

Construction, Noise and Vibration Management Plan

*Blast Furnace No. 6 Reline Project
Port Kembla, NSW*

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RARE
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Abbreviations and Acronyms

Abbreviation	Detail
5BF	Blast Furnace Number 5
6BF	Blast Furnace Number 6
AS	Australian Standards
BlueScope	BlueScope Steel (AIS) Pty Ltd
BS	British Standards
CEMP	Construction Environmental Management Plan
CSSI	Critical State Significant Infrastructure
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.
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
DP	Deposited Plan
DPE	Department of Planning and Environment
EIS	Environmental Impact Statement
EP&A Act	Environmental Planning and Assessment Act 1979 (NSW)
EPA	Environment Protection Authority NSW
EPL	Environment Protection Licence
Hz	Hertz
ICNG	Interim Construction Noise Guideline (DECC, 2009)
km	Kilometre
$L_{A1(1min)}$	The noise level exceeded for 1 per cent of the time over a 1-minute period, used to denote maximum noise levels
LGA	Local Government Area
m	Metre
m/s	Metres per second
mm/s	Millimetres per second
NCA	Noise Catchment Area
NML	Noise Management Level
NPfi	Noise Policy for Industry (EPA, 2017)
NSW	New South Wales
PKSW	Port Kembla Steelworks
Planning Approval	includes the Conditions of Approval, the EIS and Response to Submissions Report
RARE	RARE Environmental Pty Ltd
RBL	Rating Background Noise Level
SPL	Sound Pressure Level
SWL	Sound Power Level
t	Tonnes
T&I SEPP	State Environmental Planning Policy (Transport and Infrastructure) 2021

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 will be directly affected by construction of the proposal. It includes: <ul style="list-style-type: none"> The location of project infrastructure, 6BF, slag handling area and immediate surrounds The area that will be directly disturbed by the movement of construction plant and machinery, and the location of the temporary, construction compounds and laydown areas that will 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, considering the following factors: <ul style="list-style-type: none"> 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 and operations 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 management level	The NML as defined by 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 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.
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.
Proponent	BlueScope Steel (AIS) Pty Ltd
Proposal site	The southern section of the No.2 Works, within the ironmaking facilities, which is located within Lot 1 DP 606434.

Rating Background Level	The RBL is defined by the Noise Policy for Industry (NPI) 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.
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 Overview

This Construction Noise and Vibration Management Plan (CNVMP) has been developed as a Sub - Plan to the Construction Environmental Management Plan (CEMP) for the Blast Furnace No. 6 Reline Project. This CNVMP has been prepared by RARE Environmental Pty Ltd (RARE) on behalf of BlueScope Steel Pty Ltd (BlueScope) to apply to construction activities associated with the Blast Furnace No. 6 Reline Project.

This CNVMP addresses the requirements of the Infrastructure Approval SSI-22545215 and Environment Protection Licence (EPL) 6092.

1.2 Background

BlueScope's Port Kembla Steelworks (PKSW) currently operates as an integrated iron and steel plant utilising Blast Furnace ironmaking and Basic Oxygen Furnace steelmaking. The plant is co-located with hot rolling mills for plate and coil and has adjacent manufacturing facilities for cold rolling, coated products, flat products and welded beams. The site is licenced and operates in accordance with Environment Protection Licence (EPL) 6092.

This project aims to return the Blast Furnace No. 6 (6BF) to service through a reline process to allow operations to continue at PKSW following the end of the current Blast Furnace No. 5 (5BF) campaign with minimal disruption to production levels.

On the 3rd of May 2021, the Minister for Planning and Public Spaces declared the Port Kembla Steelworks Blast Furnace No. 6 Reline Upgrade Project (the Project) as Critical State Significant Infrastructure (CSSI) in accordance with Sections 5.12(4) and 5.13 of the Environmental Planning and Assessment Act, 1979 (EP&A Act). On the 20th of September 2022, the Minister approved the project under Section 5.19 of the EP&A Act subject to conditions specified in Infrastructure Approval SSI-22545215.

1.3 Purpose

This CNVMP has been prepared in accordance with the Infrastructure Approval (SSI-22545215) and EPL 6092. It describes how the management measures and commitments in the Infrastructure Approval and EPL relating to noise and vibration are to be implemented by BlueScope and its contractors during the Project. Specifically, this plan includes requirements to:

- Manage and minimise potential construction noise and vibration impacts to residential receivers.
- Ensure compliance with the noise monitoring related requirements of EPL 6092 Condition L6 and the Approval conditions.

This plan addresses the above requirements and includes, but is not limited to:

- Performance criteria for noise and vibration mitigation.
- Mitigation strategies to minimise impacts related to construction noise and vibration.
- Monitoring plans and reporting demonstrating the performance during the Project.

BlueScope and its contractors acknowledge that minimising construction noise and vibration impacts in the vicinity of the Blast Furnace is paramount to the successful delivery of the construction phase of the Project. BlueScope is committed to ensuring this CNVMP is implemented, reviewed, and updated regularly to ensure its

objectives are met and that the conditions outlined in the Infrastructure Approval (SSI 22545215) and EPL 6092 are achieved.

This CNVMP is applicable to all staff, employees, subcontractors, and any statutory service authorities undertaking the Blast Furnace No. 6 Reline works described in Section 2 of this CNVMP. The CNVMP implementation and on-going development will be managed by the Project Team (refer to Section 3).

2. Project Overview

2.1 Site Description

The Project is in Port Kembla in the Wollongong Local Government Area (LGA) and Illawarra region of NSW. Sydney is approximately 80 km to the north of Port Kembla, while the Wollongong Central Business District 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 PKSW site is zoned IN3 – Heavy Industrial under State Environmental Planning Policy (Transport and Infrastructure) 2021 (T&I SEPP). PKSW and the adjacent Springhill Works together comprise the largest site in the Port Kembla industrial area, occupying approximately 750 ha, and are mostly built around the western and southern side of Port Kembla’s Inner Harbour. The PKSW site is a multi-use 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 within PKSW.

The Project site is an established (brownfield) site located within the No.2 Works at the PKSW. The land to which this Project applies, including all connecting infrastructure and materials handling elements that require upgrades as part of the project, is within the southern section of the No.2 Works, and is part of the ironmaking facilities, located within Lot 1 DP 606434. Ancillary construction facilities will also be required and will be located within the broader PKSW site.

The area surrounding the Port Kembla industrial area is primarily occupied by residential development. These urban areas provide small and large-scale retail outlets, community services (e.g., medical facilities, hospital, schools and sporting facilities) and commercial facilities (e.g., banking and post office). 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. The urban areas of Cringila are located adjacent to the No.1 Works and No.2 Works areas and are the nearest to the project site, being approximately 1.2 km to the southwest.

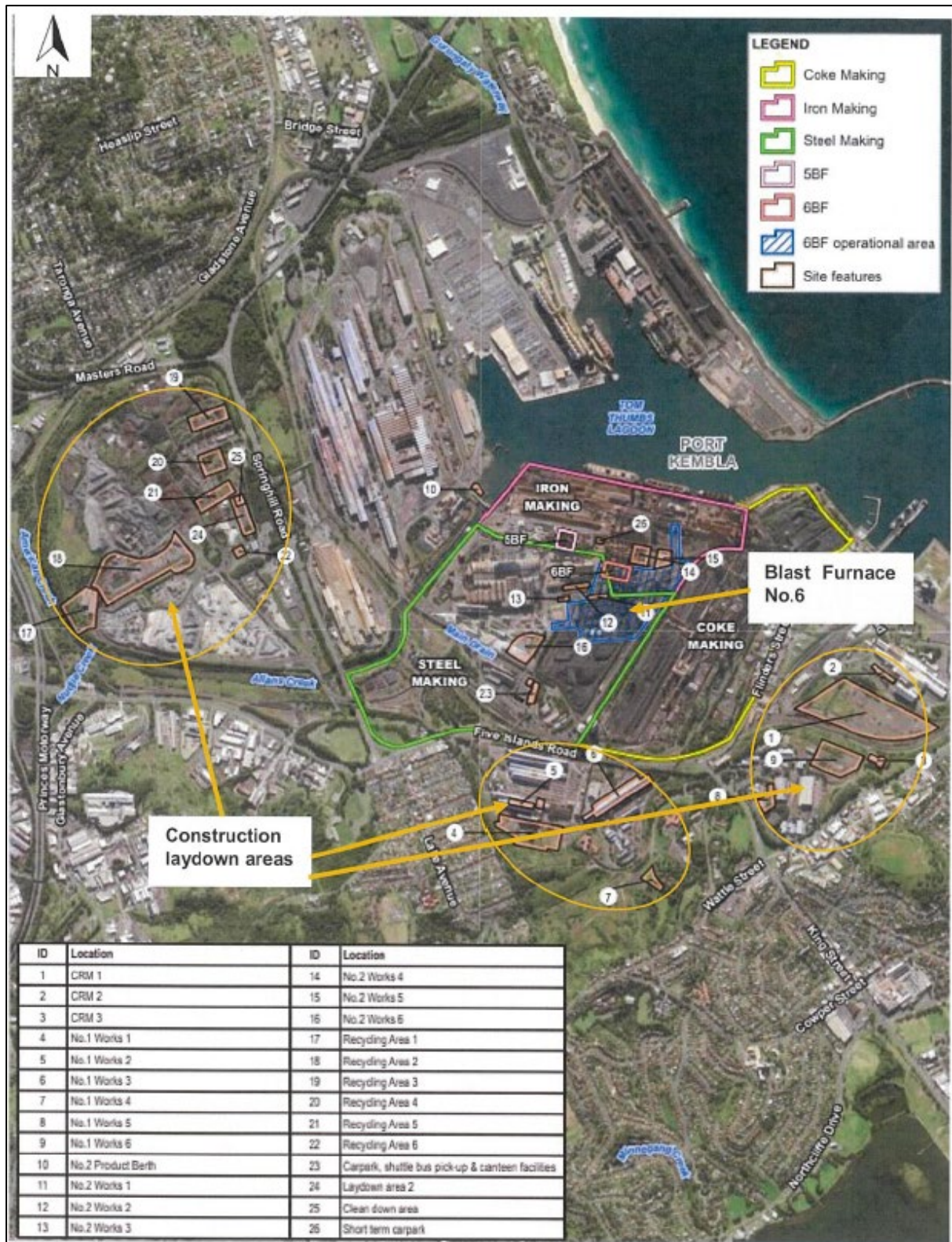


Figure 1: Site Plan. Extracted from Blast Furnace No.6 Reline Project Environmental Impact Statement (p. 28) GHD, 2022.

