



Commodity Logistics & Import Project

Noise and Vibration Impact Assessment

BlueScope Steel (AIS) Pty Ltd

09 November 2022

→ The Power of Commitment



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Executive summary

This report

This noise and vibration impact assessment (NVIA) report has been prepared on behalf of BlueScope Steel (AIS) Pty Ltd (BlueScope) to support the Environmental Impact Statement (EIS) for the Commodity Logistics & Import Project (CLIP) (the project) and responds to the Secretary's Environmental Assessment Requirements (SEARs) for noise and vibration. This NVIA describes the existing noise environment and assesses the potential noise and vibration impacts associated with the construction and operational phases of the project, including the potential increases in noise along the local transport network as a result of the project.

This report is subject to, and must be read in conjunction with, the limitations set out in Section 1.3 and the assumptions and qualifications contained throughout the report.

Existing environment

The study area identified for the purposes of this noise and vibration assessment is defined as a 3.5 kilometre radius from the central CLIP worksite. Within this study area, 103 potential receivers have been selected, which are considered representative of the most-affected noise sensitive receivers to the project. Rating background noise levels (RBLs) have been established based on previous noise monitoring undertaken in the study area and have been used to establish the operational noise and construction noise criteria.

Noise impacts from the project during operation

An assessment of operational noise from the project (CLIP activities only, as opposed to a site-wide assessment) has been undertaken to predict noise levels at noise sensitive receivers. Operational noise criteria have been proposed for residential receivers based on a review of the existing Environment Protection Licence (EPL) 6092 for the Port Kembla Steelworks (PKSW), and guidance from the NSW EPA Noise Policy for Industry (NPfI) (NSW EPA, 2017). Operational noise criteria for non-residential receivers have been provided from NPfI.

A 3D noise model has been prepared to predict operational noise levels at noise sensitive receivers. Predictions show that compliance with the proposed operational noise criteria is achieved at all noise sensitive receivers based on the operation of equipment considered part of typical operations.

The operational noise criteria used in this assessment is based on the NPfI discrete process criteria, which aims to ensure that noise emissions from the project do not contribute to the existing total industrial noise level at the most affected receivers and limit cumulative impacts. As compliance is achieved, no cumulative noise impacts considering the existing industrial noise in the area are anticipated.

Sleep disturbance impacts have been assessed against the sleep disturbance screening criterion provided in the NPfI. Operational activities with the potential for short-duration $L_{A1(1min)}$ noise events have been identified, and predictions have been made to residential receivers. It is predicted that $L_{A1(1min)}$ noise levels will be below the screening criterion and as such, no sleep disturbance noise impacts are anticipated from the project.

Noise impacts from the project during construction

Construction noise levels have been predicted to the sensitive receivers within the study area with consideration to the acoustic requirements of the Interim Construction Noise Guideline (DECCW, 2011). Construction scenarios have been prepared to assess construction noise from laydown area operations, and the main construction activities within the CLIP site.

It is predicted that construction activity and laydown area operations are below the Noise Management Levels (NMLs) during all periods of the day for all sensitive receivers, with the exception of impact piling required for the commodity berth clearance and transfer to stockpiling areas. During this activity, noise management levels are predicted to be exceeded by a maximum of 9 dB during the night period and 2 dBA during standard hours at residential receivers located in Cringila, without reasonable and feasible mitigation measures applied.

With mitigation applied (i.e. creating a minimum separation distance of 1400 metres between impact piling works and the most-affected residences for work outside standard hours), night NMLs can be achieved at all residential receivers in the study area.

Subject to the final construction timetable, the majority of construction works would be carried out between 7.00 am and 6.00 pm, Monday to Saturday. Where practical, high noise generating activities, with potential to impact any nearby receivers would be scheduled during standard hours.

Vibration impacts from the project during construction

An assessment of construction vibration has been undertaken against criteria from Assessing Vibration: A Technical Guideline (DEC, 2006) for human comfort impacts, and DIN 4150-3 2016: Vibrations in buildings - Part 3: Effects on structures (German Standards, 2016) for both standard and heritage structure impacts. Due to the large offset distance between construction activities and residential dwellings or any heritage structures, no vibration impacts are anticipated for both human comfort and structural damage during the construction phase of the project.

Traffic noise impacts from the project during construction and operation

Construction and operational traffic noise levels on public roads are anticipated to comply with the road traffic noise assessment criteria in accordance with the *NSW Road Noise Policy* (RNP) (DECCW, 2011) at residential receivers nearest to the project and access routes. As such, no construction or operational road traffic noise impacts are anticipated.

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Abbreviations and acronyms

Term	Definition
AGL	Above ground level
AS	Australian Standards
AVATG	Assessing Vibration: A Technical Guideline (DEC, 2006)
AWS	Automatic weather station
BoM	Bureau of Meteorology
BS	British Standards
BSL	BlueScope Steel Limited
CEMP	Construction Environmental Management Plan
CLIP	Commodity Logistics and Import Project
CNVG	Construction Noise and Vibration Guideline (TfNSW, 2016)
CNVMP	Construction Noise and Vibration Management Plan
CSSI	Critical State Significant Infrastructure
CSU	Continuous Ship Unloader
dB	Decibel
dBA	Decibel A-weighted
dBZ or dBA	Decibel Linear
DCNG	Draft Construction Noise Guideline (EPA, 2021)
DEC	Department of Environment and Conservation NSW
DECC	Department of Environment and Climate Change NSW
DECCW	Department of Environment and Climate Change and Water NSW
DIN	German Institute for Standardisation (Deutsches Institut für Normung)
DP	Deposited Plan
DPE	Department of Planning and Environment
EIS	Environmental Impact Statement
EPA	Environment Protection Agency NSW
EPL	Environment Protection License
Hz	Hertz
ICNG	Interim Construction Noise Guideline (DECC, 2009)
km	Kilometre
LA1(period)	Sound pressure level 99th percentile
LA10(period)	Sound pressure level 90th percentile
LA90(period)	Sound pressure level 10th percentile
LAeq(period)	Equivalent sound pressure level
LGA	Local Government Area
m	Metre
m ²	Metres squared
m/s	Metres per second

Term	Definition
MGA	Map Grid of Australia
NCA	Noise Catchment Area
NML	Noise Management Level
NMP	Noise Management Plan
NPfl	Noise Policy for Industry (EPA, 2017)
NSW	New South Wales
OOHW	Out of hours works
OUL	Ore Unloader
PKSW	Port Kembla Steelworks
PPV	Peak particle velocity
PSMA	Public Sector Mapping Agencies
RBL	Rating Background Noise Level
RNP	Road Noise Policy (DECCW, 2011)
SEARs	Secretary's Environmental Assessment Requirements
SSD	State Significant Development
SWL	Sound Power Level
SWL"	Sound Power Level per meter
6BF	Number 6 Blast Furnace

Glossary of terms

Term	Definition
A weighting	The human ear responds more to frequencies between 500 Hz and 8 kHz and is less sensitive to very low-pitch or high-pitch noises. The frequency weightings used in sound level measurements are often related to the response of the human ear to ensure that the meter better responds to what you actually hear.
Noise-enhancing weather conditions	Weather effects that enhance noise (i.e. wind and temperature inversions) that occur at a site for a significant period of time (i.e. light winds, up to and including 3 m/s, occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter).
Ambient noise	The all-encompassing noise associated within a given environment. It is the composite of sounds from many sources, both near and far. This is described using the Leq descriptor.
Background noise	The underlying level of noise present in the ambient noise, excluding the noise source under investigation, when extraneous noise is removed. This is described using the L90 descriptor.
Compliance	The process of checking that source noise levels meet with the noise limits in a statutory context.
Construction footprint	Defined as the area that would be directly affected by construction of the proposal. It includes: – The location of project infrastructure – The area that would be directly disturbed by the movement of construction plant and machinery, and the location of the temporary construction workforce accommodation facility, construction compounds and laydown areas that would be used during construction
Feasible and reasonable measures	Feasibility relates to engineering considerations and what is practical to build. Reasonableness relates to the application of judgement in arriving at a decision, taking into account the following factors: – Noise mitigation benefits (amount of noise reduction provided, number of people protected) – Cost of mitigation (cost of mitigation versus benefit provided) – Community views (aesthetic impacts and community wishes) – Noise levels for affected land uses (existing and future levels, and changes in noise levels).
Ground-borne vibration	Vibration transmitted from a source to a receptor via the ground.
Hertz	The measure of frequency of sound wave oscillations per second. 1 oscillation per second equals 1 hertz.
Maximum noise event	The loudest event or events within a given period of time. This is generally described using the Lmax descriptor.
Meteorological conditions	Wind and temperature inversion conditions.
Most-affected location	Location(s) that experience (or will likely experience) the greatest noise impact from the construction works under consideration. In determining these locations, existing background noise levels, noise source location(s), distance and any shielding between the construction works (or proposed works) and the residences and other sensitive land uses need to be considered.
Noise-enhancing weather conditions	Meteorological conditions that can increase noise levels by focusing sound-wave propagation paths at a single point. Such refraction of sound wave will occur during temperature inversions (atmospheric conditions where temperatures increase with height above ground level), and where there is a wind gradient (that is, wind velocities increasing with height) with wind direction from the source to the receiver.

Term	Definition
Noise management level	The NML as defined as the ICNG. To be measured and assessed at the property boundary that is most exposed to construction noise, and at a height of 1.5 m above ground level. If the residential property boundary is more than 30 m from the residence, the location for measuring or predicting noise levels is at the most affected point within 30 m of the residence.
Noise sensitive land use	Land uses that are sensitive to noise, such as residential areas.
Non-compliance	Development is deemed to be in non-compliance with its noise consent/ licence conditions if the monitored noise levels exceed its statutory noise limit (exceptions may be given if the noise level exceeds by less than 2 dB).
Octave	A division of the frequency range into bands, the upper frequency limit.
One third-octave	Single octave bands divided into three parts.
Pasquill-Gifford stability classification scheme	The most widely used stability classification scheme is that developed by Pasquill (1961). This is based on observations of cloud cover, wind speed and solar elevation, and can identify when noise-enhancing weather conditions are present.
Project noise trigger level	Target noise levels for a particular noise generating facility. They are based on the most stringent of the intrusive criteria or amenity criteria. Which of the two criteria is the most stringent is determined by measuring the level and nature of existing noise in the area surrounding the actual or proposed noise generating facility.
Proponent	BlueScope Steel (AIS) Pty Ltd
Rating Background Level	The RBL is defined by the Noise Policy for Industry (NPfI) as the overall, single-figure background level representing each assessment period (day/evening/night) over the whole monitoring period (as opposed to over each 24-hour period used for the assessment background level). This is the level used for assessment purposes
Resonance	Resonance describes the phenomenon of increased amplitude that occurs when the frequency of a periodically applied force is equal or close to a natural frequency of the system on which it acts.
SoundPLAN	A computer program for the calculation, assessment, and prognosis of noise exposure. SoundPLAN calculates environmental noise propagation.
Stability categories	Pasquill-Gifford stability categories, determined using hourly or three-hourly wind-speed and cloud-cover measurement data.
Study area	Land in the vicinity of, and including, the proposal site. The 'study area' is the wider area surrounding the proposal site.
Temperature inversion	An atmospheric condition in which temperature increases with height above the ground.
Z-Weighting (or Linear-weighted)	Zero-weighting or Linear-weighting indicates no weighting filter has been applied and refers to a flat frequency response for sound level meters.

1. Introduction

1.1 Background and overview

BlueScope Steel (AIS) Pty Ltd (BlueScope) is one of Australia's leading manufacturers and is a global leader in finished and semi-finished steel products. Steelmaking operations are undertaken at the Port Kembla Steelworks (PKSW), within an industrial site of approximately 750 hectares located in the Wollongong Local Government Area.

PKSW is the largest steel production facility in Australia and is the only plant in Australia manufacturing upstream flat iron and steel products. PKSW supplies the essential feedstock that keeps all other domestic manufacturing facilities owned by BlueScope's parent entity, BlueScope Steel Limited (BSL), operational.

Recent and emerging disruptions to key commodity supply chains have highlighted the importance of an upgrade to three of the five berths operated by BlueScope, which is proposed as a key component of the Number 6 Blast Furnace (6BF) Reline Project. The upgrade will allow for the berths to accommodate the increase in premium hard metallurgical coal imports needed to replace the three-seam coal from South32's Dendrobium mine. This coal is currently transported by rail and is expected to cease supply by 2028. The proposed upgrade is urgently required to support continued operations at PKSW, thus maintaining the provision of steel to the domestic and export markets, and the continuation of economic benefit to the Illawarra region.

The upgrade of PKSW's raw material import capabilities is referred to as the Commodity Logistics and Import Project (CLIP) or the project. CLIP is part of a larger Critical State Significant Infrastructure (CSSI) project involving both the reline of 6BF and CLIP.

The project has been declared CSSI in accordance with Section 5.13 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and Schedule 5 of the *State Environmental Planning Policy (Planning Systems) 2021*.

1.2 Purpose of this report

This noise and vibration impact assessment (NVIA) report has been prepared by GHD Pty Ltd (GHD) as part of the EIS for the project. The EIS has been prepared to support the application for approval of the project and address the environmental assessment requirements of the Secretary's Environmental Assessment Requirements (SEARs) pertaining to noise and vibration.

The purpose of this report is to assess the potential noise and vibration impacts from constructing and operating the project. The report:

- Addresses the SEARs as listed in Section 2.1
- Describes the existing environment with respect to noise and vibration
- Assesses the potential impacts of constructing and operating the project on sensitive receivers
- Recommends measures to mitigate and manage the impacts identified

1.3 Limitations

This report has been prepared by GHD for BlueScope Steel (AIS) Pty Ltd and may only be used and relied on by BlueScope Steel (AIS) Pty Ltd for the purpose agreed between GHD and BlueScope Steel (AIS) Pty Ltd as set out in Section 1.2 of this report. GHD otherwise disclaims responsibility to any person other than BlueScope Steel (AIS) Pty Ltd arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by BlueScope Steel (AIS) Pty Ltd and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

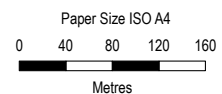
Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of buildings, services and vegetation. As a result, not all relevant site features and conditions may have been identified in this report.

Site conditions may change after the date of this report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.

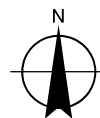


LEGEND

-  Existing feature
-  Proposed feature
-  Relocated feature
-  Project site



Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56



BlueScope Steel (AIS) Pty Ltd
Commodities Logistics Infrastructure Project
Noise and Vibration Impact Assessment

Project No. 12555409
Revision No. 0
Date 29/06/2022

Key proposal features

FIGURE 1.1

2. Legislative and policy context

2.1 Secretary's Environmental Assessment Requirements

The SEARs relevant to noise and vibration, together with a reference to where they are addressed in this report are outlined in Table 2.1.

Table 2.1 Noise and vibration SEARs

Requirement	Where addressed in this report
Noise and vibration – including:	
assessment of the likely construction noise impacts of the project under the Construction Noise Guideline if available, or the Interim Construction Noise Guideline (DECCW 2009) if the Construction Noise Guideline is not available.	Section 7.2 (Construction noise – ICNG) Section 7.3 (Construction traffic noise – RNP)
an assessment of the likely operational noise impacts of the project under the NSW Noise Policy for Industry (EPA 2017).	Section 7.1 (Operational noise – NPfl)
an assessment of the likely vibration amenity and structural impacts of the project under Assessing Vibration: A Technical Guideline (DEC 2006) and German Standard DIN 4150-3 Structural Vibration – effects of vibration on structures.	Section 7.4 (Construction vibration – AVATG, DIN 4150-3)

2.2 Guidelines and policies

The assessment was undertaken in accordance with the SEARs and with reference to the requirements of relevant legislation, policies and/or assessment guidelines, including:

- Interim Construction Noise Guideline (ICNG) (DECC, 2009)
 - Used for the assessment of construction noise and vibration impacts
- NSW Road Noise Policy (RNP) (DECCW, 2011)
 - Used for the assessment of traffic generation from the project; both in construction and operation phases
- Noise Policy for Industry (NPfl) (EPA, 2017)
 - Used for the assessment of operational noise impacts
- Assessing Vibration: A Technical Guideline (DEC, 2006)
 - Used for the assessment of construction vibration impacts
- *DIN 4150-3 2016: Vibrations in buildings - Part 3: Effects on structures* (German Standards, 2016)
 - Used for the determination of suitable vibration intensity thresholds for structures

3. Methodology

3.1 Key tasks

Project definition

- Review of operational noise sources from the project, and assignment of suitable source noise levels.
- Review of proposed construction staging, areas and indicative construction equipment lists.

Existing environment

- Identify the study area relevant to the noise and vibration assessment.
- Identify and classify sensitive receivers within the study area.
- Characterise the existing noise environment based on previous noise monitoring undertaken at representative locations in the study area.
- Determine the rating background levels (RBL) for residential receivers in the study area to establish the construction noise and operational noise criteria.

Operational noise assessment

- Identify the significant noise sources associated with the Continuous Ship Unloader (CSU) and conveyors during operation and indicative sound power levels based on assumed noise data of similar equipment.
- Determine worst-case operating scenarios during all periods of the day based on assumptions.
- Predict noise levels at sensitive receivers using SoundPLAN noise modelling software with consideration to the local meteorological conditions.
- Where required, in-principle noise mitigation measures have been recommended to reduce noise to within acceptable and compliant levels. These noise mitigation measures are to be incorporated into the detailed design noise model once the final design has been finalised.

Construction noise and vibration assessment

- The RBLs were used to establish the noise management levels (NMLs) in accordance with the ICNG.
- A list of likely construction activities and machinery were developed based on the constructability requirements for the project. The construction activities were used to develop construction scenarios for construction noise modelling. Representative sound power levels for the selected equipment were obtained from *AS2436:2010 Guide to noise and vibration control on construction, demolition and maintenance sites* (Australian Standards, 2010).
- Noise modelling was undertaken for the identified construction scenarios and likely equipment that would be operating.
- Safe working distances for human comfort and cosmetic damage to buildings were sourced from the CNVG for various vibratory intensive equipment. Any sensitive receivers located within these safe working distances were identified.
- Where noise or vibration levels were predicted to exceed the construction noise management levels or vibration criteria, feasible and reasonable construction noise or vibration mitigation measures are recommended to reduce potential impacts.

Road traffic noise assessment during operation and construction

Traffic generation on public roads during operation as a result of the project is anticipated to be consistent with the existing conditions. As such, a quantitative assessment of potential road traffic noise increase on public roads as a result of the project is not considered necessary as the acoustic requirements of the Road Noise Policy are anticipated to be met. A screening test has been undertaken to identify the potential for road traffic noise increases at sensitive receivers along public roads during the construction period.

3.2 Study area

The study area has been defined as approximately 3.5 kilometres from the main project site as noise impacts during construction or operation are not anticipated beyond this distance, as both operational and construction noise levels at this distance from the main project site do not contribute above existing environmental noise levels.

3.3 Noise monitoring

No noise monitoring was undertaken to establish the background noise environment at the nearest residential receivers to the project site. No noise monitoring was undertaken for the following reasons:

- There were concerns over the validity of long-term noise monitoring during a lockdown period due to NSW COVID-19 restrictions in an area where road traffic noise and commercial/industrial activity are the dominant noise sources in the study area.
- There were concerns regarding approaching residents to request noise monitoring be undertaken at their property due to the COVID-19 outbreaks in NSW around the relevant time.
- The data used in the noise and vibration assessment of the CLIP project is consistent with the background noise data used in the assessment of the related No.6 Blast Furnace relines project (SSI-22545215) as exhibited early in 2022.

In view of the above, background noise monitoring data has been utilised from a publicly available noise and vibration impact assessment in Port Kembla, being '*Port Kembla Gas Terminal – Noise and Vibration Impact Assessment*' (Australian Industrial Energy, 2018) to establish the RBL at residences within the study area.

Background noise monitoring, using the NPfI long term method, was undertaken at two residential locations representative of the reasonably most affected locations to quantify the existing background and ambient noise levels in the surrounding environment. The measured background noise levels were used to establish the RBLs for each of the relevant periods of the day in accordance with Fact Sheet A and Fact Sheet B of the NPfI. The RBLs were used to establish the NMLs in accordance with the ICNG and the intrusiveness noise levels in accordance with the NPfI.

The relevant noise catchment areas (NCAs) where these RBLs have been used to establish the construction noise management levels are discussed in Section 5.2.

Table 3.1 Representative background and ambient noise levels in the study area

Monitoring I.D	Location	Rating Background Level (RBL), L90 - dBA			Ambient level, Leq - dBA		
		Day	Evening	Night	Day	Evening	Night
L1	117 Gladstone Avenue, Coniston	39	40 (39)	39	52	50	50
L2	16 Merrett Avenue, Cringila	43	42	45 (42)	51	49	50

Notes:

- 1) Where the evening RBL is higher than the day RBL, the day RBL has been used to establish the criteria.
- 2) Where the night RBL is higher than the evening RBL, the evening RBL has been used to establish the criteria

3.4 Operational noise assessment

It is proposed to split the existing CLIP scope into 2 stages:

- Stage 1- Relocation of the Coke Loader and associated Ship Unloader Movements.
- Stage 2- Operation of a CSU and associated coal conveyors to 4 Area.

The following methodology is based on the worst-case noise emission from the project being the ultimate design of the CLIP scope (Stage 2). Stage 1 would include the relocation of the existing coke loader to another location less than 200 metres away. The nearest residential receivers to the relocated coke loader is more than 1.75 kilometres away in Port Kembla. As such, the change in noise emission from the Stage 1 operations is anticipated to be negligible when compared to existing operations.

3.4.1 Methodology overview

The location of noise-generating equipment/processes have been based on drawings and information provided by BlueScope and include the 3D dimensional co-ordinates of these items for inclusion in the noise model.

It has been assumed that all equipment would be operating at 100% capacity during all periods of the day for a full 15 minute period.

The sound power level (SWL) of external noise sources has been modelled as either a point source or a line source. For line sources, the SWL is represented as SWL" (per metre).

To predict the noise levels at sensitive receivers surrounding the site, the following factors have been taken in account in the environmental noise modelling methodology:

- External noise line sources (e.g. conveyors)
- External point sources (e.g. conveyor drive units)
- Terrain topography
- Absorption from the ground coverage
- Atmospheric absorption
- Relevant shielding objects (e.g. buildings / noise barriers)
- The potential for noise enhancing meteorological conditions

3.4.2 Environmental noise modelling methodology

Acoustic modelling was undertaken using SoundPLAN 8.2 noise modelling software to predict indicative environmental noise levels at the sensitive receivers surrounding the project site during the operation of the facility. SoundPLAN is a computer program for the calculation, assessment and prognosis of noise propagation. SoundPLAN calculates environmental noise propagation using industry standard models such as the ISO 9613-2: 1996 (ISO, 1996)) prediction method.

General parameters used in the model are listed in Table 3.2.

