Blast Furnace No.6 Reline Project

Environmental Impact Statement

BlueScope Steel (AIS) Pty Ltd

07 March 2022

→ **The Power of Commitment**

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Declaration

This environmental impact statement for the Port Kembla Steelworks Blast Furnace No.6 Upgrade Project has been prepared in accordance with Schedule 2 of the Environmental Planning and Assessment Regulation 2000 and submitted under section 5.15 of the Environmental Planning and Assessment Act 1979.

Project	Name	Port Kembla Steelworks Blast Furnace No.6 Upgrade Project	
	Application number	SSI-22545215	
	Address	Five Islands Rd, Port Kembla NSW 2505	
Proponent	Name	BlueScope Steel (AIS) Pty Ltd (BlueScope) (ABN 19 000 019 625)	
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Declaration	The undersigned declares that this EIS: – has been prepared in accordance with Schedule 2 and Part 10 of the Environmental Planning and Assessment Regulation 2000; – contains all available information relevant to the environmental assessment of the development, activity or infrastructure to which the EIS relates; – does not contain information that is false or misleading; – addresses the Planning Secretary's environmental assessment requirements (SEARs) for the project; – identifies and addresses the relevant statutory requirements for the project, including any relevant matters for consideration in environmental planning instruments; – has been prepared having regard to the Department's State Significant infrastructure Guidelines - Preparing an Environmental Impact Statement; – contains a simple and easy to understand summary of the project as a whole, having regard to the economic, environmental and social impacts of the project and the principles of ecologically sustainable development; – contains a consolidated description of the project in a single chapter of the EIS; – contains an accurate summary of the findings of any community engagement; and – contains an accurate summary of the detailed technical assessment of the impacts of the project as a whole.		
	Signature:		
	Name:	Simon Murphy	Karl Rosen
	Date:	7 March 2022	7 March 2022

Executive summary

Introduction

BlueScope Steel (AIS) Pty Ltd (BlueScope) operates the Port Kembla Steelworks (PKSW), an integrated iron and steel making plant located in the Wollongong local government area, south of Sydney in New South Wales. BlueScope is proposing to reline one of the two ironmaking blast furnaces at the PKSW site, the No.6 Blast Furnace (6BF) (the project).

The ironmaking process subjects the blast furnace interior to physical stress which significantly impacts the condition of the interior. Blast furnaces are therefore periodically "relined" by replacing the interior lining and other internal components, such as the staves which house cooling water pipes. A reline also involves removal of raw materials which have solidified inside the furnace as well as major repairs to other furnace elements, including the blast furnace shell if necessary. The period between each reline of a blast furnace is called a "campaign" or campaign life.

Until 2011, two blast furnaces operated concurrently at the PKSW. Since 2011, only the No.5 Blast Furnace (5BF) has operated, while 6BF has been in care and maintenance. The proposed reline of 6BF will allow the transfer of ironmaking from 5BF to 6BF when 5BF comes to the end of its campaign life and is decommissioned, predicted to occur sometime between 2026 to 2030.

The scope of the project, which is broader than a typical reline, will deliver a modernised and upgraded blast furnace facility and related infrastructure that will include comprehensive technology and environmental upgrades including new GHG emissions abatement technology. Over $100 million of measures in the project are directed at environmental improvements, including approximately $80 million of improvements which are designed to deliver reductions in GHG emissions. This will mean that the project will make a near-term positive environmental impact, relative to current 5BF operations. The scope of the project is intended to address the dual aims of the project: to secure BlueScope's domestic ironmaking needs from 2026, as well as provide a bridge to transition from current blast furnace technology to new and emerging low emissions technologies once available at commercial, viable scale.

The project aims to return 6BF to service through a reline process that would be carried out while 5BF continues to operate. The key objectives of the project are to:

– Maintain the sovereign manufacturing capability of steelmaking in Australia to continue to primarily supply the domestic market for vital infrastructure, building and construction, renewables and defence projects.
– Underpin around 6,200 jobs at PKSW and the other facilities owned by BSL around Australia.
– Minimise disruption to production at PKSW following the end of the current 5BF campaign by ensuring that 6BF is available for operation prior to 5BF ceasing operation.
– Continue to provide significant economic benefit to NSW (1% of GSP) and the Illawarra region (10% of jobs) by maintaining the provision of steel to the domestic and export market.
– Improve the environmental performance of 6BF through the implementation of the latest feasible and available technology.
– Maximise the use of local contractors and suppliers.
– Secure the short-term and medium-term future of steelmaking at Port Kembla whilst providing a 'bridge' to the longer-term transition to lower emissions steelmaking technologies when it is technically and commercially viable.

This environmental impact statement is subject to and must be read in conjunction with the limitations and assumptions stated in this environmental impact statement.

The proponent

BlueScope Steel (AIS) Pty Ltd (BlueScope) (ABN 19 000 019 625) is a wholly owned subsidiary of BlueScope Steel Limited (BSL) (ABN 16 000 011 058). BlueScope is the owner and operator of Port Kembla Steelworks and is the proponent for the project. BlueScope is one of only two primary producers of iron and steel in Australia and the only domestic manufacturer of upstream flat steel products. As part of the BSL group of companies, BlueScope is a global leader in finished and semi-finished steel products, including household brand names such as COLORBOND® steel, ZINCALUME® steel and TRUECORE® steel.

Need for the project and alternatives

Steel is the world's most widely-used metal and the second most abundant construction material in the world. It is used in nearly every aspect of life and is a vital part of a modern economy. Steel is infinitely recyclable and is the most recycled material on earth. Steel is essential in the transition to a net zero GHG emissions economy, as wind turbines, solar farms, pumped hydro, hydrogen production facilities, and the necessary electrical infrastructure to support them, all require steel for their production.

BlueScope has investigated alternatives for continuing ironmaking operations at PKSW following the end of the current 5BF campaign, as well as the option of ceasing iron and steelmaking at PKSW. The options considered were as follows:

– Option 1 - Cessation of iron and steelmaking at PKSW and moving toward an import model.
– Option 2 - Reline of 5BF.
– Option 3 - Reline of 6BF (the project).
– Option 4 - The introduction of alternative low emissions ironmaking technologies such as DRI-EAF (Direct Reduced Iron – Electric Arc Furnace).

Following an options analysis, the project (Option 3) was chosen as the preferred option for the following reasons:

– Operations at PKSW will be maintained with minimal disruption to production.
– Construction activities will be carried out at a more measured pace and moderate level while 5BF continues to operate. This will minimise the size of the workforce required, maximise local participation in the workforce, reduce the amount of construction work required outside of standard working hours, and minimise construction facilities and traffic.
– Technical and execution risks will be low relative to other options and impacts to customers and the supply chain will be minimal.
– The net environmental impact of the project will be positive relative to the current operation of 5BF.
– Severe social and economic impacts associated with cessation of steelmaking at PKSW will be avoided.
– Development and implementation timeframes for prospective alternative low emissions steelmaking technologies are too long to be successfully implemented before work needs to be initiated prior to the end of the current 5BF campaign.

Extensive research was conducted into a range of potential alternative low emissions ironmaking technologies, such as the use of renewable hydrogen in a DRI-EAF process. Ultimately, however, at this point in time none of the new emerging technologies are mature enough, available at the necessary scale, nor commercially viable to allow BlueScope to commence work in time to have an alternate iron making source in place (that is, an alternative to the currently operating 5BF) by 2026. Therefore, the project has been selected to future-proof steelmaking in Australia and ensure critical security of steel supply, while providing a bridge to transition to low or zero emissions technologies once proven at scale and commercially viable for the PKSW.

Site setting

PKSW was established in 1928 and is located within an industrial site spanning approximately 750 hectares (ha). The site is in the Wollongong Local Government Area (LGA) and is approximately 80 kilometres (km) from Sydney. The PKSW site comprises the No.1 Works, No.2 Works, Steelhaven and the Recycling Area (see Figure 2.2). The No.2 Works is divided into two sections by Allans Creek. The southern half of the No.2 Works comprises the Cokemaking, Ironmaking and Steelmaking facilities, while the northern half contains the Recycling Area, and Rolling Mills. All sectors of PKSW are internally linked by road and rail and are currently supplied with electricity, water and gas services.

The port of Port Kembla is located between the Pacific Ocean and the Port Kembla heavy industrial area. The Inner Harbour, specifically developed as an all-weather shipping port, covers approximately 60 ha with around 2,900 m of commercial shipping berths. BlueScope operates five berths in the Inner Harbour that supply materials for PKSW.

Current approved industrial activities at PKSW and the broader Port Kembla industrial area generate dust, steam, particulate matter, unfiltered air and gasses. Noise is also generated by activities at PKSW and other surrounding industrial uses. The closest sensitive receivers to 6BF are residences approximately 1.2 km to the west of the project site.

The area surrounding the Port Kembla industrial area is primarily occupied by residential development which includes 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).

Project description

The project involves the reline of 6BF over a period of approximately 3 years to return it to service and commence ironmaking after 5BF ceases operation. Ironmaking at 5BF will conclude prior to ironmaking commencing at 6BF. The project will incorporate advances in technology being used including several improvements in 6BF compared to the currently operating 5BF, resulting in lower overall emissions from the site.

Major construction work will be required within the blast furnace and surrounding facilities, and activities will involve the following tasks:

- Preparatory works.
- Removal of the remaining burden materials.
- Removal of the iron skull, which is discussed below.
- Removal of worn carbon block refractories in the hearth.
- Removal of worn refractories in the remainder of the vessel.
- Demolition of other equipment including:
  - Cooling staves which protect the blast furnace shell.
  - Hot blast main refractory lining where required, including the expansion joints.
  - Clarifier tank and associated equipment where required.
- Repairs to the blast furnace shell where required.
- Installation of a new clarifier tank and associated equipment.
- Installation of the new hearth, sidewall refractories and staves.
- Repair/replacement of tuyeres, tapholes and instrumentation.
- Repair, maintenance and/or upgrade of ancillary equipment including:
  - Furnace cooling systems.
  - Hot blast system including the stoves, with the addition of a stove Waste Gas Heat Recovery (WGHR) system.
  - Gas system, with addition of a Top Gas Recovery Turbine (TRT).
  - Furnace top, including the charging equipment, bleeder valves and outrigger crane.
  - Casthouse floors and associated equipment.
  - Stockhouse (raw materials feed system).

- Automation and power systems.
- Services.

– Installation of a new slag granulation system.

Following completion of these works, 6BF will be commissioned. During the commissioning and ramp-up phase all services will be brought back into live condition and the integrity of the control, monitoring and safety systems verified. Various parts of the plant will be reheated, and pressure and leak tests conducted. The cooling systems will also be filled and flushed. Ramp-up is expected to take several days, with a general increase in production reaching full production capacity within one or two months.

Operation of 6BF will generally be the same as the existing operations at 5BF. Specific locations of certain activities within the PKSW site will change due to the transfer of operations to 6BF, however, any changes to operating hours, staffing numbers or changes to the quantity or characteristics of inputs to or outputs from the blast furnace will be minimal.

Project approval process

The project has been declared Critical State Significant Infrastructure (CSSI) in accordance with Section 5.13 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and Clause 26, Schedule 5 of the *State Environmental Planning Policy (State and Regional Development) 2011* (SRD SEPP). This environmental impact statement (EIS) has been prepared to support the application for project approval, to be determined by the NSW Minister for Planning and Public Spaces.

This EIS has been prepared in accordance with Section 5.7 of the EP&A Act, Schedule 2 of the *Environmental Planning and Assessment Regulation 2000* and the Secretary's Environmental Assessment Requirements (SEARS) issued by the Department of Planning, Industry and Environment (DPIE) on 12 July 2021.

All applicable NSW and Commonwealth has been considered during the preparation of this EIS. The project is not considered to have the potential to have a significant impact upon any listed matters of national environmental significance including listed threatened species and listed threatened ecological communities. A referral under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is therefore not required for the project.

Community and stakeholder consultation

A wide range of community and stakeholder consultation activities have been undertaken as part of the project with a broad range of local community groups and interested stakeholders. This includes one on one virtual briefings, one to many virtual briefings, a virtual 'Town Hall' for the general public which was attended by over 100 citizens, use of existing consultation pathways, and distribution of information via local and national media as well as directly on BlueScope social media channels. Much of the consultation for the project was carried out virtually due to the COVID-19 pandemic lockdown restrictions in NSW.

As well as the local community groups in the Illawarra region, engagement has been undertaken with a range of other interested key stakeholders, such as local businesses, industry groups, peak bodies, investors, suppliers, local Councils and the state government and their relevant departments and agencies.

The engagement activities provided an opportunity to inform stakeholders about the project and the CSSI planning approval pathway process, and to answer questions and obtain feedback on additional benefits, concerns or challenges associated with the project from the perspective of stakeholders. Support for the project was positive and the issues identified during the consultation process have largely been climate change related. In the course of stakeholder and community consultation, BlueScope has set the project in the context of BSL's climate strategy and decarbonisation pathway. This strategy sets a net zero GHG emissions goal by 2050, contingent upon a number of enablers[1]. This goal is underpinned by a 12% reduction in steelmaking emissions intensity by 2030 and a 30% reduction in emissions intensity of BSL's midstream (non-steelmaking) activities. Stakeholder feedback has been taken on board by the project team, working alongside BSL's Climate Change team, in relation to the proposed scope and design of the project and has been used to inform the preparation of this EIS.

[1] BSL's Climate Action report states that achieving the 2050 net zero goal is highly dependent on several enablers, including commerciality of emerging and breakthrough technologies, the availability of affordable and reliable renewable energy and hydrogen, availability of quality raw materials, and appropriate policy settings.

Key environmental factors

Air quality

An air quality impact assessment was undertaken to assess the construction, commissioning and operation of the project. The assessment was undertaken in accordance with relevant legislation and government guidance.

The existing environment was defined as being influenced by a wide range of anthropogenic sources, including industrial operations surrounding the site, shipping and logistics operations, and coal storage. The site is also a producer of windblown dust. Natural attenuators of air quality include the sea breeze which is prevalent in the afternoons. Several sensitive receivers were identified for the purposes of assessment, being four of the closest residential receivers and two schools.

Background air quality criteria was defined from data taken from DPIE air quality monitoring stations nearby and air monitoring stations within PKSW. The following pollutants were assessed:

– TSP
– PM_{10}
– $PM_{2.5}$
– NO_2
– SO_2
– H_2S

The construction assessment identified a low risk of potential air quality impacts due to a large separation distance between construction activities and sensitive receptors. Emissions to air during construction are expected to be relatively minor and controlled at the source. The commissioning assessment concluded that there was potential of elevated emission to occur for a relatively short period of time during commissioning.

The operational air quality assessment consisted of three parts, as follows:

– Analysis of the project impact in isolation.
– Analysis of the project impact in the context of the background air quality criteria.
– Analysis of the project impact in the context of the background air quality criteria and State Significant Developments around the site.

The project was predicted to generally reduce emissions when compared to current operations. Some minor exceedances remained for particulate matter, SO_2 and H_2S, though these were considered to be minor in the context of the background air quality criteria and showed a decrease in concentration at majority of receptors. The project includes a number of additional measures to reduce emissions to air compared to the existing operation of 5BF.

The air quality impact assessment concluded the project to be an overall improvement compared to existing operations.

Noise and vibration

A noise and vibration impact assessment was undertaken to assess the construction, commissioning and operation of the project. The assessment was undertaken in accordance with relevant legislation and government guidance.

The noise impacted area for the project was defined as a 3.5 km radius from 6BF. 103 potential receivers were selected for the assessment, which were considered representative of the most-affected noise sensitive receivers to the project. The existing noise environment was defined as being dominated by industrial noise from premises in Port Kembla, road traffic, and rail noise.

Construction scenarios were prepared to assess the noise and vibration impacts from construction laydown area operations, and the main construction activities within the 6BF site. It is predicted that construction noise levels from the majority of laydown area operations and the main construction area activities will generate noise below the project noise management levels, and minimal impacts are expected. Exceedances of the noise management levels are predicted only at the nearest sensitive receivers and only during high-intensity activities such as blasting, pile driving and rock breaking. These activities will occur only for a short duration, if at all, with long respite periods in between such activities. Potentially impacted receivers will be consulted prior to these activities if they are required to be undertaken.

The assessment concluded that in general, the project will not generate construction vibration impacts. Some short-term human comfort impacts may be experienced by residences close to site preparation works in the No.1 Works laydown area, dependent on equipment used.

An assessment of operational noise from the project (6BF and associated activities only as opposed to a site-wide assessment) was undertaken to predict noise levels at noise sensitive receivers. A 3D noise model of predicted conditions indicates that compliance with the proposed operational noise criteria is achieved at all noise sensitive receivers based on the operation of equipment considered as part of typical operations. No sleep disturbance noise impacts are anticipated from the project.

Construction and operational traffic noise impacts were also assessed. Traffic noise is not expected to exceed criteria and will have a negligible impact on the surrounding area.

Hazard and risk

A hazard and risk impact assessment was undertaken to assess the construction, commissioning and operation of the project. A preliminary risk screening was carried out in accordance with *State Environment Planning Policy No.33 - Hazardous and Offensive Development* (SEPP 33).

The results of the dangerous goods and transport screening indicate that the project does not exceed any of the thresholds for operation but storage of explosives during construction exceeds the SEPP 33 threshold. Given the use of explosives during the construction of the project, it is considered 'potentially hazardous' and a Level 2 Preliminary Hazard Analysis (PHA) has been prepared.

A qualitative hazard identification study was completed as a systematic way to identify any potential offsite impacts during construction and operation. The hazard identification study identified the following hazards with the potential for offsite impact:

– Fire/explosion from the natural gas supply
– Fire/explosion from self-generated gas (coke ovens gas)
– Explosion from molten metal and water
– Discharge of toxic dust and/ or fumes (blast furnace gas and coke ovens gas)
– Use/handling of explosives.

Of these impacts, three were considered serious enough that further semi-quantitative analysis was warranted, specifically internal furnace molten metal explosions, coke ovens gas leaks, and ignition and fuel gas leaks and ignition. The assessment showed that there was no off-site impact and that the risk complies with the risk criteria in *Hazardous Industry Planning Advisory Paper No 4 – Risk Criteria for Land Use Safety Planning*.

The hazard identification study demonstrates that the project can be designed, constructed and operated in a manner that will meet relevant regulations, standards and policies. The hazard and risk assessment provided further measures to ensure that the risk factors for the project were minimised.

Water and hydrology

A water quality impact assessment was undertaken for the construction, commissioning, operation, and decommissioning of 6BF. The assessment was undertaken in accordance with relevant legislation and government guidance.

The existing ambient and background water quality and the potential impacts to water quality associated with the construction, operational, and decommissioning phases of the project were assessed with respect to the following guidelines:

– NSW Marine Water Quality Objectives (WQO's) in NSW (DEC, 2006)
– Storing and Handling Liquids: Environmental Protection (DECC, 2007)
– Managing Urban Stormwater: Soils and construction - Volume 2 (DECC, 2008)
– Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC, 2018)

Potential risks to water quality during the construction, commissioning and decommissioning phases are well understood by BlueScope given the experience gained during the successful delivery of previous reline projects at PKSW. Risks to water quality during these phases of the project are proposed to be managed via the existing drainage network and site capture and containment measures, including adequate storage basins, comprehensive monitoring and controlled discharge.

The operation of 6BF following completion of reline activities, commissioning and ramp-up will be generally the same as existing operations at 5BF. Specific locations of certain activities within the PKSW site will change due to the transfer of operations to 6BF. However, changes to the quantity or characteristics of water outputs from the blast furnace will be minimal. Minor changes to water uses and cooling water discharges are expected due to the alternative cooling system associated with 6BF. The stormwater drainage system proposed for the project will enable the capture and reuse of stormwater and containment of any spills, providing an improvement over the current stormwater management capabilities.

As part of the 6BF reline, BlueScope has committed to delivering an extensive list of mitigation measures relating to water discharge and water use that will minimise the risk of surface water or groundwater contamination during operation of the project. These include improvements relating to:

– Process and discharge controls
– Stormwater management
– Discharge locations
– Water use
– Wastewater management
– Spill management.

Further to the mitigation measures described above, recommendations have been made regarding a number of management plans to be developed following completion of detailed design and implemented during the project.

Based on the investigations and assessment undertaken by GHD, it is considered that, subject to the recommended mitigation measures being applied, the project will not result in any material adverse impacts to water quality when compared to the current operations of 5BF. Amongst other positive effects, the project will result in reduced industrial water use, improved energy efficiency and improved water capture capability thereby minimising the risk of adverse water quality impacts.

Traffic

A traffic impact assessment was undertaken to assess the construction, commissioning, and operation of the project. The assessment was undertaken in accordance with relevant legislation and government guidance. The traffic impact assessment identified roads impacted by the project as:

– Springhill Road
– Five Islands Road
– Cringila Car Park Road
– Loop Road
– Emily Road
– BlueScope Access Road
– Flagstaff Road
– Old Port Road.

The construction of the project will generate approximately 300 light vehicles (600 vehicle movements) and 30 heavy vehicles (60 movements) during a worst-case peak hour during construction. Light vehicle movements will mainly be due to the transport of construction workforce to and from construction sites. Peak hour traffic generation is associated with light vehicle movements during shift changeover periods. Light vehicle movements during other times of the day are expected to be minimal. Heavy vehicle movements will mainly be due to the transport of plant and materials to and from the site and could potentially occur during all times of the day.

Modelling of intersection and mid-block performance at key locations on the local road network found that the additional traffic generated by the project will not significantly impact the intersection of mid-block levels of service or increase travel times for users of these roads. In terms of road safety, the assessment found that the existing roads were adequate, and that construction traffic will not significantly increase the risk of accidents occurring.

Regular operations of the site will resume after the construction period as per the current environment. The operation is therefore expected to have minimal traffic impacts on the surrounding road network.

Other environmental factors

Soils, geology and groundwater

The site is underlain by Quaternary sediments described as quartz and lithic fluvial sand, silt and clay. Historically, the project site was low lying swampland, with soils predominantly silty sands and clay. The area was progressively filled during the 20th century to accommodate industrial activities with the swampland filled with artificial products. The site surface is flat and generally sealed. Any remaining soil or sediments present on the site are highly disturbed thin coverings overlying fill material. As the site contains filled areas resulting from the reclamation of Tom Thumb Lagoon, it is possible that some acid sulphate soil material is still present, particularly in the estuarine sediments underlying fill material. Excavation or disturbance to natural material below the level of fill (approximately 8 metres bgl) is not expected.

PKSW is listed as a contaminated site by the EPA. A previous investigation identified that the 6BF area has a moderate contamination risk for heavy metals, total petroleum hydrocarbons (TPH), benzene, toluene, ethylbenzene and xylenes (BTEX), polyaromatic hydrocarbons (PAHs), and volatile organic compounds (VOCs).

The project will require ground disturbance for footing installation and pavement upgrades around 6BF. Excavations will generally be shallow and in fill material. Some piling may be required to bedrock in some instances with the project unlikely to encounter natural strata or require excavation of natural material. Standard soil and erosion control measures and, if necessary, spoil management is deemed suitable to manage ground disturbance works.

Following construction of the project, disturbed areas will be restabilised and resealed where practical. The project is not expected to have ongoing erosion and sedimentation impacts once in operation. Operational activities have the potential to impact on soils through spills or leaks of hydrocarbons and chemicals, though given the sealed nature of the site, potential contamination impacts due to inappropriate storage or chemical/fuel spills is considered unlikely.

Biodiversity

The project is in the Illawarra Interim Biogeographical Regionalisation of Australia (IBRA) sub region. This landscape is substantially altered by urban and industrial development but would have originally had a very similar structure and composition to the Seven Mile Barrier Mitchell Landscape. General elevation ranges from 0 to 25 metres, with local relief of 5 metres.

The environment within the PKSW site is predominantly cleared and highly modified for industrial purposes. Remaining vegetation is limited to planted tree species and opportunistic weeds.

Under Section 7.9 of the *Biodiversity Conservation Act 2016* (BC Act) an application to carry out SSI, including CSSI, is to be accompanied by a biodiversity development assessment report (BDAR) unless the Planning Agency Head and the Environment Agency Head determine that the proposed development is not likely to have any significant impact on biodiversity values. The project is unlikely to have a significant impact on any biodiversity values, or threatened species or ecological communities, or their habitats, listed under the BC Act. The Planning Secretary and head of NSW Environment, Energy and Science have notified BlueScope that a BDAR is therefore not required. A copy of the BDAR waiver is attached to this EIS.

A known population of Green and Golden Bell Frog (*Litoria aurea*) (GGBF) is located within the greater PKSW site. The GGBF is listed as endangered under the BC Act and as vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Known GGBF habitat and associated corridors for this population include the rail line from Coniston to Port Kembla railway station, the Plate Mill within PKSW, and the Steelhaven site immediately adjacent to PKSW. BlueScope has an established site management protocol in place to avoid impacting areas of PKSW that are known to be GGBF habituative and movement corridors. This protocol will continue to be implemented as part of the project.

No clearing of native vegetation will be required to construct the project. The project site is not connected to any habitat which may be utilised as corridors for flora and fauna species. No known groundwater dependant ecosystems (GDEs) have been identified within the project site.

Heritage

PKSW is located within the traditional lands of the Wodi Wodi, part of the wider Dharawal language group. Prior to European settlement, the wider area surrounding the project site would have supported a variety of habitats, including wetland, saltmarsh, coastal scrub, hilly scrub and forested plains. The project site is located in the administrative boundaries of the Illawarra Local Aboriginal Land Council (LALC). Consultation was undertaken with the Illawarra LALC and the Illawarra Aboriginal Corporation (IAC) to assist in identifying cultural heritage aspects of the project and opportunities for BlueScope to continue working closely with the local indigenous community.

An extensive search of the Aboriginal Heritage Information Management System (AHIMS) identified no recorded Aboriginal sites within the project site. This is consistent with the highly disturbed nature of PKSW. The nearest recorded Aboriginal site is in the vicinity of Spring Hill, comprising an open camp site consisting of two flaked stone artefacts located on the crest of a hill in a disturbed context. The AHIMS coordinates place the site on the western side of Springhill Road, approximately 1.5 kilometres northwest of the 6BF operational and construction area and approximately 150 metres to the east of Laydown Area 2.

A review of several historic heritage databases identified that the nearest historic heritage item is the locally listed Commonwealth Rolling Mills (CRM), which is approximately 1.6 kilometres southeast of the project site. An item known as the Galloway Steam Engine is located on the PKSW site and is a registered item with the National Trust of Australia. This item is still present on site in the No.1 Open Hearth, approximately 200 m to the east of Laydown Area 1.

As no Aboriginal or non-Aboriginal heritage items were identified within the site, no impacts to either is anticipated during the construction and operation of the project.

Visual amenity

A range of land uses are present within the surrounding locality including Wollongong CBD, residential areas, the University of Wollongong, Port Kembla, Lake Illawarra, and the conservation areas of the Illawarra Escarpment. The Illawarra Escarpment, located to the west of the project site, provides a natural visual catchment boundary to Wollongong and Port Kembla.

Alterations to the visual landscape due to the presence of construction plant and vehicles is expected to be generally screened from view by regional topography, existing buildings and vegetated screening around the PKSW. Operational impacts will be minor given that 6BF is an existing piece of infrastructure that is an established part of the visual catchment of the locality. The construction of a new slag granulation stack will modify the visual amenity to some extent, however given the stack is in character with the industrial nature of the locality and the large offset distances to the nearest visual receptors, any visual impacts will be minor.

Land use and property

The project is located on Lot 1 DP 606434 which is owned by BlueScope and is zoned IN3 – Heavy Industrial under the Three Ports SEPP. The project meets the definition of a heavy industry in accordance with the Three Ports SEPP and is consistent with the objects of the heavy industrial land zoning. The PKSW site is a multiuse industrial area which includes storage, manufacturing, port berths, private internal roads, and offices.

The project will be located entirely on land owned by BlueScope, and therefore no land acquisition (temporary or permanent) will be required. There may be some internal restrictions on access and land use within PKSW during construction of the project, however this will be managed by BlueScope to ensure operations on site are not significantly impacted. No changes to land use are expected during operation as 6BF is an existing feature of the site and operational activities will be generally consistent with current operations. No impacts to services or infrastructure outside of the PKSW site are anticipated to be generated by the project.

Social and economic

The project is located within the Wollongong LGA, which recorded a population of 203,630 in the 2016 census. The median weekly household income was $1,339 and the most common industries of employment were hospitals, higher education and aged care residential services. PKSW is located in the suburb of Port Kembla, which is approximately 2.5 km south of the City of Wollongong. The population of Port Kembla was recorded as 5,014 in the 2016 census. Iron and steelmaking made up 3.3% of the suburb's workforce.

During construction there could be some temporary amenity impacts from noise and dust generated by the project at residences in the immediate locality. Activities such as demolition and removal of the iron skull are expected to generate the most impacts. These activities will be undertaken for a relatively short period of time. Dust will be managed at the source to stop it tracking off site, thereby avoiding potential impacts on receivers.

The continued operation of PKSW will enable the continued significant contribution it makes to the economy, including about $6.5 billion or 24 per cent of regional output per annum. The project will also facilitate the retention of approximately 4,500 jobs (direct and indirect) at the PKSW site itself and support in the order of 10,000 jobs in total including indirectly in supplier and customer businesses.

Greenhouse gas and energy

Iron and steelmaking results in the production of greenhouse gases (GHG) as a by-product of the chemical reactions used to convert the iron ore into iron.

To achieve net zero emissions in steelmaking, commercialisation of breakthrough technologies and supporting infrastructure will be needed. Development of these technologies to the operational scale required for Port Kembla is technically challenging. Based on current research, technology and commercial readiness, BlueScope expects these technologies will continue to develop over the current and following decade, with significant take-up across the steel industry predicted to occur into the 2040s. Consequently, progressing with the project is the only technically feasible and viable option for BlueScope to continue steelmaking at Port Kembla from the mid to late 2020s when it is anticipated 5BF will reach the end of its campaign life. While breakthrough technologies are still being developed, existing technologies are available to reduce GHG emissions. BlueScope has incorporated over $100 million of environmental improvements into the design of 6BF, $80 million of which includes improvements designed to reduce GHG emissions in comparison to the current GHG emissions performance of 5BF. Crucially, this investment will also enable the incorporation of further blast furnace-related GHG emission reduction technologies, currently under investigation and development, once they become technically and commercially viable at the scale required.

Technologies proposed for the project to reduce GHG emissions within existing processes as part of the operation of 6BF include the installation of a Top Gas Recovery Turbine to generate electricity, installation of dual lances at the tuyerestock to enable the use of alternative reductants such as hydrogen-rich Coke Ovens Gas and renewable hydrogen, installation of a Waste Gas Heat Recovery system to reduce fuel consumption at the stoves and liberate Coke Ovens Gas for injection into the furnace (through the new lances), and optimisation of raw material inputs. Incorporation of these technologies is expected to achieve a GHG emission reduction of approximately 172,000 tCO_2-e per year. Further to this, BlueScope has made provision for the retrofit of other prospective GHG emission reduction technologies that are currently under development. These opportunities are part of a broader suite of climate-related projects at Port Kembla that have the potential to reduce GHG emissions intensity.

BSL and BlueScope are working with partners across the industry, including research and academic bodies to explore emerging and breakthrough technologies to support their decarbonisation pathway. In October 2021 BSL and Rio Tinto signed a Memorandum of Understanding (MOU) to research and design low-emissions processes and technologies for the steel value chain across iron ore processing, iron and steelmaking and related technologies. The two priority action areas for immediate exploration are:

– **Hydrogen Direct Reduction and Iron Melter**

  This concept will involve producing a low emissions iron feed for consumption at Port Kembla and will explore the direct reduction of Rio Tinto's Pilbara iron ores, with the intent of using hydrogen produced from renewable electricity. The direct reduced iron (DRI) from this process will be melted in an electrical furnace, powered with renewable electricity, to produce iron suitable for the steelmaking process.

– **Enhancing existing processes**

  BlueScope and Rio Tinto will cooperate to explore the development of projects involving iron ore processing and technologies directed at reducing carbon emissions from existing iron and steelmaking processes.

In December 2021, BSL signed a Memorandum of Understanding with Shell Energy Operations Pty Ltd to collaborate on two projects:

– **Pilot renewable hydrogen electrolyser plant at the Port Kembla Steelworks**
  This initial project will investigate designing, building and operating a 10 MW renewable hydrogen electrolyser to explore and test the use of renewable hydrogen in the blast furnace at BlueScope's Port Kembla Steelworks. The ambition is to demonstrate hydrogen as a pathway towards low emissions steelmaking. The hydrogen could also potentially be used for other purposes, such as to feed a pilot direct reduced iron (DRI) plant.
– **Illawarra hydrogen hub concept**
  The MoU also provides for BlueScope and Shell to collaborate with other organisations to explore a "hydrogen hub" in the Illawarra. This project will explore options for hydrogen supply and offtake, renewable energy supply and hydrogen and electricity infrastructure. The project will also examine the logistics infrastructure required for a commercially viable hydrogen supply chain in the Illawarra.

BlueScope has a reputation in the global steel industry of operating a stable, consistent, high productivity blast furnace at Port Kembla. This is achieved through state-of-the-art process control of the chemical reactions in the furnace and best in-class maintenance practices[2] which are designed to minimise stopping and starting the furnace for maintenance (leading to inefficient utilisation of fuel). The proposed design of 6BF will build on BlueScope's many years of operational experience and will allow further optimisation of the blast furnace processes. Careful control of the furnace in this way ensures that the furnace is running as efficiently as possible, reducing the need for fuel and reducing the GHG emissions of the furnace.

Construction of the project will result in the generation of some limited GHG emissions through the use of plant and vehicles which combust hydrocarbons, primarily diesel, as well as through electricity use. The quantity of GHG emissions estimated to occur during the full construction period is approximately 9,800 tCO_2-e per annum over the three-year construction period. Measures such as the use of appropriately sized equipment, minimising use and turning off engines where practical aim to minimise GHG emissions during construction.

The project incorporates measures that will result in a net reduction of GHG emissions from PKSW.

Waste management

A range of waste streams will be generated by the project. The majority of these waste streams will be either reused or recycled via a range of resource recovery activities already authorised by EPL 6092. Any waste streams not covered by EPL 6092 will be disposed or recycled offsite at appropriately licensed facilities.

Blast furnace slag has been identified as a key waste stream for the project. Slag is a saleable by-product from ironmaking that is comprised of a mixture of mineral impurities from the iron ore, coke and fluxes. Slag management activities at PKSW, including the recovery and sale of blast furnace slag, are managed by a slag service provider as part of BlueScope's Circular Economy initiatives.

The construction of the project will result in the generation of waste through the removal of refractories and iron skull. The project will also generate general construction waste including packaging, domestic waste, redundant erosion and sediment controls and sewage, which will be classified, managed and disposed of in accordance with the Waste Classification Guidelines (EPA, 2014) and the principles of the waste management hierarchy. PKSW has existing waste management systems and contractors which have proven capable of dealing with temporary increases in waste streams during previous reline and shutdown activities, so are well placed to manage waste streams as a result of the project.

During operation, waste streams are expected to be generally consistent with existing operating conditions and will be managed in accordance with existing waste management processes.

[2] The blast furnace is a continuous operation and any interruptions adversely impact the energy efficiency of the process. BlueScope shuts the furnace down for scheduled maintenance only twice per year. This is world's best-practice.

Cumulative impacts

Two SSI projects in the surrounding area that have potential for cumulative impacts with the project were identified. The Port Kembla Gas Terminal may potentially have minor cumulative impacts given its close proximity to the site e.g. cumulative traffic impacts. Background pollutant concentrations were estimated and considered in the assessment. The Tallawarra Stage B Gas Turbine Power Station was considered unlikely to contribute to cumulative emissions as there is a significant distance between the two sites. The project is expected to generate some cumulative impacts with these projects during operation. Cumulative impacts will be similar to those associated with the operation of 5BF and in some cases, these will be offset by the improvements. For example, there will be reduced air emissions generated by the project through the inclusion of best available technologies where feasible that will result in improvements compared to 5BF operations.

Noise generated by the construction of the project will not significantly cumulate with other noises emanating from the site. No vibration impacts are anticipated. The operational noise assessment concluded that the relevant noise criteria will be met therefore no cumulative impacts are likely to occur. The project is unlikely to raise the likelihood of a hazardous event occurring or cumulating with other projects.

Water quality impacts have been assessed utilising a range of background data sources and historical modelling. These includes cumulative water quality effects to receive water from a range of other projects and sites impacting Port Kembla Harbour. Based on the investigations and assessment undertaken the water quality assessment concluded that, subject to the recommended mitigation measures being applied, the proposed project will not result in any material adverse impacts, including adverse cumulative impacts, to water quality, when compared to the current operations of 5BF. Amongst other positive effects, the project will result in reduced industrial water use, improved energy efficiency and improved water capture capability thereby minimising the risk of adverse water quality impacts.

The project may generate cumulative impacts with construction traffic associated with the Port Kembla Gas Terminal and the Eastern Gas Pipeline, particularly during construction. These projects are both in a similar area and will utilise the same road network as the project. Any traffic impacts are expected to be minor to moderate at worst case scenario, and at their greatest during the morning and afternoon peak. The project is not expected to have significant cumulative impacts with projects in the wider road network.

The project will generate greenhouse gases that may have an impact on anthropogenic climate change. Construction of other projects nearby may have a cumulative impact, though overall cumulative effects are not expected to be significant. The project is not expected to generate additional impacts above the existing impacts from 5BF. Through the adoption of new technologies and BSL's commitment to achieving net zero GHG emissions by 2050 (subject to the enablers identified in BSL's Climate Action Report), cumulative GHG impacts will be further reduced.

In terms of positive impact, construction of the project may overlap with some other major projects in the area, creating a significant amount of construction-related employment for the local community. Construction will also provide a short-term boost to local manufacturers and suppliers.

Conclusion

The project future-proofs the ongoing production of steel at PKSW with a proven blast furnace technology that will improve operational and environmental performance while providing a bridge to transition to new and emerging low-emissions iron and steelmaking technologies when proven at scale and commercially viable. The project is an important contribution to maintaining sovereign manufacturing capability in Australia and will deliversteel products critical for use in infrastructure, building and construction, defence and renewable energy projects, including wind towers and solar farm componentry. It also underpins an economic contribution of around 1% of NSWs GSP, whilst supporting 4,500 direct and indirect PKSW jobs and 10% of overall jobs in the Illawarra region.

Impact to the neighbouring community during the construction phase will be limited through the implementation of proactive mitigation strategies and environmental performance during operation will be improved relative to the current 5BF operation.

This EIS documents the potential environmental impacts of the project, considering both negative and positive impacts. The project has been designed and assessed with due consideration to the matters for consideration under the EP&A Act, and is generally consistent with the principles of ecologically sustainable development. The design of the project, in conjunction with the detailed assessment of potential environmental impacts, has sought to minimise impacts on the environment while maintaining feasibility. The EIS demonstrates that the projects impacts can be managed to acceptable levels.

Glossary and abbreviations

Term/ acronym	Definition
ABS	Australian Bureau of Statistics
AHIMS	Aboriginal Heritage Information Management System
AHIP	Aboriginal Heritage Impact Permit
ANZECC	Australian and New Zealand Environment and Conservation Council
ASS	Acid sulphate soils
BC Act	Biodiversity Conservation Act 2016
BFG	Blast Furnace Gas
BF-BOF operating model	Blast Furnace ironmaking and Basic Oxygen Furnace steelmaking
Biosecurity Act	Biosecurity Act 2015
BlueScope	BlueScope Steel (AIS) Pty Ltd
BoM	Bureau of Meteorology
BOS	Basic oxygen steelmaking
BSL	BlueScope Steel Limited
^{o}C	Degrees Celsius
CAS-OB	Composition adjustment station – oxygen blowing
CBD	Central Business District
CLM Act	Contaminated Land Management Act 1997
CO	Carbon monoxide
CO_2	Carbon dioxide
Coastal Management SEPP	State Environmental Planning Policy (Coastal Management) 2018
COG	Coke Oven Gas
CSSI	Critical State Significant Infrastructure
DAWE	Department of Agriculture, Water and Environment
DECCW	Department of Environment, Climate Change and Water
DPIE	Department of Planning, Industry and Environment
DRI	Direct Reduced Iron
EAF	Electric Arc Furnace
EEC	Endangered ecological community
EIS	Environmental Impact Statement
EPA	Environment Protection Authority
EP&A Act	Environmental Planning and Assessment Act 1979
EP&A Regulation	Environmental Planning and Assessment Regulation 2000
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999 (Cth)
EPI	Environmental planning instrument
EPL	Environment Protection Licence
Fe	Iron
GDE	Groundwater Dependent Ecosystems
GHD	GHD Pty Ltd

Term/ acronym	Definition
GHG	Greenhouse Gas
H_2S	Hydrogen Sulfide
ha	Hectares
Heritage Act	Heritage Act 1977
HRC	Hot Rolled Coil
km	Kilometres
km/h	Kilometres per hour
LALC	Local Aboriginal Land Council
LEP	Local Environmental Plan
LGA	Local Government Area
LNG	Liquified Natural Gas
m	Metres
m^2	Square metres
m^3	Cubic metres
mg/L	Milligrams per litre
ML	Megalitres
MNES	Matters of National Environmental Significance
mm	Millimetres
Mt	Megatonnes
Mtpa	Megatonnes per annum
NO_2	Nitrogen dioxide
NPW Act	National Parks and Wildlife Act 1974
NSW	New South Wales
PKSW	Port Kembla Steel Works
$PM_{2.5}$	Particulate matter 2.5 micrometers or less in diamter
PM_{10}	Particulate matter 10 micrometers or less in diamter
PMST	Protected Matters Search Tool
POEO Act	Protection of the Environment Operations Act 1997
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy
SEPP 33	State Environmental Planning Policy No.33 – Hazardous and Offensive Development
SEPP 55	State Environmental Planning Policy No.55 – Remediation of Land
SO_2	Sulphur Dioxide
SSD	State Significant Development
SSI	State Significant Infrastructure
SRD SEPP	State Environmental Planning Policy (State and Regional Development) 2011
t	Tonnes
TfNSW	Transport for NSW
Three Ports SEPP	State Environmental Planning Policy (Three Ports) 2013
TRL	Technology readiness level
TRT	Top Gas Recovery Turbine
WGHR	Waste Gas Heat Recovery
5BF	No.5 Blast Furnace
6BF	No.6 Blast Furnace
µg/L	Micrograms per litre

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1. Introduction

1.1 Background

BlueScope Steel (AIS) Pty Ltd (BlueScope) is one of Australia's leading manufacturers and with its parent company, BlueScope Steel Limited (BSL), is a global leader in finished and semi-finished steel products. BlueScope's Port Kembla Steelworks (PKSW) operation in NSW includes two blast furnaces. No.5 Blast Furnace (5BF) is currently operating, while No.6 Blast Furnace (6BF) is currently in care and maintenance.

5BF is expected to continue to produce (molten) iron on a continuous basis until it reaches the end of its operational life at some stage between 2026 and 2030. BlueScope is proposing a move of iron production from 5BF to 6BF, after 5BF ceases operation.

6BF last produced iron in 2011, at which point it was taken out of service and placed into care and maintenance. In order to prepare 6BF to become operational again, major upgrade and maintenance works are required (the project). The project aims to return 6BF to service through a reline process that will be carried out while 5BF continues to operate.

The project has been declared Critical State Significant Infrastructure (CSSI) in accordance with section 5.13 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and clause 26 of Schedule 5 of the *State Environmental Planning Policy (State and Regional Development) 2011* (SRD SEPP). This environmental impact statement (EIS) has been prepared to support the application for project approval, to be determined by the NSW Minister for Planning and Public Spaces.

1.2 Project objectives

The key objectives of the project are to:

– Maintain the domestic supply of steel to all BSL's other Australian manufacturing plants and operations through the continuation of Blast Furnace – Basic Oxygen Furnace (BF-BOF) iron and steelmaking at Port Kembla.
– Help to maintain the approximately 6,200 jobs at PKSW and the other facilities owned by BSL around Australia.
– Minimise disruption to production at PKSW following the end of the current 5BF campaign by ensuring that 6BF is available for operation prior to 5BF ceasing operation.
– Continue to provide economic benefit to the region by maintaining the provision of steel to the domestic and export market.
– Improve the environmental performance of 6BF through the implementation of the latest feasible and viable technologies.
– Incorporate technologies, or build the foundations for the subsequent installation of emerging technologies, to support delivery of BSL's decarbonisation pathway, including the target of 12% reduction in steelmaking GHG emissions intensity by 2030 and corporate goal of net zero emissions across BSL's operations by 2050[3].

1.3 Proponent details

BlueScope Steel (AIS) Pty Ltd (BlueScope) (ABN 19 000 019 625) is a wholly owned subsidiary of BlueScope Steel Limited (BSL) (ABN 16 000 011 058). BlueScope is the owner and operator of PKSW and is the proponent for the project. BlueScope is one of Australia's leading manufacturers, one of only two primary producers of iron and steel in Australia, and together with BSL is a global leader in finished and semi-finished steel products.

[3] BSL's 2050 net zero goal covers Scope 1 and 2 GHG emissions. Achieving the 2050 net zero goal is highly dependent on several enablers, including commerciality of emerging and breakthrough technologies, the availability of affordable and reliable renewable energy and hydrogen, availability of quality raw materials, and appropriate policy settings.

1.4 Purpose and structure of this report

This EIS has been prepared by GHD Pty Ltd on behalf of BlueScope to support the application for approval of the project. The purpose of this document is to inform government agencies and other stakeholders about the project, its potential environmental, social and economic impacts, and the measures that will be implemented to manage, mitigate and offset those impacts.

The EIS addresses the specific requirements set out in the Secretary's environmental assessment requirements (SEARs) for the project, which were issued by the NSW Department of Planning, Industry and Environment (DPIE) on 12 July 2021. The SEARs, together with references to where each of the requirements have been addressed within this EIS, are presented in tabular format in Appendix A.

The EIS has been prepared in accordance with the Environmental Planning and Assessment Act 1979 (EP&A Act) and Schedule 2 of the Environmental Planning and Assessment Regulation 2000.

An overview of the structure of the EIS is provided below:

– Executive Summary: Provides a brief overview of the project and the key outcomes of the EIS.
– Chapter 1 – Introduction: Provides an overview of the project, proponent, approval process and structure of this document.
– Chapter 2 – Site description: Provides a site overview and history, and description of the existing environment and land uses.
– Chapter 3 – Strategic context: Explains the strategic need for the project in the context of the NSW policy setting.
– Chapter 4 – Project alternatives: Outlines alternatives considered during development of the preferred project.
– Chapter 5 – Description of the project: Contains a detailed description of the project.
– Chapter 6 – Statutory context: Discusses relevant State and Commonwealth laws and planning instruments.
– Chapter 7 – Consultation and issues identification: Discusses the engagement strategies for the project and the consultation outcomes. Outlines the process for the identification and prioritisation of the assessment for key environmental aspects.
– Chapter 8 – Assessment of key impacts: Contains a description of the existing environment and a comprehensive analysis and assessment of the key issues relevant to the project.
– Chapter 9 – Assessment of other impacts: Contains a description of the existing environment and assessment of other issues relevant to the project.
– Chapter 10 – Environmental management: Provides an outline of the proposed environmental management framework and a consolidated list of the proposed mitigation and management measures.
– Chapter 11 – Justification and conclusion: Provides an overview of the conclusions from the assessment process and discusses the project's justification on balance of environmental, social and economic considerations.
– Chapter 12 – References: Lists references cited in the EIS.
– Appendices – Relevant additional information and specialist reports.

For the purposes of this report, the following definitions are employed:

– The project is the development that is the subject of this EIS, being the proposed reline and operation of 6BF.
– The project site is the area within which the project is located and would be directly impacted by the project.
– The study area is the site that was investigated during preparation of the EIS. The study area encompasses the project site and a buffer as relevant to searches and investigations.

2. Site description

2.1 Historical steelmaking

In 1927, the Australian Iron and Steel Company established an agreement with the State Government to establish a steel mill at Port Kembla. The mill was constructed in 1928 on land south of Allans Creek. The mill began operations in 1928 and the Australian Iron and Steel Company later merged with Broken Hill Proprietary (BHP) in 1935. Following the merger, BHP entered into an agreement with the State Government to further expand operations around Tom Thumb Lagoon.

The expansion of the BHP steel works included the reclamation of 30 hectares of the western edge of Tom Thumb Lagoon. The reclamation program raised land by approximately 7 metres, which required 2.3 million cubic metres (m^3) of fill material, predominantly sourced from Port Kembla sand dunes and dredge material from Tom Thumb Lagoon. The resulting industrial development required extensive modification of the natural drainage systems in the area, with Allans Creek being heavily modified and rerouted around the border of the industrial sites. Drainage along Springhill Road and the former Tom Thumb Lagoon were similarly heavily modified. Following these modifications to the site, steel works operation areas have remained largely unchanged since the 1960s.

2.2 Site details

2.2.1 Port Kembla Steelworks

Port Kembla Steelworks (PKSW) is located within an industrial site of approximately 750 hectares (ha) in the Wollongong Local Government Area (LGA) approximately 80 kilometres (km) from Sydney and 2.5 km from the City of Wollongong (see Figure 2.1). PKSW is the largest steel production facility in Australia and specialises in the production of flat steel products, including slab, hot rolled coil, cold rolled coil, plate and coated and painted steel products.

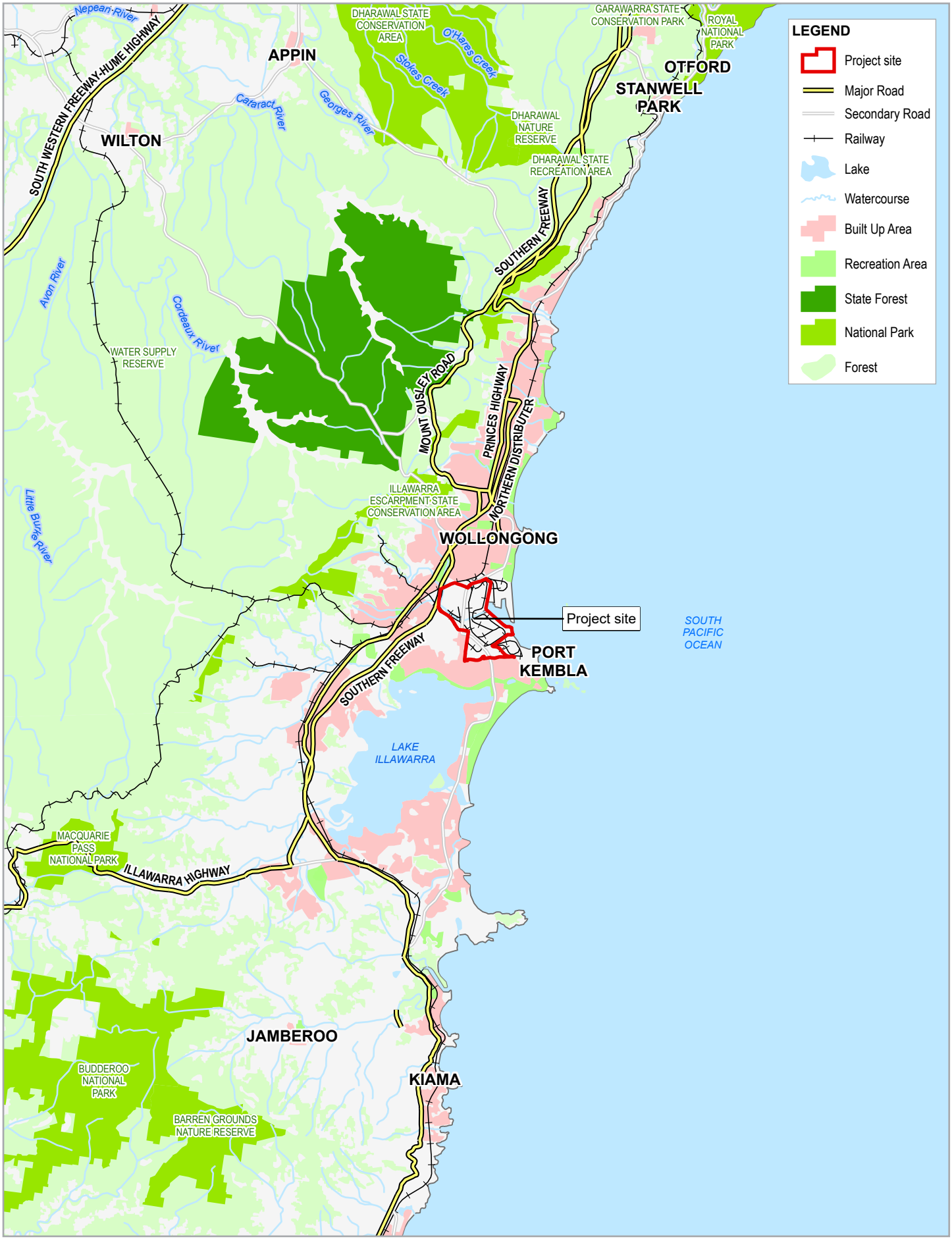
PKSW is an important national economic asset. It is one of only two primary producers of iron and steel in Australia (making iron and steel from iron ore). It is also the only plant in Australia manufacturing upstream flat iron and steel products, supplying the essential feedstock that keeps all of BSL's other domestic manufacturing facilities operational. PKSW, and the adjacent Springhill Works (owned directly by BSL), employ approximately 4,500 direct employees and on-site contractors, and generates about 10,000 jobs in total including indirect employment in supplier and customer businesses. PKSW provides sovereign manufacturing capability for a range of important construction, infrastructure, manufacturing, energy and defence applications. Together with the Springhill Works, it makes a significant economic contribution to the Illawarra region, generating $6.5 billion or 24 per cent of the region's output per annum.

The PKSW site comprises the No.1 Works, No.2 Works, Steelhaven and the Recycling Area (see Figure 2.2). The No.2 Works is divided into two sections by Allans Creek. The southern half of the No.2 Works comprises the Cokemaking, Ironmaking and Steelmaking facilities, while the northern half contains the Recycling Area, and Rolling Mills. All sectors of PKSW are internally linked by road and rail and are currently supplied with electricity, water and gas services.

The specific facilities in the southern sector of the No.2 Works include the:

– No.3 Sinter Plant.
– 5, 6 and 7 Coke Ovens Batteries.
– Coke Ovens Gas Processing.
– No.2 Blower Station.
– No.5 and No.6 Blast Furnaces.
– Raw Materials Handling.
– Basic Oxygen Steelmaking (BOS) plant.
– Steel ladle injection unit and vacuum degasser.
– Composition adjustment station - oxygen blowing (CAS-OB) steel ladle.
– Treatment station.
– Continuous slab casters.
– The flat products area (northern sector) comprises the:
    - Hot Strip Mill
    - Plate Mill
    - Cryogenics plant.

Each facility plays a different, but integrated, function in the production of steel products. 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 part of the ironmaking facilities, which is located within Lot 1 DP 606434. Ancillary construction facilities will also be required and will be located within the PKSW site as shown on Figure 5.1.



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Kilometres

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

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GHD

BlueScope Steel Ltd
No.6 Blast Furnace Reline and Operations
Environmental Impact Statement

Project No. **12541101**
Revision No. **0**
Date **21/10/2021**

Regional Location

FIGURE 2-1

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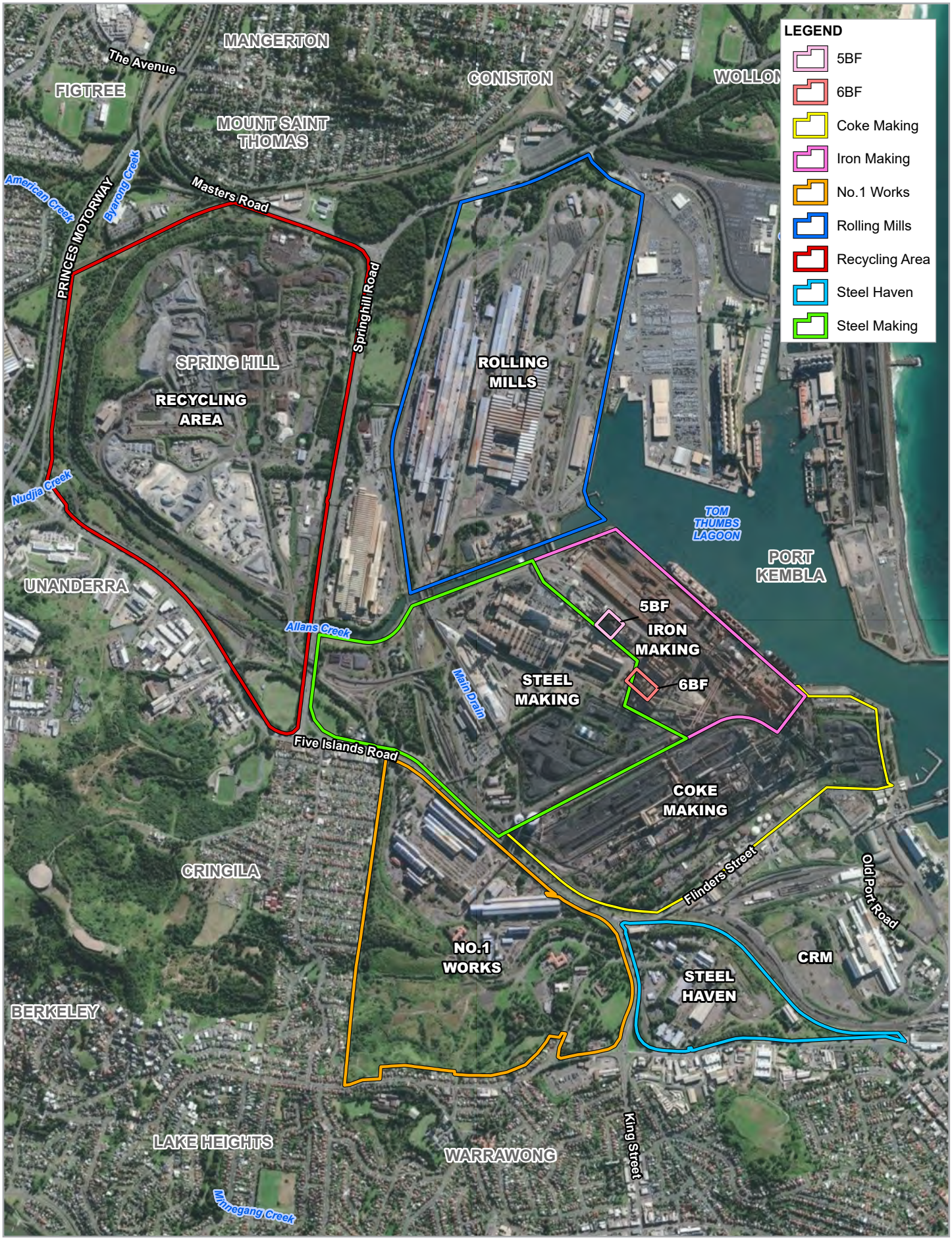

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Kilometres

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

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GHD

BlueScope Steel Ltd
No.6 Blast Furnace Reline and Operations Environmental Impact Statement

Port Kembla Steelworks site layout and locality

Project No. **12541101**
Revision No. **0**
Date **23/11/2021**

FIGURE 2-2

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Data source: LPI: DCDB/DTDB, 2017. World Imagery: Maxar.
Created by: tmorton

2.2.2 Ironmaking operations and systems

Ironmaking at PKSW is via a thermochemical process of reduction of iron ore within the blast furnace. In general, iron ore, coke and other raw materials are charged into the blast furnace for smelting and a mixture of elemental iron (Fe), slag (mineral by-products), and Blast Furnace Gas (BFG) is generated from the blast furnace.

Fine iron ore particles and other materials are first processed in the sinter plant to provide a permeable blend of raw materials for the smelting process. Following the smelting process, molten iron is cast via tapholes located near the base of the blast furnace into waiting rail-mounted torpedo ladles. The ladles transport the molten iron to other plants within PKSW for processing into steel.

The major by-products from the blast furnace operation are BFG and slag. The hot gases leaving the top of the blast furnace are cooled and cleaned then piped to other plants within PKSW as an energy source to be consumed in other processes to the maximum practical extent, with remaining gases flared to atmosphere in accordance with the conditions of Environment Protection Licence (EPL) 6092. Slag exiting the bottom of the furnace is either formed into rock or granulated slag for sale as construction materials.

2.2.2.1 Raw materials handling

The raw materials handling area covers over half of the ironmaking area and is accessible from the Inner Harbour. Raw materials are delivered via rail, road and sea and include:

– Iron ore
– Coal
– Coke
– Limestone and other fluxes (materials that assist in removing impurities during smelting)

Raw materials are processed and then transferred to storage bins at the blast furnace stockhouse. From the storage bins, they are transported via covered conveyors to the blast furnace.

2.2.2.2 Sinter plant

Sintering is an agglomeration process that fuses fine iron ore, coke, limestone dust and other materials to form a porous solid lump material. Sinter is used as an iron source and also aids the permeability of the raw material burden within the blast furnace. PKSW has one sinter machine, the No.3 Sinter Plant.

Within the sinter plant, iron ore, coke and fluxes are blended and moistened before being spread onto a continuously moving grate where they are fused and crushed, and then screened into suitably sized pieces. After cooling and screening, sinter is sent to the stockhouse storage bins and then to the blast furnace via a covered conveyor.

Waste gas from the sintering process is captured and treated at the waste gas cleaning plant, using activated carbon filters, prior to discharge.

Wastewater streams from the blast furnace are treated at the sinter plant dewatering plant before being discharged or are returned to the gas cleaning system.

Solids are stockpiled at the Recycling Area prior to, where feasible, re-processing or re-use.

2.2.2.3 Pulverised coal injection plant

The pulverised coal injection (PCI) plant is located to the south-east of 6BF immediately adjoining the coal stockpile. The PCI plant takes coal from the stockpile and pulverises it into fine coal granules that are then transported to and injected in the blast furnace. This provides a supplementary carbon source to improve the efficiency of the iron production process and reduce the total amount of coke fuel required.

2.2.2.4 Blast Furnace

There are two similar sized blast furnaces at PKSW, 5BF and 6BF. 5BF was commissioned in 1972. Since that time, 5BF has undergone three relines and is now into its fourth campaign. A campaign is the period of time (measured in years) during which the furnace operates before needing to be relined. 6BF was initially commissioned as a new facility in 1996 and operated until closure in 2011 (as a result of difficult market conditions, rather than poor furnace condition). Since this time, 6BF has been in care and maintenance. 6BF's first and only campaign commenced in 1996 and lasted approximately 15 years, over which time it produced 38.5 megatonnes (Mt) of iron.

A blast furnace is a complex piece of metallurgical processing plant comprised of several sub-systems including:

– The charging system which feeds raw materials into the furnace
– The blast furnace vessel (or furnace proper) where the iron ore is reduced to iron
– The casthouses where the liquid iron is tapped from the furnace
– The hot blast system which provides the hot blast air to the furnace
– The gas system which cleans and cools the by-product gas from the process
– The cooling system.

6BF and its major process elements are shown in Figure 2.3.

Figure 2.3 No.6 Blast Furnace and major process elements

2.2.2.5 6BF charging system

The charging system comprises the stockhouse and charging conveyors for delivering raw material to the blast furnace vessel. Feed material is transferred from the raw materials handling area and the coke handling area to the stockhouse prior to charging into the blast furnace. The stockhouse comprises a series of bins that coordinate feeds to the blast furnace to ensure that charging occurs in the correct sequence. Iron ore, sinter, coke and fluxes are charged into the blast furnace vessel via a covered charging conveyor that runs from the stockhouse to the top of the blast furnace.

2.2.2.6 6BF blast furnace vessel

The blast furnace vessel is a vertical, conical shaft of circular cross-section, approximately 14 m internal diameter in the lower section and 8.5 m in the upper section and stands approximately 40 m high. The overall blast furnace facility is approximately 90 m tall when gas collection mains and other equipment are taken into account.