2.2 Project Scope of Work

The Project involves the relining of 6BF over a period of approximately 3 years to return it to service and commence ironmaking after 5BF ceases operation. Major construction work will be required within the blast furnace and surrounding facilities to deliver the Project.

The relining of the furnace initially involves removal of remaining burden material and iron skull, followed by stripping of the staves, refractories and hearth from inside the shell. In places, repairs to the furnace shell will be required. Once stripped, installation of the new hearth, sidewall refractories and staves will be completed, together with repairs/replacement of the tuyeres, tapholes, furnace cooling systems and instrumentation. Significant work will also be required to prepare each of the 6BF ancillary systems for continuous operation across the length of the new campaign.

Following construction and equipment commissioning, 5BF will be ramped down and decommissioned. 6BF will then be hot-commissioned and ramped up for operation. 5BF and 6BF will not operate concurrently.

2.3 Blasting

Removal of the iron skull within 6BF could require rounds of blasting to be undertaken. In accordance with Condition B39 of the Infrastructure Approval, should blasting be required, noise and vibration monitoring will be performed during the first two blasting events to determine compliance with Conditions B37 and B38. Details of the standards, guidelines, and methodology for this monitoring is detailed in Section 10.

2.4 Program

Current planning aims for a transition to a relined No.6 Blast Furnace in 2026, with execution of site works commencing in late 2023. The estimated duration and planned start times for construction activities are outlined in Table 1.

Table 1: Works Schedule

Stage	Activities	Est. Duration	Planned Start
1	Progress with refurbishment activities that do not require long-lead items. Early works commences for enabling activities. Includes cranes, lifts, Casthouse roof replacement, drainage, construction facilities	12 Months	2023
2	Construction activities including demolition, civils, Stockhouse, Slag Handling, Hot Blast System, gas system, cooling system, wreck out of furnace, Furnace Top Control system and automation upgrade	24 Months	2024
3	Initiated with twelve months advance notice of end of 5BF operations Construction activities including relining of furnace Pre-commissioning and commissioning of 6BF	12 Months	2025
4	Managed transition of operations from 5BF to 6BF with ramp-down of 5BF followed by ramp-up production of 6BF 5BF decommissioned and made safe on ceasing operation	6-8 Weeks	2026

3. Roles and Responsibilities

All personnel working on the Project must comply with regulatory and BlueScope requirements and must conduct work in a proper and efficient manner to protect the environment.

The Project Director takes primary responsibility for environmental issues and compliance with this CNVMP. Environmental advisors within the BlueScope Environment Department will support the Project Director and will assist managers and supervisors fulfill their accountabilities, including the implementation and maintenance of the various mitigation/management measures outlined in this CNVMP.

The responsibilities for the key management and supervision roles include (but are not limited to) those listed in Table 2.

Table 2: Key Management Roles and Environmental Responsibilities

Role	Responsibilities
Project Director	<ul style="list-style-type: none"> Develop a culture in which environmental effects are considered at all times. Contribute to and participate in the environmental program
Project Manager	<ul style="list-style-type: none"> Develop a culture in which environmental effects are considered at all times. Participate in environmental audits and communication sessions. Set objectives, monitor, and analyse environmental performance. Understand and manage 6BF Reline environmental compliance for legislative requirements. Incorporate environmental safety goals into the roles of all team members. Ensure that environmental responsibility is an integral part of all management systems and processes. Review training needs for all employees. Provide resources to ensure that actions to address environmental issues are implemented. Ensure that adequate environmental evaluations are made of all modification designs and plant and equipment purchases. Ensure that systems are in place to inform employees, contractors and visitors of pertinent environmental issues. Ensure that meetings are held to discuss environmental issues. Ensure that desktop exercises are carried out to test the effectiveness of Emergency Response Plans. Ensure that there is responsible management of contractors on the site.
Engineering Manager	<ul style="list-style-type: none"> Ensure that management systems are in place and understood to give environmentally safe design and operation. Ensure that environmental hazards and risks are identified for all plant and major equipment. Ensure that designs are fit for purpose and that adequate consideration has been given to environmental issues. Ensure that all engineering staff are inducted and have received the required training to enable adequate environmental management of site. Contribute to and participate in the 6BF Reline management team environmental program. Provide engineering support as required to assist in the implementation and compliance of this CNVMP. Promote the involvement of all employees in improving environmental management.

	<ul style="list-style-type: none"> • Conduct environmental audits to evaluate compliance with environmental management plans and systems as per the audit/inspection schedule. • Liaise with BlueScope’s Environment Department to ensure full understanding and communication of all environmental issues impacting on BlueScope operations from 6BF Reline activities and vice versa. • Participate in environment meetings. • Assist in the preparation of Emergency Response Plans. • Identify hazards and risks through analysis and inspection, including personnel, plant and environment. • Focus on the elimination of environmentally hazardous acts and rectify unsafe conditions quickly. • Conduct workplace inspections.
<p>Construction Manager</p>	<ul style="list-style-type: none"> • Contribute to a positive environmental culture by example. • Ensure that management systems are in place and understood to provide an environmentally safe construction workplace. • Ensure that environmental hazards and risks are identified on all construction activities. • Arrange construction pre-start hazard-analysis studies for all “at risk” operations. • Contribute to and participate in the 6BF Reline management team environment program. • Participate in environment meetings. • Participate in environmental inspections and serious incident investigations. • Participate in environmental audits. • Focus on the elimination of environmentally unsafe acts and rectify unsafe conditions quickly. • Ensure that there is responsible management of contractors on the site. • Ensure that competent and trained, responsible engineers and supervisors exist to manage contractors on the works. • Maintain a relationship with BlueScope management on environmental issues. • Facilitate reviews of the CNVMP.
<p>HSE Manager</p>	<ul style="list-style-type: none"> • Understand and manage 6BF Reline environmental compliance for legislative requirements. • Participate in the 6BF Reline management team environmental programs. • Contribute to a positive environmental culture by example. • Ensure that meetings are held to discuss environmental issues. • Ensure that management systems are in place for environmentally safe execution of the project. • Report HSEC matters and performance to BlueScope. • Coordinate and participate in drills and exercises to test the effectiveness of Emergency Response Plans. • Review training needs for all employees and provide training as required. • Ensure that proper training is provided to enable an environmentally safe execution of the project. • Ensure that environmental hazards and risks are identified, and control measures introduced on all project activities. • Maintain a relationship with BlueScope management on environmental issues.
<p>Environmental Advisor</p>	<ul style="list-style-type: none"> • Promote a culture in which environmental effects are considered at all times. • Understand and manage 6BF Reline environmental compliance for legislative requirements. • Liaise with regulatory bodies and other external agencies. • Promote the involvement of all employees in improving environmental compliance.

	<ul style="list-style-type: none"> • Focus on the elimination of environmentally hazardous acts and rectify unsafe conditions quickly. • Ensure self and others' environmental awareness at all times. • Participate in accident/incident investigations. • Report to the 6BF Reline Management team on environmental issues. • Participate in and contribute to the 6BF Reline management team environmental plan. • Ensure that all incidents are thoroughly investigated to identify root causes.
<p>Construction Co-ordinators</p>	<ul style="list-style-type: none"> • Compliance with the requirements of the CNVMP. • Ensuring environmental aspects are adequately addressed and mitigated during Job. • Safety and Environment Analyses and execution of Works. • Arranging toolbox meetings to the defined schedule and ensuring that the meetings are of high standard with all employees attending and participating. • Initiation and completion of environmental audits and inspections. • Reporting all incidents, accidents and non-conformance in accordance with the CEMP. • Participation in relevant investigations of accidents, incidents and non-conformance. • Demonstrating to the vendor / contractor workforce, by their actions, commitment to the highest standards of environmental management. • Provision of appropriate resources to control / mitigate environmental hazards. • Compliance with the requirements of the CNVMP. • Attendance at team's environment meetings. • Pro-active addressing of environmental issues, looking for improvements and looking after themselves and the environment. • Ensuring hazards and controls are addressed and implemented prior to and during the execution of Works.

4. Legislative Requirements and Applicable Guidelines

4.1 Legislative Requirements

The key legislative requirements relevant to the project are detailed in Table 3.

Table 3: Key Legislative Requirements

Requirement	Description	Applicability
Protection of the Environment Operations Act 1997 (POEO Act)	An objective of the POEO Act is to protect, restore and enhance the quality of the environment, in recognition of the need to maintain ecologically sustainable development. The POEO Act provides for an integrated system of licensing and contains a core list of activities in Schedule 1 which require an Environment Protection Licence (EPL). PKSW is operated under EPL 6092.	Part 5.5 of the POEO Act outlines measures and penalties for noise pollution related to operation of plant and equipment. Construction noise impacts has been assessed and management measures developed.
Protection of the Environment Operations (Noise Control) Regulation 2017 (POEO Noise Regulation)	The POEO Noise Regulation is made under the POEO Act. The Regulation enables the NSW EPA to regulate noise related to a variety of sources, including construction. The POEO Noise Regulation provides specifications on noise control from motor vehicles and determines the maximum noise levels vehicles and vessels can produce.	Part 2 of the POEO Noise Regulation outlines requirements for motor vehicles that emit noise. Section 6 states a person must not cause a motor vehicle to be used in a manner that will emit noise in excess of the prescribed levels outlined in Schedule 1.