Table 3.2 *Noise modelling parameters*

Variable	Parameter used
Calculation method	ISO 9613-2: 1996
Topography	Sourced from ELVIS GIS Australia - 5 m elevation intervals
Receiver heights	1.5 metres above building ground level
Ground absorption	0.5 for all areas (0 is non-porous ground and 1 is porous ground such as that found in a rural setting comprising of mainly grass and vegetation)
Temperature	10°C (conservative)
Humidity	90% (conservative)
Number of reflections	A maximum number of 2 reflections from surrounding structures
Building footprints and heights (outside the project site)	PSMA Geoscape data
Building footprints and heights (within the project site)	Based on drawings provided by BlueScope and a Navisworks model to estimate the height of buildings/structures
Source noise levels	Assumptions for the source noise level inputs are presented in Section 3.4.4

3.4.3 Local meteorological conditions

Certain meteorological/weather conditions may increase noise levels by focusing sound-wave propagation paths at a single point. Such refraction of sound waves will occur during temperature inversions (atmospheric conditions where temperatures increase with height above ground level), and where there is a wind gradient (that is, wind velocities increasing with height) with wind direction from the source to the receiver.

Wind has the potential to increase noise levels at a receiver when it is light and stable and blows from the direction of the source of the noise. As the strength of the wind increases, the noise produced by the wind will mask noise from most industrial and transport sources.

Temperature inversions (i.e. where atmospheric temperature increases with altitude) typically occur during stable atmospheric conditions such as the night-time period in the winter months. Temperature inversion can also increase site noise levels at surrounding assessment locations.

Wind effects and temperature inversions need to be considered when predicting the long-term noise levels during the operation of the project.

3.4.3.1 Noise Policy for Industry requirements

The NPfl requires assessment of noise under standard and noise enhancing weather conditions. The NPfl defines these as follows:

- Standard meteorological conditions: defined by stability categories A through to D with wind speeds up to 0.5 m/s at 10 m above ground level (AGL) for day, evening and night periods.
- Noise-enhancing meteorological condition: defined by stability categories A through to D with light winds (up to 3 m/s at 10 m AGL) for the day and evening periods; and stability categories A through to D with light winds (up to 3 m/s at 10 m AGL) and/or stability category F with winds up to 2 m/s at 10 m AGL.

The NPfl specifies the following two options to consider meteorological effects:

1. Adopt the noise-enhancing meteorological conditions for all assessment periods for noise impact assessment purposes without an assessment of how often these conditions occur – a conservative approach that considers source-to-receiver wind vectors for all receivers and F class temperature inversions with wind speeds up to 2 m/s at night; or
2. Determine the significance of noise-enhancing conditions. This involves assessing the significance of temperature inversions (F and G class stability categories) for the night-time period and the significance of light winds up to and including 3 m/s for all assessment periods during stability categories other than E, F or G. Significance is based on a threshold of occurrence of 30% determined in accordance with the provisions in this policy. Where noise-enhancing meteorological conditions occur for less than 30% of the time, standard meteorological conditions may be adopted for the assessment.

3.4.3.2 Wind effects

The NPfl recommends consideration of wind effects if they are “significant”. The NPfl defines “significant” as the presence of source-to-receiver wind speed (measured at 10 m above ground level) of 3 m/s or less, occurring for 30% of the time in any assessment period and season.

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

A review of the vector components of hourly wind data from 2016 to 2020 was undertaken for data from the Bureau of Meteorology’s Port Kembla Harbour automatic weather station (AWS) (ID: 068253). The observations are approximately 2 km from the site and are considered representative for the site and surrounds.

Figure 3.1 shows the wind roses (2016 to 2020) for each NPfI assessment period and for each season. Table 3.3 provides a summary of the prevailing wind conditions that are relevant to the assessment, with blue shaded cells indicating a percentage occurrence of over 30%. The analysis indicates that noise-enhancing wind conditions are identified to be a significant feature of the area in the following wind directions: South-Southwest, Southwest, West-southwest, West and West-northwest. These wind directions all blow from the site to the sea and not in the direction of any sensitive receiver locations. As such, noise-enhancing conditions due to wind effects have not been considered in this assessment.

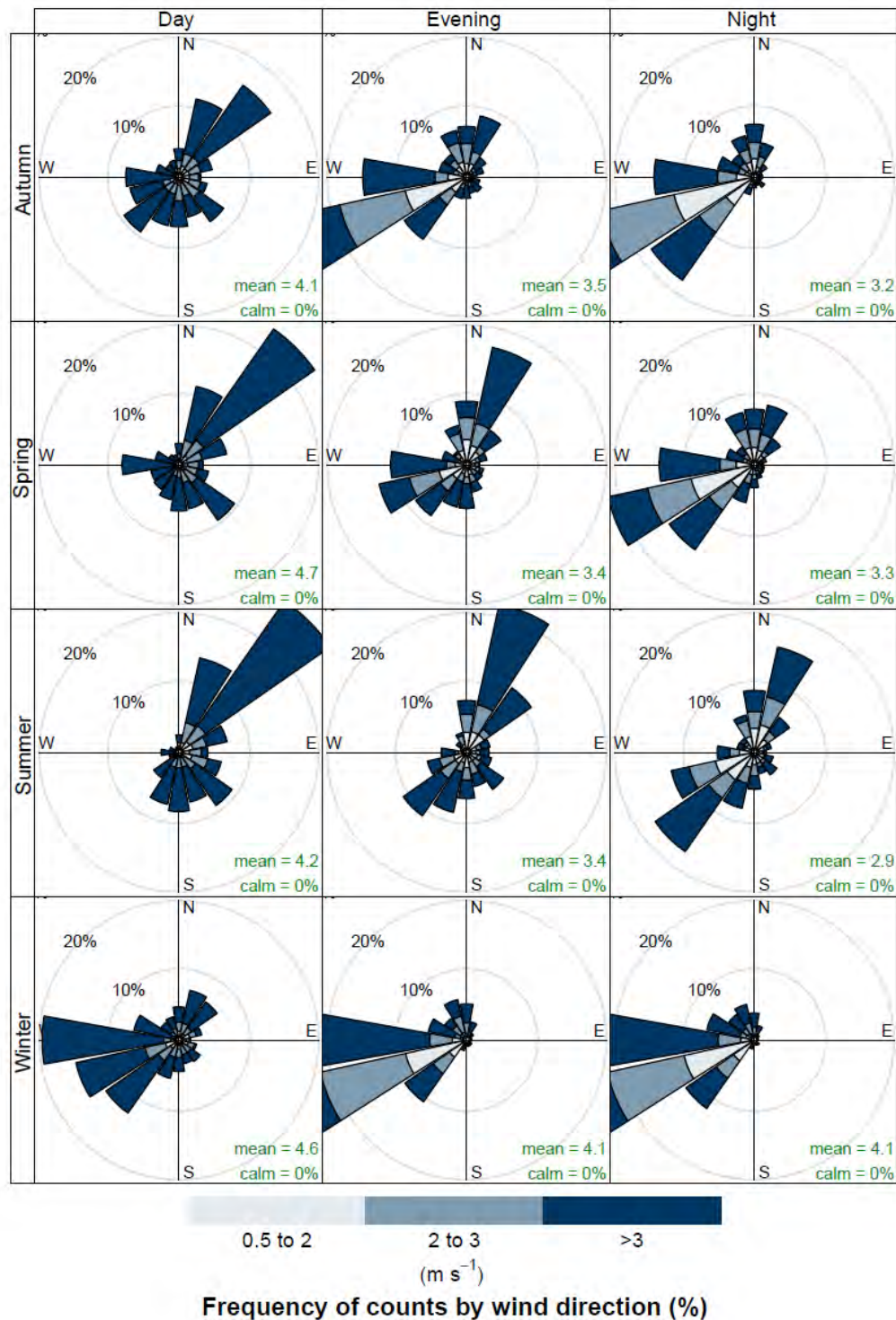


Figure 3.1 5 year wind rose (seasonal and relevant assessment periods) – 068253 AWS

Table 3.3 *Significant wind effects analysis and percentage of occurrence – Port Kembla Harbour AWS*

Wind direction ¹	Summer			Autumn			Winter			Spring		
	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night	Day	Evening	Night
N	10	19	23	10	17	14	9	9	6	9	21	18
NNE	13	20	23	12	15	12	10	7	4	12	21	17
NE	16	19	19	14	11	9	10	4	2	14	18	12
ENE	19	16	15	14	7	4	9	2	1	15	13	8
E	17	11	9	15	4	2	9	1	0	15	9	5
ESE	15	10	7	14	3	1	9	1	0	13	8	4
SE	13	12	9	14	3	2	9	1	0	11	9	5
SSE	12	13	12	14	4	3	10	1	1	10	10	7
S	9	15	19	13	8	12	11	7	7	9	13	14
SSW	7	17	26	12	26	34	14	28	29	6	19	28
SW	5	15	28	10	30	39	14	33	34	4	20	32
WSW	3	12	26	7	30	40	13	34	35	3	18	32
W	1	10	23	6	32	41	12	36	36	2	18	31
WNW	1	8	20	5	32	35	10	33	32	1	18	28
NW	2	10	16	5	18	18	7	14	12	2	16	17
NNW	5	15	21	7	17	15	8	10	8	5	19	17

Notes:

- 1) The percentages shown are the frequency of counts by wind direction for light winds up to 3 m/s and include the arithmetic sum of the direction being reported and the four closest directions

3.4.3.3 Temperature inversions

Temperature inversions typically occur during the night-time period in the winter months and have the potential to also increase noise levels from the operations at the blast furnace to the surrounding sensitive land uses. As per the NPfI, temperature inversions are to be assessed when they are found to occur for 30% of the time (about two nights per week) or greater during the winter months. As the facility is proposed to operate 24 hours a day, the effect of temperature inversions on noise levels at night should be considered.

Noise enhancement due to temperature inversions occurs when the atmosphere is relatively stable which corresponds with atmospheric stability class category F and G. The BoM Port Kembla Harbour AWS data did not contain cloud cover measurements. As such, cloud data has been sourced from the nearest available BoM AWS, being Bellambi AWS (ID: 068228) approximately 11 kilometres to the north of the site and is considered representative of the site for the purposes of determining the occurrence of temperature inversions.

An analysis of the Bellambi AWS meteorological data (three winter months from 2016 to 2020) has been undertaken using the Turner method, which considers the following meteorological observation data:

- Hourly wind speed and direction at 10 metres
- Hourly cloud cover measurements
- Hourly cloud ceiling-height measurements
- Daily records of time of sunrise and sunset

The percentage occurrence of the Pasquill-Gifford stability categories are presented in Table 3.4.

Table 3.4 Percentage occurrence of Pasquill-Gifford stability categories

Pasquill-Gifford stability category	Percentage occurrence (winter nights)	F and G combined (night period)	Are temperature inversions a feature of the area?
A	0	38%	Yes
B	0		
C	0		
D	33		
E	28		
F	28		
G	11		

The results indicate that 'F' and 'G' class temperature inversions are a feature of the area as they occur for more than 30% of the time during the winter and therefore are relevant to the assessment.

The ISO 9613-2:1996 algorithm considers a moderate source-to-receiver wind or a temperature inversion in the algorithm. As such, the environmental noise propagation prediction method is considered appropriate and representative of the worst-case meteorological conditions for the site.

3.4.3.4 Atmospheric conditions

Temperature and humidity affect how sound is absorbed by the atmosphere. With a fixed temperature at 10°C, a decrease in relative humidity from 90% to 30% can decrease the sound level at a listener standing 800 m from the noise source by 3 dB (at 1000 Hz). Fixing the relative humidity at 90% and increasing the temperature from 10 °C to 25 °C can decrease the sound level 800 m from the noise source by 3 dB (at 1000 Hz).

Adopting an average temperature of 10°C and average humidity of 90% is generally representative of the worst-case atmospheric conditions for environmental noise propagation and is considered conservative for the purposes of this assessment.

3.4.4 Source noise levels

CLIP is not currently in operation and as such, operational equipment noise levels have been estimated based on previous attended noise measurements conducted by GHD of operational coal transportation conveyors and conveyor drive units at Mandalong Mine in 2018. Source noise data of the CSU was not available at the time of this assessment, and so has been assessed conservatively using source noise data from Mandalong Mine attended noise measurements.

Source noise heights and building heights have been based on drawings provided by BlueScope. Operational noise level sources and assumptions are presented below in Table 3.5, and screenshots of the 3D SoundPLAN 8.2 noise model is provided below in Figure 3.2.

Table 3.5 *Operational noise source levels*

Operational noise source	Noise model source	Source noise level	Number/length	Reference
Conveyor unit drive units, enclosed	Point source	106 dBA	9 m	GHD Mandalong Mine attended noise measurements 2018
Conveyor, enclosed	Line source	96 dBA/m	1,630 m	

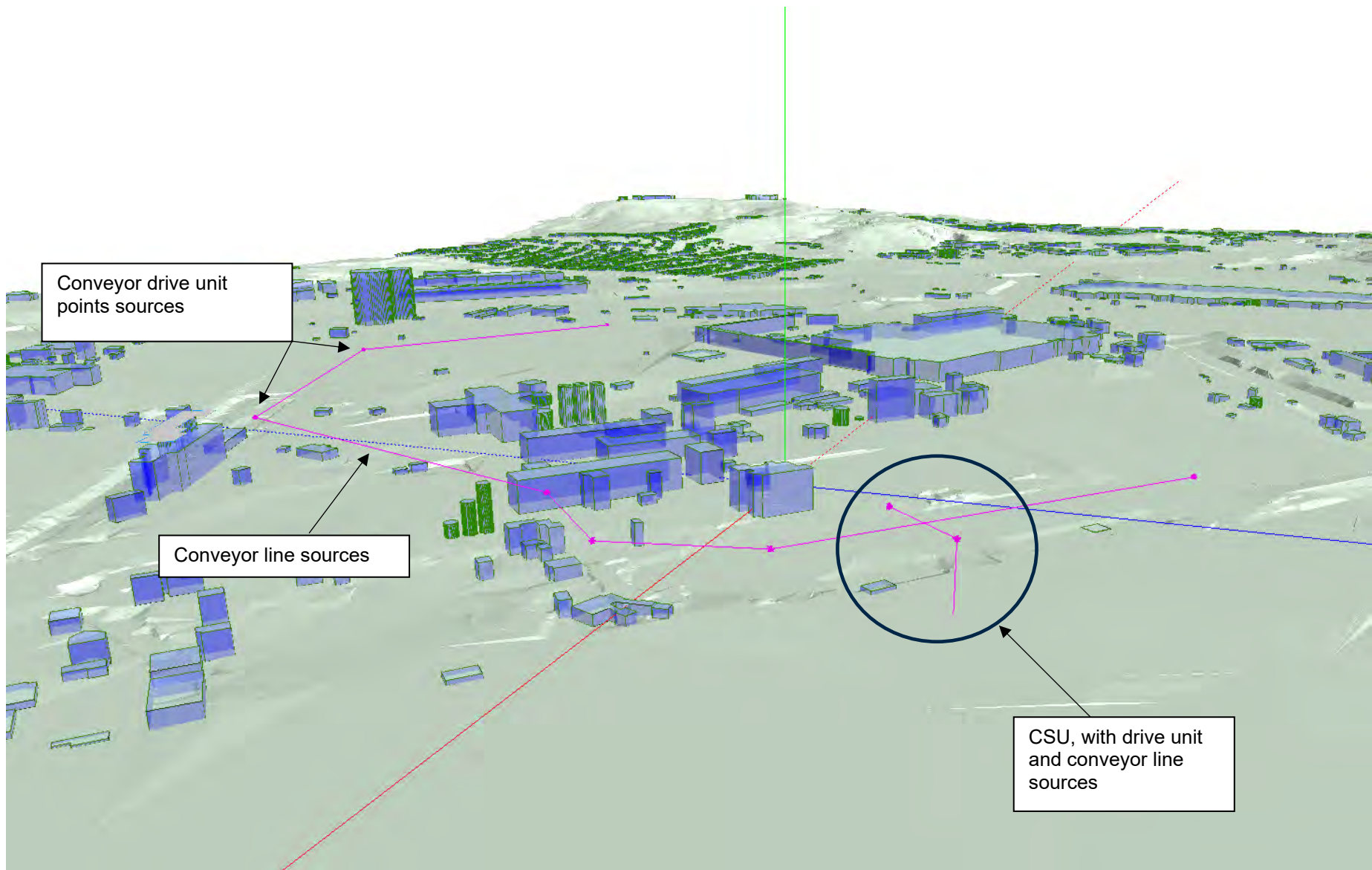


Figure 3.2 Operational noise model

3.5 Construction noise assessment

3.5.1 Construction noise prediction method

Acoustic modelling was undertaken using SoundPLAN 8.2 noise modelling software to predict the effects of construction noise generated by the proposed works. General parameters used in the model are listed in Table 3.6.

Table 3.6 Noise modelling parameters

Variable	Parameter used
Calculation method	ISO 9613- 2:1996 (recommended in the DCNG for construction noise)
Meteorology	Well-developed moderate ground based temperature inversion, such as commonly occurs on clear, calm nights or 'downwind' conditions which are favourable to sound propagation
Topography	Sourced from ELVIS GIS Australia - 5 m elevation intervals
Receiver heights	1.5 metres above building ground level
Ground absorption	0.5 for all areas (0 is non-porous ground and 1 is porous ground such as that found in a rural setting comprising of mainly grass and vegetation)

The exact details of the construction methodology, plant or equipment for the project, such as the intensity of works, sound power levels or operating duration are not yet known therefore this assessment is based on a variety of conservative assumptions. This information would be refined during detailed design and construction planning. The magnitude of the noise levels associated with construction activities will depend upon a number of factors:

- The intensity and location of construction activities
- The type of equipment used
- Existing local noise sources
- Intervening terrain
- The prevailing weather conditions

3.5.2 Construction scenarios

It is proposed to split the CLIP scope of works into 2 stages, being:

- Stage 1- Relocation of the Coke Loader and associated Ship Unloader Movements.
- Stage 2- Operation of a CSU and associated coal conveyors to 4 Area.

A detailed description of the construction activities and schedule is provided in Section 5 of the EIS. Ten worst-case construction scenarios have been modelled based on the anticipated construction activities associated with the project.

The assessed construction scenarios are provided below in Table 3.7. Resulting activity sound power levels are provided in Table 3.8. The plant and equipment likely to be required in each construction scenario have been modelled to estimate construction noise levels. Source noise level data has been obtained from Australian Standards AS2436 – *Guide to noise and vibration control on construction, demolition and maintenance sites*. Other equipment may be used however, they would produce similar net noise emissions when used concurrently with the listed equipment. The activity sound power level is calculated based on a logarithmic sum of the loudest two pieces of equipment.

Table 3.7 Construction scenarios

Scenario ID	Activity	Anticipated timeframe	Construction hours
Stage 1			
CS01	Pre-work and site preparation	6 months	Majority of works during standard hours. Potential for outside of standard hours (day, evening and night), subject to final construction timetable
CS02	Berth modifications at Berth 113	18 to 28 months	
CS03	Coke loader relocation.	12 to 24 months	
CS04	Demobilisation of construction site	6 months	
Stage 2			
CS05	Pre-work and site preparation	6 months	Majority of works during standard hours. Potential for outside of standard hours (day, evening and night), subject to final construction timetable
CS06	Commodity berth clearance and transfer to cokemaking	18 to 28 months	
CS07	Installation of CSU at Berth 111	12 to 18 months	
CS08	Demobilisation of construction site	6 months	
CS09	CSU commissioning	6 months	
Stage 1 and Stage 2			
Laydown areas	Berth 113 laydown, Sinter Plant laydown, Tug berth laydown and Christy Drive laydown, 21 Area Laydown A and 21 Area Laydown B, Carpark laydown, 4BF laydown and Energy Services Laydown	Entire construction timeframe	Standard construction hours

Table 3.8 Indicative construction scenarios and laydown area activity noise levels

Equipment	Equipment sound power level	Construction scenario (CS) or Laydown area (LD)									
		Stage 1				Stage 2					All
		CS01	CS02	CS03	CS04	CS05	CS06	CS07	CS08	CS09	LD
Activity sound power level		116	125	114	114	116	125	125	114	114	114
Concrete pump truck	108		✓	✓			✓				
Excavator	107			✓			✓				
Forklift	113	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Front end loader	113	✓				✓					✓
Piling (impact) (60 hits in 15 mins)	125		✓				✓	✓			
Roller (vibratory)	108		✓	✓			✓				
Truck (> 20 tonne)	107	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Welder	105			✓			✓	✓			
Hand tools (powered)	102										✓
Mobile crane	104	✓	✓	✓	✓	✓	✓	✓	✓	✓	

3.6 Road traffic noise assessment

3.6.1 Methodology overview

Noise modelling has been undertaken to predict road traffic noise levels at residences along the haulage routes for the following scenarios:

A road traffic noise assessment has been undertaken to identify any road traffic noise impacts for residences located adjacent to operational or construction traffic access routes. The assessment takes into consideration the following:

- The existing road traffic conditions (pre-construction)
- Road traffic conditions during construction (existing traffic + traffic generation during construction and operation)

Road traffic noise levels during construction and operation are assessed against the RNP road traffic noise criteria (see Section 7.1 for operation and Section 7.3 for construction) to identify any potential noise impacts at residences and whether any receivers qualify for consideration of noise mitigation.

4. Project description

4.1 Project summary

The project will involve upgrade of raw materials berths, unloading and conveying infrastructure, which will allow BlueScope to import raw materials for continued operations following depletion of supply from Dendrobium Coal Mine and increased scrap usage.

The project includes construction of a new CSU at Berth 111, new conveying infrastructure to facilitate transportation materials from the berth to stockpiling areas, and modifications to the berth to allow the relocation of the existing Coke Loader, No.2 Ore Unloader (2OUL) and No.3 Ore Unloader (3OUL). The project includes the following major components:

- Installation of a new CSU at Berth 111
- Relocation and modifications to 2OUL and 3OUL to operate across Berths 111, 112 and 113
- Installation of new conveyors to allow the separate transportation of iron ore to existing stockpiles and coal to the 4 Area storage location
- New truck wash at the exit of 4 Area
- Installation of crane rails, and relocation of the Coke Loader and its supply conveyors to Berth 113
- Modifications to berth infrastructure and supporting services infrastructure

Receival of coal and distribution to the cokemaking area will be undertaken within existing PKSW transportation and materials storage areas. A flow diagram showing how the CSU operates as part of the broader site raw materials supply chain is provided in Figure 4.1.

