Prepared for

BlueScope Steel (AIS) Pty Limited

Ore Preparation Upgrade Project

Environmental Assessment

Final

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BLUESCOPE STEEL

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Form 2

Submission of Environmental Assessment (EA)

Prepared under Part 3A of the *Environmental Planning and Assessment Act 1979*

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address	CH2M HILL Australia Pty Ltd	
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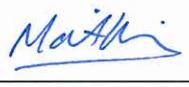
in respect of		
development application	Ore Preparation Upgrade Project	
applicant name	BlueScope Steel (AIS) Pty Ltd ABN 19 000 019 625	
applicant address	Five Islands Road, Port Kembla NSW 2505	
	PO Box 1854 Wollongong NSW 2500	
land to be developed	Parts of BlueScope Steel Port Kembla Steelworks associated with the	
	Sinter Plant and Raw Materials Handing Area (Ore Preparation Area)	
lot no., DP/MPS, vol/fol etc	Refer to attached EA	
	Or	
proposed development		
	☑ map(s) attached	
certificate	an Environmental Assessment (EA) is attached I certify that I have prepared the contents of this EA and to the best of my knowledge:	

(i) the EA has been prepared in accordance with section 75F and section 75H of the *Environmental Planning and Assessment Act 1979* and *Regulations*;

(ii) the EA contains all available information that is relevant to the assessment of the Project to which the EA relates, and

(iii) the information contained in the EA is neither false nor misleading.

Signature	
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Glossary

Term	Meaning
Baghouse	A fabric filter which removes dust from the air extracted from the casthouse and dust from the raw materials handling de-dusting systems.
Basic Oxygen Steelmaking	BOS facility where iron is converted into steel using gaseous oxygen to oxidise the carbon and other unwanted impurities in molten iron.
Blast Furnace	A large refractory lined cylindrical vessel standing approximately 85m high, used to convert iron oxide in the ore to iron through a series of chemical reactions which take place at very high temperatures. The name generally applies to include the surrounding structure and facilities attached to the Blast Furnace that are required for it to function as a unit (e.g. stoves, cooling systems, casthouses, and gas cleaning).
Blowdown	Water drained from a re-circulating water system. Chemicals tend to increase in concentration due to water evaporation from the system. The blowdown helps maintain control of the chemical concentrations.
Blower Station	The building containing large turbo blowers to blow air through the stoves and into the Blast Furnace.
BlueScope Steel	BlueScope Steel (AIS) Pty. Ltd.
Burden	The raw materials added to or inside the Blast Furnace.
Cast	The process of draining liquids (iron and slag) from the furnace through a taphole.
Clarifier	A solids/liquids separation vessel which is primarily aimed at delivering a clear overflow free of suspended solids.
Cold Mill	The Cold Mill takes HRPO from the Pickle Line and reduces the thickness of the strip in five rolling stands to produce CRFH for use as Tin Plate feed.
De-dusting Ducts	Large pipes which convey air and dust from the area being de-dusted.
Electrostatic precipitator	A gas cleaning device which uses a high voltage electrostatic charge to attract dust particles and collect them on a plate at earth potential. The plates are periodically rapped to dislodge the dust in a cake form into a hopper below the gas flow passage.
Environmental Aspect	Element of an activity, product or service that may interact with the environment. Note - A significant environmental aspect is an environmental aspect that has, or can have, a significant environmental impact.
Environmental Impact	Any change to the environment, whether adverse or beneficial, wholly or partially resulting from identified activity, product or service.
Financial Year	Beginning 1 July and ending 30 June each year.
Hazard	A situation or set of conditions that has the potential to cause harm to people or the environment, damage to plant, or loss of production.
Hot Metal	Molten Iron.
Hot Strip Mill	The Hot Strip Mill heats steel slabs in a walking beam furnace and rolls and coils the steel to produce hot rolled coil.
Iron Ore	Mineral containing a combination of iron, oxygen and other substances known as ‘gangue’.
Ironmaking	A continuous process where iron ore, coke, limestone and gases are combined at very high temperatures in a Blast Furnace to produce molten iron. Also describes the area where iron is produced.

Term	Meaning
Likelihood	An assessment of the probability of an incident resulting from a hazard or aspect, combined with the exposure of people, the environment, the plant and/or business, with the current controls in place.
Lump ore	Ore in a lumpy or rock form, rather than crushed.
Metallurgical Coke	Produced in coke ovens by heating coal in the absence of air, which forms a solid lump of coke (and ash components).
Pellets	Fine particles of iron ore mixed and bonded together with fluxes and roasted into hard, round balls for use as a Blast Furnace feed.
Pickle Line	The Pickle Line takes hot rolled coils and pickles it by passing through pickling tanks to remove scale (iron oxide) and then oils the strip to produce hot rolled, pickled and oiled coils.
Plate Mill	The Plate Mill takes steel slabs and rolls these to produce steel plate.
Project	The Project means the upgrade of the Ore Preparation Area as specified in this EA and determined in accordance with section 75B of the EP&A Act to be a Project to which Part 3A applies.
Quench	The spraying of water to cool an item.
Reclaimer	Device to reclaim material such as iron ore from a stockpile, may take various forms, e.g. bucket wheel reclaimer, barrel reclaimer. Front end loaders can also be used to reclaim from stockpiles.
Risk	A measure of human harm, environmental impact or economic loss, in terms of both the incident likelihood and the magnitude of the consequence or impact.
Sinter	Fine particles of iron ore, coke and limestone, roasted into lumps (agglomerated) for use as Blast Furnace feed.
Slab	Rectangular prism-shaped semi-finished steel ranging up to about 250 millimetres x 2000 millimetres x 4 metres.
Slag	Produced by the chemical combination of the flux and the impurities removed from the metal in Ironmaking and steelmaking.
Smelting	A process whereby materials such as iron ore, coke and other raw materials (fluxes) are charged into a Blast Furnace to generate molten iron. A thermochemical process of reduction occurs within the Blast Furnace where oxygen is removed from the ore, leaving a mixture of elemental iron (Fe), slag, carbon monoxide (CO) and carbon dioxide (CO_2).
Stockhouse	The building where raw materials are stored in separate enclosed bins, large enough to hold up to 10 hours supply. Material from the stockhouse is sent by conveyor to the top of the furnace after screening out fine particles.
Waste Gas Cleaning Plant	A system which uses activated carbon adsorption to clean waste gas from the Sintering process, prior to discharge to atmosphere (previously referred to as the SMERP).

Abbreviations

Acronym	Meaning
AADT	Annual Average Daily Traffic
ABS	Australian Bureau of Statistics
AEP	Annual Exceedance Potential
AHD	Australian Height Datum
AIS	Australian Iron and Steel Ltd
ANZECC	Australian and New Zealand Environmental Conservation Council
ASS	Acid Sulphate Soils
BAT	Best Available Technology
BFG	Blast Furnace Gas
BHP	Broken Hill Proprietary
BOD	Biochemical Oxygen Demand
BOS	Basic Oxygen Steelmaking
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes
CBD	Central Business District
CFCs	Chlorofluorocarbons
CO	Carbon Monoxide
CO_2	Carbon Dioxide
COG	Coke Ovens Gas
DA	Development Application
DCP	Development Control Plan
DCP 6	Development Control Plan N0. 6 – Commercial and Industrial Premises
DEC	NSW Department of Environment and Conservation
DIPNR	Department of Infrastructure, Planning and Natural Resources (now DoP)
DLWC	Department of Land and Water Conservation – former department of the NSW Government which has now merged with the former Planning NSW to form DIPNR
DoP	NSW Department of Planning (formerly DIPNR)
DUAP	(Former) Department of Urban Affairs and Planning
EA	Environmental Assessment
EAR	Environmental Assessment Requirements of the Minister of the NSW Department of Planning
ECRTN	EPA's Environmental Criteria for Road Traffic Noise
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
ENCM	Environmental Noise Control Manual administered by the DEC
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
EP&A Regulation	*Environmental Planning and Assessment Regulation 2000* (NSW)
EPA	(Former) Environment Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)

Acronym	Meaning
EPI	Environmental Planning Instrument
EPL	Environment Protection Licence
ESD	Ecologically Sustainable Development
ESP	Electrostatic Precipitator
Fe	Iron
FHA	Functional Hazard Analysis
GHG	Greenhouse Gas
GJ	Gigajoules
HAZOP Study	Hazard and Operability Study
HCl	Hydrogen Chloride
HIL	Health Investigation Level
HSM	Hot Strip Mill
ICP	Illawarra Cogeneration Project (now known as SCP – Steelworks Cogeneration Plant)
IMP	Incident Management Plan
INP	Industrial Noise Policy
ISO	International Standards Organisation
kL	Kilolitres
L	Litres
LBL	Load Based Licensing
LCA	Life cycle Analysis
LDP	Licensed Discharge Point
LEP	Local Environmental Plan
LGA	Local Government Area
mbgl	Metres Below Ground Level
ML	Megalitres
MSL	Mean Sea Level
Mt	Million tonnes
Mtpa	Million tonnes per annum
Mt/year	Millions of tonnes per year
NEPC	National Environmental Protection Council
NEPM	National environmental protection measure
NES	National Environmental Significance
NFR	Non Filterable Residues
NG	Natural Gas
NHMRC	National Health and Medical Research Council
Nm^3	Normal Cubic Metres (cubic metres measured at standard operating temperature and atmospheric pressure)
NO	Nitrogen oxide
NO_2	Nitrogen dioxide

Acronym	Meaning
NO_x	Oxides of nitrogen (NO and NO_2)
NPW Act	*National Parks and Wildlife Act 1974* (NSW)
NPWS	Former NSW National Parks and Wildlife Service (now a division of DEC)
OHS	Occupational Health and Safety
OPUP	Ore Preparation Upgrade Project (the Project)
PCDF	Polychlorinated-dibenzo-furans
PCIP	Pulverised Coal Injection Plant
PFM	Planning Focus Meeting
PHA	Preliminary Hazard Analysis
PKPC	Port Kembla Port Corporation
PKSW	Port Kembla Steelworks
$PM_{2.5}$	Particulate matter less than 2.5 microns (µm) in diameter
PM_{10}	Particulate matter less than 10 microns (µm) in diameter
PMF	Probable Maximum Flood
POEO Act	*Protection of the Environment Operations Act 1997* (NSW)
PRP	Pollution Reduction Plan
RDD	Room De-dedusting Stack
REP	Regional Environmental Plan
RFW	Recirculated Fresh Water
RMHA	Raw Materials Handling Area
RTA	NSW Roads and Traffic Authority
SEE	Statement of Environmental Effects
SEPP	State Environmental Planning Policy
SEPP 33	*State Environmental Planning Policy No 33 – Hazardous and Offensive Development*
SEPP 71	*State Environmental Planning Policy No 71 – Coastal Protection*
SEPP 2005	*State Environmental Planning Policy (Major Project) 2005*
SMERP	Sinter Machine Emission Reduction Plant (now referred to as the Sinter Plant Waste Gas Cleaning Plant)
SMP	Safety Management Plan
SO_2	Sulfur dioxide
SO_3	Sulfur trioxide
SO_x	Oxides of sulphur (SO_2 and SO_3)
SP	Sinter Plant
SPPD	BlueScope Slab and Plate Products Division – produces the bulk of Australia's flat steel products
SRG	Sulphur Rich Gas (gas reclaimed in the SRG Recovery Plant (gypsum plant) under construction)
SUBS	Sinter Under Bin Screenings
t/yr	Tonnes per year
TEOM	Tapered Element Oscillating Microbalance (air quality monitor)
TDS	Total Dissolved Solids

Acronym	Meaning
thm	Tonne Hot Metal
tpa	Tonnes per annum
TPH	Total Petroleum Hydrocarbons
TSC Act	*Threatened Species Conservation Act 1995* (NSW)
TSP	Total suspended particulate matter, a measure of air particle emissions
TSS	Total suspended solids
UHC	Under Hearth Cooling
VKT	Vehicular Kilometres Travelled
WCC	Wollongong City Council
WGCP	Waste Gas Cleaning Plant

Executive Summary

View over the Port Kembla Steelworks (BlueScope Steel, 2004).

Background, Project Need and Objectives

This Environmental Assessment (EA) has been prepared for BlueScope Steel (AIS), Pty. Ltd. ABN 19 000 019 625 (BlueScope Steel) to assess the environmental impacts of the proposed construction and operation of the Ore Preparation Upgrade Project (the Project) at the Port Kembla Steelworks (PKSW) site.

BlueScope Steel is exploring a number of potential proposals to remove production bottlenecks, enhance capacity, further increase operational security and ensure production facilities are capable of meeting the company's own future downstream demands (in Australia and overseas) and those of its customers. As part of this process, one option being considered is the upgrade works at the No.3 Sinter Plant (Sinter Plant) and the associated Raw Materials Handling Area. (RMHA). These works will be known as the Ore Preparation Upgrade Project (OPUP), and will potentially coincide (in whole or in part) with the proposed upgrade and maintenance works at the No.5 Blast Furnace. The Project will increase the efficiency of PKSW operations.

The Project is currently in the feasibility stage, and this EA, as part of the process required to obtain the Minister's approval for the Project in accordance with section 75D of Part 3A of the *Environmental Planning and Assessment Act 1979* (NSW) (Part 3A Approval). Part 3A Approval forms part of the critical path to determining whether the proposed works will proceed. All aspects of the Project must be assessed by BlueScope Steel before final internal approval to proceed can be obtained.

The Ore Preparation Area is located within the 742 hectare PKSW site, located in the heavy industrial area of Port Kembla within the Wollongong local government area. Port Kembla is located approximately 80 km south of Sydney and about 2.5 km south of Wollongong. PKSW is a fully integrated iron and steel making plant, which in the 2004/05 financial year produced more than five million tonnes of raw steel. BlueScope Steel, as of February 2006, directly employs approximately 3,600 people and provides work for approximately 3,200 contractors at the PKSW site, making it one of the largest employers in the Illawarra Region.

The Project is one of a number of improvements that BlueScope Steel is investigating at Port Kembla to improve the business by:

- Producing greater quantities of higher value products;

- Improving steel production by improving the utilisation of existing assets, or by upgrading the current facility; and/or
- Enhancing operational safety, security and stability.

The aim of the upgrade is to increase the production of the Sinter Plant by 20% and the efficiency of the Raw Materials Handling Area.

The Proponent and Land Owner

BlueScope Steel is both the proponent of the Ore Preparation Upgrade Project and the landowner. Throughout the remainder of this document, references to 'BlueScope Steel', unless otherwise noted, are references to BlueScope Steel Pty. Ltd.

BlueScope Steel is an internationally competitive steelmaker. It is the major supplier of steel to the Australian market and an exporter of steel products and technology. BlueScope Steel currently operates manufacturing facilities in Australia and overseas.

Existing BlueScope Steel Operations at Port Kembla

The Port Kembla Steelworks site is divided into two sectors by Allans Creek. The southern half or 'The Iron and Slab Area', comprises the Cokemaking, Steelmaking and Ironmaking facilities; the northern half, or the 'Strip and Plate Products Area', contains the Plate Mill, Hot Strip Mill, Cryogenic Plant and the Packaging Products sections. Both sectors of PKSW are linked by road and rail. Each facility at PKSW plays a different, but integrated, function in the production of steel products. This environmental assessment however centres on the Sinter Plant and Raw Materials Handing Area.

In order to achieve an efficient blend of raw materials for the blast furnace process, fine iron ore particles, coke, fluxes and other iron-bearing wastes are first agglomerated into a lump material called sinter. The Sinter Plant produces sinter of a size and composition that encourages even heating and chemical reduction in the Blast Furnace.

Following the blast smelting process, molten iron is cast via troughs located near the base of the Blast Furnace into waiting rail mounted torpedo ladles. The ladles transport the molten iron to the Steelmaking plant within Port Kembla Steelworks for processing into steel.

PKSW, as described above, operates under an existing Environment Protection License (EPL No. 6092), based on the long established definition of the 'licensed premises' by the NSW Department of Environment and Conservation (DEC). The adjacent Springhill Works operates under a separate EPL (No.571).

Should the proposed development proceed, the license will require amendment to include additional conditions related to both construction activities and operation of new and modified equipment.

Alternatives

A range of alternatives have been considered for several aspects of the proposed Ore Preparation Upgrade Project. All options were compared to a base case, which consists of operating and maintaining the existing facilities.

Options for the Project investigated by BlueScope Steel included extending the waste gas system, widening and deepening the sinter strand, removing bottlenecks at Raw Materials Handling and additional stockpiles and reclaim facilities. The preferred option was selected after consideration of technical and financial feasibility, and environmental and social factors.

Outline of the Project

The Project involves an increase in the production capacity of the Sinter Plant from 5.5Mt to 6.6Mt per annum. During the majority of the upgrade works, the plant will be shut

down allowing the opportunity to maintain and repair ancillary equipment at the Sinter Plant. In addition, new infrastructure in the Raw Materials Handling Area will be constructed to improve efficiency of operations and meet the requirements of the upgraded Sinter Plant.

In order to achieve a capacity increase for the Sinter Plant, the strand needs to be lengthened to accommodate more sinter. Additionally, modifications to several other key areas of the Sinter Plant and Raw Materials Handling Area are also required. Components of work to be undertaken at the Sinter Plant include installation of new strand feeding technology; installation of a new ignition furnace, lengthening and deepening of the sinter strand and modification of structural components of the strand – including extension of the waste gas main and addition of wind legs and wind boxes, removal of the existing hot sinter feeders, installation of a new cooler feed chute and upgrades of belt conveyors, the sinter cooler, waste gas electro-static precipitators as well as other minor repairs.

Works within the Raw Materials Handling Area will be undertaken to increase the fines handling and storage capacity. Components of the Raw Materials Handing Area upgrade includes; construction of seven new conveyors; installation of a new shuttle conveyor; rebuilding of a Conveyor House and other minor maintenance works. These works include a new conveyor system connecting the feed from the discharge berth to the secondary yards; a new reclaim hopper and conveyor sequence to feed the Sinter Plant fine ore bins from the No.4 Stacker Area and a wall under the existing pellet stockpile conveyor F2 to separate the reduced storage requirement of pellets, and the increased storage of fine ores.

The Ore Preparation Upgrade Project works are estimated to have a capital cost of approximately $100 million and will require a shutdown of approximately 20 to 35 days. These works are planned for 2009, probably during the No.5 Blast Furnace Reline (Note: current program is to perform work during a single shutdown during the reline outage).

Statutory Process

The *Environmental Planning and Assessment Act 1979* (NSW) (EP&A Act) and the *Environmental Planning and Assessment Regulation 2000* (NSW) (EP&A Regulation) provide the framework for the assessment of Part 3A Projects in NSW. A summary of the Part 3A Project application and Environmental Assessment (EA) process is shown in **Figure 3.1**.

Section 75B(1) of the EP&A Act provides that Part 3A applies to the carrying out of 'development' that is declared to be a 'Project' by a State Environmental Planning Policy (SEPP).

Clause 6 of the *State Environmental Planning Policy (Major Projects) 2005* (SEPP 2005) (see **Section 3.2.1**) provides that 'development', that is development of a kind described in Schedule 1 of SEPP 2005, is declared to be a 'Project' to which Part 3A of the EP&A Act applies.

Schedule 1 of SEPP 2005 provides the following at clause 9 that relates to *Metal, mineral or extractive material processing:*

"Development that has a capital investment value of more than $30 million or employs 100 or more people for any of the following purposes:

(a) metal or mineral refining or smelting; metal founding, rolling, drawing, extruding, coating, fabricating or manufacturing works; metal or mineral recycling or recovery ..."

Therefore, because the proposed development has a capital investment value exceeding $30 million and is for the purpose of "*metals, minerals or extractive material* processing", the 'Project' has been formally declared to be a development to which Part 3A of the EP&A Act applies (in accordance with section 75B(1) of the EP&A Act, and clause 6 and Schedule 1 of SEPP 2005).

Consequently, the Project must be undertaken in accordance with Part 3A of the EP&A Act and the Minister is the consent authority.

Under the provisions of Part 3A of the EP&A Act, an Environmental Assessment (EA) is required to enable the Minister to determine whether or not to grant a Part 3A Approval for the Project.

For the purposes of sections 75I(2)(e) and 75J(3) of the EP&A Act, it should be noted that the Project is permissible with development consent, within the *4(b) Heavy Industrial* zone, under the *Wollongong Local Environmental Plan 1990* (Wollongong LEP). The Project is consistent with the objectives of the *4(b) Heavy Industrial* zone as discussed in **Section 3.2.3**.

Steelmaking operations at PKSW constitute a scheduled activity under Schedule 1 of the *Protection of the Environment Operations Act 1997* and consequently are regulated under an existing environment protection license (EPL) issued by the Department of Environment and Conservation (DEC).

The Project is not considered to be a controlled action under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and therefore approval from the Commonwealth Minister for the Environment is not required.

Environmental Impacts and Mitigation Measures

The impacts associated with the various activities of the Project have been considered and prioritised in an environmental risk assessment. The key and lesser environmental assessment requirements, which include components of the biophysical, social and economic environment have been examined in the EA. The environmental impacts identified can be adequately mitigated by appropriate design safeguards and management strategies. The main findings of the assessment are summarised below.

Air Quality

An air quality impact assessment of the proposed upgrade using Ausplume modeling was undertaken. Impacts were predicted for Total Suspended Particulate Matter (TSP) and PM_{10} air emissions associated with the Sinter Plant Cooler and the Room De-Dusting Stack. The results from Ausplume modeling show that the predicted Ground Level Concentrations (GLC's) of TSP and PM_{10} air emissions will be well below the DEC's GLC criteria at the nominated sensitive receptor locations.

By replacing and repairing the room dedusting precipitator internals and associated ductwork, the de-dusting system will be rebalanced. This will increase collection efficiency of the de-dusting system and have a net reduction in dust levels leaving the room de-dusting electrostatic precipitators. This will reduce fugitive dust emissions from the Sinter Plant, ensuring the 50mg/m^3 limit will be met. Furthermore, as it has been determined that additional best available technology (BAT) controls are impracticable, and BlueScope Steel currently meets the DEC's TSP GLC criteria; no additional dust emission controls beyond those currently in place will be implemented.

Whilst the Project will increase the mass of SO_x and NO_x generation, SO_x and NO_x generation per tonne of Sinter produced will decrease due to the installation of a new type of ignition furnace, the change from coke ovens gas to natural gas and the deepening of the strand. This will improve overall process efficiency and produce less greenhouse gases, NO_x and SO_x per tonne of sinter produced.

The increase in SO_x generation will be accommodated within the spare capacity of the existing waste gas cleaning plant (WGCP).

PKSW has been working to reduce NO_x emissions for many years. Based on previously measured NO_x levels using conservative emission factors, there is a downward trend in NO_x emissions across PKSW compared to baseline levels from 1998.

These reductions have been achieved by the introduction of the Sinter Plant Waste Gas Cleaning Plant, closure of No. 3 Battery, removal of coal in power and steam production and changes to the balance of indigenous fuels used across the steelworks.

As part of BlueScope Steel's overall approach to NO_x management, BlueScope Steel will maintain the site NO_x mass emissions below the 1998 baseline level; and undertake further investigations to identify additional practicable NO_x reduction measures.

Traffic

PKSW is well served by the existing network of regional and local roads. Roads in residential areas will not be used by construction trucks. Construction traffic will therefore only use arterial roads, which are considered well suited to accommodate the additional traffic. A traffic management plan will be developed to coordinate traffic operations and maximise road safety.

The Project is not expected to result in any changes to the road, rail or port traffic generated during the operation of the facilities.

Noise

The noise assessment undertaken for the Project indicates that traffic flow increases generated by construction activities will not result in a significant noise level increase at receivers and will not be noticed by residents.

Construction work is expected to produce noise levels within the 35 dB(A) night noise criterion at all residential receivers. Based on this, no construction noise control measures are required except that pile driving will only occur during the day to minimise the chance of excessive noise.

New items of equipment proposed to be installed will not exceed conservative night noise criteria at any residence under normal operating conditions and prevailing weather patterns for the area. The installation of additional larger fans on the sinter cooler for example, includes silencers on the fan inlet ducts to minimise occupational noise levels and will assist in maintaining the overall noise signature of the steelworks. Selection of equipment will ensure that the new fans are expected to be quieter than the existing units. Therefore, specific noise management measures are not required.

Following construction, predicted operational noise levels are either below the existing background noise level or below existing traffic noise levels. As a result of this, no additional operational noise control measures are required or recommended.

Hydrology and Flooding

PKSW is well served by stormwater drains and is not subject to regular flooding. Construction and operation is not expected to affect the existing hydrology or flooding of the site.

Hydrogeology and Groundwater

Groundwater is found at depths greater than 3.0m below ground level at the Ore Preparation Area. Given that only minor, if any, excavation will be required for the Project, no groundwater impact is predicted.

Groundwater impacts during operation will continue to be managed by BlueScope Steel through the implementation of environmental management systems and procedures.

Soils

Given that only minor excavation will be required for the Project, the potential impacts on soils or impacts resulting from the disturbance of contaminated or acid sulphate soils during construction activities are minor.

Potential impacts of soil contamination during the construction phase will be addressed in a soil and water management plan. Contamination impacts during the ongoing operation of the facilities are not considered to be significant. Soil erosion will be controlled by minimising areas of bare soil and potential contamination will be controlled by the implementation of procedures to control and manage chemical spills.

Surface Water Quality

To minimise soil erosion and sediment transportation, and to avoid impacts from potentially contaminated soils, a number of control measures have been recommended for the construction phase. A soil and water management plan will be prepared as part of the construction environmental management plan (EMP). The EMP will determine the type of controls to be used for each construction area. The Project will continue to have no process wastewater discharges to surface waterways.

Hazard and Risk Analysis

A SEPP 33 (Land Use Safety Planning) review was prepared for this EA to determine if the Project poses any offsite risk to people, property and the environment.

The Sinter Plant currently stores a bulk quantity of dangerous goods (in the form of Anhydrous Liquid Ammonia). This Project will not involve any increase in dangerous goods storage.

As the Project does not trigger any of the SEPP 33 Threshold Quantities, a Preliminary Hazard Analysis (PHA) is not required to be prepared for the Project. Hence the Project is not considered to be 'potentially hazardous' and it does not present a land use safety planning concern.

Human Health

As construction works will be undertaken within PKSW, construction impacts on the health of the public are considered unlikely.

Potential risks may however result if construction workers were to come into contact with contaminated material. Therefore a series of mitigative measures will be implemented to ensure the health of construction workers, particularly during activities where disturbance of the soil occurs.

Land Uses

The Ore Preparation Area and the broader PKSW are located in the heavy industrial area surrounding Port Kembla. PKSW and the immediate surrounding areas are zoned for heavy industrial uses, however residential and commercial areas occur to the north and south of the industrial areas.

The Project is consistent with the adjacent industrial land uses and with the provisions of relevant environmental planning instruments.

Aquatic Flora and Fauna

Potential impacts on the aquatic flora and fauna of Port Kembla Harbour and Allans Creek during construction will be managed

Raw Materials Handling Area (BlueScope Steel, 2004).

by sediment and erosion control measures and chemical spill management. During operation, the Project will continue to have no process wastewater discharges to surface waterways and therefore no impacts on aquatic flora and fauna.

Terrestrial Flora and Fauna

The sites for the Project are of very little conservation significance in terms of flora and fauna. The proposed sites are currently occupied by buildings associated with PKSW, paved or are heavily disturbed unpaved areas such as stockpiles and laydown areas. The surrounding area is used for industrial purposes. No flora and fauna of significance were observed on the study site and it is considered that no flora or fauna of significance could reasonably be expected to occur or depend on the site.

The construction phase of the Project will therefore not have any direct impacts on flora and fauna. As part of the soil and water management plan, a range of mitigation measures have been recommended to prevent the migration of soils outside the construction site which could impact on the harbour and terrestrial animals that depend on it (e.g. marine birds).

Life-Cycle and Greenhouse Gas Assessment

The proposed upgrade will result in increases in the emission levels of the greenhouse gases CO_2 and NO_x. A 20% increase in the production of usable sinter will be achieved by an increase of less than 7.5% of CO_2 from the sinter machine and an overall increase in the Sinter Plant's contribution to the CO_2 profile of PKSW by 1%. NO_x levels have steadily decreased due to mitigative strategies across the steelworks. These will continue to be identified and implemented where practicable; however, the Project will result in an overall NO_x increase though this will still fall below the 1998 benchmark level.

Under the current and proposed upgrade arrangement, the Sinter Plant makes significant greenhouse gas (GHG) savings by reusing existing by-products from elsewhere within PKSW and in the cooler heat recovery system. The proposed alteration of fuel mixes (coke ovens gas and natural gas) and the continued reuse of by-products and of heat recovery energy will continue to assist in minimizing the GHG emissions from the Sinter Plant. The construction of the upgrade requiring shut down(s) of the plant for an estimated duration of 35 days will result in a decrease of approximately 120,800 t CO_2-e in that year, or 8% of annual operating emissions.

Socio-economic Considerations

The Project will provide a range of economic benefits for the Port Kembla industrial area and the region. The Project represents an investment of approximately $100 million in the future of PKSW. This investment is significant for the employees of PKSW and the contractors who rely on PKSW for their livelihood. In addition, the Project is expected to employ approximately 200 people on site during construction.

Visual

The proposed changes to the Sinter Plant are largely internal and confined to the existing structure and are considered to have negligible impact on the visual amenity of the area given its position within and screening provided by the broader PKSW industrial complex. The new infrastructure in the Raw Materials Handling Area will have minimal visible impact from outside PKSW.

Heritage

No known heritage items (aboriginal or non-indigenous) will be impacted by the Project.

Sinter Plant Cooler (BlueScope Steel, 2004).

Environmental Management

Specific plans to manage the environmental impacts of construction activities will be prepared as part of the environmental management plan for the construction of the Project. The following plans will be prepared (among others):

- Environmental management plans (EMP);
- Safety management plan (SMP); and
- Incident management plan (IMP).

The EA has recommended that certain mitigative measures be implemented during the construction of the Project. These mitigative measures will be incorporated into these plans.

The Ore Preparation Area will continue to be operated in accordance with BlueScope Steel's existing operational management policies and systems covering the management of health and safety, environmental performance and incidents (as well as a range of other operational issues).

The measures recommended to mitigate predicted environmental impacts during operation will be included in revised editions of Ore Preparation Departmental Environment Manual.

Key environmental management issues that will be addressed include:

- Consent conditions;
- Requirements for emissions to air;
- Requirements for chemical handling;
- Noise management; and
- Waste management.

Conclusion

An assessment of the environmental impacts of the construction and operation of the Project at PKSW has been undertaken and presented in this EA. BlueScope Steel has prepared a Draft Statement of Commitments that specifies the measures it will undertake to minimise the construction and operational impacts of the proposed upgrade.

No significant environmental impacts have been identified during the preparation of the EA. The environmental impacts identified are considered to be able to be mitigated and managed by the measures recommended.

The construction of the Project will result in reversible, temporary impacts in the local environment.

Sinter Plant Strand (BlueScope Steel, 2004).

These temporary impacts will be mainly associated with potential for noise generation, migration of soils during construction and increased traffic in arterial roads of Port Kembla. A range of measures have been recommended to mitigate and manage these short-term and reversible potential environmental impacts. An EMP including the mitigation measures recommended in this EA will be prepared during the detailed design phase of the Project.

The construction and operation of the upgraded Ore Preparation Area, will result in socio-economic benefits, including:

- The Project represents an investment of approximately $100 million by BlueScope Steel and will improve the operating efficiency of PKSW whilst meeting environmental licence conditions; and
- The Project expects to employ approximately 200 people on site during the construction phase, supplemented by additional on-going employment for contractors when maintenance overhauls of the new equipment are required.

The environmental impacts arising from the ongoing operation of the Project predicted within this EA are not considered to be significant and are within regulatory criteria, goals and objectives. Facility design and existing pollution control devices are capable of maintaining the concentration of air pollutants in emissions to within the current licence limits and mass loads remain below NSW Government regulatory limits.

The Ore Preparation Area will continue to be operated in accordance with appropriate operating procedures. These will be amended to include the recommendations made in this EA regarding the potential environmental impacts of the Project. EMPs will be prepared in consultation with relevant government authorities and will comply with conditions of consent and relevant quality standards.

The existing PKSW EPL will be modified to include additional conditions related to both construction activities and operation of new and modified equipment.

Overall, the EA concludes that the Project will maintain and enhance the existing operations of the Sinter Plant and Raw Materials Handling Area and bring significant socio-economic benefits to the local community and the Illawarra region whilst limiting the ongoing operational environmental impacts.

Draft Statement of Commitments

General

In line with the requirements of Part 3A of the EP&A Act, the following chapter describes BlueScope Steel's commitment to environmental mitigation, management and monitoring for the Ore Preparation Upgrade Project (herein referred to as the Project).

Overview

The environmental assessment of the Project has identified a range of environmental outcomes and management measures that are required during construction and operation to avoid or reduce the environmental impacts of the Project. Unless specifically identified, the commitments identified herein relate to both construction and operational stages. Environmental mitigation, management and monitoring options have been proposed by BlueScope Steel to reduce the environmental impacts of the Project. Where possible, the measures have been based on achieving a defined performance standard or implementing a proposed process. Specific actions, which aim to deliver the desired outcomes where practicable, are based on:

- Developing Project designs which are capable of achieving the outcomes;
- Developing environment management and mitigation measures during the planning and design phase; and
- Implementing, monitoring and reviewing these measures during the construction and operational phases.

Following approval of the Project, the finalised commitments will guide the subsequent phases of the Project development process to minimise, where practicable, impacts on the environment. BlueScope Steel makes the following environmental commitments.

SOC 1 Statutory Commitments

SOC 1.1 BlueScope Steel will ensure that all licenses, permits and approvals are obtained and maintained for the Project. Copies of all relevant licenses, permits and environmental approvals will be available on site at all times during the Project.

SOC 2 Project Compliance

SOC 2.1 During construction of the Project, BlueScope Steel will be responsible for the environmental impacts that may result, and will put in place an environmental management system governing the conduct of all persons on the site, including contractors, subcontractors and visitors.

SOC 2.2 BlueScope Steel will ensure that employees, contractors and sub-contractors are aware of, and comply with, the conditions of the DoP's consent relevant to their respective activities.

SOC 2.3 BlueScope Steel will demonstrate to the satisfaction of the Director-General that it has complied with all conditions of the DoP's consent applicable prior to:

- The commencement of any physical works associated with the Project; and
- The recommissioning of the Sinter Plant and Raw Materials Handling Area as they relate to the Project.

SOC 2.4 Any update reports with regard to compliance with all, or any part of, the conditions of consent will be supplied upon request. Any such update will meet the requirements of the Director-General and be submitted within such reasonable period as the Director-General and BlueScope Steel may agree.

SOC 3 Management of Key Issues

SOC 3.1 Air Quality Impacts

Dust Emissions

SOC 3.1.1 The Project will be undertaken in a manner that minimises, dust emissions from the site during construction and operation, including wind-blown and traffic-generated dust (fugitive dust). This will include managing stockpiles to suppress dust emissions, use of water carts and street sweepers.

Discharge Limits

SOC 3.1.2 The TSP concentration of the Room Dedusting Stack will meet the 50mg/m^3 limit.

SOC 3.1.3 The concentration of SO_x emissions from the Waste Gas Cleaning Plant will not exceed existing licence conditions for the Waste Gas Cleaning Plant.

SOC 3.1.4 The concentration of NO_x emissions from the Waste Gas Cleaning Plant will not exceed existing licence conditions for the Waste Gas Cleaning Plant.

SOC 3.1.5 The Port Kembla Steelwork's site NO_x mass load will be maintained below the site's 1998 baseline level.

SOC 3.1.6 Further investigations will be undertaken to identify additional practicable NO_x reduction measures.

SOC 3.2 Construction Traffic

SOC 3.2.1 In the event that internal roads are blocked and construction traffic needs to be diverted onto external roads, consultation with WCC and the RTA will be undertaken and a Traffic Management Plan will be prepared if necessary.

SOC 3.3 Noise Impacts

Restriction to Hours

SOC 3.3.1 Unless otherwise agreed in writing by the EPA, the Project will only undertake construction activities, which would generate an audible noise at any residential premises between the hours of 7am to 6pm Monday to Friday and 8am to 4pm Saturday. All other construction activities will likely occur 24 hours per day.

Operational Noise Limits

SOC 3.3.2 The development will be designed, constructed, operated and maintained so that the development does not exceed a noise contribution at the most affected residence of 35 dB(A) when measured as $LA_{eq\ 15\ minute}$.

SOC 3.3.3 BlueScope Steel will undertake a noise assessment during the development and post development to assess compliance with the predicted noise levels detailed in this document. The assessment will include an investigation of tonality, impulsiveness and vibration.

SOC 3.4 Soil and Water Quality Impacts

SOC 3.4.1 During construction, surface water and stormwater will be managed to ensure that run-off generated from disturbed areas is collected and processed appropriately before being discharged to a licenced drain. A Soil and Water Management Plan will be prepared as part of the Construction EMP, which will contain control measures that will be implemented during the construction stage.

SOC 3.4.2 Risks to groundwater contamination will continue to be managed by BlueScope Steel via the implementation of environmental management systems and procedures.

SOC 3.5 Hazards and Risk Impacts

SOC 3.5.1 All hazardous goods, will be stored and handled strictly in accordance with:

- All relevant Australian Standards;
- Relevant hazardous or dangerous goods legislation; and
- The DEC's Environment Protection Manual Technical Bulletin Bunding and Spill Management.

SOC 3.5.2 BlueScope Steel will submit for the approval of the Director-General, a Hazard and Operability Study (HAZOP) of the Project. The study will be chaired by an independent, qualified person or team, approved by the Director-General, and will be carried out in accordance with the Department's publication Hazardous Industry Planning Advisory Paper No. 8 - HAZOP Guidelines.

SOC 3.5.3 BlueScope Steel will submit for the approval of the Director-General, a Construction Safety Study for the development, prepared in accordance with the Department's *Hazardous Industry Planning Advisory Paper No. 7 - Construction Safety Study Guidelines*. The study will specifically identify and address potential hazards associated with the construction of the development and its interaction with other parts of the Steelworks while the works permitted under this consent are undertaken.

SOC 3.6 Waste Generation and Management

SOC 3.6.1 Treatment and/or beneficial reuse of waste materials associated with the Project will minimise temporary storage of waste on the site and minimisation of waste volumes requiring disposal.

SOC 3.6.2 During construction of the Project, waste types will be identified and classified. Depending on the waste classification of materials, licensed waste transporters will be used for those waste types requiring disposal.

SOC 3.6.3 BlueScope Steel will not cause, permit or allow any waste generated outside the site to be received at the site for storage, treatment, processing, reprocessing, or disposal on the site, except as expressly permitted by a license under the Protection of the Environment Operations Act 1997, if such a license is required in relation to that waste.

SOC 3.6.4 All excavated material from construction of the Project will be classified in accordance with NSW EPA (1999) Assessment, Classification and Management of Liquid and Non-liquid Wastes Guidelines to determine how to appropriately dispose of the material; the preference being to reuse any excavated material as fill elsewhere within the PKSW.

SOC 3.6.5 BlueScope Steel is currently undertaking trials to treat the electrostatic precipitator (EP) dusts. These trials will be completed in 2009. If alternatives to disposal are unable to be identified by this time, the stored EP dust and new arisings will be disposed at an appropriate landfill in accordance with relevant legislation.

SOC 3.7 Community Information, Consultation and Involvement

SOC 3.7.1 Subject to privilege and confidentiality, BlueScope Steel will make all documents required for public inspection available upon request.

SOC 3.7.2 BlueScope Steel will ensure that the following are available for community complaints:

- A 24-hour, toll-free telephone number on which complaints about the development may be registered;
- A postal address to which written complaints may be sent; and
- An email address to which electronic complaints may be transmitted.

SOC 3.7.3 The telephone number, the postal address and the email address will be advertised in a local newspaper on at least one occasion prior to the commencement of construction.

SOC 3.7.4 Details of all complaints received through the means listed under condition 3.7.2 will be recorded in BlueScope Steel's existing Complaints Register. The Register has been operational for over ten years, is audited by the DEC on a regular basis and meets their requirements. Such information can be made available to the DoP upon request.

All monitoring, including recording and reporting of monitoring results, as required by the DoP's consent and as may be specified in an Environment Protection License applicable to the development will be undertaken. Such records will be retained on site in a legible format and will be made available to authorized persons upon request.

SOC 3.8 Environmental Management and Reporting

Construction Environmental Management Plan

SOC 3.7.5 A Construction Environmental Management Plan will be prepared and implemented to outline environmental management practices and procedures to be followed during construction works associated with the Project. The Plan will address the requirements of the DEC and a copy will be submitted to the Director-General prior to the commencement of any construction works.

Operational Environmental Management

SOC 3.7.6 Prior to the re-commissioning of the Sinter Plant and Raw Materials Handling Area as they relate to the Project, BlueScope Steel will demonstrate to the satisfaction of the Director-General that it has updated environmental and safety management systems for the Steelworks to reflect any necessary modifications.

Incident Reporting

SOC 3.7.7 Any environmental incidents causing or threatening material harm to the environment will be reported in accordance with condition R2 of the existing EPL License No 6092.

SOC 3.7.2 BlueScope Steel will ensure that the following are available for community complaints:

- A 24-hour, toll-free telephone number on which complaints about the development may be registered;
- A postal address to which written complaints may be sent; and
- An email address to which electronic complaints may be transmitted.

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SOC 3.7.7 Any environmental incidents causing or threatening material harm to the environment will be reported in accordance with condition R2 of the existing EPL License No 6092.

SOC 3.9 Commitment

SOC 3.7.8 This commitment is made under authority of the following person, who is legally empowered to make this undertaking on behalf of BlueScope Steel (AIS) Pty. Ltd. ABN 19 000 019 625:

Signature

Name Rob McNamara

Position Vice President Environment

Date 31.1.07.

1 Introduction

This Environmental Assessment (EA) has been prepared for BlueScope Steel (AIS) Pty. Ltd. (ABN 19 000 019 625) to assess the environmental impacts of the proposed Ore Preparation Upgrade at the Port Kembla Steelworks (PKSW) site.

The Project is currently in the feasibility stage, where all aspects of the Project, such as technical, environmental, financial, commercial and social are assessed by BlueScope Steel (AIS) Pty Ltd (hereafter BlueScope Steel) before final internal approval to proceed is obtained. Obtaining statutory approval for the proposed development is on the critical path of the BlueScope Steel approval process.

The EA has been prepared in accordance with the *Environmental Planning and Assessment Act 1979* (the EP&A Act) and the *Environmental Planning and Assessment Regulation 2000* (the EP&A Regulation).

1.1 Background

BlueScope Steel's Port Kembla Steelworks is a fully integrated iron and steel making plant, which in the 2004/05 financial year produced more than five million tonnes of raw steel. Iron produced in two Blast Furnaces is converted to steel in the Basic Oxygen Steelmaking (BOS) furnaces and then continuously cast into slabs. The slabs are either further processed at the site via the Hot Strip Mill (HSM) or Plate Mill, or loaded onto ships for export or transferred to BlueScope Steel's facility at Western Port, in Victoria. BlueScope Steel, as of February 2006, directly employs 3,600 people and provides work for approximately 3,200 contractors at the PKSW site, and is one of the largest employers in the Illawarra Region.

This Project is one of a number of developments that BlueScope Steel is investigating at Port Kembla in order to improve the performance of the business by:

- Maintaining steel production by improving the utilisation of existing assets, or by upgrading the current facility;
- Enhancing operational safety, security and stability; and
- Securing the production capability of the plant into the future.

The Ore Preparation Upgrade Project is being considered along with a number of other proposals, which are currently proceeding through the approvals process.

BlueScope Steel proposes to upgrade the Ore Preparation Area either whilst the No.5 Blast Furnace is offline during the works proposed under the associated No.5 Blast Furnace Reline Proposal (refer to CH2M HILL, 2005) or after this time. The aim of the upgrade is to increase the production of the Sinter Plant by 20% and the efficiency of the Raw Materials Handling Area.

The development will require an investment of approximately $100 million. After the Project has been granted consent, it will take approximately 24 months to design, construct and commission.

1.2 Location

The Ore Preparation Area is located within the 742 hectare PKSW site. PKSW is located in the heavy industrial area of Port Kembla within the Wollongong local government area (LGA). Port Kembla is located approximately 80 km south of Sydney and about 2.5 km south of Wollongong (see **Figure 1.1**).

The area covered by the Ore Preparation Area, and their immediate surroundings is defined in this EA as the study area in **Figure 1.1**. This figure also shows the boundary of PKSW as defined in this EA. The location of the facilities within the study area are also shown on the aerial photograph in **Figure 1.2**.

1.3 Outline of the Project

The Project is to increase the overall Sinter Plant production capacity. The Sinter Plant currently produces sinter for use within the blast furnaces at a rate of 5.5Mtpa. The proposed upgrade will give the Sinter Plant the capability to produce up to 6.6Mt of sinter per annum primarily by lengthening the existing strand within the Plant. In order for the upgrade to be undertaken, the Sinter Plant must be temporarily shut down. Whilst the Sinter Plant is off line, maintenance and repair works will be undertaken on ancillary equipment at the Sinter Plant that is difficult or unsafe to access while the plant is operating.

The increased capacity at the Sinter Plant will result in an increased demand for fine ores at PKSW. The higher demand for fine ores will require modifications to the Raw Materials Handling Area and the construction of new infrastructure, such as conveyors, to improve the efficiency of operations and to meet the requirements of the upgraded Sinter Plant. This increased fine ore demand will be offset by a near equivalent decreased amount of imported pellets, hence the overall throughput of material will be similar.

Upgrade works at the Sinter Plant is preferred to be undertaken during the No.5 Blast Furnace reline shutdown period, thus minimising overall down time of equipment at the PKSW. However, in order to minimise the peak demand for engineering and construction resources, it may be necessary to undertake such activity at a later stage. Additionally, most construction activity associated with the Raw Materials Handling Area will be scheduled as discrete events outside the No.5 Blast Furnace shutdown period.