4.2 Applicable Guidelines

The main guidelines, specifications and policy documents relevant to this Plan include:

- Interim Construction Noise Guideline (ICNG) (DECC 2009).
- Construction Noise and Vibration Guidelines (TfNSW 2016).
- Draft Construction Noise and Vibration Guidelines (TfNSW 2019).
- Road Noise Policy (DECCW 2011).
- Noise Policy for Industry (EPA 2017).
- Assessing Vibration: A Technical Guideline (AVTG) (DEC 2006).
- German Standard DIN4150-1999 Structural vibration Part 3: Effects of vibration on Structures (DIN 1999).
- British Standard 7385: Part 2-1993 'Evaluation and measurement of vibration in buildings Part 2 (BSI 1993).
- Australian Standard AS 2107:2000 Acoustics – Recommended design sound levels and reverberation times for building interiors.
- Australian Standard AS 2187.2-2006 Explosives—Storage and use.

5. Planning Requirements

5.1 Conditions of Approval

The planning requirements and the corresponding noise and vibration management requirements related to the Project are detailed below. The requirements set out in the Infrastructure Approval (SS-22545215) dated 20th September 2022 and the Blast Furnace No.6 Reline Project Environmental Impact Statement (GHD 2022) are included in Table 4. The requirements set out in EPL 6092 are included in Table 4.

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Table 4: Approval Conditions

Requirement	Management Measure ID	Source	Evidence
<p>A construction noise and vibration management plan (CNVMP) will be developed once a detailed construction methodology has been prepared. The plan will include:</p> <ul style="list-style-type: none"> ● details of the construction methodology ● updated noise predictions at sensitive receivers based on finalised construction methodology – a noise monitoring procedure and program for the duration of works in accordance with the construction noise and vibration management plan and any approval or licence conditions. Monitoring reports will be prepared in accordance with the requirements of the noise monitoring procedures. ● feasible and reasonable mitigation measures to be implemented to mitigate predicted impacts to sensitive receivers that may be noise affected. ● a community consultation plan to liaise with the noise affected receivers, including: <ul style="list-style-type: none"> ○ Notification to residences a minimum of 7 calendar days prior to the start of high noise generating works, including 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 complaints register on site. 	NV1	EIS Condition C3 CEMP	CNVMP
<p>Provide site inductions to all employees, contractors and subcontractors. The induction must at least include:</p> <ul style="list-style-type: none"> ● All relevant project specific and standard noise and vibration mitigation measures ● Relevant licence and approval conditions ● Permissible hours of work ● Any limitations on noise generating activities with special audible characteristics. ● Location of nearest sensitive receivers ● Construction employee parking areas ● Designated loading/unloading areas and procedures. ● Site opening/closing times (including deliveries) ● Environmental incident procedures 	NV2	EIS CEMP	SAP Comply Flow
Quieter and less vibration emitting construction methods will be used where feasible and reasonable.	NV3	EIS	JSEA/SWS/SWMS
The noise levels of plant and equipment will have an operating sound power lower or similar to the levels presented in Table 8.19 of the EIS.	NV4	EIS	CNVMP
The size of the vibratory compactor will be limited to 18 tonnes or less to maintain the safe work buffer distances.	NV5	EIS	JSEA/SWS/SWMS

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Requirement	Management Measure ID	Source	Evidence
<p>The project must comply with the hours detailed below, unless otherwise agreed in writing by the Planning Secretary:</p> <p><u>Construction</u></p> <ul style="list-style-type: none"> Monday – Friday 7 am to 6 pm Saturday 8 am to 1 pm <p><u>Blasting</u>¹</p> <ul style="list-style-type: none"> Monday – Saturday 9 am to 5 pm <p><u>Commissioning</u></p> <ul style="list-style-type: none"> Monday – Sunday 24 hours <p><u>Operation</u></p> <ul style="list-style-type: none"> Monday – Sunday 24 hours 	NV6	EIS Condition B33	Construction Schedule
As much distance as possible will be placed between the plant or equipment and residences and other sensitive land uses.	NV7	EIS	JSEA/SWS/SWMS
Equipment with directional noise characteristics will be oriented away from noise sensitive receivers where possible.	NV8	EIS	JSEA/SWS/SWMS
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.	NV9	EIS	Construction Schedule
Only the necessary size and power of equipment will be used.	NV10	EIS	JSEA/SWS/SWMS
Loading and unloading of materials/deliveries will occur as far as practically possible from sensitive receivers.	NV11	EIS CTMP	JSEA/SWS/SWMS
The use of engine compression brakes will be limited in proximity to residences.	NV12	EIS CTMP	JSEA/SWS/SWMS
Equipment will not be operated until it is maintained or repaired, where maintenance or repair would address the annoying character of noise identified	NV13	EIS	Pre work inspections
Construction traffic travelling along Emily Road: need to ensure that traffic remains below the speed limit of 40 km/hr.	NV14	EIS CTMP	CTMP
<p>All rock-breaking and pile driving activities should be confined between the hours: daytime hours of 7:00 am to 6:00 pm from Monday to Friday and 8:00 am to 1:00 pm on Saturday, with the exception of the following activities:</p> <ul style="list-style-type: none"> The delivery of oversized plant or structures. Emergency work to avoid the loss of life or damage to property, or to prevent environmental harm. <p>Removal of the salamander and staves from inside the furnace will likely be carried out 24 hours a day to minimise the hire time and maximise the utilisation of the specialised wreck out equipment sourced from overseas.</p>	NV15	EIS EPL 6092	Construction Schedule

¹ Blasting carried out inside the blast furnace structure to remove iron skull, refractories and burden material.

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Requirement	Management Measure ID	Source	Evidence
Works required to be undertaken outside of standard construction hours (ICNG) should be justified in the project CEMP and assessed against the noise requirements of the ICNG.	NV16	EIS CTMP	CEMP
Approval in writing from the EPA will be sought for construction activities outside of the standard hours of construction per EPL 6092 requirements.	NV17	EIS EPL 6092	EPA Correspondence
<p>Blast Monitoring</p> <p>The Proponent must monitor the first two blasting events to determine compliance with conditions B37 and B38 and provide a report to the EPA. Where monitoring has determined that blast impacts are not discernible outside of the site, blasting may be conducted outside the hours listed above, as agreed with the EPA.</p> <p><i>Note: In all cases blasting must not be undertaken on Sundays and public holidays or between the hours of 8 pm and 6 am.</i></p>	NV20	Condition B39	Blast Monitoring Noise Report(s)
<p>Construction Noise</p> <p>The project must be constructed to achieve the construction noise management levels detailed in <i>the Interim Construction Noise Guidelines</i> (DECC, 2009) (as may be updated or replaced from time to time). All feasible and reasonable noise mitigation measures must be implemented and any activities that could exceed the construction noise management levels must be identified and managed in accordance with the Construction Environmental Management Plan (Reference) required by Condition C2.</p>	NV21	Condition B35	Noise Compliance Monitoring Report
<p>Construction works outside of the hours identified in above may be undertaken in the following circumstances:</p> <ul style="list-style-type: none"> (a) works that are inaudible at the nearest sensitive receivers. (b) works agreed to in writing by the Planning Secretary. (c) for the delivery of materials required outside these hours by the NSW Police Force or other authorities for safety reasons; or (d) where is required in an emergency to avoid loss of lives, property or to prevent environmental harm. 	NV22	Condition B34	DPE Correspondence
<p>Vibration Criteria</p> <p>The airblast overpressure level from blasting must not exceed the following limits at any sensitive receiver:</p> <ul style="list-style-type: none"> (a) 115 dB (Lin Peak) for more than 10% of the total number of blasts for the project; and (b) 120 dB (Lin Peak) at any time. <p>Ground vibration peak particle velocity from blasting must not exceed the following limits at any sensitive receiver:</p> <ul style="list-style-type: none"> (a) 5 mm/s for more than 10% of the total number of blasts for the project; and (b) 10 mm/s at any time. 	N/A	Condition B37 & B38	Blast Monitoring Noise Report(s)

5.2 Environmental Protection Licence

Conditions applicable to noise and vibration requirements under EPL 6092 are outlined in Table 5.

Table 5: EPL 6092 Conditions

Requirement	Reference	Evidence
<p>Construction Activity Noise Limits All construction activities for new works (i.e., excluding routine maintenance works), including pile driving, jack hammering, warning sirens and similar high intensity noise sources, undertaken at the premises, and which are audible at residential premises, must be restricted to the following times:</p> <ul style="list-style-type: none"> A) 7:00 am to 6:00 pm Mondays to Fridays. B) 8:00 am to 1:00 pm on Saturdays; and C) At no time on Sundays and Public Holidays. <p>The hours of construction specified above may be varied by written consent of the EPA.</p>	<p>Condition L6.2 Condition L6.1 – L6.3</p>	<p>CEMP CNVMP</p>
<p>Telephone Complaints The licensee must operate during its operating hours a telephone complaints line for the purpose of receiving any complaints from members of the public in relation to activities conducted at the premises or by the vehicle or mobile plant, unless otherwise specified in the licence. The licensee must notify the public of the complaints line telephone number and the fact that it is a complaints line so that the impacted community knows how to make a complaint. The preceding two conditions do not apply until 3 months after:</p> <ul style="list-style-type: none"> A) the date of the issue of this licence or B) if this licence is a replacement licence within the meaning of the Protection of the Environment Operations (Savings and Transitional) Regulation 1998, the date on which a copy of the licence was served on the licensee under clause 10 of that regulation. 	<p>Condition M7</p>	<p>CEMP Section 3.4</p>

6. Existing Environment

6.1 Project location and sensitive receivers

The project is situated in Port Kembla, within the Wollongong Local Government Area (LGA) and the Illawarra region of New South Wales (NSW).

The nearest residential developments to PKSW can be found in the suburbs of Cringila, Berkeley, Lake Heights, Warrawong, and Port Kembla to the south, as well as Unanderra, Cobblers Hill, Mount St Thomas, Coniston, and Figtree to the north and west.

For efficiency in assigning noise management levels to identified sensitive receivers, they have been divided into representative Noise Catchment Areas (NCA), within which existing levels of noise are likely to be similar and impacts from the project of a similar magnitude. A summary of nearby receivers and NCAs is presented in Table 6.