Raw materials are charged into the blast furnace vessel at regular intervals via a material hopper located at the top of the furnace. A furnace charge comprises a batch of coke, and two batches of blended ferrous feed, flux and coke. Each batch is fed to the furnace separately via a rotating chute, resulting in an evenly distributed layering of the burden material.

Oxygen enriched air heated to approximately 1,200 degrees Celsius (°C) is blown into the furnace through water cooled copper nozzles called tuyeres that are spaced around the lower section of the furnace. The air causes the coke to burn, producing carbon monoxide which creates a chemical reaction, reducing the iron ore to molten iron. To ensure that good iron quality is produced in the furnace, the temperature of the molten iron is maintained at 1,500 °C.

The blast furnace hearth contains a refractory lining that can resist thermal spalling and chemical deterioration for a long period of time. Normally, blast furnace refractory linings can efficiently operate for a period of 15 years or more before they need to be replaced.

2.2.2.7 6BF cooling system

The steel furnace shell is lined with cast iron or copper cooling elements called staves. Staves are also located between the furnace shell and the refractory lining in the hearth. The staves house internal pipes for cooling water passages, which protect the blast furnace shell integrity and the staves themselves.

2.2.2.8 6BF casthouses

From the blast furnace, molten iron and slag is sequentially cast into a refractory lined trough on each of the three casthouse floors. The furnace operates continuously with molten iron and slag being cast out of the furnace regularly via 3 tapholes located at the bottom of the vessel, in the hearth.

During tapping, dust, kish (flaky graphite), and sulphur dioxide (SO_2) are released. An air extraction system along the trough and at the tapholes captures airborne particulates, which are subsequently managed by dedusting equipment (the casthouse baghouse).

Approximately 1,000 tonnes of molten iron and 330 tonnes of slag are tapped at each cast, and there are nominally 7-10 casts per day.

Molten iron is transported by rail, using refractory brick lined torpedo ladles, to the steelmaking area for further processing.

2.2.2.9 6BF hot blast system

Pre-heated air (hot blast) is blown into the blast furnace to react with the iron ore and coke. Using a turbo blower, atmospheric air is charged to heating chambers called hot blast stoves. The air is heated to a temperature of 1,200 °C, and piped to the blast furnace via the hot blast main and into the vessel via the tuyeres. There are three stoves that operate in a cyclic manner to provide a continuous supply of hot blast. The hot blast air maintains a process reaction which produces iron with a temperature of approximately 1,500 °C within the blast furnace.

2.2.2.10 6BF gas cleaning system

Gases produced from the blast furnace vessel are directed from the top of the furnace to be treated by the gas cleaning system.

The gas cleaning system comprises a raw gas main, dust catcher and a high energy scrubber.

Collected dust is periodically discharged and agglomerated for transfer to the sinter plant feed beds via trucks.

Impurities are removed from the gas via washing with high velocity recycled closed loop water. This creates a slurry which is thickened and transferred to the sinter plant dewatering plant. The cleaned gas, BFG, is then piped to the 6BF hot blast stoves for use as a heating fuel, as well as reticulated throughout PKSW as an energy source for other processes.

2.2.2.11 Air emissions

The ironmaking process produces a number of point-source and fugitive air emissions, which will be treated and emitted in accordance with an amended EPL 6092, including:

– Flue gas discharged from the stoves waste heat stack
– Filtered and unfiltered air from the casthouse and stockhouse
– BFG from furnace top bleeders (under upset process conditions) and discharged during charging
– Hydrogen sulphide (H_2S) and sulphur dioxide (SO_2) from slag handling
– Dust from the raw materials and charging conveyors, off gas system and traffic.

2.2.2.12 Water emissions

Liquid waste streams produced in the ironmaking process include:

– Blowdown of water from the blast furnace effluent treatment system, which treats closed loop water used in cleaning the BFG as well as various other sources of water related to furnace operations.
– Bottom sludge from the blast furnace clarifier, which is sent for treatment at the sinter plant dewatering plant, with the resultant filtrate returned to the blast furnace effluent system.
– Water used in the granulation of slag is recycled within the process.
– The blast furnace cooling system is a closed loop system with only periodic blowdown water being discharged to the gas effluent system.
– Condensates from the BFG and Coke Oven Gas (COG) systems which are collected and treated.

2.2.2.13 Blast furnace slag

Slag is a saleable by-product generated by the ironmaking process. It is a mixture of mineral impurities from the iron ore, coke and fluxes. The slag is less dense than the molten iron and is easily separated using a skimmer box arrangement positioned in the casthouse troughs. The slag is tapped from the casthouses into large 34 m^3 slag pots and transported in liquid form via Kress Carriers to a location away from the blast furnace.

Two types of slag product are subsequently produced remote from the blast furnace, granulated slag and rock slag. Granulated slag is produced by spraying the molten slag with a jet of recycled water. It has properties that allow it to be used as a replacement for a portion of Portland cement in cement production. Alternatively, rock slag is produced by atmospheric air cooling and quenching in large pits. From the pits it is crushed into different sizes which form different products. The bulk of rock slag is sold as road base.

2.2.2.14 Dust handling

Dusts are collected from the blast furnace dustcatcher within the gas cleaning system and dampened with water in a pug mill before being transferred to the sinter plant feed beds via truck.

Dust is also collected by truck from dedusting baghouses in the casthouse and stockhouse before being transferred for pelletising prior to being added to the sinter plant feed beds.

2.2.2.15 Approved operations

The continued operation of 6BF, including its ongoing maintenance, is currently approved under development consent No. D93/16 granted by Wollongong City Council (existing consent). However, the upgrades to 6BF required to make it operational again, including the reline works, are not authorised under the existing consent. Given the nature and extent of the upgrade works required, a new approval is required. BlueScope proposes to surrender the existing consent subsequent to approval for the project being obtained.

The other key approval in place for ironmaking at PKSW is that related to the current operation of 5BF, granted by the Minister for Planning on 9 November 2005 in respect of DA 139-602005i. The current consent for 5BF is required to remain in force to the extent necessary for 5BF to be maintained until such time as BSL decides to permanently cease ironmaking from 5BF (that is, a decision that no further reline of 5BF will be undertaken). BlueScope anticipates that the approval for reline of 6BF will be conditioned in a way to prevent concurrent operation of 6BF and 5BF without additional applications for approval being made in accordance with relevant planning instruments.

2.2.3 Project setting and land use

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.

Port Kembla lies in the coastal plain which is bounded to the west by the Illawarra Escarpment and to the east by the Pacific Ocean. Port Kembla features a heavy industrial area constructed around the port and includes developments such as PKSW, fertiliser production facilities and petroleum hydrocarbon storage and wholesaling.

The PKSW site is zoned IN3 – Heavy Industrial under *State Environmental Planning Policy (Three Ports) 2013* (Three Ports 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 in PKSW.

The port of Port Kembla is located between the Pacific Ocean and the Port Kembla heavy industrial area and is zoned SP1 – Special Activities. The Inner Harbour, specifically developed as an all-weather shipping port, covers approximately 60 ha with around 2,900 m of commercial shipping berths. BlueScope operates five berths in the Inner Harbour that supply materials for the PKSW.

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 kilometres to the southwest as shown on Figure 2.2.

2.2.4 Existing environment summary

The PKSW site is generally flat and resides upon a base of artificial fill, including dredged sand and mud, rocks and local soil materials. The site is generally sealed, with small areas of exposed soil. Soils on site are classified as disturbed terrain and have a low probability of acid sulphate soils. PKSW is listed as a contaminated site on the EPA's register of contaminated sites, with contamination managed and regulated under licence conditions attached to BlueScope's EPL 6092. The site drains into two creeks, Main Drain and Allans Creek, which run into Tom Thumb Lagoon and Port Kembla Inner Harbour. There are also several constructed drains on the site. Currently, saltwater from the harbour is used for indirect cooling in industrial processes within the site and is returned to the harbour after use. A small amount of water from industrial processes is also released into the harbour via licenced discharge drains. Groundwater beneath the site generally flows towards Tom Thumb Lagoon and Allans Creek. Given the flat topography of the site, rainfall is expected to pool in some areas, and be drained from the site via the creeks into the harbour. PKSW is located above the 1 per cent AEP level. PKSW was established in 1928 and has operated since that time. It is predominantly cleared and provides minimal habitat value. Vegetation on site comprises planted species and opportunistic weed species. No threatened vegetation, flora species or ecological communities have been identified as occurring within PKSW. The waterways surrounding the site are mapped as Key Fish Habitat. The site has recorded sightings of the endangered Green and Golden Bell Frog (*Litoria aurea*). The presence of the Green and Golden Bell Frog is managed across PKSW in accordance with site manual MA-ENV-03-03 Management of Threatened Species, the Green and Golden Bell Frog (BlueScope, 2021). Listed bird species may also visit the site temporarily.

No listed Aboriginal or historic heritage items have been recorded on the PKSW site. The nearest Aboriginal heritage item is located approximately 1,500 m from the project. The nearest historic heritage item is the Commonwealth Rolling Mill Plant and Gardens located approximately 1,600 m to the south of the project.

Traffic associated with PKSW enters the site via Springhill Road, Five Islands Road and Flinders Street. PKSW is located close to the Princes Motorway, Princes Highway, Shellharbour Road and Masters Road which are used as major transport roads for vehicles transiting to wider NSW. PKSW also contains several internal roads and a functioning dock area for transport of goods via shipping.

Current approved industrial activities at PKSW and the broader Port Kembla industrial area generate dust, steam, particulate matter, unfiltered air and gases. Noise is also generated by activities at PKSW and other surrounding industrial uses. The closest sensitive receivers to 6BF are residences approximately 1,200 m to the west of the project site.

A detailed description of the existing environment in relation to each of the key and other environmental issues relevant to the project is provided in Chapter 8 and Chapter 9.

2.2.5 Land ownership

The project will be located entirely within BlueScope-owned land. The land parcels on which the project will be located and the associated project components are listed in Table 2.1.

Table 2.1 Property description – 6BF operations

Lot	Component
Lot 1 DP 606434	6BF operational area and construction footprint

A number of construction ancillary facilities will be required during the construction phase of the project as described further in Section 5.5 and as shown on Figure 5.1. The land parcels on which construction ancillary facilities will be located are listed in Table 2.2.

Table 2.2 Property description – 6BF reline construction ancillary facilities

ID	Location	Activity	Size (m^2)	Property description
4	No.1 Works 1	Storage	28,500	Lot 1 DP 606432
5	No.1 Works 2	Storage	5,000	Lot 1 DP 606432
6	No.1 Works 3	Storage	36,500	Lot 1 DP 606432
7	No.1 Works 4	Storage	6,400	Lot 1 DP 606432
8	No.1 Works 5	Storage	4,000	Lot 1 DP 595307
9	No.1 Works 6	Storage	17,000	Lot 1 DP 595307
1	CRM 1	Storage	80,000	Lot 1 DP 190251
2	CRM 2	Storage	3,000	Lot 1 DP 190251
3	CRM 3	Storage	2,800	Lot 1 DP 595307
11	No.2 Works 1	Construction	1,000	Lot 1 DP 606434
12	No.2 Works 2	Construction	3,000	Lot 1 DP 606434
13	No.2 Works 3	Construction	1,500	Lot 1 DP 606434
14	No.2 Works 4	Storage	3,000	Lot 1 DP 606434
15	No.2 Works 5	Storage	7,000	Lot 1 DP 606434
16	No.2 Works 6	Storage	7,000	Lot 1 DP 606434
10	No.2 Products Berth	Storage	2,500	Lot 1 DP 606434
17	Recycling Area 1	Storage / cleaning	14,000	Lot 1 DP 606430
18	Recycling Area 2	Processing	88,000	Lot 1 DP 606430
19	Recycling Area 3	Processing	25,000	Lot 1 DP 606430
20	Recycling Area 4	Storage / Processing	11,000	Lot 1 DP 606430
21	Recycling Area 5	Storage / Processing	20,000	Lot 1 DP 606430
22	Recycling Area 6	Storage	4,500	Lot 1 DP 606430
23	Springhill Electrical	Storage	3,000	Lot 1 DP 606430

3. Strategic context

3.1 Critical State significant infrastructure

The project involves works to rejuvenate a large and bespoke piece of infrastructure of which there are only three in Australia, two in NSW (5BF and 6BF) and one more located in Whyalla, South Australia. Without the continued provision of operational blast furnace infrastructure provided by the project, it is highly likely that steel making will be unable to continue at PKSW from 2030 (and potentially as early as 2026) and consequently no primary steel making will occur in NSW from that time. Steel made at PKSW is used throughout Australia for a range of infrastructure and construction projects both large and small as well as being exported to key overseas markets.

The proposed approach of carrying out the project over a three-year construction period, rather than the usual shorter timeframe for a reline (typically only 130 days), will provide the opportunity for BlueScope to prioritise engagement of local contractors and other NSW businesses.

The project is considered essential to NSW for the following economic and social reasons:

– The project will secure the continued operation of PKSW, the largest manufacturing facility in NSW and Australia, ensuring the continued manufacturing of flat steel products in NSW and supply of approximately 2.2 million tonnes of these products used in a range of infrastructure and construction activities of key importance to the NSW economy including:
    - Defence.
    - Infrastructure projects such as road and rail projects.
    - Building and construction, including hospitals, schools, stadiums, residential homes, commercial and industrial buildings.
    - Energy infrastructure, including wind towers, solar farms, electricity transmission infrastructure and pumped hydro.
    - The continued operation of PKSW beyond 2026 which will enable the continuation of the significant contribution which PKSW makes to the Illawarra economy, which is currently about $6.5 billion or 24 per cent of regional output per annum.
– The continued operation of PKSW beyond 2026 will facilitate the retention of approximately 4,500 jobs at the site itself (both BlueScope employees and full-time contractors on the site) and support approximately 10,000 jobs in total including indirect employment in supplier and customer businesses.

The project has been declared critical State significant infrastructure (CSSI) in accordance with section 5.13 of the EP&A Act and clause 26, Schedule 5 of the SRD SEPP. The application of the EP&A Act with regard to the assessment and determination of the project is discussed in Section 6.1.

3.2 Global and national strategic context

Steel plays an integral role in the construction of enduring assets, repurposing historic buildings to retain heritage, and supporting the transport and utilities that are vital to productive cities and the people who live in them. Steel products provide enduring solutions for rapid construction and long-term use, flexible design, thermal comfort and weather resilience.

The steel supplied today will support economies for decades to come. Steel is critical to underpinning the transition required in many sectors, including the renewable energy sector, which along with sustainable transport technology and higher levels of urbanisation, is predicted to increase steel demand. According to the International Energy Agency, global demand for steel is projected to increase by more than a third through to 2050[4].

[4] International Energy Agency (IEA) Iron and Steel Technology Roadmap, Towards more sustainable steelmaking, October 2020.

Steel's recyclability is unmatched by other material groups and its contribution to a circular economy is increasingly recognised. Steel products are becoming more lightweight, designed for diverse application and extended useful life, and the value of raw materials maximised through reuse, remanufacturing and recycling.

PKSW is a regionally cost-competitive steel maker that is located close to major population centres and is well-serviced by port, rail, and road logistics. PKSW is one of only two integrated steelworks in Australia, and the only Australian facility producing hot-rolled steel flat products for downstream processing. The ongoing operation of PKSW supports a variety of downstream manufacturing businesses.

Increasing globalisation has led to a decline in industrial production in developed economies such as Australia, raising concerns for the nation's capacity to produce goods locally in the event of a disruption to world trade.

Cessation of ironmaking in Australia is an issue of national importance, as the complexity and cost of establishing replacement ironmaking, steelmaking and hot-rolling facilities would be prohibitive in the absence of PKSW. Additionally, the COVID-19 pandemic has disrupted many global supply chains, highlighting the risk of being too reliant upon global supply chains for critical products.

If the project does not proceed, it is highly likely that BlueScope will be unable to continue primary steelmaking in Australia. Such an outcome could have significant consequences for Australia, not least of which would be the impact on supply chain resilience for industries of critical strategic significance, including but not limited to, defence.

3.3 State and local strategic context

The Illawarra region has grown with the steel industry and continues to rely upon the steel industry as a major contributor to the local economy, through direct employment, employment of contractors and by supporting downstream manufacturers. Centred around the steel industry, the Illawarra has developed a skilled workforce and contractor base from which a broader range of industries can draw.

The Illawarra is emerging as a major industrial hub for clean manufacturing and renewable energy infrastructure. A number of potential energy projects have been identified in connection with the area, including the Port Kembla Gas Terminal for the import of Liquified Natural Gas (LNG) and the proposed associated development of a dual fuel LNG-Hydrogen power station. In addition, there is the potential development of the Illawarra Hydrogen Hub as part of the National Hydrogen Roadmap and NSW Electricity Roadmap. BlueScope is also supporting sustainable manufacturing through the commitment to invest $20 million in the BlueScope Renewable Manufacturing Zone (BRMZ) as announced in November 2020.

BlueScope's position as an established manufacturer and potential customer will be of value to these projects and will help support many more than its own workforce. The project is therefore an important factor in maintaining the Illawarra's contribution to the NSW and national economies.

As part of the environmental impact assessment of the project, consideration of potential cumulative impact with other major projects in the regional has been undertaken. The assessment of potential cumulative impacts is contained in Section 9.10.

3.4 Strategic policies

3.4.1 NSW 2040 Economic Blueprint

The NSW 2040 Economic Blueprint (NSW Government 2019) aims to inform views on what the NSW economy can achieve over the next two decades. The Blueprint has been informed by research on economic, jobs and productivity trends, and through broad consultation with various stakeholders. The Blueprint identifies a range of recommendations to enhance the performance of the NSW economy guided by the following aspirations:

– A two-trillion-dollar economy after 2040
– Healthy, productive people
– Vibrant, well-connected cities
– Productive, vibrant regions

– Innovative, world-class businesses
– Sustainable environmental and resources management
– Better government performance.

A key aspect of the Blueprint in achieving the above aspirations is a focus on economic growth, advanced manufacturing, and new industries. The project will contribute to these areas through the significant capital investment being made for the project and the jobs and revenue it will deliver to the NSW economy, once operational. Additionally, the continued production of steel at PKSW will benefit downstream manufacturing industries, helping to promote the development of advanced manufacturing and new industries.

In relation to the aspiration of innovative, world-class businesses, the Blueprint recommends encouraging high growth future industries, more advanced manufacturing and growing the local defence industry supply chain. The project will help realise these recommendations by maintaining the domestic supply of steel products to manufacturing businesses within these sectors. This will contribute to the State's capacity to secure defence procurements and facilitate the growth of new businesses and industries.

The project will contribute to the aspiration of achieving a two-trillion dollar economy by 2040 through the significant capital investment for the project, providing jobs and commerce in the local economy during construction and maintaining the significant contribution which PKSW makes to the Illawarra economy.

The continued operation of PKSW beyond 2026 will facilitate the retention of approximately 4,500 jobs at the site itself and support approximately 10,000 jobs in total including indirect employment in supplier and customer businesses. This significant contribution to local and regional employment will contribute to the aspiration for the citizens of NSW to be healthy, productive people.

The Blueprint identifies that in order to have an innovative industrial base, liveable cities, productive jobs and high living standards, sustainable environmental and resource management is required. The potential impacts of the project on the environment have been assessed throughout this EIS. The project is not expected to have a significant impact on the environment and management measures are provided in this EIS to prevent or mitigate environmental impacts. As such the project is considered to be consistent with the aspiration for sustainable environmental and resource management.

3.4.2 NSW Climate Change Policy Framework

The NSW Government has released the NSW Climate Change Policy Framework, which commits NSW to the aspirational objectives of achieving net zero emissions by 2050 and helping NSW to become more resilient to a changing climate.

The policy framework defines the NSW Government's role in reducing carbon emissions and adapting to the impacts of climate change. The Net Zero Plan outlines how the NSW Governments climate change objectives will be achieved and is released in stages to enable evolving technologies to be incorporated into future stages and to allow for continual improvement over time with the aim of achieving net zero emissions by 2050. As outlined in Section 9.8 BSL's climate change policy, the company aims to achieve net zero emissions by 2050 and is consistent with the NSW Climate Change Policy Framework. The first stage objective is outlined in the Net Zero Plan Stage 1: 2020–2030.

Net Zero Plan Stage 1: 2020–2030

The Net Zero Plan Stage 1: 2020–2030 outlines four key priorities in regard to emission reductions to 2030. These are:

– Drive uptake of proven emission reduction technologies
– Empower consumers and businesses to make sustainable choices
– Invest in the next wave of emissions reduction innovation
– Ensure the NSW leads by example

BSL's climate change strategy as outlined in the Climate Action Report includes medium term targets to be achieved by 2030 on the path to achieving net zero emissions by 2050. Key to this is the uptake of proven emission reduction technologies as they become technically and commercially viable and investment in emissions reduction innovations. Through achieving its targets, BSL and BlueScope will provide its customers with products that have been produced in alignment with the Net Zero Plan.

Section 9.8 of this report provide further detail regarding BSL's Climate Action Report, and measures being implemented to achieve the specified GHG emissions intensity reduction targets by 2030 and net zero goal by 2050, subject to the enablers described in the Climate Action Report. The project will be undertaken in accordance with the Climate Action Report and is therefore consistent with the NSW Climate Change Policy Framework and Net Zero Plan Stage 1: 2020–2030.

3.4.3 NSW COVID-19 Recovery Plan

The NSW COVID-19 Recovery Plan (NSW Government 2020) is the NSW Government's plan to ensure the NSW economy is rebuilt following the COVID-19 pandemic. It identifies a number of investments and initiatives aimed at harnessing the innovations and lessons learnt during the COVID-19 pandemic to ensure the NSW economy is resilient and self-sufficient.

The initiatives outlined in the plan include:

– Investing $100 billion in a four-year infrastructure pipeline to drive employment growth.
– A Planning System Acceleration Program bringing forward immediate planning reforms to support productivity, investment and jobs by reducing the time taken to approve projects.
– Review of education and training programs to respond to skill shortages and focus on core competencies, as well as increased investment in schools.
– Adopting innovative digital models to facilitate seamless and easy interactions with government.
– Building a self-sufficient economy through supporting advanced manufacturing and local supply chains.
– Supporting national reforms to Federal-State relations to reduce overlap and regulation in cross-jurisdictional areas.

The initiatives of investing $100 billion in a four-year infrastructure pipeline and planning reforms to reduce the time taken to approve projects are both aimed at driving productivity, investment and employment. The project will support the $100 billion investment in infrastructure by providing a number of materials needed to build these infrastructure projects.

The project will provide employment and economic benefits to the region. Additionally, the project will allow the continued operation of PKSW and the continued significant contribution it makes to the local economy. The project is therefore aligned with these initiatives of the NSW COVID-19 Recovery Plan.

The project will allow PKSW to continue providing hot-rolled steel flat products to support a variety of downstream manufacturing businesses. These products are used in a range of infrastructure and construction activities of key importance to the NSW economy, such as building and construction, energy infrastructure and defence. This will contribute to the goal of building a self-sufficient economy through supporting advanced manufacturing and local supply chains.

3.4.4 State Infrastructure Strategy 2012 – 2032

The State Infrastructure Strategy (NSW Government 2018) (the Strategy) is a 20-year infrastructure investment plan for the NSW Government that aims to place strategic fit and economic merit at the centre of investment decisions. The Strategy assesses infrastructure problems and solutions, and provides recommendations to best grow the State's economy, enhance productivity and improve living standards for the NSW community.

The Strategy focusses on investment in road, rail, ports, telecommunication, water, schools, hospitals, sports arenas and other local infrastructure as a means of achieving economic growth and improving living standards. Such infrastructure projects are steel intensive therefore, the project will support the aims of the Strategy through providing a local source of steel products to downstream manufacturers and the construction industry. Similarly, the Strategy identifies a range of road, rail, and port projects and priorities including those which support the ongoing operation of the PKSW, an acknowledgement of the importance of the operation to the State.

3.4.5 Illawarra Shoalhaven Regional Plan

The Illawarra Shoalhaven Regional Plan (NSW Government 2015) is an overarching regional plan applying to the local government areas of Kiama, Shellharbour, Shoalhaven and Wollongong. The plan identifies key planning principles for the region, which include:

– Protecting land with high environmental value and recognising cultural heritage values
– Sustainable use of land and resources while building resilience to climate change
– Supporting a strong, resilient and diversified economy
– Supporting improvements to transport infrastructure including active, public and freight
– Provide for the balanced and orderly supply of land for housing development
– Increase housing density around centres with access to jobs and transport
– Encourage urban design that reduces car dependency and promote energy efficiency
– Improve coordination on the delivery of infrastructure

Based on the framework of these key planning principles, the plan identifies five goals for achieving the vision for the region of a sustainable future and resilient community, capable of adapting to changing economic, social and environmental circumstances. These goals are:

– A prosperous Illawarra–Shoalhaven
– A variety of housing choices, with homes that meet needs and lifestyles
– A region with communities that are strong, healthy and well-connected
– A region that makes appropriate use of agricultural and resource lands
– A region that protects and enhances the natural environment

The project is consistent with the planning principles of supporting a strong, resilient and diversified economy in the Illawarra Shoalhaven region and supporting the delivery of infrastructure and will contribute to the realisation of a number of the goals set out for the region.

The Illawarra region continues to be reliant upon the steel industry as a major employer and supporter of downstream manufacturers. The continued operation of PKSW is therefore critical in maintaining the Illawarra's contribution to the state and national economies. The project will have a number of economic benefits including maintaining NSW's steelmaking capacity, and providing capital investment and substantial employment opportunities. In this way, the project will assist in achieving the goal a prosperous Illawarra-Shoalhaven.

The plan identifies reinvestment of economic growth to improve transportation and restore natural assets as part of the goal of strong, healthy and well-connected communities. The project will allow for the continued operation of PKSW beyond 2026, enabling the continued significant contribution which PKSW makes to the Illawarra economy, which is currently about $6.5 billion or 24 per cent of regional output per annum. This will contribute to the economic growth of the region and assist in achieving this goal.

The potential impacts of the project on the environment have been assessed throughout this EIS. The project is not expected to have a significant impact on the environment and management measures are provided in this EIS to prevent or mitigate environmental impacts. The project will therefore be consistent with the goal of protecting and enhancing the natural environment.

3.4.6 Wollongong 2028 — Community Strategic Plan

The Wollongong 2028 Community Strategic Plan outlines the community's main priorities and aspirations for the future, and includes strategies for how to achieve them. The plan identified the following community goals:

– We value and protect our environment
– We have an innovative and sustainable economy
– Wollongong is a creative, vibrant city
– We are a connected and engaged community
– We have a healthy community in a liveable city
– We have affordable and accessible transport

In relation to the goal to have an innovative and sustainable economy, the plan identifies objectives of increased local employment opportunities and expansion of the profile of Wollongong as a regional city. The project will contribute to the sustainability of the local economy by enabling ongoing steel production to continue at PKSW. This will provide local employment opportunities during construction of between 250 to 1,000 jobs. Additionally, the continued operation of PKSW beyond 2026 will facilitate the retention of the existing workforce.

As part of the goal to have a healthy community in a liveable city, the plan identifies the objective to increase participation in recreational and lifestyle activities. The project will allow the ongoing operation of PKSW, which will also see continued support provided to community programs through BlueScope's community partners program. The community partners program was established 2012 and has supported over 150 local community groups with well over $1.5 million in funding. Many of the groups funded include recreational and lifestyle activities, contributing to the goal for Wollongong to be a healthy community in a liveable city.

The project will also be consistent with the goal of valuing and protecting the environment. As the project is located within the already highly disturbed PKSW site, impacts to the natural environment will be minimal. The project is not expected to have a significant impact on the environment, and management measures are provided in this EIS to prevent or mitigate environmental impacts.

4. Project alternatives

4.1 Project rationale

PKSW currently operates as an integrated iron and steel plant utilising Blast Furnace ironmaking and Basic Oxygen Furnace steelmaking (BF-BOF operating model). 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.

Current operations produce around 3.1 million metric tonnes of steel per year (Mtpa) of which around 2.5 Mtpa services the domestic market with the remainder being exported. The PKSW is the only domestic manufacturer of upstream flat steel products. As such, continuation of BF-BOF iron and steelmaking at Port Kembla is essential to maintaining a domestic feedstock supply chain to all of BSL's other Australian manufacturing plants and operations, and numerous other manufacturing operations and projects. Together, PKSW and the other facilities owned by BSL around Australia employ approximately 6,200 people.

The current operational blast furnace (5BF) is operating well, and BlueScope is planning to continue to operate this facility for as long as it is efficient, reliable and safe to do so. The current operating campaign is expected to extend to as late as 2030, however, the risk of unplanned shutdown progressively increases as furnace condition deteriorates with age and use.

While the design life for the current campaign was nominally 20 years, 5BF has experienced higher total liquid productivity and higher slag rates during the current campaign than in the previous campaign as well as several long furnace outages that have been necessary to address issues which have arisen during the campaign. Total liquid throughput (and hence ore processed through the furnace) influences wear on the internal lining of the furnace and furnace life. Outages, which cause thermal excursions, also effect the integrity of the refractory lining. By January 2025, 5BF is predicted to reach an equivalent liquid throughput as was achieved during the previous campaign with the risk of an issue with the furnace lining increasing further from that point.

For these reasons, to prevent operational discontinuity and to safeguard supply, it is considered prudent risk management to have 6BF ready for operation from mid to late 2026.

The project will allow operations to continue at PKSW following the end of the current 5BF campaign with minimal disruption to production levels. This will maintain the provision of steel to the domestic and export market and continue to provide economic benefit to the region.

4.2 Alternatives considered

BlueScope has investigated a number of alternatives for continuing ironmaking operations at PKSW following the end of the current 5BF campaign, as well as the option of ceasing iron and steelmaking at PKSW. These include:

– Option 1 - Cessation of iron and steelmaking at PKSW and moving toward an import model. Refer Section 4.2.1.
– Option 2 - Reline of 5BF. Refer Section 4.2.2.
– Option 3 - Reline of 6BF (the project). Refer Section 4.2.3.
– Option 4 - The introduction of alternative ironmaking technologies. Refer Section 4.2.4.

4.2.1 Option 1 – Cessation of steelmaking at PKSW (import model)

Option 1 would involve BlueScope ceasing iron and steelmaking at PKSW. Under this option, 5BF would be run for as long as possible before transitioning to an import model where all primary steelmaking operations and hot-rolling at PKSW cease, and steel hot rolled coil (HRC) is imported to supply BSL's coated flat product facilities.

New infrastructure and equipment requirements for Option 1 would be modest, consisting primarily of upgrades to coil transportation handling and storage facilities. Large portions of the PKSW site would be closed. Closure of the ironmaking and steelmaking operations would result in significant social and economic impacts to the region through high levels of job losses and loss of business for local suppliers to PKSW.

Cessation of steelmaking at Port Kembla would result in the loss of sovereign manufacturing capability for upstream flat steel products and would increase Australia's reliance on import supply chains. In relation to GHG emissions, an import model would replace domestic production with emissions intensive imported steel as well as additional GHG emissions resulting from freight. Furthermore, this option represents an opportunity cost as it would remove the potential that Australia currently has to develop low-emissions iron and steelmaking technologies, working with other industry sectors to deliver technological breakthroughs that result in economic and societal benefits.

The COVID-19 pandemic has demonstrated the fragility of some global supply chains and the negative economic consequences that can flow from their disruption. Cessation of steelmaking at Port Kembla would also make Australia's steel supply chain more vulnerable to economic and trade coercion by other countries. This could impact the supply chain resilience for industries of critical strategic significance including but not limited to defence.

BlueScope's view is that this option would be an environmentally, economically and socially retrograde step for Australia.

4.2.2 Option 2 – Reline of 5BF

Option 2 would involve the reline of 5BF. 5BF is currently the only operating iron making unit and, to reduce the production impact, the reline would have to be completed in an intense 130-day outage. There would be no iron or steelmaking at PKSW during this outage and downstream coated steel product operations would need to be maintained for the duration of the reline by using imported steel. Reliance on imports, albeit on a transitional basis, raises the unintended and negative environmental and economic impacts outlined at 4.2.1 above.

The reline activities would require a large workforce to work 24 hours a day through the outage period, resulting in additional facilities' requirements (such as amenities, parking and transport) and associated potential for community disturbance and environmental impacts when compared with the reline of 6BF (Option 3). The need for a larger workforce would also mean the need to import a higher proportion of workers from outside Wollongong, the immediate region and NSW to meet project requirements. If COVID-19 restrictions are still in place this could impact delivery of this option.

The 130-day outage could potentially impact on customers and the supply chain, disrupting manufacturing and projects in the region and more broadly throughout NSW during this time. Additionally, the compressed timeframe that would be required to reline 5BF reduces flexibility in scheduling reline activities, requiring a fixed date to be set for the reline. This reduces the ability to extract the maximum life out of the furnace and the requirement for such a large workforce makes it more difficult to respond to an earlier-than-planned end-of-life event which requires the furnace to be shut down and relined immediately.

Following completion of the 5BF reline, the operating model and technology would be largely the same as existing operations, resulting in minimal further impacts to customers and the supply chain. Similarly, operational environmental impacts would be generally similar to existing conditions.

4.2.3 Option 3 – Reline of 6BF

Option 3 would involve the reline of 6BF in a progressive and measured manner. 6BF would be relined and prepared for operation while 5BF continues to operate. Operations would transition from 5BF to 6BF with minimal disruption of supply of iron to the steelmaking operations, and of steel to downstream facilities.

The reline would be completed progressively over a period of approximately 3 years as engineering design is completed and materials become available. With 6BF currently not operating the work could be managed effectively with a predominantly day-shift workforce, minimising the need for the compressed construction timeframe and 24/7 construction works associated with a reline of the 5BF. This approach would allow a greater portion of the overall workforce to be sourced locally compared to the 5BF reline option. This would result in greater economic multiplier effects remaining within the local community.

As Option 3 would involve a familiar and well understood operating model and technology, the technical and execution risks associated with this option would be low and impacts to the community, customers and the supply chain would be minimal compared with the other options.

As this option would generally maintain the existing operational model at PKSW, operational environmental impacts would be generally similar to existing conditions.

4.2.4 Option 4 – Introduce alternative steelmaking technologies

Option 4 would involve the replacement of the BF-BOF operating model with alternative steelmaking technologies. These could include:

– Retrofitting the existing Basic Oxygen Steelmaking (BOS) building with Electric Arc Furnace (EAF) steelmaking.
– Constructing a new EAF steelmaking facility on land within PKSW.
– Construction of a Direct Reduced Iron (DRI) plant, utilising hydrogen as a fuel source, in conjunction with a transition to EAF steelmaking within the PKSW site.

In considering the likely commercialisation, cost and feasibility of adopting alternative steelmaking technologies at Port Kembla, BlueScope has consulted with leading steel industry original equipment manufacturers and a range of expert sources. These include the World Steel Association ('Worldsteel') and the International Energy Agency's (IEA's) *'Iron and Steel Technology Roadmap – Towards more sustainable steelmaking report'*, published in October 2020[5]. This report explores the technologies and strategies necessary for the iron and steel sector to pursue a pathway compatible with the IEA's broader vision of a more sustainable energy sector. It considers both the challenges and the opportunities and analyses the key technologies and processes that would enable substantial GHG emission reductions in the sector. The IEA report includes an assessment of the technology readiness level (TRL) of each of the main near zero emissions technologies currently being researched or trialled in the iron and steel sector globally.

Based on an assessment of the TRL of each of the main near-zero emissions technologies currently being researched or trialled in the iron and steel sector globally, commercialisation of emerging technologies is unlikely to be feasible prior to the end of the current 5BF campaign. BlueScope expects these technologies will continue to develop over the current and following decade, with significant take-up across the steel industry predicted to occur into the 2040s.

A transition to alternative steelmaking technologies, for example using EAF steelmaking, would involve the shut down of sintering, ironmaking and BOS at PKSW, the decommissioning of substantial existing infrastructure which would otherwise have a significant future operational life, and replacement with new or retrofitted EAF steelmaking. EAF steelmaking technology would likely reduce the environmental footprint for the site, including air emissions and cooling water discharges to Port Kembla Harbour. However, while total energy requirements would likely be lower than existing operations, electricity requirements would be much higher, requiring construction of new transmission infrastructure.

A transition to EAF steelmaking is not viable for large scale flat steel production on the East Coast of Australia at this time, given insufficient availability of cost effective, quality scrap steel to support three million tonnes of flat steel production at Port Kembla, and the high cost of electricity coupled with the very high electricity demands of EAF steelmaking. Preliminary studies have shown up to 2.6 Mtpa of scrap would be required to be imported and could potentially be supplemented with the import or production of DRI. The existing proven commercial production of DRI utilises natural gas. Due to the high cost and availability of natural gas on the East Coast of Australia, production of DRI from natural gas is not feasible for steel production at PKSW.

Transitioning PKSW to emerging alternative steelmaking technologies, such as renewable hydrogen-based DRI, would involve inherent risks to the continuity of operations at PKSW given this technology has not yet been proven to be effective on a large scale. Such a transition would require significantly more capital investment than the other options and would be a complex process, impacting all aspects of operations, such as operating practices, workforce configuration and skill set and steel grades. Further, as the technology is not proven at commercial scale, this transition risks impacts to employees (including large numbers of employees potentially becoming redundant), customers, and the supply chain.

[5] This report can be accessed at https://iea.org/reports/iron-and-steel-technology-roadmap

Additionally, these emerging alternate options would require a long project timeframe to carry out investigations and feasibility testing of the new technology. For example, renewable hydrogen-based DRI production has yet to be proven to operate commercially at scales similar to the production levels required at PKSW to manufacture sufficient amounts of steel to meet market demand. While several demonstration plants are being built globally to trial this technology, industrial-scale implementation would require successful technology trials at much larger scale.

Adoption of some of the emerging technology options would also require a breakthrough in the cost of renewable hydrogen production, and the establishment of a large-scale supply chain for hydrogen that does not currently exist. The current cost of hydrogen in Australia is five to six dollars per kilogram, or $40-48 per gigajoule (GJ) – which is around five times the cost of natural gas. The Federal Government's stretch target of $2 per kilogram (*First Low Emissions Technology Statement*, September 2020) would reduce the cost to around $16 per GJ. However, achievement of this target would require significant technology improvements and breakthroughs which are likely to take many years. Hydrogen is therefore unlikely to be a viable option in the timeframes required.

Due to the time required for development of these alternate emerging technology options, their implementation is not possible in time to maintain production following the end of the current 5BF campaign.

4.3 Analysis of options

A comparison of the options considered with regard to key evaluation criteria is provided in Table 4.1. Based on the analysis of the four options considered, option 3 was chosen as the preferred option.

Table 4.1 Comparison of options

Criteria	Option 1	Option 2	Option 3	Option 4
Commercial viability	✓	✓	✓	
Implementation timeframe	✓		✓	
Maintain production levels	✓		✓	
Minimise construction related impacts	✓		✓	
Minimise technical and execution risk	✓	✓	✓	
Reduce operational environmental impacts	✓		✓	✓
Minimise social and economic impacts			✓	
Maintain domestic steelmaking capability		✓	✓	✓
Total	**6**	**3**	**8**	**2**

✓ = option satisfies criteria

4.4 Preferred option

Option 3 is the preferred option for the following reasons:

– Operations at PKSW would be maintained with minimal disruption to production.
– Construction activities would be carried out at a more measured pace and moderate level while 5BF continued to operate. This would minimise the size of the workforce required, maximise local participation in the workforce, reduce the amount of construction work required outside of standard working hours, and minimise construction facilities and traffic.
– Technical and execution risks to the project would be low and impacts to customers and the supply chain would be minimal.
– Environmental impacts during operation would be generally consistent with or better than existing conditions.
– Severe social and economic impacts associated with cessation of steelmaking at PKSW would be avoided.
– Development and implementation timeframes for emergent alternative steelmaking technologies are too long to be successfully implemented before work needs to be initiated prior to the end of the current 5BF campaign. However, a range of measures have been incorporated into the project to reduce emissions as outlined in Section 9.8.

While BlueScope is proposing to proceed with the preferred option to reline 6BF, this does not preclude the company from continuing to investigate lower emission steelmaking alternatives. There is potential for new technologies and iron making configurations to be adopted in the medium to longer term, as and when they are technically and commercially viable at PKSW. Lower emission steelmaking technologies are further discussed in Section 9.8.

5. Description of the project

5.1 Project overview

The project involves the reline of 6BF over a period of approximately 3 years to return it to service and commence ironmaking after 5BF ceases operation.

The reline 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 after the 5BF has been ramped down and decommissioned, 6BF will be commissioned and ramped up for operation. The total cost of transitioning ironmaking activities from 5BF to 6BF is approximately $1 billion. This value incorporates the 6BF reline activities under assessment in this EIS, as well as costs associated with activities additional to the scope detailed in this EIS.

A summary of the project is provided in Table 5.1. Each of the project components are described below with key project features shown on Figure 5.1.

Table 5.1 Project summary

Project element	Summary	Reference
6BF operational area and construction footprint location	Lot 1 DP 606434	Section 2.2.5 Figure 5.1
Construction	Major construction work will be required within the blast furnace and surrounding facilities and will involve removing the remaining burden materials, refractory bricks and blocks and staves within the interior of the blast furnace for replacement. Any required repairs or replacement of ancillary equipment or structures will also be carried out.	Section 5.3
Access	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. No changes to existing access arrangements are proposed	Section 5.4
Ancillary construction facilities	Various locations within the PKSW site within Lot 1 DP 606434, Lot 1 DP 606432, Lot 1 DP 595307 and Lot 1 DP 606430.	Section 2.2.5 Section 5.5 Figure 5.1
Ironmaking components and systems	– Raw materials handling – Sinter plant – PCI plant – Blast furnace: • Stockhouse and charging system • Blast furnace vessel • Cooling system • Casthouse • Hot blast system • Gas system	Section 2.2.2

Project element	Summary	Reference
Air emissions	– Flue gas discharged from the stoves waste heat stack – Filtered and unfiltered air from the casthouse and stockhouse – Steam and H_2S from the slag granulation cooling tower – BFG from furnace top bleeders during maintenance and overpressure events – BFG discharged through primary relief valve via a silencer during charging – H_2S and SO_2 from slag pits – SO_2 from casthouse – Dust from the raw materials and charging conveyors, off gas system and traffic	Section 2.2.2
Liquid wastes	– Blow down of wastewater from the blast furnace clarifier – Bottom sludge filtrate from the blast furnace clarifier returned to the blast furnace effluent system – Excess slag granulation water discharged via a soak pit into groundwater – Condensates from the BFG and COG systems	Section 2.2.2
Blast furnace slag	Slag produced from the blast furnace is processed into two products, granulated slag and rock slag. Slag is sold for use in the manufacture of other products, such as cement and road base. Ground granulated blast furnace slag can be used to significantly reduce the CO_2 emissions associated with the manufacture and use of concrete.[6]	Section 2.2.2
Commissioning	Commissioning involves the following: – All services brought back into live condition – Various parts of plant re heated – Pressure and leak tests conducted – Cooling systems filled and flushed – Furnace dried out and charged with kindling and burden material – Gas system purged and furnace ‘blown in’ – Furnace progressively heated until regular casting of iron and slag commences – Full production reached within one to two months	Section 5.7
Operations	Operation of 6BF will be generally the same as existing operations utilised at 5BF, including: – Processing and transport of raw materials (iron ore, coal, coke, fluxes) – Production of sinter (agglomeration of iron ore, coke and limestone dust) for use within the blast furnace – Production of coke – Production of approximately 2.7 Mtpa of iron from 6BF – Processing of approximately 0.88 Mtpa of blast furnace slag for reuse as construction products.	Section 2.2.2 Section 5.8
Waste / by-product	Construction: – Spent refractories – Iron skull – Demolition waste – General construction waste Operation: – Blast furnace slag – Liquid wastes (as above) – Dust from gas cleaning system	Section 5.10

[6] A 60% slag mix reduces the CO_2 emissions for a typical 32 MPa concrete mix by 53%. This is significant given concrete is the 2nd most used substance in the world after water (from “A Guide to the Use of Iron Blast Furnace Slag in Cement and Concrete” - ASA Data Sheet 5).

Project element	Summary	Reference
Workforce	Construction: 250 to 1000 FTE Operation: 105-110 (Operations, Maintenance & Blast Furnace Engineering)	Section 5.9
Construction work hours	Where practical, and subject to the final construction program, 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; and Sundays and public holidays: no work. A number of construction activities will be scheduled to be undertaken as night works. Final construction phase will require 24 hour construction (estimated to be a period of 5 months). Further, 24 hour construction may be required for an extended period if 6BF is required online earlier than 2026.	Section 5.12
Construction duration	Approximately 3 years.	Section 5.13
Operational duration	Approximately 20 years.	Section 5.13

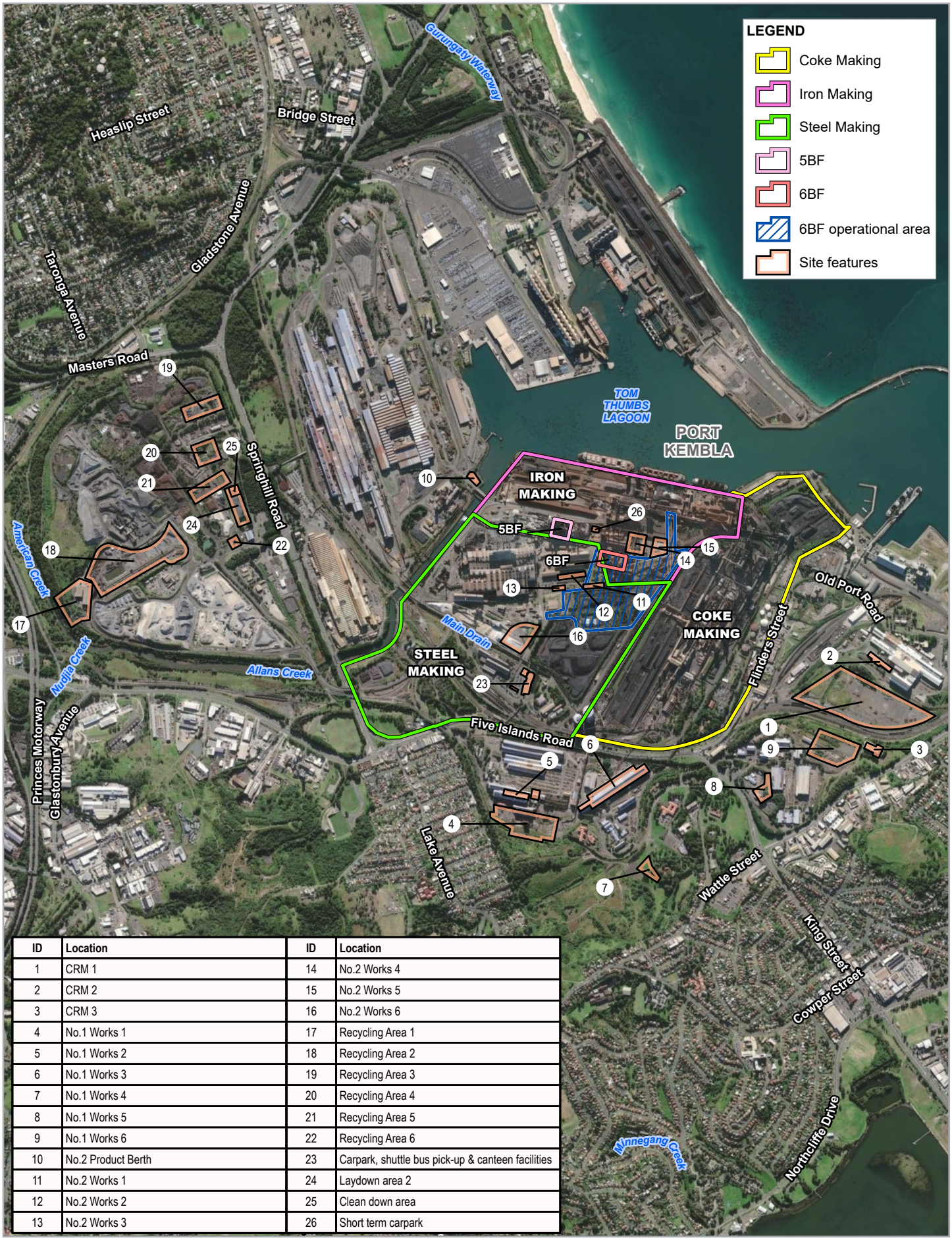
5.2 Pre-reline preparation

6BF previously operated for a period of 15 years and has been in care and maintenance since 2011. As a result, the site is ready for work to commence with a minimum of preparatory works.

Preparation works in advance of reline activities will include condition assessments of existing equipment, potentially including in-situ testing or removal for off-site assessment, completion of engineering, planning, contract finalisation and procurement of new and replacement equipment and items.

A number of preparatory activities will be undertaken as part of existing ongoing operations at PKSW, and do not form part of the project where these activities are authorised under an existing consent, the subject of a complying development certificate or that would otherwise be development which is exempt development or development which does not require development consent. These activities include:

– Tests, surveys, sampling or investigation for the purposes of the design or assessment of the project.
– Any of the following undertaken prior to the commencement of the construction of the project:
    - Adjustments to, or relocation of, existing utilities infrastructure and installation of new utilities infrastructure.
    - The establishment of construction compounds including the erection of temporary buildings and the provision of associated facilities including lay down areas, access roads and car parks.
– Removal of existing steelworks infrastructure, buildings and redundant underground services
– Maintenance and make safe works.



ID	Location	ID	Location
1	CRM 1	14	No.2 Works 4
2	CRM 2	15	No.2 Works 5
3	CRM 3	16	No.2 Works 6
4	No.1 Works 1	17	Recycling Area 1
5	No.1 Works 2	18	Recycling Area 2
6	No.1 Works 3	19	Recycling Area 3
7	No.1 Works 4	20	Recycling Area 4
8	No.1 Works 5	21	Recycling Area 5
9	No.1 Works 6	22	Recycling Area 6
10	No.2 Product Berth	23	Carpark, shuttle bus pick-up & canteen facilities
11	No.2 Works 1	24	Laydown area 2
12	No.2 Works 2	25	Clean down area
13	No.2 Works 3	26	Short term carpark

Paper Size ISO A4

0 0.2 0.4 0.6 0.8 1

Kilometres

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

BlueScope Steel Ltd
No.6 Blast Furnace Reline and Operations
Environmental Impact Statement

Project No. **12541101**
Revision No. **0**
Date **21/10/2021**

Key project features

FIGURE 5-1

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Print date: 22 Oct 2021 - 09:21

Data source: LPI: DTDB/DCDB, 2017. World Imagery: Maxar.
Created by: tmorton

5.3 Reline construction activities

Major construction work will be required within the blast furnace and surrounding facilities. Any required repairs or replacement of ancillary equipment or structures will also be carried out.

Construction activities will indicatively involve the following tasks:

- Removal of the remaining burden materials.
- Removal of the iron skull as detailed further in Section 5.6.1.
- Removal of worn carbon block refractories in the hearth as detailed further in Section 5.6.2.
- Removal of worn refractories in the remainder of the vessel.
- Demolition of other equipment including:
  - Cooling staves which protect the blast furnace shell.
  - Hot blast main refractory lining, including the expansion joints.
  - Clarifier tank and associated equipment where required.
- Repairs to the blast furnace shell where required.
- Installation of a new clarifier tank and associated equipment.
- Installation of the new hearth, sidewall refractories and staves.
- Repair/replacement of tuyeres, tapholes and instrumentation.
- Repair, maintenance and/or upgrade of ancillary equipment including:
  - Furnace cooling systems.
  - Hot blast system including the stoves, with the addition of a stove Waste Gas Heat Recovery (WGHR) system.
  - Gas system, with addition of a Top Gas Recovery Turbine (TRT).
  - Furnace top, including the charging equipment, bleeder valves and outrigger crane.
  - Casthouse floors and associated equipment.
  - Stockhouse (raw materials feed system).
  - Automation and power systems.
  - Services.
- Installation of a new slag granulation system.
- Installation primary ferrous feed system.
- Removal of the iron skull and refractories, which is discussed in more detail in Sections 5.6.1 and 5.6.2, respectively.

5.4 Site 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. These roads are all Transport for NSW approved B-Double heavy vehicle routes. Construction access to the site will be via the following access routes:

- **Route 1:** access to laydown area via Cringila Car Park Road. Vehicles to depart at Emily Road / Five Islands Road intersection.
- **Route 2:** access to laydown area via Flagstaff Road and Five Islands Road intersection.
- **Route 3:** access to laydown area and construction site via Flinders Street, Stockpile Road and Old Port Road.

Other points of access to PKSW such as the NorthGate entrance may also be used from time to time for ad hoc vehicle movements such as by visitors. Site access is discussed further in Section 8.5.

Based on conservative estimates, the expected peak traffic generation for the construction activities is summarised in Table 5.2.

Table 5.2 Traffic generation – two-way traffic

	Daily traffic generation (vehicles)	Peak Hour traffic generation (vehicles)
Light vehicles	600	300
Heavy vehicles	300	30
Total	900	330

No changes to existing access arrangements are proposed as part of the project. Table 5.3 provides a breakdown of the anticipated split of how construction traffic will utilise the road network. A detailed analysis of the project construction traffic potential has been undertaken as outlined in Section 8.5. This assessment found that construction traffic impacts will be minor and acceptable.

Table 5.3 Indicative split of light and heavy vehicles on the road network

Route ID	From	To	Route	Assumptions
1A	Wollongong	PKSW project site	Princes Motorway (SB) Five Islands Road (EB) Cringila Car Park Road (NB) Loop Road (SB) Emily Road (SB)	– Trips on Princes Motorway assumed to be split 50/50 – 70% of HV trips generated – 70% of 95% of LV trips generated
1B	PKSW project site	Wollongong	Emily Road (NB) Emily Road (NB) Five Islands Road (WB) Princes Motorway (NB)	– Trips on Princes Motorway assumed to be split 50/50 – 70% of HV trips generated – 70% of 95% of LV trips generated
2A	Port Kembla	PKSW project site	Five Islands Road (NB) Flagstaff Road (WB) General Office Road (WB) Emily Road (NB)	– 30% of HV trips generated – 30% of 95% of LV trips generated
2B	PKSW project site	Port Kembla	Emily Road (SB) General Office Road (EB) Underpass Road (EB) / Flagstaff Road (EB) Five Islands Road (SB) / Five Islands Road (NB)	– 30% of HV trips generated – 30% of 95% of LV trips generated
3	PKSW project site	Other PKSW locations	Old Port Road	– internal only

Onsite parking will be available for the workforce as shown in Figure 5.1.

5.5 Construction ancillary facilities and laydown areas

Laydown areas for construction equipment and materials will generally be within the PKSW site. The project will require approximately 31,000 m^2 of indoor storage and 57,000 m^2 of outdoor storage. The delivery of materials and equipment to the work sites will be staged as required with minimal storage close to 6BF. Indicative laydown areas are shown on Figure 5.1.

Construction support facilities, car parks and laydown areas identified are already established on site and therefore do not require approval as part of the project. Where new support facilities are required and can be carried out as exempt or complying development, those facilities will be excluded from the project. A summary of proposed ancillary facilities is provided in Table 5.4, noting that more areas have been identified than will actually be required for the project.

Table 5.4 Ancillary facilities existing and proposed use

ID	Location	Activity	Size (m^2)	Indoor/Outdoor
4	No.1 Works 1	Storage	28,500	Outdoor
5	No.1 Works 2	Storage	5,000	Indoor
6	No.1 Works 3	Storage	36,500	20,000 indoor 16,500 outdoor
7	No.1 Works 4	Storage	6,400	Outdoor
8	No.1 Works 5	Storage	4,000	500 indoor 3,500 outdoor
9	No.1 Works 6	Storage	17,000	Outdoor
1	CRM 1	Storage	80,000	Outdoor
2	CRM2	Storage	3,000	Indoor
3	CRM3	Storage	2,800	Indoor
11	No.2 Works 1	Construction	1,000	Outdoor
12	No.2 Works 2	Construction	3,000	Outdoor
13	No.2 Works 3	Construction	1,500	Outdoor
14	No.2 Works 4	Storage	3,000	Outdoor
15	No.2 Works 5	Storage	7,000	Outdoor
16	No.2 Works 6	Storage	7,000	Outdoor
10	No.2 Products Berth	Storage	2,500	Outdoor
17	Recycling Area 1	Storage / cleaning	14,000	3,000 indoor 11,000 outdoor
18	Recycling Area 2	Processing	88,000	Outdoor
19	Recycling Area 3	Processing	25,000	Outdoor
20	Recycling Area 4	Storage / Processing	11,000	Outdoor
21	Recycling Area 5	Storage / Processing	20,000	Outdoor
22	Recycling Area 6	Storage	4,500	Outdoor
23	Springhill Electrical	Storage	3,000	Indoor

5.6 Construction materials and equipment

Much of the equipment and materials required for the project have a long lead time for procurement. Specific types and quantities of equipment and materials will be determined during project planning. An indicative list of equipment and materials that may be required for the project is provided in Table 5.5 and Table 5.6 respectively.

Table 5.5 Indicative construction equipment

Construction equipment			
Excavators ranging from 5t to 40t	Bobcats (skid steer loaders)	Water blasters	Rail tamper
Cranes of various capacity ranging from 15t to 800t	Rock breaker	Grit blasters	Various brick saws and mixers
Dump trucks	Explosives equipment	Semi trailers	Material hoists and winches
Front end loaders	Air compressors	Abbey hoists	Refractory gunning machine
Telescopic boom excavator	Diesel welders	Forklifts	Temporary stove burners, fuel pipe and fans.
Liquids tankers	Welding Machines	Sykes pumps	Alimak passenger and goods lifts
Tear-Out machine	Temporary conveyors	Temporary Oxygen, Acetylene, LPG, Argon, Nitrogen welding and cutting gases	Scaffolding
Boom and scissor lifts	Vacuum loading (suck) trucks	Concrete mixers	Concrete pumps
Fuel trucks	Flat Bed Trucks	Road Rollers	Piling Rigs

Table 5.6 Indicative construction materials

Construction material	Approximate quantity
Concrete	100 m^3
Steel	1,500 t
Stainless Steel	20 t
Cast Iron	600 t
Copper	800 t
Refractory	2,000 t
Insulation	50 m^3

5.6.1 Iron skull removal

Iron skull is a conglomerate layer of iron and slag that solidifies on the inner surface of the hearth lining. The iron skull will be removed using mobile equipment and recycled on site. Recycling activities are managed by contracted service providers under a separate approval within PKSW.

Iron skull demolition using explosives is the most widely used technique internationally and it has an established track record at PKSW. An experienced blasting contractor will be engaged to drill and blast the skull into manageable pieces of about 25 tonnes, using small explosive charges. To facilitate this work, an opening will be cut into the side of the hearth shell, beneath the casthouse floor, and the broken sections of skull material will be extracted through this opening using an excavator or other appropriate heavy equipment.

Only small sections of the skull will be blasted away at any one time to minimise the amount of explosive used. Blasting has been undertaken during previous reline projects at PKSW, with noise and vibration impacts to surrounding receivers being found to be minimal. Noise and vibration impacts are discussed in Section 8.2.

Blasting will be undertaken in accordance with BlueScope's existing blasting safety procedures by a licensed contractor.

5.6.2 Removal of refractories

Refractory material will be removed by jack picking and breaking up the blocks into smaller pieces for extraction. A telescopic boom excavator machine will be used to rake the material out from the furnace. Most of the material in the upper shaft will be demolished and dropped into the bottom of the furnace and removed by the telescopic boom excavator.

Refractories removed from the blast furnace will be stockpiled at one of the construction laydown areas prior to recycling or disposal to an appropriately licensed facility.

5.7 6BF commissioning and ramp up

During the commissioning and ramp-up phase all services will be brought back into live condition and the integrity of the control, monitoring and safety systems verified. Various parts of the plant will be reheated and pressure and leak tests conducted. The cooling systems will also be filled and flushed.

The furnace proper will be dried out using hot blast at limited temperatures, then charged with kindling (comprising firewood/railway sleepers and coke) and filled with a mix of burden material (coke and iron ore). The gas systems will be purged ready for use and the furnace will be 'blown in'. This involves the introduction of hot blast air through the tuyeres, with gas initially discharged until its composition is satisfactory for internal use, at which time the gas is then diverted into the gas cleaning system.

The furnace is progressively heated until regular casting of iron and slag commences, although the iron quality is not usable initially, and it will take several days to produce useable iron which can be converted to steel. The furnace is then uprated to target production over the following weeks, reaching full production within one or two months.

5.8 6BF operations

Operation of 6BF following completion of reline activities, commissioning and ramp-up will be generally the same as existing operations utilised at 5BF (see Section 2.2.2). Specific locations of certain activities within the PKSW site will change due to the transfer of operations to 6BF, however, any changes to operating hours, staffing numbers or changes to the quantity or characteristics of inputs to or outputs from the blast furnace will be minimal. The proposed site plan and layout is shown on Figure 5.1.

Additionally, ongoing operation of 6BF is approved under development consent No. D93/16 granted by Wollongong City Council. The approved 6BF operational activities are described in Section 2.2.2. The impacts of these activities have already been assessed by Wollongong City Council and were determined by Council to be acceptable when the original 6BF development consent was granted. Except where otherwise noted in this EIS, the project will not give rise to any additional operational environmental impacts over and above the impacts approved by the original development consent.

5.9 Decommissioning / care and maintenance

It is envisaged that at the end of the 6BF campaign, a rundown, salamander tap, and make safe operation will be carried out. A rundown is a complex task that requires additional equipment to that which is normally used by the blast furnace to operate. This is due to the higher heat and dust loads generated when the burden level is lowered. The rundown tasks will include the following:

– Rundown of burden level
– Salamander tap
– Purge and ignition

The following equipment will be required to facilitate the rundown. This additional equipment is required to safely manage by-products of the rundown:

– Setup of water treatment systems
– Blast Furnace Gas monitoring

Make safe activities will commence once the rundown work is complete. The make safe work area will encompass the entire 6BF site. The purpose of the make safe activity is to leave 6BF in a condition where it can remain until refurbished or demolished as required in the future. Works in the make safe may include:

– Isolation of equipment
– Removal of piping and/or blanking
– Cleaning residue from gas mains
– Removal and storage of long lead time equipment
– Removal of common spares and consumables
– Removal of chemicals and stored gases
– Shut down of electrical systems
– Draining of accumulators
– Lowering of conveyor gravity take-up units (GTUs)
– Erection of fencing and signage around site

5.10 Waste generation and management

The project will generate a number of waste streams during construction and operation.

During construction spent refractories will be the most significant waste generated. The waste refractory will be stockpiled within the PKSW site following removal and reused where possible. Other wastes generated during construction will include iron skull, other demolition waste, and general construction waste such as packaging and materials.

During operation, waste streams are expected to be generally consistent with existing operating conditions. The primary waste streams generated during operation include various liquid wastes, and dust collected from the gas cleaning system.

Specific types and quantities of wastes likely to be generated and proposed management measures are provided in Section 9.9.

5.11 Workforce

The 6BF reline methodology allows reline activities to be completed in a measured way requiring a smaller construction workforce when compared to a 5BF multi-month reline outage.

Labour requirements for the 6BF reline model will be modest and will be mostly satisfied by local contractors. Across the duration of the project a workforce of approximately 250 full time equivalent (FTE) workers will be required. If 6BF is required online earlier than 2026 for strategic, operational, or safety reasons, this workforce size may be increased to complete the work in the reduced timeframe. The required increase in workforce will be dependent on the timeframe required to complete the remaining works however this may result in a maximum of up to 1,000 workers being required, equivalent with what might be needed during a traditional compressed timeframe reline.

During operation, it is anticipated that workforce requirements will not change significantly from existing operations with the 5BF workforce of approximately 105 to 110 FTE workers transferring to 6BF once operational.

5.12 Work 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 a number of construction activities scheduled to be undertaken as night works to manage interaction with the remainder of the PKSW operations and the higher day shift workforce.

