Tomago Industrial Site - Stage 3

Noise and Vibration Verification

Prepared for Northbank Enterprise Hub

July 2024

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Northbank Enterprise Hub

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1	31 May 2024	Matthew Cheesman	Najah Ishac	Draft
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TABLE OF CONTENTS

Appendices

Tables

1 Introduction

Northbank Enterprise Hub (NEH) is proposing the development of Stage 3 of the Tomago Industrial Site in Tomago, NSW. The proposed development (the Project) is to be located at Lot 210 DP1174939, Tomago Road.

EMM Consulting Pty Limited (EMM) has been engaged by Northbank Enterprise Hub to undertake a noise and vibration review to aid in understanding possible controls needed to satisfy the development consent MP07_0086

This Noise and Vibration Impact Assessment (NVIA) report documents the existing acoustical environment, applicable noise and vibration objectives, noise modelling methodology and assumptions and assessment of predicted noise emissions from example site operations against relevant objectives.

This report has considered the following relevant guidelines and policies:

- NSW Environment Protection Authority (EPA) 2017, Noise Policy for Industry (NPfI)
- NSW Department of Environment, Climate Change and Water (DECCW) 2011, Road Noise Policy (RNP)
- Department of Environment and Conservation NSW 2006, Assessing Vibration: A Technical Guideline.

2 Project and site description

2.1 Site location

The site is located on land within the extent of the Tomago Industrial Site, which is identified as a State Significant Precinct by Appendix 2 of the State Environmental Planning Policy (Precincts – Regional) 2021 (Regional Precincts SEPP). It is located approximately 23 kilometres (km) to the north of Newcastle CBD and 12 km from Newcastle Airport. The subject site is legally known as Lot 210 DP1174939 and fronts Tomago Road. Tomago Road is classified as a State Road under the *Roads Act 1993*. The road is an industrial link that connects the site to the Newcastle airport, and the Pacific Highway. The site is located within the Port Stephens local government area (LGA).

2.2 Details of the proposed development

The development is approved to operate 24 hours a day, 7 days a week for all areas except the inventory area, which has approval to operate 7 days a week between the hours of 7:00 am and 10:00 pm. This review has assumed that the facility could include a manufacturing plant, a warehouse, office space and amenities.

Noise generating activities on site are also expected to include on-site vehicle (road trucks and cars) movements. Based on predicted traffic generation from the report supplied by TTPP Transport Planning dated 1 December 2023 the Stage 3 is expected to typically generate 710 hourly AM peak and 791 hourly PM peak vehicle movements.

2.3 Assessment locations

Noise assessment locations representing potentially the most exposed to the Project are provided in Table 2.1.

Table 2.1 Assessment locations

Receptor number	Address	MGA 56 coordinate		Land use
		Latitude	Longitude	
R1	87 Tomago Road	151.7654233	32.8170138	Residential
R2	93 Tomago Road	151.7649195	32.8171272	Residential
R3	97 Tomago Road	151.7642675	32.8171673	Residential
R4	101 Tomago Road	151.7639687	32.8172488	Residential
R5	139 Tomago Road	151.7596573	32.8182065	Residential
R6	159 Tomago Road	151.7585433	32.8187933	Residential
R7	175 Tomago Road	151.7572440	32.8194458	Residential
R8	7 Graham Drive	151.7479574	32.8209477	Residential

3 Existing environment

Noise monitoring was conducted to establish the existing prevailing noise environment. A noise logger was deployed at a location representative of the acoustic environment of the assessment locations, with considerations made for equipment security and the minimisation of extraneous noise sources.

3.1 Measurement equipment and locations

Noise monitoring was carried out using an Acoustic Research Labs (ARL) NGARA environmental noise logger. The details of the logger and monitoring location are provided in Table 3.1. The microphone was 1.5 metres (m) above ground in a free field environment and 11 m from the road edge.

Table 3.1 Monitoring location

Equipment type and serial number	Period of measurement (2023)	Monitor location		
		Address	Latitude	Longitude
ARL NGARA, 878017	29 August to 6 September	170 m east of 308 Tomago Road	151.7455125	32.8234695

The logger was 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 carried appropriate and current NATA (or manufacturer) calibration certificates.

3.2 Weather affected noise data

Weather data for the survey period was obtained from the Bureau of Meteorology (BoM) weather station at Williamtown RAAF (ID 061078,). The 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) (approximately 9 knots) at the microphone height in accordance with NPfI methods.