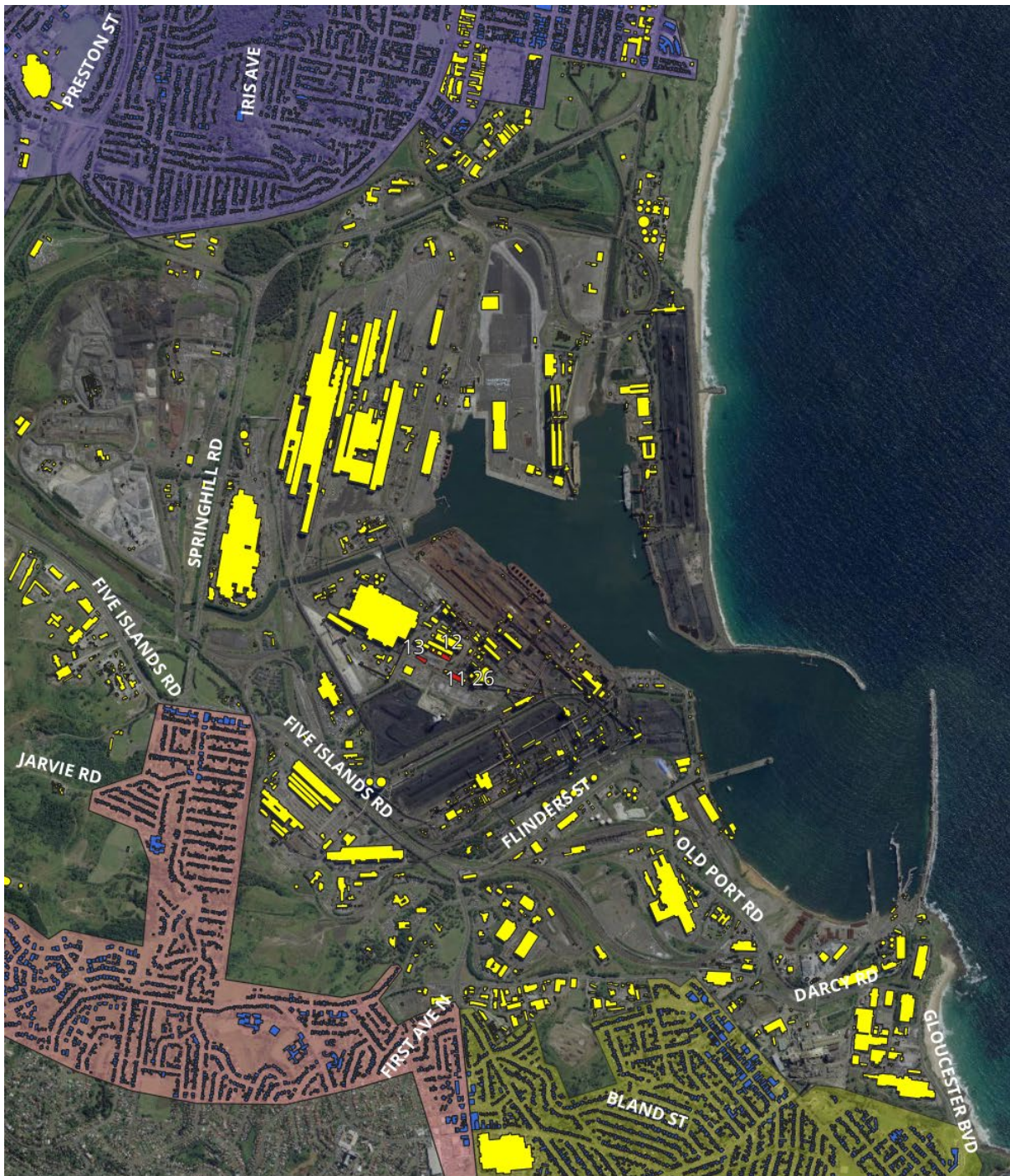
Table 6: Key Residential Sensitive Receivers

NCA	Description
NCA01	Residential and mixed-use areas of Kembla
NCA02	Residential areas of Cringila
NCA03	Residential and other sensitive receivers in Mount St Thomas, Coniston & Wollongong
NCA04	Industrial and commercial uses including Port Kembla Steel works

Other sensitive receivers in the vicinity of the PKSW include classrooms, hospitals, places of worship, recreational areas, community centres and hotels. Commercial and other industrial areas are generally not considered sensitive and have relatively high noise criteria. The closest non-residential sensitive receiver is 1350 metres east southeast of the project, a Place of Worship. Non-residential sensitive receivers up to 2 kilometres from the works are listed in Table 7.

Table 7 Non-residential sensitive receivers

Description	Land use	Distance from works	Direction
BlueScope Centenary Park	Active recreation	1600 m	W
Cringilla Public School	Education	1850 m	ESE
Imam Rida As Mosque	Place of Worship	1950 m	SE
Bilal Mosque	Place of Worship	1350 m	ESE



Noise catchment areas



Figure 2: Existing Land Use and Receivers.

6.2 Existing acoustic environment

The existing acoustic environment at each of the receivers identified above is influenced by industrial land uses in the area such as PKSW, ports and grain terminals. Heavily trafficked transport corridors also influence the existing noise level such as Five Islands Road, Princes Motorway and Princes Highway.

The EIS noted each NCA:

- Is dominated by ‘urban hum’ or industrial source noises.
- Has through-traffic with characteristically heavy and continuous traffic lows during peak periods
- Is near commercial and industrial districts.

Background noise monitoring was completed in 2018 as part of the EIS for Port Kembla Gas Terminal Noise and Vibration Impact Assessment² completed by Australian Industrial Energy (AIE). Data from this study was adopted in the Environmental Impact Statement (EIS) for the No. 6 Blast Furnace (6BF) by GHD Pty Ltd (GHD) in 2022 and will be used in this CNVMP to establish representative Rating Background Levels (RBLs) for the project.

The RBLs are summarised in Table 8 and indicate little variation between the day, evening and night assessment periods with industrial and road traffic noise remaining relatively constant. The ambient L_{Aeq} values also remain consistent across each monitoring location and assessment period.

Table 8: Rating Background Levels (AIE, 2018)

ID	Rating Background Level (RBL), L90 - dBA			Ambient level, Leq - dBA		
	Day	Evening	Night	Day	Evening	Night
L1	39	39	39	52	50	50
L2	43	42	42	51	49	50

² Port Kembla Gas Terminal – Noise and Vibration Impact Assessment, Australian Industrial Energy (AIE), 2018.

7. Assessment Criteria

7.1 Construction Noise

7.1.1 Noise Management Levels

The *Interim Construction Noise Guideline* (ICNG) outlines the following Noise Management Levels (NMLs). It is important to note that NMLs are not a noise limit but rather a level at which noise management is required.

Table 9 summarises the NMLs for standard and outside standard hours. During standard hours, where construction noise is within 10 dB(A) of the RBL, the impacts are considered acceptable. Where construction noise is more than 10 dB(A) above the RBL, a residential receiver is taken to be noise affected and the proponent should undertake all reasonable and feasible steps to manage the impact and consult with the affected community. Above a L_{Aeq} , 15-minute noise level of 75 dB(A), a receiver is considered to be highly noise affected, requiring respite to be given in consultation with the regulatory authority and the community.

At night, or outside approved construction hours, construction noise at a residential receiver more than 5 dB(A) above the RBL is taken to be noise affected.

Table 9: Noise Management Levels (ICNG, 2009)

Time of Day	Noise Management Level, L_{Aeq} (15 min)	Application Notes
Recommended standard hours	Noise affected: RBL + 10 dBA	Where the predicted or measured L_{Aeq} (15 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	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: <ul style="list-style-type: none"> • 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 will 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.

7.1.2 Sleep disturbance

The ICNG recommends where works are likely to occur over more than two consecutive nights, maximum noise levels should be analysed in terms of the extent and number of times the maximum noise exceeds the RBL. Additionally, the DECCW (2011) Road Noise Policy discusses a guideline aimed at limiting the level of sleep disturbance due to environmental noise: a $L_{A1, 1 \text{ minute}}$ or L_{Amax} level of any noise should not exceed the ambient L_{A90} noise level by more than 15 dB(A).

The Road Noise Policy also suggests maximum internal noise levels below 50-55 dB(A) are unlikely to awaken people from sleep and one or two noise events per night, with maximum internal noise levels of 65-70 dB(A) are not likely to affect health and wellbeing significantly.

Based on this guidance, a sleep awakening criterion of 55 dB(A) (internal) has been adopted for the works. Given that noise attenuation of 10 dB(A) is typically provided by an open window, a sleep awakening criterion of 65 dB(A) (external) has been applied to residential bedroom façades.

Hence, a screening criterion for sleep disturbance of RBL + 15 dB(A) and an awakening criterion of 65 dB(A), measured as $L_{A1, 1 \text{ minute}}$ or L_{Amax} , will be applied. While not mandatory, the screening criterion should trigger additional consideration of the nature and frequency of disturbances whilst the awakening criterion should act as a maximum noise goal not to be exceeded on more than a couple of occasions.

7.1.3 Project-specific construction noise management levels

Based on the measured RBLs and requirements of the ICNG, project-specific noise management levels (NMLs) are summarised in Table 10. NMLs for non-residential receivers are described in Table 11.

Table 10 Noise management levels

Representative NCA	Noise Management Level, L_{Aeq} , 15 minute					
	Standard hours		Outside standard hours			
	Noise affected	Highly noise affected	Day	Evening	Night	Sleep disturbance screening (L_{Amax})
3	49	75	44	44	44	54
1 & 2	53	75	48	47	47	57

Table 11 NMLs for non-residential sensitive receivers

Sensitive receiver type	NML applicable when in use, L_{Aeq} , 15 min
Classrooms at schools and other educational institutions	Internal noise level 45 dB(A)
Hospital wards and operating theatres	Internal noise level 45 dB(A)
Places of worship	Internal noise level 45 dB(A)
Active recreation areas (characterised by sporting activities and activities which generate their own noise or focus for participants, making them less sensitive to external noise intrusion)	External noise level 65 dB(A)
Passive recreation areas (characterised by contemplative activities that generate little noise and where benefits are compromised by external noise intrusion, for example, reading, meditation)	External noise level 60 dB(A)

7.1.4 Construction traffic noise

While operating within the construction site, construction vehicles are assessed as part of the construction activity of which they are a part. However, once these vehicles leave the construction site and enter public roads, they are assessed as road traffic.