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

Final installation of components inside the blast furnace and other residual construction activities will require 24 hour construction (estimated to be a period of 5 months). Further, 24 hour construction may be required for an extended period to bring forward the completion of construction if 6BF is required online earlier than 2026.

During the 6BF commissioning period, each of the separate sub-systems of the furnace will be trial run and tested for safe operation. Apart from this, there will be no concurrent ironmaking of both 5BF and 6BF.

Normal operation of 6BF will be 24 hours per day seven day a week consistent with 5BF current operations.

5.13 Work schedule

The reline and transition to operation of 6BF will be completed in approximately three years which, assuming a construction start during 2023, would see completion of construction in 2026. An indicative works schedule is provided in Table 5.7. The actual construction start and completion dates will depend on the operational performance of the 5BF facility and the timing of when furnace condition requires that it be decommissioned.

As detailed in Section 1.1 it is anticipated that 5BF may come to the end of its operable life between 2026 and 2030. This presents a potential timing mismatch between when 6BF is needed and when it may be ready for use based on the schedule provided in Table 5.7. To address this potential issue BlueScope will monitor the operation of 5BF during the construction phase. If it is identified that 6BF is required online sooner, measures can be taken to speed up the completion of construction. For example, the construction schedule could be condensed and additional resources applied to achieve a revised start of 6BF operations.

Table 5.7 Indicative works schedule

Project stage	Activities	Approximate duration
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	24 to 30 months
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
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
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

Once operational, the target campaign duration for 6BF will be 20 years.

6. Statutory context

6.1 Approval pathway and permissibility

6.1.1 Environmental Planning and Assessment Act 1979

The key legislation in NSW regulating the use of land is the *Environmental Planning and Assessment Act 1979* (EP&A Act) and *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation). The EP&A Act institutes a system for environmental planning and assessment, including approvals and environmental impact assessment requirements for proposed developments. The EP&A Act contains three key parts that impose requirements for planning approval. These include:

– Part 4 (Division 4.3), which provides for the assessment and determination of development that requires development consent from the local council or a local or regional planning panel.
– Part 4 (Division 4.7), which provides for the assessment and determination of development that is classed as State significant development.
– Part 5 (Division 5.2), which provides for the assessment and determination of State Significant Infrastructure (SSI) including critical SSI (CSSI).

The need or otherwise for consent or approval for a new development is set out in environmental planning instruments (EPIs) as described below.

The project has been declared CSSI in accordance with Section 5.13 of the EP&A Act and clause 26, Schedule 5 of *State Environmental Planning Policy (State and Regional Development) 2011*. BlueScope is seeking CSSI approval for the project under Part 5, Division 5.2 of the EP&A Act. The Minister for Planning and Public Spaces is the approval authority and the project is to be assessed in accordance with the provisions of Division 5.2 of the EP&A Act.

6.1.1.1 EP&A Regulation requirements

Schedule 2 of the EP&A Regulation describes the requirements for an EIS. Clause 6, Part 3 of Schedule 2 outlines the required form for an EIS, while Clause 7, Part 3 of Schedule 2 outlines the required content. These requirements and where they are addressed in the EIS are outlined in Appendix C.

6.1.1.2 Operation of Section 5.28(5) of the EP&A Act

Construction and operation of 6BF was approved by development consent No. D93/16 granted by Wollongong City Council on 27 July 1993 (existing consent).

Subject to approval of the project, BlueScope will surrender the existing consent and ongoing operation will occur subject to the new CSSI approval.

Section 5.28(5) of the EP&A Act provides that:

A condition of the approval of State significant infrastructure under this Division may require any one or more of the following—

(a) The surrender under this section of any other approval under this Division (or under Part 3A) relating to the infrastructure or the land concerned.

(b) The surrender under section 4.63 of any development consent relating to the infrastructure or the land concerned.

(c) The surrender, subject to and in accordance with the regulations, of a right conferred by Division 4.11 relating to the infrastructure or the land concerned.

6.1.1.3 Development contributions

Pursuant to section 5.22(3) of the EP&A Act, the provisions of Division 7.1 and 7.2 of the EP&A Act apply to State significant infrastructure that is not being carried out by or on behalf of a public authority. The Minister has the discretion as to whether or not to impose a condition of approval requiring payment of a development contribution, after taking into account the provisions of any applicable development contributions plan. BlueScope notes that the project will have negligible, if any, impacts on the requirements and demand for local government services and amenities.

6.1.2 Environmental planning instruments

BlueScope is seeking CSSI approval as identified above. Section 5.22(2) of the EP&A Act provides that environmental planning instruments do not apply to or in respect of SSI (including CSSI), except where they apply to the declaration of infrastructure as SSI or CSSI. While environmental planning instruments other than SEPP SRD therefore do not apply, the following instruments have been taken into consideration when assessing the potential impacts of the project.

6.1.2.1 State Environmental Planning Policy (State and Regional Development) 2011

State Environmental Planning Policy (State and Regional Development) 2011 (SRD SEPP) identifies development that is considered to be of State significance and includes provisions for SSD and SSI including CSSI. The EP&A Act defines CSSI as development that is, in the opinion of the Minister for Planning and Public Spaces, essential to the State for economic, environmental or social reasons. The project has been declared as CSSI and is listed in Schedule 5 of the SRD SEPP.

Under Section 16 of the SRD SEPP, the project therefore:

a. May be carried out without development consent under Part 4 of the EP&A Act.
b. Is declared to be State significant infrastructure for the purposes of the EP&A Act if it is not otherwise so declared.
c. Is declared to be critical State significant infrastructure for the purposes of the EP&A Act.

6.1.2.2 State Environmental Planning Policy (Three Ports) 2013

State Environmental Planning Policy (Three Ports) 2013 (Three Ports SEPP) provides a planning regime for the development and delivery of infrastructure on land in Port Botany, Port Kembla and the Port of Newcastle.

The PKSW site falls within the Port Kembla land application map under the Three Ports SEPP and the project is located on land zoned IN3 Heavy Industrial. The project meets the definition of a heavy industry in accordance with the Three Ports SEPP and is considered to be consistent with the objects of the land zoning.

While the project is permissible with consent under the provisions of the Three Ports SEPP, it has also been declared CSSI and will therefore be assessed and determined under Division 5.2 of the EP&A Act and can be undertaken without consent under Part 4 of the EP&A Act.

6.1.2.3 State Environmental Planning Policy No.33 – Hazardous and Offensive Development

State Environmental Planning Policy No.33 - Hazardous and Offensive Development (SEPP 33) regulates, amongst other matters, the determination of development applications to carry out development for the purposes of a potentially hazardous industry or potentially offensive industry. A hazard and risk assessment has been undertaken in accordance with the *Hazardous and Offensive Development Application Guidelines, Applying SEPP 33* (Department of Planning, 2011) as part of the EIS and included the assessment of potential hazards associated with the construction and operation of the project (see Section 8.3).

6.1.2.4 State Environmental Planning Policy (Coastal Management) 2018

State Environmental Planning Policy (Coastal Management) 2018 (Coastal Management SEPP) aims to promote an integrated and co-ordinated approach to land use planning in the coastal zone in a manner consistent with the objectives of the *Coastal Management Act 2016*. The objectives of the Coastal Management SEPP are to manage development in the coastal zone and establish a framework for land use planning and decision making in the coastal zone.

The project is located partially within the coastal use area and partly within the coastal environment area mapped under the Coastal Management SEPP. The consent authority would therefore ordinarily have to consider and be satisfied as to the matters in clauses 13 and 14 of the Coastal Management SEPP before development consent could be granted. While the CSSI declaration overrides the need for consideration of these matters under the Coastal Management SEPP, consideration has nevertheless been given to the requirements of the SEPP, including the following principles:

– The development is designed, sited and will be managed to avoid adverse impact(s).
– If the impact cannot be reasonably avoided—the development is designed, sited and will be managed to minimise that impact.
– If impact cannot be minimised—the development will be managed to mitigate that impact.

For development within the coastal use area (other than development that is SSI and CSSI), the consent authority has the additional obligation to take into account the surrounding coastal and built environment, and the bulk, scale and size of the proposed development.

The project is consistent with Clause 13 and Clause 14 of the SEPP, as detailed in Table 6.1.

Table 6.1 Impacts to be considered under the Coastal Management SEPP

Clause 13 and 14 requirement	Comment
Clause 13(1)	
(a) The integrity and resilience of the biophysical, hydrological and ecological environment	A comprehensive environmental assessment for the project has been carried out (Chapters 8 and 9). The project is located in a highly modified industrial site and will not significantly degrade the biophysical, hydrological or ecological environment.
(b) Coastal environmental values and natural coastal processes	The project will be located in a highly modified industrial site and will not impact on coastal environmental values or natural coastal processes.
(c) The water quality of the marine estate, in particular, the cumulative impacts of the proposed development on any of the sensitive coastal lakes identified in Schedule 1	The project is not likely to adversely impact the water quality of the marine estate. Water quality impacts are discussed in Section 8.4. The project is not located in or near any coastal lakes listed in Schedule 1 of the Coastal Management SEPP.
(d) Marine vegetation, native vegetation and fauna and their habitats, undeveloped headlands and rock platforms	The project has considered potential impacts on biodiversity with the assessment concluding no State or Commonwealth listed threatened biota, or their habitats, will be significantly impacted as a result of the project. Biodiversity impacts are discussed in Section 9.2.
(e) Existing public open space and safe access to and along the foreshore, beach, headland or rock platform for members of the public, including persons with a disability,	The project is located on privately owned land and will not impact on any existing public open space or access to and along the foreshore, beach, headland or rock platforms.
(f) Aboriginal cultural heritage, practices and places	The project in unlikely to impact on Aboriginal cultural heritage, practices and places. Potential impacts to Aboriginal heritage are discussed in Section 9.3.
(f) The use of the surf zone	The project is not located within or near the surf zone.

Clause 13 and 14 requirement	Comment
Clause 14(1)	
(a)(i) Existing, safe access to and along the foreshore, beach, headland or rock platform for members of the public, including persons with a disability	The project is located on privately owned land and will not impact on access to and along the foreshore, beach, headland or rock platforms.
(a)(ii) Overshadowing, wind funnelling and the loss of views from public places to foreshores	During construction, presence of plant and equipment will have a negligible impact on the visual amenity of the site given the context of the surrounding industrial area. During operation, the site will be generally consistent with the pre-existing visual landscape. Visual amenity impacts are discussed in Section 9.5.
(a)(iii) The visual amenity and scenic qualities of the coast, including coastal headlands	
(a)(iv) Aboriginal cultural heritage, practices and places	The project is unlikely to impact on Aboriginal cultural heritage, practices and places. Potential impacts to Aboriginal heritage are discussed in Section 9.3.
(a)(v) Cultural and built environment heritage	The project is unlikely to impact on cultural and built environment heritage. Potential impacts to historic heritage are discussed in Section 9.4.

6.1.2.5 State Environmental Planning Policy No 55 – Remediation of Land

State Environmental Planning Policy No.55 – Remediation of Land (SEPP 55) provides for a state-wide planning approach to the remediation of contaminated land. In particular, SEPP 55 aims to promote the remediation of contaminated land for the purpose of reducing the risk of harm to human health or any other aspect of the environment.

The project represents a continuation of the existing industrial land use and the management of any contaminated land and the suitability of the site for the project is considered in Section 9.1.

6.2 Other relevant legislation

6.2.1 NSW legislation

6.2.1.1 Protection of the Environment Operations Act 1997

An objective of the *Protection of the Environment Operations Act 1997* (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, which applies to a range of scheduled activities carried out at the site. This licence will be varied, as required, to incorporate any new and remove any discontinued scheduled activities associated with the project.

Section 5.24 of the EP&A Act provides that an EPL cannot be refused if it is necessary for carrying out an approved CSSI project and is to be substantially consistent with the approval.

6.2.1.2 Biodiversity Conservation Act 2016

The purpose of the *Biodiversity Conservation Act 2016* (BC Act) is to maintain a healthy, productive and resilient environment for the greatest well-being of the community, now and into the future. The BC Act lists threatened species, populations and ecological communities as well as critical habitat and key threatening processes to be considered when assessing an activity.

Under Section 7.9 of the BC Act, an application to carry out SSI, including CSSI, is to be accompanied by a biodiversity development assessment report (BDAR) unless the Planning Agency Head and the Environment Agency Head determine that the proposed development is not likely to have any significant impact on biodiversity values.

The project is unlikely to have a significant impact on any biodiversity values, or threatened species, populations or ecological communities, or their habitats, listed under the BC Act. The Planning Secretary and head of NSW Environment, Energy and Science have notified BlueScope that a BDAR is therefore not required. Impacts to biodiversity are addressed in Section 9.2.

6.2.1.3 National Parks and Wildlife Act 1974

The *National Parks and Wildlife Act 1974* (NPW Act) provides for the protection of Aboriginal objects (including deposits and cultural material) and Aboriginal places.

It is an offence under Section 86 of the NPW Act to harm or desecrate an object the person knows is an Aboriginal object. It is also a strict liability offence to harm an Aboriginal object or harm or desecrate an Aboriginal place, whether knowingly or unknowingly. Section 87 of the NPW Act provides a series of defences against the offences listed in Section 86 which include if the harm was authorised by and conducted in accordance with the requirements of an Aboriginal heritage impact permit (AHIP) under Section 90 of the NPW Act. Under section 5.23 of the EP&A Act, an AHIP under Section 90 of the NPW Act is not required for approved CSSI.

The project will be restricted to a highly disturbed industrial site of the existing PKSW and is therefore not expected to have any impacts on Aboriginal cultural heritage. Potential for impacts upon Aboriginal cultural heritage are addressed in Section 9.3.

6.2.1.4 Heritage Act 1977

The *Heritage Act 1977* (Heritage Act) is concerned with all aspects of heritage conservation ranging from basic protection against indiscriminate damage and demolition of buildings and sites, through to restoration and enhancement.

Heritage places and items of particular importance to the people of NSW are listed on the State Heritage Register. An application for approval under Section 59 of the Heritage Act is required to be made for any direct impacts on an item on the register. An application for a permit from the NSW Heritage Council under Section 139 of the Heritage Act is required to be made prior to disturbance or excavation likely to discover, expose, move, damage or destroy a relic.

The project is not expected to impact upon any identified heritage item or relic (see Section 9.4). Under section 5.23 of the EP&A Act, an approval under Part 4 or a permit under Section 139 of the Heritage Act is not required for approved CSSI.

6.2.1.5 Contaminated Land Management Act 1997

The *Contaminated Land Management Act 1997* (CLM Act) establishes a process for investigating and (where appropriate) remediating land that is considered to be contaminated.

Section 59 of the CLM Act requires the NSW Environment Protection Authority (EPA) to inform local authorities of contaminated sites, and for local councils to specify certain matters relevant to contaminated land management in a planning certificate. Section 60 of the CLM Act requires landowners to report any contamination that represents a significant risk of harm to human health or the environment to the EPA.

The PKSW site is listed as a contaminated site by the EPA. The site has had four notices issued to it, the last being in March 2018, which was a notification to cease the Voluntary Management Plan for the site on the basis that regulation of the site under the CLM Act is no longer warranted. Contamination is discussed further in Section 9.1.

6.2.1.6 Roads Act 1993

The objects of the *Roads Act 1993* (Roads Act) include classifying roads, declaring Roads and Maritime Services and other public authorities as roads authorities, and regulation of various activities on public roads.

Under section 138 of the Roads Act, consent from the relevant roads authority is required for work in, on, or over a public road. The project does not propose any such works therefore no consents under the Roads Act are required.

6.2.2 Commonwealth legislation

6.2.2.1 Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is administered by the Commonwealth Department of Agriculture, Water and the Environment (DAWE) and provides a legal framework to protect and manage nationally important flora, fauna, ecological communities and heritage places defined as matters of national environmental significance (MNES). Part 9 of the EPBC Act provides that an action that has, will have or is likely to have a significant impact on MNES may not be undertaken without prior approval from the Commonwealth Minister. Approval under the EPBC Act is also required for actions carried out by Commonwealth agencies or impacting on Commonwealth land.

A search using the Protected Matters Search Tool (PMST) within a 10 kilometre buffer from the project site was undertaken on 24 August 2021. Table 6.2 provides a summary of the results.

Potential impacts upon listed threatened species and communities and any other MNES potentially impacted by the project have been assessed as part of the EIS. No impacts have been identified that are considered likely to be significant and consequently a referral to DAWE for approval of the project under the EPBC Act is not required.

Table 6.2 EPBC protected matters search results

Protected matter	Matter located within search radius	Comments	Potential impact
Matters of national environmental significance			
World Heritage Property	None	N/A	N/A
National Heritage Places	None	N/A	N/A
Wetlands of International Importance	None	N/A	N/A
Great Barrier Reef Marine Park	None	N/A	N/A
Commonwealth Marine Areas	None	N/A	N/A
Threatened Ecological Communities	7	Discussed further in Section 9.2	
Threatened Species	94	Discussed further in Section 9.2	
Migratory species	75	Discussed further in Section 9.2	
Other matters			
Commonwealth Land	14	None occurring on site	N/A
Commonwealth Heritage Places	None	N/A	N/A
Marine Species	104	Discussed further in Section 9.2	
Whales and Other Cetaceans	14	Discussed further in Section 9.2	
Critical Habitats	None	N/A	N/A
Commonwealth Reserves Terrestrial	None	N/A	N/A
Australian Marine Parks	None	N/A	N/A

6.2.2.2 Native Title Act 1993

The objectives of the *Native Title Act 1993* (Native Title Act) are to:

– Recognise native title rights and set down basic principles in relation to native title in Australia.
– Provide for the validation of past acts and intermediate period acts, which may be invalid because of the existence of native title.
– Provide for a future regime in which native title rights are protected and conditions imposed on acts affecting native title land and waters.
– Provide a process by which native title rights can be established and compensation determined, and by which determinations can be made as to whether future grants can be made or acts done over native title land and waters.
– Provide for a range of other matters, including the establishment of a National Aboriginal and Torres Strait Islander Land Fund.

Under the Native Title Act, the valid grant of a freehold estate on or before 23 December 1996 is known as a 'previous exclusive possession act'. This means that native title has been extinguished over the area and native title claimants cannot include this land in their applications.

The project is located on freehold land owned by BlueScope and therefore native title does not exist within the project site.

7. Consultation and issues identification

7.1 Introduction

This chapter describes the stakeholder and community consultation process carried out prior to the lodgement of the EIS and the consultation activities which will continue during the assessment and development of the project. It includes issues raised and identifies where, if applicable, the design or work program has been amended in response to those issues. The chapter also details the approach to the impact assessment and the location within the EIS of the responses to the SEARs.

PKSW is recognised as an important national economic asset and deemed critical to the state of NSW. The longevity of steel production at the site and its significant economic contribution has resulted in a high level of awareness of BlueScope's operations among the broader community and key stakeholders.

Over a long period of time, BlueScope has established mature and sophisticated engagement channels with the community which have led to a strong local understanding of the Company's operations, the steelmaking process, the critical importance of the blast furnace, as well as providing various opportunities and touchpoints for the community to engage directly on operational issues.

These engagement channels include:

– The BlueScope Community Consultative Committee (CCC) – formed in 2015 and chaired by the Lord Mayor of Wollongong. The CCC meets quarterly and aims to provide a forum for open discussion between BlueScope, community representatives and other stakeholders in relation to the environmental management and performance of operations at PKSW. Minutes of each meeting are published on the www.bluescopeillawarra.com.au website. The CCC represents significant numbers of residents through local community groups, including: NSW Ports; Wollongong City Council; Environmental Protection Authority; Industry Groups; Port Kembla Pollution Group; Community Service Groups; Local Schools; Neighbourhood Forums (representing residents in nearby suburbs); Area Health Service and Healthy Cities Illawarra.
– Site visits – as part of BlueScope's open-door policy, over 5,000 visitors tour the PKSW plant every year (with the exception of COVID-19 restrictions) maintaining open, transparent and effective communication and relationships with neighbours, the local community, visitors and all interested stakeholders.
– The BlueScope Visitor Centre – located at the main Northgate entrance to the steelworks, the Visitor Centre is open to the general public six days per week (with the exception of COVID -19 restrictions) and contains displays and information about PKSW. The centre is regularly used by a variety of local community groups as a central meeting place for events and forums.
– Various local business organisations, networks and peak bodies with which BlueScope is affiliated and regularly updates on matters of interest.
– Local partnerships – for example the longstanding BlueScopeWIN Community Partners Program (in the Illawarra) which has funded over $5 million in donations and sponsorships to support hundreds of local community groups over the last decade.

BlueScope's community engagement approach is based on living up to 'Our Purpose' and 'Our Bond'.

Our Purpose sets the course for BlueScope to deliver what matters to its communities around the world. In August 2020 BlueScope announced its new Purpose and Corporate Strategy, which reinforced the commitment to 'Strengthening our Communities'.

"We create and inspire smart solutions in steel, to strengthen our communities for the future"

Our Bond outlines the guiding principles and underlying values of BlueScope as a company. It identifies key stakeholders, guides business conduct, and provides benchmarks for success. One of those principles is that '*Our communities are our homes*'. BlueScope prides itself on upholding its strong reputation by being a good neighbour and also a good corporate citizen in the Illawarra region.

According to Reptrak, who produce the Corporate Reputation Index globally, BlueScope has a 'Strong' reputation in Australia including within the local Illawarra community. Out of the Top 60 benchmark companies in Australia, BlueScope has consistently ranked in the top 10 to 20 companies with a score in the 'Strong' range. BlueScope is also the highest ranked manufacturer/industrial company amongst the Top 60.

Together, **Our Purpose**, **Our Bond** and **Strategy** define the way BlueScope develops, manufactures and sells steel products and solutions, while building resilience and capacity to drive a sustainable future.

7.1.1 Consultation context

From a consultation perspective, the 6BF Reline Project differs from many major projects requiring the preparation of an EIS. No major new infrastructure will be constructed as part of the project which essentially involves the upgrade of existing facilities.

6BF was constructed in 1996 and operated alongside 5BF until 2011 when it ceased operating and was placed in care and maintenance. Operations at PKSW have continued using a single blast furnace, 5BF. Once relined and brought back online, 6BF will replace the operations of 5BF when 5BF has reached the end of its operational life. Additionally:

– Significant stakeholder engagement channels already exist, so many community concerns and issues have been identified during the operation of 5BF (commissioned in 1972).
– The project does not increase the existing operational footprint and is located entirely within an industrial area (there will be no material change to the industrial landscape).
– Once construction work is complete there will be no new impact on the surrounding area or businesses.
– As there will be no significant change to production levels, operational impacts will not increase.
– Whilst essentially a like-for-like replacement, the project will allow for the adoption of new equipment and technology to improve its operating and environmental performance. For example, carbon emission reduction technology is to be introduced to the blast furnace and associated infrastructure to reduce emissions and improve existing environmental impacts, once it is feasible and available.
– Relines have previously been carried out at the site (most recently 5BF in 2009), so there is a thorough understanding of the work involved, key issues and how to best structure the work program to minimise impacts.

7.2 Consultation undertaken to date

7.2.1 Consultation strategy

BlueScope has developed a community consultation strategy for the project to identify key issues of concern to stakeholders and the community. The community consultation strategy was developed with consideration to the community participation objectives in the *Undertaking Engagement Guidelines for State Significant Projects* (DPIE, 2021). The purpose of the community consultation strategy is to ensure ongoing and effective communication with key stakeholders and the local community. The outcomes of consultation are summarised in Section 7.2.3.

Stakeholder groups identified to have an interest in the project include:

– NSW Department of Planning, Industry and Environment (DPIE)
– NSW Government
– Federal Government
– Local Councils (Wollongong and Shellharbour)
– Regulators
– Local, State and Federal politicians (located in the Illawarra and/or with relevant ministerial portfolios)
– Environment Protection Authority (EPA)
– NSW Ports
– Transport for NSW (TfNSW)
– DPIE Water

– Natural Resources Access Regulator
– Environment Energy and Science Group
– Heritage NSW
– NSW Fire and Rescue
– Sydney Trains
– Surrounding local landowners and residents neighbouring the PKSW site
– Traditional owners and indigenous groups
(including the Illawarra Local Aboriginal Land Council and Illawarra Aboriginal Corporation)
– Neighbouring businesses (e.g. Port users group, Port Kembla Coal Terminal)
– BlueScope Community Consultative Committee
– Local community groups (e.g. neighbourhood forums, local schools)
– Community more broadly
– Environmental groups
– Industry groups and peak bodies
– Business Leaders
– Local and National Media
– Investors / shareholders and analysts
– Suppliers / contracting community (e.g. Utility providers)
– Unions
– BlueScope Employees
– BlueScope Customers

Community engagement aimed at keeping key stakeholders informed of the assessment process and anticipated project impacts such that concerns could be raised and effectively addressed through the design process. This was achieved through a number of different channels.

7.2.2 Consultation activities

7.2.2.1 Government agency and stakeholders

During the implementation of the project's consultation strategy, BlueScope undertook a range of consultation activities. Key activities undertaken included:

– Direct consultation with key stakeholders, including State and Federal politicians and government agencies, via one-to-one or one-to-few briefings. These briefings have afforded the opportunity to discuss the project in detail and for stakeholders to provide feedback on the process.
– BlueScope's Community Consultative Committee (CCC) - In November 2020, a short briefing to the CCC on ironmaking at Port Kembla post-2026 included mention of the project as the preferred option. An update was provided at the March 2021 meeting and a more detailed presentation on the project was given at the June 2021 meeting, along with updates at the Setpember and December 2021 meetings.
– Presentations at various existing forums in which BlueScope actively participates (e.g. Wollongong City Council regular briefings, i3Net forums, Port Kembla Harbour users group, The Port Kembla Pollution Group, Inside Industry Board meetings, Business Illawarra functions and Regional Development Australia (RDA) board meetings).
– Regular email updates to key stakeholders, including assessment milestones and other items of interest.

To ensure consultation with the broader community, the following key activities were undertaken during preparation of the EIS:

– On 7 October 2021, a community 'Town Hall' style information session specific to the Reline Project was held. Due to COVID restrictions, it was conducted virtually, online. The session was widely promoted through BlueScope's existing stakeholder network, the BlueScope Illawarra website, BlueScope's social media and LinkedIn and was also advertised via a double page spread in the Illawarra Mercury (print audience ~50,000 plus additional online audience).
– The 'Town Hall' style information session featured an hour-long presentation on the project, including work program, assessment process, benefits, opportunities and management of environmental issues and carbon emission reduction opportunities. The second hour provided the opportunity for attendees to ask questions directly to key members of the BlueScope project team. With over 50 questions being asked and addressed, there was lots of interest and engaement. A full recording of the information session was posted on the BlueScope Illawarra website immediately after the event to ensure those who couldn't attend 'live' had the opportunity to access the information presented 'on demand', at a later time.
– The BlueScope Illawarra website (www.bluescopeillawarra.com.au) was modified to include a separate section on the project. This includes general information on the work program, an information video, news and updates and environmental information. Enquiries about the project can be emailed through to the project team or via phone to the existing hotline and those interested in having regular project updates emailed to them can register.
– BlueScope's social media (LinkedIn, Twitter, Youtube and Facebook) was used to convey information about the project and to promote the community information session. A link to the virtual Town Hall event was posted to BlueScope's 50,000+ LinkedIn followers immediately after the 'live' event.
– Local and national media were informed about the project and various outlets ran stories that reached a broad audience (e.g. Illawarra Mercury, WIN TV News, Australian Financial Review, The Australian, ABC Radio and TV, Sky News, Sydney Morning Herald / The Age, Daily Telegraph).

A detailed list of community and stakeholder communications and engagement activities undertaken for the project is provided in Appendix C.

7.2.3 Key issues raised

7.2.3.1 Government agency issues raised

A summary of the matters raised by government agencies and the location within this EIS where those matters are addressed is provided in Table 7.1.

Table 7.1 Government agency stakeholder consultation outcomes

Agency	Comments / matters raised	Addressed in this EIS
NSW Ports	Interested in the Port Kembla property precinct.	NA
Wollongong Council	Interested in climate change action and surplus land and property.	Section 9.8
CCC	Supportive of the project and appreciative of the regular updates at each meeting.	NA
EPA	Request to utilise best available proven environmental improvement technology on 6BF where it makes commercial sense.	Chapter 8
TfNSW	TfNSW provided input into the SEARs in consultation with DPIE. Consultation letter was issued. No response was received prior to finalisation of this EIS.	Section 8.5
DPIE – Water and resource regulator	Consultation letter was issued. No response was received prior to finalisation of this EIS.	Section 8.4

Agency	Comments / matters raised	Addressed in this EIS
DPIE – Environment, Energy and Science (EES)	DPIE -ESS provided input into the SEARs in consultation with DPIE. A BDAR waiver was sought and received from EES during the projects scoping phase. Consultation letter was issued. No response was received prior to finalisation of this EIS.	NA
Heritage NSW	Consultation letter was issued. No response was received prior to finalisation of this EIS.	Section 9.4
Sydney Trains	Consultation letter was issued. No response was received prior to finalisation of this EIS.	NA. Traffic and transport is addressed in Section 8.5. There will be no impact to rail operations.

7.2.3.2 Community issues raised

Consultation with the local community has also been undertaken and has assisted in identifying key issues to be considered as part of the assessment process. During the virtual 'Town Hall' session, a question and answer session allowed members of the public to submit questions and comments to BlueScope's project team. A summary of the matters raised and the location within this EIS where (if applicable) these matters are addressed is provided in Table 7.2.

Table 7.2 Community consultation outcomes

Comments / matters raised	Response	Addressed in this EIS
Why does the work need to take place?	A blast furnace is a key component of the steel-making process. 5BF is the only operational blast furnace at PKSW. It is almost 50 years old and is nearing the end of its operational life. The planned upgrade will allow 6BF to be ready to take over as the operational blast furnace when 5BF comes offline. This will maintain domestic steel supply and the PKSW workforce. If the project does not go ahead, it is unlikely that BlueScope will be able to continue primary steel-making in Australia.	Chapter 3
Is the existing blast furnace safe?	5BF is operating well and safely. Typically, blast furnace campaigns (the operational time between relines) last between 15- 20 years. 5BF has been in operation since 1972 and has undergone 4 relines, and is expected to reach the end of its operational life at the end of this campaign, so between 2026 – 2030. BlueScope plans to have the much newer 6BF relined and upgraded by 2026 so there is no interruption to production when 5BF is taken offline.	Section 4.1
What is 5BF's future?	5BF will be placed in care and maintenance in a similar way to 6BF's current status in care and maintenance.	-
Are there plans to operate both blast furnaces as in the past?	There are no plans to operate both blast furnaces at the same time in a commercial capacity. The focus is on having 6BF upgraded and ready to take over from 5BF when it is decommissioned.	Section 5.13
What are the economic benefits?	PKSW is an important national economic asset. It produces around 3 million tonnes of steel each year – 75% of which is used domestically for a range of important construction, infrastructure, manufacturing, energy and defence applications. BlueScope's PKSW and the adjacent Springhill Works employ approximately 4,500 direct employees and on-site contractors, and generate about 10,000 jobs in total, including indirect employment in supplier and customer businesses. BlueScope's Illawarra operations generate $6.5 billion or 24 per cent of the region's output per annum.	Section 2.2.1 and Section 9.7
What is the scope of the work?	The bulk of the work will be the removal and replacement of the existing heatproof refractory lining of 6BF, and the staves which cool the outer shell of the furnace. As 6BF has been offline since 2011, various other maintenance works and upgrades, including to associated infrastructure, will also take place. The project will also allow for emission reduction technologies to be installed where practical.	Chapter 5
Noise impacts of the work?	A detailed Noise and Vibration Impact assessment has been prepared which provides an assessment of the construction and operational noise impacts and proposed management measures.	Section 8.2
Hours of construction?	By choosing to stage the project over a longer time with a more measured work program, we anticipate the bulk of the work will be carried out between 7am – 6pm, Monday – Saturday. Where practical, noise generating activities will be scheduled during these hours. However, some nightworks will need to be undertaken.	Section 5.12
Traffic impacts during construction and operation?	A detailed traffic impact assessment has been prepared which provides an assessment of the construction and operational traffic and transport impacts and proposed management measures.	Section 8.5
Dust and air quality concerns?	A detailed air quality impact assessment has been prepared which provides an assessment of the construction and operational air quality impacts and proposed management measures.	Section 8.1

Comments / matters raised	Response	Addressed in this EIS
Waste handling – concerns about stockpiled waste from the project.	Refractory waste will be reused where possible. All waste that can't be reused will be classified, managed and disposed of in accordance with Waste Classification Guidelines (EPA, 2014). During operation, waste streams are expected to be generally consistent with existing operating conditions and will be managed in accordance with existing waste management processes.	Section 9.9
Concerns about ongoing emissions from the 6BF once operational.	Emissions will be similar to, or better than (that is, reduced when compared to) emissions from 5BF. BlueScope will utilise lower-emissions technologies where practical as part of the upgrade, which is anticipated to improve on existing emission levels. Emissions will also continue to be managed in accordance with the site's environmental protection licence administered by the NSW EPA.	Section 8.1
Visual amenity.	During operation there will be no significant change in the appearance of 6BF. During construction there may be some additional plant and equipment visible but it will be consistent with the existing industrial landscape and visual amenity management measures will also be put in place.	Section 9.5
What is the assessment process and how does the project's declared Critical State Significant Infrastructure (CSSI) status impact that process?	The project will undergo the same rigorous regulatory process as other projects. The main difference with CSSI projects is that the application is determined by the NSW Minister for Planning and Public Spaces rather than a body such as the Independent Planning Commission. This EIS contains details of the approval pathway under the EP&A Act and other environmental legislation as relevant.	Chapter 6
Will there be other opportunities to have input on the project?	When complete, the EIS will be placed on public exhibition and stakeholders will be invited to make submissions on the project. These submissions will need to be addressed by BlueScope in its Response to Submissions document, which will then be reviewed and assessed by the DPIE.	Section 7.3
What is the lifespan of the project/how long will 6BF last?	Relines generally last 15 – 20 years depending on operational conditions.	-
Does this mean operations will be coal-powered for next 2 decades?	Not necessarily. BlueScope has made various commitments around its operations, including its Net Zero emission target by 2050 detailed in its recent Climate Action Report. The reline of 6BF will ensure steel production levels can be maintained and allow BlueScope the operational flexibility to explore and trial lower emissions technologies as they are further developed.	Section 9.8
Concerns about impacts on the water catchment from coal mined locally and used as an input to the blast furnace.	Coal sources for use at PKSW is obtained from mining operations which have the required environmental approvals for the jurisdiction in which they are located.	-
The risk to operations if local coal cannot be sourced due to difficulties gaining regulatory approvals?	BlueScope continues to identify primary and alternative suppliers for all materials used in the steel making process to ensure that continuity of supply and therefore production can continue with minimal impact should one source no longer be available.	-

Comments / matters raised	Response	Addressed in this EIS
Why not shift to green steel now?	While BlueScope is committed to reducing greenhouse gas emissions, “green steel” technologies are not yet technologically or commercially viable for use at PKSW. By carrying out the reline project now, we are ensured a solid long term-base from which to investigate and implement “green steel” technologies in the future.	Section 4.2
Were other alternatives considered?	Yes. BlueScope carefully considered four options, including three alternatives to the project. The reline of 6BF was the option that ensured the continuation of commercially viable steelmaking at PKSW, maintained the workforce and minimised supply disruptions.	Chapter 4
Does the project guarantee the future of the PKSW and jobs are safe?	The project will allow BlueScope to continue producing steel in Australia for many years. Of the alternatives considered, it was the option most likely to secure the future of the workforce.	Chapter 4
How many jobs will be generated by the project?	Approximately 300 jobs will be created during construction. During operation, workforce requirements will not change significantly, with the 5BF workforce transferring to 6BF once operational.	Section 5.11
Will local companies be prioritised?	A more measured work program is being planned which will reduce the size of the workforce, but increase the project timeframe from around 4 months for a traditional reline, to around 3 years. This approach will mean fewer workers will need to be brought in from other areas and local business participation can be maximised.	Section 5.11
Opportunities for indigenous participation?	As part of BlueScope’s First Nations Framework strategy, we are working with a number of indigenous organisations, including procurement agencies, to maximise opportunities.	-
Impacts on local housing and amenity due to extra construction workforce.	The measured work program was specifically chosen to ensure local participation can be maximised, minimising the number of workers from other areas and associated impacts on housing. etc.	Section 5.11 and Section 5.13
What does this mean for a possible future hydrogen hub?	BlueScope is still very supportive of a hydrogen hub at Port Kembla and hydrogen is likely to play an important role in the future production of “green” steel at PKSW. Currently, while prospective hydrogen technologies are really promising, those which have the potential to deliver a meaningful reduction in greenhouse gas emissions are only in the early stages of technology development. They do not have the scale or certainty to provide a commercially viable solution for PKSW’s operations in the timeframe needed, which is before 5BF reaches the end of its operational life.	-
What does this certainty around BlueScope’s future plans mean for BlueScope’s surplus land holdings in the Port precinct?	With BlueScope’s future plans now more certain, BlueScope has begun a property Master Planning process to explore the possibility of better utilising its surplus land holdings in the Port precinct, as well as its land at Kembla Grange.	-
Can land access be opened up to attract more jobs and investment to the Port area?	With BlueScope’s future plans now more certain, BlueScope has begun a property Master Planning process to explore the possibility of better utilising its surplus land holdings in the Port precinct, as well as its land at Kembla Grange.	-

7.3 Ongoing consultation

Opportunities for members of the community and other stakeholders to engage with BlueScope during the project have been and will continue to be provided through a range of mechanisms, as outlined in Table 7.3.

Table 7.3 Stakeholder engagement mechanisms

Mechanism	Description
Key Stakeholder Briefings	Direct consultation with key stakeholders via one-to-one or one-to-few briefings affords the opportunity to discuss the project in detail and provide feedback input into the process.
BlueScope CCC	Meets quarterly and includes representatives from a broad range of stakeholder groups. Allows for information about the project and progress updates to be widely disseminated, and for the tabling of any issues or concerns raised by the constituents of these varied groups.
Existing Forums	BlueScope will continue to provide updates through existing community and business forums. Presentations in these forums will provide the attendees with an opportunity to communicate community sentiments regarding project activities and raise any issues or concerns. Forums include regular events conducted by business organisations Regional Development, Illawarra Business Chamber and i3net, the Port Kembla Harbour Environment Group (which includes other Port tenants), and Neighbourhood Forums 5 & 7 which represent the communities close to the PKSW.
BlueScope in the Illawarra website	A section of the BlueScope Illawarra website is dedicated to the project and includes project information, updates, assessment documents, an enquiry function, phone and email contacts, and allows members of the public to register their interest in staying informed about the project via email updates.
Subscriber updates	Regular email updates for those who have registered their interest through the website and at local forums.
Social media	Updates about the project will be regularly posted on BlueScope's Facebook, Twitter, LinkedIn and YouTube accounts offering another communication avenue for stakeholders.
News Media	Ongoing responsiveness to media enquiries, as well as proactive distribution of key project developments to local, state and national media.
Site Visits (Post-COVID)	In addition to site visits which will be organised for specific stakeholder groups, around 5,000 people each year attend our regular weekly public site visits of the PKSW. These visits will recommence as soon as COVID restrictions allow.
BlueScope Visitor Centre (Post-COVID)	The Visitors' Centre is the starting point for community tours and will feature information and various displays about the project and updates on its progress. The Visitors' Centre will reopen to the public as soon as COVID restrictions allow.

7.4 Approach to impact assessment

The framework for the impact assessment has been designed to provide a structured and objective approach to identifying environmental, social and economic impacts, and to developing effective mitigation, management and offset measures. The approach has generally involved:

– Project definition including analysis of the need and alternatives to maintaining ironmaking and steelmaking at PKSW.
– Identification of key issues through consultation with key government and community stakeholders.
– Identifying existing environmental, social and economic baseline conditions.
– Completion of impact assessments for the project based on the broad description of the project having regard to the baseline conditions.
– Refinement of the project having regard to the impact assessments.
– Identification of appropriate mitigation, management, and monitoring measures for the identified potential impacts.

The baseline (or existing environment) conditions for the project site and surrounding locality were derived using a combination of desktop and field investigations relevant to each environmental aspect or value. Where possible, the investigations built on previous studies that have been completed over a number of years at PKSW and Port Kembla in recognition of the extent of historical development that has been undertaken in the region.

The impact assessment methodology for each environmental, social and economic value was developed to meet the Secretary's Environmental Assessment Requirements (SEARs) for the project issued by DPIE and the requirements of the EP&A Act and the EP&A Regulation.

Mitigation and management measures were applied to reduce the level of identified potential impacts. These measures aim to protect the identified environmental values and will be applied as required during the planning and design, construction, and operation phases of the project. A number of monitoring plans will also be developed and implemented to monitor potential impacts associated with the development of the project.

The SEARs for preparation of the EIS were issued by the DPIE on 12 July 2021. An outline of the key issues raised in the SEARs, together with where each issue has been addressed in the EIS, is presented in Appendix A.

Consultation with local community representatives has also been undertaken and has assisted in identifying key issues to be considered as part of the assessment process. Issues raised during consultation are outlined in Chapter 8 and have been addressed as part of the EIS where applicable.

8. Assessment of key impacts

8.1 Air quality

This section describes the potential air quality related impacts associated with construction and operation of the project. It summarises the key findings of the Air Quality Impact Assessment (AQIA) which is included in Appendix E.

8.1.1 Methodology

8.1.1.1 Overview

The scope broadly includes:

– Desktop review of site plans, aerial photographs and topographic maps to gain an understanding of the existing environment in terms of local terrain, proposed operations and sensitive receptors within the study area.
– Review of available ambient air quality monitoring data, to gain an understanding of existing air quality within the vicinity of the project site. Ambient pollutant levels were sourced from data recorded from Office of Environment and Heritage (OEH) ambient monitoring stations located in the local area.
– Outline of the applicable air quality criteria with consideration to the Approved Methods (EPA, 2016).
– An emissions inventory created using BlueScope supplied data based on actual monitoring data, allowable EPA emission limits and national pollution inventory emission factors.
– Meteorological modelling to gain an understanding of the local wind climate and use as model input for conducting atmospheric dispersion modelling.
– Dispersion modelling to predict construction and operational impacts at nearby receptors was conducted using CALPUFF.
– Recommend management measures to reduce impacts and, if warranted, recommend air quality monitoring programmes.

A detailed outline of the assessment methodology used in the AQIA is provided in Appendix E.

8.1.1.2 Guidelines and legislation

The AQIA was prepared in accordance with the *NSW EPA Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (2017) (the Approved Methods) with reference to the following legislation and government guidelines:

– *NSW Protection of the Environment Operations Act 1997 (POEO Act).*
– *NSW Protection of the Environment Operations (Clean Air) Regulation 2021* (POEO Clean Air Regulation).
– National Environment Protection Council (NEPC) National Environment Protection (Ambient Air Quality) Measure 2021 (the Air NEPM).
– Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales (DEC, 2007).
– Technical framework - Assessment and management of odour from stationary sources in NSW (the Technical Framework), NSW Department of Environment and Conservation (DECC 2006).
– Guidance on the assessment of dust from demolition and construction, Institute of Air Quality Management (2016) (IAQM guidance).

8.1.1.3 Air quality species of interest

Construction

Construction activities as outlined in Section 5 have the potential to generate the following air emissions:

– Engine emissions from hydrocarbon combustion in plant and equipment.
– Particulate matter (dust) emissions from the movement of plant and equipment over sealed and unsealed surfaces and from general construction activities.

Due to the type and dispersed nature of potential construction related air quality emissions, a qualitative approach to the assessment of construction impacts has been adopted.

Operation

The blast furnace and related systems emissions profile is well known to BlueScope which has managed emissions from its operation for many decades. The pollutants of interest when assessing the air quality impacts associated with the operation of 6BF are identified as:

– Airborne particulate matter ('particulates'), including Total Suspended Particulates (TSP) and particulate matter with diameter smaller than 10 microns (PM_{10}).
– Common gaseous pollutants including nitrogen dioxide (NO_2) and sulphur dioxide (SO_2).
– Odour in the form of hydrogen sulphide (H_2S).

8.1.1.4 Emissions inventory development

Based on the current operation of 5BF and historical operation of 6BF at the PKSW, BlueScope provided GHD with a detailed emissions inventory for the future operation of 6BF. This site-wide emissions inventory was based on measured operational data under typical operating conditions as well as National Pollutant Inventory emissions estimation techniques if sampling data was not available. Full details of the assessed emissions inventory are provided in Appendix E.

8.1.1.5 Meteorology modelling methodology

Local meteorological features including long term wind speed and direction, as well as atmospheric stability, influence how air pollutants are dispersed into the local environment.

Site specific meteorological data used to drive the dispersion model was generated by use of the Weather Research and Forecast model (WRF) and CALMET meteorological models to produce a three-dimensional wind field which also takes into account local variations in the terrain. Prognostic WRF data was used as an 'initial guess field' for the CALMET meteorological model. The meteorology modelling methodology was used in CALPUFF to drive the dispersion model and is summarised below:

– Selection of a model period.
– Development of coarsely gridded prognostic meteorological data set using the WRF model.
– Development of refined gridded meteorological data set which takes into account local terrain features using the CALMET diagnostic meteorological model.
– Verification of model performance using data measured at BoM and BlueScope meteorological monitoring stations.
– Extraction of predicted meteorological parameters from the CALMET model.

8.1.1.6 Modelling approach

Based on a review of the proposed construction methodology, agency requirements, and identification of emissions that could arise, a qualitative based approach that focused on management was adopted to assess potential construction impacts. The potential particulate impacts were calculated using a risk-based approach in accordance with IAQM guidance.

Emissions to air during commissioning will occur for a short duration at the start of the project's operational phase. Where possible, emission controls will be implemented to reduce any emissions during this stage. A qualitative approach based on management was adopted to assess the commissioning of the project.

The operation assessment methodology comprised of three parts:

– Emission limit assessment: Assessment of air emission concentrations against the relevant air emission limits applicable to the operation of 6BF sourced from the POEO Clean Air Regulation. Potential cumulative air quality impacts with proposed and approved major projects in the area were reviewed on a case-by-case basis and potential cumulative impacts were incorporated where considered appropriate.
– Air quality impact assessment: Air quality dispersion modelling was undertaken for two scenarios, existing operations and future operations, to allow for a comparison which will identify project related air quality impacts.
– Best Available Techniques (BAT) assessment: Carried out with consideration of the European Union Best Available Techniques Reference Document (BREF) for Iron and Steel Production Industrial Emissions Directive 2010/75/EU (Integrated Pollution Prevention and Control) to benchmark the proposed operations against industry scenarios modelled.

8.1.1.7 Scenarios modelled

– Emission sources and scenarios have been simplified to the following classifications:
– Source type:
  - Stack sources (inclusive of existing and proposed environmental protection licence point sources).
  - Fugitive sources.
  - All sources (combined stack and fugitive sources).
– Scenario:
  - **Existing and future** – sources that are unaffected by the project that occur during the existing scenario and will continue to occur during the future scenario.
  - **Existing** – 5BF sources that will cease ironmaking operation when 6BF is operating including existing and future sources.
  - **Future** – 6BF sources that will be operating when 5BF has ceased ironmaking operation including existing and future sources.

For pollutants assessable as cumulative impacts, predictions for the following two scenarios were provided:

– **Cumulative with DPIE AQMS:** Project impacts and emission concentration level assessed in conjunction with data from DPIE operated air quality monitoring stations (AQMS). This provides an assessment of background air quality plus the impacts of the project.
– **Cumulative with DPIE AQMS and other SS projects:** Project impacts assessed in cumulation with data from AQMS and predicted impacts from other State significant projects near the site.

8.1.1.8 Criteria

Assessment criteria for the project were predominately taken from the Approved Methods, with the exception of NO_2 and SO_2 which were sourced from the Air NEPM air quality objectives as they represent the most recent and stringent standards for protection of the air quality environment. An alternative 1-hour H_2S criteria was sourced from the California Ambient Air Quality Standards for comparative purposes.

The adopted air quality assessment criteria are summarised in Table 8.1.

Table 8.1 Air quality assessment criteria

Pollutant	Averaging period	Statistic	Impact location	Impact type	Criteria (µg/m^3)	
					EPA Assessment Criteria	Air NEPM
Airborne particulate matter and common gaseous pollutants						
TSP	Annual	Maximum	Sensitive receptor	Cumulative	90	-
PM_{10}	24 hour	Maximum	Sensitive receptor	Cumulative	50	-
	Annual	Maximum	Sensitive receptor	Cumulative	25	-
NO_2	1 hour	Maximum	Sensitive receptor	Cumulative	246	164
	Annual	Maximum	Sensitive receptor	Cumulative	62	31
SO_2	1 hour	Maximum	Sensitive receptor	Cumulative	570	286 (planned to be reduced to 215 in 2025)
	24 hour	Maximum	Sensitive receptor	Cumulative	228	57
Principal air toxics						
Benzene	1 hour	99.9th percentile	At or beyond site boundary	Incremental	29	-
Dioxins and furans	1 hour	99.9th percentile	At or beyond site boundary	Incremental	2.00E-06	-
Individual air toxics						
Ammonia	1 hour	99.9th percentile	At or beyond site boundary	Incremental	330	-
Benzo[a]pyrene equivalent	1 hour	99.9th percentile	At or beyond site boundary	Incremental	0.4	-
Chlorine	1 hour	99.9th percentile	At or beyond site boundary	Incremental	50	-
Cyanide (as CN)	1 hour	99.9th percentile	At or beyond site boundary	Incremental	90	-
Ethyl-benzene	1 hour	99.9th percentile	At or beyond site boundary	Incremental	8000	-
Odorous air pollutants						
H_2S	1 second	99.9th percentile	Sensitive receptor	Incremental	1.38	-
	1 hour	Maximum	Sensitive receptor	Cumulative	42	-
Phenol	1 hour	99.9th percentile	Sensitive receptor	Incremental	20	-
Styrene	1 hour	99.9th percentile	Sensitive receptor	Incremental	120	-
Toluene	1 hour	99.9th percentile	Sensitive receptor	Incremental	360	-
Xylene	1 hour	99.9th percentile	Sensitive receptor	Incremental	190	-

Note 1 - Impact type – the type of impact assessed. For some pollutants, the impacts are assessable only for the project's contribution to pollutant concentrations at the relevant impact location (referred to as 'incremental impacts'). For other pollutants, the cumulative impact (which includes both the incremental concentration as well as the background concentration) is assessed.

8.1.2 Existing environment

8.1.2.1 Regional context

A wide range of anthropogenic sources currently impact the air quality in the area, including industrial operations surrounding the site, shipping and logistics operations, quarries and coal storage. Windblown dust is also expected to be present from on-site and off-site sources. Natural attenuators of air quality include the sea breeze which is prevalent in the afternoons. The PKSW site is generally flat and resides upon a base of artificial fill, including dredged sand and mud, rocks and local soil materials. The terrain within 10 kilometres of the PKSW site is considered complex due to a land-sea interface bordering the site to the east and the Illawarra escarpment which is located approximately 6 kilometres to the northwest.

8.1.2.2 Meteorology

Local meteorological data was obtained from the Bellambi AWS (site number 068228) located approximately 12.5 kilometres north of the site (BoM, 2021). Mean monthly maximum temperatures range between 17.2 °C in July to 25 °C in February. Mean monthly minimum temperatures range between 10.2 °C in July to 19.2 °C in February. Autumn and spring are generally mild with sporadic temperature fluctuations. Mean monthly rainfall in the area ranges between 144.8 millimetres (mm) in February to 54.1 mm in September, with most of the mean annual 1127.9 mm of rainfall occurring between October and March. Mean morning wind speeds are typically greater in summer and spring, ranging from 18.7 kilometres per hour (km/h) in November to 15 km/h in March. Afternoon winds are strongest in December (with an average windspeed of 25.4 km/h) and weakest in July (with an average wind speed of 20.7 km/h). Winds are predominantly from the south, south west and west in the morning, and predominantly from the north east and south in the afternoon. A detailed analysis of the meteorology used in the AQIA is provided in Appendix E.

8.1.2.3 Sensitive receptors

The selection of identified sensitive receptors is consistent with the previous air quality assessment undertaken by *BlueScope Steel, Port Kembla Site Air Emissions Modelling – PRP131* (Environ, 2012) to readily allow comparison of predicted impacts between assessments and to analyse changes in predictions over time.

ERM (2021) also conducted a peer review of the 2011 BSL Air Emission Site Wide Model. In its review, ERM states that there have been no material changes to land use or occupancy surrounding the facility since the production of the model. Based on this, ERM concluded that sensitive receptor locations do not require significant review or amendment. In addition to the identified sensitive receptor locations, the assessment predicted pollutant concentrations for a sampling grid centred on the PKSW so that results can be determined at any location within the sampling grid.

Table 8.2 identifies the sensitive receptors assessed in the AQIA.

Table 8.2 Location of identified sensitive receptors

Receptor ID	UTM coordinates (m)		Receptor type	Approximate distance and direction from PKSW Boundary	Description
	Easting	Northing			
R01	303054	6186079	Residential	~410 m northwest	Residence 1
R02	304458	6186662	Residential	~180 m north	Residence 2
R03	305835	6187128	Educational	~360 m northwest	Coniston Primary School
R04	301769	6185029	Residential	~1,630 m west	Unanderra Community Centre
R05	304332	6183457	Educational	~460 m west	Cringila Primary School
R06	307138	6182455	Residential	~400 m south	Warrawong Community Centre

8.1.2.4 Background air quality

In accordance with the Approved Methods, an assessment of the total impact, which includes the project impact as well as the background concentrations has been completed for the following pollutants:

– TSP
– PM_{10}
– $PM_{2.5}$
– NO_2
– SO_2
– H_2S

To establish representative background concentrations data was collated from the following sources:

– DPIE air quality monitoring stations located at Wollongong, Kembla Grange and Albion Park South
– Two BlueScope air quality monitoring stations: North Gate and Scouts Hall

A full summary of the data from these stations is presented in Appendix E.

The data from these was reviewed and compared with DPIE data to define the adopted background values to be used in the AQIA, which is presented below in Table 8.3.

Table 8.3 Adopted background criteria

Pollutant	Averaging period	Adopted background value
TSP	Annual	36.2 µg/m^3, equal to twice the annual PM_{10} concentration recorded at Wollongong AQMS for the modelling period
PM_{10}	24 hour	Daily variable from Wollongong AQMS
NO_2	1 hour	Hourly variable from Wollongong AQMS, if unavailable then from Kembla Grange AQMS, if unavailable from either station then from Albion Park South AQMS
O_3	1 hour	Hourly variable from Wollongong AQMS, if unavailable then from Kembla Grange AQMS, if unavailable from either station then from Albion Park South AQMS
SO_2	1 hour	Hourly variable from Wollongong AQMS
	24 hour	Daily variable from Wollongong AQMS
H_2S	1 hour	2 µg/m^3, equal to the highest monthly average H_2S concentration recorded by BlueScope

8.1.3 Potential impacts

8.1.3.1 Construction

The project will include demolition and removal of old infrastructure, as well as some dust generating works to construct new facilities associated with 6BF. Relatively minor particulate emissions are expected from removal, demolition, repair and installation activities with the use of localised emission controls such as watering. Construction particulate emissions will vary significantly based on the specific activities being undertaken at any one time (i.e. particulate emissions will not occur at all times). It is anticipated that some particulate emissions may include contaminants and heavy metals from removal of infrastructure. With dust management measures in place, contaminant emission will be relatively minor and can be controlled at the source.

Some activities will have a higher potential for particulate emissions including any blasting, heavy demolition and use of rock breaking equipment. Activities with a higher potential for particulate emissions will be managed by the implementation of a construction dust management plan.

Minor vehicle exhaust emissions are expected throughout the construction period, however, sources will be discontinuous, transient, and mobile, and therefore the air quality risk associated with vehicle emissions during construction is low. Vehicle movement at laydown areas may also produce some amount of dust. Impacts will be small and localised, given that the laydown areas are mostly sealed.

8.1.3.2 Commissioning

Prior to operation, the project will undergo a period of commissioning which is understood to be a once off procedure that is necessary to allow operation of the project. It is anticipated the commissioning process will take several months, after which, the furnace will be blown-in and then gradually uprated over a period of approximately 6 weeks until full production is achieved.

During commissioning, the primary emissions to air are expected to comprise of pollutants including carbon monoxide (CO), carbon dioxide (CO_2), hydrogen (H_2), and particulates, that will occur during charging, purging and heating of the furnace. Typical operational emissions control equipment (such as a baghouse) will be active during commissioning, however open runner covers to allow plant condition assessment whilst uprating may result in elevated emissions to air for a short period.

During blow-in, gas generated during the initial combustion period varies slightly in composition when compared to blast furnace gas and is unable to be re-used in other areas at PKSW. As a result, this gas will be vented through the furnace top bleeders before being directed through the gas cleaning system. This will result in visible emissions for a period of approximately two to three hours. Once the composition of the blast furnace gas is suitable for re-use in other areas at PKSW, it will be reintroduced to the interworks gas system and the bleeding to atmosphere will stop.

During this time, the tapholes at the bottom of the blast furnace will be open and flared allowing the escape of combusting gas mixtures until enough smelted liquids and slag are generated to seal the tapholes. As soon as the tapholes are sealed off, ironmaking will commence and the existing casthouse baghouse system will become more effective as covers are replaced as operations allow. It is estimated this will take 3-4 days before normal de-dusted casthouse cover arrangements can be adopted. The casthouse dedusting system will be operating throughout the recovery with reduced capacity initially due to the removal of the runner covers.

The proposed commissioning procedure aligns with the industry standard approach that is adopted at similar facilities around the world. In addition, best practice methods will be implemented to minimise emissions to air where possible.

Due to the relatively short duration of commissioning, and the implementation of industry standard and best practice methods, there is a low risk of potential air quality impacts. Residual air quality impacts as a result of commissioning activities are not expected to be significant as it is a once-off requirement of short duration.

8.1.3.3 Operation

A comparative analysis of predicted incremental and cumulative air quality concentrations examined the relative impact of the project by presenting the difference in model predictions between existing and future scenarios. The difference was expressed as the percentage change from existing to future scenario (i.e. a positive percentage indicates increased impacts are predicted during the future scenario, while a negative percentage indicates decreased impacts are predicted during the future scenario).

Appendix E includes the detailed outcomes of the existing and future scenarios modelling results. This section focuses on the results of the comparison between the existing and future scenarios which provides an indication of the potential impact of the operation of 6BF.

8.1.3.4 Particulates and common gaseous pollutants

Particulate matter

Predicted incremental and cumulative particulate concentrations are presented in Table 8.4. Minor exceedance of the 24 hour PM_{10} criteria was predicted at R03 and R05. These minor exceedances comprise the following:

– The exceedance at R03 comprised an incremental concentration from 6BF of 0.7 µg/m^3 with elevated background concentrations resulting in a cumulative concentration of 50.1 µg/m^3.
– The exceedance at R05 comprised of an incremental concentration from 6BF of 1.3 µg/m^3 with elevated background concentrations resulting in a cumulative concentration of 50.3 µg/m^3.

For both predicted exceedances, the incremental contribution from 6BF operations was relatively minor (<5% of assessment criteria) whilst background concentrations were elevated (>95% of assessment criteria). Therefore, the exceedances were primarily attributed to elevated background (off-site) concentrations.

As previously discussed, the background concentration used in the assessment already includes some increment from PKSW, therefore the results of this assessment are conservative. The proposed 6BF has a number of additional controls when compared to 5BF, and additional particulate impacts from the project are considered to be unlikely.

Table 8.4 Predicted particulate concentrations

Receptor	Predicted particulate concentrations (µg/m^3)											
	Incremental						Cumulative					
	Only 6BF sources			All PKSW future sources			Cumulative with DPIE AQMS			Cumulative with DPIE AQMS and other SS projects		
	TSP	PM_{10}		TSP	PM_{10}		TSP	PM_{10}		TSP	PM_{10}	
	Annual	24 hour	Annual	Annual	24 hour	Annual	Annual	24 hour	Annual	Annual	24 hour	Annual
Criteria	**90**	**50**	**25**	**90**	**50**	**25**	**90**	**50**	**25**	**90**	**50**	**25**
R01	0.1	0.6	0.04	0.7	6.1	0.5	36.9	47.2	18.2	36.9	47.2	18.2
R02	0.2	0.8	0.1	1.3	8.8	0.8	37.5	47.5	18.5	37.5	47.5	18.5
R03	0.3	0.7	0.1	1.6	6.8	1.0	37.9	50.1	18.7	37.9	50.2	18.7
R04	0.1	0.6	0.03	0.5	6.4	0.3	36.7	47.2	18.0	36.7	47.2	18.0
R05	0.4	1.3	0.1	3.3	19.7	1.8	39.6	50.2	19.5	39.6	50.3	19.6
R06	0.5	1.1	0.1	2.2	8.1	1.3	38.4	48.3	19.0	38.4	48.4	19.0

A contour dispersion plot of incremental 24 hour PM_{10} under the future scenario is shown in Figure 8.1.

Table 8.5 outlines the percentage change in TSP and PM_{10} at each of the assessed receptors. A minor increase in incremental particulate concentrations was predicted as a result of the project. It is attributed to the minor increase in particulate emissions from the future scenario.

A less than 1% change between scenarios is predicted for cumulative predictions. This is attributed to low site contributions relative to the background concentrations which account for the majority of the cumulative impact at receptors.

Table 8.5 Predicted particulate concentrations (percentage change from existing to future scenario)

Receptor	Incremental			Cumulative with DPIE AQMS			Cumulative with DPIE AQMS and other SS projects		
	TSP	PM_{10}		TSP	PM_{10}		TSP	PM_{10}	
	Annual	24 hour	Annual	Annual	24 hour	Annual	Annual	24 hour	Annual
R01	10.3%	3.8%	3.2%	0.2%	0.0%	0.1%	0.2%	0.0%	0.1%
R02	9.2%	0.7%	2.9%	0.3%	0.0%	0.1%	0.3%	0.0%	0.1%
R03	12.3%	-0.7%	4.0%	0.5%	0.2%	0.2%	0.5%	0.2%	0.2%
R04	12.2%	1.6%	3.5%	0.1%	0.0%	0.1%	0.1%	0.0%	0.1%
R05	5.7%	0.3%	0.9%	0.5%	0.2%	0.1%	0.5%	0.2%	0.1%
R06	18.0%	5.2%	4.9%	0.9%	0.4%	0.3%	0.9%	0.4%	0.3%

Nitrogen dioxide

The difference in predicted NO_2 concentrations at modelled receptors is detailed in Table 8.6. Incremental and cumulative NO_2 concentrations are predicted to meet the EPA and NEPM criteria and no exceedances are predicted.

Table 8.6 Predicted NO_2 concentrations (future scenario)

Receptor	Predicted NO_2 concentrations ($\mu g/m^3$)							
	Incremental				Cumulative			
	Only 6BF sources		All PKSW future sources		Cumulative with DPIE AQMS		Cumulative with DPIE AQMS and other SS projects	
	1 hour	Annual	1 hour	Annual	1 hour	Annual	1 hour	Annual
EPA criteria	**246**	**62**	**246**	**62**	**246**	**62**	**246**	**62**
NEPM criteria	**164**	**31**	**164**	**31**	**164**	**31**	**164**	**31**
R01	6.8	0.1	75.2	1.5	107.2	13.1	107.2	13.5
R02	7.9	0.1	74.8	2.7	107.2	14.3	107.2	14.9
R03	9.8	0.2	68.2	4.3	107.2	15.8	107.2	17.0
R04	6.3	0.05	60.6	1.2	107.2	12.8	107.2	13.1
R05	13.2	0.2	92.7	4.5	108.9	16.1	108.9	16.8
R06	19.6	0.2	68.3	2.5	113.8	14.1	116.2	15.0

Table 8.7 provides a comparison of the modelled percentage change in NO_2 at each of the assessed receptors. This shows that the project is generally resulting in a decrease in NO_2 at receptors and therefore having a positive impact.

A contour dispersion plot of incremental 1 hour NO_2 is shown in Figure 8.2.