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

Time period[1]	Existing noise levels, dB	
	$L_{Aeq,period}$	Rating background level (RBL)
Day	69	44
Evening	64	39
Night	64	36

1. The daytime is 7:00 am to 6:00 pm; evening 6:00 pm to 10:00 pm; night-time 10:00 pm to 7:00 am. On Sundays and Public Holidays, the daytime is 8:00 am to 6:00 pm; evening 6:00 pm to 10:00 pm; night-time 10:00 pm to 8:00 am.

4 Assessment criteria

4.1 Operational noise

Noise from development in NSW is regulated by the local council, NSW Department of Planning and Environment (DPE) and/or the NSW Environment Protection Authority (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.

4.1.1 Intrusiveness noise levels

The intrusiveness noise level target applies to residences only and is expressed as:

$L_{Aeq,15minute}$ = Rating Background Level (RBL) + 5 dB

Where:

- $L_{Aeq,15minute}$ represents the equivalent continuous (energy average) A-weighted sound pressure level of the source over 15 minutes
- RBL represents the background level to be used for assessment purposes.

Intrusive noise levels are only applied to residential receptors (residences). For other receptor categories, recommended amenity noise levels apply.

Table 4.1 presents the site intrusiveness noise levels based on adopted RBLs.

Table 4.1 Project intrusiveness noise levels (dB)

Assessment location	Land use	Measured background noise level, RBL			Project Intrusiveness noise level, $L_{Aeq,15min}$		
		Day	Evening	Night	Day	Evening	Night
R1 to R7	Residential	44	39	36	49	44	41

4.1.2 Amenity noise levels

The assessment of amenity is based on noise levels specific to the land use. These noise levels relate only to industrial noise and exclude road or rail traffic noise. Where measured existing industrial noise approaches recommended amenity noise levels (RANL), it needs to be demonstrated that levels from new developments will not contribute to existing such that amenity levels are exceeded.

To ensure that industrial noise levels (existing plus new) remain within RANL for an area, the project amenity noise level (PANL) for a new industrial development is the RANL (see Table 2.2 of the NPfI) minus 5 dB. Adopting this approach to this Project is considered conservative given the likelihood of residences being impacted by multiple industrial sites.

Amenity for various assessment locations is presented in Table 4.2.

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 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 both intrusive and amenity targets.

Table 4.2 Amenity noise levels dB

Assessment location	Indicative area	Time period[1]	RANL $L_{Aeq,period}$	PANL $L_{Aeq,period}$	PANL $L_{Aeq,15min}$
Residential	Rural	Day	50	45	48
		Evening	45	40	43
		Night	40	35	38

Source: NPfI (EPA 2017)

Notes: 1. Day: 7:00 am to 6:00 pm Monday to Saturday; 8:00 am to 6:00 pm Sundays and public holidays; Evening: 6:00 pm to 10:00 pm; Night: remaining periods.

4.1.3 Project noise trigger level

The Project noise trigger level (PNTL) is the lower of the calculated intrusiveness or amenity noise levels. Taking account of background noise levels, Project intrusive noise levels and Project amenity levels for relevant assessment locations, a summary of the PNTL for the assessment of operational noise from the project is presented in Table 4.3. The NPfI rural residential category has been conservatively adopted for the residential property R1.

Table 4.3 Project noise trigger levels – $L_{Aeq,15minute}$ dB

Assessment location	Assessment period[1]	Intrusiveness noise level	PANL[2]	PNTL[3]
R1 to R8	Day	49	48	48
	Evening	44	43	43
	Night	41	38	38

Notes: 1. Day: 7:00 am to 6:00 pm Monday to Saturday; 8:00 am to 6:00 pm Sundays and public holidays; Evening: 6:00 pm to 10:00 pm; Night: remaining periods.

2. Project amenity $L_{Aeq,15min}$ noise level is the RANL $L_{Aeq,period}$ +3 dB as per the NPfI.

3. PNTL is the lower of the calculated intrusiveness or amenity noise levels.

4.2 Development consent limits

Site specific noise limits are prescribed in clauses 25 to 30 of Development Consent MP07_0086 which are applicable to the operation of Stages 1 to 3. These are presented in Table 4.4.

