16	43/53/48/43	43	45	42	43	Nil)
R17	43/53/48/43	44	46	43	43	Yes (+1 during MS)
R18	43/53/48/43	50	50	50	50	Yes

Assessment location	Amenity noise level(MS/D/E/N)	Operational noise level				Exceedance
		Morning shoulder	Day	Evening	Night	
						(+7 during MS and N, +2 during E)
R19	43/53/48/43	48	48	48	48	Yes (+5 during MS and N)
R20	43/53/48/43	51	51	51	51	Yes (+8 during MS and N, +3 during E)
R21	43/53/48/43	43	43	42	43	Nil
R22	43/53/48/43	41	43	41	41	Nil
R23	43/53/48/43	38	41	37	37	Nil
R24	43/53/48/43	40	43	38	38	Nil
R25	38/48/43/38	38	40	38	38	Nil
R26	38/48/43/38	36	38	34	33	Nil

Noise predictions comply with amenity noise targets at most residential receivers within the residential zoned NCA1 and NCA3, with the exception of R1 and R2 where a 1-2 dB exceedance of the night period amenity target is predicted during the morning shoulder period.

Noise emissions at R17, R18, R19 and R20 are predicted to exceed the morning shoulder period and night period criteria by up to 8 dB. It should be noted these receptors are all in the zoned E4 General Industrial land. If these receivers were assessed against industrial noise amenity criteria, as is typical for isolated residences within an industrial zone, predicted noise impacts would comply with criteria.

The exceedances at R18 - R20 are related to the immediately adjacent smaller warehouses (warehouse 14 – 32).

Noise predictions comply with amenity noise targets at regional assessment locations R25 and R26.

It should be noted that R19 has recently been purchased by HBB Property and will be vacated prior to commencing operations.

5.5 Road traffic noise generation

Road traffic noise generated by additional traffic movements from the site has been addressed for assessment locations along Luddenham Road. Road noise modelling has been done to quantify potential increases in road traffic noise due to site generated traffic when compared against the natural growth of traffic volumes in the absence of the development.

Development and background traffic data for this assessment has been provided by Arcadis.

The data in Table 5.4 describes the following:

- traffic volumes in the absence of the development (‘no-build’)
- traffic volumes expected to be generated by the development (‘development traffic’)

- the combined traffic volumes due to the development and under the 'no-build' scenario.

Table 5.4 shows the comparison between volumes with and without the development. This assessment is based on estimated background traffic levels for 2027 when operations are proposed to commence.

Background noise measurements undertaken in 2020 show existing road traffic noise levels are $L_{Aeq,15hour}$ 61 dB and $L_{Aeq,9hour}$ 57 dB façade corrected as assessed at NM1, which is representative of the worst affected assessment locations on Luddenham Road. Existing road traffic noise levels are above the RNP planning levels for this road category. This means that a traffic noise increase limit of 2 dB is the relevant criterion.

No-build and Build traffic volumes have been assessed at each assessment location in Table 2.3 with the highest relative increase presented in Table 5.4.

Table 5.4 Predicted increase in Luddenham Road traffic, $L_{Aeq,period}$ dB

Assessment location	Period	No-build (2027)		Development traffic		Build		Increase in road traffic noise
		Traffic volume	HV %	Traffic volume	HV %	Traffic volume	HV %	
Luddenham Road North of Patons Lane	Day (15hr)	14,413	6	4,750	14	19,163	8	2
	Night (9hr)	2,269	6	1050	22	3,319	11.1	2.7
Luddenham Road South of Patons Lane	Day (15hr)	8,511	8	2050	14	10,561	9.2	1.2
	Night (9hr)	1,340	8	460	22	1,800	11.6	2

Notes: 1. Traffic data provided by the AIBP project masterplan traffic consultant (Arcadis).

Minor exceedances of the 2 dB relative increase criteria (0.7 dB) is predicted for traffic on Luddenham Road north of Patons Lane at assessment location R1 during the night period.

6 Discussion

6.1 Operational noise impact at receptors zoned E4

Several assessment locations considered in this assessment, including R16 - R20 are in the area zoned E4 General Industrial, but are still privately owned and have been assessed as residential receivers for the purpose of this assessment. Predicted operational noise levels exceeded assessment criteria at these locations based on rural residential amenity levels.

If these receivers were assessed against industrial noise amenity criteria, as is typical for isolated residences within an industrial zone, predicted noise impacts would comply with the relevant amenity levels.

While the masterplan design will provide effective noise control once the precinct is complete, the current design provides limited shielding to the existing residential receivers which have been rezoned for future industrial development.

