Miscellaneous Purposes Licence Application – Ardrossan Dolomite Quarry Mine Waste Rock Area

10 June 2010

OneSteel Ardrossan

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Author: J Goode.....

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Signed: .....

Approved by: J Goode.....

Signed: .....

Date: 10 June 2010.....

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1. Introduction

1.1 Overview

OneSteel's Ardrossan Quarry is the largest dolomite mining operation in Australia. Located on the York Peninsula, South Australia the quarry has been operating since 1950 and now averages an annual production rate of 0.9 million tonnes (Mt) per annum.

Dolomite is a sedimentary carbonate rock and a mineral, composed of calcium magnesium carbonate. The dolomite from the Ardrossan Quarry is fine grained, dense and yellow to brown in colour and is considered the best in the country due to its unique composition.

The dolomite from the Ardrossan operations is predominantly used by OneSteel (OST) as a flux in the steel making process (at operations in Whyalla). It is also used in the local area for everything from concreting to road making and fertilising.

1.2 History of operations

Dolomite and dolomitic limestone occur extensively in an outcrop along the eastern shore of the Yorke Peninsula, South Australia. The occurrence of high-grade dolomite was first noted in 1918 and initially examined by Broken Hill Proprietary Ltd (BHP) geologists in 1944/45. Surface sampling and mapping gave favourable results and was followed by the drilling of 15 diamond drill holes to test the grade and depth of dolomite in the proposed quarry area.

Full production at the Ardrossan Dolomite Quarry commenced in 1950 by (BHP) with annual. During 1961-62 a further 78 exploration holes were drilled in the quarry to generate an ore body model for maintenance of dolomite production specifications to customers.

In 1950 BHP also established a crushing plant, conveyor system and jetty at Ardrossan for use by the mine. The belt and jetty established by BHP were also made available for the shipment of the wheat and barley from the region and salt from the nearby salt pans at Price. With agreement to this, work began on grain silos and bulk handling facilities.

1.3 Current operations

OneSteel currently owns and operates the dolomite mine at Ardrossan. Annual production capacity is nominally 600,000 t/yr, with a mine life in excess of 10 years at current production levels. The mine supplies metallurgical grade dolomite for the Company's South Australian steel making operation at Whyalla and BlueScope Steel's Port Kembla steel making operation in New South Wales. The mine also supplies other international steel mills.

1.4 Purpose and scope of the report

1.4.1 Purpose

This document accompanies an application for Miscellaneous Purposes Licence (MPL) for a waste rock dump associated with the existing approved operations of the Ardrossan

Dolomite Quarry. The existing operations and approved Mining Leases (ML), Private Mine (PM) and MPL production tenements are detailed on Figure 1.1.

This document has been prepared using PIRSA's 'Guidelines for the Preparation of a Mining Lease Proposal or Mining and Rehabilitation Program (MARP)' Version 4.9, in order to:

- provide an appropriately comprehensive and detailed description of the existing environment and the proposed operation
- identify all environmental risks associated with the operation
- develop a set of environmental outcomes based on the risk assessment, for constructing, operating, progressively rehabilitating and completing the mine
- develop measurement criteria for the environmental outcomes
- develop environmental management plans in order to meet and measure the environmental outcomes.

1.4.2 Scope

This report applies to the area of the proposed MPL which includes:

- a proposed waste rock dump to be located to the west of MPL 46 and ML5317.

Refer to Figure 1.2 for the location of the waste rock dump associated with this MPL application.

1.5 Structure of the report

Below is an outline of the structure of this report and the information contained in each section.

Section 1 – Introduction

Provides information relating to the project background and history as well as the purpose and scope of this report.

Section 2 – Proponent details and mine tenure

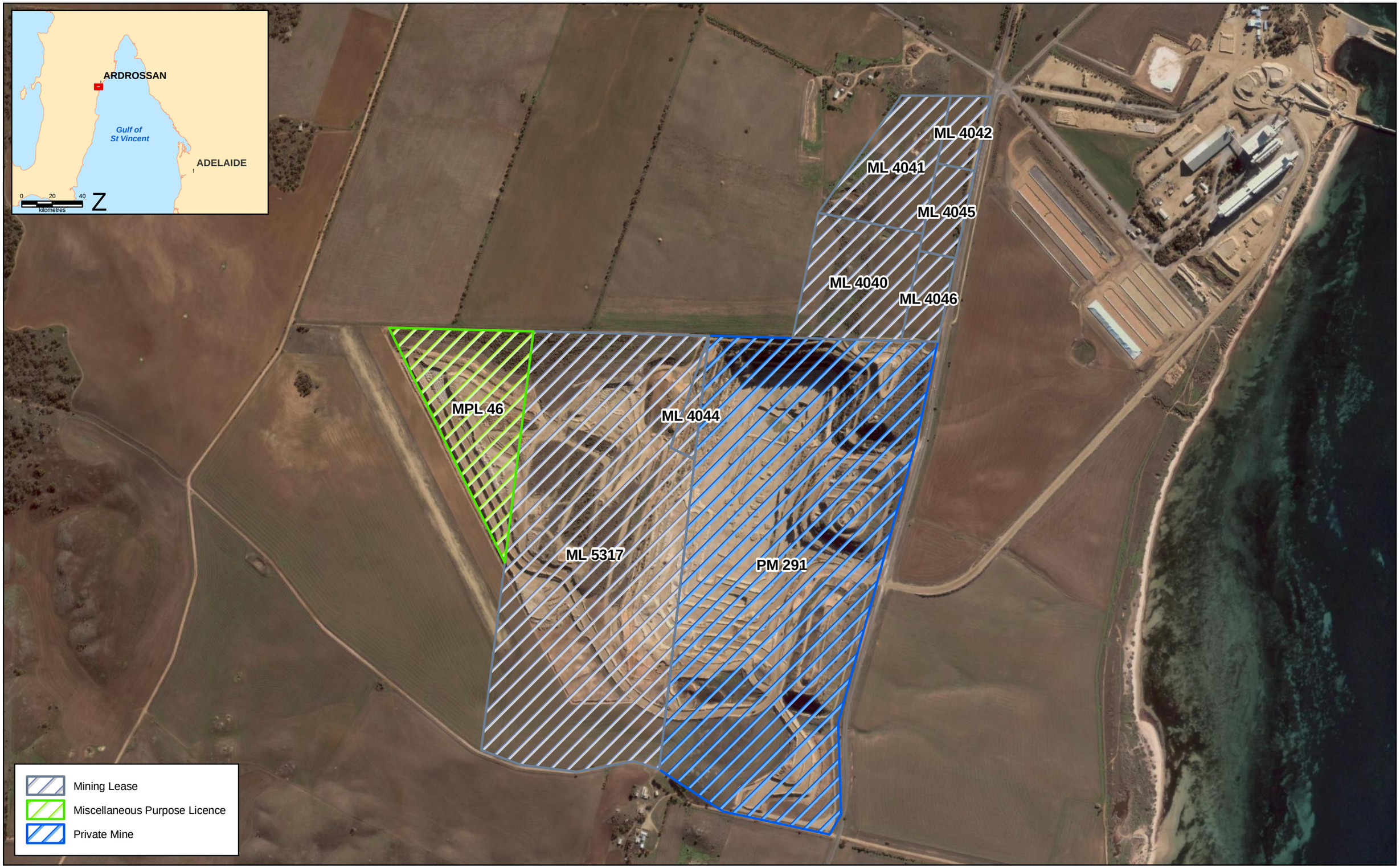
Provides the proponents details and an overview of the mining tenure, exploration licences, native title and local government for the mining area.

Section 3 – Legislative Requirements

Outlines and discusses the South Australian and Commonwealth legislation that applies to the existing and proposed mining activities.

Section 5 – Stakeholder consultation

Provides an overview of the project's consultation objectives, the approach taken and a summary of the consultation conducted for the existing operations.



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APPROVED FOR AND ON BEHALF OF
Parsons Brinkerhoff Australia Pty Limited

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Ardrossan Dolomite Quarry

Boundaries of current mineral production tenements

Figure 1.1

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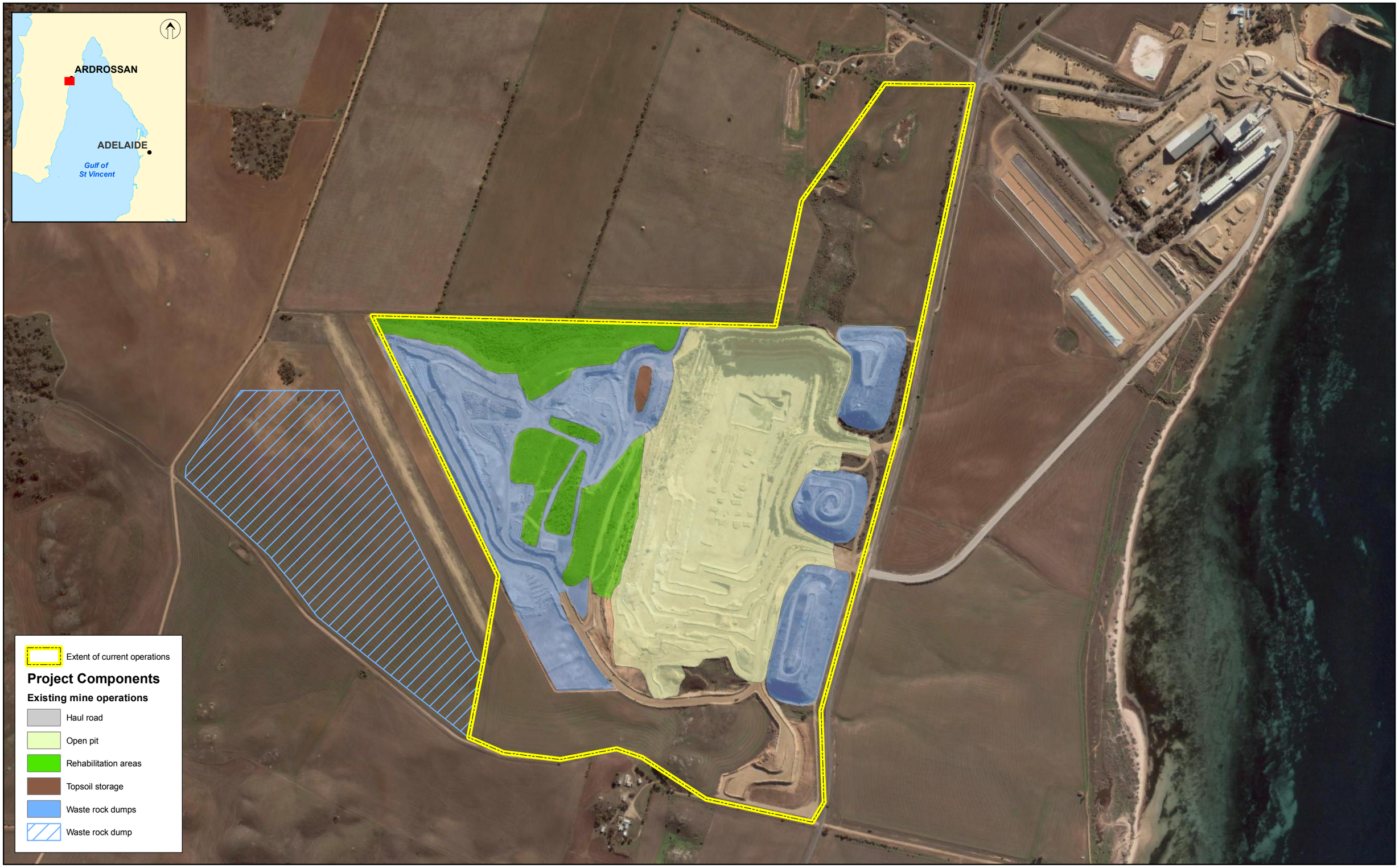

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Ardrossan Dolomite Quarry

Proposed MPL area

Figure 1.2

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Section 6 – Description of land and environment

Provides baseline information for each aspect of the project areas environment including both a regional and local context.

Section 7 – Description of existing operations

This section provides detailed information about the project's current operations including the projects existing and proposed footprint, the mining method, activities conducted on site, the existing infrastructure, workforce and management techniques.

Section 8 – Description of the proposed extension

Outlines the aspects of the operations proposed for the MPL area.

Section 9 – Environmental Impact Assessment

This section provides an outline of the approach taken to environmental impact assessment (and risk assessment) for the proposed waste rock dump area.

Section 10 – Predicted outcomes and assessment criteria

This section outlines the predicted outcomes and assessment criteria for the existing mine operations and the proposed mine extension.

Section 11 – Environmental Management

This section outlines the environmental management measures that are currently undertaken and proposed as part of the mine extension.

Section 12 – Bibliography

Lists the reports and legislation used to prepare this report.

2. Proponent details and mine tenure

2.1 Proponent details

The proponent for the project is OneSteel. OneSteel is the largest manufacturer of steel long products and is the leading metals distribution company in Australia (www.onesteel.com). OneSteel manufactures and distributes structural, rail, rod, merchant bar, cold finished bar, chrome plated bar, reinforcing, wire, tube, pipes, fittings, valves and actuation. OneSteel owns and operates the dolomite mine at Ardrossan. The Ardrossan mine supplies dolomite for the Company's Australian steel making operation at Whyalla, BlueScope Steel's Port Kembla operation and other international steel mills.

The contact details for this project are:

Greg Smith, Mine Manager (Ardrossan Operations)
OneSteel Manufacturing Pty Ltd
c/- PO Ardrossan
South Australia 5571
Phone: 08 8837 3106
Fax: 08 8837 3676
Email: SmithGM@onesteel.com

2.2 Mining tenure

The existing open pit, waste dump and rehabilitation areas are situated on two titles both owned by OneSteel Manufacturing Pty Ltd. The land on which the northern expansion operations are undertaken is located on land privately owned by Mr Robert John Clift.

The existing haul road is located on CT5801/508, CT5880/832, CT5850/730, CT5830/252 and CT5577/722 which is owned by Ausbulk Ltd with a lease to OneSteel Manufacturing Pty Ltd until 31 January 2101.

Existing mining tenements held by OneSteel include one private mine, seven mineral leases and one miscellaneous purposes license. Figure 2.1 shows the Certificates of Title information for the operations. Copies of the Certificate of Title are provided in Appendix A.

The ownership details for the existing mining tenements are detailed below.

2.2.1 Existing operations

2.2.1.1 Private Mine

Mining Tenement	PM291
Land Tenure	Private freehold
Certificate of Land Title	CT5570769
Name of Lessee/Owner	OneSteel Manufacturing Pty Ltd
Current land use	Active dolomite quarry and waste rock dump

2.2.1.2 Mining Leases

Mining Tenement	ML5317, ML4044, ML4040, ML4041, ML4046, ML4045
Land Tenure	Private freehold
Certificate of Land Titles	CT5492167 / CT5571147
Name of Lessee/Owners	OneSteel Manufacturing Pty Ltd / Robert John Clift
Current land uses	Active dolomite quarry and waste rock dump / agricultural / approved northern pit extension area

2.2.1.3 Miscellaneous Purpose License

Mining Tenement	MPL46
Land Tenure	Private freehold
Certificate of Title	CT5492167
Name of Lessee/Owner	OneSteel Manufacturing Pty Ltd
Current land use	Waste rock dump

2.3 Exploration licences

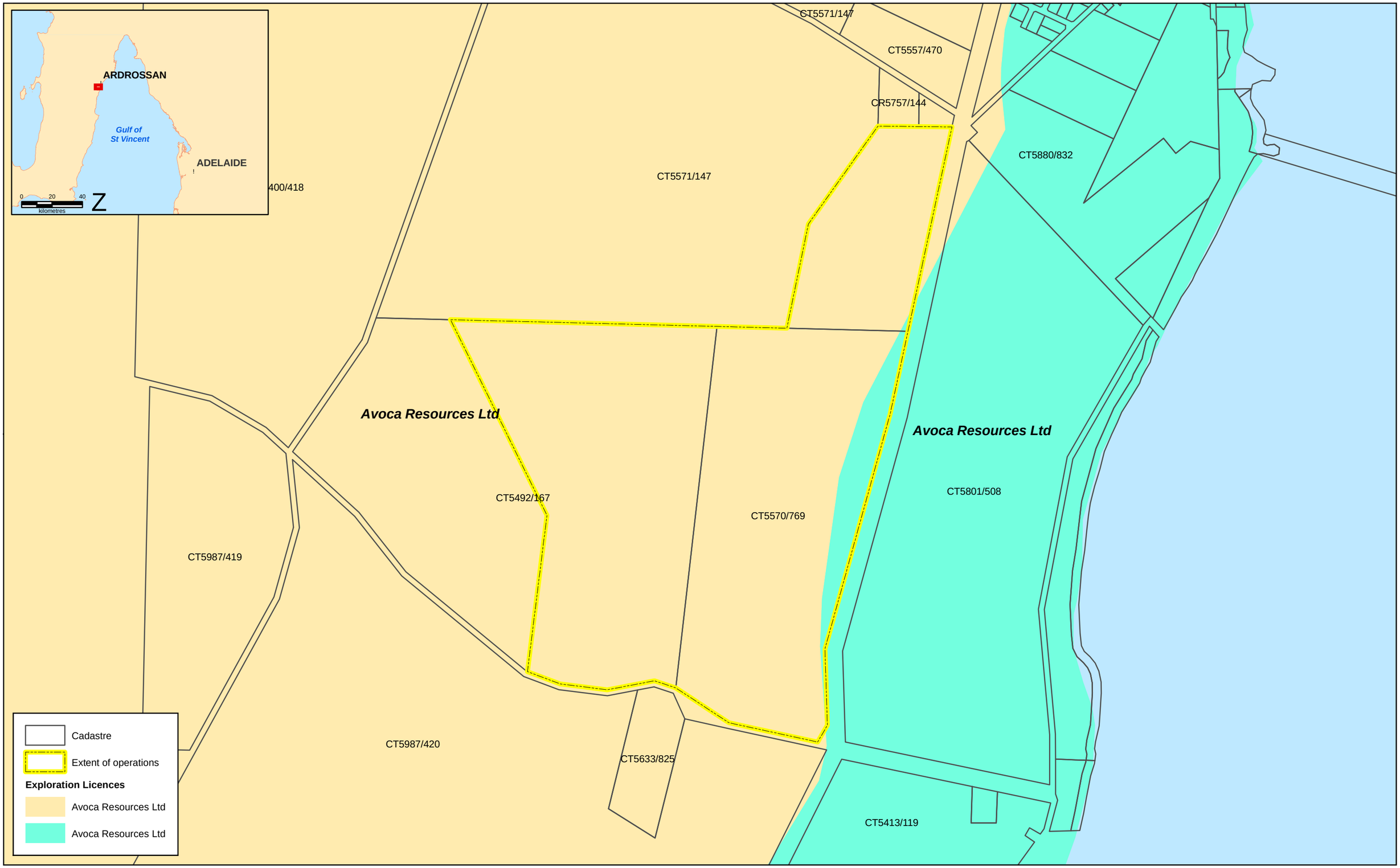
As shown in Figure 2.1 there are two exploration licences covering the entire Yorke Peninsula EL 3116 and EL 2925, both licenses are held by Avoca Resources Limited.

2.4 Native title

There are no Native Title applications over the Yorke Peninsula.

2.5 Local government

Development (under the *Development Act* 1993) in this area is governed by the Yorke Peninsula DC Development Plan (consolidated 8 February 2007). The OneSteel Ardrossan operations are located within the Extractive Industry Zone. The objective for this zone is the continuation of extractive industry operations and the dispatch, in bulk, of mineral resources (Development Plan, 2007 p172). The development plan states that any extensions to resource extractions are to be undertaken with minimal disturbance to the environmental qualities of the area.



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Ardrossan Dolomite Quarry

Exploration licences and parcel boundaries

Figure 2.1

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3. Legislative requirements

Mining in South Australia is primarily governed by the *Mining Act 1971* and Regulations (as well as the *Offshore Minerals Act 2000* and the *Opal Mining Act 1995*). In addition to the primary approval and regulation of mining projects via the Mining Act, there are a number of other South Australian and Commonwealth Acts and regulatory processes that may affect exploration work and mining operations.

3.1 South Australian Legislation

3.1.1 *Mining Act 1971*

Approval for the OneSteel Ardrossan project will be sought via the *Mining Act 1971* as this is the guiding legislation for mining development in South Australia. The Act is administered by PIRSA with construction and operation of a mining operation only undertaken with an approved Mining Lease (ML) area. All MLs require that the mining operation is carried out in an orderly and skilful manner in accordance with an approved MARP and with appropriate bond in place.

The final MARP becomes the key operational document for environmental management at the mine site. A stamped, numbered copy of the MARP must be kept on site at all times, and must be reviewed at no longer interval than every seven years. Earlier review may be required, however, if additional significant environmental risks are identified, lease renewal is required, if there is a change in the operation or operator, if the MARP is not proving to be adequate in addressing environmental risks or if there is a change in community or stakeholder expectations regarding the operation (sufficient for PIRSA to require an update).

In the case of the OneSteel Ardrossan Project, existing mining activities are occurring on a private mine lease which is regulated by Mining Regulation 88. Regulation 88D requires that the MOP is reviewed every 7 years and must be finalised prior to 2008.

OneSteel already have a mining lease for the area north of the existing mine, however there is no MARP.