Table 4.4 Development consent noise limits

Assessment location		Site specific noise limit, L_{Aeq}			Site specific noise limit, $L_{Aeq,15min}$			Site specific noise limit, $L_{Aeq,1min}$		
	Land use	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night
R1 to R7	Residential	50	45	40	43	37	35	NA	NA	60

4.3 Sleep disturbance

The NPfI suggests that a detailed maximum noise level event assessment should be undertaken where operation or construction night period noise at a residential location exceed screening levels of:

- $L_{Aeq,15minute}$ 40 dB or the prevailing RBL plus 5 dB (whichever is the greater); and/or
- L_{Amax} 52 dB or the prevailing RBL plus 15 dB (whichever is the greater).

These noise level event screening criteria have been adopted for assessment of sleep disturbance for all residential assessment locations.

4.4 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 prescribed within the development consent as the Environmental Criteria for Road Traffic Noise (ECRTN). Table 4.5 presents the road noise assessment criteria for residential land uses (i.e. assessment locations), reproduced from Table 1 of the ECRTN for road categories relevant to construction and operational use of the Project.

Table 4.5 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	$L_{Aeq,9hour}$ 55

Additionally, the ECRTN 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.

4.5 Cumulative operational noise

Cumulative operational noise is typically assessed against RANL listed in Table 4.2, however where a standalone project can meet the stricter project amenity PANL, cumulative impact due to the Project is not expected as that criterion allows for industrial noise contributions from multiple sites/projects.

PANL listed in Table 4.3 have conservatively been used to assess cumulative operational noise.

5 Assessment

5.1 Noise modelling methodology

Road traffic noise and industrial operational noise levels were predicted using SoundPLAN modelling software.

For road traffic noise, calculations were performed using the Calculation of Road Traffic Noise (CoRTN, 1988) algorithm. This is a widely accepted noise propagation algorithm validated under Australian conditions, primarily used to evaluate the hourly traffic noise level exceeded for 10 percent of the time denoted as $L_{A10\ (period)}$, with a -3 dB(A) adjustment made to provide the hourly equivalent continuous sound level denoted as $L_{Aeq\ (period)}$.

For industrial operational noise calculations were performed using 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 models for both road traffic noise and industrial noise prediction consider factors that influence noise propagation such as the lateral and vertical location of the source relative to the receptor, ground effects, atmospheric absorption, topography of the site and surrounding area (using a three-dimensional digital ground model) and applicable meteorological conditions.

5.2 Industrial noise modelling

5.2.1 Operational noise generation

i On-site vehicle movements

The operational noise model represents a snapshot of example operations, with equipment placed at various locations and heights, representing a realistic operational scenario, based on information provided by the client. A typical worst case 15-minute assessment for the day and evening/night period has been developed. Equipment sound power levels have been based on data obtained from EMM's internal database of similar equipment. Indicative plant and equipment of acoustic significance and associated sound power levels for the development are presented in Table 5.1

Table 5.1 Operational noise sources (dB)

Noise source	Quantity	Source Lw, L_{Aeq} (dB)	Percentage time active per 15-minute period	
			Day and evening periods	Night period
Semi-trailer	15	104 at 10 km/h	100%	100%
Cars	3	89 at 10 km/h	100%	100%
Green block forming facility	1	85 transmissive surfaces	100%	100%
Dryer and furnace	1	85 transmissive surfaces	100%	100%

ii Sleep disturbance

An L_{Amax} sound power of 110 dB has been used to represent an impact event for assessment of sleep disturbance. The assessment undertaken assumes the impact event occurs at the nearest end of the hardstand area to assessment locations, whilst all other operational noise sources are in operation.

iii Predicted operational noise impacts

Predicted operational and sleep disturbance impacts are provided in Table 5.2 and Table 5.3 respectively. The model includes the surrounding landscape and existing buildings (see Appendix A showing model render). Results for each location are provided for day, evening and night periods. No exceedances of noise targets are expected.

