WorleyParsons
resources & energy

BOULDER STEEL LIMITED

Steel Making Facility

Initial Advice Statement

12 November 2008

Level 3, 80 Albert Street
Brisbane QLD 4000
Australia
Telephone: +61 7 3221 7444
Facsimile: +61 7 3221 7791
www.worleyparsons.com
ABN 61 001 279 812

Disclaimer

This report has been prepared on behalf of and for the exclusive use of Boulder Steel Limited, and is subject to and issued in accordance with the agreement between Boulder Steel Limited and WorleyParsons. WorleyParsons accepts no liability or responsibility whatsoever for it in respect of any use of or reliance upon this report by any third party.

Copying this report without the permission of Boulder Steel Limited or WorleyParsons is not permitted.

CONTENTS

List of Tables

List of Figures

EXECUTIVE SUMMARY

Boulder Steel Limited is proposing to construct and operate an integrated steelmaking plant at a site within the Aldoga Precinct of the Gladstone State Development Area (GSDA) in Central Queensland. The plant will produce high quality steel in bloom and round billet form (i.e. semi-finished steel) for export to overseas finishing plants.

Boulder Steel Limited has undertaken a detailed investigation of a number of potential development sites along the eastern seaboard of Australia and particularly within the Gladstone region. A site selection study undertaken for Boulder Steel of the GSDA has indicated the preferred development site for Boulder Steel as being within the Aldoga precinct, to the northeast of the proposed Aldoga rail yard.

The project development plan for the plant specifies ultimate production of 5 million tonnes per annum (Mtpa) of steel product with an initial stage (Stage 1) of production proposed of 2.1 Mtpa. Raw materials will be sourced mainly from Australia, namely iron ore, metallurgical coke, limestone and scrap. Waste gases and heat generated by the iron making process will be captured and used to produce steam to generate electricity for the national electricity market (NB impact associated with the power plant will be addressed by a third party that will develop, own and operate that infrastructure). Metallurgical coal will be railed to sidings in the Gladstone area and then trucked to the site. Iron ore will be delivered via sea to the Port Curtis Fisherman's Landing wharf from mined resources in Australia, and then transferred from a stockpile at the wharf area to the project site utilising haul trucks. Finished steel products will be transported to Auckland Point Wharf for export.

The estimated capital cost of development of Stage 1 of the steel making facility is AUD$1.4 billion. It is expected that development of Stage 2 will require investment of a further AUD$1.4 billion (in today's dollars). Construction and commissioning for Stage 1 will take place over a period of 30 months after financial close, which is expected to occur in the third quarter of 2009.

The benefits to the state of Queensland of the progression of the project are substantial and include:

- Creation of over 600 new long term jobs during Stage 1 and a further 550 jobs in Stage 2 for a total of 1150 new long terms jobs in the operations of the steel making facility;
- Creation of approximately 900 jobs on average over two years during the construction of Stage 1, with an expected peak employment for construction of 1500 persons. Construction phase jobs for Stage 2 are expected to be of similar number to Stage 1;
- Generation of approximately 1800 full time equivalent jobs throughout other sectors of the regional economy for the operations of Stage 1, with a similar number of further jobs expected to be created through the project's ultimate development to Stage 2;
- Improvement of the skill base of the labour pool;
- Development of a new industry base in Central Queensland;

- Development of additional electricity generation capacity through the 'environmentally smart' use of waste heat and gases; and
- Generation of additional export revenue through significant value adding to current export products, with the replacement of the export of steel making materials (iron ore and metallurgical coal) with the export of semi-finished steel products.

Development and operations of the facility will require concurrent development or upgrade of various transport and service infrastructure, including road, rail, power, wharf and pipeline infrastructure, some of which will be managed by third parties. This necessary infrastructure will be contained within the planned infrastructure corridors and development areas for the GSDA and Gladstone region.

This initial advice statement (IAS) provides assistance with the declaration of significance under the *State Development and Public Works Organisation Act 1971* and also:

- Enables stakeholders (including the general community) to determine the nature and level of their interest in the proposal; and
- Assists the Department of Infrastructure and Planning to prepare draft terms of reference for an Environmental Impact Statement (EIS) for the proposed project.

This IAS provides background information regarding the proposal and a brief description of the elements that comprise it. The IAS has been developed to provide an overview of the nature and extent of the potential environmental, social and economic impacts that may be associated with the construction and operation of the proposed project as far as they can be foreseen at this time. The IAS also identifies the key statutory approvals that may be required for the project to proceed, and identifies further environmental studies that may be required to support the project.

The EIS is being developed to consider impacts associated with development of both Stage 1 and Stage 2 of the project to ultimate facility production of 5 Mtpa of semi-finished steel products. The EIS will consider construction and operational impacts of the steel making facility including components; land acquisition and site development, raw materials transport, storage and handling, coke ovens, sinter plant, oxygen plant, blast furnace, basic oxygen furnace, continuous casters, other associated plant and finished product transport.

At this stage it is intended that the EIS will not consider construction or operational impacts of the proposed co-generation power station (to be developed adjacent to the steel making facility). These impacts will be assessed by the proponent of that facility. The EIS will not consider the construction or operational impacts of the proposed multi-user wharf and associated facilities at Fisherman's Landing. These impacts will be assessed by Gladstone Ports Corporation (GPC). The EIS will not consider construction or operational impacts of the development of off-site haul roads, rail loading and unloading stations, or the water and natural gas pipelines proposed to service the site. These impacts will be assessed through other processes. The EIS will not consider the construction impacts of temporary construction workforce accommodation. This development will be assessed through other processes.

1. INTRODUCTION

1.1 Project Overview

Boulder Steel Limited is proposing to construct and operate an integrated steelmaking plant at a site within the Aldoga Precinct of the Gladstone State Development Area (GSDA) in Central Queensland. The plant will produce high quality steel in bloom and round billet form (i.e. semi-finished steel) for export to overseas finishing plants. The project development plan for the plant specifies ultimate production of 5 million tonnes per annum (Mtpa) of steel product with an initial stage of plant production (Stage 1) proposed of 2.1 Mtpa. Raw materials will be sourced mainly from Australia, namely iron ore, metallurgical coke, limestone and scrap. Waste gases generated by the iron making process will be captured and used to produce steam to generate electricity for the national electricity market (NB impact associated with the power plant will be addressed by a third party that will develop, own and operate that infrastructure).

The estimated capital cost of development of Stage 1 of the steel making facility is AUD$1.4 billion. It is expected that development of Stage 2 will require investment of a further AUD$1.4 billion (in today's dollars). Construction and commissioning for Stage 1 will take place over a period of 30 months after financial close, which is expected to occur in the third quarter of 2009. Plant output will increase to full capacity (Stage 2) as soon as practicable after completion of the facility, providing that market conditions remain favourable.

In summary the project is estimated to:

- Create over 600 new long term jobs during Stage 1 and a further 550 jobs in Stage 2 for a total of 1150 new long terms jobs in the operations of the steel making facility;
- Create approximately 900 jobs on average over two years during the construction of Stage 1, with an expected peak employment for construction of 1500 persons. Construction phase jobs for Stage 2 are expected to be of similar number to Stage 1;
- Generate approximately 1800 full time equivalent jobs throughout other sectors of the regional economy for the operations of Stage 1, with a similar number of further jobs expected to be created through the project's ultimate development to Stage 2;
- Improve the skill base of the labour pool;
- Develop a new industry base in Central Queensland;
- Develop additional electricity generation capacity by the 'environmentally smart' use of waste heat and gases; and
- Generation of additional export revenue through significant value adding to current export products with the replacement of the export of steel making materials (iron ore and metallurgical coal) with the export of semi-finished steel products.

An overview of the project processes is provided in Figure 1-1.

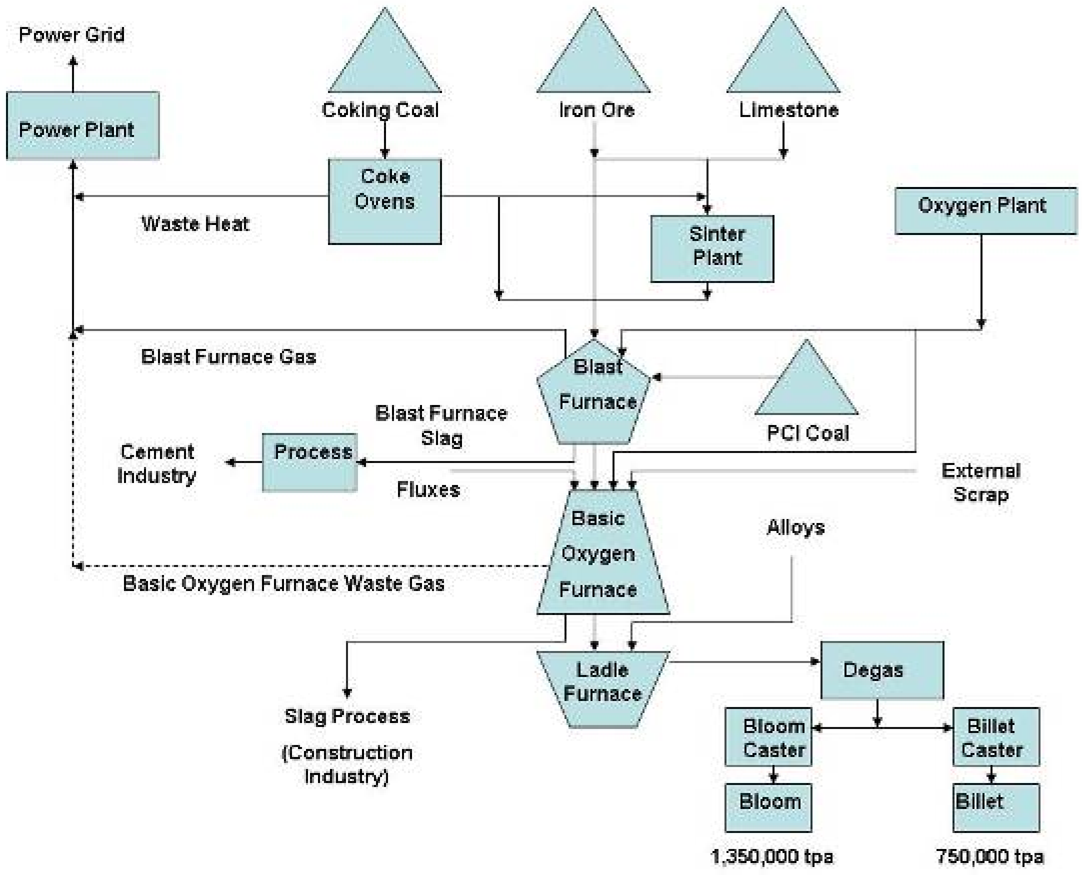

Figure 1-1 Simplified Process Flowsheet[1]

1.2 Document Purpose & Scope

This initial advice statement provides assistance with the declaration of significance under the *State Development and Public Works Organisation Act 1971* (SD Act) and also:

- Enables stakeholders (including the general community) to determine the nature and level of their interest in the proposal; and
- Assists the Department of Infrastructure and Planning (DIP) to prepare draft terms of reference for an Environmental Impact Statement (EIS) for the proposed project.

[1] Stage 1 production only

This IAS provides background information regarding the proposal and a brief description of the elements that comprise it. The IAS introduces the proponents and includes a discussion on the need and justification for the project. The IAS has been developed to provide an overview of the nature and extent of the potential environmental, social and economic impacts that may be associated with the construction and operation of the proposed project as far as they can be foreseen at this time. The IAS also identifies the key statutory approvals that may be required for the project to proceed, and identifies further environmental studies that may be required to support the project.

The IAS and subsequent EIS is being developed to consider impacts associated with development of both Stage 1 and Stage 2 of the project to ultimate facility production of 5 Mtpa of semi-finished steel products.

1.3 Project Proponent

The sponsor for the Steel Making Facility Project proposed for the Gladstone region is Boulder Steel Limited (BGD). BGD is an Australian publicly listed company (ACN 009074588) with its principal office address at Level 2, 16 Byfield Street, North Ryde, New South Wales. BGD has manufacturing facilities in Austria and Germany and is developing a seamless tube rolling plant in the United Arab Emirates.

BGD is seeking partnership with an international steel company for the development of the Gladstone Project.

1.3.1 Project Partners

BGD is in the process of selecting partners to assist with the development and operation of the project. It is envisaged that the development and operations of the plant will involve four principal operating partners that will develop and / or manage components of the facility, being as follows:

- Oxygen Plant: to be built, owned and operated by a specialised industrial gas supplier, adjacent to the site;
- Co-Generation Power Station: a Queensland company has shown interest in constructing a 300 MW co-generation power station near the project site. This station will convert the plant's off-gases and waste heat into electricity. The electricity will be used to supply the project facility, with the balance supplied to the power grid;
- Plant Services: this would include the responsibility for scrap handling, slag handling and processing, alloys management, mobile equipment, logistics and other general services; and
- Stores and spares: discussions are underway with a Queensland company to establish and maintain the stores and spare parts inventory for the operation.

WorleyParsons has conducted a site selection study of various sites in the GSDA for BGD and has been commissioned to assist BGD obtain planning and environmental approvals for the project through development of an EIS.

The capabilities of WorleyParsons along with those of other Australian engineering consultants will be considered by BGD for the undertaking of the detailed engineering and project management works associated with the project.

Discussions are currently underway between BGD and major Australian construction companies that are capable of carrying out the civil and structural works associated with the development, along with the installation and pre-commissioning of the plant equipment.

1.4 Project Financing

BGD and their project partner will arrange finance for the project based on respective interest shares in the project. It is anticipated that the majority of the financing will be obtained from offshore sources.

1.5 Need for the Project

The proponent is seeking to develop a project primarily to produce billets and blooms for export to overseas finishing plants. This project's main objective is the production and the supply of quality semi-finished steel billets and blooms to the finishing mills. The finished products will be used to produce a number of steel components, including seamless tubes, for varying industries including the oil and gas industry. Billets and blooms, from time to time, will also be sold on the world market. At this time, it is not intended to supply the Australian market with semi-finished steel products from the Gladstone facility. The proponent and project partner would be the financial owners of the Gladstone project.

Although the majority of the facility's product will be sold offshore, the plant will be using materials and a workforce which is provided from local, state and national sources. This project will provide opportunities for the Gladstone area locally and Queensland regionally. It will also provide opportunities within logistic and export industries.

The 'do nothing' option in this case would mean that the facility is not constructed. If this were the case, there would be no opportunity to realise the significant economic or strategic benefits potentially realised through the project for the Gladstone region, Queensland and Australia. This would mean that there would be no increase of jobs, potential training or monetary resources injected into the area. Ultimately this option would result in a loss of investment and economic activity in the Australian economy.

1.5.1 Objectives of the Project

The products supplied by this facility will be processed in finishing mills to produce, amongst other things, special seamless tubes for the oil and gas industry. The project will provide value to Gladstone, Queensland and Australian resources and markets. This is especially relevant to the coal and limestone production industries in the local region. The project will also consume locally produced scrap metal. The following objectives for BGD are relevant to the execution of this project:

- to be a competitive supplier of high quality semi-finished steel products for export;

- to develop and operate the project in an environmentally responsible way;
- to establish a world class facility which will contribute significantly to the local and regional economy; and
- to transform locally sourced materials and services into high value products.

Achieving appropriate environmental outcomes will be achieved amongst other things through:

- installing abatement technology to minimise air emissions to the surrounding environment;
- minimising noise impacts on the surrounding environments;
- maximise on site re–use of water;
- re-use of waste gases / heat for the generation of electricity; and
- processing of all slags for use in the Australian cement and construction industries.

The proponent is committed to ensuring the project will have a net positive effect on the local and regional economy, particularly through maximising local employment opportunities in the construction and operation of the facility.