1.4 The Proponent and Land Owner

BlueScope Steel Limited (ABN 16 000 011 058) is an internationally competitive steelmaker. It is the major supplier of steel to the Australian market and an exporter of steel products and technology. Its key strengths are its product range, advanced

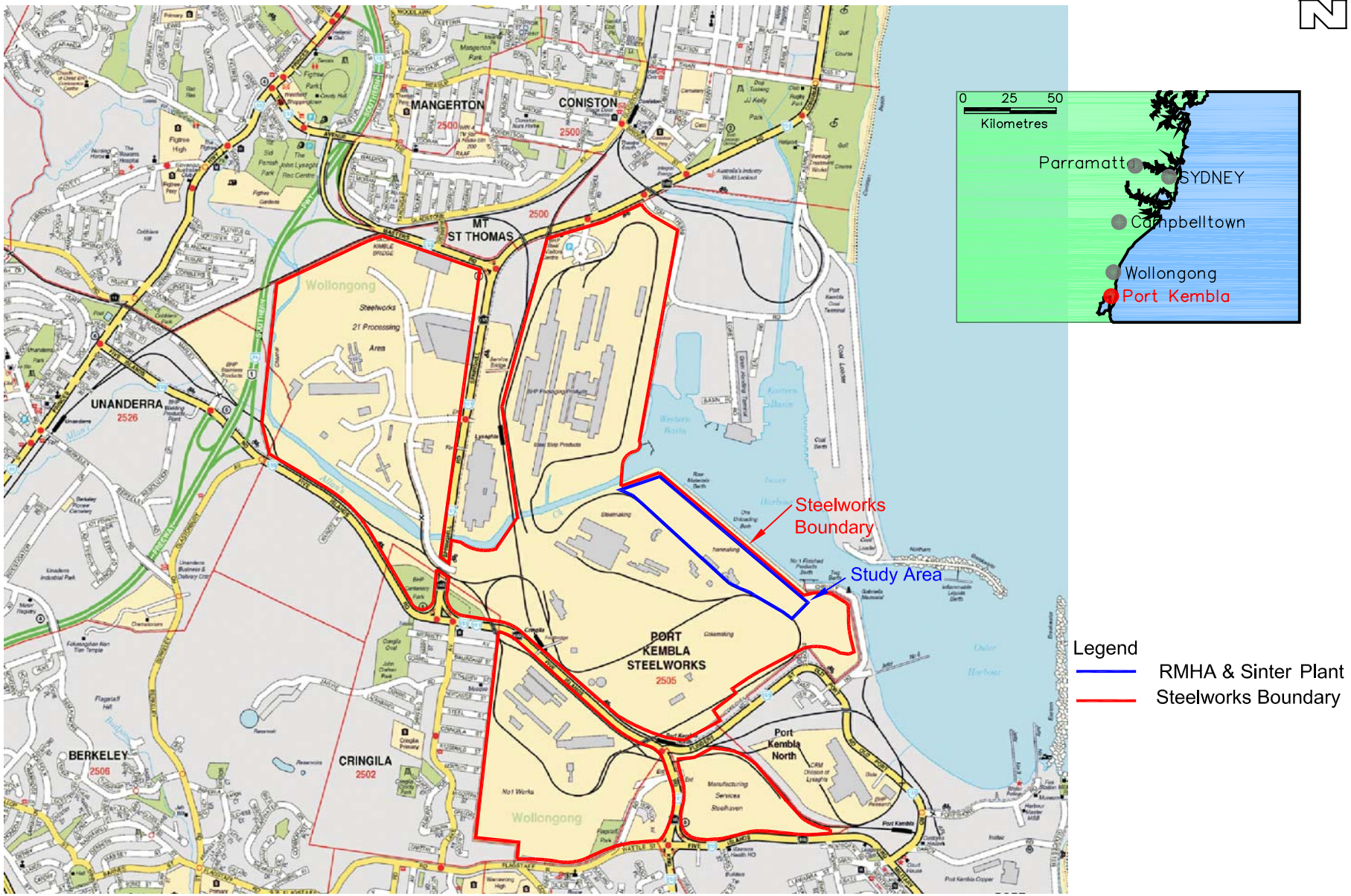


Figure 1.1
Locality Plan

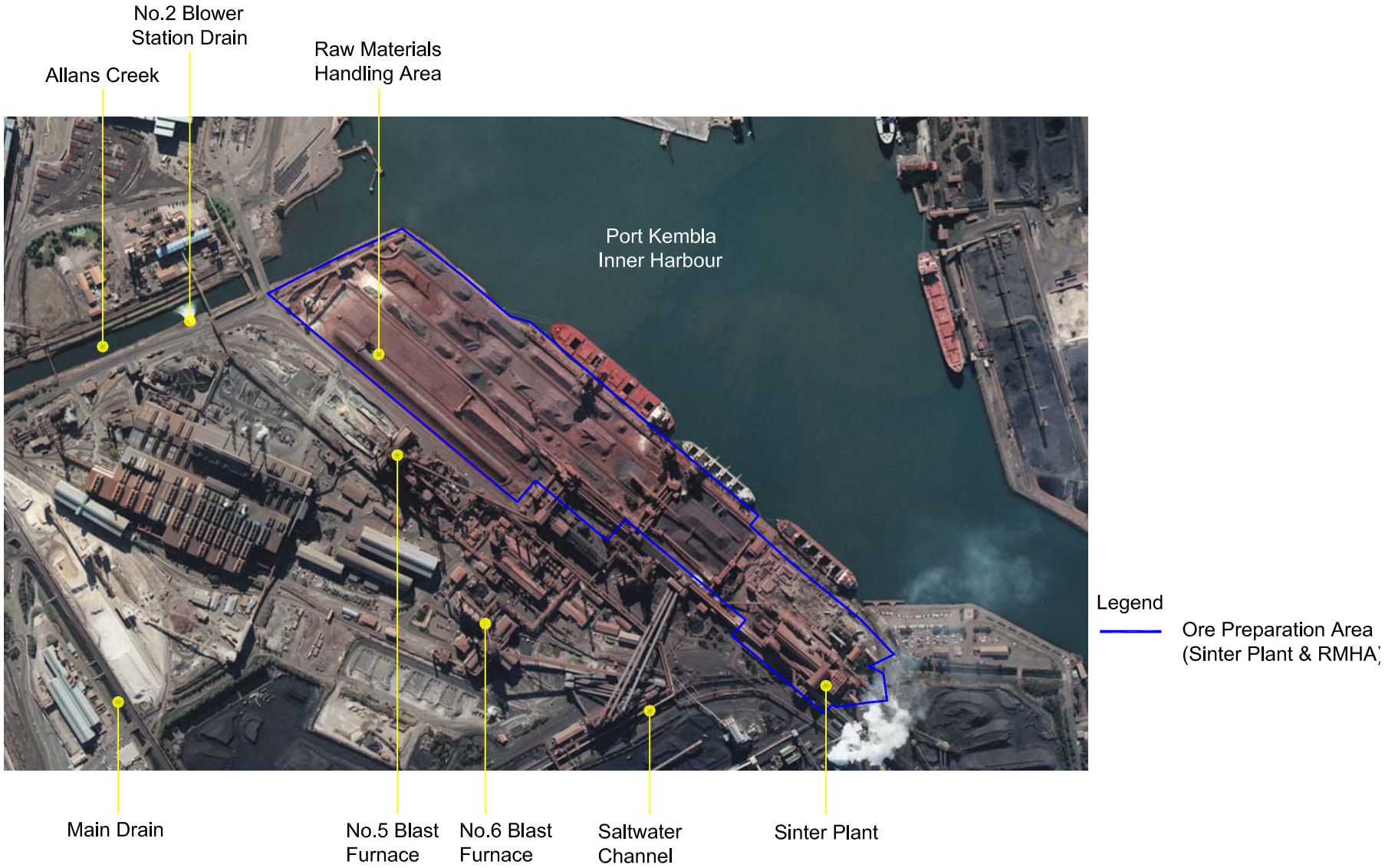


Figure 1.2
Aerial View of the Study Area

coated steel technology and competitive production costs. BlueScope Steel Ltd currently operates manufacturing facilities in Australia and overseas.

BlueScope Steel (AIS) Pty Ltd (ABN 19 000 019 625) is a wholly owned subsidiary of BlueScope Steel Limited (ABN 16 000 011 058). BlueScope Steel (AIS) Pty Ltd is both the proponent and the land-owner of the proposed upgrade of the Ore Preparation Area.

Table 1.1 summarises BlueScope Steel Limited's manufacturing activities and the locations where they are undertaken. In addition, the company has licensed steel processing technology to more than 20 countries and operates trading services companies worldwide.

The Ore Preparation Area and associated facilities are located within the part of PKSW known as the Ironmaking area (see **Figure 1.3**). The No.5 & 6 Blast Furnaces are also located within this area. The Ironmaking area is bounded by Port Kembla Inner Harbour to the east, Allans Creek to the north, the Saltwater Channel to the south and the No.2 Blower Station Drain and No.6 Blast Furnace to the west. The Steelmaking area is located to the west and the Cokemaking area is located to the south. The Ironmaking area falls within Lot No. 1 in DP 606434, Port Kembla in the Parish of Wollongong, County of Camden.

Table 1.1 BlueScope Steel Ltd Manufacturing Activities and Locations

Activity	Geographic Area and Country				
	Australia and New Zealand	South East Asia	Central/ North Asia	Oceania	North America
Integrated Steelworks	Australia New Zealand	-	-	-	-
Electric Arc Furnace Steelmaking	-	-	-	-	USA
Hot Rolling	Australia New Zealand	-	-	-	USA
Metallic Coating	Australia New Zealand	Indonesia Malaysia Thailand	-	-	-
Coil Prepainting	Australia New Zealand	Indonesia Malaysia Thailand	-	-	-
Cold Rolling	Australia New Zealand	Thailand	-	-	-
Steel Building Products Manufacture	Australia New Zealand	Brunei Indonesia Malaysia Singapore Thailand Vietnam	China Sri Lanka Taiwan	Fiji New Caledonia Vanuatu	-

Source: www.bluescopesteel.com (2006)

1.5 Project Objectives

The objectives of the Project are as follows:

- The major aim/justification of the Project is to replace expensive imported pellets with locally produced sinter (made from fine iron ore);
- To ensure the continued safe and efficient operation of the Ore Preparation Area;
- To further improve operational security thereby securing supply for key downstream customers, both internal BlueScope Steel customers and external customers, by upgrading various equipment;
- To use the opportunity provided by the No.5 Blast Furnace reline shutdown period to maintain existing plant and to update outdated equipment at the Ore Preparation Area;
- To strengthen the long term viability of BlueScope Steel by improving the quality and efficiency of iron production at PKSW and the financial performance of the business; and
- To increase the Sinter Plant capacity which will help consistency in blast furnace operations and increase operational security.

1.6 Scope and Structure of the EA

This EA has been prepared to assess the potential environmental impacts of the proposed Ore Preparation Upgrade. In order to achieve this, the EA has considered the following:

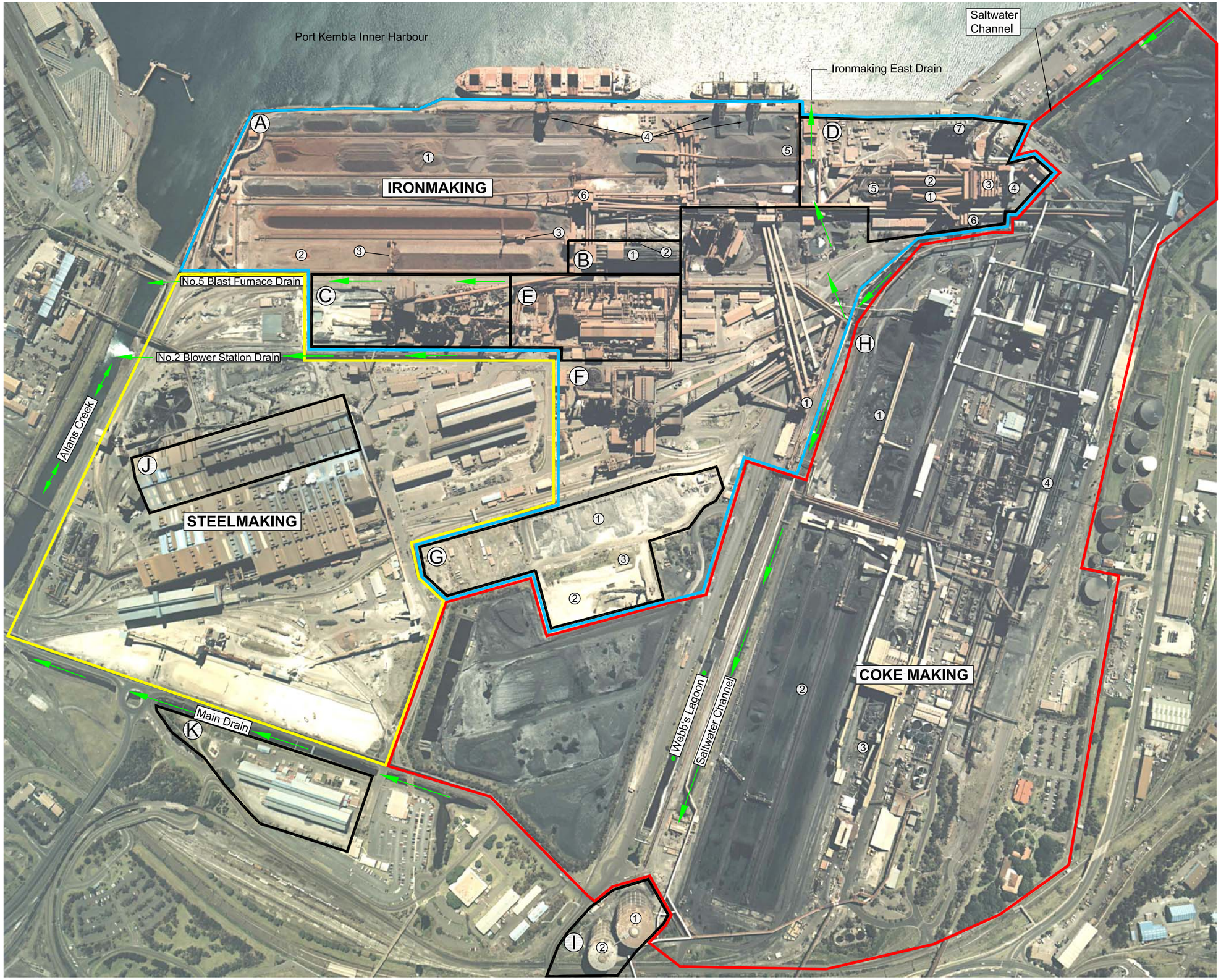
- Department of Planning Environmental Assessment Requirements (EARs) (provided in **Appendix A**). These requirements were provided for the preparation of the EA pursuant to Division 2 Part 3A of the EP&A Act; and
- Issues raised by relevant government departments (provided in **Appendix B**).

The EA has been structured to allow thorough understanding of the Project, alternatives to the preferred option, its development, and its impacts. The structure of the EA is outlined in **Table 1.2**.

1.7 Contact Person for Public Inquiries

Inquiries regarding this EA and the Project should be directed to:

Name	Michelle Nicholson
Position	Manager Strategy and Planning
Company	BlueScope Steel Limited
Telephone	02 4275 3919



LEGEND

A. RAW MATERIALS HANDLING
- ① PRIMARY YARDS
- ② SECONDARY YARDS
- ③ SECONDARY STACKER & BARREL RECLAIMER
- ④ UNLOADERS
- ⑤ No.4 STACKER
- ⑥ SCREENHOUSE

B. No.5 BLAST FURNACE
- ① STOCKHOUSE
- ② STOCKHOUSE BAGHOUSE

C. No.5 BLAST FURNACE

D. No.3 SINTER PLANT
- ① FEED CONVEYORS
- ② SINTER STRAND
- ③ WASTE GAS PRECIPITATORS
- ④ STACK (DISUSED)
- ⑤ COOLER BED
- ⑥ ROOM DEDUSTING STACK
- ⑦ WASTE GAS CLEANING PLANT

E. No.2 BLOWER STATION

F. No.6 BLAST FURNACE
- ① STOCKHOUSE

G. No.6 BLAST FURNACE SLAG
- ① ROCK SLAG
- ② GRANULATED SLAG
- ③ GROUNDWATER SOAKPIT

H. COKEMAKING
- ① RAW COAL STOCKPILE
- ② BLENDING BEDS
- ③ WASHERY
- ④ COKE OVENS

I. GAS HOLDER
- ① BLAST FURNACE GAS
- ② COKE OVENS GAS

J. BASIC OXYGEN STEEL MAKING

K. MULTISERV BRIQUETTING FACILITY

WATER BODIES:
- NO FLOW
- DIRECTION OF FLOW
- TIDAL FLOW

- Cokemaking Boundary
- Ironmaking Boundary
- Steelmaking Boundary

Figure 1.3
Existing Facilities in the Ironmaking Area

Table 1.2 EA Structure

	Section	Content
	Glossary	Glossary of terms utilised within the EA.
	Abbreviations	Comprehensive list of abbreviations utilised within the EA.
	Executive Summary	Summary of the EA.
1	Introduction	Introduces the Project and BlueScope Steel, and provides background to the Project.
2	Consultation	Outlines the consultation undertaken with government agencies and the community.
3	Statutory Context	Sets the legislative and statutory planning framework for the Project in a national, state, regional and local context. Identifies approvals and licenses required for the Project and describes the planning approval process.
4	Existing BlueScope Steel Operations at Port Kembla	Describes existing operations at PKSW affected by the Project to set the baseline for the assessment.
5	Project Need and Alternatives	Discusses the need for the Project and describes the alternatives to the preferred option.
6	Description of the Project	Provides a description of the Project, including construction and operational phases, timing requirements, and other details of the Project as a basis for impact assessment.
7	Existing Biophysical Environment, Impacts and Mitigation Measures	Describes the existing biophysical environment potentially impacted by the Project, assesses potential environmental impacts during construction and operation, and identifies mitigation measures to minimise environmental impacts.
8	Existing Social and Economic Environment, Impacts and Mitigation Measures	Describes the existing socioeconomic environment potentially impacted by the Project, assesses potential environmental impacts during construction and operation (including cumulative impacts), and identifies mitigation measures to minimise environmental impacts.
9	Environmental Management	Describes the environmental management of the Project, including a summary of all mitigation measures identified for the construction and operational phases, the preparation of environmental management plans for construction and operation, and monitoring, auditing and reporting requirements for both phases.
10	Project Justification and Conclusions	Presents the justification of the Project having regard to biophysical, economic and social considerations, and also the principles for Ecologically Sustainable Development. It also provides a conclusion.
11	References	Lists all references cited in the EA.
	Appendices	The appendices provide supporting information to the EA.

2 Consultation

2.1 Consultation with Government Agencies

2.1.1 Environmental Assessment Requirements

During the pre-planning phase of the Project, BlueScope Steel consulted with the then Director-General of DIPNR regarding the required content of the EIS (now EA). Consultation and provision of the requirements by the Director-General of DIPNR occurred before the Project was declared a Major Project under *State Environmental Planning Policy (Major Project) 2005* (SEPP 2005) (see **Section 3.1.1**). The Director General of DIPNR has provided the requirements for the preparation of the then EIS pursuant to Clause 73 (1)(a) of the EP&A Regulation. The DGRs were obtained from DIPNR in January 2005.

Subsequently, revised Environmental Assessment Requirements (EARs) as required under Part 3A of the EP&A Act for the preparation of an Environmental Assessment (EA) were issued to BlueScope Steel in February 2006. The EARs are provided in **Appendix A**. A summary of the EARs, and the respective section of the EA addressing each requirement, is also provided in **Appendix A**.

2.1.2 Consultation with Government Departments

A planning focus meeting (PFM) for the Project was held on 22 November 2004. A background paper describing the Project and its potential environmental impacts was provided to all PFM invitees (**Appendix B**). Representatives of the following government departments attended the PFM:

- DoP;
- Wollongong City Council (WCC);
- NSW Department of Environment and Conservation (DEC); and
- Port Kembla Port Corporation (PKPC).

Written response was received from WCC in a letter dated 13 December 2004.

BlueScope Steel met with the NSW Roads and Traffic Authority (RTA) to brief them on the Projects and the potential impact on traffic movements in March 2005. Consultation with the utility providers Integral Energy and Sydney Water is not considered to be required, as current design data indicates that there will be no significant change in respective energy and water load requirements.

Throughout the development of the Project, additional consultation was undertaken with relevant government departments (see **Table 2.1**). This provided opportunities to identify ongoing issues that need to be addressed. **Appendix B** provides full reports from these additional meetings.

Table 2.1 Additional meetings held with government departments

Date	Attendees	Purpose/Issues Discussed	Addressed in Section
14th March 2005	• WCC • BSL • CH2M HILL	To brief members of Councilors and Council Executive Committee on the capital investment proposals BlueScope Steel is evaluating in the Port Kembla Steelworks Region.	Not applicable
24th October 2005	• WCC • DEC • CH2M HILL • BSL	A PFM was held which provided an update to government departments relating to three proposals, namely the No. 5 Blast Furnace reline, the upgrade of the Pickle Line Cold Mill and the Ore Preparation Area Upgrade. Key issues for the Ore Preparation Area Upgrade Project include dust deposition outside of BSL premises (specifically on the port area), de-dusting capability and energy recovery.	Section 8.1
1st November 2005	• WCC • DEC • CH2M HILL • BSL	This main focus of this meeting was to further brief government departments on the scope of the proposed upgrades, to identify key issues regarding the Project and determine aspects that will need to be addressed as part of the environmental assessment. A site inspection of the facilities proposed to be upgraded was also undertaken.	Not applicable
18th November 2005	• DEC • HAS • CH2M HILL • BSL	A follow up meeting to the one held on the 1st November 2005, was initiated. This allowed the DEC to highlight and discuss key aspects of the Project that they had identified. These included aspects concerned with the cooler de-dusting, the waste gas cleaning plant, room de-dusting, dust management in the RMHA and alternative sintering options.	Section 5.2 and; Section 8.1
23rd March 2006	• DEC • HAS • CH2M HILL • BSL	The purpose of this meeting was to report back on the findings of the issues raised and discussed in the previous meetings. The meeting was also used to update the DEC on the progress of the Project and any changes to scope.	Not applicable
5th April 2006	• DoP • CH2M HILL • BSL	Discussions were held around the 3A process, expectations of scope for the Project, DA approval timeframe, sign-off/Statement of Commitments and associated corporate responsibilities for BSL.	Draft Statement of Commitments and; Section 3

2.2 Community Consultation

A community consultation program has been undertaken with regard to the Project. The objectives of this program are to establish a dialogue with the community and to provide information about the Project. Specific groups known to be interested in the ongoing operations of PKSW were targeted and an open community meeting was held to discuss the Project. This open community meeting was advertised in the Illawarra Mercury.

Presentations regarding the Project were given to the following groups:

- An open community meeting on the 16th March 2005;
- WCC Neighbourhood Committee No. 9 (covering Cringila and Port Kembla), on the 22nd March 2005; and
- BlueScope Steel Community Consultation Committee on the 6th April 2005.

Refer to **Appendix C** for summaries of the issues discussed and notes taken at the abovementioned meetings[1].

[1] *Note that the Ore Preparation Upgrade Project was previously referred to as the Sinter Plant Upgrade Proposal.*

3 Statutory Context

3.1 The Approvals Process

3.1.1 Part 3A Approval

The EP&A Act and the EP&A Regulation provide the framework for the assessment of Part 3A Projects in NSW. A summary of the Part 3A Project application and environmental assessment process is shown in **Figure 3.1**.

Section 75B(1) of the EP&A Act provides that Part 3A applies to the carrying out of 'development' that is declared to be a 'Project' by a State Environmental Planning Policy (SEPP).

Clause 6 of the *State Environmental Planning Policy (Major Projects) 2005* (SEPP 2005 – see **Section 3.2.1**) provides that 'development', that is development of a kind described in Schedule 1 of SEPP 2005, is declared to be a 'Project' to which Part 3A of the EP&A Act applies.

Schedule 1 of SEPP 2005 provides the following at clause 9.

9 Metal, mineral or extractive material processing

Development that has a capital investment value of more than $30 million or employs 100 or more people for any of the following purposes:

(a) metal or mineral refining or smelting; metal founding, rolling, drawing, extruding, coating, fabricating or manufacturing works; metal or mineral recycling or recovery,...

Therefore, because the proposed development has a capital investment value exceeding $30 million and is for the purpose of "*metals, minerals or extractive material processing*", the 'Project' has been formally declared to be a development to which Part 3A of the EP&A Act applies in accordance with section 75B(1) of the EP&A Act, and clause 6 and Schedule 1 of SEPP 2005.

Consequently, the Project must be undertaken in accordance with Part 3A of the EP&A Act and the Minister is the consent authority. Under the provisions of Part 3A of the EP&A Act, an Environmental Assessment (EA) is required to enable the Minister to determine whether or not to grant a Part 3A Approval for the Project.

For the purposes of sections 75I(2)(e) and 75J(3) of the EP&A Act, it is noted that that the Project is permissible with development consent, within the *4(b) Heavy Industrial* zone, under the *Wollongong Local Environmental Plan 1990* (Wollongong LEP). The Project is consistent with the objectives of the *4(b) Heavy Industrial* zone as discussed in **Section 3.2.3**.

3.1.2 Licensing and Permits

Under section 55 of the POEO Act, BlueScope Steel is the holder of the existing Environmental Protection Licence (No. 6092) (EPL) for a Scheduled Activity (Premises Based). Details of this licence are discussed below.

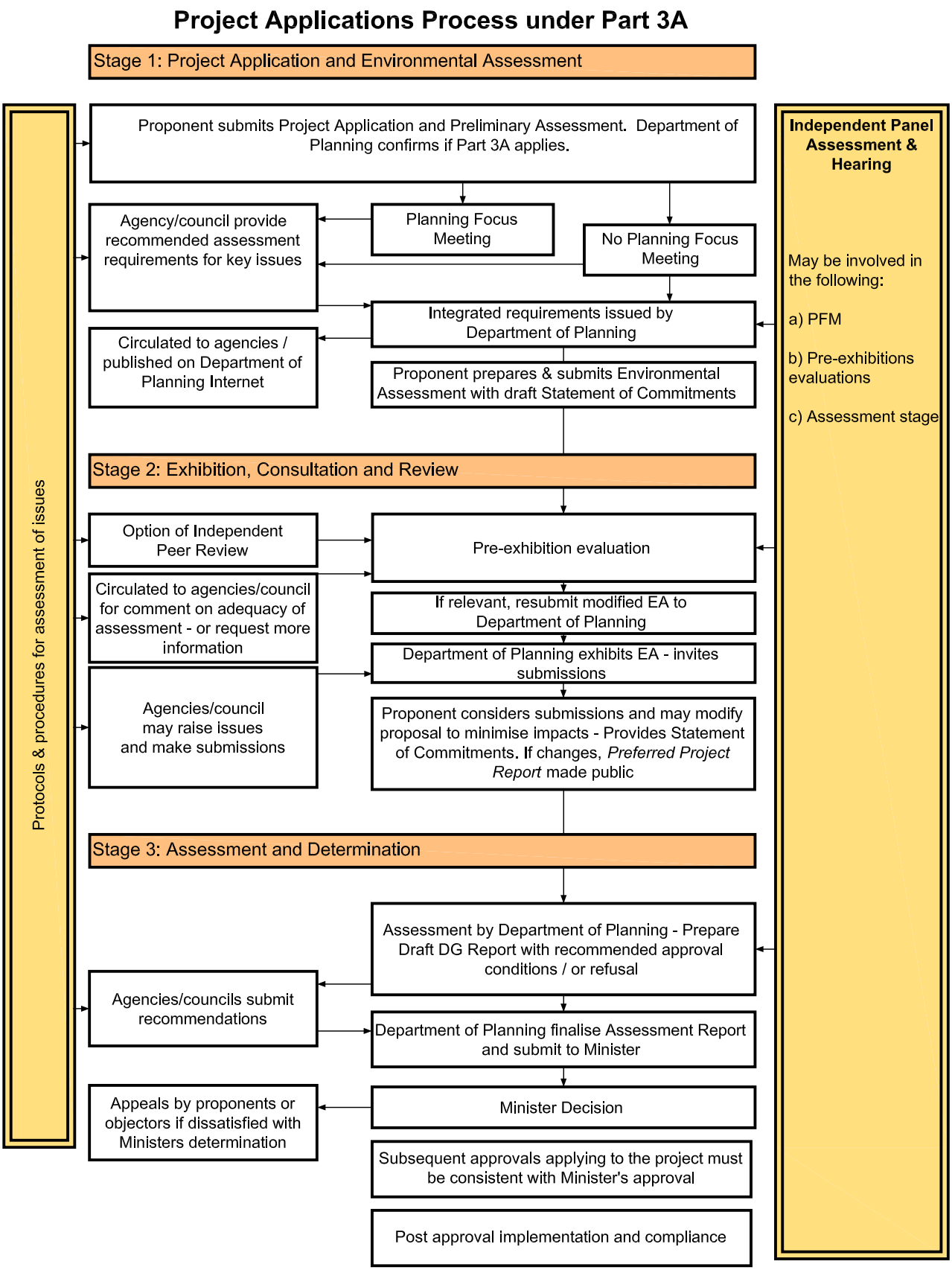
Under section 55 of the POEO Act, BlueScope Steel is the licensee of EPL No. 6092 for Scheduled Activities (Premises). This licence is issued by DEC and controls activities undertaken by BlueScope Steel on the PKSW.

Several conditions of the licence are relevant to the Project. These conditions and their interaction with the Project are outlined below.

- **Condition P1** defines monitoring and discharge points on the premises for air and water emissions.
- **Condition L2** and **L3** describe the Load Based Licensing (LBL) requirements and concentration limits for monitoring and discharge points.
- **Condition L3** sets concentration limits for emissions to air and water from the premises.
- **Condition L4.2** and **L4.3** sets out the SMERP mass load limits for solid particulates and for Sulfur Dioxide and Nitrogen Oxides.
- **Condition L6.5** sets out the operating noise limits for the SMERP.
- **Condition L10** requires annual mass emission reductions from the Pulverised Coal Injection (PCI) Facility and the proposed Sinter Plant Gas Cleaning Project.
- **Condition L12** sets out air quality limits for the SMERP.
- **Condition O10** refers to the operational objectives of the Sinter Plant and SMERP.
- **Condition M4** requires BlueScope Steel to keep records of pollution complaints received.
- **Condition M6.2** and **M6.3** requires BlueScope Steel to undertake mass load monitoring for particular pollutants at the SMERP.

In addition to conditions, the EPL includes a number of current Pollution Reduction Plans (PRPs), some of which are relevant to the Project, namely:

- PRP No. 90 requires BlueScope Steel to prepare a report on air emission points and stack testing facilities by 30 June 2003. This requirement has been completed;
- PRP No. 91 requires BlueScope Steel to prepare and implement a stack testing program by 31 December 2003. This requirement has been completed and is ongoing;
- PRP No. 93 requires BlueScope Steel to undertake a Performance Audit of dust generation by 30 June 2004. This requirement has been completed;



Source: Steps in the Assessment Approval of Major Projects under Part 3A (DIPNR, Draft: 26 July, 2005)

Figure 3.1
Approval Process

- PRP No. 98 requires BlueScope Steel to monitor and report on pH, total suspended solids and total iron in discharges at Monitoring/Discharge Points at PKSW during storm events. A report has been submitted to fulfill this requirement;
- PRP No. 99 required BlueScope Steel to prepare a Stormwater Pollution Control Plan for PKSW that defines water quality objectives and strategies to minimise water quality impacts and maximise stormwater reuse. This plan is required to be submitted to the DEC by 30 June 2004. A report has been submitted to fulfill this requirement;
- PRP No. 100 requires BlueScope Steel to prepare a Noise Investigations and Abatement Report that meets the requirement of the procedures defined by the NSW Industrial Noise Policy (EPA, 2000). This report is required to be submitted to the DEC by 30 June 2005. This requirement has been completed;
- PRP No. 104 requires BlueScope Steel to implement an ongoing monitoring program to demonstrate the SMERP compliance with Solid Particulate and Dioxin limits specified in the license. Investigations were to be completed by 11 November 2003 and a report submitted to the DEC no later than 11 March 2004. This requirement was completed in April 2004 and is noted as complete on the licence;
- PRP No. 105 requires BlueScope Steel to implement a noise monitoring program to confirm performance of the SMERP in compliance with Condition L6. This noise monitoring program is required to be implemented no later then 11 November 2003. This requirement has been completed and is noted as complete on the licence;
- PRP No. 106 requires BlueScope Steel to prepare reports regarding the findings of the Mass Emission Monitoring Program at the SMERP. Reports for submission to the DEC must be prepared no later than 11 August 2004, 11 August 2005, 31 December 2006 and 31 December 2007. Reporting continues;
- PRP No. 107 requires BlueScope Steel to prepare a report detailing investigations to beneficially reuse blowdown waters from the SMERP recirculating system including a strategy to reduce the amount of blow down waters discharged to Port Kembla Harbour. The report is to be submitted to the DEC no later the 31 December 2007;
- PRP No. 108 requires BlueScope Steel to implement a program to monitor dust loads entering the SMERP from the Sinter Plant Electrostatic Precipitator (ESP) and submit progress reports to the DEC on the findings of this Sinter Plant ESP Outlet Dust Load Monitoring Program no later than 11 November 2003, 11 February 2004, 11 May 2004, 11 August 2004 and 11 December 2004. This requirement has been completed and is noted as complete on the licence;

- PRP No. 109 requires BlueScope Steel to undertake a Dioxin Pathway Monitoring Program to determine if the SMERP is operated with the objective of maximising destruction of dioxins and related substances. A report on the findings of the Program must be submitted to the DEC by 31 December 2007. This will allow additional data to be gathered, thus improving the accuracy of the program;
- PRP No. 110 requires BlueScope Steel to review the SMERP Sulphur Rich Gas (SRG) Integrity Program after the first twelve months of operation following hot commissioning to assess the adequacy of this procedure in light of any new information on the performance of the plant obtained during the optimisation period. A report must be submitted to the DEC before 11 October 2004. This requirement was completed in October 2004;
- PRP No. 111 requires BlueScope Steel to report on the compliance monitoring program at the SMERP to assess whether the SMERP is meeting environmental objectives. Progress reports must be submitted to the DEC before 11 November 2003, 11 February 2004, 11 May 2004, 11 August 2004 and 11 December 2004. This requirement has been completed;
- PRP No. 112 requires BlueScope Steel to develop a monitoring program to characterise the pollutants and determine the whole effluent toxicity in discharges from the SMERP waste water treatment plant to demonstrate if the licensee is complying with conditions. A completion date of 30 June 2007 has been set for this program to include assessment of effluent from the SRG treatment plant currently under construction;
- PRP No. 113 requires that BlueScope Steel develop and implement a radionuclide monitoring program at the SMERP. This requirement is due for completion by 31 December 2007 to permit inclusion of six data sets from the new SRG treatment plant following its completion; and
- PRP No. 114 requires that BlueScope Steel implement measures to minimise or eliminate the amount of non liquid waste requiring disposal as a result of the operation of the SMERP. From when the SMERP started operation there have been variations in pollutant concentrations in the dusts collected by the SMERP. This program is slated for completion by 30 June 2007.

BlueScope Steel understands that the EPL will need to be amended should the Project be approved. However, BlueScope Steel expects that conditions of approval relating to construction activities will be 'sunset' or temporary in nature, where as conditions relating to the operational aspects of the Project would not.

3.1.3 Planning Certificate

Planning Certificate No. 200405287 for No.2 Steelworks issued by WCC provides information on appropriate usage and development limits within PKSW.

3.2 NSW Planning Instruments

Environment and planning decision making in NSW is generally made with respect to State, Regional and Local Environmental Planning Instruments (EPIs) made under Part 3 of the EP&A Act, including:

- State environmental planning policies (SEPPs);
- Regional environmental plans (REPs); and
- Local environmental plans (LEPs).

The following sections provide a general consideration of EPIs that are generally relevant to the Project which is required to address sections 75I(2)(e) and 75J(3) of the EP&A Act. This information is partially based on a review of the planning certificate issued by WCC under section 149 of the EP&A Act.

Notwithstanding section 75I(2)(e) of the EP&A Act, sections 75R(2) and (3) of Part 3A of the EP&A Act (Application of other provisions of the Act) provide the following:

(2) Part 3 and State environmental planning policies apply to:

i. the declaration of a project as a project to which this Part applies or as a critical infrastructure project, and

ii. the carrying out of a project, but (in the case of a critical infrastructure project) only to the extent that the provisions of such a policy expressly provide that they apply to and in respect of the particular project.

(3) environmental planning instruments (other than state environmental planning policies) do not apply to or in respect of an approved project.

3.2.1 State Environmental Planning Policies

There are four SEPPs that generally relate to the Project as discussed below.

SEPP 33 – Hazardous and Offensive Development

This SEPP links the permissibility of an industrial development proposal to its safety and environmental performance. Certain activities involve handling, storing or processing a range of materials which, in the absence of controls, may create risk outside of operational borders to people, property or the environment. Such activities are defined by SEPP 33 as a 'potentially hazardous industry' or 'potentially offensive industry'. SEPP 33 applies to any industrial development proposals which fall within these definitions.

Under clause 3, a development is deemed part of a potentially hazardous industry if it satisfies the definition:

> "*a development for the purposes of any industry which, if the development were to operate without employing any measures (including, for example, isolation from existing or likely future development on other land) to reduce or minimize its impact*

in the locality or on the existing or likely future development on other land, would pose a significant risk in relation to the locality:

(a) to human health, life or property, or

(b) to the biophysical environment,

and includes a hazardous industry and a hazardous storage establishment."

DUAP (1997) guideline 'Applying SEPP 33' provides a risk screening procedure to help determine if a proposed development falls within the SEPP. If, under this screening test SEPP 33 is triggered, clause 12 of SEPP 33 requires that any proposal to carry out a potentially hazardous development must be supported by a Preliminary Hazard Analysis (PHA).

A risk impacts and hazard management assessment was undertaken as part of the EA which satisfies the requirements of SEPP 33 (see **Section 8.6**).

SEPP (Major Projects) 2005

State Environmental Planning Policy (Major Projects) 2005 (SEPP 2005) classifies certain development as 'Projects' for the purposes of Part 3A of the EP&A Act.

Clause 6 of SEPP 2005 provides that 'development', that is development of a kind described in Schedule 1 of SEPP 2005, is declared to be a 'Project' to which Part 3A of the EP&A Act applies.

Schedule 1 of SEPP 2005 provides the following at clause 9.

9 Metal, mineral or extractive material processing

Development that has a capital investment value of more than $30 million or employs 100 or more people for any of the following purposes:

(b) metal or mineral refining or smelting; metal founding, rolling, drawing, extruding, coating, fabricating or manufacturing works; metal or mineral recycling or recovery,...

Therefore, because the proposed development has a capital investment value exceeding $30 million and is for the purpose of "*metals, minerals or extractive material processing*", it is a 'Project' to which Part 3A of the EP&A Act applies (in accordance with section 75B(1) of the EP&A Act, and clause 6 and Schedule 1 of SEPP 2005).

Consequently, the Project must be undertaken in accordance with Part 3A of the EP&A Act and the Minister is the consent authority. Under the provisions of Part 3A of the EP&A Act, an Environmental Assessment (EA) (this document) is required to enable the Minister to determine whether or not to grant a Part 3A Approval for the Project.

SEPP 55 – Remediation of Land

The objective of SEPP 55 is to provide for a coordinated statewide planning approach to the remediation of contaminated land. SEPP 55 aims to promote the remediation of contaminated land with the objective of reducing the risk of harm to human health or other aspects of the environment.

Clause 7 of SEPP 55 imposes an obligation on the consent authority to have regard to certain matters before granting development consent. These matters are, relevantly:

- Whether the land is contaminated;
- Whether the land is, or will be, suitable for the purpose for which development is to be carried out; and
- If remediation is required for the land to be suitable for the proposed purpose, whether the land will be remediated before the land is used for that purpose.

This obligation will apply to the consent authority in deciding whether to grant consent to the Project. SEPP 55 also imposes obligations to carry out any remediation work in accordance with relevant guidelines and to notify the relevant council of certain matters in relation to any remediation work. No remediation works will be undertaken in association with this Project.

SEPP 71 – Coastal Protection

SEPP 71 covers developments proposed within the coastal zone, as defined under the *Coastal Protection Act 1979*. Under this Act, the coastal zone is defined on maps published and maintained by DoP (formerly DIPNR). The area surrounding Port Kembla, including PKSW is not included in the coastal zone defined by DoP, therefore SEPP 71 does not apply to the Project.

3.2.2 Illawarra Regional Environmental Plan No.1

The *Illawarra Regional Environmental Plan No. 1 1998* (Illawarra REP) outlines objectives, policies and principles to be taken into account in the preparation of LEPs in the Illawarra. The Illawarra REP covers a wide range of issues including social and economic development, transport, natural resources, environmental protection, conservation and recreation. Relevant clauses in the Illawarra REP are discussed below.

Part 5 of the Illawarra REP contains provisions relating to energy. Clause 46 of the Illawarra REP states that 'the responsible authorities should, where practicable, facilitate the use of renewable energy resources in new development'. The Project is generally consistent with this objective, as it will allow BlueScope Steel to continue to maximise the use of endemic fuels at PKSW.

Part 6 of the Illawarra REP contains provisions relating to industry. Clause 54 of the Illawarra REP states that 'the maintenance of the coal and steel industries is vital to the region's economy and should be facilitated by the planning process'. The Project

is consistent with this aim. The Project will be of economic benefit to the steel industry through the provision of high value increased exports and will enable PKSW to improve its efficiency and competitiveness. The Project represents a substantial investment in the future of the steel industry of the Illawarra.

Part 11 of the Illawarra REP contains provisions relating to waste disposal. Clause 95 provides objectives including 'to encourage the most efficient use of resources by recycling or alternative use'. BlueScope Steel currently recycles or reuses a range of solid and gaseous wastes, such as heated gas, blast furnace flue dusts, BOS gas scrubber metallics, lime kiln flux undersized material, iron ore spillage, BOS metallic slag fines, millscale and unsuitably sized sinter as described in **Section 4.3**. These practices will continue following the commissioning of the proposed development.

Clause 99 (Part 11) of Illawarra REP provides that industries should 'wherever practical, treat their own liquid industrial waste so that it is suitable for disposal in the sewerage system'. As described in **Section 4.3**, wastewater from the Sinter Plant Dewatering Plant is currently treated before being released to the Ironmaking East Drain. These wastewaters are discharged under the provisions of EPL No. 6092 for PKSW (discussed in **Section 4.3**). The Project will not increase the volume of wastewater discharged and no changes to the current treatment system is proposed.

Part 17 of Illawarra REP contains provisions relating to high rise buildings. Clause 138 provides objectives relating to high rise buildings including 'to preserve the landscape quality of coastal and foreshore land by encouraging the erection of buildings which are designed in harmony with that landscape'. A visual assessment of the Project has been undertaken in the EA. It is concluded that given the industrial nature of the Port Kembla area (where the Project will be located) and given that many of the existing facilities at PKSW are of similar heights to the proposed facilities, the visual impact of the Project is not considered to be significant.

Clause 139(2) requires the concurrence of the Director-General of DIPNR for buildings above 11m. However, Amendment No. 73 (Part 1 Clause 3(2)) of the Wollongong LEP 1990 states that Clause 139(2) of the Illawarra REP does not apply to a structure or part of a structure to which the Wollongong LEP applies. The Project is located in land to which the Wollongong LEP applies, therefore the Director-General does not have this approval role under Clause 139(2).

3.2.3 Wollongong Local Environmental Plan 1990

The Project is located within Wollongong LGA. The Wollongong LEP is the local environmental planning instrument that applies. The aim of the Wollongong LEP is to provide a framework for land use management in the City of Wollongong to achieve the following objectives:

(a) To encourage the proper management, development and conservation of natural and man-made resources (including agricultural land, natural areas, forest, minerals,

water and the built environment) for the purpose of promoting the social and economic welfare of the community and a better environment;

(b) To protect the environment from degradation and despoliation by protecting environmentally sensitive areas from development and minimising adverse impacts of urban development on both the built and natural environment;

(c) To protect and improve the quality of life and the social well-being and amenity of local residents;

(d) To encourage economic diversification and growth of the business and industrial base to increase employment;

(e) To conserve the environmental heritage of the land to which the plan applies; and

(f) To enable the classification and reclassification of land, owned or controlled by the Council, under the Local Government Act 1993.

The Project is compatible with the aims of the Wollongong LEP and will promote the economic welfare of the region. The Project will not impact on environmentally sensitive areas.

Under the Wollongong LEP the proposed site for the development is zoned *4(b) Heavy Industrial* (see **Figure 3.2**). In this zone, the Project is permissible with development consent. As development consent is required, the Project will be assessed under Part 3A of the EP&A Act and the EP&A Regulation (refer to **Section 3.1**).

The objectives of zone *4(b) Heavy Industrial* are to:

a. Provide suitable areas for those industrial enterprises which should be kept well away from residential neighbourhoods;

b. Make the best use of public utilities and infrastructure required by substantial enterprises; and

c. Allow some diversity of activities which will not prejudice the objectives referred to in paragraphs (a) and (b) from being achieved or significantly detract from the operation of existing or proposed industrial enterprises.

The Project is consistent with the objectives of the zone. The Project will use existing infrastructure and utilities serving PKSW.

Draft Wollongong Local Environmental Plan Interim Review

At the time of the preparation of this EA, WCC had commenced the Interim Review of the Wollongong LEP (the Interim Review). The *Interim Review Summary Document*, exhibited from 13 December 2004 to 25 March 2005 for community comment, identifies that the Interim Review seeks to implement a number of general and specific amendments to the Wollongong LEP to remove anomalies, clarify provisions,

reflect best practice and improve the readability of the LEP. Council endorsed the draft LEP on 24 May 2004, and received permission from the DoP to exhibit the draft plan.

The provisions of the draft amending LEP were considered in the assessment of the Project. Despite changes to the definition of heavy industry and development controls in zone *4(b) Heavy Industrial* to incorporate new provisions for high-tech industry, the draft amending LEP does not affect planning considerations with respect to the Project, and are not further assessed in this EA.

3.2.4 Development Control Plans

There are several DCPs that apply to any development at PKSW. A review of applicable DCPs indicates that Wollongong DCP No. 6 – Commercial and Industrial Premises (DCP 6) applies to the proposed development.

DCP 6 identifies relevant State and WCC building and planning policies, and establishes WCC's standards and guidelines affecting commercial and industrial development in the Wollongong LGA. DCP 6 requires all commercial and industrial development to conform to the provisions and standards set out in Parts 2 and 3 of the plan, and to take into account the matters set out in Part 4. It applies to new development, redevelopment, alterations or additions for all commercial and industrial purposes.

In terms of industrial development, Part 3 of the Wollongong DCP 6 includes development standards pertaining to:

- Landscaping;
- Advertising;
- Neighbourhood amenity/nuisance; and
- Discharges.

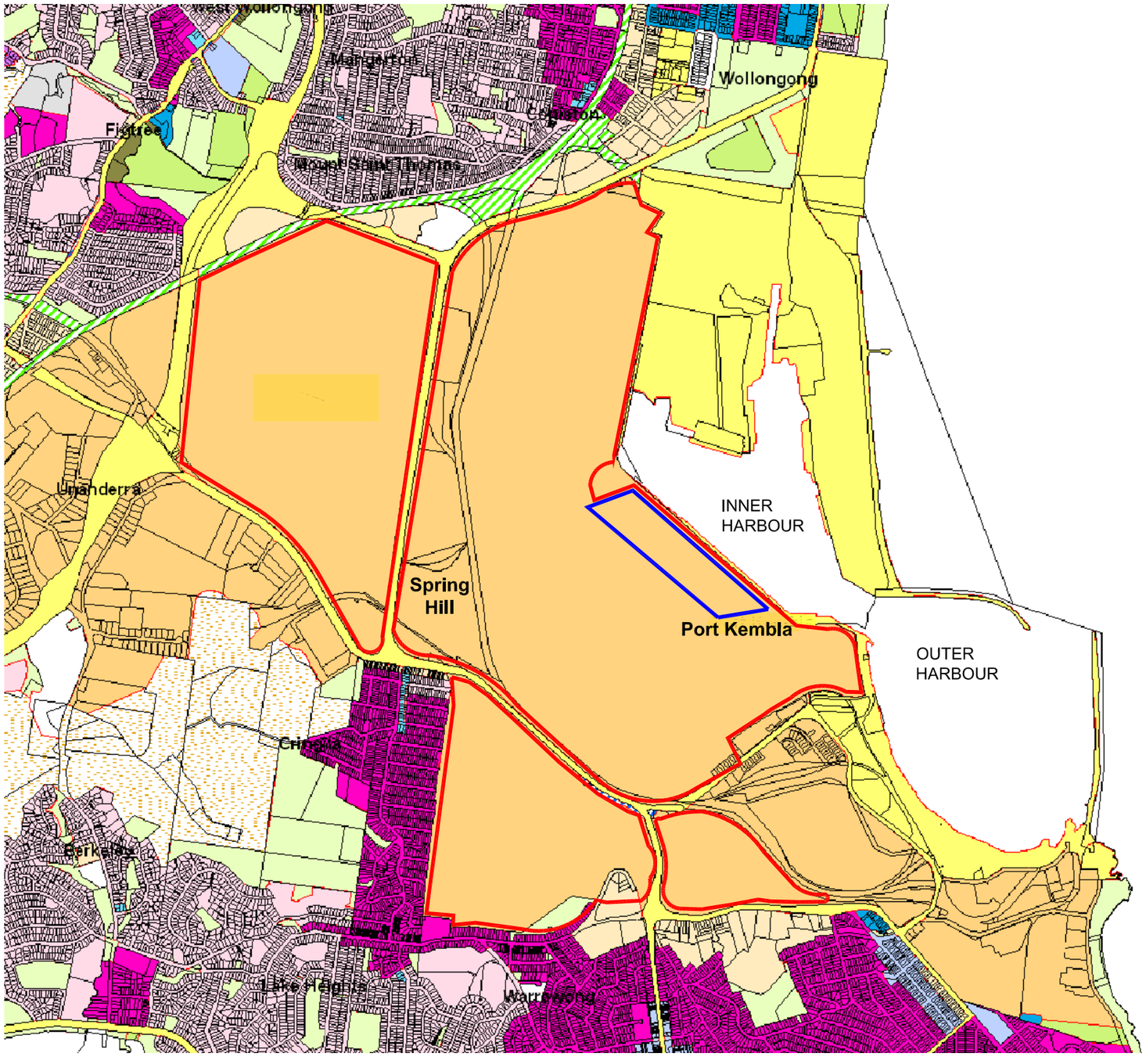
Part 4 of Wollongong DCP 6 cites several objectives relating to industrial development.

The proposal complies with all the applicable industrial development standards and objectives of DCP 6. The measures for ensuring compliance are discussed in the proceeding relevant environmental impact sections of this EA.

The industrial development standards and objectives set in DCP 6 will also be considered during detailed design, and in the construction and operational EMPs for the Project.

3.3 Commonwealth Legislation

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) requires referral to and approval from the Commonwealth Minister for



LEGEND:

- NON URBAN
- LOW DENSITY
- SPECIAL LOW DENSITY
- MEDIUM DENSITY
- HIGH DENSITY
- GENERAL BUSINESS
- NEIGHBORHOOD BUSINESS
- REGIONAL BUSINESS
- COMMERCIAL BUSINESS
- RESEARCH & DEVELOPMENT BUSINESS
- LIGHT INDUSTRIAL
- HEAVY INDUSTRIAL
- EXTRACTIVE
- NAME OF SPECIAL USE
- RAILWAYS
- MAIN ROADS
- PUBLIC RECREATION
- PRIVATE RECREATION
- TOURISM
- SPECIAL
- CONSERVATION
- RESIDENTIAL
- RURAL RESIDENTIAL
- HACKING RIVER
- NATIONAL PARKS
- STATE RECREATIONAL AREAS
- NAME OF SPECIAL USE
- MAIN ROADS
- LOCAL ROADS
- OPEN SPACE
- DEFERRED
- RMH AREA & SINTER PLANT
- STEELWORKS BOUNDARY

Source: City of Wollongong Local Environmental Plan 1990

Figure 3.2
Zonings in Study Area and Surroundings

the Environment for actions which have, may have, or are likely to have a significant impact on a matter of National Environmental Significance (NES). An action that requires this Commonwealth approval is called a 'controlled action' and may be a project, development, undertaking, activity or series of activities.

As part of the EA process, an assessment of potential impacts on matters of NES was undertaken. There are currently seven matters of NES declared under the EPBC Act. These matters are listed in **Table 3.1**, with the potential impact of the Project on each.

Table 3.1 Matters of National Environmental Significance and the Predicted Impacts of the Project

Matter of NES	Impact and Reasoning
World Heritage properties	No impact – No World Heritage properties located close to the Project.
National Heritage places	No impact – The Kurnell Peninsula located in Sydney is the nearest National Heritage place.
Ramsar wetlands of international significance	No impact – No Ramsar wetlands located close to the Project. Although Lake Illawarra is classified as an 'important wetland' by Environment Australia (2001), this is not close to the Project.
Listed threatened species and ecological communities	No significant impact. Register searches indicate that no threatened ecological communities exist in the area. The Green and Golden Bell Frog is listed as a threatened species, but occurs more than 1km from the sites associated with the Project (see **Table 7.1)**.
Listed migratory species	No significant impact. Although there are migratory species that may occur in the area, they are likely to be deterred by existing operations at PKSW (see **Table 7.1)**.
Commonwealth marine areas	No impact – No Commonwealth marine areas located close to the Project.
Nuclear actions (including uranium mining)	No impact – Not relevant.