Table 5.2 Predicted Stage 3 operational noise levels, $L_{Aeq,15min}$ (dB)

Assessment period	Assessment location	Predicted noise level	Project noise trigger level (PNTL)	Exceedance of Project noise trigger level (PNTL), dB	Site specific noise limit, $L_{Aeq,15min}$	Exceedance of site specific noise limit, dB
Day	R1	33	48	Nil	43	Nil
	R2	34	48	Nil	43	Nil
	R3	32	48	Nil	43	Nil
	R4	35	48	Nil	43	Nil
	R5	38	48	Nil	43	Nil
	R6	38	48	Nil	43	Nil
	R7	39	48	Nil	43	Nil
	R8	49	48	1	43	6
Evening	R1	33	43	Nil	37	Nil
	R2	34	43	Nil	37	Nil
	R3	32	43	Nil	37	Nil
	R4	35	43	Nil	37	Nil
	R5	38	43	Nil	37	1
	R6	38	43	Nil	37	1
	R7	39	43	Nil	37	2
	R8	49	43	6	37	12
Night	R1	33	38	Nil	35	Nil
	R2	34	38	Nil	35	Nil
	R3	32	38	Nil	35	Nil
	R4	35	38	Nil	35	Nil
	R5	38	38	Nil	35	3
	R6	38	38	Nil	35	3

Table 5.2 Predicted Stage 3 operational noise levels, $L_{Aeq,15min}$ (dB)

Assessment period	Assessment location	Predicted noise level	Project noise trigger level (PNTL)	Exceedance of Project noise trigger level (PNTL), dB	Site specific noise limit, $L_{Aeq,15min}$	Exceedance of site specific noise limit, dB
	R7	39	38	1	35	4
	R8	49	38	11	35	14

Table 5.3 Predicted maximum operational noise levels at assessment locations

Assessment location	Predicted noise level, dB L_{Amax}	Screening criteria, dB L_{Amax}	Exceedance of screening criteria
R1	32	52	Nil
R2	35	52	Nil
R3	37	52	Nil
R4	35	52	Nil
R5	36	52	Nil
R6	36	52	Nil
R7	34	52	Nil

It should be noted that when considered cumulatively with the operational noise of the Stage 1 development, that the predicted noise levels at sensitive receptors are not expected to increase from the operation of Stage 1 alone. The summation of the mitigated operational noise levels measured by Global Acoustics in 2019 (for Stage 1) and the predicted contributions from the Stage 3 development are presented in Table 5.4.

The 7 Graham Drive location (R8) is the most highly impacted residence by the operational noise of the development. We understand that the proponent is in the process of negotiating an agreement with this land owner.

As can be observed, the cumulative operational noise impacts of Stages 1 to 3 can lead to an exceedance of the site specific noise criteria prescribed within the development consent, if not mitigated. It is therefore recommended that that mitigation be further considered for Stage 3 and or revisiting of the consent limits to align with the derived PNTLs as derived herein.

Table 5.4 Predicted cumulative operational noise levels, $L_{Aeq,15min}$ (dB)

Assessment period	Assessment location	Predicted cumulative noise level	Project noise trigger level (PNTL)	Exceedance of Project noise trigger level (PNTL), dB	Site specific noise limit, $L_{Aeq,15min}$	Exceedance of site specific noise limit, dB
Night	R1	33	38	Nil	35	Nil
	R2	34	38	Nil	35	Nil
	R3	32	38	Nil	35	Nil

Assessment period	Assessment location	Predicted cumulative noise level	Project noise trigger level (PNTL)	Exceedance of Project noise trigger level (PNTL), dB	Site specific noise limit, $L_{Aeq,15min}$	Exceedance of site specific noise limit, dB
	R4	35	38	Nil	35	Nil
	R5	38	38	Nil	35	3
	R6	38	38	Nil	35	3
	R7	39	38	1	35	4
	R8	49	38	11	35	14

5.2.2 Road traffic noise generation

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

The following peak traffic movement data was supplied to EMM:

- Peak hourly movements of 710 vehicles per hour in the AM peak (6:00 am to7:00 am) and 791 vehicles per hour in the PM peak (3:45 pm to 4:45 pm).
- 75% of the traffic generated by the site will travel to and from the west, and 25% will travel to and from the east.

The data in Table 5.5 describes the following:

- Traffic volumes in the absence of the development ('no-build'), adopting industry standard annual increase of 3% per annum. This base 'no-build' excludes the existing Stage 1 development that has been operating for 11 years.
- Traffic volumes expected to be generated by the development ('development traffic').
- The combined traffic volumes with the development.