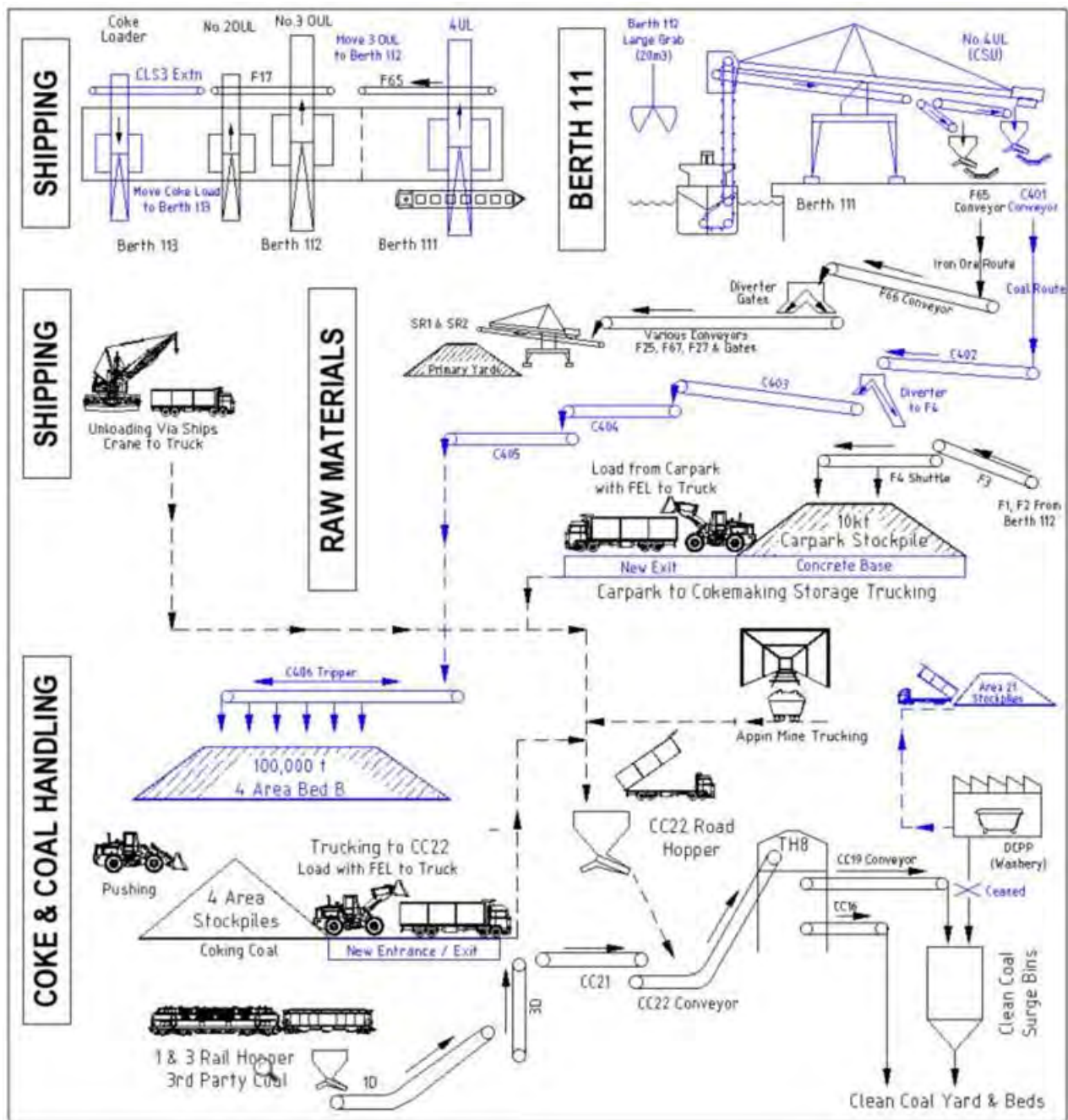


Figure 4.1 Simplified process flow diagram

4.2 Construction of the project

It is proposed to split the existing CLIP scope into 2 stages:

- Stage 1- Relocation of the Coke Loader and associated Ship Unloader Movements
- Stage 2- Purchase and installation of a CSU and associated coal conveyors to 4 Area

A detailed description of the construction activities and schedule is provided in Section 5 of the EIS.

Construction will commence once all necessary approvals are obtained. Detailed construction planning, including timing, staging and work sequencing, would be confirmed once construction contractors have been engaged.

4.2.1 Construction access and traffic

The majority of the construction traffic will access the site via the major roads that service the Port Kembla industrial area, including the Princes Motorway and Princes Highway, Shellharbour Road, Springhill Road, Five Islands Road and Masters Road. The primary access points for CLIP construction activities are from the south via Old Port Road and Christy Drive. Parking for light vehicles is provided in the Christy Drive carpark. Light vehicle access for construction workers would be via Christy Drive or directly to the PKSW via existing access points on Flinders Street and Old Port Road. Heavy vehicle access would be directly to the PKSW via existing access points on Flinders Street and Old Port Road.

4.2.2 Construction storage / laydown areas

Laydown areas for construction equipment and materials would be wholly within the PKSW site. The delivery of materials and equipment to the work sites will be staged as required with minimal storage close to the berths. Indicative laydown areas are shown in Section 5.4 of the EIS and are summarised in Table 4.1.

Table 4.1 Ancillary facilities existing and proposed use

ID	Location	Activity	Size (m ²)	Indoor/Outdoor
1	Berth 113 laydown	Main construction area laydown and staging area, equipment, materials and site sheds.	5,806	Outdoor
2	Sinter Plant laydown	Piles, conveyors and large equipment, excavation spoil	2,328	Outdoor
3	Tug berth laydown	Piling rig, piles and equipment	1,278	Outdoor
4	Christy Dr laydown	Containers for covered storage, equipment	845	Indoor using containers
5	21 Area Laydown A	Large equipment, excavation spoil	7,430	Outdoor
6	21 Area Laydown B	Large equipment, excavation spoil	4,864	Outdoor
7	Carpark Laydown	Materials, equipment, excavation spoil	3,616	Outdoor
8	4BF Laydown	Materials, equipment, excavation spoil, piles	1,161	Outdoor
9	Energy Services Laydown	Materials, equipment, excavation spoil, piles	1,617	Outdoor
10	4 Area Laydown	Materials, equipment, excavation spoil, piles	8,726	Outdoor

4.2.3 Indicative equipment list

A list of indicative equipment required for the reline construction activities are presented in Table 4.2 and categorised into general construction equipment and high-impact construction equipment for modelling purposes.

Table 4.2 *Indicative construction equipment*

Construction equipment		
Excavators- Various Sizes	Concrete Trucks	Welding machines
Bulldozers	Contractor service vehicles	Site Sheds
Semi-trailers and rigid body trucks	Concrete trucks	Vacuum Trucks
Dump Trucks	Rollers – compactor and vibratory	Boring machines
Mobile Cranes-up to 750 tonnes	Piling Rigs	Asphalting machines
Elevated Work Platforms	Semi-Trailers	Rockbreakers
Concrete pumps	Welding machines	Forklifts up to 5 tonnes
Excavators up to 50 tonnes	Heavy lift ship (for import of CSU only)	-

4.2.4 Construction hours

Authorisation for 24-hour construction is being sought as part of the request for planning approval.

Where practical, and subject to the final construction timetable, construction will be carried out during the following construction hours:

- Monday to Friday: 7.00 am to 6.00 pm
- Saturday: 7.00 am to 6.00 pm
- Sundays and public holidays: no work

However, there will be several construction activities scheduled to be undertaken outside of standard hours to manage interaction with the remainder of PKSW operations, shipping movements, tidal flows and the higher day shift workforce. The CSU itself will be transported to site by ship and require a crane lift from ship to shore. This operation and other significant crane lifts will need to be undertaken during the early morning prior to 7.00 am when weather conditions are calmest. Additionally, piling works will be conducted outside of standard hours for technical and safety reasons.

Where practical, noise generating activities with potential to impact any nearby receivers will be scheduled during standard hours.

As the construction activities, including piling and crane lifts are similar for both stages, the work hours will be the same for both stages.

4.3 Operation of the project

4.3.1 Operational hours

Operation of the project will be 24 hours per day seven days a week consistent with current operations. Operation will be ongoing following commissioning.

4.3.2 Operational equipment

Continuous ship unloader

CSUs are equipped with a bucket-elevator unloading device that is suspended from a boom. Material is unloaded from the ship by the bucket elevator and transported vertically to the top of the CSU boom, where it is unloaded onto a conveyor belt. The entire bucket elevator system can fully rotate, allowing access to the entire hold of the ship. This enables improved emptying of the hold and reduces the requirement for trimming.

The CSU proposed for construction at Berth 111 would allow for the handling of both coal and iron ore and would be capable of achieving a discharge rate of 20,000 tonnes per day for coal and 40,000 tonnes per day for iron ore. The design of the CSU would reduce trimming time, providing significant reductions in the time taken to completely discharge a ship and therefore increasing the throughput of the berth. Key features of the CSU are described in Table 4.3.

Table 4.3 *Continuous ship unloader – indicative dimensions*

Feature	Summary
Height	55 metres from bottom of bucket elevator to top of suspension elements (with boom level)
Length	97 metres from tip of bucket elevator to tip of counterweight
Width	39 metres across long travel assemblies
Weight	2,500 tonnes

The CSU conveying system is predominantly enclosed until the material is discharged. As the CSU is not lifting a bucket of material over the side of the ship, spillage is almost eliminated. This removes the need for additional controls such as catch tarpaulins or bins to be setup alongside the ship and reduces dust emissions and material spillage.

The CSU also removes the risk of damaging the ship as the machine head is placed inside the hold once and remains inside the hold during the entire unloading operation. This prevents the need for continually moving the ship unloader head in and out of the ship as is required for a 'grab' or clamshell type unloader. An example of a CSU is shown in Figure 4.2.



Figure 4.2 *Example of CSU machinery*

New conveying infrastructure

Berth 111 is the main berth for importing high volume raw materials for the operation of PKSW. This is primarily iron ore, which makes up over 3 million tonnes of the total 6 million tonnes of commodities imported across all the berths. Due to the proximity of the iron ore storage yards, significant conveyor infrastructure across multiple paths already exists to distribute iron ore that is discharged at Berth 111.

This current infrastructure is only suitable for iron ore as discharges of coal and iron ore cannot be mixed due to the risk of contamination and its impact on the ironmaking process. As such, new conveyor infrastructure is required for transporting coal that is unloaded on Berth 111 to the coal stockpiling areas. It is proposed to duplicate the iron ore materials handling system in the conveying chain along Berth 111 all the way to the main coal stockpiling area (Referred to as 4 Area). The new conveyor infrastructure will have the benefit of facilitating the discharge of multiple materials, as well as being safer and more efficient. Provision to divert the coal to a F4A Stockpile in the raw materials handling area will also be included in the conveyor sequence design. The 4 Area will be used to store metallurgical coal, while the F4A Stockpile will be used to temporarily store other coal types, such as those used for pulverised coal injection. The new conveyor sequence will require the construction of several new conveyors to link Berth 111 to the stockpiling areas. Trucks will transport material from the F4A Stockpile to other locations within PKSW.

4.3.3 Operational traffic and transport

Shipping operations would continue to service BlueScope's berths in a similar manner as they are currently operated. Shipping movements will continue to occur 24 hours per day. The additional capacity that the new CSU will provide will allow for an estimated 15 to 18 additional ships (30 to 36 additional ship movements) per year.

Trucking operations would continue to move raw materials from BlueScope's berths in a similar manner as they are currently operated. The additional volumes of metallurgical coal that are imported would all be moved to the stockpiling area by conveyors and no additional truck movements are required. These truck movements occur using internal roads and transport routes with the PKSW site. They do not currently impact the public road network and will continue not to impact in the future. As such, it is not expected that there would be an increase in road traffic noise levels at sensitive receivers along any public roads.

5. Existing environment

5.1 Project site location

The project is located in Port Kembla in the Wollongong LGA and Illawarra region of NSW. Sydney is approximately 80 km to the north of Port Kembla, while the Wollongong Central Business District (CBD) is approximately 2.5 km to the north and Lake Illawarra is approximately 3 km to the south. Port Kembla is the main industrial centre of the Illawarra region.

The project falls within the Port Kembla land application map under Part 5.1 of the *State Environmental Planning Policy (Transport and Infrastructure) 2021*. The project is located on land zoned IN3 Heavy Industrial and SP1 Special Activities. The PKSW site is a multiuse industrial area which includes storage, manufacturing, port berths, private internal roads and offices. Access to PKSW is provided by Springhill Road, Five Islands Road and Flinders Street, and then private internal roads in PKSW.

The closest urban developments to PKSW are the suburbs of Cringila, Berkeley, Lake Heights, Warrawong and Port Kembla to the south, Unanderra, Cobblers Hill, Mount St Thomas, Coniston and Figtree to the north and west.

5.2 Noise sensitive land uses

Noise sensitive land uses are defined based on the type of occupancy and the activities performed in the land use. Noise sensitive land uses include:

- Residential dwellings
- Classrooms at schools and other educational institutes
- Hospital wards and operating theatres
- Places of worship
- Passive and active recreational areas such as parks, sporting fields, golf courses. Note that these recreational areas are only considered sensitive when they are in use or occupied
- Community centres
- Hotels, motels, caretaker's quarters, holiday accommodation and permanent resident caravan parks

Offices, retail outlets and other business such as theatres and childcare centres could be considered noise sensitive. However, typically industrial and commercial premises are not considered particularly noise sensitive and have a relatively high noise criteria.

The study area has been defined as approximately 3.5 kilometres from the CLIP project boundary as noise impacts are not anticipated beyond this distance. Within this distance, 103 potential receivers have been selected to represent all sensitive receivers within the study area. The sensitive receivers and planning zones are shown in Figure 5.1.

Residential areas have been categorised into four discrete noise catchment areas (NCAs), being:

- NCA01 – The most-affected residences in Wollongong
- NCA02 – The most-affected residences in Coniston / Mount Saint Thomas
- NCA03 – The most-affected residences in Cringila
- NCA04 – The most-affected residences in Warrawong and Port Kembla

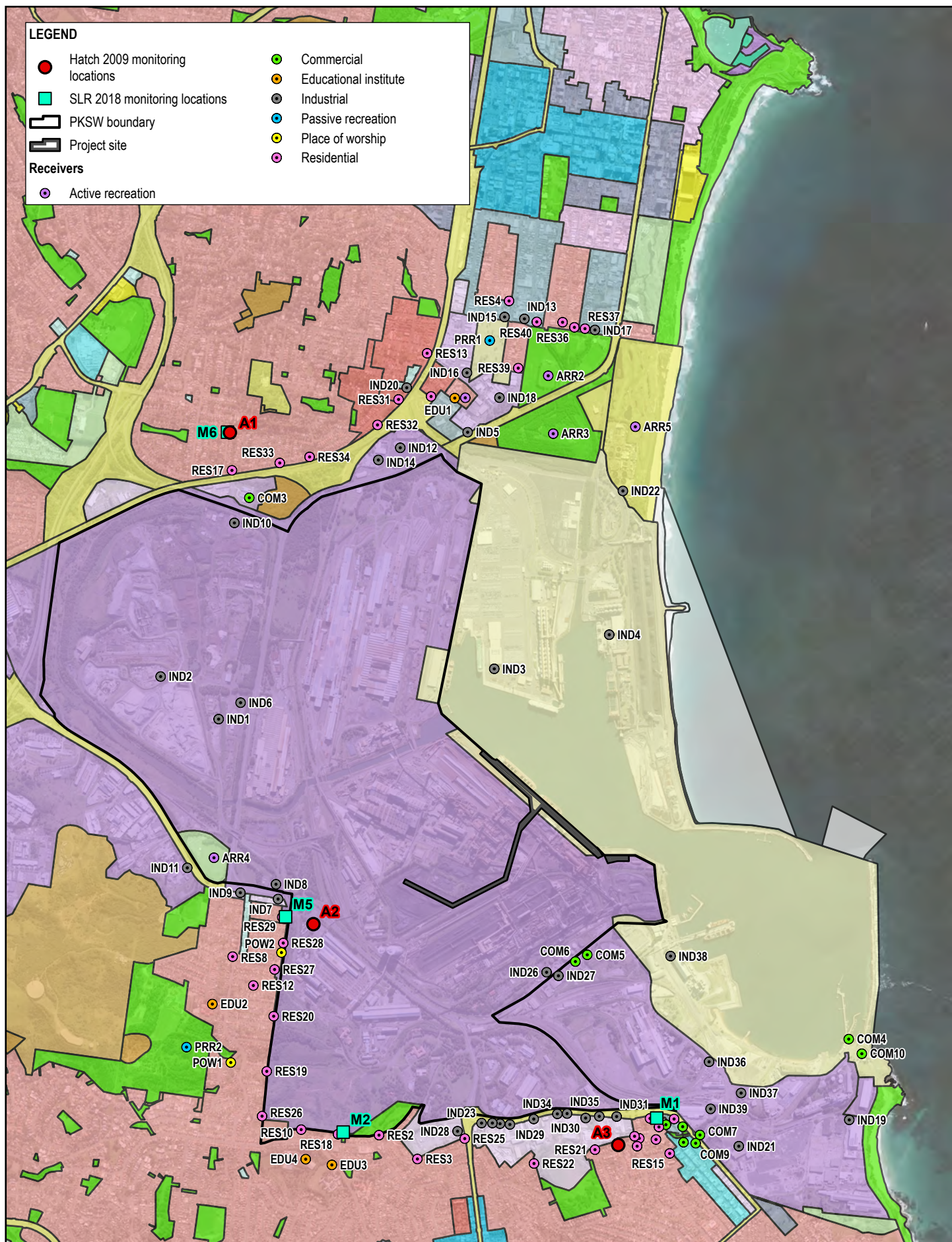
For the purposes of this noise assessment, key residential receivers have been selected for each NCA. If compliance is achieved at these residential receivers, then compliance will be ensured for all other residential receivers for each NCA. These key residential receivers are provided below in Table 5.1. Non-residential noise sensitive receivers considered in this noise assessment are provided in Table 5.2.

Table 5.1 *Key residential sensitive receivers*

ID	MGA20 Z56 coordinates		Type	NCA	Description
	x	y			
RES39	306246	6187289	Residential	NCA01	Most-affected residences in Wollongong
RES33	304813	6186719	Residential	NCA02	Most-affected residences in Coniston
RES29	304828	6183990	Residential	NCA03	Most-affected residences in Cringila
RES01	306945	6182674	Residential	NCA04	Most-affected residences in Port Kembla
RES23	305641	6182840	Residential	NCA04	Most-affected residences in Warrawong

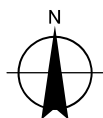
Table 5.2 *Non-residential sensitive receivers*

ID	MGA20 Z56 coordinates		MGA20 Z56 coordinates	Description
	x	y		
ARR1	305928	6187111	Active recreation	Coniston Primary School playground
ARR2	306427	6187243	Active recreation	JJ Kelly Park
ARR3	306457	6186895	Active recreation	Australia's Industry World Lookout
ARR4	304418	6184347	Active recreation	Bluescope Centenary Park
ARR5	306950	6186936	Active recreation	Wollongong Golf Club
EDU01	305865	6187109	Educational institute	Coniston Primary School
EDU02	304408	6183468	Educational institute	Cringila Public School
EDU03	305126	6182501	Educational institute	Warrawong High School
EDU04	304969	6182536	Educational institute	Warrawong Public School
POW01	304519	6183117	Place of worship	Imam Rida As Mosque Cringila
POW02	304823	6183777	Place of worship	Bilal Mosque
PRR01	306075	6187455	Passive recreation	Wollongong Cemetery
PRR02	304253	6183209	Passive recreation	Park in Cringila



Paper Size ISO A4
0 0.25 0.5 0.75 1
Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56



BlueScope Steel (AIS) Pty Ltd
Commodities Logistics Infrastructure Project
Noise and Vibration Impact Assessment
Project site locations, sensitive
receivers, planning zones and
noise monitoring locations

Project No. 12555409
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FIGURE 5.1

5.3 Rating Background Levels (RBL)

As discussed in Section 3.3, RBLs have been established based on previous noise monitoring undertaken in the study area and are considered representative of the noise environment for the most-affected residences within each NCA. These RBLs have been used to establish the construction noise management levels in this assessment. The most-affected residences (All NCAs) can be characterised as urban residential as the acoustic environment is:

- Dominated by ‘urban hum’ or industrial source noises
- Has through-traffic with characteristically heavy and continuous traffic flows during peak periods
- Near commercial and industrial districts

Table 5.3 *Representative background and ambient noise levels in the study area*

Monitoring I.D	Noise Catchment Area (NCA)	Rating Background Level (RBL), L90 - dBA			Ambient level, Leq – dBA		
		Day	Evening	Night	Day	Evening	Night
L1	NCA01 and NCA02	39	39	39	52	50	50
L2	NCA03 and NCA04	43	42	42	51	49	50

6. Assessment criteria

6.1 Operational noise criteria

6.1.1 Existing operational noise limits – EPL 6092

The operations associated with CLIP form one area within the larger PKSW site which is regulated by EPL 6092. EPL 6092 contains operational noise limits for some individual activities within the Port Kembla Steelworks site, however these do not include noise limits for the project area.

6.1.2 NSW EPA Noise Policy for Industry (NPfI)

The following guidance is provided in the NPfI pertaining to certain criteria which may apply to existing industrial operations with a proposed discrete modification to their operations:

“Where a development proposal involves a discrete process and premises-wide mitigation, has or is to be considered outside of the development proposal, a project noise trigger level for noise from new/modified components (not the whole site) of the operation may be set at 10 dB(A) or more below existing site noise levels or requirements. This approach means that the increase in noise from the whole site is minimised and provides scope for existing components to achieve noise reductions over time.”

Previous industrial compliance noise monitoring for the Bluescope site was conducted by SLR as part of *Bluescope Steel – Port Kembla N&V Compliance Monitoring August 2018* (SLR, December 2018). Monitoring location have been selected which are considered representative of the NCAs used in this noise assessment. This noise monitoring data is also generally supported by the ambient noise descriptors as provided in GHD’s background noise monitoring data in Table 3.1 (refer to night period measurements). As such, this compliance noise monitoring data is considered suitable to establish criteria for a NPfI discrete process assessment. The assessment criteria for a discrete process is provided below in Table 6.1.

Due to the complexity and scale of the PKSW site, premises-wide mitigation is not proposed. This noise assessment considers noise emission from the project and existing industrial noise levels. If required, mitigation strategies are recommended in Sections 8.2 and 8.3 to reduce operational noise levels to compliant levels.

Table 6.1 Existing industrial noise level, and NPfI discrete assessment noise criteria

Representative monitoring location (SLR)	NCA representation	Measured industrial noise level (night period), dBA	NPfI discrete process criteria (night period) LAeq(15min), dBA
M1 Wentworth Street, Port Kembla	NCA04 – Port Kembla	51 (General site noise)	38 (lower of the two values)
M2 (BlueScope Air Monitoring Station – Flagstaff Road, Lake Heights)	NCA04 – Warrawong	48 (General site noise)	
M5 (Site-office – Merret Avenue, Cringila)	NCA03 – Cringilla	51 (General site noise)	41
M6 (Cnr Hill Street and Ocean Street, Mt St Thomas)	NCA02 – Mt St Thomas	41 (General low frequency rumble)	31
	NCA01 - Wollongong		

The SLR noise monitoring locations and the residential receiver locations are shown in Figure 6.1 for reference. This figure shows that the SLR noise monitoring locations are generally representative of the most-affected residences to the project.