This EA has concluded that the Project will have no significant impact on matters of NES, as defined by the EPBC Act. Therefore, approval under the EPBC Act is not required for the Project and no referral to the Commonwealth Department of Environment and Heritage was made.

4 Existing BlueScope Steel Operations at Port Kembla

4.1 Overview of BlueScope Steel and Operations

BlueScope Steel has two main business units operating within Australia:

- BlueScope Steel Industrial Markets, consisting of the PKSW except for the Packaging Products plant; and
- BlueScope Steel Australian Manufacturing Markets, consisting of the Packaging Products plant, the Port Kembla Springhill Works, the Western Port facility in Victoria and various service centres, sales offices and roll forming facilities distributed around Australia.

BlueScope Steel (AIS) Pty Limited is the subsidiary responsible for the PKSW as outlined above. BlueScope Steel Ltd's PKSW is an integrated Steelworks, which in the 2004/05 financial year produced more than five million tonnes of raw steel. It generates a wide range of finished and semi-finished flat steel products for Australian and international customers.

The Packaging Products plant, Springhill Works and Western Port plant are important customers of the Industrial Markets business unit.

PKSW, as defined on **Figure 1.1** and described in **Section 4.2**, operates under the existing EPL No. 6092 (premises) covering the Packaging Products section as well as the Industrial Markets Business Unit.

The Springhill Works produces cold rolled, metallic coated and pre-painted steel coils for local and overseas markets, producing an output of 900,000 t/yr. It sources hot rolled steel coils from PKSW for further processing. The Springhill Works operates under a separate EPL (No. 571).

4.2 BlueScope Steel Port Kembla Steelworks Site

Figure 1.1 shows the whole of the PKSW. The PKSW site comprises the No.1 Works, No.2 Works, Steelhaven and the Recycling area. The No.2 Works is divided into two sectors by Allans Creek. As shown in **Figure 4.1**, the southern half of the No.2 Works comprises the Cokemaking, Steelmaking and Ironmaking facilities, while the northern half, referred to in this EA as the 'Strip and Plate Products Area' contains the Plate Mill, Hot Strip Mill, Cryogenic Plant and the Packaging Products section. All sectors of PKSW are internally linked by road and rail and are currently provided with electricity, water and gas services.

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

- Sinter Plant;
- Coke Ovens Batteries;
- Coke Ovens Gas Processing;

- No.2 Blower Station;
- No's 5 and 6 Blast Furnaces;
- Raw Materials Handling Area;
- 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;
- Briquetting Plant; and
- Pulverised Coal Injection Plant.

The Strip and Plate Products Area (northern sector) comprises the:

- Hot Strip Mill;
- Plate Mill;
- Cryogenics Plant; and
- Packaging Products.

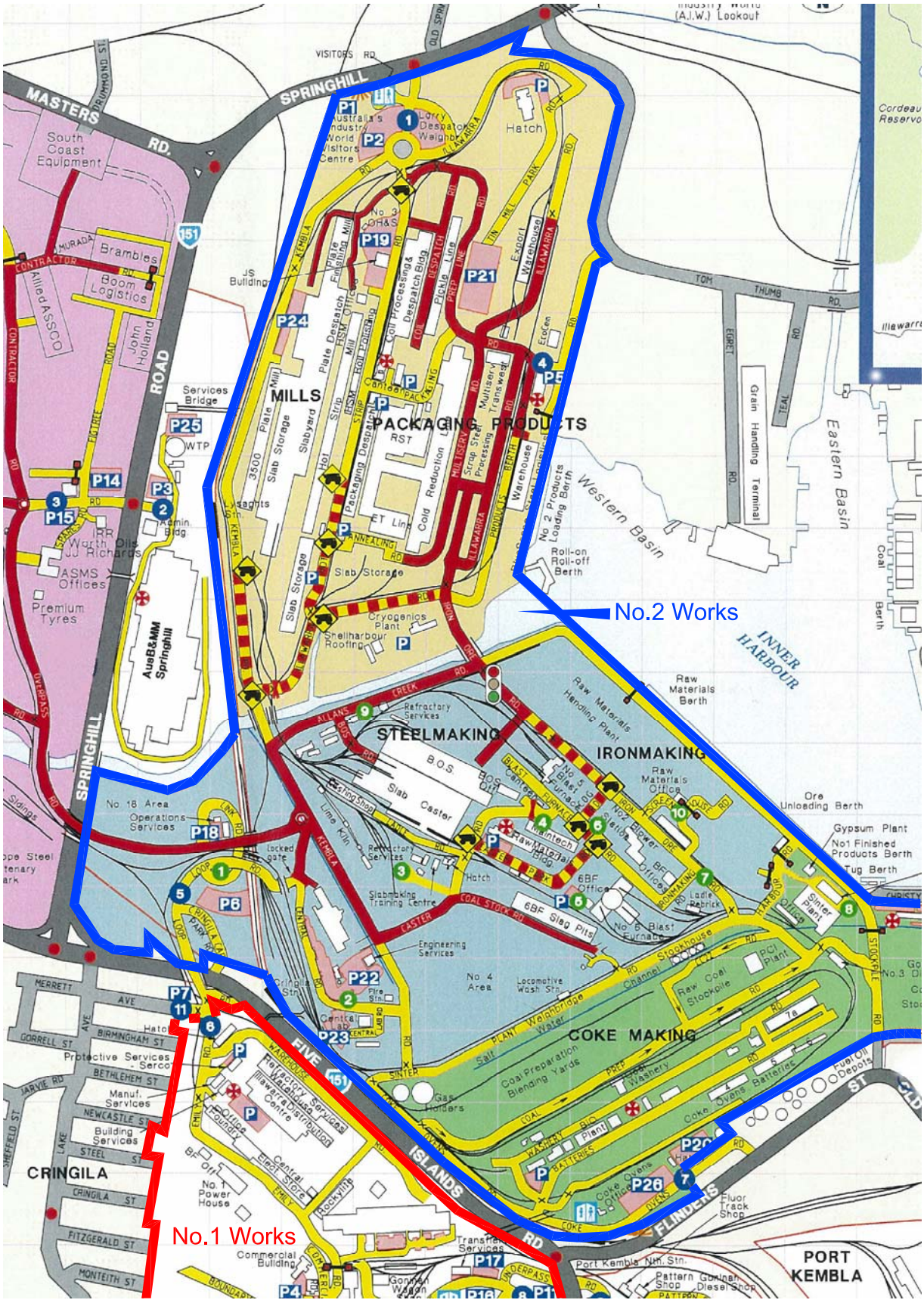
Each facility plays a different, but integrated, function in the production of steel products. However, this assessment centres on the Ore Preparation Area.

4.3 Ironmaking Operations and Systems

During ironmaking operations, a thermo-chemical process of reduction occurs within the blast furnace. In general, iron ore, coke and other raw materials (fluxes) are charged into a blast furnace for smelting and molten iron is generated. Oxygen in the air blasted in at the bottom of the furnace combines with carbon in the coke to form carbon monoxide (CO). This CO then removes the oxygen from the ore, leaving a mixture of elemental iron (Fe), slag, CO and carbon dioxide (CO_2) and other gases. The excess gas is collected, cooled, cleaned and then transferred to other parts of PKSW for reuse as blast furnace gas (BFG).

In order to achieve an efficient blend of raw materials for the smelting process, fine iron ore particles and other materials (fluxes) are first agglomerated into a lump product called Sinter in the Sinter Plant. The Sinter Plant produces sinter of a size and composition that encourages even smelting in the blast furnace. The total iron ore charged into a blast furnace is via sinter, lump ore or pellets.

The Raw Materials Handling Area supplies raw materials to the Sinter Plant imported by ship, road and rail. The Ore Preparation Area supplies feed materials to the two operating blast furnaces at PKSW – No. 5 & 6 Blast Furnaces.



Legend
- Border contains No.1 Works
- Border contains No.2 Works
- 1 Entry gates
- 2 Bus stops

Figure 4.1
Steelworks Facilities

Source: Gregory's Maxi 2003 Street Directory 15th Edition

Following the smelting process, molten iron is cast into troughs via tapholes located near the base of the blast furnace, into waiting rail mounted torpedo ladles. The ladles transport the molten iron to Steelmaking plant within PKSW for processing into steel.

By-products from the blast furnace operations are BFG and slag. Slag exiting the bottom of the furnace is either formed into rock or granulated slag. Both are sold to the construction or cement industry.

The No.5 and No.6 Blast Furnaces, Sinter Plant and Raw Materials Handling Area are illustrated on **Figure 1.3**.

4.3.1 Ore Preparation Area

The Ore Preparation Area at PKSW consists of the Raw Materials Handling Area and the Sinter Plant (**Figure 4.2**).

4.3.2 Raw Materials Handling Area

The Raw Materials Handling Area covers a significant proportion of the Ironmaking area and is accessible from the Inner Harbour. Raw materials are delivered to this area via rail, road or sea. An overview of the Raw Materials Handling Area process and equipment is provided on **Figure 4.3**.

The following raw materials are required in the ironmaking process:

- Iron Ore;
- Coal;
- Coke; and
- Limestone and other fluxes.

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

Iron Ore

Approximately ten million tonnes of iron ore is received by the Raw Materials Handling Area annually. The ores are sourced primarily from the Pilbara region in Western Australia and are delivered to the storage area by sea, in bulk carriers. Additional material is transported from South Australia, South America, Canada and Tasmania.

Ferrous material is fed to the blast furnace lump ore, sinter or pellets. Lump ore is approximately 6mm to 30mm diameter and are primarily Mt Newman Lump and Yarrie Lump (both sourced from Western Australia). Sinter is an agglomeration of fine ore and fluxes which are blended and fired. Pellets are iron ore fines which are ground, rolled into balls of approximately 12mm in diameter and fired. Pellets used

in the PKSW blast furnaces include Savage River Pellets (sourced from Tasmania) and Carol Lake Pellets (sourced from Canada). Approximately two million tonnes of pellets are delivered to the Raw Materials Handling Area annually. There is a small pelletiser which recycles very fine dusts at a rate of approximately two tonnes per hour at PKSW. Several million tonnes of fine iron ores are also purchased by PKSW.

Lump iron ore delivered on site is segregated at the Screenhouse. The particles are separated into sizes greater than 6mm (lump ore) and finer than 6mm (secondary fines). The lump ore is transferred to the No.5 and No.6 Blast Furnaces via the covered conveyors. Fine particles (less than 6mm) are blended in the secondary yards before being sent to the Sinter Plant via conveyors, for conversion into sinter.

There are two blending beds on the south-western side of the Raw Materials Handling Area, each with a capacity of 300,000 tonnes. The blended bed consists of fixed proportions of various ores to achieve a consistent mix of raw materials. Blended material is then transferred from the Raw Materials Handling Area to the Sinter Plant (**Figure 4.2** and **4.3)**.

Coal and Coke

The majority of coal used by PKSW is sourced from nearby Illawarra coal mines and is transported to the coal preparation blending beds via rail and road. Approximately 75% of the coal is brought to the site by road. Road transport is undertaken six nights a week.

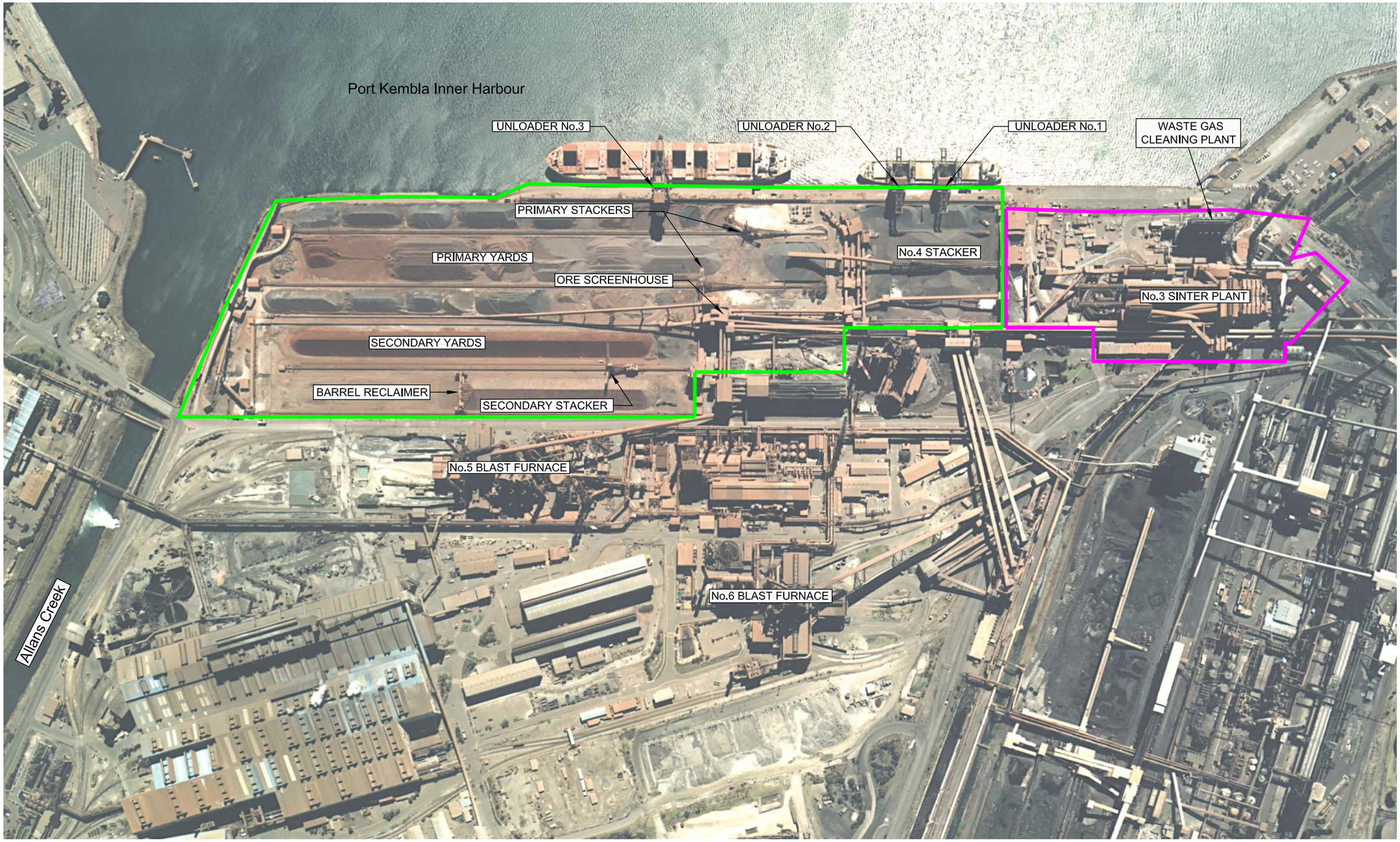
Before coal is suitable for use in the blast furnaces it must be treated by washing, crushing and coking. Coal is transformed into metallurgical coke by heating it for 18-22 hours in the absence of air in the coke ovens. The process drives off volatile compounds and gases from the coal. The Cokemaking Area is shown on **Figure 1.3**.

The volatile gases driven off are captured and cleaned. These gases, known as Coke Ovens Gas (COG), are an important source of fuel for heating throughout PKSW. The COG is reticulated through a network of large pipes for reuse in many locations across PKSW, including the Blast furnaces, Hot Strip Mill reheat furnaces, Sinter Plant and general heating.

Coke, screened to greater than 25mm, for the blast furnace is either stockpiled or fed directly to the storage bins at the stockhouses and then to the No.5 and No.6 Blast Furnace via a covered conveyor. Fine material (less than 10mm), referred to as coke breeze, is also produced in the coking process. Coke breeze is used as fuel in the Sinter Plant.

Fluxes

Fluxes are added to the blast furnace feed to assist in removing impurities in the ore during smelting. Fluxes that can be used include limestone, quartz, dolomite and serpentine. Limestone and quartz are currently used as flux material in the Blast Furnaces.



LEGEND

RAW MATERIALS HANDLING AREA
SINTER PLANT
} ORE PREPARATION AREA

Figure 4.2
Ore Preparation Area
Existing Facilities

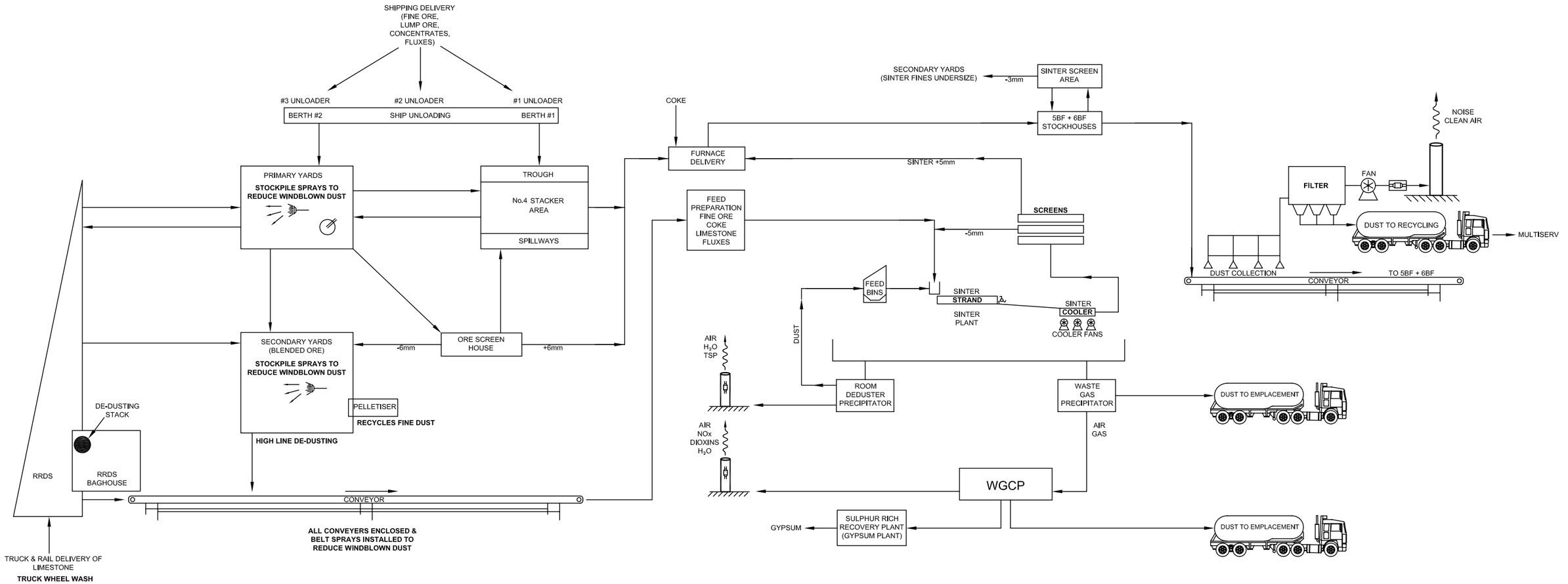


Figure 4.3
Existing Ore Preparation Area Process Flow

Fluxes are transported to the Raw Materials Handling Area via rail or truck. They are then transferred via conveyer to the stockhouse storage bins for the No.5 and No.6 Blast Furnaces via the covered conveyors.

4.3.3 Sinter Plant

Sintering is an agglomeration process that fuses fine iron ore, coke, limestone dust and other materials to form a lumpy porous material. Sinter is important as an iron source and also aids the permeability of the blast furnace burden. PKSW has one sinter machine, the No.3 Sinter Plant. The location of the Sinter Plant is shown on **Figure 1.2** and **4.2.** An exploded view of the internal layout of the Sinter Plant and associated facilities is shown in **Figure 4.4.** A process flow diagram for sinter production is shown on **Figure 4.5**. Photographs of the Sinter Plant are provided in **Figure 4.6** and **Figure 4.7**.

Iron ore fines, coke breeze, dust, sinter fines and flux fines (limestone, quartz, dolomite and/or serpentine) are blended and moistened in the rolling drum granulator at the Sinter Plant. Approximately 1,000 tonnes of mixture an hour is produced and is spread onto a continuously moving grate called a strand, to a thickness of approximately 500mm. The strand is 5m wide and 84m long and is comprised of a series of pallets that travel along rails within the Sinter Plant. The strand begins under an ignition furnace where combustion of the uppermost surface of the mixture occurs at a temperature of 1300°C. As the mixture moves slowly along the rails, air is drawn down through the mixture to allow thorough and even fusing of the materials. The draw down air passes through the wind boxes located under the strand. It takes 25 minutes for the sinter to traverse the strand. Fusing is complete by the time the pallets have reached the end of the strand, and once fused, the mixture becomes sinter and is transferred from the strand to the cooler bed by the hot feeders (**Figure 4.4**).

The sinter is cooled for approximately one hour on the cooler bed before being screened into suitably sized pieces. The cooling process is assisted by fan forced air blown up through the sinter from the base of the cooler bed. Additionally, process water is currently sprayed onto the cooler bed to provide additional cooling of the sinter. Wastewater is not produced as part of this process as all water sprayed onto the hot sinter evaporates soon after contact. Up to a maximum of 634kL per day of water is used for this process.

At the Sinter Plant, the sinter is screened into particles coarser than 5mm in size and conveyed to the Blast Furnace Stockhouse bins. Here it is screened into different size fractions, one greater than 6 mm (lump sinter); another between 6mm and 4mm - referred to as sinter under bin screenings (SUBS); and a final fraction less than 4mm in size. The Coarse Lump material is fed to the blast furnace and makes up approximately 55% of the ore burden. The SUBS are also fed to the blast furnace, however, SUBS only make up approximately 5% of the ferrous burden. The material that is finer than 4mm is returned for reprocessing in the Sinter Plant.

Waste gas from the sintering process (i.e. the draw down air) is captured and treated by an electrostatic precipitator and the Sinter Plant Waste Gas Cleaning Plant (previously referred to as the SMERP), which uses activated carbon adsorption to clean the waste gas, prior to discharge to atmosphere.

4.3.4 Blast Furnaces

There are two blast furnaces operating at PKSW: No.5 Blast Furnace and No.6 Blast Furnace. They are of similar size with a combined output of over 5Mt/year of Iron.

Within each blast furnace, approximately 13,000 tonnes (81%) of ferrous bearing materials (including sinter), 2,900 tonnes (18%) of coke and 70 tonnes (1%) of fluxes are charged into the furnace every day. Of the total ferrous materials, between 50% and 60% of the burden is comprised of sinter produced from the Sinter Plant.

The composition of Blast Furnace burden is listed in **Table 4.1** which shows that between 50% and 60% of the blast furnace ferrous burden is comprised of sinter.

The blast furnace processes are fully described in No.5 Blast Furnace Reline Proposal Statement of Environmental Effects (CH2M HILL, 2005). Additionally, following is a brief description of blast furnace operations, describing the by-products which are reused in the Sinter Plant.

Table 4.1 Indicative Blast Furnace Burden Composition

Burden Composition	Average for year 01/02	Average for year 02/03	Average for year 03/04	Forecast Average for year 05/06
Ferrous Feed (average proportion as %) – Comprises approximately 81% of total burden.				
Sinter	57.57%	57.31%	55.12%	56.54%
SUBS (fine sinter)	5.23%	2.8%	5.4%	0.46%
Mt Newman Lump Ore	0.00%	0.0%	0.0%	14.39%
Yarrie Lump Ore	12.08%	14.11%	12.40%	2.40%
Savage River Pellets	14.98%	16.1%	15.9%	16.27%
Carol Lake Pellets	10.14%	9.7%	9.9%	8.13%
Whyalla Pellets	0.00%	0.0%	0.0%	1.45%
MAC Lump Ore*	0.00%	0.0%	1.2%	0.35%
Coke Burden (average proportion as %) – Comprises approximately 18% of total burden.				
Small (10x25mm)	10.3%	9.0%	9.3%	9.96%
Lump (25x80mm)	89.7%	91.0%	90.7%	90.04%
Fluxes (annual quantity as Tonnes) – Comprises approximately 1% of total burden.				
Quartz	12,453	7,315	6,013	10,930
Limestone	6,776	17,926	23,314	28,700

*Based on figures for No.5 Blast Furnace

**Mining Area C from BHP Billiton

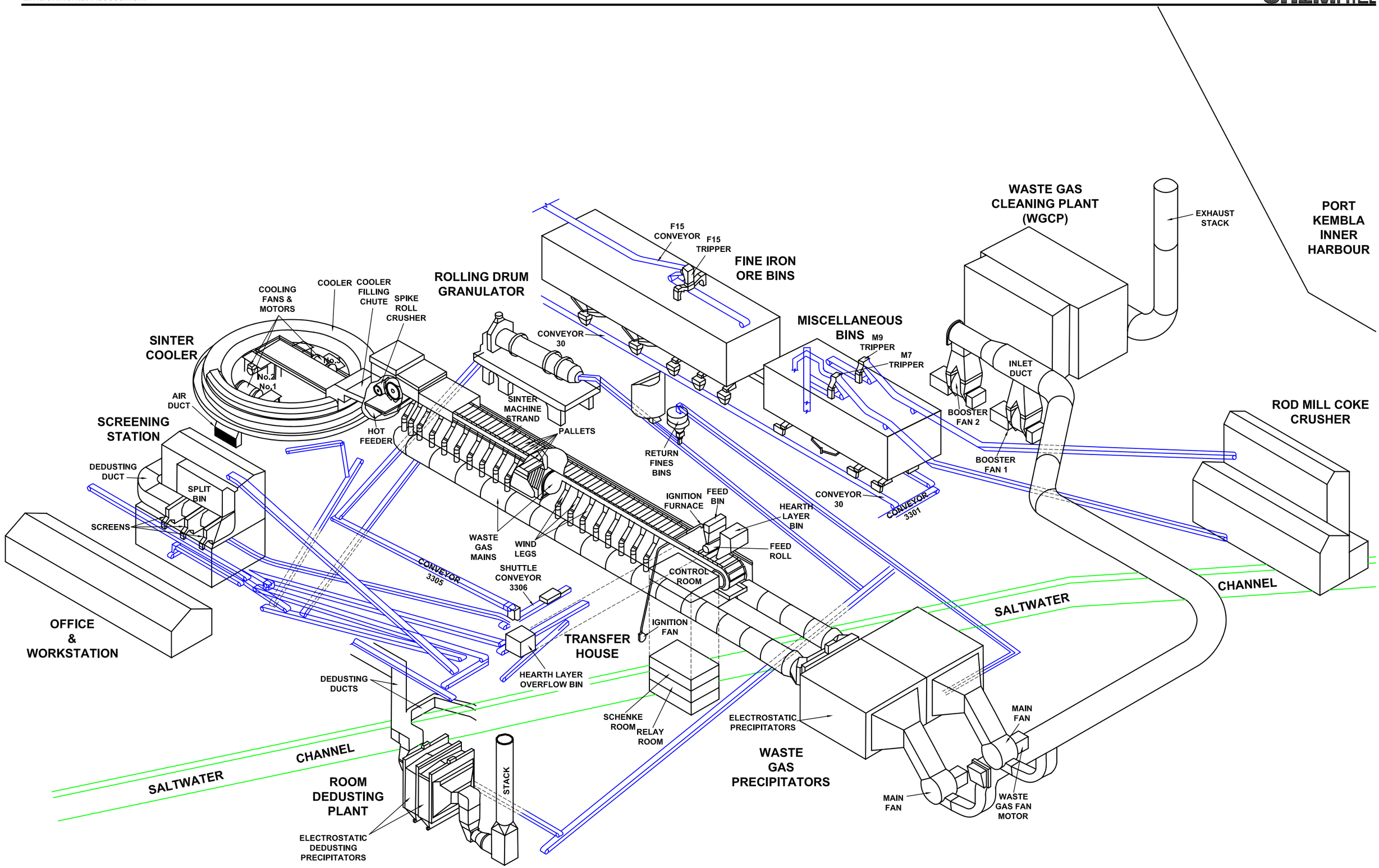


Figure 4.4
Existing Sinter Plant & Associated Facilities

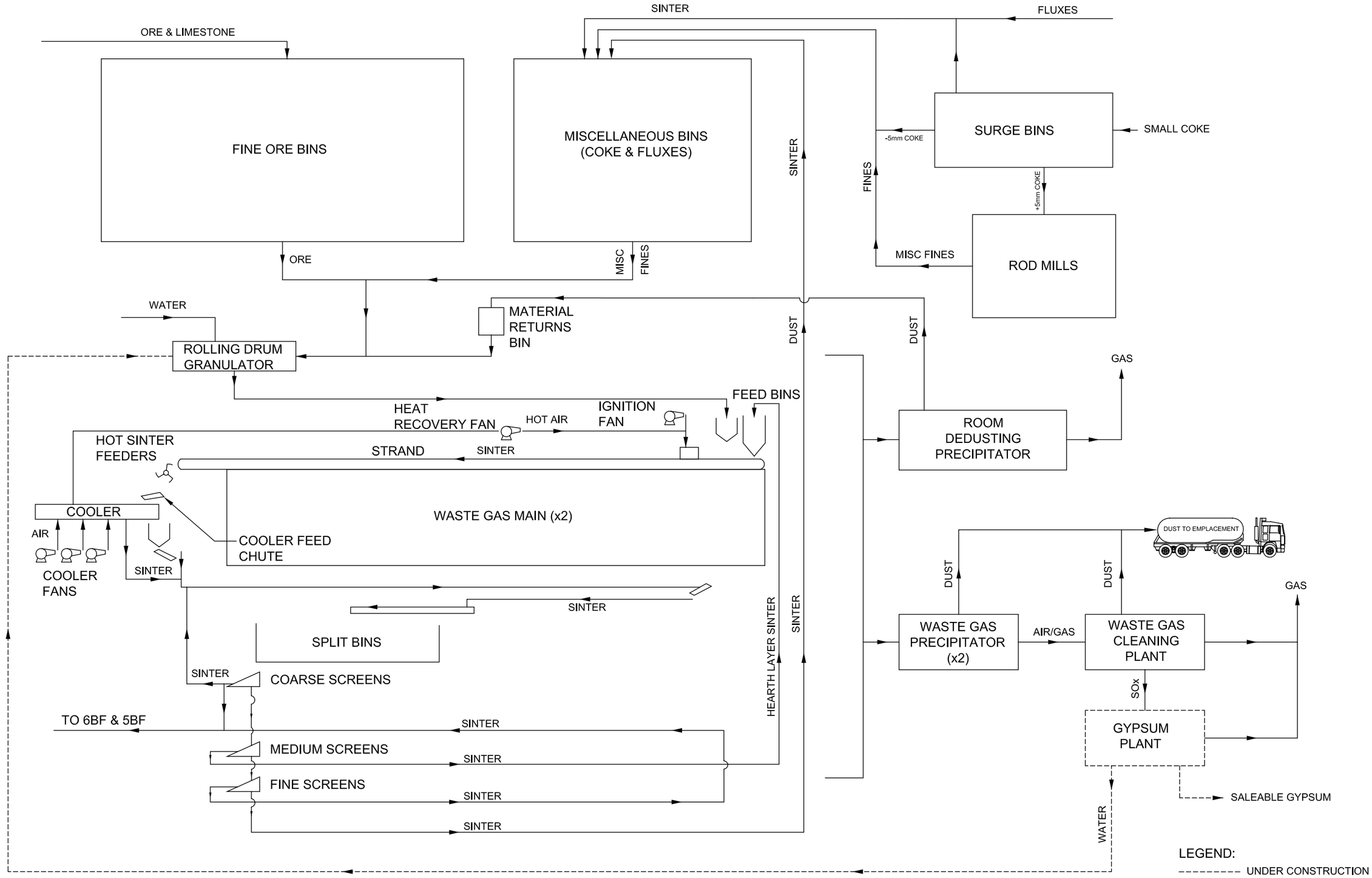


Figure 4.5
Existing Sinter Plant Process Flow

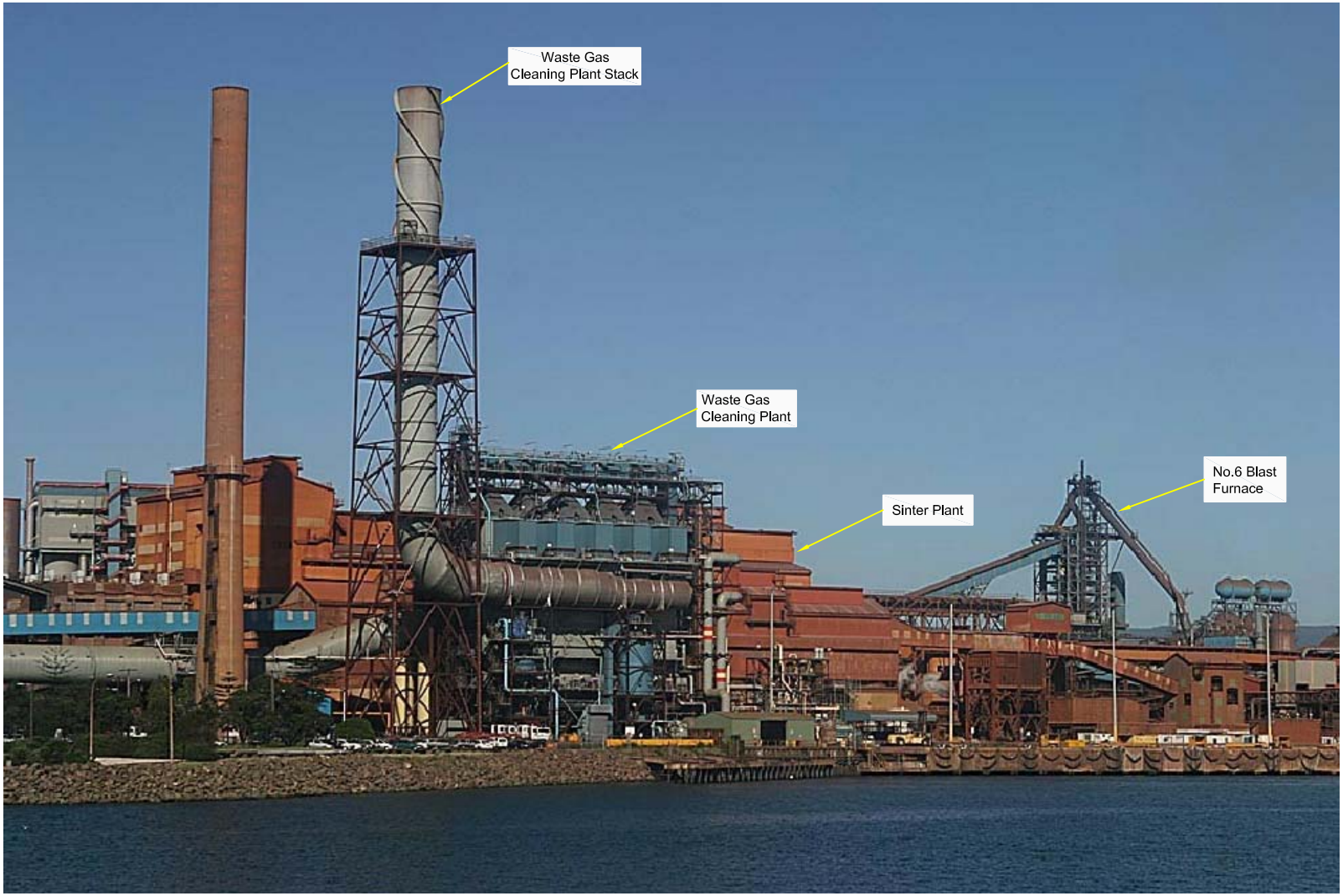


Figure 4.6
Existing Sinter Plant from Inner Harbour

Room Dedusting Plant

The strand within the Sinter Plant. The ignition hood is at the rear of the photo.

Sinter Plant Cooler

Sinter Plant Conveyor

Figure 4.7
Existing Sinter Plant Equipment

Dust and Slurry from the Off Gas System

Recycle by-products, including dust and liquid wastes, produced by blast furnace operations is transferred for use at the Sinter Plant or treatment at the Dewatering treatment facilities.

Surplus gases produced from the blast furnace vessel are directed from the top of the furnace to be treated by the gas cleaning system. The dust caught in the dust catcher of the gas cleaning system (flue dust) is periodically discharged and passes through a pugmill to agglomerate it for transfer to the blending beds via trucks. Approximately 50,000t/year of collected flue dust is transferred from the No.5 & 6 Blast Furnace Dust Catchers to the Sinter Plant, where it is incorporated into the sintering process.

In the Blast furnace gas system, the fine dust particles are washed out of the gas stream and collected in a clarifier or thickener, from where they are pumped via a slurry line to the Dewatering plant at the Sinter Plant. The water is returned to the furnaces and the residue recycled in the briquetting process.

5 Project Need and Alternatives

5.1 Need and Benefits of the Project

5.1.1 Project Need

BlueScope Steel operates in an extremely competitive global market. Historically, the steel business has displayed significant variability, with cyclic profitability ranging from high levels, to significant periods of low to negative profitability. Many steel businesses have not been able to survive, and consolidation of smaller organisations into larger businesses more able to benefit from synergies and economies of scale has been common in recent times.

In order to ensure its ongoing viability, BlueScope Steel is constantly exploring various ways to ensure that adequate returns will continue to be generated for shareholders in all phases of the steel business cycle. A key requirement is to ensure that BlueScope Steel's current and future downstream demands are met.

An opportunity exists during the No.5 Blast Furnace reline shutdown period to increase the Sinter Plant capacity from 5.5 to 6.6 million tonnes per annum. Increasing the capacity of the Sinter Plant will result in a change in raw materials demand required by PKSW. Increased volumes of fine ores will need to be purchased to supplement the sinter feed and this will be offset by a decreased equivalent amount of imported pellets. This change in raw materials will subsequently require modifications to the Raw Materials Handling Area.

5.1.2 Benefits of the Project

The upgrade works at the Sinter Plant, which will result in increased production of sinter, will enable a smaller quantity of more expensive, imported iron ore pellets to be consumed at the Blast Furnaces, giving a significant net reduction in hot metal (molten iron) production costs. An increase in sinter production will also enable more consistency in the quantity and quality of hot metal produced, thereby increasing the security of the iron-making operations.

Modification to the cooler will be required as part of the increased sinter production. Following upgrading of the cooler, regular use of the cooling water spray nozzles will no longer be required as the upgraded cooler will satisfy the cooling requirements. This will result in fresh water savings of 634kL per day.

The increase in production will also mean an increase in the ability of the sinter machine to recycle material such as blast furnace flue dust and mill scale.

The proposed upgrade works will result in improved operational security for PKSW, thereby securing supply for BlueScope Steel's key downstream customers, both internal and external.

5.2 Project Alternatives

In determining the scope of the proposed Sinter Plant capacity increase, BlueScope Steel considered a range of alternatives as described below.

5.2.1 Do Nothing - Maintain and Operate Existing Ore Preparation Area

The Ore Preparation Area is capable of continuing to operate, as is current practice. However, a higher production rate of sinter is desirable to ensure product supply and this will not be possible without a plant upgrade. In addition, process improvements at the Sinter Plant will be addressed during upgrade operations. Subsequently, as a result of the Sinter Plant upgrade, modifications will be required at the Raw Materials Handling Area to ensure that adequate raw materials will be able to be stored and supplied to the Sinter Plant.

Modifications to the Raw Materials Handling Area will not be required if the Sinter Plant continued to operate at its current level.

5.2.2 Sinter Plant Alternatives

Various combinations of technically feasible options to increase sinter production have been considered by BlueScope Steel during the planning process. These options are divided into two categories: facilities in addition to the existing Sinter Plant and modifications to the existing Sinter Plant. These options are discussed below:

New facilities

BlueScope Steel undertook an assessment of the viability of increasing blast furnace feed materials through the following arrangements:

- Construction and operation of an additional Sinter Plant;
- Construction and operation of a new pellet plant;
- Increasing sinter use by importing additional sinter in place of pellets; and
- Increasing pellet use by importing additional pellets in place of sinter.

These alternatives are further discussed below:

Additional Sinter Plant

An additional Sinter Plant would result in improved operational security for PKSW, thereby securing supply for BlueScope Steel's key downstream customers. Increased sinter production will reduce the consumption of the more expensive, imported iron ore pellets, giving a significant net reduction in hot metal production costs. However, this option is not considered feasible due to space constraints at PKSW, construction costs, operating cost, greenhouse gas production and time. Therefore, this option is not considered appropriate.

New iron ore pellet plant

An iron ore pellet plant would alleviate the current need to import expensive pellets over long distances. BlueScope Steel's dependency on the pellet supply market directly impacts production costs and BlueScope Steel's delivery of final product to the marketplace. The dependency on iron ore pellets and suppliers can be alleviated by increasing sinter production. However, this option is not considered feasible due to space constraints at PKSW, construction costs, operating cost, greenhouse gas production and time. At PKSW, sinter is seen as a better quality feed material for iron production than pellets. Therefore, this option is not considered appropriate.

Importing sinter in place of pellets

The cost of this option and the quality of the imported sinter precludes this option as previous experiences with sinter transport indicate that sinter degrades during transport and a suitable size fraction would not be available for use upon arrival. Handling is damaging to the sinter and creates dust generation and water management issues as well as the need for facilities associated with the collection and reuse of sinter fines generated during transport. Because of the fragility of sinter in transport, it is generally not a product that is produced and exported by other facilities and its availability and condition for use upon arrival is extremely limited. Consequently, the cost, availability and quality issues associated with this option make it unviable.

Importing pellets in place of sinter

Whilst Whyalla Steelworks does have a 100% reliance on pellets, this is achieved by the co-location of an adjacent pellet plant which permits the recycling of breakage fines. At PKSW, this option would require the decommissioning of the existing Sinter Plant and place 100% reliance upon pellet import. This transformation represents a significant security of operations challenge to the viability of PKSW since sinter and pellets react differently within the blast furnace. It would also increase the costs of operation and remove the site's ability to recycle various steelworks wastes.

Modifications to existing Sinter Plant

Modifications that could be undertaken to the existing Sinter Plant include strand elongation, strand widening, deepening of the strand bed and relocation of the ignition furnace to the first windbox. These alternatives are further discussed below:

- Strand elongation. This option would involve increasing the strand and waste gas mains length by up to 15m to accommodate the required capacity of raw materials. This option has the distinct advantage of providing a full height Cooler filling chute which optimises the particle segregation in the Cooler and hence the efficiency of cooling is also optimised.

- **Strand widening.** This option will require widening of the strand by an additional 0.5m along the length of the strand. This will involve removal of existing pallet walls and replacement with new pallet walls. The effective strand length will remain at its current length. This option is considered feasible as adequate space is available to accommodate the additional width and reducing in-leakage can offset any potential increase in airflow. This modification has been successfully implemented at many overseas sinter strands.
- **Strand bed deepening.** This option will involve increasing the depth of the strand bed by increasing the pallet side plate height by 200mm. This modification has been made to many overseas sinter strands and is considered to be a feasible option.
- **Installation of a new ignition furnace**. This option is considered for Windboxes one and two and will result in improved ignition. Any increase in energy consumption from the ignition gas will be offset by a commensurate reduction in solid fuel required in the mix. The new design ignition furnace will allow full suction to be applied to Windbox three, increasing the effective strand area. This option would be a feasible and efficient option when installed in combination with lengthening of the strand.

In addition, **modification to the sinter cooler** will be required as part of the increased sinter production. Options considered for modifications to the cooler include:

- Widening the cooler pans;
- Improving cooler filling;
- Improving cooler sealing; and
- Installing larger capacity cooler fans.

The option that maximises the cooler's ability to cool sinter is the removal of the existing cooler and fabrication of a new cooler, including upgrading of the three existing fans and installation of one new fan. To enable efficient filling of the cooler with beneficial vertical size segregation of the particles, the strand must be lengthened by 15m and the waste gas mains and windbox suction area increased accordingly. This will have the added benefit of removing the two existing hot feeders, which currently generate fugitive dust within the Sinter Plant building.

The key environmental issue relating to sinter cooler operation is the emission of dust particulates. Several options were considered to reduce dust emissions from the upgraded cooler. These options included:

- Installation of a fan, cyclone and stack. This option was considered in conjunction with modelling undertaken (refer **Section 8.1**) and discounted on the basis that dispersion modelling indicates that the vast majority of the dust from the cooler does not travel beyond the boundary due to its weight (and density). This option would create a stack discharge that would not meet emission limits;

- Installation of a baghouse, however this option was not adopted as the operating conditions are too hot for a baghouse to operate effectively. Also the volume and temperature of the air coming off the cooler dictate that a large (several megawatts) fan would be required adding to noise emissions and energy requirements (and associated greenhouse gas load) with virtually no environmental dust benefit. This option is very expensive and would make the Project commercially non-viable;
- Increasing the covered proportion of the cooler. At present the first portion of the cooler is covered and the hot air is collected and returned to the start of the strand and used as pre-heat and annealing air either side of the ignition furnace. This results in a fuel saving. It is planned to retain this arrangement. It is not practical to expand it as the air coming off the first portion of the cooler has the 'useable' heat. This portion also contains the highest dust load;
- Refurbishing the existing cooler and augmenting cooling capacity by installation of on-strand cooling with additional fan capacity. This option would preclude elongation of the strand for increased production; and
- Emission Optimised Sintering (EOS), this system recycles part of the waste gas back to the sinter strand to reduce the volume of waste gas which needs to be cleaned. This option is not considered feasible due to its detrimental effect on sinter quality. EOS also increases waste gas temperature and moisture content above the design limits of the Waste Gas Cleaning Plant. This option is very expensive and would make the Project commercially non-viable.

5.2.3 Raw Materials Handling Alternatives

Storage Areas

A number of options regarding storage areas within the Raw Materials Handling Area for additional fines were evaluated. These options included:

- Storing all additional Yandicoogina fines in the Secondary Yard Beds and then transferring the fines to the Sinter Plant. This option is estimated at a cost of $23.5 million, however it does not allow for unexpected delays or schedule changes;
- Storing additional Yandicoogina fines in the No.4 Stacker area and pellets in the remaining stockpile area. This option is estimated to cost $29 million and is considered the most appropriate option because it provides a cost effective alternative route for elevating material to the Sinter Plant Fine Ore Bins hence removing a bottleneck in raw material supply;
- Storage of additional Yandicoogina fines in half of the No.4 Stacker area and Savage River pellets in the other half of No.4 Stacker area and the F4 Shuttle area. This option is estimated to cost $29 million, however additional operating costs of approximately $2.25 million per annum would be associated with trucking materials between storage areas;

- Storing additional Yandicoogina fines at the Primary Yard Beds and then trucking the fines to the bunkers in the No.5 Stacker area. This option is estimated at $32 million and would include an additional 205 truck movements per year and an additional operating cost of approximately $3.3 million per annum; and
- Storage of all additional Yandicoogina fines in the No.5 Stacker area. This option is estimated to cost $48.5 million due to additional infrastructure requirements at the No.5 Stacker area.

5.3 Preferred Option

Based on the considerations of the return on investment and duration of the outage for all of the alternatives described above, BlueScope Steel's preferred option for the upgrade of the Ore Preparation Area includes:

- Undertaking modifications to the existing Sinter Plant by installing a new type of strand feed device and new ignition furnace; deepening the sinter strand pallets; lengthening the strand (including the waste gas main) and installing two new windboxes; refurbishing the existing room de-dusting electro-static precipitator and associated ductwork (as maintenance work); refurbishing and upgrading the existing Waste Gas Electrostatic Precipitators; refurbishing and upgrading the sinter cooler including new cooler fans; and
- Storing additional Yandicoogina fines in the No.4 Stacker area and pellets in the Trough and F4 Shuttle area, a new additional conveyor system from this area to the Fine Ore Bins and a new Primary Yard Bypass sequence.

A detailed description of this preferred option (the Project) is provided in **Section 6**.

6 Description of the Project

6.1 Overview

The Project involves an increase in the production capacity of the Sinter Plant from a nominal 5.5Mt to 6.6Mt per annum. The shutdown(s) required to install the planned upgrades will also provide the opportunity to maintain and repair ancillary equipment at the Sinter Plant that is difficult or unsafe to access while the plant is operating. Work at the Sinter Plant is estimated to have a capital cost of approximately $60 million. In addition, new infrastructure in the Raw Materials Handling Area will be constructed to improve efficiency of operations and to meet the requirements of the upgraded Sinter Plant. The work at the Raw Materials Handling Area is estimated to have a capital cost of approximately $40 million.

The Project is planned to occur in the latter half of 2009, with the major activity potentially occurring during the No.5 Blast Furnace shutdown for reline works, which is currently planned to occur during 2009. Work on the Sinter Plant will require a plant shutdown of approximately 21 days, with some of the upgrade works being undertaken outside the shutdown period. Most construction activity associated with the Raw Materials Handling Area will be scheduled as discrete events outside the No.5 Blast Furnace shutdown. These activities will most likely occur in 2009.

6.1.1 Timing and Project Staging

If the Project was granted consent by the Minister, and was authorised to proceed by the BlueScope Steel Board, the overall Project will take approximately 24 months to complete. The Project will consist of a set of small to medium sized individual projects, which will stretch over this time period, which will include a 21 day Sinter Plant shutdown period to facilitate the completion of three of the key sub-projects. In the Raw Materials Handling Area the Projects will be constructed in parallel with normal operations and cut over on normal maintenance down-days. Where possible, engineering and construction work will be undertaken in advance of the No.5 Blast Furnace reline date. The detail and timing of this will be determined by economic analysis. Prior to construction works, the main activities to be undertaken include the completion of engineering, planning, contract finalisation and procurement of replacement equipment and items. The pre-feasibility phase of this Project started in October 2004. The current target for commercial operation is June 2009.