The NSW Road Noise Policy is generally adopted to assess the impact of construction traffic on public roads. A screening test is first applied to establish whether noise levels will increase by more than 2 dB due to construction traffic. Where any noise increase is less than 2 dB, the objectives of the Road Noise Policy have been met.

Where this is not the case, further assessment is undertaken in line with the Noise Criteria Guideline, which Transport for NSW uses to implement the Road Noise Policy. Applicable noise criteria from the Noise Criteria Guideline are summarised in Table 12.

Table 12 Road traffic noise criteria

Development type	Day 7am to 10pm	Night 10pm to 7am
Existing residence affected by additional traffic on arterial roads generated by land use developments	60 L _{Aeq} (15 hour)	55 L _{Aeq} (9 hour)
Existing residence affected by additional traffic on local roads generated by land use developments	55 L _{Aeq} (1 hour)	50 L _{Aeq} (1 hour)

7.2 Construction Vibration

7.2.1 Human Comfort

Construction vibration that potentially affects people is assessed in accordance with *Assessing Vibration: A Technical Guideline* (DEC, 2006). Construction activities typically generate intermittent vibration, defined as interrupted periods of continuous or repeated periods of impulsive vibration, or continuous vibration that varies significantly in magnitude. Sources can originate from activities such as drilling, hydraulic hammering, and sources which operate intermittently, but which would produce continuous vibration if operated continuously. Acceptable values of vibration are presented in Table 13.

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.

Table 13: Acceptable Peak Particle Velocity (PPV) values for human comfort.

Location	Time Period	Continuous and impulsive vibration guide goals	
		Preferred value (mm/s)	Maximum value (mm/s)
Residences	Day	0.28 (8.6)	0.56 (17.0)
Offices, schools, educational institutions 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)

7.2.2 Structural Damage

Vibration impacts related to building structures has been assessed in accordance with *German Standard DIN 4150-3: Structural Vibration - effects of vibration on structures* (DIN 4150), which provides guideline values for the maximum absolute value of the velocity 'at the foundation of various types of buildings'.

Guideline values from the DIN 4150 for short term vibration impacts on building structures are outlined in Table 14.

Table 14: Guideline values for short term vibration on structures.

Line	Type of structure	Guideline values for velocity (mm/s)		
		1 Hz to 10 Hz	10 Hz to 50 Hz	50 Hz to 100Hz ³
1	Buildings used for commercial purposes, industrial buildings, and buildings of similar design.	20	20 to 40	50 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 (e.g., listed buildings under preservation order).	3	3 to 8	8 to 10

7.3 Blasting

Blasting may result in both ground-borne and air-borne vibration, the latter known as airblast overpressure. Blast criteria are presented in:

- Technical Basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration (ANZECC, 1990)
- Australian Standard AS2187.2 (2006) Explosives – Storage and use Part 2: Use of explosives

For human comfort, ANZECC (1990) recommends airblast overpressure should be no greater than 115 dBL on more than 5% of the total blasts over 12 months and should not exceed 120 dBL.

For ground-borne vibration, the recommended human comfort level should not exceed peak particle velocity of 5 mm/s on more than 5% of total blasts over 12 months and should not exceed 10 mm/s.

Considering structural damage, AS2187.2 recommends airblast to not exceed 133 dBL, which has been shown to result in no damage to buildings.

For ground-borne vibration, DIN 4150 recommends 5 mm/s as not likely to cause damage to residential buildings and 20 mm/s for commercial/industrial buildings at frequencies below 10 Hz.

³ At the frequencies above 100 Hz, the values given in this column may be used as minimum value.

8. Impact Assessment

8.1 Noise

8.1.1 Construction activities and equipment

In line with NV1 in Table 4, this section provides an updated noise impact assessment based on current construction methodologies.

The works will involve removing burden materials, refractory bricks and blocks and staves within the interior of the blast furnace. Repairs or replacement of ancillary equipment or structures will also be carried out. The following process is representative of the major project phases.

- Remove remaining burden materials, iron skull, worn carbon black refractories in the hearth and remainder of the vessel.
- Demolish other equipment included cooling staves, main refractory lining and clarifier tank.
- Repair blast furnace shell as needed.
- Install new clarifier tank.
- Install new hearth, sidewall refractories and staves.
- Repair or replace tuyeres, tapholes and instrumentation.
- Repair, maintain or upgrade cooling systems, hot blast system, gas system, furnace top, cast house floors, stock house and power systems.
- Construct new ferrous feed system and new slag handling area.
- Install new slag granulation system.
- Commissioning

The plant expected to be used over the course of the project includes:

- | | | |
|--|--|---------------------------------|
| • Excavators 5t to 40 t | • Semi-trailers | • Temporary conveyors |
| • Bobcats | • Lifting equipment (hoists and winches) | • Elevated work platforms |
| • Water blasters | • Front end loaders | • Vacuum trucks |
| • Rail tamper | • Air compressors | • Concrete mixers and pumps |
| • Cranes 15 t to 800 t | • Refractory gunning machine | • Vibrator roller |
| • Plate compactors | • Boom excavator | • Piling rigs (augur and sheet) |
| • Grit blasters | • Welding rigs | • Rock breakers |
| • Brick saws and mixers | • Forklifts | • Concrete saw |
| • Dump trucks | • Tear-out machine | |
| • Explosives equipment including drills. | | |

Not all items of plant would be used at one time or one location. For assessment purposes, Table 15 provides a representative scenario with likely plant and equipment. Estimated sound power levels will vary with equipment use, location and intensity.

The project will utilise several discrete work areas within and around the PKSW facility for construction as well as support activities such as storage and recycling of materials. A summary of these areas and representative equipment to be used in each scenario is presented in Table 15. Figure 3 illustrates the location of work areas including construction, recycling and laydown/storage areas for the project.

Table 15 Work are summaries and indicative construction scenarios.

Area ID	Location	Indicative construction scenario	Plant / Equipment	Plant sound power level, dBA	Activity sound power level, dBA
1 - 3	CRM1 – CRM3	Storage	Forklift Excavator Franna crane	105 105 98	108
4 - 9	No.1 Works 1 - 6	Storage	Forklift Excavator Franna crane	105 105 98	108
10	No.2 Product berth	Storage	Forklift Excavator Franna crane	105 105 98	108
11 – 14	No.2 Works 1 - 3	Construction, typical	Excavator Franna crane Front end loader Vibratory roller* Pile rig (CFA)	115 98 112 109 104	118
		Construction peak	Rock breaker* Pile driver (vibratory)*	122 123	126
15 – 16	No.2 Works 4 – 6	Storage	Forklift Excavator	105 105	108
17 – 22	Recycling area 1 – 6	Processing	Forklift Excavator	105 105	108
23	Carpark	Parking	Light vehicles	80	80
24	Laydown area	Storage	Forklift Excavator	105 105	108
25	Clean down area	Clean down	Air compressor Water blaster Excavator	104 111 105	113
26	Blast furnace 6	Construction, typical	Excavator Franna crane Front end loader Vibratory roller* Pile rig (CFA)	115 98 112 109 104	118
		Construction peak	Rock breaker* Pile driver (vibratory)*	122 123	126

* Includes 5 dB penalty for annoying characteristics in line with ICNG (EPA 2009)

Construction, Noise and Vibration Management Plan



Figure 3 Work areas

8.1.2 Impact assessment

The construction areas and representative construction scenarios were included in a predictive noise model developed using SoundPlan noise software and including all receivers within 2 kilometres of the works. The model accommodated intervening terrain, structures, ground and air absorption and meteorological conditions favouring noise propagation with temperature inversion and gentle breeze from source to receiver.

A summary of predicted levels for typical and peak scenarios is presented in Table 16. Predictions demonstrate the works represent a low level of risk of impacts on the surrounding community, with the daytime NML not likely to be exceeded by any of the activities, whether peak or typical. No receivers are expected to highly noise affected (>75 dBA).

Works would primarily be during standard hours; however, where unavoidable at night, peak activity (hammering and piling) in outdoor areas is predicted to result in minor exceedance (1 – 3 dB) of the night NML at up to 31 sensitive receivers in Cringilla. Typical scenarios are not likely to exceed the NML outside standard hours. Where work is necessary at night, sleep disturbance is not expected.

Table 16 Summary of predicted noise

NCA	NML			Max predicted level, dBA		No. receivers exceeding NML					
	Day	Eve	Night	Typical scenario	Peak scenario	Typical scenario			Peak scenario		
						Day	Eve	Night	Day	Eve	Night
1	53	47	47	45	47	0	0	0	0	0	0
2	53	47	47	44	50	0	0	0	0	31	31
3	49	44	44	40	43	0	0	0	0	0	0

Figure 4 presents noise contours for typical scenarios, illustrating the level of impact at nearby sensitive receivers. The contours demonstrate typical construction scenarios (without highly noise intensive activities) should meet the NML outside standard hour. Works indoors also represent a low risk of noise impact.

Peak construction scenarios (including hammering and piling) are likely to exceed NMLs outside standard hours in NCA 2, around Cringilla. Predicted contours are shown in Figure 5.

High intensity activities should be avoided in outdoor areas outside standard hours as far as practicable or should operate with reduced intensity at this time.