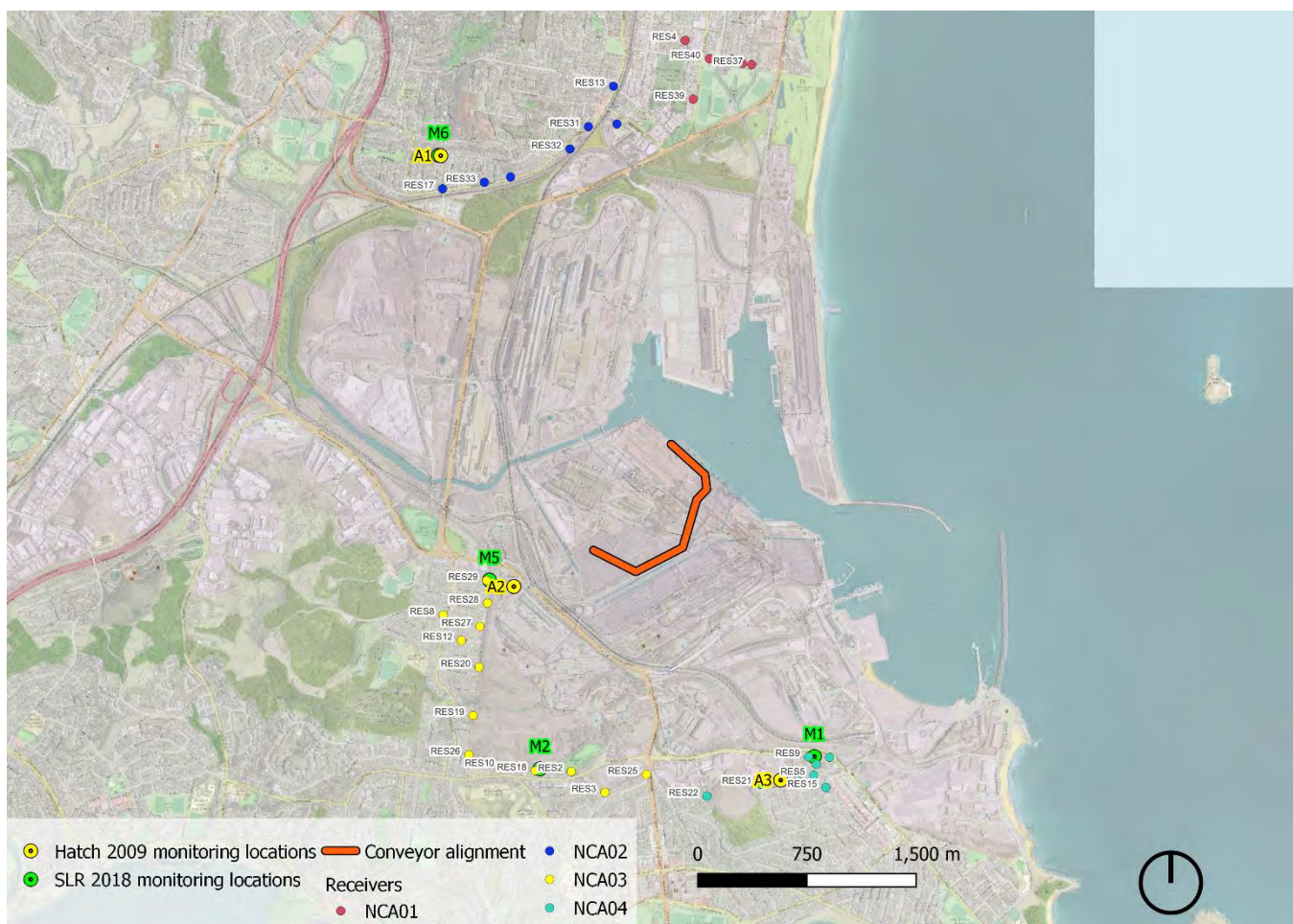


Figure 6.1 SLR noise monitoring locations and residential receivers locations

6.1.3 Operational noise criteria

With consideration to the operational noise criteria provided above in Section 6.1.1, the operational noise emission from the industrial processes associated with CLIP will be assessed towards the NPfl discrete criteria to ensure that existing industrial noise levels do not increase as a result of the project when assessed at the most affected residences.

The operational noise criteria for this assessment are provided below in Table 6.2. Assessing against this criteria aims to ensure that noise contribution from CLIP does not contribute to the overall noise emission levels from the overall PKSW site at the most-affected residences.

Table 6.2 Operational noise criteria

Assessment	Receiver type	Operational noise criteria, $L_{Aeq(15min)}$ dBA	Operational components considered in assessment
NPfl discrete assessment	Residential – NCA01	31	- CSU - Conveyor and conveyor drive houses
	Residential – NCA02		
	Residential – NCA03	41	
	Residential – NCA04	38	

6.1.4 Cumulative noise criteria for residential receivers

Cumulative noise impacts affecting receivers from all industrial noise sources are assessed according to the amenity criteria of the NPfl. The combined impact of all industrial noise sources at a receiver point should be considered, where industrial facilities are either operating or have been approved for development. The cumulative noise criteria that apply for the residential receivers within the project area are shown in Table 6.3.

Table 6.3 Amenity noise level for urban residential receivers

Receiver type	Time of day	Recommended amenity noise level L_{Aeq} , dBA
Urban residential receivers	Day	60
	Evening	50
	Night	45

Based on the previous noise monitoring data and compliance noise monitoring, the recommended amenity noise levels for urban residential receivers is currently being exceeded during the night period at the most-affected residential receivers in Cringila and Warrawong. Adoption of the assessment criteria in Section 6 should ensure noise emissions from the PKSW site do not increase as a result of the project (including opportunities to improve noise emissions).

6.1.5 Operational noise criteria for non-residential receivers

Operational noise criteria for non-residential receivers have been established based on the project amenity noise levels provided in Section 2.4 of the NPfl. These noise limits are based on the recommended amenity noise level minus 5 dB. The operational noise criteria for non-residential receivers are provided below in Table 6.4.

Table 6.4 Non-residential receiver project amenity noise criteria

Receiver type	Time of day	Recommended amenity noise level L_{Aeq} , dBA	Project amenity noise criteria $L_{Aeq(15min)}^2$, dBA
Educational institute	When in use	45 ¹	43
Place of worship	When in use	50	48
Active recreation	When in use	55	53
Passive recreation	When in use	50	48
Note 1: The recommended amenity noise level is provided as an internal noise level. A + 10 dB correction has been applied to convert to an external noise level, based on a 10 dB reduction for a partially open window			
Note 2: A + 3 dB correction has been applied to convert the L_{Aeq} noise descriptor to a $L_{Aeq(15min)}$ noise descriptor, as per guidance from the NPfl			

6.2 Construction Noise

The EPA has released the Draft Construction Noise Guideline (DCNG) in 2020 for public consultation purposes only and once public consultation is complete, the feedback will be used to provide a final guideline to replace the ICNG. The ICNG will remain applicable for projects as it is referred to in the SEARs.

However, the DCNG still provides useful guidance and includes the following changes:

- Emphasis on the need to engage with the community, to ensure that the community's views are considered when planning how to manage construction noise impacts
- Improved guidance for managing noise from construction activities taking place outside the recommended standard hours of work
- Alignment of the level of assessment required with risk of noise impact
- A simplified assessment path for routine activities undertaken by public authorities on public infrastructure through industry management procedures
- Increased emphasis on the need for proponents to justify the selection of noise mitigation measures to improve transparency

The intent of the key changes in the DCNG have been considered in this assessment however construction noise associated with the project has been assessed against the requirements of the ICNG.

6.2.1 ICNG / EPL construction hours

The ICNG provides guidance for assessment and management of construction noise. The guideline recommends standard hours for construction activities as follows:

- Monday to Friday: 7 am to 6 pm
- Saturday: 8 am to 1 pm
- No work on Sundays or Public Holidays.

Figure 6.2 shows the ICNG recommended standard construction hours (consistent with the EPL construction hours) and the out-of-hours work periods for the day, evening and night.

Hour commencing	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	
	am	am	am	am	am	am	am	am	am	am	am	am	pm	pm	pm	pm	pm	pm	pm	pm	pm	pm	pm	pm	
Monday																								Outside	
Tuesday																			Outside of					of	
Wednesday	Outside of recommended							Recommended											recommended					recommended	
Thursday	standard hours -							standard											standard hours -					standard	
Friday	night period							construction hours											Evening period					hours -	
Saturday																								night	
Sunday								Outside of recommended standard hours - Day period																	period
Public Holidays																									

Figure 6.2 Recommended standard and outside of recommended standard construction hours

6.2.2 Outside of recommended standard hours work

Construction activities should aim to be undertaken during the recommended standard hours. However, the following activities have justification to be undertaken outside the recommended construction hours. This is assuming all reasonable and feasible mitigation measures are implemented to minimise the impacts to the surrounding community:

- The delivery of oversized plant or structures that police or other authorities determine require special arrangements to transport along public roads
- Emergency work to avoid the loss of life or damage to property, or to prevent environmental harm
- Public infrastructure works that shorten the length of the project and are supported by the affected community
- Considerations of worker safety do not allow work within standard hours
- Works where a proponent demonstrates and justifies a need to operate outside the recommended standard hours
- Where it can be demonstrated that the NML can be met after all reasonable and feasible mitigation measures have been applied. Where all feasible and reasonable measures have been applied and noise is more than 5 dBA above the noise affected level, the proponent should negotiate with the community.

6.2.3 Noise management levels

The construction noise management levels represent a noise level that, if exceeded, would require management measures including:

- Reasonable and feasible work practices
- Contact with the residences to inform them of the nature or works to be carried out, the expected noise levels and durations and contact details.

The management measures are aimed at reducing noise impacts at the residential receivers. However, it may not be reasonable and feasible to reduce noise levels to below the noise affected management level. The noise affected construction noise management levels are not intended as a noise limit but rather a level at which noise management is required and as such should not be considered as a noise limit in the environmental protection license or Consent Condition.

Table 2 in the ICNG provides recommended NML for residences, which are detailed in Table 6.5.

Table 6.5 Residential construction noise management levels, dBA (ICNG, 2009)

Time of day	Noise management level, $L_{Aeq}(15 \text{ min})$	Application notes
Recommended standard hours	Noise affected: RBL + 10 dBA	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured $L_{Aeq}(15 \text{ min})$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly noise affected: 75 dBA	The highly noise affected level represents the point above which there may be strong community reaction to noise. Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: – Times identified by the community when they are less sensitive to noise (such as before and after school, or mid-morning or mid-afternoon for works near residences). – If the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
Outside recommended standard hours	Noise affected: RBL + 5 dBA	A strong justification would typically be required for works outside the recommended standard hours. The proponent should apply all feasible and reasonable work practices to meet the noise affected level. Where all feasible and reasonable measures have been applied and noise is more than 5 dBA above the noise affected level, the proponent should negotiate with the community.

6.2.4 Sleep disturbance

Authorisation for 24-hour construction is being sought as part of the request for planning approval. As such, there is potential for construction works to cause sleep disturbance at residential receivers in the study area. To identify the potential for sleep disturbance impacts as a result of construction works (during the night period), a $L_{A1}(1\text{min})$ sleep disturbance screening level of RBL + 15 dBA has been adopted in accordance with the Noise Policy for Industry (EPA 2017) as presented in Table 6.6.

6.2.5 Project specific construction noise management levels

The noise management levels at sensitive receivers in the study area are summarised in Table 6.6 and have been based on Table 6.5. As the measured RBLs are lower than the minimum background levels specified in the NPfl, the minimum background noise levels have been used.

Table 6.6 Project specific construction noise management levels

Sensitive receiver type	Construction Noise Management Levels, $L_{Aeq}(15min)$					Sleep disturbance (Night)
	Standard construction hours		Outside standard construction hours			
	Noise affected	Highly noise affected	Day	Evening	Night	
Residential NCA01 (Wollongong) and NCA02 (Coniston/Mt. St. Thomas)	49	75	44	44	44	54 $L_{A1}(1min)$
Residential NCA03 (Cringila) and NCA04 (Warrawong / Port Kembla)	53	75	48	47	47	57 $L_{A1}(1min)$

Sensitive receiver type	Construction Noise Management Levels, $L_{Aeq}(15min)$					Sleep disturbance (Night)
	Standard construction hours		Outside standard construction hours			
	Noise affected	Highly noise affected	Day	Evening	Night	
Educational institutions	55 (external)					-
Places of worship	55 (external)					-
Active recreation areas	65					-
Passive recreation areas	60					-

6.3 Construction vibration

6.3.1 Human comfort

Vibration is assessed based on the criteria in *Assessing Vibration: A Technical Guideline* (DEC, 2006)). *BS6472: Guide to Evaluation of Human Exposure to Vibration in Buildings* (1 Hz to 80 Hz) (British Standards, 2008)) is recognised by the guideline as the preferred standard for assessing the 'human comfort criteria'. Intermittent vibration, such as construction work, is assessed using the vibration dose value.

Whilst the assessment of response to vibration in BS 6472-1:2008 is based on vibration dose value and weighted acceleration, for construction related vibration, it is considered more appropriate to provide guidance in terms of a peak particle velocity (PPV), since this parameter is likely to be more routinely measured based on the more usual concern over potential building damage. Table 6.8 provides guidance on the effect of vibration levels for human comfort in peak particle velocity as reference against the vibration guide values shown in Table 6.7.

Table 6.7 Acceptable PPV Values for Human Comfort (BS 6472-2008)

Receiver	Period	Continuous and impulsive vibration guide goals	
		Preferred value	Maximum value
Residential	Day	0.28 (8.6)	0.56 (17.0)
Offices, schools, educational institutes and places of worship	When in use	0.56 (18.0)	1.1 (36.0)
Workshops	When in use	1.1 (18.0)	2.2 (36.0)

Notes:

- 1) Impulsive goals are shown in brackets – These are most relevant to activities that create up to 3 distinct vibration events in an assessment period, e.g. occasional dropping of heavy equipment, occasional loading and unloading.

Humans are capable of detecting vibration at levels which are well below those causing risk of damage to a building. The degrees of perception for humans are suggested by the vibration level categories given in *BS5228.2 – 2009, Code of Practice Part 2 Vibration for noise and vibration on construction and open sites – Part 2: Vibration* (British Standards, 2009)), as shown below in Table 6.8.

Table 6.8 Guidance on effect of vibration levels for human comfort (BS 5228.2 – 2009)

Vibration level	Effect
0.14 mm/s	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction.
0.3 mm/s	Vibration might be just perceptible in residential environments.
1.0 mm/s	It is likely that vibration at this level in residential environments will cause complaints but can be tolerated if prior warning and explanation has been given to residents.
10 mm/s	Vibration is likely to be intolerable for any more than a very brief exposure.

6.3.2 Structural damage to standard and heritage structures

The minimum working distances for structural (cosmetic) damage used for this assessment have been based on *DIN 4150-3 2016: Vibrations in buildings - Part 3: Effects on structures* (German Standards, 2016) levels from ground borne vibration which enables the likelihood of building damage from ground vibration to be assessed.

The vibration levels in this standard are adopted as building damage criteria for standard and heritage listed structures are presented in Table 6.9.

Table 6.9 Guideline values for short-term vibration effects on structures (DIN 4150 Part 3)

Line	Type of structure	Guideline values for velocity, mms ⁻¹		
		1 Hz to 10 Hz	10 Hz to 50 Hz	50 Hz to 100 Hz ¹
1	Buildings used for commercial purposes, industrial buildings, and buildings of similar design	20	20 to 40	40 to 50
2	Dwellings and buildings of similar design and/or occupancy	5	5 to 15	15 to 20
3	Structures that, because of their particular sensitivity to vibration, cannot be classified under lines 1 and 2 and are of great intrinsic value (for example listed buildings under preservation order)	3	3 to 8	8 to 10
Note 1: At frequencies above 100 Hz, the values given in this column may be used as minimum values				

6.4 Traffic noise (construction and operation)

The RNP provides traffic noise target levels for residential receivers in the vicinity of existing roads which are applied to road upgrades. For this assessment these levels are also applied to construction works to identify potential construction traffic impacts and the potential for reasonable and feasible mitigation measures. The RNP road types are based on the functional roles shown in Table 6.10.

The additional traffic during construction and operation is anticipated to have a negligible effect on the existing traffic volumes (and traffic noise) on the local road network. As such, no further assessment of potential road traffic noise increases is deemed necessary.

Table 6.10 Road Categories from RNP

Road category	Functional role	Public roads used by project
Freeways or motorways/arterial roads	Support major regional and inter-regional traffic movement. Freeways and motorways usual feature strict access controls via grade separated interchanges.	- Princes Motorway - Princes Highway
Sub-arterial road or collector road	Provide connection between arterial roads and local roads. May support arterial roads during peak period. May have been designed as local streets but can serve major traffic generating developments or support non-local traffic.	- Springhill Road - Masters Road - Five Islands Road - Old Port Road - Flinders Street
Local roads	Provide vehicular access to abutting property and surrounding streets. Provide a network of the movement of pedestrians and cyclists and enable social interaction in a neighbourhood. Should connect, where practicable, only to sub-arterial roads.	- Flagstaff Road - Christy Drive

The application notes for the RNP state that “for existing residences and other sensitive land uses affected by additional traffic on existing roads generated by land use developments, any increase in the total traffic noise level as a result of the development should be limited to 2 dB above that of the noise level without the development. This limit applies wherever the noise level without the development is within 2 dB of, or exceeds, the relevant day or night noise assessment criterion.”

If the road traffic noise increase from the construction work is within 2 dBA of current levels, then the objectives of the RNP are met and no specific mitigation measures are required. Mitigation should be applied when road traffic noise levels increase by 2 dB *and* the controlling noise criterion in Table 6.11 are exceeded at the façade of the residence.

Table 6.11 *Road traffic noise criteria, dBA*

Development type	Applicability to assessment	Day 7 am to 10 pm	Night 10 pm to 7 am
Existing residence affected by additional traffic on arterial / sub-arterial / collector roads generated by land use developments	– Princes Motorway – Princes Highway – Springhill Road – Masters Road – Five Islands Road – Old Port Road	60 L _{eq} (15hr)	55 L _{eq} (9hr)
Existing residence affected by additional traffic on local roads generated by land use developments	– Flagstaff Road – Christy Drive	55 L _{eq} (1hr)	50 L _{eq} (1hr)

7. Impact assessment

7.1 Operational noise

7.1.1 Predicted noise levels

The predicted $L_{Aeq(15min)}$ noise levels at each sensitive receiver are presented below in Table 7.1, and only include the noise sources presented in Table 7.1 against the NPfI discrete process criteria for residential receivers, and amenity criteria for non-residential receivers.

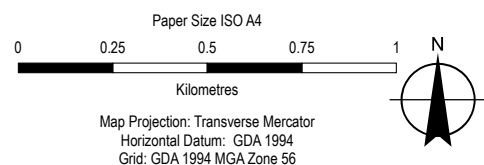
The noise modelling indicates compliance is predicted at all sensitive receiver locations, with RES8, RES24 and RES29 predicted to receive the highest noise levels of $L_{Aeq(15min)}$ 40 dBA. These most-affected receivers are located in NCA03 (Cringila)

$L_{Aeq(15min)}$ noise contours at 1.5 metres above the ground are presented in Figure 7.1.

Table 7.1 Predicted operational noise levels $L_{Aeq(15min)}$, dBA

Receiver ID	Receiver type	NCA	Predicted operational noise level $L_{Aeq(15min)}$, dBA	Criteria $L_{Aeq(15min)}$, dBA
ARR1	Active recreation	-	27	53
ARR2	Active recreation	-	26	53
ARR3	Active recreation	-	29	53
ARR4	Active recreation	-	34	53
ARR5	Active recreation	-	27	53
EDU1	Educational institute	-	31	43
EDU2	Educational institute	-	33	43
EDU3	Educational institute	-	27	43
EDU4	Educational institute	-	30	43
POW1	Place of worship	-	36	48
POW2	Place of worship	-	37	48
PRR1	Passive recreation	-	31	48
PRR2	Passive recreation	-	31	48
RES1	Residential	NCA04	33	38
RES2	Residential	NCA03	37	41
RES3	Residential	NCA03	35	41
RES4	Residential	NCA01	26	31
RES5	Residential	NCA04	33	38
RES6	Residential	NCA04	35	38
RES7	Residential	NCA04	33	38
RES8	Residential	NCA03	40	41
RES9	Residential	NCA04	34	38
RES10	Residential	NCA03	35	41
RES11	Residential	NCA04	35	38
RES12	Residential	NCA03	36	41
RES13	Residential	NCA02	27	31
RES14	Residential	NCA04	33	38

Receiver ID	Receiver type	NCA	Predicted operational noise level $L_{Aeq}(15min)$, dBA	Criteria $L_{Aeq}(15min)$, dBA
RES15	Residential	NCA04	31	38
RES16	Residential	NCA04	36	38
RES17	Residential	NCA02	30	31
RES18	Residential	NCA03	36	41
RES19	Residential	NCA03	32	41
RES20	Residential	NCA03	33	41
RES21	Residential	NCA04	35	38
RES22	Residential	NCA04	34	38
RES23	Residential	NCA03	37	41
RES24	Residential	NCA03	40	41
RES25	Residential	NCA03	36	41
RES26	Residential	NCA03	34	41
RES27	Residential	NCA03	35	41
RES28	Residential	NCA03	39	41
RES29	Residential	NCA03	40	41
RES30	Residential	NCA02	29	31
RES31	Residential	NCA02	28	31
RES32	Residential	NCA02	28	31
RES33	Residential	NCA02	30	31
RES34	Residential	NCA02	29	31
RES35	Residential	NCA02	31	31
RES36	Residential	NCA01	26	31
RES37	Residential	NCA01	26	31
RES38	Residential	NCA01	28	31
RES39	Residential	NCA01	27	31
RES40	Residential	NCA01	26	31
RES41	Residential	NCA01	26	31



BlueScope Steel (AIS) Pty Ltd
Commodities Logistics Infrastructure Project
Noise and Vibration Impact Assessment

Operational noise emission
 L_{Aeq} noise contours

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FIGURE 7.1

7.1.2 Sleep disturbance impacts

The potential for sleep disturbance is assessed against short-duration, high level noise events. In this case, significant maximum noise level events have been modelled from the following set of operational equipment:

- Conveyors:
 - Failure of a conveyor bearing, resulting in a SWL of $L_{A1(1\text{min})}$ 120 dBA
- Conveyor drive units:
 - Failure of a conveyor drive unit motor, gearbox or bearings, resulting in a SWL of $L_{A1(1\text{min})}$ 120 dBA

It is anticipated that these events would occur very rarely and are not representative of typical operations. These events do have the potential for sleep disturbance impacts as they have the potential to occur at any time of the day, including the night period. As such a sleep disturbance impact assessment has been carried for these events. The predicted $L_{A1(1\text{min})}$ noise levels are presented in Table 7.2.

Table 7.2 Predicted $L_{A1(1\text{min})}$ noise levels at residential receivers during the night, dBA

Receiver ID	NCA	Predicted operational noise level $L_{A1(1\text{min})}$, dBA	EPL Sleep disturbance noise criterion $L_{A1(1\text{min})}$, dBA
RES1	NCA04	42	55
RES2	NCA03	45	55
RES3	NCA03	43	55
RES4	NCA01	35	55
RES5	NCA04	42	55
RES6	NCA04	44	55
RES7	NCA04	42	55
RES8	NCA03	49	55
RES9	NCA04	42	55
RES10	NCA03	43	55
RES11	NCA04	44	55
RES12	NCA03	43	55
RES13	NCA02	35	55
RES14	NCA04	41	55
RES15	NCA04	37	55
RES16	NCA04	44	55
RES17	NCA02	38	55
RES18	NCA03	43	55
RES19	NCA03	40	55
RES20	NCA03	42	55
RES21	NCA04	42	55
RES22	NCA04	42	55
RES23	NCA03	45	55
RES24	NCA03	50	55
RES25	NCA03	44	55
RES26	NCA03	43	55
RES27	NCA03	44	55
RES28	NCA03	50	55

Receiver ID	NCA	Predicted operational noise level $L_{A1(1min)}$, dBA	EPL Sleep disturbance noise criterion $L_{A1(1min)}$, dBA
RES29	NCA03	50	55
RES30	NCA02	35	55
RES31	NCA02	35	55
RES32	NCA02	35	55
RES33	NCA02	36	55
RES34	NCA02	36	55
RES35	NCA02	39	55
RES36	NCA01	33	55
RES37	NCA01	33	55
RES38	NCA01	36	55
RES39	NCA01	34	55
RES40	NCA01	33	55
RES41	NCA01	33	55

$L_{A1(1min)}$ noise predictions indicate that the sleep disturbance screening criterion is not exceeded at any of the residential receivers from worst case maximum noise events.