In addition to the requirement for a Mine Operational Plan (MOP) / MARP for existing operations, construction of infrastructure associated with a mining development (but not within the ML area) requires the application for Miscellaneous Purposes Licences (MPLs). MPLs, under Part 8 of the Mining Act, may be used for ancillary purposes such as:

- for the carrying on of any business that may conduce to the effective conduct of mining operations or provide amenities for persons engaged in the conduct of mining operations
- for establishing and operating plant for the treatment of ore recovered in the course of mining operations
- for drainage from a mine
- for the disposal of overburden or any waste produced by mining operations
- any other purpose ancillary to the conduct of mining operations.

The project will require MPLs for the waste rock dump number 6 which is outside of the existing ML area. These will be applied for as soon as all design information has been finalised. They will require supporting documentation on application which will then be

incorporated into the final MARP, which is intended to cover all aspects of the operation regulated by PIRSA.

3.1.2 *Natural Resources Management Act 2004*

The abstraction and use of groundwater, and the diversion of any watercourses for the OneSteel Ardrossan project will be governed by the *Natural Resources Management Act 2004* (NRM Act), which promotes sustainable and integrated management of the State's natural resources and provides for their protection. This act brings together three Acts, the *Animal and Plant Control (Agricultural Protection and Other Purposes) Act 1986*, *Soil Conservation and Land Care Act 1989* and *Water Resources Act 1997* and is administered by the Department of Water, Land and Biodiversity Conservation (DWLBC).

3.1.2.1 Groundwater

Groundwater in the project area is not prescribed under the NRM Act. As a result there are no requirements for licences or allocations to facilitate extraction for use on the project.

3.1.2.2 Surface water

The project is not contained within a prescribed surface water area. As a result there are no requirements for a water allocation or water use licence to capture and use surface water on site.

3.1.3 *Environment Protection Act 1993*

3.1.3.1 General environmental duty

In addition to the various conditions of lease that may be applied to the project (in the event of project approval). OneSteel will also have a 'general environmental duty' under the *Environment Protection Act.*

This general duty (as detailed in Part 4 (Section 25) of the Act) specifies that "a person must not undertake an activity that pollutes, or might pollute, the environment unless the person takes all reasonable and practicable measures to prevent or minimise any resulting environmental harm".

In determining what measures are required to be taken consideration must be given to:

- the nature of the pollution or potential pollution and the sensitivity of the receiving environment; and
- the financial implications of the various measures that might be taken as those implications relate to the class of persons undertaking activities of the same or a similar kind; and
- the current state of technical knowledge and likelihood of successful application of the various measures that might be taken.

3.1.3.2 Authorisations

Authorisations have been obtained for activities associated with the OneSteel Ardrossan Project which are classified as a prescribed activity of environmental significance under Schedule 1 of the *Environment Protection Act 1993* (EP Act). This act provides for the

protection of the environment and is administered by the Environment Protection Authority (EPA).

OneSteel Manufacturing Pty Ltd already has approvals for prescribed activities under the EP Act in the form of a licence for the following activity:

- **Crushing, grinding or milling:** processing (by crushing, grinding, milling or separating into different sizes by sieving, air elutriation or in any other manner) of rock, ores, or minerals at a rate in excess of 1,000 tonnes per year.

No activities associated with the waste rock area are considered prescribed activities of environmental significance under the Act. No additional authorisations will therefore be required to construct or operate the waste rock area.

3.1.4 *Native Vegetation Act 1991*

For mining projects, PIRSA currently has delegation for the administration of the *Native Vegetation Act 1991* which regulates the clearance and provides for the management of native vegetation throughout the State. The MARP must include a Native Vegetation Management Plan (NVMP) which will be assessed against the requirements of the Native Vegetation Act, including arrangements for compensation (provision of a Significant Environmental Benefit (SEB)).

3.1.5 Other relevant legislation

There are a number of other South Australian Acts and policies which are relevant to the infrastructure developments OneSteel is undertaking in conjunction with the project discussed in this mining proposal.

Details of these Acts and Policies are provided in Table 4.1 below.

Table 3.1 Other relevant legislation and policies related to the project

Act	Objective	Relevant Section(s)	How it applies to the project
Aboriginal Heritage Act 1988	An Act to provide for the protection and preservation of aboriginal sites, objects and human remains (including burials)	Authorisation under Section 23 must be obtained before disturbing a known aboriginal site. Section 12 provides a process for determining if a site or object is an aboriginal site or object. Section 20 controls the discovery and search for Aboriginal objects and remains.	If an aboriginal site is found or needs to be disturbed during the project, OneSteel will be required to consult with traditional owners.
Explosives Act 1936	The Explosives Act and its regulations regulate the manufacture, carriage and storage of explosives.	Part 4 – Storage of Explosives which relates to the storage of explosives for use by appropriately qualified personnel.	In the event that explosives will be stored on site a licence will be required for quantities exceeding 3 kg and up to 60 kg. Explosives are currently stored onsite in accordance with the required licences.

Act	Objective	Relevant Section(s)	How it applies to the project
Heritage Places Act 1993	To provide for the identification, recording and conservation of places and objectives of non-Aboriginal heritage significance.	Section 16 provides the criteria of what is considered to be heritage Significance. The proposal to make entry into the South Australian heritage register is provided in Section 17.	If a non Aboriginal heritage site is found or needs to be disturbed during the project, OneSteel will be required to consult with the South Australian Heritage Council.
Mines and Works Inspection Act 1920	An Act to improve the regulation and inspection of mines and associated works.	Schedule 5 – Responsibilities and duties of owners and persons employed within mines and associated works	The Act allows for the inspection of the OneSteel Ardrossan Mining Project works (by PIRSA) throughout the life of the project.
Occupational Health Safety and Welfare Act 1986	The objects of this Act are to secure the health, safety and welfare of persons at work and to protect the public against risks to health or safety arising out of or in connection with the activities of persons at work or the use or operation of various types of machinery.	Part 3 – General Provisions related to occupational health, safety and welfare.	OneSteel are required to comply with all aspects of the Act relating to occupational health, safety and welfare.
Native Title (South Australia) Act 1994	An Act which outlines the existence of native title, native title rights, compensation for extinguishment or impairment of native title and acquisition of native title in land, or entry to/ occupation of native title land or any other matter related to native title.	Section 39 - confirms Crown ownership of all natural resources within South Australia. Section 43 also establishes alternative right to negotiate provisions for mining activity through amendments to the *Mining Act 1971*.	Under the provisions of the Act OneSteel is (where required) required to negotiate (and have agreements in place) prior to commencement of mining operations. No Native Title claims exist on the York Peninsula as a result no Native Title agreement is required for the MPLs.
Environment Protection (Industrial Noise) Policy 1994	No specific objective established for the policy	3(a) definition of non domestic premises includes “a mine within the meaning of the *Mines and Works Inspection Act 1920*”. Sections 4–7	OneSteel (as the occupier) of a non domestic premise must not cause or permit excessive noise to be emitted from the Ardrossan Project site. Excessive noise is noise that exceeds the background noise level at a measurement site (by more than 5dBA); and exceeds the maximum noise level for that time of day and the area (rural) in which the project site is situated. Provides guidance on instrumentation requirements as well as time and place of noise measurements procedures and records.

3.2 Commonwealth legislation

3.2.1 EPBC Act

Under the provisions of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), referral of a proposal to the Commonwealth Environment Minister is required for actions that may have a significant impact on matters of national environmental significance.

The EPBC Act identifies seven matters of national environmental significance:

- world heritage properties
- national heritage places
- wetlands of international importance (Ramsar wetlands)
- threatened species and ecological communities
- migratory species
- Commonwealth marine areas
- nuclear actions (including uranium mining).

The EPBC referral is necessary to determine whether a project requires assessment and approval under the Act. When a project is referred under the EPBC Act, the Commonwealth Department for the Environment, Water, Heritage and the Arts (DEWHA) makes a determination regarding the status of the proposal as a Controlled Action (i.e. requiring approval) or Not a Controlled Action. Results of the ecological assessment indicated that works associated with the construction activities at the proposed project site are unlikely to have any significant impacts on a matter of national significance listed under the *EPBC Act 1999* (EBS 2007).

It is concluded that a submission under the EPBC Act is not required for this expansion, however the ultimate decision lies with the SA agencies approving the project (i.e. PIRSA, including consultation with SA DEH on matters relating to threatened species).

4. Stakeholder consultation

OneSteel and its consultants are committed to providing information about the Ardrossan expansion project in a transparent and timely manner and receiving feedback in accordance with the PIRSA Guidelines for the preparation of a MARP.

4.1 Consultation objectives

The objectives of the stakeholder consultation process include:

- provide consistent accurate project related information to all stakeholders
- listen and respond to stakeholder concerns
- incorporate stakeholder input into the design and management of the proposed project
- ensure that all issues and disputes are dealt with in a timely manner and followed up effectively.

To meet these objectives OneSteel have:

- identified key stakeholders and determined their communication requirements and established appropriate consultation tasks (e.g. regular meetings)
- identified stakeholders issues and concerns and their interest in the project
- provided stakeholders with an understanding of the constraints and opportunities of the development
- established a framework to obtain, consider, respond to and document stakeholder comments, issues and concerns

4.2 Approach

OneSteel's ongoing approach to community consultation has been to inform stakeholders (including the community) of the project and to consider any issues or concerns they may have as part of the project. Consultation has commenced early in approval process and has included government discussion, landholder meetings and issues management. A community complaints register is maintained at the Ardrossan mine site via the OneSteel incident reporting system.

4.3 Consultation for existing Operation

4.3.1 Issues and complaints received since last review

In accordance with the requirements of the PIRSA guideline the stakeholder concerns associated with OneSteel Ardrossan operations have been summarised by reviewing complaints received about the operation, or issues arising from ongoing community consultative committee meetings (if relevant) or ongoing one-on-one meetings with neighbours'.

4.4 Consultation for proposed expansion

4.4.1 Stakeholder analysis

The following stakeholders were determined to be important stakeholders for the project and will be included in ongoing consultation:

- District Council of Yorke Peninsula
- Department of Primary Industries and Resources South Australia (PIRSA)
- Department for Environment and Heritage (DEH)
- Department of Water, Land and Biodiversity Conservation (DWLBC)
- Environmental Protection Authority (EPA)
- Landowners and managers within and adjacent to the project area
- business owners in the region
- local Aboriginal groups.

Other stakeholders will be identified throughout the life of the project through ongoing consultation and involvement within the local community.

4.4.2 Consultation undertaken

A number of meetings with individual stakeholders have been held prior to the submission of the MARP.

Table 4.1 Details of stakeholder consultation undertaken

Date	Stakeholder	Matters discussed
September 2007	PIRSA	Structure of the report
June 2007	PIRSA	Onsite discussions regarding the future expansion to the north
August 2006	ABB	Preliminary discussions regarding the expansion to the north
June 2005 July 2006 March 2007	Northern landowner	Preliminary discussions regarding the expansion to the north
June 2006	Southern landowner	Preliminary discussions regarding the expansion to the north

OneSteel's plans to consult with the local community during January/February 2010 regarding the provision of information on the OneSteel waste rock area expansion.

4.5 Ongoing consultation

OneSteel will continue a pro-active consultation approach with the community and stakeholders through continued dialogue. This consultation will continue until the life of the mine is exhausted and will continue during the site rehabilitation, closure and completion process.

5. Description of land and environment

5.1 Land use and surrounding area

The project area is located on the east coast of the Yorke Peninsula, a 90 minute drive from Adelaide. Land use in this region is predominately agricultural with grazing the major land use and cropping occurring adjacent the mine. Salt is harvested by Chetham Salt north of Ardrossan.

The closest town is Ardrossan approximately three kilometres north east of the mine site. Ardrossan is an agricultural centre servicing the surrounding district. Bulk handling facilities, with a current capacity in excess of 250,000 tonnes of grain and a deep sea port are located on the edge of the town. As shown in Appendix F and Table 5.1 the nearest house to the proposed MPL (470 m to the southeast) is owned by the Ardrossan Mine Manager (Greg Smith). Greg is fully agreeable with the construction of the waste dumps in the proposed location.

Table 5.1 Adjacent land owners

Owner	Location	Proximity to proposed MPL
GM & AT Smith	BHP Road, Ardrossan, SA 5571	500m southeast
AP & GM Wheare	Government Road, Ardrossan, SA 5571	1 km southeast
T & J Nixon	Maitland Road, Ardrossan, SA 5571	2 km northeast

Figure 5.1 shows the general area surrounding the existing mine site and the outer boundary of the current approved operations.

5.2 Climate

The climate of Ardrossan region is typical of a temperate Mediterranean climate with regular sea breezes. Summer temperatures range from 26°C to 29°C in the shade with annual rainfall in the area being around 330 mm per annum, falling predominantly in winter and spring.

The mine has two Bureau of Meteorology (BOM) weather stations within 50 km that contain complete weather data. These weather stations are:

- Price Weather Station (BOM code 022015) located approximately 35 km northeast of the mine site. It observes temperature, wet bulb temperature, dew point, relative humidity, wind, rainfall and the presence of cloud cover.
- Maitland Weather Station (BOM code 022008) located approximately 45 km west of the mine site. This weather station observes temperature, relative humidity, wind and rainfall.

5.2.1 Temperature

Temperature data for the Price and Maitland weather stations are presented in Tables 5.2 and 5.3 below.

Table 5.2 Annual temperature data for Price and Maitland

	Price	Maitland
Annual average maximum	22.5	21.6
Number of days over 40°C	4.3	2.3
Number of days over 35°C	15	17.6
Number of days over 30°C	35	50.6
Annual average minimum	10.6	11.2
Number of days under 2°C	5.2	0.7
Number of days under 0°C	0.5	0.0

Table 5.3 Mean monthly temperature data for Price and Maitland

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Price													
Max	28.6	28.2	26.2	23.3	19.6	16.5	15.9	17.2	19.9	22.7	24.9	27.0	22.5
Min	15.7	16.0	14.0	11.2	8.9	7.0	6.1	6.2	7.2	9.2	11.7	13.8	10.6
Maitland													
Max	28.8	28.7	25.9	22.3	18.3	15.4	14.4	15.6	17.9	21.2	24.5	26.5	24.6
Min	15.5	15.9	14.4	12.4	10.0	7.9	7.0	7.3	8.5	10.1	12.1	13.9	11.2

5.2.2 Wind

Wind rose data is available from both the Price and Maitland BOM weather stations.

Price experiences calm condition on average 13% with the prevailing wind direction from the north and south. Prevailing winds at Maitland are from the north and calm conditions are experienced on average 1% of the time.

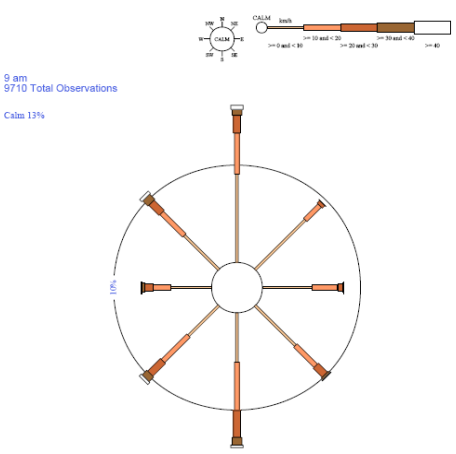


Figure 5.2 Price, Rose of wind direction versus wind speed in km/hr – 5 Jan 1965 – 29 Dec 2006

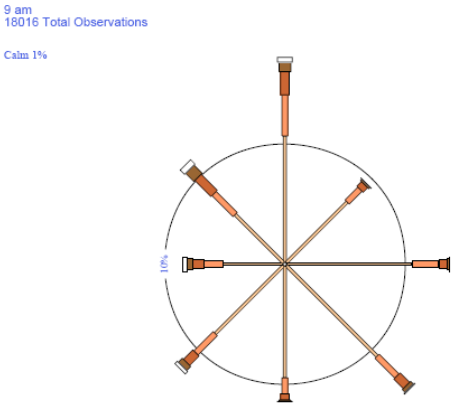
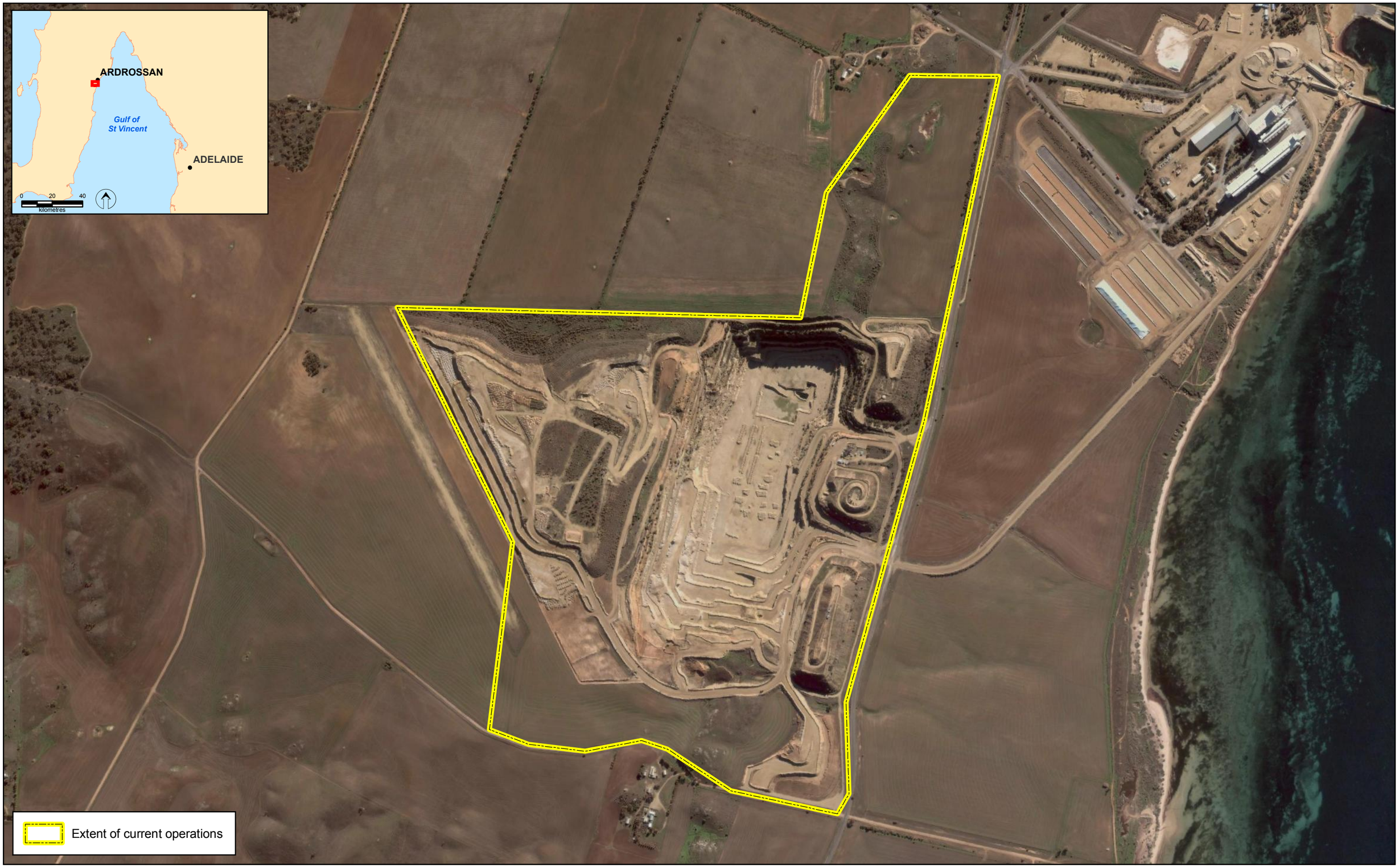


Figure 5.3 Maitland, rose of wind direction versus wind speed in km/hr – 1 Jan 1957 – 31 Dec 2006



OneSteel

PB 100 YEARS

1:10,000 at A3

0 200 400
metres

Data Source: DEH, PIRSA

Coord. Sys.: GDA94 MGA53

NOT REQUIRED

SIGNED

DATE

Drawing No.:	**2102726A-GIS-F001**		
Revision:	**B1**	**Date:**	**03/09/2009**
Drawn By:	**DF**	**Checked by:**	**JG/SH**
Client Ref:	**ONESTEEL ARDROSSAN**		

Ardrossan Dolomite Quarry

Surrounding land use and operations extent

Figure 5.1

GIS File: J:\A303-ENVPLN\PROJ\2102726A_Onesteel_Ardsn\10_GIS\Projects\2102726A_GIS_F001_B1.mxd

5.2.3 Relative humidity

Measurements for relative humidity at Price and Maitland weather stations show similar trends. Relative humidity levels are higher in the mornings (9 am) than in the afternoons (3pm). Average relative humidity peaks in June and July (85% at Price) and is lowest in January (37% at Maitland).

5.2.4 Rainfall

Rainfall data collected at the mine between 2000 and 2006 has been included due to the variation in rainfall between Price and Maitland.

Annual rainfall ranges from 330.2–505.7 mm between the two weather stations. The month-to-month rainfall variability at Price and Maitland is shown in Figure 5.4. June and July are the wettest months at both sites. May to October are the months that experience the most number of days greater that 1 mm.