1.6 Project Benefits and Costs

The estimated capital cost of development of Stage 1 of the steel making facility is AUD$1.4 billion. It is expected that development of Stage 2 will require investment of a further AUD$1.4 billion (in today's dollars). Construction and commissioning for Stage 1 will take place over a period of 30 months after financial close, which is expected to occur in the third quarter of 2009. Plant output will increase to full capacity (Stage 2) as soon as practicable after completion of the facility, providing that market conditions remain favourable.

1.6.1 Economic Benefits

The project will generate significant economic benefits on a regional, state and national scale as a result of:

- Initial estimates indicate that both Stage 1 and Stage 2 of the project will create direct employment for some 1500 persons at the peak of the construction phases and an average of 900 persons over each of the two year construction phases. With the commencement of Stage 1 of the steel making facility's production approximately 600 operational phase jobs will be created. A further 550 jobs will be created for the operations of Stage 2 for a total of 1150 new long term jobs in the operation of the steel making facility. Further operational jobs will be created with the operation of the associated power plant;
- The supply of coal to the project is expected to generate additional economic activity in the Bowen Basin;

- The supply of iron ore to the project is expected to generate additional economic activity in the Pilbara region of Western Australia along with exploration and potentially iron ore mine development activity in Queensland;
- Increased port activity at Port Curtis through import of iron ore and export of steel product for the project (increased wharf throughput expected to be in excess of 6 Mtpa during Stage 1 and in excess of 14 Mtpa when fully developed);
- The generation of export income associated with this port activity;
- Expenditure in the local economy through the purchase and use of local resources (wherever practical) for the construction and operation of the plant, and the local expenditure of worker disposable incomes (i.e. the project is envisaged to significantly boost indirect employment and value added output throughout the regional economy); and
- Government revenue collected through taxes and royalties related to the project and export businesses.

It should be noted that the consequences of not proceeding with the project would be the non-realisation of the above benefits to the detriment of the local, state and national economies.

A socio-economic study will be undertaken as part of the EIS and will provide estimates of the full economic impact of the project on regional, state and national economies.

1.6.2 State and Local Government Policy Support

The proposed project is expected to support in principle the implementation of a number of key Queensland and Local Government policies and strategies along with community based development initiatives in the Gladstone community. These policies and strategies are listed below:

- Queensland Government's vision for 2020 (Toward Q2) in particular targets relating to:
    - Strong economy; and
    - Green environment;
- Queensland Energy Policy: A Cleaner Energy Strategy;
- Export Solutions - Queensland Government's Trade Strategy;
- The Local Industry Policy - A Fair Go for Local Industry;
- The Central Queensland Training and Employment Strategy; and
- Community based economic development initiatives of Gladstone Area Promotion and Development Ltd.

1.6.3 Clean Energy Benefits of the Project

The heat recovery coke-making process proposed to be used for the project converts coal to coke by a process called carbonisation. However in this process of coke making the coal is not combusted. Therefore, there is very little carbon loss to the environment. Production of the coke on-site through this method, rather than purchase of coke produced through use of older and less environmentally friendly coke ovens enables overall global emissions for the steelmaking process to be lowered.

Energy will be taken into the steel plant in four forms, namely as coal, natural gas, oxygen and electricity. Combustion processes involved in the production and use of energy include:

- Combustion of volatile material in coal in the coke ovens and its co-generation plant;
- Combustion of natural gas in the sinter plant ignition hood;
- Combustion of coke and powdered coal in the blast furnace followed by combustion of blast furnace gas in the blast furnace stoves or the co-generation plant; and
- Combustion of carbon in hot metal at the basic oxygen furnace (BOF) flare stack or the co-generation plant.

The overall 'energy balance' for Stage 1 of the project consists of:

- 445 GWh of electricity that is purchased from the grid to operate the plant; and
- 1335 GWh of electricity that is generated within the plant, made up of the following:
    - 575 GWh generated from the coke ovens co-generation plant;
    - 85 GWh from the top gas energy recovery turbine at the blast furnace (TRT); and
    - 675 GWh from the blast furnace gas co-generation plant.

    NB: an additional 182 GWh of electricity could be generated from the BOF off-gas if and when (potentially for Stage 2 of the plant development) it is economical to do so.

The waste gases will be supplied to a service provider for conversion to high pressure steam for electricity generation.

This "smart" generation of power will assist in the reduction of greenhouse gas emissions as it generates electricity using the heat produced from the combustion of waste gases in the steelmaking process. The generation of electricity from gas, with no combustion of coal, produces electricity with a greenhouse gas intensity that is considerably better than modern coal fired power stations. Thus, electricity generated from the project will displace generation from older less efficient coal-fired plants. The cogeneration plant will generate 300MW with the operation using natural gas as a top-up fuel supply. This will result in a net reduction in greenhouse gas emissions for the energy production.

1.6.4 Waste Reuse

As described in section 1.6.3 waste heat and gases will be used to generate electricity, and consequently the steel making plant will be a net exporter of electrical power.

All coal, coke, iron ore, sinter fines and dusts generated and captured throughout the various steelmaking process steps will be reused in the production process.

Internal scrap arisings, from the basic oxygen furnace and casting machines, (amounting to 118,000 tpa for Stage 1) will be remelted in the basic oxygen furnace.

Two forms of process slag are produced, one from the blast furnace and the other from the basic oxygen furnace. The slag from the blast furnace is granulated and will be sold to the Australian cement industry. Basic oxygen furnace slag is much in demand by the construction industry for road construction.

Approximately 13,000 tpa (Stage 1) of mill scale from the casting machines will be sold externally to the cement industry.

1.6.5 Global Environmental Issues

Development and operation of the steelmaking plant implies resource usage which may be considered significant from a global perspective. Significant facility resource usage for Stage 1 of the project is estimated in Table 1-1 with estimated usage for ultimate facility development (considering both Stage 1 and Stage 2) shown in brackets.

Table 1-1 Significant Global Environmental Issues

General Emissions to Air (per annum)	
Fine particulates emitted to air	550 - 850 tonnes (1300 – 2000 tonnes)
NO_x emitted to air	2,100 tonnes (5000 tonnes)
SO_2 emitted to air	3,500 tonnes (8350 tonnes)
Waste materials to landfill (per annum)	10,500 tonnes (25,000 tonnes)
Greenhouse Gas Emissions (per annum)	
CO_2 directly emitted to air	4,000,000 tonnes (9,520,000 tonnes)
CO_2 from power consumed	400,000 tonnes (952,000 tonnes)
Credit for slag in cement	- 232,000 tonnes (- 552,000 tonnes)
Credit for nett electricity generation	- 1,200,000 tonnes (- 2,856,000 tonnes)
Nett equivalent CO_2 emitted	2,968,000 tonnes (7,064,000 tonnes)
Fresh water consumed (per annum)	5,250 Megalitres (12,500 Megalitres)

1.6.6 Demand on Infrastructure and Workforce

Depending on timing, the project may place increased demand pressure on the skilled labour pool in the Gladstone region and on local utility and community services e.g. the demand for bricklayers for construction of the coke oven, blast furnace and basic oxygen furnace will be substantial. The project also calls for construction of new materials handling facilities and a new wharf at Fisherman's Landing, the development of which are expected to be significant undertakings.

The procurement and contracting pre-planning will include extensive constructability reviews, during which the particular attributes and deficiencies of areas of the project will be examined in detail and appropriate procurement and contracting policies put in place. Examples of such policies include increased modularisation of assemblies and maximum off site preassembly in order to greatly reduce site construction hours required.

The proponents intend to address the infrastructure and workforce demand issues during the EIS process through socio-economic analysis and consultation with the relevant stakeholders.

2. PROJECT PROPOSAL

2.1 Project Site Selection

Over the past four years BGD has considered the development of a smaller electric arc steelmaking facility for the production of seamless steel tubing, primarily for use in the oil and gas industry. Site selection studies were undertaken by BGD considering New South Wales (Hunter Valley region) and South East Queensland (particularly the Swanbank Enterprise Park industrial estate near Ipswich). The site eventually chosen for development following these studies was the Swanbank site near Ipswich. Development approval was sought of the Ipswich City Council and BGD prepared an EIS as part of that development approval process. Preliminary development approval was granted by the Council for the proposed 50 ha site.

Change to the BGD business plan, including a need to increase the scale of development to ultimately produce 5 Mtpa of steel product (including a need to utilise coal and limestone raw materials) has meant that the Ipswich site is no longer suitable for the proposed development. A decision was taken by the BGD board to seek a suitable site for development within the GSDA. The principal drivers that have caused BGD to focus on the GSDA for their development are:

- Queensland State Government have endorsed the development of a steel making facility in the GSDA;
- Significant land availability in the GSDA exists to meet the developments needs (over 400 hectares of land required for the facility);
- Acceptable cost of land in the GSDA;
- Appropriate land use zoning in the GSDA and location of the Aldoga precinct away from significant residential or other sensitive areas;
- Access to excellent port facilities for import of materials and export of finished product;
- Supporting infrastructure including power, water, gas and transport available at or near the potential sites or planned for development in those areas; and
- Existing established heavy industry within the GSDA and acceptance by the community of the further establishment of heavy industry in the Aldoga precinct.

BGD commissioned WorleyParsons to undertake a desktop site selection study considering areas of the GSDA. The site selection study was conducted to analyse five different potential sites located in the GSDA. A staged approach was used for the study. In stage one of the study, four sites in the Aldoga precinct and one site in the Targinie precinct were assessed in detail considering transport access, service provision, topography, site area and availability, and environmental aspects such as hydrology, air quality, noise, ecology and visual amenity. Given the environmental, social and economic parameters considered, the study short-listed two sites in the Aldoga precinct (referred to as Site B and Site C) that were considered potential development sites. Stage 2 of the study identified potential site layout configurations for both Site B and Site C, considering each of the components of a steel making facility. Stage 2 of the study further compared the short-listed sites, identifying the relevant differentiators (environmental, social and economic aspects) for development of the sites. Weightings were assigned to the differentiators and the sites were rated against them.

Through this study, Site B was chosen for further investigation as the project site as it was the most suitable for the facility and was more attractive that the other site in relation to the following aspects:

- hydrology;
- visual amenity;
- site layout;
- operational cost associated with transport; and
- capital cost aspects for haul road and site development (earthworks).

2.2 Project Site

The proposed site is located in the eastern part of the Aldoga Precinct of the GSDA. The site is contained on part of Lot 2 on SP 157677 which is owned by the state government (owned by the Minister for Industrial Development (DIP)). The site is located approximately 22 km to the northwest of Gladstone and 10 km to the east of the township of Mt Larcom. The site is approximately 500 ha in size. The site is generally of a shallow slope, sloping from the north-east (Mt Larcom Range area) to the west / south-west. Larcom Creek runs along the western boundary of the site. To the east and north of the site are the Mt Larcom ranges and to the south of the site is the Gladstone - Mt Larcom Road, the existing North Coast Rail Line and the proposed area for the Aldoga Rail Yard (refer to Figure 2-1).

On land adjacent and to the east of the proposed area, a Powerlink owned sub-station is currently being developed. To the south of this parcel of land a power line easement has been created. An easement for high voltage power lines feeding the sub-station bisects the site running from the south-east to the north-west. If this easement through the site is to be maintained a site area of approximately 470 ha is expected to be able to be retained for the site's development.

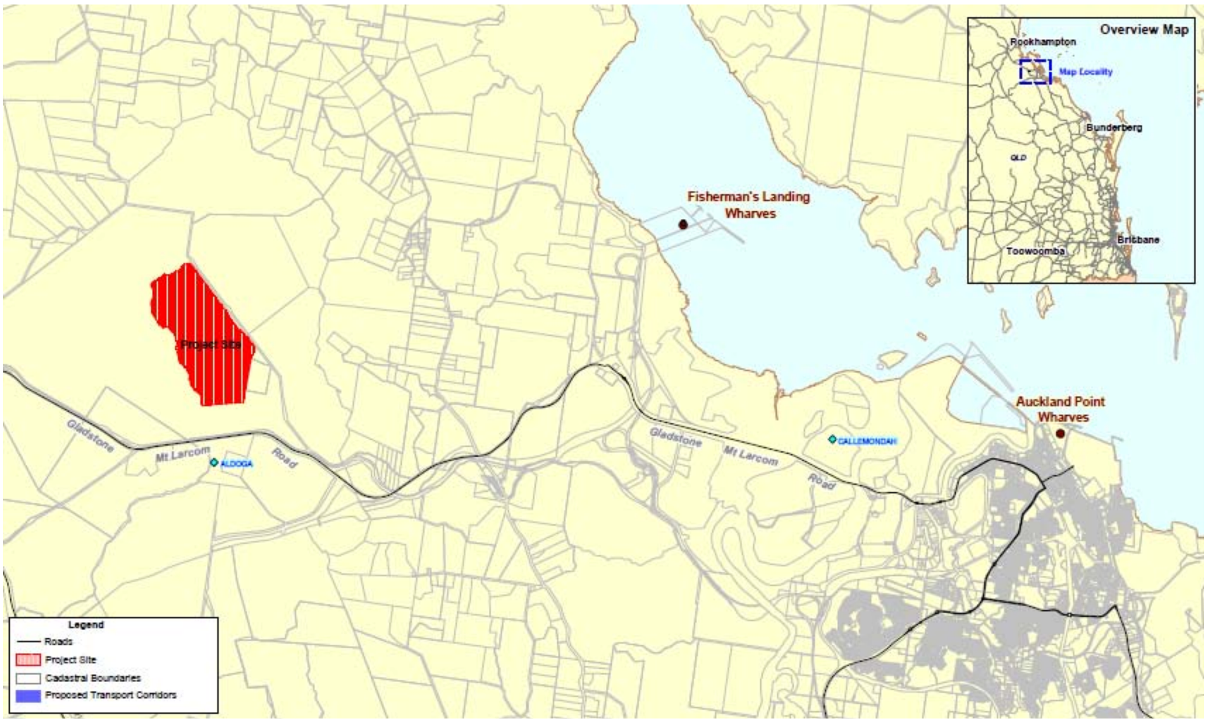

Figure 2-1 Project Site Location[2]

2.3 Project Components and Staging

The plant is proposed to be constructed in two stages. Stage 1 is intended to produce 2.1 Mtpa of product being steel billets and blooms and Stage 2 an additional 2.9 Mtpa, equating to an ultimate production rate of 5.0 Mtpa. Each of the components of the plant will be scaled according to the required sizing needed to achieve the overall throughput.

2.3.1 Raw Materials Receipt, Storage and Handling

Raw materials will be delivered by sea and will be unloaded at a Fisherman's Landing Berth (to be constructed) within Port Curtis, and transported by trucks to the plant site along the proposed transport corridor. Whilst the source of iron ore is yet to be finalised it is considered that a percentage will be shipped from an as-yet undeveloped deposit in Queensland with the balance being shipped from Fortescue Metals Group (ex Port Hedland in WA). Coal will be sourced from the Bowen Basin, delivered to the vicinity of the site by rail, and then transported to the site's stockpiles from the coal dump stations. Limestone and burnt lime will be sourced from the Gladstone / Rockhampton area and will be delivered to the site by road. Ferro alloys will be shipped in through Port Curtis and trucked to site. Scrap steel will be trucked to the site from a variety of sources in the Gladstone / Rockhampton

[2] Refer to figures associated with this IAS for higher quality images.

region. A percentage will be sourced from internal process scrap arisings and the balance from various areas of Queensland, including Brisbane.

Overall quantities of raw materials to be handled annually and requisite storage capacities are shown in Table 2-1 for both Stages 1 and 2. Additional quantities for Stage 2 are shown in brackets.