7.1.3 Cumulative noise impacts

As stated in Section 2.1 of the NPfI, “*The project amenity noise level seeks to protect against cumulative noise impacts from industry and maintain amenity for particular land uses.*” The operational noise criteria used in this assessment are more stringent than the NPfI project amenity noise level. They are based on the NPfI discrete process criteria, which aim to ensure the noise emission from the project does not contribute to the existing total industrial noise level at the most affected receivers. Compliance with the assessment criteria should ensure there are no cumulative noise impacts as a result of the project.

A list of the major projects in the vicinity of the project is presenting in Section 9.11 of the EIS for reference.

7.2 Construction noise

7.2.1 Construction noise levels at residences

Construction noise levels have been predicted to the residential receivers within the study area with consideration to the acoustic requirements of the ICNG. The predicted maximum $L_{Aeq(15min)}$ noise level along with the NML for all construction activity scenarios and laydown area activities for each receiver is provided in Table 7.3. The noise modelling assumes that the loudest two pieces of equipment, as outlined in Table 3.8, are operating at maximum capacity simultaneously at the closest distance between the construction work area and the receiver. Construction noise contours from construction activities and laydown areas are provided in Appendix A.

Exceedances of the NML during standard hours are shaded in blue.

Table 7.3 Predicted construction noise levels, $L_{Aeq(15min)}$ dBA

Receiver ID	Receiver type	NCA	Predicted construction noise level, dBA									
			CS01	CS02	CS03	CS04	CS05	CS06	CS07	CS08	CS09	LD
Noise Management Levels												
NCA01 & NCA02		NCA03 & NCA04										
Standard hours: 49		Standard hours: 53										
OOHW Day: 44		OOHW Day: 48										
OOHW Eve: 44		OOHW Eve: 47										
OOHW Night: 44		OOHW Night: 47										
RES1	Residential	NCA04	35	43	32	33	35	44	43	33	33	35
RES2	Residential	NCA03	38	41	30	36	38	47	41	36	36	34
RES3	Residential	NCA03	36	41	30	34	36	45	41	34	34	33
RES4	Residential	NCA01	28	34	24	26	28	35	36	26	26	26
RES5	Residential	NCA04	35	43	33	33	35	44	44	33	33	33
RES6	Residential	NCA04	38	44	36	36	38	47	47	36	36	36
RES7	Residential	NCA04	35	42	32	33	35	45	43	33	33	34
RES8	Residential	NCA03	45	43	32	43	45	54	43	43	43	39
RES9	Residential	NCA04	37	45	34	35	37	45	45	35	35	34
RES10	Residential	NCA03	34	39	29	32	34	44	40	32	32	31
RES11	Residential	NCA04	35	43	33	33	35	45	44	33	33	33
RES12	Residential	NCA03	40	40	30	38	40	49	42	38	38	34
RES13	Residential	NCA02	27	36	25	25	27	36	37	25	25	28
RES14	Residential	NCA04	35	43	32	33	35	44	43	33	33	34
RES15	Residential	NCA04	33	42	31	31	33	40	43	31	31	31
RES16	Residential	NCA04	36	44	33	34	36	45	44	34	34	34
RES17	Residential	NCA02	29	36	27	27	29	38	39	27	27	45
RES18	Residential	NCA03	37	38	30	35	37	46	41	35	35	36
RES19	Residential	NCA03	34	36	28	32	34	44	39	32	32	31
RES20	Residential	NCA03	38	40	29	36	38	46	40	36	36	33
RES21	Residential	NCA04	37	43	35	35	37	46	46	35	35	36
RES22	Residential	NCA04	36	41	30	34	36	45	41	34	34	33
RES23	Residential	NCA03	39	41	31	37	39	48	42	37	37	37
RES24	Residential	NCA03	46	42	32	44	46	55	43	44	44	40

Receiver ID	Receiver type	NCA	Predicted construction noise level, dBA									
			CS01	CS02	CS03	CS04	CS05	CS06	CS07	CS08	CS09	LD
Noise Management Levels												
NCA01 & NCA02		NCA03 & NCA04										
Standard hours: 49		Standard hours: 53										
OOHW Day: 44		OOHW Day: 48										
OOHW Eve: 44		OOHW Eve: 47										
OOHW Night: 44		OOHW Night: 47										
RES25	Residential	NCA03	39	43	32	37	39	46	43	37	37	34
RES26	Residential	NCA03	35	40	29	33	35	44	40	33	33	33
RES27	Residential	NCA03	40	41	30	38	40	48	41	38	38	36
RES28	Residential	NCA03	45	42	32	43	45	55	44	43	43	38
RES29	Residential	NCA03	45	44	33	43	45	55	44	43	43	40
RES30	Residential	NCA02	31	38	27	29	31	40	40	29	29	30
RES31	Residential	NCA02	29	36	26	27	29	38	38	27	27	33
RES32	Residential	NCA02	30	37	27	28	30	39	40	28	28	33
RES33	Residential	NCA02	30	37	28	28	30	39	40	28	28	40
RES34	Residential	NCA02	30	37	27	28	30	39	40	28	28	42
RES35	Residential	NCA02	32	41	31	30	32	40	41	30	30	36
RES36	Residential	NCA01	27	35	25	25	27	36	36	25	25	24
RES37	Residential	NCA01	27	35	24	25	27	36	36	25	25	25
RES38	Residential	NCA01	28	36	26	26	28	37	37	26	26	25
RES39	Residential	NCA01	28	36	26	26	28	37	38	26	26	27
RES40	Residential	NCA01	27	35	25	25	27	36	36	25	25	26
RES41	Residential	NCA01	27	35	24	25	27	36	36	25	25	24

It is predicted that construction noise levels from CLIP construction activities and laydown area operations are below the NMLs during all assessment periods and at all residential receivers, except for construction scenario CS06 - Commodity berth clearance and transfer to cokemaking. Exceedances of the NMLs are predicted at the following most-affected receivers within Cringila (NCA03):

- RES8 – 1 dBA during standard hours, 8 dBA during night period
- RES24 / RES28 / RES29 – 2 dBA during standard hours, 9 dBA during night period

These exceedances are based on the worst-case construction equipment being the use of an impact piling rig at a separation distance of approximately 700 metres between the source and the most-affected receiver (RES28/RES29), which is expected to be in use for approximately 3-4 months during CS06. For the majority of the time, construction noise levels associated with CS06 will be much lower than the worst-case noise levels presented in the table above.

Piling works occurring within 300 metres of the berth (an approximate minimum distance of 1,400 metres to the nearest residential receivers in Cringila) are predicted to be below the NML for all periods of the day, including both within and outside standard construction hours (including the most-sensitive night period). Where it is proposed that piling works occur beyond 300 metres of the berth outside standard construction hours, approval from the EPA would be required in accordance with condition L6.3 of EPL 6092. Consultation with affected residences may also be required where piling activity noise levels are more than 5 dBA above the NML outside standard construction hours, in accordance with Table 2 of the ICNG (DECC, 2009).

Feasible and reasonable mitigation and management measures have been recommended in Section 8.1 to reduce potential noise impacts at residential receivers.

7.2.2 Construction noise impacts for non-residential receivers

It is predicted that construction noise levels from CLIP construction activities and laydown area operations are below the NML for all non-residential receivers. The predicted noise levels are shown in Table 7.4.

Table 7.4 Predicted construction noise levels, $L_{Aeq(15min)}$ dBA

Receiver ID	Receiver type	Predicted construction noise level, dBA									
		CS01	CS02	CS03	CS04	CS05	CS06	CS07	CS08	CS09	LD
Noise Management Levels:											
Educational institute: 55											
Places of worship: 55											
Active recreation: 65											
Passive recreation: 60											
ARR1	Active recreation	29	36	26	27	29	38	38	27	27	26
ARR2	Active recreation	28	36	25	26	28	37	37	26	26	26
ARR3	Active recreation	31	40	29	29	31	40	40	29	29	28
ARR4	Active recreation	36	39	29	34	36	45	41	34	34	36
ARR5	Active recreation	29	37	27	27	29	38	38	27	27	26
EDU1	Educational institute	29	37	27	27	29	38	38	27	27	31
EDU2	Educational institute	39	40	29	37	39	48	40	37	37	35
EDU3	Educational institute	32	36	25	30	32	41	37	30	30	29
EDU4	Educational institute	31	31	24	29	31	40	36	29	29	29
POW1	Place of worship	32	34	24	30	32	41	35	30	30	29
POW2	Place of worship	40	38	27	38	40	49	38	38	38	34
PRR1	Passive recreation	27	34	24	25	27	36	35	25	25	26
PRR2	Passive recreation	32	36	25	30	32	41	36	30	30	28

7.2.3 Sleep disturbance impacts

Construction works during the night period have the potential to cause sleep disturbance impacts due to maximum noise events, such as impact piling. To identify the potential for sleep disturbance impacts, the worst-case scenario CS06 (Commodity berth clearance and transfer to cokemaking) has been assessed assuming the use of an impact piling rig with a sound power level of L_{AFmax} 135 dBA. The predicted L_{AFmax} noise levels at the most-affected residences within each NCA is presented in Table 7.5. The results indicate that with no mitigation applied, L_{AFmax} noise levels are predicted to exceed the sleep disturbance screening level at NCA03/NCA04 (as shaded in blue).

To reduce L_{AFmax} noise levels to a level below the screening level at these receivers, works could be limited to an area within 300 metres of the berth during the night period between 10:00 pm to 7:00 am (an approximate minimum distance of 1,400 metres to the nearest residential receivers in Cringila).

The mitigated noise levels (CS06 Berth area only) are also presented in Table 7.5.

Table 7.5 Predicted construction noise levels, L_{AFMax} dBA

Receiver ID	Receiver type	NCA	Predicted construction noise level, dBA	
			CS06	CS06 (Berth area only)
NCA01 & NCA02			NCA03 & NCA04	
Sleep disturbance screening level: 54 dBA			Sleep disturbance screening level: 57 dBA	
RES37/38	Residential	NCA01	47	47
RES35	Residential	NCA02	50	50
RES28/29	Residential	NCA03	65	53
RES6	Residential	NCA04	57	53

7.2.4 Cumulative noise impacts

Section 9.11 of the EIS provides a list of proposed major projects in the vicinity of the project site. There is the potential for construction of these projects to occur concurrently which may lead to cumulative construction noise impacts. Based on predicted construction noise levels, potential cumulative construction noise impacts may be experienced during impact pile rig activities, however this would only be considered minor or negligible. Noise emissions from all other construction activities are predicted to be below the NMLs at residential receivers.

When the Construction Noise and Vibration Management Plan (CNVMP) for the project is prepared, it can be determined whether construction activities are to occur concurrently alongside noise emissions from proposed major projects in the vicinity.

7.3 Construction traffic

The majority of the construction traffic will access the site via the major roads that service the Port Kembla industrial area, including the Princes Motorway and Princes Highway, Shellharbour Road, Springhill Road, Five Islands Road, and Masters Road. The primary access points for CLIP construction activities are from the south via Old Port Road and Christy Drive.

For the following arterial and sub-arterial roads, there is a significant amount of existing traffic along these roads:

- Princes Motorway
- Princes Highway
- Springhill Road
- Masters Road
- Five Islands Road
- Old Port Road
- Flinders Street.

Exact traffic volumes from the project are not confirmed however, it is unlikely that traffic resulting from the construction of the project will result in any road traffic noise impacts along these roads.

The following local roads form part of the construction traffic access routes:

- Flagstaff Road
- Christy Drive.

These local roads are not located near any sensitive residential receivers. As such, no road traffic noise impacts are anticipated along these roads from construction traffic associated with the project.

7.4 Construction vibration

7.4.1 Vibration safe working distances

The method for the construction vibration assessment included:

- Identifying safe working distances to comply with the human comfort and the cosmetic damage criteria. These buffer distances have been adopted from *Construction Noise and Vibration Strategy*.
- Safe working distances for vibration intensive equipment are shown in Table 7.6. The vibratory equipment associated with the project include vibratory rollers and excavators.
- Buildings within the safe working distances have been identified for consideration of management measures.
- The safe working distance for heritage structures has been estimated as twice the distance as the safe working distance for standard structures.

Safe working distances for vibratory intensive equipment are shown in Table 7.6.

Table 7.6 *Vibration safe working distances*

Equipment	Human comfort (OH&E Vibration guideline)	Cosmetic damage to standard structures	Cosmetic damage to heritage structures
Piling rig – Bored <800 mm	N/A	2 m (nominal)	4 m
Piling rig–Hammer (12 t down force)	50 m	15 m	30 m
Piling rig – Vibratory (sheet piles)	20 m	2 m to 20 m	40 m
Vibratory roller (>18 tonnes)	100 m	25 m	50 m
Vibratory roller (13-18 tonnes)	100 m	20 m	40 m
Vibratory roller (7-13 tonnes)	100 m	15 m	30 m
Vibratory roller (4-6 tonnes)	40 m	12 m	24 m
Vibratory roller (2-4 tonnes)	20 m	6 m	12 m
Vibratory roller (1-2 tonnes)	15 m	5 m	10 m
Small hydraulic hammer 300 kg (5-12t excavator)	7 m	2 m	4 m
Medium hydraulic hammer 900 kg (12-18t excavator)	23 m	7 m	14 m
Large hydraulic hammer 1600 kg (18-34t excavator)	73 m	22 m	44 m
Jackhammer (handheld)	Avoid contact with structure	1 m (nominal)	2 m

7.4.2 Human comfort

A conservative assessment based on a vibratory roller > 18 tonnes has been conducted to identify any human comfort vibration impacts towards residential receivers. Based on the human comfort buffer distance for a vibratory roller of 100 m, no residential receivers fall within this buffer distance towards construction activity areas. As such, no human comfort impacts are anticipated for construction activities.

7.4.3 Structural damage

Vibratory rolling activities have the potential to exceed the structural damage vibration criteria should these works occur within 20 metres of residences or 40 metres of heritage structures. No residences or heritage structures have been identified within 40 metres of any construction works and as such, no adverse structural damage vibration impacts are anticipated as a result of the project.

8. Mitigation measures

8.1 Construction mitigation measures

8.1.1 Reasonable and feasible mitigation measures

The *Interim Construction Noise Guideline* identifies that, due to the nature of construction, it is inevitable that impacts arise where construction occurs near sensitive receivers. During construction there would be noise impacts on some receivers during certain times and during certain construction activities.

Where noise is above the construction noise management levels, all feasible and reasonable work practices to minimise noise would be implemented, and all potentially affected receivers would be informed.

Table 8.1 Reasonable and feasible mitigation measures during the construction phase

Control type	Mitigation measure
At source mitigation measures	
Construction hours and scheduling	Where feasible and reasonable, construction will be carried out during the standard daytime working hours. Work generating high noise and/or vibration levels, such as impact piling, will be scheduled during less sensitive time periods, where possible.
Piling works	Piling will predominantly be undertaken during the recommended standard construction hours. Where piling is required outside of the recommended standard hours, works will be limited to an area within 300 metres of the berth and at a minimum distance of 1,400 metres from the nearest residential receivers, where possible. Should impact piling works be required outside of standard hours and within 1,400 metres of residential receivers due to technical and safety reasons, noise monitoring will be undertaken at the source and at the most-affected residential receivers to determine actual noise levels and determine any additional reasonable and feasible mitigation measures to reduce impacts.
Non-tonal and ambient sensitive reversing alarms	Non-tonal reversing beepers (or an equivalent mechanism) will be fitted and used on all construction vehicles and mobile plant regularly used and for any out of hours work. The use of ambient sensitive alarms that adjust output relative to the ambient noise level would be considered.
Equipment selection	The use of quieter and less vibration emitting construction methods should be considered, where feasible and reasonable. Ensure plant and equipment are well maintained.
Plant noise levels	The noise levels of plant and equipment will have an operating sound power lower or similar to the levels presented in Table 3.8. Special consideration should be given to the $L_{Aeq(15min)}$ and $L_{AF(1min)}$ noise levels assumed for the impact piling rig, being $L_{Aeq(15min)}$ 125 dBA and $L_{AF(1min)}$ 135 dBA.
Location of plant	As much distance as possible will be placed between the plant or equipment and residences and other sensitive land uses, where possible.
Direction of equipment	Equipment with directional noise characteristics will be oriented away from noise sensitive receivers.
Plan worksites and activities to minimise noise and vibration.	Where additional activities or plant may only result in a marginal noise increase and speed up works, the duration of impact will be limited by concentrating noisy activities at one location and moving to another as quickly as possible.
Reduced equipment power	Only the necessary size and power of equipment will be used where available.
Minimise disturbance arising from delivery of goods to construction sites.	– Loading and unloading of materials/deliveries will occur as far as practically possible from sensitive receivers. – Out of hours movements will be avoided or minimised where possible.

Control type	Mitigation measure
Engine compression brakes	The use of engine compression brakes will be limited in proximity to residences. Vehicles will be fitted with a maintained Original Equipment Manufacturer exhaust silencer or a silencer that complies with the National Transport Commission's 'In-service test procedure' and standard.
Maintain equipment	Equipment will be regularly inspected and maintained to ensure it is in good working order. The condition of mufflers would also be checked. Equipment will not be operated until it is maintained or repaired, where maintenance or repair would address the annoying character of noise identified.

8.1.2 Construction noise and vibration management plan (CNVMP)

A construction noise and vibration management plan (CNVMP) will be developed once a detailed construction methodology has been prepared. The construction noise and vibration management plan will include a review of the construction noise predictions during the environmental impact assessment phase. The plan will be based on the construction method and include a detailed examination of feasible and reasonable work practices and noise mitigation measures to manage sensitive receivers that are predicted to be 'noise affected'. The construction noise and vibration management plan will also include:

- Summary of the construction methodology
- Feasible and reasonable mitigation measures to be implemented
- Updated noise predictions at sensitive receivers if required
- A noise monitoring procedure and program for the duration of works
- A community consultation plan to liaise with the noise affected receivers, including:
 - Notification to residences a minimum of 7 calendar days prior to the start of works and should include information such as total building time, what works are expected to be noisy, their duration, what is being done to minimise noise and when respite periods will occur.
 - A procedure for complaints, including maintaining a compliance register on site in accordance with existing BlueScope processes.

8.1.3 Construction noise monitoring

A noise monitoring procedure and program will be carried out for the duration of works in accordance with the construction noise and vibration management plan and any approval or licence conditions. Monitoring reports would be prepared in accordance with the requirements of the noise monitoring procedures.

8.1.4 Out of hours work procedure

An out of hours works procedure will be developed as part of the construction environmental management plan for the project, if these works are required. This will include a detailed construction noise and vibration assessment for the potential construction activities proposed to occur out of hours.

An out of hours works application form for any works outside of the approved working hours for the project will be required where high-intensity construction equipment is proposed to be used, for submission to the EPA. These include, in accordance with license condition L6.2 of EPL 6092:

- Pile driving
- Jack hammering
- Warning sirens
- Similar high-intensity noise sources.

A description of the works, justification, and management measures will be included as part of the application. It is expected that strong justification and negotiation with the community would be required if works are to be undertaken during any out of hours periods.

8.1.5 Construction management measures

Management measures to reduce potential noise impacts at sensitive receivers will be incorporated into the CNVMP and will include the following as a minimum:

- All employees, contractors and subcontractors are to receive an environmental induction. The site induction must at least include:
 - All project specific and relevant standard noise and vibration mitigation measures
 - Relevant licence and approval conditions
 - Permissible hours of work
 - Any limitations on high noise generating activities
 - Construction employee parking areas
 - Designated loading/unloading areas and procedures
 - Site opening/closing times (including deliveries)
 - Environmental incident procedures
- All construction activities should be undertaken during standard construction hours, with the exception of the following activities (as specified in Table 2 of the ICNG):
 - The delivery of oversized plant or structures that police or other authorities determine require special arrangements to transport along public roads
 - Emergency work to avoid the loss of life or damage to property, or to prevent environmental harm
 - Maintenance and repair of public infrastructure where disruption to essential services and/or considerations of worker safety do not allow work within standard hour
 - Public infrastructure works that shorten the length of the project and are supported by the affected community
 - Works where a proponent demonstrates and justifies a need to operate outside the recommended standard hours
- In the context of this project, the following activities could be considered appropriate to be conducted outside standard construction hours:
 - Large crane lifts taking advantage of calm conditions
 - Work required to be completed within tidal ranges
 - Piling works at locations where the NML for noise sensitive receivers is not exceeded
- The need for additional works required to be undertaken outside of standard construction hours (ICNG) should be justified in the CEMP

8.2 Mitigation measures for operation

The noise assessment and modelling are based on assumptions from previous noise measurements of similar operational equipment. In particular, the CSU has been assumed to be a combination of conveyor and conveyor drive units based on its design and configuration of components, in the absence of CSU noise source data. To confirm noise model predictions are representative of CLIP noise emission at sensitive receivers, noise validation measurements should be undertaken at intermediate locations in the path between source equipment and receivers. Nearfield source measurements should also be undertaken in order to confirm source noise levels and refine the noise model if required. During the final commissioning of the project, an on-site noise compliance investigation should be undertaken to determine suitable noise measurement locations and conduct noise measurements as described above. Locations should be selected such that subject source noise levels are at a minimum 10 dB above extraneous environmental and non-subject PKSW operations noise levels.

If compliance noise measurements indicate that operational noise levels are above noise predictions, mitigation measures to conveyors, conveyor drive houses, and the CSU can be considered for noise reduction. This can include:

- Low noise bearing alternatives for conveyors where suitable
- Upgraded construction of enclosures for conveyor and conveyor drive units
- Local shielding around identified noise components of the CSU

8.3 Operational Noise Management Plan (NMP)

An operational noise management plan should be developed to minimise the risk of adverse noise impacts during the operation. It should be refined throughout the design process and have consideration to:

- The relevant license conditions (to be confirmed)
- Conditions of approval (to be confirmed)
- *The Noise Policy for Industry*
- *Australian Standards 1055 Acoustics – Description and measurement of environmental noise*
- *Approved methods for the measurement and analysis of environmental noise in NSW* – currently in draft form
- conclusions of verification noise monitoring prior to operations commencing.

The operational noise management plan should include:

- Operational noise management measures to be implemented
- A complaints handling protocol as per existing BlueScope process.

Table 8.2 provides draft inclusions for incorporation into the operational noise management plan to minimise the risk of adverse noise impacts at sensitive receivers during the operation.