The staging of the Project will be undertaken as indicated in **Table 6.1**, with the listed approximate durations from commencement of the Project.

Table 6.1 Proposed Project Staging

Construction Activity	Start (months from Project commencement)	Finish (months from Project commencement)
Planning, design review and approval	0	27
Engineering, procurement and manufacture	27	39
Preparation for shutdown	39	42
Sinter Plant upgrade works	42	54
Raw Material Handling Area works	39	54
Commissioning	39	54

6.2 Scope of the Project

6.2.1 Sinter Plant Capacity Increase

The upgrade of the Sinter Plant will increase the production of sinter by 20% from 5.5Mt to 6.6Mt per annum. In order to achieve this, the strand will be widened and deepened to accommodate more sinter. The larger strand and subsequent increase in Sinter Plant capacity will require modifications to several other key areas of the Sinter Plant, and key sections of the Raw Materials Handling Area, from which the Sinter Plant is fed (see **Section 6.2.2**). The existing Sinter Plant facilities are shown on **Figure 4.4** and the sinter process flow is outlined on **Figure 4.5**.

The proposed modifications to the Sinter Plant Area are shown in **Figure 6.1.** It should be noted that some of the upgrade activities can be undertaken prior to or following the Sinter Plant shut down period(s), which will minimise the down time of the machine.

The following activities are included in the scope of works for the Sinter Plant:

- The sinter strand length will be marginally increased by 15m to enable installation of a segregating cooler filling chute. The existing waste gas main will be extended commensurate with the strand extension, with a proper number of new windboxes installed;
- Sinter strand deepening by 200mm. Deepening will involve removal of existing pallet side-plates and replacement with new pallet side-plates;
- Installation of new strand feeding technology. Changes will be required to equipment at the feed end of the strand to facilitate a pallet 200mm deeper. It is proposed that the existing chute feed system be replaced with a new active strand-feeding device designed to promote vertical segregation of the feed material. Remote motor drives on each feed gate are also planned;
- Installation of a new ignition furnace to provide better ignition;

1) Sinter Feed Area
- New type of ignition furnace
- Installation of new strand feeding technology to accommodate the modified sinter strand
- Minor modifications to the feed hopper, hearth layer bin, split bin and strand drive motor
- Dust sealing & installation of de-dusting hoods

2) Sinter Strand
- New vertical cooler feed chute at the end of the strand
- Refurbish wind boxes below the sinter strand
- Sinter strand lengthening by 15m
- Sinter strand deepening by 200mm
- Replace hot feeder with cooler filling chute

3) r Cooler
- Removal of the existing sinter cooler and installation of a larger capacity sinter cooler
- Modification of cooler fans and additional cooler capacity

4) n De-dusting
- Refurbish room de-dusting precipitator and associated duct work

5) e Gas Precipitators
- Expand internals of Waste Gas Precipitators from 3 to 4 zones
- Refurbish Waste Gas Precipitator shells and internals
- Refurbish the Waste Gas Precipitator mains and attached dust hoppers

6)
- Upgrade of belt conveyors 30, 3301, 3305 and 3306
- Extension of Sinter Plant building at cooler end by 14m
- Repair or replace leaking ductwork

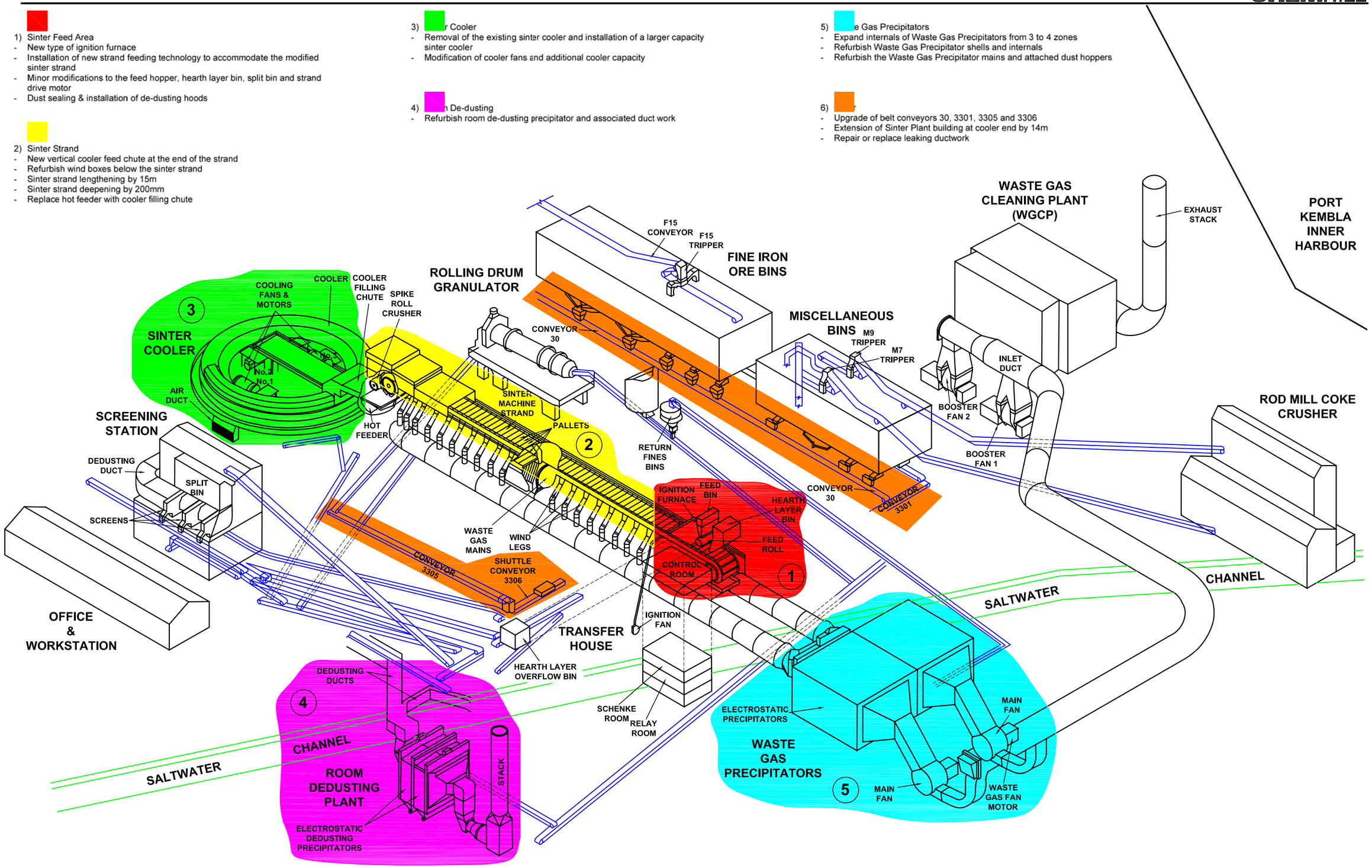


Figure 6.1
Sinter Plant Proposed Modifications

- Modification of structural components of the strand, including relocation of hearth layer bin support beams, installation of a new hearth layer lower hopper, dust sealing at the feed end and installation of discharge end de-dusting hoods. This activity will require minor excavation of approximately 45m^3 of soil material;
- Removal of existing hot sinter feeders from strand to cooler and relocation of the lowering wheel and discharge end de-dusting hoods;
- Installation of a new vertical cooler feed chute at the end of the strand;
- Installation of internal components into Zone 1 of each Waste Gas Precipitator;
- Upgrade of belt conveyors 29, 3305, 3314 and 3317;
- Minor modifications to the feed hopper, hearth layer bin, split bin and strand drive motor; and
- Extension of the Sinter Plant building by approximately 14m at the Sinter Cooler end. The building will remain open ended.

The Sinter Plant upgrade also includes rebuilding the Sinter Cooler with the following scope of work:

- Removal of the existing cooler, with steelwork removed being recycled. A new cooler will be fabricated and installed on the existing cooler footings. The proposed cooler will have a diameter of approximately 40m (same as existing diameter) and a 0.5m wider pan (new pan will be 4.5m wide). This will provide a new cooling area of 420m^2, which will be an increase of approximately 45m^2. In addition, the bed depth will be decreased by 0.2m, with a new bed depth of 1.6m; and
- The three existing 1.25MW cooler fans will be modified to new design specifications, which will increase the efficiency of the fans. Additional fan capacity will be installed once the final plant arrangement is confirmed. The existing combined fan capacity is 400m^3/min, which will be increased following installation of the additional fan capacity. Establishment of footings for the new fan capacity will require excavation of approximately 100m^3 of material.

In addition, the following equipment will be repaired and refurbished to design specifications:

- Waste gas precipitator shells (this activity will be undertaken as maintenance work prior to shutdown);
- Waste gas precipitator internals;
- Room de-dusting precipitator and associated duct work (maintenance works);
- Wind boxes below the sinter strand (this activity will be undertaken as maintenance works prior to shutdown); and
- Waste gas mains and attached dust hoppers (maintenance works).

6.2.2 Raw Materials Handling Area Upgrade

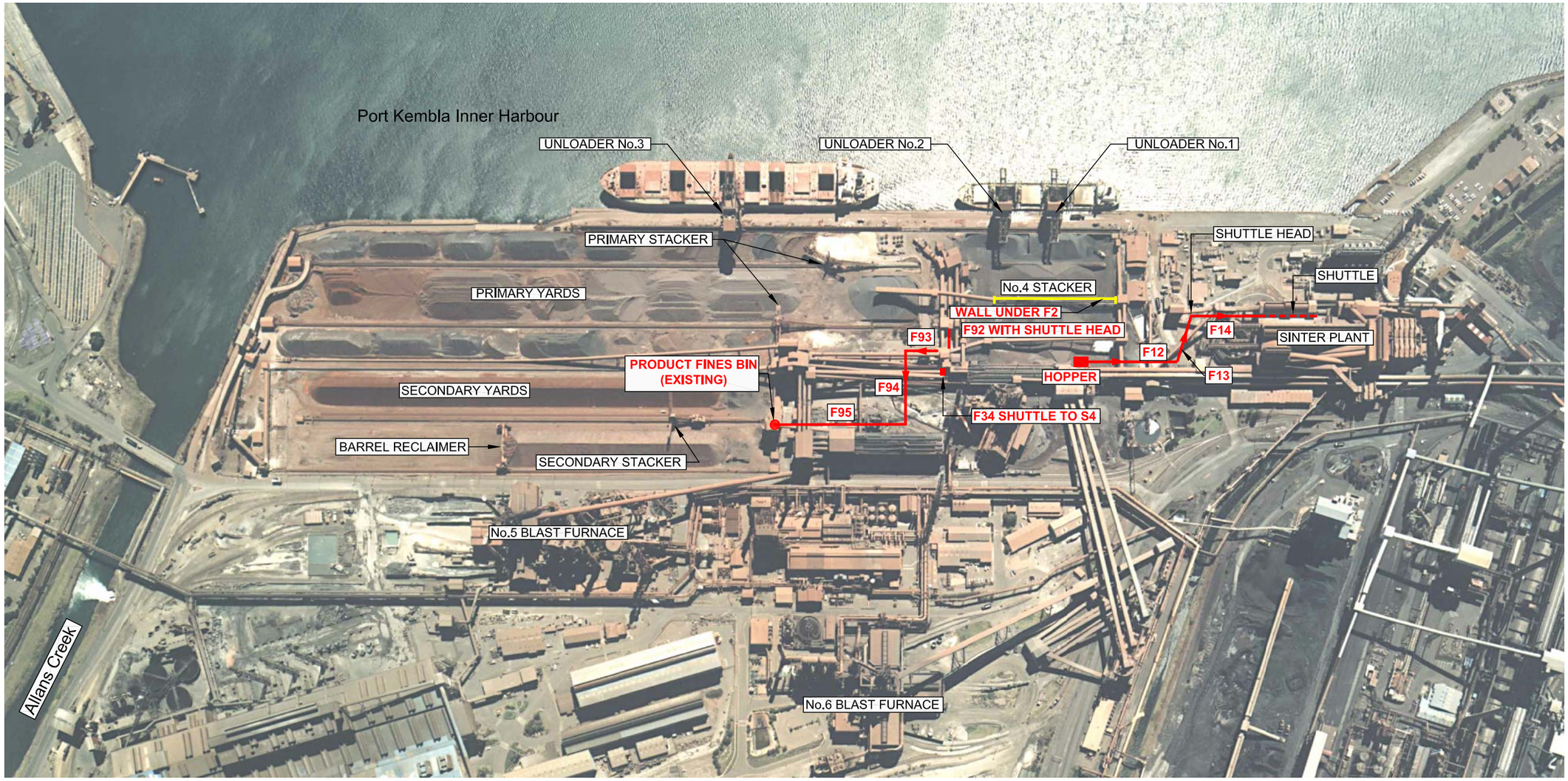
The Raw Materials Handling Area stocks and delivers raw materials to both the Sinter Plant and No.5 and No.6 Blast Furnaces. While the No.6 Blast Furnace will continue to operate throughout the No.5 Blast Furnace reline, this period provides a critical opportunity for maintenance and improvement of facilities at the Raw Materials Handling Area. The existing Raw Materials Handling Area and associated equipment are shown on **Figure 4.2**.

Under the proposal to increase the capacity of the Sinter Plant, approximately 1.0 million tonnes per annum of pellets will be removed from supply. The No.4 Stacker area will then be available for the storage of increased amounts of fines required for the increased sinter production. Additional infrastructure required will be limited to a reclaim and elevation sequence to take ore from No.4 Stacker area to the fine ore bins at the Sinter Plant. The proposed modifications to the Raw Materials Handling Area are shown in **Figure 6.2**.

It is expected that the fine material to be stored in the No.4 Stacker area will likely be Yandicoogina fines as it is naturally highly consistent, maintains its handling ability in wet weather and can be used at very high proportions in sintering. Changes to the Raw Materials Handling Area will provide for improved production security of the Sinter Plant in adverse weather conditions.

The following activities are included in the scope of works at the Raw Materials Handling Area:

- Construction of a new 26m conveyor FA from F26 to Transfer Tower T4, including minor modifications to F26 and addition of a new chute for FA;
- Installation of new conveyors F93 (52m) and F94 (80m) from Transfer Tower T4 to F76;
- Replacing conveyor F76 (165m) with F95 to an existing product fines bin;
- Installation of new conveyors F12 (65m), F13 (110m) and shuttle F14 (70m) from a new hopper to the Fine Ore Bins at the Sinter Plant;
- Installation of a new shuttle from F34 to S4;
- Excavation for the installation of the new Primary Yard By-pass conveyors will be approximately 300m^3 and excavation for installation of the new Sinter Plant Feed Sequence conveyors will be approximately 100m^3;
- Minor maintenance work on the:
  - Rake drive on the Barrel Reclaimer;
  - Secondary Stacker, including painting, boom pivot bearings, stacker electrics and field devices; and
  - F15 Tripper.



LEGEND

- PROPOSED HOPPER
- PROPOSED CONVEYOR
- PROPOSED BIN
- PROPOSED WALL

Figure 6.2
Raw Materials Handling Area
Proposed Modifications

- Increase in the Sinter Sequence capacity to the No.5 Blast Furnace by using larger motors to alleviate the current bottleneck effect; and
- Upgrading of the Secondary Stacker Chute.

In addition, the following equipment will be repaired and refurbished to design specifications:

- Change barrel shell and drive ring barrel field rewire;
- Conveyor electrics and field devices;
- F41 to F15 chute replacement upgrade field devices;
- Replace Motor Control Centre; and
- Replace 6.6kv Starter Panel, F24, F27, and F30.

6.3 Pre-Upgrade Planning

As a consequence of the No.5 Blast Furnace being off-line for approximately 100 days during reline works, the significant reduction in total steel production will impact on BlueScope Steel's business. Consequently, strategies to minimise this impact are being assessed and may include increased production prior to the shutdown, substituting for other products or importing slab.

Should a temporary increase in production be pursued, the Ore Preparation Area will be operated to support this increase in production.

The No.6 Blast Furnace will continue operating during the No. 5 Blast Furnace and Sinter Plant shutdowns. To meet the requirements of the No.6 Blast Furnace, it will be necessary to change the mix of ferrous supplies, particularly pellets. These additional pellets will be stored in the Raw Materials Handling Area where fines are currently stored. This space will be available, as fines will not be used during the Sinter Plant shutdown.

6.3.1 Market Analysis

Security of feed supply is a critical factor underpinning the competitive position and growth of BlueScope Steel's coated steel business portfolio throughout Asia. A key is the leveraging of slab sales to BlueScope Steel's Asian steel mills.

6.3.2 Potential Impact of the Outage

A significant volume of slab production will be lost during the No.5 Blast Furnace reline, representing greater than 25% of total slab exports during FY2003/04. No additional slab tonnage will be lost due to the Ore Preparation Upgrade unless there is a significant Sinter Plant shutdown outside the reline period.

6.3.3 Mitigating Actions

In order to offset the impact of lost iron production during Sinter Plant outages, a number of strategies are being considered, which include:

- Minimising the duration of any Sinter Plant shutdown outside the Blast Furnace reline period. This can be achieved through work sequencing where only critical items are undertaken during the shut down of the Sinter Plant with other items done during normal operations or periodically during maintenance periods; and
- Improved flexibility of Raw Materials Handling sequencing with new equipment to maintain feed to the Blast Furnaces.

6.4 Decommissioning Phase

6.4.1 Sinter Plant

The following major items of equipment will be decommissioned at the Sinter Plant for up to 35 days to allow upgrade activities to be undertaken:

- Sinter machine;
- Ignition furnace;
- Waste Gas precipitators; and
- Sinter Cooler.

All other upgrade activities will be scheduled to be undertaken at opportune times outside the Sinter Plant shut down period.

6.4.2 Raw Materials Handling Area

Major items of equipment will not be shutdown or decommissioned for significant periods at the Raw Materials Handling Area during upgrade works. The Raw Materials Handling Area will continue to operate during the upgrade works, with activities scheduled to be undertaken at opportune times.

6.5 Construction Phase

The major construction period may be scheduled to occur at the Sinter Plant during the No.5 Blast Furnace reline shutdown and/or in the months following. The Sinter Plant will be decommissioned for up to 35 days total, with major construction and installation activities occurring during this time. Additional upgrade works will also be scheduled to occur at the Ore Preparation Area prior to and following the No.5 Blast Furnace shutdown. Suitably qualified contractors working directly for BlueScope Steel will undertake this construction work.

Construction activities at the Sinter Plant will predominantly involve heavy steel fabrication and mechanical fitting. Additionally, some minor civil works including piling activities will be undertaken prior to or after the initial temporary shut down of the Sinter Plant. Construction activities will include the following tasks:

- Extension of the sinter strand and building;
- Deepening of the sinter strand pallets;
- Removal and retrofit or replacement of existing strand feed equipment, including installation of a new strand feed device;
- Relocation of the existing lowering wheel and spike roll crusher to the end of the extended strand;
- Removal of the existing hot feeders to the cooler;
- Installation of a new cooler feed chute;
- Removal and replacement of the Sinter Cooler and installation of additional fan capacity; and
- Refurbishment of the electrostatic precipitators.

Construction activities at the Raw Materials Handling Area will involve:

- Installation of new conveyor galleries and hoppers; and
- Construction of a wall under No.4 Stacker.

Construction hours will comprise a five and a half day work week (7-00am to 5-00pm) for work carried out during normal operating times, and 24 hours a day, seven days per week shift work for work on normal down-days and the major Sinter Plant shut down periods.

6.5.1 Construction Laydown Areas

Laydown areas for construction equipment and materials will be within the PKSW. The following BlueScope Steel areas might be used as construction laydown areas:

- No. 1 works, including the building/workshop formerly known as the Shinagawa Building;
- The area behind the Rod Mills;
- The No.4 Blast Furnace area;
- On site at the Sinter Plant; and
- Other areas within PKSW yet to be identified.

The delivery of materials and equipment to the work sites will be staged as required.

6.5.2 Construction Methods and Equipment

The equipment planned to be used during the construction of the Project is outlined in **Table 6.2**:

Table 6.2 Proposed Construction Equipment

Activity Description	Construction Equipment	
Sinter Strand Building Extension and Lowering Wheel Relocation	200t crane x 1	Piling rig x 1
	25t crane x 2	Heavy Boom Lift x 2
	5t mini crane x 2	
Sinter Strand Waste Precipitators Rebuild	200t crane x 1	Heavy Boom Lift x 2
	25t crane x 2	Scissor lift x 2
Sinter Cooler Rebuild	200t crane x 1	20t excavator x 1
	80t crane x 1	Piling Rig x 1
Primary Yard By-pass Conveyors	80t crane x 2	20t excavator x 1
	Heavy Boom lift x 2	Piling Rig x 1
New Sinter Plant Feed Sequence Conveyors	80t crane x 2	20t excavator x 1
	Heavy Boom lift x 2	Piling Rig x 1

6.5.3 Construction Materials and Procurement

A significant amount of preparation time is required for the upgrade works. The bulk of the preparation will be devoted to designing, engineering, procuring and manufacturing the replacement equipment needed for the upgrade works.

Construction material proposed to be used for construction of the Project is listed in **Table 6.3** with the expected quantity of material required.

Table 6.3 Estimated Quantity of Construction Materials

Construction Material	Approximate Quantity and Use
Concrete	180 tonnes for construction works for the Sinter Strand Lowering Wheel relocation.
	400 tonnes for the Sinter Cooler rebuild.
	1,500 tonnes for construction of Primary Yard By-pass conveyors.
	400 tonnes for construction of new Sinter Plant Feed Sequence conveyors.
	Total concrete: 2,480 tonnes
Steel	600 tonnes for construction works for the Sinter Strand Building Extension/ Lowering Wheel relocation.
	160 tonnes for the Sinter Strand Waste Precipitators rebuild.
	450 tonnes for the Sinter Cooler rebuild.
	800 tonnes for construction of Primary Yard By-pass conveyors.
	300 tonnes for construction of new Sinter Plant Feed Sequence conveyors.
	Total steel: 2,310 tonnes
Pre Fabricated Components	ESP Internals: fabricated steel plates manufactured by an Australian Fabricator yet to be selected. This equipment will be transported to PKSW via truck.

Construction Material	Approximate Quantity and Use
	Strand feeding device: proprietary item overseas supply shipped to Sydney and truck transport to PKSW.
	Ignition Furnace: proprietary item overseas supply shipped to Sydney and truck transport to PKSW.
	Strand deepening: new side plate castings 552 off. Manufactured by an Australian foundry to be selected. Truck transport to PKSW.
	Additional pallets to lengthen strand: 20 castings manufactured by an Australian foundry to be selected. Truck transport to PKSW.
	Cooler feed chute: fabricated steel, manufactured by an Australian fabricator yet to be selected. Truck transport to PKSW. This item may be oversized for normal road transport if delivered as a unit, thus will be transported in compliance with RTA regulations.
	Cooler Pans: fabricated steel 45 off and cast wheels 90 off. Manufactured by an Australian fabricator yet to be selected. Truck transport to PKSW.
	New cooler fans and electric motors. Motors supplied from overseas location. Truck transport to PKSW.
	Standard conveyors for the Raw Materials Handling Area to be manufactured by an Australian fabricator. Truck transport to PKSW.

6.5.4 Temporary Works

Each of the facilities will continue to be under the control of the Ore Preparation Area Operations whenever construction is undertaken during normal operating times. Any work performed on the facilities during this time will be managed in accordance with the internal 'Authority To Work' (ATW) procedure, with the Plant Supervisor being the nominated Operations person.

During scheduled shutdowns, the Sinter Plant will be handed over to a specifically designated Shutdown Coordinator in accordance with the ATW Handover Procedure. The Shutdown Coordinator will then control all work on the site in accordance with the ATW procedure. The shutdown work site will be clearly defined with barriers and signs, with only authorised persons allowed access to the site.

Work performed in the designated contractor sites or assembly areas will be managed by the Contractor in accordance with BlueScope Steel procedures. Such areas will be clearly defined with barriers and signs, with only authorised persons allowed access to site.

6.5.5 Construction Waste

A variety of wastes will be generated during the construction phase. Details of these wastes and the proposed handling methods are outlined below.

Excavated Material

The estimated amount of spoil to be excavated for the upgrade works will be approximately 545m^3. Excavation will be undertaken during construction works for the Sinter Strand Building Extension/Lowering Wheel relocation (approximately 45m^3), the Sinter Cooler rebuild including excavation for a new fan footing (approximately 100m^3), Primary Yard By-pass conveyors (approximately 300m^3) and New Sinter Plant Feed Sequence conveyors (approximately 100m^3).

According to commercial/industrial land use criteria, excavated fill material (spoil) is considered suitable to be relocated for use within the PKSW site in accordance with BlueScope Steel procedures. A Soil and Water Management Plan will be prepared as part of the Construction EMP, which will address excavated material and contain control measures that will be implemented during the construction stage. **Section 8.7** discusses the soil study undertaken.

Grease and Oil

All excess oil and grease will be drained into suitable containers on site, before being recycled by Worth Oil. Contaminated equipment will be transported to the Allied Plant Services degreasing station at the south end of the HSM, where it will be degreased prior to scrapping at Multiserv. These service providers operate under existing contracts with BlueScope Steel. Only minimal amounts of oil and grease from bearings is expected to be generated during construction.

Construction Waste

Approximately 850 tonnes of scrap steel will be produced during the Ore Preparation Area upgrade. The removed steelwork will be used as scrap for recycling. This will comprise of approximately:

- 300 tonnes of scrap steel generated during the Sinter Strand Building Extension/Lowering Wheel relocation;
- 80 tonnes generated during the Electrostatic Precipitators rebuild;
- 450 tonnes generated during the Sinter Cooler rebuild; and
- 20 tonnes generated during the Primary Yard By-pass Conveyors works.

6.5.6 Construction Personnel

Approximately 110 construction personnel (per shift with two shifts per 24 hour period) will be on site at the Sinter Plant during the shut down construction periods. This will include approximately 40 personnel working on the Sinter Strand Lowering Wheel relocation, 30 personnel working on the Electrostatic Precipitators rebuild and 40 personnel working on the Sinter Cooler rebuild. The 30 personnel associated with the Precipitators rebuild will be on site at the Sinter Plant for an additional time frame outside the shut down period, as this activity will be undertaken over a two month period.

Works at the Primary Yard By-Pass Conveyors will require approximately 40 construction personnel to be on site for a period of six months. This work will most likely be undertaken prior to or after the reline shutdown period. In addition, approximately 20 construction personnel will be required for works at the New Sinter Plant Feed Sequence Conveyors. These works will run for four months.

In addition to the above construction personnel requirements, approximately 40 Engineering, Construction and Procurement Management (ECPM) staff will be on site for the duration of the Ore Preparation Area upgrade. In total over the entire construction period, approximately 210 construction personnel will be required on site at various phases of the Project.

6.5.7 Construction Traffic

The majority of the construction traffic will access the site via the major roads that service the Port Kembla industrial area. Within PKSW, light transport loads will travel via Loop Road, Central Road, Stockhouse Road, then either Iron Ore Road or Harbour Road. Possibly one oversized load is envisaged during the construction period and would enter PKSW via Tom Thumb Road, No.2 Products Berth Road, Iron Ore Road and Harbour Road (see **Figure 4.1** and **8.1**). The break-up of construction traffic is estimated as shown in **Table 6.4**.

Table 6.4 Estimated Break-up of Construction Traffic

		Vehicles per day			
		Trucks	Buses	Heavy Vehicles	Private Vehicles
Project Component	Sinter Strand Lowering Wheel Relocation	2	1	2	10
	Sinter Strand Waste Precipitators Rebuild	2	1	3	8
	Sinter Cooler Rebuild	0	1	2	10
	Primary Yard By-pass Conveyors	2	1	0	10
	New Sinter Plant Feed Sequence Conveyors	1	1	0	5

In total, up to 84 vehicle movements may occur per day during the peak periods of construction activities. This will incorporate vehicle movements generated during the Sinter Strand Lowering Wheel relocation, Sinter Strand Waste Precipitators Rebuild and Sinter Cooler Rebuild, provided that these phases of work occur simultaneously.

The peak traffic flow during construction will occur around shift changeover times during the Sinter Plant shutdown periods. Construction works will be undertaken 24 hours per day during this time and two shift changes per period will occur, one at approximately 7.00am and the other at approximately 7.00pm. Shift changeover times will be modified to the extent possible to minimize traffic congestion resulting from shift changes of multiple concurrent projects (e.g. No. 5 Blast Furnace Reline project).

For the Sinter Plant shutdowns all equipment will be delivered to site in advance of each shutdown.

6.6 Commissioning Phase

Commissioning phase for the Ore Preparation Area is not expected to introduce significant environmental issues. There is nothing intrinsic about commissioning process that is foreseen to lead to negative environmental impacts.

The major activities that will be undertaken during start up activities at the Ore Preparation Area will include:

- Close out of all identified process hazard mitigation actions; and
- Commissioning of plant functionality and safety systems.

6.7 Future Operations

There will be no change to general operation of the Ore Preparation Area as a result of the Project. In particular, operating hours and staffing numbers will remain the same as operations prior to the upgrade.

The increased capacity at the Sinter Plant will result in an increased demand for fine ores. However, this increased fine ore demand will be offset by a near equivalent decreased amount of imported pellets, hence the overall throughput of material in the Ore Preparation Area will be similar.

The Project will result in the following equipment changes to the future Sinter Plant operations, which will increase the productivity of the Plant:

- Sinter strand deepening which will allow a lower fuel rate giving less greenhouse gases, NO_x and SO_x per tonne of sinter produced;
- Installation of a new strand feeding technology to increase strand feeding efficiency;
- Installation of a new ignition furnace which will decrease SO_x generation due to the change from coke ovens gas to natural gas;
- Removal of existing hot sinter feeders from strand to cooler with an extended strand and waste gas main and a new higher cooler feed chute. The hot sinter feeders are a significant dust load on the room de-dusting system. Their replacement by extending the sinter strand will remove this load from the room de-dusting-system;
- Repair/refurbishment of the Room De-dusting electro-static precipitator and associated ductwork This maintenance work will improve the dust collection efficiency and ensure it continues to operate within its license limits into the future;

- Installation of internal components into Zone 1 of both of the Waste Gas Precipitators, which will lower the dust volume going to the Waste Gas Cleaning Plant, allowing it to operate more efficiently and cause less interruptions to production; and
- Rebuilding of the Sinter Cooler.

In addition, the major equipment improvements to the future Raw Materials Handling Area operations will include:

- Shipping bypass sequence to the Secondary Yards;
- Increase in the Sinter Sequence capacity; and
- Installation of a new feed sequence to Fine Ore Bins at the Sinter Plant.

7 Environmental Risk Assessment

An environmental risk assessment (ERA) is a process undertaken to identify the aspects of the environment that may be affected by an activity and the potential impacts that might arise from the activity. This extends to include construction and operation. Once the possible aspects and impacts have been identified, the risk of a significant environmental impact resulting from each aspect is undertaken using an objective risk assessment technique.

The results of this assessment identify those activities associated with the Project that have the greatest actual or potential risk to cause a significant environmental impact. This has been undertaken in accordance with the requirements of the amended EP&A Act as directed by the NSW Department of Planning. The ERA (and the subsequent environmental assessment in **Section 8**) includes, but is not limited to, the matters raised by the DoP's EARs. On the basis of the resultant risk ranking, the key environmental aspects are addressed. The methodology adopted for the ERA is provided in **Appendix D.**

7.1 Environmental Setting

7.1.1 Regional Geography

Port Kembla is located in the Wollongong LGA in the Illawarra region of NSW (refer to **Figure 1.1**). Sydney is situated approximately 80km to the north of Port Kembla, the Wollongong central business district (CBD) is approximately 2.5km also to the north and Lake Illawarra is located approximately 3km to the south. Port Kembla, a suburb of the City of Wollongong, is the main industrial centre of the Illawarra region.

The Illawarra region is divided into two areas separated by the Illawarra escarpment; a coastal and a tablelands area. The region stretches from the Royal National Park in the north to Durras Water in the south, and extends about 80km inland. It covers 8,480km^2 and is divided into three physical sub-regions, the Wollongong Plain Sub-region, the Shoalhaven Sub-region and the Tablelands Sub-region. The Wollongong Plain Sub-region is predominantly urban and contrasts with the Shoalhaven and Tablelands Sub-regions, which are predominantly rural. The Wollongong Plain Sub-region is mainly reliant on coal mining and steel production, export shipping, road and rail freight, manufacturing industries, tertiary education services, and tourism, to generate employment and income (SKM, 1998).

Port Kembla, located in the Wollongong Plain Sub-region, lies in the coastal plain which is bounded to the west by the Illawarra Escarpment and to the east by the Pacific Ocean. Significant features of Port Kembla include the heavy industrial area and the port (see **Figure 7.1**). The heavy industrial area includes industrial developments such as PKSW, copper smelter (recently closed), fertiliser production facilities, and petroleum hydrocarbon storage and wholesaling. The Port Kembla heavy industrial area is constructed around the port. The port is the southernmost of

the three major ports within NSW. The port at Port Kembla is made up of two ports, the original Outer Harbour (created in 1889) and the newer Inner Harbour (created in 1960 as a result of dredging of Tom Thumb Lagoon and associated swampland). Two man-made breakwaters delineate the Outer Harbour. The Inner Harbour, having relatively protected water, is suitable for handling cargo of all types. The Cut, which is the channel that links the Outer and the Inner Harbour, is 200m wide at mean high water (MSE *et al*., 1991).

PKSW occupies about 742 hectares of the industrial area and is mostly built around the western and northern side of Port Kembla's Inner Harbour. PKSW site is a multi-use industrial area (see **Section 4.1** for details), which includes storage, manufacturing, port berths, private internal roads and offices.

7.1.2 Topography and Drainage

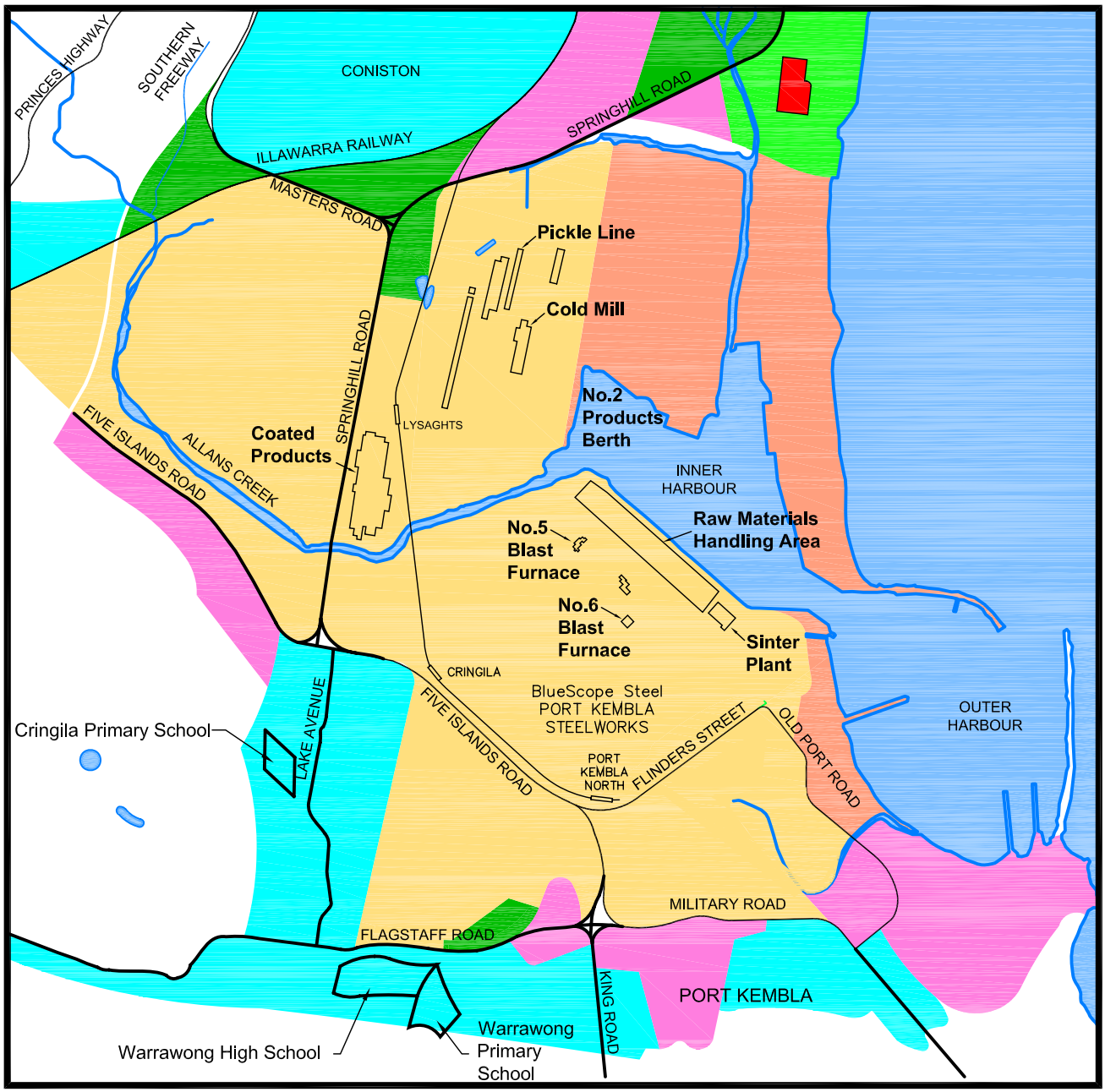
The topography around the port is generally flat as much of the land in the immediate area of the port has been reclaimed or significantly altered in the past. Most of the port area has been levelled to slopes of less than 5%. The topography in PKSW is flat (surface slopes in the order of 1%). These flat areas were constructed through the gradual filling of the Tom Thumb Lagoon at the mouth of Allans Creek by slag, coal wash and dredged materials (GHD, 1991).

Outside the port and industrial area, the topography rises to the west towards the Illawarra Escarpment. The steep Illawarra Escarpment rises to an average elevation of 500m (AHD) above sea level parallel to the coast. In the Wollongong/Port Kembla area, the Illawarra escarpment is located about 8km to the west of the coast. The Escarpment in the area is characterised by sheer cliff faces and steep slopes, which are replaced eastwards by the more gentle slopes and then the coastal plains where the Port Kembla and Wollongong urban areas are located. The Port Kembla Scenic Lookout, with a height of 72m, is one of the highest points in the Port Kembla area. The lookout is located about 2km south of the Outer Harbour and provides a view of the Port and its surroundings.

Two natural watercourses drain into Port Kembla's Inner Harbour: Allans Creek and the Town Drain. Allans Creek is the predominant source of freshwater inflow into Port Kembla Harbour. It has a catchment area of approximately 41km^2. The creek catchment consists of sloping forested land in the upper reaches, with some flatter grazing land and a large urban area in the lower reaches (SKM, 2000). Industrial activities are carried out in the lower portion of the catchment, with industrial cooling and process water discharged to the creek (see **Section 8.4**).

The Inner Harbour also receives flows from the Town Drain, a canalised remnant of a creek with a small urban catchment. The Town Drain carries urban runoff from Wollongong (SKM, 2000).

Drainage characteristics of PKSW site are discussed in **Section 8.5.1**.



Legend:
- Industrial (Heavy)
- Industrial (Light)
- Port
- STP
- Residential
- Park
- Golf Course

0 0.5 1 2 3
Approximate Scale (km)

Figure 7.1
Land Use Map

7.1.3 Local Climate

Local meteorological data has been obtained from the Australian Bureau of Meteorology (2003) at the Port Kembla Signal Station located in Port Kembla. A summary of the Port Kembla meteorological data, representing 50 years of data collection, is provided below.

Temperature and Humidity

The warmest months are January and February, both with a mean daily maximum temperature of 25.6°C and a minimum of 17.9°C and 18.3°C respectively. July is the coldest month with a mean daily minimum temperature of 8.4°C and maximum of 16.9°C. Relative humidity is comparatively constant throughout the year with an annual 9am average of 64%. Relative humidity at 9am is slightly higher in late summer reaching 73% in February.

Rainfall and Cloud Cover

Port Kembla receives the most rainfall during summer and early autumn with the month of March experiencing the most rainfall during the year. March also experiences the highest number of rain days. The mean annual rainfall for the 27 years on record is 1,277mm and the average number of rain days per year is 123. The number of days each month with cloud cover is lowest in winter and greatest in summer.

Wind Speed and Wind Direction

The wind pattern is complex and shows strong seasonal variation. In summer, the predominant winds are from the north-northeast and from the south, and in winter west-southwest and west winds are most common. The pattern in autumn is similar to winter. In spring three equally common winds occur, north-northeast, west-southwest and south winds.

7.1.4 Geology

The 1:100,000 Wollongong – Port Hacking Geological Sheet (Sherwin and Holmes, 1986) shows fluvial sands, silts and clays underlying the fill material at the site. This may be underlain by Budgong Sandstone, which is a fine to medium grained lithic sandstone, and/or Dapto Latite, which is basaltic in composition and may exhibit columnar jointing.

7.2 Identification of Environmental Aspects and Impacts

A review of the existing and proposed Ore Preparation Area operations was undertaken. This process identified activities in these operations that can interact with the environment (aspects).

The review identified environmental aspects and environmental impacts from each proposed modification or operational condition for the Ore Preparation Area (**Table 7.1**). Each identified environmental impact is prioritised based on an assessment of the risk of significant impacts. By identifying the likelihood and consequence of an

impact, the current risk of an aspect having a detrimental impact on the environment is determined. Since the steelworks, including the Ore Preparation Area are an existing operation, there are existing control measures in place to reduce the likelihood and/or consequence of these impacts occurring. After applying existing control measures along with other proposed control measures, the post upgrade risk is determined.

The environmental impacts which are identified by the DoP in its EARs plus any additional impacts that have been identified as having an 'extreme' (7-10) post upgrade risk (i.e. a significant risk that may exist following the application of safeguards or control measures), or those identified in the DoP's EARs, are considered to be key issues. Such issues and any additional controls that need to be put in place are assessed in the detailed assessment and mitigation measures in **Section 8**.

Table 7.1 Ore Preparation Environmental Aspects and Impacts

Activity/Product/ Service	Environmental Aspect	Current Or Potential Environmental Impact	Current risk			Changes / Control Measures	Post Upgrade Risk			Where Addressed in EA
			L	C	R		L	C	R	
RAW MATERIALS HANDLING										
Raw materials transport (road, rail, sea)	Movement of vehicles	Fugitive air pollution (exhaust emissions)	5	1	6	Maintenance procedures	5	1	6	**8.1**
		Personnel hazard	2	4	6	Operating procedures, vehicle escorts	2	4	6	**8.6**
		Fugitive dust	3	1	4	Operating procedures – sweepers, water carts	3	1	4	**8.1**
		Noise	2	2	4	Procurement and vehicle maintenance	2	2	4	**8.2**
	Spillages/leaks	Surface water contamination	4	2	6	Operating procedures, catchment management per site management plan	4	2	6	**8.4**
		Soil contamination	3	2	5	All spillages cleaned up in accordance with site management plan	3	2	5	**8.7**
		Groundwater contamination	3	2	5	Operating procedures – Sinter Plant site management plan	3	2	5	**8.7**
Screening	Noisy operation	Disturbance to local community	2	2	4	Distance to residential communities, shielding by buildings	2	2	4	**8.2**
Ore blending	Release of fugitive dust into atmosphere	Air pollution (dust in blending yards)	4	2	6	Conveyor belt and stockpile water sprays	4	2	6	**8.1**
	Storm water runoff	Water pollution	3	2	5	Filter beds discharging to groundwater, maintenance procedures	3	2	5	**8.7**

Activity/Product/ Service	Environmental Aspect	Current Or Potential Environmental Impact	Current risk			Changes / Control Measures	Post Upgrade Risk			Where Addressed in EA
			L	C	R		L	C	R	
Ore conveying	New conveyor structures	Alteration of visual amenity	1	1	2	The new infrastructure will be visible from Port Kembla Inner Harbour and further areas north, however, given the scale of these changes and the industrial context provided by PKSW in which the new conveyors will be placed and partially shielded from view, visual amenity impacts are considered negligible.	1	1	2	Given the heavy industrial context provided by PKSW, alteration of visual amenity is assessed as being negligible, thus no further assessment is deemed necessary.
	Spillages	Soil contamination	1	1	2	Operating procedures	1	1	2	**8.7**
		Personnel hazard – slips and trips	3	2	5	Operating and maintenance procedures	3	2	5	**8.6**
	Operation	Air pollution – fugitive dust	3	1	4	Baghouses on sinter and coke conveyors, sprays on conveyers, ore moisture content	3	1	4	**8.1**
SINTER PRODUCTION										
Feed sequencing	Water usage for mixing	Industrial water usage	1	1	2	Increased overall water usage balanced by increased use of reclaimed water	1	1	2	**8.4**
	Spillage	Fugitive dust	2	1	3	Hardstand areas, recycling	2	1	3	**8.1**
	Noise (rod mills)	Noise pollution	2	2	4	Buffer distances, shielding by surrounding buildings	2	2	4	**8.2**
Sintering	Consumption of ores, fluxes and other raw materials	Depletion of non-renewable resources	2	2	4	Recycling of internal by-products	2	2	4	**8.4**

Activity/Product/ Service	Environmental Aspect	Current Or Potential Environmental Impact	Current risk			Changes / Control Measures	Post Upgrade Risk			Where Addressed in EA
			L	C	R		L	C	R	
Sintering (cont.)	Waste gas production - nitrogen oxides, fine particles, carbon monoxide, air toxins (e.g. organic compounds, polychlorinated-dibenzo-p-dioxins (PCDD) and polychlorinated-dibenzo-furans (PCDF), polycyclic aromatic hydrocarbons (PAH) and heavy metals etc.)	Community concern	3	2	5	Waste Gas Cleaning Plant	3	3	6	**8.1**
		Air pollution (NO_x, SO_x dioxins etc.)	4	2	6	Waste Gas Cleaning Plant	4	3	**7**	**8.1**
		Solid waste disposal	4	2	6	Repair and maintenance, additional zone in electrostatic precipitators, EP dust washing to make suitable for reuse, investigation to remove chlorides (recycle residues)	4	3	**7**	**8.1**
	Greenhouse gas emissions	Generation of greenhouse gases	4	2	6	Anthracite : natural gas ratio reduced	4	1	5	**8.8**
	Release of fugitive dust within Sinter Plant building	Detectable effects on plants, animals or community	3	2	5	Dust extraction, enclosure of building and maintenance on ducting and room de-dusting precipitator	2	2	4	**8.1**
Room de-dusting	Stack emission – intermittent “puff” of precipitator dust	Community concern (visual amenity)	3	2	5	Technologies are being investigated to reduce this ‘puff’.	2	2	4	**8.1**
	Ductwork	Fugitive dust	4	2	6	Repair and maintenance program, reduction in number of suction points from obsolete equipment	3	2	5	**8.2**
	Noise generation – possible tonal and harmonics	Localised noise	2	2	4	No change to existing fan design	2	2	4	**8.2**
Sinter Cooling	Use of spray water to assist cooling process	High industrial water usage	5	2	7	Modified cooling technique, additional fan	2	1	3	**8.4**

Activity/Product/ Service	Environmental Aspect	Current Or Potential Environmental Impact	Current risk			Changes / Control Measures	Post Upgrade Risk			Where Addressed in EA
			L	C	R		L	C	R	
Sinter Cooling (cont.)	Release of cooler dust into atmosphere	Disturbance to local community Air pollution	5	2	7	Existing covered portion of cooler retained and corresponding portion of dust extracted to RDD. Modified cooling technique and additional fan.	3	2	5	**8.1**
	Reusable energy	Increased non-renewable energy consumption	3	2	5	Heat recovery system on strand and cooler – dependant on ignition furnace choice and fan configuration	3	2	5	**8.8**
	Sinter cooling fans generate noise	Noise pollution - Disturbance to local community	4	2	6	Distance, shielding by buildings, inlet silencers	4	2	6	**8.2**
Sinter Screening	Noisy operation	Localised noise pollution	2	2	4	Enclosed by sinter building, buffer distance, shielding by buildings	2	2	4	**8.2**
	Dust generation	Air pollution – local deposition of dust within the building	4	1	5	Repair and maintenance, de-dusting	4	1	5	**8.1**
Conveying and storage	Stormwater runoff	Water pollution – direct impact or degradation of habitat for aquatic flora and fauna	2	2	4	Catchments drains to No. 4 thickener (effluent station)	2	2	4	**8.4**
	Spillage	Fugitive dust	4	2	6	Misting sprays	4	2	6	**8.1**
		Personnel hazard	2	2	4	Maintenance procedures, scrapers, cleaning.	2	2	4	**8.6**
PROPOSED CONSTRUCTION										
Construction materials/equipment	Use of natural resources and energy	Energy usage and depletion of natural resources	4	1	5	Recycling of demolished components	4	1	5	**8.4**
	Use of construction equipment such as cranes and trucks and materials storage	Alteration of visual amenity	1	2	3	Due to the heavy industrial context in which these works will occur, short term alteration of visual amenity is considered negligible.	1	2	3	Given the negligible impact on visual amenity, no further assessment is deemed necessary.