Consideration should be given to the design and tenancies for warehouse 14-32 of the AIBP to mitigate potential noise impacts at R17 – R20. It should be noted that R19 has recently been purchased by HBB Property and will be vacated prior to development of the subject site.

6.2 Peak hour noise predictions

The predominant noise generating activity from the AIBP is expected to be heavy vehicle movements. This assessment has determined a worst case 15 minute assessment period for each lot within the development to assess cumulative impact. This approach allows for direct comparison between this assessment and assessments undertaken for individual lots in the future when detailed information is available.

A 3 dB conversion has been made between $L_{Aeq,period}$ and $L_{Aeq,15min}$ noise levels as detailed in the NPfI. While this is the commonly used methodology, it likely overstates noise impacts when we are using peak hour traffic movements for each warehouse to assess heavy vehicle noise, particularly during the night period.

6.3 Masterplan development

Noise modelling for the AIBP has been undertaken over several years as the site masterplan has been developed. This has assisted HBB in the planning and development of site plan to ensure that noise levels were considered and minimised as far as practicable. The general layout of the site, where practical, has vehicle access and hardstand areas shielded from the nearest receivers by warehouse buildings. This includes future planning for the southern and eastern land parcels.

Where this is not currently achievable, including the northern and southern hardstand of warehouse 1 (Alspec Warehouse) and hardstand areas of warehouse 14a, 15a, 19, 20, 25 and 30, noise barriers have been considered around hardstand areas. A 3m barrier around hardstand areas on these lots has been included in modelling.

Further design considerations should be made at the DA stage for warehouse 14 – 32 to, where possible, orient warehouses to provide screening to adjacent lots, taking into account any changes to land ownership.

6.4 Road traffic noise

Minor exceedances (0.7 dB) of the 2 dB relative increase criteria are predicted for traffic north of the development at assessment location R1 for the night period as a result of traffic generated by the development. At dwelling mitigation could be considered for this residence.

7 Conclusion

EMM Consulting (EMM) was engaged by HBB Property to address potential noise impacts associated with the proposed Alspec Industrial Business Park (AIBP) to be located at 211-227 and 289-317 Luddenham Road, Orchard Hills NSW (the Site). This noise impact assessment (NIA) will support the development application (DA) for bulk earthworks and subdivision of the Site and be used to assess cumulative operational noise impact for the whole of site based on an indicative masterplan.

Noise from the operation of the precinct based on the indicative masterplan has been assessed against the EPA 2017, Noise Policy for Industry (NPfI). The NPfI provides a framework for addressing noise from multiple allotments within an industrial subdivision such that the cumulative impacts do not exceed recommended amenity levels.

The potential for road traffic noise generation on Luddenham Road has been assessed using the guidance provided in the NSW Department of Environment Climate Change and Water (DECCW) 2011, Road Noise Policy (RNP).

The outcomes from the noise assessment relevant to the indicative masterplan indicate the following:

- Noise associated with operation of warehouses can be mitigated with the implementation of architectural acoustic treatments which would be formulated as part of each individual lot development application such that the treatment is consistent with the operational use.

- On-site vehicle noise (eg loading dock hardstand operations, carparks, etc.) is expected to be primarily responsible for operational noise from the Site. Noise mitigation measures have been incorporated into modelling including the masterplan layout which, where possible, has docks to the West of warehouse buildings, and a 3m noise barrier has been included around unshielded hardstand areas.

- Based on full site operations, noise predictions comply with recommended amenity noise levels at most residential receivers within the residential zoned NCA1 and NCA3, with the exception of R1 and R2 where 1-2 dB exceedance of the night period amenity level is predicted during the morning shoulder period.

- Noise levels at R17, R18, R19 and R20 are predicted to exceed the morning shoulder period and night period amenity levels by up to 8 dB. It should be noted these receptors are all in the zoned E4 General Industrial land. If these receivers were assessed against industrial noise amenity levels, as is typical for isolated residences within an industrial zone, predicted operational noise levels would comply.

- The exceedances at R18 - R20 are related to the immediately adjacent smaller warehouses (warehouse 14 – 32). Detailed design and tenancy information for these lots was not available at the time of this assessment. It is likely that progressive development of the precinct will occur such that some warehouses would be developed prior to others and hence with the benefit of time, receptors R18 to R20 would not exist as residences at the time warehouses closest to them are developed.

- Noise predictions comply with amenity noise targets at regional assessment locations R25 and R26.