Table 5.5 Tomago Road traffic volumes associated with Stage 3 development

Direction		Stage / year	No-build (2035)		Development traffic		Combined	
			Traffic volume	HV %	Traffic volume	HV %	Traffic volume	HV %
Eastbound	East of intersection	Day (15hr)	2955	27.5	2520	8	5475	18.5
		Night (9hr)	1062	18.1	1512	8	2574	12.6
	West of intersection	Day (15hr)	2910	26.5	1335	8	4245	20.6
		Night (9hr)	1296	13.9	801	8	2097	11.6

Table 5.5 Tomago Road traffic volumes associated with Stage 3 development

Direction		Stage / year	No-build (2035)		Development traffic		Combined	
			Traffic volume	HV %	Traffic volume	HV %	Traffic volume	HV %
Westbound	East of intersection	Day (15hr)	6,735	20.3	450	8	7,185	19.5
		Night (9hr)	810	23.8	270	8	1,080	19.8
	West of intersection	Day (15hr)	5,175	25.6	7,560	8	12,735	15.2
		Night (9hr)	522	34.1	4,536	8	5,058	10.7

Notes: 1. Provided by the masterplan traffic consultant.

2. Traffic distribution from the site is approximately 75% of vehicles to the west and 25% to the east.

The predicted increase in road traffic noise due to the Stage 3 development is presented in Table 5.6.

As shown, the predicted increase due to the development is equal to or less than 2 dB at all sensitive receptors.

Table 5.6 Predicted increase in road traffic noise levels due to Stage 3 development (Tomago Road)

Assessment location	No-build (2035)		Including development (2035)		Difference (build vs no-build)		Exceedance of ECRTN allowable increase criteria
	Day (15hr)	Night (9hr)	Day (15hr)	Night (9hr)	Day (15hr)	Night (9hr)	
R1	65	60	65	62	0	2	Nil
R2	63	59	64	60	1	1	Nil
R3	65	61	66	62	1	1	Nil
R4	65	61	66	62	1	1	Nil
R5	64	60	65	62	1	2	Nil
R6	65	60	65	62	0	2	Nil
R7	61	57	62	59	1	2	Nil
R8	63	59	65	63	2	4	Yes (2dB nighttime)

It should be noted that Stages 1 and 2 of the development also contribute to the cumulative road traffic noise generated by the development of the industrial site. The predicted increase in road traffic noise due to Stages 1 and 2 of the development are presented in Table 5.7.

Table 5.7 Predicted increase in road traffic noise levels due to Stage 1 and 2 development (Tomago Road)

Assessment Location	No-build (2035)		Including development (2035)		Difference (build vs no-build)		Exceedance of ECRTN allowable increase criteria
	Day (15hr)	Night (9hr)	Day (15hr)	Night (9hr)	Day (15hr)	Night (9hr)	
R1	65	60	65	61	0	1	Nil
R2	63	59	63	60	0	1	Nil

Assessment Location	No-build (2035)		Including development (2035)		Difference (build vs no-build)		Exceedance of ECRTN allowable increase criteria
	Day (15hr)	Night (9hr)	Day (15hr)	Night (9hr)	Day (15hr)	Night (9hr)	
R3	65	61	65	62	0	1	Nil
R4	65	61	66	62	1	1	Nil
R5	64	60	65	61	1	1	Nil
R6	65	60	65	61	0	1	Nil
R7	61	57	62	58	1	1	Nil
R8	63	59	64	61	1	2	Nil

Whilst neither of the scenarios induce exceedances at sensitive receptors when considered independently, the predicted cumulative road traffic noise levels due to the development of all three stages are expected to exceed the ECRTN allowable increase criteria of 2dB (during the nighttime period). These predicted noise levels are presented in Table 5.8.

Table 5.8 Predicted cumulative increase in road traffic noise levels due to Stage 1-3 developments (Tomago Rd)

Assessment Location	No-build (2035)		Including development (2035)		Difference (build vs no-build)		Exceedance of ECRTN allowable increase criteria
	Day (15hr)	Night (9hr)	Day (15hr)	Night (9hr)	Day (15hr)	Night (9hr)	
R1	65	60	66	63	1	3	Yes (1 dB at night)
R2	63	59	64	61	1	2	Nil
R3	65	61	66	63	1	2	Nil
R4	65	61	66	63	1	2	Nil
R5	64	60	66	63	2	3	Yes (1 dB at night)
R6	65	60	66	63	1	3	Yes (1 dB at night)
R7	61	57	62	59	1	2	Nil
R8	63	59	66	64	3	5	Yes (1 dB daytime, 3 dB nighttime)

It is shown that exceedances of the ECRTN allowable increase criteria of 2 dB are predicted at R1, R5 and R6 and R8 during the nighttime period due to cumulative traffic generation from Stages 1 to 3 of the industrial site. Therefore, it is recommended that mitigation measures are implemented to minimise noise impacts. These are described in further detail in Section 6.