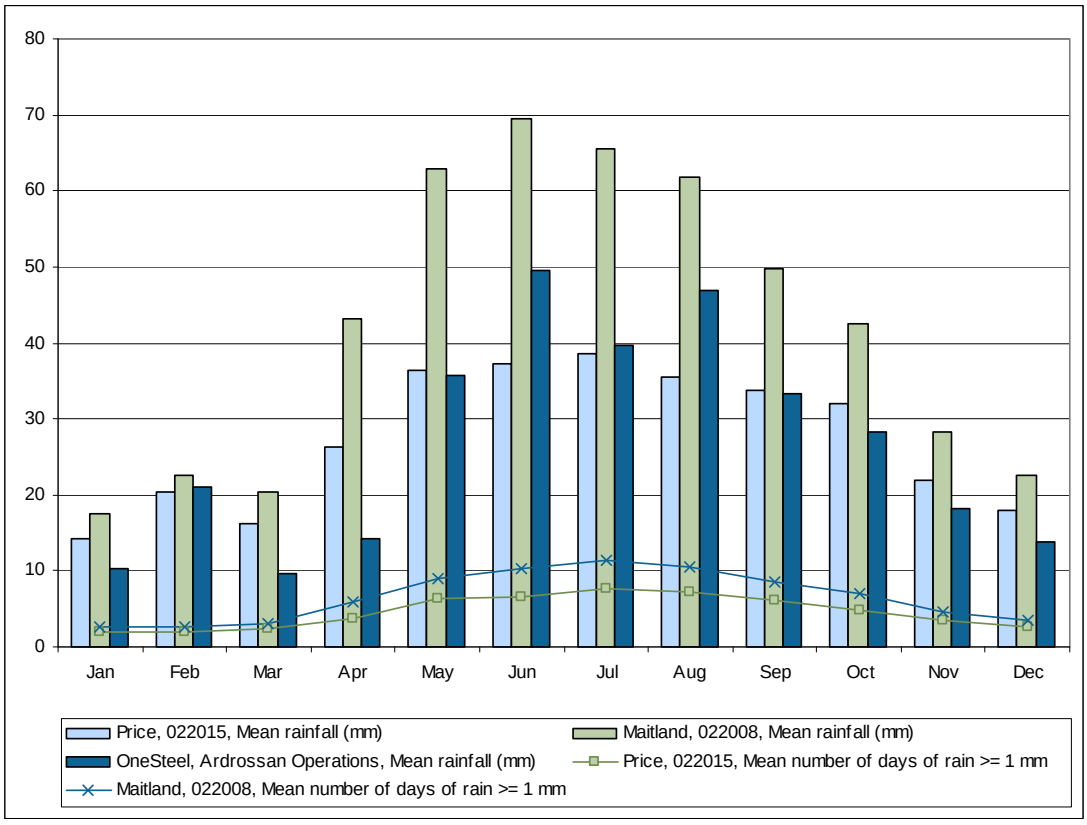


Figure 5.4 Mean monthly rainfall for the Maitland and Price BOM weather stations and OneSteel Ardrossan Operations

5.3 Topography and landscape

Yorke Peninsula is generally of subdued relief, lower near the coast rising to a height of about 200 m above sea level near Maitland, in the centre of the peninsula west of Ardrossan (Zang 2006). There are sea cliffs along part of the east coast of the peninsula including near Ardrossan (Corbett & Scrymgour 1973) up to 10 m high but these diminish rapidly in height

north and south of the town (ibid.). Inland from and roughly parallel to the coast the Kulpara Fault is sometimes expressed as a scarp. The fault forms the eastern boundary of the dolomite deposit that is mined at Ardrossan (see Section 5.4).

The location of the Ardrossan quarry itself is elevated because of the Kulpara Fault and the land falls away to the coast (Photo 5.1).

Photo 5.1 **View from north of quarry northeast towards Ardrossan township and Gulf St Vincent**

5.4 Geology

5.4.1 Regional setting

The following description is based largely on Zang (2006) with information also from Gravestock and Gatehouse (1995) and Corbett and Scrymgour (1973).

The rocks of the Yorke Peninsula comprise deformed Palaeoproterozoic and early Mesoproterozoic basement of the southeastern Gawler Craton and undeformed Neoproterozoic to Quaternary sediments. More than 90% of the land surface is covered by Quaternary sand dunes, calcrete, aeoolianite and soil, with most bedrock outcrops restricted to the coast. The oldest rocks are metamorphic and igneous, including gneiss, granite and metamorphosed sediments (metasediments).

The Cambrian (Neoproterozoic) age Stansbury Basin sediments occur over parts of Yorke Peninsula and under the adjacent Gulf St Vincent. The Ardrossan dolomite deposit is contained within the carbonate rock part of this basin, part of the Kulpara Limestone (Briant & Wilkinson 2001).

5.4.2 Local setting

The site is located in a shallow southerly plunging syncline in which the dolomitic Kulpara Formation of the Early Cambrian Hawker Group exceeds 300 m in thickness. This formation crops out at intervals between Ardrossan and Kulpara, and includes thick sequences of high-grade dolomite.

5.5 Geochemistry and geohazards

5.5.1 Geochemistry

The Ardrossan rock contains a relatively minor amount of iron and sulphur.

Various ore and rock types that exist on site have been analysed for trace elements. The analysis indicates that manganese, iron, phosphorus, copper, titanium, potassium, zinc and sulphur are all present in varying levels.

5.5.2 Asbestiform minerals

No asbestiform minerals have been observed to date during operations at the Ardrossan quarry.

5.5.3 Radioactivity

While Dolomite is not considered radioactive all naturally occurring soils, rocks and minerals contain small amounts of the radioactive materials (radionuclides) Thorium and Uranium. The background gamma radiation level of the earth's surface is largely due to the presence of these elements. These radionuclides are not soluble and do not break free from the sand. They are still present due to the decay half life (time taken to lose their radioactivity) being millions of years. (ARPANSA 2007)

5.5.4 Earthquakes

Surface soils across the proposed development will consist of shallow (<10 m) of loose to medium dense dunal sands and calcareous horizons. The following parameters should be used to calculate loads due to earthquake loading in accordance with AS1170.4-2007 'Earthquake actions in Australia'

- Site Sub-Soil Class = Class C_e (Shallow soil site).
- Hazard factor (Z) = 0.1.

5.6 Surface water and flooding

5.6.1 Surface water

In general there is little surface water in the northern part of Yorke Peninsula, and no permanent streams. However, because of the topography there are short, minor gullies incised into the scarp formed by the Kulpara fault that occasionally flow into Gulf St Vincent

in the east. In the south of the peninsula are numerous saline lakes and swamps at almost sea level, which dry out in summer and contain water after significant rain (Zang 2006).

5.6.2 Flooding

Due to the elevated coastal location of the mine flooding events have been extremely rare and isolated.

5.7 Groundwater

5.7.1 Regional setting

Nearly all groundwater on the Yorke Peninsula is salty, with the exception of limited potable quality water in aeolianite of the Bridgewater Formation in the southern 'foot' of the peninsula in the small Carribie and Para Wurlie Basins (Zang 2006). This zone is located approximately 60 km south of Ardrossan.

Groundwater in Tertiary, Permian and Cambrian sediments is of relatively high salinity (2,000–7,000 mg/L; ibid) and suitable for stock water only. The presence of salt lakes and mangrove and samphire flats in parts of the peninsula suggests some groundwater is saline.

5.7.2 Local setting

The dolomite quarried at Ardrossan has a primary porosity that is small to zero, with most groundwater transmission via fracturing, jointing, possible channels within clay seams and possible solution channels (Clarke 1999).

The local hydrogeology was studied during dewatering investigations undertaken in 1994 and again in 2000, documented by Clarke (1999) and unpublished company memoranda dated 2002 respectively. The earlier trials revealed groundwater was brackish to saline, with electrical conductivity starting at 4,510 μS/cm increasing to 22,000 μS/cm after several days pumping. Assuming a conversion factor of 0.7 these are equivalent to salinities of approximately 3,000 mg/L to 15,000 mg/L (15,920 mg/L by analysis; see below). For comparison, seawater is approximately 35,000 mg/L. High groundwater salinities in the quarry area were confirmed during the 2000 dewatering trials. Groundwater is not used by adjacent properties, presumably due to its salinity.

An analysis of groundwater taken at the end of the 1994 test showed a sodium-chloride dominated water chemistry with co-dominant magnesium sulphate (Table 5.4). However, bicarbonate ion was not measured and could be also high due to the carbonate rock the water is found in (dolomite has the chemical formula $CaMg(CO_3)_2$). The total dissolved solids (TDS) content of 15,920 mg/L is higher than the upper limit for stock water, usually taken as 13,000 mg/L.

Table 5.4 Groundwater chemistry mg/L (1994 dewatering test, final sample)

TDS	Na	K	Ca	Mg	Cl	SO_4
15,920	3,400	40	260	540	7,600	3,600

5.8 Flora

5.8.1 Background

Vegetation within the proposed extension area was assessed by EBS (Environmental and Biodiversity Services) in July 2007 to establish the vegetation associations present. The condition and overall biological significance of the vegetation was also assessed in accordance with the South Australian Native Vegetation Council assessment methodology.

Background research into the potential existence of flora and fauna species with the project area was undertaken through a literature review and database searches. Database searches included records obtained from the Department for Environment and Heritage (DEH) and South Australian Museum (SAM) (DEH 2007, SAM 2007). An area of 40 by 40 km^2 around the site was used for database searches.

A protected matters search for the project area under the EPBC Act (1999) was also completed to determine if any matters of environmental significance are likely to occur within the survey area (20 km by 20 km search area used).

5.8.2 Regional biodiversity and conservation areas

The project site is within the hundred of Cunningham and in both the Arthurton Environmental Association and Urania Environmental Association. The hundred of Cunningham has approximately 5.2% remnant vegetation remaining, the Arthurton Environmental Association has 1.8% remaining and Urania Environmental Association has 5.3 % remaining. These figures reflect the extensive land clearing that has occurred in region, predominantly for agriculture (EBS 2007).

The project site occurs within the Northern Agricultural Districts Biodiversity Planning Area. The area is primarily dedicated to agricultural pursuits and habitat for threatened species has been fragmented due to impacts from agriculture and grazing of native grasslands.

The Northern Agricultural Districts area is a highly fragmented environment and contains several areas marked as Threatened Habitat Areas (THAs). The majority of the region's THAs occur north east of the project site and Yorke Peninsula. Two THAs occur south of the project site on the Peninsula. The closest THA to the site is the Minlaton/Curramulka THA which is located approximately 12 km south of the project site (Graham *et al.* 2001).

There are no Large Remnant Areas (LRA) within the immediate area (nearest LRA is 85 km south west) (Graham *et al.* 2001).

There are no conservation areas located near the project site.

5.8.3 Vegetation associations

The survey area is dominated by an Exotic Grassland and cropped paddocks. The cropped paddocks contain *Lupinus sp.* (Lupins) whilst *Triticum aestivum* (Wheat) dominates the non cropped areas. A number of exotic weeds occur scattered throughout the association such as *Asphodelus fistulosus* (Onion weed), *Asteriscus spinosus* (Golden Pallensis) and *Carrichtera annua* (Ward's weed), which were recorded generally along fence lines. Paddocks occurring on the northern side of the survey area are lined with planted vegetation

such as *Eucalyptus torquata* (Coral Gum), *Casuarina glauca* (Grey She-oak) and other introduced Eucalypt species, where vegetation is primarily acting as a wind break.

Native understorey vegetation occurring within the survey area is considered to be in poor to very poor condition. A number of remnant *Eucalyptus porosa* (Mallee Box) scattered within the survey area and are generally located within the paddocks, along fence lines and within wind breaks as single trees or as small groups. The understorey condition of these *Eucalyptus porosa* patches is considered to be in poor to very poor condition with very few native species being recorded.

Other native vegetation occurring within the survey area occurs as scattered small areas. Small patches of *Austrostipa nitida* (Balcarra Spear-grass), *Lepidosperma viscidum* (Sticky Sword-sedge) and *Gahnia lanigera* (Black Grass Saw-sedge) also occur within the survey area. All indigenous understorey species identified within the survey area are generally located within rocky areas (which are too rocky to be cropped), along fence lines or within fenced off areas such as the revegetation sites.

Small patches of revegetation were also recorded within the survey area. The mine's site manager suggested that the revegetation had been started in the mid 1990's with both tubestock planting and direct seeding techniques being used. Indigenous species such as *Acacia brachybotrya* (Grey Mulga-bush), *Acacia pycnantha* (Golden Wattle) and *Dodonaea viscosa* (Sticky Hop-bush) have been planted. The understorey within the revegetation areas is in poor condition and is dominated by exotic species. However, several native species are scattered within the revegetated areas such as *Enchylaena tomentosa var. tomentosa* (Ruby Saltbush), *Austrostipa nitida* (Balcarra Spear-grass) and *Lepidosperma viscidum* (Sticky Sword-sedge).

5.8.4 Flora Species of Conservation Significance

5.8.4.1 Survey results

No flora species of state or national conservation significance were recorded within the survey area. However, two species of regional conservation significance (Yorke Peninsula Botanical Region) are located within the survey area. A single patch of *Enneapogon nigricans* (Black-head Grass) is located on the north west area of the survey which is rated as rare within the Yorke Peninsula Botanical Region. A single patch of *Cryptandra tomentosa* (Heath Cryptandra), which is rated as rare within the Yorke Peninsula Botanical Region, is located within the paddock on the southern side of the survey area and the plants are heavily grazed (the location of these species is illustrated in the EBS ecological assessment report, Appendix B).

5.8.4.2 Database searches

Twenty five species of conservation significance were highlighted within the database search; eight of these species are also nationally significant including *Acacia enterocarpa* (Jumping-jack Wattle), *Caladenia macroclavia* (Large-club Spider-orchid), *Euphrasia collina ssp. osbornii* (Osborn's Eyebright) and *Prostanthera eurybioides* (Monarto Mintbush), *Acacia rhetinocarpa* (Resin Wattle), *Caladenia brumalis* (Winter Spider-orchid), *Olearia pannosa ssp. pannosa* (Silver Daisy-bush) and *Senecio macrocarpus* (Large-fruit Groundsel). The remaining 17 conservation significant species are state rated species listed under the NPW Act (1972). Of these species, nine have the potential to occur in within the survey area. Table 5 of the EBS report (Appendix B) lists these species and their likelihood of occurring within the survey area.

5.8.5 Weeds/pathogens

A number of proclaimed and environmental weed species occur within the survey area. Seven weed species proclaimed under the *Natural Resources Management Act* (1994) were identified during the field survey, including *Asparagus asparagoides* (Bridal Creeper), *Asphodelus fistulosus* (Onion weed), *Lycium ferocissimum* (African Boxthorn), *Marrubium vulgare* (Horehound), *Olea europaea ssp. Europaea* (Olive), *Oxalis pes-caprae* (Soursob) and *Tamarix aphylla* (Athel Pine). A further seven species are considered to be environmental weeds listed in Table 4 of the EBS report (Appendix B).

The project area is located in a very low risk area for *Phytophthora cinnamomi* (root-rot fungus), or Mundulla Yellows area within the State (DEH 2003). No evidence of either pathogen has been identified during field investigations to date.

5.9 Fauna

5.9.1 Background

Background research (SAM, DEH and EPBC Act Protected Matters Tool database searches) and opportunistic observations (including scats, tracks and skeletal remains) of fauna species during the survey were used to determine potential faunal species that may be present within or around the study area.

5.9.2 Site fauna

A total of 22 fauna species were observed during the vegetation survey and consisted of 16 bird species, 2 reptile species and 4 mammal species. The two reptile species, a Sleepy Lizard (*Tiliqua rugosa*) and a small skink (not identified to species level) were observed within vegetation adjacent the roadside reserve. The majority of bird species were observed within the isolated trees or small groups of remnant *Eucalypt*us *porosa* (Mallee Box) or within re-vegetated areas. Three out of the 16 bird species were introduced (House Swallow, Feral Pigeon and Common Starling). These species made up the majority of bird species recorded away from the *Eucalyptus porosa* trees and small groups. A dead Cormorant was found within the grazed paddock, this being the only sign of a marine bird utilizing the area. A cause of death is unknown and it is possible that a fox moved the carcass from another location to the open paddock. All mammal species observed were introduced (dog, sheep, fox and rabbit). *Macropus sp*. (Kangaroo) was the only native mammal species observed within the project site during the field assessment.

A species list is provided in Appendix 4 of the EBS report (Appendix B).

5.9.3 Database searches

Results from the 40 by 40 km^2 database search (DEH and SAM) of the survey area revealed 149 fauna species have been previously recorded within close proximity to the survey area. One hundred and forty of these species recorded are indigenous (including 5 threatened species), while nine are exotic species.

A species list is provided in Appendix 3 of the EBS report (Appendix B).

5.9.4 Fauna species of conservation significance

As mentioned above, five fauna species previously recorded in the project area within the DEH and SAM databases have conservation significance. Additionally, 16 fauna species were listed by the EPBC Protected Matters Search Tool as possibly occurring within the survey area. These species and their conservation ratings are provided in Tables 7 and 8 respectively of the EBS report (Appendix B).

Leipoa ocellata (Malleefowl) is listed as vulnerable (EPBC Act (1999); NWP Act (1972)). The Malleefowl occurs in semi-arid and arid zones of temperate Australia, where it occupies shrublands and low woodlands that are dominated by mallee vegetation. It also occurs in other habitat types including eucalypt or native pine *Callitris* woodlands, acacia shrublands, Broombush *Melaleuca uncinata* vegetation or coastal heathlands. The distribution of the Malleefowl within Yorke Peninsula is restricted to Innes National Park, however the DEH and SAM database search reveals 3 recorded sightings in 1985 and 2000 within the 40 by 40km area close to native vegetation within open paddocks. Due to the location of the survey area, the high level of disturbance from mine activity and the lack of suitable habitat it is very unlikely *Leipoa ocellata* (Malleefowl) occurs within the survey area.

It is unlikely any of the other fauna species identified would occur within the survey area due to the lack of preferred habitat (four species are marine or waterbird species), lack of suitable nature corridors (i.e. closed woodlands), and the close proximity of the project area (the existing mine) and highway; noise, explosions and light pollution attributed to the existing mine and highway would create significant disturbance levels.

Several of the migratory and/or marine fauna species (e.g. Giant Petrel's) are sea-birds and would not be observed in the area very often, whilst a number of the other species are either waterbirds or species which rely on a coastal environment. Whilst the project site is close to the coast (<3 km), the project site does not contain suitable habitat for these species to regularly occur within the site. It is considered that, at most, these species may fly over the project site.

5.9.5 Pest species

Nine exotic species have previously been recorded in the project area (six birds and three mammals). Three bird species (feral pigeon, house swallow and common starling) and three mammal species (rabbit, sheep and fox) were also observed during the vegetation survey. See Appendix B for species lists.

5.10 Heritage

5.10.1 Aboriginal heritage

5.10.1.1 Native Title

There are no Native Title applications over the Yorke Peninsula.

5.10.1.2 Cultural heritage

No sites of cultural heritage significance have been identified in the proposed MPL area.

There are no Indigenous Land Use Agreements (ILUA) relevant for the MPL area.

5.10.2 Non-Aboriginal (European) heritage

Analysis of the local development plan (Yorke District Council) and the State and National heritage databases, the nearest heritage sites are located within the township of Ardrossan. These are located at the following addresses:

- Ardrossan Institute (former): 9-13 First Street, Ardrossan, SA
- Dowlingville Post Office: Ardrossan Road, Dowlingville via Ardrossan, SA
- First School: 14 Second Street, Ardrossan, SA.

5.11 Air quality and noise

The OneSteel Ardrossan operation carries out monthly boundary sample analysis to monitor the air quality at the mine. The ambient air quality is expected to be consistent with that of rural environments. Peak dust levels occur during the drier summer months.

Noise samples are taken three annually and recorded from sites around the Crushing and Screening Plan, northern and western boundaries in accordance with the environmental monitoring work instruction. Background noise levels are expected to be consistent with that of rural environments. The nearest house is 470 m to the southeast of the proposed MPL. (refer to Appendix F). Noise samples taken during May 2006 found that the noise levels from the Ardrossan operation are less than 5 dB(A) above the background noise level which is compliant with the *Environment Protection Act (Industrial Noise Policy) 1994*.

5.12 Socio-economic

5.12.1 Study area

The OneSteel Ardrossan operations are located in the Yorke Peninsula North Statistical Local Area (SLA), 150 km north-west of Adelaide. The region was established in the 1850's when copper was discovered at Kadina, and has largely developed on the back of copper mining. When the copper mines closed in the 1930's, agriculture and farming became the mainstay of industry and the area now accounts for 10% of South Australia's agricultural produce. Agriculture and its related industries is still the biggest employer within the Ardrossan and Yorke Peninsula with some of South Australia’s most reliable rainfall country. However tourism is also a major employer with many of the towns, including Ardrossan, doubling in size during holiday periods.

5.12.2 Population

At the 2006 Australian Bureau of Statistics (ABS) Census, the total population of the Yorke Peninsula North SLA was 7,333. As shown in Table 5.5 the population of the Yorke Peninsula North SLA decreased between 1991 and 2006 by 0.16%, however between 1996 and 2006 it increased. This is different to the population change in South Australia which has experienced a steady increase between 1991 and 2006. However, the current trend indicates that the population is growing at a continually faster rate. This could be attributed to several factors such as people moving and/or retiring in a “sea change” location such as the Yorke Peninsula.