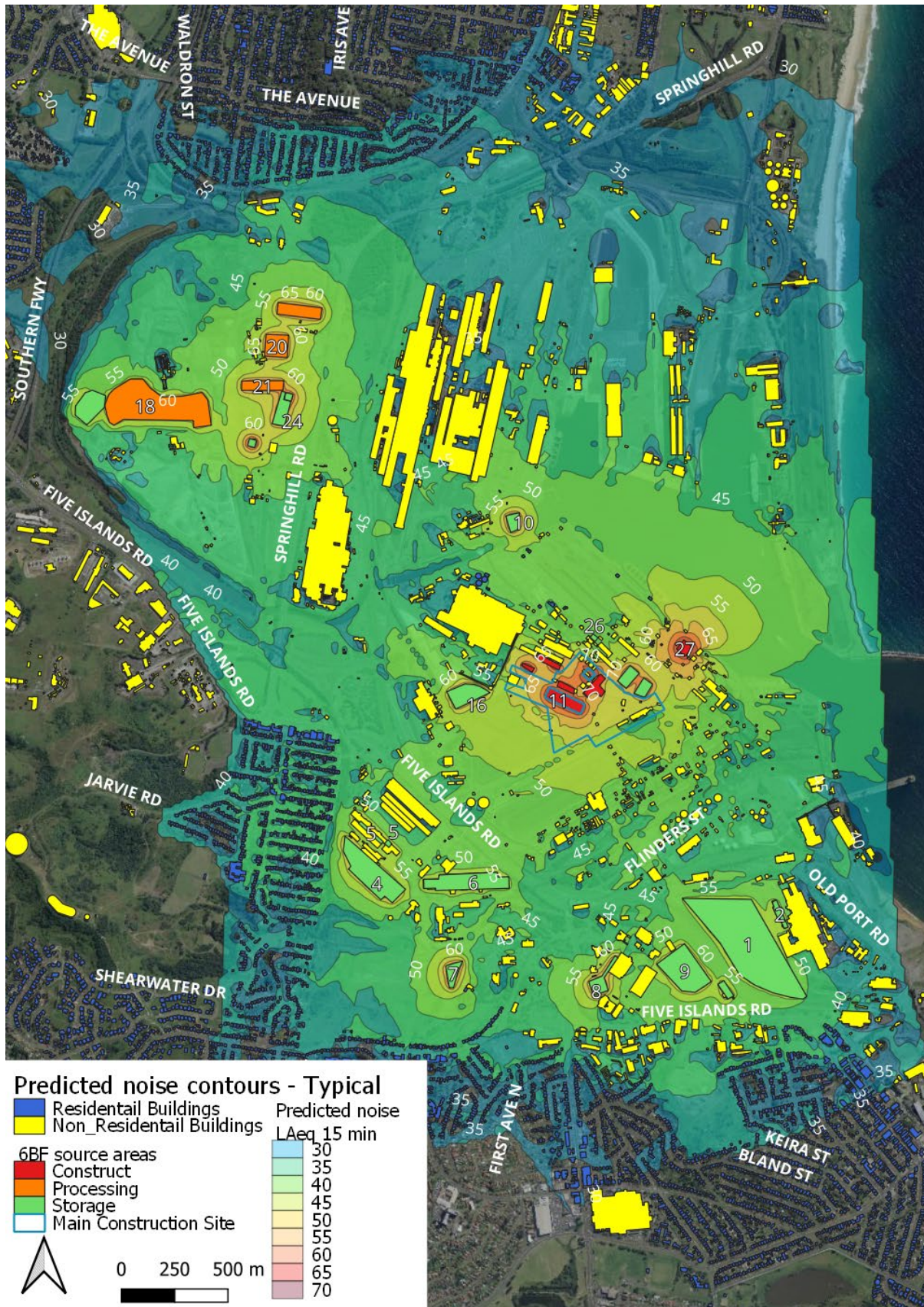


Figure 4 Predicted noise contours including typical construction scenario, recycling and storage.

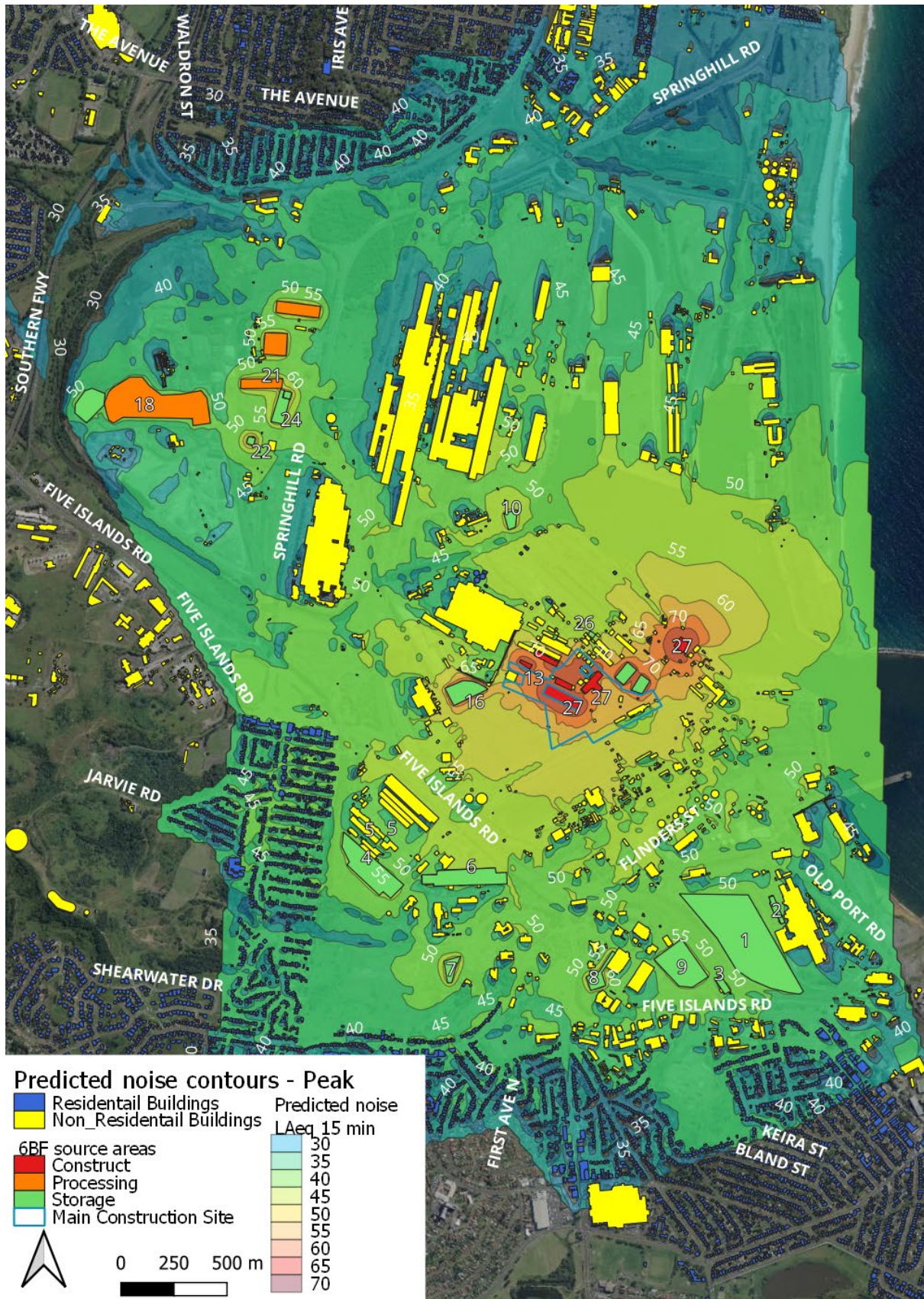


Figure 5 Predicted noise contours including peak construction scenario, recycling and storage.

8.2 Construction traffic

The project will result in construction-related traffic movements including light vehicles, trucks and buses. Movements will predominantly be around shift changes as contractors arrive and depart the project site. Total traffic movements are summarised in Table 17.

Table 17: Traffic movements associate with the 6BF project.

	Daily traffic generation	Peak hour traffic generation
Light vehicles	600	300
Heavy vehicles	300	30
Total	900	330

Traffic routes are illustrated in Figure 5 and would include access to the laydown area in via Cringila Car Park Road (shown in blue); access to the laydown area via Flagstaff Road and Five Islands Road intersection (shown in yellow) and access to laydown area and construction site via Flinders Street, Stockpile Road and Old Port road (shown in red).



Figure 6 Construction traffic routes (source: EIS)

As part of the EIS, a screening assessment was completed for construction traffic. The assessment was based on the Road Noise Policy (DECCW 2011) which recommends any increase in total noise should be limited to 2 dB above the existing scenario without construction traffic.

Typically to increase traffic noise by 2 dB, around a 60% increase on existing traffic volumes is required.

Considering the traffic routes are busy freeways and sub-arterial roads, the EIS determined traffic during construction is anticipated to have a negligible effect on the existing traffic volumes (and traffic noise) on the road network.

8.3 Construction Vibration

8.3.1 Surface vibration

Vibration intensive equipment involved in the project includes rock hammers, rollers and piling rigs. As the most intensive of these plant, minimum working distances for an 18-tonne vibratory roller are illustrated in Figure 6. Outside these distances impacts on residential receivers are not likely based on “cosmetic” damage guidelines (refer BS 7385) and human comfort criteria (refer OH&E’s Assessing Vibration - a technical guideline).

Rolling and piling activities have the potential to exceed the structural damage vibration criteria where works occur within 20 metres of residences. No residences have been identified within 20 metres of any construction works as illustrated in Figure 6. Therefore, no adverse structural damage vibration impacts are anticipated from this project.

The closest distance between the proposed laydown area and the nearest residence in Cringila is approximately 85 metres. This falls within the minimum working distance of 100 metres for an 18 t vibratory roller and the nearest residents may detect some vibration. This is a conservative assessment and impacts should be minor. Where complaints are raised, monitoring would be undertaken.



Figure 7 Minimum working distance contours (18 t vibratory roller)

8.3.2 Blasting

Blasting may be necessary to remove the iron skull within 6BF. During blasting activities at 5BF in 2009, monitoring of blasting concluded no discernible blast events (ground vibration or air blast overpressure) were identified at monitoring undertaken 1.1 km to the southwest. The blasting at 5BF was performed out in the open whereas the blasting at 6BF would be internal to the furnace structure.

Given blasting required for the 6BF will take place approximately 1.1 kilometres away from the nearest residential receivers in Cringila and will be done internal to the furnace as opposed to the blasting at 5BF, no ground vibration or airblast overpressure impacts from blasting are anticipated at any of the nearby residential receivers.