Table 8.2 Draft operational noise management plan inclusions

Control type	Measure
Operational noise management measures for operators/workers	
Operational noise management measures for operators/workers	– All equipment would be properly maintained. – All equipment would be operated in the appropriate manner. – The use of engine/compression brakes on-site would be minimised. – Buildings openings such as doors or shutters would remain closed when not in use. – All buildings and enclosures would be maintained to preserve their acoustic performance. – Where noisy maintenance is required, it would be scheduled to occur during periods when receivers are less sensitive, such as during the daytime.
Noise monitoring program	
Noise complaint records	If a noise complaint is received from the community, the complaint will be promptly investigated and resolved.
Noise monitoring qualifications	All attended noise monitoring would be carried out by a suitably qualified noise specialist. Records of routine equipment calibration and testing would be maintained by the qualified noise specialist undertaking the monitoring.

9. Evaluation and conclusion

This noise and vibration impact assessment report has been prepared on behalf of BlueScope to support the environmental impact assessment (EIS) for the project and responds to the Secretary's Environmental Assessment Requirements (SEARs) for noise and vibration. It describes the existing ambient and background noise and vibration and assesses the potential noise impacts associated with the construction and operational phases of the project and the increases in noise along the local transport network (during construction and operation) with respect to the following guidelines referred to in the SEARs:

- Operational phase - Noise Policy for Industry (NPfI) (EPA, 2017)).
- Construction phase - Interim Construction Noise Guideline (ICNG) (DECC, 2009). The Draft Construction Noise Guideline (DCNG) (EPA, 2021) has also been considered for general guidance only.
- Road transport network - Road Noise Policy (DECCW, 2011)
- Vibration – Assessing Vibration: A Technical Guideline (DEC, 2006) and DIN 4150-3 2016: Vibrations in buildings - Part 3: Effects on structures (German Standards, 2016)

Recommended mitigation and management measures were identified in response to the impact assessment findings.

9.1 Impacts from the project during operation

An assessment of operational noise from the project (CLIP activities only, as opposed to a site-wide assessment) has been undertaken to predict noise levels at noise sensitive receivers. Operational noise criteria have been proposed for residential receivers based on a review of the existing Environment Protection License (EPL) 6092 for the Port Kembla Steelworks (PKSW), and guidance from the NSW EPA Noise Policy for Industry (NPfI) (NSW EPA, 2017). Operational noise criteria for non-residential receivers have been provided from NPfI.

A 3D noise model has been prepared to predict operational noise levels at noise sensitive receivers. Predictions show that compliance with the proposed operational noise criteria is achieved at all noise sensitive receivers based on the operation of equipment considered part of typical operations.

The operational noise criteria used in this assessment are based on the NPfI discrete process criteria, which aim to ensure that noise emissions from the project do not contribute to the existing total industrial noise level at the most affected receivers. As compliance is achieved, no cumulative noise impacts considering the existing industrial noise in the area are anticipated.

To ensure that noise predictions are representative of operational noise levels from the project, noise validation measurements should be undertaken prior to operations commencing. Based on the validation results, noise model and assumptions may be refined, and operational mitigation measures can be incorporated where appropriate. If compliance noise measurements indicate that operational noise levels are above noise predictions, mitigation measures to conveyors, conveyor drive houses, and the CSU may be considered for noise reduction. This may include:

- Upgraded construction of enclosures for conveyor and conveyor drive units
- Local shielding around identified noise components of the CSU

Sleep disturbance impacts have been assessed against the sleep disturbance screening criterion provided in the NPfI. Operational activities with the potential for short-duration $L_{A1(1min)}$ noise events have been identified, and predictions have been made to residential receivers. It is predicted that $L_{A1(1min)}$ noise levels will be below the screening criterion and as such, no sleep disturbance noise impacts are anticipated from the project.

9.2 Impacts from the project during construction

Construction noise levels have been predicted to the sensitive receivers within the study area with consideration to the acoustic requirements of the Interim Construction Noise Guideline (DECCW, 2011). Construction scenarios have been prepared to assess construction noise from laydown area operations, and the main construction activities within the CLIP site.

Subject to the final construction timetable, the majority of construction works will be carried out between 7.00 am and 6.00 pm, Monday to Saturday. Where practical, high-noise generating activities, with potential to impact any nearby receivers would be scheduled during standard hours.

It is predicted that all construction activity and laydown area operations are below the Noise Management Levels (NMLs) for all sensitive receivers, with the exception of some construction activities associated with the commodity berth clearance and transfer to cokemaking as impact piling would be required. Noise management levels are predicted to be exceeded by a maximum of 9 dBA during the night period and 2 dBA during standard hours at residential receivers located in Cringila. Where possible, these activities will be scheduled during standard hours to reduce the potential for noise impacts.

Should impact piling works be required outside of the recommended standard hours, it has been recommended that these works are limited to an area within 300 metres of the berth and a minimum distance of 1,400 metres from the nearest residential receivers. This will also reduce L_{AFmax} noise levels to a level below the sleep disturbance screening level at all residential receivers in the study area.

It is typical for construction projects to exceed the construction noise management levels. Any impacts due to construction works are temporary in nature and would not represent a permanent impact on the community and surrounding environment. The predicted noise levels are generally conservative and would only be experienced for limited periods during construction.

An assessment of construction vibration has been undertaken against criteria from Assessing Vibration: A Technical Guideline (DEC, 2006) for human comfort impacts, and DIN 4150-3 2016: Vibrations in buildings - Part 3: Effects on structures (German Standards, 2016) for both standard and heritage structure impacts. Due to the large offset distance between construction activities and residential dwellings or any heritage structures, no vibration impacts are anticipated for both human comfort and structural damage during the construction phase of the project.

9.3 Road traffic noise impacts

Construction and operational traffic noise levels on public roads are anticipated to comply with the road traffic noise assessment criteria in accordance with the NSW Road Noise Policy (RNP) (DECCW, 2011) at residential receivers nearest to the project and access routes. As such, no construction or operational road traffic noise impacts are anticipated.

10. References

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Appendices

Appendix A

Acoustic concepts and terminology

Acoustic concepts and terminology

Definition of 'noise'

Sound may be defined as any pressure variation that the human ear can detect. The terms “sound” and “noise” are more or less interchangeable however, “noise” is generally often referred to as unwanted sound.

Factors that contribute the environmental noise

Noise from an activity such as construction noise or noise during the operation of a facility at a given receiver location can be affected by a number of different factors, including:

- How loud the source activity is and the type of source:
 - Point (for e.g. a pump or motor)
 - Line (for e.g. a road or railway line)
 - Area (for e.g. the external façades of an industrial building)
- The distance from the source to receiver
- The type of ground between the sound and receiver locations (e.g. hard surfaces or porous ground)
- The ground topography between the source and the receiver. For e.g. is it flat or hilly? Blocking the line of sight will generally reduce the noise level for the receiver
- Obstacles that may block the line of sight between the source and the receiver. For e.g. buildings or noise walls
- Atmospheric absorption (dependent on humidity and temperature)
- Meteorological conditions that may increase or reduce environmental sound propagation (for e.g. wind direction or temperature inversions)

Noise measurements

Noise is generally measured using a specially designed ‘sound level meter’ (SLM) and must meet internationally recognized performance standards. To avoid expressing sound or noise in terms of Pa, which could involve some unmanageable numbers, the logarithmic decibel or dB scale is used. The scale uses the hearing threshold of 20 μ Pa or 20×10^{-6} Pa as the reference level and is defined as 0 dB.

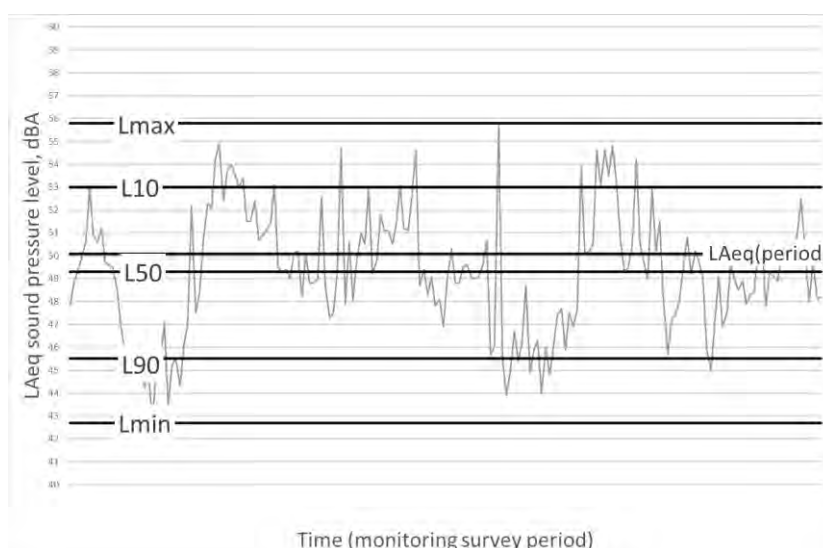
Typical noise levels

The table below presents typical noise sources for each various sound pressure levels and a corresponding subjective noise level description.

Subjective level	Sound pressure level (dBA)	Typical sources
Silent	0	Threshold of hearing
Almost silent	20	Recording studio
Quiet	30	Bedroom
	40	Private office
Moderate	50	General office
	60	Department store
Loud	70	Loud television
	80	Kerb side of busy street
Very loud	90	Construction site
	100	Loud car horn (3 m away)
Extremely loud	110	Grinding on steel
	120	Heavy rock concert
Intolerable	130	Threshold for pain

Typical noise descriptors

Noise is represented by the descriptor L_{AN} , representing a statistical sound measurement recorded on the 'A' weighted scale. A typical noise monitoring chart is shown in the graph below along with the noise descriptors.



Where:

- L_{Amax} : The maximum sound level recorded during the measurement period.
- L_{Amin} : The minimum sound level recorded during the measurement period.
- $L_{A10(period)}$: The A-weighted sound pressure level that is exceeded for 10% of the measurement period.
- $L_{Aeq(period)}$: Equivalent sound pressure level, the steady sound level that, over a specified period of time, would produce the same energy equivalence as the fluctuating sound level actually occurring.
- $L_{A90(period)}$: The A-weighted sound pressure level that is exceeded for 90% of the time over which a given sound is measured. This is considered to represent the background noise e.g. $L_{A90(15min)}$.

Changes in noise levels

The table below presents a qualitative description of average human responses to changes in noise levels.

Difference	Human response
Difference of 2 dBA	Generally imperceptible by the human ear
Difference of 5 dBA	Considered significant
Difference of 10 dBA	Perceived as a doubling (or halving) of the noise source
Addition of two identical noise levels	Increase levels by 3 dBA
Addition of second noise level of similar character	If the secondary noise level is a minimum 8 dBA below the primary noise level, the noise level will not significantly increase
Doubling of distance between source and receiver	Results in a 3 dBA decrease for a line source and 6 dBA for a point source
A doubling of traffic volume	Results in a 3 dBA increase in noise

Audibility of noise

The table below presents quantitative guidance and qualitative descriptions regarding the audibility of noise.

Audibility	Description
Inaudible	Noise source cannot be heard. The noise level is generally less than the background noise level, potentially by more than 10 dBA or greater
Barely audible	Characteristics of the noise is difficult to define or masked by extraneous noise. The noise level is generally 5-7 dBA below the background noise or ambient noise level, depending on the nature of the noise e.g. constant or intermittent
Just audible	Characteristics of the noise can be defined but extraneous noise sources are also contributing to the received noise. The noise level is typically below the background and ambient noise level.
Audible	Characteristics of the noise can be easily defined. The noise level may be at the level of the background noise and above.
Dominant	The noise source is significantly 'louder' than all other noise sources. The noise level will likely be significantly greater than the background noise level.

Types of noise sources

The table below offers a qualitative description of various noise types and provides the noise descriptor that is typically used to measure the type of noise.

Duration of the noise	Description
Continuous noise	Continuous noise is produced by equipment or activities that operates without interruption in the same mode, for e.g. blowers, pumps and processing equipment. Measuring for just a few minutes with hand-held equipment is sufficient to determine the noise level. If tones or low frequencies are heard, the frequency spectrum can be measured for documentation and further analysis. Continuous noise sources are generally captured by the L_{90} noise descriptor.
Intermittent noise	Intermittent noise is a noise level that increases and decreases rapidly. This might be caused by a train passing by, factory equipment that operates in cycles, or aircraft flying above. Intermittent noise is measured in a similar way to continuous noise, with a sound level meter. The duration of each occurrence and the time between each event is important to note. To gain a more reliable estimate of the noise level, multiple occurrences of the noise source is measured to gain a reliable estimate. Intermittent noise sources are generally captured by the L_{eq} noise descriptor.
Impulsive noise	The noise from impacts or explosions, for e.g. from a pile driver, punch press or gunshot, is called impulsive noise. It is brief and abrupt, and its startling effect causes greater annoyance than would be expected from a simple measurement of sound pressure level. To quantify the impulsiveness of noise, the difference between a quickly responding and a slowly responding parameter can be used. Impulsive noise sources are generally captured by the L_{max} or L_{peak} noise descriptor.
Frequency content	Description
Low frequency	Noise containing major components in the low-frequency range (10 hertz [Hz] to 160 Hz) of the frequency spectrum
Tonal noise	Tonal noise contains one or more prominent tones (i.e. distinct frequency components), and is normally regarded as more offensive than 'broad band' noise
Defining characteristic	Description
Extraneous noise	Noise resulting from activities that are not typical of the area. Atypical activities may include construction, and traffic generated by holiday periods and by special events such as concerts or sporting events. Normal daily traffic is not considered to be extraneous.
Subject noise	The noise in question removed from any extraneous noise in the area
Offensive noise	The definition of offensive noise in the POEO Act is noise: (a) that, by reason of its level, nature, character or quality, or the time at which it is made, or any other circumstances: (i) is harmful to (or is likely to be harmful to) a person who is outside the premises from which it is emitted, or (ii) interferes unreasonably with (or is likely to interfere unreasonably with) the comfort or repose of a person who is outside the premises from which it is emitted, or (b) that is of a level, nature, character or quality prescribed by the regulations or that is made at a time, or in other circumstances, prescribed by the regulations.

Frequency analysis

Frequency analysis is the process used to examine the tones (or frequency components) which make up the overall noise or vibration signal. This analysis was traditionally carried out using analogue electronic filters, but is now normally carried out using Fast Fourier Transform (FFT) analysers. The units for frequency are Hertz (Hz), which represent the number of cycles per second. Frequency analysis can be in:

- Octave bands (where the centre frequency and width of each band is double the previous band)
- 1/3 octave bands (3 bands in each octave band)
- Narrow band (where the spectrum is divided into 400 or more bands of equal width)

Vibration

Definition of 'vibration'

Vibration may be defined as cyclic or transient motion. This motion can be measured in terms of its displacement, velocity or acceleration. Most assessments of human response to vibration or the risk of damage to buildings use measurements of vibration velocity.

Vibration descriptors

These may be expressed in terms of 'peak' velocity or 'rms' velocity. The former is the maximum instantaneous velocity, without any averaging, and is sometimes referred to as 'peak particle velocity', or PPV. The latter incorporates 'root mean squared' averaging over some defined time period. Vibration measurements may be carried out in a single axis or alternatively as triaxial measurements. Where triaxial measurements are used, the axes are commonly designated vertical, longitudinal (aligned toward the source) and transverse. The common units for velocity are millimetres per second (mm/s). As with noise, decibel units can also be used, in which case the reference level should always be stated. A vibration level V , expressed in mm/s can be converted to decibels by the formula $20 \log (V/V_0)$, where V_0 is the reference level (10^{-9} m/s). Care is required in this regard, as other reference levels may be used by some organisations.

Types of vibration

Vibration in buildings can be caused by many different external sources, including industrial, construction and transportation activities. The vibration may be continuous (with magnitudes varying or remaining constant with time), impulsive (such as in shocks) or intermittent (with the magnitude of each event being either constant or varying with time). A description of each vibration type including examples are presented in the table below.

Vibration type	Description	Examples
Continuous vibration	Vibration continues uninterrupted for a defined period (usually throughout daytime and/or night-time). This type of vibration is assessed on the basis of weighted rms acceleration values	Machinery, steady road traffic, continuous construction activity (such as tunnel boring machinery)
Impulsive vibration	A vibration source (continuous or intermittent) which has a rapid build up to a peak followed by a damped decay that may or may not involve several cycles of vibration (depending on frequency and damping). This type of vibration is assessed on the basis of weighted rms acceleration values	Infrequent: Activities that create up to 3 distinct vibration events in an assessment period, e.g. occasional dropping of heavy equipment, occasional loading and unloading.
Intermittent vibration	Interrupted periods of continuous (for e.g. a drill) or repeated periods of impulsive vibration (for e.g. a pile driver), or continuous vibration that varies significantly in magnitude. This type of vibration is assessed on the basis of vibration dose values	Trains, nearby intermittent construction activity, passing heavy vehicles, forging machines, impact pile driving, jack hammers. Where the number of vibration events in an assessment period is three or fewer this would be assessed against impulsive vibration criteria

How humans perceive vibration

People are able to 'feel' vibration at levels lower than those required to cause even superficial damage to the most susceptible classes of building (even though they may not be disturbed by the motion). An individual's perception of motion or response to vibration depends very strongly on previous experience and expectations, and on other connotations associated with the perceived source of the vibration. For example, the vibration that a person responds to as 'normal' in a car, bus or train is considerably higher than what is perceived as 'normal' in a shop, office or dwelling.

Typical vibration levels

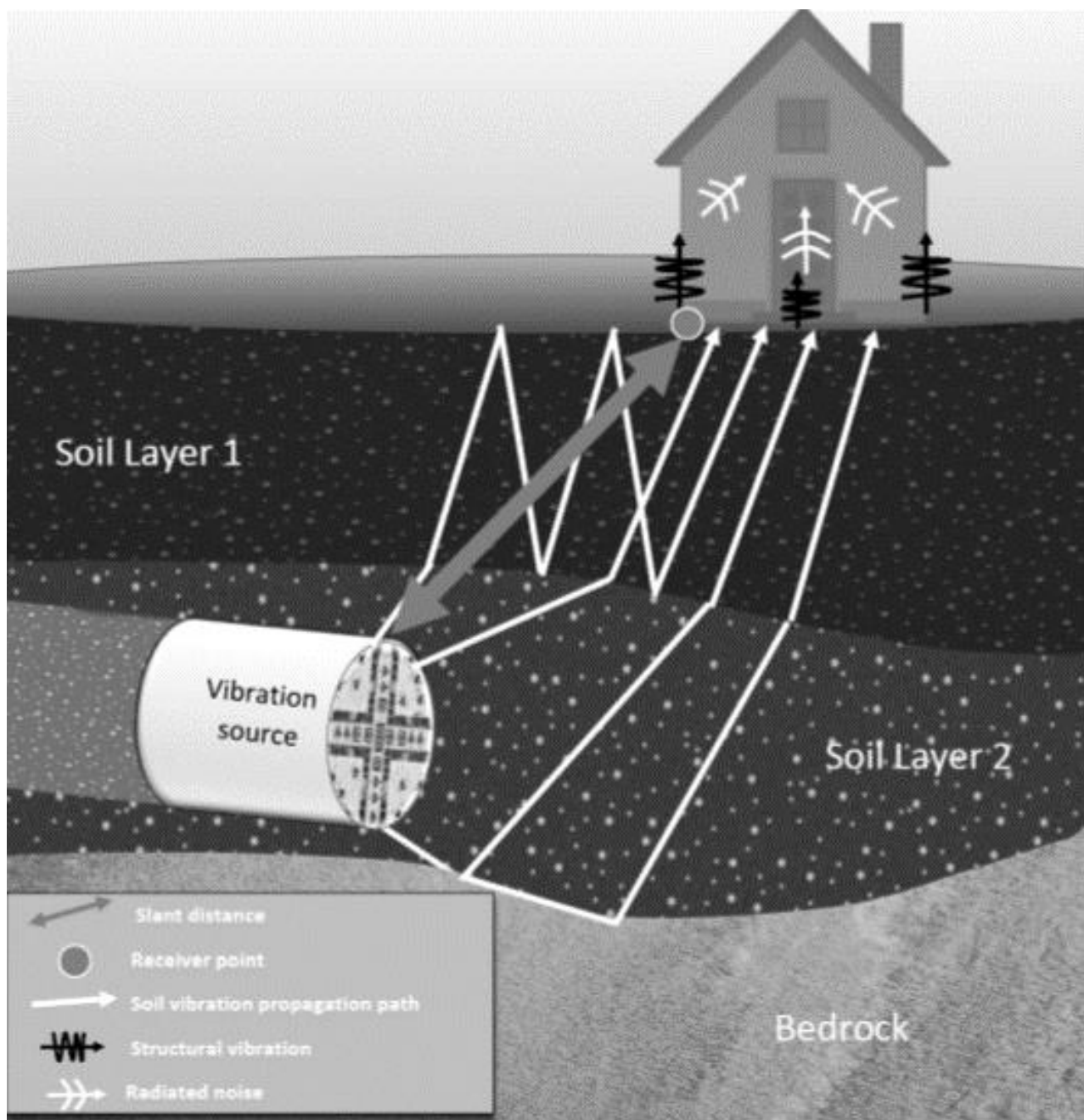
Typical ground vibration from civil construction activities occurs in the frequency range of approximately 8 Hz to 100 Hz. Within this frequency range, building contents such as blinds and pictures would commence visible movement at 0.5 mm/s. At vibration levels higher than 0.9 mm/s, rattling of windows, crockery or loose objects would be audible and annoying.

Velocity level (mm/s)	Typical source	Response
0.01	Typical background vibration level	Scanning electron microscopes to 50000 x amplification
0.03		500x amplification bench microscopes
0.1	Average passenger train vibration	Approximate threshold for human perception of vibration
0.3	Average freight train vibration Max passenger train vibration	Approx. residential annoyance for train passbys
1	Large rock breaker	Vibration level that will generally result in complaints
3	Blasting/ Impact pile driving	Threshold for minor cosmetic damage

Ground-borne noise and vibration

Noise that propagates through a structure as vibration and is radiated by vibrating wall, ceiling and floor surfaces is termed “ground-borne noise”, “regenerated noise”, or sometimes “structure borne noise”. Ground-borne noise originates as vibration and propagates between the source and receiver through the ground and/or building structural elements, rather than through the air. Typical sources of ground-borne noise include tunnelling construction works or underground railway operations.

The figure below presents the various paths by which vibration and ground-borne noise may be transmitted between a source and receiver for construction activities that occur below the ground level (for e.g. a tunnel boring machine).