Activity/Product/ Service	Environmental Aspect	Current Or Potential Environmental Impact	Current risk			Changes / Control Measures	Post Upgrade Risk			Where Addressed in EA
			L	C	R		L	C	R	
Construction materials/equipment (cont.)	Demolition of structures, excavation and construction	Human health (worker) impacts from dust	4	2	6	Personal protective equipment, hazard reduction planning	4	1	5	**8.1**
Transport of construction material	Construction workforce	Localised parking and traffic impacts	3	2	5	Operating hours, selection of transport routes, off-site parking and shuttle bus use	2	2	4	**8.2**
	Noise	Noise pollution	2	2	4	Distance to local community, operating hours, selection of transport routes	2	2	4	**8.2**
	Vehicle movements	Air pollution – fugitive dust	3	1	4	Construction environmental management plan – water carts, sweepers	3	1	4	**8.1**
		Personnel hazard	2	4	6	Construction management plan and operating procedures	2	4	6	**8.6**
	Internal road closures requiring traffic re-routing	Internal traffic may use external roads temporarily– disruption to local traffic conditions and the local community	3	2	5	Construction staging, short distance (Sinter Plant gate to the coke ovens gate is approximately 500m) and a traffic management plan	3	1	4	**8.2**
		Alternative shipping berths may be required for unload/load requiring transportation to port via external roads	3	2	5	Temporary occurrence, construction sequencing	3	1	4	**8.2**
General earth moving - Excavation, filling and leveling	Disturbance or destruction of indigenous heritage	None – The PKSW site and surrounds have been significantly disturbed in the past. The Ore Preparation Area is sited on reclaimed land.	1	2	3	A search of the NPWS Aboriginal Sites Register showed no items of indigenous significance within the study area, Furthermore, a search of the National Native title Tribunal showed no Aboriginal land title claims on the land.[2]	1	2	3	Searches of applicable registers indicated no listed indigenous sites, no further assessment is deemed necessary

[2] *It is noted that Aboriginal sites are protected under the NPW Act. Consequently, if any cultural material is unearthed, work will cease and NPWS officers will be contacted to determine further action. Construction workers will be made aware of their obligation under the NPW Act in relation to Aboriginal artifacts.*

Activity/Product/ Service	Environmental Aspect	Current Or Potential Environmental Impact	Current risk			Changes / Control Measures	Post Upgrade Risk			Where Addressed in EA
			L	C	R		L	C	R	
General earth moving - Excavation, filling and leveling (cont.)	Disturb areas of non-indigenous heritage items	None – The PKSW site and surrounds have been significantly disturbed in the past. The Ore Preparation Area is sited on reclaimed land.	1	2	3	Searches of the relevant national, state and local statutory registers did not provide any listings of heritage items on the development site, or within PKSW[3].	1	2	3	Searches of applicable registers indicated no listed indigenous sites, no further assessment is deemed necessary
	Disturb contaminated soils	Uncontrolled movement of contaminated material – soil, surface or groundwater pollution possibly leading to degradation of aquatic flora and fauna and marine protected species	2	2	4	Soil and water management plan, operating procedures and soil classification guidelines	1	2	3	**8.5, 8.6**
		Personnel hazard	2	2	4	Soil and water management plan, construction safety management plan, soil classification guidelines	2	2	4	**8.5**

3 Registers searched include the Register of the National Estate, NSW Heritage Register, National Trust of NSW Register, Illawarra REP No.1 1998 and City of Wollongong LEP 1990.

Activity/Product/ Service	Environmental Aspect	Current Or Potential Environmental Impact	Current risk			Changes / Control Measures	Post Upgrade Risk			Where Addressed in EA
			L	C	R		L	C	R	
General earth moving - Excavation, filling and leveling (cont.)	Destruction of terrestrial flora and fauna habitat	None – PKSW and surrounds are very highly disturbed and there is little vegetation of habitat value in the area.	1	3	4	No clearing of vegetation is proposed. No direct discharges to marine environments will occur. Register searches indicate no records of protected flora and fauna species within a 10km radius of the proposed works.[4] As the Green and Golden Bell Frog occurs more than 1km from the Ore Preparation Area, the Project is not expected to impact on this threatened species. Migratory or threatened bird species are likely to be deterred by existing operations at PKSW.[5]	1	3	4	PKSW is an existing highly disturbed area. Searches of applicable registers have showed no threatened ecological communities occur in the area of the Project. Consequently, no further assessment is deemed necessary
Demolition of existing structures	Generation of waste materials	Land pollution - landfill	3	2	5	All scrap steelwork and sinter will be recycled.[6]	3	1	4	**8.4**

L: Likelihood	1. Rare	2. Unlikely	3. Possible	4. Likely	5. Almost Certain
C: Consequences	1. Low	2. Minor	3. Moderate	4. Major	5. Critical
R: Risk level	2 – 4: Low	5 – 5: Moderate	6 – 7: High	>7: Extreme	**Key issues: > 7**

4 A full search of the National Parks and Wildlife Service's Atlas of NSW Wildlife which contains records of sighted flora and fauna species and their status under the Threatened Species Conservation Act 1995 (TSC Act) and the National Parks and Wildlife Act 1974 (NPW Act) was undertaken in December 2004.

5 A search of the Commonwealth Department of Environment and Heritage EPBC Act online database found that in relation to an area within 1km of the study area there are no World Heritage properties, National Heritage Places or Ramsar wetlands of international significance; there are 29 listed threatened species but no threatened ecological communities; and there are 26 listed migratory species.

6 All wastes will be classified in accordance with the Environmental Guidelines: Assessment, Classification and Management of Liquid and Non-Liquid Wastes (NSW EPA, 1999) prior to disposal.

7.3 Identification of Key Environmental Issues

The Ore Preparation Upgrade Project will augment the existing facility and is not expected to affect any new environmental aspects. Whilst some activities undertaken within the Ore Preparation Area have the potential to significantly impact the environment (i.e. a high inherent risk), **Table 7.1** has identified that there are few issues of key environmental significance that remain following the application of controls (i.e. post upgrade risk). The key environmental issues identified by the DoP in the EARs along with those identified in **Table 7.1** and showing the location these issues are addressed in the report include:

- Air Quality (**Section 8.1**);
- Traffic and Transportation Impacts (**Section 8.2**);
- Noise Impacts (**Section 8.3**);
- Water Management issues (**Sections 8.4** and **8.5**);
- Hazards and Risk Management (**Section 8.6**);
- Land and Soil Management (soils and groundwater) (**Section 8.7**);
- Lifecycle/greenhouse gas impacts (**Section 8.8**); and
- Waste management issues (**Section 8.9**).

The assessment of these potential impacts is largely focused within the Ore Preparation Area. However, during construction and operation, there may be flow on or indirect impacts to other parts of the PKSW or other approved projects. These cumulative impacts are addressed in **Section 8.10**.

8 Assessment of Key Environmental Issues, Potential Impacts and Mitigation Measures

Following the preparation of an Environmental Risk Analysis (**Section 7**) the Director General of the Department of Planning has specified a number of environmental issues within its EARs which it considers have the potential to cause key environmental impacts.

These key issues along with other issues identified in the ERA are discussed in this chapter. The EARs issued by the Director General of the DoP set out outcomes to be addressed by the EA. At the beginning of each Section, the matters raised by the Director General of the DoP within the EARs are specifically addressed

8.1 Air Quality

8.1.1 Summary Assessment of the Director General of the Department of Planning EARs

- *Characterisation of materials to be processed through the project, particularly in terms of particulate size, to provide a basis for the assessment of dust impacts from the project*

  The sintering process converts fine-sized raw materia1ls, including iron ore, coke breeze, limestone, mill scale, and flue dust, into an agglomerated product called Sinter. Suitably sized Sinter is used for charging the blast furnace. Emissions from the Ore Preparation Area are generated from raw materials handling, exhaust discharges, cooler bed and the room de-dusting precipitator.

  The sinter cooler TPM with PM_{10} concentrations was sampled between February 2002 and September 2005 (**Appendix E**). The report indicates that PM_{10} concentrations are a significantly small percentage of TPM concentrations with the average percentage over the period being 4.3%.

  Additional particle size sampling was undertaken in 2002. Samples were taken at four points around the cooler at both the top and bottom. The results demonstrate that the PM_{10} fraction is consistently less than 4%.

- *Details of impacts of construction activities on air quality, particularly dust emissions, with identification of appropriate mitigation measures*

  These matters are addressed in **Section 8.1.4.**

- *A full air quality assessment, identifying all fugitive and point source emissions during operation and assessing these parameters from a project-specific perspective in accordance with the Department of Environment and Conservation's (DEC) Approved Methods and Guidance for the modelling and Assessment of Air Pollutants in NSW (2000)*

  An air quality impact assessment was prepared by Holmes Air Sciences for CH2M HILL as part of an Environmental Assessment for the Ore Preparation Upgrade Project. This assessment is provided in full in **Appendix E**. The purpose of the report was to quantitatively assess proposed changes to the Sinter

Cooler Bed and the Sinter Plant Room De-dusting stack (RDD) that may affect particulate matter air emissions from BlueScope Steel.

Potential offsite impacts have been predicted for current, proposed and cumulative impacts for the Sinter Cooler Bed and the RDD. Ausplume modeling has shown that the concentrations of emissions due to the Sinter Cooler Bed and the Room De-dusting Stack will not cause an exceedence of stack concentration limits or ground level concentration criteria as set by DEC.

- *Details of measures such as building design and ventilation systems in the context of minimisation of fugitive emissions from the project*

  Mitigation measures for fugitive emissions during construction and operations have been considered in **Section 8.1.5**.

  For the Sinter Plant, particulate emissions generated throughout the sintering process are effectively captured by the room de-dusting unit and the Waste Gas Cleaning Plant (WGCP).

  Modelling of air emissions indicates that they meet the GLC requirements for the refurbished Sinter Plant Room De-dusting precipitator. Particulate emissions are anticipated to reduce after the upgrade due to the replacement of precipitator internals, ductwork refurbishment and overall system rebalance.

  The repair and upgrade work proposed for the waste gas mains and the precipitators will result in a net reduction in dust levels to the WGCP. The repairs to the waste gas main, precipitator shells and dust hoppers involve plating and sealing holes, which currently allow fresh air to be drawn into the system. This results in wasted fan power and higher velocities through the precipitators than necessary, reducing their collection efficiency. The repair and upgrade of the precipitator internals will result in a further increase in collection efficiency.

  The result of the refurbishment and maintenance work on the room de-dusting system will result in a higher extraction volume at specific collection points. This in turn will result in less fugitive emissions, mainly within the Sinter Plant building. The repairs to the precipitator internals will ensure ongoing dust collection performance.

- *Details of practicable and feasible measures to recover energy from the project*

  The existing heat recovery system will remain in the upgraded plant, so that the heat from the first section of the Sinter Cooler will still be recycled to the pre-heat and annealing hoods on the Sinter Strand to maximize energy recovery.

  The existing heat recovery fan extracts approximately 74,000 Am^3/h (equivalent to 30,000 Nm^3/h) of the hottest and dustiest air from the Sinter Cooler and recycles it to the pre-heat annealing hoods on the Sinter Strand. This heat recovery system will remain in the upgraded plant with a similar volume of air

recycled, the actual amount being dependant on the temperature of the recycled air, which must be attemperated to meet fan design constraints.

- *An outline of air quality monitoring for the project, including pollutants and parameters that would be monitored, monitoring locations, methods and frequencies*

  BlueScope Steel will monitor emissions to air from the Ore Preparation Area as required by the conditions of consent for the Project and the EPL for the Port Kembla Steelworks and the Protection of the Environment Operations (Clean Air) Regulation 2002.

  Routine ambient dust monitoring will be conducted during the construction phase of the Project to ensure minimal offsite and occupational impacts are achieved throughout the Project.

  Dust monitoring will be conducted in accordance with the Australian Standard 3640-1989 (Workplace Atmosphere-Methods for sampling and gravimetric determination of inspirable dust). The results of the monitoring will be compared to the TWA value of NOHSC: 3008 (1995) exposure standard.

  Currently, the WGCP stack is measured for flow, opacity, SO_2, NO_x and other species quarterly, as defined in EPA licence 6092 for point 107. Measurements are also made in the inlet duct of the WGCP to allow assessment of the plant performance.

8.1.2 Existing Air Quality

One of the most difficult aspects in air quality assessments is accounting for existing levels of pollutants. At any location within an airshed, the concentration of a pollutant is determined by the contributions from all sources that have at some stage or another been upwind of the source. In an area such as the Illawarra region, which is known to experience complex wind flows, this could include recirculated pollutants which have moved through complicated pathways in sea breeze/land breeze cycles. In general, the further away a particular source is from the area of interest, the smaller will be its contribution to air pollution at the area of interest. However, the larger the area considered, the greater the number of sources contributing to the background.

Monitoring programs conducted by the DEC have produced a database on existing ambient air quality conditions in the Illawarra region. The closest stations to the site which measure PM_{10} concentrations are located at Warrawong, Kembla Grange and Wollongong. The locations of these stations are shown in **Figure 8.1**. These are reported on a quarterly basis as monthly averages. A summary of peak and annual average concentrations are provided in **Table 8.1**.

Particulate Matter

Measurements of PM_{10} have been reported on a monthly basis for all three DEC locations in the area. Maximum values and annual averages are included in **Table 8.1** The annual averages and maximum recorded concentrations are also displayed. The

annual average for each year is well below the DEC goal of 30µg/m^3, however maximum levels exceed the 24-hour goal on occasions as described by region below. It should be noted that the area was strongly affected by bushfires in December 2001.

Warrawong

This site recorded exceedances of the 24-hour goal during four months in 1995, one month in 2000 and two in 2001. The annual average PM_{10} concentration is 21µg/m^3, which is below the annual goal of 30µg/m^3.

Kembla Grange

This site appears to have more frequent exceedances of the 24-hour goal, with levels above the goals recorded every year, except 1999 since 1995. However the annual average values are very similar to those recorded at Warrawong, which is close to 21µg/m^3.

Wollongong

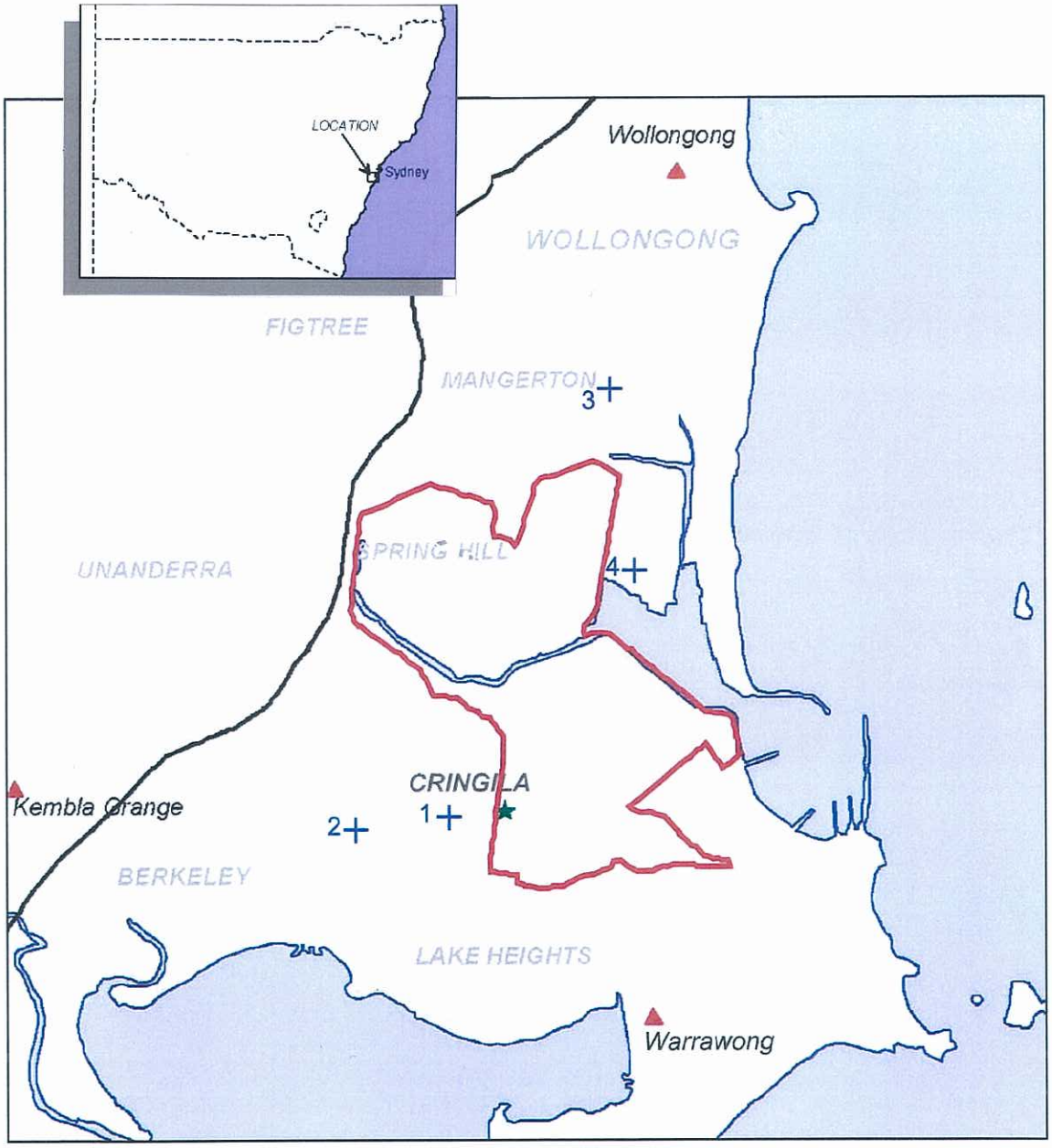
PM_{10} concentrations recorded at Wollongong were similar to those recorded at Warrawong with values above the goal in 1995, followed by no recorded exceedances until December 2001. The annual average concentration was highest in 1995, in common with the other two sites, dropping to values below 20µg/m^3 since 1996.

Table 8.1 PM_{10} Air Quality Monitoring Data within the Illawarra airshed

Year	Warrawong	Wollongong	Kembla Grange
Maximum 24-hour average (µg/m^3), Goal/standard : 50 µg/m^3			
1995	**66**	**59**	**135**
1996	49	37	**53**
1997	43	43	**60**
1998	34	48	**73**
1999	27	28	31
2000	**53**	49	**89**
2001	**79**	**68**	**79**
Annual average (µg/m^3), Goal/standard : 30 µg/m^3			
1995	28	27	25
1996	21	19	22
1997	18	18	21
1998	18	20	22
1999	14	13	15
2000	18	15	20
2001	24	16	21

*Bold text identifies an exceedence of the specified goal/standard

Data were also available from a Tapered Element Oscillating Microbalance (TEOM) monitor located to the south of the steelworks on the corner of Flagstaff Road and Bruce Road, Warrawong. Data collected by BlueScope Steel in 2003, showed an annual average PM_{10} concentration of 22 µg/m^3. There were 22 exceedances of the 24-hour PM_{10} goal of 50 µg/m^3 with a maximum 24-hour concentration of 297 µg/m^3. The PM_{10} data collected are from all sources in the vicinity of the monitor, not just as



LEGEND:

- ★ - Meteorological Station
- ▲ - DEC Monitoring Site
- — - Port Kembla Steelworks
- \+ - Discrete (Modelled) Receptors

Figure 8.1
Location of Study Area, Discrete (Modelled) Receptors, Meteorological & Monitoring Stations

a result emissions from BlueScope Steel. These data were used as background for the modelling described below.

8.1.3 Air Quality Goals

Table 8.2 and **Table 8.3** summarise the air quality goals that are relevant to this study as noted by the DEC (NSW DEC, 2005). The air quality goals relate to the total dust burden in the air and not just the dust from the Project. In other words, some consideration of background levels needs to be made when using these goals to assess impacts.

Table 8.2 Air Quality Assessment Criteria for Particulate Matter Concentrations

Pollutant	Standard / Goal	Averaging Period	Agency
Total suspended particulate matter (TSP)	90 μg/m^3	Annual mean	NHMRC[1]
Particulate matter < 10 μm (PM_{10})	50 μg/m^3	24-hour maximum	NSW DEC
	30 μg/m^3	Annual mean	NSW DEC long-term reporting goal
	50 μg/m^3	(24-hour average, five exceedances permitted per year)	NEPM[2]
Particulate matter < 2.5 μm ($PM_{2.5}$)	8 μg/m^3	Annual mean	NEPM[3]
	25 μg/m^3	24-hour maximum	NEPM[3]

Notes:
1. NHMRC – National Health and Medical Research Council
2. NEPM – National Environmental Protection Measure
3. Long-term reporting goal, not yet applied to projects in NSW

Also included in **Table 8.2** are the NEPM reporting goals for the fine fraction of PM_{10}, namely $PM_{2.5}$. Epidemiological studies indicate that it is the finer particles, that is, those below 2.5 μm in diameter and referred to as $PM_{2.5}$, which cause health impacts as they are taken deeper into the lung. As yet, Australia has no ambient goal for $PM_{2.5}$ applied on a project basis.

In addition to health impacts, airborne dust also has the potential to cause nuisance impacts by depositing on surfaces. **Table 8.3** shows the maximum acceptable increase in dust deposition over the existing dust levels. These criteria for dust fallout levels are set to protect against nuisance impacts (NSW DEC, 2005).

Table 8.3 NSW DEC criteria for Dust Fallout

	Averaging period	Maximum increase in deposited dust level	Maximum total deposited dust level
Deposited dust	Annual	2 g/m^2/month	4 g/m^2/month

8.1.4 Construction Impacts on Air Quality and Mitigation Measures

During construction, the local air quality will potentially be impacted as a result of the following emissions:

- Dust generation from construction activities, particularly materials handling and machinery and truck movements; and
- Exhaust emissions (mainly diesel exhaust) from construction traffic and machinery.

These two potential sources of air emissions will be addressed as follows.

Dust Generation

Dust generation from exposed areas, stockpiles and other materials handling and machinery movements have the potential to have a temporary impact on the local air quality. In general, dust generation at construction sites can vary substantially from day to day, depending on the level of activity, the specific operations and the meteorological conditions. The quantity of dust emissions is proportional to the area of the work site being worked/disturbed and the level of construction activity. Certain weather conditions, such as dry and windy conditions, increases the likelihood of dust generation at construction sites.

Exhaust Emissions

Exhaust emissions (mainly diesel exhaust) from construction traffic and machinery have the potential to temporarily impact on local air quality. Estimated construction traffic volumes are provided in **Section 8.2**. Given the relatively low number of vehicles and machinery required for construction compared to existing traffic at PKSW, exhaust emissions are unlikely to cause significant impacts on the local and regional air quality. Vehicle and machinery exhaust systems, however, will be maintained so that exhaust emissions comply with relevant standards.

Mitigation

To minimise the fugitive dust impacts, exposed surfaces of potential dust generating areas (e.g. soil or material stockpiles or unsealed areas where machinery may be operating) will be regularly watered. Moisture in soils increases aggregation and cementation of the particles, which reduces the potential for dust emissions.

The internals of the precipitator will be completely washed down at the start of the Sinter Plant shut down. The washdown slurry will be collected and disposed of in accordance with established procedures. The sinter cooler will be emptied of all sinter prior to the shutdown.

Consistent with the construction Soil and Water Management Plan (**Section 8.7**), the area of soil exposure will be minimised as far as practical. Land disturbance will be confined to minimum workable areas and for the shortest possible time. Access to the construction sites will be controlled and vehicles and machinery will be kept to well-defined areas. Where possible, soil disturbance will be undertaken in stages to

minimise the generation of dust. Temporary soil stockpiles will be located in areas protected from wind. Consistent with the EPL, trucks transporting construction materials that could generate dust will be covered when entering and leaving the site.

A dust control plan including the above measures and any other safeguards identified during the detailed design phase of the Project will be developed and incorporated in the Construction EMP (refer to **Section 9.2**). The plan will include dust suppression controls, responsibilities for implementation of the controls and monitoring and reporting requirements. Dust will be monitored visually during construction.

The nearest residential areas to the construction sites are not expected to be impacted by dust due to distance to these areas (1.5km) and the low potential for significant dust generation. Dust may however impact on construction employees. Standard health and safety procedures for construction employees will be implemented at the construction site, including requirements for personal protective equipment (masks, etc.) where dust generation is unavoidable. Dust emissions during construction are not anticipated to result in significant air quality impacts if the above recommendations are implemented.

Monitoring to ensure compliance with emission limits and to establish the extent of any impacts on ambient air quality will continue to be undertaken in accordance with the EPL.

8.1.5 Operational Impacts on Air Quality and Mitigation Measures

Particulate Matter

Off-site pollutant concentrations due to emissions for current, future and cumulative scenarios were modelled using Ausplume Version 6.0. The Ausplume model was used to model the emission rates of TSP and PM_{10}. The Director General of the Department of Planning requires that dispersion modelling be undertaken to demonstrate the changes in impact before and after activities are undertaken. For this assessment, the model predictions have been made at ground-level due to emissions from the Sinter Cooler Bed, the Room De-dusting stack and the cumulative emissions across the modelling grid and at four community based receptors (refer to **Figure 8.1**).

PM_{10} and TSP concentrations were predicted for each of the following scenarios:

- Current sinter cooler bed operation emissions;
- Proposed sinter cooler bed operation emissions;
- Current room de-dusting stack emissions;
- Proposed room de-dusting stack emissions;
- Cumulative impact of current sinter cooler bed and room de-dusting stack; and
- Cumulative impact of proposed sinter cooler bed and room de-dusting stack.

Key outputs of the Ausplume modeling are illustrated in **Table 8.4** and **Figures 8.2, 8.3** and **8.4**. A complete set of modeling outputs is provided in **Appendix E**.

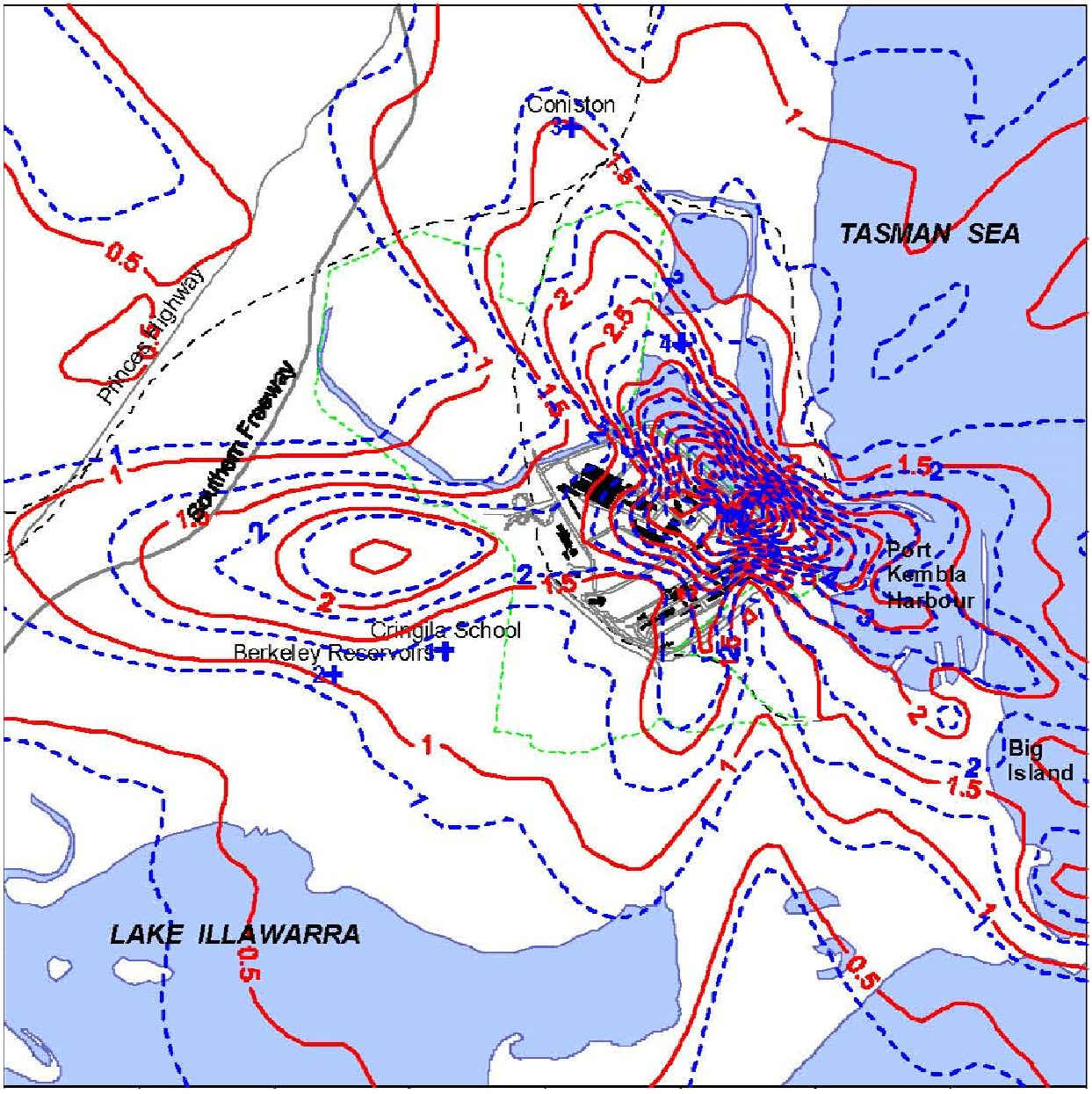
Figure 8.2 represents the maximum cumulative 24-hour average PM_{10} concentration at ground level, before and after the proposed upgrades, combining the contributions from both the sinter cooler and the room de-dusting precipitator. The maximum off-site concentrations due to the existing operations in the nearest residential areas are approximately 2.7 µg/m³. With the proposed operations, the predicted cumulative concentrations are predicted to increase marginally to 3.0 µg/m³. These concentrations do not include background concentrations.

Figure 8.3 presents the cumulative annual average PM_{10} concentrations at ground-level having combined the contributions from both the sinter cooler and the room de-dusting precipitator. The concentrations in the residential areas due to the existing operations are less than 0.2 µg/m³. With the proposed operations, the predicted concentrations are not expected to change. When added to the existing annual average concentrations in the vicinity of the site that are measured at the TEOM monitor (located to the south of the steelworks on the corner of Flagstaff Road and Bruce Road, Warrawong) of approximately 20 µg/m³, the concentrations due to the cooler bed and RDD would not cause an exceedence of the annual goal of 30 µg/m³.

Table 8.4 Predicted Particulate Concentrations

	Scenario	Existing operations			Proposed operations		
	Pollutant	PM10		TSP	PM10		TSP
	Averaging Period	*24-hour*	*Annual*	*Annual*	*24-hour*	*Annual*	*Annual*
				Assessment Criteria			
Receptor Name	**ID**	*50 µg/m³*	*30 µg/m³*	*90 µg/m³*	*50 µg/m³*	*30 µg/m³*	*90 µg/m³*
Due to emissions from Sinter Cooler Bed							
Cringila School	1	0.31	0.04	1.50	0.37	0.04	1.77
Berkeley Reservoirs	2	0.26	0.03	1.13	0.34	0.03	1.39
Coniston	3	0.34	0.04	1.66	0.41	0.05	1.90
Port facility lands	4	0.53	0.06	2.17	0.51	0.06	2.22
Due to emissions from RDD Stack							
Cringila School	1	0.91	0.11	0.32	1.02	0.12	0.38
Berkeley Reservoirs	2	0.83	0.09	0.29	0.91	0.11	0.32
Coniston	3	1.18	0.14	0.43	1.23	0.15	0.47
Port facility lands	4	2.13	0.20	0.61	2.39	0.24	0.74
Due to emissions from Sinter Cooler Bed & RDD Stack							
Cringila School	1	1.16	0.14	1.82	1.34	0.17	2.15
Berkeley Reservoirs	2	1.09	0.12	1.42	1.25	0.14	1.72
Coniston	3	1.52	0.18	2.08	1.63	0.20	2.37
Port facility lands	4	2.66	0.26	2.78	2.90	0.30	2.96

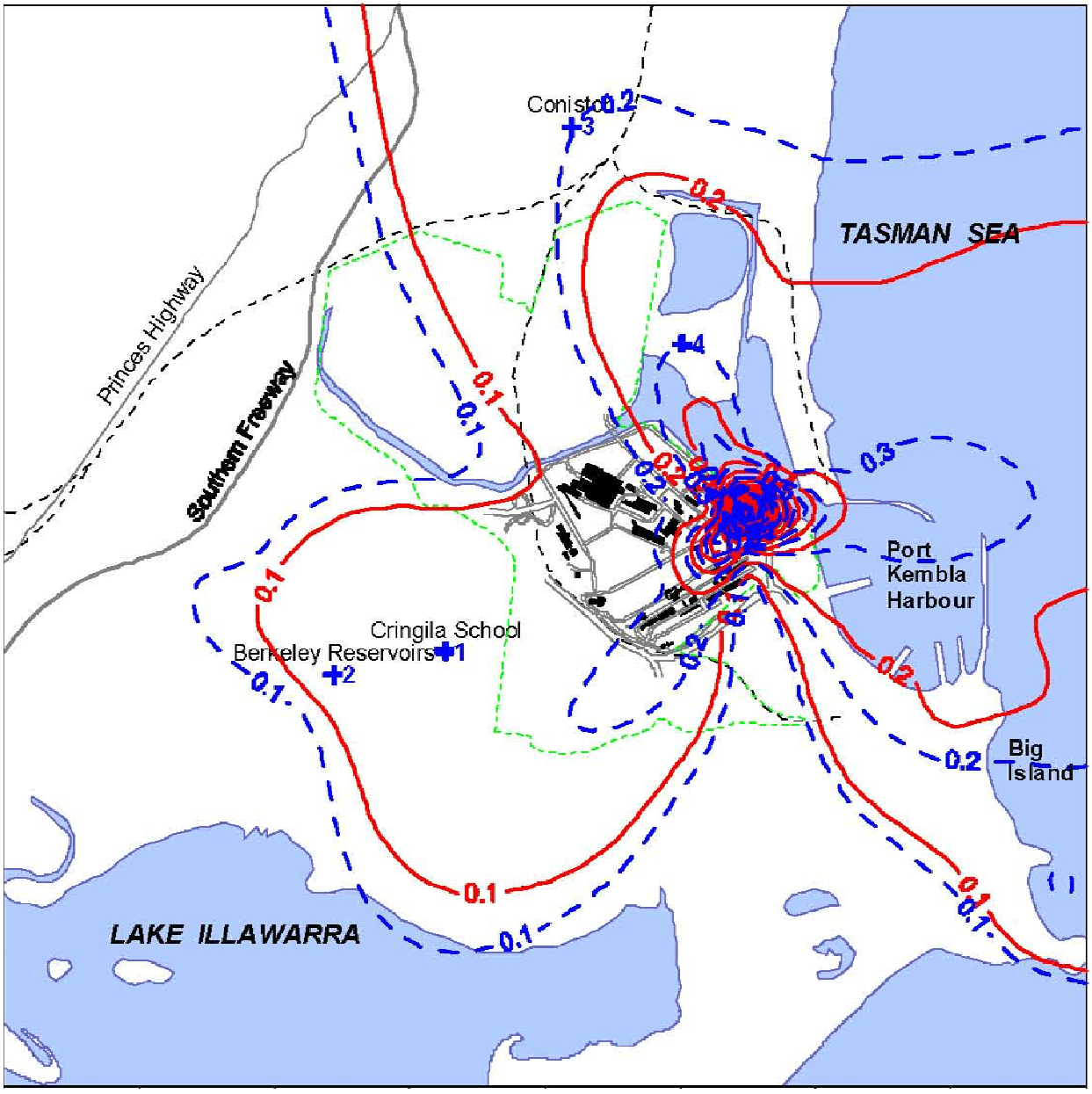
Figure 8.4 presents the annual cumulative average TSP concentrations at ground-level combining the contributions from both the sinter cooler and the room de-dusting precipitator. The concentrations in the residential areas due to the existing operations are less than 3 µg/m³. With the proposed operations the predicted concentrations are not expected to change significantly.



LEGEND:

- SITE BOUNDARY
- EXISTING COOLER AND RDD OPERATION
- PROPOSED COOLER AND RDD OPERATION

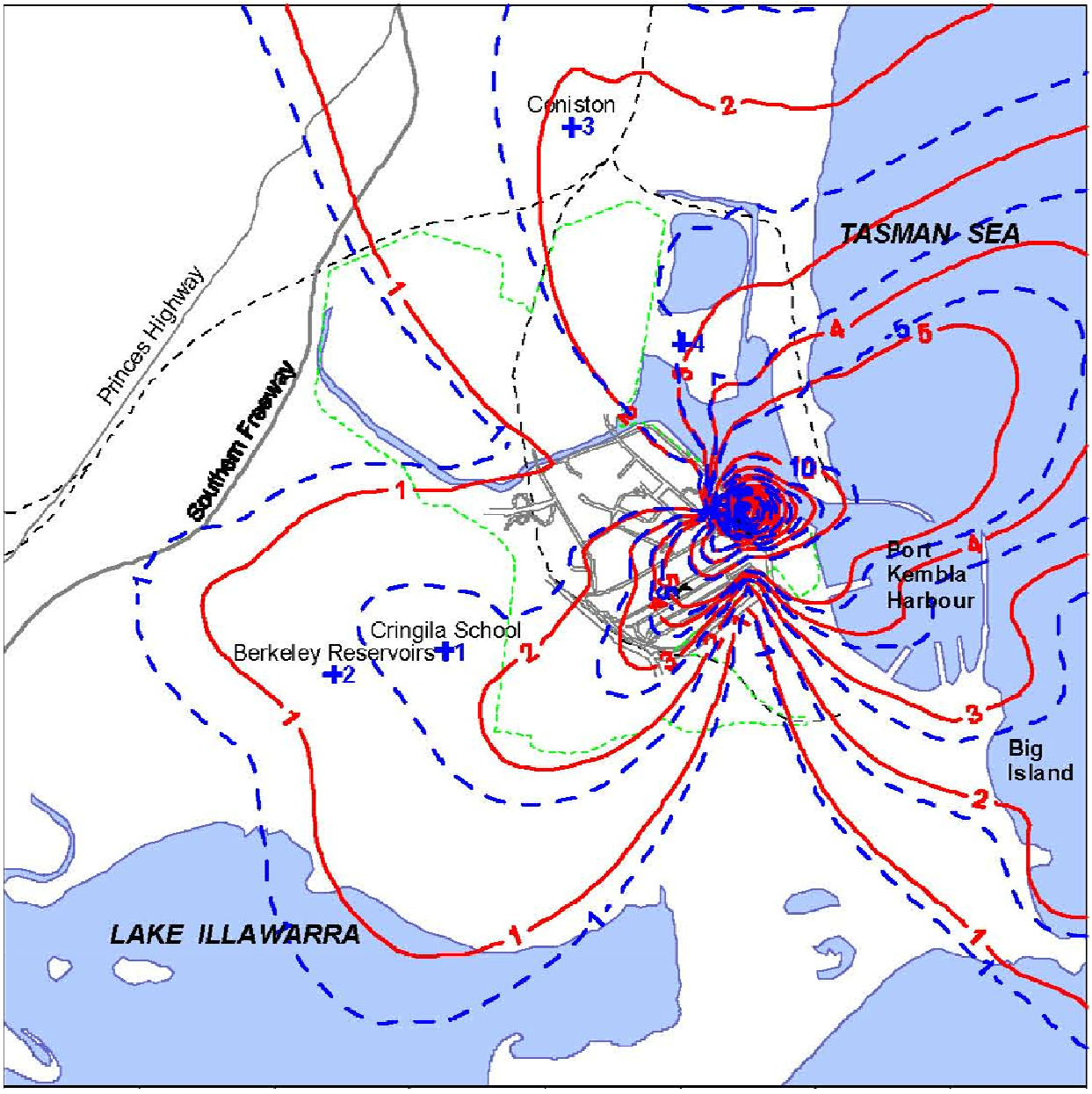
Figure 8.2
Predicted Maximum 24-Hour Average PM_{10} Concentrations due to Cooler Bed & Room De-dusting Stack Emissions ($\mu g/m^3$)



LEGEND:

- SITE BOUNDARY
- EXISTING COOLER OPERATION
- PROPOSED COOLER OPERATION

Figure 8.3
Predicted Annual Average PM_{10} Concentrations due to Cooler Bed & Room De-dusting Stack Emissions ($\mu g/m^3$)



LEGEND:

- SITE BOUNDARY
- EXISTING COOLER OPERATION
- PROPOSED COOLER OPERATION

Figure 8.4
Predicted Annual Average TSP Concentrations due to Cooler Bed & Room De-dusting Stack Emissions ($\mu g/m^3$)

Differences between the existing and proposed situation are very slight with emission rates of PM_{10} and TSP likely to remain similar to existing conditions. This is primarily due to the proposed upgrades and refurbishment of the Sinter Plant. Particulate emissions are captured by the exhaust hoods and treated in the room de-dusting plant.

Currently, significant air ingress reduces the efficiency of particulate removal. By replacing and repairing the room de-dusting precipitator internals and associated ductwork, the de-dusting system will be rebalanced. This will increase collection efficiency of the de-dusting system. Also, in the current operation the hot sinter feeders are a significant dust load on the room de-dusting system. Their removal by extending the sinter strand will remove this load from the room de-dusting system, and so assist in ensuring the particulate emission concentration from the room de-dusting electrostatic precipitator stack will be maintained below 50mg/m^3.

Currently, sprays are in full time operation on the third quarter of the bed to facilitate cooling of the sinter. With the proposed changes, the sprays would no longer be operated full-time. The effect of the dust emissions is expected to be minimal as the majority of the dust results from the first and second quarter of the bed. Turning off the continuous use of the sprays will result in reductions in industrial water used for this purpose of up to 634kL/day and reduction in the presence of a visual steam plume.

The DEC has also reflected community concern relating to the quantity and frequency of the periodic emission (or 'puff') of red coloured dust that is emitted from the room de-dusting precipitator. The red colour is caused by the iron (ferric) content within the ore that is a core component of sinter. Following the upgrade, the quantity of red coloured dust will reduce slightly. This is due to planned maintenance work and upgrades on the room de-dusting precipitator.

In addition to the above mentioned works, BlueScope Steel has undertaken an assessment of the best available technologies (BAT) to reduce particulate emissions from the Sinter Cooler Strand and the Sinter Room De-dusting Stack. An assessment of the options considered by BlueScope Steel is provided in **Table 8.5**. As illustrated in **Table 8.5**, the assessment concluded eight of the nine technologies were impracticable. The remaining options BlueScope Steel will pursue is to review any spare capacity of the Room De-dusting system after the repair works are completed and reassess the feasibility of diverting any additional load from the cooler.

Table 8.5 Assessment of Best Available Technologies to Reduce Particulate Emissions from the Sinter Cooler Strand and the Sinter Room De-dusting Stack

Technology/ Option	Technical Feasibility	Capital Cost ($ AUD)	Environmental Benefit	Final Assessment
Reduce overall fan speed to increase the efficiency of the precipitators. Reducing the fan speed will result	No. The current/existing motor is already very slow speed (10 pole motor, less than 600 rpm sync speed). Also, as a result of the Project, the inlet dust loading to the Room Dedusting (RDD) Electrostatic Precipitator will remain the same or increase.	Estimated to cost $250k.	Whilst this may reduce the "'puff" from the last zone,' it would do so by not collecting the dust at the suction points. Hence, it would actually serve to reduce the overall	This option is not viable. Dust levels within the Sinter Plant itself would be unacceptable in terms of OH&S requirements.

Technology/ Option	Technical Feasibility	Capital Cost ($ AUD)	Environmental Benefit	Final Assessment
in a lower volume of air being drawn from the collection points.	So, if the fan speed is reduced, this will reduce system velocity/volume and, hence total dust collection efficiency.		performance of the unit.	
Utilise variable voltage variable frequency motor drives to reduce the fan speed on the last rap. By reducing the velocity of the air over the last collector plate at the time that it is rapped, it is theoretically possible to reduce the amount of dust emitted.	No. Under such an arrangement, the size and momentum of the system, including the air column, will more than likely result in positive (back) pressure upstream of the slowing fan. This will result in dust being forced out of the ductwork and collection points with each rap of the last zone.	Estimated to cost $5 million.	Slight reduction in TSP emissions.	This option is not viable as it would be unacceptable from an OH&S perspective due to the positive back pressure that would be created. In addition, the cycling loads on the various mechanical components of the system would lead to unacceptable maintenance and reliability issues.
Increase the number of rapping zones from two to three	Possibly. However this process would be required to occur twice as often.	Estimated to cost $8 million.	By splitting the plates in the last field into two zones, which are rapped independently, the red puff could be halved.	This option has been discounted, as there would be no overall improvement in collection efficiency for the considerable capital expenditure required.
Diverting dust to the main waste gas electrostatic precipitators	No. The size of the ducts, corrosion issues, distance between the two systems and the operational limits on the main fan and the WGCP capacity, render this solution as not technically feasible.	Not determined, as this option is not technically feasible.	This option could reduce the emissions from the RDD by diverting dusts to the waste gas mains and electrostatic precipitators, thereby reducing the load on the exiting RDD.	This solution is not technically feasible.
Increasing the moisture content in the last stage of the precipitator, possibly with steam or atomizing water sprays	No. Although gas conditioning is a proven technology in many electrostatic precipitator applications. The additional moisture in this particular system will likely accelerate corrosion of the components down-stream of the moisture injection to an unacceptable level.	Estimated to cost $4 million.	Application of this technology in the RDD situation may improve the overall collection efficiency and reduce the red puff but it is unlikely the red puff would be eliminated completely.	In addition to the capital cost, additional moisture in the system has the potential to accelerate corrosion of the components down-stream of the moisture injection. Nonetheless, this option will remain under review.
Utilise the spare capacity in the room de-dusting system to handle the additional dust load from the cooler	Whilst the overall profile of dust emissions from the cooler and RDD may reduce, this is dependent upon the spare capacity within the RDD. It is expected that following the repair of existing connection points and ductwork, additional load will be transported to the RDD and any spare capacity will be utilized/consumed.	Estimated to cost $4 million.	This option would not assist in reducing the red puff but could assist in reducing the overall dust emissions.	BSL will review any spare capacity of the RDD after the repair work is completed and will reassess the feasibility of diverting any additional load from the cooler.

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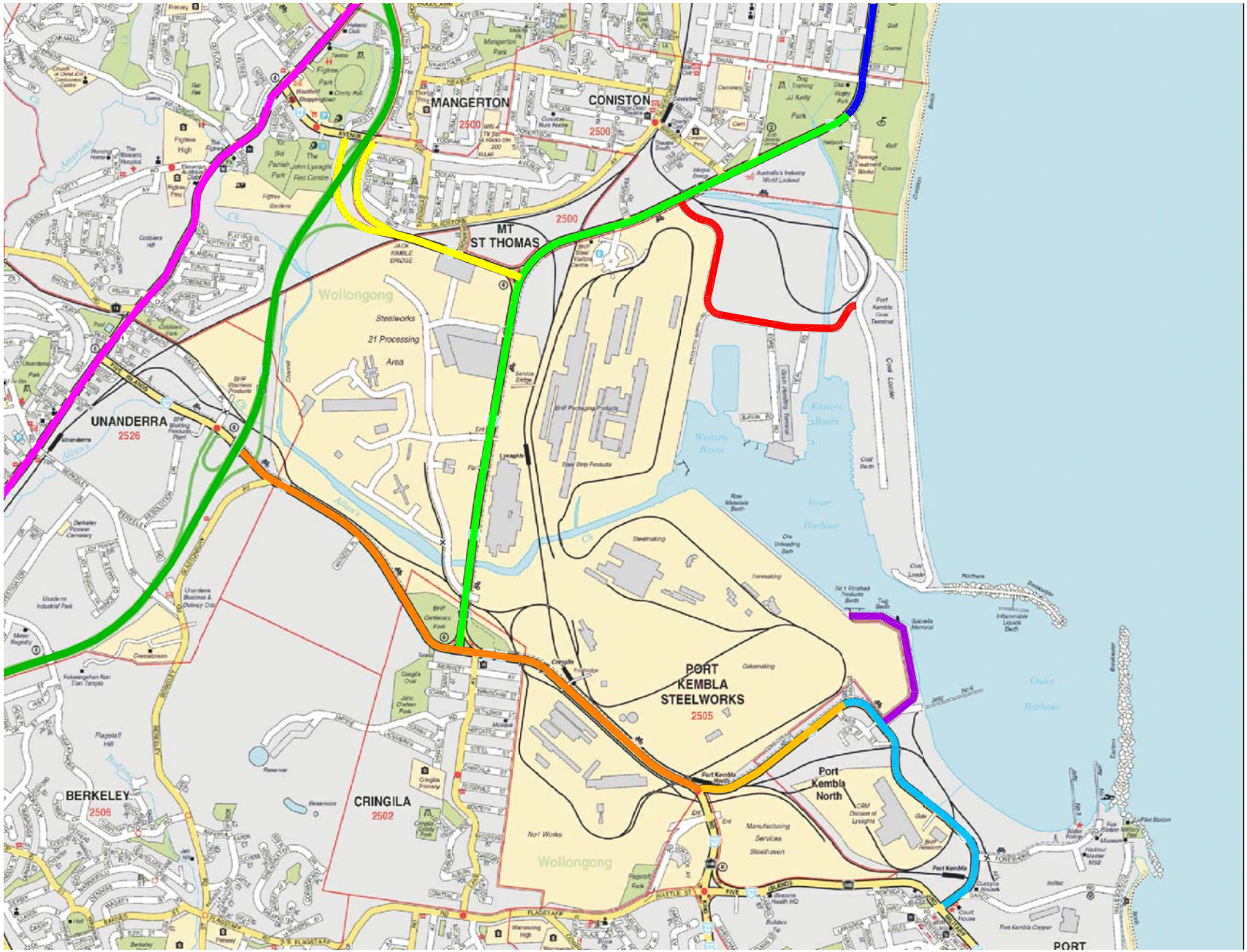


Figure 8.7
External Road Network Servicing the Port Kembla Steelworks

Technology/ Option	Technical Feasibility	Capital Cost ($ AUD)	Environmental Benefit	Final Assessment
Alternative Cooler Dedusting option utilising cyclones.	No.	Estimated cost $ 10 million	Whilst cyclones would be capable of removing 75% of the dust, the discharge from the new stack would have a dust concentration of approximately 100 mg/m3 and therefore not meet regulatory standards.	This option was discounted on the grounds that the regulatory standards would be exceeded.
High temperature bag houses with ceramic or metal filter.	A high temperature bag house entails significant technical risk compared to an Electrostatic Precipitator.	Estimated cost $19.6 million, plus $8 million for electrical infrastructure (33kV supply). The operating cost of a fabric filter bag house is also significant in terms of additional electricity requirements, water consumption and waste disposal requirements.	A fabric filter bag house with water quenching to treat a volume of 20% of the proposed Cooler discharge air would consume up to 68,000 l/h of water. This option will require several megawatts of additional fan motor power, a significant increase in water consumption and disposal of thousands of worn bags every year.	This option was discounted on the grounds of technical feasibility, capital cost and the excessive cooling water requirements, electricity usage and waste disposal requirements.
Dedust part of the Cooler with a high temperature electrostatic precipitator, fan, silencer, ductwork and 40m high stack.	Yes - technically feasible.	Estimate cost for the equipment $A34.6 million, plus $8 million for electrical infrastructure (33kV supply).	This option will dedust 26% of the cooler discharge air.	This option was discounted as it was considered prohibitive for the financial viability of the entire upgrade project.