Table 8.7 Predicted NO_2 concentrations (percentage change from existing to future scenario)

Receptor						
	Incremental		Cumulative with DPIE AQMS		Cumulative with DPIE AQMS and other SS projects	
	1 hour	Annual	1 hour	Annual	1 hour	Annual
R01	-0.3%	-2.2%	0.0%	-0.3%	0.0%	-0.2%
R02	-3.2%	-2.0%	0.0%	-0.4%	0.0%	-0.3%
R03	-4.5%	-2.9%	0.0%	-0.8%	0.0%	-0.7%
R04	-2.8%	-2.7%	0.0%	-0.3%	0.0%	-0.2%
R05	0.1%	-4.6%	0.0%	-1.3%	0.0%	-1.2%
R06	-0.2%	-1.3%	0.0%	-0.2%	0.0%	-0.2%

Sulphur dioxide

Predicted incremental and cumulative SO_2 concentrations are presented in Table 8.8. Compliance was predicted against the EPA criteria for all receptors.

The following exceedances of the NEPM criteria were predicted:

– An incremental exceedance of the 1 hour criteria at R06 for all PKSW future sources
– Cumulative exceedances of the 1 hour criteria at R06 for all PKSW future sources

The exceedances of the NEPM criteria require interpretation in the context that the 1 hour and 24 hour SO_2 standards were strengthened in a recent revision (May 2021) of the Air NEPM. The 1 hour SO_2 criteria was strengthened from 570 µg/m^3 to 286 µg/m^3 (representing a 50% reduction) while the 24 hour criteria was strengthened from 228 µg/m^3 to 57 µg/m^3 (representing a 75% reduction). The NEPC notes that the strengthened SO_2 standards are now among the tightest in the world.

For assessment purposes, it is considered unrealistic to expect existing industry to be able to comply with the strengthened NEPM SO_2 criteria immediately. It is noted that compliance is predicted when comparing the 1 hour and 24 hour SO_2 predictions against the superseded NEPM criteria.

Therefore, a comparative approach was adopted to assess the relative impact of the project on predicted SO_2 concentrations.

Incremental SO_2 emissions from new sources related to this project only (i.e 6BF on its own) are well below the EPA and NEPM criteria (refer Table 8.8) and represent a relatively small contribution to overall cumulative concentrations. Despite predicting exceedances of the new Air NEPM 1 hour and 24-hour SO_2 criteria at a single receptor, it is noted that the project is predicted to generate a net reduction of SO_2 emissions compared to existing operations. Table 8.8 shows the percentage change in SO_2 at the modelled receptors.

Table 8.8 Predicted SO_2 concentrations (future scenario)

Receptor	Predicted SO_2 concentrations (µg/m^3)							
	Incremental				Cumulative			
	Only 6BF sources		All PKSW future sources		Cumulative with DPIE AQMS		Cumulative with DPIE AQMS and other SS projects	
	1 hour	24 hour	1 hour	24 hour	1 hour	24 hour	1 hour	24 hour
EPA criteria	**570**	**228**	**570**	**228**	**570**	**228**	**570**	**228**
NEPM criteria	**286**	**57**	**286**	**57**	**286**	**57**	**286**	**57**
R01	23.8	3.1	163.3	23.3	166.1	29.4	168.1	29.8
R02	27.7	5.5	150.6	47.1	160.5	52.8	161.0	53.0
R03	34.6	4.3	170.4	28.2	220.2	37.1	220.3	37.4
R04	22.3	3.8	125.5	26.2	134.9	26.2	134.9	27.5
R05	48.6	6.1	232.6	32.1	235.5	42.9	253.9	44.1
R06	66.7	6.1	312.0	35.5	312.0	35.5	312.1	37.1

Table 8.9 Predicted SO_2 concentrations (percentage change from existing to future scenario)

Receptor	Incremental		Cumulative with DPIE AQMS		Cumulative with DPIE AQMS and other SS projects	
	1 hour	24 hour	1 hour	24 hour	1 hour	24 hour
R01	-4.6%	-7.0%	-2.9%	-0.5%	-2.8%	-0.5%
R02	-10.1%	-2.8%	-4.2%	-2.5%	-4.4%	-2.5%
R03	-5.5%	-3.6%	-5.5%	-13.6%	-5.5%	-13.7%
R04	-7.6%	-7.3%	-0.8%	-7.3%	-3.3%	-7.0%
R05	-17.8%	3.4%	-17.6%	-5.4%	-16.6%	-5.2%
R06	-8.8%	-1.4%	-8.8%	-1.4%	-8.8%	1.5%

A contour dispersion plot of incremental 1 hour SO_2 is shown in Figure 8.3.

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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GHD

BlueScope Steel Ltd
No.6 Blast Furnace Reline and Operations
Environmental Impact Statement

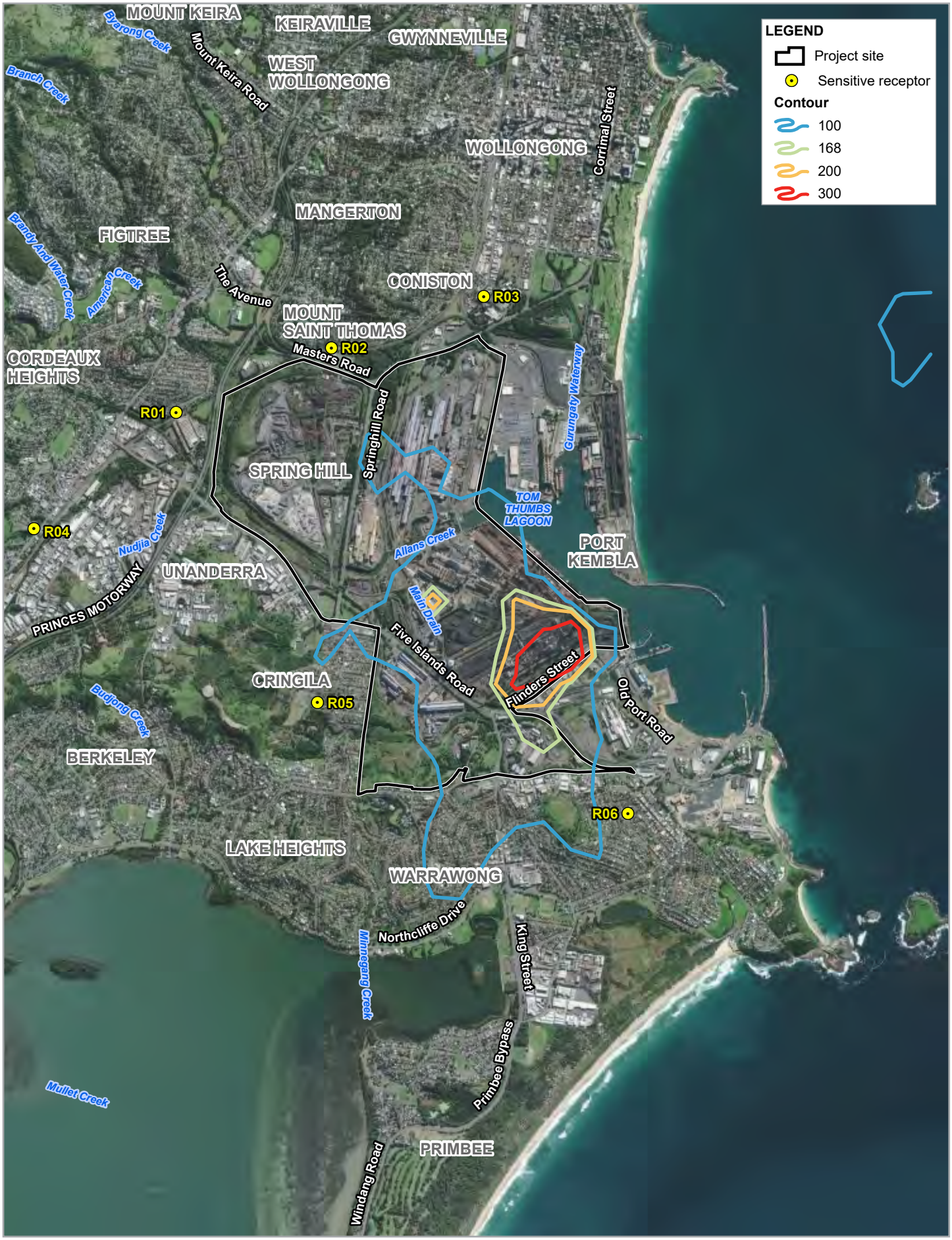
Predicted incremental 24 hour PM10 concentration for future scenario (µg/m³, 100th percentile)

Project No. **12541101**
Revision No. **0**
Date **10/11/2021**

FIGURE 8.1

G:\22\12541101\GIS\Maps\12541101_EIS_0.aprx\12541101_EIS004_24Hr_PM10_Future_0
Print date: 10 Nov 2021 - 15:59

Data source: LPI: DCDB/DTDB, 2017. Commonwealth of Australia (Geoscience Australia) 250K Topographic Data Series 3, 2006. World Imagery: Maxar. Created by: tmorton



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

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BlueScope Steel Ltd
No.6 Blast Furnace Reline and Operations
Environmental Impact Statement

Predicted incremental 1 hour NO2 concentration for future scenario (µg/m³, 100th percentile)

Project No. **12541101**
Revision No. **0**
Date **10/11/2021**

FIGURE 8.2

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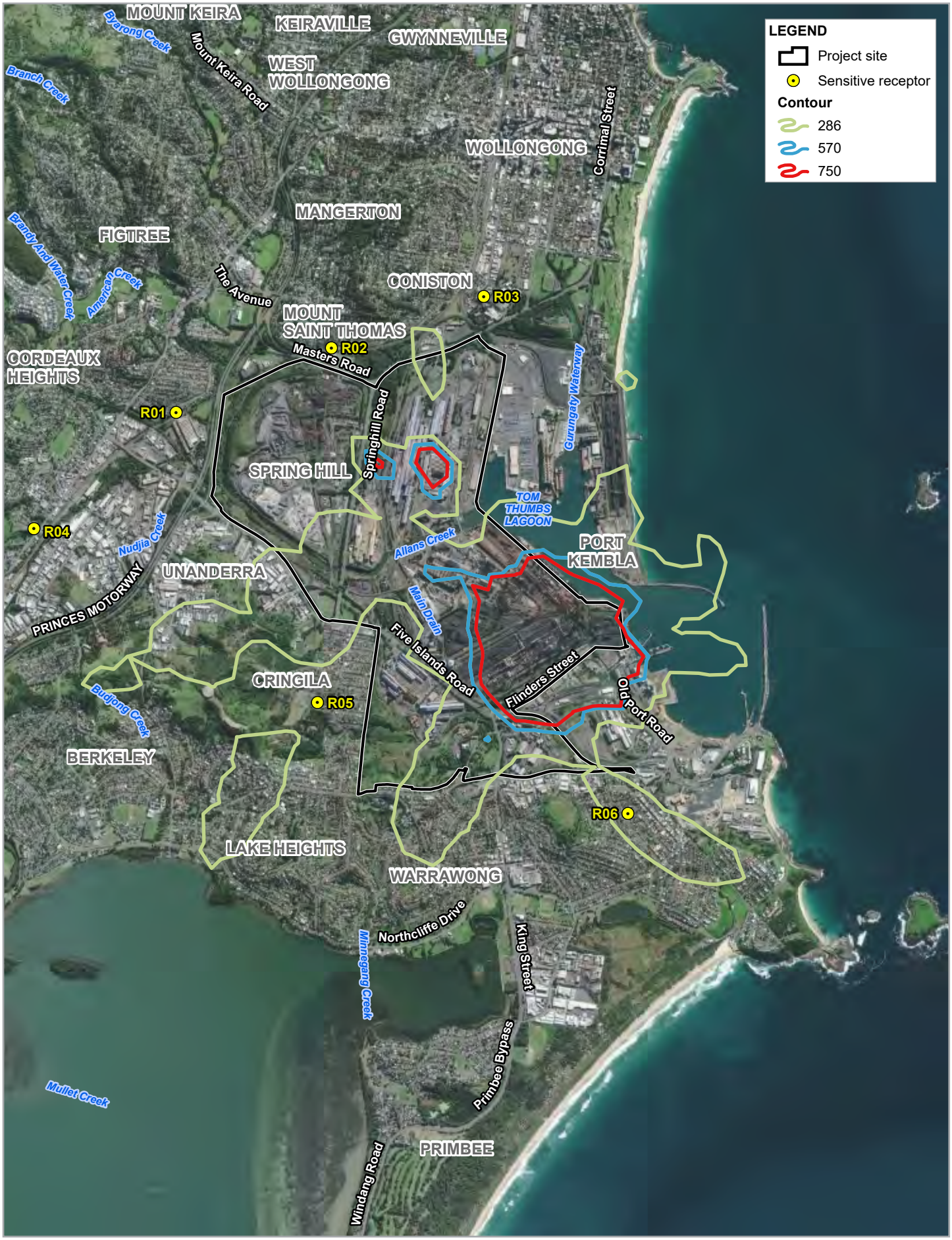
Print date: 10 Nov 2021 - 15:59

Data source: LPI: DCDB/DTDB, 2017. Commonwealth of Australia (Geoscience Australia) 250K Topographic Data Series 3, 2006. World Imagery: Maxar. Created by: tmorton



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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BlueScope Steel Ltd
No.6 Blast Furnace Reline and Operations Environmental Impact Statement

Predicted incremental 1 hour SO2 concentration for future scenario (µg/m³, 100th percentile)

Project No. **12541101**
Revision No. **0**
Date **10/11/2021**

FIGURE 8.3

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Print date: 10 Nov 2021 - 16:00

Data source: LPI: DCDB/DTDB, 2017. Commonwealth of Australia (Geoscience Australia) 250K Topographic Data Series 3, 2006. World Imagery: Maxar. Created by: tmorton

8.1.3.5 Odorous air pollutants

Predicted H_2S concentrations are presented in Table 8.10. Compliance with the 1 hour criteria was predicted at all sensitive receptors. A minor exceedance of the 1 second H_2S criteria was predicted at R06, however there has been a reduction in concentration due to this project.

The predicted incremental H_2S concentration from 6BF only shows that it contributes about one third of total H_2S emissions at the receptor locations. Given that modelled emissions from 6BF are likely to be conservative, the project is unlikely to lead to offsite odour impacts and is predicted to reduce odour impacts at the sensitive receptor locations.

An area of off-site incremental exceedance of the 1 second H_2S criteria was predicted to the south and east of PKSW (refer Figure 8.4). This is a peak concentration that would only likely occur for a short time over any one year period. The NSW EPA criteria for H2S (1 second, 99th percentile) allows for 88 hours per year (1% of the time) where the concentration may exceed 1.38 µg/m^3. At receptor R06, the 99th percentile criteria is exceeded, with the model predicting only 53 additional hours per year (0.6% of the time) where the concentration is above the criteria level.

It is noted that the exceedance area predicted for the future scenario is smaller than that predicted for the existing scenario. Therefore, the project is anticipated to have a beneficial impact on ambient H_2S concentrations (net reduction) compared to existing operations.

As discussed in *BlueScope Steel, Port Kembla Sub-hourly Modelling of Hydrogen Sulphide* (Environ, 2011) and *BlueScope Steel, Port Kembla Site Air Emissions Modelling – PRP131* (Environ, 2012), the 1 second H_2S criteria is considered very stringent and therefore the Californian EPA 1 hour (public welfare) criterion of 42 ug/m^3 was included for comparative purposes. The predicted maximum 1 hour H_2S concentrations are significantly below the Californian criterion.

Table 8.10 Predicted odorous air pollutant concentrations (future scenario)

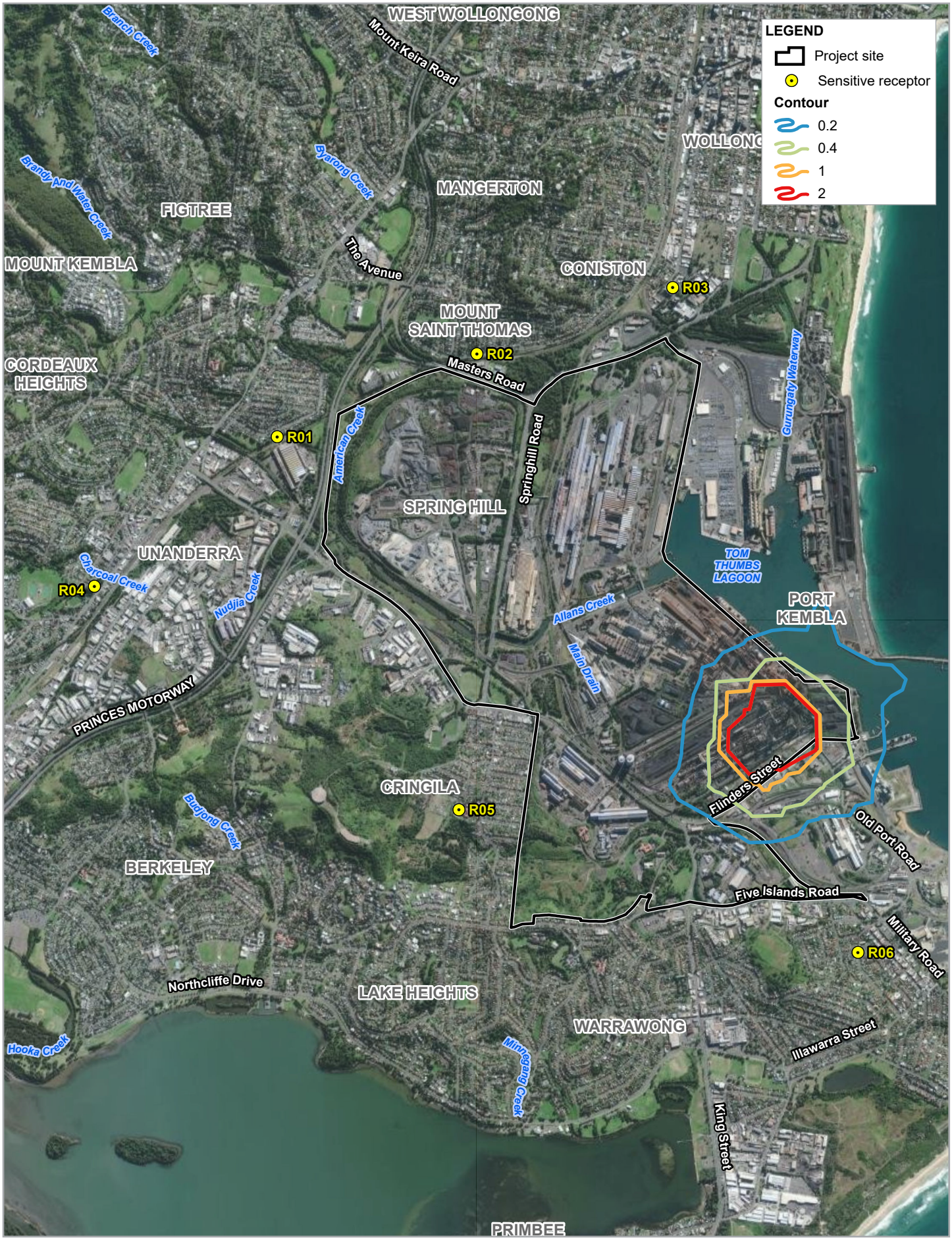
Receptor	**Predicted odorous air pollutant concentrations (µg/m^3)**			
	Incremental – Only 6BF sources		**All PKSW future sources**	
Pollutant	**H_2S**		**H_2S**	
Averaging period	**1 second**	**1 hour**	**1 second**	**1 hour**
Statistic	**99.9th percentile**	**Maximum**	**99.9th percentile**	**Maximum**
Impact type	**Incremental**	**Incremental**	**Incremental**	**Cumulative**
Criteria	**1.38**	**42**	**1.38**	**42**
R01	0.19	0.3	0.64	3.0
R02	0.27	0.6	0.81	3.1
R03	0.31	0.8	0.94	3.4
R04	0.15	0.2	0.53	2.9
R05	0.38	1.5	1.35	7.0
R06	0.44	0.7	1.59	3.9

Table 8.11 highlights the percentage difference in predicted odorous air pollutants expected to result from the operation of 6BF compared to 5BF. This demonstrates that the project will result in a net improvement which can be attributed to the proposed emissions control systems that BlueScope has committed to implementing during the 6BF campaign.

Table 8.11 Predicted odorous air pollutant concentrations (percentage change from existing to future)

Pollutant	H_2S	
Averaging period	**1 second**	**1 hour**
Statistic	**99.9th percentile**	**Maximum**
R01	-6.1%	-9.9%
R02	-15.4%	-11.9%
R03	-13.2%	-3.4%
R04	-11.0%	-8.5%
R05	-6.3%	27.9%
R06	-12.5%	-6.9%

A contour dispersion plot of incremental 1 second H_2S is shown in Figure 8.4.



Paper Size ISO A4

0 0.5 1

Kilometres

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

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GHD

BlueScope Steel Ltd
No.6 Blast Furnace Reline and Operations
Environmental Impact Statement

Predicted incremental 1 hour benzo[a]pyrene equivalent concentration for future scenario (µg/m³, 99.9th percentile)

Project No. **12541101**
Revision No. **0**
Date **21/10/2021**

FIGURE 8.4

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Print date: 22 Oct 2021 - 09:21

Data source: LPI: DCDB/DTDB, 2017. Commonwealth of Australia (Geoscience Australia) 250K Topographic Data Series 3, 2006. World Imagery: Maxar. Created by: tmorton

8.1.3.6 Abnormal operations

Outside of normal stable furnace operations, there may be short periods of higher emissions. These events are difficult to anticipate and the likelihood of any of these occurring is very low, and if occurring, would have a very short duration. Given the short duration, significant ground level impacts at sensitive receptors are not anticipated and will be no greater than if they would happen under current operations.

8.1.4 Summary of assessment

The operational air quality assessment concluded that the project is considered an improvement (reduction in pollutant concentrations) compared to existing operations, with the exception of minor increases in to H_2S and SO_2 concentrations at one receptor (R05) and a minor increase in particulate matter which is attributed to elevated background concentrations.

8.1.5 Mitigation and management measures

Management and mitigation measures that will be implemented to minimise the air quality impacts of the project are provided in Table 8.12.

Table 8.12 Air Quality management measures

Impact / Aspect	ID	Measure	Timing
Dust control	AQ1	A dust management plan for use during construction activities will be prepared prior to works commencing.	Pre-Construction
	AQ2	Existing ambient air quality stations will be used to monitor dust generating construction activities.	Construction
	AQ3	During demolition of any contaminated areas, extra measures will be implemented to prevent dust leaving the work area.	Construction
	AQ4	Dust generating activities will be ceased or reduced if a visual plume of dust leaves the site or monitoring shows excessive particulate levels.	Construction
	AQ5	Blasting or heavy demolition which may lead to excessive dust will only be undertaken in conditions not likely to disperse dust towards sensitive receptors.	Construction
	AQ6	Operations conducted in areas with low moisture content material will be suspended during high speed wind events or water sprays will be used.	Construction
	AQ7	Stockpile sizes will be kept to a minimum, where practical.	Construction
	AQ8	Limit cleared areas of land and stockpiles, and clear only when necessary to reduce fugitive dust emissions.	Construction
	AQ9	Control on-site traffic by following specific routes for haulage and access in accordance with signposted speeds.	Construction
	AQ10	All trucks hauling material will be covered on the way to the site and should maintain a reasonable amount of vertical space between the top of the load and top of the trailer.	Construction
Additional emission controls	A11	BlueScope intends to provide the following additional process and emission controls as part of the project: – Cast house floor fugitives - manipulator and trough covers, extraction from main trough, extraction at taphole with primary and secondary hood (5BF only has a primary hood so this is an improvement), lowered tilting platforms during casting (also an improvement on 5BF). – Iron Kish - extraction at iron ladles and slag tilting spouts, both the iron ladles and Slag Pots will have level sensors to ensure they are filled in a controlled manner. – Slag Handling - Coldwater slag granulation with condensing stack - BAT and improvement on 5BF. Slag pits - air cooling for up to 24 hours before applying water to minimise H_2S generation during watering. – Dust catcher - A lock-hopper will be installed at the base of the dust catcher and will minimise BFG and dust emissions to the atmosphere. – Dust suppression - Sealed roads, street sweepers and truck wheel washes from stock house and slag handling areas.	Construction

Impact / Aspect	ID	Measure	Timing
Commissioning phase impacts	AQ12	If there is potential for local residents to experience impacts, they will be notified about the proposed commissioning timetable and provide advice on what they can expect regarding emissions including smoke.	Operation
	AQ13	Where practicable, any commissioning activities that may lead to excessive emissions or visible smoke (excluding blow-in) will be timed as much as possible to occur when winds are not blowing towards residential areas.	Operation
Operational Air Quality Management	AQ14	– BlueScope will develop and implement an Air Quality Management Plan prior to commencement of operations including: – Identify all major sources of air emissions and associated proactive and reactive mitigation measures to ensure air pollution is prevented or minimised – Describe protocols for regular maintenance of plant and equipment – Outline procedures for monitoring and reporting air emissions – Describe measures to regularly review the effectiveness of air pollution control measures	Operation
	AQ15	Conduct ongoing emission sampling in accordance with conditions of approval and EPL 6092.	Operation

8.2 Noise and vibration

This section describes the existing noise environment, and the potential noise and vibration impacts during the construction and operation of the project. It also provides an overview of the key findings of the detailed Noise and Vibration Impact Assessment (NVIA) included in Appendix F.

8.2.1 Methodology

The NVIA has been prepared in accordance with the requirements or relevant legislation, policies and 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 (NPfI) (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
- *BS 7385-2:1993 Evaluation and measurement for vibration in buildings Part 2 – Guide to damage* (British Standards, 1993)
  - Used for the determination of suitable vibration intensity thresholds for structures
- *Technical Basis for Guidelines to Minimise Annoyance due to blasting overpressure and ground vibration* (ANZEC, 1990)
  - Used for the assessment of overpressure impacts resulting from blasting activities

The scope broadly includes:

- Identification of the existing noise levels in the project study area, including an existing operation noise assessment.
- Review of the proposed construction methodology, identification of potential construction equipment.
- Assessment of construction noise and vibration impacts, including a road traffic noise assessment.
- A blasting assessment noise and vibration assessment.
- Operational road traffic assessment.
- Provision of mitigation and management measures where suitable.

Full details of the methodology and noise compliance criteria for construction and operation applied in the assessment are provided in Appendix F.

8.2.2 Existing environment

The PKSW site is zoned IN3 – Heavy Industrial under State Environmental Planning Policy (Three Ports) 2013 (Three Ports SEPP). The PKSW site is a multiuse industrial area which facilitates activities such as the production of steel and iron, coke and port activities. The existing noise environment is dominated by industrial noise from premises in Port Kembla, road traffic and rail noise.

Access to PKSW is provided by Springhill Road, Five Islands Road and Flinders Street, and then private internal roads in PKSW. A more detailed analysis of traffic movements to and from the site is discussed in Section 8.5.

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

A review of wind data for the area identified that the strongest winds were from the southwest, west and northwest. These winds were recorded at speeds that are considered to 'significantly' enhance how noise travels from source to receptor. Due to PKSW's location by the coast, these wind directions push offshore and are not expected to generate impacts to residents. Temperature inversions are a feature of the landscape, which have been considered in the noise model used to identify noise impacts.

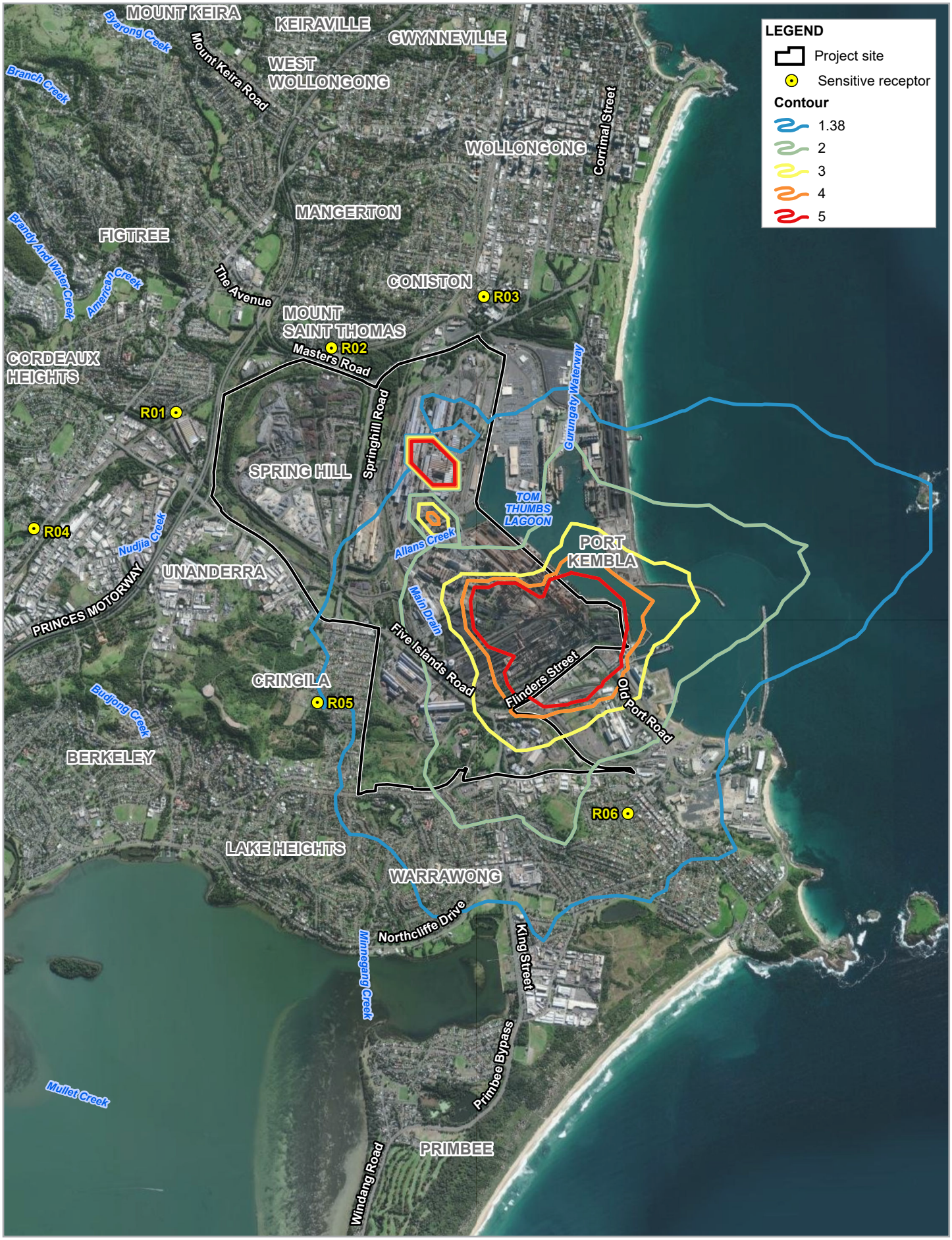
Noise sensitive land uses

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 6BF structure as noise impacts are not anticipated beyond this distance under normal operating conditions. Within this distance, 103 potential receptors have been selected to represent all sensitive receptors within the study area. 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.
– NCAs are shown in Figure 8.5.



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Kilometres

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

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No.6 Blast Furnace Reline and Operations Environmental Impact Statement

Predicted incremental 1 second H2S concentration for future scenario (µg/m³, 99th percentile)

Project No. **12541101**
Revision No. **0**
Date **21/10/2021**

FIGURE 8.5

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Data source: LPI: DCDB/DTDB, 2017. Commonwealth of Australia (Geoscience Australia) 250K Topographic Data Series 3, 2006. World Imagery: Maxar. Created by: tmorton

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 in Table 8.13, as well as the non-residential noise sensitive receivers considered in the noise assessment.

Table 8.13 Noise sensitive receivers

ID	MGA20 Z56 coordinates		Type	NCA	Distance from 6BF structure (m)	Direction	Description
	X	Y					
RES39	306246	6187289	Residential	NCA01	2,950	N	Most-affected residences in Wollongong
RES33	304813	6186719	Residential	NCA02	2,650	NNW	Most-affected residences in Coniston
RES29	304828	6183990	Residential	NCA03	1,250	ESE	Most-affected residences in Cringila
RES01	306945	6182674	Residential	NCA04	1,900	SSE	Most-affected residences in Port Kembla
RES23	305641	6182840	Residential	NCA04	1,550	SSE	Most-affected residences in Warrawong
ARR1	305928	6187111	Active recreation	N/A	2,750	N	Coniston Primary School playground
ARR2	306427	6187243	Active recreation	N/A	2,900	N	JJ Kelly Park
ARR3	306457	6186895	Active recreation	N/A	2,600	N	Australia's Industry World Lookout
ARR4	304418	6184347	Active recreation	N/A	1,600	W	BlueScope Centenary Park
ARR5	306950	6186936	Active recreation	N/A	2,750	NNE	Wollongong Golf Club
EDU01	305865	6187109	Educational institute	N/A	2,750	N	Coniston Primary School
EDU02	304408	6183468	Educational institute	N/A	1,850	ESE	Cringila Public School
EDU03	305126	6182501	Educational institute	N/A	2,050	SSE	Warrawong High School
EDU04	304969	6182536	Educational institute	N/A	2,100	SSE	Warrawong Public School
POW01	304519	6183117	Place of worship	N/A	1,950	SE	Imam Rida As Mosque Cringila
POW02	304823	6183777	Place of worship	N/A	1,350	ESE	Bilal Mosque
PRR01	306075	6187455	Passive recreation	N/A	3,100	N	Wollongong Cemetery
PRR02	304253	6183209	Passive recreation	N/A	2,100	ESE	Park in Cringila

Rating background levels

Rating background levels (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 lows during peak periods
– is near commercial and industrial districts

RBLs for the project are described below in Table 8.14.

Table 8.14 RBL 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

8.2.3 Potential impacts

8.2.3.1 Assessment criteria

The sections below describe the criteria used to undertake the noise and vibration assessment.

Construction Noise

The Interim Construction Noise Guideline (ICNG) provides guidance for the assessment and management of construction noise. Construction noise management levels represent noise levels that if exceeded, would require management measures to ensure that significant impacts to sensitive receivers are avoided. The noise affected construction noise management levels are not intended as noise limits, but rather levels at which noise management is required and as such should not be considered as noise limits in the environmental protection license or consent condition. The project specific noise management levels are presented in Table 8.15.

Table 8.15 Project specific 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 $L_{A1(1min)}$
Educational institutions	55 (external)					-
Places of worship	55 (external)					-
Active recreation areas	65					-
Passive recreation areas	60					-

Construction Vibration

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. Acceptable vibration for human comfort is described below in Table 8.16.

Table 8.16 Acceptable PPV Values for Human Comfort (BS 6472-2008)

Receiver	Period	Continuous and impulsive vibration guide goals	
		Preferred value (PPV)	Maximum value (PPV)
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: 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.

The minimum working distances for structural (cosmetic) damage used for this assessment have been based on *BS 7385-2:1993 Evaluation and measurement for vibration in buildings Part 2 – Guide to damage* (British Standards, 1993) levels from ground borne vibration which enables the likelihood of building damage from ground vibration to be assessed. No listed heritage structures are located within 250 m of the project site.

Vibration guidelines for the project are presented in Table 8.17.

Table 8.17 Transient vibration guide values - minimal risk of cosmetic damage

Type of building	Peak component particle velocity in frequency range of predominant pulse[1]	
	4 Hz to 15 Hz	15 Hz and above
Reinforced or framed structures industrial and heavy commercial building	50 mm/s at 4 Hz and above	
Unreinforced or light framed structures residential or light commercial type buildings [2]	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above

Notes: Values referred to are at the base of the building.

At frequencies below 4 Hz, a maximum displacement of 0.6 mm (zero to peak) should not be exceeded.

Blasting

Blasting is required to remove the iron skull. Air blast overpressure and ground vibration can impact human comfort, as well as impact the foundation of buildings. Criteria for the project as presented in Table 8.18 were developed using *Technical Basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration* (ANZECC, 1990) and *Australian Standard AS2187.2 (2006) Explosives – Storage and use Part 2: Use of explosives.*

Table 8.18 Blasting criteria for the project

Type	Impact	Screening criteria	Source
Ground vibration	Human comfort	5 mm/s	ANZECC (1990)
	Structural damage to residences	15 mm/s	AS2187.2 (2006)
Airblast overpressure	Human comfort	115 dBL_{peak}	ANZECC (1990)
	Structural damage to residences	133 dBL_{peak}	AS2187.2 (2006)

Operational noise

Operational noise limits for 5BF are determined by EPL 6092, which sets the project noise limit at $L_{Aeq(15min)}$ 35 dBA at the most potentially affected residence. The Noise Policy for Industry (NPfI) (EPA, 2017) also provides guidance for determining operational noise criteria.

The operation of 6BF was assessed against the exiting limits set by EPL6092 and the NPfI discrete process criteria. The operational noise criteria are presented in Table 8.19.

Table 8.19 Operational noise criteria – 6BF

Assessment	Receiver type	Operational noise criteria, $L_{Aeq(15min)}$ dBA	Operational components considered in assessment	
			Operational component	Modelled source groups
NPfI discrete assessment	Residential – NCA01	31	6BF Slag Handling Area Stock house	Hot Blast Slag Granulator Conveyor belts Bag Houses Furnace Top Gas Cleaning Cooling Stockhouse Slag Handling
	Residential – NCA02			
	Residential – NCA03	41		
	Residential – NCA04	38		
EPL 6092 noise limit	Residential (All)	35	6BF	Hot Blast Slag Granulator Bag Houses Furnace Top Gas Cleaning Cooling

The NPfI also provides criteria for cumulative noise impacts regarding noise amenity. This was used to determine criteria for non-residential sensitive receivers, which are presented in Table 8.20.

Table 8.20 Non-residential 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 NPfI.			

Traffic noise (construction and operation)

The Road Noise Policy (RNP) provides traffic noise target levels for residential receivers in the vicinity of existing roads that are applied to road upgrades or construction works. 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 dBA and the criteria shown in Table 8.21 are exceeded.

Table 8.21 Road traffic 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	Springhill Road Five Islands 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	55 $L_{eq(1hr)}$	50 $L_{eq(1hr)}$

8.2.3.2 Construction assessment

Construction scenarios

To inform the noise and vibration assessment, several construction scenarios have been identified based on what is expected to represent typical construction activities. These scenarios were separated into two categories to represent works on 6BF and works in laydown areas. These scenarios are presented in Table 8.22 and Table 8.23

Table 8.22 Indicative construction scenarios – 6BF construction activities

Construction scenario	Anticipated construction equipment						Activity sound power level (SWL), dBA
	Large excavator	Franna crane	Front end loaders	Vibratory roller	Rock breaker	Pile driver	
Equipment SWL, dBA	115	98	112	109	120	130	
General construction activities	✓	✓	✓	✓			116
High intensity construction activities					✓	✓	130

Table 8.23 Indicative construction scenarios – Laydown areas

Construction scenario	Anticipated construction equipment			Activity sound power level (SWL), dBA
	20T Forklift	Excavator	Rock breaker	
Equipment SWL, dBA	105	105	120	-
No1W 1	✓	✓		105
No1W 4	✓	✓		105
No1W 5	✓	✓		105
No2B 1	✓	✓		105
No2W 1	✓	✓		105
No2W 1 – Rock breaking			✓	120
No2W 2	✓	✓		105
No2W 2 – Rock breaking			✓	120
No2W 3	✓	✓		105
No2W 3 – Rock breaking			✓	120
No2W 4	✓	✓		105

Construction scenario	Anticipated construction equipment			Activity sound power level (SWL), dBA
	20T Forklift	Excavator	Rock breaker	
No2W 4 – Rock breaking			✓	120
No2W 5	✓	✓		105
No2W 5 – Rock breaking			✓	120
No2W 6	✓	✓		105
No2W 6 – Rock breaking			✓	120
RA 4	✓	✓		105
RA 5	✓	✓		105
SpringHill Electrical	✓	✓		105

A full list of equipment and sound power levels is presented in Appendix F.

Construction impacts

Construction noise levels have been predicted at the sensitive receivers within the study area with consideration to the acoustic requirements of the ICNG. The predicted maximum noise level along with the NML from laydown area operations for each receiver is provided in Table 8.24 for residential receivers, and Table 8.25 for non-residential receivers. The predicted maximum noise level along with the NML from 6BF construction activities is provided in Table 8.26. The noise modelling assumes that the loudest equipment in the scenario is operating at maximum capacity simultaneously at the closest distance between the construction work area and the receiver. Construction noise contours are provided in Figure 8.6 for laydown area operations, and Figure 8.7 and Figure 8.8 for 6BF construction activities.

Exceedances of the NML during standard construction hours are printed in red. Exceedances of the NML during outside standard construction hours are printed in blue.

Table 8.24 Construction noise levels for laydown areas – Residential receivers

Laydown area and construction activity	Noise Management Levels Standard hours: 53 OOHW Day: 48 OOHW Evening: 47 OOHW Night: 47			Noise Management Levels Standard hours: 49 OOHW Day: 44 OOHW Evening: 44 OOHW Night: 44	
	RES01 (NCA04)	RES23 (NCA04)	RES29 (NCA03)	RES33 (NCA02)	RES39 (NCA01)
No1W 1 – excavator / forklift	5	38	20	16	8
No1W 4 – excavator / forklift	3	40	9	10	4
No1W 5 – excavator / forklift	11	34	17	10	6
No2B 1– excavator / forklift	13	17	25	22	16
No2W 1 – excavator / forklift	15	23	25	14	0
No2W 1 – Rock breaking	30	38	40	29	15
No2W 2 – excavator / forklift	18	24	29	6	0
No2W 2 – Rock breaking	33	39	44	21	10
No2W 3 – excavator / forklift	19	23	27	17	10
No2W 3 – Rock breaking	33	39	42	32	25
No2W 4 – excavator / forklift	19	22	22	14	11
No2W 4 – Rock breaking	34	37	37	29	26
No2W 5 – excavator / forklift	19	20	21	15	12
No2W 5 – Rock breaking	34	35	36	30	27
No2W 6 – excavator / forklift	18	26	34	16	7
No2W 6 – Rock breaking	33	41	49	31	22
RA 4 – excavator / forklift	7	11	21	31	15
RA 5 – excavator / forklift	8	13	22	30	14
SpringHill Electrical – excavator / forklift	0	1	6	15	19

Table 8.25 Construction noise levels for laydown areas – Non-residential receivers

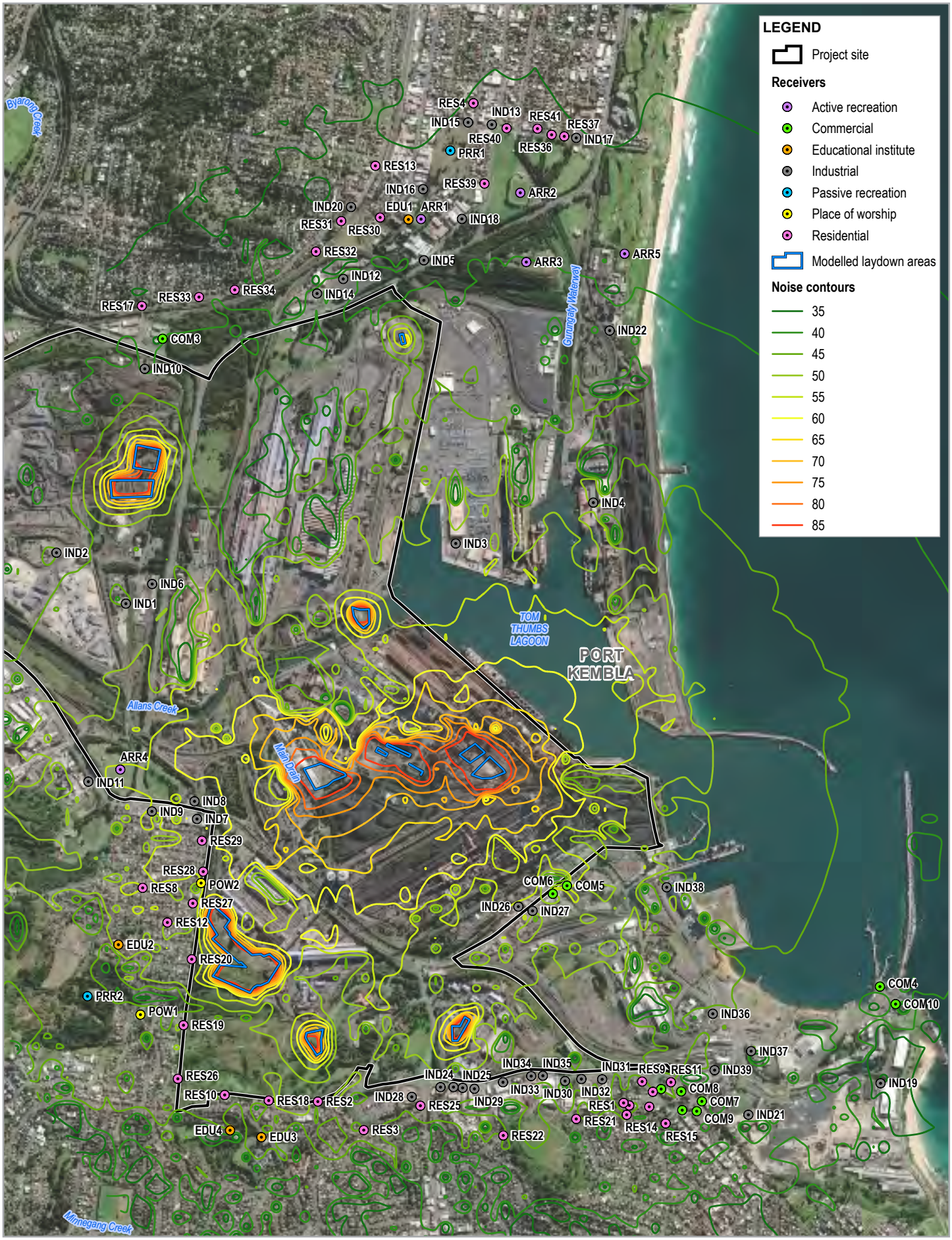
Laydown area and construction activity	NML (Active Recreation) 65 dBA					NML (Educational) 55 dBA				NML (Place of worship) 55 dBA		NML (Passive Recreation) 60 dBA	
	ARR1	ARR2	ARR3	ARR4	ARR5	EDU1	EDU2	EDU3	EDU4	POW1	POW2	PRR1	PRR2
No1W 1 – excavator / forklift	9	8	10	28	9	9	41	30	28	38	47	7	32
No1W 4 – excavator / forklift	6	5	7	20	6	7	31	23	21	29	27	5	29
No1W 5 – excavator / forklift	7	6	8	17	8	2	23	24	21	20	22	6	19
No2B 1– excavator / forklift	18	16	18	23	16	9	21	10	9	12	12	15	13
No2W 1 – excavator / forklift	1	2	12	20	7	0	22	11	17	17	19	2	13
No2W 1 – Rock breaking	16	17	27	35	22	11	37	26	32	32	34	17	28
No2W 2 – excavator / forklift	0	0	5	23	2	0	25	18	18	20	23	0	18
No2W 2 – Rock breaking	11	10	20	38	17	10	40	33	33	35	38	11	33
No2W 3 – excavator / forklift	10	10	14	22	12	0	25	7	4	9	22	10	12
No2W 3 – Rock breaking	25	25	28	38	26	13	40	21	19	22	37	25	25
No2W 4 – excavator / forklift	8	11	14	17	12	0	20	17	16	15	6	4	7
No2W 4 – Rock breaking	23	26	29	32	27	13	35	32	31	30	21	20	22
No2W 5 – excavator / forklift	14	13	15	17	14	13	21	16	15	8	20	11	14
No2W 5 – Rock breaking	29	28	30	32	29	28	36	31	30	23	35	26	29
No2W 6 – excavator / forklift	9	9	11	31	10	0	29	21	21	22	30	9	22
No2W 6 – Rock breaking	24	24	26	46	25	13	44	36	36	37	45	24	37
RA 4 – excavator / forklift	11	15	17	21	13	20	16	11	10	13	16	16	13
RA 5 – excavator / forklift	10	15	16	26	13	21	18	12	10	14	18	15	14
SpringHill Electrical – excavator / forklift	25	18	21	4	15	7	2	0	0	0	1	17	0

Table 8.26 Construction noise levels from 6BF construction activities (main construction site)

Receiver ID	Noise Management Level, $L_{Aeq(15min)}$ dBA	Prediction construction noise level, $L_{Aeq(15min)}$ dBA	
		General construction activities[1]	High impact construction works[2]
ARR1	65 (Active recreation)	26	35
ARR2		25	34
ARR3		28	37
ARR4		35	44
ARR5		26	35
EDU1	55 (Educational institute)	24	33
EDU2		38	47
EDU3		32	41
EDU4		30	39
POW1	55 (Place of worship)	32	41
POW2		38	47
PRR1	60 (Passive recreation)	24	33
PRR2		30	39
RES1 (NCA04)	NMLs for Residences in Cringila, Warrawong and Port Kembla: Standard hours: 53 OOHW Day: 48 OOHW Evening: 47 OOHW Night: 47	34	43
RES23 (NCA04)		37	46
RES29 (NCA03)		42	51
RES33 (NCA02)	NMLs for Residences in Wollongong, Coniston and Mt. St Thomas: Standard hours: 49 OOHW Day: 44 OOHW Evening: 44 OOHW Night: 44	29	38
RES39 (NCA01)		26	35

Note 1: Based on a selection of the highest noise generating equipment from this scenario's equipment list, being large excavator, franna crane, front end loaders and vibratory roller

Note 2: Based on a selection of the highest noise generating equipment from this scenario's equipment list, being a rock breaker and pile driver



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Kilometres

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

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No.6 Blast Furnace Reline and Operations
Environmental Impact Statement

Construction noise contours laydown area operations

Project No. **12541101**
Revision No. **0**
Date **04/02/2022**

FIGURE 8-6

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

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No.6 Blast Furnace Reline and Operations Environmental Impact Statement

Construction noise contours 6BF construction activities, general construction activities

Project No. **12541101**
Revision No. **0**
Date **04/02/2022**

FIGURE 8-7

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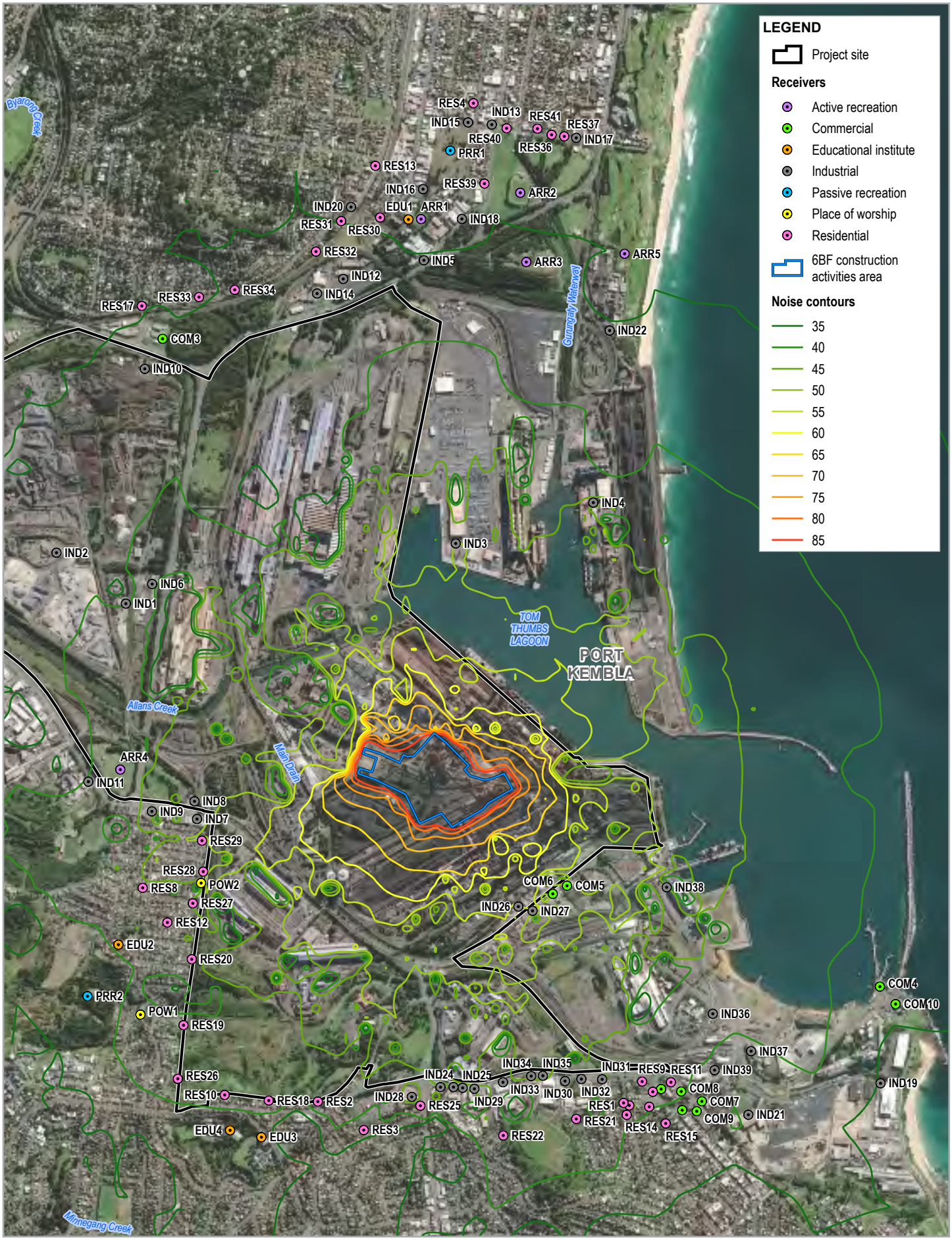

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Kilometres

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

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No.6 Blast Furnace Reline and Operations
Environmental Impact Statement

Construction noise contours 6BF construction activities, high intensity construction activities

Project No. **12541101**
Revision No. **0**
Date **04/02/2022**

FIGURE 8-8

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Created by: tmorton

6BF construction activities – high intensity construction activities

It is predicted that construction noise levels from 6BF construction activities involving high intensity activities are above the NML at residential receiver RES29 outside standard construction hours. These exceedances will occur during the following activities:

– Rock breaking
– Impact piling

It is recommended that these activities be scheduled to only occur during standard construction hours to ensure that construction noise levels do not exceed the NML at the nearest residential receivers during out of hours construction works.

6BF construction activities – impacts outside standard construction hours

It is predicted that construction noise levels from 6BF construction activities involving general construction are below the NML for all residential receivers outside standard construction hours.

It is predicted that rock breaking activities may lead to exceedances of the NML at one residential receiver outside of standard construction hours. For all other receivers, it is predicted that noise generation is below the NML for out of hours works. It is anticipated that these activities may be required at the project commencement phase for site and laydown area establishment. It is therefore recommended that these activities be scheduled to only occur during standard construction hours to ensure that construction noise levels do not exceed the NML at the nearest residential receivers during out of hours construction works.

8.2.3.3 Construction road noise

Additional traffic along local roads will generate noise during construction of the project.

One of the anticipated construction traffic routes involves use of Emily Road, which at certain points is situated approximately 70 metres from residential receivers. These residential receivers are represented by key receiver RES29. Approximately 200 light vehicles and 11 heavy vehicles may use this access road between 5:00 am and 6:00 am, which may generate noise impact. Noise modelling has been conducted along Emily Road to assess noise impacts from construction traffic towards residential receivers. The noise modelling determined that traffic along Emily Road will not exceed the NML, and therefore impacts are not anticipated.

Vehicles will travel along several major local roads to access the site, such as Springhill Road and Five Islands Road. A significant impact would be generated if traffic volumes on Springhill Road and Five Islands Road increase by more than 58%, resulting in an increase of 2 dBA. The project will not generate traffic volumes of this level, and therefore construction traffic is not expected to impact sensitive receivers. Traffic impacts are discussed further in Section 8.5.3.

8.2.3.4 Blasting

Monitoring the slag pit skull blasting for airblast overpressure noise and ground vibration occurred at two locations in January 2009 at the base of the 5BF and at the Merrett Avenue office car-park, the nearest BlueScope residential boundary approximately 1.1 kilometres to the southwest. Monitoring occurred for four blasts in January 2009 and no discernible blast events (ground vibration or airblast overpressure) were identified at the Merrett Avenue office car park (representative of the most-affected residences in Cringila). Blasting required for the 6BF will take place approximately 1.1 kilometres away from the nearest residential receivers in Cringila and will use a similar methodology to the blasting at 5BF. Due to the similar distance from the source, no ground vibration or airblast overpressure impacts from blasting are anticipated at any of the nearby residential receivers.

Blast levels measured in the blast furnace basement area during the slag pit skull blasting (near the source) were up to about 3.5 mm/s ground vibration and airblast overpressures of about 130 to 134 dBL. It is difficult to estimate the airblast overpressure levels at the most-affected residences due to the acoustic shielding provided by the shell of the blast furnace, however it is anticipated airblast overpressure levels will be well below the criteria of 115 dBL given no blast events could be measured at the Merrett Avenue office carpark during the 5BF blasting activities. Similarly, given ground vibration levels were measured to be 3.5 mm/s near the source of the blasting, ground vibration levels are predicted to be well below 5 mm/s when assessed at the nearest residences over 1 km away.

8.2.3.5 Construction vibration

Machinery required for the project has the potential to generate vibration that will have an impact on human comfort and building stability. Safe working distances for various plant and equipment are for the project are presented in Table 8.27.

Table 8.27 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

Human comfort

It is anticipated that as part of the site preparation phase for works associated with laydown area No.1 Works area 1, a vibratory roller may be used for earthworks. For a conservative assessment, an 18T vibratory roller is considered. The closest distance between the proposed laydown area and the nearest residence is approximately 85 metres, and falls within the buffer distance of 100 metres for an 18T vibratory roller. Whilst this may indicate construction vibration impacts for human comfort, it will only be limited to the duration of this phase of work. Further, this is based on a highly conservative approximation of the potential works; at this stage is not certain whether use of the roller is required, or for what duration. As such, long term residual human comfort vibration impacts are not anticipated.

Structural and cosmetic damage

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.

8.2.4 Operational assessment

8.2.4.1 Operational scenario

An operational noise assessment was developed for 6BF based on typical operational equipment that will be in operation over a typical 15 minute assessment period. 6BF will operate 24 hours a day with a generally consistent series of noise generating activities and machinery contributing to operational noise. A detailed description of the noise sources and their sound power levels which have been included in the operational scenarios for further assessment is provided in Appendix F.

8.2.4.2 Operational impacts

To determine impacts of 6BF during operation, noise levels were predicted at each key sensitive receiver as shown in Table 8.28. Noise levels are predicted to be highest at RES29, though are anticipated to remain under the criteria for the project.

Table 8.28 Predicted $L_{Aeq(15min)}$ noise levels at sensitive receivers, dBA

RID	Receiver Type	$L_{Aeq(15min)}$ noise level, dBA		Compliance
		Criteria	Predicted noise level	
ARR1	Active recreation	53	22	Yes
ARR2	Active recreation	53	20	Yes
ARR3	Active recreation	53	25	Yes
ARR4	Active recreation	53	32	Yes
ARR5	Active recreation	53	23	Yes
EDU1	Educational institute	43	18	Yes
EDU2	Educational institute	43	36	Yes
EDU3	Educational institute	43	28	Yes
EDU4	Educational institute	43	27	Yes
POW1	Place of worship	48	27	Yes
POW2	Place of worship	48	33	Yes
PRR1	Passive recreation	48	20	Yes
PRR2	Passive recreation	48	28	Yes
RES1	Residential - NCA04	38[1]	33	Yes
RES23	Residential - NCA04	38[1]	35	Yes
RES29	Residential - NCA03	41[1]	39	Yes
RES33	Residential - NCA02	31[1]	28	Yes
RES39	Residential - NCA01	31[1]	23	Yes
Note 1: In accordance with the NPfI discrete process assessment criteria provided in Table 8.19.				

The operational noise limit for the project is established by EPL 6092, which determines noise levels at the most potentially affected residence. The projected contribution noise level from 6BF components at the closest residence (RES29) was found to be compliant with the existing EPL and is shown in Table 8.29.

Table 8.29 Predicted $L_{Aeq(15min)}$ contribution of noise sources at most-affected residences (RES29 in Cringila) dBA

Source group	Operational component	EPL 6092 criteria	Contributed noise level $L_{Aeq(15min)}$, dBA	
Hot Blast	6BF	35 (based on 5BF)	27	31 (Total from 6BF)
Conveyor belts			24	
Bag Houses			23	
Furnace Top			22	
Gas Cleaning			21	
Cooling			18	
Stockhouse	Charging system	N/A	36	
Slag Handling	Slag handling	N/A	35	
Slag Granulator			25	
Total			39	

8.2.4.3 Sleep disturbance

The potential for sleep disturbance is considered from short-duration, high level noise events. Several pieces of equipment have been identified that may cause short duration, high level noise events:

– Furnace top:
  - Bin pressure relief silencer
  - Bin pressure relief valve
  - Furnace top bleeder– not considered as part of normal operations, as noise emissions only occur during emergency operation.
– Hot blast:
  - Snort control valve silencer
  - Stove pressurisation/depressurisation valves.
– Stockhouse:
  - Vibrofeeders
  - Screens.
– Slag handling:
  - Knocking block.

Regarding the furnace top bleeder and snort control valve silencer, sound levels of these events were measured during cold commissioning of 5BF during its reline in 2009. Both were audible at residential receiver locations with the following observations:

– Noise from the Snort control valve silencer was barely audible
– Noise from the Furnace top bleeder valves was easily audible and measured.

These sources occur infrequently, with the furnace top bleeder operating in a noise-producing state only in emergency situations; it is therefore not considered as part of normal operations and is not considered as part of the sleep disturbance assessment. The Snort Valve operates at shutdown and start-up (approximately every 18 weeks) and in emergency situations, and can be considered part of normal operations, despite being infrequent. The Snort Valve has been considered part of the sleep disturbance assessment. The assessment is presented in Table 8.30.

Table 8.30 Predicted $L_{A1(1min)}$ noise levels at sensitive receivers during the night, dBA

RID	Receiver Type	$L_{A1(1min)}$ EPL sleep disturbance criterion	Highest $L_{A1(1min)}$ noise level, dBA						
			Furnace top		Hot blast		Stockhouse		Slag handling
			PW Bin Pressure Relief Silencer	PW Bin Pressure Relief Valve	Snort Control Valve Silencer	Stove Depressurisation Valve	Screen	Vibrofeeder	Knocking Block
RES01	Residential - NCA04	55	30	27	42	10	31	30	36
RES23	Residential - NCA04	55	35	35	30	14	32	34	40
RES29	Residential - NCA03	55	38	38	40	18	36	35	45
RES33	Residential - NCA02	55	27	27	39	8	25	23	31
RES36	Residential - NCA01	55	22	23	37	3	23	22	14

The sleep disturbance screening criterion is not exceeded at the key residential receivers from worst case maximum noise events. Short term exceedances will occur during operation of the furnace top bleeder during emergency operation or testing. $LA_{1(1min)}$ noise levels from its testing are predicted to reach up to 85 dBA at the nearest residential receivers. This noise event is expected to last up to approximately 10 seconds and will be highly intrusive to residential receivers. Both instances are not considered part of the general operation of 6BF.

Operational traffic associated with the project will not differ significantly from current conditions, and no additional noise impacts are expected to be generated.

8.2.5 Summary of assessment

Construction noise levels are predicted to be below the NMLs for all sensitive receivers, for works both within and outside standard construction hours. Exceedances of the NMLs are predicted during high intensity 6BF construction activities outside of standard construction hours. Short term vibration impacts to human comfort may be experienced for residences close to site preparation works in the No.1 Works laydown area if use of an 18T vibratory roller is required.