9. Noise and Vibration Management

9.1 Construction Noise and Vibration Management

Predictions of noise and vibration levels at the nearest sensitive receivers demonstrate low risk of impact associated with the 6BF construction program with daytime NMLs not expected to be exceeded at any time. Where out-of-hours works are unavoidable, and with written consent of the EPA, minor exceedances of the evening and night NMLs may occur with some activities.

Standard noise and vibration mitigation measures adopted for the 6BF project are provided in Table 17

Table 18: Reasonable and Feasible Construction Noise and Vibration Mitigation Measures

Control	Measure
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 will be scheduled during less sensitive time periods.
Equipment selection	Only the necessary size and power of equipment will be used. Quieter and less vibration emitting construction methods will be used where feasible and reasonable.
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 15.
Selection of low-noise attachments for rock breaking equipment	Where rock breaking and impact piling works required within No2. Works areas 1,2,3 and 6, mitigations measures should be considered, such as: – Low noise attachments for rock breakers – Resilient pad (dolly) between pile and hammerhead for impact piling
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 where possible.
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.
Minimise disturbance from deliveries.	Loading and unloading of materials/deliveries will occur as far as practically possible from sensitive receivers
Engine compression brakes	The use of engine compression brakes will be avoided close to residences.
Maintain equipment	Equipment will not be operated unless maintained and/or repaired, where this would address the annoying character of noise identified.
Reduce size of vibratory roller or compactor	Limit the size of the vibratory compactor to 18 tonnes to maintain the safe work buffer distances.
Construction traffic within project site	Construction traffic travelling along Emily Road to remain below the speed limit of 40 km/hr.
Scheduling of high-intensity construction activities	Impact piling and rock breaking would only be undertaken within recommended standard construction hours;

10. Monitoring

10.1 Compliance Monitoring

For works other than blasting occurring during standard construction hours, noise and vibration monitoring will not be routinely undertaken.

However, in the event of complaint regarding noise or vibration that cannot be resolved by the project team, a qualified and experienced acoustic practitioner may undertake appropriate monitoring in line with the procedures in the ICNG and recommend reasonable and feasible measures to reduce the level of impact.

Where construction is unavoidable outside standard hours, the hours of construction would be varied by written consent of the EPA. In this case, noise monitoring may be proposed to verify predicted levels and in response to complaints. A suitable monitoring program would be developed for each out-of-hours work event and agreed with the EPA.

Operational noise compliance monitoring will continue to be performed per Condition L6.5 of EPL 6092.

10.2 Blast Monitoring

In accordance with Condition B39 of the Infrastructure Approval, should blasting be required, noise and vibration monitoring will be performed during the first two blasting events to determine compliance with Conditions B37 and B38. Additional blasts would be undertaken where a change in blasting technique is required to verify any change to blast impacts from the change. Details of the standards, guidelines, and methodology for this monitoring is detailed below.

For each measured blast, vibration and airblast monitoring shall be carried out in accordance with guidance provided in Australian Standard AS 2187.2-2006 (Appendix J). Section J3 of the standard describes how to measure vibration and airblast overpressure. For both vibration and airblast, the frequency range of the measurement equipment must be at least 2 Hz to 250 Hz (-3 dB roll off), with a tolerance of 10% over this frequency range for vibration and 1 dBL for airblast. Appendix A contains specifications for suitable equipment.

The vibration transducer would be coupled to record the motion of the ground. The preferred coupling method depends on site conditions. Where there is a rigid surface (e.g., concrete or rock) adhesive or mechanical bonding can be used. Where the surface is soil, the transducer can be embedded or fixed to an embedded mount (for example, 200 mm concrete cube or similarly sized cylinder).

The airblast microphone would be oriented in a direction of maximum sensitivity to the incident sound. A windshield would be fitted in accordance with the manufacturer's recommendations. The microphone would be mounted on a tripod or similar stable stand and located at least 1 m from ground level unless a specific investigation shows that measurements taken at a lower height are valid. It should be located away from structures that may produce reflections and cause spurious readings.

Each monitoring event will involve as a minimum one boundary location and one residential location. The residential location will be the closest to the blast site, adjusted for elevation to ensure there will be no barriers in the sound propagation pathway for representative data.

Monitoring instruments will be calibrated in accordance with manufacturers specifications and relevant Australian Standards.

11. Communication and Complaints

11.1 Interested Parties

Interested parties relevant to the project include BlueScope inter-departments, service providers, Environment Protection Agency, Sydney Water, Wollongong City Council, Department of Planning & Environment, and the neighbouring community.

Policies and procedures are in place at BlueScope and will apply to the project to ensure compliance to the needs and expectations of interested parties is achieved through a range of activities including the effective management of legal obligations, reporting of environmental requirements and performance, communication with regulatory authorities where applicable, employee/contractor engagement activities, and community consultation.

11.2 Community Consultation

Per Condition A22 of the Infrastructure Approval, the community will be regularly informed about the construction, commissioning, and operation of the project through the existing BlueScope Community Consultative Committee.

Further, in accordance with Condition C17, information about the project will be made publicly available on the BlueScope Illawarra website (<https://www.bluescopeillawarra.com.au/pksw-no6-blast-furnace-reline/>).

11.3 Stakeholder Engagement

A communications plan has been developed for the project (6BFR-PRJ-PLN-0004). This plan aims to ensure that stakeholders are informed of the project status and environmental performance. It details internal and external stakeholders, the forum through which engagements occur, the purpose and frequency of communications, and the roles responsible for conducting the engagement.

11.4 Complaints Handling

BlueScope has an established complaints handling procedure, Contact Procedure for Complaints and Enquiries (SP-ENV-07-03), that is applicable to the project. The procedure addresses external complaints and enquiries as well as internal complaints, enquiries or self-reports and defines the key contacts and actions to be taken following a complaint or enquiry.

Any complaints or enquiries that relate to the project will be recorded in accordance with the established procedure and the Project Manager will be notified.

12. Inspections, Compliance and Audits

12.1 Inspections

All personnel working on the project will be encouraged to undertake environmental audits of activities as they are performed and record the audits and any findings in BlueScope's incident and risk management database. Inspections of environmental controls will be conducted as a monthly audit by the construction manager (or a nominated delegate) to confirm the controls are in place and working effectively, and to identify improvement opportunities. The inspections may constitute a general assessment of control conditions, targeted inspections, adequacy assessment of controls, or activity observations.

Observations of all inspections and audits will be documented in an incident and risk management system. Any corrective actions identified must be assigned to a suitable person with an appropriate timeframe for completion.

12.2 Compliance

BlueScope has developed a Compliance Register to outline the compliance requirements for the construction and commissioning of the project as specified in the Infrastructure Approval, EPL 6092, and the CEMP. The register tabulates the condition referenced, a description of the requirement, if conditions have been met, if a non-compliance has occurred, and supporting evidence/comments where required.

Each quarter, the Project Manager and the Environment Advisor will review and update the Compliance Register. The HSE Manager will periodically audit the construction activities to verify compliance with the CEMP.

12.3 Non-Compliance, Corrective and Preventative Actions

A non-conformance is a situation or event that does not comply with the safeguards required in the CEMP, including this CNVMP. All personnel working on the project may raise any non-conformances or improvement opportunities as they are identified.

A non-compliance is an occurrence or set of circumstances that breach the conditions of the Infrastructure Approval, Environment Protection Licence and/or any other legal requirement. In accordance with Condition C11 of the infrastructure Approval, non-compliances will be reported to the Department of Planning and Environment (DPE) via the Major Projects website within seven days of becoming aware of any non-compliance. Non-compliances to the EPL will be reported to the EPA.

Non-conformances and non-compliances will be recorded in BlueScope's incident and risk management database and managed in accordance with BlueScope's HSE Incident Management procedure (BSL-HSE-SD-12-01). Corrective and preventative actions addressing any non-conformances or non-compliances will be assigned to relevant personnel with an appropriate completion date. These actions will be recorded in the incident and risk management database entry.

13. Incident Management and Emergency Response

An incident is an occurrence or set of circumstances that causes or threatens to cause material harm and which may or may not be or cause a non-compliance. Material harm is harm that:

- a) Involves actual or potential harm to the health or safety of human beings or to the environment that is not trivial, or
- b) Results in actual or potential loss or property damage of an amount, or amounts in aggregate, exceeding \$10,000.

Such loss includes the reasonable costs and expenses that would be incurred in taking all reasonable and practical measures to prevent, mitigate, or make good harm to the environment.

A project-specific 6BF Reline Emergency Response Plan (MA-6BF-EMG-01) has been developed to ensure that effective systems and appropriately trained personnel are in place to detect and respond to an emergency. This plan identifies potential emergency scenarios and their safety and environmental impacts, describes the response process, specifies personnel who are responsible and others that must be notified, and details the locations of emergency assembly areas, emergency shower and eyewash stations, spill kits, and fire suppression equipment.

All incidents must be reported and managed in accordance with BlueScope's HSE Incident Management procedure (BSL-HSE-SD-12-01) and documented in an incident and risk management system. Corrective and preventative actions relating to incidents will be included in the incident report. Contractor incident reports must be provided to the plant or work owner (as identified in the relevant JSEA/SSW/SWMS) such that they can be documented in the project's incident and risk management system.

A BlueScope Environment Officer is available 24 hours 7 days per week on 1800 640 252 or (02) 4275 7522. The Environment Officer will receive and respond to incident reports, provide clean up assistance where required, and will notify appropriate government agencies, such as the EPA and DPE in accordance with relevant statutory requirements. In accordance with Condition C10 of the Infrastructure Approval, incidents relating to the project will be reported to the DPE via the Major Projects website.

14. Document Management and Review

As specified in Condition C8 and C9 of the Infrastructure Approval, the CNVMP will be reviewed within three months of:

- the submission of an incident report under condition C10.
- the approval of any modification of the conditions of this approval; or
- the issue of a direction of the Planning Secretary under condition A2(b) which requires a review, the strategies, plans and programs required under this approval must be reviewed.