Table 2-1 Quantities of Raw Materials

Material	Annual Quantity Handled (tonnes)	Stockpile Quantity (tonnes)
Iron Ore	3,090,000 (4,264,000)	185,000 (92,000)
Coal	1,470,000 (2,028,000)	70,000 (35,000)
Limestone	745,000 (1,028,000)	20,000 (10,000)
Ferrous Scrap	205,000 (283,000)	12,000 (6,000)
Burnt Lime	88,000 (121,000)	2,000 (1000)
Ferro-alloys	19,000 (26,000)	3,000 (1,500)

2.3.2 Coke Ovens

The coke ovens are used to convert coal into coke, a hard, porous material strong enough to support the weight of the charge materials in the blast furnace shaft. The individual ovens are constructed of silica brick within a steel buck-stay framework.

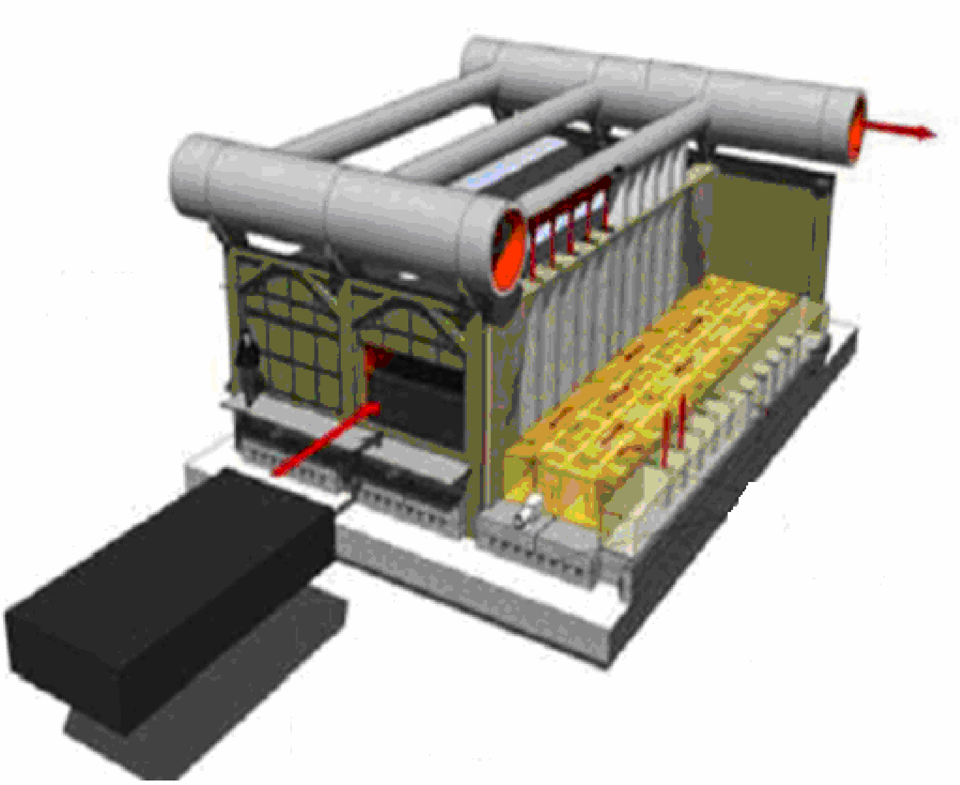

Figure 2-2 Isometric View of Coke Ovens (3 ovens)

The coking coal is blended in a stockpile after discharge at the site. After reclaiming from the stockpile the coal is mixed with a small amount of oil to improve its bulk density and ground in a hammer mill to 85% less than 3 mm diameter and stored in a charging bunker of 1500 t capacity. From this bunker it is stamp-charged into the oven through a charging machine as shown in Figure 2-2. To charge the oven the door is raised and the block of stamped coal is pushed into the oven by a ram.

The ovens are maintained at a temperature of 1100-1200^{o}C. When the coal is heated in the oven the volatile matter is driven off. These volatile gases are combusted under controlled conditions above the coal and under the sole of the ovens. This provides heat for the ovens and the waste heat surplus to the process is led in refractory-lined ducts to a waste heat boiler to generate steam, which is then used to generate electricity.

For Stage 1 the ovens will be arranged in three batteries of 62 ovens with an additional four identical batteries added at Stage 2. The 186 (3 x 62) ovens developed for Stage 1 will produce sufficient coke for the steel making plant and generate 70 MW of electrical power from the waste heat. The ovens operate continuously. This use of type of oven is considered best practice for steel plants where limited amounts of indigenous fuel are required for reheating. Because no by-products are generated the issues relating to benzene and polycyclic aromatic hydrocarbons (PAHs), the main carcinogens, that are normally associated with conventional coke ovens are largely avoided. Ovens of this type can be seen at Bowen Coke and in the Illawarra region of NSW.

After heating for a period of about 48-60 hours the coke is pushed out of the oven by the ram on the charger into a flat hot-car and quenched with water under a quenching tower which releases the steam generated at a convenient height above the surrounding working areas. The coke is then pushed from the car and screened at 100 mm and 30 mm. Material that is larger than 100 mm in diameter is crushed to reduce its top size below that level and fed back into the screen input belt. The remainder is separated into lump (larger than 30 mm) and small coke (less than 30 mm) for use in the blast furnace, from which is screened the fine material (less than 6 mm) for consumption in the sinter plant. A stockpile of 15,000 t of coke is kept for emergency situations. All the coke produced is used in the downstream processes.

2.3.3 Sinter Plant

The majority of iron ores available are unsuitable for charging directly into the blast furnace because of their fineness. 95% of the ferrous feed to the blast furnace is in the form of sintered iron ore. It is also good practice to add the necessary fluxes to the furnace though the sinter plant, thereby eliminating from the furnace the task of calcining the fluxes (refer to Figure 2-3).

Figure 2-3 Sinter Plant

One sinter strand (machine) will be initially installed with an additional identical strand installed at the second stage.

The sinter machine itself is a continuous grate formed of steel pallets 4-5 m wide and 80-100 m long, with high chrome cast steel grate bars on the floor of the pallet. The grate is propelled by an electric drive. At the start of the strand a hearth layer is placed on the strand. This serves to prevent the fine ore from clogging up the grate bars.

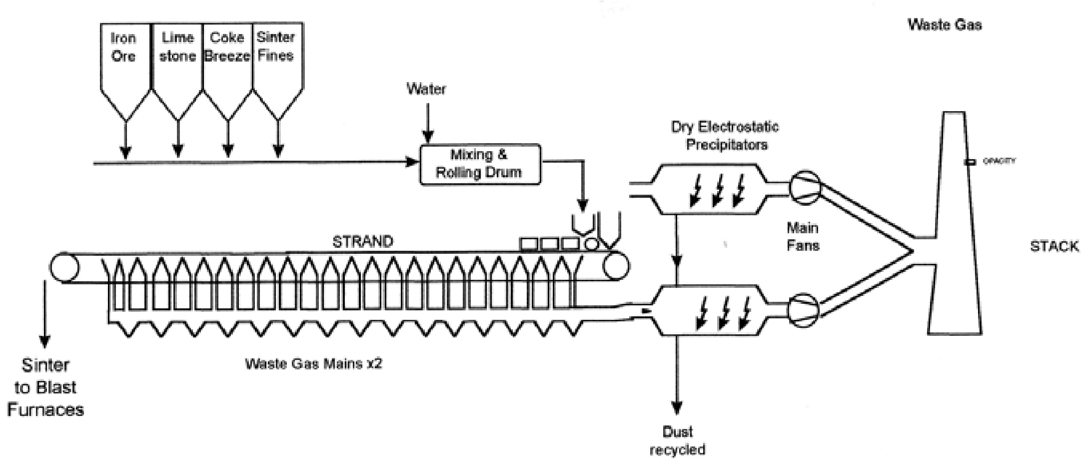

Figure 2-4 Schematic of the Sinter Plant Process

The fine ores are stockpiled upon delivery at the sinter plant and then blended through bins to ensure a consistent mixture is fed to the sintering process, this consistency being both short term (over the next 24 hours) and long term (over the next few weeks). It is mixed with coke breeze, in-plant dusts and fine limestone and/or dolomite and agglomerated in a 3 m diameter rolling drum with small amounts of water. Small additions of burnt lime may also be made from time to time to enhance the agglomeration of the fine particles and accelerate output.

The agglomerated mixture is fed evenly onto the moving strand on top of the hearth layer. The mixture is passed under a natural gas fired, refractory lined ignition hood where the coke breeze on the top of the strand is ignited.

Two large centrifugal fans at the downstream end of the gas cleaning plant suck air through the strand materials and the flame front in the bed moves progressively through the bed, reaching the floor of the bed about 75% of the way along the length of the strand. During this process it raises the temperature of the materials to about 1300^{o}C and causes them to fuse together and changes the physical structure, while at the same time calcining the ore and fluxes. At the end of the strand, the sintered mass falls onto a rotating sinter breaker and into a circular cooler. The sinter cooler is formed in a similar manner to the strand itself. Air is blown through the mass of sinter to complete it's cooling to about 70-100^{o}C. It is then screened into three size fractions. The material larger than15 mm is sent to the blast furnace, where it is re-screened before charging to remove any fines generated in transport. Material 6-15 mm is fed back onto the strand to form a hearth layer below the agglomerated raw feed. The material less than 6mm is fed back into the raw ore mixture along with any returns from the re-screening of the sinter at the blast furnace.

The air coming through the grates in the strand is at varying temperatures, but on average about 250^{o}C. It is laden with particulate matter and is fed into two waste gas mains fitted with dropout boxes to collect the coarser suspended materials falling through the grates of the pallets in the strand. The conventional method of cleaning sinter plant gases is by using electrostatic precipitators due to the high temperatures expected being beyond the operating limits for a large baghouse. While precipitators will deliver sinter plant stack particulate discharge levels of less than 50 mg/Nm3, the plume is still visible at some times of the day because of the diffractive effects of the fine particles that are not trapped by the precipitators. The screening stations are de-dusted through a conventional baghouse. This process is shown schematically in Figure 2-4.

2.3.4 Blast Furnace

A single 2500 m^3 internal volume blast furnace will be installed for Stage 1 with a second furnace added at Stage 2.

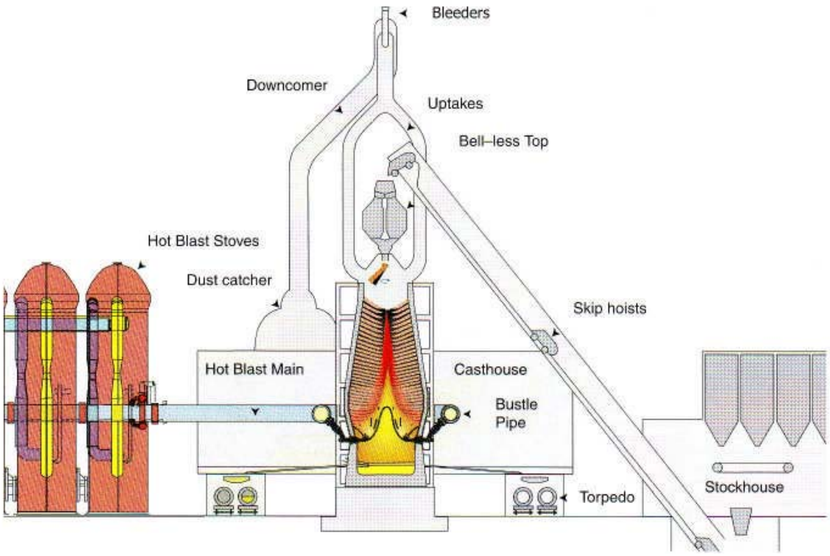

Figure 2-5 Cross Section through the Blast Furnace

The blast furnace reduces the iron oxide in iron ore or sinter into molten iron by passing a gas rich in carbon monoxide, at high pressure, through a shaft packed with ore, sinter and coke. The carbon monoxide is produced by burning coke in front of the tuyeres (injection nozzles) in a blast of hot air at 1200°C near the base of the furnace. Raw materials are charged into the top of the furnace and molten iron and slag collect in the hearth at the bottom, whence they are tapped on an almost continuous basis. The gas coming off the top of the furnace has a low calorific value and can be used for heating the hot blast stoves and steam-raising. The furnace is charged with 95% sinter and 5% lump ore. 1640 kg of ferrous feed is required per tonne of hot metal. 355 kg of coke is required per tonne of hot metal, supplemented by the injection of 130 kg of powdered coal (PCI) at the tuyeres. Coke is charged separately as lump (larger than 30 mm) and nuts (6-30 mm). The raw materials are stored in bins in the stockhouse, allowing for 8-12 hours storage capacity. In order to admit the materials into the pressurised furnace a lock hopper system is used. The materials are charged in particular sequence and are distributed across the top of the furnace by means of a rotating chute. The pressure of the gas in the top of the furnace is two atmospheres and its temperature is about 120°C. The pressure of the top gas is reduced through an expansion turbine driving an electric generator (TRT), which generates 10 MW of power.

The furnace is designed as a pressure vessel and the walls are protected by water cooled blocks (staves) made of cast iron or copper in the more vulnerable regions of the furnace (see Figure 2-5). The design and intensity of cooling of these elements is vital for the longevity of the furnace.

Oxygen-enriched air is supplied by a turbo-compressor, driven by steam or electricity. The furnace is equipped with three regenerative stoves filled with silica chequer bricks. Two of these are heated with blast furnace gas enriched with natural gas while the third stove is heating the oxygen-enriched blast air. The flue gases from the stoves are passed into a chimneystack. The temperature in the dome of the stove reaches 1350°C and the hot blast leaving the stove is tempered with cold air, which bypasses the stove, to achieve a straight-line temperature of 1200°C.

The hot blast is carried in a refractory lined main to a circular bustle main around the furnace, from which individual off-takes lead to the 24 tuyeres. The tuyeres are water-cooled copper nozzles that can withstand the temperature of the blast and the radiated heat from the raceway in which coke and powdered coal combusts. The blast volume is about 180,000 Nm^3/hour. The blast velocity at the tuyere nose is about 240 m/sec.

PCI is injected into the hot blast at the tuyeres to minimise the use of coke. The coal is fed into a gas-swept ball mill where it is ground to 80 µm and fed into a holding bin. From there it is fed into an injection hopper (one of three) for pneumatic transfer to the blast furnace. There a distributor feeds the fine coal equally to all the tuyere injection lances.

The temperature in the raceway is about 2500°C. In the raceway, the coal and coke is burnt to carbon monoxide, which passes upwards through the furnace and reduces and heats the descending ore and sinter. The iron formed from reduction of the ore melts and drips through the coke bed into the hearth. Slag is formed from the gangue in the ores and the ash in the coke and it too drips into the hearth. The metal and slag are tapped from the hearth through one of two tapholes. The taphole is drilled out by a mechanical drill and closed at the end of the cast by a hydraulic clay gun.

The iron is separated from the slag on the casthouse floor and is taken in refractory-lined ladles (on heavy haul carriers) to the steelmaking shop. A very small amount is dumped into pits to make “flat iron” due to process disruptions at the steelmaking shop. There is considerable fume generated during the casting process and this is collected in a baghouse for recycling through the sinter plant. The slag will be granulated with a high-pressure water jet and can be used as a cement extender or replacement by the Australian cement industry. The granulation of slag produces some hydrogen sulphide H_2S in the steam plume from the granulator. While the point emission of H_2S is well above accepted air quality standards, it is common in overseas plants to regulate these emissions at the plant boundary, where they are acceptable. The top gas is cleaned in a simple dust catcher and then a venturi scrubber before use in the stoves or boilers. The cleaned gas will contain less than 5 mg/Nm^3 of particulate matter. Some bleed of contaminated water takes place from the water treatment plant for the venturi scrubber.