During operation, the predicted noise emissions are compliant with the NPfI discrete process criteria, and no sleep disturbance noise impacts are anticipated.

8.2.6 Mitigation and management measures

Management and mitigation measures that will be implemented to minimise the noise and vibration impacts of the project are provided in Table 8.31.

Table 8.31 Noise and vibration management measures

Impact / Aspect	ID	Measure	Timing
Construction Noise and Vibration Management	NV1	A construction noise and vibration management plan (CNVMP) will be developed once a detailed construction methodology has been prepared. The plan will include: – 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 mitigated predicted impacts to sensitive receivers that may be noise affected – 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 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.	Pre-construction
Site induction	NV2	– All employees, contractors and subcontractors are to receive an environmental site 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 • Location of nearest sensitive receivers • Construction employee parking areas • Designated loading/unloading areas and procedures • Site opening/closing times (including deliveries) • Environmental incident procedures.	Pre-construction Construction
At source mitigation measures – pre - construction	NV3	– Quieter and less vibration emitting construction methods will be used where feasible and reasonable.	Pre-construction
	NV4	– The noise levels of plant and equipment will have an operating sound power lower or similar to the levels presented in Table 8.22 and Table 8.23.	Pre-construction
	NV5	– The size of the vibratory compactor will be limited to 18 tonnes or less to maintain the safe work buffer distances.	Pre-construction
At source mitigation measures - construction	NV6	– Where practical noise generating activities with potential to impact any nearby receivers would be scheduled during standard hours.	Construction
	NV7	– As much distance as possible will be placed between the plant or equipment and residences and other sensitive land uses.	Construction
	NV8	– Equipment with directional noise characteristics will be oriented away from noise sensitive receivers.	Construction

Impact / Aspect	ID	Measure	Timing
	NV9	– 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.	Construction
	NV10	– Only the necessary size and power of equipment will be used.	Construction
	NV11	– Loading and unloading of materials/deliveries will occur as far as practically possible from sensitive receivers.	Construction
	NV12	– The use of engine compression brakes will be limited in proximity to residences.	Construction
	NV13	– Equipment will not be operated until it is maintained or repaired, where maintenance or repair would address the annoying character of noise identified.	Construction
At source mitigation measures – road noise	NV14	– Construction traffic travelling along Emily Road: need to ensure that traffic remains below the speed limit of 40 km/hr.	Construction
Rock breaking	NV15	– All rock-breaking and pile driving activities to 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: – The delivery of oversized plant or structures – Emergency work to avoid the loss of life or damage to property, or to prevent environmental harm – 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.	Construction
Out of hours work	NV16	– Out of hours movements will be minimised where possible. The need for out of hours work will be justified in the CEMP from the project and assessed against the noise requirements of the ICNG.	Construction
	NV17	– Approval in writing from the EPA will be sought for construction activities outside of the standard hours of construction per EPL 6092 requirements.	Construction
Noise validation	NV18	– All conclusions from the operational noise assessment are based on a combination of similar noise sources from 5BF, alongside additional noise measurements where required. To check that noise model predictions are representative of 6BF operational noise emissions at sensitive receivers, noise validation measurements will be undertaken at an intermediate location in the path between source equipment and Cringila receivers. Refer to section 8.2 in Appendix F.	Operation
	NV19	– If the results of the noise validation measurements indicate that operational noise levels are above the noise predictions, then mitigation measures for the Stockhouse and Slag handling areas can be considered for noise reduction. These can include: – Nearfield shielding adjacent to operating noise sources to block line of site to receivers, such as barriers or enclosures – Incorporation of measures to reduce knocking or impact noise for vibrofeeders and screens – Additional noise measurements of operating equipment, and comparison against assumed noise sources provided in Appendix F. The operational noise model may be refined where appropriate.	Operation
Operational noise management plan	NV20	– An operational noise management plan to be developed to minimise the risk of adverse noise impacts during the operation.	Operation

8.3 Hazard and risk

This section describes the hazards and risks associated with the construction and operation of the project. It summarises the key findings of the specialist hazard and risk assessment prepared for the proposal by GHD, which is included in full in Appendix G.

8.3.1 Methodology

The process of assessment as outlined in SEPP 33 was followed to determine the potential hazards and risks of the project. This included the following:

– Preliminary risk screening – SEPP 33 requires a screening process to be undertaken to determine whether a project is a 'potentially hazardous industry' or 'potentially offensive industry'.
– The preliminary risk screening process concentrated on the storage of specific dangerous good (DG) classes that have the potential for significant offsite effects. The assessment involved the identification of classes and quantities of all DGs to be used, stored or produced on site with an indication of storage locations. The quantities of DGs were then assessed against the SEPP 33 threshold quantities. Where any of the SEPP 33 threshold quantities are exceeded, a Preliminary Hazard Analysis (PHA) is required.
– The screening process also considered whether the project would be a 'potentially offensive industry' based on expected air and noise emissions.
– Hazard identification – following screening, SEPP 33 requires a determination as to whether the proposal poses significant risk or offence. This includes identification of potential hazards to highlight any risks associated with the interaction of the proposal with the surrounding environment. The hazard identification was a desktop qualitative assessment and involved documenting possible events that could lead to a possible off-site incident.
– Preliminary Hazard Analysis – the preliminary risk screening determined that the project is a 'potentially hazardous industry'. A PHA was therefore required to be completed in accordance with *Hazardous Industry Planning Advisory Paper No.6 – Guidelines for Hazard Analysis* (DoP, 2011a) and *Multi-Level Risk Assessment* (DoP, 2011b) to determine the risk to people, property and the environment. Criteria of acceptability set out in *Hazardous Industry Planning Advisory Paper No 4 – Risk Criteria for Land Use Safety Planning* (HIPAP No 4) (DoP, 2011c) were used to determine whether the project is classified as a 'hazardous industry'.
– SEPP 33 identifies three levels of PHA based on the level of risk associated with the project. The three levels of PHA are:
    - Level 1 – if significant but not serious potential for harm is identified, a qualitative PHA is required.
    - Level 2 – if medium potential for harm is identified, a semi-quantitative PHA is required.
    - Level 3 – if high potential for harm is identified, a quantitative PHA is required.

Based on the results of the preliminary risk screening and hazard identification, a Level 2 PHA was undertaken for the project.

8.3.2 Potential impacts

8.3.2.1 Preliminary risk screening

Dangerous goods

A summary of the chemicals that will be used and/or stored on-site during construction, including the maximum expected quantity and DG classification, is provided in Table 8.32. The SEPP 33 storage thresholds for on-site storage are provided in Table 8.33. During construction, minimal storage of chemicals and no stockpiling occur with DGs delivered under a just-in-time usage method.

Based on the DG class, the SEPP 33 storage thresholds for the construction of the project will be exceeded for explosives if storage is unconstrained. The project is therefore considered 'potentially hazardous' and a PHA has been prepared (see Section 8.3.2.5). However, it is possible for the storage of explosives to not exceed the threshold if the location is set back a minimum of 90 metres from the boundary (see Section 8.3.2.3). The SEPP 33 storage thresholds for construction of the project will not be exceeded for any other chemical.

Table 8.32 Construction chemicals

Product Name	UN number	DG Class	Packing group (PG)	SUB RISK/S	Maximum Quantity (kg)
Bottled Gases					
Oxygen	1072	2.2		5.1	729
LPG	1075	2.1			180
Acetylene	1001	2.1			249
Argon	1006	2.2			922
Argoshield	1956	2.2			944
Nitrogen	1066	2.2			906
Medical air		2.2			559
Miscellaneous					
Paint (spray cans)	various	2.1			50
Paint (liquid)	various	3	II		500
Solvents - thinners, MEK	various	3	II		1,000
Diesel	3082	9	III		5,000
Kerosene	1223	3	III		200
Epoxies	various	3	III		500
Welding fluxes	N/A	N/A			50
Adhesives	various	3	III		100
Cleaning agents	various	8	II		1,000
Carbon and ceramic refractory blocks (monolithic and brick)	N/A	N/A			1,300,000
COG residue	N/A	N/A			1,000
BFG residue		9	III		1,000
Gearbox oil	various	3	III		500
Grease	various	3	III		500
Aircon refrigerant	various	2.2			200
Explosives		1.1			150

Table 8.33 Construction chemical threshold comparison

DG class	Combined storage threshold (tonnes)	Combined quantity (tonne)	Exceedance of SEPP 33 threshold
1.1	0.1	0.15	Fail (exceeds the threshold)
2.1	0.5	0.25	Pass (does not exceed)
2.1 (LPG)	10	0.18	Pass (does not exceed)
2.2	None	3.33	Pass (excluded) *
3 - II	5	0.20	Pass (does not exceed)
3 - III	5	0.60	Pass (does not exceed)
4.2 - III	1	0.50	Pass (does not exceed)
5.1	5	0.73	Pass (does not exceed)
8 - II	25	1.0	Pass (does not exceed)
9 - III	None	6.0	Pass (excluded) *

* This refers to dangerous goods that SEPP 33 has excluded from requiring a threshold quantity.

A summary of the chemicals that will be used and/or stored on-site during operation, including the maximum expected quantity and DG classification, is provided in Table 8.34. The screening thresholds for on-site storage are shown in Table 8.35. Based on the DG class, the SEPP 33 storage thresholds for operation of the project are not exceeded for any chemical.

Table 8.34 Operational chemicals

Product Name	UN number	DG Class	PG	SUB RISK/S	Quantity (kg)
Water Treatment Chemicals					
NALCO® 1392	3265	8	III		1,500
ACTI-BROM 7342	N/A	N/A			1,500
HI-TEX 82220	N/A	N/A			4,500
CAT-FLOC 8103 PLUS	N/A	N/A			1,500
Sodium Hypochlorite 12.5% Solution	1791	8	II		3,450
Caustic soda - Liquid (46% - 50%)	1824	8	II		18,000
Furnace Cooling Chemicals					
Nalco 8338	3266	8	III		354
Nalco 8338	3266	8	III		2,596
Nalco 8338	3266	8	III		354
Manufacturing Bottled Gases					
Air Compressed		2.2			121
Oxygen Compressed	1072	2.2		5.1	541.6
HANDIGAS (LPG)	1075	2.1			90
Acetylene	1001	2.1			444
HELIUM COMPRESSED	1046	2.2			25.35
Piped Gases					
COG	1023	2.3		2.1	No storage vessels onsite
BFG	1953	2.3		2.1	No storage vessels onsite
Natural gas	1971	2.1			No storage vessels onsite
Oxygen	1072	2.2		5.1	No storage vessels onsite
Nitrogen	1066	2.2			No storage vessels onsite
Miscellaneous					
CIGWELD COMWELD BRONZE FLUX	1458	5.1	III		20
CONCRESIVE 2530 (B)	2735	8	III		20
Gearbox oil	various	3	III		1,000
Grease	various	3	III		1,000
KEROSENE	1223	3	III		160
WHITE KNIGHT SQUIRTS GLOSS BLACK AEROSOL	1950	2.1			6
WORMALD HFC-227EA (WORMALD HFC-227EA)	3296	2.2			No storage vessels onsite
BELZONA® 2921 (ELASTOMER GP CONDITIONER)	1193	3	II		20
BELZONA® 2211 (MP HI-BUILD ELASTOMER) SOLIDIFIER	3082	9	III		20

Table 8.35 Operation chemical threshold comparison

DG class	Combined storage threshold (tonnes)	Combined quantity (tonne)	Exceedance of SEPP 33 threshold
2.1	0.5	0.45	Pass (does not exceed)
2.1 (LPG)	10	0.09	Pass (does not exceed)
2.2	None	0.69	Pass (excluded) *
3 - II	5	0.02	Pass (does not exceed)
3 - III	5	0.16	Pass (does not exceed)
5.1	5	0.56	Pass (does not exceed)
8 - II	25	21.5	Pass (does not exceed)
8 - III	50	4.8	Pass (does not exceed)
9 - III	None	0.02	Pass (excluded) *

* This refers to dangerous goods that SEPP 33 has excluded from requiring a threshold quantity.

8.3.2.2 Transport

During construction, there will be low volumes of DGs stored in the construction compound, using a just-in-time usage regime. Therefore, the transportation volumes of chemicals during construction will be minimal. The transport screening minimum threshold for any DG vehicle movements is 100 per year. Based on this, the SEPP 33 transport thresholds for construction of the project will not be exceeded.

Transport of DGs during operation of the project is expected to follow similar patterns to current blast furnace operations. As such, the transportation screening thresholds for operation will not be exceeded. It is expected that DGs vehicle movements will primarily access the site via Springhill Road from Port Kembla.

8.3.2.3 Hazard identification

The results of the hazard identification are provided in Table 8.36. The hazard identification focussed on both construction and operation activities of the project. Safeguards that have been, or will be, implemented are also outlined in Table 8.36 and will ensure the risk scenarios that were identified are contained or controlled to an acceptable level.

Table 8.36 Hazard identification list

Hazard scenario	Causes	Consequence	Further assessment to assess potential off-site impacts	Identified/ recommended safeguards
Vehicle interactions	Vehicle movements in vicinity of personnel	Personal injury	No	Traffic management plan including standard traffic rules, signage Site speed limits One way traffic movement through the site for delivery vehicles Designated pedestrian areas Driver competency Construction management plan
Natural hazards	Flooding, earthquake, lightning	Personal injury Plant shut down Possible fire	No	Structures and tanks designed to appropriate codes and standards Housekeeping standards Site drainage
External fire (adjacent to site)	Fire or explosion from adjacent land users	Asset damage Plant shut down Personal injury	No	Site fuel management Buildings designed to appropriate codes Fire protection systems Housekeeping standards

Hazard scenario	Causes	Consequence	Further assessment to assess potential off-site impacts	Identified/ recommended safeguards
Furnace explosion	Incorrect fuel / air mix Internal water leak	Asset damage Personal injury	No	Standard operating procedures Closed loop cooling system with leak detection system Process monitoring systems Gas safety regulations, training and accreditations based on AS3814 (Industrial and Commercial Gas Fired Appliances) and AS1375 (Industrial Fuel Fired Appliances
Molten metal spill	Splash Loss of containment	Asset damage Personal injury	No	Standard operating procedures Maintenance and inspection strategies Furnace operation training and accreditations for personnel Plant and process design
Molten metal explosion	Contact with water	Asset damage Personal injury	Yes	Closed loop cooling system with leak detection system Standard operating procedures Maintenance and inspection strategies Furnace operation training and accreditations for personnel Plant and process design
Flammable gas leak and ignition	Fire or explosion following a fuel gas leak due: – Failure/ damage of pipework – Failure/ damage of cylinders – Impact damage – Corrosion	Asset damage Personal injury	Yes	Barriers erected around gas pipe in key areas Pressure piping and pressure vessel design Standard operating procedures Maintenance and inspection strategies
Use/ handling of explosives	Removal of furnace skull	Asset damage Personal injury	Yes	Licenced explosives contractor Handling procedures Safe Working Method Statement Use minimal amounts possible Containment (within blast furnace)
Loss of containment of chemicals, including dangerous goods	Damage to storage containers e.g. due to external impact Corrosion Wear & tear	Environmental damage Personal injury	No	Purpose designed chemical store, including bunds Inspection and maintenance strategies Handling procedures Standard operating procedures Spill kits
Contact with chemicals, including dangerous goods	Transfer and handling	Personal injury	No	Transfer and handling procedures Standard operating procedures PPE
Toxic release	Failure/ damage of pipework	Personal injury	Yes	Safe piping design Inspection and maintenance strategies

8.3.2.4 Hazards with potential for off-site impacts

Based on the results of the hazard identification (Table 8.36), the following scenarios may have the potential for off-site impacts:

– Fire/explosion from the natural gas supply
– Fire/explosion from self-generated gas (coke ovens gas)
– Explosion from molten metal and water interaction
– Discharge of toxic dust and/ or fumes (blast furnace gas and coke ovens gas)
– Use/handling of explosives.

Fuel gas (natural)

Fire or explosion resulting from leaks in the gas supply pipeline could result in high heat radiation levels with potential for off-site impacts.

The likelihood of a leak occurring in the gas supply branch pipeline was considered to be low, given that the pipeline is on an elevated pipe corridor, fully welded and situated in a controlled industrial environment. This scenario was therefore not considered further in the PHA.

At the gas reducing station (ground level), the pressure is reduced from the feed pressure of 1,140 kPag to a value of 400 kPag downstream in the reticulation system for gas appliance usage and 15 kPag for the stoves.

The worst-case scenario considered is that of an ignited gas release occurring at the gas reducing station. The reducing station is considered to have the highest potential risk because of the pressure and exposure to surrounding activities. Likely leak sources include piping connections and flanges. With the elevated pipe corridor, the potential for damage by impact from a vehicle on internal roads is limited to the reducing station, so is not considered beyond this location.

Molten metal

Molten metal-water explosions, with associated fatalities, have been recorded in the metal processing industry (Jacoby 2000). A molten metal-water explosion in the furnace could conceivably occur in the event of an undetected water leak (e.g. from a leak in a cooling element). Outside of the furnace, a molten metal-water explosion could occur if moisture or pooled water contacts molten metal or slag during transfer processes. Impurities, if present, could also increase the risk of explosion. It is considered that most of the effect of a molten metal-water explosion would be limited to within the PKSW site, however, given the possibility of overpressure and missile effects off-site this scenario was considered further in the PHA (see Section 8.3.2.5).

Blast furnace gas

BFG is a toxic gas, comprising a composition of carbon monoxide, carbon dioxide, nitrogen, water vapour and hydrogen. A failure in the pipework or associated fittings could result in a potential release to the atmosphere. The design of the BFG system includes numerous engineering controls, making the likelihood of such a failure rare. Additionally, the project will not result in a change to the quantity of blast furnace gas onsite. This scenario was therefore not considered further in the PHA.

Coke ovens gas

Coke ovens gas is a flammable and toxic gas. It is a composition of hydrogen, methane, carbon monoxide, carbon dioxide, nitrogen, ethylene, ethane, and trace elements of benzene, toluene, hydrogen sulphide, acetylene and propane. A failure in the pipework or associated fittings could result in a potential release to the atmosphere. There are a number of engineering controls designed to reduce this likelihood to rare. Additionally, whilst the location of the coke ovens gas will move from 5BF to 6BF, there is no fundamental change in the quantity of coke ovens gas on site. Release of coke ovens gas will also have a localised toxic effect, but the offsite risk is negligible, so is not considered in the consequence analysis. However, given the possibility of overpressure impacts off-site, limited quantitative analysis was conducted.

Explosives

Blasting will be undertaken to remove the iron skull retained inside the 6BF hearth. Based on the estimated quantity of iron skull to be removed (500 tonnes), a maximum quantity of explosives that will be stored onsite at any one time during construction is expected to be 150 kilograms (kg). Explosives will be stored a minimum of 90 metres from the PKSW site boundary, away from any blasting activities and in accordance with AS 2187.1 - *Explosive storage, transport and use - storage*. As such, explosive storage will comply with the DG storage thresholds and the risk of offsite impacts is considered negligible. This scenario was therefore not considered further in the PHA.

8.3.2.5 Preliminary Hazard Analysis (PHA)

Based on the results of the hazard identification (Section 8.3.2.3), three scenarios were identified as having potential for moderately serious harm and requiring assessment via a semi-quantitative PHA:

– Flange leak in the above-ground section of the 50 mm natural gas branch pipeline (1.14 MPag) at the gas reducing station
– Split to the 100 mm fuel gas piping connection on the natural gas reducing station outlet (0.4 MPag)
– Explosion resulting from the contacting of molten metal and 100 litres of water (cooling system leak) in the furnace
– Coke ovens gas connection leak (10 mm) to the 400 mm pipeline (0.14 barg)
– Coke ovens gas pipe split (200 mm) to the 400 mm pipeline (0.14 barg)

Each of these scenarios was analysed to determine the consequence and likelihood of the scenario occurring. These results were then compared with the HIPAP 4 risk criteria to assess the acceptability of these risks.

Consequence determination

A summary of the determined consequences for each scenario is provided in Table 8.37 and Table 8.38. Details of the assumptions and calculations used are provided in Appendix G. The identified consequences are considered conservative as they assume no intervention to limit the release of gas.

Table 8.37 Summary of heat radiation consequences

Release Scenario	Maximum distance downwind of release to heat radiation (m)		
	4.7 kW/m^2 (injury)	12.6 kW/m^2 (fatality)	23 kW/m^2 (property damage)
Natural gas pipeline (inlet pipeline of gas reducing station) – flange leak	5.1	4.0	3.5
Natural gas pipeline (outlet pipeline of gas reducing station) – pipe split	31.1	24.6	21.9
Natural gas pipeline (inlet pipeline of gas reducing station) – vehicle strike pipe rupture	48.6	38.5	34.3
Coke ovens gas pipeline – connection leak	Does not reach level	Does not reach level	Does not reach level
Coke ovens gas pipeline – connection split	26.9	21.7	18.2

Table 8.38 Summary of overpressure consequences

Release Scenario	Maximum Distance Downwind of Release to Overpressure (m)		
	0.07 bar (injury)	0.14 bar (property damage)	0.21 bar (fatality)
Molten metal – water contact	100.0	68.0	48.0
Coke ovens gas pipeline – connection split (delayed explosion)	38.8	30.8	28.1

The consequence distances identified in Table 8.37 and Table 8.38 do not extend beyond the PKSW site boundary, as such, there would be no off-site impact for any scenario. All scenarios would, however, have the potential to impact the on-site worker population.

Likelihood estimation

The likelihood of the worst-case scenarios resulting in a fatality or injury was calculated based on industry failure frequencies, specialist risk management judgement and the quantified consequences identified in Table 8.37 and Table 8.38.

A summary of the calculated likelihood of each scenario is provided in Table 8.39 and Table 8.40. Details of the calculations are provided in Appendix G. As no consequences would extend off-site, likelihood frequencies for off-site impacts have not been included.

Table 8.39 On-site jet fire frequencies

Scenario	Natural Gas Flange Leak	Natural Gas Pipe Split	Natural Gas Vehicle Impact	Coke Ovens Gas Connection Leak	Coke Ovens Gas Pipe Split
Frequency of gas release (per annum)	5.00×10^{-06}	6.70×10^{-07}	1.10×10^{-08}	1.60×10^{-06}	6.5×10^{-08}
Frequency of jet fire (per annum)	5.00×10^{-09}	1.27×10^{-09}	3.24×10^{-09}	1.60×10^{-09}	1.24×10^{-10}
Frequency of fatality (per annum)	5.00×10^{-10}	1.02×10^{-09}	2.91×10^{-09}	0.00	9.88×10^{-11}

Table 8.40 On-site explosion frequencies

Scenario	Molten Metal – Water Interaction	Coke Ovens Gas Pipe Split
Frequency of explosion (per annum)	1.00×10^{-06}	6.50×10^{-08}
Frequency of fatality (per annum)	8.00×10^{-07}	4.16×10^{-08}

Risk assessment

A summary of the compliance of each scenario with the relevant risk criteria from HIPAP 4 is provided in Table 8.41.

Table 8.41 Risk criteria compliance

Event	Individual Fatality Risk	One Injury / Fatality every X Years	HIPAP Risk Criteria	Compliance
Fire and explosion scenarios with property damage offsite	0.00	–	5.00×10^{-05}	Complies
Fire and explosion scenarios with serious injury to offsite people	0.00	–	5.00×10^{-05}	Complies
Fire and explosion scenarios with fatality of offsite people	0.00	–	1.00×10^{-06}	Complies
Fire and explosion scenarios with fatality of onsite personnel	8.46×10^{-07}	1,200,000	5.00×10^{-05}	Complies

The project will comply with the HIPAP 4 risk criteria. This indicates that all risks identified for the project can be managed to tolerable levels with the implementation of the management and mitigation measures identified in Section 8.3.4.

8.3.3 Summary of assessment

The project is deemed a ‘potentially hazardous industry’ as it exceeds the thresholds within SEPP 33 requirements for dangerous good storage. The assessment showed that there was no off-site impact. The risk complies to HIPAP 4 risk criteria and can be managed through safeguards.

Over the life of the project, and with the recommended safeguards implemented, the project is not expected to result in an exceedance of the assessed offsite risk criteria and is not considered to be an ‘offensive industry’.

8.3.4 Mitigation and management measures

Management and mitigation measures that will be implemented to minimise the hazards and risks of the project are provided in Table 8.42.

Table 8.42 Hazard and risk management measures

Impact / Aspect	ID	Measure	Timing
Explosives	HR1	Explosives will be stored in a non-ferrous receptacle clearly marked 'Explosives' that is kept closed and locked (except during use by authorised personnel) and stored in the original containers which are securely sealed. The storage area will be a well-ventilated magazine licenced for Class 1.1 explosives, which protects the explosives from the weather, contamination, sources of ignition and access from unauthorised individuals. Storage will be isolated from other dangerous good stores and the area free of debris, waste and combustibles. The explosives containers will be protected against physical damage and regularly checked for spills and leaks.	Construction
	HR2	Explosive storage magazines will comply with the requirements of AS 2187.1 *Explosives – Storage, transport and use – Storage.*	Construction
	HR3	Where more than 2.5 kg of Class 1.1 explosives are stored onsite, every perimeter entrance to the designated construction site must be labelled with a 'Hazchem' placard in accordance with the *Explosives Regulation 2013*. Adequate security will be provided for the explosives' storage area, and only those who are authorised for unsupervised access to the area will have means to unlock the explosive storage magazine.	Construction
	HR4	There will be no smoking, naked light, heat or ignition source present at the explosives' storage area.	Construction
	HR5	The explosives stock will be rotated to prevent ageing (use on first in-first out basis).	Construction
	HR6	Explosives will be stored at least 90 metres from the PKSW site boundary.	Construction
Fire or explosion from gas leak.	HR7	An inspection and maintenance regime for the gas reducing station and the blast furnace gas pipework and associated fittings will be implemented to prevent leaks.	Construction Operation
	HR8	The site gas reticulation line will be suspended from the wall or roof above and away from the reach of any mobile equipment.	Detailed design Construction
	HR9	Barriers will be erected around the gas pipe in key areas.	Construction Operation
Molten metal-water explosion	HR10	Any water use will be separated from the blast furnace area where possible. Any use of water within proximity to the blast furnace area will be tightly controlled to prevent mixing of water with molten metal.	Operation
	HR11	Furnace will be designed to avoid inadvertent water leakage into the furnace and casting areas.	Detailed design Construction
Toxic gas release	HR12	An inspection and maintenance regime for the BFG system will be implemented to prevent leaks.	Construction Operation
Dangerous goods and chemical spills	HR13	All chemicals and DGs will have appropriate labelling, be separated where necessary, contained within a bund and be disposed of in accordance with Australian Standards.	Construction Operation
	HR14	A copy of the Safety Data Sheet (SDS) for all chemicals present on site will be made readily accessible to emergency services.	Construction Operation
	HR15	Appropriate safe work procedures will be implemented for safe handling of all chemicals and dangerous goods, including transfer, storage, spill prevention and clean up requirements.	Construction Operation

8.4 Water quality

This section describes the potential water quality related impacts associated with construction and operation of the project. It summarises the key findings of the Water Quality Impact Assessment (WQIA) which is included in Appendix H.

8.4.1 Methodology

The approach taken in the assessment of water quality impacts is:

– Assessment scope:
  - Review of potential surface and groundwater impacts of the project.
  - Characterisation of water quality discharges, including quality and quantity of all pollutants from the project.
  - Documenting details of the stormwater and wastewater management systems.
  - Undertaking a site water balance.
– Existing environment:
  - Identifying the study area relevant to the water quality assessment, including sensitive receiving environments.
  - Characterising the existing water quality of Allans Creek and the Inner Harbour based on previous numerical modelling and monitoring programs undertaken in the vicinity of the study area.
  - Identifying and classifying existing intake and discharge points within the study area.
  - Reviewing the completed and ongoing Pollution Reduction Programs of relevance to the study area.
  - Identifying where relevant criteria for receiving waters are being met.
  - Identifying where relevant criteria for receiving waters are not being met and what activities are being undertaken to work toward their achievement over time.
  - Characterising the nature and extent of any contamination on the site and surrounding area.
– Water quality impact assessment:
  - Documenting relevant criteria for assessment of potential water quality impacts.
  - Comparing expected discharge characteristics and resulting water quality parameters at the edge of the mixing zone and within Allans Creek and the Inner Harbour of Port Kembla to the relevant criteria.
  - Where the relevant criteria are not met, describing potential mitigation measures that will limit impacts to water quality and may enable the criteria to be met in time, thereby avoiding or minimising impacts to sensitive receiving environments.
  - Describing the proposed erosion and sediment controls during construction.
  - Providing recommendations for any required water quality controls for implementation during construction and future operations.

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

– NSW Marine Water Quality Objectives in NSW (DEC, 2006)
– Storing and Handling Liquids: Environmental Protection (DECC, 2007)
– Managing Urban Stormwater: Soils and construction - Volume 2 (DECC, 2008)
– Australian and New Zealand guidelines for fresh and marine water quality (ANZG, 2018)
– NSW Environment Protection Authority (EPA) guidance regarding mixing zones (EPA, 2018)

8.4.1.1 Assessment Criteria

The Marine Water Quality Objectives (WQOs) were adopted by the NSW Government in 2005 and are intended as a guideline tool for strategic planning and development assessment (DEC 2006). The WQOs are generally consistent with the national framework for assessing water quality set out in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG 2018) and include five objectives which describe the water quality needed to protect the following marine water quality values:

– Aquatic ecosystems i.e. aquatic ecosystem health
– Primary contact recreation i.e. swimming, surfing
– Secondary contact recreation i.e. boating, wading
– Visual amenity i.e. aesthetic qualities of waters
– Aquatic foods i.e. water suitable for growing seafood

In the case of Port Kembla Harbour, the relevant values relate only to Aquatic Ecosystems and Visual Amenity, for which the relevant guideline levels for ambient water quality are presented in Figure 8.9.

Marine Water Quality Objectives	**Aquatic ecosystem health** **To maintain or improve the ecological condition of ocean waters.**	**Visual amenity** **To maintain or improve ocean water quality so that it looks clean and is free of surface films and debris.**
Examples of indicative guideline levels for environmental (ambient) water quality The indicative guideline levels (indicators and numerical criteria) listed are examples only of some of the relevant water quality guideline levels recommended in the ANZECC & ARMCANZ Guidelines 2000. For a full list, refer to the appropriate tables as referenced in the ANZECC & ARMCANZ Guidelines 2000. These are available at www.deh.gov.au/water/quality/nwqms/index.html	**Biological** • Frequency of algal blooms – no change from natural conditions • Bioaccumulation of contaminants – no change from natural conditions. **Physico-chemical** • **Nutrients** Total Nitrogen < 120 µg/L Total Phosphorous < 25 µg/L • **Turbidity** 0.5–10 NTU* **Toxicants in coastal waters** • **Metals** Copper < 1.3 µg/L Lead < 4.4 µg/L Zinc < 15 µg/L • **Pesticides** Chlorpyrifos < 0.009 µg/L **Toxicants in bottom sediments** • **Metals** Copper < 65 mg/kg dry weight Lead < 50 mg/kg dry weight Zinc <200 mg/kg dry weight Mercury < 0.15 mg/kg dry weight • **Organochlorines** Chlordane < 0.5 µg/kg dry weight Total PCBs < 23 µg /kg dry weight	**Indicators to ensure water looks clean and free from pollutants** • **Surface films and debris** Oils and petrochemicals should not be noticeable as a visible film on the water, nor should they be detectable by odour. Waters should be free from floating debris and litter. • **Nuisance organisms** Macrophytes, phytoplankton scums, filamentous algal mats, blue-green algae, and sewage fungus should not be present in unsightly amounts.

Figure 8.9 Relevant guideline levels for ambient water quality (DEC 2006)

Allans Creek and the western portion of the Inner Harbour are considered part of a highly disturbed ecosystem where exceedances of the 95% trigger values for protection of marine waters have been recorded in relation to aluminium, cadmium, copper, lead, zinc, tin and arsenic.

Despite these legacy water quality issues, it is recognised that significant efforts have been made on the part of industry to reduce the level of pollution and improve water quality within Port Kembla Harbour. Hence for the purposes of this assessment, it is proposed to rely on the WQOs for definition of the relevant values for Port Kembla Harbour (as defined in Figure 8.9) and to rely on the ANZG 2018 Water Quality Guidelines for Default Guideline Values (DGV's) for the Levels of Species Protection (LOSP) summarised in Table 8.43, with the exception of temperature as described below.

Table 8.43 Relevant water quality criteria

Water quality parameter		DGV's (ANZG 2018)[7], [8]		NSW water quality objective
Aquatic ecosystems				
Biological				
Frequency of algal blooms		Not listed		No change from natural conditions
Bioaccumulation of contaminants		Not listed		No change from natural conditions
Physico-chemical and Nutrients				
Dissolved oxygen		90-110 % saturation		Not listed
pH		8.0-8.4		Not listed
Temperature		80th %ile of reference system*		Not listed
Turbidity		0.5-10 NTU		0.5-10 NTU
Total Nitrogen		120 µgN/L		<120 µg/L
Total Phosphorous		25 µgP/L		<25 µg/L
Chlorophyll-a		1 µg/L		Not listed
Toxicants				
	80% LOSP	90% LOSP	95% LOSP	
Ammonia (NH3)	1700 µg/L	1200 µg/L	910 µg/L	Not listed
Cyanide (CN)	14 µg/L	7 µg/L	4 µg/L	Not listed
Cadmium (Cd)	36 µg/L	14 µg/L	5.5 µg/L	Not listed
Chromium(VI) ($Cr6^{+}$)	85 µg/L	20 µg/L	4.4 µg/L	Not listed
Copper (Cu)	8 µg/L	3 µg/L	1.3 µg/L	<1.3 µg/L
Lead (Pb)	12 µg/L	6.6 µg/L	4.4 µg/L	<4.4 µg/L
Zinc (Zn)	43 µg/L	23 µg/L	8 µg/L	<15 µg/L
Mercury (Hg) (inorganic)	1.4 µg/L	0.7 µg/L	0.4 µg/L	Not listed

The operations associated with the 6BF will take place within one area within the larger PKSW site. EPL 6092 contains individual discharge concentration limits for 14 surface water locations within the PKSW site. Monitoring conditions specified in the EPL include monitoring parameters, locations, frequencies as well as discharge limits relating to the 50th, 90th and 100th percentile concentrations for each discharge point.

Based on long term seawater temperature measurements outside of the port, the ambient 20th percentile, 50th percentile (median) and 80th percentile seawater temperatures are provided in Table 8.44.

[7] Values, targets and actions in these guidelines are not mandatory, but support a nationally-agreed framework for water quality planning and management.

[8] DGVs for groundwater ecosystems have not been developed as part of the 2018 ANZG. It is noted that generally, the Water Quality Guidelines should apply to the quality of both surface water and of groundwater, since the community values which they protect relate to above-ground uses (e.g. irrigation, drinking water, farm animal or fish production and maintenance of aquatic ecosystems). The 2013 AG groundwater guidelines do not provide guideline values for toxicants in groundwaters, but rather provide guidance on how existing DGV's for other community values might be applied, or where new guideline values might need to be derived, in order to inform the setting of appropriate water quality objectives (ANZG, 2018).

Table 8.44 Ambient seawater temperature offshore of Port Kembla (Cardno, 2019)

Season	Seawater Temperature (ºC)		
	20th Percentile	Median	80th Percentile
Summer	20.0	21.2	22.4
Autumn	19.2	20.5	21.8
Winter	15.6	16.6	17.4
Spring	16.4	17.5	18.7

Adopting the two-step approach to the assessment, as recommended by the ANZECC guidelines, first requires testing of the predicted and measured temperatures at the point of discharge to Allans Creek against the 80th percentile temperatures to assess compliance with the low risk trigger values for slightly to moderately disturbed ecosystems. Compliance would require the temperature increase at the edge of the nearfield mixing zone to be less than 0.8 (ºC) to 1.3 (ºC) depending on the season.

As part of investigations into an alternative salt water cooling system undertaken between 2006 and 2008, UNSW completed a study to assess ecological issues in relation to the proposed system and to identify a more suitable guideline trigger value for temperature impacts to Allans Creek and Port Kembla Harbour (CH2MHILL 2008, NSG 2006). The study concluded that ecologically important changes may occur if temperatures are elevated by more than 3˚C. A water temperature trigger value of 3˚C was adopted for the earlier assessment and is considered to be of more relevance to Allans Creek and the Inner Harbour than the default guideline value specified in the 2018 Water Quality Guidelines (ANZG, 2018).

Nevertheless, assessment of the proposed discharge stream associated with the project has also been compared to the 80th percentile values as a target for site improvement.

8.4.2 Existing environment

8.4.2.1 Existing operations and drainage network

Ironmaking at PKSW is conducted via a thermochemical process of reduction of iron ore within the blast furnace. In general, iron ore, coke and other raw materials are charged into the blast furnace for smelting and a mixture of elemental iron, slag, and BFG is generated from the blast furnace.

The major by-products from the blast furnace operation are BFG and slag. Both of these by-products require the use and management of water. The hot gases leaving the top of the blast furnace are cooled and cleaned then piped through the interworks blast furnace gas main to other plants within PKSW for use as an energy source to the maximum practical extent. The molten slag stream is exposed to a continuous stream of high pressure water to generate slag sand, whilst the water is collected, cooled and reused in a closed loop system.

Further details regarding key elements of the existing 5BF operations relating to water quality are provided below.

Existing 5BF gas cleaning

Condensate that is generated in the gas main is collected in seal pots. All the BFG condensate is collected and returned to the effluent treatment system via a series of collection tanks and pumps.

A wet scrubber is used to cool and clean the BFG exiting the top of the furnace. The resulting scrubber water reports to an effluent treatment system, where it is treated and cooled so it may be reused for further gas cleaning. A portion of the treated water is ‘blown down’ (discharged) at a rate of 30 – 45 m^3/hr into the Outlet Channel (as shown in Figure 8.12) where it combines with approximately 26,000 m^3/hr of salt water used for cooling in other plant areas and discharges into Allans Creek and the Inner Harbour via the No.2 Blower Station Drain. Flocculant and coagulant are added to the effluent treatment system to assist with the settling of solids in the clarifier and prevent excessive scaling. The slurry formed in the clarifier is sent via pipework for dewatering at the sinter plant, with recovered water returned to the effluent treatment system and the remaining slurry transported to the PKSW Recycling Area.

During abnormal furnace operation, the chemical composition of the water may vary; in this circumstance, the blowdown water from the effluent treatment system is diverted to contingency storage to prevent release to the environment; it is then stored until such time as the quality of the water is confirmed to be acceptable for discharge in accordance with EPL 6092.

Existing 5BF cooling systems

The furnace cooling systems are all a fully closed loop design with heat exchangers. The closed loop design is a safety feature of the blast furnace allowing high accuracy leak detection and has the added benefit of minimising water loss. An evaporative cooling tower provides the heat sink for the closed loop cooling systems at the 5BF. The cooling tower requires fresh water to replenish water lost through evaporation, and chemical treatment to comply with statutory requirements. A blowdown stream is recycled through the effluent treatment system.

Salt water sourced from the Outer Harbour is used for once-through cooling of the heat exchangers at the 5BF effluent treatment system and is subsequently discharged to Allans Creek and the Inner Harbour via No.2 Blower Station Drain. Stormwater drains at 5BF discharge directly to the No.2 Blower Station Drain or to the No.5 Blast Furnace Drain, both of which report to the Inner Harbour via Allans Creek.

A catchment map is presented in Figure 8.11 and schematic drawing showing inputs to the No.2 Blower Station Drain, including from 5BF, is shown in Figure 8.12.

Existing 5BF slag granulation

Slag produced by the blast furnace is either formed into rock or granulated slag for sale as construction materials. Granulated slag is formed by subjecting the molten slag stream to a continuous stream of high pressure water. The water used for granulation is collected, cooled and reused in a closed loop system.

Existing 5BF stormwater drainage

Stormwater drains at 5BF discharge directly to the No.2 Blower Station Drain or to the No.5 Blast Furnace Drain, both of which report to the Inner Harbour via Allans Creek. EPL 6092 contains individual discharge concentration limits for 14 surface water locations within the PKSW site, 12 of which relate to water quality within the drainage network. The location of the water quality monitoring points identified in the licence are shown in Figure 8.10. Monitoring conditions specified in EPL 6092 include monitoring parameters, locations, frequencies as well as discharge limits relating to the 50th, 90th and 100th percentile concentrations for each discharge point as described in Section 8.4.1.

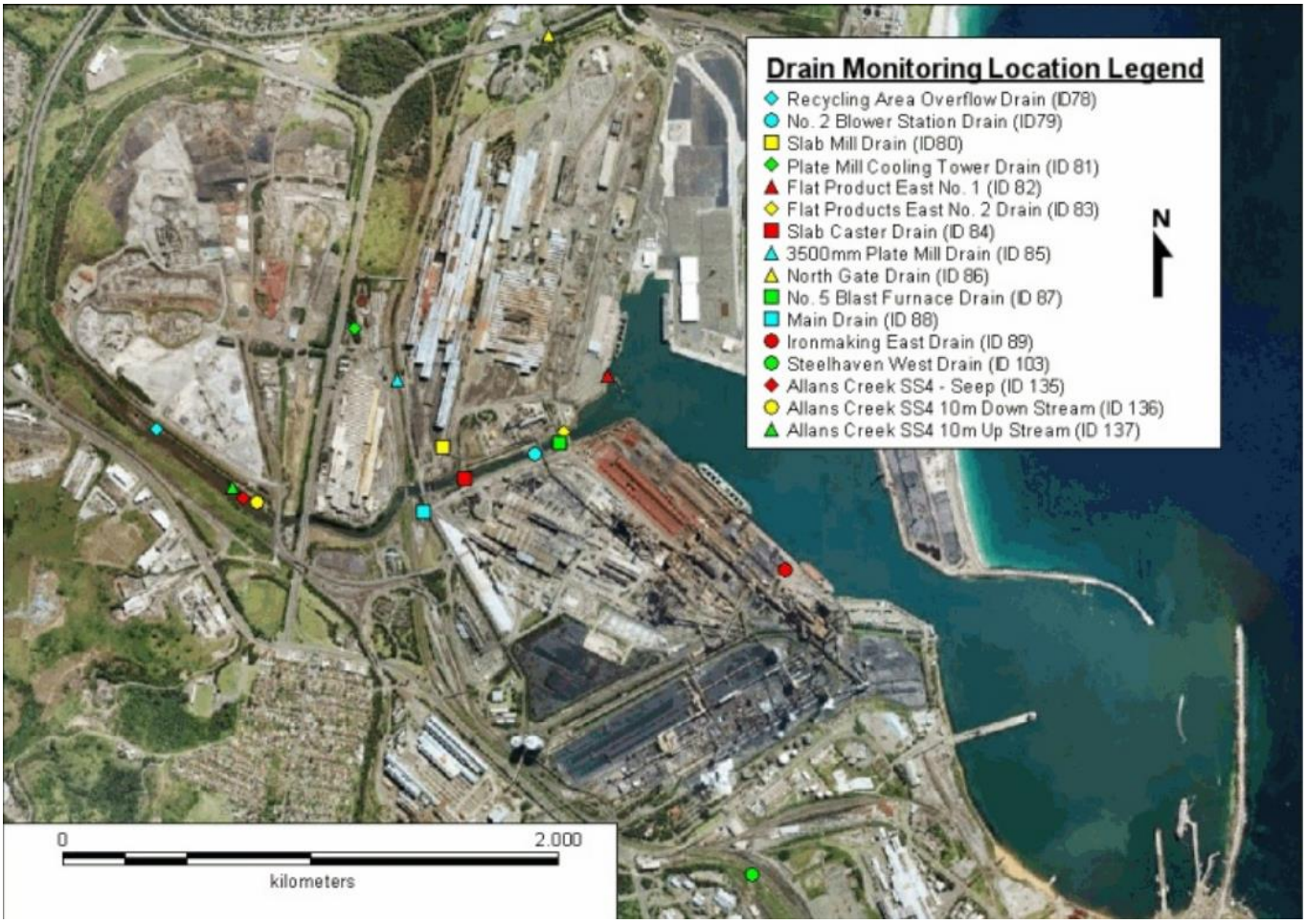

Figure 8.10 Water quality monitoring locations (including EPL identification numbers)

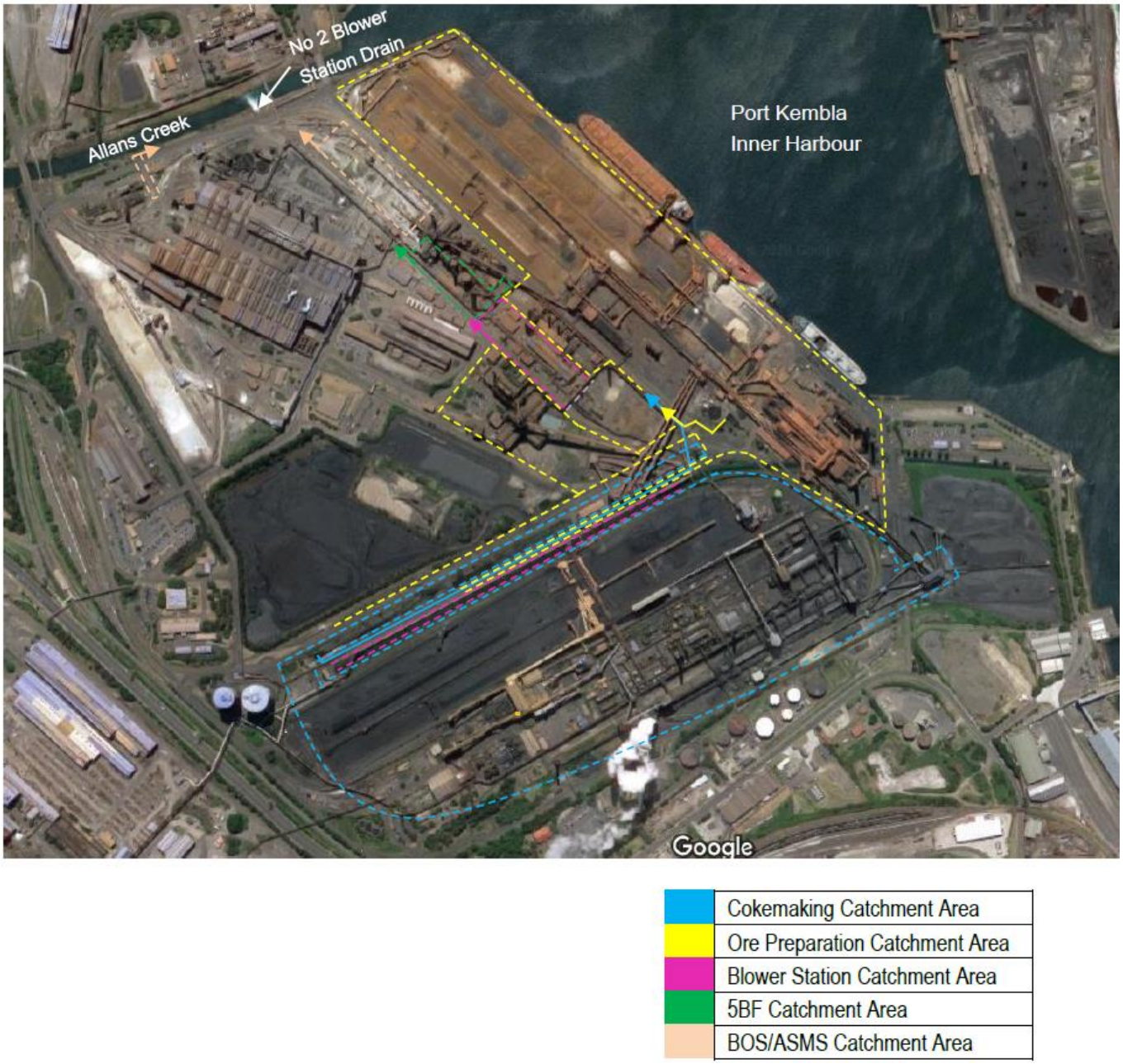

Figure 8.11 Drain catchment map

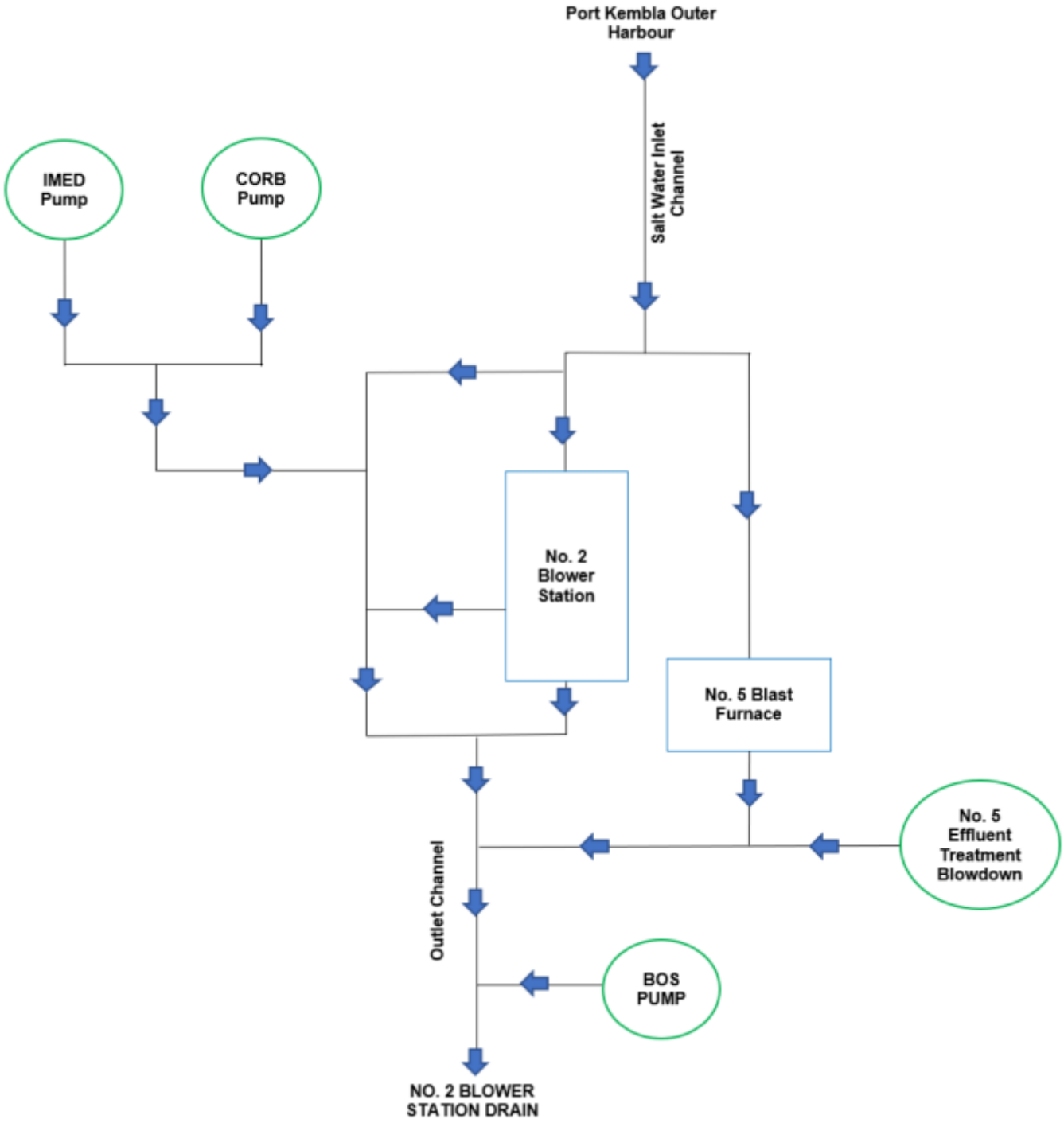

Figure 8.12 Schematic drawing of current 2BS Drain inputs

8.4.2.2 Receiving environment

Overview

The PKSW site is generally flat and resides upon a base of artificial fill, including dredged sand and mud, rocks and local soil materials. The site is generally sealed, with small areas of exposed soil. Soils on site are classified as disturbed terrain, have a low probability of acid sulphate soils, and are generally susceptible to erosion, subsidence and lack permeability. The site drains into two creeks, Main Drain and Allans Creek, which run into Tom Thumb Lagoon and Port Kembla Inner Harbour.

Temperature

Allans Creek is a heavily modified waterway measuring approximately 30 m to 35 m in width with less than two metres of water depth at lowest astronomical tide in the vicinity of PKSW (Australian Hydrographic Service Chart AUS194). Allans Creek is the predominant source of freshwater inflow into Port Kembla Harbour and is subject to elevated temperature industrial discharges. Previous numerical modelling undertaken on behalf of BlueScope indicated that cooling water processes and recirculation are primarily controlled by harbour flushing, with notable differences at each level in the water column. The modelling revealed that wind and tidal influences play a significant role in the rate at which cooling waters discharged to Allans Creek are conveyed to the Inner Harbour (Cardno, 2006). As a result, water temperatures within the Inner Harbour are generally one to two degrees warmer than sea temperatures beyond the entrance to the harbour.

Aquatic ecology

Detailed studies into the ecology of Allans Creek and the Inner Harbour were undertaken as part of BlueScope's investigations into a once-through seawater cooling system (NSG, 2006). Key findings were summarised as follows (CH2M HILL, 2008):

– The Inner Harbour of Port Kembla is indicative of a stressful environment
– Many species present in the Outer Harbour are not found within the Inner Harbour
– Sessile invertebrate assemblages of Port Kembla demonstrated smaller numbers and varieties of sponges and ascidians than in slightly to moderately disturbed systems
– Species more often associated with tropical waters are found in the Inner Harbour, possibly due to the warm cooling water
– Fish assemblages resemble other estuaries within NSW.

A follow up study was completed in June 2012 as part of PRP 146: Assessment of the ecological condition of Port Kembla (UNSW, 2012). The objective of the study was to describe ecological communities and contaminant concentrations at multiple study locations in Port Kembla for comparison with study locations from reference estuaries and creeks. Key findings of the ecological health report cards for Port Kembla and Allans Creek are summarised in Table 8.45 and Table 8.46 respectively.

Table 8.45 Summary of Port Kembla ecological health report card findings (modified from UNSW, 2012)

Ecological community	Summary of historical results
Benthic larval fish	Communities are different, but no evidence of reduced ecological condition
Benthic and pelagic adult fish	Communities do not differ in composition or diversity measures
Planktonic larval fish	Communities may differ and evidence of reduced ecological condition
Epibiota	Communities are different, but no evidence of reduced ecological condition
Infauna	Communities may differ and evidence of improved ecological condition
Phytoplankton and microphytobenthos	Communities may differ and evidence of reduced ecological condition

Table 8.46 Summary of Port Kembla ecological health report card findings (modified from UNSW, 2012)

Ecological community	Summary of historical results
Epibiota	Communities are different, but no evidence of reduced ecological condition
Infauna	Communities do not differ in composition or diversity measures
Phytoplankton and microphytobenthos	Communities may differ and evidence of reduced ecological condition

Water quality

As outlined in Appendix H, a range of water quality monitoring studies have been previously undertaken to define ambient water quality within the port and to monitor water quality parameters. Key water quality monitoring programs undertaken within the Inner Harbour and Outer Harbour of Port Kembla since 2002 which have been used to establish background water quality are outlined in full in Appendix H and relevant results summarised in Table 8.47.

Table 8.47 Historical water quality

Parameter	Summary of historical results
Contaminants	Water samples collected under ambient conditions during the 2002-2005 monitoring program undertaken by the Port Kembla Harbour Environment Group identified concentrations of aluminium, cadmium, copper, lead, zinc, tin and arsenic in excess of the 95% trigger values for protection of marine waters. Concentrations of all other analytes were below the adopted trigger values. Elevated levels of adverse water quality parameters were generally found in the vicinity of creeks and waterways that drain industrial and stockpile areas such as the entrance to Allans Creek (Site 1), Gurangaty Waterway (Site 5), near No.1 Products Berth (Site 3), the Cut (Site 7) and Darcy Road Drain (Site 15).
Suspended Solids / Turbidity	Total Suspended Solids concentrations are known to be influenced by shipping movements and freshwater flood events. Long term data collected during the 2002-2005 monitoring program undertaken by the Port Kembla Harbour Environment Group measured average TSS concentrations of 5.9mg/L and 3.2mg/L within the Inner and Outer Harbours respectively. TSS concentrations within the Inner Harbour were shown to vary between 1.0mg/L and 17.9mg/L. TSS concentrations within the Outer Harbour were shown to vary between 0.5mg/L and 11.8mg/L. Previous dredging campaigns (Berth 103) established a relationship between Nephelometric Turbidity Units (NTU) and TSS of 1 NTU = 2mg/L TSS. It is critical to note that the relationship between NTU and TSS is highly dependent on the material properties of the sediments in suspension.
pH	Previous monitoring campaigns have recorded pH levels within the Inner and Outer Harbour ranging between 7.6 and 8.1, and in some instances below the recommended ANZECC criteria for harbour waters (8.0-8.5). Previous investigations concluded that pH levels are lower in the Inner Harbour than the Outer Harbour, indicating pH levels within the Inner Harbour are likely influenced by freshwater discharges from existing waterways.
Temperature	Water temperatures within Port Kembla are generally higher than those measured offshore due to tidal flushing patterns and existing industrial discharges to the Inner Harbour. As a result, water temperatures within the Inner Harbour are generally one to two degrees warmer than sea temperatures beyond the entrance to the harbour. The Outer Harbour benefits from greater tidal flushing and is generally less than 0.25 degrees warmer than sea temperatures beyond the entrance to the harbour.
Salinity	Total Dissolved Solids (TDS) concentrations assessed during the 2014 maintenance dredging campaign ranged from 31.15g/L to 35.38g/L. Concentrations have been shown to vary with depth indicating density stratification within the water column. Concentrations are also known to be influenced by freshwater flood events.

8.4.3 Potential impacts

8.4.3.1 Construction impacts to surface water quality

Potential risks to water quality during the construction phase are well understood given the experience gained during the successful completion of previous reline projects at PKSW. Specific risks include:

– Release of poor quality stormwater into drains and waterways where impacted by excavation works and other construction activities. This may include impacts to TSS, DO, pH, organics and debris.
– Mobilisation of existing contamination within soils.

All construction activities are proposed to take place in established areas. The proposed laydown areas and carparks are existing infrastructure on the site with existing water management controls in place.

Similarly, the 6BF, Stockhouse and roadways within PKSW have existing stormwater drainage systems. The 6BF yard area is sealed and the drainage system includes a series of sumps designed to contain the ‘first flush’ of rainfall events and spills.

A site specific Soil and Water Management Plan (SWMP) will be developed and implemented prior to construction in accordance with the *Managing Urban Stormwater: Soils & Construction, vol. 1* (Landcom 2004). This plan will outline the established controls that will be in place for the duration of construction works, as well as any targeted controls specific to the project. For example, bunding and storage requirements for chemical management will be in accordance with the relevant EPA requirements, Australian Standards and manufacturers’ requirements.

8.4.3.2 Commissioning impacts to surface water quality

During commissioning, cooling water systems will be filled and flushed with industrial water in a controlled manner to drain. There is potential for foaming to occur within the gas system during start up due to the use of kindling and initial fill, which may require discharge into storage basins. Site containment measures will be developed during the detailed design phase to ensure that any overflows due to foaming are able to be contained on site.

During charging, purging and heating of the furnace, as much exhaust gas as possible will be directed through the gas cleaning systems. Similar to 5BF, the dust will be removed from the gas by way of a wet scrubber and the resulting scrubber water treated and recycled in the effluent system. It is possible that the volume and chemical composition of the blowdown water generated during the commissioning phase will vary from that associated with full scale operations. A commissioning Water Quality Management Plan (WQMP) (or similar) will be developed during detailed design to assess the likely composition of effluent treatment plant water, including the potential for foaming. Where required, monitoring programs and corrective measures, such as the use of antifoam, will be developed to ensure that discharges to No.2 Blower Station drain and Allans Creek are in accordance with EPL 6092.

Commissioning of the granulator will be undertaken using industrial water within sealed hardstand areas in the vicinity of 6BF where drainage systems will be in place. Any potential impacts to surface water will be monitored and managed through either the commissioning WQMP or SWMP, which will be prepared following completion of detailed design.

8.4.3.3 Operations impacts to surface water quality

Water uses and discharges from 6BF will be consistent with the quantity and quality of that which is currently discharged from 5BF, with minor changes to cooling water discharges expected due to the alternative cooling system associated with the project. A simplified block flow diagram for 6BF is presented in Figure 8.13. Discharges with potential impacts have been assessed in relation to the process water systems associated with the operation of 6BF. The results are summarised below.

Blowdown

The effluent treatment system proposed for 6BF is consistent with the effluent treatment system used for existing operations and the discharge location will remain as the 2BS drain which discharges to Allans Creek.

The rate of future 6BF blowdown discharge is expected to be approximately 30 – 45 m^3/h, which is consistent with existing discharge rates associated with 5BF operations. This rate represents a very small component (< 0.2%) of the broader flow rate within No.2 Blower Station drain of approximately 26,000 m^3/h.

Flocculant and coagulant will be added to the effluent treatment system to assist with settling of solids, while biocide and scale inhibitor will be added to comply with statutory requirements (contained in AS/NZS 3666.1:2011) and prevent excessive scale build up. Specific products are assessed in Table 8.48.

Table 8.48 Assessment of products used within the effluent treatment system

Product name and manufacturer	Use, dosing and expected discharge concentration	Potential impacts to water quality
CAT-FLOC 8103 PLUS NALCO Water	- Water clarification aid (coagulant) - Dosing rate: 1.5 mg/L - Discharge concentration: 0.0026mg/L	Summary of ecological information (Nalco, 2020): – No known ecotoxicological effects – Lowest reported NOEC Ceriodaphnia dubia: 1.25 mg/L – Poorly biodegradable – Not expected to bioaccumulate – Manufacturer's assessment of potential environmental hazard is: Low WQIA conclusion: No significant impacts to water quality expected at proposed discharge concentration.

Product name and manufacturer	Use, dosing and expected discharge concentration	Potential impacts to water quality
HI-TEX 82220 NALCO Water	– Anionic flocculant – Dosing rate: 1.5 mg/L – Discharge concentration: 0.0026mg/L	Summary of ecological information (Nalco, 2017): – Considered harmful to aquatic life if released to waterways in sufficient concentrations – Lowest reported LC50 / EC50: > 1,000 mg/L – Poorly biodegradable but rapidly eliminated from the aquatic environment by adsorption onto organic particulate matter and sediment – Not expected to bioaccumulate – Manufacturer's assessment of potential environmental hazard is: Low WQIA conclusion: No significant impacts to water quality expected at proposed discharge concentration.
ACTI-BROM™ 7342 NALCO Water	– Biocide precursor, biodispersant – 0.25 - 0.3 mg/L bromine based on a dosing rate of 0.6 - 0.8 mg/l and ~40% actives. – Discharge concentration: 0.0014mg/L	Summary of ecological information (Nalco, 2021a): – Considered harmful to aquatic life with long lasting effects if released to waterways in sufficient concentrations – Lowest reported NOEC Lepomis macrochirus: 1,000 mg/L – Lowest reported LC50 Daphnia magna: 0.038 mg/L – Inorganic substances for which a biodegradation value is not applicable – Not expected to persist in the environment – Not expected to bioaccumulate – Manufacturer's assessment of potential environmental hazard is: Low WQIA conclusion: No significant impacts to water quality expected at proposed discharge concentration.
NALCO® 1392 NALCO Water	– Scale inhibitor – Dosing rate 0.8 – 1.3 mg/L – Discharge concentration: 0.0023mg/L	Summary of ecological information (Nalco, 2021b): – No known ecotoxicological effects – Lowest reported LC50 Green Algae: 20 mg/L – Inherently biodegradable – Not expected to bioaccumulate – Manufacturer's assessment of potential environmental hazard is: Low WQIA conclusion: No significant impacts to water quality expected at proposed discharge concentration.
Sodium hypochlorite Solution (10-15% available chlorine) Ixom Operations Pty Ltd	– Sanitising agent, biocide – 0.5 mg/L chlorine based on a dosing rate of 4mg/L with ~12.5% available chlorine – Discharge concentration 0.0069mg/L	Summary of ecological information (IXOM,2019): – Considered very toxic to aquatic life with long lasting effects if released to waterways in sufficient concentrations – Lowest reported 96hr LC50 (fish): 0.065 mg/L (sodium hypochlorite) – Biodegradable – Does not bioaccumulate. – Acute Aquatic Toxicity – Category 1 – Chronic Aquatic Toxicity – Category 1 – WQIA conclusion: No significant impacts to water quality expected at proposed discharge concentration.