- Noise from existing traffic on Luddenham Road is shown to be above the road noise policy planning levels. Additional road traffic noise on Luddenham Road generated by the development is predicted to exceed the relative increase criteria by 0.7 dB for Northbound traffic (location R1) during the night period. Compliance with the relative increase criterion is predicted at all other assessment locations. It is further noted that increased road traffic noise would be realised over several years and should be considered in the planned growth of the area (ie major transport infrastructure, industrial, retail, commercial and high density residential).

References

NSW Noise Policy for Industry (NPfI) (EPA 2017).

Road Noise Policy (RNP) (DECCW 2011).

Glossary

Project and technical terms

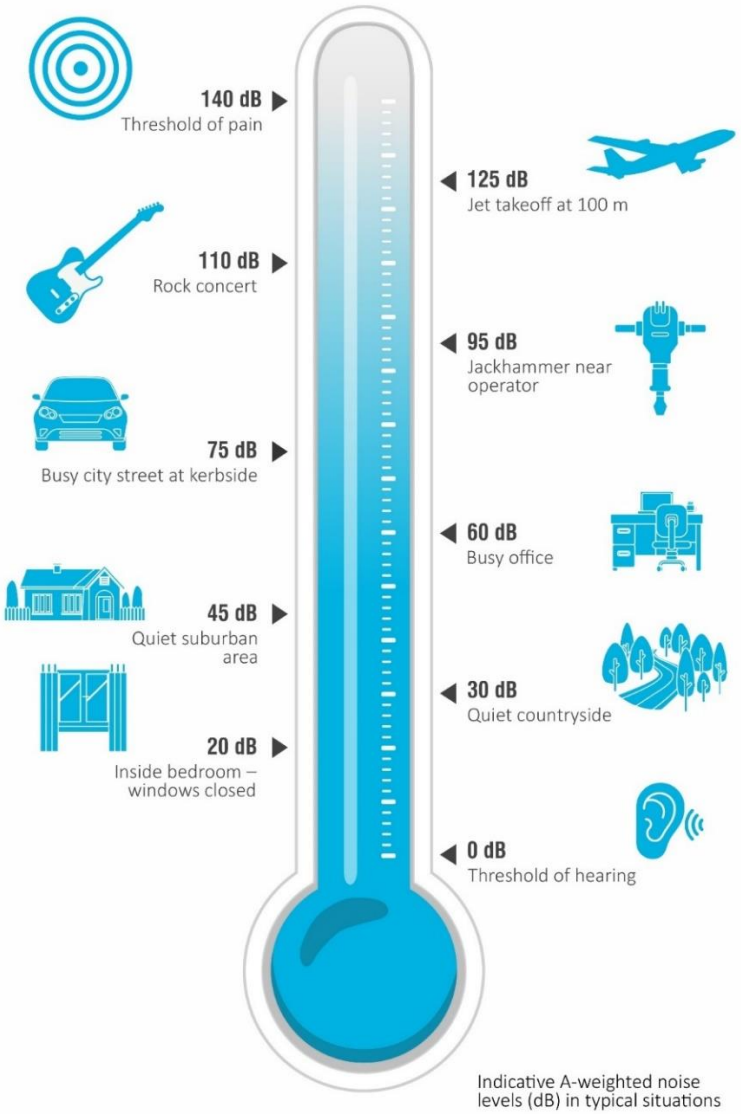
Term	Meaning
dB(A)	Noise level measurement units are decibels (dB). The "A" weighting scale is used to approximate how humans hear noise.
L_{Amax}	The maximum root mean squared A-weighted noise level over a time period.
L_{A1}	The A-weighted noise level which is exceeded for 1% of the time.
$L_{A1,1minute}$	The A-weighted noise level which is exceeded for 1% of the specified time period of 1 minute.
L_{A10}	The A-weighted noise level which is exceeded for 10% of the time.
L_{Aeq}	The energy average A-weighted noise level.
L_{A50}	The A-weighted noise level which is exceeded for 50% of the time, also the median noise level during a measurement period.
L_{A90}	The A-weighted noise level exceeded for 90% of the time, also referred to as the "background" noise level and commonly used to derive noise limits.
L_{Amin}	The minimum A-weighted noise level over a time period.
L_{Ceq}	The energy average C-weighted noise energy during a measurement period. The "C" weighting scale is used to take into account low-frequency components of noise within the audibility range of humans.
SPL	Sound pressure level. Fluctuations in pressure measured as 10 times a logarithmic scale, with the reference pressure being 20 micropascals.
Hertz (Hz)	The frequency of fluctuations in pressure, measured in cycles per second. Most sounds are a combination of many frequencies together.
Day	Monday – Saturday: 7 am to 6 pm, on Sundays and Public Holidays: 8 am to 6 pm.
Evening	Monday – Saturday: 6 pm to 10 pm, on Sundays and Public Holidays: 6 pm to 10 pm.
Night	Monday – Saturday: 10 pm to 7 am, on Sundays and Public Holidays: 10 pm to 8 am.
ABL	The assessment background level (ABL) is defined in the INP as a single figure background level for each assessment period (day, evening and night). It is the tenth percentile of the measured L90 statistical noise levels.
RBL	The rating background level (RBL) is an overall single value 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 average background levels.
Sound power level (Lw)	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.