2.3.5 Basic Oxygen Furnace

The iron produced by the blast furnace contains a number of impurities that must be removed to produce steel. The main impurities are carbon, phosphorus, silicon, and sulphur. They are removed by blowing a stream of pure oxygen onto the surface of the iron in the brick-lined converter vessel. The oxidation of these impurities gives off so much heat that the temperature of the molten metal is raised about 300^{o}C, even after the addition of about 15% of scrap in the charge..

Figure 2-6 shows photos of scrap charging, hot metal charging and oxygen blowing. Fluxes in the form of burnt lime and burnt dolomite are added to flux the silica formed by the oxidation of silicon and also to extract the sulphur and phosphorus from the metal.

Figure 2-6 Scrap Charging, Hot Metal Charging and Oxygen Blowing

The BOF converter is a steel vessel supported in a trunnion ring so that it can be rotated through 360°. It is lined with a dolomitic refractory. Two vessels will be provided at Stage 1 to allow for relining, with a campaign life of in excess of 6,000 heats being expected. A third vessel will be added at Stage 2.The size of the vessel allows heats of 250 tonnes to be made. The first material charged to the vessel is scrap, which is made up of plant arisings, flat iron and purchased scrap. The scrap charge will be approximately 40 tonnes per heat. The hot metal received from the blast furnace is lifted by ladle crane and any slag raked off. The molten iron is then poured into the vessel onto the scrap. The vessel is then turned to the vertical, the water-cooled oxygen lance lowered just above the bath and blowing commences. The oxygen supply is 99.5% purity at 15 kg/cm^2 pressure and a maximum volume of 45,000 Nm^3/hr. A small volume of argon is blown in through four tuyeres in the floor of the vessel to promote stirring of the bath during the blow. Once it is thought that all the impurities have been removed the vessel is sampled, any final adjustments made, and then tapped with the liquid steel being run into a brick-lined steel ladle, with a slag dart used to prevent any slag carryover. The slag is run into a cast steel ladle. The slag is dumped and cooled before being processed at a remote site to recover contained metallic scrap. The tap-to-tap time in the vessel is about 30 minutes, with the actual treatment time for each heat being about 15 minutes.

The steel is further refined in a ladle treatment facility. This allows for the addition of the appropriate quantity of alloys and carbon to adjust to the final steel specification. This station also incorporates an oxygen lance to allow adjustment of temperature. Steel temperature can be increased by 10-15^{o}C/min with the use of 4,000 Nm3/hr of oxygen. Argon is bubbled through an injection point in the floor of the steel ladle at a rate of 200-400 L/min to promote stirring and uniformity of steel composition. The ladle is next treated in a vacuum degasser for those grades requiring low gas levels, particularly the low carbon grades. The vacuum degasser comprises two snorkels fitted to a refractory lined vacuum chamber. The action of the vacuum causes steel to flow up one snorkel and down the other, with any entrained gases released in the low vacuum chamber. The ladle is then taken to the next stage of the process, the continuous caster.

The gases coming out of the mouth of the vessel are at about 2200^{o}C and are cooled in a water-cooled duct before being scrubbed with water in a venturi scrubber. In large plants the gases, which are largely carbon monoxide, can be collected and fired in a boiler to raise steam for electricity generation. The plant size at Stage 1 would not justify collection of this gas so it will be flared to atmosphere. However Stage 2 development (5 Mtpa total) will justify the capture and reuse of these gases.. The gases passing to the flare stack will contain less than30 mg/Nm^{3} of particulate matter. The gas volume during the blow is approximately 130,000 Nm^{3}/hr.

A purpose built oxygen plant will be built ‘over the fence’ by a specialised industrial gas supplier. The development and operation of the oxygen plant will be considered by the EIS and will be included in the development application for this project.

2.3.6 Continuous Casters

The liquid steel produced in the basic oxygen furnace must be cast into billets (either square or round in cross-section) or larger sections such as blooms. This is done by pouring the steel into a tundish and thence into a copper mould that is very intensively water cooled. At this point it forms a solid shell and is progressively pulled down through curved segments of support rolls with spray cooling until the whole cross-section of the billet is solidified as it starts to travel horizontally. The billet is cut to length with oxy-acetylene torches and removed to air-cooling beds. A caster usually operates with four or six strands simultaneously. Some casters are built to produce either blooms or slabs. Blooms can be produced by slitting slabs longitudinally after they have been removed from the casting machine (refer to Figure 2-7).

For Stage 1 a four strand round billet caster and a four strand bloom caster will be installed and an additional billet caster added at Stage 2.

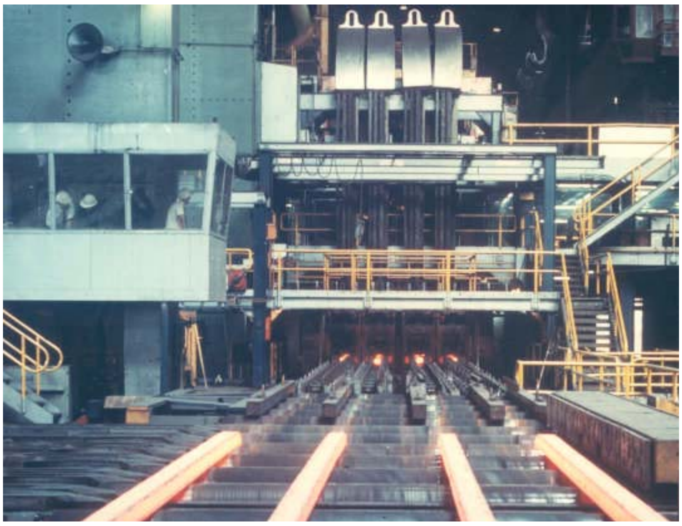

Figure 2-7 Billet Caster and Isometric of Bloom Caster

In this process description a billet caster is used as an example.

The steel ladle is hoisted by crane onto a turret. This turret holds two ladles and can rotate in order to bring the second ladle over the tundish when the first ladle is empty without causing the casting machine to stop. The flow of steel out of the ladle is regulated by a refractory slide-gate plate feeding into a submerged entry nozzle (SEN) shrouded by argon. These precautions are necessary to avoid exposure of the molten steel to the atmosphere, which would cause the steel to pick up gas inclusions that have just been carefully removed in the previous refining stages. The lower end of the ladle SEN is submerged below the liquid level in a tundish. The tundish acts as a bathtub and serves to distribute the flow of steel from a single ladle outlet into the greater number of outlets into the mould below it. The tundish will hold some 40-80 t of steel. The flow of steel from tundish to mould is again regulated by slide-gate plates and SENs into the mould itself. The mould is intensively water cooled. The protection of the steel from exposure to atmosphere is further enhanced by covering the surfaces in the tundish and mould(s) with flux materials. The mould oscillates in a vertical plane and the steel inside it forms a solid skin in contact with the mould wall (refer to Figure 2-8).

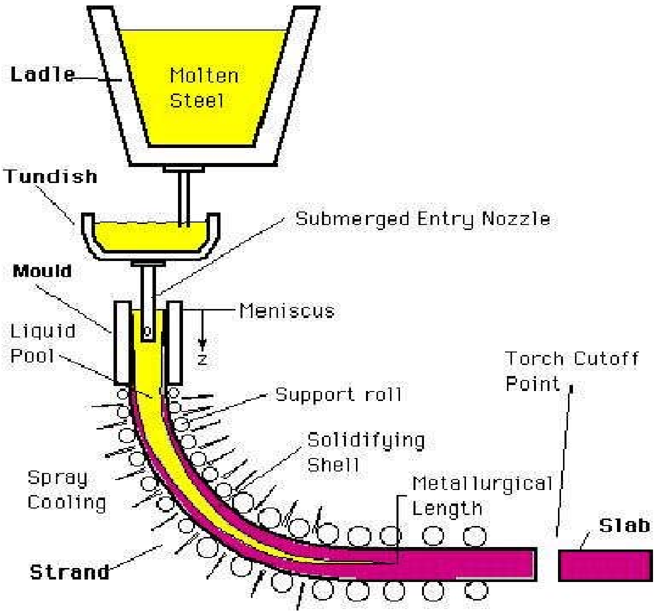

Figure 2-8 Schematic of Caster

As the billet is withdrawn from the mould it is supported by a series of segments containing water sprays and rolls. The billet is gradually bent into the horizontal plane and the continuous cooling makes the billet fully solid by the time it emerges horizontally from the last roll segment. Here it is cut to length by oxy-acetylene torches and taken to cooling beds where it is air cooled before being inspected and despatched.

To commence the casting sequence a dummy bar is fed back through the roll segments and into the mould. Steel is poured onto the end of the dummy bar and the bar is gradually withdrawn. The beginning and end of the billet must be cropped, so there are yield advantages in putting as many ladles as possible through the caster before the sequence is interrupted and the dummy bar has to be used again. Sequences in excess of 100 ladles are possible if the production planning schedule will allow. Different grades of steel, within certain limitations, can be cast in the same sequence with some loss of yield at the change of grade region in the billet. There is some scrap generated from the ends of the billets and mill scale is also generated, the latter being recycled through the sinter plant.

2.3.7 Finished Product Transport

Steel billets and blooms (semi-finished steel products) will be transported to Auckland Point No.4 Berth area for consolidation prior to loading onto customers' ships. The indicative Stage 1 quantities to be transported from the plant are as shown in Table 2-2 with the additional quantities for Stage 2 shown in brackets.

Slag from iron and steelmaking processes will be transported by truck to local customers. The major quantity will be taken by the Australian cement industry, who will also take some of the dusts that cannot be recycled within the steel making process.

Table 2-2 Quantities of Materials Produced

Material	Annual Quantity Handled (tonnes)	Stockpile (tonnes)
Steel billets	2,100,000 (2,900,000)	120,000 (60,000)
Iron making slag	520,000 (720,000)	20,000 (10,000)
Steelmaking slag	263,000 (363,000)	20,000 (10,000)

2.4 External Infrastructure Requirements

Development of the site for the steel making facility requires access to various transport and service infrastructure including:

- Transport access for the site:
  - Proposed haul road for transport of iron ore from Fisherman's Landing to the project site, and transport of steel products from the site to a load out point to rail for transport to Auckland Point Wharf. This would be a non-public road for use of heavy haulage trucks only;
  - Proposed roads for general access to the site (employees, deliveries, visitors, etc). This would utilise the upgraded Flynn Road and Gladstone - Mt Larcom Road as per the proposed Aldoga rail yard access; and
  - Proposed rail access for coal transport to the site. An existing or new rail siding in the vicinity of the site will be utilised. Coal would then be transported from the rail siding to the site.
- Services access for the site
  - Electrical power for the proposed site. As the proposed development site is directly adjacent a sub-station currently being developed, along with a 275 kVA high voltage power corridor, access to electrical power for the site will be able to be provided at the site boundary with minimal infrastructure development required;
  - Natural Gas for the proposed site. Natural gas is required in the blast furnace of the plant and would be used as top up gas in the co-generation power station. Access is to be developed from existing and planned corridors;
  - Water for the proposed site. Water is required in the process of steel production with a total of 5,250 ML required on an annual basis (Stage 1). Access is to be developed from existing and planned corridors; and
  - Access to the co-generation facility. It is assumed that the co-generation facility would be developed directly adjacent to the proposed site. Therefore access from

the site for heat and gas to the co-generation facility would be directly at the boundary of the steel making facility.

The access to the site for delivery of iron ore is good. It is assumed that a haul road to the site would utilise existing infrastructure corridors from Fisherman's Landing (Landing / Boat Creek Road) to an area adjacent to the village of Yarwun, and then would follow the proposed (DIP) transport corridor up to the base of the Mt Larcom Range at the Gladstone - Mt Larcom Road and Flynn Road intersection. From that point the proposed haul road would follow the route of Flynn Road up the range and along the eastern boundary of the site, to where the main entrance point for the site is proposed. Utilisation of Flynn Road has been highlighted in the EIS for the Moura Link Aldoga Rail Yard Project as an access point. There may be the potential for sharing of the costs of the construction / upgrade of this access corridor with Queensland Rail. The site has better potential access to the transport corridor than other Aldoga precinct sites due to it being closer than these other sites to Fisherman's Landing and also not requiring a grade separated crossing of the North Coast rail line and Gladstone - Mt Larcom Road.

As for the access for iron ore import to the site, usage of the to-be-developed haul road will enable the finished steel product to be transported to a load out point to rail in the vicinity of Fisherman's Landing and then be transported to Auckland Point wharf for export. The haul road route may need to be segregated from the general road access point for the site (due to the use of off public road haulage transport for the haul road) however the cost of developing these parallel roads would be relatively low when compared to other options.

The access for the site to coal deliveries is good. A coal unloading facility suitable to the needs of the site will be established in the vicinity of the site from which point the coal will be transported to the site stockpiles.

The site currently does not have direct access to proposed or existing corridors for natural gas or water pipelines. Pipeline takeoffs of approximately 2.5 km length will be constructed to provide access to gas and water for the site. The pipeline will cross existing and planned road and rail infrastructure.

The site has excellent access to a High Voltage Power infrastructure corridor. The site is directly adjacent to a preferred location for power co-generation along with the Powerlink sub-station which is currently being developed to service the area. As the High Voltage power line bisects the proposed site it may be necessary to maintain the easement or relocate and / or bury this infrastructure in order for the site to be effectively operated. However, it is expected the plant will be able to operate with the existing easement in place.

2.5 Project EIS Boundaries

Given the various infrastructure to be developed in concurrence with this project (some of which will be multi-user infrastructure) it is considered relevant to clarify the project boundaries that will apply to the EIS for the Project. The EIS will consider both Stage 1 and Stage 2 of the development and operation of the steel making facility i.e. the EIS will consider the ultimate planned production for the facility of 5 Mtpa. The EIS will consider:

- Construction impacts of the construction of the steel making facility at the project site;
- Construction impacts of the development of the site access road for haul trucks and general access from the haul road corridor and Gladstone – Mt Larcom Road respectively; and
- Operational impacts of the operations of the steel making facility (including the oxygen plant) on the environment, community and economy.

The EIS will not consider:

- Construction impacts of the construction of the proposed co-generation power station to be developed adjacent to the steel making facility. These impacts will be assessed by the proponent of that facility;
- Construction impacts of the construction of the proposed multi-user wharf at Fisherman's Landing or the associated wharf back infrastructure including stevedoring and storage infrastructure for import of iron ore. These impacts will be assessed by Gladstone Ports Corporation (GPC) as part of their development assessment process;
- Construction impacts of the construction of the haul road to be located in the planned infrastructure corridor from Fisherman's Landing to the Aldoga area;
- Construction impacts of the construction of the off-site rail loading and unloading stations. These impacts will be assessed by Queensland Railways through other processes;
- Construction impacts of the construction of the water and natural gas pipelines developed to service the site. These impacts will be assessed by the proponents of those developments respectively;
- Operational impacts of the operations of the proposed co-generation power station. These impacts will be assessed by the proponent of that development; and
- Operational impacts of the operations of the GPC managed Port Curtis. These will be assessed by GPC.

An illustration of the proposed environmental studies area for the project EIS is provided in Figure 2-1.

2.6 Construction & Operational Processes

2.6.1 Construction

Site preparation works and construction activities associated with the project are expected to be undertaken in accordance with the following timeframes:

- o Monday – Friday, construction activities may be undertaken 24 hrs per day;

- o Saturday, construction activities would be undertaken from 6AM to 6PM; and
- o Sunday and public holidays, no construction activities would be undertaken.

The hours of site preparation and construction works may need to be varied occasionally to enable critical construction activities to be undertaken. It is expected that this would be negotiated with regulators on a case by case basis.