Acronyms and abbreviations

Term	Definition
AWS	Automatic Weather Station
BOM	Bureau of Meteorology
dB	Decibel is the unit used for expressing the sound pressure level (SPL) or power level (SWL) in acoustics.
dBA	Decibel expressed with the frequency weighting filter used to measure 'A-weighted' sound pressure levels, which conforms approximately to the human ear response, as our hearing is less sensitive at low and high frequencies.
dBZ or dBL	The unit used to measure 'Z-weighted' sound pressure levels with no weighting applied, linear.
CEMP	Construction Environmental Management Plan
DECC	Department of Environment and Climate Change
DECCW	Department of Environment, Climate Change and Water
EPA	Environmental Protection Authority
ICNG	<i>Interim Construction Noise Guideline</i> (DECC, 2009).
NPfl	<i>Noise Policy for Industry</i> (EPA, 2017).
L _{Aeq(period)}	Equivalent sound pressure level: the steady sound level that, over a specified period of time, would produce the same energy equivalence as the fluctuating sound level actually occurring.
L _{A10(period)}	The noise level exceeded for 10 per cent of the time and is approximately the average of the maximum noise levels.
L _{A90(period)}	The sound pressure level that is exceeded for 90% of the measurement period.
L _{Amax}	The absolute maximum noise level in a noise sample
NSW	New South Wales
OOHW	Out-of-hours Works
PPV	Peak particle velocity is the maximum vector sum of three orthogonal time-synchronized velocity components regardless of whether these component maxima occurred simultaneously.
RBL	Rating Background Level . The overall single-figure background level representing each assessment period (day/evening/night) over the whole monitoring period.
rms	Root Mean Square Amplitude (rms) is the square root of the average of the squared values of the waveform. In the case of the sine wave, the RMS value is 0.707 times the peak value, but this is only true in the case of the sine wave.
RNP	<i>Road Noise Policy</i> (DECCW, 2011).
SEARs	Secretary's Environmental Assessment Requirements
SPL	Sound Pressure Level
SWL	Sound Power Level
SWRO	Seawater Reverse Osmosis
Rw	Weighted Sound Reduction Index which provides a single-number quantity which characterises the airborne sound insulation of a material or building element over a range of frequencies
TBM	Tunnel Boring Machine
VDV	Vibration dose value - As defined in BS6472 – 2008, VDV is given by the fourth root of the integral of the fourth power of the frequency weighted acceleration.
WFP	Water Filtration Plant

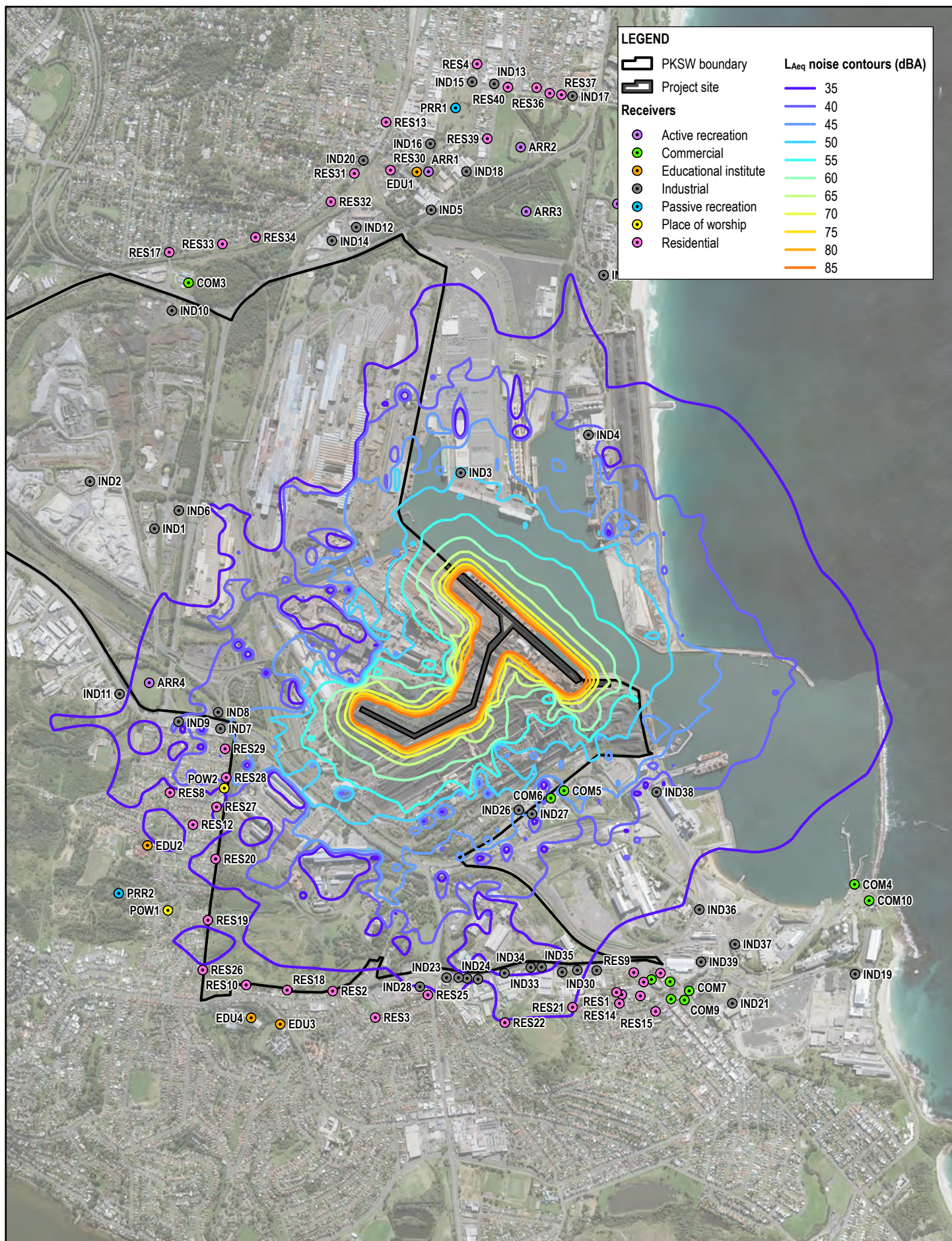
Common Terms

Term	Definition
A weighting	The human ear responds more to frequencies between 500 Hz and 8 kHz and is less sensitive to very low-pitch or high-pitch noises. The frequency weightings used in sound level measurements are often related to the response of the human ear to ensure that the meter better responds to what you actually hear
Adverse weather	Weather effects that enhance noise (that is, wind and temperature inversions) that occur at a site for a significant period of time (that is, wind occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter).
Ambient noise	The all-encompassing noise associated within a given environment. It is the composite of sounds from many sources, both near and far. This is described using the Leq descriptor
Background noise	The underlying level of noise present in the ambient noise, excluding the noise source under investigation, when extraneous noise is removed. This is described using the L90 descriptor
Compliance	The process of checking that source noise levels meet with the noise limits in a statutory context.
Determining authority	Defined by Section 110 of the <i>Environmental Planning and Assessment Act 1979</i> as 'a Minister or public authority and, in relation to any activity, means the Minister or public authority by or on whose behalf the activity is or is to be carried out or any Minister or public authority whose approval is required in order to enable the activity to be carried out.'
Extraneous noise	Noise resulting from activities that are not typical of the area. Atypical activities may include construction, and traffic generated by holiday periods and by special events such as concerts or sporting events. Normal daily traffic is not considered to be extraneous
EIS	Environmental Impact Assessment
Feasible and reasonable measures	Feasibility relates to engineering considerations and what is practical to build. reasonableness relates to the application of judgement in arriving at a decision, taking into account the following factors: - Noise mitigation benefits (amount of noise reduction provided, number of people protected); Cost of mitigation (cost of mitigation versus benefit provided); Community views (aesthetic impacts and community wishes); Noise levels for affected land uses (existing and future levels, and changes in noise levels)
Ground-borne noise	Noise heard within a building that is generated by vibration transmitted through the ground into the structure from construction works, sometimes referred to as 'regenerated noise' or 'structure-borne noise'. Ground-borne noise can be more noticeable than airborne noise for underground works such as tunnelling. The ground-borne noise levels are only applicable when ground-borne noise levels are higher than airborne noise levels.
Ground-borne vibration	Vibration transmitted from a source to a receptor via the ground
Hertz	The measure of frequency of sound wave oscillations per second. 1 oscillation per second equals 1 hertz.
Masking	The phenomenon of one sound interfering with the perception of another sound. For example, the interference of traffic noise with use of a public telephone on a busy street.
Maximum noise event	The loudest event or events within a given period of time. This is generally described using the L _{max} descriptor
Meteorological conditions	Wind and temperature inversion conditions
Most-affected location	Location(s) that experience (or will likely experience) the greatest noise impact from the construction works under consideration. In determining these locations, existing background noise levels, noise source location(s), distance and any shielding between the construction works (or proposed works) and the residences and other sensitive land uses need to be considered.

Term	Definition
Noise management level	The Noise Management Level (NML) as defined as the EPA's ICNG. To be measured and assessed at the property boundary that is most exposed to construction noise, and at a height of 1.5 m above ground level. If the residential property boundary is more than 30 m from the residence, the location for measuring or predicting noise levels is at the most affected point within 30 m of the residence.
Noise sensitive receiver	An area or place potentially affected by noise which includes: a residential dwelling an educational institution, library, childcare centre or kindergarten a hospital, surgery or other medical institution an active (e.g. sports field, golf course) or passive (e.g. national park) recreational area commercial or industrial premises a place of worship.
Non-compliance	Development is deemed to be in non-compliance with its noise consent/ licence conditions if the monitored noise levels exceed its statutory noise limit (exceptions may be given if the noise level exceeds by less than 2 dB)
Octave	A division of the frequency range into bands, the upper frequency limit
Project noise trigger level	Target noise levels for a particular noise generating facility. They are based on the most stringent of the intrusive criteria or amenity criteria. Which of the two criteria is the most stringent is determined by measuring the level and nature of existing noise in the area surrounding the actual or propose noise generating facility.
Proposal	The construction and operation of the SWRO site, the modifications to the Illawarra WFP site and associated infrastructure including the power route, the delivery pipeline, the se and the intake and outlet tunnels.
proposal site	The immediate location of the proposal, which is the area that has the potential to be directly disturbed by construction and operation.
Resonance	Resonance describes the phenomenon of increased amplitude that occurs when the frequency of a periodically applied force is equal or close to a natural frequency of the system on which it acts.
Study area	Land in the vicinity of, and including, the proposal site. The 'study area' is the wider area surrounding the proposal site.
Temperature inversion	An atmospheric condition in which temperature increases with height above the ground.
Third-octave	Single octave bands divided into three parts.

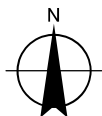
Appendix B

Construction noise contours



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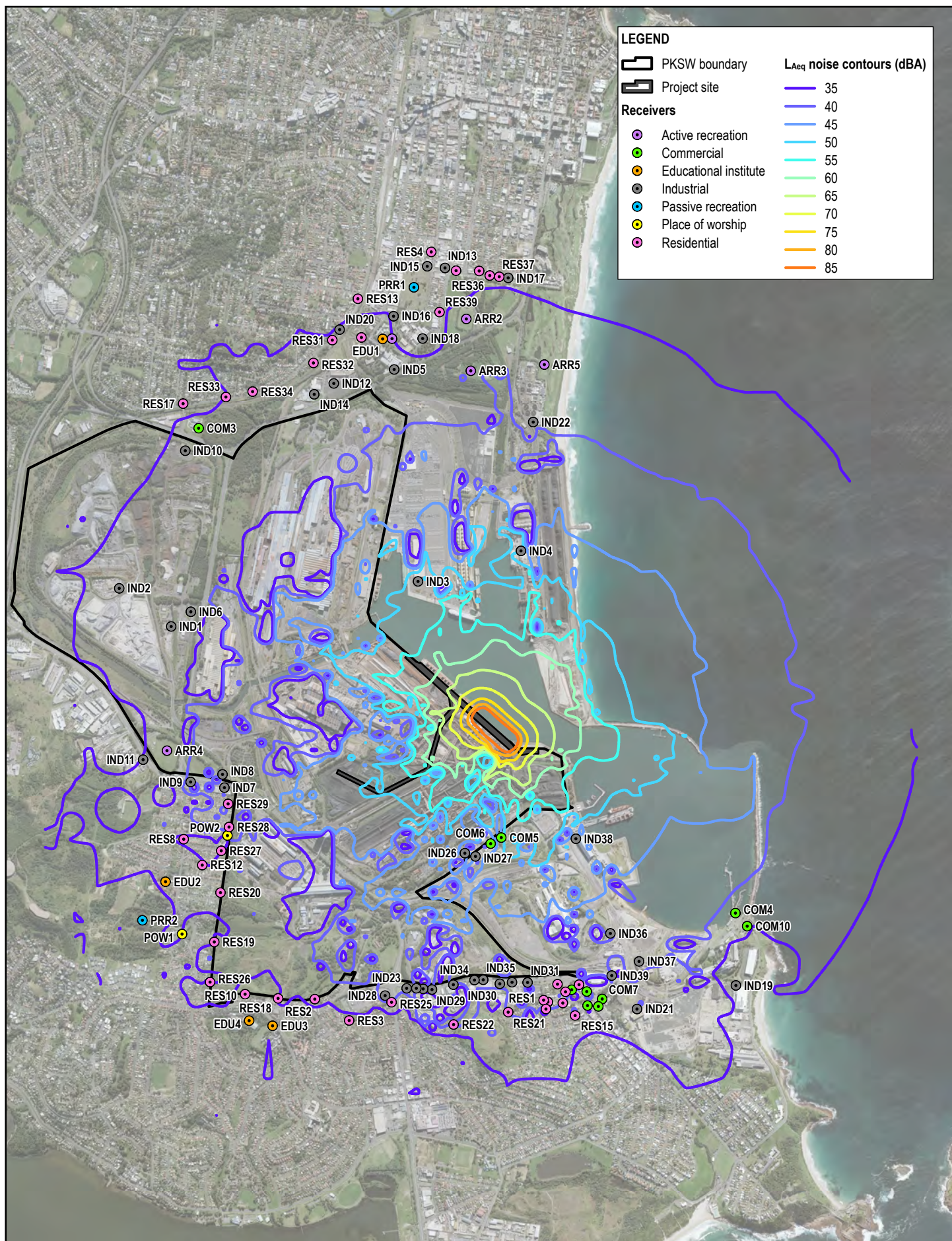


BlueScope Steel (AIS) Pty Ltd
Commodities Logistics Infrastructure Project
Noise and Vibration Impact Assessment

Construction noise contours
Construction scenario 1

Project No. 12555409
Revision No. 0
Date 19/10/2022

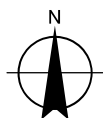
APPENDIX B-1



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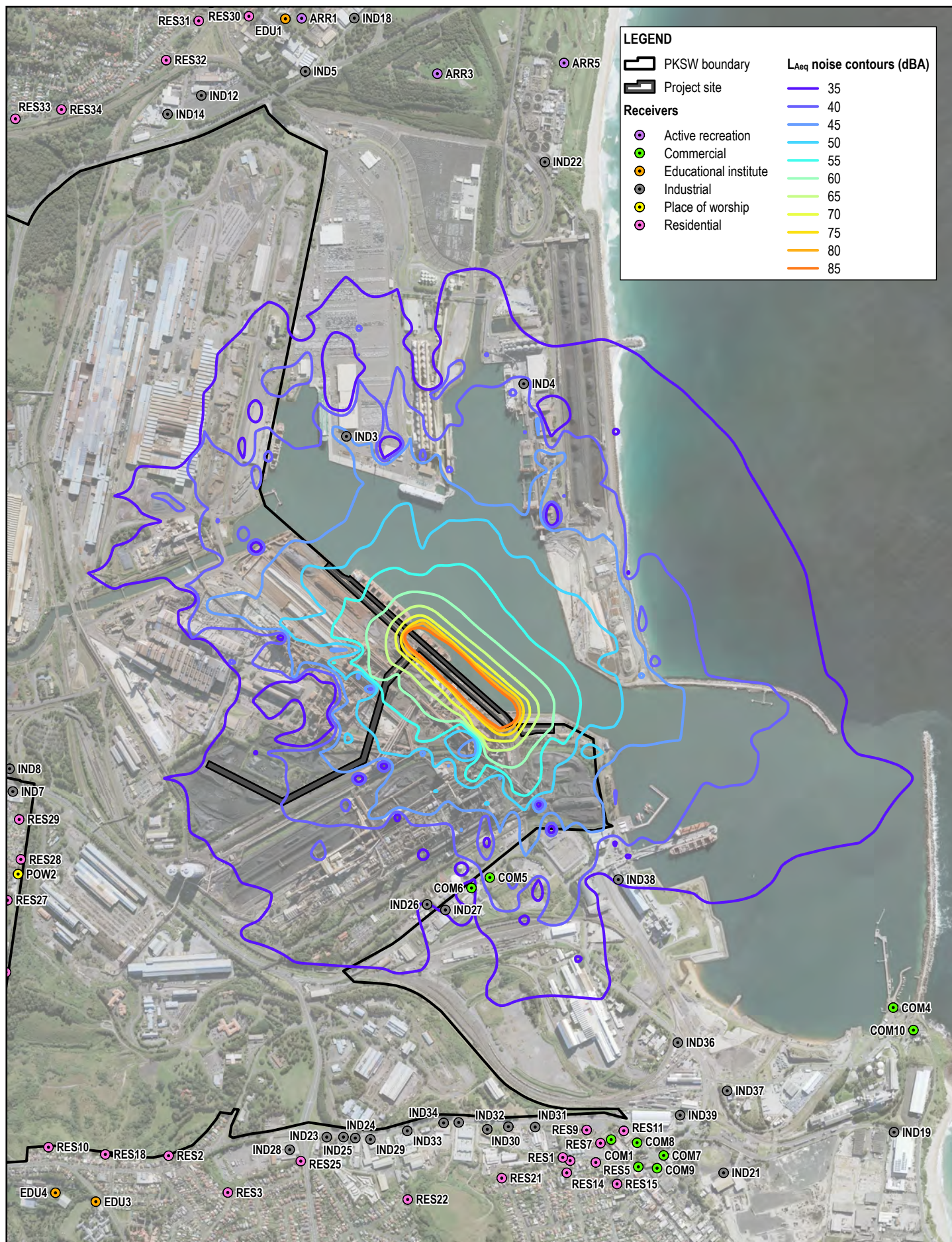


BlueScope Steel (AIS) Pty Ltd
Commodities Logistics Infrastructure Project
Noise and Vibration Impact Assessment

Construction noise contours
Construction scenario 2

Project No. 12555409
Revision No. 0
Date 19/10/2022

APPENDIX B-2

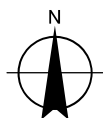


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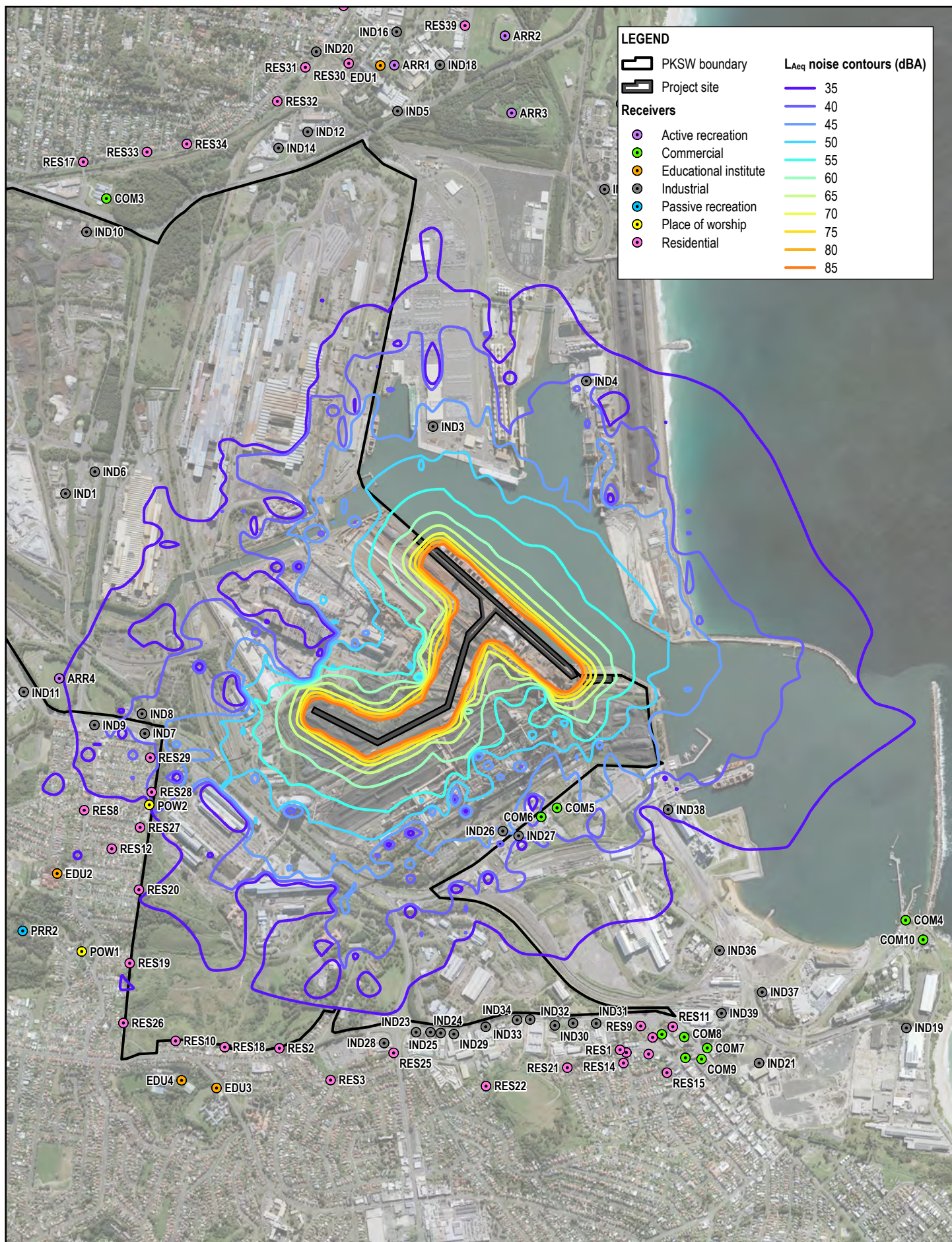


BlueScope Steel (AIS) Pty Ltd
Commodities Logistics Infrastructure Project
Noise and Vibration Impact Assessment