6 Noise mitigation and management

6.1 General

Where possible, feasible and reasonable noise mitigation strategies should be adopted to minimise noise as much as practicable.

Work practice methods to minimise noise include:

- regular reinforcement (such as at toolbox talks) of the need to minimise noise
- regular identification of noisy activities and adoption of improvement techniques
- avoiding the use of portable radios, public address systems or other methods of site communication that may unnecessarily impact upon nearby residents
- develop routes for the delivery of materials and parking of vehicles to minimise noise
- where possible, avoid the use of equipment that generates impulsive noise
- minimise the movement of materials and plant and unnecessary metal-on-metal contact

Work practice methods particularly relevant to minimising the generation of operational and road traffic noise include:

- minimise truck movements at night
- where the above is not possible, develop routes for the movement of trucks during the nighttime period to minimise the generation of traffic to the east of the development.

6.1.1 Plant and equipment

Additional measures for plant and equipment include:

- where possible, choose quieter plant and equipment based on the optimal power and size to most efficiently perform the required tasks
- movement alarms and beepers to be replaced with non-tonal level varying quackers or equivalent
- operate plant and equipment in the quietest and most efficient manner.

6.1.2 Quantifying noise reductions

Approximate noise reductions provided by some of these measures are provided in Table 6.1.

Table 6.1 Relative effectiveness of various forms of noise control

Noise control	Nominal noise reduction possible, in total A-weighted sound pressure level
Increase source to receiver distance[1]	approximately 6 dB for each doubling of distance
Reduce equipment operating times or turn off idling machinery[2]	approximately 3 dB per halving of operating time

Table 6.1 Relative effectiveness of various forms of noise control

Noise control	Nominal noise reduction possible, in total A-weighted sound pressure level
Operating training on quiet operation[2]	up to 3 dB to 5 dB
Screening (e.g. noise barrier)[1]	normally 5dB to 10 dB, maximum 15 dB
Enclosure (e.g. shed/building)[1]	normally 15 dB to 25 dB, maximum 50 dB
Silencing (e.g. exhaust mufflers)[1]	normally 5 dB to 10 dB, maximum 20 dB

Sourced from AS2436-2010.

2. Based on EMM's measurement experience at construction and mining sites.

6.2 Road traffic noise measures

Examples of mitigation strategies applicable to traffic generating developments on existing roads as defined within the RNP include:

- appropriate location of private access roads
- regulating times of use
- clustering vehicle movements
- using 'quiet' vehicles
- using barriers and acoustic treatments
- treatment of dwellings upon request.

6.3 Negotiated agreements

Condition 26 of the development consent notes:

> The noise limits do not apply if the Applicant has an agreement with the relevant owner of lands within these locations to generate higher noise levels and the Applicant has advised the Department in writing of the terms of this agreement.

Therefore, where an agreement is negotiated with an impacted resident, the agreement will override the criteria defined within this assessment. A holding statement has been provided whilst negotiations are undertaken which is as follows:

> Northbank Enterprise Hub the owner of the development consent MP07_0086 Stage 3 has commenced discussions on acoustic agreements with the owners of the 3 neighbouring properties identified by DPHI - 7 Graham Drive, 159 Tomago Rd and 175 Tomago Rd.
>
> Initial meetings have been positive, and agreements will be delivered to the neighbours next week.

7 Conclusion

EMM has completed verification of road traffic noise and review of potential industrial noise impacts associated with the proposed Stage 3 development at Lot 210 DP1174939, Tomago NSW. The assessment considered the potential for on-site operational and road traffic noise impacts of the project and has been prepared in accordance with the methodologies outlined in the NPfI and ECRTN, as well as other relevant guidelines and standards.

Project noise trigger levels for the Project have been established based on the results of ambient noise monitoring and methodology provided in the NPfI.