Notes: Expected discharge concentrations based on conservative assumptions of maximum discharge of 45 m^3/hr from blowdown and no loss of product during processing into 2BS drain flow of 26,000 m^3/hr. In reality, the majority of sodium hypochlorite, ACTI-BROM™ and NALCO® 1392 will be consumed in the process and the majority of CAT-FLOC 8103 PLUS and HI-TEX 82220 will bind to slurry solids and settle out in the clarifier.

The concentrations of pollutants in future water discharges are therefore expected to be comparable with existing discharges, and no adverse impacts are anticipated in Allans Creek or the Inner Harbour as a result of the project when compared to existing operations.

A detailed assessment of the key discharge characteristics against relevant water quality criteria is provided in Section 8.4.3.4.

Cooling water

The quality of the water discharging from 6BF will be consistent with the existing discharge from 5BF, except for temperature which will be slightly elevated due to the salt water heat exchanger cooling system proposed for 6BF. It is predicted that this will result in an increase of approximately 0.5 – 1°C at the licence discharge point, No.2 Blower Station drain (Point 79).

Cooling water discharges will increase by approximately 3,000m^3/h, which represents an increase of around 10% over current operations associated with 5BF.

A detailed assessment of the key discharge characteristics against relevant water quality criteria is provided in Section 8.4.3.4.

Gas condensate

BFG condensate from 6BF is expected to be of similar composition to that associated with 5BF operations. There will be no change to Coke Ovens Gas (COG)[9] condensate as a result of the project. The 'no-blow' design of the BFG seal pots proposed for the 6BF area will reduce the risk of gas condensate overflows when compared to traditional seal pot designs.

All gas condensate collection tanks will be fitted with remote level monitoring and alarming to reduce the risk of overflows. As occurs with existing operations, the BFG condensate will be collected in tanks and pumped to the effluent treatment system and COG condensate will be collected and trucked for processing at Cokemaking.

[9] COG is gas generated from cokemaking processes and is used as a fuel at the blast furnace. As such, there is a COG main with seal pots in the blast furnace yard from which COG condensate is collected.

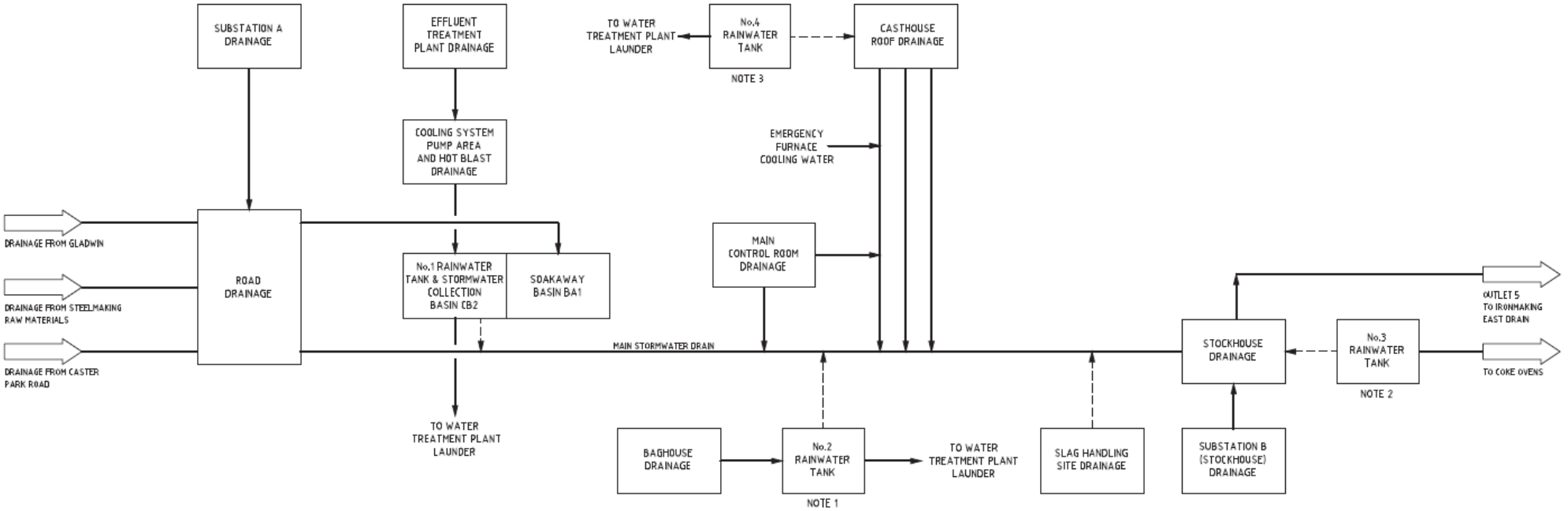

Figure 8.13 Simplified No.6 Blast Furnace Block Flow Diagram

8.4.3.4 Assessment against relevant water quality criteria

An assessment of the key operational impacts has been undertaken against the relevant assessment criteria relating to temperature and contaminants expected to be released to Allans Creek and the Inner Harbour.

Temperature – Assessment against water quality criteria

The quality of the water discharging from 6BF will be consistent with the existing discharge from 5BF with the exception of temperature which will be slightly elevated due to the saltwater heat exchanger cooling system proposed for 6BF. With an increase in cooling water discharge of approximately 10% from 6BF compared to the existing discharge, it is predicted that this will result in an increase of approximately 0.5 – 1°C at the licence discharge point, No.2 Blower Station drain (EPL 6092 Point 79).

The EPA's policy is that the WQOs should be met at the edge of the area where initial mixing or "near-field" mixing occurs, ("near field" relates to initial mixing where the initial characteristics of momentum flux, buoyancy flux and outfall geometry influence the plume trajectory and mixing). Mixing that occurs through buoyant spreading motion and passive diffusion due to ambient turbulence is referred to as 'far field' mixing. Mixing zones should not receive concentrations of pollutants that cause acute toxic impacts meaning that acute impacts should be assessed at the point of release (EPA, 2018).

Adopting the two-step approach to the assessment recommended by the Water Quality Guidelines first requires comparison of the future temperatures at the point of discharge to Allans Creek to the 80th percentile temperatures of the reference system as a target for improvement. Table 8.44 indicates that compliance would require the temperature increase at the edge of the nearfield mixing zone to be less than 0.8 (^{o}C) to 1.3 (^{o}C) above ambient temperatures of the reference system depending on the season.

Given the multiple discharges to Allans Creek with temperature differentials of approximately 6 to 7 degrees Celsius, it is considered highly unlikely that the existing or proposed discharge streams comply with the low risk 80th percentile trigger values for slightly to moderately disturbed ecosystems at the edge of the nearfield mixing zone. Previous modelling results (refer to Section 8.4.2.1) predict that average heat loads associated with PKSW operations during summer would result in exceedances of the 80th percentile trigger values at a surface output point in the Inner Harbour located approximately 250 m from the entrance to Allans Creek.

Based on these results, both the existing and proposed discharge streams exceed the default assessment criteria relating to slightly to moderately disturbed ecosystems. Allans Creek and the Inner Harbour have, however, been subject to the effects of warmer than ambient industrial discharges for decades and are considered part of a highly disturbed ecosystem (NSG, 2006). Given the history of the PKSW site, it is considered appropriate to rely on site-specific scientific studies, together with professional judgement and other relevant information, to derive site specific trigger values in accordance with the approach adopted by previous assessments completed on behalf of BlueScope (CH2MHILL, 2008).

The Water Quality Guidelines note that where local but higher-quality reference data are used, a less stringent cut off than the 20th or 80th percentile value may be used. The 20th or 80th percentile values, however, should be used as a target for site improvement.

In this regard, the predicted increase in temperature at the point of discharge from No.2 Blower Station drain into Allans Creek will comply with the temperature limits specified under Clause L3.5 of EPL 6092. Similarly, the predicted increase in temperature at the point of discharge into Allans Creek will comply with the site specific temperature criteria (an increase of less than 3°C).

Numerical modelling of cooling water discharge

Historical investigations

BlueScope has previously undertaken detailed numerical modelling of cooling water discharges to the Inner Harbour as part of proposed upgrade projects. Between 2006 and 2008, Cardno Lawson Treloar issued a series of reports documenting the findings of numerical cooling water studies into the proposed salt water cooling of the then-proposed Steelworks Co-Generation Plant (SCP) (Cardno, 2006a, 2006b, 2008).

The modelling in 2006 – 2008 was undertaken using a combination of near and far-field models (CORMIX and Delft 3D respectively) and was calibrated against earlier records of measured temperature data (operational data and field data collected using ADCP's within Allans Creek and the Inner Harbour). The model has since been used by other proponents to assess the potential water quality impacts associated with the discharge of thermal plumes and their chemical constituents to Port Kembla Harbour (Cardno, 2019). On account of the recent use of the model by other major projects, the modelling approach and software used in the 2006 and 2008 BlueScope studies can be considered appropriate for this assessment. Since the earlier modelling was completed, no projects have been constructed or approved that would significantly alter ambient temperatures within Port Kembla.[10]

The modelling completed between 2006 and 2008 considered a variety of operating scenarios relating to typical and maximum heat loads during summer and winter conditions to account for seasonal variability. Importantly, all scenarios involved the operation of two blast furnaces (5BF and 6BF), which represents a worst-case scenario when compared to the proposed operations following completion of the 6BF reline project. It is also important to note that the Cogeneration Plant Project (for which the modelling was completed) was approved (Application Number: MP08_0132-Mod-1) but was not progressed; meaning that the previously proposed additional heat load was not applied to Allans Creek and the Inner Harbour. The flow and temperature data used for the modelling assessment is provided in Table 8.49 and Table 8.50.

Table 8.49 Modelled drain flows – Existing summer conditions (Cardno, 2006)

Modelled Drain Flows - Existing Summer Conditions					
Model Source No	Drain	Average Condition		Peak Condition	
		Flow (m^3/s)	ΔT(°C)	Flow (m^3/s)	ΔT(°C)
1	Main Drain	1.174	7.1	1.431	9.5
2	No.2 Blower Station	7.953	6.44	8.233	8.5
3	Iron Making East	0.208	4.05	0.232	7.5
4	3500mm Plate Mill Drain	0.395	2.84	0.43	3.5
5	Slab Mill Drain	0.013	31.41*	0.013	32.68*
6	No. 1 Flat Products East Drain	0.112	4.64	0.112	10.5
7	Allans Creek Flow	0.17	22.5*	0.17	22.5*
8	North Gate Drain	0.077	28.06*	0.13	30.22*

* presented as absolute temperature rather than excess

Table 8.50 Modelled drain flows – Existing winter conditions (Cardno, 2006)

Modelled Drain Flows - Existing Winter Conditions					
Model Source No	Drain	Average Condition		Peak Condition	
		Flow (m^3/s)	ΔT(°C)	Flow (m^3/s)	ΔT(°C)
1	Main Drain	1.517	6.28	2.993	6.2
2	No.2 Blower Station	8.211	7.11	8.413	13.2
3	Iron Making East	0.100	3.06	0.127	4.2
4	3500mm Plate Mill Drain	0.408	2.41	0.405	4.21
5	Slab Mill Drain	0.016	21.37*	0.081	22.0*
6	No. 1 Flat Products East Drain	0.196	4.35	0.189	9.21
7	Allans Creek Flow	0.170	16.80*	0.170	16.8*
8	North Gate Drain	0.102	17.98*	0.172	17.0*

* presented as absolute temperature rather than excess

[10] The proposed warming water discharge associated with the AIE Gas Import Terminal will partially offset BlueScope's cooling water discharge, however it would not be appropriate to include these benefits in the current assessment. It is also noted that the proposed AIP power station will discharge cooling water to the open coast beyond the Coal Loader Seawall, thus minimising the potential for any cumulative impacts to the Inner and Outer Harbours of Port Kembla.

The 2008 modelling exercise assessed a new discharge point to Allans Creek with a temperature differential (ΔT) of 10.29°C and a discharge rate of 8.682 m^3/s. The previously assessed increased heat load is significantly higher than the predicted increase associated with the current project of approximately 0.5 – 1°C. The following general observations regarding the previously predicted mixing zone behaviours are of relevance to the current project (Cardno, 2008):

– The previously proposed discharge point to Allans Creek resulted in an average mid-depth temperature increase near the discharge point in Allans Creek of approximately 3°C, indicating a rapid drop in temperature increases upon discharge.
– The initial mixing zone may extend between 30 m to 40 m from the discharge point in Allans Creek, indicating a limited area where the initial characteristics of momentum flux, buoyancy flux and outfall geometry influence the plume trajectory and mixing.
– Within the Inner Harbour, resulting average temperatures were generally less than 1.5°C for the surface layers and less than 0.5°C in the mid to bottom layers. Within the Outer Harbour, resulting average temperatures were generally less than 0.5°C for the surface layers and less than 0.2°C in the mid to bottom layers. Inner and Outer Harbour temperature increases indicate that far field mixing behaviours continue throughout the broader Port through buoyant spreading motion and passive diffusion due to ambient turbulence.

The previously assessed increased heat load is significantly higher than the predicted increase associated with the current project. Further details regarding the mixing behaviours in Port Kembla and extent of the previously predicted thermal plume within the surface, mid-depth and bottom layers of the water column for the previously assessed peak summer load scenario are provided in Appendix I.

Resulting 50^{th} percentile temperatures from the surface, mid-depth and bottom layers of the model were compared to summer and winter 80^{th} percentile trigger values in accordance with the WQO's (DEC, 2006). Key findings of the 2008 salt water cooling assessment (CH2MHILL, 2008) are summarised below:

– Discharges generally exceed trigger values under summer and winter conditions at all locations within Allans Creek and at some locations within the Inner Harbour.
– The extent of the mixing zone was predicted to be within 40 m of the discharge point.
– No major losses of biota from the Inner Harbour or Allans Creek were anticipated as a result of the thermal discharges.
– It was considered unlikely that the predicted temperature increases would cause a significant increase in the effects (toxic or bioaccumulation) of the heavy metals or PAHs at the entrance to Allans Creek or the Inner Harbour.
– The expected temperature changes were considered unlikely to influence potential for invasion of marine pest species.
– Plankton blooms were considered unlikely to occur as a result of the predicted temperature increases.
– Temperature impacts are noticeably different at each level within the water column.
– The highest absolute temperatures occur in the surface layers but the largest impacts to temperature may occur at the surface, mid-water column or near the seabed.
– Behaviour of the discharge plume is dominated by the stage of tide and wind conditions.
– Tidal influences result in previously discharged cooling water being transported backwards and forwards through the discharge points.

Current monitoring data and predications

Temperature data from 2BS drain discharge point is collected every 8 days by BlueScope as required by monitoring conditions contained in EPL 6092. Continuous flow data at the 2BS drain discharge point is also measured in accordance with condition M8 of EPL 6092. Table 8.51 displays the average and maximum summer and winter results collected at this discharge point using data collected between 2016 and 2021, and includes the predicted temperature conditions as a result of the project. A comparison of the existing and predicted temperatures at the discharge point with values used for previous modelling demonstrate that the anticipated minor increase in temperature is similar to the modelled data. As no significant impacts to marine life were found in the previous modelling study, no significant impacts are anticipated due to the proposed discharges from operation of 6BF.

Table 8.51 Measured and predicted temperature conditions at the 2BS drain discharge point

Condition	Existing Flow (m^3/s)	Existing ΔT(°C)	Predicted Flow (m^3/s)	Predicted ΔT(°C)
Summer Average	7.291	6.5	7.314	7.0
Summer Maximum	9.090	7.2	9.170	8.2
Winter Average	7.242	6.1	7.322	6.6
Winter Maximum	9.385	6.7	9.465	7.7

Contaminants - Assessment against water quality criteria

An assessment of the future discharge to Allans Creek and the Inner Harbour has been undertaken on the basis that the 6BF discharge contribution to the 2BS drain will be the same as that associated with 5BF.

Data acquired from licence monitoring and load based licencing requirements at the 2BS drain at the point of discharge to Allans Creek (EPL 6092 Point 79) has been used to inform this assessment. Licence testing is undertaken every 8 days, while samples for load based licencing requirements are collected per 'The Protocol' (Load Based Licencing, June 2009) using NATA accredited laboratories.

Results of the assessment are presented in Table 8.52 and Table 8.53 respectively. The data has been compared against the ANZG (2018) Default Value Guidelines (DGVs) for marine waters at the 80%, 90% and 95% LOSP.

Only data from the period 2016 – 2021 has been used due to the following operational changes made prior to 2016:

– 2009 – Recirculating clarified water system installed at 5BF
– 2009 – Seal pot condensate containment system installed at 5BF
– 2011 – 6BF ceases operation
– 2016 – Ironmaking East Drain diverted to the 2BS drain
– 2016 – Coke Ovens Recovery Basin overflows diverted from the Main Drain (Point 78) to the 2BS drain

Table 8.52 No.2 Blower Station Drain data assessment summary (2016 – 2021)

Parameter	80% LOSP	90% LOSP	95% LOSP
Ammonia	✓	✓	✓
Anthracene	✓	✓	✓
Arsenic (AsIII)*	✓	✓	✓
Arsenic (AsV)*	✓	✓	✓
Benzo(a)pyrene	✓	✓	✓
Cadmium	✓	✓	✓
Chromium (CrIII)	✓	✓	✓
Chromium (CrVI)	✓	✓	✓
Copper	⊙	⊙	⊙
Cyanide	✓	×	⊙
Fluoranthene	✓	✓	✓
Lead	⊙	⊙	⊙
Mercury (inorganic)	✓	✓	✓
Naphthalene	✓	✓	✓
Phenanthrene	✓	✓	✓
Selenium (total)*	✓	✓	✓
Zinc	⊙	⊙	⊙

Notes: ✓ - *Complies with assessment criteria*

× - *Does not comply with the assessment criteria*

⊙ - *Limit of Reporting is not sufficiently low to assess compliance*

**Freshwater value has been used in absence of a marine water value*

Table 8.53 No.2 Blower Station Drain data assessment against DGV (2016 – 2021)

Parameter / units	No. samples	Min value	Av. value	Max. value	100% EPL	80% LOSP	90% LOSP	95% LOSP
Ammonia (Nitrogen) (µg/L)	253	<60	<60	310	5000	1700	1200	910
Anthracene (µg/L)	4	<0.05	<0.05	<0.05	--	7	1.5	0.4
Arsenic* (µg/L)	23	<10	<10	<10	--	140	42	13
Benzo(a)pyrene (µg/L)	4	<0.05	<0.05	<0.05	--	0.7	0.4	0.2
BOD (mg/L)	1	<2	<2	<2	20	--	--	--
Cadmium (µg/L)	24	<5	<5	<5	60	36	14	5.5
Chromium (Total) (µg/L)	24	<10	<10	<10	--	85	20	4.4
Copper (µg/L)	24	<10	<10	<10	--	8	3	1.3
Cyanide (Total) (µg/L)	253	<5	<5	11.3	300	14	7	4
Flouranthene (µg/lL)	4	<0.05	<0.05	0.06	--	2	1.7	1.4
Filtrable Iron (mg/L)	253	<0.01	<0.01	0.16	0.3	--	--	--
Fluoride (mg/L)	5	<0.1	0.68	1.40	--	--	--	--
Hexavalent Chromium (mg/L)	21	<0.001	<0.001	<0.001	--	--	--	--
Lead (µg/L)	24	<20	<20	<20	100	12	6.6	4.4
Mercury (µg/L)	26	<0.20	0.02	0.27	--	1.4	0.7	0.4
Naphthalene (µg/L)	4	<0.05	<0.05	0.15	--	120	90	70
Oil and Grease (mg/L)	253	<5	<5	<5	50	--	--	--
Phenanthrene (µg/L)	4	<0.05	<0.05	0.1	--	8	4	2
Selenium* (µg/L)	23	<10	<10	<10	--	34	18	11
Total Iron (mg/L)	253	0.06	0.19	1.4	--	--	--	--
TSS (mg/L)	253	<2	10.28	29	500	--	--	--
Zinc (Total) (µg/L)	253	<50	<50	520	3000	21	12	8

*Notes:

– Freshwater DGV's for As(V), Se
– Where individual readings were below LOR, a value of zero has been adopted in calculating average values
– Where all readings were below LOR, average value has been reported as <LOR

From examination of the above data, it is apparent that relatively few exceedances of the 95% LOSP DGV's occur during operations, with the exception of cyanide. The cyanide concentrations detected were all compliant with EPL 6092 concentration limits. The laboratory Limit of Reporting (LOR) for copper, lead and zinc is not sufficiently low to assess compliance against the DGVs.

Cyanide is present in the blowdown water discharged from the blast furnace effluent treatment system. Investigations are currently underway at the 5BF to determine additional, online treatment solutions to reduce the concentration of cyanide in the blowdown water before it is discharged to the 2BS drain. Solutions identified through the investigations will be implemented at 5BF. Learnings and solutions for cyanide treatment at the 5BF will be applied to the future operation of 6BF.

The existing data set does not include several of the DGVs and, as already highlighted, in some cases the LOR is not sufficiently low to compare against DGVs. A project, PRP 182, is currently underway to address the identified gaps in data when comparing the analytes measured at 2BS drain against the list specified in the ANZG (2018)

DGVs. For this program, BlueScope is undertaking extensive sampling to identify and quantify all sources of pollutants entering, and ultimately discharging from the 2BS drain to Allans Creek, including from the blast furnace effluent treatment system. PRP 182 includes assessment of the potential impact of discharges on the environmental values of the receiving waters with reference to the relevant criteria relating to levels of aquatic ecosystem protection defined in ANZG (2018).

The findings of this ongoing program will provide critical inputs to the assessment and ongoing management of the potential water quality impacts of discharges to Allans Creek.

8.4.3.5 Decommissioning impacts to water quality

The target campaign duration for 6BF will be 20 years after which time furnace conditions will dictate relining or decommissioning requirements.

The risks to water quality associated with the rundown and decommissioning are well understood by BlueScope given the experience gained during the successful delivery of previous reline projects. During decommissioning, rundown water is captured, treated and tested prior to discharge to ensure compliance with EPL 6092.

As a result, risks to water quality associated with the rundown and decommissioning phase can be effectively managed through a rundown and decommissioning strategy (or similar) which will be developed at a future date, in consultation with the EPA.

8.4.4 Summary of assessment

The proposed project will not result in any material adverse impacts to water quality, when compared to the current operations of 5BF. The predicted increase in temperature at the point of discharge into Allans Creek is predicted comply with the site-specific temperature criteria (an increase of less than 3°C) developed during detailed studies into the ecology of Allans Creek and the Inner Harbour.

The project will result in reduced water use, improved energy efficiency and improved water capture capability thereby minimising the risk of adverse water quality impacts.

8.4.5 Mitigation and management measures relating to water quality

Management and mitigation measures that will be implemented to minimise the water quality impacts of the project are provided in Table 8.54.

Table 8.54 Water quality management measures

Impact / Aspect	ID	Measure	Timing
Surface Water General	WQ1	To manage impacts to water quality during the construction phase, it is recommended that the CEMP include a site specific SWMP outlining site management requirements, specific controls, environmental inspection requirements, roles and responsibilities, health and safety, incident management and emergency response including arrangements for managing wet weather events. The SWMP will include an Erosion and Sediment Control Plan (ESCP) which will be prepared in accordance with the *Blue Book -Managing Urban Stormwater: Soils and Construction* (4th edition, Landcom, 2004).	Pre-construction
	WQ2	A commissioning Water Quality Management Plan (WQMP) will be developed following investigations during detailed design to assess the likely composition of initial flushing water, the potential for foaming, the characteristics of the start-up blowdown water and commissioning of the granulator. Where required monitoring programs and corrective measures will be developed to ensure that discharges to groundwater, No.2 Blower Station Drain and Allans Creek are in accordance with EPL 6092. The commissioning WQMP may be a standalone document or may form part of the SWMP.	Pre-construction
	WQ3	The only direct discharge to 2BS drain will be from the effluent treatment system. All other discharges will be directed to Ironmaking East Drain (IMED), a secondary containment basin, which will then be pumped to 2BS.	Operation

Impact / Aspect	ID	Measure	Timing
Process Water / Stormwater	WQ4	The slag handling area will include: – Hardstand surfaces graded to internal drains in the area so surface water will flow into either the new slag pit settling pond or the granulator settling pond. – Collected water from the water sprays in the area will be recycled as make up water to the granulator or as slag pit sprays. – In a rain event the first flush will be collected in the new slag pit settling pond, which will flow into the plant stormwater drain before draining to IMED and subsequently being pumped to 2BS for release to Allans Creek.	Operation
	WQ5	The effluent treatment system will be above ground and bunded underneath to capture any flows. Any spillage will be captured and directed to the effluent treatment system. Additional paving between the effluent treatment system and the road on the east side of the plant will cover the unsealed area.	Operation
	WQ6	COG and BFG condensate will be managed with the controls that have previously been identified as part of PRP181-Seal Pot Risk Assessment. 'No-blow' seal pots will be installed for BFG seal pots which will improve the risk of gas condensate overflows, collection tanks will be bunded and level detection with alarming installed to avoid over fill events.	Operation
	WQ7	The effluent treatment system will discharge cleaned and treated water to 2BS, however if the water quality is variable, this will be directed to contingency storage for further treatment and reassessment.	Operation
	WQ8	All process wastewater within the 6BF area will be either captured or treated and then discharged as per below: – Blowdown water from the effluent treatment system is discharged to 2BS drain following the treatment process. – Contingency storage for all discharges will be used when water quality is variable. – Collection of blast furnace gas seal pot water and return to the effluent treatment system. – Collection of COG seal pot water with pick up by truck. – Seal pot tanks will have bunds installed and level detection with alarming on collection tanks to avoid over fill events. – Online treatment for cyanide is currently under investigation at 5BF. Outcomes and Learnings will be applied to 6BF.	Operation
	WQ9	In high rainfall events water in the IMED may overflow the weir into Port Kembla Harbour at licensed discharge point 89.	Operation
	WQ10	Surface and groundwater monitoring will be undertaken in accordance with EPL conditions and the outcomes of any Pollution Reduction Plans requirements.	Operation
	WQ11	Spill management will involve: – EPA compliant bunding of all hazardous chemicals. – Spill kits readily available. – High risk process areas sealed. – All runoff, including spills, from the gas cleaning and effluent treatment plants will be collected and returned to the water treatment plant during normal operation. – Spill containment and additional paving between effluent treatment system and road on the east side of the plant. – No-blow seal pots installed on blast furnace gas mains reducing the chance of make-up water being left on for extended periods of time. – Level detection and alarming on gas condensate collection tanks. – Seal pot tanks will have bunds installed and level detection with alarming on collection tanks to avoid over fill events. – Above ground effluent treatment system clarifier with bunding underneath to capture any overflows.	Construction and Operation

Impact / Aspect	ID	Measure	Timing
Decommiss-ioning	WQ12	A rundown and decommissioning strategy (or similar) will be developed prior to decommissioning, in consultation with the EPA. The strategy will describe the water dosage and treatment processes during the rundown phase and management measures that will be implemented during decommissioning to ensure that water quality in the No.2 Blower Station drain meets EPL conditions throughout the rundown process.	Pre-Decommiss-ioning

8.5 Traffic

This section describes traffic and access matters relevant to the construction and operation of the project. It summarises the key findings of the specialist Traffic Impact Assessment (TIA) prepared for the proposal by GHD which is included in full at Appendix I.

8.5.1 Methodology

The TIA was prepared with reference to the relevant guidelines including *Guide to Traffic Generating Developments* (Roads and Maritime Service, 2002) and to satisfy the SEARs for the project.

The existing road network and traffic and access conditions were determined based on site inspections, traffic counts at key roads and intersections, and publicly available traffic data. Traffic count data from 2019 and 2021 was used to understand the impact of COVID-19 on local traffic to better determine the impact of the project on the road network under normal (pre-COVID) conditions.

The performance of the existing road network including the potential impacts of the project were assessed to determine the impact upon the safety and capacity of the road network including both intersection capacity and mid-block assessment criteria.

8.5.1.1 Intersection assessment criteria

The performance of the existing road network is largely dependent on the operating performance of key intersections, which are critical capacity control points on the road network.

The criteria for evaluating the operational performance of intersections are provided by the *Guide to Traffic Generating Developments* (Roads and Maritime Service, 2002) and reproduced in Table 8.55. The criteria for evaluating the operational performance of intersections is based on a qualitative measure being Level of Service (LoS) which is applied to each band of average vehicle delay.

Table 8.55 Level of service criteria for intersections

Level of Service	Average Delay per Vehicle (seconds/veh)	Traffic Signals, Roundabouts	Give Way & Stop Signs
A	< 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays & spare capacity	Acceptable delays & spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity & accident study required
E	57 to 70	At capacity; at signals, incidents will cause excessive delays Roundabouts require other control modes	At capacity, requires other control mode
F	> 70	Over Capacity Unstable operation	Over Capacity Unstable operation

Source: Guide to Traffic Generating Developments (Roads and Maritime Services 2002)

SIDRA 8 intersection modelling software was used to assess the peak hour operating performance of intersections on the surrounding road network with and without project traffic.

8.5.1.2 Midblock assessment criteria

According to *Austroads Guide to Traffic Management, Part 3: Traffic Studies and Analysis,* Section 5.2.1, the one-way mid-block capacity of an urban arterial road with interrupted flow varies depending on the type of lane. The typical mid-block capacity for urban roads with interrupted flow is outlined in Table 8.56.

An interrupted flow facility road is one in which traffic flow conditions are subject to the influence of fixed elements such as traffic signals, stop signs, give-way signs, roundabouts or other controls which cause traffic to stop periodically, irrespective of the total amount of traffic; examples include urban streets, unsignalised and signalised intersections.

Table 8.56 Typical mid-block capacity for urban roads with interrupted flow

Type of lane	One-way mid-block capacity (pc/h)
Median or inner lane	
Divided Road	1,000
Undivided Road	
Middle lane (of a 3 lane carriageway)	900
Divided road	900
Undivided road	1,000
Kerb lane	
Adjacent to parking lane	900
Occasional parked vehicles	600
Clearway conditions	900

Source: Table 5.1 in Austroads Guide to Traffic Management Part 3: Traffic Studies and Analysis Note: pc/h = passenger cars per hour

Austroads Guide to Traffic Management Part 3 – Traffic Studies and Analysis (Section 5.2.1) outlines that:

– *Peak period mid-block traffic volumes may increase to 1,200 to 1,400 pc/h/lane on any approach road when the following conditions exist or can be implemented:*
  - *Adequate flaring at major upstream intersections*
  - *Uninterrupted flow from a wider carriageway upstream of an intersection approach and flowing at capacity*
  - *Control or absence of crossing or entering traffic at minor intersections by major road priority controls*
  - *Control or absence of parking*
  - *Control or absence of right turns by banning turning at difficult intersections*
  - *High volume flows of traffic from upstream intersections during more than one phase of a signal cycle*
  - *Good co-ordination of traffic signals along the route.*

For the purposes of this assessment:

– A one-way mid-block capacity of 1,200 pc/h/lane has been adopted for arterial roads in the study area, including for Springhill Road and Five Islands Road.

– A one-way mid-block capacity of 900 pc/h/lane has been adopted for other roads in the study area, including Cringila Car Park Road, Loop Road, Emily Road, BlueScope Access Road, Flagstaff Road, and Old Port Road.

This is in keeping with the Austroads special conditions, which are reflective of the existing conditions for roads in the study area. This capacity is used to assess the Volume Capacity Ratio (VCR) of a particular road.

The VCR is a measure of the level of congestion on a road given the traffic volume and road capacity. When the VCR reaches 1, this indicates that the road is operating at 100 percent capacity.

8.5.2 Existing environment

8.5.2.1 Road network

There are several key roads that will be impacted by the project, each of which are discussed below.

Springhill Road

Springhill Road is a state arterial road and forms part of the B65, which connects Wollongong Central Business District and Port Kembla. Springhill Road is a sealed dual-carriageway road with a speed limit of 80 km/h. The speed limit is reduced to 60 km/h north of Port Kembla Road. Parking and stopping are restricted along the alignment. Footpaths and shared bicycle paths are present along some parts of the road. Bus stops are also located along the road.

Springhill Road runs in an approximately northeast to southwest alignment between Corrimal Street and the signal-controlled intersection with Masters Road. To the south of Masters Road, Springhill Road runs in an approximate north to south alignment and forms the northern approach to a signal-controlled intersection with Five Islands Road. Springhill Road provides access to mainly industrial and port related land uses, including access roads to PKSW, which are accessed via signal-controlled intersections.

Five Islands Road

Five Islands Road is a state road, which forms part of the B65 between Wollongong and Port Kembla. Five Islands Road is a sealed dual-carriageway road with a speed limit of 60 km/h. Parking and stopping along the alignment are restricted. There are pedestrian and cyclist facilities along some parts of the road. Public transport links along Five Islands Road are two bus stops and Cringila railway station.

Five Islands Road forms a signal-controlled intersection with Springhill Road and Flinders Street and provides a connection between the Princes Motorway and Port Kembla. It provides access to the PKSW via Cringila Car Park Road, Emily Road and Flagstaff Road.

Cringila Car Park Road

Cringila Car Park Road is a 250 metre local road, providing access to PKSW from Five Islands Road. It connects Five Islands Road in the south to Loop Road in the northwest and provides access to the project site car park. Cringila Car Park Road is a sealed bi-directional road with one land in each direction. It is divided by 30 m long median strip at the north western end before the intersection with Loop Road. The road is sign posted at 40 km/h. There are no restrictions for parking and stopping along the road. A shared path is provided along the eastern side of the road between Five Islands Road and Cringila Car Park, and there are no public transport facilities or services along the road.

Loop Road

Loop Road is a local private road, providing a connection between Emily Road to the south and Central Road to the northeast. It has a sealed single carriageway with one lane in each direction and a 40 km/h default urban speed limit. There are no restrictions for stopping and parking along the road. A shared path is provided along the southern side of the road between Cringila Car Park and Central Road.

Emily Road

Emily Road is a short (approximately 120 metres) split, local private road, providing access to PKSW from Five Islands Road. It has two separate one-way roads from Five Islands Road that converge into a single carriageway at around 40 metres from Emily Road. It has a sealed carriageway with one lane on in each direction and a 40 km/h speed limit. There are no pedestrian or bicycle facilities along the road.

BlueScope Access Road

BlueScope Access Road is an approximately 180 metre local private road, which serves as one of the primary access to PKSW from Springhill Road. It forms a roundabout intersection with Kembla Road, Hot Strip Road and Illawarra Road at its southern end. It has a sealed carriageway, generally divided by a single barrier line, varying traffic lanes (two to three) in each direction and a 50 km/h default urban speed limit. There are no stopping or parking facilities along the alignment. Shared paths are provided on both sides of the road.

Flagstaff Road

Flagstaff Road is a local road that runs in an approximately east-west alignment from Five Islands Road to Berkeley Road. It provides access from Five Islands Road to PKSW in the south. It has a single sealed carriageway with one lane in each direction and a 40 km/h speed limit. Stopping is prohibited and there are no pedestrian or bicycle facilities present along the alignment.

Old Port Road

OId Port Road is classified as a state road and provides access to industrial and port related land uses within the southern part of Port Kembla. At its southern end it forms a roundabout intersection with Foreshore Road and further to the south becomes Darcy Road. At its southern end, Darcy Road forms the minor approach to a priority "Stop" controlled intersection with Five Islands Road and Military Road.

Heavy vehicle approved routes

PKSW can be accessed by the following heavy vehicle routes approved for use by vehicles up to 26 m B-double equivalent:

– Springhill Road
– Five Islands Road
– Flinders Street
– Old Port Road
– Masters Road (via Springhill Road)
– Princes Motorway (via Five Islands Road or Masters Road).

Public and active transport

The closest stations to the project site are Cringila Station and Port Kembla North Station. These stations are served by the South Coast Line. Several bus services also service the area, with a frequency of approximately 1 service per hour for each bus route. Active transport facilities in proximity to the project site are limited to footpaths / shared paths along Springhill Road, Five Islands Road, Cringila Car Park Road, and BlueScope Access Road. There are neither pedestrian nor bicycle facilities along Emily Road and Flagstaff Road within the PKSW premises.

8.5.2.2 Traffic behaviour

Traffic volumes

Traffic count data from the TfNSW Traffic Volumes Viewer website can be used to determine traffic growth trends. A traffic count station was established at Five Islands Road, east of Springhill Road (TfNSW Count Station ID: 07097). A summary of the average weekday traffic volumes indicated that there was a decline in average daily traffic movements from 45,181 to 40,623 over the period between 2014 and 2018 (TfNSW, 2021a).

Traffic turning counts were undertaken on Tuesday, 7 September 2021. Surveys were undertaken during the following time periods during the morning (5:00 am to 9:00 am) and afternoon (4:00 pm to 6:00 pm) weekday peaks. Intersection turning count surveys were undertaken at the following major intersections:

– Cringila Car Park Road / Five Islands Road intersection (left in, left out only)
– Loop Road / Cringila Car Park Road intersection
– Five Islands Road / Emily Road (Entry) intersection
– Five Islands Road / Emily Road (Exit) intersection
– Springhill Road / BlueScope Access Road signalised intersection
– Five Islands Road / Flagstaff Road intersection (left in, left out only)

Analysis of the traffic survey data identified that the morning peak hours were between 7:45 and 8:45 am. The afternoon peak was observed to be between 4:00 to 5:00 pm.

However, given the impact of COVID-19 lockdowns causing a significant reduction in travel patterns at the time of the traffic count, the data collected does not reflect normal (pre-COVID) traffic conditions. To quantify the effects of the pandemic in the road network and PKSW operations, the September 2021 traffic survey data has been compared with average gate entries / exits from the site recorded between 9 to 13 of September 2019 (using from gate data provided by BlueScope) and with the traffic data from GHD's Port Kembla Gas Terminal TIA Report prepared in November 2018. This data is presented in Table 8.57

Table 8.57 Traffic count data

Location	Direction	Average 2019 Gate Entries / 2018 Traffic Survey		2021 Traffic Survey		% Difference	
		AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
Loop Road Gate	Entry	90	39	67	71	-26%	82%
	Exit	54	145	50	106	-7%	-27%
North Gate	Entry	68	21	47	68	-31%	224%
	Exit	34	97	25	55	-26%	-43%
Five Islands Road (northwest of Flinders Street)	NB/EB	2,186	1,838	1,114	1,436	-49%	-22%
	SB/WB	1,598	2,222	1,203	1,252	-25%	-44%
Springhill Road (southwest of Port Kembla Road)	NB/WB	1,366	649	1,555	906	14%	40%
	SB/EB	547	756	729	1,308	33%	73%

To reflect the pre-pandemic traffic conditions for the subsequent analysis, 2021 surveyed traffic data was factored up utilising the 2018 surveyed traffic data and 2019 gate data, except for the North Gate entries during the PM peak. The 2021 traffic survey data was utilised for this location to avoid reducing the traffic demands, to provide the most conservative assessment. Peak hour traffic data is generally consistent with the road classification of the roads surrounding the site.

8.5.2.3 Mid-block capacity analysis

For the purposes of this assessment, a one-way mid-block capacity of 1,200 passenger car per hour per lane (pc/h/lane) has been adopted for the arterial roads, including Springhill Road and Five Islands Road, which is in keeping with the Austroads special conditions, which are reflective of the existing conditions. For Cringila Car Park Road, Loop Road, Emily Road, BlueScope Access Road, Flagstaff Road and Old Port Road, a one-way mid-block capacity of 900 pc/h/lane has been adopted.

The analysis of VCR for existing morning and afternoon peak hours identified that all assessed roads are currently operating within acceptable levels. The highest VCRs were identified on:

– Five Islands Road during the AM peak with a maximum VCR of 0.5
– Five Islands Road during the PM peak with a maximum VCR of 0.56.

All other mid-block locations assessed demonstrated lower VCRs indicating all roads reviewed currently have available capacity and are not experiencing congestion. A complete summary of the VCR results for all assessed locations is included in Appendix I.

8.5.2.4 Crash data review

Road crash data is published by the NSW Centre for Road Safety. Crash data for key intersections from between 2015 and 2019 is presented below in Table 8.58.

Table 8.58 Number of recorded crashes by road section (2015-2019)

Location	Number of Crashes	Number of Injuries			
		Fatal	Serious	Moderate	Minor
Five Islands Road within approximately 100 metres from Emily Roads	6	0	2	0	1
Five Islands Road within approximately 100 metres from Flagstaff Road	5	0	3	2	0
Springhill Road within approximately 100 metres from BlueScope Access Road	7	0	2	3	2
Total	18	0	7	5	3

The predominant crash types are rear-end collisions and collisions with parked vehicles at daytime and off-carriageway left on right bend into objects and parked vehicles at night. These could be attributed to the reduced sight distance around the bends (when compared to straight alignment) or poor driver behaviour such as speeding and tailgating, among others.

8.5.3 Potential impacts

8.5.3.1 Construction

Traffic volume

The construction of the project will generate traffic as described in Section 5.4. Light vehicle movements will mainly be due to the transport of the construction workforce to and from construction sites. Heavy vehicle movements will mainly be due to the transport of plant, equipment and materials to and from the site. The predicted additional daily light and heavy vehicle traffic volumes on the road network during construction are summarised in Table 8.59. The traffic volumes are based on predicted routes to and from the site and represent a conservative estimate.

Table 8.59 Increase in construction traffic generation – daily traffic and peak

Road	Location	Direction	Daily traffic			Peak hours		
			Light vehicles	Heavy vehicles	Total vehicles	Light vehicles	Heavy vehicles	Total vehicles
Springhill Road	Northeast of BlueScope Access Road	Eastbound	0	40	40	0	4	4
		Westbound	4	0	4	4	0	4
	Northwest of BlueScope Access Road	Eastbound	11	0	11	11	0	11
		Westbound	11	0	11	11	0	11
BlueScope Access Road	South of Springhill Road	Northbound	15	0	15	15	0	15
		Southbound	15	0	15	15	0	15
Five Islands Road	Southeast of Cringila Car Park Road	Eastbound	0	0	0	0	0	0
	Southwest of Cringila Car Park Road	Eastbound	200	110	310	200	11	211
	Southeast of Emily Road (Entry)	Westbound	0	0	0	0	0	0
	Northwest of Emily Road (Entry)	Westbound	0	0	0	0	0	0
	Northeast of Emily Road (Exit)	Westbound	0	0	0	0	0	0
	Northwest of Emily Road (Exit)	Westbound	200	110	310	200	11	211
	Northeast of Flagstaff Road	Northbound	0	0	0	0	0	0
	Southeast of Flagstaff Road	Northbound	170	80	250	170	8	178
Cringila Car Park Road	Southeast of Cringila Car Park	Northbound	200	110	310	200	11	211
		Southbound	0	0	0	0	0	0
	Southwest of Cringila Car Park	Eastbound	200	110	310	200	11	211
		Westbound	0	0	0	0	0	0
Loop Road	Northeast of Cringila Car Park Road	Northbound	285	0	285	285	0	285
		Southbound	285	0	285	285	0	285
	Southeast of Cringila Car Park Road	Northbound	85	0	85	85	0	85
		Southbound	285	110	395	285	11	296
Emily Road	South of Five Islands Road	Northbound	200	110	310	200	11	211
		Westbound	0	0	0	0	0	0

Road	Location	Direction	Daily traffic			Peak hours		
			Light vehicles	Heavy vehicles	Total vehicles	Light vehicles	Heavy vehicles	Total vehicles
Flagstaff Road	East of Five Islands Road	Eastbound	170	80	250	170	8	178
		Westbound	0	0	0	0	0	0
Old Port Road	North of Darcy Road	Northbound	0	150	150	0	15	15
		Southbound	0	150	150	0	15	15

Peak hour traffic generation is associated with light vehicle movements during shift changeover periods. Light vehicle movements during other times of the day are expected to be minimal. In addition, it should be noted that the morning peak hour for the construction traffic (5:00 am – 6:00 am) will not occur at the same time as the road network peak hour (7:45 am – 8:45 am). Outside of shift change over hours, the construction of the project will result in an increase of around 30 two-way heavy vehicle movements per hour.

Intersection performance

Key intersections near the project were assessed using the SIDRA 8 Intersection modelling software to assess their performance against the predicted increase in traffic. The intersection traffic modelling was undertaken for the weekday peak hour periods (7:45 to 8:45 am and 4:00pm to 5:00pm). Intersection modelling is presented below in Table 8.60 and Table 8.61. Intersection performance will not be significantly impacted by the project.

Table 8.60 SIDRA modelling results – Morning peak

Intersection	Control Type	AM Peak (7:45 am – 8:45 am) Normal conditions			AM Peak (7:45 am – 8:45 am) Construction conditions		
		Average Delay (s)	LoS	Degree of Saturation	Average Delay (s)	LoS	Degree of Saturation
Cringila Car Park Road / Five Islands Road	Stop	9.8	A	0.016	8.9	A	0.013
Loop Road / Cringila Car Park Road	Give way/Yield	5.2	A	0.029	6.3	A	0.072
Five Islands Road / Emily Road (Entry)	Give way/Yield	5.9	A	0.330	5.9	A	0.330
Five Islands Road / Emily Road (Exit)	Give way/Yield	6.7	A	0.028	6.7	A	0.028
Springhill Road / BlueScope Access Road	Signal	23.8	B	0.797	23.9	B	0.797
Five Islands Road / Flagstaff Road intersection	Give way/Yield	10.7	A	0.020	10.1	A	0.019

Table 8.61 IDRA modelling results – Afternoon peak

Intersection	Control Type	PM Peak (4:00 pm – 5:00 pm) Normal conditions			PM Peak (4:00 pm – 5:00 pm) Construction conditions		
		Average Delay (s)	LoS	Degree of Saturation	Average Delay (s)	LoS	Degree of Saturation
Cringila Car Park Road / Five Islands Road	Stop	13.0	A	0.075	12.6	A	0.069
Loop Road / Cringila Car Park Road	Give way/Yield	5.6	A	0.005	7.8	A	0.014
Five Islands Road / Emily Road (Entry)	Give way/Yield	5.6	A	0.270	5.6	A	0.270
Five Islands Road / Emily Road (Exit)	Give way/Yield	6.1	A	0.087	6.7	A	0.307
Springhill Road / BlueScope Access Road	Signal	22.3	B	0.591	22.3	B	0.591
Five Islands Road / Flagstaff Road intersection	Give way/Yield	7.8	A	0.022	7.8	A	0.228

Mid-block performance

The peak hour construction traffic movements have been added to the observed road network AM and PM peak hour traffic volumes. This provides a conservative assessment noting that during the AM peak, the network peak hour was observed to be between 7:45 am and 8:45 am although the construction traffic peak hour is expected to be between 5:00 am and 6:00 am. Additionally, the PM peak for staff light vehicle movements is expected to occur over a two hour period, with light vehicles departing the site between 4:00 pm to 6:00 pm. However, for a conservative assessment, it has been assumed that all staff would depart during the network peak hour.

Table 8.62 and Table 8.63 provide the VCR results for the AM and PM peak hours respectively for the peak construction period. The data indicates that the majority of key roads in the vicinity of the project are expected to operate well within the acceptable capacity for weekday morning and afternoon peak periods.

Table 8.62 Peak construction midblock volume / capacity – AM peak hour

Road	Location	Direction	Capacity (veh/hr/lane)	Number of lanes	Total vehicles (PCUs)	V/C ratio
Springhill Road	Northeast of BlueScope Access Road	Eastbound	1,200	3	1,466	0.41
		Westbound	1,200	3	626	0.17
	Northwest of BlueScope Access Road	Eastbound	1,200	3	1,544	0.43
		Westbound	1,200	3	638	0.18
BlueScope Access Road	South of Springhill Road	Northbound	900	2	60	0.03
		Southbound	900	2	126	0.07
Five Islands Road	Southeast of Cringila Car Park Road	Eastbound	1,200	3	1,558	0.43
	Southwest of Cringila Car Park Road	Eastbound	1,200	3	2,058	0.57
	Southeast of Emily Road (Entry)	Westbound	1,200	3	2,028	0.56
	Northwest of Emily Road (Entry)	Westbound	1,200	3	2,016	0.56
	Northeast of Emily Road (Exit)	Westbound	1,200	3	1,994	0.55
	Northwest of Emily Road (Exit)	Westbound	1,200	3	2,020	0.56
	Northeast of Flagstaff Road	Northbound	1,200	3	1,860	0.52
	Southeast of Flagstaff Road	Northbound	1,200	3	2,045	0.57
Cringila Car Park Road	Southeast of Cringila Car Park	Northbound	900	1	515	0.57
		Southbound	900	1	16	0.02
	Southwest of Cringila Car Park	Eastbound	900	1	247	0.27
		Westbound	900	1	295	0.33
Loop Road	Northeast of Cringila Car Park Road	Northbound	900	1	678	0.75
		Southbound	900	1	57	0.06
	Southeast of Cringila Car Park Road	Northbound	900	1	239	0.27
		Southbound	900	1	121	0.13
Emily Road	South of Five Islands Road	Northbound	900	1	26	0.03
		Westbound	900	1	12	0.01
Flagstaff Road	East of Five Islands Road	Eastbound	900	2	120	0.07
		Westbound	900	2	115	0.06
Old Port Road	North of Darcy Road	Northbound	900	1	129	0.14
		Southbound	900	1	125	0.14

**veh = vehicles, hr = hour, PCU = passenger car units, V/C = volume to capacity ratio*
Note, PCU factors = 1 for light vehicles, 2 for heavy vehicles (or 2.5 if the number of B-Doubles is unknown) and 4 for B-Doubles

Table 8.63 Peak construction midblock volume / capacity analysis – PM peak hour

Road	Location	Direction	Capacity (veh/hr/lane)	Number of lanes	Total vehicles (PCUs)	V/C ratio
Springhill Road	Northeast of BlueScope Access Road	Eastbound	1,200	3	613	0.17
		Westbound	1,200	3	416	0.12
	Northwest of BlueScope Access Road	Eastbound	1,200	3	587	0.16
		Westbound	1,200	3	496	0.14
BlueScope Access Road	South of Springhill Road	Northbound	900	2	130	0.07
		Southbound	900	2	30	0.02
Five Islands Road	Southeast of Cringila Car Park Road	Eastbound	1,200	3	2,132	0.59
	Southwest of Cringila Car Park Road	Eastbound	1,200	3	2,088	0.58
	Southeast of Emily Road (Entry)	Westbound	1,200	3	1,625	0.45
	Northwest of Emily Road (Entry)	Westbound	1,200	3	1,609	0.45
	Northeast of Emily Road (Exit)	Westbound	1,200	3	1,600	0.44
	Northwest of Emily Road (Exit)	Westbound	1,200	3	2,148	0.60
	Northeast of Flagstaff Road	Northbound	1,200	3	1,381	0.38
	Southeast of Flagstaff Road	Northbound	1,200	3	1,448	0.40
Cringila Car Park Road	Southeast of Cringila Car Park	Northbound	900	1	7	0.01
		Southbound	900	1	51	0.06
	Southwest of Cringila Car Park	Eastbound	900	1	54	0.06
		Westbound	900	1	7	0.01
Loop Road	Northeast of Cringila Car Park Road	Northbound	900	1	11	0.01
		Southbound	900	1	715	0.79
	Southeast of Cringila Car Park Road	Northbound	900	1	11	0.01
		Southbound	900	1	669	0.74
Emily Road	South of Five Islands Road	Northbound	900	1	549	0.61
		Westbound	900	1	16	0.02
Flagstaff Road	East of Five Islands Road	Eastbound	900	2	214	0.12
		Westbound	900	2	5	0.00
Old Port Road	North of Darcy Road	Northbound	900	1	134	0.15
		Southbound	900	1	165	0.18

**veh = vehicles, hr = hour, PCU = passenger car units, V/C = volume to capacity ratio*
Note, PCU factors = 1 for light vehicles, 2 for heavy vehicles (or 2.5 if the number of B-Doubles is unknown) and 4 for B-Doubles

8.5.3.2 Road safety

Additional traffic will be generated by the project. As discussed above, the wider road network has the capacity to manage this increase, and therefore construction traffic will have a negligible impact on road safety across the wider road network. The morning and afternoon peak of light vehicles entering and exiting the site will lead to a small increase in the likelihood of accidents. Heavy vehicles entering and exiting the site will also cause a small increase in the likelihood of accidents occurring. Neither case is considered to be a significant increase in risk, as intersection performance will remain similar to the existing conditions.

During the site investigation undertaken for the TIA, the approach sight distance to the Emily Road access / Five Islands Road intersection was investigated based on crash data for crashes surrounding the area. The approach site distance was measured to be approximately 170 m, which is considered acceptable under Austroads Guide to Road Design Part 4A: Un-signalised and Signalised. This assessment confirmed that no road upgrades are required to complete the project.

8.5.3.3 Other construction impacts

Approximately 570 parking spaces are available on site for construction personnel at the central car park. This provision is expected to be adequate to accommodate the workforce, and therefore impacts to on-street parking are not anticipated. No new parking is proposed to be built as part of the project, therefore no assessment of any new parking against *Australian Standard 2890 Parking Facilities* is required.

In regard to emergency service access, BlueScope has established emergency management plans which are enacted should they be required. Emergency access during construction would be consistent with current arrangements.

The project will not disrupt public transport services or pedestrian/cycle facilities. The additional traffic generated by the construction activities is expected to have minimal impacts on both modes of transport.

Impact to public and active transport was found to be negligible given that the works will be contained within the confines of the PKSW site.

8.5.3.4 Operation

Regular operations of the site will resume after the construction period. Therefore, the operational peak hour traffic is expected to be lower than the peak hour traffic associated with the construction activities. The operation of the project traffic is therefore expected to have minimal traffic impacts to the surrounding road network.

8.5.4 Summary of assessment

The assessment looked at 8 roads, 3 State, 2 Council, 3 private, and found that all will operate well within capacity at all times, including both morning and afternoon peak periods. Intersection performance was also largely unaffected with all assessed intersections delivering a LoS of A or B, as a result the traffic impacts during construction and operation can easily be accommodated by the local roads networks.

8.5.5 Mitigation and management measures

Management and mitigation measures that will be implemented to minimise the impacts on traffic and transport are provided in Table 8.64.

Table 8.64 Traffic and transport management measures

Impact / Aspect	ID	Measure	Timing
Construction Traffic	TT1	A Construction Traffic Management Plan (CTMP) will need to be prepared prior to the commencement of works. The CTMP will provide: – Measures to minimise the impact of the construction vehicle traffic on the overall operation of the road network. – Measures to provide continuous, safe, and efficient movement of traffic for both the general public and construction workers. – Details regarding installation of appropriate advance warning signs to inform users of the changed traffic condition. – A description of the construction vehicles and the volume of these construction vehicles accessing the construction site. – Information regarding the changed access arrangement and a description of the proposed external routes for vehicles, including the construction vehicles, accessing the site. – Measures to establish a safe pedestrian environment in the vicinity of the site. – That all staff and subcontractors engaged on site will be required to undergo site induction. The induction will outline the requirements on the CTMP, including site access routes, environmental and occupational health and safety responsibilities, emergency procedures, potential carpooling opportunities and vehicle height restriction under the power lines, among others. – Additionally, the Site Manager will discuss CTMP requirements regularly as a part of “toolbox talks”.	Pre-construction
Traffic management measures	TT2	Key stakeholders, including owners/operators of adjacent lands and emergency service providers, will be notified of any changes to the traffic management arrangements prior to the commencement of works.	Pre-construction
	TT3	The construction site access will be reviewed during design development to consider the turn path required for the construction vehicles.	Pre-construction
	TT4	Construction works to occur within the standard hours defined by the Interim Construction Noise Guideline (DECC, 2009) where practical. As discussed in Section 5.12, some works may occur outside of these hours.	Construction
	TT5	Truck drivers will be directed to follow the predetermined haulage routes.	Construction
	TT6	Workers required to undertake works or traffic control will be suitably trained and hold the required accreditation to carry out works on site and will also be site inducted.	Construction
	TT7	Protection will be provided to workers and road users through advanced warning of roadworks, speed changes, safety barriers with adequate offsets and deflection allowance, where necessary.	Construction
	TT8	Site access will be restricted to authorised personnel only and existing employees on site. Pedestrian access to and around the site will be maintained at all times.	Construction
	TT9	Roadwork speed zones must be logical, credible, and enforceable. They should only be used where they are self-enforcing or will be enforced. Roadwork speed zones will be used with traffic control signs and devices and should not be used in place of more effective traffic controls. They will be used only while road works are in progress or the lower speed road conditions exist.	Construction

Impact / Aspect	ID	Measure	Timing
	TT10	A Transport Access Guide (TAG) should be prepared to identify alternate travel options for visitors and staff to encourage sustainable transport and reduce parking demand. The TAG summarises alternate transport options to access the development, outlining where and how these services can be accessed and the frequency of the service. This could include but is not limited to: – Public transport locations (bus and train connection) – Active transport (cycle / walking) opportunities – Bicycle infrastructure facilities – Carpooling between workers (subject to COVID-19 safe practices)	Construction
	TT11	The following environmental requirements should be adhered to: – All vehicles transporting loose materials will have the entire load covered and/or secured to prevent any large items, excess dust or debris depositing onto the roadway during travel to and from the site, including but not limited to construction rumble strips/wheels wash at the site egress location. – The lead contractors will monitor the roads leading to and from the site and take all necessary steps to rectify any road deposits caused by site vehicles, to maintain the safety of all road users. – Vehicles operating to, from and within the site shall do so in a manner, which does not create unreasonable or unnecessary noise or vibration. – Public roads and access points will not be obstructed by any materials, vehicles, refuse skips or the like, under any circumstances.	Construction

9. Assessment of other impacts

9.1 Soils, geology and groundwater

9.1.1 Existing environment

9.1.1.1 Geology and soils

A review of the 1:100,000 Geological Map of the Wollongong – Port Hacking Sheets 9029, 9129 indicates that the project site is underlain by Quaternary sediments described as quartz and lithic fluvial sand, silt and clay.

A search of the DPIE eSpade soil and land information database was undertaken on 23 August 2021 (DPIE, 2021a). The site is mapped as Disturbed Terrain soil landscape (9029xx) occurring within other landscapes. Key limitations of the disturbed terrain are dependent on the nature of the fill material and can include mass movement hazards, impermeable soils, poor drainage, low fertility and toxic materials.

Historically, the project site was low lying swampland, with soils predominantly including silty sands and clay. The area was progressively filled during the 20th century to accommodate industrial activities with the swampland filled with blast furnace slag, open hearth slag and coal washery rejects (Egis, 2001). The site surface is flat and generally sealed. Any remaining soil or sediments present on the site are highly disturbed thin coverings overlying fill material.

Various investigations (Egis, 2001; GHD, 2004; GHD, 2009; JBS&G, 2016) have refined the understanding of the site and have broadly identified the following underlying geology:

– Fill material 0 to 6 metres below ground level (bgl): Variable quality and composition of slag material, dredged sands and coal wash materials of varying thicknesses, generally in the order of 4 to 6 metres deep and of high permeability.
– Estuarine sediments 6 to 15 metres bgl: including interbedded sands, silts, clays and muds of variable thicknesses.
– Deeper bedrock materials are reported as present at depths from 19 metres bgl as weathered latite underlain by sandstone in some areas.

9.1.1.2 Groundwater

BlueScope has established a network of 54 groundwater monitoring wells across the No.2 Works site. The network is broadly focused on boundary impact however, there are wells surrounding the project site located to the east and west of the proposed 6BF slag handling area and to the north of 6BF Stockhouse.

Previous investigations (GHD, 2004; GHD, 2009; JBS&G, 2016; Senversa, 2019) indicated that on site groundwater is generally shallow, ranging from approximately 1 to 8 metres bgl, and encountered within fill materials overlying the less permeable alluvial deposits. JBS&G (2016) recorded standing grounding water levels near 6BF ranging between 3.5 to 5.6 metres bgl.

Groundwater flow was inferred to flow northeast, towards Port Kembla Inner Harbour, in line with the local topography (JBS&G, 2016).

Investigations by GHD in 2009 concluded that the site has two primary aquifers:

– Fill/shallow estuarine aquifer (5 to 10 metres bgl): a shallow unconfined aquifer, of variable quality and yield, which may be discontinuous and intermittent.
– Deeper estuarine aquifer (greater than 10 metres bgl): a partially confined aquifer underlying fill material and dredged sediments.

9.1.1.3 Acid sulfate soils

Review of acid sulfate soil risk mapping (DPIE, 2021a) indicates that the project site is classified as disturbed terrain at an elevation of greater than four metres. Areas classified as disturbed terrain may include filled areas, which often occur during reclamation of low lying swamps for urban development.

Estuarine sediments within Allans Creek and the Inner Harbour are mapped as having a high probability of occurrence of acid sulfate soils. As the site contains filled areas resulting from the reclamation of Tom Thumb Lagoon, it is possible that some acid sulphate soil material will be present, particularly in the estuarine sediments underlying fill material.

Previous soil investigations undertaken in the wider area (GHD, 2018a) have found acid sulphate soils within natural sediments at various depths, sometimes as shallow as 2.5 metres, however no acid sulfate soils were found within fill materials.

9.1.1.4 Contamination

A search of contaminated land record of notices and record of sites notified to the Environment Protection Authority (EPA) was conducted on 24 March 2021. PKSW is listed as a contaminated site by the EPA. The site has had four notices issued to it, the last being in March 2018, which was a notification to cease the Voluntary Management Plan for the site on the basis that regulation of the site under the Contaminated Land Management Act 1997 (CLM Act) is no longer warranted. Ongoing management of site contamination occurs under EPL 6092.

Previous investigations undertaken at the project site (Egis, 2001; GHD, 2004; GHD, 2009; JBS&G, 2016) have identified potentially contaminated areas and contaminants of potential concern within the project site. The 6BF area was identified as a moderate contamination risk for heavy metals, total petroleum hydrocarbons (TPH), benzene, toluene, ethylbenzene and xylenes (BTEX), polyaromatic hydrocarbons (PAHs), and volatile organic compounds (VOCs).

JBS&G (2016) found areas of hydrocarbon contamination in soils around the sinter plant and coke making area, approximately 250 metres to the east and south of the project site, respectively. Elevated levels of heavy metals, benzene, ammonia and fluoride were also found in soils in these areas.

Elevated concentrations of heavy metals, TPH, PAHs, VOCs, cyanide, ammonia, nitrate, nitrogen and fluoride have been found within groundwater across the PKSW site (JBS&G, 2016; Senversa, 2019). Additionally, the hydrocarbon contamination at the sinter plant, coke making and gas processing area has resulted in associated groundwater impacts, with a light non-aqueous phase liquid (LNAPL) plume identified in each of these areas (JBS&G, 2016; Senversa, 2019). BlueScope undertakes regular monitoring of this known contamination and provides annual reporting to the EPA.

9.1.2 Potential impacts

9.1.2.1 Construction

The project will require some~~,~~ excavation and ground disturbance, including for the slag handling civils and roads, slag granulator foundations, new Highline Switchroom foundations, WGHR foundations, clarifier foundations, TRT foundations, replacement of rail line ballast and rail, Main Control Building foundations, Primary Ferrous Feed Conveyor foundations (in RMH) and new Casthouse Roof Dedusting Baghouse (if this is required).