Ausplume modeling has shown that the concentrations of emissions due to the Sinter Cooler Bed and the Room De-dusting Stack is not expected to cause an exceedence of stack concentration limits or GLC criteria as set by DEC. Therefore, based on the BAT assessment and the Ausplume modelling results, no mitigation measures for dust emission control over those already proposed for the Sinter Cooler Strand and the Sinter Room Dedusting Stack will be undertaken in order to meet the DEC GLC for TSP. BlueScope will continue to review the practicalities of applying new technologies that may assist in providing a reduction in dust emission.

In relation to the Raw Materials Handling Area, BlueScope Steel has undertaken an assessment of the BAT to reduce fugitive emissions from Raw Materials Handling. An assessment of the options considered by BlueScope Steel is provided in **Table 8.6.** As illustrated in **Table 8.6**, BlueScope Steel will employ the majority of the BAT passive dust controls listed. This will involve utilising shaped chute designs, sealing of the chute loading and exits in conjunction with gallery design and water sprays.

Table 8.6 Assessment of Best Available Technologies to Reduce Particulate Emissions from the Raw Materials Handling Area

Technology/ Option	Technical Feasibility	Capital Cost ($ AUD)	Environmental Benefit	Final Assessment
Material Total Moisture Content and Belt Sprays	Suppliers are contractually committed to meeting min and max moisture content as supplied. Any additional dust suppression that is required can be achieved by activating belt sprays situated at all the chute exits.	$15,000/chute X 15 chutes = $225,000	Decreases the tendency of dust generation from open surfaces and turbulent air in chutes.	Currently utilized in passive dust suppression and will maintain this approach.
Enclosed Chute Design	Design is such that openings are minimal and only for material entry and exit with hanging rubber dust curtains as the final seal.	$10,000/chute X 15 Chutes = $150,000	Inhibits drag out dust by minimising induced air flow entering and exiting the chute.	Currently utilized as a contributing factor in passive dust suppression and will maintain this approach.
Hood and Spoon Diverters	The hood and spoon inserts facilitate a controlled stream of material through the entire chute, thus reducing turbulent air and resultant dust generation.	$70,000/chute X 15 Chutes = 1,050,000	Reduced dust generation in chute internals hence minimize fugitive dust from the chute openings.	This approach is being used in the any new chute designs for OPUP.
Central Baghouse with duct network	The concept is a proven technology and minimizes fugitive dust emissions from transfer chutes.	$10M (1 unit and ductwork)	Fugitive dust emissions are controlled and dust collected for further processing.	While this system of dust control and collection has a proven effectiveness, the low level of dust emission expected and the high capital expenditure has excluded further consideration.
Chute mounted mini bag filters	The concept is a proven technology and works well with very dry materials. Materials with higher moisture content require a different approach.	$100,000/chute X 15 Chutes =1,500,000	Fugitive dust emissions are controlled and dust recycled back into the material stream.	Have proved to be less effective than systems described above due to the potential for bag blockages as a result of material moisture content. The resulting poor performance and high maintenance requirements excludes the option from further consideration.
Conveyor Gallery Design	BlueScope steel standard is to enclose on 4 sides with ventilation opening on one side.	10% of total cost of gallery – proportional to length.	This acts to minimise any fugitive dust emission from the open surface of the conveyor belt.	BlueScope Steel Conveyor Gallery design standard is to sheet on 4 sides with a ventilation opening on one side only. This design acts to prevent wind generated fugitive dust from material as it is transported along the conveyor sequence.
Stockpile Sprays and Water Carts	Reducing tendency for fugitive dust emissions from open surfaces by wetting the top layer.	Use of existing infrastructure.	This acts to minimise any fugitive dust emission from the open surface of the conveyor belt.	Stockpile sprays have been operating in Ore Preparation for 20yrs and have been successful in controlling the fugitive dust emissions by a combination of early warning weather alerts and stockpile spraying strategies.
Truck washing Stations and Road Sweepers	Removal of any adhering material from truck wheels and bodies. This minimizes materials being dragged from unsealed stockpile roads onto	Use of existing infrastructure.	This acts to minimise any fugitive dust emission from the open surfaces by wind or mobile equipment.	Strategically placed truck washing stations are utilised by all equipment as they leave unsealed sections and enter onto

Technology/ Option	Technical Feasibility	Capital Cost ($ AUD)	Environmental Benefit	Final Assessment
	sealed internal roads. Road sweepers are used as additional clean up of sealed road surfaces.			sealed roads so as to minimise the "drag out" effect that mobile equipment can cause onto existing roads. Sealed roads in the Ore Preparation department are routinely swept so as to minimise dust generation by mobile equipment.

In addition to the site fugitive dust controls currently employed, such as providing sprays at each transfer point and minimising the number of truck movements, BlueScope Steel will implement the practicable BAT controls identified in **Table 8.6**. Following the Ore Preparation Upgrade, dust emissions from the Raw Materials Handling Area are expected to improve slightly.

NO_X and SO_X Emissions

By operating a new ignition furnace, there will be an increase in the gaseous fuel consumption. However, there will be a compensating reduction in solid fuel rate in the sinter blend lessening SO_X and NO_X generation per tonne. The potential to deepen the sinter blend on the strand will also allow a lower fuel rate, thereby generating less greenhouse gases, NO_X and SO_X per tonne of sinter produced.

Table 8.7 Capacity of Waste Gas Cleaning Plant to Handle 6.6Mtpa Emissions

Concentration	Units	Design Capacity	Current	Predicted	Difference
Average NO_x as NO_2	mg/Nm^3	-	347	378	31
Average NO_x as NO	mg/Nm^3	300	226	246	20
Average SO_2	mg/Nm^3	500	305	357	52
Output per hour					
Average NO_x as NO_2	kg/hr	-	427	473	46
Average NO_x as NO	kg/hr	-	278	308	30
Average SO_2	kg/hr	-	374	446	72
Annual Output					
Average NO_x as NO_2	t/year	-	3,479	3,853	374
Average NO_x as NO	t/year	-	2,265	2,509	244
Average SO_2	t/year	-	3,049	3,638	589
Average Waste Gas Flow	MNm^3/hr	-	1.23	1.25	0.02

Assumptions:
1. SO_2 and NO_x generation rates are directly proportional to sinter production.
2. Effects of deeper beds and higher FeO not quantified but will tend to cancel each other.
3. Change from COG to Natural Gas will provide a minor positive benefit.
4. Predicted calculations based on a post uprate production of 6.6Mtpa; 93.0% availability; 810t/hr production rate with a Waste Gas flow of 1.25 MNm^3/hr.
5. Current data is based on measured concentrations at a Waste Gas flow of 1.23 MNm^3/hr.
6. WGCP ammonia injection facility operational and 30% of coke breeze feed substituted with anthracite.

Table 8.7 indicates that:

- The current average SO_2 concentration is 305 mg/Nm^3 (based on 23 sampling tests conducted from January 2004 to September 2005). With the increased sinter production to 6.6Mtpa, the predicted SO_2 concentration is calculated to be 357 mg/Nm^3;
- The maximum SO_2 load for the WGCP based on initial design specification is 500mg/Nm^3, therefore the existing WGCP has the capacity to process the increased levels of SO_2 generation;
- The current average NO concentration is 220mg/Nm^3 (based on 23 sampling tests conducted from January 2004 to September 2005 for NO_X). With the increased production to 6.6Mtpa, the predicted NO concentration is calculated to be 258 mg/Nm^3; and
- The maximum NO load for the WGCP based on initial design specification is 300mg/Nm^3, therefore the existing WGCP has the capacity to process the increased levels of NO generation.

Given the design capacity of the existing WGCP and the predicted higher levels of SO_X and NO_X (as NO) generation, the WGCP will be able to handle the increase in production from the Sinter Plant and still meet the exit concentrations limits for SO_X and NO. Based on the above, the upgrade is not expected to have any impact on the deNO_X performance of the WGCP.

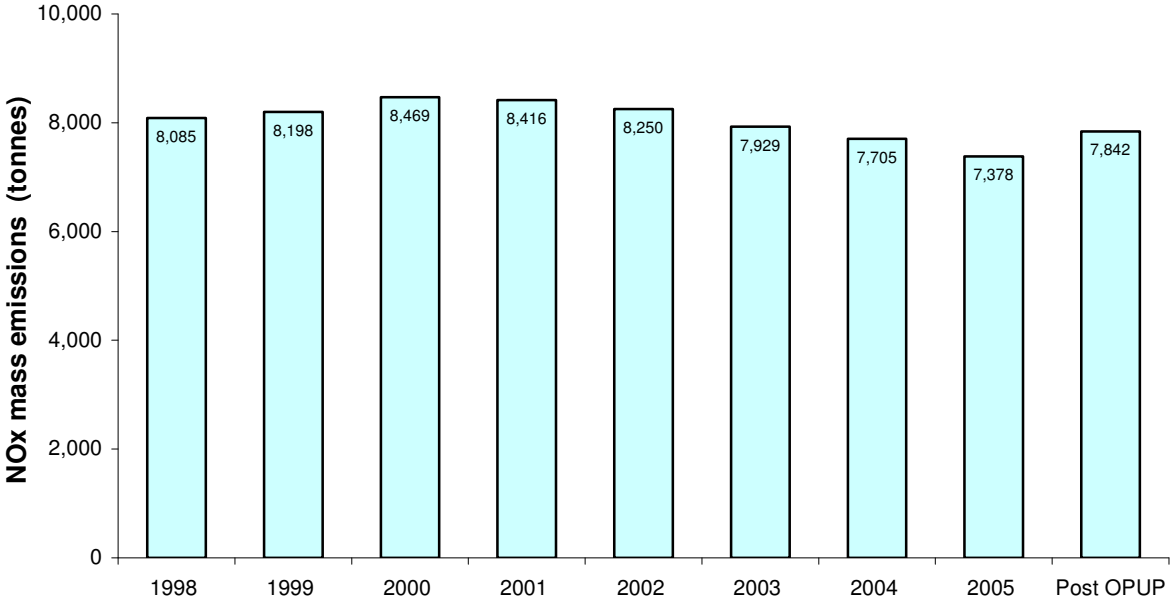
The increase in sinter production will result in a net 10% increase in the mass of NO_X generated and an 18% increase in the amount of SO_X generated[7]. The total mass increase of NOx is expected to be approximately 374 tonnes of NO_2[8]. This will increase the total NO_X emissions from PKSW but will not be more than the Action For Air 1998 target[9]. BlueScope Steel will maintain the site NO_X load below the 1998 baseline level. NO_X emissions have been calculated between 1998 and 2005. The results of the calculations are shown in **Figure 8.5**.

7 The full 20% increase will be partly off-set due to the change from coke ovens gas to natural gas, the operation of the WGCP ammonia injection facility, and the partial substitution of coke breeze with anthracite. In order to simulate the potential upper NOx emissions post the OPUP, the NOx reduction associated with the WGCP ammonia injection has been removed.

8 NO_X emissions (i.e. NO and NO_2) have been converted to NO_2 as per the reporting methodology used to report NO_X discharges to the DEC.

9 Action for Air is the NSW Government's 25-year air quality management plan released in 1998 that focuses on regional air pollution across Sydney, the Lower Hunter and the Illawarra. The strategies in the plan focus on photochemical smog and fine particle pollution, principally arising from emissions by motor vehicles, industry, commercial and domestic sources and influences from bushfire hazard reduction and agricultural burning. This EA reports against air quality goals and objectives that are consistent with the Action for Air plan. In line with Action 4.5 of the Plan, BlueScope Steel is contributing to meeting the overall objective by limiting and progressively reducing it's emission below 1998 licensed levels.

Figure 8.5 NO_X Mass Emissions at PKSW - 1998 to 2005[10]



The NO_X emission total, post the OPUP, as shown above in **Figure 8.5**, includes NO_X emissions from the following sources:

- NO_X emissions from the increase in sinter production from OPUP [374 T NO_X p.a.]; and
- NO_X emissions from the additional gas used in the installation of the second walking beam furnace in the Hot Strip Mill commissioned in 2006 [90 T NO_X p.a.].

As illustrated, even with the inclusion of the additional NO_X emission sources, BlueScope Steel will be able to maintain the site NO_X load below the 1998 baseline level.

In addition to illustrating the site 1998 NO_X emission total can be maintained post OPUP, **Figure 8.5** also shows the site NO_X levels have remained relatively constant over the eight year period, despite the 14% increase in raw steel production over the same period. If NO_X emission rates remained at the 1998 intensity, a total NO_X emission post OPUP in excess of 9,200 tonnes p.a. would be anticipated. Significant actions have been undertaken over the reported period to achieve a reduction in the site NO_X emission intensity. These actions include:

- Installation of the Waste Gas Cleaning Plant

The largest reduction in NO_X emissions has been achieved through the installation of the WGCP. The WGCP uses a carbon packed bed to adsorb NO_X. The BlueScope Steel installation achieves a NO_X reduction of about 10%. Additional information on the WGCP is contained in **Table 8.8** detailing the BAT to Reduce NO_X Emissions from the Sinter Plant.

[10] *Source: BlueScope Steel, 2006*

- Replacement of coal with gas in site boilers

Coal is no longer used for the generation of power and steam in the site's boilers. The coal has been replaced with coke ovens and blast furnace gases.

- Reduced energy consumption in the Blast Furnace Stoves

Improvements have been undertaken on the Blast Furnace Stoves to reduce the energy consumption and the associated NO_X emissions. These works include improvements to the burner controls and double skinning the top of the stove to reduce heat loss.

- Closure of the No. 3 Coke Ovens Battery

The closure of the No. 3 Coke Ovens Battery and associated reduction in coke production have assisted in lowering the site NO_x emissions.

- Use of anthracite in the Sinter Mix

The use of an anthracite and coke blend in the sinter mix, as opposed to coke alone has lowered the NO_x emissions. Anthracite produces lower NO_x emissions than coke. BlueScope Steel will continue to use anthracite in the sinter mix and will increase its use whenever practicable.

In addition to the abovementioned NO_x reduction measures, BlueScope Steel has undertaken an assessment of the BAT to manage NO_x emissions from the Sintering Process. An assessment of the options considered by BlueScope Steel is provided in **Table 8.8**.

Table 8.8 Assessment of Best Available Technologies to Reduce NO_X Emissions from the Sinter Plant

Technology/ Option	Technical Feasibility	Capital Cost ($ AUD)	Environmental Benefit	Final Assessment
Combustion Controls - Reduce air to gas ratio to reduce the oxygen concentration in the flue gas.	Yes. Lowering the excess oxygen content can reduce the amount of thermal NO_x generated. Lower flue gas oxygen content will also increase the flame temperature that will increase the potential for thermal NO_x generation.	Already implemented	Already implemented	Already implemented
Heat recovery from sintering and cooling.	Yes. Technically feasible. The existing heat recovery system will remain in the uprated plant, so that the heat from the Sinter Cooler will be recycled to the pre-heat and annealing hoods on the Sinter Strand to maximize energy recovery.	Already implemented	Already implemented	Already implemented
Use of Anthracite as a substitute to coke breeze.	Yes. Technically feasible. The nitrogen content of anthracite is lower than coke breeze. However, as the sulphur	Already implemented	Already implemented	Already implemented

Technology/ Option	Technical Feasibility	Capital Cost ($ AUD)	Environmental Benefit	Final Assessment
	content of the available anthracite is double that of the coke breeze, it not only increases SO_x emissions, but also reduces the NO_x removal efficiency of the waste gas cleaning plant. As such the increased use of anthracite is limited.			
Utilise low NO_x burners for the new Ignition Furnace. The staged air burner gradually introduces combustion air to the fuel at various stages along the flame front. This reduces the oxygen content in the primary combustion zone, lowering the amount of NO_x formed.	No. The flame length for this type of burner tends to be longer than for conventional burners. The burners are also generally longer, wider and require higher combustion air pressures. So, although this technique is common in boiler applications, it is not generally possible to retrofit the burners into existing installations. In addition, depressing the flame temperature to minimise NO_x generation is likely to cause incomplete combustion of fuel gases where the burner flames are impinging on the sinter bed surface and ultimately drawn into/through the bed by the applied suction. This would create a significant operational safety/security risk.	Not determined, as this option is not technically feasible.	The gaseous fuel content is less than 2% of the total heat input, with the main nitrogen source being the solid fuel. The use of a low NO_x burner would not significantly reduce NO_x emissions.	This option has been discounted on safety and technical grounds.
Flue gas recirculation to reduce the oxygen concentration by recycling some of the low oxygen content flue gases.	No. This technology was investigated in 1998 and rejected because of its unacceptable impact on the required sinter quality.	Estimated to cost $18 million.	In a 1996 trial application undertaken in Europe, this application achieved a 40% NO_x reduction[11].	This option has been discounted on technical grounds and the excessive capital cost.
Sectional gas recirculation	Yes. Technically feasible.	Estimated to cost $28.5 million.	A 3% reduction in NO_x emissions has been reported11.	This option has been discounted on the excessive capital cost for minor NO_x reduction.
Selective catalytic reduction (SCR) – resulting in the breakdown of NO_x to nitrogen and water using ammonia and a catalyst.	Yes. The required temperature is about 300 to 425oC. This will require expensive reheating of the flue gases in some cases. In addition due to the dust and sulphur in the indigenous fuels catalyst replacement is likely to be required every five years.	Estimated to cost $96 million. Not including catalyst replacement.	This option has the potential of reducing NO_x emissions by up to 70%.	This option has been discounted on the excessive capital cost and technical grounds.

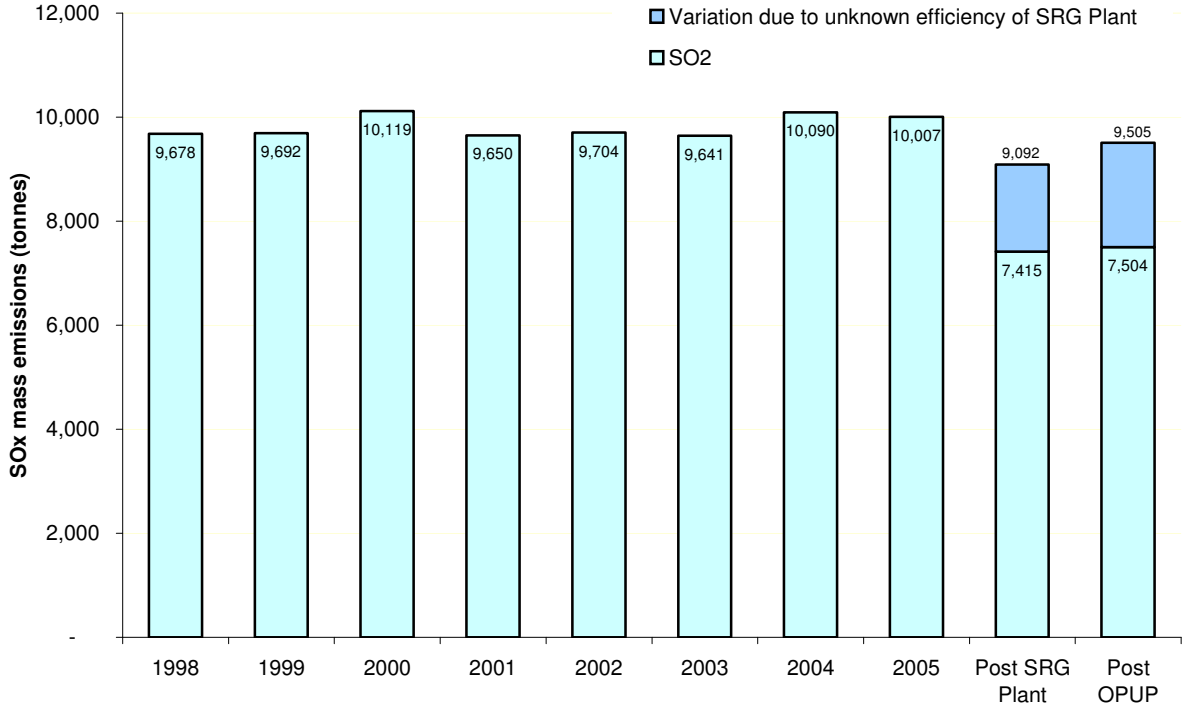
[11] *Source: European Commission (2001) 'Integrated Pollution Prevention and Control (IPPC), Best Available Techniques Reference Document on the Production of Iron and Steel'*

Technology/ Option	Technical Feasibility	Capital Cost ($ AUD)	Environmental Benefit	Final Assessment
Carbon packed bed (cpb) and ammonia injection.	Yes. The existing cpb installation achieves a NO_x reduction of about 10%. However, There is a limit to how much ammonia can be injected into this plant because it has a preference to react with the SO_2 present to form ammonium sulphate, which can impact on the adsorber performance. The NO_x removal performance expected by the cpb designers was 10% if the SO_2 concentration was 250mg/Nm^3 and 2% if the SO_2 concentration was 500 mg/Nm^3. Both of these figures assume that ammonia injection is operating.	Cost $93 million in 2003. Ammonia injection will cost an additional $300,000 p.a.	The cpb is currently achieving a 10% NO_x reduction. An investigation is underway assessing the effectiveness of NO_x reduction through ammonia injection.	Carbon packed bed already implemented. An investigation is currently being undertaken assessing the effectiveness of ammonia injection.

As illustrated in **Table 8.8**, BlueScope Steel currently employs the best available technologies associated with operating controls. Furthermore, BlueScope steel will undertake investigations to identify additional practicable NO_X reduction measures. In relation to the remaining BAT identified, these technologies have been discounted on technical grounds and/or the excessive capital costs associated with their application.

The total mass increase of SO_X is expected to be approximately 530 tonnes of SO_2. This will increase the total SO_X emissions from PKSW. SO_X emissions have been calculated between 1998 and 2005. The results of the calculations together with the impact of the gypsum plant and the impact of this Project are shown in **Figure 8.6**.

Figure 8.6 SO_X Mass Emissions at PKSW - 1998 to 2005[12]



The change in **Figure 8.6** is explained below:

Dependent upon the efficiency of the sulfur rich gas (SRG) recovery plant (gypsum plant)[13], SO_X generated by the sintering process will be captured and used in the generation of gypsum. Due to the unique nature of the sulphur removal process being used, the amount of sulphur removed will not be known until the plant is fully commissioned. The estimates range from 30% to 85% recovery of SO_X. The darker shaded bars represent the range of removal of SO_X from the gypsum plant;

The second walking beam furnace increases SO_X production by less than 10 tonnes per year and is not represented on the graph. The Project will increase the Sinter Plant throughput resulting in increased generation of NO_X and SO_X. However, the design capacity of the existing WGCP will be able to handle the increased load and still keep the exit concentrations below the design and licence limits.

8.2 Traffic and Transportation

8.2.1 Summary Assessment of Director General of the Department of Planning EARs

- *The EA must include an assessment of traffic impacts associated with the construction of the project, including identification of the likely vehicle types and routes to be employed for the carriage of equipment and employees/contractors to and from site. A clear focus on scheduling heavy vehicle movements and peak construction workforce movements to avoid peak traffic flows through the regional road network and to avoid sensitive road users (eg. school related traffic) should be demonstrated.*

These matters are addressed in the following sections.

[12] *Source: BlueScope Steel, 2006*

[13] *The Sulphur Rich Gas (SRG) recovery plant (gypsum plant) has been approved under a separate planning process outside of the scope of this EA and is under construction.*

8.2.2 Existing Transportation Network and Traffic Volumes

Regional Road Network

Port Kembla is strategically located to take advantage of the regional road networks. Good road and rail links connect Port Kembla to the major cities of NSW, enabling free movement of goods to and from the port and adjacent industrial sites.

The regional road network is predominantly influenced by topography. The steep Illawarra escarpment, rising to 500m above sea level parallel to the coast, has been a major factor in both the area's urban development and transportation systems. The main roads serving the Illawarra are the Southern (F6) Freeway and Princes Highway to Sydney, Appin and Picton Roads to the Macarthur region, the Illawarra Highway to the Southern Highlands and the Princes Highway to the South Coast. All of these roads are managed by the RTA.

The main roads (managed by the RTA) serving the Port Kembla area are outlined below (see **Figure 8.7**):

- Southern Freeway – The main north-south arterial road through the Illawarra region. To the north, this road links with Mount Ousley Road and the Northern Distributor (just north of Wollongong). Mount Ousley Road becomes the Southern Freeway around Bulli Pass, ultimately connecting with the Princes Highway at Waterfall. The Northern Distributor ends in the Princes Highway at Bellambi. To the south the Southern Freeway links with the Princes Highway at Yallah (around the southern section of Lake Illawarra). A significant volume of traffic travelling to and from Port Kembla uses this four-lane freeway;
- Princes Highway (north)/Northern Distributor – The Princes Highway links Port Kembla with Sydney. This road is generally a four-lane undivided carriageway. However, in non-peak periods, it operates as a two-lane carriageway due to significant levels of on-street car parking. The road passes predominantly through urban areas (both residential and commercial). At Bellambi, the Princes Highway is joined by the Northern Distributor, a four lane limited access arterial, which feeds into the Southern Freeway just north of Wollongong;
- Shellharbour Road – This urban arterial provides the most direct route from Port Kembla to the South Coast. The road is mostly a six-lane carriageway, divided by a central median; and
- Springhill Road, Masters Road and Five Islands Road – These arterial roads provide connections between PKSW/industrial area and the Southern Freeway. They are high standard roads in industrial environments. Two key intersections, Springhill Road/Masters Road and Springhill Road/Five Islands Road, are signalised, with the provision of left turn slip lane and designated right turn lanes. Further description of these roads, which are part of the local network, is provided below.

Local Road Network

Port Kembla is served by a good quality road network, which is well-suited to haulage of goods by heavy vehicles. The significance of Port Kembla Harbour (one of

the three major ports within NSW) and the industrial area that stretches from the coast to the Southern Freeway, requires a good transportation network to serve these economic centres. The roads linking PKSW and Port Kembla with the Southern Freeway (Springhill, Masters and Five Islands Roads) are also located within this industrial environment. The roads linking the Port with the Southern Freeway are of high capacity and well suited to the movement of heavy vehicles.

A description of the three arterial roads linking PKSW and the Southern Freeway (see **Figure 8.7**) is provided below (SKM, 2000):

- Springhill Road – A six-lane divided road which runs along the northern boundary of PKSW before turning south, bisecting the Recycling Area to the west and the Springhill Works to the east. Springhill Road forms part of the road link between the Wollongong CBD to the north and the southern areas of Port Kembla and Shellharbour. The speed limit along Springhill Road is 80km/hr;
- Five Islands Road – A six-lane divided road running in an east-west direction along the southern boundary of the Steelmaking, Ironmaking and Cokemaking Areas and the Recycling Area with No. 1 Works to the south. Five Islands Road forms part of the north-south arterial road system as well as connecting to the F6 Freeway immediately west of the Recycling Area. Five Islands Road joins with Flinders Street south of the Cokemaking Area of PKSW. The speed limit along Five Islands Road is 80km/hr; and
- Masters Road – A six-lane divided road running in an east-west direction along the northern boundary of the Recycling Area. Masters Road connects Springhill Road with the F6 Freeway. The speed limit along Masters Road is 80km/hr.

The major intersections along the above routes are signal controlled.

Other roads in the local traffic network relevant to the Project include:

- Flinders Street – A two-lane road with a speed limit of 60km/hr. It runs northeast from Five Islands Road until it reaches Old Port Road. Flinders Street is owned and managed by WCC;
- Old Port Road – A two-lane road with a speed limit of 60km/hr. It runs in a northwest to southeast direction connecting Flinders Street with Darcy Road and providing access to the Outer Harbour via Foreshore Road. Old Port Road also provides access to some industrial developments in the vicinity of the Outer Harbour. Old Port Road is owned and managed by WCC; and
- Christie Road – A two-lane no through road with a speed limit of 40km/hr. It heads northeast from Old Port Road towards the No. 6 Jetty managed by Port Kembla Gateway, and then northwest towards the Tug Berth and a number of BHP Steel offices. Christie Road is owned and managed by WCC.

These roads provide access to employee parking and pedestrian access to PKSW in the vicinity of the Sinter Plant.

The local traffic network inside and outside the BlueScope Steel PKSW is shown in **Figure 4.1** and **8.7**.

Road Access to PKSW

Access to PKSW is provided by Springhill Road, Five Islands Road and Flinders Street, and then private internal roads in PKSW. There are currently ten open entries or gates that provide access to the internal roads of PKSW (see **Figure 4.1**).

A network of internal private roads is provided inside PKSW. Speed limits on the internal Steelworks road range from 10km/hr in car parks to 40km/hr depending on the area of PKSW where the road is located.

Rail and Sea Transport

Port Kembla is well served by rail and sea transport facilities. The rail service is important both as a passenger service and as a freight service. Three passenger terminals are provided near PKSW, at Port Kembla North, Lysaghts adjacent to the Strip and Plate Products area and at Cringila (see **Figure 4.1**). These stations provide access for employees to PKSW.

Currently around 2.7 to 3.0Mt/year of coking coal is brought into PKSW, with approximately 0.5Mt/year by rail. A small amount of finished product is dispatched by rail. Approximately 1Mt/year of reject material from the BHP Billiton coal washery is transported by rail to the Wongawilli emplacement (SKM, 2000).

The port is one of the three major ports in NSW and supports a substantial proportion of the industry in the region. A description of the port transport facilities is provided in **Sections 7.2.1** and **8.2.2**.

Existing Traffic Volumes

The latest available traffic volumes of key roads in Port Kembla are in the form of Annual Average Daily Traffic (AADT) and are provided in **Table 8.9**. Heavy road traffic in the area is presently dominated by semi-trailers transporting coal to the coal terminal (CH2M HILL, 2000).

Table 8.9 Annual Average Daily Traffic on Main Roads Around Port Kembla

Road	Location and Direction of Travel	Total 2000	Total 2002	Total 2003	AM Peak 2003	PM Peak 2003
Springhill Road	North of Five Islands Road	38,723	-	35,931	-	-
	N bound	21,795	-	20,870*	2,609*	1,622*
	S bound	17,635	-	16,016*	1,055*	1,660*
Springhill Road	North of Masters Road	35,226	-	31,147	-	-
	N bound	18,229	-	16,270*	2,607*	-
	S bound	-	-	15,934*	-	2,055*
Springhill Road	North End near Keira Street	16,184	-	15,582	-	-

Road	Location and Direction of Travel	Total 2000	Total 2002	Total 2003	AM Peak 2003	PM Peak 2003
	N bound	8,339	-	8,404*	1,171*	6,89*
	S bound	7,741	-	7,707*	4,87*	8,01*
Five Islands Road	East of (per shift with 2 shifts per 24 hour period) Springhill Road	39,622	41,122	41,030		
	N/W bound		20,795	20,731	1,999	1,933
	S/E bound		20,327	20,299	1,780	1,922
Five Islands Road	West of Springhill Road	17,028	-	16,914	-	-
	E bound	8,535	-	7,969*	-	-
	W bound	9,725	-	8,945*	-	-
Five Islands Road	West of Harris Street	11,128	-	12,271	-	-
Masters Road	West of Springhill Road	25,317	-	25,226	-	-
	N/W bound	-	-	13,286*	-	1,708*
	S/E bound	-	-	12,279*	1,196*	-
Flinders Street	North of Five Islands Road	4,565	-	4,612	-	-
Corrimal Street	North of Crown Street	14,948	15,103	15,255	-	-
	Northbound	-	8,199	8,327	613	889
	Southbound	-	6,904	6,928	795	537

* = raw data.
Source: NSW RTA (2004) and pers. comm.
The 2003 north-bound hourly profile data from site is for January 2003 which coincides with school holidays.
Permanent counting site with data given in vehicle passes. All other sites are sample counting sites with the data given as axle pair passes.

In general, there are two types of truck movements to and from PKSW. These are :

- Raw materials entering PKSW; and
- Finished product departing PKSW.

In addition to these main movements, BHP Billiton owned washed coal is exported out of PKSW to the Port Kembla Coal Terminal via the Illawarra Ports Authority roads.

Approximately 1.8Mt/year of raw materials (excluding coal) is brought into PKSW by road via B-Doubles (40 tonne capacity), semi-trailers (27 tonne capacity) and truck and dogs (33 tonne capacity). This represents approximately 51,000 vehicle movements per year, the majority of which uses the Recycling Area Entry Gate entrance on Springhill Road. The major roads used to access this entrance are Masters Road, Springhill Road and Five Islands Road.

Almost all finished products departing PKSW by road use the North Gate with the exception of slag, which is carried by truck from the Recycling Area. From there, it generally travels west along Springhill Road and Masters Road to the Southern

Freeway. Some movements are to the north along Springhill Road to Wollongong and south along Five Islands Road to Shellharbour (SKM, 2001).

Approximately 0.3Mt/year of raw coal is transported to PKSW site by road, representing about 10,526 truck movements. Approximately 1Mt/year of clean coal also arrives by truck (approximately 35,088 truck movements).

Road Movements Associated with the Ore Preparation Area

Internal roads around the perimeter of the Sinter Plant will be closed periodically for construction purposes. During this time, alternate routes will be used for transportation of product and raw materials. If an external road needs to be used, relevant authorities will be consulted. A Traffic Management Plan will be prepared if required, which, where necessary, will include traffic control to maintain normal through traffic in conjunction with re- routed transport. To ensure fugitive dust emissions are controlled, road sweepers, water carts and other measures as appropriate will be used.

Following construction, the internal and external road network will be returned to the existing arrangement.

8.2.3 Construction Traffic Impacts and Mitigation Measures

The construction from the Project will require the importation of construction equipment and materials to the construction site. It will also require construction employees to access and leave the construction site during the construction period.

The total Project is expected to last approximately 30 months, with two distinct Sinter Plant shutdown periods lasting a total of approximately 35 days. Additional upgrade works will be undertaken at the Ore Preparation Area outside the shutdown periods. Starting date will depend on approval of the Project. Traffic generation during the construction periods will vary depending on the phase of construction.

As shown in **Table 8.9**, traffic associated with construction has been estimated to be up to 14 heavy vehicle movements per day.

There will be on average between two and eight truck movements and two to four bus movements per day into and out of PKSW, which would be generated by between one and four trucks and one to two buses per day. Particular operations may require more frequent truck movements (e.g. concreting operations that will require deliveries of large quantities of concrete) but these periods will be limited and timed to avoid peak traffic times whenever possible.

The maximum number of employees during the construction period is expected to be up to 210 people spread over two twelve-hour shifts. Up to 100 cars per day are expected to enter the site giving 200 movements per day depending on which phase of works are in progress. Workers will either park in the Christy Drive car park or at their employer's local workshop and be shuttled to site by bus.

Most construction truck traffic is expected to access and leave the PKSW via the Recycling Area Gate (Gate 3) and the Coke Ovens Gate (Gate 7). Internal roads

within PKSW will then be used to access the construction site for buses transporting employees or trucks transporting material. Light transport loads within PKSW will travel via Loop Road, Central Road, Stockhouse Road, then either Iron Ore Road or Harbour Road. Possibly one oversize load is envisaged during the construction period and will enter PKSW via Tom Thumb Road, No.2 Products Berth Road, Iron Ore Road and Harbour Road. External roads that will be utilised during the construction phase will include Five Islands Road, Springhill Road, Old Port Road, Flinders Street, Masters Road and Corrimal Street (see **Figure 8.7**).

Additionally, temporary construction laydown areas will be established for the Ore Preparation Area upgrade.

A marshalling yard will be prepared, which will also include parking facilities.

Construction Traffic Mitigative Measures

Construction traffic is not expected to significantly impact on traffic flow in main roads in Port Kembla. Port Kembla is served by a good quality road network that is well suited to heavy haulage vehicles. The majority of truck deliveries to the site will come from a diverse range of origins. Generally, the number on any one day will be relatively low and impacts on local roads are not expected to be significant. Truck deliveries would likely be spread during the day and therefore will not impact on local roads at specific times.

There is a potential for peak hour traffic impacts (e.g. 7.00 - 8.00 am traffic), however, given the good access conditions and the capacity and quality of the roads surrounding PKSW, no significant impacts are expected. In order to mitigate any effects of construction traffic it is proposed that a Traffic Management Plan be prepared in consultation with WCC as part of the Construction EMP (see **Section 9.2.1**). The main purpose of the plan will be to coordinate construction traffic and maximise traffic safety. The following measures are recommended to be incorporated in the plan:

- Truck deliveries at the construction site should avoid peak traffic hours (i.e. 7.00 - 8.00 am and 5.00 - 6.00 pm). Truck deliveries should be coordinated so they can be evenly distributed during the construction day as well as over the construction period;
- Similarly truck access/exit to and from PKSW should be coordinated to minimise congestion of PKSW internal roads;
- Construction traffic should avoid residential areas. Construction traffic routes should be established along main and arterial roads and should be documented in the plan. Truck drivers will be trained regarding selected routes and access to the construction site; and
- Consideration should be given to the transportation of some construction materials and machinery by rail and sea.

It is also noted that during construction, some heavy construction equipment will need to be brought onto the construction site. Special arrangements may need to be

made with relevant authorities (RTA, police and/or WCC) regarding appropriate traffic controls for the transport of oversized vehicles on the public road system.

8.2.4 Operational Traffic Impacts and Mitigation Measures

The Ore Preparation Upgrade Project is not expected to result in any changes to the road, rail or port traffic generated during the operation of the Ore Preparation Area or PKSW. Therefore no specific measures to mitigate traffic impacts have been proposed.

Total throughput over the PKSW discharge wharf will not be changed. However the mix of Pellets/Ore fines/ore lumps will be reconfigured so as to replace approx. 1.0Mt of Pellets with 1.0Mt of ore fines.

8.3 Noise

8.3.1 Summary Assessment of Director General of the Department of Planning EARs

The Director General of the DoP has recommended the following environmental outcomes related to noise quality. These outcomes and how they are addressed are summarized below.

The facility must be designed, constructed, operated and maintained so that the facility:

- *Complies with the DEC's NSW EPA Industry Noise Policy;*

  Noise criteria have been determined in accordance with guidelines described in the DEC's guideline known as the Industrial Noise Policy (INP), which requires the background noise level and existing industrial noise levels to be considered. Operational noise criteria for the Project have been selected based on the long term goal of PKSW to meet the 45 LA_{eq}, night amenity limit at all receivers.

- *Does not cause intrusive noise at the nearest affected premises; and*

  New items of equipment proposed to be installed within the Ore Preparation Area are unlikely to exceed conservative night noise criteria at any residence under prevailing weather conditions and specific noise management measures are not required.

  Minor additional traffic noise will be generated during the construction phase but will not be measurable or noticeable at any residence.

  BlueScope Steel will undertake a noise assessment during the development and post development to assess compliance with the predicted noise levels detailed in this document. The assessment will include an investigation of tonality, impulsiveness and vibration.

- *Does not compromise local planning noise goals.*

  As noted above, noise criteria have been selected in consideration of long term noise goals for PKSW, as set by the DEC.

The Director General of the DoP considers that the following Noise Policies and Issues should form the basis for noise assessment and management for this development:

- *Environmental Noise Management Series: NSW Industrial Noise Policy, January 2000;*

  The noise assessment has been undertaken with consideration of the *Environmental Noise Management Series: NSW Industrial Noise Policy*.

- *Environmental Noise Management Series: Environmental Criteria for Road Traffic Noise, May 1999; and*

  The noise assessment has been undertaken with consideration of the *Environmental Noise Management Series: Environmental Criteria for Road Traffic Noise*.

- *Chapter 171 Noise Control Guideline, Construction Site Noise, Environmental Noise Control Manual, 1994.*

  The noise assessment has been undertaken with consideration of the *Chapter 171 Noise Control Guideline, Construction Site Noise, Environmental Noise Control Manual*.

The noise impact assessment for this EA was prepared by Bridges Acoustics and addresses the noise impacts from construction and operation. A copy of the full Noise Impact Statement is included in **Appendix F.**

8.3.2 Existing Noise Environment

The Ore Preparation Area is surrounded by other parts of PKSW and major transport routes and therefore has no immediately adjoining noise sensitive neighbours. The closest neighbours not associated with the steelworks include the grain terminal approximately 500m north-east of the Raw Materials Handling Area, the coal loader approximately 450m north-east of the Sinter Plant and Incitec's fertilizer plant approximately 1500m south-east of the Sinter Plant.

The nearest residential area is Cringila located just over 1400m from the Sinter Plant site. Other residential areas in close proximity include Coniston and Mt St. Thomas, approximately 2300m to the north and north-west and Figtree and Unanderra 3000m to the west.

Flagstaff Park is the nearest public reserve and is located approximately 1700m south west of the Sinter Plant and north of Flagstaff Road in Warrawong. **Appendix F** of this report includes a base plan of PKSW site and nearby residential areas and receptor locations.

Background and ambient noise levels have previously been measured at a number of locations around PKSW. PRP 100 requires BlueScope Steel to prepare a Noise Investigations and Abatement Report that meets the requirement of the procedures defined by the NSW Industrial Noise Policy (EPA, 2000). This report was completed in June 2006 and submitted to the DEC.

An environmental noise survey was carried out in Cringila by BHP (now BlueScope Steel) in the year 2000, during preparation of the Illawarra Cogeneration Plant EIS (CH2M HILL, 2000). Environmental noise levels were also surveyed in Mt St.

Thomas, north of the site, in August 2003 during preparation of the Hot Strip Mill Upgrade EIS (CH2M HILL, 2003). A summary of results appears in **Table 8.10**Error! Reference source not found..

Table 8.10 Summary of Environmental Noise Monitoring Results

Time Period	Day dB(A)		Evening dB(A)		Night dB(A)	
	L_{90}	L_{eq}	L_{90}	L_{eq}	L_{90}	L_{eq}
Merrett Avenue Cringila, 2000	54.0	62.2	52.0	59.5	50.5	58.8
Steel Street Cringila, 2000	50.3	53.0	52.5	56.7	50.5	55.6
Hill Street Mt St. Thomas, 2003	46.4	59.4	47.6	54.9	43.5	53.1
Milne Crescent Mt St. Thomas, 2003	42.1	51.1	41.2	50.0	39.3	47.2

Both the Steelworks and traffic influence the background noise level over most of Mt St. Thomas and Coniston, with traffic being the dominant background noise source during the day and the Steelworks being more dominant at night. Observations in the Mt St. Thomas area in 2003, showed a number of Steelwork sources contribute to background noise levels in this area and no source is particularly dominant.

Most Steelworks noise is produced by fixed equipment such as fans, motors and turbines, with some intermittent or variable noise from mobile equipment such as trucks, locomotives and cars. Relief valves and similar noise sources can be heard occasionally but do not usually affect long term ambient noise levels in receiver areas.

8.3.3 Noise Criteria

Operational Noise Criteria

Noise criteria have been determined to guidelines in the DEC's Industrial Noise Policy (INP), which requires the background noise level and existing industrial noise levels to be considered. Two separate criteria are developed for each location and time period including:

- An intrusive limit set five decibels above the background noise level; and
- An amenity limit, which depends on existing industrial noise levels and the nature of the receiver area.

The lowest of the intrusive or amenity limits are normally adopted as the criterion for that receiver area and time period. Where the existing level of industrial noise exceeds the acceptable amenity limit for that area, the INP provides two alternatives:

- Where existing industrial noise levels are unlikely to decrease in the future, the amenity criterion is set ten decibels below the existing industrial noise level; and
- Where existing industrial levels may decrease in the future, the amenity criterion is set ten decibels below the acceptable limit for the area.

The DEC's long term goal is for noise from PKSW to achieve the amenity criteria at all residential receivers, requiring each source of noise on the site to produce no more

than ten decibels below these criteria. While that goal will take many years to achieve for some receiver areas, the Director of the DoP and the DEC believe it is appropriate to begin working towards the goal with each expansion or upgrade project on the Steelworks site. Accordingly, amenity criteria are set ten decibels below the acceptable limit where existing industrial noise levels are above that limit.

A high traffic noise criterion also applies to areas exposed to dominant traffic noise. Noise logger results show traffic noise can be intermittent during the more critical evening and night time periods and may not be sufficient to mask the industrial noise at all times. Nevertheless, with traffic being the dominant noise source and producing more than ten decibels above the amenity limit at closest receivers, there is some justification for the high traffic noise criterion to apply to these receivers during the night. **Table 8.11** shows criteria applied to each residential area. Table 8.11 also shows the intrusive criterion generally applies during the day and amenity or high traffic criteria generally apply during the evening and night. This situation is common near existing heavy industries operating 24 hours per day.

Table 8.11 Operational Noise Criteria, dB(A)

	Time Period	Cringila		Mt St. Thomas	
		Merrett Av.	Steel St.	Hill St.	Milne Cres.
Background Level $LA_{90,15min}$	Day	54.0	50.3	46.4	42.1
	Evening	52.0	52.5	47.6	41.2
	Night	50.5	50.5	43.5	39.3
Intrusive Criteria $LA_{eq,15min}$	Day	59.0	55.3	51.4	47.1
	Evening	57.0	57.5	52.6	46.2
	Night	55.5	55.5	48.5	44.3
Amenity Limit $LA_{eq, period}$	Day	60.0			
	Evening	50.0			
	Night	45.0			
Existing Industrial Noise $LA_{eq, period}$ (estimated)	Day	56.0	52.3	48.4	44.1
	Evening	54.0	54.5	49.6	43.2
	Night	52.5	52.5	45.5	41.3
Amenity Criteria $LA_{eq, period}$	Day	58.0	60.0	60.0	60.0
	Evening	**40.0**	**40.0**	42.0	50.0
	Night	**35.0**	**35.0**	35.0	**43.0**
Existing Ambient Noise $LA_{eq, period}$	Day	62.2	53.0	59.4	51.1
	Evening	59.5	56.7	54.9	50.0
	Night	58.8	55.6	53.1	47.2
High Traffic Noise Criteria $LA_{eq, period}$	Day			49.4	
	Evening	N/A	N/A	**44.9**	N/A
	Night			**43.1**	
Adopted Criteria	Day	**58.0**	**55.3**	**51.4**	**47.1**

Time Period	Cringila		Mt St. Thomas	
	Merrett Av.	Steel St.	Hill St.	Milne Cres.
Evening	40.0	40.0	44.9	46.2
Night	35.0	35.0	43.1	43.0

The DEC's long term goal for PKSW to meet the 45 LA_{eq}, night amenity limit at all receivers requires a criterion of 35 LA_{eq},15min during the night for any new equipment installed on PKSW site.

Construction Noise Criteria

Construction and installation of additional plant will be carried out partly off-site and partly on the site. Off-site work includes fabrication of most machine components and many assemblies, which are then transported to the site and installed. On-site work includes the following main tasks:

- Demolition and removal of old equipment using cranes, jackhammers and various powered and unpowered hand tools;
- Civil construction work including pile drilling/auguring and concrete pouring to upgrade foundations for new equipment;
- Mechanical construction work to remove and replace equipment to be refurbished and to install new equipment;
- Electrical work to replace wiring, transducers and control systems as required; and
- A commissioning period for all new equipment and control systems.

The main construction work will be performed during two separate shutdowns – with a total estimated combined duration of 35 days (21 days for the first shutdown, which will be concurrent with the No. 5 BF reline, and 14 days for the second shutdown, which will occur sometime after the reline). Construction work will also be required before and after the shutdowns to minimise the work required to be completed during the critical shutdown periods. Any delays or potential delays beyond the shutdown periods will be actively managed and minimised to ensure the No.6 Blast Furnace has a constant supply of sinter. The total construction period is not expected to extend beyond six months, excluding minor tasks that are similar in character to maintenance activities normally carried out on the site.

Noise criteria applying to a construction period of less than six months are therefore applied to this Project, ignoring extended planning and material delivery periods that are unlikely to cause significant noise before the actual construction period. Noise criteria for the construction period are sourced from section 171 of the EPA's (DEC's) Environmental Noise Control Manual (ENCM), partly reproduced below:

Level Restrictions

(i) Construction period of four weeks and under:

The L_{10} level measured over a period of not less than 15 minutes when the construction site is in operation must not exceed the background level by more than 20 dB(A).

(ii) Construction period greater than four weeks and not exceeding 26 weeks:

The L_{10} level measured over a period of not less than 15 minutes when the construction site is in operation must not exceed the background level by more than 10 dB(A).

Time Restrictions

Monday to Friday, 7am to 6pm

Saturday, 7am to 1pm if inaudible on residential premises, otherwise 8am to 1pm.

No construction work to take place on Sundays or Public Holidays.