Due to the demands placed on construction labour and services in the Gladstone region it is expected that a component of the workforce will be sourced from outside of the Gladstone area. Efforts will be made at the contracts planning stage of the project to mitigate the requirement for externally sourced construction personnel through the emphasis on off-site assembly and shipment to site of large sub-assemblies. This policy will have a considerable effect in reducing on-site personnel requirements, with the added benefit of a reduction in the likelihood of occurrence of safety incidents and accidents.

2.6.2 Operations

The operations of the facility will be virtually continuous with scheduled plant maintenance breaks for the blast furnace every two months for approximately eight hours and a major furnace reline occurring after 15-20 years of operation. Other components of the process plant, such as the casting machines will have more frequent scheduled maintenance production breaks, arranged around the blast furnace operations.

Deliveries of raw materials by truck, such as iron ore, external scrap and limestone will be a 24 hour / day operation, as will be the movement of steel products (billets and blooms) to Auckland Point wharf. The plant operations workforce will work a 12 hour shift roster, as is the practice at other steelmaking plants in Australia.

2.7 Waste Management

BGD intend to apply the principles of cleaner production and best practice industrial ecology to the design, construction and operation of the steel making facility to minimise / avoid wastes. Waste streams generated will include general wastes, process wastes, sewage and stormwater.

2.7.1 General Wastes

During construction, it is expected that the following general wastes will be produced:

- General domestic garbage from onsite construction workers;
- Paper, cardboard and timber from packaging;
- Scrap steel;
- Greywater and sewage from onsite amenities; and
- Waste hydrocarbons and oily rags from equipment maintenance and refuelling.

It is expected that a less diverse and smaller volume of general wastes will be generated during operation, including:

- Minor waste hydrocarbons and oily rags;
- General garbage, including putrescibles from the onsite staff facilities (kitchen, offices);
- Greywater and sewage from onsite amenities; and
- Paper, cardboard and timber from occasional packaging for spare parts etc.

The management of these wastes will be addressed in the project EIS and particularly the Environmental Management Plan (EMP) developed as part of the EIS. The EIS will identify waste streams and quantities and the EMP will identify controls which target the reduction of generated wastes to ensure that onsite wastes do not enter the environment and minimise subsequent impacts.

Identified controls and initiatives are likely to include, but not be limited to:

- The provision of onsite waste collection bins, including those for recyclables;
- Wastes will be minimised by reducing waste entering the site, for example excess packaging;
- Wherever possible, recyclable materials are to be used;
- The onsite workforce will receive training in waste minimisation and management;
- All waste building materials will be removed from site for potential reuse at the completion of the construction project; and
- Specific provisions for the storage, handling and disposal of hazardous materials, including any regulated wastes.

It is considered that sewage generated by the project will be directed to the recently developed Aldoga sewage management facility for treatment and disposal.

2.7.2 Process Wastes

The steel making facility will generate a number of process wastes including:

- Emissions to air including Nitrogen Oxides (NO_x), Sulphur Dioxides (SO_2) Carbon Dioxide (CO_2) Hydrogen Sulphide (H_2S), Benzene, Polychlorinated Biphenyls (PCBs), Polycyclic Aromatic Hydrocarbons (PAHs), Ammonia, greenhouse gases;
- Dust emissions;
- Granulated blast furnace slag;
- Basic oxygen furnace slag;
- Process water; and
- Refractory debris.

In recent times, slags are more commonly known as co-products as they are very much in demand by the cement and construction industries throughout Australia.

The design of the steel making facility will incorporate reuse of process heat and gas from components of the plant (including the coking ovens and the blast furnace). Further discussion of the air quality impact and management is made at section 3.5.

Process dust is recycled in the production process as far as practicably possible. However it is expected that process dust which is not recyclable will be sent to landfill as sludge waste.

Granulated blast furnace slag will be reused in the cement industry, possibly taking advantage of the proximate location of the Cement Australia facilities in Yarwun.

Basic oxygen furnace process slag waste will be reused in the construction industry for roads.

Process water will be recycled as far as possible. The coke quenching process will operate on zero discharge with all process water being treated and reused. Water will be treated before reuse in plant processes.

Refractory debris from the casthouse, torpedo ladles, converter and steel ladles will be sent to a licensed landfill.

Note: Reuse of waste gases from the basic oxygen furnace is also under consideration and is likely to be utilised for Stage 2 of the plant development.

2.7.3 Stormwater

The surface water discharges associated with the steel making facility will arise from surface runoff caused by rainfall or the wash down of equipment during maintenance. These surface water sources have the potential to export oil, nutrients and suspended solids from within the plant area.

It is expected that the plant will generate the following discharge streams:

- Drainage from paved areas where there is potential for operational or accidental contamination (routed for treatment);
- Clean stormwater drainage from paved and unpaved areas such as roads, administrative areas and building surfaces (water harvesting will be investigated for this water); and
- Drainage from materials stockpile areas.

Much of the site will be drained by grading and / or open drains; however, some areas of the site will require special drainage construction. Oily water drains and closed drain systems will be required in hydrocarbon handling areas.

Given that the planned site layout will include a number of materials stockpiles, stormwater runoff from those areas may contain suspended sediment. This water will be directed to settling ponds for treatment, with that water being reused in the steelmaking process where possible.

A surface water management plan will be developed as part of the project EIS to address these potential impacts.

2.8 Project Workforce & Housing

This project will require a significant labour effort, both during construction and throughout the operation period. A temporary workforce ranging from 900 to 1500 people will be required during the construction phase of Stage 1 and Stage 2 of this project, with the objective being to minimise the negative impact on the local community of this construction phase workforce. It is considered likely that the construction workforce will consist of a mix of local and non-local labour force. Temporary accommodation may need to be provided to ensure that minimal strain in placed on the local housing market. This accommodation may be provided in the form of temporary demountable buildings as part of a construction camp located near the site location. It may be that a construction company moves existing construction camp infrastructure (offices, dormitories, and mess hall) from a project currently in construction phase to the site for the development. These options will be further investigated in the project EIS.

An operational workforce of approximately 600 people will be required to operate the facility in Stage 1 of its development. A further 550 people will be required for the operations of Stage 2 of the development bringing the total operational workforce to 1150 for the facilities ultimate planned production of 5 Mtpa. Efforts will be made to source workers for these operational positions from the local and regional areas. However, it is likely that a portion of the operational workforce will be sourced from external to the region. Further investigations will be undertaken in a social and economic study as part of the EIS to identify the accommodation requirements and methods of managing impacts associated with the project workforce and housing requirements.

2.9 Proposed Project Schedule

It is anticipated that Stage 1 of the project will take approximately 39 months to design, procure, build, commission and bring to full commercial operation (for output of 2.1 Mtpa of steel products). Full commercial production for the Stage 1 is expected to commence in the fourth quarter of 2012. Table 2-3 presents the anticipated project timeframe for Stage 1.

Table 2-3 Anticipated Project Schedule

	2008				2009				2010				2011				2012			
Stage	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Sign purchase agreement for GSDA site				■																
Bankable Feasibility Study				■	■	■														
Planning and Environmental Approvals				■	■	■	■	■												
Financing					■	■	■													
Detail Design								■	■	■	■	■								
Site Works										■	■	■	■	■	■	■				
Pre-commission, Start-up, Commission, Ramp-up to full production																	■	■	■	■

The project schedule for Stage 2 is yet to be defined.

2.10 Hazard & Safety

Construction of the project will involve the normal hazards and safety risks commonly associated with the construction of industrial plant. Management of these risks during construction will be the responsibility of the engineering contractors engaged to carry out project construction. The contractor's ability to manage these risks will be a key factor in the contractor selection process. All construction materials and practices will be in accordance with relevant Australian Standards.

Project operational hazards will be identified as part of the detailed feasibility study for the project. It is intended that a comprehensive hazard and operability study (HAZOP) will be undertaken. As a consequence safety features will be designed into the plant to address the identified risks where possible.

Given the relatively simple and well established nature of the steel manufacturing process no major hazards are expected to be identified. It is expected that issues associated with the handling of materials and the malfunction of systems will be addressed in the EIS.

The development will comply with the requirements of the Queensland *Workplace Health and Safety Act 1995* and associated regulations.

2.11 Environmental & Planning Approvals

2.11.1 Overview

This section describes the project approval framework and the relevant legislation to be addressed by the steel making facility project, and considers the project within a broader project development process.

Given the nature, scale and location of the proposed facilities, various approvals will be required from Commonwealth, State and Local governments. Further details regarding the approvals required for the project are provided below.

2.11.2 Local Government (GSDA Development Scheme)

As required by the SD Act, a Development Scheme has been prepared to manage the development of the GSDA. Development that is a 'material change of use' in the GSDA is assessed under the provisions of this Development Scheme. This proposed development constitutes a 'material change of use' as defined in the Development Scheme as it would be the start of a new use of the premises. The Development Scheme outlines the assessment procedure and process for applications for a 'material change of use' of premises in the GSDA.

Under the Development Scheme a person may make application to the Coordinator-General for a material change of use of premises in the GSDA. An application must:

- Include an accurate description of the land, the subject of the application;
- Identify the proposed use or uses for which approval is sought;
- Include the written consent of the owner of the land to the making of the application;
- Include the application fee determined by the Coordinator-General; and
- be accompanied by
  - A planning report; or
  - An Environmental Impact Statement *NB the EIS process under the SD Act (as described in section 2.11.3) replaces the Information and Referral Stage, and the Notification Stage under the Integrated Planning Act 1997 (IPA).*

The Development Scheme provides for a transparent and streamlined approval process with stated objectives and guidelines for land use. Under this framework there are:

- Requirements for public notification of applications and referral to government agencies;
- Processes to avoid duplication in handling applications;
- Procedures to ensure that referrals proceed within acceptable timeframes; and
- Requirements for liaison with local government.

2.11.3 State Government

This IAS document provides assistance with the State Government's declaration of this steel making facility project as a "Significant Project" under Section 26 of the SD Act. The SD Act establishes the framework for environmental assessment of major projects in Queensland, identifying the EIS process and its relationship with IPA.

In the consideration of whether a project is to be declared a significant project, the Coordinator-General has regard to one or more of the matters listed under Section 27 of the SD Act.

(a) detailed information about the project given by the proponent in an initial advice statement;

(b) relevant planning schemes or policy frameworks, including those of a relevant local government or of the State or the Commonwealth;

(c) the project's potential effect on relevant infrastructure;

(d) the employment opportunities that will be provided by the project;

(e) the potential environmental effects of the project;

(f) the complexity of local, State and Commonwealth requirements for the project;

(g) the level of investment necessary for the proponent to carry out the project; and

(h) *the strategic significance of the project to the locality, region or the State.*

Matters to be addressed in an EIS prepared pursuant to the SD Act are detailed in Schedule 1 of the *State Development and Public Works Organisation Regulation 1999*.

The EIS process under the SD Act includes provision for:

- Public notification and development of the EIS Terms of Reference (ToR);
- Public notification of the EIS which must address the matters detailed in the ToR;
- Consideration and review of public submissions on the EIS; and
- The evaluation of the EIS and public submissions, and the preparation of an Evaluation Report by the Coordinator-General.

In addition to preparing an EIS under the SD Act a number of other environmental approvals may be required prior to the construction and operation of the steel making facility. These approvals will be fully identified and confirmed as part of the EIS process. It is likely that those provided in Table 2-4 will be required. This table outlines the applicable legislation, the authority that is responsible for enforcing the legislation (Administering Authority) and the action which triggers the legislation to be applicable to this project (Potential Trigger).

Table 2-4 Summary of Likely Further State Planning and Environmental Approvals Required

Legislation	Administering Authority	Potential Trigger
Aboriginal Cultural Heritage Act 2003	DNRW	Duty of care to take all reasonable and practicable measures not to harm Aboriginal cultural heritage. Cultural Heritage Management Plan (CHMP) required if EIS prepared.
Dangerous Goods Safety Management Act 2001	DES	Large dangerous goods location established.
Environmental Protection Act 1994 and *Integrated Planning Act 1997*	EPA	ERA 7: Storing chemicals (other than crude oil, natural gas and petroleum products). ERA 8: Coke producing - producing, quenching, cutting, crushing or grading coke. ERA 11: Crude oil or petroleum product storing - storing crude oil or a petroleum product in tanks or containers having a combined total storage capacity of 10000L or more but less than 500000L. ERA 17: Fuel burning - any process involving the use of fuel burning equipment (including, for example, a standby power generator) that is capable of burning (whether alone or in total) 500kg or more of fuel an

		hour. ERA 22: Screening etc. materials - screening, washing, crushing, grinding, milling, sizing or separating material extracted from the earth (other than under a mining tenement or petroleum authority) or by dredging using plant or equipment having a design capacity of 100000t or more a year. ERA 40: Metal foundry - commercially producing metal castings. ERA 41: Metal works - commercially smelting or processing ores or ore concentrates to produce metal in works having a design production capacity of 10000t or more a year. ERA 74: Stockpiling, loading or unloading goods in bulk - commercially loading, unloading or stockpiling materials or goods, using a crane, conveyor, pump or other similar way at a rate of more than 100t a day. Removal of contaminated soil from sites listed on CLR or EMR.
Fisheries Act 1994 and *Integrated Planning Act 1997*	DPIF	The construction or raising of a waterway barrier.
Nature Conservation Act 1992	EPA	Taking, using, keeping or interfering with a protected wildlife.
Vegetation Management Act	DNRW	Removal of Regional

1999 and *Integrated Planning Act 1997*		Ecosystems as defined by the EPA under the VM Act.
Water Act 2000	DNRW	Destroying of vegetation, excavating or placing fill in a watercourse, lake or spring. Works in a watercourse.

Planning and Environmental approvals obtained under the IPA utilise the Integrated Development Assessment System (IDAS) framework. As previously discussed, the SD Act EIS process replaces the Information and Referral Stage, and the Notification Stage of the IDAS process under IPA. At the completion of the EIS process, the Coordinator General Report will be taken as being a Concurrence Agency response under IPA and will be provided to the Assessment Manager to issue a Decision Notice. Approval for the environmentally relevant activities (ERAs) will take the form of Development Approvals granted under IPA and Registration Certificates granted under the EP Act.

2.11.4 Commonwealth Government

Environment Protection And Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides the primary environmental assessment and approval legislative framework for the Commonwealth Government. The EPBC Act establishes the requirement for the approval by the Commonwealth for actions which have, will have or are likely to have a significant impact on matters of national environmental significance. The matters of national environmental significance are:

- Listed threatened species and ecological communities;
- Migratory species protected under international agreements;
- Ramsar wetlands of international importance;
- The Commonwealth marine environment;
- World Heritage properties;
- National Heritage places; and
- Nuclear actions.

The Great Barrier Reef (World Heritage Property) is likely to be the most relevant matter of national significance with respect of the project, although it is considered unlikely that the project will have a significant impact on this property. Although the Project is unlikely to have a significant impact on matters of environmental significance as listed above, the Project is being referred under the EPBC Act to the Commonwealth Department of the Environment, Water, Heritage and the Arts (DEWHA) for confirmation that the Project is a Not a Controlled Action. The referral to DEWHA will provide detailed information indicating whether or not the Project should be considered as a Controlled Action.

CIVIL AVIATION REGULATIONS 1988 AND CIVIL AVIATION SAFETY REGULATIONS 1988

The Commonwealth *Civil Aviation Regulations 1988* and *Civil Aviation Safety Regulations 1988* provide Civil Aviation Safety Authority (CASA) with the power to control the height of objects, structures, buildings and plumes, which might be a hazard to aircraft. These regulations would therefore typically apply to tall structures (i.e. the BGD plant stacks and BOF building) and generated plumes (i.e. exhaust from BGD Plant) in the vicinity of certified or registered aerodromes.