Table 5.5 Population change, Yorke Peninsula North SLA, 1991-2006

	1991	1996	2001	2006	% Change 1991-2006
Yorke Peninsula North SLA	7,345	7,173	7,209	7,333	-0.16
South Australia	1,400,622	1,427,936	1,467,261	1,514,337	7.51

5.12.3 Ethnicity

Ethnicity in the Yorke Peninsula SLA is predominately Australian with 86% of the population born in Australia. The next largest ethnic group in the SLA are from the United Kingdom (5%). The remaining 9% comprises a range of smaller ethnic groups, each group making up less than one percent of the population and a significant percentage (6%) that did not state their country of birth.

5.12.4 Employment

Employment in the Yorke Peninsula North SLA for 2001 follows a similar trend to South Australia (Table 5.6). Information from the 2006 census was not available for employment statistics. Yorke Peninsula has 34% employed in part time work, 63.5% employed in full time work and 2.5% were the hours worked were not stated. There are more males employed in full time work (77.9%) and females working part time (53.9%). This split is also represented in the South Australian 2001 census data.

Table 5.6 Employment structure, 2001

	Yorke Peninsula North SLA (%)			South Australia (%)		
	Male	Female	Total	Male	Female	Total
Part-time workers *	19.5	53.9	34.0	21.5	50.8	34.8
Full-time workers	77.9	43.8	63.5	75.8	46.6	62.6
Hours worked not stated	2.6	2.2	2.5	2.7	2.5	2.6

* 'Part-time' is defined by fewer than 35 hours per week

The main employment industry in the Yorke Peninsula North SLA is agriculture, forestry and fisheries (34%), this is considerably higher than the percentage of South Australian employed in this industry. Mining in the Yorke Peninsula North SLA employs 1.5% of the population (40 people) compared to 0.6% employed in mining for South Australia (refer to Figure 5.5).

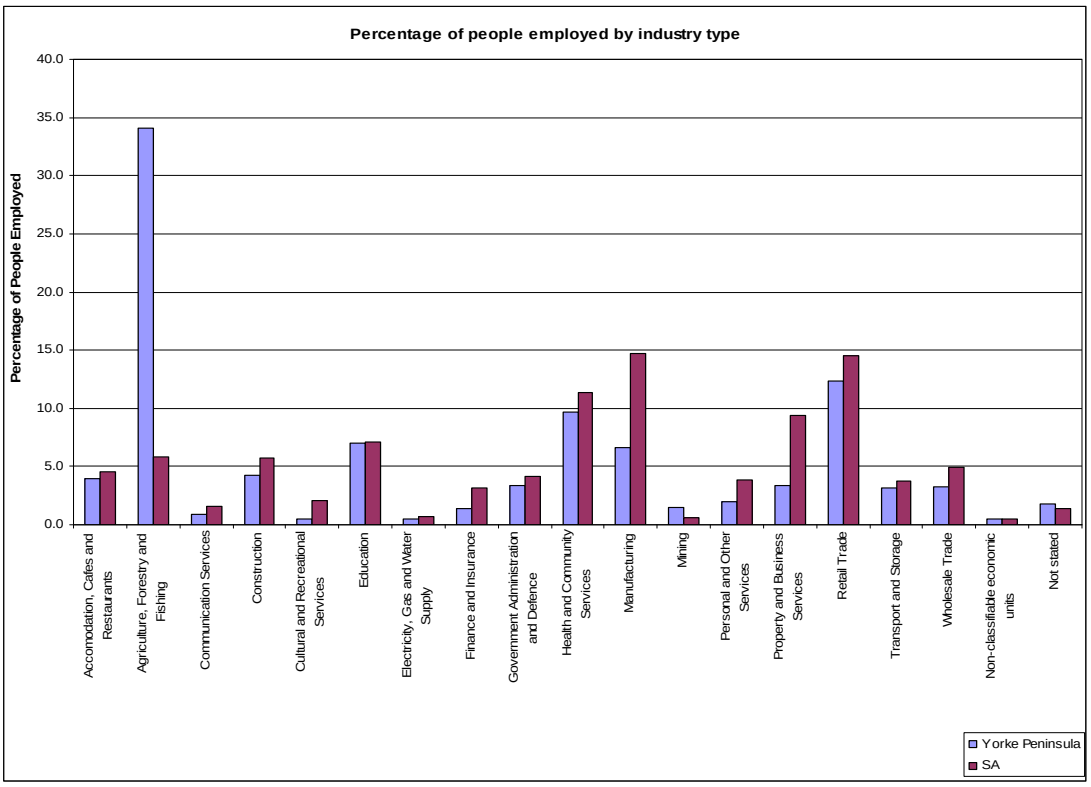


Figure 5.5 Percentage of people employed by industry type on the York Peninsula and in SA

5.12.5 Income

The Australian Bureau of Statistics (2006) reports that the 2006 median weekly individual income for persons aged 15 years and over in the Yorke Peninsula SLA is $333, which is less than the South Australian median weekly individual income of $433.

5.12.6 Tourism

It is estimated that the Yorke Peninsula attracts over 597,000 visitors a year with over 420,000 visitors staying one or more nights. This makes tourism an important part of the region's future development and growth. Tourist attractions are best accessed by private vehicle, with good road conditions making it an easy drive between towns and attractions in the region.

Tourist attractions in Ardrossan include (South Australia.com, 2005):

- Ardrossan Museum displays the ingenuity of the Smith Brothers who invented the famous stump jump plough
- OneSteel Lookout – a man-made hill just south of the town provides spectacular views over Gulf St Vincent.
- The wreck of the *Zanoni* lies 10 nautical miles southeast of Ardrossan, the ship is the most intact 19th century merchant sailing vessel located in SA. The 338-ton barque was built in Liverpool, England, in 1865 and arrived at Port Adelaide on 13 January 1867.

Nearly a month later, laden with wheat, she set sail for London, but sank after running into a violent storm. People interested in diving can obtain permits from the Maritime Heritage Branch of the Department for Environment and Heritage.

- Fishing, crabbing and other forms of coastal recreation are also important tourism drawcards.

5.13 Infrastructure and transport

5.13.1 Infrastructure

5.13.1.1 Electricity

The existing operations area is connected to the state grid. Electricity for the Yorke Peninsula is supplied via the Hummocks sub-station North-West of Port Wakefield. A 132 kV transmission line runs to the Ardrossan West sub-station which then serves most of the peninsula.

5.13.1.2 Water supply

The area is supplied and is dependent on water from the River Murray via transmission pipelines from the east. Mains water is not sourced locally.

5.13.1.3 Communications

Ardrossan has dial-up internet access and recently had broadband internet access installed in the community. The majority of the region has mobile communications access however there are gaps in coverage in sparsely populated areas.

5.13.1.4 Other infrastructure

There is no other significant infrastructure within the area.

5.13.2 Transport Network

5.13.2.1 Road

The Main Coast Road acts as a north-south axis on the western side of Yorke Peninsula. This offers connections to the national highway which meet in nearby Port Wakefield which is approximately 50 km North-East. From here many main Australian highways can be accessed, including the Barrier Highway, Dukes Highway and the Sturt Highway. Port Wakefield Road provides a major highway connection from Yorke Peninsula to Adelaide in the south and north towards Western Australia and the Northern Territory. The site can currently be accessed via the Main Coast Road.

Ardrossan is approximately 150 km from Adelaide.

Maitland Road, Ardrossan Arthurton Road, Main Coast Road (continuing south) and a network of unsealed roads provide access to the rest of Yorke Peninsula.

5.13.2.2 Rail

The area is not directly served by rail. The nearest rail station is located at Port Wakefield/Bowmans, approximately 50 km north east of the project area. The standard gauge railway line from Adelaide to Perth/Darwin passes through northern Yorke Peninsula. The inter-modal container facility at Bowmans has access to the standard-gauge rail network.

5.13.2.3 Air

There are no air services directly to Ardrossan, however OneSteel maintains a workable air strip adjacent the mine pit area.

5.13.2.4 Port

The Port of Ardrossan lies directly south of the Ardrossan Township. A bulk loading plant with conveyor capacity of 2000 tonnes per hour (grain), is situated on the jetty which is approximately 900 m long. Commodities that are loaded at the Port include dolomite and grain however the facility is capable of handling other dry bulk commodities. The Port of Ardrossan is privately managed.

There are two other major ports located in the Yorke Peninsula region which are located at Wallaroo and Port Giles; these are major wheat exporting facilities for the region.

6. Description of existing operations

6.1 Operation overview

OneSteel owns and operates a dolomite mine at Ardrossan in South Australia. Annual production capacity is nominally 600,000 t/yr, with a mine life in excess of 10 years at current production levels. The mine supplies metallurgical grade dolomite for the Company's South Australian steel making operation at Whyalla and BlueScope Steel's Port Kembla steel making operation in New South Wales. The mine also supplies other international steel mills.

Key characteristics of the project are summarised in Table 6.1.

Table 6.1 Key characteristics of the project

Item	Description
Project Location	150 km north-northwest of Adelaide, South Australia
Private Mine	PM 291
Mining Leases	ML 5317 ML 4044 ML 4040 ML 4041 ML 4046 ML 4045 ML 4042
Miscellaneous Purposes Licences	MPL 46
Project Footprint	1,871,430.7 km^2
Mining Method	Medium scale open pit
Available minerals	20.7% Mg, 30.4% Ca and 0.1 to 0.3 g/t Au
Mineralisation	Resource: 143.3 Mt made up of: ▪ Measured: 56.5 Mt ▪ Indicated: 31/3 Mt ▪ Inferred: 55.4 Mt
Open pit dimensions	1200m long, 450m wide, 85m deep
Mine life	>10 years
Mining rate (average)	600,000 t/a
Processing method	Conventional crushing and screening
Operating hours	12 hours per day, 5 days per week
Power source	State grid
Raw water source	Quarry Sump
Raw water requirement	80 kL per day
Accommodation	In and around the township of Ardrossan
Employees	Operations: approximately 26 people

6.2 Project footprint

The major components of the current project and their footprints are identified in Table 6.2 and are described in Sections 6.3–6.10. Details are provided on Figure 1.2.

Table 6.2 Project components and footprints

Component	Footprint Area (m^2)
Existing Mine Operations	
Open Pit	500,546.7
Topsoil storage	4,560.1
Rehabilitation areas	208,617.6
Waste rock dumps	501,604.2
Haul road	36,099.7
Total	**1,251,428.3**

6.3 Geology and resources

6.3.1 Deposit geology

This description is based on Briant and Wilkinson (2001) who drew on their own site observations and earlier internal documents and interpretations.

The dolomite ore mined at Ardrossan occurs within the basal sequence of the Kulpara Limestone. The Kulpara Formation consists of limestones and dolomites, and is interpreted to be Lower Cambrian in age. Surrounding these Cambrian limestones and dolomites are a sequence of Proterozoic conglomerates and sandstones, which are themselves surrounded by Archaean gneisses and other metamorphic rocks (see Section 6.4). The deepest part of deposit is at least 177 m thick. Evidence from nearby indicates that sandstone, quartzite and grits underlie the dolomite-limestone sequence at depth, however these units have yet to be intersected within the current quarry area.

The dolomite is bounded to the east by the Ardrossan Fault, which coincides with the eastern limit of the pit. To the west, the dolomite appears to change laterally to limestone, and this transition coincides approximately with the western limit of the pit. The dolomite is overlain by Tertiary sediments.

The dolomite deposit lies in a broad synclinal structure with its axis striking at 015° across the centre of the quarry. The pitch of the synclinal axis is variable along strike and has an overall pitch of 3° to 4° to the south. Drag folding is evident on the limbs of the syncline. An anticlinal structure is present in the north-western section of the current quarry. Based on limited mapping, it is thought that the synclinal structure present in the quarry extends to the north of the current pit.

The main structural feature of the dolomite deposit is the Ardrossan Fault. This is a steeply dipping normal block fault running approximately N-S along the eastern edge of the deposit, which dips at ~85° to the east. The eastern block, which has been down-thrown relative to the western block, has been covered by Tertiary sediments with thickness in excess of 26 m. Associated with the Ardrossan Fault is extensive fracturing and brecciation which increases across the pit towards the fault.

There are numerous minor faults exposed in the current quarry. These faults trend NW-SE with dips of 70° to 80° and lateral movements typically less than 0.3 m. The anticlinal

structure present in the north-west of the quarry has been horizontally displaced to the south-east.

These fracture zones which, are associated with the faulting and the open joint planes within the dolomite have provided the principal controls on the movement of meteoric water and hence on contaminant levels in the dolomite.

The Ardrossan dolomite varies in colour from pale yellow-grey to buff. The dolomite is hard, dense, brittle and finely crystalline with common dendritic manganese oxide markings on joint planes.

The composition of the dolomite (in dolomite grains) is close to the theoretical value of pure dolomite: 30.4% CaO and 21.7% MgO. There are minor additions of silica and alumina, and some limited replacement of magnesium by iron. Silica is the main contaminant that reduces the quality of dolomite at the mine. Some thin (up to 20 mm) siliceous lenses occur, concordant with the bedding. These are interpreted to have been precipitated from low temperature meteoric waters which had percolated into voids created by structural deformation.

Clays and silts may occur within the dolomite. The bulk of these occur within sink holes and sub-vertical fractures in the dolomite and appear to have been washed in from surface soils and Tertiary sediments.

6.3.2 Resource estimates

Five broad classes of rock have been identified and shown in Table 6.3.

The recoverable resource is estimated at: 143.3 Mt analysing 20.7% MgO, 30.4% CaO, 0.83% SiO_2, 0.25% Al_2O_3, 46.4% LOI, 0.082% S, 0.011% P. Of the 143.4 Mt of dolomite resource, 56.6 Mt is classified as Measured, 31.3 Mt is classified as Indicated and 55.4 Mt is classified as Inferred.

Table 6.3 Broad rock classes

Class	Description	Grade Range
1	High Grade Dolomite Ore	SiO_2<1.2%, MgO>20%
2	Low Grade Dolomite Ore	SiO_2>1.2%<2%, MgO>20%
3	Siliceous Dolomite	SiO_2>2%<4%, MgO>20%
4	Waste	SiO_2>4%
5	Limestone	Low MgO (<20%), Elevated contaminants

6.3.3 Proportion of waste

For every tonne of ore mined there will be an estimated 0.16-0.24 tonnes of waste. A breakdown of the waste versus ore components for the medium and long term are included in Table 6.4.

Table 6.4 Proportion of waste

	Recovered ore tonnes (ktonnes)	Waste tonnes (ktonnes)	Waste/ore (ktonne)
Medium term	7,835	1,878	0.24
Long term	27,880	4,373	0.16

Source: HATCH, 2001

6.4 Mining

6.4.1 Mining methods

The orebody is being mined by conventional open pit methods. This involves drilling and blasting the material and loading onto haul trucks for removal from the pit. Ore and waste rock will be drilled and blasted to a depth of up to 9.5 m and then excavated on benches by conventional loaders and trucks.

Blasting is being undertaken fortnightly using ammonium nitrate/fuel oil (ANFO) and where necessary emulsion-based explosives.

6.4.2 Pit design

The pit design uses design only experience in the absence of a formal geotechnical study being undertaken. The parameters used in the design of the open pit are summarised in Table 6.5.

Table 6.5 Open pit design parameters

Pit Design parameters	
Overall slope angles	45 degrees
Face angle	60 degrees
Bench/Face Height	9 m
Berm width	8 m (some older berms vary in width and RL
Haul ramp design parameters	
Ramp width	25 m
Ramp gradient	1:12

Source: HATCH 2001

6.4.3 Plant and machinery

Table 6.6 identifies the equipment currently used for the mine operations.

Table 6.6 Existing equipment list

Equipment	Number
Mobile Crane	1
Maint-truck with crane	1
Forklift	1
Loader	7
32t Dump truck	3
65t dump truck	3
16t dump truck	1
Water truck	1
Grader	1
Service vehicle	1
Drill	1
Bowl truck	1
Utilities	3

6.4.4 Mine dewatering

Dewatering trials were previously undertaken in 1994. Mining operations will extend to the local water table, which is about 30 m below surface, however, the highly permeable sandy sediments are shallow and unsaturated in the area of the pit therefore groundwater is unlikely to seep very quickly into the pit, as it will come from isolated fractures only (see Section 6.7). It is therefore anticipated that dewatering bores will not be required. Most groundwater flow into the pit will be used directly for mine dust suppression. Excess groundwater and rainfall runoff will be removed using in-pit sumps.

6.4.5 Waste rock and low grade ore

The waste rock dump design uses a conservative figure of 35% swell. This is similar to that used in the Whyalla South Middleback Ranges operations. Available dump volumes have been estimated using the June 2000 topographic surface and final waste dump designs.

6.4.6 Stockpiles

A Run of Mine (ROM) pad is located adjacent the crushing plant for stockpiling a supply of mined ore. This area is located on the site of the crusher which is outside of the mining lease.

6.4.7 Ongoing exploration

Potential to extend the life of the project through further exploration beyond the current mining lease areas is low due to Avoca Resources holding the exploration licenses for the surrounding area.

6.5 Crushing

The location of crushing plant is shown on Figure 1.2, however this component of the Ardrossan operation is not regulated by the *Mining Act, 1971* and therefore not considered part of the scope this report.

6.6 Road access and transport

6.6.1 Existing haul road

Vehicle transport between the pit and crushing facility is facilitated by an existing haul road that crosses the Main Coast Road (see Figure 1.2). The road is a private road with access restricted to that necessary for mine operations. There is no public access along the roads.

6.6.2 Transport vehicles and traffic

Table 6.7 Haulage statistics

Tonnes per annum	600,000
Number trucks	9,230
Average movements per truck per day	800
Total movements a day – 24/7	37

6.7 Existing infrastructure

Existing infrastructure is located in an area not covered by a mining lease and not considered part of the scope of this document.

6.7.1 Energy supply

Energy supply is required for infrastructure located in an area not covered by a mining lease and not considered part of the scope of this document.

6.7.2 Fuel storage

Fuel is stored on a section of the private mine and areas of the operation not covered by a mining lease and not considered part of the scope of this document.

6.7.3 Water supply

The project will require water for dust suppression and vehicle wash-down, and potable water for domestic use. Water is sourced from the local mains supply.

6.7.4 Mine service buildings

The location of mine service buildings are shown on Figure 1.2, however this component of the Ardrossan operation is not regulated by the *Mining Act, 1971* and therefore not considered part of the scope this report.

6.8 Site water management

Ardrossan OneSteel site works are located on the eastern side of the Yorke Peninsula. Stormwater flows either to the beach or into two sediment ponds. The stormwater in the open pit area drains back into the pit region.

6.9 Waste management

Domestic wastes from the service areas and industrial wastes such as waste oils, packaging and drums are generated during operations. The onsite waste management strategies are detailed below:

- general waste is collected in Sulo Bins and removed by the Yorke Peninsula District council to the Yorke Peninsula District Council dump
- hard fill including rock and soil are disposed on site in the waste dumps
- steel waste is recycled as scrap
- liquid waste is collected and stored in designated areas with periodic collection/disposal by an EPA licensed contractor
- waste water from the site amenities is treated by an onsite sewage treatment system.

6.10 Workforce

The project employs 26 people for the operations. Employees are sourced locally and it is unlikely that additional recruitment will be necessary for the extension.

7. Description of proposed operations

Changes to mine operations as a result of the proposed MPL (and associated operation) are detailed below.

7.1 Overview

The footprint of the proposed waste rock dump is approximately 372,530.7 m^2 and the location of the proposed area in relation to the existing mining lease areas and operations is shown in Figure 7.1.

7.2 Waste rock dump

The waste rock dump design uses a conservative figure of 35% swell. This is similar to that used in the Whyalla South Middleback Ranges operations. Available dump volumes have been estimated using the June 2000 topographic surface and final waste dump designs.

The total dump capacity will be 1.8 million m^3 with outslopes of 37°. Dump lifts will be 5 m with berms of 20 m. The design of the dump complies with Civil Aviation Safety Authority (CASA) requirements and has windrows of 1.5 m high around the perimeter of each lift. A perimeter road way is proposed around the dumps.

Appendix C[1] provides further details on the waste rock dump including the height and scaled cross-sections of the proposed waste rock dump area and the current pit.

7.3 Project alternatives

The application for a Miscellaneous Purpose License or Mining Lease for the additional waste rock dump was considered by OneSteel. Due the intended use of the area as a waste rock dump, OneSteel has decided to apply for a Miscellaneous Purpose License.

OneSteel considered various alternatives for the waste rock area and an overview of these alternatives is provided in Table 7.1 below.

Table 7.1 Waste Rock Area Alternatives

Alternative Option	Discussion
Do nothing option	The existing waste rock area is near capacity. Any further placement of material in this location could result in unstable landforms and greater visual impact in the area. There is approximately 10 MT of ore available within the existing leases at the site. Not proceeding with the additional waste rock dump would restrict production and result in lost revenue (due to there not being a suitable location to place the waste rock).

[1] *Appendix C also shows a future pit expansion. This pit expansion has not been commenced however has previously been approved under ML404 0 - ML4042 and ML4045 – ML4046*

Alternative Option	Discussion
Locate in an alternative location	Land tenure surrounding the Ardrossan site restricts the possible location of the additional waste rock dump. Locating the area to the west of the current operations was also considered to be efficient in terms of operations and minimising on site haulage etc.
Alternative approval mechanism – development application	Although provisions under the *Development Act 1993* could be used to apply for and gain approval for the waste rock area, it was considered that due to the existing mining operations, an application for an MPL (under the provisions of the *Mining Act 1971*) was the most appropriate option for the project.
Backfilling of the pit as an alternative to an overburden dump	The OneSteel Ardrossan mine currently has the pit floor at RL08 with some mining activity taking the pit to the RL03. The mining of the remainder of RL08 is scheduled to take several years. The pit floor will have a haulage road that traverses the pit floor for the life of the pit. It is for these reasons that dumping waste material in the pit is not feasible for the Ardrossan operation.