Vehicle movements may also disturb the ground, however, as the majority of the site is currently sealed, disturbance is expected to be minimal. Soil disturbance associated with the project has limited potential to cause localised soil erosion. The erosion risk is considered relatively low as the site is flat, and predominantly sealed with concrete or bitumen and the level of disturbance will be minor. Potential erosion and sedimentation impacts will be managed through the implementation of appropriate controls with reference to Managing Urban Stormwater: Soils and Construction Volume 1 (The ‘Blue Book’; Landcom, 2004).

Excavation or disturbance to natural material below the level of fill (approximately 5-8 metres below existing ground level subject to geotechnical design) may be required, however the location and extent of excavation will be determined during detailed design once additional geotechnical site investigations have been completed.

Given the industrial land use of the site and the results of previous soil investigations, there is potential to encounter previously unidentified contamination during construction. The project will involve ground disturbing works, which may lead to contaminated material being exposed. This has the potential to impact the health of the construction workforce and potentially mobilise contaminants elsewhere during strong winds and rain. Given the nature of ground disturbing works proposed the likelihood of this occurring is low. The risk of exposure or mobilisation of contaminants from any isolated contaminated areas or unexpected finds will be managed during construction with an unexpected contaminated finds procedure in the CEMP.

During construction, fuel-powered vehicles and equipment as well as some chemicals such as diesel, oils, greases, hydraulic oils, refractory grouts, paints, cleaning fluids and acids for pipe flushing will be required. Chemical and dangerous goods are discussed further in the hazard and risk assessment in Section 8.3. There is potential for accidental spillage or leaks of hydrocarbons or chemicals during works or from any stored hazardous materials in the compound areas. While this would present a negative impact, the volumes of potential spillages would be relatively minor so would not be anticipated to result in a significant impact. Mitigation measures including the preparation of an incident emergency spill plan will be developed and implemented before any construction commences to manage this risk.

9.1.2.2 Operation

Following construction of the project, disturbed areas will be restabilised and resealed where practical. The project is not expected to have ongoing erosion and sedimentation impacts during operation.

Operational activities have the potential to impact on soils through spills or leaks of hydrocarbons and chemicals. All chemical/fuel storage and loading areas will be bunded or otherwise contained. Spill management procedures currently implemented to manage any spills will continue. Potential contamination impacts due to inappropriate storage or chemical/fuel spills are therefore considered unlikely.

9.1.3 Mitigation and management measures

Management and mitigation measures that will be implemented to minimise the impacts on soils, geology and groundwater are provided in Table 9.1.

Table 9.1 Soils, geology and groundwater management measures

Impact / Aspect	ID	Measure	Timing
Erosion and sedimentation	S1	Prior to construction commencing, a site specific Soil and Water Management Plan (SWMP) will be prepared. The plan will include arrangements for managing wet weather events, specific controls and environmental inspection requirements. The SWMP will include an Erosion and Sediment Control Plan (ESCP) which will be prepared in accordance with the *Blue Book -Managing Urban Stormwater: Soils and Construction* (4th edition, Landcom, 2004) and *Volume 2* (DECC, 2008a).	Pre-construction
	S2	The ESCP will detail the erosion controls used for the project and where they will be established. The ESCP will include soil specific measures to: – Prevent sediment moving off-site and sediment laden water entering any watercourse, drainage lines, or drain inlets. – Prevent mixing of soils. – Ensure soils are replaced in their pre-existing configuration during rehabilitation. – Reduce water velocity overland and capture sediment on site. – Minimise the amount of material transported from site to surrounding pavement surfaces. – Divert clean water around the site. – Install measures and site entry and exit points to minimise movement of material onto public roads.	Pre-construction
	S3	Erosion and sediment controls will be established prior to works commencing on site.	Pre-construction

Impact / Aspect	ID	Measure	Timing
	S4	Erosion and sediment controls will be inspected on a regular basis and replaced when their function is compromised.	Construction
	S5	Erosion and sediment controls will be inspected promptly after rainfall events.	Construction
	S6	If excavations are required during demolition works, soil generated would be reused where applicable. Excess spoil not required or able to be reused onsite will be disposed of appropriately as per the EPA's Waste Classification Guidelines (2014).	Construction
	S7	Vehicles will be restricted to existing access routes where practical.	Construction
	S8	Disturbed areas will be returned to pre-existing condition following the completion of construction.	Post- construction
Contamination	C1	An incident emergency spill plan will be detailed in the CEMP.	Pre-construction
	C2	Spill response kits will be provided on site and will be located in a clearly defined location.	Construction
	C3	Plant and machinery will be inspected regularly to ensure that they are in sound working order.	Construction
	C4	If soils that appear to be contaminated are exposed during construction of the project, works will cease in the area until further investigation can be undertaken. The following factors are indications of potential contamination on site: – Stained or discoloured fill – Hydrocarbon or chemical odour – Construction wastes such as concrete, bricks, timber, tiles, fibre cement sheeting, fragments and pipes – Imported material such as ash, slag or coal chitter Contaminated soils requiring disposal will be classified under the Waste Classification Guidelines (EPA,2014) prior to disposal.	Construction
	C5	All chemical/fuel storage and loading areas will be bunded or otherwise contained.	Construction, Operation
	C6	All plant personnel that may encounter chemicals/fuels will be trained in required handling procedures.	Construction, Operation

9.2 Biodiversity

9.2.1 Methodology

A desktop search of the following databases was undertaken to describe the existing environment:

– BioNet Atlas search (DPIE, 2021b)
– EPBC Protected Matters Search Tool (DAWE, 2021)

These searches are presented in Appendix E. A review of previous studies from projects undertaken around Port Kembla was also undertaken to inform this section.

Given the highly disturbed nature of the project site, an application to DPIE for a Biodiversity Development Assessment Report (BDAR) waiver was made on 11 June 2021. The BDAR waiver was granted on 5 August 2021 and is provided in Appendix E. The following assessment of the project potential impacts to biodiversity has been based on a desktop assessment.

9.2.2 Existing environment

The project is located in the Illawarra Interim Biogeographical regionalisation of Australia (IBRA) sub region. The Illawarra subregion is characterised by vegetated cliff faces on coastal escarpments and barrier systems. The Illawarra subregion forms part of the Sydney Basin Bioregion. The Sydney Basin Bioregion extends north of Batemans Bay to Nelson Bay, and as far west as Mudgee occupying approximately 4.53 percent of NSW land area. The project is located in the Lake Illawarra Barrier Mitchell Landscape. This landscape is substantially altered by urban and industrial development but would originally have had a very similar structure and composition to the Seven Mile Barrier Landscape. General elevation ranges from 0 to 25 metres, with local relief of 5 metres.

9.2.2.1 Terrestrial environment

The environment within the PKSW site is highly modified for industrial purposes. The PKSW site is predominantly cleared and covered by operational facilities such as buildings, plant, roads and storage buildings. The project site is mapped as cleared-urban/industrial within regional vegetation mapping (DPIE, 2015, 2016) with remaining vegetation limited to planted tree species and opportunistic weeds. The planted street trees within the project site and remaining exotic vegetation are unlikely to reflect a historical near-natural state due to the highly disturbed nature of the project site, and therefore are unlikely to fall within a plant community type. No karst, caves, crevices, cliffs and other geological features of significance occur within the project site. Man-made structures are also unlikely to provide habitat for any flora or fauna.

The project site is not connected to any habitat which may be utilised as corridors for flora and fauna species, and therefore does not contribute to habitat connectivity. There are no Coastal Management SEPP wetlands or proximity areas, nationally important wetlands or internationally important wetlands within the site. The project site is approximately 6 kilometres from large patches of native vegetation.

9.2.2.2 Aquatic environment

The hard substrates within Port Kembla consist of infrastructure such as break walls, piles and quay walls around the perimeter of the port. Previous studies identified that intertidal regions are dominated by the Sydney rock oyster (*Saccostrea glomerata*), with oyster limpets (*Patelloida mimula*) and sea squirts (*Cunjevoi pyura*) also present. The subtidal zone (down to 2 metre depth) generally consists of encrusting bryozoan (*Watersipora subtorquata*), polychaete tubeworms (predominantly *Hydroides elegans*), compound ascidians (*Botrylloides leachii*), solitary ascidians (*Styela plicata*) and blue mussels (*Mytilus galloprovincialis*) (Worley Parsons, 2012). Large hydroids, arborescent bryozoans (Bugula flabellata and Bugula stolonifera), small sponges and barnacles are also common in in the sub-tidal zone. Substrates are heavily silted beyond two metres depth (Worley Parsons, 2012). Introduced species account for 50% of the hard substrate assemblages in Port Kembla (Johnston, 2006). Biofouling communities identified during field investigations in 2018 were generally consistent with previous surveys of the area (GHD, 2018a).

The seabed within the Inner Harbour consists of fine, unconsolidated silt expanses with large decapod burrows. Historically, patches of seagrass (Halophila ovalis) have been recorded within the Inner Harbour, however they have not been recorded in surveys undertaken in 2012 (Worley Parsons, 2012) and 2018 (GHD, 2018a).

The project site drains into the Iron Making East Drain which is pumped to the No.2 Blower Station Drain and discharged at Allans Creek, before draining into the Inner Harbour. During extended wet weather events, the Iron Making East Drain overflows into the Inner Harbour. No.2 Blower Station Drain is a lined drain which runs underground from the No.2 Blower Station to an outlet point at Allans Creek. Allans Creek is a natural catchment of approximately 30 km^2 to the west. Allans Creek and the Inner Harbour (former areas of Tom Thumbs Lagoon) are mapped as key fish habitat.

9.2.2.3 Flora and fauna

A search of the DPIE BioNet Atlas for records of threatened species listed under the BC Act and EPBC Act (DPIE, 2020b) was undertaken on 24 August 2021. Threatened species previously recorded within 10 km of the site are listed in Appendix G.

PKSW is generally cleared of vegetation and almost entirely sealed. Vegetation previously recorded near the project site includes *Mitrasacme polymorpha, Salvinia sp.,* Wood Rush (*Luzula densiflora*) and Prairie Grass (*Bromus catharticus*). The project site also contains introduced shrubs and ground cover in planted garden beds. No listed flora species have been recorded near the project site or stockpile locations. A review of the Atlas of Groundwater Dependent Ecosystems (BOM, 2020b) indicated that no known groundwater dependant ecosystems (GDEs) have been identified within the project site.

Fauna previously recorded near the project site were common native birds such as Nankeen Kestrals (*Falco cenchroides*), Silver Gulls (*Chroicocephalus novaehollandiae*) and introduced species such as rabbits (*Oryctolagus cuniculus*). Marine bird species may also visit the site periodically.

A known population of the Green and Golden Bell Frog (*Litoria aurea*) (GGBF) occurs within the greater PKSW site, approximately 1.4 kilometres from the project site. The GGBF is listed as endangered under the BC Act and vulnerable under the EBPC Act. Known GGBF habitat and associated corridors within the PKSW are shown in Figure 9.1. The corridors for this population include the rail line from Coniston to Port Kembla railway station, Plate Mill and the Steelhaven site.

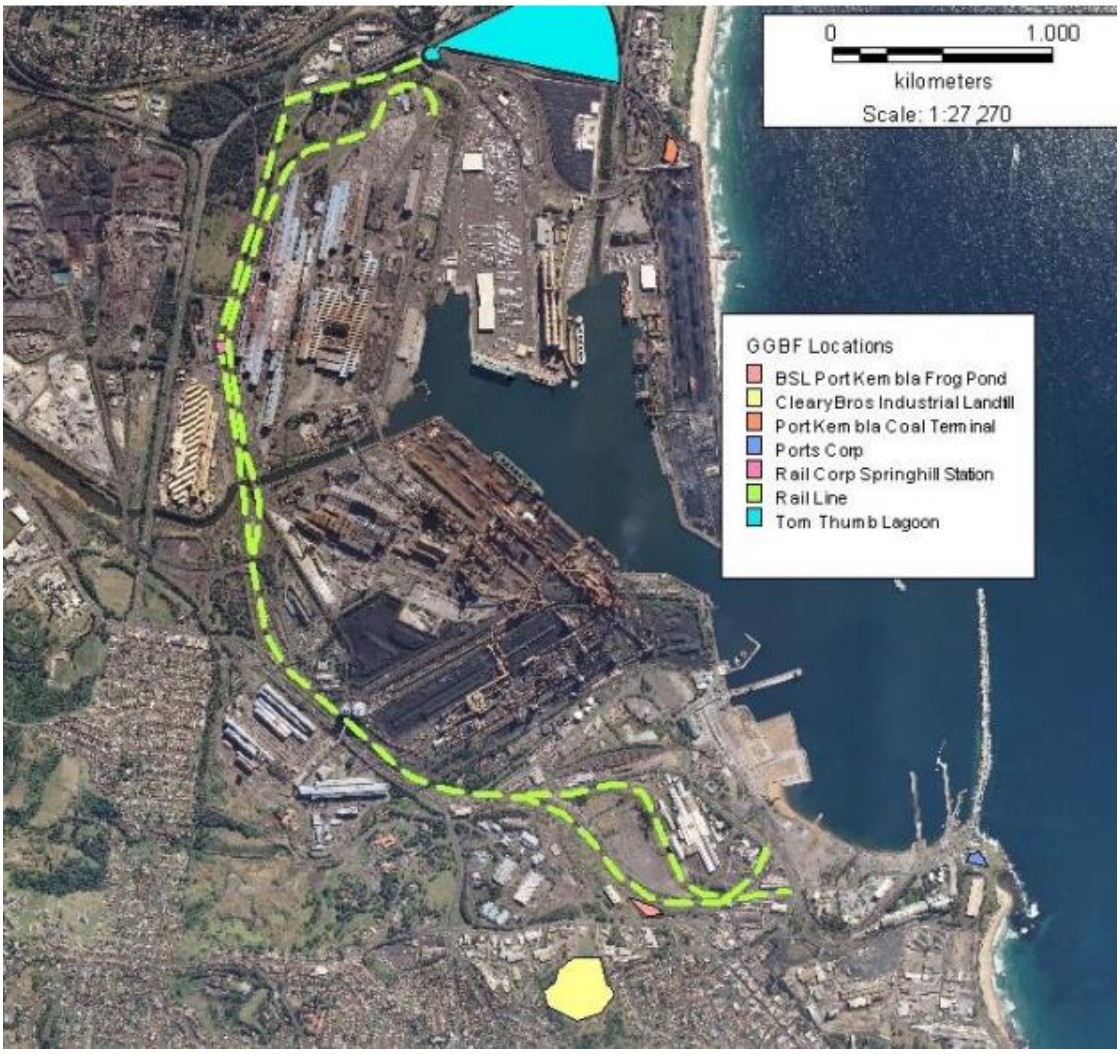

Figure 9.1 Green and Golden Bell Frog potential habitat and habitat corridors (BlueScope, 2020)

The GGBF frog prefers habitats with dense vegetation, particularly plants that form tussocks as they provide good cover from predators. Examples of preferable flora for habitat include Spiny Mat Rush (*Lomandra longifolia*), *Phragmites australis*, *Bolboschoenus caldwelii* and *Juncus* species. The species is generally found in close proximity to standing water bodies, which it requires for breeding. The species may be found amongst human refuse including bricks, fibre cement, waste concrete and piles of sheet iron. Habitat connectivity is reliant on wet areas between places of preferable habitat, such as rivers, culverts, swales and ephemeral waterways (DECC, 2008c).

9.2.3 Potential impacts

9.2.3.1 Construction

The project site is predominantly cleared and does not contain listed flora species or habitat that would support listed flora species. Remaining vegetation within the project site is limited to planted street trees and opportunistic weed species. All planted trees will be retained within the project site to avoid impacts to any potential cultivated native street trees and impacts to native vegetation are not anticipated. No clearing of native vegetation will be required to construct the project.

Stockpile and compound sites shown in Figure 5.1 will be within previously disturbed areas owned by BlueScope and will not generate impacts to native flora or impact vegetation integrity in surrounding lots.

GGBF have been recorded within the southern area of the PKSW site and the species is known to inhabit highly disturbed areas. A management plan was prepared for the species and included habitat construction at the Steelhaven site, installation of frog-proof fences to discourage frogs from entering PKSW, and discouraging use of stormwater basins by keeping them clear of vegetation and removing shelter habitat (BlueScope, 2020).

As the project site is located within the PKSW industrial district, it is unlikely to provide foraging habitat for bat species. The reline works may impact industrial buildings that could provide roosting habitat for microbat species. 6BF has been in care and maintenance for approximately 10 years, including being used as a storage facility. The ongoing use, high noise environment, disturbances of the buildings and surrounds, and location of 6BF in the middle of the PKSW site would likely reduce the suitability of roosting habitat for microbats. This coupled with the availability of higher quality roosting habitat and foraging opportunities regionally make it highly unlikely that any microbats would be present.

As the project site occurs within the existing PKSW site, threatened species are unlikely to utilise the site other than for temporary visits from threatened or migratory bird species. Given the disturbed nature of the site and lack of suitable foraging or breeding habitat, these species will not be impacted by the project.

Any species which may use flight paths over the project site would be limited to bird species which are accustomed to the existing noise and light from the active PKSW and associated works in the surrounding industrial area. The project will temporarily increase impacts from noise and light, however, is unlikely to interfere with existing flight paths used by protected species over the project site.

The Port Kembla Inner Harbour is located approximately 500 metres from the project site. This lagoon and associated bay may contain habitat for threatened aquatic species. The marine environment is unlikely to be directly impacted during construction as mitigation measures will be implemented to prevent sediment or contaminants entering waterways.

9.2.3.2 Operation

Once completed, the project will generate operational impacts consistent with the existing operation of 5BF. Discharges to the harbour are expected to be generally consistent with current operations and therefore impacts to aquatic species are not anticipated.

The project will not modify any existing habitat and is not expected to generate a significant impact on flora and fauna of the area.

An assessment of the potential water quality impacts of the project is provided in Section 8.4. This assessment concluded that the operation of 6BF would have similar impacts to the receiving catchment therefore the project would result in negligible change to aquatic ecology.

9.2.4 Mitigation and management measures

Management and mitigation strategies that will be implemented to manage biodiversity impacts generated by the project are shown in Table 9.2.

Table 9.2 Biodiversity management measures

Impact / Aspect	ID	Measure	Timing
General biodiversity	B1	The following measures will be implemented to manage general biodiversity impacts: – Measures proposed in the SWMP will be implemented to ensure appropriate sediment control measures are put in place to ensure run-off during construction does not result in indirect impacts to surrounding habitats. – No native flora will be cleared during the establishment of laydown areas. – Laydown areas will be placed on existing hardstand, and where possible, as far away from drainage lines and places where surface water can pool. These measures will be implemented in the CEMP and may be revised at any time to manage potential environmental impacts.	Pre-construction Construction
Green and Golden Bell Frog	B2	All measures outlined in Management of Threatened Species, The Green and Golden Bell Frog, Litoria Aurea (BlueScope, 2020) will be implemented during construction of the project.	Construction
	B3	Workers inductions will outline relevant procedures from *Management of Threatened Species, The Green and Golden Bell Frog, Litoria Aurea (BlueScope, 2020)* and their responsibilities.	Construction
	B4	If a GGBF is found in the project site or laydown area, work in the vicinity will cease immediately. Work will not recommence until clearance from a qualified ecologist or wildlife carer can be provided. Following confirmation of the sighting of GGBF either by a local ecologist or by means of identification using the GGBF Audit / Inspection Checklist, the sighting must be registered with the EPA and NSW BioNet Species sightings via the web or telephone.	Construction
Unexpected species discovery	B5	If other endangered species are discovered on the project site or in laydown areas, work will cease in the vicinity and a qualified ecologist will be employed to assess the discovery. Additional mitigation measures presented by the ecologist will be incorporated into the CEMP. Work in the area will not commence unless clearance is given by the ecologist.	Construction

9.3 Aboriginal heritage

9.3.1 Existing environment

9.3.1.1 Environmental setting

Prior to industrial development, the project site was part of the Tom Thumb Lagoon estuary. The estuary was comprised of an estuarine channel, saltmarsh and tidal mudflats which covered an area of approximately 500 hectares. The estuary would have been bounded by a sand barrier at the mouth with a large, moderately deep, central basin influenced by fluvial processes (GHD, 2007).

Prior to European settlement, the wider area surrounding the project site would have supported a variety of habitats, including wetland, saltmarsh, coastal scrub, hilly scrub and forested plains. The landscape would have supported a wide range of fauna, including molluscs, fish, birds and macropods. The abundance of these species, as well as edible flora, meant the area provided the local Aboriginal people with a resource rich environment (GHD, 2018c).

9.3.1.2 Ethnohistory

The project site is located within the traditional lands of the Wodi Wodi, part of the wider Dharawal language group. Early European settlers recorded gatherings of Aboriginal people at Tom Thumb Lagoon and Spring Hill. Settlers recorded Aboriginal people camping and fishing around the shores of the lagoon and an estimated 100 people gathering for a corroboree at Spring Hill. Aboriginal camps around the lagoon were documented to have continued until 1914. Aboriginal resource gathering and commercial fishing occurred in the area until the early 1940s (GHD, 2018c).

Port Kembla has remained a place of residence for many Aboriginal families. Spring Hill, west of the former Tom Thumb Lagoon and north west of PKSW, includes some areas that are relatively undisturbed but had historically been used for industrial purposes and commons recreation. The local Aboriginal community has recreational access to this area. Fig trees in the area are culturally important to the local Aboriginal people, being traditional meeting places and having associations with womens' business. The area immediately surrounding two large fig trees in Spring Hill was converted into a recreational reserve in 2007 and 2008. Works included landscaping, revegetation and erection of a shelter. The reserve is frequently visited by the local Aboriginal community and includes memorials to deceased community members (GHD, 2018c).

The project site is located in the administrative boundaries of the Illawarra Local Aboriginal Land Council (LALC). Consultation was undertaken with the Illawarra LALC and Ilawarra Aboriginal Corporatiom (IAC) to assist in identifying the cultural heritage values of the project site and work together on future opportunties (see Section 7).

9.3.1.3 Heritage significance

Prior to industrialisation, it is possible that the PKSW site would have contained Aboriginal artefacts or sites, given the resource rich surrounding environment. Dredging and reclamation of the site during the construction of PKSW in the 1920s has extensively disturbed the site.

The main areas of potential Aboriginal heritage significance are around Spring Hill, approximately 1.5 kilometres to the north west of the project site, in areas that have not been subject to previous disturbance associated with industrial development. These include an area known as The Horse Paddock and areas of land in the reserve along Springhill Road that are remnant landforms at the margins of the former Tom Thumb Lagoon. Surviving land surfaces are likely to have potential for Aboriginal cultural material, likely in the form of middens, stone artefacts, and scarred trees (where mature native vegetation has survived) (GHD, 2018c).

An extensive search of the Aboriginal Heritage Information Management System (AHIMS) (see Appendix L) identified no recorded Aboriginal sites within the project site. The nearest recorded Aboriginal site is in the vicinity of Spring Hill, comprising an open camp site consisting of two flaked stone artefacts located on the crest of a hill in disturbed context. The AHIMS coordinates place the site on the western side of Springhill Road, approximately 1.8 kilometres north west of the 6BF operational and construction area and approximately 150 metres to the east of Laydown Area 2.

Hill 60 Illowra Battery Landscape Area is located approximately 1.7 kilometres south east of the 6BF operational and construction area and is listed on the State heritage register and includes a number of AHIMS sites including artefact (52-2-2203), shell (52-2-1290) and midden and artefact (52-2-4502). Hill 60 and its environs is listed as containing a rare suite of Aboriginal heritage sites which demonstrate the evolving pattern of Aboriginal cultural history and the Aboriginal land rights struggle.

9.3.2 Potential impacts

The PKSW site does not contain known Aboriginal items or sites. The project will be undertaken on heavily disturbed, reclaimed lands. Excavations into natural material will be limited to piling into bedrock subject to the outcome of geotechnical investigations to be undertaken during detailed design. Therefore, the likelihood of unexpectedly encountering Aboriginal heritage items is low.

No previously recorded Aboriginal sites will be impacted by construction and operation of the project.

9.3.3 Mitigation and management measures

Management and mitigation strategies that will be implemented to manage potential impacts to Aboriginal Heritage are shown in Table 9.3.

Table 9.3 Aboriginal heritage management measures

Impact / Aspect	ID	Measure	Timing
Unexpected Aboriginal heritage finds	AH1	In the event of an unexpected find of potential Aboriginal object/s (or suspected item), work will cease in the area and DPIE will be notified. Works would not recommence until continuation is authorised by DPIE.	Construction

9.4 Historic heritage

9.4.1 Existing environment

9.4.1.1 Historic context

The project site has been subject to a number of past land uses prior to the establishment of PKSW. During the 1800s the locality was used for cedar cutting, farming, cattle breeding, hotel and estate development, recreational commons and a race course. Industrialisation within the locality began in 1882, when the Mount Kembla Coal and Oil Company established a private jetty and rail link. Port operations continued expanding throughout the 19th century and into the early 1900s.

Over the following decades more land was acquired for port development. Port Kembla Rail Line was constructed in 1916 along the western boundary of Tom Thumb Lagoon. Spring Hill Road was also formalised around this time. Dredging and reclamation occurred in the 1930s, during which time PKSW was constructed on land south of Allans Creek. The mill began operation in 1928 under the ownership of the Australian Iron and Steel Company, which later merged with Broken Hill Proprietary (BHP) in 1935. Following the merger, BHP entered into an agreement with the State Government to further expand operations around Tom Thumb Lagoon. The expansion of the BHP steel works included the reclamation of 73 acres along the western edge of Tom Thumb Lagoon. The reclamation program raised land by approximately seven metres, which required 2.3 million m^3 of fill material, predominately sourced from Port Kembla sand dunes and dredge material from Tom Thumb Lagoon.

The industrialisation boom during the 1950s and 1960s led to large scale land modification across the locality. The resulting industrial development required extensive modification of the natural drainage systems in the area, with Allans Creek being heavily modified and rerouted around the border of the industrial estates. Drainage along Springhill Road and the former Tom Thumb Lagoon were similarly heavily modified. While steel operation areas have remained largely unchanged since the 1960s, works on the Inner Harbour berths and terminals continued well into the 1980s, 1990s and to the present day (GHD, 2018d).

9.4.1.2 Existing environment

The following sources were searched on 23 August 2021 to identify any historic heritage items located within or near the project site:

– Australian Heritage Database
– NSW State Heritage Register
– Wollongong LEP 2009
– Three Ports SEPP

The nearest historic heritage item is the locally listed Commonwealth Rolling Mills, which is approximately 1.6 kilometres southeast of the project site. The NSW State Heritage Resister listed Hill 60 Illowra Battery Landscape Area, which includes Hill 60, Fisherman's Beach, Boilers Point and MM Beach, is located approximately 1.7 kilometres to the south of the project site.

An item known as the Galloway Steam Engine is located on the PKSW site and is a registered item with the National Trust of Australia. The Galloway Steam Engine is a three-crank geared reversing rolling mill system engineered by Galloways Ltd of Manchester, England in 1917. The engine was purchased by Australian Iron and Steel Pty Ltd in 1928 and installed in the first rolling mill at Port Kembla. The Galloway Steam Engine was the first steel rolling mill engine in Port Kembla and has played a large role in the history of PKSW. The engine was taken out of service in December 1982. This item is still present on site in the No.1 Open Hearth located south of Five Islands Road, approximately 1.1 kilometres south of 6BF. The No.1 Open Hearth is located 200 m to the east of Laydown Area 1.

The National Trust of Australia lists those buildings, sites, items and areas, which, in the Trust's opinion, fall within the following definition:

> *Those places which are components of the natural or the cultural environment of Australia, that have aesthetic, historic, scientific, or social significant or other special values for future generations as well as the present community.*

Listing on National Trust of Australia's register does not impose any statutory requirements.

9.4.2 Potential impacts

No listed items of historic heritage were identified within the project site. Given the distance between the project site and the closest item (Commonwealth Rolling Mills, approximately 1.6 kilometres south east), no impacts to historic heritage items are anticipated.

The Galloway Steam Engine is located within close proximity to Laydown area 1. Given its location within an existing building, it is unlikely that the project will have any impact on this item. Construction activities at 6BF will not impact the item, as it is approximately 1.1 kilometres away.

9.4.3 Mitigation and management measures

Management and mitigation strategies that will be implemented for the listed and potential (unlisted) heritage items located within the study area are provided in Table 9.4.

Table 9.4 Historic heritage management measures

Impact / Aspect	ID	Measure	Timing
Unexpected finds	HH1	In the unlikely event that unexpected historical (non-Aboriginal) archaeological remains are discovered during works they will be managed with reference to the standard protocols and procedures of Section 146 of the *Heritage Act 1977*.	Construction

9.5 Visual amenity

9.5.1 Existing environment

A range of land uses are present within the locality including Wollongong CBD, residential areas, the University of Wollongong, Port Kembla, Lake Illawarra, and the conservation areas of the Illawarra Escarpment. The Illawarra Escarpment, located to the west of the project site, provides a natural visual catchment boundary to Wollongong and Port Kembla.

Natural features within the locality include Mount Keira and the Illawarra Escarpment. The Illawarra Escarpment is characterised by its continuous elevated cliff line and plateau contrasting with the coastal plain below. Lake Illawarra is the major waterbody in the area and is fed by a series of small creeks from the escarpment to the coast. Some of these creeks form part of the Allans Creek catchment.

Built form within the locality includes the industrial and port areas of Port Kembla and the area below the Illawarra Escarpment, with views towards the coast. Residential areas generally consist of low to medium density housing, contrasting with the multi-storey (up to 22 storey) mixed development within the Wollongong CBD.

PKSW consists of a variety of open-structure plants, exhaust stacks, equipment, operational buildings, ancillary facilities (such as office space and amenities), storage areas, internal roads and storage tanks. Visual features around the PKSW site include Tom Thumb Lagoon and Port Kembla Harbour, grain and coal export facilities, manufacturing premises and truck depots. The site contains two canals, Main Drain and Allans Creek, which flow through the site and provide a somewhat different view to the steel and concrete that predominates the site. PKSW is visible from distant public vantage points, such as local lookouts and highways, as well as from the surrounding residential areas and arterial roads.

The nearest residential receivers are located approximately 1.2 kilometres to the southwest of the project site. The existing visual characteristics of 6BF and the immediate surrounds are shown in Figure 9.2.

Figure 9.2 No.6 Blast Furnace and immediate surrounds

9.5.2 Potential impacts

For the assessment of visual impacts, five key viewpoints (VP) towards the project were identified. These points from around the PKSW site were identified for assessment and represent the key visual catchments overlooking the site.

View point 1: Mount Kiera

Criteria	Comments
Location	VP1 is located at Mount Keira Lookout, approximately 7 kilometres north-west of the project site and at an elevation of approximately 560 metres. Mount Keira Lookout includes a visitor carpark, lookout and walking track, and is within a national park.
View direction	South-east.
Description of existing view	VP1 is representative of visitors to Mount Keira Lookout stopping to enjoy the views up and down the coastline. VP1 provides a panoramic view of the study area, capturing residential areas on the foothills, the Wollongong CBD to the left, Port Kembla harbour to the centre, and Lake Illawarra to the distant right. Built form types and scale variations are discernible between different uses such as the tower buildings in the city, finer grain suburban areas, and larger scale industry around the harbour.
Anticipated Change to View	Construction: The project will see a temporary presence in construction plant and equipment within the existing PKSW site. Given the distance between VP1 and PKSW, it is unlikely that the project will be clearly visible, and impacts are expected to be negligible. Operation: Additional structures proposed as part of the project include a new granulation cooling tower stack (30 m) and, subject to detailed design, a new gas bleeder although if required this will be the same height as the existing 6BF gas bleeder. These will be consistent with existing infrastructure on site and have negligible visual impact offset distances.
Sensitivity to Change	The sensitivity to change is High. This is due to the high value placed on the view.
Magnitude of Change	The magnitude of change is Negligible. The project will be consistent with its immediate environment and will not encroach other significant views visible from VP1.
Significance of Impact	Negligible.

View point 2: Flagstaff Hill

Criteria	Comments
Location	VP2 is located at the lookout above the carpark near the Wollongong Head Lighthouse, approximately 4.9 kilometres northeast of the project site at an elevation of approximately 20 metres. The Wollongong Lighthouse and Flagstaff Hill Park forms part of a natural rocky headland adjacent to Wollongong CBD and beach and is a popular tourist destination.
View direction	Southwest.
Description of existing view	VP2 represents views experienced by visitors to the Flagstaff Hill Park and Wollongong Head Lighthouse. VP2 is a long distant view southwest along the coastline. The foreground is dominated by the carpark. To the middle ground, the ocean and beach shoreline can be seen, with tall pine trees and multi-storey towers of Wollongong to the right. Port Kembla industrial area features in the mid distance, with features of the PKSW being clearly seen, including 5BF and 6BF. The Illawarra Escarpment is pictured in the distance.
Anticipated Change to View	Construction: The project will see a temporary presence in construction plant and equipment within the existing PKSW site. Given the direction of the view from VP2, it is likely that most of the construction area will be screened by existing infrastructure in the northern portion of Port Kembla industrial area. Operation: Gas plumes (not shown in this photograph) are expected to move to the left from 5BF to 6BF. Whilst this change will be clearly seen from the view point, visual impacts are expected to be minor as there are no residents sharing this view.
Sensitivity to Change	The sensitivity of change is High as this is a major tourist lookout location adjacent to the Wollongong CBD.
Magnitude of Change	The magnitude of change is Low; while the shift in gas plume is likely to be noticeable it will be minor and not uncharacteristic of the existing site.
Significance of Impact	Minor.

View point 3: Mount St Thomas

Criteria	Comments
Location	VP3 is located at the park on Television Avenue, approximately 2.8 kilometres north west of the project site at an elevation of approximately 70 metres.
View direction	Southeast.
Description of existing view	VP3 represents views experienced by users of the parkland to the north of the project site. It is also representative of some residential views in the area. VP3 looks out over park land and residential housing towards the northern Port Kembla industrial area. PKSW is partially obscured by vegetation to the right of the view.
Anticipated Change to View	Construction: The increase in construction plant and equipment within the existing PKSW site may be visible from this viewpoint. Given that it is approximately 2.8 kilometres away, changes to views will be negligible. Operation: Gas plumes (not shown in this photograph) are expected to be more visible, as views of 6BF aren't screened by vegetation.
Sensitivity to Change	The sensitivity of change is Moderate as surrounding residents will experience long viewing periods.
Magnitude of Change	The magnitude of change is Low; while the shift in gas plume is likely to be noticeable it will be minor, not uncharacteristic of the existing site and be of negligible impact given the offset distance of 2.8 kilometres.
Significance of Impact	Minor.

View point 4: Cringila

Criteria	Comments
Location	VP4 is located at the intersection of Steel Street and Lake Avenue in Cringila, approximately 1.6 kilometres south-west of the project site at an elevation of approximately 40 metres. Cringila is a residential suburb with single-storey dwellings on relatively undulating topography and extensive views to the steelworks at Port Kembla. This viewpoint is representative of the closest view point to the PKSW for residential receivers.
View direction	Northeast.
Description of existing view	VP4 represents views from nearby residential properties at a similar elevation. The view looks out over residential properties towards the PKSW site. Infrastructure at PKSW of chimneys and sheds dominates the centre and left of the view extending across the horizon line, with 5BF and 6BF clearly visible. Electrical poles are dominant vertical foreground elements in the view.
Anticipated Change to View	Construction: Construction plant and equipment will be partially screened from residential receivers, given the relatively low elevation and screening from trees and existing infrastructure. Some equipment may be visible, though would not be uncharacteristic with the existing site. Operation: The operation of 6BF will bring visual impacts associated with operation towards the middle of this viewpoint. Whilst not show in the photograph, plumes from 5BF are common and will be consistent with the existing environment after the commissioning of 6BF.
Sensitivity to Change	The sensitivity to change is Moderate as residents will experience long viewing periods at a distance from the project site.
Magnitude of Change	The magnitude of change is Low; while the shift in gas plume is likely to be noticeable it will be minor and not uncharacteristic of the existing site.
Significance of Impact	Minor.

View point 5: Lake Heights

Criteria	Comments
Location	VP5 is located on a footpath within an open space area on Flagstaff Road Lake Heights, approximately 2.2 kilometres southwest of the project site at an elevation of approximately 50 metres. This view is characteristic of the low to medium density residential development located between the industrial port and Lake Illawarra.
View direction	Northeast.
Description of existing view	VP5 represents views from nearby residences at a similar elevation. The view comprises Flagstaff Road residences to the right, sited at an elevation overlooking the open space area towards the port. The centre of the view to the fore and middle ground comprises low shrubs and grasses within the open space valley, exposing clear views towards the PKSW. Large scale vertical and horizontal sheds, chimneys and silos can be seen, with steam billowing into the skyline. The Illawarra Escarpment and ocean form a blue backdrop to the view.
Anticipated Change to View	Construction: Construction plant and equipment will be partially screened from residential receivers by other buildings on PKSW. Given that the project is separated by a distance of 2.2 kilometres any remining view changes would have negligible impact. Operation: The operation of 6BF will see a minor change in gas plume origin, though given the orientation of the view, is not expected to significantly alter views from this location.
Sensitivity to Change	The sensitivity to change is Moderate as residents will experience long viewing periods at a distance from the project site.
Magnitude of Change	The magnitude of change is Low; while the shift in gas plume is likely to be noticeable it will be minor and not uncharacteristic of the existing site.
Significance of Impact	Minor.

Summary of impacts

Alterations to the visual landscape due to the presence of construction plant and vehicles are expected to be generally screened from view by regional topography, existing buildings and vegetated areas in the locality. Operational impacts will see the origin of the plume associated with blast furnace operation shift slightly, however it will remain within the PKSW site and will not be uncharacteristic of the existing area. The construction of a new slag granulation stack will modify the visual amenity somewhat, however given it is in the same location as previous campaigns, impacts will be minor.

9.5.3 Mitigation and management measures

The management and mitigation strategies will be implemented to reduce the impact to visual amenity on surrounding receivers are shown in Table 9.5.

Table 9.5 Visual amenity management measures

Impact / Aspect	ID	Measure	Timing
Visual amenity – construction works	LV1	Temporary boarding, barriers, traffic management and signage will be removed when no longer required.	Construction
	LV2	Roads providing access to the site and work areas will be maintained free of dust and mud as far as reasonably practicable.	Construction
	LV3	Materials and machinery will be stored neatly during construction works.	Construction
	LV4	Temporary lighting required during the construction period will be sited and designed to avoid light spill into the surrounding area.	Construction
	LV5	Existing site features will be utilised as screening when positioning plant where practical.	Construction

9.6 Land use and property

9.6.1 Existing environment

9.6.1.1 Regional context

The project is located in Port Kembla in the Wollongong LGA and Illawarra region of NSW, and is approximately 2.5 kilometres south of the Wollongong CBD. Port Kembla lies in the coastal plain which is bounded to the west by the Illawarra Escarpment and to the east by the Pacific Ocean. The major land uses within the area surrounding the PKSW, extending from the harbour to the escarpment, are low density residential development, public recreation areas, commercial premises, agriculture, mining and manufacturing.

Key features of Port Kembla are the heavy industrial area and the port. The heavy industrial area is constructed around the port and includes industrial developments such as PKSW, fertiliser production facilities and petroleum hydrocarbon storage and wholesaling.

The port of Port Kembla is located between the Pacific Ocean and the Port Kembla industrial area. The Inner Harbour, specifically developed as an all-weather shipping port, covers 60 hectares with 2.9 kilometres of commercial shipping berths. Other berths in the Inner Harbour include the car import/general cargo and container facility, the grain terminal and the coal terminal. The Outer Harbour includes the common user terminal and bulk liquids facility. Port Kembla industrial area is serviced by internal electricity, water and gas.

The closest urban developments to PKSW are the suburbs of Cringila, Berkeley, Lake Heights, Warrawong and Port Kembla to the south, Unanderra, Mount St Thomas, Coniston and Figtree to the north and west. These suburbs are generally comprised of low-density residential developments that were initially developed as housing for workers employed by heavy industry. Schools, medical facilities, businesses, and outdoor recreation areas are also present in these areas, as identified in Table 9.6.

Table 9.6 Summary of surrounding land use

Suburb	Description of key land use	Distance from project site
Cringila	Residential, public recreation, industrial, environmental management.	1.2 km southwest
Berkeley	Residential, public recreation, industrial, commercial, environmental management, place of worship, cemetery.	2.8 km west
Lake Heights	Residential, public recreation, commercial.	1.9 km southwest
Warrawong	Residential, public recreation, industrial, commercial and tourism.	1.5 km south
Port Kembla	Residential, public recreation, industrial, commercial, environmental conservation.	1.5 km south to nearest areas outside the PKSW site.
Unanderra	Residential, public recreation, industrial, commercial, education establishment, cemetery and tourism.	2 km west
Figtree	Residential, public recreation, industrial, commercial, environmental management, environmental conservation.	3.2 km northwest
Mount St Thomas	Residential, public recreation.	2.6 km northwest
Coniston	Residential, public recreation, commercial, industrial.	2.4 km north

9.6.1.2 Project site

The project is located on Lot 1 DP 606434 (see Figure 2.2), which is owned by BlueScope and is zoned IN3 – Heavy Industrial under the Three Ports SEPP. The project meets the definition of a heavy industry in accordance with the Three Ports SEPP and is consistent with the objects of the land zoning. The PKSW site is a multiuse industrial area which includes storage, manufacturing, port berths, private internal roads, and offices. The project will require ancillary facilities during construction, which are shown on Figure 5.1 and listed in full in Section 2.2.5. All ancillary facilities will be located on BlueScope owned land.

9.6.2 Potential impacts

The project will be located entirely on land owned by BlueScope, and therefore no land acquisition (temporary or permanent) will be required. There may be some internal restrictions on access and land use within PKSW during construction of the project, however this will be managed by BlueScope to ensure operations on site are not significantly impacted.

No changes to land use are expected during operation as 6BF is an existing feature of the site and operational activities will be generally consistent with current operations. The PKSW site is predominantly serviced by private utility assets within the site. The project will require modification of some of these onsite services, such as water and power. This will be managed by BlueScope to minimise disruptions to existing activities on site. No impacts to services or infrastructure outside of the PKSW site are anticipated to be generated by the project.

Construction and operation of the project has the potential to indirectly impact land use and public amenity:

– Air quality (refer to section 8.1)
– Noise and vibration (refer to section 8.2)
– Traffic (refer to section 8.5)
– Visual amenity (refer to section 9.5)
– Waste management (refer to section 9.9)

Following the implementation of the mitigation measures outlined in each of these sections, impacts to land use and public amenity are likely to be negligible.

9.6.3 Mitigation and management measures

The management and mitigation strategies will be implemented to reduce the impact to land use on surrounding areas are shown in Table 9.7.

Table 9.7 Land use and property management measures

Impact / Aspect	ID	Measure	Timing
Land use	LU1	Management and mitigation strategies presented in the following sections will be implemented during construction of the project: – Air quality (Section 8.1.5) – Noise and vibration (Section 8.2.6) – Traffic (Section 8.5.5) – Visual amenity (Section 9.5.3) – Waste management (Section 9.9.3)	Pre-construction Construction Operation
	LU2	BlueScope will coordinate project activities to minimise the impact to land use and services within the PKSW site.	Construction

9.7 Social and economic

9.7.1 Existing environment

The project is located within the Wollongong LGA. The key economic metrics for the Wollongong LGA (idcommunity, 2019) are summarised in Table 9.8.

Table 9.8 Wollongong community statistics

Key statistics	Value
Gross regional product	$12.15 billion
Residents	218,114
Employed residents	103,797
Unemployment rate (2016)	6.9%
Local businesses	13,887
Largest industry (by employment)	Health care and social assistance
Value of primary metal and metal product manufacturing (2018/19)	$1,762 million
Population forecast	254,805 (2036)

PKSW is located in the suburb of Port Kembla, which is approximately 2.5 km south of the City of Wollongong. The population of Port Kembla was recorded as 5,014 in the 2016 census. This comprised 1,303 families, with an average of 1.8 children per family (for families with children). Children aged 0 - 14 made up 16.6 per cent of the population and adults over 65 made up 20.2 per cent of the population. 3.7 per cent of the population identified as Aboriginal and/or Torres Strait Islander. The median weekly household income was $1,016. Iron smelting and steelmaking made up 3.3% of the suburb's workforce (ABS, 2016b).

The social locality for the basis of this assessment is defined as the suburb of Port Kembla and the suburbs immediately surrounding the site that will be most impacted by the project. These suburbs are Cringila, Berkeley, Lake Heights, Warrawong, Unanderra, Cobblers Hill, Mount St Thomas, Coniston and Figtree. In addition to residences and businesses, key places of social value within these suburbs include:

– Schools (both primary and secondary)
– Medical facilities
– Religious buildings and places of worship
– Community facilities (such as public halls, libraries and museums)
– Outdoor recreational facilities (beaches and parks)
– Sporting clubs
– Places of local significance, such as heritage sites and iconic views
– Impacts to the wider Wollongong LGA have also been considered

9.7.2 Potential impacts

An assessment of the project potential to result in social and economic impacts has been undertaken in accordance with the *Department's Social Impact Assessment Guideline – State significant projects* (SIA Guideline) (DPIE, 2021c). Pursuant to the SIA Guidelines social impact assessment scoping was undertaken as an initial phase during the preparation of the Scoping Report for the project. During the scoping phase it was identified that the project was likely to only result in minor social impacts due to construction activities, with these activities also being confined to the existing PKSW site. When 6BF is operational, social and economic impacts will see negligible change to what is currently experienced through the operation of 5BF. Therefore, a basic assessment in accordance with the SIA Guideline is suitable for the assessment of the project.

9.7.2.1 Stakeholder engagement

A wide range of stakeholder groups was consulted during the preparation of the EIS, ranging from local government, business, special interest groups and neighbourhood forums. Key issues raised by the community included:

– Energy sources for the project and related greenhouse gas emissions
– Alternative steelmaking technology
– Emissions generated by the project
– Recycling and waste
– Safety of 5BF if the reline of 6BF was to be delayed
– Economic and employment opportunities
– Importance of steelmaking in the region and flow on benefits

Further details of the outcome of stakeholder engagement are outlined in Appendix D and 7.2.3.2.

9.7.2.2 Amenity impacts

Construction

During construction there could be some temporary amenity impacts to public areas in the immediate locality. Noise impacts are anticipated to occur during high impact activities such as impact piling, rock breaking and blasting. Whilst these activities have the likelihood to reduce amenity for some residents (if detailed design confirms they are required), they will be infrequent and of short duration. In general, the location of 6BF within PKSW provides a natural buffer to public areas as industrial noises are already characteristic of the existing environment. Appropriate management measures including consulting with the community have been recommended in Section 8.2 to manage these impacts.

The project will generate dust during construction. The Air Quality Impact Assessment (refer to Section 8.1 and Appendix E) concluded that dust generation, with the proposed management measures applied, will result in minor impacts to public amenity. Construction emissions of dust and other particulate matter will vary significantly based on the specific activities being undertaken at any time. Vehicle movement at laydown areas may also produce some amount of dust. Impacts will be small and localised, given that the laydown areas are mostly sealed. Activities such as demolition and removal of the iron skull will generate the most dust. These activities will be undertaken for a relatively short period of time. It is anticipated that demolished components may include contaminants and heavy metals. Much like noise, the location of 6BF within PKSW provides some buffer from the site to places of community value. The strongest winds in the area are also generally from the southwest, west and northwest. This means that in conditions in which fugitive dust is most likely, it will be blown away from residences and places of community value.

Traffic and transport impacts during construction will be limited to an increase in light and heavy vehicle traffic on the road network during construction. Traffic modelling showed that impacted intersections and the mid-block capacity of impacted roads will continue to operate within an acceptable level of service during the construction period. There will be negligible impacts to public and active transport networks as a result of the project.

Operation

Operation of the project will generate emissions and dust as described in Sections 8.1.3 and 8.2.3. Impacts will be generally consistent or slightly better than the existing operation of 5BF. Section 8.1.3 outlines the predicted increases in emissions levels for the project, which are minor and would have a negligible impact on the amenity of the places of community value surrounding the site.

Some minor changes to views of the site will occur as a result of the project, however these impacts will be negligible to visual amenity from viewpoints of community value. Sections 8.1.3 outlines the limited range of circumstances in which increases in emissions levels for the project are predicted. These will be minor and are considered negligible to the amenity of community value surrounding the site.

Social infrastructure impacts

Social infrastructure refers to community and individual support services. As discussed in the sections above, the project will generate some impacts in regard to noise and dust during operation. The extent of these impacts is considered negligible, given the distance between 6BF and social infrastructure services.

Social and economic benefits

The project will secure the continued operation of PKSW, ensuring the continued manufacturing of flat steel products in NSW and supply of approximately 2.2 million tonnes of these products used in a range of infrastructure and construction activities of key importance to the NSW economy.

The continued operation of PKSW will enable the continued significant contribution which it makes to the economy, including about $6.5 billion or 24 per cent of regional output per annum. The continued operation of PKSW beyond 2026 will facilitate the retention of approximately 4,500 jobs at the site itself (both BlueScope employees and full-time contractors on the site) and support in the order of 10,000 jobs in total in the region and across NSW. As a result of the proposed reline approach, a greater proportion of the project's economic benefits will be realised within the local community compared to an intense shutdown reline approach.

BlueScope also makes a significant contribution to the local community through its role as a joint partner in the BlueScopeWIN Community Partners Program. This program provides grants for community projects to be undertaken. As of late 2021, the program has been in place for eight years, funding over 400 projects and investing over $4 million. BlueScope also sponsors local organisations such as Lifeline South Coast, Community Cancer Link and Legacy, amongst others.

As part of BlueScope's First Nations Framework strategy, BlueScope works with a number of indigenous organisations, including procurement agencies to increase indigenous employment opportunities. BlueScope will continue to implement this as part of the project.

Social and economic categories

The *Social Impact Assessment Guideline – State significant projects (SIA Guideline) (*DPIE, 2021c) sets out eight categories of social impact that a project may impact upon. Socio-economic impacts of the project are described below for construction (Table 9.9) and operation (Table 9.10).

Table 9.9 Social impact categories – Construction assessment

Category	Assessment	Level of impact
Way of life	The project will generate a number of construction jobs for skilled labourers in the region.	Minor, positive
Community	The utilisation of local staff and services will have a positive impact on the community. The continuation of steelmaking in the region is a positive contribution to Australia's supply chain security and a potential source of local pride.	Minor, positive
Accessibility	The project will be contained within PKSW and will not impact traffic routes or accessibility.	Neutral
Culture	The project is not expected to have an impact on heritage items (Aboriginal and Non-Aboriginal). The project will also not impact access to significant sites and activities. BlueScope will continue to provide indigenous employment opportunities as part of their First Nations Framework strategy.	Neutral
Health and wellbeing	As discussed above, the project may generate dust and noise impacts during construction. Dust generation related to the proposed construction activities is well understood and can be easily managed through the application of standard measures as outlined in Section 8.1.5.	Minor, negative
Surroundings	The project will have a minor impact on the air quality of the surrounding environment during construction as described above.	Minor, negative

Category	Assessment	Level of impact
Livelihood	The project will generate jobs and employment opportunities for the local community during construction of the project.	Minor, positive
Decision making systems	During the preparation of this EIS, the community was consulted. The outcomes of consultation were considered when preparing the EIS to ensure that the community has been properly engaged. This process has been undertaken in accordance with accepted regulatory processes. The project will not impact on future decision making systems.	Neutral

Table 9.10 Social impact categories – Operation assessment

Category	Assessment	Level of impact
Way of life	The project will see steelmaking continued within PKSW. The operation of 6BF will be consistent with the existing operation of 5BF. No additional impacts to way of life are anticipated.	Major, positive
Community	Steelmaking has a rich history at PKSW and is something for which the Illawarra Region is well known. There are many families who have had several generations work at the PKSW site. The reline of 6BF will enable steelmaking to continue and enable more generations of local families to seek employment at PKSW. During consultation for the project, the community raised concerns regarding the greenhouse gas and energy impacts generated by the project. BSL has set a target to reduce the Scope 1 and 2 GHG emissions of its steelmaking sites by 12 per cent by 2030 relative to 2018, and to achieve net zero GHG emissions by 2050. BSL has also promised funding of projects to decrease the carbon impact of their wider operations. A detailed discussion of these strategies is presented in Sections 9.8.2 and 9.8.3.	Major, positive
Accessibility	The project will not change existing site access arrangements or generate a significant amount of traffic to change the existing road network.	Neutral
Culture	As the project will be undertaken within existing industrial land on a previously developed site, no impacts to cultural heritage (Aboriginal and non-Aboriginal) are expected.	Neutral
Health and wellbeing	As discussed in Section 8.1.3.3, the project will generate a small increase in particulate matter, SO_2 and H_2S at some locations when assessed within the context of ambient air quality and potential impacts from other State Significant Projects. The increase generated by the project is expected to be negligible overall. The project will also enable more modern technology to be implemented into the steelmaking activities. Section 8.1.3.3 details that the project is expected to decrease the levels of some pollutants when compared to the existing operations. In terms of hazard and risk, the project is expected to be a better alternative than continuing operations at 5BF until risk of failure becomes significant. Hazard and risk generated by the operation of the project is also assessed to be acceptable for the nature of the project.	Minor, positive and negative
Surroundings	The project will be undertaken on previously developed land and will enable the continuance of existing operations. As discussed in Section 8.1.3.3, the project will generate some mixed changes in emissions from the current regime. These changes will be negligible and are unlikely to cause significant impact to the surrounding environment. Ecological impacts to the surroundings are not expected to be significant, given the already heavily industrialised setting.	Minimal, positive and negative
Livelihood	PKSW is a significant employer for residents of the greater Wollongong area. The project will enable operations to continue, with the current value of those operations being about $6.5 billion or 24 per cent of regional output per annum. The continued operation of PKSW will facilitate the retention of approximately 4,500 jobs at the site itself (both BlueScope employees and full-time contractors on the site) and support in the order of 10,000 jobs in total in the Illawarra region and across NSW.	Major, positive

Category	Assessment	Level of impact
Decision making systems	The operation of the project will continue current works and operations on the PKSW site. Existing community engagement activities and channels to make comments and complaints about the PKSW site will remain in place following completion of 6BF.	Neutral

9.7.3 Mitigation and management measures

The management and mitigation strategies that will be implemented to reduce social and economic impacts on surrounding areas are shown in Table 9.11

Table 9.11 Social and economic management measures

Impact / Aspect	ID	Measure	Timing
Investment and employment	SE1	A contracting and procurement strategy focusing on maximising local content will be prepared to support local employment and business opportunities during construction. During operation, the project will seek to work with interested local parties to fulfil workforce requirements.	Construction, operation
	SE2	BlueScope will continue to invest into the local community through the continuation of the BlueScopeWIN Community Partners Program.	Construction, operation
Community engagement	SE3	The project will include a comprehensive, multi-stakeholder engagement program to inform decisions regarding the project.	Construction
	SE4	A Community Consultative Committee (CCC) will continue to be operated by BlueScope for PKSW.	Construction
	SE5	BlueScope will provide a contact number and email address for the community to provide comments on throughout the project.	Construction
Amenity	SE6	BlueScope will ensure that measures discussed in other sections that reduce environmental impacts are implemented effectively for the duration of the project.	Construction, operation.

9.8 Greenhouse gas and energy

This section describes the potential greenhouse gas (GHG) emissions associated with construction and operation of the project. It summarises the key findings of the Greenhouse Gas Report which is included in Appendix J.

9.8.1 Methodology

9.8.1.1 Overview

Iron and steelmaking results in the production of GHGs as a by-product of the reduction reaction used to convert the iron ore into iron. GHGs produced by current operations at PKSW are predominantly CO_2, with low levels of methane (CH_4) and sulphur hexafluoride (SF_6).

The SEARs require an assessment of the GHG emissions associated with the project, but do not mandate a specific standard, protocol, or methodology for the GHG assessment. This assessment has been undertaken in accordance with the principles of ISO 14064-2 and National Greenhouse and Energy Reporting (NGER) (Measurement) Determination 2008 for measuring emissions, in the following steps:

– Review relevant legislation, guidelines and policy documents to establish the regulatory context for the GHG assessment.
– Describe the existing environment, PKSW, and the proposed project.
– Establish baseline GHG emissions for PKSW inclusive of the existing operation of 5BF and assess the likely GHG emissions from 6BF.
– Assess potential GHG emissions reduction technologies and measures that may be applicable to the operation of 6BF and review their viability for incorporation into the project.

9.8.1.2 Guidelines and legislation

The GHG assessment was undertaken in accordance with the relevant sections of the following documents for the purposes of defining appropriate methods for quantification of emissions from individual sources:

– NGER (Measurement) Determination 2008 (as amended) and NGER Act 2007, Commonwealth Department of Environment and Energy
– Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (GHG Protocol) (World Business Council for Sustainable Development and World Resources Institute, 2015)

These guidelines are considered representative of good practice GHG accounting in Australia and are applicable to the project.

In addition to the quantitative assessment of GHG emissions the following strategic and policy documents have also been reviewed in relation to the projects alignment to international, national, state and local GHG strategies:

– Intergovernmental Panel on Climate Change (IPCC). (2021). Climate change widespread, rapid, and intensifying.
– IPCC. (2021). Summary for Policymakers of IPCC Special Report on Global Warming of 1.5°C approved by governments.
– Australian Government. (2021). Australia's Long-term Emissions Reduction Plans.
– NSW Government. (2020). Net Zero Plan. Stage 1: 2020-2030. Net Zero Plan Stage 1: 2020-2030, NSW Environment, Energy and Science.
– Wollongong City Council (2020) Climate Change Mitigation Plan 2020.
– Wollongong City Council (2020) Sustainable Wollongong 2030.
– BlueScope (2021) Climate Action Report.
– BlueScope (2021) Sustainability Report 2020/21.

9.8.1.3 Greenhouse gases and global warming potentials

The GHGs considered in this assessment and the corresponding global warming potential (GWP) for each GHG are listed in Table 9.12. GWP is a metric used to quantify and communicate the relative contributions of different substances to climate change over a given time horizon. GWP accounts for the radiative efficiencies of various gases and their lifetimes in the atmosphere, allowing for the impacts of individual gases on global climate change to be compared relative to those for the reference gas carbon dioxide (CO_2).

The GWPs from the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment report and section 2.02 of the National Greenhouse and Energy Reporting (NGER) Regulations 2008, updated July 2021, were used in this assessment.

Table 9.12 Greenhouse gases and 100-year global warming potentials

Greenhouse gas	Global warming potential
Carbon dioxide (CO_2)	1
Methane (CH_4)	28
Nitrous oxide (N_2O)	265
Sulphur hexafluoride (SF_6)	23,500

9.8.1.4 Emissions sources

The following emissions sources have been assessed:

– Construction stage:
  - Diesel used in plant and equipment
  - Transport of plant, materials and equipment to the site, and removal of waste from the site
  - Worker commuting, including private transport to/from the site, and buses used around the site

- Electricity from the NSW grid
- Disposal of waste
- Acetylene for welding
- Natural gas use during commissioning of the 6BF

– Operational stage:
  - Scope 1 and 2 emissions from iron and steelmaking activities

9.8.2 Existing environment

9.8.2.1 PKSW existing operational emissions

PKSW currently operates as an integrated iron and steel plant utilising Blast Furnace ironmaking and Basic Oxygen Furnace steelmaking (BF-BOF operating model). 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.

BSL reports annually on its total Australian net energy consumption and GHG emissions under the NGERS in accordance with the methodology prescribed by the National Greenhouse and Energy Reporting (Measurement) Determination 2008 (Measurement Determination). The Measurement Determination recognises the complexity of measuring GHG emissions from an integrated steelworks in which the BF is not operated independently from other steelmaking processes. The GHG emissions from PKSW, as well as its energy use and consumption, are included in BSL's report.

The Measurement Determination provides a specific methodology to determine emissions arising from the use of coke as a carbon reductant (called a carbon mass balance approach) which involves:

– Calculating the carbon content of fuels and other carbonaceous inputs.
– Calculating the carbon content in products leaving the activity (that is, of an integrated steelworks) during the relevant year.
– Calculating the carbon content in waste by-products leaving the activity during the relevant year, other than as an emission of greenhouse gas.
– Calculating the carbon content in the amount of the change in stocks of inputs, products and waste products held within the boundary of the activity during the relevant year.

This approach is used to determine the majority of GHG emissions from PKSW, which arise from the use of metallurgical coal in the iron and steelmaking process, comprising approximately 92 per cent of total GHG emissions from PKSW in any one year. The Measurement Determination does not require an allocation of GHG emissions to different plant areas within the integrated steelworks. Of particular relevance to the project, the gas generated by the blast furnace (Blast Furnace Gas or BFG) is captured and circulated around PKSW for use as an energy source, with the location of gas usage determined on a daily basis by operational need.

The integrated nature of the steelworks which makes it impracticable to assess GHG emissions from a single BF is demonstrated by the PKSW integrated operation diagram shown in Figure 9.3. The diagram illustrates the process flow from the material inputs, various operational facilities and respective output pathways, through to the Hot Strip Mill and Plate Mill where the steel is made into flat rolled products. It shows how Coke Ovens Gas (COG), generated during the cokemaking process, and BFG, are captured and circulated for use as an energy source across multiple operational facilities at PKSW from which emissions will ultimately occur.

In financial year 2021, PKSW emitted a total of 6,868,848 tonnes of carbon dioxide equivalent (tCO_2-e), comprised of:

– Scope 1 emissions: 6,260,763 tCO_2-e
– Scope 2 emissions: 608,085 tCO_2-e

The GHG emission intensity of steelmaking at PKSW (tonnes of CO_2-e per tonne of crude steel produced) reported for FY2021 was 2.14 tCO_2-e per tonne of crude steel produced.

BSL is a member of the World Steel Association (Worldsteel) and also participates in Worldsteel's climate action data collection program. In FY2020, the average GHG emissions intensity of steelmakers reporting to Worldsteel using BF-BOF technology was 2.33 tCO_2-e per tonne of crude steel produced. During this period, the GHG emissions intensity of steelmaking at PKSW was 2.21 tCO_2-e per tonne of crude steel produced, comparing favourably to the average reported by Worldsteel. For FY2020, PKSW was within the top quartile of reporters for integrated steel plants (i.e. lowest emitters), using the Worldsteel calculation methodology (based on ISO 14404 series).