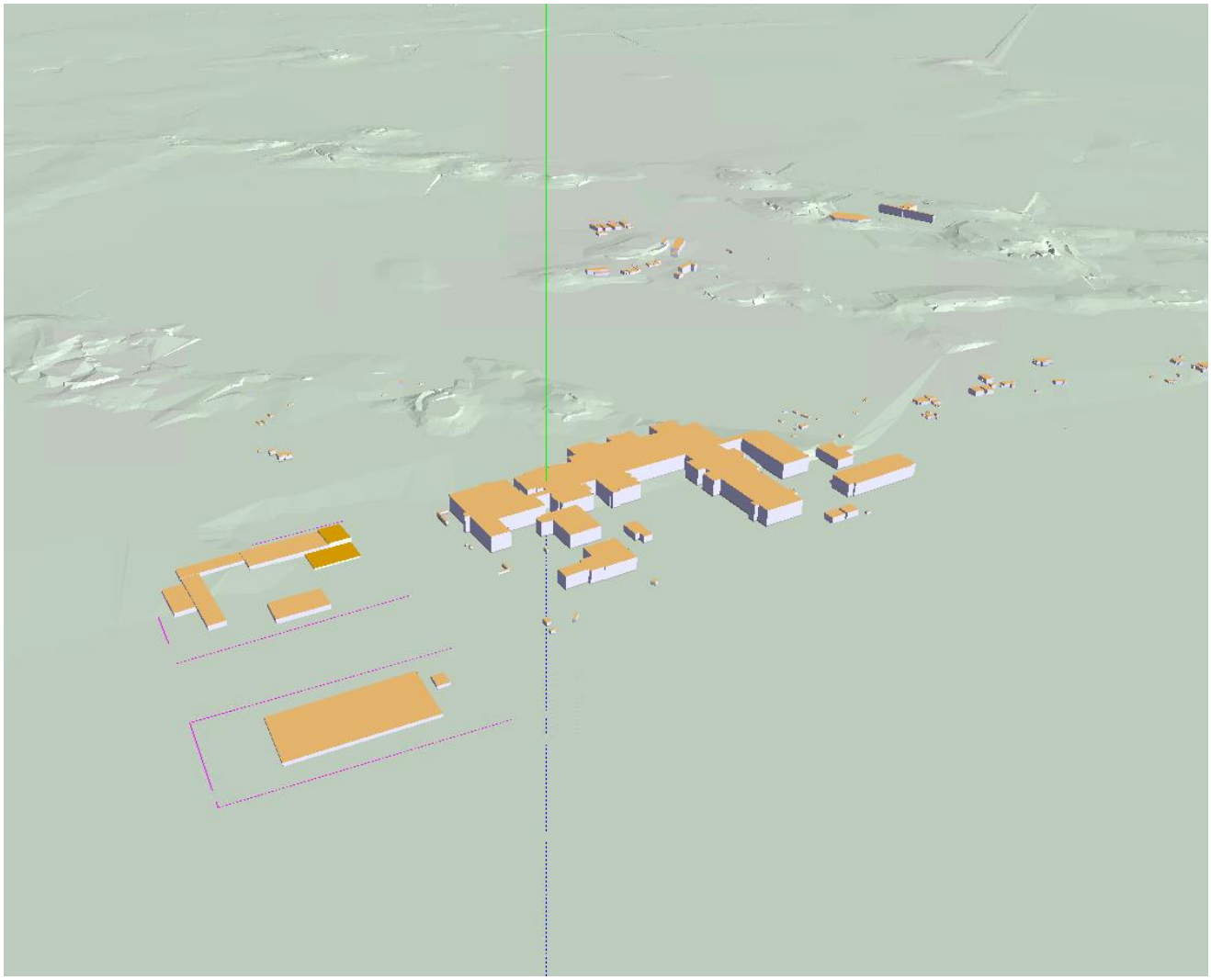
Noise modelling has been undertaken based on likely levels of noise generated by the development during typical worst-case vehicle movements. Findings of the assessment are summarised as follows:

- Operational noise levels of example uses are likely to require mitigation to achieve the project noise trigger levels, and cumulative impact assessment criteria.
- Additional road traffic movements on Tomago Road generated by the development of Stage 3 is expected to result in up to a 2 dB increase at residences.
- Additional road traffic movements on Tomago Road generated by the cumulative operation of Stages 1 to 3 of the Tomago Industrial Site are expected to exceed the ECRTN allowable increase limit of 2 dB during the nighttime period.
- Mitigation measures suggested for the exceedance of the ECRTN allowable increase criterion include minimising the movement of trucks during the nighttime period and the development of routes for the movement of trucks during the nighttime period to minimise the generation of traffic to the east of the development. Alternatively, where a negotiated agreement exists with potentially affected properties, noise limits do not apply in accordance with condition 26 of the development consent MP07_0086.

Appendix A
Example of model inputs

EMM
creating opportunities

A.1 Example of model inputs



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