7.4 Project schedule

The proposed pit extension is expected to increase the mine's life by ten years. This may be extended if exploration indicates further sources of mineralisation. Details of the project schedule are provided in Table 7.2 below.

Table 7.2 Project schedule

Milestone	Target Date
MPL approval	February 2010
MARP Approval	March 2010
MPL development and use	April 2010
Cease mining	2030
Cease production	2030

Extent of current operations

Project Components

Existing mine operations

- Haul road
- Open pit
- Rehabilitation areas
- Topsoil storage
- Waste rock dumps
- Future pit extension
- Waste rock dump

Project Component	Area (m^2)
Existing Mine Operations	
Open Pit	500,546.7
Future pit extension	146,436.2
Topsoil storage	4,560.1
Rehabilitation areas	208,617.6
Waste rock dumps	501,604.2
Haul road	36,099.7
Sub-total	**1,397,864.5**
Proposed MPL	
Waste rock dump	372,530.7
Total	**1,770,395.2**

OneSteel

1:10,000 at A3

0 100 200
metres

Data Source: DEH, PIRSA

Coord. Sys.: GDA94 MGA53

Drawing No.:	2102726A_GIS_F004		
Revision:	D1	**Date:**	08/01/2010
Drawn By:	TK	**Checked by:**	JG
Client Ref:	ONESTEEL ARDROSSAN		

Ardrossan Dolomite Quarry

Existing operations and proposed MPL area

Figure 7.1

GIS File: J:\A303-ENVPLN\PROJ\2102726A_Onesteel_Ardsn\10_GIS\Projects\2102726A_GIS_F004_D1.mxd

8. Environmental impact assessment

Environmental Impact Assessment (EIA) is an assessment of the impacts to the biophysical, social and economic dimensions of the environment.

The EIA process provides a structure in which the environmental consequences of options can be considered when developing and formulating projects. The EIA approach for the proposed MPL infrastructure and operations is detailed below.

8.1 Approach

To assist in the identification of environmental aspects and provide a framework for the environmental impact assessment associated with the proposed MPL infrastructure and operations an environmental risk assessment has been undertaken.

The approach to the risk assessment has been developed based on the risk assessment process as detailed in the PIRSA *Guidelines for the Preparation of a Mining Lease Proposal or Mining and Rehabilitation Program (MARP)* Version 4.9 as well as the OneSteel Environment Management Plan.

8.1.1 Identification of issues, aspects and impacts

The environmental issues associated with the MPL infrastructure and operations have been identified by undertaking an environmental risk assessment.

The risk assessment has been documented as a register that identifies the environmental and social issues/impacts associated with the MPLs. A copy of the register is contained in Appendix D.

Further discussions of the aspects and impacts identified in the register are outlined in Sections 8.2–8.17 below.

8.1.2 Risk identification and assessment

8.1.2.1 Process

Inherent risk is a measure of the likelihood and consequences of environmental harm occurring from an activity if the project was to be undertaken without having any regard to environmental impacts and risks i.e. it does not take into account any environmental management and mitigation measures.

The Inherent Risk Level (IRL) has been assessed against the identified objective based on knowledge of the existing environment (refer Section 5), experience with similar operations elsewhere and issues of concern identified by project stakeholders.

Consideration has then been given to avoidance, mitigation and/or management measures. These have been categorised as Design Control Measures (i.e. those measures that can be incorporated into the design of the operations) and Operational Management Measures (e.g. management approaches and plans to be implemented during operations).

The Design Control Measures and Operational Management Measures are considered technically and economically feasible and reflect OST's commitment to minimising environmental impacts.

The final component of the assessment involved assessing the Residual Risk Level (RRL) associated with each of the identified aspects. This assessment assumes the effective implementation of the Design Control and Operational Management Measures.

The descriptors used in the IRL and RRL assessments are based on the categories as outlined in OST's internal EHSMS *Risk and Hazard Management Standard*, and are outlined below.

8.1.2.2 Likelihood rating

The likelihood of each event occurring has been determined, based on information such as past experience, known meteorological data / site conditions etc, and the effectiveness of proposed control measures (for Residual Risk Level). The likelihood of the event has been classified using the following categories (Table 8.1).

Table 8.1 Qualitative measures of likelihood

Rating	Description
Almost certain (AC)	Will occur, or is of a continuous nature, or the likelihood is unknown.
Likely (LI)	Will probably occur during the mine lifetime.
Possible (P)	Could occur in most mines.
Unlikely (UL)	Could occur in some mines, but is not expected to occur.
Rare (R)	Has almost never occurred in similar mines but conceivably could.

8.1.2.3 Severity rating

The consequence of each event occurring has been determined, based on information such as the potential scale of the event, the range of stakeholders who may be affected, the duration of the event, the difficulty in remediating the impact. The consequence of the event is to be classified using the following categories (Table 8.2):

Table 8.2 Qualitative measures of severity

Rating	Description
Insignificant (I)	Possible impacts but without noticeable consequence.
Minor (M)	Very local consequence with no significant long term changes, may be simply rehabilitated or alleviated at some cost without outside assistance, not of significance to wider community.
Moderate (MO)	Significant local changes, but can be rehabilitated or alleviated with difficulty at significant cost and with outside assistance.
Major (MA)	Substantial and significant changes, will attract significant public concern, only partially able to be rehabilitated or alleviated. May be doubtful that can be successfully rehabilitated, major costs involved. Changes will be substantial if cumulative effects are considered..
Catastrophic (C)	Extreme permanent changes to social or natural environment (not able to be practically or significantly rehabilitated or alleviated), deaths or widespread health and economic effects on public, major public outrage or the consequences are unknown.

8.1.2.4 Risk determination and categories

The risk associated with each event was then determined by multiplying the likelihood and severity by and referring to the matrix below (Table 8.3).

Table 8.3 Qualitative risk analysis matrix – level of risk

Severity of consequence		Likelihood of consequence				
		Rare (R)	**Unlikely (UL)**	**Possible (P)**	**Likely (LI)**	**Almost Certain (AC)**
	Insignificant (I)	L	L	L	MO	H
	Minor (M)	L	L	MO	H	H
	Moderate (MO)	MO	MO	H	H	E
	Major (MA)	H	H	E	E	E
	Catastrophic (C)	H	E	E	E	E

Legend

E : Extreme risk MO : Moderate risk

H : High risk L : Low risk

8.1.3 Risk acceptance

A consideration of each of the identified aspects, impacts and RRL has been undertaken to assist in determining whether the residual risk is considered to be acceptable.

When considering the identified RRL, a process of involved and deliberate thinking and debate was undertaken by OneSteel and a number of project stakeholders including environmental professionals. By involving a number of parties in the evaluation, a balanced outcome has been achieved that takes into account the risks both from a technical and economic and social perspective.

As outcomes of the risk assessment process, the residual risk values that have been applied to the aspects and impacts (as outlined in the Environmental Risk Register contained in Appendix D) are considered by OneSteel to be appropriate risks that are associated with the project that they are knowingly prepared to accept.

Discussion regarding the risk acceptance for the identified aspects and impacts are discussed in the respective sections below.

8.1.4 Control and management measures

The incorporation of control and management measures into the operations activities includes both Design Control Measures and Operational Management Measures. Design control measures are the primary control measures designed to ameliorate the impact prior to it occurring. They encompass aspects of the project such as infrastructure design and placement e.g. inclusion of impermeable barriers in dam design. Secondary measures (i.e. operational management measures) are those that involve management activities during operations e.g. management and monitoring plans.

8.2 Flora (native vegetation)

8.2.1 Context

As outlined in Section 5.8 no flora species of state or national conservation significance were recorded within the project area.

The project area is dominated by an Exotic Grassland and cropped paddocks. The cropped paddocks contain *Lupinus sp.* (Lupins) whilst *Triticum aestivum* (Wheat) dominates the non cropped areas. A number of exotic weeds occur scattered throughout the association such as *Asphodelus fistulosus* (Onion weed), *Asteriscus spinosus* (Golden Pallensis) and *Carrichtera annua* (Ward's weed), which were recorded generally along fence lines. Paddocks occurring on the northern side of the survey area are lined with planted vegetation such as *Eucalyptus torquata* (Coral Gum), *Casuarina glauca* (Grey She-oak) and other introduced Eucalypt species, where vegetation is primarily acting as a wind break.

Native understorey vegetation occurring within the survey area is considered to be in poor to very poor condition. A number of remnant *Eucalyptus porosa* (Mallee Box) scattered within the survey area and are generally located within the paddocks, along fence lines and within wind breaks as single trees or as small groups. The understorey condition of these *Eucalyptus porosa* patches is considered to be in poor to very poor condition with very few native species being recorded.

Vegetation clearance associated with the proposed waste rock dump expansion area is detailed in Table 8.4.

Table 8.4 Vegetation clearance areas in the extension areas

Vegetation status	Area cleared
Very Poor	372,530.7m^2

The relevant acts of legislation that protect the State's flora and provide a framework for management are discussed in detail in Section 3 and include:

- *Environment Protection and Biodiversity Conservation Act 1999*
- *National Parks and Wildlife Act 1972*
- *Native Vegetation Act 1991.*

8.2.2 Potential impacts

Two flora and native vegetation impacts have been identified as being associated with the expansion of the waste rock dump area. The impacts are associated with reduced species abundance and impacts on threatened species. Details of the impacts are discussed below.

8.2.2.1 Clearance of vegetation: Potential for reduced species abundance due to clearing activities (MPL_01)

Vegetation clearance is to facilitate the waste rock dump extension. Without any consideration and management, it is considered **unlikely** that this vegetation clearance will result in reduced species abundance and that there would be an **insignificant** impact on native flora as a result of the clearance. This provides a **low** level of inherent environmental risk associated with the project.

8.2.2.2 Clearance of vegetation: Adverse effects on threatened species due to clearing activities (MPL_02)

Two species of regional conservation significance (Yorke Peninsula Botanical Region) were recorded within the survey area. Neither of these species will be impacted by the extension areas.

Given that the project area is not located near any conservation areas, it is considered **rare** that without any control or management the clearance of vegetation would result in effects on threatened species and that there be a **moderate** consequence to threatened flora species as a result of clearing. This provides a **moderate** inherent environmental risk.

8.2.3 Control and management measures

8.2.3.1 Design control measures

Design control measures to minimise impacts to native vegetation during the planning and development phases of the expansion of the waste rock dump area have considered the area required for clearing as far as practicable.

8.2.3.2 Operational management measures

Management measures to avoid, mitigate and manage the risks associated with flora and native vegetation include:

- avoiding areas that contain native vegetation, particularly the *Eucalyptus porosa* trees
- if native vegetation is removed an appropriate Significant Environmental Benefit should be determined and implemented
- rehabilitation to include local and regionally endemic species.

8.2.4 Residual risk acceptance

Reconsideration of the risks to flora (native vegetation) and taking into account the design and operational management measures has resulted in the residual risk of the impacts remaining at, or being reduced to **moderate** and **low**.

The residual risks are considered to be as low as reasonably practicable and for this reason are considered by OneSteel to be acceptable for the project. Details of the residual risks are provided in Table 8.5 below.

Table 8.5 Environmental risk assessment and control measures summary for flora and native vegetation

ID	Aspect and impact	IRL			Summary of control and management measures	RRL		
		LHD	CON	IRL		LHD	CON	RRL
MPL_01	Reduced species abundance both locally and regionally due to clearing of vegetation.	UL	I	L	Design to minimise vegetation clearance. Rehabilitation to include local and regionally endemic species.	UL	I	L
MPL_02	Adverse effects on threatened species due to clearing of vegetation.	R	MO	MO	Rehabilitation to include local and regionally endemic species.	R	MO	MO

8.3 Fauna

8.3.1 Context

A total of 22 fauna species were observed during the vegetation survey and consisted of 16 bird species, 2 reptile species and 4 mammal species. The two reptile species, a Sleepy Lizard (*Tiliqua rugosa*) and a small skink (not identified to species level) were observed within vegetation adjacent the roadside reserve. The majority of bird species were observed within the isolated trees or small groups of remnant *Eucalypt*us *porosa* (Mallee Box) or within re-vegetated areas. Three out of the 16 bird species were introduced (House Swallow, Feral Pigeon and Common Starling). These species made up the majority of bird species recorded away from the *Eucalyptus porosa* trees and small groups. A dead Cormorant was found within the grazed paddock, this being the only sign of a marine bird utilizing the area. A cause of death is unknown and it is possible that a fox moved the carcass from another location to the open paddock. All mammal species observed were introduced (dog, sheep, fox and rabbit). *Macropus sp*. (Kangaroo) was the only native mammal species observed within the project site during the field assessment.

Five fauna species previously recorded in the project area within the DEH and SAM databases have conservation significance. Additionally, 16 fauna species were listed by the EPBC Protected Matters Search Tool as possibly occurring within the survey area.

The relevant acts of legislation that protect the State's fauna and provide a framework for ongoing management are discussed in detail in Section 2 and include:

- *Environment Protection and Biodiversity Conservation Act 1999*
- *National Parks and Wildlife Act 1972.*

8.3.2 Potential impacts

Two types of impacts associated with fauna have been identified and are described in the sections below:

- clearance of agricultural land
- clearance of vegetation.

8.3.2.1 Clearance of agricultural land: Reduction in amount of available land for grazing (MPL_03)

Vegetation clearance is to facilitate the waste rock dump extension. Without any consideration and management, it is considered **likely** that the clearance of agricultural land for the waste rock dump extension will result in a reduction of grazing land and that there would be an **insignificant** impact on fauna as a result of the clearance. This provides a **moderate** level of inherent environmental risk associated with the project.

8.3.2.2 Clearance of agricultural land: Adverse effects on available habitat and reduction in species abundance (MPL_04)

Vegetation clearance of vegetation within the extension area will not significantly affect any migratory and/or marine fauna species. Several of these species (e.g. Giant Petrel's) are sea-birds and would not be observed in the area very often whilst a number of the other species are either waterbirds or species which rely on a coastal environment. Whilst the project site is close to the coast (<3km), there is not suitable habitat on the mine extension area for these species to regularly occur within the site. Instead it is considered that, at most, these species may fly over the project site.

It is considered **unlikely** that there will be significant habitat reduction in the area and that there will be a **minor** consequence on reduced species abundance as a result of this habitat clearance. This provides a **low** level of inherent environmental risk associated with the project.

8.3.3 Control and management measures

8.3.3.1 Design control measures

Design control measures to minimise impacts to fauna during the planning and development phases of the expansion of the waste rock dump area have focussed on minimising the area required for clearing as far as practicable.

8.3.3.2 Operational management measures

Management measures to avoid, mitigate and manage the risks associated with fauna include:

- progressive clearing and revegetation
- rehabilitation procedures and activities to facilitate agricultural land use post mine operation.

8.3.4 Residual risk acceptance

Reconsideration of the risks to fauna and taking into account the design and operational management measures has resulted in the residual risk of the impacts remaining at, or being reduced to **low**.

The residual risks are considered to be as low as reasonably practicable and for this reason are considered by OneSteel to be acceptable for the project. Details of the residual risks are provided in Table 8.6 below.

Table 8.6 Environmental risk assessment and control measures summary for fauna

ID	Aspect and impact	IRL			Summary of control and management measures	RRL		
		LHD	CON	IRL		LHD	CON	RRL
MPL_03	Reduction in amount of land available for grazing due to clearing of agricultural land.	LI	I	MO	Site rehabilitation procedure and activities will facilitate agricultural land use post mine operation	UL	I	L
MPL_04	Adverse effects on available habitat and reduction in species abundance due to clearing of agricultural land.	UL	M	L	Design to minimise amount of vegetation clearance Progressive clearing and revegetation	UL	I	L

8.4 Pest plants

8.4.1 Context

A number of proclaimed and environmental weed species occur within the survey area. Seven weed species proclaimed under the *Natural Resources Management Act* (1994) were identified during the field survey, including *Asparagus asparagoides* (Bridal Creeper), *Asphodelus fistulosus* (Onion weed), *Lycium ferocissimum* (African Boxthorn), *Marrubium vulgare* (Horehound), *Olea europaea ssp. Europaea* (Olive), *Oxalis pes-caprae* (Soursob) and *Tamarix aphylla* (Athel Pine).

The project area is located in a very low risk area for *Phytophthora cinnamomi* (root-rot fungus), or Mundulla Yellows area within the State (DEH 2003). No evidence of either pathogen has been identified during field investigations to date.

8.4.2 Potential impacts

Two types of impacts associated with pest plants and animals have been identified and are described in the sections below:

- introduction and/or spread of weed propogules
- introduction and/or spread of plant pathogens.

8.4.2.1 Importation or spread of weed propogules: Spread of existing or introduction of new weed infestations on site (MPL_05)

If not controlled, it is considered **likely** that weeds may either be introduced to the site, or the distribution of existing weeds may be exacerbated, with **moderate** consequences. This results in a **high** inherent environmental risk.

8.4.2.2 Spreading of plant pathogens: Introduction of plant pathogens to site (MPL_06)

It is considered **unlikely** that the plant pathogens *Phytophthora cinnamomi* (root-rot fungus), Mundulla Yellows or any other pathogens will be introduced to the project area. Given the

environmental conditions at the site, the consequence is considered to be **minor** which provides a **low** inherent environmental risk.

8.4.3 Control and management measures

8.4.3.1 Design control measures

No specific design control measures have been identified.

8.4.3.2 Operational management measures

Measures to mitigate against the introduction or spread of pest plants onsite include:

- Implementation of weed management procedures and activities (including vehicle wash down instructions) that have already been developed for the mine operations and will cover the operations associated with the waste rock dump.

8.4.4 Residual risk acceptance

Reconsideration of the risks associated with pest plants and taking into account the design and operational management measures has resulted in the residual risk of the impacts remaining at, or being reduced to **moderate** and **low**.

The residual risks are considered to be as low as reasonably practicable and for this reason are considered by OneSteel to be acceptable for the project. Details of the residual risks are provided in Table 8.7 below.

Table 8.7 Environmental risk assessment and control measures summary for pest plants and animals

ID	Aspect and impact	IRL			Summary of control and management measures	RRL		
		LHD	CON	IRL		LHD	CON	RRL
MPL_05	Spreading of existing or introduction of new weed infestations on site.	LI	MO	H	Weed management has been developed on site (including vehicle wash down instructions) and will cover operations associated with waste rock dump	P	M	MO
MPL_06	Introduction of plant pathogens to site.	UL	M	L	Weed management has been developed on site (including vehicle wash down instructions) and will cover operations associated with waste rock dump	UL	M	L

8.5 Dust and air quality

8.5.1 Context

OneSteel Ardrossan carries out monthly boundary sample analysis to monitor the air quality at the mine. The ambient air quality is expected to be consistent with that of rural environments. Peak dust levels occur during the drier summer months.

High wind levels are likely to exacerbate dust generation and lead to an increase in the concentration of airborne dust. The level of dust generation is exacerbated where there is a lack of ground cover and during periods of little rain or drought. The relevant acts of legislation that govern air quality in the State and provide a framework for ongoing management are discussed in detail in Section 2 and include:

- *Mining Act 1971*
- *Natural Resources Management Act 2004*
- *Environment Protection (Air Quality) Policy 1994*
- *Environment Protection Act 1993.*

8.5.2 Potential impacts

Two impacts associated with dust and air quality have been identified and are described below:

- wind generated dust

8.5.2.1 Haulage vehicle generated dust. Wind generated dust: Dust generated from site impacts on nearby sensitive receiver(s) (MPL_07)

The operation of the northern expansion area brings the mine operations closer to the Ardrossan township. During the risk assessment it was considered **unlikely** that wind generated dust will have an impact on receivers. If an impact was to be felt it was considered to be **moderate** in nature. This provides an inherent risk level of **moderate**.

8.5.2.2 Haulage vehicle generated dust: Dust generated from haulage vehicle impacts on users of Main Coast Road (MPL_08)

Given that haul vehicles already use an existing haul road that crosses Main Coast Road, it is unlikely that windblown dust generated on site will eventuate. If dust from haulage vehicles was generated it was considered to have a moderate impact on the visual amenity and safety of the users of Main Coast Road. This provides a moderate inherent risk level.

8.5.3 Control and management measures

8.5.3.1 Design control measures

No specific design control measures have been identified.

8.5.3.2 Operational management measures

Measures to mitigate against the generation of dust include:

- implementation of existing dust suppression activities to include the extension to the waste rock dump
- continue the site dust monitoring activities.

8.5.4 Residual risk acceptance

Reconsideration of the risks associated with dust and air quality and taking into account the design and operational management measures has resulted in the residual risk of the impacts being reduced to **low**.

The residual risks are considered to be as low as reasonably practicable and for this reason are considered by OneSteel to be acceptable for the project. Details of the residual risks are provided in Table 8.8 below.