It is usually accepted that construction work can be carried out at other times of the day or night, or on Sundays or public holidays, providing noise produced by construction work does not exceed normal operational noise criteria for these periods or is inaudible at any residence. Construction criteria for the evening and night are therefore equal to operational noise criteria listed in **Table 8.11.**

Construction criteria are considered to apply at any residential boundary. Construction work is, by its nature, a relatively short term activity. Occasional exceedances of the above criteria for specific well-defined activities are generally acceptable to the community and the DEC during normal construction hours. Examples include pile driving or large concrete pours. In most cases, community acceptance of any short term 'excessive' noise is greatly enhanced if affected residents are given prior notice of the activity, expected duration and approximate noise level. **Table 8.12** shows adopted construction noise criteria in closest residential areas to the site.

Table 8.12 Construction Noise Criteria, dB(A)

	Time Period	Cringila		Mt St. Thomas	
		Merrett Av.	Steel St.	Hill St.	Milne Cres.
Construction Criteria, $LA_{10,15min}$	Day	64	60	56	52
	Evening	40	40	45	46
	Night	35	35	43	43

Construction Vibration Criteria

Ground vibration is caused by particular construction activities such as pile driving, excavating hard rock, concrete breaking and explosive blasting. Of these activities, pile driving is expected to be required near the sinter cooler and at various locations within the Raw Materials Handling Area.

Ground vibration due to other construction activities is assessed to criteria in Chapter 174 of the ENCM. A base acceleration curve and the recommended multiplying factor of 60 for construction work results in an acceleration level of 0.3mm/s^2 RMS in the frequency range 4Hz to 8Hz and higher acceleration levels outside that range. This is

equivalent to a peak particle velocity limit of 8.5mm/s assuming sinusoidal vibration. Vibration is not usually sinusoidal and a maximum of 5mm/s is considered more appropriate. Vibration criteria applicable to pile driving are provided in **Table 8.13.**

Table 8.13 Summary of Vibration Criteria Applicable to Residential Properties

Period	Day/Time	PPV[1]	dB_{Lin} Peak
Daytime	Monday to Saturday, 9:00am to 5:00pm	5mm/s	115
Shoulder	Sunday 9:00am to 5:00pm Any Day 6:00am to 9:00am, 5:00pm to 8:00pm	2mm/s	105
Night	Any day 8:00pm to 6:00am	1mm/s	95

[1] Peak Particle Velocity

Construction Road Traffic Noise

Construction work will generate traffic movements on roads near PKSW including Masters Road, Springhill Road, Five Islands Road and Flinders Street, and on internal roads within PKSW. Vehicles moving on internal roads are assessed as site sources, while vehicles on public roads are assessed as road traffic. Changes in noise level due to construction traffic are assessed to the DEC's *Environmental Criteria for Road Traffic Noise* (ECRTN) (EPA, 1999).

A criteria of 60 dB(A)$L_{eq,15hr}$ during the day and 55 dB(A)$L_{eq,9hr}$ during the night applies, for case seven in the ECRTN of 'Land use developments with potential to create additional traffic on existing freeways/arterials'. A further recommendation, where existing criteria are already exceeded, is 'In all cases, traffic arising from the development should not lead to an increase in existing noise levels by more than 2 dB'.

8.3.4 Noise Sources

Construction Noise

Construction work required to complete the Project will vary significantly during the six month period and particularly during the proposed Sinter Plant shutdowns. Some components, such as installation of new conveyors within the Raw Materials Handling Area, can be completed at any time and are proposed to be completed between or after the shutdowns.

A reasonable worst-case construction scenario which is likely to occur during the shutdown period includes machines and processes scattered over the site as shown in **Table 8.14.**

Table 8.14 Assumed Sound Power Levels, Worst-Case Construction Period, LAeq

	dB(A) in Octave Band, Hz									Total
Octave Frequency Band, Hz	**31.5**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**dB(A)**
Sinter Plant										
Hydraulic concrete breaker	69	85	93	93	103	110	114	108	94	117
Jackhammer	78	91	95	101	104	106	105	104	98	112
Backhoe	67	80	92	95	95	97	95	88	80	102
Pile driver[1]	85	95	108	114	120	114	112	106	94	123
Truck (4) maneuvering on site	71	83	88	93	98	101	101	95	87	106
Mobile crane	75	88	92	102	105	111	107	99	87	113
Compressor, welder (4)	73	85	90	95	100	103	103	97	89	108
Total - Sinter Plant	87	98	109	115	120	117	117	112	101	125
Raw Materials Handling Area										
Truck (2) maneuvering on site	74	86	91	96	101	104	104	98	90	109
Mobile crane (2)	78	91	95	105	108	114	110	102	90	116
Backhoe	67	80	92	95	95	97	95	88	80	102
Compressor, welder (4)	73	85	90	95	100	103	103	97	89	108
Total - RMHA	81	93	98	106	109	115	112	104	95	117

[1] The pile driver may also be required to work within the Raw Materials Handling Area but would not operate on both sites simultaneously. Piles in the Sinter Plant area are likely to be bored rather than driven due to vibration considerations for surrounding operating equipment.

All listed construction machines are likely to be operating simultaneously and this situation has been modelled to estimate reasonable worst-case received noise levels during the construction phase. Equipment listed in each area has been modelled in that area, with all Sinter Plant construction equipment modelled within the building or in the area around the cooler and all conveyor construction equipment modelled in the southern half of the Raw Materials Handling Area.

Operational Noise

A number of components in each of the main working areas are proposed to be replaced with similar or upgraded equipment. Noise levels from existing major components in each area were measured during a site visit on 2nd December 2005. Sound power levels produced by dominant sources are listed in **Table 8.15.**

Other sources of noise exist within the Sinter Plant but such sources are expected to be significantly quieter than those listed in **Table 8.15**. Sources listed for the Raw Materials Handling Area were operating at the time of the site visit and are considered typical for this area. While many other conveyors will operate intermittently, not all conveyors will operate simultaneously and the scenario shown in **Table 8.15** is considered typical for this area. Stackers and reclaimers also operate

in this area but their sound power levels are insignificant compared to long conveyors.

Table 8.15 Measured Sound Power Levels, Existing Sources, LA_{eq}

	dB(L) in Octave Band, Hz									Total
Octave Frequency Band, Hz	**31.5**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**dB(A)**
Sinter Plant										
Strand feeders	73	92	92	94	94	93	91	95	76	102
Ignition furnace	54	69	81	92	91	93	93	92	87	100
Strand	64	76	85	97	99	104	106	105	99	111
Windlegs	66	78	86	97	101	108	112	116	106	118
Sinter breaker	67	75	82	91	92	94	94	95	84	101
Hot feeder	80	85	93	100	101	101	99	98	87	107
Cooler	77	89	99	109	111	111	110	105	99	117
Cooler fan 1 inlet	81	84	101	112	110	108	105	99	89	116
Cooler fan 2 inlet	80	82	100	109	110	109	105	100	90	115
Cooler fan 3 inlet	77	83	100	111	110	109	105	99	90	116
Main exhaust fan casing	75	85	94	106	110	113	113	111	108	119
Room de-dusting fan	67	80	94	108	105	100	99	95	83	111
Vacuum truck	78	83	92	99	94	91	93	94	93	103
Raw Materials Handling Area										
Conveyor F24	69	85	92	101	108	106	107	98	90	112
Conveyor F51	65	78	89	97	100	97	95	88	78	104
Conveyor F30	75	88	99	107	110	107	105	98	88	114
Conveyor F37	76	80	88	96	95	92	89	83	78	100
Conveyor alarm	67	89	84	94	98	99	110	109	92	113
F24 drive	56	74	86	94	100	99	94	86	74	104
F29 drive	60	72	84	93	98	97	92	88	86	102
Screen house	73	94	93	99	99	98	95	91	81	105

8.3.5 Traffic Noise Impact Assessment and Mitigation Measures

Information regarding existing traffic flows is presented in **Section 8.2**.

It is estimated that less than 30 trucks and buses (60 movements) per day will enter and leave PKSW, with most of these vehicles entering and leaving the site via Flinders Street and Loop Road.

Less than 200 cars per day carrying construction personnel are expected to enter the site, most likely via Gate 3 (21 Entry Road), with construction staff then conveyed to the work site by bus. This car parking strategy has been proposed in response to limited available parking spaces near the work sites.

Approximately 40% of construction vehicles are assumed to approach and leave the area via Masters Road, with another 40% travelling to and from the south via Springhill Road and Five Islands Road and the remaining 20% travelling to and from the north along Springhill Road. **Table 8.16** shows these anticipated vehicle movements superimposed over existing traffic flows.

Table 8.16 Existing and Construction Traffic Volumes, Vehicles Per Day

Road	Location	Existing	Construction	Total
Southern Freeway	North of Five Islands Road	51,000	24 trucks, 80 cars	51,104
Southern Freeway	South of Five Islands Road (Berkeley)	52,500	24 trucks, 80 cars	52,604
Springhill Rd	North of Five Islands Rd	36,886	24 trucks, 80 cars	36,890
Springhill Rd	North of Masters Road	32,204	12 trucks, 40 cars	32,256
Springhill Rd	North of Steelworks' Gate 1	16,111	12 trucks, 40 cars	16,163
Masters Rd	West of Springhill Rd	25,565	24 trucks, 80 cars	25,669

The table shows traffic generated by construction activities represents less than 1% of existing traffic flows on all roads. Minor additional traffic noise will be generated during the construction phase but will not be measurable or noticeable at any residence.

8.3.6 Construction Noise Impact Assessment and Mitigation Measures

Noise levels during the construction period include car and truck movements to and from the proposed material storage site within the No. 1 Works, as insufficient storage space for all required equipment exists near the Sinter Plant. The calculations represent a busy trucking period, as would occur during spoil removal from the site and disposal within the No.1 works, with typical trucking noise levels for most of the construction period being significantly lower. **Table 8.17** shows received noise levels at representative receivers listed in **Section 8.2** of this report.

Table 8.17 shows predicted construction noise levels are well within the daytime criteria listed in **Table 8.12** with all proposed machines and activities occurring simultaneously. The table also shows on-site construction work is expected to produce noise levels within the 35 dB(A) night noise criterion at all residential receivers, in the absence of the pile driver and an intense truck transport campaign to and from the No.1 works. Occasional truck movements to pick up materials would produce significantly lower noise levels.

Table 8.17 Received Construction Noise Levels, dB(A)

Receiver	On-site Construction			Transport from No.1 Works	Total Received
	Sinter Plant	Raw materials	Pile driver		
1. Mt St. Thomas	28.8	15.1	37.8[1]	27	39
2. Figtree	12.0	11.9	20.5	23	25
3. Cringila Nth	25.7	18.2	34.2	44[1]	45
4. Cringila Sth	21.2	17.5	30.2	29	33
5. Warrawong	16.8	17.9	25.2	24	28
6. Port Kembla	22.0	22.1	31.3	11	32
7. Grain Terminal	43.9	46.3	50.1	39	52
8. Coal Loader	45.6	45.0	50.8	34	53
9. Incitec	26.4	20.2	38.8	7	39

[1]Indicates noise levels over the 35 dB(A) night noise criterion in residential areas.

Based on the results in **Table 8.17**, construction work can continue for 24 hours per day, seven days per week provided the following noise control measures are implemented:

- The pile driver will be restricted to normal construction hours of 7am to 6pm Monday to Friday and 8am to 4pm Saturday, although quieter work that does not require hammering such as moving the pile driving machine or setting up the next pile can be carried out at any time of the day or night; and
- Periods of relatively intensive truck movements to and from the No. 1 Works would be restricted to the day and evening periods, although the predicted level of 44 $LA_{eq,-15min}$ is still within the measured background noise level of 50.5 $LA_{90,15min}$ during the night at nearest Cringila residences so is considered an acceptable impact for a few hours per night over short durations not exceeding two weeks.

Additionally, BSL will undertake a noise assessment during the development to assess compliance with the predicted noise levels detailed in this document. The assessment will include an investigation of tonality, impulsiveness and vibration.

Construction Vibration Impact Assessment

Sources of ground vibration generally include hydraulic hammers on excavators, trucks and excavators moving around on rough ground, vibrating rollers and pile driving. Most of these sources generally produce insignificant ground vibration at distances greater than 50m, although pile driving can produce noticeable vibration at a distance of 150m depending on ground conditions. Predicted vibration levels at the closest Cringila residences, 1200m from the work sites, are less than 0.1mm/s and would not be measurable or perceptible. Further assessment of ground vibration due to anticipated construction sources is not warranted.

8.3.7 Operational Noise Impact Assessment and Mitigation Measures

The existing and proposed future situations have been modelled and results are listed in **Table 8.18**. The results in **Table 8.18** represent combined noise levels from simultaneous operation of the Ore Preparation Area before and after the proposed upgrades are completed. The proposed situation results in slightly lower predicted noise levels and is primarily due to:

- Replacement of the existing vibrating sinter feeders between the strand and the cooler with a slower speed extended strand and full height cooler filling chute;
- Installation of an additional seven conveyors totaling 680m of belt within the Raw Materials Handling Area, although the extra 680m is less than 5% of the existing combined belt length of at least 15km within this area so makes only a small difference to received noise levels;
- Installation of additional fan capacity on the sinter cooler. Silencers will be installed on the fan inlet ducts to minimise occupational noise levels for personnel passing the site and modern fans are expected to be quieter than the existing units. No noise decrease has been modeled for these fans to present a conservative assessment, although a reduction of at least ten decibels is expected as a result of the proposed inlet silencers; and
- Existing cooler fans do not produce tonal noise according to the definitions of tonality in the ENCM, INP and AS1055, although noise from the fans may sound tonal due to a concentration of acoustic energy in a very narrow frequency band. New fans and silencers will be designed to ensure noise from the fans is not tonal at any residential receiver.

Table 8.18 Received Operational Noise Levels, Ore Preparation Area, $LA_{eq,15min.}$

Receiver	Existing Situation	Proposed Situation	Difference
1. Mt St. Thomas	35.9	35.8	-0.1
2. Figtree	20.9	20.8	-0.1
3. Cringila North	32.8	32.6	-0.2
4. Cringila South	29.7	29.6	-0.1
5. Warrawong	31.3	31.2	-0.1
6. Port Kembla	33.8	33.7	-0.1
7. Grain Terminal	52.7	52.7	0
8. Coal Loader	51.9	51.9	0
9. Incitec	36.2	36.0	-0.2

Calculated noise levels are within the target of 35 LAeq, 15min at all except the closest Mt St. Thomas residences and are well within the 43 LAeq, 15min night criterion at these residences. BSL will undertake a noise assessment post development to assess compliance with the predicted noise levels detailed in this document. The assessment will include an investigation of tonality, impulsiveness and vibration.

8.4 Surface Water Quality

8.4.1 Summary Assessment of Director General of the Department of Planning EARs

The Director of the DoP has recommended the following environmental outcomes related to water quality:

The EA mist include full details of the project's water cycle and management, including a description of water supply and the need for any licences, measures to reuse water within the process and any proposal to apply water to land or discharge water to natural waterways. The EA must also detail proposed erosion and sedimentation control measures to be utilized throughout the life of the project.

Water management relates to the management of surface waters and hydrology and flooding issues. These matters are addressed in **Sections 8.4** and **8.5** respectively.

8.4.2 Water Quality Criteria and Objectives

This water quality assessment has been undertaken considering the following water quality criteria and objectives:

- DEC Environment Protection Licence (EPL) 6092 limits at the No.5 Blast Furnace Drain (LDP 87) and Ironmaking East Drain (LDP 89);
- NSW EPA Illawarra Catchment Water Quality and River Flow Interim Environmental Objectives in estuaries/harbours for the environmental values of aquatic ecosystems and visual amenity;
- DEC Proposed Marine Water Quality Objectives for NSW Coastal Waters (also for the environmental values of aquatic ecosystems and visual amenity); and
- The Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC, 2000). The trigger values are not considered to be applicable to this particular assessment as the DEC specifies site-specific allowable concentrations in the EPL.

8.4.3 Drainage Catchments and Discharges

PKSW Drainage

Drainage conditions in the Port Kembla area are described in **Section 7.1**. Drainage conditions at the PKSW are discussed below. The topography at PKSW is generally flat. Most of the port area has been levelled to slopes of less than 5%. The Ore Preparation Area is located on flat ground which is predominantly paved or covered with buildings. There are a number of artificially created drains at PKSW. As shown in **Figure 1.3**, there are two drains serving the Ore Preparation Area, namely the No.5 Blast Furnace Drain and the Ironmaking East Drain. The No.5 Blast Furnace Drain drains discharge to Allans Creek and the Ironmaking East Drain discharges directly to the Inner Harbour.

Stormwater Management at PKSW

All stormwater in the vicinity of the Sinter Plant is collected via drains and directed to the Effluent Station prior to being pumped to the No.4 Blast Furnace Thickener. At

the No.4 Blast Furnace Thickener solids are separated out and the water is discharged to the Ironmaking East Drain. In addition, a retention basin is located at the Sinter Plant Waste Gas Cleaning Plant for first flush collection. Collected stormwater is then pumped to the Effluent Station and follows the above process.

A number of soak-away pits are located within the Raw Materials Handling Area yards which have been designed for the collection of stormwater and facilitate return of stormwater to the groundwater table.

Stormwater management opportunities are currently being considered by BlueScope Steel for the entire PKSW, including the area around the Ore Preparation Area. Changes to stormwater management at the Ore Preparation Area are therefore not within the scope of the Project.

Ore Preparation Area Drainage

As shown in **Figure 1.3**, surface water run-off from the Sinter Plant and adjoining areas is eventually discharged to the Inner Harbour via the Ironmaking East Drain, following collection and solids separation at the No.4 Blast Furnace Thickener as described above. The Ironmaking East Drain collects discharges from the No.25 Air Compressor Cooling system, the No.4 Blast Furnace Thickener and some discharges from the No.2 Blower Station. It also collects overflow from the 7A Battery Settling Basin during heavy rainfall events. Flows average approximately 15ML per day and the Ironmaking East Drain discharges directly to the Inner Harbour (CH2M HILL, 2001). Additionally, the No.5 Blast Furnace Drain is located adjacent to the Raw Materials Handling Area and includes discharge of surface water run-off from outside the Raw Materials Handling Area into Allans Creek. Flows are approximately 0.7ML per day and are predominantly comprised of stormwater.

Additional to the drainage works within Port Kembla, salt water is pumped from the harbour at the salt water intake point located along the foreshore of the Harbour east of the Sinter Plant (i.e. the section of the harbour between the Inner and Outer Harbours). Salt water is pumped to the Saltwater Channel (**Figure 1.3**) which is an artificial canal that runs in a generally east to west direction. The Saltwater Channel is open most of its way and is used as the source of salt water for cooling water purposes at different facilities in PKSW.

Water quality data and flows for the Ironmaking East Drain, No.5 Blast Furnace Drain and Saltwater Channel are provided in **Table 8.19**. Water quality data is from monitoring undertaken every eight days from December 2003 to December 2004. Monitoring at the Saltwater Channel is upstream of any PKSW discharges and therefore water quality results presented in **Table 8.19** for the Saltwater Channel represent water quality conditions in the area around the Cut in the harbour.

As shown in **Table 8.19**, the temperature of discharges into Allans Creek from the No.5 Blast Furnace Drain and into the Inner Harbour from the Ironmaking East Drain are on average 3°C higher than the water temperature at the harbour (i.e. Saltwater Channel intake point).

Table 8.19 Water Quality Data for PKSW Drains (December 2003 to December 2004)

Parameter	Unit	Saltwater Channel			Ironmaking East Drain			No.5 Blast Furnace Drain		
		Max	Min	Mean	Max	Min	Mean	Max	Min	Mean
Flow	ML/day	NA	NA	NA	61.12	7.16	10.15	2.126	0.055	0.703
Temp.	°C	25.00	15.00	19.41	30.00	18.00	22.24	30.00	17.00	22.11
NFR	mg/L	42.00	3.00	12.33	610.00	ND	20.28	216.00	3.00	16.45
pH		8.40	7.70	8.09	9.20	7.90	8.14	9.00	7.50	7.97
Grease & Oil	mg/L	5.00	ND	2.55	5.00	ND	2.55	9.00	ND	3.12
BOD	mg/L	2.00	ND	1.04	NA	NA	NA	NA	NA	NA
Salinity	ppt	36.70	21.10	32.97	30.10	2.40	26.87	34.20	7.60	29.65
Fluoride	mg/L	1.40	ND	0.84	1.70	ND	0.90	NA	NA	NA
Cyanide	mg/L	0.02	ND	0.01	0.08	ND	0.01	0.13	ND	0.02
Ammonium	mg/L	0.56	ND	0.04	3.92	ND	1.51	5.04	ND	0.53
Phenol	mg/L	0.04	0.01	0.01	0.05	0.01	0.01	NA	NA	NA
Iron (Total)	mg/L	1.40	0.09	0.30	24.00	0.04	1.25	29.00	0.09	1.02
Iron (Filt.)	mg/L	0.1500	ND	0.0186	0.0200	ND	0.0054	0.0300	ND	0.0073
Tin	mg/L	ND	ND	ND	NA	NA	NA	NA	NA	NA
Zinc (Total)	mg/L	0.170	ND	0.034	1.100	ND	0.082	2.000	ND	0.122
Arsenic	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cadmium	mg/L	ND	ND	ND	ND	ND	ND	0.0050	0.0025	0.0026
Copper	mg/L	0.050	ND	0.008	0.072	ND	0.007	0.056	ND	0.006
Chromium (Total)	mg/L	ND	ND	ND	0.028	ND	0.006	0.052	ND	0.006
Chromium (VI)	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
Lead	mg/L	ND	ND	ND	0.14	ND	0.02	0.29	ND	0.02
Mercury	µg/L	ND	ND	ND	1.30	ND	0.27	2.50	ND	0.30
Selenium	µg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
T-Nitrogen	mg/L	0.55	0.13	0.26	3.70	1.10	2.30	19.30	0.51	3.15
Phosphorus	mg/L	1.20	ND	0.31	1.00	0.20	0.35	0.90	0.10	0.30

NA: Not Applicable ND: Not Detected (above the laboratory Limit Of Detection) ppt: parts per thousand

Of the other parameters measured, mean ammonia concentrations at the drains were on average between 13 to 36 times higher than at the Saltwater Channel intake point, however the maximum recorded ammonium concentration is approximately half the EPL limit; total zinc and iron concentrations are up to four times greater than at the intake point; both total cyanide and total lead concentrations in the No.5 Blast Furnace Drain were above detection limits and lead in the intake is below the detection limit.

It is also noted that the discharges from the Ironmaking East Drain comply with the DEC licence conditions. Exceptions to this are reported to the DEC. Phosphorus and nitrogen concentrations are monitored on a monthly basis, however they are not covered by the EPL.

It is also noted that the discharges from the No.5 Blast Furnace Drain and Ironmaking East Drain comply with the DEC licence conditions. Exceptions to this are reported to the DEC. Phosphorus and nitrogen concentrations are monitored on a monthly basis, however they are not covered by the EPL.

Ore Preparation Area Process Water Discharges

Industrial water is currently used, via the water spray nozzles, for cooling on the Sinter Cooler. However, this process does not generate any waste water discharges as water used evaporates soon after contact with the hot sinter.

As mentioned in **Section 4.3.4,** the resultant slurry from the bottom of the No.5 Blast Furnace Thickener is transferred to the Dewatering Plant where the mixture is dewatered using the belt press filter. This activity is not considered to be part of the Sinter Plant operations, but is functionally part of the No.5 & 6 Blast Furnace operations. Thus this activity has been assessed in the No.5 Blast Furnace Reline Proposal Statement of Environmental Effects (CH2M HILL, 2005). Wastewater from this process is discharged to the Ironmaking East Drain. It is estimated that 0.05ML per day of water generated at the No.5 Blast Furnace is discharged to the Ironmaking East Drain through this process.

Treated water from the Waste Gas Cleaning Plant Water Treatment plant is discharged to No.4 Blast Furnace Thickener at the Dewatering Plant at a rate of up to 2.0kl/hr whilst processing.

8.4.4 Construction Surface Water Impacts and Mitigation Measures

The proposed construction sites are located approximately 100-150m to the southwest of the Inner Harbour. Two Steelworks drains are located in the vicinity of the construction site, the Ironmaking East Drain, which discharges directly into the Inner Harbour and No. 5 Blast Furnace Drain, which discharges into Allans Creek.

The construction of the Project will involve minor excavation works. Therefore, the following activities have the potential to impact on water quality during construction:

- Soil erosion resulting from movements of construction machinery and general construction activities, which may result in migration of the eroded material off site; and
- Potential off-site impacts if contaminated soil or other material migrates outside the construction site e.g. aquatic flora and fauna impacts.

These potential impacts are discussed below.

Soil Erosion and Migration of Sediment and Contaminated Materials Off-Site

Potential soil erosion and impacts from migration of sediments and contaminated materials off-site (e.g. degradation of aquatic flora and fauna) are considered to be relatively minor risks given the flat topography of PKSW. Nonetheless, a Soil and Water Management Plan will be prepared as part of the Site Management Plan and implemented during construction to minimize the risk of these impacts. The Soil and Water Management Plan will include the following:

- Procedures for appropriate spill containment, cleanup and disposal;
- Sediment and erosion control measures will be installed prior to any construction activities and will be maintained in an effective condition until the site is rehabilitated;

- Access to the construction sites will be controlled, and vehicles and machinery will be kept to well-defined areas within the construction sites;
- Disturbed sites will be rehabilitated as soon as possible;
- Any excavated soil will be kept on site; and
- To ensure the successful implementation of the Soil and Water Management Plan, monitoring of environmental controls will be undertaken during the construction phase.

8.4.5 Operational Surface Water Impacts and Mitigation Measures

The Ore Preparation Area will continue to have no process wastewater discharges to surface waterways. The operational impacts of the Sinter Plant Dewatering Plant (functionally part of No.5 Blast Furnace) on water quality are addressed in **Section 8.4.3.**

8.5 Hydrology and Flooding

8.5.1 Existing Hydrological Conditions

The general drainage and topographic conditions in the Port Kembla area are described in **Section 7.1.2**. Two natural watercourses drain into Port Kembla's Inner Harbour, Allans Creek and the Town Drain (SKM, 2000). Allans Creek is the predominant source of freshwater inflow into Port Kembla Harbour, and has a catchment area of approximately 41km^2.

Industrial activities are carried out in the lower portion of the catchment, with some industrial cooling and process water discharged to the creek, including those presented in **Figure 8.8.** Industrial discharges, mainly in the form of cooling water, dominate the flow over most of the creek (AM&OG, 1995). Plant cooling and process water outflow from PKSW site to Allans Creek were up to 825ML per day in 2004. Measured freshwater stream inflows in the creek appear to be very low during dry weather (approximately 0.21ML per day) (AM&OG, 1995). These waters mix and flow seaward into the Inner Harbour as a plume of warm, slightly fresh water, which is less dense and so flows over the cooler seawater in the harbour (SKM, 2000). Water from the harbour penetrates into the creek during high tide, pushing heated discharges from PKSW upstream in Allans Creek. The persistence of warmer, saline water bodies at low tide indicates that, when Allans Creek inflows are very low, the creek system above PKSW drains is not flushed out during a tide cycle (AM&OG, 1995).

The Inner Harbour also receives flows from the Town Drain, a canalised remnant of a creek with a small urban catchment. The Town Drain carries urban runoff from Wollongong.

The Ore Preparation Area is located on flat ground which is predominantly open yards with all roads paved. There are a number of artificially created drains at PKSW. The network of drains serving these areas is shown in **Figure 1.3** and discussed in detail in **Section 7.1.2**.

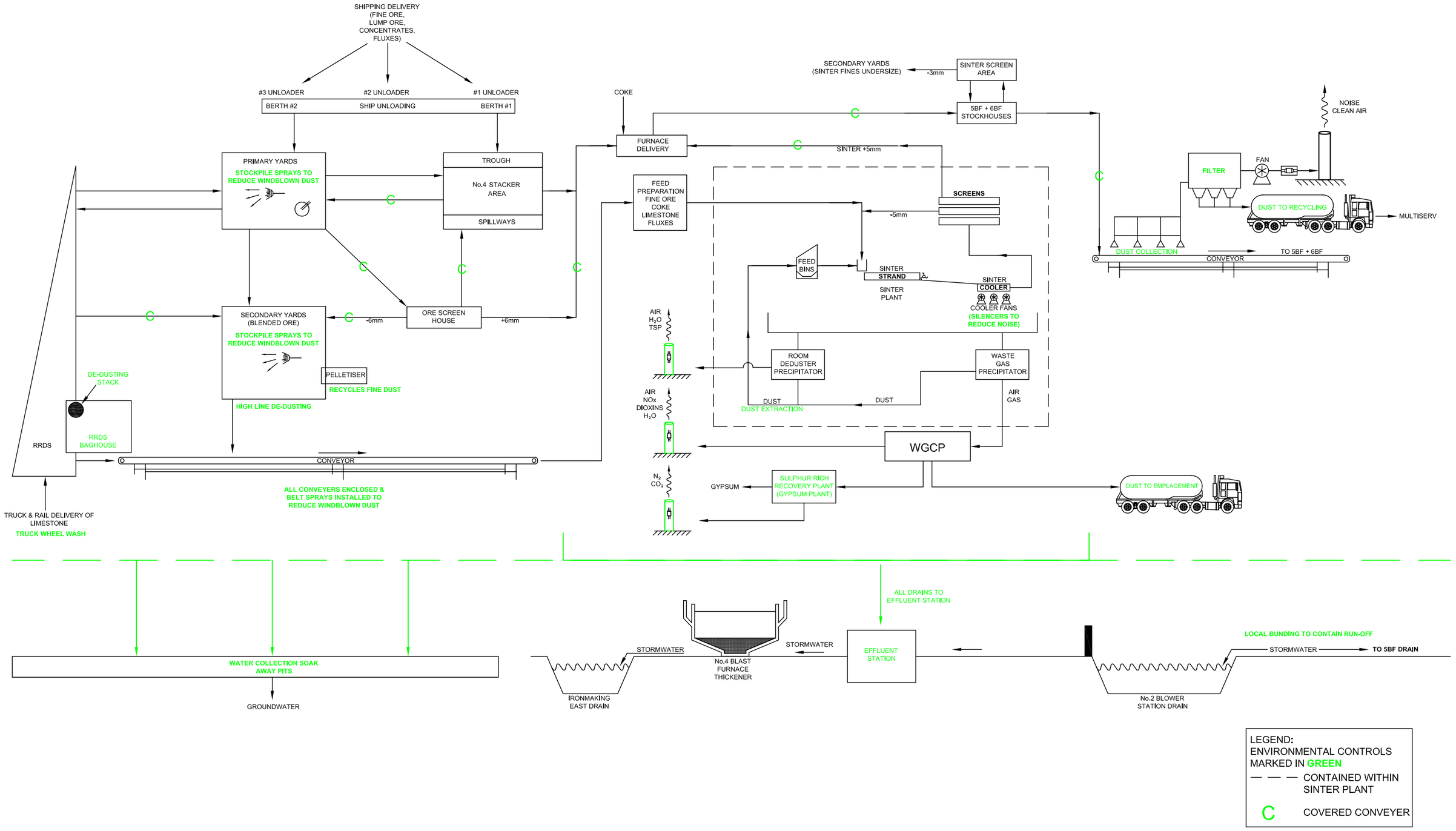


Figure 8.8
Post Upgrade Stormwater Management, Safety and Environmental Controls in the Ore Preparation Area

8.5.2 Existing Flooding Regime

As discussed in **Section 7.1.2** the topography in PKSW is relatively flat and the underlying slag fill drains well. The majority of PKSW is some four to six metres above the Mean Sea Level (MSL). Based on flooding information available from WCC (2002) the study area appears to be situated above the level of 1% Annual Exceedence Potential (AEP) or a 1 in 100 year flood event.

The closest flooding data records are located in the vicinity of Allans Creek, upstream of the study area. The 1% AEP at this point is 3m Australian Height Datum (AHD) (WCC, 1991). The Draft Allans Creek Flood Study (WCC, February 2002) indicates preliminary values for 1% AEP and PMF (Probable Maximum Flood) levels in the vicinity of the study area. The PMF values range between 8.17m AHD and 9.75m AHD and the corresponding 1% AEP values range between 3.74m AHD and 5.58m AHD.

The site has been categorised as likely being situated on a 'flood fringe' and in the 'low hazard' category according to the NSW Floodplain Development Manual (NSW Government, 1986). BlueScope Steel has advised that the Ore Preparation Area has not previously been affected by flooding.

8.5.3 Construction Hydrology and Flooding Impacts and Mitigation Measures

The construction phase of the Project will not affect the existing hydrological or flooding regimes of Allans Creek, internal BlueScope Steel drainage system or the Inner Harbour as most of the activities will be undertaken within existing structures and buildings or involve minor modifications to flat surfaces.

Based on the information available, the construction area does not appear to be located above the 1 in 100 years flood level and therefore the risk of flooding at the construction site is low.

Stormwater management during construction is discussed in **Section 8.4.**

8.5.4 Operational Hydrology and Flooding Impacts and Mitigation Measures

PKSW is well served by drains that discharge to Allans Creek or Port Kembla Harbour. As per its current operations, the Ore Preparation Area will not have any operational water discharges, and thus will have no adverse hydrological impact of these drains or receiving waterways.

The proposed facilities are highly unlikely to be affected by floodwaters as the study area appears to be above the 1 in 100 years flood level.

8.6 Hazard and Risk Analysis

A risk impacts and hazard management review was undertaken for this EA.

8.6.1 Summary Assessment of Director General of the Department Planning EARs

- *Preliminary risk screening in accordance with State Environmental Planning Policy No. 33 – Hazardous and Offensive Development and Applying SEPP 33 (DUAP, 1994) with*

a clear indication of class, quantity and location of all dangerous goods and hazardous materials to be located on the site.

The Project will not involve any increase in chemical storage or dangerous goods. Minor quantities of construction related chemicals will be required, but not in terms of significant SEPP 33 quantities. From a land use safety planning perspective, there is no foreseeable fire, explosion or toxic release scenario that will impact outside site boundaries let alone the localised area.

- *Specific consideration must be given to inventories of dangerous goods and hazardous materials, as well as hazards that may be posed by leaks, spills and the full or temporary failure of any pollution control measures.*

  An Environmental Management Plan, Safety Management Plan and Incident Management Plan will be prepared for the construction and commissioning of the Project. Collectively, these will address employee, contractor and visitor occupational health and safety issues such as chemical management, spills/leaks, air emissions, incident management, and other risks associated with construction of the Project. Organisational roles and responsibilities for health and safety, reporting, hazard and risk management procedures, safe work procedures and occupational health and hygiene requirements will be managed throughout the life of the Project.

  The Incident Management Plan will provide procedures to follow in the event of an incident, including notification, action and response procedures.

- *Should preliminary screening indicate that the project is "potentially hazardous", a Preliminary Hazard Analysis (PHA) must be prepared for inclusion in the EA, as required under SEPP 33. The PHA should be prepared in accordance with the Department's publications Hazardous Industry Advisory paper No.6 – Guidelines for Hazard Analysis and Multi-level Risk Assessment. Specific consideration of fatality, irritation, injury and societal risks must be included. Details of contingency plans for any potential incidents and equipment failures during the operation of the project. Details of a proposed monitoring and maintenance regime to be implemented for the project to ensure performance within acceptable risk limits.*

  Only minor quantities of construction related chemicals will be stored on site. As these will be less than those quantities listed in **Table 8.18**, a Preliminary Hazard Analysis (PHA) is not required to be prepared.

Risk and hazard issues are further addressed in the following sections.

8.6.2 SEPP 33 (Land Use Safety Planning) Review

As part of the consent process for an industrial development, SEPP 33 may apply if a proposed development involves handling, storing or processing a range of substances, which in the absence of locational, technical or operational controls, may create an off-site risk to people, property or the environment. Such activities will be defined as potentially hazardous, and would require assessment to determine the

offsite risk to people, property and the environment at the proposed location and in the presence of controls.

In this context, potentially hazardous refers to the acute land use safety planning risks which the proposed activity imposes on the surrounding land uses. The assessment considers abnormal (accidental) events, and not normal (or licensed) site emissions. As outlined by DoP (DUAP, 1999), the level and extent of the analysis reflects the nature, scale and location of the proposed development.

DoP has developed a risk screening procedure to assist in determining whether a Project falls within the definition of potentially hazardous industry. The procedure is based on determining whether, in a land use safety context, the Project will involve significant storage and/or process inventories of hazardous materials. Significant in this case is defined as being less than the quantities specified in the document *Applying SEPP 33* (DUAP, 1997). For quantities below the screening thresholds, it can be assumed there is unlikely to be a significant risk off-site. These minimum quantities are summarised in **Table 8.20**.

Table 8.20 SEPP 33 Threshold Quantities

Chemical Class/Type	SEPP 33 Threshold Quantity Applicable
Class 1.1 (Explosives)	100kg
Class 1.2 (Explosives with a projection hazard but not a mass explosion hazard)	5 tonnes (or are located within 100m of a residential area)
Class 1.3 (Explosives with a fire hazard and either a minor blast hazard or a minor projection hazard or both, but not a mass explosion hazard)	10 tonnes (or are located within 100m of a residential area)
Class 2.1 (Flammable Gases Pressurised (Excluding LPG))	1,000m^3 (as site boundary is located more than 50m away)
Class 2.1 (Flammable Gases Liquefied Under Pressure (Excluding LPG))	1,000m^3 (as site boundary is located more than 100m away)
LPG	16m^3 if stored aboveground, or 64m^3 if stored underground or mounded
Class 2.3 (Toxic Gas)	5 tonnes of anhydrous ammonia, kept in the same manner as for liquefied flammable gases and not kept for sale 1 tonne of chlorine and sulphur dioxide stored as liquefied gas in containers <100kg 2.5 tonnes of chlorine and sulphur dioxide stored as liquefied gas in containers >100kg 100kg liquefied gas kept in or on premises 10m^3 other poisonous gases (measured at metric standard condition)
Class 3PGI (Flammable Liquids)	1,000m^3 (as site boundary is located more than 50m away)
Class 3PGII & Class 3PGIII (Flammable Liquids)	1,000m^3 (as site boundary is located more than 40m away)
Class 4 (Flammable Solids)	Class 4.1 (flammable solid) - 5 tonnes Class 4.2 (spontaneously combustible) – 1 tonne Class 4.3 (dangerous when wet) – 1 tonne

Chemical Class/Type	SEPP 33 Threshold Quantity Applicable
Class 5 (Oxidising Agents & Organic Peroxides)	5 tonnes ammonium nitrate
	1 tonne dry pool chlorine
	5 tonnes (any other class 5.1(oxidising agent))
	Class 5.2 (organic peroxide) – 10 tonnes/10m^3
Class 6 (Poisonous and Infectious)	Class 6.1(a) - 0.5 tonnes/0.5m^3
	Class 6.1(b) – 2.5 tonnes/2.5m^3
	Class 6.2 (infectious) – 0.5 tonnes/0.5m^3
Class 7 (Radioactive)	All – should demonstrate compliance with Australian codes
Class 8 (Corrosive)	5 tonnes/5m^3 – packaging group I
	25 tonnes/25m^3 – packaging group II
	50 tonnes/50m^3 – packaging group III

Source: DUAP, 1997

It should also be noted that the minimum distance from the Sinter Plant to other land uses (such as residential or industrial areas) is more than 100m and, hence a significant buffer distance is provided in terms of land use safety planning issues.

The proposed upgrade will not involve any increase in chemical storage. In fact, the Sinter Plant does not involve any bulk storage of dangerous goods (apart from the 25 tonne anhydrous liquid ammonia bullet which was subject to a FHA study prior to construction of the WGCP). From a land use safety planning perspective, there is no foreseeable fire, explosion or toxic release scenario that will impact outside the localised area, let alone outside site boundaries. It is expected that minor quantities of construction related chemicals may be required, but not in terms of significant SEPP 33 quantities.

As the inventories of chemical materials will be less than those quantities listed in **Table 8.20**Error! Reference source not found., a Preliminary Hazard Analysis (PHA) is not required to be prepared, and hence the Project is not considered to be 'potentially hazardous'.

Therefore, the Ore Preparation Upgrade Project does not present a land use safety planning concern.

8.7 Soils and Groundwater

8.7.1 Summary Assessment of Director General of the Department of Planning EARs

- *Consider the potential for contaminated soils to be disturbed during the project. Where such a potential exists, the EA must include specific mitigation and management measures proposed to be implemented to manage any risk posed by contaminated materials, and if relevant, remediation of the contamination.*

  Samples taken around the Sinter Plant reported concentrations of contaminants of potential concern below the NEPC HIL F criteria, indicating that the material *in situ* does not present any risk of adverse human health effects in a

commercial/industrial setting. It is likely that fill material containing trace slag and gravels will be encountered during the limited excavation associated with the upgrade Project. According to commercial/industrial land use criteria, the fill material to be excavated is considered suitable to be relocated for use within the PKSW site. All excavated material will be classified in accordance with NSW EPA (1999) *Assessment, Classification and Management of Liquid and Non-liquid Wastes Guidelines* to determine how to appropriately dispose of the material; the preference being to reuse any excavated material as fill elsewhere within the PKSW.

Further environmental assessment of soils and groundwater are contained in the following Sections.

8.7.2 Existing Soil Landscape

PKSW site is generally flat as a result of extensive filling and levelling that has occurred over much of the area. Historically, the majority of the site was low-lying swampland, comprising moderately permeable silty sands and clay. However, an island used to exist where the Ironmaking area is located, and hence this area does not have as thick a layer of fill overlying the fluvial sediments as in other areas of the site. The swampland was filled with Blast Furnace slag, open hearth slag and coal washery rejects (Egis, 2001).

The typical geological stratigraphy across PKSW comprises 5-6.5m of fill (consisting of slag, dredged sand, coal wash and carbonaceous fines), which has been placed over approximately 5m of loose silty sands, 1.5m of very dense slightly cemented sands, 4.5-8m of organic silty clays and 1.5m of very dense clayey gravel. These unconsolidated materials are underlain by weathered latite and sandstone below approximately 19m (Egis, 2001).

According to the *Soil Landscapes of Wollongong – Port Hacking 1:100,000 Sheet* (Hazelton, 1990), the soils underlying the area are disturbed terrain. Limitations on the soils in this area include mass movement hazard, unconsolidated low wetstrength materials, impermeable soil, poor drainage, localised very low fertility and toxic materials. Egis (2001) reported that this is confirmed by historical records which indicate that the majority of the site has been reclaimed from former swampland (Tom Thumb Lagoon) using blast furnace slag, open hearth slag and coal washings.

8.7.3 Existing Hydrogeology

The groundwater beneath PKSW is thought to flow generally towards the Inner Harbour and Allans Creek. Groundwater recharge is from the infiltration of rainfall through permeable ground surfaces, groundwater flow from the up hydraulic gradient areas to the north west and south west of PKSW, and infiltration of dust suppression water and drainage waters across PKSW (Egis, 2001).

The investigations undertaken by GHD (2004) demonstrated that the direction of groundwater flow beneath the majority of PKSW is towards the Inner Harbour. However, groundwater within PKSW's central regions appear to flow radially from

an apparent groundwater high in the vicinity of the No.5 Blast Furnace, which may be attributable to the original island that was present at that location before the surrounding swampland was filled and levelled.

8.7.4 Soils and Groundwater Impact Assessment

In conjunction with the DEC and under the *Contaminated Land Management Act, 1997*, BSL voluntarily undertook a Stage 2 investigation to determine potential sources of soil and groundwater contamination across PKSW. As shown on **Figure 8.9**, GHD (2004) installed one monitoring well near the Sinter Plant (G11) and one near the Raw Materials Handing Area (G12), approximately 500m northwest of the Sinter Plant. Soils and groundwater were sampled from these wells. Although this was not a detailed investigation specifically targeted into the environmental conditions at the Sinter Plant or Raw Materials Handling Area, the observations made and results obtained can be used as an indication of likely soil and groundwater conditions. GHD (2004) reported that samples from each location showed concentrations of contaminants of potential concern below the NEPC HIL F criteria, indicating that the material *in situ* does not present any risk of adverse human health effects in a commercial/industrial setting.

This initial investigation indicated that there are no areas of particular concern within the Ore Preparation Area. The results obtained from the sampling were provided to the DEC and following discussions and agreement, further investigations were not deemed necessary in this area. However, BSL is continuing to monitor groundwater conditions at the existing wells.

8.7.5 Existing Acid Sulphate Soils

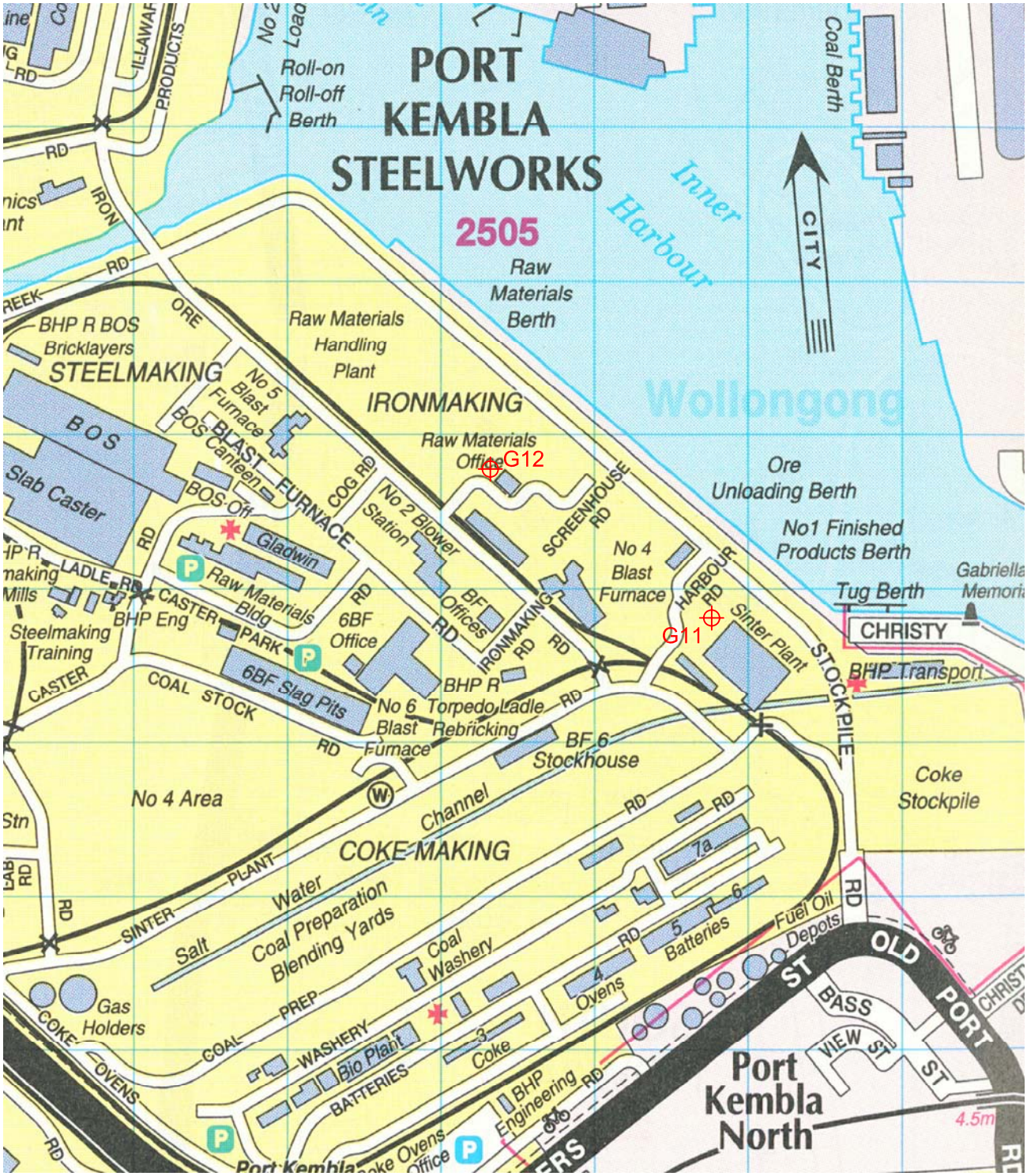
A review of the DLWC's Acid Sulphate Soil (ASS) Risk Map for Wollongong (DLWC, 1997) was undertaken. The purpose of the ASS Risk Maps is to identify risk locations for the occurrence of potential ASS that may need to be further addressed by site specific soil investigations.

The maps show that generally the whole PKSW have been classified as Disturbed Terrain. DLWC (1997) notes that disturbed terrain may include filled areas, which often occur during reclamation of low lying swamps for urban development, and that soil investigations are required to assess these areas for acid sulphate soils.

As the study area is highly disturbed, it is not known what the acid sulphate potential is in this area. However, as the terrain contains filled areas resulting from the reclamation of Tom Thumb Lagoon, it is possible that some acid sulphate soil material could be present.

8.7.6 Groundwater Quality Impacts and Mitigation Measures

As described in **Section 8.7**, groundwater is found at depths of approximately 3.0mbgl at the Ore Preparation Area. Given that the maximum depth of excavation will be to 2.0mbgl, for the installation of footings, no groundwater impacts are predicted. Pile driving will be required during construction of conveyors in the Raw Materials Handing Area. Should groundwater require removal during this activity it



Legend:

G11 ⊕ Groundwater Monitoring Well

Source: Gregory's Maxi 2003 Street Directory 15th Edition & GHD (2004). BlueScope Steel, Port Kembla No.2 Steelworks, Investigation of Site Contamination - Stage 2

Figure 8.9
Location of Existing Groundwater Monitoring Wells

will be sampled and analysed to determine appropriate method of disposal. Refer to **Section 8.7** for details regarding excavation locations and amount of spoil to be excavated.

Groundwater impacts during operation will be similar to any impacts that are currently occurring on the site. The risk of impact primarily arises from spills or leaks from process equipment. These risks will continue to be managed by BlueScope Steel via the implementation of environmental management systems and procedures.