Construction noise contours
Construction scenario 3

Project No. 12555409
Revision No. 0
Date 19/10/2022

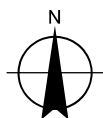
APPENDIX B-3



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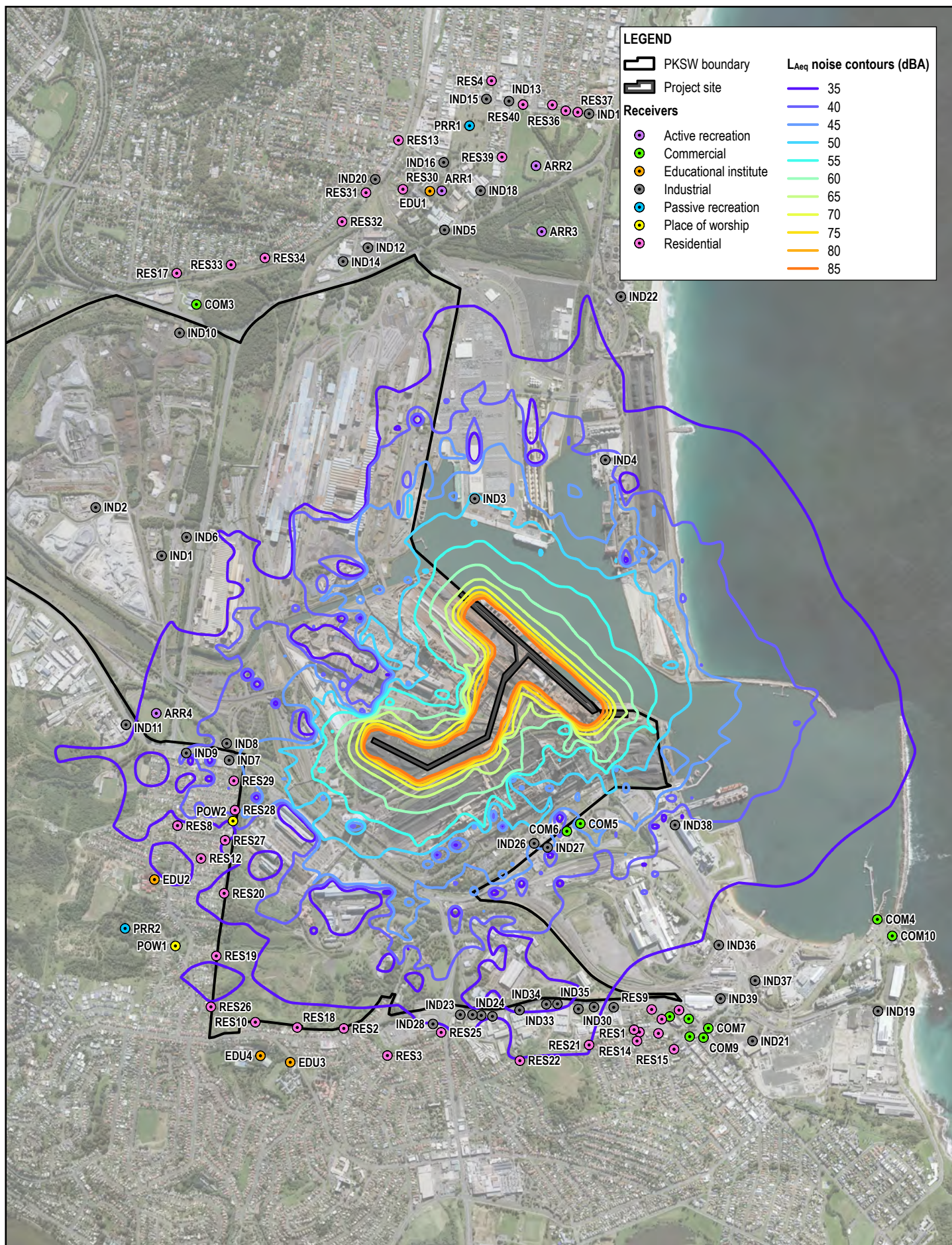


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Commodities Logistics Infrastructure Project
Noise and Vibration Impact Assessment

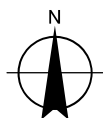
Construction noise contours
Construction scenario 4

Project No. 12555409
Revision No. 0
Date 19/10/2022

APPENDIX B-4



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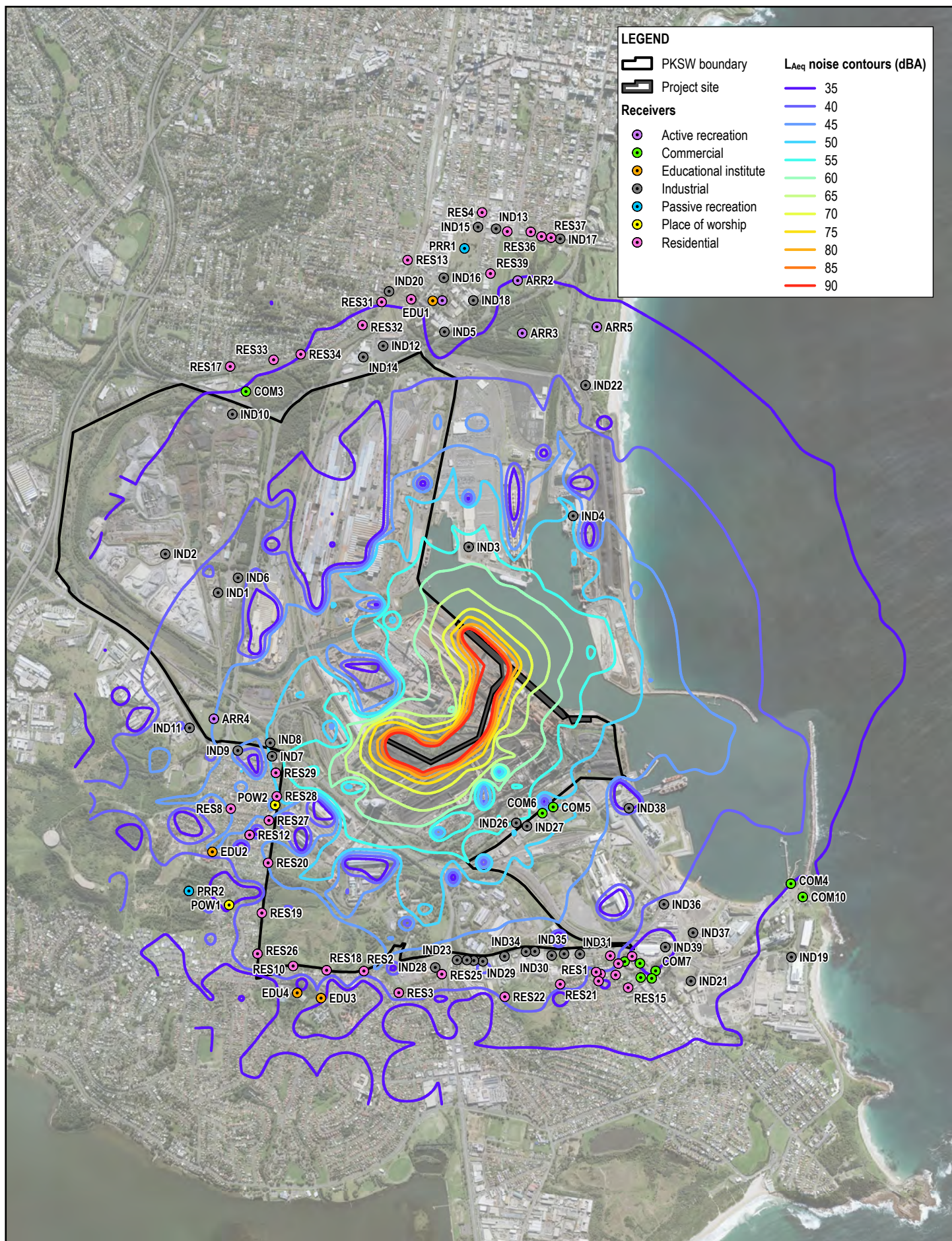


BlueScope Steel (AIS) Pty Ltd
Commodities Logistics Infrastructure Project
Noise and Vibration Impact Assessment

Construction noise contours
Construction scenario 5

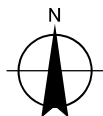
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Revision No. 0
Date 19/10/2022

APPENDIX B-5



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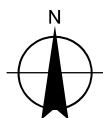
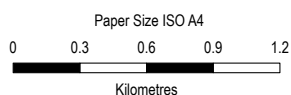
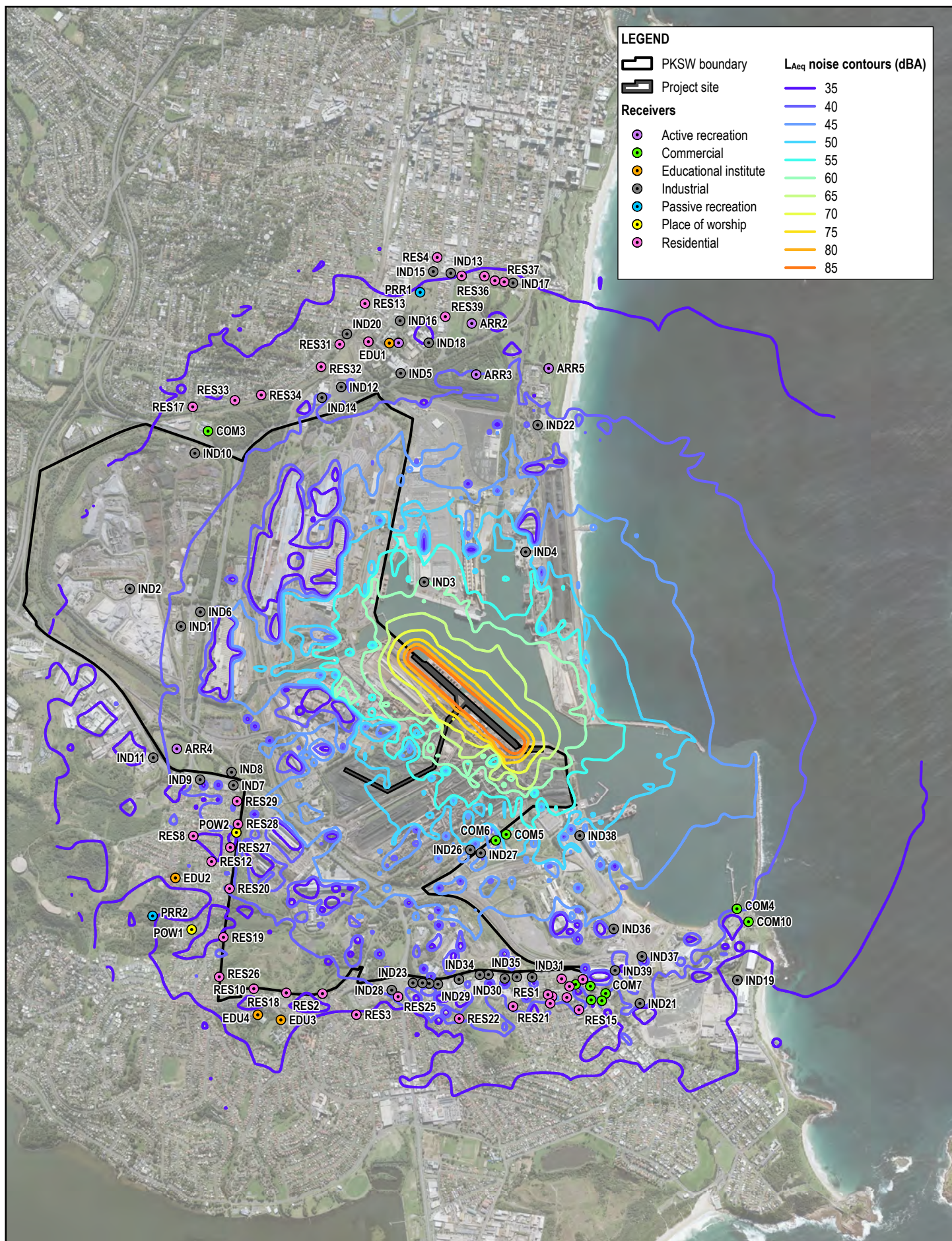


BlueScope Steel (AIS) Pty Ltd
Commodities Logistics Infrastructure Project
Noise and Vibration Impact Assessment

Construction noise contours
Construction scenario 6

Project No. 12555409
Revision No. 0
Date 19/10/2022

APPENDIX B-6



Map Projection: Transverse Mercator
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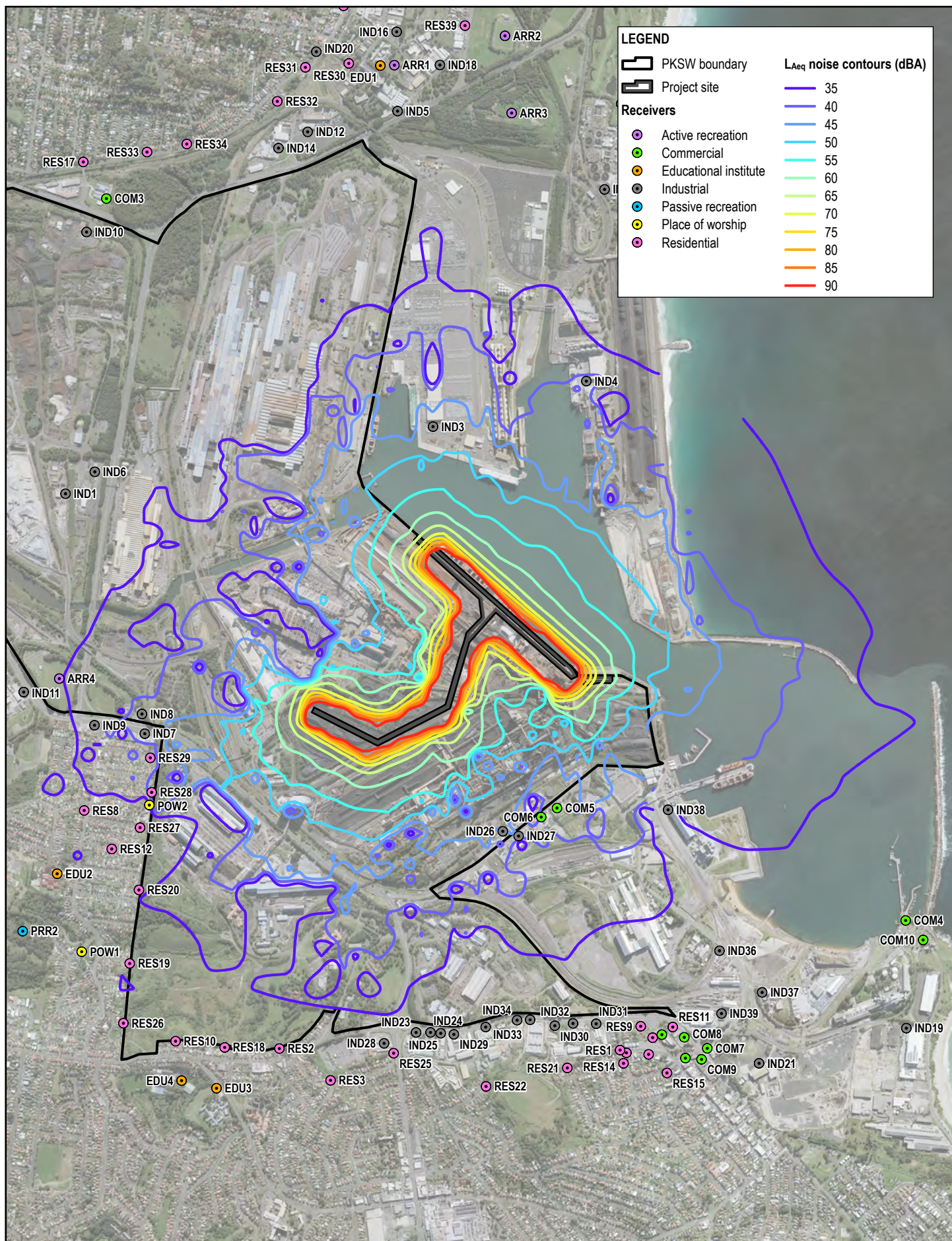


BlueScope Steel (AIS) Pty Ltd
Commodities Logistics Infrastructure Project
Noise and Vibration Impact Assessment

Construction noise contours
Construction scenario 7

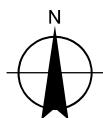
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Date 19/10/2022

APPENDIX B-7



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Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

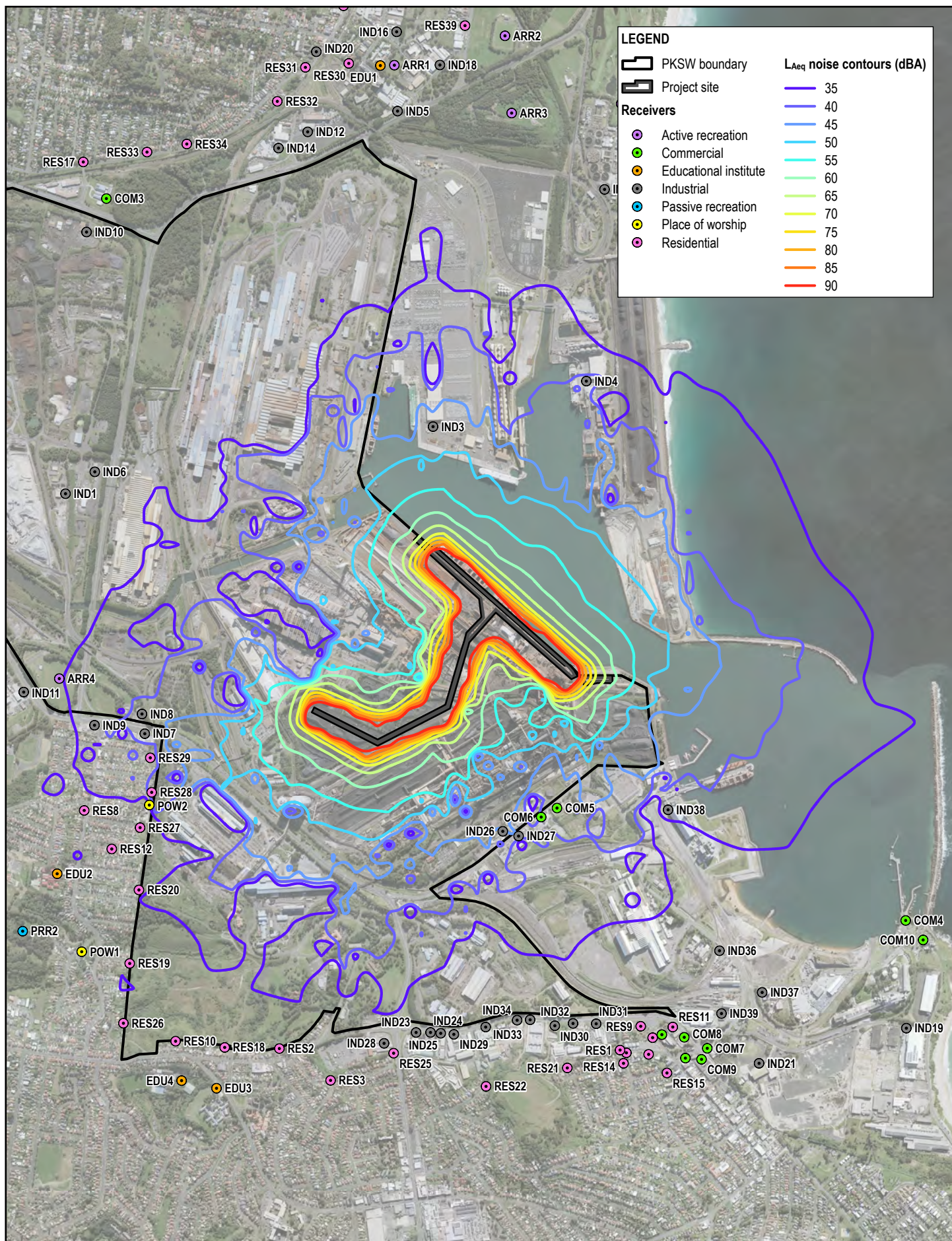


BlueScope Steel (AIS) Pty Ltd
Commodities Logistics Infrastructure Project
Noise and Vibration Impact Assessment

Construction noise contours
Construction scenario 8

Project No. 12555409
Revision No. 0
Date 19/10/2022

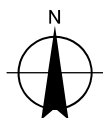
APPENDIX B-8



Paper Size ISO A4

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Kilometres



Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

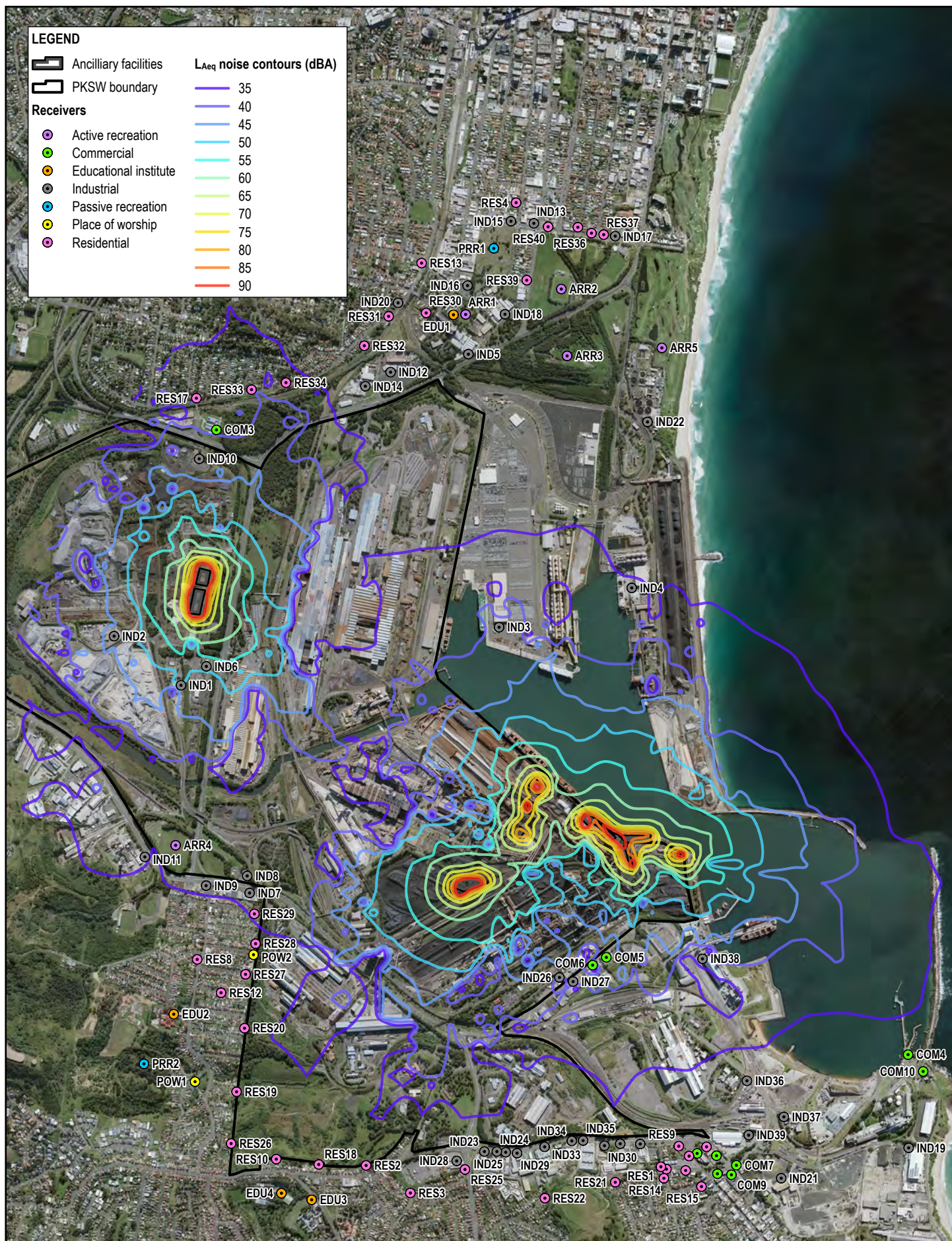


BlueScope Steel (AIS) Pty Ltd
Commodities Logistics Infrastructure Project
Noise and Vibration Impact Assessment

Construction noise contours
Construction scenario 9

Project No. 12555409
Revision No. 0
Date 19/10/2022

APPENDIX B-9

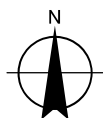


Paper Size ISO A4

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Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56



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Commodities Logistics Infrastructure Project
Noise and Vibration Impact Assessment

Construction noise contours
Laydown areas

Project No. 12555409
Revision No. 0
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APPENDIX B-10



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