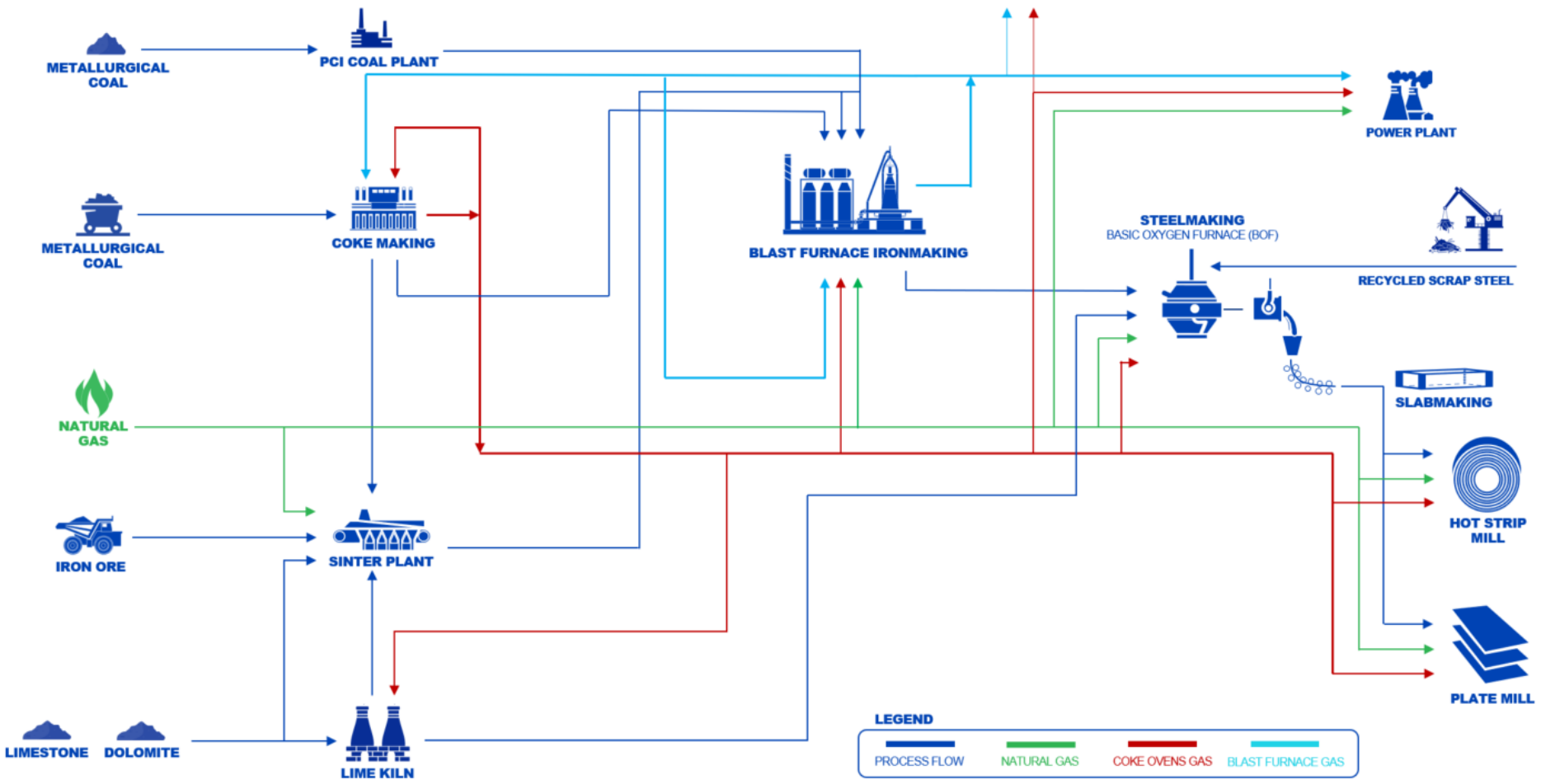

Figure 9.3 *Integrated steelworks schematic*

9.8.2.2 BlueScope Steel Limited corporate strategy

BSL has embedded climate strategy into its corporate strategy and has set a goal of pursuing net zero GHG emissions across its global operations by 2050. Achieving the 2050 net zero goal is highly dependent on several enablers, including the commerciality of emerging and breakthrough technologies, the availability of affordable and reliable renewable energy and hydrogen, the availability of quality raw materials, and the appropriate policy settings. BSL has also established medium term targets of a 12% improvement in Scope 1 and 2 GHG emissions intensity by 2030 for its steelmaking activities, and a 30% improvement GHG emissions intensity by 2030 for its non-steelmaking activities[11].

The company has taken a range of measures to enhance its management of climate change risks and opportunities, including reporting annually in line with the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD). The importance of the climate change strategy is evidenced by the refocus of the Board Committee previously known as the Audit and Risk Committee to issues around sustainability, including climate change, and the corresponding change of name to the Risk and Sustainability Committee of the Board and a Climate Change Council, introduction of shadow carbon pricing for the evaluation of major capital projects, and investment in a solar power purchasing agreement equivalent to 20 per cent of its Australian electricity consumption. In February 2021, BSL appointed a Chief Executive Climate Change to lead its global climate change response and help drive the company's decarbonisation pathway.

BlueScope and BSL are also participating in and leading several collaborations with industry and research organisations, including ResponsibleSteel, the Net Zero Steel Pathway Methodology Project, the Australian Industry Energy Transition Initiative project, and with the University of Wollongong.

To achieve net zero emissions in steelmaking, commercialisation of breakthrough technologies and supporting infrastructure will be needed. The availability of breakthrough low carbon ironmaking technologies has been an important consideration in assessing options for the future configuration of PKSW. As these technologies require significant development, and are unlikely to be commercially viable at industrial-scale for use in the specific circumstances at Port Kembla Steelworks prior to the end of the current 5BF campaign, the most technically feasible and economically viable option for BlueScope at this time is to progress with the project. As emerging and breakthrough technologies are developed over time to full commercial scale, the strong cash-flows and earnings capability of the Australian Steel Products business, of which BlueScope is a part, is expected to provide significant capacity to transition to these technologies as and when they become technically and commercially viable for use in the Australian context. While breakthrough technologies continue to be developed, there is scope to optimise production processes to reduce GHG emissions through existing and emerging technologies.

Raw material availability will be crucial to secure steel production capability in the near and longer term and to support the transition to net zero. Securing access to the raw materials that are currently used in the blast furnace process, such as metallurgical coal, will be critical in the early transition period, as will be securing future raw material requirements, such as Direct Reduced Iron (DRI) and renewable hydrogen.

BSL and BlueScope are working with partners across the industry, including research and academic bodies to explore emerging and breakthrough technologies to support their decarbonisation pathway. In October 2021 BSL and Rio Tinto signed a Memorandum of Understanding (MOU) to research and design low-emissions processes and technologies for the steel value chain across iron ore processing, iron and steelmaking and related technologies. The two priority action areas for immediate exploration are:

– **Hydrogen Direct Reduction and Iron Melter**

  This concept will involve producing a low emissions iron feed for consumption at Port Kembla and will explore the direct reduction of Rio Tinto's Pilbara iron ores, with the intent of using renewable hydrogen produced from renewable electricity. The direct reduced iron (DRI) from this process will be melted in an electrical furnace, powered with renewable electricity, to produce iron suitable for the steelmaking process.

[11] The Climate Action Report contains further details on the Climate Change strategy and the scope and boundaries of the net zero goal and medium term targets

– **Enhancing existing processes**

  BSL and Rio Tinto will cooperate to explore the development of projects involving iron ore processing and technologies directed at reducing carbon emissions from existing iron and steelmaking processes.

In December 2021, BSL signed a Memorandum of Understanding with Shell Energy Operations Pty Ltd to collaborate on two projects:

- **Pilot renewable hydrogen electrolyser plant at the Port Kembla Steelworks**
  This initial project will investigate designing, building and operating a 10MW renewable hydrogen electrolyser to explore and test the use of renewable hydrogen in the blast furnace at BlueScope's Port Kembla Steelworks. The ambition is to demonstrate hydrogen as a pathway towards low emissions steelmaking. The hydrogen could also potentially be used for other purposes, such as to feed a pilot direct reduced iron (DRI) plant.
- **Illawarra hydrogen hub concept**
  The MoU also provides for BlueScope and Shell to collaborate with other organisations to explore a "hydrogen hub" in the Illawarra. This project will explore options for hydrogen supply and offtake, renewable energy supply and hydrogen and electricity infrastructure. The project will also examine the logistics infrastructure required for a commercially viable hydrogen supply chain in the Illawarra.

Along with its Finley Solar Farm Power Purchase Agreement in NSW, in late 2020 BSL announced a $20 million investment to develop a Renewable Manufacturing Zone at PKSW. Half of this investment will be allocated to companies aspiring to build manufacturing capability, particularly in the renewable energy sector in NSW, with an immediate focus on supporting the manufacture of wind tower, solar farm, and pumped hydro electricity transmission facilities. The remaining half of the investment will be directly investing into PKSW to support the development of technology solutions in steelmaking, such as the development of renewable hydrogen projects.

Based on the measures taken and commitments made as outlined in this section, it is clear that BSL's corporate strategy aligns closely with the NSW Climate Change Policy Framework and Net Zero Plan Stage 1. Further detail in relation to the NSW Climate Change Policy is outlined in Section 3.4.2.

9.8.3 Potential impacts

9.8.3.1 Construction

Emissions during construction have been estimated based on the assumptions listed in Table 9.13. The estimated emissions are shown in Table 9.14. Emission factors have been sourced from the NGER (Measurement) Determination and the National Greenhouse Accounts (NGA, 2021).

Table 9.13 Construction emission assumptions

Emission source	Assumptions
Construction equipment diesel use	Fuel use for construction equipment was estimated based on the type and number of equipment, weeks of use, daily hours of operation and fuel use per hour (sourced from equipment manufacturers data). Equipment includes cranes, excavators, rollers, graders, piling rigs, forklifts, concrete trucks and other trucks.
Electricity from grid (NSW)	The quantity of electricity used was estimated by BlueScope based on the type of equipment/ building, the estimated number of days during the construction program and the consumption per day. Electricity is used in site sheds and lighting, and for small power tools, electric welders, compressors, etc. (Note: large equipment and machinery is normally diesel-driven and is included in the 'construction equipment diesel use' above).
Worker commute	There would be up to 300 car trips per day over the construction period, for contractors and construction workers. All vehicles were conservatively assumed to be diesel. Fuel use for passenger vehicles is from the Australian Bureau of Statistics (ABS) Survey of Motor Vehicle Use in Australia (ABS, 2020).
Transport Buses	Buses transport workers around the site. There would be approximately 50 bus trips per day over the construction period. Fuel use for buses is from ABS, 2020.

Emission source	Assumptions
Transport major equipment and materials	There would be approximately 100 trucks accessing the site per day over the construction period (delivery of equipment and materials to the site and removal of waste from the site). Fuel use from trucks is from ABS, 2020.
Waste (MSW and C&D)	Approximately 100 t of Municipal Solid Waste (MSW) and 7,500 t of Construction and Demolition (C&D) waste would be generated during the construction period. Disposal of this waste to landfill generates GHG.
Welding	Acetylene gas would be used for welding and cutting during demolition, modifications and construction of new structures. The quantity of acetylene used was estimated by BlueScope based on the estimated number of welding days and the consumption per day.
Commissioning	Natural gas will be used during commissioning for drying and heating. The quantity of natural gas used was estimated by BlueScope based on commissioning of previous BFs.

Table 9.14 Construction and commissioning emissions

Emission source	Value		Fuel Type/ parameter	Emissions
	Quantity	Units		tCO_2-e
Total diesel consumption	6,803	kL	Diesel (Stationary)	18,435
Electricity from grid (NSW)	5,688	MWh	Electricity from grid (NSW)	4,494
Worker commute	726	kL	Diesel (Transport)	1,974
Transport Buses	287	kL	Diesel (Transport)	781
Transport major equipment and materials	650	kL	Diesel (Transport)	1,767
Waste (MSW & C&D)	7,600	t waste	Waste (C&D)	1,660
Welding	105,350	m^3	Acetylene	213
Commissioning	56,000	m^3	Natural gas	113
Total emissions				**29,437**

The quantity of GHG emissions estimated to occur during the full construction period is approximately 30,000 tCO_2-e, or approximately 9,800 tCO_2-e per annum over the three-year construction period. Emissions during construction are minor and only 0.1% of annual operational emissions as detailed further in Section 9.8.3.2.

9.8.3.2 Operations

Operational GHG emission generation

As outlined in Section 9.8.2, due to the complex integrated nature of PKSW, it is not feasible to extract a separate GHG emission rate for blast furnace operation alone. GHD therefore considers it appropriate to take an integrated approach to quantifying and assessing impacts associated with the project. When assessing the potential impact of project emissions, the following needs to be considered:

– The project represents ongoing operations with ironmaking transferring from 5BF to 6BF.
– The operation of 6BF will have a similar emissions profile to 5BF, with the exception of proposed GHG mitigation strategies (refer Section 9.8.4) which will either:
    - Provide GHG reduction from the commencement of operation of 6BF, or
    - Enable the introduction of a number of future GHG reduction technologies as they become commercially viable, such as the use of renewable hydrogen to displace fossil fuel-based energy sources that will enable GHG emissions reduction over the medium to loger term.

It is noted that BSL has announced that the opportunities for GHG emissions reductions enabled by the 6BF reline are part of a broader suite of climate-related projects at Port Kembla that have further potential to reduce GHG emissions.

A summary of Scope 1 and 2 GHG emissions, calculated in accordance with the NGER methodology, from the operation of PKSW for FY2020 and FY2021 is presented in Table 9.15. Scope 1 emissions contributed 91% of total GHG emissions in FY2021, while Scope 2 emissions contributed around 9% of the total GHG emissions from the site. The total GHG emissions presented in Table 9.15 include emissions from the current operation of 5BF.

Table 9.15 Summary of PKSW annual emissions

GHG Emissions (tCO_2-e)	2020	2021
Scope 1	6,103,129	6,260,763
Scope 2	558,237	608,085
Scope 3 (not included in total)	Not reported	1,125,456
Total	6,661,366	6,868,848
Steel production (tonnes)	3,012,548	3,209,637
Intensity (tonnes CO_2-e/tonne steel)	2.211	2.140

Source: Climate Action Report 2021

Overall, the project will have a net improvement (reduction) in GHG emissions intensity per tonne of steel produced, with significant potential for further improvements to be made as new and emerging low emissions technologies become viable. A review of currently available and future technologies along with those selected for implementation by the project is provided in Section 9.8.4.

Operational GHG emission impacts

Australia's national GHG emissions, by sector for the year to June 2021 and year 2019 (the most recent year available) are presented in Table 9.16. Total emissions for the year to June 2021 are 498.9 $MtCO_2$-e, and 518.9 $MtCO_2$-e for year 2019.

The most recently published state-based emissions inventory is for 2019. NSW GHG emissions, by sector, for the 2019 year are also presented in Table 9.16. Total annual emissions for NSW are 136.6 $MtCO_2$-e.

Table 9.16 National and NSW GHG emissions

Emissions Source	Australia Emissions Year to June 2021 ($MtCO_2$-e) [1]	2019 Australia Emissions ($MtCO_2$-e) [2]	2019 NSW Emissions ($MtCO_2$-e) [3]
Energy – Electricity	163.9	278.9	94.7
Energy – Stationary Energy (excluding electricity)	99.4		
Energy – Transport	91.2	100.5	27.6
Energy – Fugitive Emissions	48.7	51.0	12.7
Industrial Processes and Product Use	31.1	32.6	12.8
Agriculture	75.0	69.8	16.3
Waste	14.0	12.4	4.8
Land Use, Land Use Change and Forestry	-24.4	-26.3	-12.5
Overall Total	**498.9**	**518.9**	**136.6**

Source:

1. Table 3, Department of Industry, Science, Energy and Resources (DISER) "Quarterly Update of Australia's National Greenhouse Gas Inventory: June 2021" December 2021
2. Table 2.1, DISER, "National Inventory Report 2019", April 2021
3. DISER "State and Territory Greenhouse Gas Inventories 2019", 2021

The quantity of Scope 1 and 2 emissions from PKSW operations reported for FY2021 were 6,868,848 tCO_2-e (approximately 6.9 $MtCO_2$-e) per annum. These emissions represent less than 1.4% of the total Australia emissions, and approximately 5% of NSW emissions, based on the available data presented in Table 9.16.

Operational GHG emission policy alignment

The GHG Report included a review of relevant international, national, state and local GHG and climate change strategies and policies. This review assessed the consistency of the project against the relevant policies with reference to BlueScope's Climate Action Report as well as decarbonisation efforts being made by the steel industry more generally. A detailed analysis of the project alignment to these strategies and policies is provided in Appendix J and summarised in Table 9.17.

Table 9.17 GHG policy alignment summary

Strategy	Comment
United Nations Framework Convention on Climate Change (Paris Agreement)	Australia is a signatory to the Paris Agreement with signatory counties committed to achieving net zero emissions by 2050. BlueScope's commitment to achieving net-zero emissions by 2050 is consistent with the Paris Agreement.
Australia's Long-Term Emissions Reduction Plan	This is a whole-of-economy plan that aims to achieve net-zero emissions by 2050. BlueScope's commitment to achieving net-zero emissions by 2050 is consistent with this plan.
NSW Climate Change Policy Framework and Net Zero Plan Stage 1: 2020-2030	NSW Climate Change Policy Framework, commits NSW to the aspirational objectives of achieving net zero emissions by 2050. BlueScope's commitment to achieving net-zero emissions by 2050 is consistent with this plan.
Wollongong City Council Climate Change Mitigation Plan 2020	Whilst this plan is primarily focuses on reducing emissions from Council activities through the ongoing reduction commitments made by BlueScope (refer Section 9.8.4) the project is considered consistent with the objectives of showing community leadership in climate change mitigation.
Sustainable Wollongong 2030	The project is consistent with this strategy in regard to the goals of reducing GHG emissions and achieving net zero emissions by 2050.

GHG reduction measures that will be implemented as part of the project to reduce GHG emission over the 6BF campaign are summarised in Section 9.8.4.

9.8.4 Mitigation and management measures

9.8.4.1 GHG mitigation and management overview

To achieve net zero emissions in steelmaking, commercialisation of breakthrough technologies and supporting infrastructure will be needed. The availability of breakthrough low emissions ironmaking technologies has been an important consideration for BlueScope in assessing options for the future configuration of PKSW. For this reason, the scope of the project is intended to address the dual aims of securing BlueScope's domestic ironmaking needs from 2026, as well as providing a bridge to transition from current blast furnace technology to new and emerging low emissions technologies once available at commercial, viable scale.

While breakthrough technologies are still being developed, there is scope to optimise production processes to reduce GHG emissions through existing and emerging technologies.

9.8.4.2 Proposed technologies for implementation

BlueScope has incorporated GHG abatement technologies into the design of 6BF which will result in reductions in GHG emissions when compared to those from the current operation of 5BF. Table 9.18 details the technologies or equipment that are proposed to be installed as part of the operation of 6BF that will assist in reducing GHG emissions when compared with the operation of 5BF. A detailed description of each of these technologies is provided in Appendix J.

Table 9.18 Technologies or practices proposed as part of the project

Technology	Description	Potential GHG reduction	Viability
Dual lance tuyeres	Allow the use of additional supplementary gaseous fuels such as Coke Ovens Gas (COG) or hydrogen.	No direct reduction, however, enables COG and hydrogen injection which will reduce GHG emissions by offsetting pulverised coal injection into the furnace. COG injection has the potential to reduce emissions by approximately 150,000 tCO_2 per year.	Dual lance tuyeres are being designed and will be incorporated into the project design.
Top Gas Recovery Turbine	A Top Gas Recovery Turbine utilises the pressure and thermal energy of blast furnace gases as they leave the furnace to generate electricity. The technology reduces GHG emissions by offsetting external power requirements sourced from fossil fuel generation.	Potential reduction of approximately 11,000 tCO_2 per year in comparison to existing operations.	Proven means of recovering energy from the blast furnace which has been previously implemented on 5BF and will be part of the project design, with improvements which will achieve greater energy recovery on 6BF.
Hot Blast Waste Gas Heat Recovery	Gas to gas heat exchangers recover waste heat from the Hot Blast Stoves allowing a reduction in fuel consumption. The higher efficiency combustion liberates Coke Ovens Gas which can be injected into the dual lance tuyeres displacing a proportionate amount of pulverised coal injection into the furnace. Reduction in GHG emissions via reduced fossil fuel energy consumption.	Potential reduction of approximately 11,000 tCO_2 per year, and enables injection of COG into the blast furnace.	Proven technology which will be part of the project design.
Energy Efficiency	Use of variable speed drives on compressors, pumps and fans, high efficiency motors, and correct equipment selection to avoid over sizing electric motors. Reduction in GHG emissions achieved via reduced fossil fuel energy consumption.	N/A	Proven technology that will be implemented as part of the project.

The incorporation of the technologies identified in Table 9.18 is expected to achieve a reduction of GHG emissions of approximately 172,000 tCO_2-e. Furthermore, these technologies will be key enablers of medium to longer-term opportunities to reduce Port Kembla Steelworks' greenhouse gas intensity. These opportunities are part of a broader suite of climate-related projects at Port Kembla that have the potential to significantly reduce GHG emissions intensity.

In addition to the newly installed technologies, all operational equipment will be operated and maintained to minimise leaks, accidental venting of gases, or other fugitive GHG emissions to the maximum extent practical.

9.8.4.3 Emerging and future breakthrough technologies

A range of innovative "green steel" ideas are starting to be piloted globally and BlueScope, when examining the possible steel production and supply options to be adopted at the conclusion of the current 5BF campaign, considered the potential use of these breakthrough technologies. Following extensive review of the available options and industry analysis of those developments, BlueScope has concluded that these technologies, and the supporting infrastructure required to implement them (such as a cost competitive renewable hydrogen supply chain) will not be commercialised at a viable scale in sufficient time to maintain production once the current campaign of 5BF concludes in the mid to late 2020s. Given this timeframe, the project seeks to secure

BlueScope's domestic ironmaking needs from 2026, as well as provide a bridge to transition from current blast furnace technology to new and emerging low emissions technologies once available at commercial, viable scale.

Table 9.19 provides a summary of the emerging technologies that are being considered as part of the longer term plans for steelmaking by BlueScope. It should be noted that this is not an exhaustive list of technologies and BlueScope continue to monitor the progress of various technologies as they approach commercial viability for potential incorporation into the PKSW operation. Further detail regarding other longer term technologies which may become viable over the 6BF campaign are provided in Appendix J.

Table 9.19 Summary of emerging and breakthrough technologies

Technology	Description
Biochar	The use of biochar is identified as an emerging technology in BSL's Climate Action Report. BlueScope is currently evaluating options for the use of biochar as pulverised coal into the BF, through potential supply of biomass/biochar, pyrolysis equipment capable of producing large quantities of biochar, and plant trials at 5BF. If trials are successful and a sustainable supply chain can be established, BlueScope will be able to introduce biochar into the relined 6BF. It is estimated that biochar has the potential to achieve reductions of up to 450,000 tonnes of CO_2 per annum.
Hydrogen-based Direct Reduced Iron (DRI) / Electric Arc Furnace (EAF) steelmaking	Hydrogen-based DRI coupled with steel production using an EAF is technically feasible and already considered to be part of a potential long-term solution for decarbonising the steel industry on a large scale. While integrated manufacturers produce steel from iron ore and need coal as a reductant, EAF producers use steel scrap or direct reduced iron (DRI) as their main raw material and sometimes pig iron in billets. The existing commercial production of DRI is achieved by subjecting pelletised iron ore to natural gas or COG and use of the EAF relies on high iron bearing ores making this process not suitable for the majority of the Pilbara ores. BSL and Shell Energy Operations Pty Ltd have signed a Memorandum of Understanding to investigate, design, build and operate a 10 MW renewable energy hydrogen electrolyser to explore and test the use of renewable hydrogen in the blast furnace at PKSW. If successful, it is estimated the 10 MW electrolyser may achieve emission reductions of up to 12,000 tonnes of CO_2 per year. While an improvement, BlueScope estimates up to a 300 MW electrolyser would be required to service the blast furnace.
Hydrogen-based Direct Reduced Iron (DRI) / Melter / Basic Oxygen Furnace (BOF)	Hematite ores such as those which are predominant in the Pilbara region of Australia are not currently suitable for direct reduction using the commercially available DRI-EAF technology due to the levels of metal oxide impurities present in the material, but may be suitable for DRI-Melter-BOF technology. An alternative process for the use of lower-grade ore sources that are unsuitable for DRI-EAF steel production is to add a Melter process after the DRI process. Such technology exists and may be used to remove the metal oxide impurities that are present in the hematite based ores. This process also enables the existing BOF-Caster configuration that is part of an integrated steelworks to continue to be utilised, without the need to invest in an additional conversion process. The limitations of renewable hydrogen production and availability for DRI discussed above remain applicable to this technology. As with the DRI-EAF technology, the DRI-Melter-BOF process is electricity-intensive. BSL and Rio Tinto have signed a Memorandum of Understanding which includes a priority action to explore the direct reduction of Rio Tinto's Pilbara ores, to determine the suitability of this technology in the future.
Direct electrolysis of iron ore	Direct electrolysis of iron ore is a proposed technology currently undergoing small pilot trials overseas. It involves the reduction of iron ore using electro-chemical processes rather than using chemical reductants. This electricity intensive process could potentially be a zero-carbon emission technology if utilising 100 per cent renewable energy however, the technology is in its early stages and must be further developed to overcome engineering issues, and pilot trials upscaled before it can be considered technically and economically viable at the scale required.

Technology	Description
Blast furnace coupled with carbon capture, utilisation and storage (CCUS)	Carbon Capture Utilisation and Storage (CCUS) involves capturing CO_2 emissions at the source, removing impurities, compressing the CO_2 for transport, and either utilising it to create other products or permanently storing it in underground geological formations. In 2018 to 2019, BlueScope partnered with the CO_2 Cooperative Research Centre (CO2CRC) to explore potential pathways for reducing GHG emissions in steel production through CCS and CCU. A high-level evaluation of the economic viability of transport (piping or shipping) and storage location options for captured CO_2 from Port Kembla was carried out by CO2CRC and the Sydney University. In addition, utilisation of CO_2- and CO-rich gases to provide high-quality, value-added products using innovative biochemical and chemical processes have been considered. Further work on the potential to use plant generated gases to produce ethanol was completed, with many different scenarios considered, including hydrogen and methane. Findings are yet to be released publicly, however, CCUS opportunities will not be progressed at this stage, as they were determined to be economically unviable.

9.8.4.4 GHG mitigation and management measures

Management and mitigation strategies that will be implemented to manage and reduce GHG generation associated with the project are shown in Table 9.20.

Table 9.20 Greenhouse gas management measures

Impact / Aspect	ID	Measure	Timing
Construction GHG emissions	GHG1	All plant and equipment used during the construction works will be regularly maintained to comply with the relevant exhaust emission guidelines.	Construction
Construction GHG emissions	GHG2	Sustainable procurement practices will be adopted where feasible.	Construction
Construction GHG emissions	GHG3	Where reasonable and feasible, measures to be implemented by contractors will include, but not be limited to: – Construction materials sourced locally where possible – Construction materials that have minimal embodied energy be selected – Construction materials that are low maintenance and durable – Plant and equipment will be switched off when not in constant use and not left idling – Plant and equipment brought onsite will be regularly serviced and energy efficient vehicles or equipment will be selected where available – Any plant and equipment that is not working efficiently (e.g. emitting excessive smoke) will be repaired or replaced as soon as possible – Construction works will be planned to ensure minimal movement of plant and equipment, including barges	Construction
Operational GHG emissions	GHG4	Subject to confirmation of engineering suitability, the following elements will be incorporated into the operation of the project: – Dual lance tuyeres. – Waste Gas Heat Recovery unit installed on 6BF stoves. – Top Gas Recovery Turbine installed to extract energy from gases vented from the top of the blast furnace.	Detailed design
Operational GHG emissions	GHG5	All operational equipment will be operated and maintained to minimise leaks, accidental venting of gases or other fugitive GHG emissions to the extent practical.	Operation

Impact / Aspect	ID	Measure	Timing
Operational GHG emissions	GHG6	Annually report on total PKSW net energy consumption and GHG emissions under the NGERS in accordance with the methodology prescribed by the National Greenhouse and Energy Reporting (Measurement) Determination 2008 (Measurement Determination).	Operation
Operational GHG emissions	GHG7	BlueScope will seek to maximise the use of steel manufacturing co-products to offset carbon intensive material inputs into industrial processes e.g. the use of Granulated Blast Furnace Slag as a cementitious replacement for Portland Cement in concrete construction to lower GHG emissions.	Operation

9.9 Waste management

In line with BlueScope's circular economy aspirations, manufacturing processes aim to minimise the use of resources, reduce waste and reuse or convert waste materials into other valuable products. Where practical, byproducts and waste products from steelmaking operations and other sources are used as substitutes for virgin raw materials. Besides the commercial benefits, this contributes to the circular economy, reduces greenhouse gas emissions, prevents waste materials from going to landfill and supports their use in sectors beyond the iron and steel industry.

The general approach to waste management for the project will be in accordance with the waste hierarchy defined in the *Waste Avoidance and Resource Recovery Act 2001*. In accordance with the hierarchy, waste will in the first instance be avoided through avoidance of unnecessary resource consumption. When waste is produced, options to recover the waste will be observed including options for reuse, reprocessing, recycling and energy recovery.

Waste will only be disposed of as a last resort where other options have been investigated and are not practicable.

9.9.1 Existing environment

A range of waste streams generated at the PKSW are treated, processed or disposed of at the premises in accordance with EPL 6092 and existing waste management plans, including:

– Basic solutions or bases in solid form
– Recovery of dry recyclables
– Waste oil/hydrocarbon mixtures/emulsions in water
– Containers and drums containing controlled waste residues
– Acidic solutions or acids in solid form
– Waste mineral oils
– Sewage sludge and residues
– Tar sludge
– Slag materials
– Paper and pulp residue
– Dust
– Scrap metal
– Timber packaging

The majority of these waste streams are either reused or recycled via a range of resource recovery activities authorised by EPL 6092. Any waste streams not covered by EPL 6092 are disposed of or recycled offsite at appropriately licensed facilities.

As described in Section 2.2.2, the key waste stream associated with existing operations of 5BF is blast furnace slag. Slag is a saleable by-product from ironmaking. It is a mixture of mineral impurities from the iron ore, coke and fluxes. Two types of slag product are produced from the blast furnace, granulated slag and rock slag. Granulated slag is produced by spraying the molten slag with a jet of industrial water. It has properties that allow it to be used as a replacement for a portion of Portland cement in cement production. Alternatively, rock slag is produced by atmospheric air cooling and quenching the slag in large pits. From the pits it is crushed into different sizes which form different products. The bulk of rock slag is sold as road base.

Slag management activities at PKSW, including the recovery and sale of blast furnace slag, are managed by a slag service provider in accordance with the “NSW EPA Resource Recovery Order for Blast Furnace Slag.

9.9.2 Potential impacts

9.9.2.1 Construction

Construction of the project will result in the generation of waste through the removal of refractories and iron skull, as well as general construction waste. Anticipated quantities of key waste streams are included in Table 9.21. This table is based on conservative or nominal estimates of the key waste streams and is not intended to be exhaustive.

Table 9.21 Waste generation

Waste stream	Anticipated quantity (tonnes)
Spent refractories – Hearth	1,100
Spent refractories – tuyere and stave, Hot Blast System, Casthouse	1,000
Iron skull	700

As described in Table 9.21, spent refractories will be the most significant waste generated from the relining of 6BF. The refractories consist mainly of carbon and carbonaceous material. Hearth refractory material will be comprised of approximately 90 percent carbon and varying proportions of oxides of iron, silicon, aluminium, calcium, manganese, magnesium, potassium, phosphorus, titanium, sodium and chromium. Refractory material from the tuyere and stave refractory will predominantly comprise of silicon carbide materials. Refractory material from the Hot Blast System will predominantly comprise of alumina oxide and silicon carbide materials.

Management of the waste refractory material will be undertaken in accordance with the principles of the waste management hierarchy. The material will be classified and reused or disposed of in accordance with the *Waste Classification Guidelines* (EPA, 2014). The waste generated from the removal of the refractories will be stockpiled at one of the construction laydown areas prior to reuse or disposal.

Reuse options for the waste refractory material include reuse in the blast furnace and sintering process. The final reuse or disposal method will be further investigated in the detailed design phase. The appropriate management method will be determined following an inspection of the properties and composition of the removed material.

The removal of the iron skull will generate waste iron slag which will be recycled on site in line with current slag recycling processes.

Given that minor, if any, excavation will be required for the project, disposal of soil material is not expected. If soils are required to be excavated during the project, they will be reused where appropriate within the PKSW site. If soils are unable to be reused, they will be classified as per the *Waste Classification Guidelines* (EPA, 2014) and disposed of appropriately.

The project will also generate general construction waste including packaging, domestic waste, redundant erosion and sediment controls, and sewage, which will be classified, managed and disposed of in accordance with the *Waste Classification Guidelines* (EPA, 2014). PKSW has existing waste management systems and contractors which have proven capable of dealing with temporary increases in waste streams during previous reline and shutdown activities so is well placed to manage waste streams as a result of the project.

9.9.2.2 Operation

During operation, waste streams are expected to be generally consistent with existing operating conditions and will be managed in accordance with existing waste management processes.

The primary waste stream during operation will be blast furnace slag, which will continue to be processed for reuse as saleable products by a slag service provider.

9.9.3 Mitigation and management measures

Management and mitigation strategies that will be implemented to manage waste generated by the project are shown in Table 9.22.

Table 9.22 Waste management, management measures

Impact / Aspect	ID	Measure	Timing
Construction waste	WM1	A waste management plan for the project will be prepared prior to construction commencing. The waste management plan will detail: – Statutory requirements for waste in NSW – Systems to sort and track the actual types and quantities of waste generated – Measures for separating waste based on classification of management options including colour coded bins – Options for offsite reuse, reprocessing, recycling and energy recovery	Pre-construction
	WM2	Awareness of waste minimisation practices will be included in the project induction.	Construction
	WM3	Waste will be classified, managed and disposed of in accordance with the *Waste Classification Guidelines* (EPA, 2014).	Construction
Operational waste	WM4	Operational waste streams will continue to be managed in accordance with EPL 6092.	Operation
	WM5	Recycling and resource recovery activities will continue to be managed by a slag service provider.	Operation

9.10 Cumulative impacts

This section describes the potential cumulative impacts of the project and other existing or proposed major projects. The cumulative impact assessment draws on the findings of other specialist assessments of the project contained throughout the EIS and publicly available assessment documentation on other existing or proposed major projects in the Illawarra region.

The cumulative impact assessment has found that there is limited potential for cumulative impacts to occur. Having regard to the specialist assessments, the potential for cumulative impacts in each of these areas was considered limited, drawing on specialist assessments of the project and the other identified projects where relevant.

9.10.1 Existing environment

The existing environment of the project is generally defined by a range of existing port and industrial uses in and around Port Kembla. Existing users of the berths at Port Kembla include Port Kembla Coal Terminal, general cargo facilities and Quattro Port grain facility at Inner Harbour Berths, GrainCorp grain terminal and bulk liquids facilities operated by NSW Ports in the Outer Harbour.

In addition to operations at import and export berths, there are multiple other business, cargo, logistics, bulk goods and heavy industrial facilities in and around Port Kembla including Ceva Logistics, AutoNexus, PrixCar, Port Kembla Gateway, PKK Mining Equipment, Svitzer, Cement Australia, NSW Ports Maritime Centre and Pacific National.

In addition to the known existing and established facilities in and around Port Kembla, additional proposed major projects identified in the region that have been identified are outlined in Table 9.23.

Table 9.23 Proposed major projects

Project	Type	Status	Approx. distance
Port Kembla Gas Terminal	Liquid natural gas export terminal	Approved	500 m east
Port Kembla Biodiesel facility	Soybean processing and biodiesel facility	Approved	1.1 km north
EasternGas Pipeline – Port Kembla Lateral Pipeline	Gas pipeline	Approved	1.4 km east
Port Kembla Outer Harbour Development	Reclamation and development of the Outer Harbour	Approved	1.5 km south east
Kembla Grange Waste Facility	Resource recovery of construction and demolition waste	Approved	6.5 km west
Tallawarra B Power Station	Gas turbine power station with a nominal capacity of up to 300-450 megawatts (MW)	Approved	8 km south west
Port Kembla Resource Recovery Facility	Resource recovery of construction and demolition waste	Prepare EIS	2.7 km south east
Unanderra Liquid Waste Facility	Liquid waste processing facility	Prepare EIS	3.2 km west
Dendrobium Mine Extension Project	Coal mine	Refused by Independent Planning Commission	9 kilometres west
Port Kembla Power Station	Gas turbine power station with a nominal capacity of up to 635 megawatts (MW)	Project scoping	700 m east

9.10.1.1 Port Kembla Gas Terminal

Port Kembla Gas Terminal is a proposed LNG import terminal at Berth 101 in the Inner Harbour of Port Kembla, approximately 500 metres east of the project. The project was approved in April 2019 and is currently undergoing construction.

The Port Kembla Biodiesel Facility is a proposed soybean processing and biodiesel facility about 1.1 kilometres north of the project in the same area as the Port Kembla Bulk Liquids terminal. The most recent modification application for the project was made in 2015 and extended the approval lapse date to May 2016. It is understood that the facility has not been constructed and therefore it is considered that the approval for the facility has lapsed.

9.10.1.2 Eastern Gas Pipeline – Port Kembla Lateral Pipeline

The Port Kembla Lateral Pipeline proposes to duplicate the existing Port Kembla lateral pipeline, which forms part of the Eastern Gas Pipeline which transports gas from Victoria to NSW. The project was approved in late 2020 and is yet to be constructed.

9.10.1.3 Port Kembla Outer Harbour Development

The Port Kembla Outer Harbour Development received concurrent concept and project approval under Part 3A of the EP&A Act in March 2011. The majority of dredged sediments and excavated material required for the establishment of a new berthing pocket at Berth 101 is proposed to be disposed within a 17 ha disposal area within the Outer Harbour as part of the reclamation activities proposed as part of the development.

The disposal area has been developed through discussion with NSW Ports to accommodate the latest plans for the redevelopment of the Outer Harbour. The disposal footprint falls predominantly within the approved development area for Stage 1 of the Outer Harbour Development Project, with a small portion of the disposal area extending beyond the approved footprint near the southern shoreline of the Outer Harbour.

9.10.1.4 Kembla Grange Waste Facility

Kembla Grange is an existing waste recovery facility about 6.5 kilometres west of the project. In 2016, approval was sought to expand the facility to provide for processing of up to 230,000 tonnes per annum of building and demolition waste. The expansion was completed in 2018.

9.10.1.5 Tallawarra B Power Station

Tallawarra B Power Station is a proposed gas fired power station adjacent to the existing Tallawarra A Power Station, located 9.8 kilometres south of the project. The project was approved in 2010, however due to project delays the project was not constructed and consent lapsed. The project has been granted an extension until 2022 to physically commence.

9.10.1.6 Port Kembla Resource Recovery Facility

Port Kembla Resource Recovery Facility is a proposed facility about 2.7 kilometres south of the project. The facility would involve processing including crushing, screening and separation of up to 400,000 tonnes of construction and demolition waste per annum. Environmental assessment requirements for the project were provided in 2014, however the environmental impact assessment has not been published and the proposed facility has not been approved. The environmental assessment requirements are expected to have lapsed requiring reapplication.

9.10.1.7 Unanderra Liquid Waste Facility

The Unanderra Liquid Waste Facility is a proposed extension to an existing waste treatment facility about 3.2 kilometres west of the project. It is understood the extension would process in the order of 6,500 tonnes of inorganic liquid waste per annum. Environmental assessment requirements for the project were provided in May 2018. It is expected that the environmental assessment for the facility is underway.

9.10.1.8 Dendrobium Mine Extension Project

The Dendrobium Mine Extension Project is a proposed extension to the existing underground coal mine leased across a large area around Cordeaux. The mine pit top is about 9 kilometres west of the project. The project was rejected in 2021. It is understood that current operations at Dendrobium Mine are continuing in accordance with existing approvals.

9.10.1.9 Port Kembla Power Station

Australian Industrial Power (AIP) proposes to develop a power station at Port Kembla's Berth 101 approximately 700 metres to the east of 6BF. The power station will generate power from natural gas supplied by the Port Kembla Gas Terminal at Berth 101 with an ultimate generation capacity of nominally 635 megawatts. Station design will allow for fuel mixtures of renewable hydrogen and natural. The project also includes transmission lines which will run along the southern boundary of the PKSW site. At the time of preparation of this EIS, AIP has lodged a Scoping Report for their project but no SEARs have been issued.

9.10.2 Potential impacts

The sections below detail the potential cumulative impacts of the project and other existing or proposed major projects described in section 9.10.1. Based on the potential impacts of the project and the other existing or proposed major projects that were identified, the main areas where potential cumulative impacts could occur were considered to be air quality, noise and vibration, hazard and risk, water and hydrology and traffic.

9.10.2.1 Air quality

The AQIA identified two SSI projects in the surrounding area that have potential for cumulative impacts with the project. The Port Kembla Gas Terminal was considered likely to have cumulative impacts given its close proximity to the site. Background pollutant concentrations were estimated and were considered in the assessment. The Tallawarra B Power Station was considered unlikely to contribute to cumulative emissions as there is a significant distance between the two sites. The AQIA also considered the project's impact on air quality in the context of existing conditions.

Key findings from the AQIA were that during construction, impacts to air quality will be minor with the implementation of measures provided in the assessment. Some cumulative impacts are expected as a result of the project. These were identified to be:

– A minor increase of 0.3% with negligible change to cumulative impacts.
– A generalised decrease of SO_2 and H2S with one minor increase in a localised area.

These impacts would be offset by the positive changes that will be generated, including:

– Decrease ofNO_2emissions at all locations assessed.

Overall, the AQIA has assessed the potential cumulative impacts of the project and found that the project will generally result in an improvement of emissions when the operation of 6BF is compared to 5BF despite elevated background levels for some pollutants. The AQIA is summarised in Section 8.1 and presented in full in Appendix E.

9.10.2.2 Noise and vibration

The NVIA describes the background level of noise present at the site to define the existing conditions. The background level of noise was described to be dominated by 'urban hum' or industrial source noises. Given the proximity of Port Kembla Gas Terminal, Port Kembla Biodiesel facility, the Eastern Gas Pipeline – Port Kembla Lateral Pipeline and Port Kembla Outer Harbour Development, the background level of noise is considered to be inclusive of these developments.

Noise generated by the construction of the project was estimated to generally be below noise management levels. Some high impact activities will generate noise able to be heard at nearby receivers. The construction noise assessment considered background noise levels which resulted in a cumulative impact assessment. The NVIA found that construction noise will not significantly cumulate with other noises emanating from the site. Vibration impacts are also not anticipated.

The operational noise assessment incorporated background noise sources to assess the cumulative noise impact at sensitive receivers, as well as the noise impacts at receivers generated from the project independently. The assessment concluded that the relevant noise criteria would be met therefore no cumulative impacts are likely to occur. The Noise and Vibration assessment is summarised in Section 8.2 and presented in full in Appendix F.

9.10.2.3 Hazard and risk

The potential for hazard and risk associated with the project was assessed based on a review of potential hazards that may occur on site. The hazard identification study identified the following hazards with the potential for offsite impact, all of which can be suitably controlled:

– Molten metal/water interaction explosion
– Natural gas leak and ignition
– Coke ovens gas leak and ignition
– Use/ handling of explosives
– Toxic gas release

Of these scenarios, molten metal/water interaction explosions, coke ovens gas leaks and ignition and natural gas leaks and ignition were the highest risk hazards. These scenarios were assessed in accordance with criteria in *Hazardous Industry Planning Advisory Paper No 4, Risk Criteria for Land Use Safety Planning.* All scenarios were found to be compliant with the criteria and the assessment concluded that the risks can be managed to tolerable levels with the implementation of the proposed safeguards. This means that there will be no significant offsite hazards or risks associated with the project that have the potential to result in cumulative impacts. The Hazard and Risk assessment is summarised in Section 8.3 and presented in full in Appendix G.

9.10.2.4 Water and hydrology

An assessment of the future 6BF operations against the above water quality guidelines was undertaken based on the historical 5BF operational monitoring data, previous numerical modelling studies and ecological studies of Allans Creek and the Inner Harbour. These studies and modelling utilised background water quality monitoring data which has allowed the assessment of the cumulative impacts as a result of the project. Key findings of the water quality assessment are:

- Relatively few exceedances of the 95% LOSP DGV's occur during operations, with the exception of cyanide which remains compliant with EPL 6092 concentration limits.
- Products added to the effluent treatment system such as scale inhibiter, flocculant, coagulant and biocides will be dosed at rates in accordance with the manufacturer's guidance and BlueScope's current operational procedures such that no significant impacts to water quality are expected at the proposed discharge point.
- Whilst the cooling system proposed for 6BF offers the benefits of reduced energy use and water use in comparison to the existing cooling system at 5BF, an increase of approximately 3,000m^3/h of salt water will be required, which represents an increase of around 10% over current operations. At the point of discharge to Allans Creek, these changes are expected to result in an increase of approximately 0.5 – 1°C.
- Numerical modelling previously undertaken on behalf of BlueScope indicates that increased temperatures drop rapidly upon discharge to Allans Creek, with an initial mixing zone of 30m to 40m from the discharge point.
- Allans Creek and the Inner Harbour have been subject to the effects of warmer than ambient industrial discharges for decades and are considered part of a highly disturbed ecosystem. Existing temperatures within 2BS Drain and Allans Creek are not compliant with the default guideline values for temperature and Future temperatures are expected to remain non-compliant. However, the predicted increase in temperature at the point of discharge into Allans Creek will comply with the site-specific temperature criteria (an increase of less than 3°C) developed during previous studies and will remain well within the Temperature limits specified under EPL 6092.
- The historical temperature environment has been taken into consideration using previous reporting which adopted a conservative impact assessment approach negating the need to assess cumualative temperature impacts against specific projects such as the PKGT.
- The risk of negative impacts to groundwater posed by the project is considered low on account of BlueScope's recent and proposed improvements to capture and containment measures and the ongoing groundwater monitoring program.
- Water proposed to be used during the project does not trigger water licencing requirements and will be sourced from an appropriately authorised and reliable supply comprised of both recycled water from the Wollongong Water Recycling Plant (over 85% of the current industrial water mixture) and unfiltered Avon Dam water.

9.10.2.5 Traffic

An assessment of the project's impact on traffic conditions was undertaken based on background traffic counts to give an indication of the existing conditions of the roads surrounding the site. The assessment found that whilst construction of the project will generate some traffic during the morning and afternoon peaks, the road capacity will not be exceeded. Operational traffic will be at similar levels to the existing environment. Overall, the assessment concluded that the project will have a low impact on traffic conditions.

The project may generate cumulative impacts with construction traffic associated with the Port Kembla Gas Terminal and the Eastern Gas Pipeline, particularly during construction. These projects are all in a similar area and will utilise the same road network as the project. Any traffic impacts are expected to be minor to moderate at worst case scenario, and at their greatest during the morning and afternoon peak. Given the major road infrastructure surrounding the site and the level of available capacity identified even with project construction traffic, it is expected that the local road network will be able to manage with the increase in traffic. The project is not expected to have significant cumulative impacts in combination with projects in the wider road network.

The TIA assessment is summarised in Section 8.5 and Appendix I.

9.10.2.6 Other cumulative impacts

The construction of the project may overlap with some projects listed in Section 9.10.1 however the potential for other cumulative impacts to occur is considered negligible due to the project being contained within PKSW. Positive cumulative impacts will occur through the generation of a significant number of construction-related roles for the local community. It will also provide a short-term boost to local manufacturers and suppliers.

The project will generate greenhouse gases that may have an impact on anthropogenic climate change. There are several listed premises around the site within the Port Kembla Industrial area which all contribute to emissions. Construction of the project will generate greenhouse gases though combustion of fuels and electricity use. This will be cumulative with the resources needed to complete other State Significant projects in the area. As discussed in Sections 9.8.3 and 9.8.4, this project will implement various measures to reduce emissions during construction. In a similar manner, it is expected that other major projects in the area will be required to do the same. Overall impacts are not expected to be significant and will be limited to the period of construction.

For the operation of the project, several measures have been incorporated into the design to allow 6BF to have a reduced greenhouse gas footprint compared to the current operation of 5BF. BlueScope is committed to reducing its carbon and other atmospheric impacts over time.

9.10.3 Mitigation and management measures

Management and mitigation strategies that will be implemented to manage potential cumulative impacts generated by the project are shown in Table 9.24.

Table 9.24 Cumulative impacts management measures

Impact	ID	Measure	Timing
General impact reduction	CI1	The mitigation measures presented in Appendix D will be implemented effectively to reduce the project's impact on the environment.	Pre-construction Construction Operation

10. Environmental Management

10.1 Environmental management system

PKSW operates under an Environmental Management System (EMS) that is certified to the international environment management standard: ISO 14001:2015. The EMS includes a series of management plans and procedures to assess and mitigate environmental risks.

BlueScope also maintains a Pollution Incident Response Management Plan (PIRMP) as required under EPL 6092. EPL 6092 also stipulates the discharge points to air and water and monitoring requirements and limits for discharges from these points.

These plans will be reviewed to incorporate the environmental management commitments and any conditions of approval for the project.

This EIS identifies safeguards and management measures to minimise adverse environmental impacts which could potentially arise as a result of the project. These are outlined throughout Chapter 8. These mitigation and management measures will be incorporated into the detailed design of the project and applied during its construction and operation.

All safeguards and management measures outlined in this document will be managed by implementing a Project Environmental Management Plan. The Project Environmental Management Plan will manage the impacts of all stages of the project and will include the following sub plans:

– Construction Environmental Management Plan (CEMP) to address the impacts of the construction phase.
– Operational Environmental Management Plan (OEMP) to address the impacts of the operational phase.
– Decommissioning Environmental Management Plan to address the impacts of the decommissioning phase. It is however noted that this plan will be similar to the CEMP as many of the measures to be implemented during this phase are similar to those in the CEMP.

Each of the above plans will be prepared prior to the commencement of each of the stages and will include but not be limited to the following:

– Roles of specific staff
– Reporting requirements
– Monitoring requirements
– Environmental targets and objectives
– Auditing and review timetables
– Emergency response requirements
– Details of training and inductions required
– Complaint response procedures
– Adaptive management mechanisms to encourage continuous improvement

The above plans will also potentially contain sub-plans for specific issues such as erosion and sedimentation and waste management plans.

10.2 Decommissioning

In addition to the CEMP and OEMP, a plan will be required at the end of the project life to mitigate and manage the potential environmental impacts of decommissioning.

Decommissioning activities will involve a Rundown, Salamander Tap, and Make Safe operation as described in Section 5.9.

A summary decommissioning plan will be prepared as outlined in Section 5 with a detailed decommissioning plan to be developed in consultation with relevant stakeholders at the end of the project life.

10.3 Summary of safeguards and management measures

Environmental safeguards and management measures outlined in this EIS will be incorporated during construction, operation and decommissioning of the project. These safeguards will minimise any potential adverse impacts arising from the project on the surrounding environment. The safeguards and management measures are provided as a consolidated list in Appendix D.

11. Justification and conclusion

11.1 Justification for the project

11.1.1 Strategic justification

BlueScope is proposing to reline 6BF to secure future steelmaking at PKSW when the current operational blast furnace, 5BF, comes to the end of its operational life. Without the continued provision of operational blast furnace infrastructure provided by the project, there is a risk that steel making will be unable to continue at PKSW from as early as 2026 and consequently that no primary steel making will occur in NSW from that time onwards.

The scope of the project, which is broader than a typical reline, will deliver a modernised and upgraded blast furnace facility and related infrastructure that will include comprehensive technology and environmental upgrades including new GHG emissions abatement technology. This will mean that the project will make a near-term positive environmental impact, relative to current 5BF operations. The scope of the project is intended to address the dual aims of the project: to secure BlueScope's domestic ironmaking needs from 2026, as well as provide a bridge to transition from current blast furnace technology to new and emerging low emissions technologies once available at commercial, viable scale.

Steel is the world's most widely-used metal. It is used in every aspect of human life and is a vital part of a modern economy. Steel is infinitely recyclable and the most recycled material on earth. It is an essential part of the transition to net zero carbon emission economies. Wind turbines, solar farms, hydrogen production, storage facilities and the necessary electrical infrastructure to support all of these depend upon and will require vast amounts of steel. Steel made at PKSW is used throughout Australia for a wide range of infrastructure and construction projects, both large and small, as well as being exported to key overseas markets.

The project is considered essential to NSW for a number of economic and social reasons. Specifically, it will secure the continued operation of PKSW, the largest manufacturing facility in NSW and Australia, beyond 2026, ensuring the continued manufacturing of flat steel products in NSW and supply of approximately 2.2 million tonnes of these products which are used in a range of infrastructure and construction activities of key importance to the NSW economy.

The ongoing operation of PKSW will enable the continued significant contribution which PKSW makes to the Illawarra economy, and will facilitate the retention of approximately 4,500 jobs at the site itself and support approximately 10,000 jobs in total including indirectly in supplier and customer businesses, many of which are skilled and industry-specific.

The project will also have national strategic importance through the continued operation of one of only two integrated steelworks in Australia. Increasing globalisation has led to a thinning of industrial production in developed economies such as Australia, raising concerns for the nation's capacity to produce goods locally in the event of a disruption to world trade. The complexity and outright cost to establish replacement ironmaking, steelmaking and hot-rolling facilities may be prohibitive if PKSW is shut down. This could impact the supply chain resilience for industries of critical strategic significance including but not limited to defence.

PKSW is strategically located in the Illawarra, which is emerging as a major industrial hub for manufacturing and energy infrastructure. A number of potential energy projects have been identified in connection with the area, including the Port Kembla Gas Terminal for the import of Liquified Natural Gas (LNG) and the proposed associated development of a dual fuel LNG-Hydrogen power station. BlueScope's position as an established manufacturer and potential customer will be of value to these projects and will continue to be an important factor in maintaining the Illawarra region's contribution to the state and national economies.

In recognising the strategic importance of the project, the NSW Government has declared it 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 (State and Regional Development) 2011* (SRD SEPP).

This EIS has undertaken a thorough review of the potential environmental impact associated with the project. As the project will allow for a switch of iron production from 5BF to 6BF, changes experienced by the environment and community will be negligible, rather a net positive environmental outcome will occur through the use of a newer furnace that incorporates improved environmental controls.

11.1.2 Objects of the EP&A Act

The project's consistency or otherwise with the objects of the EP&A Act is summarised in Table 11.1.

Table 11.1 Objects of the EP&A Act

Object	Comment
(a) to promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources,	The continued operation of PKSW beyond 2026 will enable the continued significant contribution which PKSW makes to the Illawarra economy, which is currently about $6.5 billion or 24 per cent of regional output per annum. This will also facilitate the retention of approximately 4,500 jobs at the site itself and support in the order of 10,000 jobs in total including indirectly in supplier and customer businesses. Net positive environmental outcomes will arise from the project, and changes experienced by the community will be negligible. A number of management measures have been identified in this EIS and will be implemented to minimise any environmental, social or economic impacts associated with the project.
(b) to facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment,	Ecologically sustainable development is specifically addressed in Section 11.1.3.
(c) to promote the orderly and economic use and development of land,	The project will represent the continued operation of the existing PKSW, which is a heavily disturbed industrial site that has operated as a steel making plant for nearly a century. The project will therefore constitute an orderly and economic use and development of the land.
(d) to promote the delivery and maintenance of affordable housing,	Not relevant to the project other than indirectly via the domestic provision of supplies used in housing construction.
(e) to protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats,	The project will not have a significant impact on the environment, including threatened and other species of native animals and plants, ecological communities and their habitats. Measures identified in this EIS will be implemented to protect and conserve the environment and native animals and plants.
(f) to promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage),	The project will be located within a highly disturbed industrial site and will not impact on built or cultural heritage. Measures will be implemented to sustainably manage known and unknown heritage resources as relevant.
(g) to promote good design and amenity of the built environment,	The project will involve the refurbishment and upgrade of existing structures within the PKSW site. Any additional structures will be designed in accordance with relevant design standards and requirements and will be generally consistent with the existing industrial character of the site.
(h) to promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants,	All buildings will be constructed and maintained in accordance with all relevant construction and health and safety standards.

Object	Comment
(i) to promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State,	Not relevant to the project.
(j) to provide increased opportunity for community participation in environmental planning and assessment.	Consultation with the community and relevant government agencies was undertaken during the development of the project. Consultation will be ongoing during detailed design, construction and operation.

11.1.3 Ecologically sustainable development

The principles of ecologically sustainable development are defined under the EP&A Regulation (Schedule 2) as:

> *(a) the precautionary principle, namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should be guided by:*
>
> *(i) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and*
>
> *(ii) an assessment of the risk-weighted consequences of various options,*
>
> *(b) inter-generational equity, namely, that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations,*
>
> *(c) conservation of biological diversity and ecological integrity, namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration,*
>
> *(d) improved valuation, pricing and incentive mechanisms, namely, that environmental factors should be included in the valuation of assets and services, such as:*
>
> *(i) polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement,*
>
> *(ii) the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste,*
>
> *(iii) environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.*

These principles are addressed in turn, as they pertain to the project, in the following sections.

11.1.3.1 The precautionary principle

This principle states "*if there are threats of serious or irreversible damage, lack of scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation*".

Evaluation and assessment of alternative options has aimed to reduce the risk of serious and irreversible impacts on the environment. Stakeholder consultation considered issues raised by stakeholders and a range of specialist studies were undertaken for key issues to provide accurate and impartial information to assist in project planning and development.

The project will allow for the continuity of operations at PKSW by transferring operations from 5BF to 6BF. The relining process to bring 6BF back to service for a second blast furnace campaign will incorporate additional environmental controls to result in improvements in environmental performance and the sustainability of operations. The project aims to secure BlueScope's domestic ironmaking needs from 2026, as well as provide a bridge to transition from current blast furnace technology to new and emerging low emissions technologies once available at commercial, viable scale. The project has sought to minimise impacts on the amenity of the locality and the environment, while maintaining engineering feasibility and safety for all personnel.

To achieve net zero emissions in steelmaking, commercialisation of breakthrough technologies and supporting infrastructure will be needed. While breakthrough technologies continue to be developed, there is scope to optimise production processes to reduce GHG emissions through existing and emerging technologies. BlueScope has incorporated additional technologies into the project to improve the environmental performance of 6BF relative to 5BF. In addition, the project scope includes improved environmental controls for improved water and air quality management. The project therefore has a net positive environmental impact, relative to current 5BF operation.

BSL has also set a target to reduce the Scope 1 and 2 GHG emissions of its steelmaking sites by 12 per cent by 2030 relative to 2018, and to achieve net zero GHG emissions by 2050. Delivery of the 2030 targets and progress on the 2050 goal will be supported by BSL's revised Capital Allocation Framework. Partnerships and collaborations with governments, technology vendors and industry bodies will be crucial to implementing future technologies. In late 2021, BSL signed Memorandums of Understanding with Shell Energy Operations Pty Ltd and Rio Tinto to pursue the use of hydrogen in the steelmaking process and the direct reduction of hematite ores, respectively.

A number of safeguards have been proposed to minimise potential impacts. These safeguards will be implemented during the construction and operation of the project. No safeguards have been postponed as a result of lack of scientific certainty.

A CEMP will be prepared before construction starts. This requirement will ensure the project achieves a high-level of environmental performance. No management measures or mechanisms will be postponed as a result of a lack of information.

11.1.3.2 Intergenerational equity

The principle states, "*the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations*".

Steel is the world's most widely-used metal. It is used in nearly every aspect of life and is a vital part of a modern economy. Steel is infinitely recyclable, and is the most recycled material on earth. Steel is a key component of renewable energy projects such as wind turbines, solar farms, pumped hydro, hydrogen production facilities, and the necessary electrical infrastructure to support them, so it plays an important role in moving towards net zero greenhouse gas emissions by supporting the uptake of renewable energy.

The project will benefit future generations by maintaining access to domestically produced steel products. If these products are produced overseas, the access of future generations to such products will be subject to international market supply chain issues which may lead to lack of supply certainty. Moving to an overseas supply model will also cause a large number of local employment opportunities taken away from the future workforce.

In maintaining future generations' access to domestically produced steel products, the project will also secure employment generated by PKSW, as well as significant ongoing economic contributions to the regional and state economies. When balanced with the delivery of these benefits to future generations, this EIS demonstrates that environmental impacts will be within acceptable levels and BSL has committed to ongoing research and development for commercialisation of breakthrough technologies and carbon reduction projects to reduce the footprint for ongoing operations.

11.1.3.3 Conservation of biological diversity and ecological integrity

This principle states that the "*diversity of genes, species, populations and communities, as well as the ecosystems and habitats to which they belong, must be maintained and improved to ensure their survival*".

The project is located in an established heavy industrial area which has been used for steelmaking since 1928. The project relates to the reline of an existing blast furnace to replace the currently operating blast furnace once it reaches the end of its campaign life. The project site does not contain any areas that contain biodiversity or sensitive ecology. There is potential for impacts to occur to receiving environments such as the marine environment of Port Kembla. Through the application of the measures outlined in Appendix D these impacts will be appropriately managed. Importantly these measures include established environmental management practices which are currently in place at PKSW. These measures are subject to ongoing review and improvement where required as outlined in Section 10.1. With these measures in place the project is unlikely to have an impact on biological diversity or ecological integrity.

11.1.3.4 Improved valuation, pricing and incentive mechanisms

This principle requires that "*costs to the environment should be factored into the economic costs of a project*".

The EIS has examined the environmental consequences of the project and identified management measures to manage the potential for adverse impacts. As outlined in Section 5, BlueScope is upgrading a number of elements of 6BF to deliver a better energy and emissions profile, when compared to 5BF. Notably the project incorporates over $100 million in environmental improvements. The requirement to implement these management measures will result in an economic cost to BlueScope. The implementation of management measures will increase both the capital and operating costs of the project. This signifies that environmental resources have been given appropriate valuation.

BSL has revised its Capital Allocation Framework to incorporate climate capital. Capital allocations have been made to help deliver on the 2030 mid-term commitments and make progress on the longer term decarbonisation journey. Further details regarding the significant investments being made by BSL in relation to emissions reduction are outlined in Section 9.8.

11.2 Biophysical, economic and social merits of the project

The biophysical, economic and social costs and benefits of the project have been assessed in detail throughout the EIS. The biophysical impacts of the project will be limited due to the already highly disturbed nature of the site and the relatively limited further disturbance required by the project.

The main waterbodies in and around the project site include Allans Creek, Tom Thumb Lagoon and Port Kembla Inner Harbour. The hydrology and water quality of these waterbodies have been heavily modified by historic industrial and port development, and continue to be influenced by industrial runoff and releases.

The main potential impacts of the project relate to air quality, noise, hazards and risks, water quality and traffic. These environmental aspects have been assessed in detail in this EIS. The project is not expected to have a significant impact on the environment. Overall, the potential impacts of the project on the environment will result in a net positive position due to the introduction of new environmental controls on 6BF. Where impacts have the potential to occur, they are generally an improvement on 5BF and will be readily managed with the implementation of the measures discussed through the EIS that will be collated in construction and operation environmental management plans.

Construction of the project is expected to generate employment through the approximately 250 workers required to complete the project. Furthermore, the continued production of steel at PKSW will provide a continued significant contribution to the Illawarra and NSW economies and help facilitate the continued growth and development of emerging manufacturing industries in the region and the State.

11.3 Conclusion

BlueScope's Port Kembla Steelworks (PKSW) operation in NSW includes two blast furnaces: No.5 Blast Furnace (5BF) is currently operating, while No.6 Blast Furnace (6BF) is currently in care and maintenance.

5BF is expected to continue to produce (molten) iron on a continuous basis until it reaches the end of its operational life at some stage between 2026 and 2030. BlueScope is proposing a move of iron production from 5BF to 6BF, after 5BF ceases operation.

BlueScope has investigated a number of alternatives for continuing ironmaking operations at PKSW following the end of the current 5BF campaign, as well as the option of ceasing iron and steelmaking at PKSW, and has concluded that a reline of 6BF is the only option which can be executed within the timeframes necessary to maintain uninterrupted iron production at PKSW.

The project will secure the ongoing production of steel at PKSW, which is an important domestic source of steel for a range of construction and infrastructure projects that are of key importance to the NSW economy. PKSW also provides a significant contribution to the local economy, with the project facilitating the retention of approximately 4,500 jobs at the PKSW site itself and supporting approximately 10,000 jobs in total including indirectly in supplier and customer businesses.

The EIS has documented the potential environmental impacts of the project, considering both negative and positive impacts. The project has been designed and assessed with regard to the matters for consideration under the EP&A Act, and is consistent with the principles of ecologically sustainable development.

The design of the project, in conjunction with the detailed assessment of potential environmental impacts, has sought to minimise impacts on the environment while maintaining feasibility. The EIS has demonstrated that the project will not have a significant environmental impact, and in some respects, may result in an improved environmental performance when compared to the existing 5BF operations.

The project will also make provision for the use of low emission fuel such as renewable hydrogen during the 6BF campaign. BlueScope's has committed to achieving Net Zero GHG emissions by 2050 and the project will support this goal while securing significant employment and economic benefits for the Illawara region and NSW over the 6BF campaign. With the implementation of the proposed management and mitigation measures, the beneficial effects of the project are considered to significantly outweigh any potential negative impacts.

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