Common noise levels

The table below gives an indication as to how an average person perceives changes in noise levels. Examples of common noise levels encountered on a daily basis are provided in the figure below.

Perceived change in noise

Change in sound 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 as loud (or quarter) as loud



Indicative A-weighted noise levels (dB) in typical situations

Appendix A
Individual lot contributions

EMM
creating opportunities

A.1 Individual lot contributions

Individual warehouse noise impact WH1-14A

Assessment period	NCA	WH1	WH2	WH3	WH7	WH8	WH9	WH10	WH11	WH22	WH13	WH14a
Morning shoulder	NCA1	44	31	33	28	<25	32	29	30	29	26	31
	NCA2	39	29	30	33	26	37	30	31	34	32	42
	NCA3	25	<25	27	29	33	26	35	29	30	32	<25
	R15	42	<25	26	33	<25	27	<25	<25	29	26	<25
Day	NCA1	44	33	37	30	27	36	33	34	32	27	31
	NCA2	39	30	34	34	30	41	33	34	37	33	42
	NCA3	25	25	31	32	36	30	38	32	34	35	<25
	R15	42	25	30	35	25	31	<25	28	31	28	<25
Evening	NCA1	42	29	31	27	<25	30	27	27	27	26	31
	NCA2	38	26	28	32	<25	35	27	28	33	31	42
	NCA3	<25	<25	25	26	30	25	33	27	28	29	0
	R15	42	<25	<25	33	<25	<25	<25	<25	28	<25	<25
Night	NCA1	39	30	30	28	<25	30	27	27	28	26	31
	NCA2	39	27	27	32	<25	35	27	28	35	31	42
	NCA3	<25	<25	<25	26	30	25	33	27	28	29	<25
	R15	42	<25	<25	33	<25	<25	<25	<25	28	<25	<25

Individual warehouse noise impact WH14B-WH22

Assessment period	NCA	WH14b	WH15a	WH15b	WH16	WH17	WH18a	WH18b	WH19	WH20	WH21	WH22
Morning shoulder	NCA1	29	28	<25	26	36	36	34	<25	<25	26	<25
	NCA2	36	45	44	26	36	36	34	37	49	34	36
	NCA3	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
	R15	<25	30	30	<25	<25	<25	<25	<25	27	<25	<25
Day	NCA1	29	28	<25	28	36	36	34	<25	<25	26	<25
	NCA2	36	45	44	28	36	36	34	37	49	34	36
	NCA3	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
	R15	<25	30	30	<25	<25	<25	<25	<25	27	<25	<25
Evening	NCA1	29	28	<25	26	36	36	34	<25	<25	26	<25
	NCA2	36	45	44	26	36	36	34	37	49	34	36
	NCA3	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
	R15	<25	30	30	<25	<25	<25	<25	<25	27	<25	<25
Night	NCA1	29	28	<25	28	36	36	34	<25	<25	26	<25
	NCA2	36	45	44	28	36	36	34	37	49	34	36
	NCA3	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
	R15	<25	30	30	<25	<25	<25	<25	<25	27	<25	<25

Individual warehouse noise impact WH23 - OSSM

Assessment period	NCA	WH23	WH24	WH25	WH26	WH27	WH28	WH29	WH30	WH31	WH32	OSSM
Morning shoulder	NCA1	<25	33	33	<25	<25	<25	<25	<25	<25	<25	27
	NCA2	36	36	33	32	31	27	31	42	25	<25	<25
	NCA3	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
	R15	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
Day	NCA1	<25	33	33	<25	<25	<25	<25	<25	<25	<25	27
	NCA2	36	36	33	32	31	27	31	42	25	<25	<25
	NCA3	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
	R15	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
Evening	NCA1	<25	33	33	<25	<25	<25	<25	<25	<25	<25	27
	NCA2	36	36	33	32	31	27	31	42	25	<25	<25
	NCA3	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
	R15	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
Night	NCA1	<25	33	33	<25	<25	<25	<25	<25	<25	<25	27
	NCA2	36	36	33	32	31	27	31	42	25	<25	<25
	NCA3	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
	R15	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25

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