Where the CNVMP is revised as a result of the review, the revised document must be submitted to the Planning Secretary for approval within six weeks of the review in accordance with C9 of the Approval.

15. References

- Australian Industrial Energy (2018), Port Kembla Gas Terminal – Noise and Vibration Impact Assessment
- Australian Standard (2000) Acoustics – Recommended design sound levels and reverberation times for building interiors.
- Australian Standard (2006) Explosives—Storage and use.
- Australian Standards (2010) Guide to noise and vibration control on construction, demolition and maintenance sites.
- Australian Standards. (2018). AS1055 Description and Measurement of Environmental Noise.
- BlueScope (2023). 6BF Reline Project Construction Environmental Management Plan.
- British Standards. (1993). Evaluation and measurement for vibration in buildings Part 2 – Guide to damage.
- British Standards. (2000). Building acoustics - Estimation of acoustic performance of buildings based on the performance of elements – Part 4: Transmission of indoor sound to the outside’.
- British Standards. (2008). BS6472 Guide to Evaluation of Human Exposure to Vibration in Buildings.
- British Standards. (2009). Code of Practice Part 2 Vibration for noise and vibration on construction and open sites – Part 2: Vibration.
- Department of Environment and Conservation NSW (2006), Assessing Vibration: A Technical Guideline
- Department of Environment and Climate Change NSW (2009). Interim Construction Noise Guideline.
- Department of Environment and Climate Change and Water NSW (2011). Road Noise Policy.
- German Standard (1999), Structural vibration Part 3: Effects of vibration on Structures (DIN 1999).
- GHD (2022). Blast Furnace No. 6 Reline Project Noise and Vibration Impact Assessment.
- NSW Environment Protection Authority (2017), Noise Policy for Industry.
- NSW Environment Protection Authority (2021), Draft Construction Noise Guideline.
- Transport for NSW (2016), Construction Noise and Vibration Guideline.
- Transport for NSW (2019), Construction Noise and Vibration Strategy.

Appendix A. Vibration and Noise Monitor Specifications

Vibration, Noise and Air Overpressure Monitor for Regulatory Compliance

Range of Applications:

- Blast monitoring for compliance
- Near field monitoring
- Sound monitoring
- Pile driving
- Compaction
- Construction activity
- Dynamic compaction monitoring
- Demolition activity
- Heavy transportation
- Environmental monitoring
- Tunnel and subway monitoring
- Bridge monitoring
- Structural monitoring and analysis
- Remote access monitoring

Monitoring Redefined

With **Micromate**, InstanTel has redefined industry standards for functionality and ease of use. **Micromate** provides reliable regulatory compliance monitoring with an ISEE or DIN Triaxial Geophone and ISEE Linear Microphone or Sound Level Microphone. Small enough to fit in your hand, **Micromate** is the first monitor in the industry to provide a touch screen interface. Support of USB 2.0 allows use of memory sticks and approved external devices such as USB hubs, modems, printers and GPS (sold separately). Ruggedness and reliability are the cornerstone attributes of InstanTel products.

Communications

Micromate supports USB 2.0 on both the host and device ports, operating up to 12 MB/s. External memory sticks, an InstanTel compatible printer, modem and a host of optional USB peripherals (sold separately) are supported. Supported peripherals are automatically identified when connected, and associated commands and functions are made available (in much the same manner that you are accustomed to with your laptop and computer). Micromate supports InstanTel's **AutoCall Home™** feature; when an event occurs the event is immediately captured and is automatically transmitted to your computer (there is no need to prompt the unit to transmit data). Event data can also be sent to Vision™, InstanTel's cloud-based data hosting application automatically.

Easy to Use

With the use of a color touch screen and icon based user interface, InstanTel sets a new industry standard for efficiency and ease of use. A key pad compliments the user interface. Whether you prefer touch screens, key pads, or a combination of both, you'll find the Micromate intuitive to use and easy to learn. A full display touch screen keyboard makes entry of data and notes convenient and easy. Of course, the unit can be interfaced to a laptop or computer as well. Connectors are color coded for easy identification and installation.

Saving Events

Events and unit settings are saved in a reliable on-board, non-volatile memory with ample storage capacity for most applications and up to 1,000 events (with additional optional memory capacity available). Data can be transferred for off-unit storage or off-unit data manipulation to a computer

or laptop via the convenient USB interface or via use of a compatible modem. Data retrieval can be as simple as copying events to an external USB memory stick (no laptop or computer is required).

Rugged and Reliable

Simply put, the Micromate is built to last. It's built to be reliable, every day and all day – for years! The base unit comes with a fully sealed top panel, non-corrosive industrial grade connectors and fully sealed electronics. The base unit housing and connectors provide a water resistant seal. The custom molded housings for the geophone and base unit are made of superior impact polycarbonate. An optional protective "boot" complete with faceplate provides the highest level of durability and ruggedness available in InstanTel's product line.

Key Features

- USB 2.0 with Host and Device support
- USB support for memory sticks, and InstanTel compatible field printer, modem and GPS devices (sold separately)
- Synchronizes Class 1 noise monitoring and vibration data on the same monitoring unit
- Large, high resolution, color graphics touch screen. Easy to read and navigate menu structure
- Context Sensitive Icons: Icons are only shown if they are relevant to what you are doing
- Short Cut Icons: Fast, one touch access to the most commonly used features
- Integrated Keypad: Large 10-key interface with dedicated function keys
- Supports InstanTel's **Auto Call Home** for remote automated data reporting/transmission
- Monitor Scheduler: Assign different setup files, scheduled self checks, scheduled Auto Call Home times and when to start and stop monitoring
- Small enough to be hand-held
- Rugged and reliable: Field rugged and durable design with a fully sealed top panel, non-corrosive connectors, and sealed electronics to enhance water resistance
- Storage capacity for 1,000 events (additional capacity optional)
- Printer for immediate in-field printing of reports (sold separately)
- 10 day battery life (standard), 15 days (optional)



Micromate®

General Specifications

Channels	Microphone and Triaxial Geophone (ISEE or DIN)	
Geophone		
Range	Up to 254 mm/s (10 in/s)	
Response Standard	ISEE Seismograph Specification or DIN 45669-1	
Resolution	0.00788 mm/s (0.00031 in/s)	
Frequency Range (ISEE/DIN)	2 to 250 Hz, within zero to -3 dB of an ideal flat response / 1 to 315 Hz	
Accuracy (ISEE/DIN)	+/- 5% or 0.5 mm/s (0.02 in/s), whichever is larger, between 4 and 125 Hz / DIN 45669-1 Standard	
Transducer Density	2.2 g/cc (137 lbs/ft ³)	
Maximum Cable Length (ISEE/DIN)	1,000 m (3,250 ft)	
Microphone (Sold separately)	ISEE Linear Microphone	Sound Level Microphone
Weighting Scales	ISEE Linear Microphone	A-Weight or C-Weight
Response Standard	ISEE Seismograph Specification (2011)	Fast (125s) or Slow (1s)
Range	2 to 500 Pa (0.00029-0.0725 psi [88 to 148 dB])	30 to 140 dB A or C
Resolution	0.0156 Pa (2.2662x10 ⁻⁶ psi)	0.05 dB (Display limit 0.1dB)
Frequency Response	2 to 250 Hz between -3 dB roll off points	Up to 20 kHz
Accuracy	+/- 10% or +/- 1dB, whichever is larger, between 4 and 125 Hz	IEC 61672 Class 1
Maximum Cable Length	75 m (250 ft)	75 m (250 ft)

Waveform Recording

Record Modes	Waveform, Waveform Manual
Seismic Trigger	0.13 to 254 mm/s (0.005 to 10 in/s)
Linear Acoustic Trigger	2.0 to 500 Pa (100 to 148 dB)
Sample Rate	1,024, 2,048, 4,096 S/s per channel (independent of record time)
Record Stop Mode	Fixed record time, InstanTel AutoRecord™ record stop mode
Record Time	1 to 90 seconds (programmable in one-second steps) plus a pre-trigger at 0.25, 0.50, 0.75, or 1.0 second
AutoRecord Time	Event is recorded until activity remains below trigger level for duration of auto window, or until available memory is filled
Cycle Time	Recording uninterrupted by event processing, monitoring, or communication - zero dead time
Storage Capacity	
Full Waveform Events	1,000, 1 second events at 2,048 S/s sample rate (memory upgrade optional)

Histogram Recording

Record Modes	Histogram and InstanTel Histogram Combo™ (monitor captures triggered waveforms while recording in Histogram mode)
Recording Interval	2 to 30 seconds in 1 second increments, and 30 seconds to 30 minutes in 30 second increments
Histogram Storage Capacity	Approximately 220,000 intervals. Examples: 5 days at 2 second intervals, or 150 days at 1 minute
Histogram Combo Storage Capacity	Example: 30 Days of Histogram recording at 1 minute intervals, and over 900 1 second waveform events

Physical Specifications

Dimensions	101.6 x 135.1 x 44.5 mm (4.15 x 5.32 x 1.75 in)
Weight	0.5 kg (1.1 lbs)
Battery	10 day rechargeable lithium ion (optional 15 day battery upgrade available)
User Interface	10 domed tactile keys, colour touch screen, and full display keyboard with dedicated icons for common functions
Display	QVGA, 320 x 240 color touch screen
Printer (sold separately)	Precision high-resolution
PC Interface	USB
Auxiliary Inputs and Outputs (Optional)	External trigger, Remote alarm
Environmental	
LCD Operating Temperature	-10 to 55°C (14 to 131°F)
Operating Temperature Supporting USB Sensors	-40 to 45°C (-40 to 113°F)
Operating Temperature Without USB Sensors	-40 to 55°C (-40 to 131°F) *NOTE: LCD screen saver must be enabled and set to a maximum time out of 2 minutes.
Remote Communications	Compatible with these supported modems; Sierra Wireless™ Airlink® Raven Series X, XT, GX400, or LS300
Electrical Standard	CE Class B - The Micromate has been tested and passed IEC (CB scheme test report available) 61010-1

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980-721001-000 Rev 10 - Product Specifications are Subject to Change