Aviation authorities have established that an exhaust plume with a vertical gust in excess of 4.3 m/s may cause damage to an aircraft airframe, or interfere with aircraft when flying at low levels. As a result of this, CASA requires the proponent of a facility with an exhaust plume, which has an average vertical velocity exceeding the limiting value (4.3 m/s at the aerodrome obstacle limitation surface or at 110 m above ground level anywhere else), to be assessed for the potential hazard to aircraft operations.

In view of this it is proposed to undertake liaison with CASA and if necessary conduct an aviation safety assessment in accordance with CASA requirements for the proposed plant, which will define the size of the potential hazard zone around the site.

2.12 Proposed Environmental Studies

It is proposed that a range of environmental studies will be required to support the application process, including the following:

- Air quality modelling and assessment;
- Environmental noise assessment;
- Land/soil assessment including contamination investigations;
- Ecological assessment;
- Hydrological assessment;
- Soil and groundwater contamination assessment;
- Social and economic impact assessment;
- Cultural heritage assessment;
- Risk and hazard review;
- Transport / Traffic impact assessment; and
- Visual amenity and local character assessment.

3. EXISTING ENVIRONMENT & POTENTIAL IMPACTS

A desktop study of available literature and relevant sources has been conducted in order to be able to describe the existing environment in the project area, and to be able to identify potential impacts which will need to be mitigated throughout the life of the project.

3.1 Topography, Geology & Soils

3.1.1 Existing Environment

Geology and soil information was gathered through a search of existing literature and information provided by the CSIRO in the form of soil and geological mapping (Bureau of Rural Sciences, CSIRO, 1991). The topography of the site was identified using contour mapping of the site.

The Aldoga area is generally flat, with some minor ridges and valleys located in the precinct. The land in the Aldoga area generally becomes steeper in the approach to Mt. Larcom, which is the highest point of the area. The project site lies in an area which has a small variation in topography, with the majority of the site lying between 60 mAHD and 70 mAHD. The site slopes generally from high points in the East and North-East (towards Mt Larcom range) to lower points in the West and South-West (towards Larcom Creek). The site is comprised of the following geological categories:

- Quaternary alluvium and lacustrine deposits from the Quaternary period; and
- Volcanic units of North East Bowen Basin and Gogango Overfolded Zone from the Permian period.

This signifies that the area was formed by a combination of sedimentary and volcanic geology. Sand, silt, mud and other sediments are associated with alluvium areas. The volcanic areas have been formed by mixed volcanic and sedimentary rocks, andesitic to dacitic and basaltic lavas.

The site is comprised of two soil types, each covering approximately half of the site. The low rounded hills to the west side of the site are chiefly hard acidic yellow mottled soils with hard acidic red soils on metasediments. These soils are associated with lithic parent materials. The eastern side, which lies in closer proximity to Mt. Larcom is made up of steep hilly to mountainous country. This country is comprised of metasediments and contains considerable areas of plateau remnants.

3.1.2 Potential Impacts

Soils in this area are considered to be potentially erosion prone and subject to dispersive behaviour. Construction of the project has the potential to cause erosion of these soils, given that areas of earth will be exposed during earthworks for periods of time. This could lead to increased volumes of sediment entering the local catchment area during construction of the facility.

Investigation of the possibility of the site containing acid sulfate soils will be conducted during the EIS preparation. It is unlikely that acid sulfate soils will be located on the steel making facility site (given its location above 60 m AHD) however, it may be that they are encountered along the route of the haul road to Fisherman's Landing. As the area has been used for agriculture in the past, a search of the contaminated lands register will be conducted. If contaminated land is found to be located on site, it may have to be rehabilitated before construction begins, depending on the levels of contamination.

Further investigation into the exact soil composition of the site during the EIS phase, will enable appropriate mitigation measures to be developed in order to address possible erosion and sediment issues throughout construction and operation of the facility.

3.2 Hydrology & Water Quality

3.2.1 Existing Environment

The project site is located within the Calliope River catchment. This catchment has an area of over two thousand square kilometres and includes Mt Alma, Mt Larcom and Calliope. Larcom Creek is considered to be an ephemeral watercourse in the area of the proposed project site. A minor feeder of Larcom Creek traverses the northern section of the proposed site however it appears that this feeder only carries water during significant rainfall events. Larcom Creek is one of the major tributaries for the Calliope River. The main uses of the Calliope River Catchment, and the Larcom Creek sub-catchment, are agricultural, generally grazing with some irrigated cropping. Industrial uses are also present in the Calliope catchment primarily in the lower reaches of the system, however also include the East End Mine to the south of the township of Mt Larcom. It is important to note that Calliope River discharges into Port Curtis, which is part of the Great Barrier Reef World Heritage Area.

According to the National Land and Water Audit, conducted between 2002 and 2008 and established under the *Natural Heritage Trust of Australia Act 1997*, the water quality in the area is regarded as being poor to moderate in this catchment. This is most likely due to the current land uses in the area.

DIP has provided information regarding the potential for flooding in the area. The chosen site is located in an area which is not prone to flooding. According to the DIP data, the site's western boundary intersects the boundary of the modelled Q100 year flood levels. The proponent proposes to install a vegetation buffer around the site, and in the case of potential flooding at the western boundary, only the vegetated buffer would be impacted.

A search of registered boreholes in the region was conducted through using the DNRW database. No registered boreholes are located in close proximity to the project site, and therefore there is currently limited information regarding the presence or quality of groundwater in the area. From previous investigations conducted in the area (for the Aldoga Aluminium Smelter EIS), it has been shown that the groundwater has high salinity levels and is unsuitable for irrigation or stock watering. The groundwater was also found to have a slightly acid pH, and elevated metals levels, which may be attributed to recharge from surface uses of chemicals associated with pesticides.

3.2.2 Potential Impacts

The construction phase of the project will involve vegetation clearing and significant earthworks activity. During the construction period the potential exists for runoff from the site (due to rainfall or equipment washdown) to act as a vector for the introduction of sediment into Larcom Creek, subsequently elevating levels of turbidity in the creek. There is also the potential for contaminants such as oils and greases from construction machinery and other nutrients to impact on local water quality through runoff.

The potential for impact on water quality due to the construction of the project will be mitigated in order to limit, and if possible, avoid contamination or degradation of the surrounding catchment areas. Management methods which may be implemented on and around site may include, but are not limited to:

- limited clearing at any one time to ensure the minimum amount of bare soil on site;
- rehabilitation and revegetation of areas as soon as possible;
- installation of sediment containment measures such as sediment dams, silt traps, silt fences and hay bales to dissipate the velocity of stormwater which runs across the site;
- bunding and correct handling of possible contaminant areas including minor maintenance and washdown areas;
- diversion of clean runoff away from potentially dirty areas;
- covering and / or windrowing of soil stockpiles;
- utilising well-maintained equipment only for the construction activities;
- maintaining appropriate spill containment infrastructure onsite; and
- the development of a sediment and erosion management plan to be implemented during construction and operation.

Operations of the facility will utilise process water which, if not managed appropriately could have the potential to introduce various contaminants into the hydrological environment. Process water will be stored on site and recycled wherever possible. Process water will be treated to an appropriate standard before any release or potential release to the environment. Stormwater runoff from areas that have the potential to be contaminated would be managed separately from areas of clean stormwater runoff. Potentially dirty stormwater runoff would be appropriately treated prior to release to the environment. Process water management and stormwater management plans would be developed for the operational phases of the project.

Groundwater removal to assist in foundation excavation is not anticipated during the construction phase. In the unlikely event that some dewatering is required, the groundwater would not be discharged to the local drainage system but would be used for dust control and/or rehabilitation. As there will be no use of groundwater for the operational phase, there will be no interference with the existing groundwater resources and no direct impact on the local groundwater flow regime.

Whilst no interaction with the groundwater is anticipated, further investigation of local conditions will be undertaken. This will allow for the development of impact management measures if required.

3.3 Ecological Values

3.3.1 Existing Environment

Desktop research, using available databases and published information was conducted in order to document the existing ecological values of the site. Database searches conducted utilised:

- Regional Ecosystem Mapping, provided by the Queensland EPA;
- Wildlife Online Search, provided by the EPA; and
- EPBC Act Protected Matters Report, provided by DEWHA.

Information was also obtained through the investigation of data sets which have been purchased by WorleyParsons, such as the location of Ramsar wetlands and Koala Management areas.

Protected Areas

The site in not located within a protected area. Whilst the Calliope River Catchment is a contributor to the Great Barrier Reef World Heritage Area (the site is approximately 60 km upstream from the world heritage area), given the stormwater management measures to be implemented it is unlikely that this project will have a significant impact on the downstream values of this area.

Flora

The site is located in an area which has been heavily cleared in the past. The area is generally not densely vegetated and is comprised mainly of grassland and shrubland regrowth. There is little habitat connectivity offered by this area; however, there is a strip of riparian vegetation along Larcom Creek, which may provide a buffer or corridor for fauna movement.

Regional Ecosystem Mapping and *Vegetation Management Act 1999* Essential Habitat Mapping information was obtained from the EPA. This mapping indicates that there are no essential habitat areas on the project site. However essential habitat areas have been identified on the north eastern side of the current proposed access to the site (via Flynn Road). This project will not directly affect these areas however they will have to be considered in the EIS process. Regional Ecosystem Mapping indicates that the proposed site is covered by approximately 190 ha of dominant ‘of concern’ vegetation (refer to Table 3-1).

Table 3-1 Regional Ecosystems considered to be present on the project site

Regional Ecosystem	Description	Status
11.3.4	Sparse tall woodland on alluvial plains, containing Eucalyptus tereticornis and may contain other Eucalyptus species	Of Concern
11.7.6	Corymbia citriodora or Eucalyptus crebra woodland on lateritic duricrust	Not of Concern
11.3.26	Mid – dense Eucalyptus moluccana or E. microcarpa woodland to open forest on margins of alluvial plains	Not of Concern

Aerial photography indicates that the site area is sparsely vegetated and, in some areas, has been cleared since the vegetation mapping was conducted. During the EIS process, site investigation will need to be conducted to ground truth these regional ecosystems and to identify flora which is located on the proposed site.

The management of weeds in the area is also important to minimise the impact associated with this project. Through database searches, it has been identified that several weed species are potentially found within the site and surrounding areas. Further investigation is required to identify and document possible weeds located on site and the extent of their growth. If not properly managed, weeds and their seeds can easily be distributed a vast distance.

Fauna

A search of the Queensland EPA and the DEWHA databases provided a list of rare, vulnerable and endangered animals which may be found on the proposed site and within a ten kilometre radius of the site. According to the EPBC Act, there are 19 threatened species potentially utilising habitat within ten kilometres of the site, and 18 migratory species potentially associated with the site.

Table 3-2 lists the Queensland Conservation Status of threatened species under the *Nature Conservation Act 1992.* These are listed with their status and the associated number is the number of records of the particular species from within a ten kilometre radius of the chosen site.

Table 3-2 Queensland Conservation Status of Threatened Species

Name	Status
Accipiter novaehollandiae (Grey Goshawk)	R (4)
Lophoictinia isura (Square-tailed Kite)	R(1)
Nettapus coromandelianus (Cotton Pygmy Goose)	R(2)
Geophaps scripta scripta (Squatter Pigeon - southern subspecies)	V(10)
Melithreptus gularis (Black-chinned Honeyeater)	R (3)
Numenius madagascariensis (Eastern Curlew)	R (2)
Ninox strenua (Powerful Owl)	V(7)
Turnix melanogaster (Black-breasted Button Quail)	V(2)
Taphozous australis (Coastal Sheathtail Bat)	V (5)
Ophioscincus cooloolensis	E(3)

E=Endangered, V=Vulnerable, R=Rare

From this list it can be concluded that the species listed are found in habitat regions which fall within ten kilometres of the site. Further investigation, during the EIS stage, will include studies to identify the potential of finding these animals on or in areas surrounding the site. From studying the aerial photographs of the area, photos and descriptions of the area, and the limited records of these species in the area, it is considered unlikely that these threatened species will be found on site; however, fauna studies of the area will be conducted to confirm this. It is also important to identify the habitats of these species, as the vegetation on site may not be appropriate for these species.

3.3.2 Potential Impacts

Flora

The construction of the steel making facility will result in the clearance of much of the existing remnant vegetation currently on the development site. This will also have the potential to increase the impact of edge effects on remaining vegetation. However, the site will maintain a significant vegetation buffer on each of the site's boundaries and will include significant buffering vegetation to the riparian zone of Larcom Creek. This may actually lead to an improvement of the riparian vegetation for that creek, effectively managing the 'edge effect' impact for that area. However, in general the amount of vegetation in the area will be diminished, consequently diminishing possible habitat areas of fauna in the area.

In order to clear the site, an approval for clearing 'of concern' remnant vegetation will have to be obtained under the *Vegetation Management Act 1999.* The relevant Regional Vegetation Management Code, developed by the Department of Natural Resources and Water, will have to be complied with. This will ensure that any clearing which is required will be conducted in a way which limits impact on the values of the area. Native revegetation of the buffer areas on the boundaries of the development site will be undertaken, minimising the impact of the clearing and edge effects on remaining vegetation outside of the site's boundaries. This will also help to mitigate any loss of habitat due to clearing.

Emissions from the facility may impact sensitive vegetation surrounding the proposed site. These impacts will be investigated during the EIS with mitigation measures developed if necessary.

The spread of weeds due to clearing and construction is also a potential impact. Simple mitigation measures can be installed to ensure that seeds are not spread due to the movement of construction and operational vehicles. The spreading of weed species in the area can have detrimental effects on the native flora and fauna in the affected areas, as the weeds over take the area, and potentially destroy food sources. A weed management plan should be developed and implemented to ensure that the project activities do not encourage the spread of weed species. This may include, however is not limited to the following:

- providing a wash down area to ensure seeds are not transported to or from the site;
- revegetation as soon as possible to avoid weed species taking hold;
- providing assurance that all fill or topsoil is certified to ensure that no weed seeds enter the site via this method; and
- use of established roads and tracks to limit the area of impact for the site's development.

Fauna

The clearing activities associated with the site may impact on the fauna in the area due to the operation of heavy equipment, with the fauna in the area potentially experiencing disruption to their habitat usage. Other impacts include injury to fauna on site. As the site is not densely vegetated, it is not expected that a high density of fauna will be found to be using the area of the project site, nor is the removal of vegetation on the site expected to cause a significant impact to the fauna of the area. However fauna investigations will be carried out during the EIS to identify the fauna species using the site, and likely impacts.

A vegetation management plan will be developed and implemented during the construction and operational phases of this project. If determined to be necessary, mitigation measures could include using fauna spotters during clearing, clearing vegetation in stages and the installation of buffer zones to provide wildlife corridors. A vegetation buffer area will be installed on each of the boundaries of the site and this will provide a permanent wildlife corridor for the fauna in the area. This is expected to be of particular value along the site boundary interface with Larcom Creek.

3.4 Noise

3.4.1 Existing Environment

It is pertinent to note the site is located within the Aldoga precinct of the GSDA. Whilst extensive industrial development that would create significant noise impact has not yet been undertaken in this precinct (with the exception of construction works on the proposed Aldoga Aluminium Smelter site and the Comalco Alumina Residue Storage Facility), the designation and purpose of the Aldoga precinct as per the GSDA Development Scheme includes:

- *"To encourage the establishment of industrial development that is of regional, State or national significance. In particular large scale, large plant footprint industrial development requiring undeveloped sites would be encouraged."*

The proposed steel making facility fits with this designation and purpose and it is considered that assessment of the noise impact of the facility needs to consider the designation of the surrounding land uses for heavy industrial development.

The site selection study commissioned by BGD considered noise sensitive receptors nearest the site along with the level of noise attenuation (due to effects including distance, directivity, ground effect, atmospheric absorption, shielding by intervening topographic features and meteorological effects) expected between the boundary of the facility site and these potential sensitive receptors.