Table 8.8 Environmental risk assessment and control measures summary for dust and air quality

ID	Aspect and impact	IRL			Summary of control and management measures	RRL		
		LHD	CON	IRL		LHD	CON	RRL
MPL_07	Dust generated from site impacts nearby sensitive receiver(s)	UL	MO	MO	Existing site dust management will include the new waste rock dump and mine haul road Site dust monitoring activities will continue	UL	M	L
MPL_08	Dust generated from haulage vehicle impacts users of Main Coast Rd	UL	MO	MO	Existing site dust management will include the new waste rock dump Site dust monitoring activities will continue	UL	M	L

8.6 Noise and vibration

8.6.1 Context

Noise samples are taken three annually and recorded from sites around the Crushing and Screening Plan, northern and western boundaries in accordance with the environmental monitoring work instruction. Background noise levels are expected to be consistent with that of rural environments. The nearest sensitive receptor to the mining operations is a residential dwelling 100 m from the mine. Noise samples taken during May 2006 found that the noise levels from the Ardrossan operation are less than 5 dB(A) above the background noise level which is compliant with the *Environment Protection Act (Noise) Policy 1997*.

8.6.2 Potential impacts

One impact associated with noise and vibration has been identified and is described in the sections below:

- generation of noise and vibration.

8.6.2.1 Generation of noise and vibration: Possible disturbance to nearby sensitive receiver(s) (MPL_09)

The town of Ardrossan is located three kilometres from the mine and the nearest sensitive receiver is approximately 100 m north (Mine Operations Manager residence). As a result it is considered **possible** that disturbance from noise and vibration would be experienced in this

location. In the event that an effect was felt, the consequence would be **moderate**. The inherent environmental risk considered to be **high**.

8.6.3 Control and management measures

8.6.3.1 Design control measures

No specific design control measures have been identified.

8.6.3.2 Operational management measures

Measures to mitigate against the generation of noise include:

- implementation of existing noise and vibration management activities will continue and will cover the extension to the waste rock dump.

8.6.4 Residual risk acceptance

Reconsideration of the risks associated with noise and vibration and taking into account the design and operational management measures has resulted in the residual risk of the impacts being reduced to **moderate**.

The residual risks are considered to be as low as reasonably practicable and for this reason are considered by OneSteel to be acceptable for the project. Details of the residual risks are provided in Table 8.9 below.

Table 8.9 Environmental risk assessment and control measures summary for noise and vibration

ID	Aspect and impact	IRL			Summary of control and management measures	RRL		
		LHD	CON	IRL		LHD	CON	RRL
MPL_09	Disturbance to nearby sensitive receiver(s) from noise and vibration	P	MO	H	Noise and vibration management has been developed on site and will cover waste rock dump	UL	MO	MO

8.7 Radiation and asbestiform materials

8.7.1 Context

Dolomite is not considered radioactive, although all naturally occurring soils, rocks and minerals contain small amounts of the radioactive materials (radionuclides) Thorium and Uranium. The background gamma radiation level of the earth's surface is largely due to the presence of these elements. These radionuclides are not soluble and do not break free from the sand. They are still present due to the decay half life (time taken to lose their radioactivity) being millions of years. The average annual radiation dose to the Australian population from exposure to natural background radiation is 2.3 mSv (ARPANSA 2007).

The relevant acts of legislation that governs radiation and asbestiform materials in the State and provides a framework for ongoing management are discussed in detail in Section 2 and include:

- *Radiation Protection and Control Act 1982*
- *Occupational Health, Safety and Welfare Act 1986*.

8.7.2 Potential impacts

Potential impacts associated with radiation and asbestiform materials have been identified as being:

- adverse impacts to workers or fauna from asbestiform materials
- radiation impacts to soil, water, air and biological impacts.

8.7.2.1 Radiation: Radiation impacts to soil, water, air and biological impacts (MPL_10)

Based on a likelihood of **unlikely** and a consequence of **minor**, the risks associated with soil, water, air and biological radiation exposure are considered to be **low**.

8.7.2.2 Asbestiform materials: Adverse impacts to workers or fauna from asbestiform materials (MPL_11)

Based on a likelihood of **unlikely** and a consequence of **minor**, the risks associated with impacts to workers or fauna from asbestiform materials are considered to be **low.**

8.7.3 Control and management measures

8.7.3.1 Design control measures

No design control measures are proposed.

8.7.3.2 Operational management measures

No specific operational management measures proposed.

8.7.4 Residual risk acceptance

The residual risks related to radiation and asbestiform material impacts remain at **low** without any design control or operational management measures being introduced.

The residual risks are as low as reasonably practical and for this reason are considered by OneSteel as acceptable for the project.

A summary of the environmental risk assessment including inherent risks, control and management measures and residual risks are provided in Table 8.10 below.

Table 8.10 Environmental risk assessment and control measures summary for radiation and asbestiform material

ID	Aspect and impact	IRL			Summary of control and management measures	RRL		
		LHD	CON	IRL		LHD	CON	RRL
MPL_10	Radiation impacts to soil, water, air and biological impacts	UL	MI	L	None proposed	UL	MI	L
MPL_11	Adverse impacts to workers or fauna due to asbestiform material	UL	MI	L	None proposed	UL	MI	L

8.8 Land use and visual amenity

8.8.1 Context

The visual amenity impacts associated with the mining operations including mine rehabilitation and closure are related to how the project will affect the long-term character of landscape and the nature of changes (i.e. landform and/or vegetation).

The relevant legislation that requires that visual amenity impacts are assessed, which is discussed in detail in Section 2, is:

- *National Parks and Wildlife Act 1972.*
- *Wilderness Protection Act 1992*

8.8.2 Potential impacts

Two impacts associated with land use and visual amenity has been identified and is described in the sections below:

- reduced availability of agricultural land due to operation of the waste rock dump
- reduced visual amenity in the project area due to operation of the waste rock dump .

8.8.2.1 Operation of waste rock dump: Reduced availability of agricultural land (MPL_12)

It is considered **likely** that the extension of the waste rock dump will reduce the availability of agricultural land and that there would result in an **insignificant** impact on agricultural land availability. This provides a **moderate** level of inherent environmental risk associated with the project.

8.8.2.2 Operation of waste rock dump: Reduced visual amenity in the project area (MPL_13)

It is considered **likely** that the extension of the waste rock dump will reduce the visual amenity in the project area both locally and regionally. Given the remoteness of the site, this will have a **minor** consequence. The resulting inherent environmental risk is considered to be **high**.

8.8.3 Control and management measures

8.8.3.1 Design control measures

The soil and overburden stockpiles will be designed to address appropriate height and gradient requirements.

8.8.3.2 Operational management measures

Management measures to avoid, mitigate and manage the risks associated with land use and visual amenity include implementing rehabilitation procedures and activities to facilitate land use post mine operation.

8.8.4 Residual risk acceptance

Reconsideration of the risks associated with land use and visual amenity and taking into account the design and operational management measures has resulted in the residual risk of the impacts being reduced to **low**.

The residual risks are considered to be as low as reasonably practicable and for this reason are considered by OneSteel to be acceptable for the project. Details of the residual risks are provided in Table 8.11 below.

Table 8.11 Environmental risk assessment and control measures summary for land use and visual amenity

ID	Aspect and impact	IRL			Summary of control and management measures	RRL		
		LHD	CON	IRL		LHD	CON	RRL
MPL_12	Reduced availability of agricultural land during operation of waste rock dump	L	I	MO	Rehabilitation procedure and activities will facilitate agricultural land use post mine operation	UL	I	L
MPL_13	Reduced visual amenity in project area (local and regional)	L	M	H	Soil and overburden stockpiles design to address height and gradient requirements Rehabilitation procedure and activities will facilitate agricultural land use post mine operation	P	I	L

8.9 Air traffic

8.9.1 Context

The existing airstrip is located directly west of the existing waste rock dump which is used by OneSteel for their operations. With the establishment of the proposed waste rock dump directly west of the airstrip, the airstrip will be located between the two waste rock dumps.

8.9.2 Potential impacts

8.9.2.1 Operation of waste rock dump: Decreased safety of airfield users associated with overburden stockpile heights (MPL_14)

It is considered **unlikely** that the operation of the waste rock dump and subsequent overburden stockpile design will an effect on the safety of the airfield users. Stockpile heights will be maintained to designed heights and will thus only have a **moderate** consequence resulting in a **moderate** inherent risk level.

8.9.3 Control and management measures

8.9.3.1 Design control measures

The design control measures incorporated into the mine plan to assist in air traffic management include:

- overburden stockpile design (heights) to be designed to address CASA requirements and facilitate ongoing use of the airfield.

8.9.3.2 Operational management measures

Measures to mitigate and manage potential impacts associated with air traffic include:

- ongoing maintenance of stockpile heights as per design heights.
- regular inspection of stockpile heights as per site management requirements and schedule.

8.9.4 Residual risk acceptance

Reconsideration of the risks associated with air traffic and taking into account the design and operational management measures has resulted in the residual risk of the impacts being reduced to **low**.

The residual risks are considered to be as low as reasonably practicable and for this reason are considered by OneSteel to be acceptable for the project. Details of the residual risks are provided in Table 8.12 below.

Table 8.12 Environmental risk assessment and control measures summary for air traffic

ID	Aspect and impact	IRL			Summary of control and management measures	RRL		
		LHD	CON	IRL		LHD	CON	RRL
MPL_14	Decreased safety of airfield users associated with overburden stockpile heights	UL	MO	MO	Overburden stockpile heights to be designed to address CASA requirements and facilitate ongoing use of airfield Waste rock stockpile heights to be maintained to design heights Stockpile heights to be checked as per current site management requirements and schedule	UL	M	L

8.10 Surface water

8.10.1 Context

In general there is little surface water in the northern part of Yorke Peninsula, and no permanent streams. However, because of the topography there are short, minor gullies incised into the scarp formed by the Kulpara fault that occasionally flow into Gulf St Vincent in the east. In the south of the peninsula are numerous saline lakes and swamps at almost sea level, which dry out in summer and contain water after significant rain (Zang 2006).

The relevant acts of legislation that govern the protection of surface water in the State and provide a framework for ongoing management are discussed in detail in Section 2 and include:

- *Natural Resources Management Act 2004*
- *Environment Protection Act 1993.*

8.10.2 Potential impacts

8.10.2.1 Operation of waste rock dump: Increased flows to the existing surface water drainage system (MPL_15)

Surface water runoff from the site currently flows onto the beach or into the sedimentation ponds or occurs as sheet flow across the surface. During detailed design, the drainage system will compliment the existing drainage system and it is **unlikely** that there will be an increased flow to the existing surface water drainage system. The potential impact of the design of drainage system is of **minor** consequence, thereby resulting in a **low** inherent risk.

8.10.2.2 Operation of waste rock dump: Impacts to the off-site stormwater quality associated with the release of sediment laden water (MPL_17)

It is **likely** that surface water flows across the site may result in the release of sediment laden water from areas form the waste rock dump. The consequence of sedimentation is **minor** with potential impacts to the environment including:

- increases in the sediment load in local watercourses
- decreases in water quality.

This results in a **high** risk.

8.10.3 Control and management measures

8.10.3.1 Design control measures

The design control measures incorporated into the mine plan to assist in the management of surface water drainage include:

- drainage system design must be complimentary to the current site drainage system and requirements and include collection and storage structures
- construction and design of stockpiles/dumps to include measures to minimise water run-off and erosion.

8.10.3.2 Operational management measures

Measures to mitigate and manage potential impacts associated with surface water include:

- Site management requirements and schedule updated to include:
  - additional surface water drainage elements with regard to the waste rock dump
  - monitoring of waste rock dump drainage and appropriate sediment and erosion controls (as required).

8.10.4 Residual risk acceptance

Reconsideration of the risks associated with surface and taking into account the design and operational management measures has resulted in the residual risk of the impacts being reduced to **low** or **moderate**.

The residual risks are considered to be as low as reasonably practicable and for this reason are considered by OneSteel to be acceptable for the project. Details of the residual risks are provided in Table 8.13 below

Table 8.13 Environmental risk assessment and control measures summary for surface water

ID	Aspect and impact	IRL			Summary of control and management measures	RRL		
		LHD	CON	IRL		LHD	CON	RRL
MPL_15	Increased flows to existing surface water drainage system	UL	M	L	Drainage system design to include collection and storage and be complimentary to current system and requirements Site maintenance schedule to include site drainage elements	UL	M	L

ID	Aspect and impact	IRL			Summary of control and management measures	RRL		
		LHD	CON	IRL		LHD	CON	RRL
MPL_17	Impacts to off site stormwater quality associated with release of sediment laden water	LI	M	H	Stockpiles / dumps to be constructed to minimise water runoff and erosion Monitoring dump drainage and appropriate sediment erosion control developed	P	M	MO

8.11 Groundwater

The project will require water for dust suppression and vehicle wash-down, and potable water for domestic use and water is sourced from the local mains supply.

The waste rock dump establishment and operation will not involve the extraction or interaction with groundwater and as a result, no risk assessment has been undertaken for this aspect of the project.

8.12 Aboriginal heritage

8.12.1 Context

No Native Title applications cover the Yorke Peninsula; however there are Indigenous Land Use Agreements (ILUA) which may have implications for the expansion area.

The relevant acts of legislation that protect the State's cultural and European heritage and provide a framework for ongoing management are discussed in detail in Section 2 and include:

- *Aboriginal Heritage Act 1988*
- *Native Title (South Australia) Act 1994*.

8.12.2 Potential impacts

8.12.2.1 Operation of mining operations: Disturbance to Aboriginal sites of Aboriginal significance (MPL_18)

It is **unlikely** that during the mining operation activities, there will be any disturbance to Aboriginal sites or objects. No sites of cultural heritage significance have been identified in the proposed MPL areas resulting in a consequence of **moderate** with an inherent risk of **moderate**.

8.12.3 Control and management measures

8.12.3.1 Design control measures

If any significant Aboriginal heritage sites or items are identified during construction, mine infrastructure will be relocated where practicable and feasible.

8.12.3.2 Operational management measures

In order to manage the potential heritage impacts of the project OneSteel proposes to undertake the following activities:

- implement procedures and protocols in the event a discovery of Aboriginal heritage significance is made.

8.12.4 Residual risk acceptance

Reconsideration of the risks associated with aboriginal heritage and taking into account the design and operational management measures has resulted in the residual risk of the impacts being reduced to **low**.

The residual risks are considered to be as low as reasonably practicable and for this reason are considered by OneSteel to be acceptable for the project. Details of the residual risks are provided in Table 8.14 below

Table 8.14 Environmental risk assessment and control measures summary for Aboriginal heritage

ID	Aspect and impact	IRL			Summary of control and management measures	RRL		
		LHD	CON	IRL		LHD	CON	RRL
MPL_18	Disturbance to Aboriginal sites of Aboriginal significance (without prior approval)	UL	MO	MO	Procedures to be implemented in the event a discovery is made and to be included in mine operational management plans Protocol to address statutory reporting requirements	UL	M	L

8.13 Non-Aboriginal heritage

8.13.1 Context

The nearest heritage sites are located within the township of Ardrossan and include:

- Ardrossan Institute (former): 9-13 First Street, Ardrossan, SA
- Dowlingville Post Office: Ardrossan Road, Dowlingville via Ardrossan, SA
- First School: 14 Second Street, Ardrossan, SA.

The relevant acts of legislation that protect the State's European heritage and provide a framework for ongoing management are discussed in detail in Section 2 and include:

- *Heritage Places Act 1993*.

8.13.2 Potential impacts

8.13.2.1 Operation of mining operation: Disturbance to non-Aboriginal historic and cultural heritage sites (MPL_19)

The mine site is located approximately 3 km southwest of the town of Ardrossan and it is thus **unlikely** that there will be any disturbance to non-Aboriginal historic and cultural heritage. The consequence is thus **moderate** resulting in a **moderate** inherent risk.

8.13.3 Control and management measures

8.13.3.1 Design control measures

If any significant non-Aboriginal heritage sites or items are identified during construction, mine infrastructure will be relocated where practicable and feasible.

8.13.3.2 Operational management measures

In order to manage the potential heritage impacts of the project OneSteel proposes to undertake the following activities:

- develop and implement protocol to be followed in the event that non-Aboriginal historic and cultural heritage sites are uncovered during site development e.g., cease work within 50 m of the area until a cultural heritage consultant has been contacted to undertake an assessment of the site and determine appropriate management measures.

8.13.4 Risk acceptance

Reconsideration of the risks associated with Non-aboriginal heritage and taking into account the design and operational management measures has resulted in the residual risk of the impacts being reduced to **low**.

The residual risks are considered to be as low as reasonably practicable and for this reason are considered by OneSteel to be acceptable for the project. Details of the residual risks are provided in Table 8.15 below

Table 8.15 Environmental risk assessment and control measures summary for European heritage

ID	Aspect and impact	IRL			Summary of control and management measures	RRL		
		LHD	CON	IRL		LHD	CON	RRL
MPL_19	Disturbance to non-indigenous historic and cultural heritage sites	UL	MO	MO	Procedures to be implemented in the event a discovery is made and included in mine operational management plans Protocol will address all statutory reporting requirements	UL	M	L

8.14 Hydrocarbon and chemical storage

No hydrocarbon and chemical storage facilities or activities will be undertaken on the area associated with the extension. As a result, no risk assessment has been undertaken for this activity.

8.15 Solid waste disposal (excluding waste rock)

No solid waste storage facilities or activities will be undertaken on the area associated with the extension. As a result, no risk assessment has been undertaken for this activity.

8.16 Rehabilitation

8.16.1 Context

Mining is a temporary land use that allows for re-establishment the environmental values following cessation of the mining activities. The goal of rehabilitation is to return the disturbed land to a condition suitable for the agreed post-mining land uses.

Rehabilitation of both native vegetation and agricultural land use to facilitate ongoing biodiversity conservation and agricultural activities is the proposed post-mining land use objective for the project.

The relevant acts of legislation that regulate land management and rehabilitation and provide a framework for ongoing management are discussed in detail in Section 2 and include:

- The SA *Mining Act* (1971)
- The SA *National Parks and Wildlife Act* (1972)
- The SA *Natural Resources Management Act* (2004)
- The SA *Environment Protection Act* (1993).

8.16.2 Potential impacts

8.16.2.1 Vegetation establishment: Rehabilitation failure due to poor preparation and vegetation establishment in rehabilitation areas (MPL_20)

The successful establishment of seedlings requires that they are able to inhabit an environment that is free of grazing animals (including both native and pest animal species) and where the soil and landscape is able to provide adequate water, nutrition and tolerable environmental conditions (temperature, light, air, protection from grazing) to allow them to develop into mature reproductive adults.

Without adequate study, planning and active management, it is **likely** that the (overall) unsuccessful re-establishment of vegetation will result in **minor** consequences to rehabilitation success, resulting in a **high** inherent risk rating.

8.16.2.2 Soil management: Rehabilitation failure associated with long-term compaction and stockpiling during operations (MPL_21)

The behaviour of soils and their ability to support the target vegetation communities is critical to the success of post-mining rehabilitation. Previous has part of the existing operation has alerted OneSteel to the potential that topsoil and subsoil handling, storage and replacement practices may affect the behaviour of these soils within the rehabilitation system.

Based on the information available, it is **possible** that the management of topsoils and subsoils will result in **moderate** consequences of long term compaction of soil during operations which is considered to be **high** risk outcome for the Ardrossan Project.

8.16.2.3 Soil stability: Unacceptable erosion rates resulting in rehabilitation failure (MPL_22)

Stabilisation of surface materials across the site will be essential to ensure, critical soil resources are available to enable rehabilitation, vegetation to establish in rehabilitation areas.

Based on the site knowledge gained from the existing operations, it is considered **likely** that erosion will create **moderate** consequences to the project and therefore poses a **high** inherent risk.

8.16.3 Control and management measures

8.16.3.1 Design control measures

The design control measures identified to assist in avoiding impacts to rehabilitation and closure include:

- soil stockpile storage will be located in areas that minimise potential for erosion and losses
- stockpile heights to be designed to maintain soil viability and use in rehabilitation activities.

8.16.3.2 Operational control measures

Proposed operational management measures to assist in avoiding impacts to rehabilitation include the implementation of site procedures and method statements to identify:

- rehabilitation area preparation and species requirements
- soil compaction minimisation and soil stockpile management requirements
- erosion and sedimentation management, inspections and corrective action requirements.

8.16.4 Residual risk acceptance

Reconsideration of the risks associated with rehabilitation and taking into account the design and operational management measures has resulted in the residual risk of the impacts being reduced to **low** and **moderate**.

The residual risks are considered to be as low as reasonably practicable and for this reason are considered by OneSteel to be acceptable for the project. Details of the residual risks are provided in Table 8.16 below.

Table 8.16 Environmental risk assessment and control measures summary for rehabilitation

ID	Aspect and impact	IRL			Summary of control and management measures	RRL		
		LHD	CON	IRL		LHD	CON	RRL
MPL_20	Rehabilitation failure due to poor preparation and vegetation establishment in rehabilitation areas	LI	M	H	Procedures and method statements to identify rehabilitation requirements	UL	M	L
MPL_21	Rehabilitation failure associated with long-term compaction and stockpiling	P	MO	H	Stockpile heights to be designed to maintain soil viability and use in rehabilitation activities Procedures and method statements to identify rehabilitation requirements	UL	MO	MO
MPL_22	Unacceptable erosion rates resulting in rehabilitation failure	LI	MO	H	Stockpile heights to be designed to maintain soil viability and use in rehabilitation activities Procedures and method statements to identify management requirements	UL	MO	MO

8.17 Closure

8.17.1 Context

Mining is a temporary land use that allows for re-establishment the environmental values following cessation of the mining activities. The goal of rehabilitation is to return the disturbed land to a condition suitable for the agreed post-mining land uses.