8.7.7 Soils Construction Impacts and Mitigation Measures

Potential impacts on soils or impacts resulting from soil disturbance from construction activities may result from the following:

- Construction activities (e.g. movements of construction machinery) have the potential to cause soil erosion on the site;
- Potentially contaminated soils may migrate off site during construction; and
- Soils may become contaminated from oil, grease or fuel from construction machinery operation and maintenance.

Excavation will be required during the following phases of construction:

- Construction of footings which will support the extension to the Sinter Plant building and lowering wheel. Excavation of approximately 45m^3 is expected with the maximum depth of excavation being 2.0m except for two bored piles being 18m;
- Works for the Sinter Cooler rebuild including excavation for a new fan footing. Excavation of approximately 100m^3 is expected with the maximum depth of excavation being 2.0m;
- Construction of Primary Yard By-pass conveyors. Excavation of approximately 100m^3 is expected with the maximum depth of excavation being 2.0m; and
- Construction of new Sinter Plant Feed Sequence conveyors. Excavation of approximately 100m^3 is expected with the maximum depth of excavation being 2.0m.

Installation of the new conveyors will require excavation of approximately 200m^3 with the maximum depth of excavation being 2.0m.

The fill material in the study area will be excavated to a depth of approximately 2.0m. Based on the findings of the GHD (2004) investigation, it is likely that fill material containing trace slag and gravels will be encountered. According to commercial/industrial land use criteria, the fill material to be excavated is considered suitable to be relocated for use within the PKSW site.

Since it is unlikely that these soil samples were collected from the exact location of the proposed excavations, and given the heterogeneity of the subsurface lithologies, all excavated material will be classified in accordance with NSW EPA (1999) *Assessment, Classification and Management of Liquid and Non-liquid Wastes Guidelines* to determine

how to appropriately dispose of the material; the preference being to reuse any excavated material as fill elsewhere within the PKSW.

Although investigations have not identified any contamination that will cause a risk to human health, workers on the site involved in the excavation and relocation of the fill material, as well as those involved in construction, will still take precautionary measures, such as wearing protective clothing and gloves, if handling the fill.

A Soil and Water Management Plan will be prepared as part of the Construction EMP, which will address the above issues and contain control measures that will be implemented during the construction stage. Additionally, the acid sulphate soil management plan used by BlueScope Steel will be activated if any acid sulphate soils are identified.

8.7.8 Soils Operational Impacts and Safeguards

Once construction is complete any areas of bare soil remaining will be appropriately sealed, bunded or landscaped to minimise erosion from the site.

The operation of the Ore Preparation Area will not impact on underlying soils. The only activities that may have some potential to impact on soils are those associated with fuel, oil or chemical spillages. This may result from direct spills, or as a result of potentially contaminated stormwater runoff leaving the site. In order to avoid soil contamination during operation the following controls will be established if required:

- All fuel, oil or chemical storage areas and unloading areas will be bunded or otherwise contained; and
- All plant personnel that may come into contact with fuel, oil or chemicals will be trained in required handling procedures.

There will be no increase in fuel, oil or chemical storage due to the Project.

The Site Management Plan (see **Section 9.2**) will incorporate, in the form of an Incident Management Plan, appropriate spill containment, cleanup and disposal procedures that site personnel will undertake in spillage and leakage events.

8.8 Lifecycle Analysis

8.8.1 Background

Life-cycle analysis (LCA) is the compilation and evaluation of the inputs and outputs, and the potential environmental impacts, of a product throughout its life-cycle. In the case of the Ore Preparation Area upgrade, the LCA tracks the greenhouse gas impacts of defined production precursors and waste materials as they are used throughout the entire life-cycle in the production of sinter. The summation of the impacts of each individual input and output provides the LCA/greenhouse gas profile for the Project. This is an incomplete process, limited by the extent to which input and output boundaries are drawn, the depth of investigation into the manufacture of a particular product and the availability of data regarding the particular pollutants (emissions) generated for each input of sinter production. Nonetheless, the LCA provides a

meaningful comparison of the greenhouse gas emissions likely to occur from construction and operation of the Project when compared to the current emissions generated by the Sinter Plant and within the context of the Port Kembla Steelworks as a whole.

8.8.2 Greenhouse Gases

Greenhouse gases (GHGs) are included as a sub-set of environmental impacts within LCA and are the focus of the assessment for this Project. Greenhouse impacts tend to be the most consistently reported, given the greatest extent of pollutant emission data known about GHGs. GHGs are a group of gaseous compounds, which are able to absorb heat from infrared radiation. Energy from the sun drives the earth's weather and climate, and heats the earth's surface; in turn, the earth radiates energy back into space. Atmospheric GHGs (water vapour, carbon dioxide and other gases) trap some of the outgoing energy, retaining heat somewhat like the glass panels of a greenhouse. The main GHGs are water vapour, carbon dioxide, ozone, methane, nitrous oxide and chlorofluorocarbons (CFCs). Apart from CFCs, all these gases occur naturally. A second set of gases contributes indirectly to the greenhouse effect by reacting together in the atmosphere to produce ozone. These gases are carbon monoxide, nitrous oxides (NO_x), and gaseous organic compounds other than methane.

Since the industrial revolution, human activities have rapidly increased the concentration of greenhouse gases in the atmosphere (e.g. according to the USEPA (2000) carbon dioxide concentrations have increased nearly 30% since the industrial revolution). As a result, the risk of changes in the earth's climate has been predicted with potential significant consequences to human activities.

8.8.3 Scope of the LCA

The LCA has been conducted to assess the impact of the Project on the PKSW overall greenhouse gas profile. A simplified LCA was undertaken based on the framework provided by *ISO 14040: 1997 – Environmental Management Life-cycle Assessment – Principles and Framework and other associated references*. This framework requires, *inter alia* that the boundaries, assumptions and limitations of the LCA be carefully defined and that the methodology taken, data quality and conclusions drawn from the study are appropriate to the goal.

The goal of this LCA is to determine the relative, rather than absolute, greenhouse gas emissions from the construction and operation of the Ore Preparation Area following the upgrade.

8.8.4 Boundaries and Off-sets

To assess this process, three boundary diagrams showing the inputs and outputs of the process have been prepared (see **Appendix G**). A system boundary diagram demonstrates the relationships between the different inputs and outputs and shows which of these are included in the assessment and which are not. The system boundary adopted and the principal inputs and outputs assessed for the operational phases in this LCA are included in **Appendix G** (**Figure G1, G2** and **G3**). The system

boundaries for this assessment have been nominated in a manner consistent with BHP Billiton's Operational Boundaries for GHG reporting (BHP-Billiton, 2000) as used by BlueScope Steel Limited.

System boundaries have been selected on the basis of the level of concept design information available for each phase of the Project. This assessment has been made on a coarse concept design. Once the proposed development has been approved (both internally and externally) the detailed design will be undertaken, which will provide greater detail on the construction and operational requirements. For the purposes of this LCA, each phase has been assessed using common elements, where possible, with differences assessed where these exist. Since, at this stage, only broad estimates of the magnitude of the required resources is possible, the level of accuracy gained by quantifying such inputs and outputs would not aid any absolute comparison made. The LCA is also bound by the available inputs and outputs (life-cycle inventory (LCI)) data for the processes likely to be encountered during construction and operation.

The system boundaries adopted for this LCA are as follows:

- Processes in other areas of the PKSW generate recycled products (by-products) that form input materials into the sinter making process. These materials are not included within the boundary of the GHG analysis because they are accounted for as an input in the production of the product for which they are a by-product. To include these in the sinter making process would double count the energy required in their production and would be misleading. The energy and resultant GHG in the transport of these materials within the PKSW to the Sinter Plant are included. The contribution of these materials in the overall material balance for the production of sinter is included;
- Similarly the use of the sinter produced by the Sinter Plant is not included as this is accounted for in the blast furnaces for slab production;
- Processes within the Sinter Plant such as screening, de-dusting and cooling generate materials that are either partially or fully collected and are re-introduced with water and other materials back into an earlier stage of the process (cold return fines) to result in usable product. Such materials are deemed to be intrinsic within the operation of the Sinter Plant and are simultaneously inputs and outputs of the process. Consequently, these products do not contribute to the GHG profile of the Sinter Plant. The internal transport of these materials are accounted for in the electricity consumption for the plant and the volumes of these materials are taken into account with reference to the total material input of the sinter making process;
- Infrastructure required to build the facility as specified including the demolition of existing structures, the excavation and disposal of materials and the construction and installation of concrete and steel structures are included within the construction assessment;

- Infrastructure required to operate the facility where it is possible to quantify this infrastructure given the conceptual design stage are included. Materials necessary to operate the Sinter Plant, including the manufacture of electrical power and the transport of materials to and across the site are included;
- It has been assumed that the timescale for construction impacts will be short in duration (nominally six months). The contributions of various components of construction have been calculated based on their absolute contribution rather than specific durations. The impacts of operation have been assessed and reported for a one year period. However, an off-set equivalent to a full shut down of the Sinter Plant for a period of 30 days in year one (for the purposes of construction) has been included; and
- Transport associated with construction and operation only is included. Transport implications associated with the import of materials from overseas have been included on a tonne per kilometre (t/km) basis. The transport of recycled product within the PKWS boundaries to the Raw Materials Handling Area or Sinter Plant has been excluded on the grounds that no additional production of these by-products will be produced and that this material is already transported around the site.

Off-sets

The greenhouse gas impacts identified in this study are tempered by the following off-sets:

- During construction, aspects of the Sinter Plant will be demolished. Such steel, concrete and other materials that can be recovered during this demolition will be re-used elsewhere on the PKSW site and as a result new materials will not be required to meet this need. Consequently the GHG value of these quantities of material are off-set against the overall GHG production of the Project;
- At the completion of the sintering process (i.e. the point on the strand where the sinter enters the cooler), ducting is already provided to recover the heated air rising from the hot sinter. This captured energy is re-circulated in the system to pre-heat air and in the annealing process at the start of the sintering process. By capturing this energy, this cooler heat recovery system consequently off-sets the need to generate new energy for this purpose;
- In the proposed system (either with the use of more natural gas or more coke ovens gas), and dependent upon the approval and efficiency of the sulfur rich gas (SRG) recovery plant (gypsum plant – approved under a separate planning process outside of the scope of this EA) the SO_x generated by the sintering process will be captured and used in the generation of gypsum. A conservative off set of a 30% recovery of SO_x has been assumed although in practice SO_x recoveries of up to 90% are expected from the gypsum plant; and
- During Year one, an off-set equivalent to a full shut down of the Sinter Plant for a period of 30 days has been included to account for construction when greenhouse gases are not produced.

8.8.5 Assumptions

Key assumptions adopted in the LCA are as follows:

- During the pre-upgrade planning phase, no sinter production increases are undertaken to cover the down period but strategies to maintain blast furnace operation and slab production other than sinter stockpiling are undertaken as described in **Section 6.3.3**;
- Usable sinter increases from current levels by 20%. All inputs to the manufacture of sinter as shown in **Appendix G** increase with the exception of:
  - Blast furnace flue dust which is limited by recovery elsewhere in the PKSW;
  - Coke breeze which remains relatively constant;
  - Limestone which is increased by a fixed amount to substitute the limestone reduced to the blast furnace intake as a result of a reduction in the tonnes of imported pellets used in iron making;
  - Activated char pellets which are a consumable within the waste gas cleaning plant that are limited by annual flow through the waste gas cleaning plant;
  - Coke ovens gas which is either reduced to zero or increased to approximately three times current usage (the new ignition burner will use either COG or natural gas)[14];
  - Natural gas which is either increased by approximately three times current COG energy or remains unchanged (the new ignition burner will use either COG or natural gas)[1]; and
  - Anthracite which is increased by either 9% or 14% dependent upon whether more coke ovens gas or more natural gas is used respectively (dependent upon the operating scenario chosen).
  - The existing heat recovery system will remain in the uprated plant, so that the heat from the first section of the Sinter Cooler will still be recycled to the pre-heat and annealing hoods on the Sinter Strand to maximize energy recovery.
- The location of construction materials and process consumables for the Sinter Plant are sourced (and consequently transported) from other locations within 10km of the Sinter Plant;
- Electricity is derived in NSW from predominantly non-renewable (black coal fossil fuel) sources; and
- Operation of the plant is variable and due to maintenance and downtime, actual operational time is equivalent to 7886 hours per year (90.02%)[15]. Predicted values are based on 93% availability.

[14] *One input into the selection of the use of COG or NG for use in sintering has been the greenhouse gas generation assessed in the LCA. BlueScope Steel has identified NG as the appropriate feed gas.*

[15] *Based on actual operational data for the 2004/05 operating year. During Year 1, operation is calculated as 335 days to allow a 30 day construction period.*

8.8.6 Results and Conclusions

Construction

The relative contribution of construction to GHGs, consisting of emissions from demolition of existing Sinter Plant components, excavation, construction of new steel and concrete and transport is approximately 187,286 tonnes of CO_2-equivalent (t CO_2-e (about 14% of the current annual operating emissions from the Sinter Plant). This is calculated based on the summation of published emission factors for the use of different equipment types, activities and the avoidance (recycling) or production of new materials. This contribution is negligible when compared to a typical 20 year design life for major equipment and when compared to the overall annual GHG contribution of the PKSW.

Operation

Currently the Sinter Plant produces approximately 1,360,532 t CO_2-e per annum which, excluding transport, is about 10% of the total steelworks GHG CO_2-e contribution. The transport contribution is approximately 198,402 t CO_2-e and is attributed to the transport of input materials by truck, rail or ship to the Ore Preparation Area.

After the upgrade, the annual operation of the Sinter Plant will result in an increase in the GHG contribution of approximately 7.4%. Since the major GHG contributions come from the use of anthracite and coke breeze, the choice of either natural gas or coke ovens gas has a negligible (0.03%) difference on the total GHG profile under the upgrade operational scenario. In the year construction occurs, the 30 day shut down of the Sinter Plant will reduce the annual emissions by approximately 120,800 t CO_2-e.

Whilst small gains in GHG reductions can be made using natural gas in place of coke ovens gas (in the order of approximately 8,350 t CO_2-e annually) the total GHG profile using natural gas actually increases as a result of fewer tonnes of anthracite being off-set by the use of indigenous fuels. That is, the annual operation of the Sinter Plant using more coke ovens gas is approximately 1,469,382 t CO_2-e compared to 1,469,950 t CO_2-e using natural gas.

The two possible operating scenarios represent increases of 8.00% for coke ovens gas and 8.04% for natural gas on the current Sinter Plant operating contribution of GHGs and increases the overall Sinter Plant contribution by 1% to 13% of the GHG profile for PKSW.

Overall, the transport component of the GHG contribution following the upgrade increases by 2% to approximately 19% accounted for by the finite nature of recycled by-products that can be sourced within PKSW as input into the sinter making process and the need to import additional materials to account for the shortfall.

Conclusion

The operational impacts for one year of operation in the upgraded Sinter Plant far exceed the total construction impacts. Over a typical 20 year design life, the operational impacts will totally dominate the construction impacts.

The major influence on the outcome of this LCA is from the use of anthracite as a fuel source. Alterations of the proposed fuel source to eliminate coke ovens gas in favour of natural gas will result in GHG benefits but these benefits are dwarfed by the GHG contribution made by the use of anthracite. The shipping of large volumes of anthracite over large distances also impacts strongly on the GHG profile of the Sinter Plant. Opportunities to maximize the use of natural gas and minimise the use of anthracite (including its transport) will have positive benefits in reducing GHG emissions from Sinter Plant operation. Reducing the transport tonnages and distance of all bulk raw materials (e.g. ores and fluxes) will also reduce the GHG contribution.

Under the current and proposed upgrade arrangement, the Sinter Plant makes significant GHG savings by reusing existing by-products from elsewhere within PKSW and in the cooler heat recovery system (in the order of 8,000 t CO_2-e annually). The proposed alteration of fuel mixes and the continued reuse of by-products and of annealing and pre-heating energy will continue to assist in minimising the GHG emissions from the Sinter Plant. A 20% increase in the production of usable sinter will be achieved by an increase of less than 7.5% of GHG from the Sinter Plant and an overall increase in the Sinter Plant's contribution to the GHG profile of PKSW by 1%. Where possible, opportunities should be taken in the upgrade to minimise anthracite use in favour of indigenous fuel sources, particularly natural gas, minimise bulk material transport and maximise the recovery and reuse of PKSW by-products and potentially lost energy through mechanisms such as the cooler heat recovery system.

8.9 Waste

8.9.1 Summary Assessment of Director General of the Department of Planning EARs

The Director General of the DoP has recommended the following environmental outcomes related to waste. These outcomes and how they are addressed are summarized below.

The development must be designed, operated and maintained:

- *In accordance with the principles of the waste hierarchy and cleaner production.*

  Reuse and recycling is integral to the Ironmaking process. All unsuitably sized sinter is re-sintered and collected dust is recycled during the sintering process. The principles of the waste hierarchy will continue to be incorporated into the operation of the Ore Preparation Area.

- *To ensure that the handling, processing and storage of all materials used at the premises does not have negative environmental or amenity impacts.*

  Handling and storage of hazardous materials throughout construction and operation will be in accordance with the relevant guidelines and licences.

- *The beneficial reuse of all wastes generated at the site are maximized.*

  As noted above, beneficial reuse of waste is integral to the Ironmaking process. During construction, wastes will be reused or recycled where possible. Reuse options for construction include recycling of waste steelwork from dismantling of the Sinter Cooler.

  BlueScope Steel is currently undertaking trials to treat the electrostatic precipitator dusts. These trials are expected to be completed in 2009. If alternatives to disposal are unable to be identified by this time, the stored electrostatic precipitator dust and new arisings will be disposed at an appropriate landfill in accordance with relevant legislation.

- *To ensure that any process residues and contaminated products are stored or managed appropriately.*

  No contaminated products are expected to be generated during construction. If contaminated materials are encountered, they will be stored and disposed of appropriately. Waste materials generated during operation will continue to be managed as they are at present.

In addition:

- *Liquid and non-liquid waste residuals should be classified and managed according to the Environmental Guidelines: Assessment, Classification and Management of Liquid and Non-Liquid Wastes (NSW EPA, 1999).*

  All wastes will be classified in accordance with the *Environmental Guidelines: Assessment, Classification and Management of Liquid and Non-Liquid Wastes (NSW EPA, 1999)* prior to disposal. Wastes will then be managed in accordance with these guidelines.

8.9.2 Construction Impacts and Mitigation Measures

Scrap steelwork from the Sinter Strand Lowering Wheel relocation, the Sinter Strand Waste Precipitators rebuild, the Sinter Cooler rebuild and the Primary Yard By-pass Conveyors works will be the most significant waste generated as a result of the upgrade works. This material will be recycled following removal within the PKSW by re-melting the steel in the BOS furnace. Approximately 850 tonnes of steel scrap will be removed.

Other waste material generated during the upgrade works will include 345m^3 of soil from excavations, and minor quantities of waste oils that will be removed from equipment before demolition.

Given that minor excavation will be required within the Ore Preparation Area, disposal of soil material is not expected as excavated soil will be reused as fill on the PKSW site. However, any excavation and removal of soils will be classified in accordance with NSW EPA (1999) *Assessment, Classification and Management of Liquid and Non-liquid Wastes Guidelines* to determine how to appropriately dispose of the material; the preference being to reuse any excavated material as fill elsewhere within

PKSW. A description of the existing soils in the vicinity of the facilities, including potential contamination and acid sulphate soils is provided in **Section 8.7**.

Construction wastewater management is discussed in **Section 8.4**.

The following additional mitigation measures for the management of waste will be implemented:

- Where possible, waste materials will be reused in construction activities on or recycled/reused off-site;
- Packaging minimisation and reuse initiatives will be implemented as part of the procurement;
- Waste types will be identified prior to construction commencement (where possible);
- Should on site waste separation be practicable, waste disposal containers will be provided for the collection and recycling/disposal of all industrial and domestic waste;
- Awareness of waste minimisation processes will form part of the site induction program;
- Depending on the waste classification of material to be removed, the use of licensed waste transporters may be required. The classified waste material will be disposed to a waste management facility licensed to accept the classification of waste and disposal documentation is required;
- Bunded and impervious storage areas will be provided for fuels and chemicals in accordance with *AS1940 – Storage and Handling of Flammable and Combustible Liquids* and DEC technical guidelines *Bunding and Spill Management*. Bunded areas will have a storage capacity of 110% of the volume of stored;
- Any activity that may result in the spillage of a chemical, fuel or lubricant, will be undertaken by approved methods; and
- A spill kit will be maintained on site at all times where chemicals are used or stored.

8.9.3 Operational Impacts

There will be no change to existing waste management processes associated with the Ore Preparation Area as a result of the reline Project.

8.10 Cumulative Environmental Impacts

The Project assessed in this EA has the potential to have cumulative impacts during its construction and operation. There are also other Project within PKSW that have been identified as potentially having cumulative impacts with the Project, which include:

- No.5 Blast Furnace Reline Proposal;

- Pickle Line and Cold Mill Upgrade Proposal; and
- Proposed Steelworks Cogeneration Plant.

The degree to which these projects have cumulative impacts on the Ore Preparation Upgrade Project, depends on the approval, timing and staging of each.

In addition the 'Expansion of the Port Kembla Cargo Handling Facility', proposed by the Port Kembla Ports Corporation and approved in April 2006, has the potential to have cumulative impacts with the Ore Preparation Upgrade Project.

A description of these developments, their status in the approval process and the nature of the potential cumulative impacts with the Ore Preparation Area upgrades are discussed below.

8.10.1 Proposed No.5 Blast Furnace Reline

The No.5 Blast Furnace Reline Proposal is focused on ensuring the security of BlueScope Steel's steel making operations. These maintenance works will not result in a capacity increase. Additionally, process improvements will not be incorporated within the works. Thus, operational impacts of the proposal will be similar to the current operating impacts.

The major impacts that result from this proposal consist of construction impacts, specifically air quality, traffic and noise impacts during construction works. These impacts will be short term impacts only and will not impose significant changes to the surrounding environment. A significant portion of the Ore Preparation Area upgrades are scheduled to be undertaken during the proposed No.5 Blast Furnace Reline works, as process interruptions will be minimised by undertaking these two proposals concurrently. Thus, the main cumulative impacts of these proposals are air quality, traffic and noise impacts due to concurrent running construction phases.

8.10.2 Pickle Line and Cold Mill Upgrade Proposal

This project involves an upgrade of the Pickle Line and Cold Mill and will increase the production of both Cold Rolled Full Hard (CRFH) coil (from 450,000 to 700,000t/year) and Hot Rolled, Pickled and Oiled (HRPO) (15,000 tonnes to 90,000t/year). Overall there will be no change to the total steel making capacity as less Hot Rolled Coil (HRC) and more CRFH and HRPO will be sold. To increase production of these products a number of upgrades will be made to the Pickle Line and Cold Mill equipment and associated facilities.

The Pickle Line and Cold Mill are located inside existing buildings, and no changes to the buildings will occur as a result of this Project. However, a new building for the Roll Coolant System will be constructed adjacent to the existing buildings. Also, changes are required to the equipment and operations of the Pickle Line, Cold Mill and associated facilities to increase efficiency, provide greater operating safety and meet a market demand for different types of rolled product.

The upgrade to the Pickle Line and associated processes include an increase in the level of automation of the facilities, a reduction in the cycle time, addition of a tension leveller to improve pickling efficiency, replacement of existing pickle tanks and associated installations including hoods and heating equipment, and addition of a Hot Rolled Pickled and Oiled (HRPO) dispatch facility.

The upgrade for the Cold Mill will include the instantiation of Mill automation, which will achieve higher rolling capacity. This will require the demolition and removal of the existing once-through coolant system and the installation of a new recirculating coolant system. Additionally, the entry and exit ends will be modified to enable a shorter cycle times and improved strip quality.

It is currently projected that the Pickle Line upgrade will commence in December 2006 (the Cold Mill has been delayed for 12 months). Thus construction works for the Pickle Line and Cold Mill should not overlap with the Ore preparation Upgrade construction period.

8.10.3 Steelworks Cogeneration Plant

This Proposal has not yet received internal approval.

Consent for the Illawarra Cogeneration Project (ICP) was granted by WCC in 2001. This project was to use indigenous fuel generated at PKSW (i.e. COG, BFG and BOS Off gas) and natural gas to generate steam for use in PKSW. When initially proposed, BlueScope Steel's partner in the project was to have been Duke Energy International. However, the project did not proceed in its original form and the exact timing for the proposal is not yet known. Construction has commenced but at this stage is not ongoing.

In terms of construction, it is possible that the construction period for this Project could overlap with the other proposals described above. Should they overlap, there will be some additional impacts associated with construction traffic both inside and outside the Steelworks and construction noise.

8.10.4 Proposed General Cargo Handling Facility

This proposal is to develop a general cargo handling facility to be constructed adjacent to the Inner Harbour of Port Kembla. This will include the development of land immediately north of the general cargo handling facility for cargo and motor vehicle storage and processing, reconstruction of Tom Thumb Road to the north of the expanded facility, redevelopment of Eastern Basin Berth No. 4, construction of a new Multi-Purpose Berth No. 3 and extension of the existing Multi-Purpose Berth by 80 metres to the east.

Construction works for the Project will include the relocation of the existing rail spur to align with the eastern boundary of the site, development of a site entry and queuing area and car park, fencing, signage, lighting, paving and stormwater drainage works. Additionally, works will also include the demolition of existing buildings, construction of several new buildings, the construction of two wash bays and three cargo sheds for the storage of weather-sensitive break-bulk cargo.

This proposal will have a positive cumulative impact on the employment situation within the area as it will increase employment opportunities and associated positive flow-on impacts to the local and regional economy. A negative cumulative impact of this proposal will be increased traffic volumes on the surrounding road network.

The construction period will not be occurring during the Ore Preparation Area upgrades construction period, thus cumulative construction impacts will not result from this proposal.

9 Environmental Management

9.1 Summary of Recommended Mitigative Measures

Measures to mitigate the predicted environmental impacts of the Project have been recommended in **Section 8**. These measures are summarised below.

Table 9.1 summarises the proposed mitigative measures to be implemented during construction and commissioning and **Table 9.2** summarises those to be implemented during the operational phase of the Ore Preparation Area following commissioning.

9.2 Site Management Plan

Specific plans to manage the environmental impacts of construction activities will be prepared as part of the Project Management Plan for the construction of the Project. The following plans will be prepared (among others):

- Environmental Management Plans (EMP);
- Safety Management Plan (SMP); and
- Incident Management Plan (IMP).

This EA has recommended that certain mitigative measures be implemented during the construction of the Project. These mitigative measures are listed below in **Table 9.1** and will be incorporated into these plans as outlined below.

Table 9.1 Recommended Construction and Commissioning Mitigative Measures

	Summary of Mitigative Measures
Hydrology and Flooding	No specific measures required.
Hydrogeology and Groundwater	If groundwater requires removal during construction works it will be sampled and analysed to determine appropriate method of disposal.
Soils	A Soil and Water Management Plan will be prepared as part of the Construction EMP to minimise soil erosion and sediment transportation (refer to Surface Water Quality below).
	The acid sulphate soil management plan used by BlueScope Steel will be activated if any acid sulphate soils are identified.
	Soils removed from site will be classified in accordance with NSW EPA (1999) *Assessment, Classification and Management of Liquid and Non-liquid Wastes Guidelines* to determine how to appropriately dispose of the material; the preference being to reuse any excavated material as fill elsewhere within PKSW.
Surface Water Quality	The Soil and Water Management Plan will include the following: ▪ Procedures for appropriate spill containment, cleanup and disposal; ▪ Sediment and erosion control measures will be installed prior to any construction activities and would be maintained in an effective condition until the site is rehabilitated; ▪ Access to the construction sites will be controlled, and vehicles and machinery will be kept to well-defined areas within the construction sites; ▪ Disturbed sites will be rehabilitated as soon as possible;

	Summary of Mitigative Measures
Surface Water Quality (cont.)	▪ Any excavated soil will be kept on site; and ▪ To ensure the successful implementation of the Soil and Water Management Plan, monitoring of environmental controls will be undertaken during the construction phase.
Aquatic Flora and Fauna	Mitigation measures for aquatic flora and fauna will be in accordance with the Soil and Water Management Plan to avoid erosion and migration of potentially contaminated soils into the harbour and to prevent increased turbidity levels in Allans Creek.
Terrestrial Flora and Fauna	The mitigative measures outlined in the Surface Water Quality Section of this table will minimise potential impacts on marine protected species.
Air Quality	A dust control plan will be developed and incorporated in the construction EMP. The plan will include dust suppression controls, responsibilities for implementation of the controls and monitoring and reporting requirements. Dust will be monitored visually during construction.
	Exposed surfaces or any potential dust generating area (e.g. soil stockpiles or unsealed areas where machinery may be operating) will be regularly watered.
	Land disturbance will be confined to minimum workable areas and for the shortest possible time.
	Access to the construction sites will be controlled and vehicles and machinery will be kept to well-defined areas.
	Where possible, soil disturbance will be undertaken in stages to minimise the generation of dust.
	Temporary soil stockpiles will be located in areas protected from wind.
	Trucks transporting construction materials that could generate dust will be covered when entering and leaving the construction site.
	Standard health and safety procedures for construction employees will be implemented at the construction site, including requirements for protective equipment (masks, etc) where dust generation is unavoidable.
	Vehicle and machinery exhaust systems will be maintained so that exhaust emissions comply with relevant standards.
	The internals of the precipitator will be completely washed down at the start of the Sinter Plant shut down. The washdown slurry will be collected and disposed of in accordance with established procedures.
Hazards and Risk	No specific measures required.
Human Health	Construction activities will be undertaken inside PKSW in an area with access restrictions to non-authorised construction personnel.
	In relation to potential contamination at the site, the SMP will detail any required personal protective equipment requirements (e.g. usage of gloves, breathing apparatus, etc) and occupational health and safety procedures (e.g. personal hygiene precautions such as washing hands before eating, drinking or smoking, decontamination areas, etc) for employees, contractors and visitors.
Traffic and Transportation	A Traffic Management Plan will be prepared in consultation with WCC as part of the Construction EMP.
	Truck deliveries at the construction site will avoid peak traffic hours (i.e. 7.00-8.00 am and 5.00-6.00 pm). Truck deliveries will be coordinated so they can be evenly distributed during the construction day as well as over the construction period.
	Truck access/exit to and from PKSW will be coordinated to minimise congestion of PKSW internal roads.

	Summary of Mitigative Measures
Traffic and Transportation (cont.)	Construction traffic will avoid residential areas. Construction traffic routes will be established along main and arterial roads and will be documented in the plan. Truck drivers will be trained regarding selected routes and access to the construction site.
	Consideration will be given to the transportation of some construction materials and machinery by rail and sea.
	Special arrangements will be sought as required with relevant authorities (RTA, police and/or WCC) regarding appropriate traffic controls for the transport of oversized vehicles on the public road system.
Noise	Based on the predicted construction noise levels, all construction activities, except pile driving and spoil transportation, can occur 24 hours per day. Pile driving and spoil transportation will be limited to 7am to 6pm Monday to Friday and 8am to 4pm Saturday.
	New fans and silencers will be designed to ensure noise from the fans is not tonal at any residential receiver.
	Trucks will minimize the use of public roads by using internal Steelworks roads as much as possible.
	Truck movements outside of daytime construction hours will be minimized to reduce any noise impacts on residents.
	BSL will undertake a noise assessment post development to assess compliance with the predicted noise levels detailed in this document. The assessment will include an investigation of tonality, impulsiveness and vibration.
Visual	No specific measures required.
Non-Indigenous Heritage	No specific measures required.
Aboriginal Heritage	No specific measures required.
Waste	All waste material will be classified and disposed of in accordance with the NSW EPA (1999) *Assessment, Classification and Management of Liquid and Non-liquid Wastes Guidelines.*
	Where possible, waste materials will be reused in construction activities on or recycled/reused off-site.
	Packaging minimisation and reuse initiatives to be implemented as part of the procurement.
	Where possible, waste will be identified prior to construction commencement.
	Should on site waste separation be practicable, waste disposal containers will be provided for the collection and recycling/disposal of all industrial and domestic waste.
	Awareness of waste minimisation processes will form part of the site induction program.
	Depending on the waste classification of material to be removed, the use of licensed waste transporters may be required. The classified waste material will be disposed to a waste management facility licensed to accept that classification. Disposal documentation will be obtained as required.
	Bunded and impervious storage areas will be provided for fuels and chemicals in accordance with *AS1940 – Storage and Handling of Flammable and Combustible Liquids* and EPA technical guidelines *Bunding and Spill Management*. Bunded areas will have a storage capacity of 110% of the volume of stored.
	Any activity that may result in the spillage of a chemical, fuel or lubricant, will be undertaken by approved methods.
	Spill kits will be maintained on site at all times where chemicals are used or stored.

9.2.1 Outline of Construction Environmental Management Plan (EMP)

An EMP will be prepared for the construction and commissioning of the Project. BlueScope Steel will be responsible for ensuring that the EMP adequately addresses environmental issues and the conditions of approval. The EMP will include (but not be limited to) the following information and control plans:

- **Project Objectives and Scope** – Once approval of the Project has been obtained, the Project scope and objectives will be reassessed within the terms of any approval conditions. This may require additional measures to mitigate environmental impacts specified in the approval conditions;
- **Permits and Approvals** – All permits and approvals required prior to and during the construction of the Project will be identified in the Construction EMP. This will provide a checklist for construction contractors to ensure all permits and regulations are complied with and relevant approvals are obtained;
- **Consent Conditions** – DIPNR consent conditions will be outlined within the Construction EMP with instructions on how to meet the conditions of approval. This will provide a checklist for construction contractors to ensure that consent conditions in the most effective manner;
- **Complaints Procedure** – A procedure for managing complaints received during construction will be provided in the Construction EMP. The procedure will provide details on undertaking and monitoring actions following receipt of a complaint;
- **Construction Methods and Environmental Management Procedures** – This section will provide an accurate description of the proposed construction activities. Location plans will be provided. Environmental considerations to be taken into account during all construction activities will be provided. Specific requirements relating to noise, dust, traffic, etc will be outlined in other sections of the Construction EMP and will include timing details and who is responsible for their implementation;
- **Soil and Water Management** – A Soil and Water Management Plan will be prepared as part of the Construction EMP. The plan will detail the methods of erosion and sediment control, maintenance requirements, location requisites for effective operation of erosion and sediment control measures and related monitoring and reporting requirements. The Soil and Water Management Plan will also address soil contamination issues and management procedures to minimise the risk of contaminated soils impacting outside of construction sites;
- **Dust Management** – A Dust Control Plan will be developed as part of the Construction EMP. The plan will include dust suppression controls during construction, responsibilities for implementation of controls and reporting requirements;

- **Noise Management –** A Noise Management Plan for construction noise control will be developed as part of the Construction EMP. This will include details of noise standards to be met, noise monitoring requirements and noise control measures to be implemented;
- **Traffic Management –** A Construction Traffic Management Plan will be prepared as part of the Construction EMP. The main purpose of this plan will be to coordinate construction traffic operations and maximise safety. The plan will detail construction traffic routes, access management, traffic safety requirements, traffic timing and parking requirements;
- **Waste Management –** This section will outline waste management procedures, including waste recycling and reuse measures, waste disposal measures (when reuse is not feasible), and the identification of the closest waste disposal areas. The waste management plan will be developed to minimise the generation of waste during construction and maximise reuse, recovery and recycling of waste products;
- **Monitoring and Auditing –** A monitoring program will be developed during the preparation of the Construction EMP. The monitoring methods, locations, frequency, criteria, reporting and responsibilities will be detailed in this section of the EMP. Audit requirements, audit frequency and responsible personnel will also be outlined. Monitoring requirements are further discussed in **Section 9.5**; and
- **Communications and Training –** Employee training and awareness programs will be developed to make employees aware of environmental responsibilities and potential consequences of departure from construction procedures. Communication procedures will also be developed in the Construction EMP.

The Construction EMP will be amended as necessary to incorporate the results of any monitoring undertaken.

9.2.2 Construction Safety Management Plan (SMP)

A SMP will be prepared for the construction and commissioning of the Project. The SMP will address employee, contractor and visitor occupational health and safety issues such as noise, chemical management, air emissions, incident management, etc associated with construction of the Project. The SMP will also cover organisation, roles and responsibilities for health and safety, performance measurements and reporting, hazard and risk management procedures, safe work procedures, OH&S communication and training requirements, and occupational health and hygiene requirements.

The SMP and EMP will cross-reference each other, as appropriate, to address issues that have both safety and environmental aspects (e.g. noise and dust issues).

9.2.3 Construction Incident Management Plan (IMP)

An IMP will be prepared for the construction and commissioning of the Project. The IMP will provide procedures to follow in the event of an incident, including

notification, action and response procedures. The plan will also include cause identification and review of procedures if required. The IMP will cover environmental as well as safety incidents.

Should an environmental or safety incident occur which causes, or has the potential to cause, environmental harm, the IMP will govern responses in accordance with specific incident procedures for key activities. Incidents addressed in the IMP will include events such as chemical spills, power shortages or flooding.

The IMP will detail corrective actions/improvements to reduce the risks and effects of incidents, key personnel responsible for coordinating required actions, internal and external (e.g. DEC) reporting and communication requirements, auditing requirements and incident monitoring requirements and training requirements for staff working in relevant areas.

The IMP will also include procedures for causal analysis following an environmental incident. This will ensure that each incident is analysed and any changes to existing standard operating procedures are amended as relevant to prevent a recurrence.

9.3 Environmental Management During Operation

The Ore Preparation Area will continue to be operated in accordance with BlueScope Steel's Policies and System covering the management of health, safety, environmental performance and incidents (as well as a range of other operational issues). The measures recommended to mitigate predicted environmental impacts during operation (listed in **Table 9.2**) will be included in the Ore Preparation Departmental Environment Manual.

Key environmental management issues that will be addressed include:

- Consent conditions;
- Requirements for emissions to air;
- Requirements for chemical handling;
- Soil management; and
- Waste management.

Table 9.2 Recommended Operational Mitigative Measures

	Summary of Mitigative Measures
Hydrology and Flooding	No specific measures required.
Hydrogeology and Groundwater	Groundwater will continue to be managed via the implementation of the existing environmental management systems and procedures.
Air Quality	Air emissions will continue to be monitored in accordance with the EPL conditions (as amended) and the conditions of consent for the Project.
Soils	Once construction is complete any areas of bare soil remaining will be appropriately landscaped to minimise erosion from the site.

	Summary of Mitigative Measures
Soils (cont.)	In order to avoid soil contamination during operation, controls implemented will include bunding all chemical storage areas and chemical unloading areas and training of all plant personnel that may come into contact with chemicals in handling procedures.
	The SMP will incorporate, in the form of an IMP, appropriate spill containment, cleanup and disposal procedures that site personnel will undertake in spillage and leakage events.
Noise	A noise assessment will be undertaken post development to assess compliance with the predicted noise levels detailed in this document. The assessment will include an investigation of tonality, impulsiveness and vibration.
Aquatic Flora and Fauna	No specific measures required.
Terrestrial Flora and Fauna	No specific measures required.
Hazards and Risk	No specific measures required.
Human Health	No specific measures required.
Surface Water Quality	No specific measures required.
Traffic and Transportation	No specific measures required.
Visual Amenity	No specific measures required.
Non-Indigenous Heritage	No specific measures required.
Aboriginal Heritage	No specific measures required.
Waste	No specific measures required.

9.4 External Communications

Following approval of the Project, any communication with DEC will be in accordance with the requirements of the conditions of consent as defined within the DA. In addition, communication with the local community will be through the forums currently established by BlueScope Steel and in accordance with BlueScope Steel's current procedures.

9.5 Environmental Monitoring, Auditing and Reporting

Environmental monitoring will be required at all stages of the Project to provide data for appropriate environmental management.

Whilst detailed monitoring programs will be developed during the preparation of the Construction EMP and updated Environment Manuals, an outline of proposed monitoring, auditing, and reporting requirements is provided below.

9.5.1 Construction Phase Monitoring

Monitoring during construction will be undertaken as outlined below.

Surface Water and Erosion Control

During construction, regular monitoring will occur at strategic sites in drains downstream of construction sites. Sampling will be undertaken at regular intervals during earthworks. Any sediment and erosion control structures will be regularly

inspected and any defects reported and addressed. During construction, monitoring will include a report on the integrity of structures such as diversion drains, sediment ponds and filter fences. Sediment and erosion controls will be maintained and replaced as necessary.

Monitoring will be the regular monitoring that is currently undertaken as part of the EPL conditions.

All non-conformances to specified criteria will be recorded and corrective action identified. The construction supervisor will review all non-conformances and will certify that appropriate action has been taken to correct non-conformances.

Noise and Vibration

BSL will undertake a noise assessment during development to assess compliance with the predicted noise levels detailed in this document. The assessment will include an investigation of tonality, impulsiveness and vibration.

Other Requirements

Further monitoring requirements may be identified during the approval process and detailed design phase of the Project. Should additional requirements be identified (i.e. traffic), they will be incorporated in the Construction EMP for the Project.

9.5.2 Operational Phase Monitoring

Monitoring following the commissioning of the Project will be undertaken in accordance with the conditions of consent for the Project and the EPL (as amended) for PKSW.

9.5.3 Environmental Audits

Environmental audits will be undertaken during the construction and commissioning and the operational phases of the Project. The audits will check for compliance with the EMP and EPL conditions.

9.5.4 Environmental Reporting

All monitoring results will be reported to meet the requirements of approval conditions. Any environmental incidents will be reported and recorded in a register to provide the basis for identifying and prioritising corrective actions.

10 Project Justification and Conclusions

10.1 Project Justification

The justification of the Project is discussed below having regard to biophysical, economic and social considerations and the principles of ecologically sustainable development (ESD).

10.1.1 Biophysical Considerations

The biological and physical components of the environment were examined in this EA and the impacts of the Project on these components assessed. The main findings are summarised below.

Water Quality, Hydrology and Soils

The Ore Preparation Area will continue to have no process wastewater discharges to surface waterways. Therefore, the Project will not alter the current chemical loading or volume of water discharged to the harbour. Additionally, the Project is not predicted to be affected by, or to cause any flooding.

The Project will reduce process water usage at the Sinter Plant, as the water sprays currently in use on the Sinter Cooler will no longer be required. This will lead to a saving of up to 634kL per day of process water.

Activities during the construction of the Project will not significantly disturb the soils on the Project sites and potential water quality impacts will be managed. To minimise soil erosion and sediment transportation and to avoid impacts from potentially contaminated soils in surface and groundwater, a number of control measures have been recommended for the construction phase. A Soil and Water Management Plan will be prepared as part of the Construction EMP. Groundwater is not expected to be encountered during the construction works.

Terrestrial Flora and Fauna

The Project sites for the development are of very little conservation significance in terms of flora and fauna. The study area is currently occupied by infrastructure and buildings associated with PKSW or paved. The surrounding area is used for heavy industrial purposes. No flora and fauna of significance was observed in the study area and it is considered that no flora or fauna of significance could reasonably be expected to occur or depend on the site. The construction phase of the Project will therefore not have any direct impacts on flora and fauna. A range of mitigation measures will be implemented to avoid the migration of soils outside the construction site which could impact on the harbour and terrestrial animals that depend on it (e.g. marine birds).

Aquatic Ecology

Potential impacts on the aquatic biota of Port Kembla Inner Harbour during construction will be managed by sediment and erosion control measures and chemical spill management. The quality of water being discharged into the Harbour will not change as a result of the Project.

10.1.2 Economic Considerations

The Project will provide a range of economic benefits for the Port Kembla industrial area and the region. The proposed investment in PKSW is expected to ensure its viability and allow PKSW to become more competitive, into the future.

In terms of employment, the construction phase of the Project will generate up to 500 jobs. A proportion of the capital cost of the Project will be spent in the Illawarra region, including the payment of direct income to the local workforce. Other indirect economic benefits will derive from the purchase of materials, payment of licence fees, stamp duties and taxes.

10.1.3 Social Considerations

Air Quality

Dust generated during construction will be controlled by a range of mitigative measures and is not expected to be a significant issue. Dust generated by the Ore Preparation Area during operations will not increase as a result of the proposed upgrades. Air emissions will continue to be monitored in accordance with the EPL licence conditions (as amended).

Human Health

Potential human health impacts of the Project include impacts from air and noise emissions, and storage of hazardous goods. A range of management plans and monitoring has been recommended to mitigate against any potential impacts on human health. Impacts are not considered to be significant given the implementation of these mitigation measures.

Noise

According to the noise modelling undertaken for the EA, construction noise (including noise generated during peak construction periods and/or significant noise generating machinery) will not exceed noise criteria in residential and industrial areas.

The Project will produce acceptable noise emissions during operation and no specific noise control measures are required. Some mitigative measures have been recommended to ensure noise levels from new equipment meet the required levels.

Traffic

Construction traffic will not use roads in residential areas. Construction traffic will only impact on arterial roads in Port Kembla, which are considered well suited to accommodate the additional traffic. A construction traffic management plan will be developed to coordinate traffic operations and maximise road safety. Changes to levels of operational traffic generated by PKSW are predicted to be negligible as a result of the Project.

Visual

Construction activities will be screened by existing facilities and buildings at PKSW and therefore construction visual impacts will not be significant.

The proposed changes to the Ore Preparation Area are considered to have negligible impact on the visual amenity of the area. Additionally, given the industrial nature of the existing facilities at PKSW and the existing buildings on PKSW, the visual impact is not expected to be significant. Post construction, the physical view of the Ore Preparation Area will remain similar to the existing view.

Heritage

No heritage items (Aboriginal or non-indigenous) will be impacted by the Project.

Other Social Considerations

The Project is consistent with the adjacent industrial land uses and activities and with the provisions of relevant planning instruments.

A social benefit of the Project is the ongoing viability of PKSW will ensure that the region can continue to benefit from the income generated by and as a result of the facility.

10.1.4 Implications of Ecologically Sustainable Development

The sustainability of the Project in terms of the principles of ESD is discussed below.

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.

The precautionary principle was applied in the environmental assessment process documented in this EA. Where scientific uncertainty was identified, monitoring and mitigation measures have been recommended. Environmental monitoring and auditing procedures will be established and maintained for the construction, commissioning and operational phases of the Project, and implemented through the Construction EMP and relevant Environment Manuals. The implementation of monitoring and audit procedures as tools to identify and manage actual environmental impacts associated with the Project demonstrates the application of the precautionary principle. In addition to providing assurance that required measures are effectively mitigating potential impacts, these tools ensure that uncertainties during construction and operation are clarified and appropriate action is taken to mitigate any unforeseen impacts.

The proposed developments have been assessed as not posing threats of serious or irreversible environmental damage.

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.

The existing health, diversity and productivity of the environment will not be significantly impacted as a result of the Project. The environmental value of the industrial area is low. The Project will have positive environmental impacts mainly in terms of reducing dust emissions at PKSW. In this respect, the health, diversity and productivity of the environment will be enhanced.

The benefits of the Project cannot be achieved without some degree of environmental impact. The impacts resulting from construction and operation of the Project have been assessed in the EA which has concluded that, subject to the implementation of the recommended mitigative measures, potential environmental impacts can be controlled to acceptable levels. Therefore health, diversity and productivity of the environment will not be compromised for future generations.

Conservation of Biological Diversity and Ecological Integrity

The terrestrial habitat has been heavily modified in the past, with no flora or fauna of significance occurring on or close to the site of the Project. Similarly, the aquatic ecology of the Harbour is largely altered through past activities. As noted above, the Project is expected to reduce dust emissions to air and therefore would have benefits for the biodiversity and ecological integrity of the area.

Improved Valuation and Pricing of Environmental Resources

Economic evaluations of the Project have not included the valuation of environmental resources. Nonetheless, the Project will result in continued operational viability of the steelworks and will be undertaken by more efficient use of indigenous fuels with resultant improvements in air quality emissions per tonne of sinter produced compared to current operations. Design modifications and processing protocols will considerably reduce water usage. These operational changes reflect BlueScope Steel's appreciation of the value of environmental resources.

10.2 Conclusions

An environmental assessment of the proposed construction and operation of the Ore Preparation Area at the PKSW has been undertaken and presented in this EA.

No significant environmental impacts have been identified during the preparation of this EA for either construction or operation. The environmental impacts identified are considered to be able to be mitigated and managed by elimination in detailed design, through the application of specific construction related measures, by the measures currently in place as part of this existing facility and the implementation of additional measures recommended.

The construction of the Project will result in short-term impacts in the local environment. These temporary impacts will be mainly associated with potential for noise generation, soil erosion and increased traffic in the arterial roads of Port Kembla. A range of measures have been recommended to mitigate these and other potential short-term and reversible environmental impacts. A Construction EMP including the mitigation measures recommended in this EA will be prepared during the detailed design phase of the Project. Assuming the Construction EMP is successfully implemented, no significant environmental impacts during construction are predicted.

The construction and continued operation of the Ore Preparation Area and associated facilities will result in socio-economic benefits, including:

- The proposed development will improve the economic performance and operating efficiency of PKSW; and
- The proposed development will employ up to 200 people during construction.

The environmental impacts arising from the ongoing operation of the Project predicted within this EA are not considered to be significant and are within regulatory criteria, goals and objectives. Facility design and existing pollution control devices are capable of maintaining the concentration of air pollutants in emissions to within licence limits and mass loads remain below NSW Government regulatory limits. Mitigative measures identified to manage these impacts will be incorporated in an Operational EMP or into the Sinter Plant and Raw Materials Handling Area Departmental Environment Manuals.

Overall, the EA concludes that the Project will maintain and enhance the existing operations of the Sinter Plant and Raw Materials Handling Area and bring significant socio-economic benefits to the local community and the Illawarra region whilst limiting the ongoing operational environmental impacts.

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