The project site is located approximately 8 km from the township of Mt Larcom and approximately 3 km from the township of Yarwun. These are the nearest relatively 'dense' groupings of sensitive receptors in the area. There are several residences located on the ridge of Mt Larcom, which is approximately 2 km from the site; however, they are on the opposite side of the mountain from the project site. There are a number of industrial sites operating to the east of the area including the Rio Tinto Aluminium Yarwun Refinery. The proximity and density of sensitive receptors adjacent to the proposed development site is significantly less than potential development sites in Yarwun and Targinie precincts of the GSDA. The site's location, relatively distant from sensitive receptors, was a significant factor in the site being chosen as the preferred site during the site selection study for the steel making facility.

The project requires development of various transport and service infrastructure which will largely be constructed in the proposed material transportation and service corridors under consideration by DIP. Existing use of transport corridors for road, rail and services through the Aldoga precinct would impact on the background noise levels associated with these corridors.

3.4.2 Potential Impacts

Both the construction and operation of the steel making facility are expected to impact on the noise levels in the area however it is considered that these impacts are manageable.

During the construction period, noise will be created through the use of various items of construction machinery (e.g. heavy earthmoving equipment). During construction, mitigation measures such as noise controls and mufflers will be installed on equipment. If necessary the undertaking of construction activities with a propensity for high noise emissions could be restricted to certain time periods. Construction noise is expected to comply with relevant EPA standards. This will be further considered within the EIS studies for the project.

Operation of the facility is expected to involve a number of major noise sources (depicted in Table 3-3).

Table 3-3 – Significant Noise Sources in each Plant Process

Plant Section	Processes / Significant Noise Sources
Raw materials handling	Unloading facilities, conveyors, screens and vibrators, trucks, mobile equipment
Coke Ovens	Coal grinding and charging, screening, transport and stockpiling, induced draft (ID) fans, boilers and pumps, cooling towers, turbines/generators, machinery drives
Sinter Plant	ID fans, blowers/compressors, machinery drives
Blast Furnace	Charging furnace top, dust collection, ID fans, pressure relief valves, turbo-compressor
Basic Oxygen Furnace	Preparing scrap, slag processing, ID fans, flare stack
Continuous Casters	Machinery drives, pumps
Product Dispatch	Machinery drives, mobile equipment, trucks

During operation, the facility aims to be emitting no more than 65 dB(A) of operational noise at the boundary of the site. This can be achieved through various normal noise mitigation measures being installed on site. Noise controls will be installed on all significant noise sources as required. This may include locating noisy equipment in enclosures and positioning enclosures and buildings close to noise sources to act as screens. Based on preliminary noise modelling undertaken for the site selection study it was concluded that from an operational noise impact perspective, the site is suitable for the proposed development.

Whilst noise emitted from transport servicing of the site should be similar to the existing situation and within appropriate levels, it is expected that the frequency of these emissions will increase given the increase of the intensity of use of these corridors and that this would have some impact on the background noise levels for those areas. This will be further investigated during the EIS for the project.

Further investigation into current ambient levels and noise which may be emitted by the facility will need to be undertaken. These results will be monitored to ensure that construction and operation of this facility is in compliance with the *Environmental Protection (Noise) Policy 1997* and associated guidelines. Further studies will be used to develop a noise management plan, in order to address any non-compliances or complaints from the surrounding area.

3.5 Air Quality

3.5.1 Existing Environment

The proximity of the project site to both the harbour and coastline results in the local wind fields being strongly influenced by the sea breeze and the prevailing south-easterly winds that are associated with the trade winds and flows along the coast. The wind roses for the site illustrate the dominance of the easterly and south-easterly synoptic flows on this site. However, they also indicate a significant proportion of strong north-easterly winds, particularly during the day in the summer and autumn months.

Near the centre of the GSDA and directly to the east of the project site lies the region's most dominant geophysical feature, Mt. Larcom. Mt. Larcom, along with other elevated terrain in the region to the east and south create valleys that channel local wind flows in both a north-south and east-west direction. Additionally, the height and steep slopes of Mt. Larcom present a formidable obstacle that affects the dispersion of air pollutants in the region and leads to ponding in the valley along Targinie Road. The significant terrain in the area can also produce drainage flows, particularly at night, under lighter synoptic winds and stable atmospheric conditions.

The existing land uses in the region to the west of Gladstone, including the GSDA, are a diverse mix of heavy industry, transport infrastructure, agriculture, pasture, forest and residential. Significant existing approved (yet to be developed) and proposed industries in the vicinity of the project site include:

- NRG Gladstone Power Station (15 km east-southeast of the project site);
- Rio Tinto Aluminium, Alumina Refinery (8 km east of the project site);
- Orica Ammonia Nitrate Plant (9 km east of the project site);
- Cement Australia cement plant (9 km northeast of the project site);
- Queensland Energy Resources Ltd shale oil plant (not operating at present) (8 km northeast of the project site);
- Aldoga Aluminium Smelter(approved but yet to be constructed) (1 km south of the project site);
- Gladstone Pacific Nickel, Nickel refinery (approved but yet to be constructed) (9.5 km east of the project site);
- Sunshine Gas, LNG Plant (proposed) (10 km northeast of the project site);
- Gladstone LNG, LNG Plant (proposed) (10.5 km northeast of the project site);
- Queensland Curtis LNG (proposed) (14 km northeast of the project site);
- Santos LNG (proposed) (14 km northeast of the project site); and

- Southern Cross LNG Project, LNG Plant (14 km northeast of the project site).

The Gladstone Airshed Modelling System (GAMS) was developed by Katestone Environmental for the Queensland EPA and involved a significant modelling and model validation study covering two dispersion models and one year of concurrent ambient monitoring at seven sites. The updated model has been developed using observed meteorological data from eight stations operated by the BoM and EPA in the Gladstone region including a station in the Aldoga area in reasonable proximity to the project site. The model has been developed with a new emissions database that includes emissions from the region's significant emitters. The GAMS model is available for use by stakeholders, including industry for the assessment of the impacts of development proposals.

The EPA maintains air quality information on their website with this being updated regularly. There are several monitoring sites in the Aldoga / Targinie area, and results collected from the area indicate that the air quality in this area ranges from good to very good.

3.5.2 Potential Impacts

Emissions from the project that have the potential to impact air quality would be expected to occur during construction and operational phases of the project.

The principal emissions from the site during construction phase will be dust associated with activities such as ground clearing, road construction, earthworks, haulage, and building on the site. Such emissions will be controlled by watering and by limiting the area of disturbed surfaces at any one time. Mitigation measures will be further investigated during the preparation of the EIS

During the operational phase, steel production will generate a number of air emissions with the potential to impact on air quality. These would include dust / particulate matter (PM), benzene (C_6H_6), polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), carbon monoxide (CO), carbon dioxide (CO_2), ammonia (NH_3), sulphur dioxide (SO_2), nitrogen oxides (NO_x), Zinc (Zn) fume, alkali vapour, hydrogen sulphide (H_2S).

Preliminary air quality studies were conducted by Katestone Environmental during the site selection study. This produced some basic results for the site area and indicated the site as a preferred site for development within the GSDA. Table 3-4 provides a summary of the risk level assigned regarding potential impacts to air quality for the proposed development at the site.

Table 3-4 – Risk Matrix Summarising the Potential for Impacts to Air Quality for the Site

Issue	Risk for Site B (Low, Medium or High)
Background air quality*	Low
Proximity to residential areas	Low-Medium
Proximity to sensitive vegetation	Low-Medium
Potential for terrain impacts on Mt Larcom	High
Potential for fugitive / odour issues	Low-Medium
Public Perception	Medium-High
Potential encroachment of separation distances	Low
*Assuming the currently approved Aldoga Aluminium Smelter is not developed	

The level of risk associated with the site was defined as generally low-medium. Those identified risks of a high rating are due consideration of terrain impacts on Mt Larcom, significantly due to the site's location adjacent to Mt Larcom. It is not considered that these risks make the site unsuitable for the proposed use, however site specific modelling will be undertaken as part of the EIS process to appropriately assess the air quality impacts.

Various process design and operational measures will be made to limit potential impact to air quality. Mitigation measures will include:

- Shrouding of equipment and dust collection;
- Maintenance of negative pressure in coke ovens;
- Flood quenching of coke;
- Use of stockpile sprays;
- Gas scrubbing systems, gas cleaning precipitator systems, baghouses;
- Gas dispersion; and
- Coke oven and stove burner design.

Further investigation of potential air quality impacts will be undertaken through the project EIS, along with further development of appropriate impact mitigation measures.

3.6 Social and Economic Issues

3.6.1 Existing Environment

In the report entitled "Gladstone Regional Overview - September Quarter 2006" recently compiled by Gladstone Area Promotion and Development Limited (2006), the following key statistics for Gladstone and the surrounding region are noted:

- There is a population of approximately 64 000 in the Gladstone region;
- The median age in Gladstone city is 32 and is forecast to rise marginally to 33 over the next 20 years;
- Average annual population growth is currently around 0.9% within Gladstone City, however, this is to forecast to rise to 2.4% and then 3.1% for the next ten years and the ten years after that respectively. The population growth in the Gladstone/Rockhampton region in recent times has occurred as a result of the establishment of major industry;
- Employment by population can be categorised as follows for Gladstone region, in accordance with the Gladstone Regional Overview (GAPD Ltd 2006):
    - Managers and administration 9.8%
    - Professionals 11.6%
    - Associate professionals 10.7%
    - Tradespersons 17.0%
    - Clerks/sales/service workers 15.2%
    - Labourers and related workers 33.8%
    - Other 1.9%
- To the end of the June 2006 quarter, the median house price in Gladstone City was $252,500 and the median weekly rent was $225 (for a three bedroom house); and
- House price growth at June 2006 was high, with a quarterly increase of 7.4% (for the Gladstone City Local Government Area).

In terms of facilities the Gladstone region provides:

- Health – the Gladstone General Hospital offers a choice of general practitioner and specialist doctors, dentists and medical services and has 98 beds. A private hospital wing operated by the Mater hospital is also available;
- Education – there are a variety of pre-schools, primary schools, special schools, high schools and tertiary education facilities. The spectrum of tertiary education facilities in the area

includes a TAFE and a Central Queensland University campus. Around 9,000 state and private school pupils are enrolled in the Gladstone education system; and

- Airport – Gladstone has a modern airport that offers regular services to Brisbane, Mackay, Rockhampton, Townsville and Cairns. Services are operated by Qantas Link, offering nine daily services to Brisbane.

The workforce of the Gladstone region contains many of the skills needed for the construction and operation of the project. However, the availability of such workers for employment on the project is likely to be limited as most are currently gainfully employed. There are also a number of specialist skills that will be required for the operation of the facility. Potentially these skills will have to be sourced from outside the region. Preliminary discussions with construction workforce contractors have indicated that construction workforce needs may be partially met by providing full time construction employment to employees currently only working on part time arrangements in the region. However based on past experience with development in the region it is considered likely that a significant portion of the workforce for construction and operational phases will be newcomers to the community.

The Gladstone community contains a wide range of community facilities and services. The ability of these facilities and services to accommodate increased demand will be considered as part of the project. Mitigating actions will be developed and implemented where appropriate.

3.6.2 Potential Impacts

There are significant Regional, State and National level social and economic benefits associated with the steel making facility development. Direct benefits will occur at the regional level at both the construction phase and during the ongoing operation of the facility.

During construction and operation it is anticipated that the workforce within the Gladstone Region will increase through direct employment significantly. The construction workforce is estimated to peak at 1500 employees with the average number of construction employees being 900 over the two years. The operational workforce for Stage 1 of development of the facility is estimated to be 600 employees. An additional 550 people will be employed for operations of Stage 2 of the facility's development, giving an overall operational workforce of 1150 people for ultimate planned production of the facility at 5 Mtpa. The demographics and nature of the immigrant workforce and the influence of the existing demographic profile will not be altered significantly considering past infrastructure expansions and the region's current workforce. The Gladstone region, including Gladstone City and regional villages and townships will likely be the dormitory centres for both the construction workforce and the permanent workforce. Temporary construction camps may be constructed in order to accommodate the volumes of workers needed for this project.

The construction and operation of the project will promote indirect employment and business opportunities in the project location, the region and the state of Queensland.

It is considered that a proportion of the construction and operational workforces (and their families) are likely to be sourced from outside the Gladstone regional area. This outsourcing will create a demand for housing, goods and services and government facilities and services.

The EIS will assess the effects of this additional demand for housing and services and identify measures to overcome supply problems. Previous studies on similar sized industrial projects in the region have provided solutions to accommodation, transport and demand on infrastructure which were acceptable to stakeholders. The proponents intend to build on this previous work.

3.7 Traffic & Transport

3.7.1 Existing Environment

The steel making facility is well serviced by existing and proposed corridors for transport infrastructure within the GSDA.

The facility will require access to a rail siding and dump station in the Gladstone area for the transport of coking coal to the project site. Preliminary discussions with Queensland Rail (Network Access) have indicated that sidings and dump station will be able to be developed in the Gladstone area for the project.

The facility would require access to road for the import of iron ore and other materials (including construction modules) to the site and for the export of steel products. It is planned that iron ore will be transported to site, via the use of a non-public-use haul road. This road would largely follow the proposed haul-road corridor that has been set aside for that purpose by the DIP. Construction modules will also be delivered to site via this route. Finished product will also utilise this haul road, being trucked to a rail loading point for subsequent transport to wharves at Auckland Point.

The site can be provided with access to the normal range of utility services. Access to power for the site will be through the Powerlink sub-station (currently under construction and directly adjacent to the site). Access for water to the site will be through a take off line from the current and proposed infrastructure corridor servicing the Aldoga area. Access to gas for the site will be through a take off line from the current and proposed infrastructure corridor servicing the Aldoga area.

There are two designated airfields (one existing airport at Gladstone and one reserved for future development on Kangaroo Island to the north-east of proposed development site) in the vicinity of the proposed site. The airspace above the site may be used by aircraft approaching and departing the airport sites (present or future) and operational airspace (obstacle limitation surfaces) has been defined for the area.

The construction of a new wharf at Fisherman's Landing and improvements at the Auckland Point facilities will be necessary to serve the proposed development.

3.7.2 Potential Impacts

Project engineering studies to date have not identified any substantive impediments to the transport of construction materials, raw materials or product or the provision of utility services to the site. Preliminary discussions with infrastructure providers and government agencies have indicated that the project's proposed utilisation of planned transport infrastructure corridors and facilities is appropriate.

However the project will impact on the local traffic and transport infrastructure during construction and operational phases when it is expected that a large number of workers will be onsite and a range of materials and equipment will be delivered to and taken from site by truck.

The haul route will run adjacent to current road (Gladstone - Mt Larcom Road) and rail (North Coast Line) infrastructure from the site to Fisherman's Landing Wharf. This route will not be for public use. Construction of the haul road will impact on the existing environment and this will be assessed through the EIS. Operation of the haul road will have minimal impact on other transport infrastructure with the exception of intersection points with other roads at Calliope River Targinie Road and access points for other developments in the GSDA.

Construction of the public access road to the site will include upgrade and modification of Flynn Road. The impact of upgrade and modification of this road will be assessed through the EIS. Operational usage of this road will include deliveries to site and employee and visitor site access. Utilisation of the modified Flynn Road and Gladstone - Mt Larcom Road will impact the local traffic network to some extent.

Development of the site is also likely to increase traffic utilising the main feeder roads linking to the area.

A traffic and transport investigation will be undertaken as part of the EIS process in conjunction with the Department of Main Roads (DMR) and Gladstone Regional Council. Potential traffic and transport impacts and mitigation measures will be investigated, along with possible network alterations or planning options that may be appropriate for implementation in terms of safety, operations and cost.