The relevant acts of legislation that regulate rehabilitation and closure and provide a framework for ongoing management are discussed in detail in Section 2 and include:

- The SA *Mining Act* (1971)
- The SA *National Parks and Wildlife Act* (1972)
- The SA *Natural Resources Management Act* (2004)
- The SA *Environment Protection Act* (1993).

8.17.2 Potential impacts

8.17.2.1 Post-mining landform: Reduced availability of agricultural land (MPL_23)

It is **possible** that when mining activities cease, the availability of agricultural land within the post-mining landform is reduced. Rehabilitation of the extended mine area will create a consequence of **minor** resulting in an inherent risk of **moderate**.

8.17.2.2 Post-mining landform: Injury or death of land owners and/or the public due to subsidence or failure of the pit walls / slopes (MPL_24)

The design, revegetation and rehabilitation of the pit walls/slopes include measures to recreate a safe post-mining landform that is consistent with the surrounding conditions. It is thus **unlikely** that that at closure, these pit walls/slopes will result in a **major** consequence with a **high** inherent risk.

8.17.2.3 Post-mining landform: Reduced visual amenity in the project area (both local and regional) (MPL_25)

Without adequate design and rehabilitation it is **likely** that the final mine landform is not consistent with the surrounding area resulting in a **minor** consequence and therefore a **high** inherent risk.

8.17.3 Control and management measures

8.17.3.1 Design control measures

The design control measures identified to assist in avoiding impacts to mine closure include:

- design of final mine landform to maximise agricultural use where possible and enhance visual amenity
- design of final landform slopes to be consistent with the existing slope angles and surrounding area.

8.17.3.2 Operational control measures

Proposed operational management measures to assist in avoiding impacts to mine closure include the development and implementation of procedures and method statements to:

- include all mine areas;
- address rehabilitation of agricultural land post-mine use; and
- to inspect slope stability and photo monitoring at completion of rehabilitation.

8.17.4 Residual risk acceptance

Reconsideration of the risks associated closure and taking into account the design and operational management measures has resulted in the residual risk of the impacts being reduced to **high**, **moderate** and **low**.

The residual risks are considered to be as low as reasonably practicable and for this reason are considered by OneSteel to be acceptable for the project. Details of the residual risks are provided in Table 8.17 below

Table 8.17 Environmental risk assessment and control measures summary for closure

ID	Aspect and impact	IRL			Summary of control and management measures	RRL		
		LHD	CON	IRL		LHD	CON	RRL
MPL_23	Reduced availability of agricultural land	P	M	MO	Final mine landform to be designed to maximise agricultural use where possible Rehabilitation procedure to include extended mine area and agricultural land	P	M	MO
MPL_24	Injury or death due to subsidence or failure of pit walls/slopes.	UL	MA	H	Final landform slopes to be designed to be consistent with existing slope angles Inspection of slope stability and photo monitoring at completion of rehabilitation	R	MA	H
MPL_25	Reduced visual amenity in project area (local and regional)	L	M	H	Final landform slopes to be designed to address visual amenity Rehabilitation procedure to include extended mine area and agricultural land	UL	I	L

8.18 Risk level summary and discussion

8.18.1 Summary

A summary of the project related environmental issues and associated inherent and residual risk levels are provided in Table 8.18 below:

Table 8.18 Risk level summary

Issue	IRL				RRL			
	L	MO	H	E	L	MO	H	E
Flora & Native Vegetation	1	1	0	0	1	1	0	0
Fauna	1	1	0	0	2	0	0	0
Pest Plants and Animals	1	0	1	0	1	1	0	0
Dust and Air Quality	0	2	0	0	2	0	0	0
Noise and Vibration	0	0	1	0	0	1	0	0
Radiation and Asbestiform Materials	2	0	0	0	2	0	0	0
Land Use and Visual Amenity	0	1	1	0	2	0	0	0
Air Traffic	0	1	0	0	1	0	0	0
Surface Water	1	0	1	0	2	0	0	0
Groundwater	–	–	–	–	–	–	–	–
Aboriginal Heritage	0	1	0	0	1	0	0	0
Non-Aboriginal Heritage	0	1	0	0	1	0	0	
Hydrocarbon and chemical storage	–	–	–	–	–	–	–	–
Solid Waste Disposal	–	–	–	–	–	–	–	–

Issue	IRL				RRL			
	L	MO	H	E	L	MO	H	E
Rehabilitation	0	0	3	0	1	2	0	0
Closure	0	1	2	0	1	1	1	0
Total	**6**	**9**	**9**	**0**	**17**	**6**	**1**	**0**

8.18.2 Discussion

The risk assessment resulted in a total of 24 environmental aspects and impacts being identified across 16 categories (refer to Appendix D).

Of the 24, no risks were considered to have an IRL of extreme, nine had levels of high, nine were moderate and six were considered to be low.

Following consideration of control and management measures, the inherent risk levels were reconsidered and resulted in zero extreme risks, one residual risk of high, six of moderate and 17 low.

The high residual environmental risk is related to land use and visual amenity and road traffic while moderate risks are considered to remain for issues associated with rehabilitation success, pest plants and animals, noise and vibration and road traffic.

Predicted outcomes and assessment criteria have been developed for all those environmental aspects with an IRL of moderate or higher (i.e. 18 of the 24 aspects) as detailed in the Environmental Risk Register (Appendix D). Details of the outcomes and criteria are discussed in Section 9.

9. Predicted outcomes and assessment criteria

9.1 Background

9.1.1 Predicted outcomes

The predicted outcomes have been developed for each of the environmental risks with an IRL of moderate or higher.

The predicted outcomes reflect the anticipated level of environmental impact associated with the proposed waste rock dump and the demonstrated success of OneSteel's operations at the Ardrossan dolomite mine.

9.1.2 Assessment criteria

Each predicted outcome is accompanied by measurable assessment criteria that will be used by OneSteel during the life of the project to assess their compliance against the predicted outcome and/or progress against a program or similar (that is associated with the predicted outcome).

Where possible, the criteria have been designed to allow for quantitative (numerical) comparison by referring to requirements of standards, guidelines or other references (as may be applicable).

Where it has been considered necessary, the criteria may also facilitate comparison to the project baseline data.

The predicted outcomes and assessment criteria for the project are presented in Section 9.2.

9.2 Predicted outcomes and assessment criteria

Predicted outcomes and assessment criteria are presented in Tables 9.1–9.13.

Table 9.1 Predicted outcomes and assessment criteria – flora and native vegetation

ID	Aspect and impact	Summary of control and management measures	RRL	Predicted outcomes	Assessment criteria
MPL_01	Clearing of vegetation: Reduced species abundance both locally and regionally due to clearing activities	Design to minimise vegetation clearance Rehabilitation to include local and regionally endemic species	L	Predicted outcomes and assessment criteria have only been developed for environmental aspects with an IRL of moderate or higher.	
MPL_02	Clearing of vegetation: Adverse effects on threatened species due to clearing of vegetation	Rehabilitation to include local and regionally endemic species	M	All clearance of native vegetation is authorised under appropriate legislation.	Actual clearance boundaries versus authorised clearance boundaries (output from site GIS).

Table 9.2 Predicted outcomes and assessment criteria – fauna

ID	Aspect and impact	Summary of control and management measures	RRL	Predicted outcomes	Assessment criteria
MPL_03	Clearing of agricultural land: Reduction in amount of land available for grazing	Site rehabilitation procedure and activities to facilitate agricultural land use post-mine operations	L	To recreate a safe, stable, vegetated landform that is consistent with surrounding conditions and allows the re-establishment of agricultural land use.	The post mining landscape is resilient, self sustaining and indicating that the agricultural land use function will ultimately be achieved.
MPL_04	Clearing of agricultural land: Adverse effects on available habitat and reduction in species abundance	Design to minimise amount of vegetation clearance Progressive clearing and land revegetation	L	Predicted outcomes and assessment criteria have only been developed for environmental aspects with an IRL of moderate or higher.	

Table 9.3 Predicted outcomes and assessment criteria – pest plants

ID	Aspect and impact	Summary of control and management measures	RRL	Predicted outcomes	Assessment criteria
MPL_05	Importation or spreading of weed propagules: Spreading of existing or introduction of new weed infestations on site	Weed management has been developed on site (including vehicle wash down instructions) and will cover operations associated with waste rock dump	MO	No introduction of new weeds, plant pathogens or pests (including feral animals), nor increase in abundance of existing weed or pest species in the MPL and adjacent areas caused by mining operations.	Ongoing surveys of feral / pest animals. Comparison of results against existing site information to demonstrate no long term unmanageable introduction of feral species or increase in abundance within the MPL areas.
MPL_06	Importation or spreading of plant pathogens: Introduction of plant pathogens to site	Weed management has been developed on site (including vehicle wash down instructions) and will cover operations associated with waste rock dump	L	Predicted outcomes and assessment criteria have only been developed for environmental aspects with an IRL of moderate or higher.	

Table 9.4 Predicted outcomes and assessment criteria – dust and air quality

ID	Aspect and impact	Summary of control and management measures	RRL	Predicted outcomes	Assessment criteria
MPL_07	Wind generated dust: Dust generated from site impacts nearby sensitive receiver(s)	Existing site dust management will include the new waste rock dump Site dust monitoring activities will continue	L	No long term increase in monitored dust levels on and around operations.	Ongoing dust monitoring. Comparison of results against existing site information to demonstrate no long term increase in dust generation from site operations.
MPL_08	Haulage vehicle generated dust: Dust generated from haulage vehicle impacts users on Main Coast Rd	Existing site dust management will include the new waste rock dump Site dust monitoring activities will continue	L	No long term increase in monitored dust levels on and around operations.	Ongoing dust monitoring. Comparison of results against existing site information to demonstrate no long term increase in dust generation from site operations.

Table 9.5 Predicted outcomes and assessment criteria – noise and vibration

ID	Aspect and impact	Summary of control and management measures	RRL	Predicted outcomes	Assessment criteria
MPL_09	Generation of noise and vibration: Disturbance to nearby sensitive receiver (s)	Noise and vibration management has been developed on site and will cover waste rock dump	MO	No long term increase in monitored noise levels associated with mine operations.	Ongoing noise monitoring. Comparison of results against existing site information to demonstrate no long term increase in noise generation from site operations.

Table 9.6 Predicted outcomes and assessment criteria – radiation and asbestiform materials

ID	Aspect and impact	Summary of control and management measures	RRL	Predicted outcomes	Assessment criteria
MPL_10	Radiation: Radiation impacts to soil, water, air and biological impacts	None proposed.	L	Predicted outcomes and assessment criteria have only been developed for environmental aspects with an IRL of moderate or higher.	
MPL_11	Asbestiform materials: Adverse impacts to workers or fauna due to asbestiform material	None proposed.	L	Predicted outcomes and assessment criteria have only been developed for environmental aspects with an IRL of moderate or higher.	

Table 9.7 Predicted outcomes and assessment criteria – land use and visual amenity

ID	Aspect and impact	Summary of control and management measures	RRL	Predicted outcomes	Assessment criteria
MPL_12	Operation of waste rock dump: Reduced availability of agricultural land	Rehabilitation procedure and activities will facilitate agricultural land use post mine operation.	MO	To recreate a safe, stable, vegetated landform that is consistent with surrounding conditions and allows the re-establishment of agricultural land use.	PIRSA sign off indicating acceptable rehabilitation and post mining landform. Landowner sign off indicating acceptable rehabilitation and post mining landforms.

ID	Aspect and impact	Summary of control and management measures	RRL	Predicted outcomes	Assessment criteria
MPL_13	Operation of waste rock dump: Reduced visual amenity in project area (local and regional)	Soil and overburden stockpiles design to address height and gradient requirements. Rehabilitation procedure and activities will facilitate agricultural land use post mine operation.	L	To recreate a safe, stable, vegetated landform that is consistent with surrounding conditions and allows the re-establishment of agricultural land use.	PIRSA sign off indicating acceptable rehabilitation and post mining landform. Landowner sign off indicating acceptable rehabilitation and post mining landforms.

Table 9.8 Predicted outcomes and assessment criteria – air traffic

ID	Aspect and impact	Summary of control and management measures	RRL	Predicted outcomes	Assessment criteria
MPL_14	Operation of waste rock dump: Decreased safety of airfield users associated with overburden stockpile heights	Overburden stockpile heights to be designed to address CASA requirements and facilitate ongoing use of airfield Waste rock stockpile heights to be maintained to design heights Stockpile heights to be checked as per current site management requirements and schedule	L	There are no air traffic incidents resulting from mine operations that could have been reasonably prevented.	Investigation evidence (records, reports etc)

Table 9.9 Predicted outcomes and assessment criteria – surface water

ID	Aspect and impact	Summary of control and management measures	RRL	Predicted outcomes	Assessment criteria
MPL_15	Operation of waste rock dump: Increased flows to existing surface water drainage system	Drainage system design to include collection and storage and be complimentary to current system and requirements Site maintenance schedule to include site drainage elements	L	Predicted outcomes and assessment criteria have only been developed for environmental aspects with an IRL of moderate or higher.	
MPL_17	Operation of waste rock dump: Impacts to offsite stormwater quality associated with release of sediment laden water	Stockpiles / dumps to be constructed to minimise water runoff and erosion Monitoring dump drainage and appropriate sediment erosion control developed	MO	Migration or infiltration of any leakage to the surrounding environment is prevented (in accordance with the Environment Protection Authority Code of Practice for Stormwater Pollution Prevention).	Demonstrate that facilities are designed in accordance with EPA Code of Practice for Stormwater Pollution Prevention (via a post construction audit).

Table 9.10 Predicted outcomes and assessment criteria – Aboriginal heritage

ID	Aspect and impact	Summary of control and management measures	RRL	Predicted outcomes	Assessment criteria
MPL_18	Operation of mining operations: Disturbance to Aboriginal sites of Aboriginal significance (without prior approval)	Procedures to be implemented in the event a discovery is made and to be included in mine operational management plans Protocol to address statutory reporting requirements	L	No disturbance to Aboriginal artefacts or sites of significance unless prior approval under the relevant legislation is obtained.	Demonstration that no operations have been undertaken in areas for which heritage clearance has not been gained. Demonstration of compliance with regulatory requirements in the event of a discovery (through internal incident reporting procedure and requirements).

Table 9.11 Predicted outcomes and assessment criteria – Non-Aboriginal heritage

ID	Aspect and impact	Summary of control and management measures	RRL	Predicted outcomes	Assessment criteria
MPL_19	Operation of mining operations: Disturbance to non-indigenous historic and cultural heritage sites	Procedures to be implemented in the event a discovery is made and included in mine operational management plans Protocol will address all statutory reporting requirements	L	No disturbance to Non-Aboriginal items or sites unless prior approval under the relevant legislation is obtained.	Demonstration of compliance with regulatory requirements in the event of a discovery (through internal incident reporting procedure and requirements).

Table 9.12 Predicted outcomes and assessment criteria – rehabilitation

ID	Aspect and impact	Summary of control and management measures	RRL	Predicted outcomes	Assessment criteria
MPL_20	Vegetation establishment: Rehabilitation failure due to poor preparation and vegetation establishment in rehabilitation areas	Procedures and method statements to identify rehabilitation requirements	L	To recreate a safe, stable, vegetated landform that is consistent with surrounding conditions and allows the re-establishment of agricultural land use.	The post mining landscape is resilient, self sustaining and indicating that the agricultural land use function will ultimately be achieved.
MPL_21	Soil management: Rehabilitation failure associated with long-term compaction and stockpiling	Stockpile heights to be designed to maintain soil viability and use in rehabilitation activities Procedures and method statements to identify rehabilitation requirements	MO	To recreate a safe, stable, vegetated landform that is consistent with surrounding conditions and allows the re-establishment of agricultural land use.	The post mining landscape is resilient, self sustaining and indicating that the agricultural land use function will ultimately be achieved.
MPL_22	Soil stability: Unacceptable erosion rates resulting in rehabilitation failure	Stockpile heights to be designed to maintain soil viability and use in rehabilitation activities Procedures and method statements to identify management requirements	MO	To recreate a safe, stable, vegetated landform that is consistent with surrounding conditions and allows the re-establishment of agricultural land use.	The post mining landscape is resilient, self sustaining and indicating that the agricultural land use function will ultimately be achieved.

Table 9.13 Predicted outcomes and assessment criteria – closure

ID	Aspect and impact	Summary of control and management measures	RRL	Predicted outcomes	Assessment criteria
MPL_23	Post-mining landform: Reduced availability of agricultural land	Final mine landform to be designed to maximise agricultural use where possible Rehabilitation procedure to include extended mine area and agricultural land	MO	To recreate a safe, stable, vegetated landform that is consistent with surrounding conditions and allows the re-establishment of agricultural land use.	PIRSA sign off indicating acceptable rehabilitation and post mining landform. Landowner sign off indicating acceptable rehabilitation and post mining landforms.
MPL_24	Post-mining landform: Injury or death due to subsidence or failure of pit walls/slopes.	Final landform slopes to be designed to be consistent with existing slope angles Inspection of slope stability and photo monitoring at completion of rehabilitation	H	To recreate a safe, stable, vegetated landform that is consistent with surrounding conditions and allows the re-establishment of agricultural land use.	PIRSA sign off indicating acceptable rehabilitation and post mining landform. Landowner sign off indicating acceptable rehabilitation and post mining landforms.
MPL_25	Post-mining landform: Reduced visual amenity in project area (local and regional)	Final landform slopes to be designed to address visual amenity Rehabilitation procedure to include extended mine area and agricultural land	L	To recreate a safe, stable, vegetated landform that is consistent with surrounding conditions and allows the re-establishment of agricultural land use.	PIRSA sign off indicating acceptable rehabilitation and post mining landform. Landowner sign off indicating acceptable rehabilitation and post mining landforms.

10. Environmental management

10.1 Environmental management system

OneSteel Ardrossan Operations currently holds ISO 14001 Environmental Management System (EMS) Accreditation. Environmental management activities associated with the waste rock dump extension will be integrated into the overall site management and the EMS. A copy of the certification is provided in Appendix E.

10.2 Environmental management plan

As part of the EMS, OneSteel has developed and implemented an Environmental Management Plan (EMP) for the operations. The EMP details a number of objectives for the operations and contains various sub-plans as well as work instructions.

10.2.1 Objectives

During the development of this MPL application, a review of the current environmental objectives has been undertaken. Details of the objectives, targets and review comments are presented below.

Table 10.1 Extract of objectives and targets from EMP

Category	Objectives	Targets	Review comments
Air quality	Reduce the creation of dust and minimise disturbance to flora and fauna	Nil action by administrative authorities	No change to objective.
		Response to incidents immediately and reporting/notification to all parties within 48 hours	Objective being met as part of normal operations.
Noise and vibration	Reduce the create of noise and minimise disturbance to flora and fauna	Nil action by administrative authorities	No change to objective.
		Response to incidents immediately and reporting/notification to all parties within 48 hours	Objective being met as part of normal operations.
Surface and drainage	Minimisation of disturbance to drainage channels and natural waterways	Nil visible decrease in water quality.	No change to objective.
		Nil action by administrative authorities	Objective being met as part of normal operations.
		Response to incidents immediately reporting/notification to all parties within 48 hours	
Land disturbance and revegetation	Minimisation of disturbance to landforms and revegetation programs	Nil action by administrative authorities	No change to objective.
		Response to incidents immediately reporting/notification to all parties within 48 hours	Objective being met as part of normal operations.

Category	Objectives	Targets	Review comments
Ore and waste characterisation and placement	Minimisation of disturbance to land within and adjacent to mine site	Nil action by administrative authorities Response to incidents immediately reporting/notification to all parties within 48 hours.	
Hydrocarbon and dangerous goods	Reduction and minimisation of the use of hazardous substances and dangerous goods. Storage and licensing.	Reconciliation of diesel usage. Waste oil removal and receipting of removal. Nil action by administrative authorities Response to incidents immediately reporting/notification within 48 hours.	No change to objective. Objective being met as part of normal operations.
Flora and fauna	Minimise disturbance to flora and fauna adjacent to the site	Nil action by administrative authorities Response to incidents immediately and reporting/notification to all parties within 48 hours	No change to objective. Objective being met as part of normal operations.
Environmental training	Development of environmental awareness and responsibility among employees in order to achieve a solid base of environmental competence throughout the personnel onsite.	Conduct environmental toolbox sessions. All employees received environmental induction.	No change to objective. Objective being met as part of normal operations.
Environmental auditing	Ensure audit meets all requirements	Undertake internal planned inspections annually. Implement and update continuous improvement action plan	Ardrossan has obtained and complies with the requirements of (AS/NZS ISO 14001:2004) See attachment.
Reporting and records	Implement incident and complaints register at the site and ensure all incidents/complaints are investigated and reported.	Maintain and update incident register Complete and forward all incident report forms to EMO as incidents occur Maintain and update complaints register	No change to objective. Objective being met as part of normal operations.
Risk assessment and EMP review	Ensure the EMP is suitable to the conditions of the site by undertaking an hazard/risk analysis of project and review of the EMP.	Annually update risk register of site and integrated into EMP Annually update EMP	No change to objective. Objective being met as part of normal operations.

10.2.2 Environmental management sub-plans

- Air quality management.
- Noise management.
- Waste and pollution management.
- Surface water and drainage management.
- Land disturbance and revegetation management.
- Hazardous substances and dangerous goods.
- Ore and waste characterisation and placement.
- Flora and fauna management.
- Cultural heritage management.