BGD is investigating minimisation of transport (road usage) impact through optimising haul fleet sizes and utilisation of single suppliers for site store and maintenance requirements.

Access to metallurgical coal will be provided by development of rail sidings in the Gladstone area and trucking from the sidings to the project site. Impact of the development or upgrade of these railway sidings will be assessed through other approvals processes. It is considered that the increase in rail traffic due the delivery of coking coal to the region will be negligible in comparison to the traffic generated by the export of coal through existing port facilities (RG Tanna Coal Terminal and Barney Point Terminal) and the proposed Wiggins Island Coal Terminal (WICT). Impact of trucking operations for transport of coal from the sidings to the project site will be assessed through the EIS for this project.

The operation of the steel making facility may generate high temperature exhaust gases, which could generate upward rising air plumes. Such plumes could impact on the navigation safety of aircraft accessing either of the two designated airport areas. This matter will be further investigated during the EIS process through air modelling and liaison with the relevant agencies (e.g. CASA) as necessary.

3.8 Cultural Heritage

3.8.1 Existing Environment

Previous studies within the Aldoga Precinct of the GSDA indicate there to be sites / artefacts of indigenous and/or of European cultural significance within close proximity of the project area. According to previous studies undertaken of the area types of sites/artefacts existing include stone artefacts, former station yards and a massacre site.

A preliminary assessment was undertaken of the project area which included a review of existing background data. Database searches included the following:

• The Australian Heritage database (DEWHA); and

• The Queensland Heritage Register (EPA).

A search of the Australian and Queensland Heritage Databases (non-indigenous) was undertaken. No culturally significant sites (non-indigenous) were identified within the project area. One place, Mt Larcom Range was listed as an indicative place (no decision has been made as to whether entry to the register should be made or not) on the Register of the National Estate for its value as a scenic backdrop to the city of Gladstone.

Previous searches of the Aboriginal and Torres Strait Islander Cultural Heritage Register and Aboriginal and Torres Strait Islander Cultural Heritage Database (Indigenous) indicated that sites of cultural significance have been identified along Larcom Creek to the west of the project area.

The proposed project is being undertaken in part of the traditional country of the Port Curtis Coral Coast Native Title Claim Group. The group has lodged a native title claim over the wider area and this claim (National Native Title Tribunal File No. QC01/29) provides the Port Curtis Coral Coast Native Title Claim Group with native title processing rights and cultural heritage consultation rights for future developments within the claim boundary.

There is an existing agreement for the management of cultural heritage issues in respect of the GSDA between the Traditional Owner Claimants (consisting of the Gurang, Bailai and Gooreng Gooreng peoples) the Minister Industrial Development of Queensland and the Gladstone Economic and Industry Development Board (GEIDB).

Further investigations, including consultation with the relevant parties, will be conducted initially as part of the EIS process during the planning phase of the Project. During the EIS process, a CHMP will be developed for the Project.

3.8.2 Potential Impacts

The methodology to be employed to ensure that the Project proceeds in compliance with the *Aboriginal Cultural Heritage Act 2003* (ACHA) and best practice is as follows:

- Discussion with relevant indigenous group/s about the nature of the Project, its location and the potential impacts on known Aboriginal cultural heritage;
- The commissioning of an Aboriginal cultural heritage survey involving nominated traditional owners and an accredited independent archaeological consultant to conduct the survey. This systematic survey will cover the entire project area and will locate and record any items and places of Aboriginal cultural heritage value;
- The production of a report by the independent archaeologist detailing specifics and locations of cultural heritage significant to the nominated traditional owners together with recommendations as to the preservation and mitigation of cultural heritage impact within the impact area;
- The survey recommendations will be discussed and agreed with the nominated traditional owners and, as required under ACHA, these procedures will be drafted into a Project specific CHMP; and
- The procedures contained within the CHMP will be strictly adhered to during the construction and operational phases to ensure that impacts on Aboriginal cultural heritage are minimised, and where impact is unavoidable, ensure that effective management and mitigation measures are employed to preserve Aboriginal cultural heritage.

The CHMP development will follow the processes described under ACHA which will then be endorsed and registered with the DNRW as a formal CHMP. This Plan will provide the basis for the management of Aboriginal cultural heritage issues in the project's zone of influence.

3.9 Visual Amenity

3.9.1 Existing Environment

The site is located within the Aldoga precinct of the GSDA, remote from significant population centres of Gladstone and Mt Larcom at a distance of approximately 22 km and 8 km respectively. Visibility of the site is generally restricted to the road (Gladstone - Mt Larcom Road) and rail (North Coast Line) corridors. Visibility of the site is restricted to the north and east by the Mt Larcom ranges and to the west by other hill formations.

From the Gladstone Industrial Land Study developed by consultants Connell Wagner for the Department of Infrastructure and Planning (1992) the visual quality of the GSDA was found to lie in:

- The naturalness of the area;
- The contrasts in the landform and vegetation;

- The presence of views of landmark hills and ranges such as Mt Larcom; and
- The cultural landscape of open, undulating grasslands and woodlands.

The project site is located within the Aldoga precinct of the GSDA. As per the development scheme for the GSDA the designation and purpose of the Aldoga precinct includes:

- *"To encourage the establishment of industrial development that is of regional, State or national significance. In particular large scale, large plant footprint industrial development requiring undeveloped sites would be encouraged".*

The proposed steel making facility is considered to accord with this designation and purpose.

Whilst the GSDA is currently only partially developed, it is considered that in accordance with current land use planning the Aldoga area will ultimately be characterised by large scale industrial development.

Specific to the project development site the proposed Aldoga Rail Yard will influence the visual character of the area as seen from the Gladstone - Mt Larcom Road as the rail yard will be located between the proposed steel making facility and that road (the only significant current view point to the site).

The visual character of the project area surrounding the proposed Rail Yard is influenced by existing industry, rail and road transport infrastructure and other rural land uses. Hilly and mountainous terrains, particularly the Mt Larcom ranges dominate and frame the site.

3.9.2 Potential Impacts

The location of the development site, away from significant population centres, in the shadow of the Mt Larcom ranges and to the north of the proposed Aldoga Rail Yard and Gladstone - Mt Larcom Road limits the expected impacts on the visual amenity of the area. However, as the plant will include a number of stacks and other tall structures. It is considered that there will be some visual impact from the development that will be consistent with the designation and purpose of the Aldoga precinct of the GSDA.

In order to minimise these impacts on visual amenity it is proposed that site landscaping will be employed in the detailed project design to screen the plant from public viewing points as much as is practicable. In addition, plant colours will be selected to assist the development to blend into its visual setting. Highly reflective and bright colours will be avoided, unless required for plant operational or safety purposes.

4. ENVIRONMENTAL MANAGEMENT

BGD are committed to best practice management of its environmental risks. BGD's approach is to design, construct and operate the project to minimise the project's environmental impact.

BGD proposes to implement an Environmental Management System consistent with the approach outlined in ISO 14001. An integral component of the management system is the preparation and implementation of a number of environmental management procedures, particularly in relation to various aspects including; ground and surface water, flora and fauna, air quality (including greenhouse gases), noise, waste management, infrastructure, workplace and health issues, cultural heritage and health and safety matters.

The EIS will identify the potential construction, operation and decommissioning impacts associated with the steel making facility and recommend a range of mitigation measures to be implemented during the design, construction and operational stages of the Project. The EMP as part of the EIS will address proposed environmental safeguards and control measures and establish the framework of roles and responsibilities, and timings to ensure they are implemented. The EMP will become the key reference document as it will convert the findings and recommendations in the EIS into a set of management actions, procedures and commitments to be followed by designers, constructors and operators in order to mitigate adverse and enhance beneficial environmental and social impacts. The EMP will serve as the framework for measuring the effectiveness of environmental protection and management. This is achieved by specifying the monitoring, reporting and auditing requirements, including responsibilities, timing and format in order to meet the necessary performance criteria. The EMP will also specify continuous improvement strategies to be undertaken at the site. The EMP will make provision as appropriate for unforseen events by outlining corrective actions which may be implemented in these situations. The EMP will be written as a stand alone document, so that it may be extracted from the main body of the EIS.

Construction and other contractors will be engaged on the basis that compliance with the project EMP, development approvals and environmental permits is a contractual requirement. However, it is recommended that the construction contractor develop their own Construction EMP in direct compliance with the overall EMP. BGD will also maintain compliance with the EMP and relevant approval conditions through a program of risk-based tools, including onsite audits, documentation reviews, key performance metrics, management meetings and illustrated commitment from senior management.

5. STAKEHOLDER ENGAGEMENT

The proponents believe in the principles of good corporate citizenry in their business activities. Accordingly, the proponents view constructive stakeholder and community consultation processes as essential to the success and long-term viability of this project. To this end, the consultation component of the project is intended to be based on the guiding principles of proactive information sharing and relationship building with key stakeholders.

Stakeholder participation in the development of the EIS is actively encouraged. The consultation strategy will involve a number of key activities. The first key activity involves identifying stakeholders who may be impacted or have an interest in the project. These stakeholders may include landowners and citizens of communities, business and industry groups such as Chambers of Commerce and regional development organisations and non-government organisations such as environmental groups. Relevant agencies throughout the three tiers of government will be extensively consulted, as will elected government officials.

It is expected that the public consultation process will identify broad issues of concern to local community and interest groups at all stages including project planning, construction, commissioning, operations and final decommissioning.

The key objectives of the developed consultation strategy will be to:

- Inform the different interest groups about the project proposal;
- Seek an understanding of interest group concerns about the proposal;
- Explain the environmental impact assessment process and indicate how public input might influence the final recommendations for the project;
- Provide an understanding of the regulatory approval process;
- Seek local information and input into the project; and
- Provide a sense of involvement and possession of the project.

Initiatives used to inform stakeholders about the project proposal may include:

- Development of a dedicated project web site and fact sheets;
- Development and distribution of a project newsletter;
- Newspaper advertisements;
- Letterbox drops;
- Establishment of a community liaison group;
- Establishment of a project office in Gladstone to distribute information and host visual displays of the project; and

- Establishment of an 1800 telephone number for general enquiries.

The public consultation strategy would include public meetings, interest group meetings, production of regular summary information and updates and other consultation mechanisms for encouraging and facilitating active public consultation.

Ultimately, the consultation would establish:

- The project's ongoing program for communicating and consulting with the public and stakeholder groups during the course of the project; and
- Appropriate project responses to the issues and suggestions of stakeholders and members of the public, including potential project design modifications aimed at mitigating or managing environmental impact issues.

To date, BGD has undertaken preliminary consultation with Queensland government departments, including the DIP and the EPA and government owned corporations including Queensland Rail, Stanwell Corporation Limited and the GPC. BGD also proposes to conduct focused community liaison with the Port of Gladstone Community Focus Group, which was recently established by the GPC.

6. GLOSSARY

AHD	Australian Height Datum
Arisings	Arisings is internally produced scrap generated through the process i.e. off cuts, ladle skulls and other items.
Blast furnace	A receptacle for iron ore, coke and other raw materials used in the processing of iron ore into iron. Iron is subsequently processed into steel.
Breeze	Coke fines generated during handling and screening, generally less than 5mm.
BGD	Boulder Steel Limited
BOF	Basic Oxygen Furnace
CASA	Civil Aviation Safety Authority
Calcining	To heat (a substance) to a high temperature but below the melting or fusing point, causing loss of moisture, reduction or oxidation, and the decomposition of carbonates and other compounds.
CHMP	Cultural Heritage Management Plan
Coke	The end product of the carbonisation of coal. Coke products can be categorised as sized coke (includes coke of 25 x 100mm for blast furnace use and foundry coke at +100mm) and coke fines (breeze), produced from the screening and handling of coke.
Coking coal	Coal that is used in the production of metallurgical coke.
Crude steel	The molten end product after the processing of iron in steel making furnaces to remove excess carbon. Steel making furnaces comprise basic oxygen furnaces, electric arc (EAF) furnaces and open-hearth furnaces. In this application the BOF is the form of furnace used.
DEWHA	Department of the Environment, Water, Heritage and the Arts
DIP	Department of Infrastructure and Planning
DMR	Department of Main Roads
DNRW	Department of Natural Resources and Water
EIS	Environmental impact statement
EMP	Environmental management plan

EPA	Queensland Environmental Protection Agency
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
EPCM	Engineering procurement and construction management
EPP Noise	*Environmental Protection (Noise) Policy 1997* (QLD)
ERA	Environmentally relevant activity, as defined under the *Environmental Protection Act 1994* (QLD)
GSDA	Gladstone State Development Area
GPC	Gladstone Ports Corporation
Heat	Contents of the BOF steel making vessel, in this case 250 tonnes
IAS	Initial advice statement
IPA	Integrated Planning Act 1997
Integrated steel making	The steel making process ranging from the production of pig iron in a blast furnace through to the making of steel in a basic oxygen furnace. It is normally assumed that coke production forms part of an integrated process.
ISO14001	International Standardisation Organisation standard for an Environmental Management System.
Kt	One thousand tonnes
L_{Aeq}	Adjusted equivalent continuous A-weighted sound pressure level (or average) measured over a time period
Metallurgical coal	Coals, which are consumed in the production of pig iron, either via the coke oven process, direct injection (PCI) or by direct reduction
Mt	Million tonnes
Mtpa	Million tonnes per annum
O&M	Operation and maintenance
PCI coal	Coals, which are suitable for direct injection into the blast furnace in a pulverised state. PCI replaces oil and displaces some quantity of coke. Traditionally, the PCI coal price is closely linked to thermal coal which will allow the blast furnace operator to reduce the overall cost of raw material by reducing the volume of coke needed to produce each tonne of hot metal.

Q100	**100 year flood levels**
RE	Regional Ecosystem
SD Act	State Development Act
ToR	Terms of reference for an EIS
tpa	Tonnes per annum
Trunnion	A pin or pivot on which something can be rotated or tilted
Tundish	A holding vessel on the casting machine which receives steel from the ladle and distributes it equally to the four strands of the casting machine
Turret	A holding device which supports two ladles on the casting machine. This device rotates through 180 degrees to remove the empty ladle from the casting position and position a full ladle in the casting position
Tuyeres	The pipe, nozzle, or other opening through which air is forced into a blast furnace or forge to facilitate combustion.

7. REFERENCES

Bureau of Rural Sciences after Commonwealth Scientific and Industrial Research Organisation (1991). *Digital Atlas of Australian Soils*. [Online] Available HTML: http://www.brs.gov.au/data/datasets

Connell Hatch, 2007. Initial Advice Statement, Moura Link – Aldoga Rail Project, Queensland Rail.

Connell Hatch, 2007. Wiggins Island Coal Terminal Supplementary Environmental Impact Statement, Central Queensland Ports Authority and Queensland Rail.

Connell Wagner, 2005. Gladstone State Development Area (GSDA) Industrial Land Suitability, Connell Wagner and Queensland Government State Development and Innovation.

Connell Wagner, 2002, Aldoga Aluminium Smelter Environmental Impact Assessment.

Environmental Protection Agency (year of access). Copy of the certified regional ecosystem map for the purpose of the Vegetation Management Act 1999. Online RE Data, Environmental Protection Agency, Brisbane. [URL: http://www.epa.qld.gov.au/REDATA] Accessed on 25/09/2008.

Gladstone Area Promotion and Development Ltd (GAPD Ltd) 2006, *Gladstone Regional Overview – September Quarter 2006*, GAPD Ltd, Gladstone.

Queensland Coke & Energy Pty Ltd and Stanwell Corporation Limited, 2004. Initial Advice Statement, Coke Plant and Power Station Project.

WorleyParsons Services Pty Ltd, 2008, Site Selection Study, Boulder Steel Limited Steel Production Facility.