10.2.3 Work instructions (environmental)

- Wash mobile equipment.
- Dust control management.
- Stormwater management.
- Waste material management.
- Management of site services.
- Managing bioremedial compound.
- Environmental incident.
- Hazardous substances register.
- Environmental monitoring.

Further details of the Environmental Management sub-plans and procedures will be contained in the MARP required for the operations of the waste rock dump extension area.

11. Bibliography

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Appendix A

Certificates of title

Title Register Search

LANDS TITLES OFFICE, ADELAIDE

For a Certificate of Title issued pursuant to the Real Property Act 1886

REGISTER SEARCH OF CERTIFICATE OF TITLE * VOLUME 5492 FOLIO 167 *

COST	: $16.80 (GST exempt)	PARENT TITLE	: CT 4167/448
REGION	: GROUND FLOOR, L.T.O. - LGHP12	AUTHORITY	: CONVERTED TITLE
AGENT	: GRFL BOX NO : 000	DATE OF ISSUE	: 15/01/1998
SEARCHED ON	: 07/09/2007 AT : 14:37:51	EDITION	: 2

REGISTERED PROPRIETOR IN FEE SIMPLE

ONESTEEL MANUFACTURING PTY. LTD. OF LEVEL 23 1 YORK STREET SYDNEY NSW 2000

DESCRIPTION OF LAND

ALLOTMENT 4 FILED PLAN 10759
IN THE AREA NAMED ARDROSSAN
HUNDRED OF CUNNINGHAM

EASEMENTS

NIL

SCHEDULE OF ENDORSEMENTS

NIL

NOTATIONS

DOCUMENTS AFFECTING THIS TITLE

NIL

REGISTRAR-GENERAL'S NOTES

NIL

END OF TEXT.

LANDS TITLES OFFICE ADELAIDE SOUTH AUSTRALIA

DIAGRAM FOR CERTIFICATE OF TITLE VOLUME 5492 FOLIO 167

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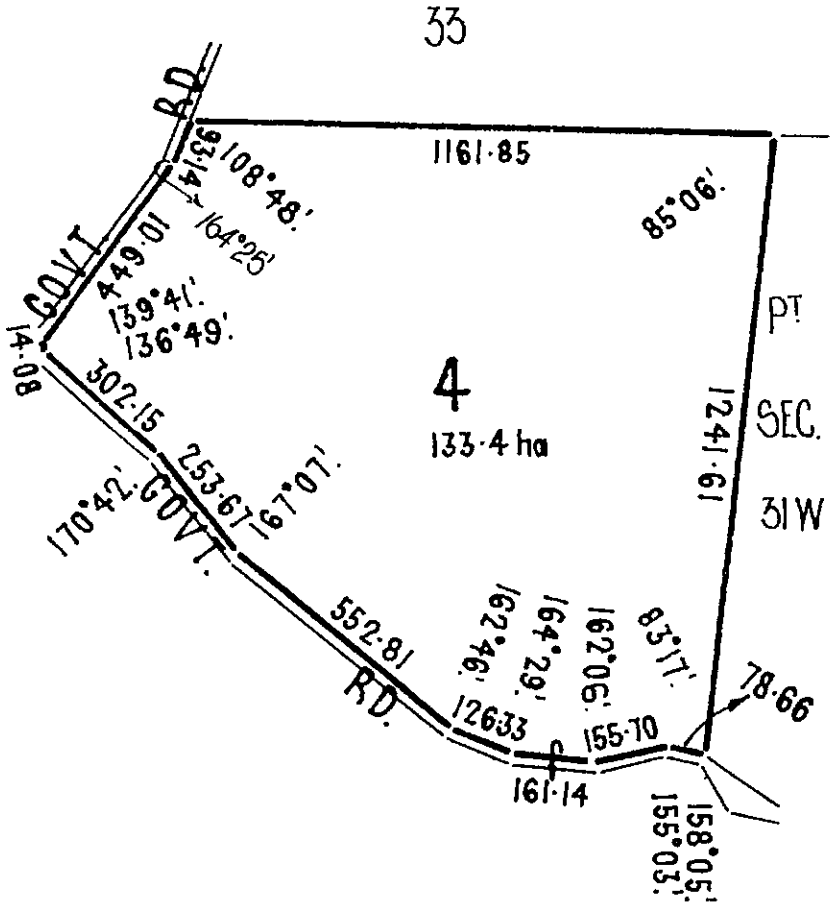

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Title Register Search

LANDS TITLES OFFICE, ADELAIDE

For a Certificate of Title issued pursuant to the Real Property Act 1886

REGISTER SEARCH OF CERTIFICATE OF TITLE * VOLUME 5570 FOLIO 769 *

COST : $16.80 (GST exempt)	PARENT TITLE : CT 2042/68
REGION : GROUND FLOOR, L.T.O. - LGHP12	AUTHORITY : CONVERTED TITLE
AGENT : GRFL BOX NO : 000	DATE OF ISSUE : 01/09/1998
SEARCHED ON : 07/09/2007 AT : 14:37:57	EDITION : 4

REGISTERED PROPRIETOR IN FEE SIMPLE

ONESTEEL MANUFACTURING PTY. LTD. OF LEVEL 23/1 YORK STREET SYDNEY NSW 2001

DESCRIPTION OF LAND

ALLOTMENT 827 FILED PLAN 197388
IN THE AREA NAMED ARDROSSAN
HUNDRED OF CUNNINGHAM

EASEMENTS

NIL

SCHEDULE OF ENDORSEMENTS

8534539 LEASE TO TELSTRA CORPORATION LTD. COMMENCING ON 1.1.1998 AND EXPIRING ON 31.12.2007 OF PORTION (T IN GP 163/1998)

9056353 LEASE TO OPTUS MOBILE PTY. LTD. COMMENCING ON 1.1.2003 AND EXPIRING ON 31.12.2007 OF PORTION (C IN GP 221/2000)

9056354 LEASE TO OPTUS MOBILE PTY. LTD. COMMENCING ON 1.1.2008 AND EXPIRING ON 31.12.2012 OF PORTION (C IN GP 221/2000)

9056355 LEASE TO OPTUS MOBILE PTY. LTD. COMMENCING ON 1.1.2013 AND EXPIRING ON 31.12.2017 OF PORTION (C IN GP 221/2000)

9074707 LEASE TO VODAFONE NETWORK PTY. LTD. COMMENCING ON 1.1.2003 AND EXPIRING ON 31.12.2007 OF PORTION (D IN GP 221/2000)

9074708 LEASE TO VODAFONE NETWORK PTY. LTD. COMMENCING ON 1.1.2008 AND EXPIRING ON 31.12.2012 OF PORTION (D IN GP 221/2000)

9074709 LEASE TO VODAFONE NETWORK PTY. LTD. COMMENCING ON 1.1.2013 AND EXPIRING ON 31.12.2017 OF PORTION (D IN GP 221/2000)

CONT.

Title Register Search

LANDS TITLES OFFICE, ADELAIDE

For a Certificate of Title issued pursuant to the Real Property Act 1886

REGISTER SEARCH OF CERTIFICATE OF TITLE * VOLUME 5570 FOLIO 769 *

	PARENT TITLE : CT 2042/68
REGION : GROUND FLOOR, L.T.O. - LGHP12	AUTHORITY : CONVERTED TITLE
AGENT : GRFL BOX NO : 000	DATE OF ISSUE : 01/09/1998
SEARCHED ON : 07/09/2007 AT : 14:37:57	EDITION : 4

NOTATIONS

DOCUMENTS AFFECTING THIS TITLE

NIL

REGISTRAR-GENERAL'S NOTES

PLAN FOR LEASE PURPOSES GP 126/97
PLAN FOR LEASE PURPOSES GP 163/98
PLAN FOR LEASE PURPOSES GP 19/00
PLAN FOR LEASE PURPOSES GP 221/00

END OF TEXT.

LANDS TITLES OFFICE ADELAIDE SOUTH AUSTRALIA

DIAGRAM FOR CERTIFICATE OF TITLE VOLUME 5570 FOLIO 769

SEARCH DATE : 07/09/2007 TIME: 14:37:57

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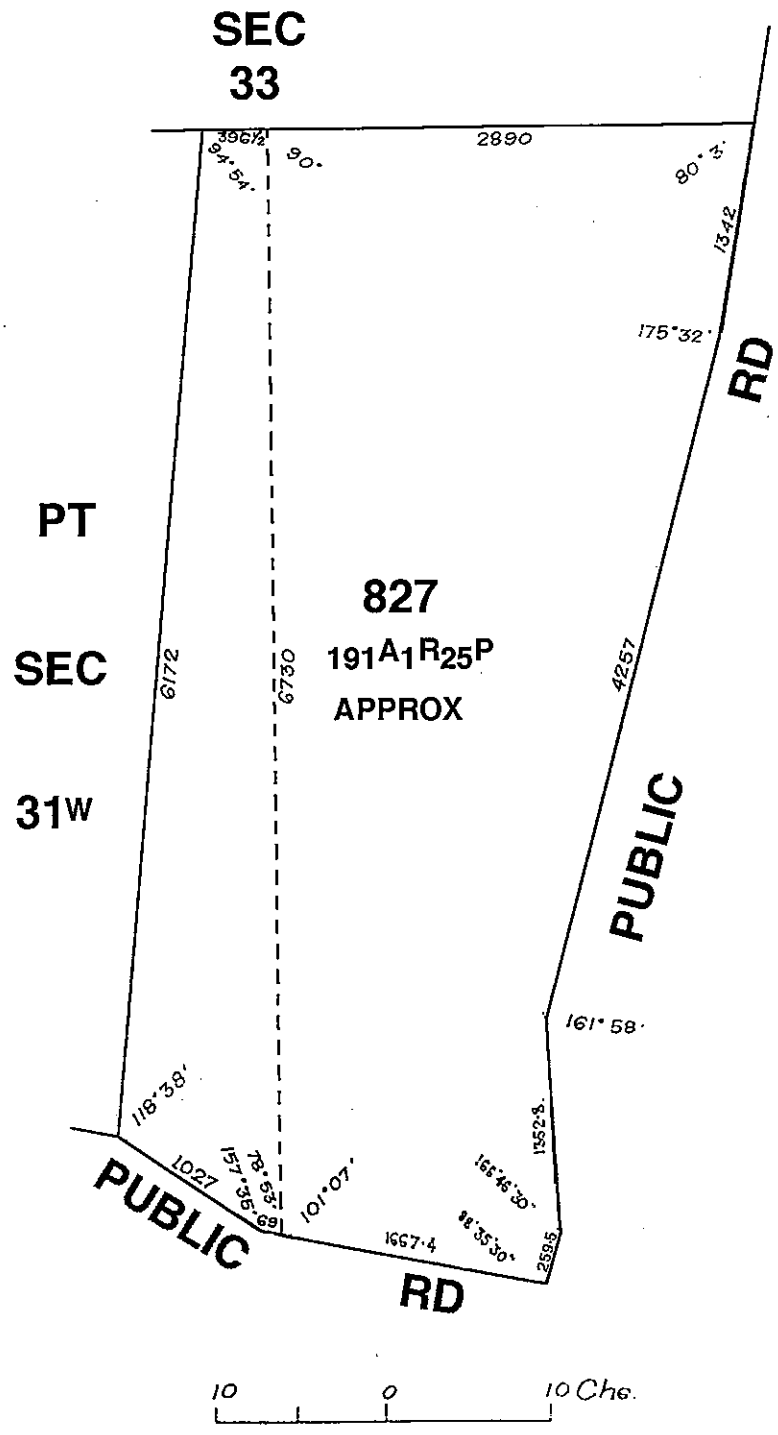

FOR METRIC CONVERSION		
1 LINK	=	0·201168 METRES
1 CHAIN	=	100 LINKS
1 ACRE	=	0·404686 HECTARES
1 ROOD	=	1011·7 m²
1 PERCH	=	25·29 m²

NOTE: SUBJECT TO ALL LAWFULLY EXISTING PLANS OF DIVISION

Title Register Search

LANDS TITLES OFFICE, ADELAIDE

For a Certificate of Title issued pursuant to the Real Property Act 1886

REGISTER SEARCH OF CERTIFICATE OF TITLE * VOLUME 5571 FOLIO 147 *

COST : $16.80 (GST exempt)	PARENT TITLE : CT 3718/148
REGION : GROUND FLOOR, L.T.O. - LGHP12	AUTHORITY : CONVERTED TITLE
AGENT : GRFL BOX NO : 000	DATE OF ISSUE : 02/09/1998
SEARCHED ON : 07/09/2007 AT : 14:37:44	EDITION : 3

REGISTERED PROPRIETOR IN FEE SIMPLE

ROBERT JOHN CLIFT OF ARDROSSAN SA 5571

DESCRIPTION OF LAND

SECTIONS 33 AND 42
HUNDRED OF CUNNINGHAM
IN THE AREA NAMED ARDROSSAN

EASEMENTS

SUBJECT TO THE EASEMENT OVER THE LAND MARKED A TO THE ETSA CORPORATION (T 3127644)

SCHEDULE OF ENDORSEMENTS

10473218 MORTGAGE TO WESTPAC BANKING CORPORATION

NOTATIONS

DOCUMENTS AFFECTING THIS TITLE

NIL

REGISTRAR-GENERAL'S NOTES

NIL

END OF TEXT.

LANDS TITLES OFFICE ADELAIDE SOUTH AUSTRALIA

DIAGRAM FOR CERTIFICATE OF TITLE VOLUME 5571 FOLIO 147

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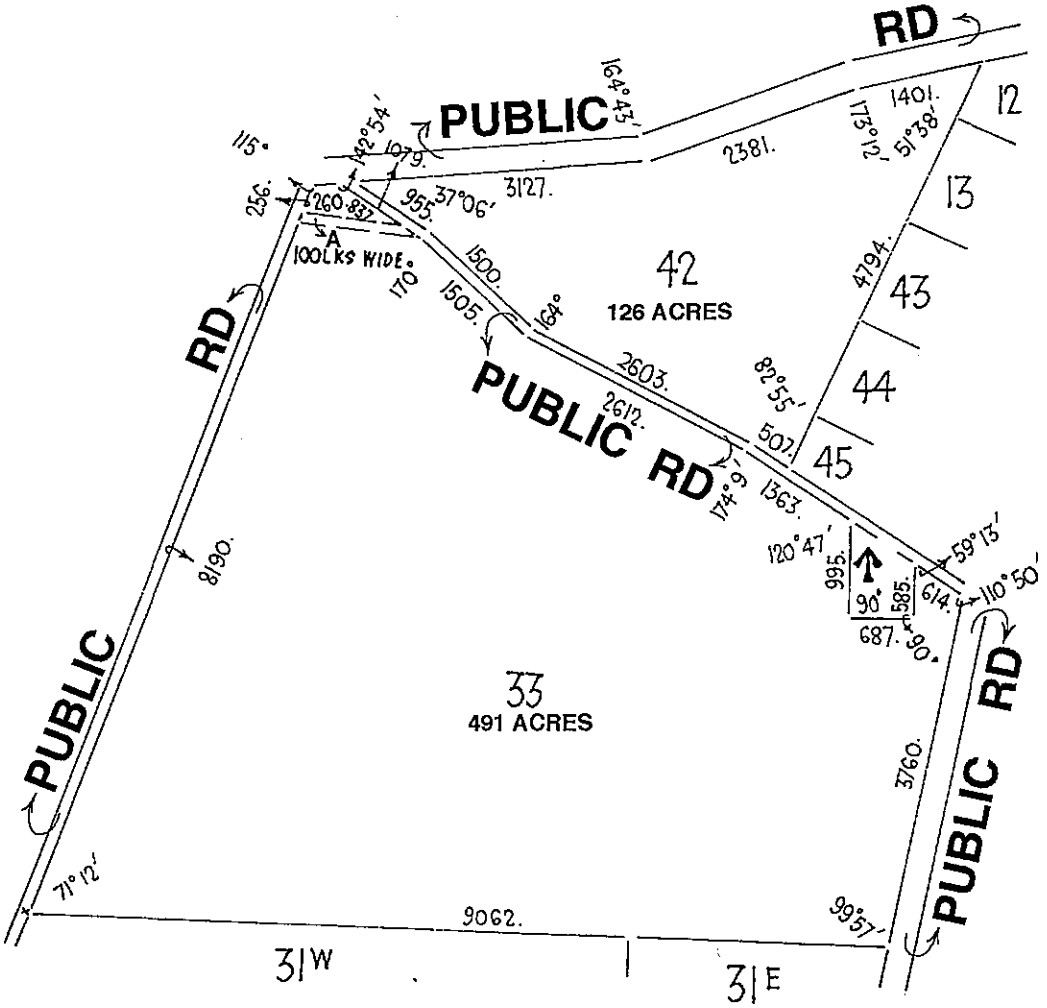

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FOR METRIC CONVERSION	
1 LINK	= 0·201168 METRES
1 CHAIN	= 100 LINKS
1 ACRE	= 0·404686 HECTARES
1 ROOD	= 1011·7 m²
1 PERCH	= 25·29 m²

Title Register Search

LANDS TITLES OFFICE, ADELAIDE

For a Certificate of Title issued pursuant to the Real Property Act 1886

REGISTER SEARCH OF CERTIFICATE OF TITLE * VOLUME 5577 FOLIO 722 *

COST : $16.80 (GST exempt)	PARENT TITLE : CT 3901/93
REGION : GROUND FLOOR, L.T.O. - LGHP12	AUTHORITY : CONVERTED TITLE
AGENT : GRFL BOX NO : 000	DATE OF ISSUE : 21/09/1998
SEARCHED ON : 07/09/2007 AT : 14:38:28	EDITION : 4

REGISTERED PROPRIETOR IN FEE SIMPLE

AUSBULK LTD. OF 124-130 SOUTH TERRACE ADELAIDE SA 5000

DESCRIPTION OF LAND

SECTION 406
HUNDRED OF CUNNINGHAM
IN THE AREA NAMED ARDROSSAN

EASEMENTS

NIL

SCHEDULE OF ENDORSEMENTS

9398007 LEASE TO ONESTEEL MANUFACTURING PTY. LTD. COMMENCING ON 1.2.2002 AND EXPIRING ON 31.1.2101

NOTATIONS

DOCUMENTS AFFECTING THIS TITLE

NIL

REGISTRAR-GENERAL'S NOTES

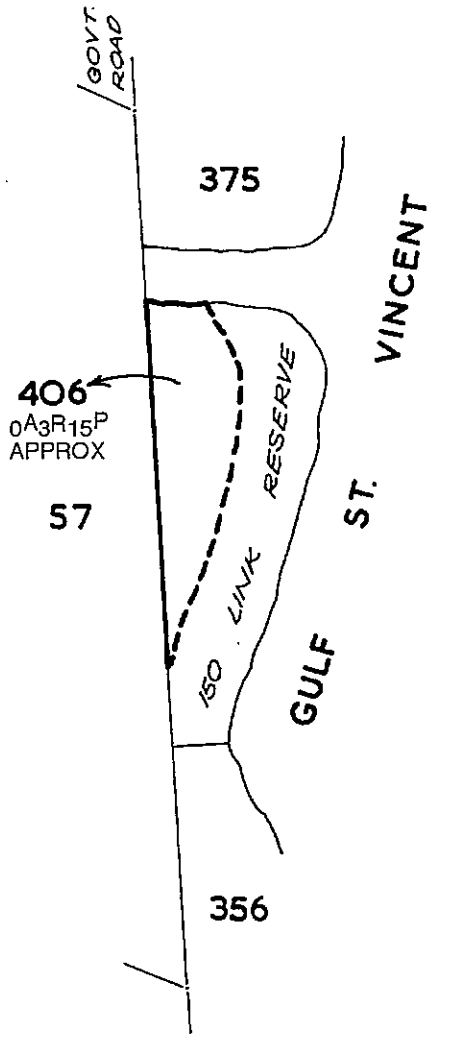
PLAN FOR LEASE PURPOSES GP 231/02

END OF TEXT.

LANDS TITLES OFFICE ADELAIDE SOUTH AUSTRALIA

DIAGRAM FOR CERTIFICATE OF TITLE VOLUME 5577 FOLIO 722

SEARCH DATE : 07/09/2007 TIME: 14:38:28



LINKS 400 200 0 2 4 CHAINS

FOR METRIC CONVERSION		
1 LINK	=	0·201168 METRES
1 CHAIN	=	100 LINKS
1 ACRE	=	0·404686 HECTARES
1 ROOD	=	1011·7 m²
1 PERCH	=	25·29 m²

Title Register Search

LANDS TITLES OFFICE, ADELAIDE

For a Certificate of Title issued pursuant to the Real Property Act 1886

REGISTER SEARCH OF CERTIFICATE OF TITLE * VOLUME 5801 FOLIO 508 *

COST : $16.80 (GST exempt)	PARENT TITLE : CT 3434/198
REGION : GROUND FLOOR, L.T.O. - LGHP12	AUTHORITY : CONVERTED TITLE
AGENT : GRFL BOX NO : 000	DATE OF ISSUE : 25/08/2000
SEARCHED ON : 07/09/2007 AT : 14:38:04	EDITION : 4

REGISTERED PROPRIETOR IN FEE SIMPLE

AUSBULK LTD. OF 124-130 SOUTH TERRACE ADELAIDE SA 5000

DESCRIPTION OF LAND

ALLOTMENT 96 FILED PLAN 215377
IN THE AREA NAMED ARDROSSAN
HUNDRED OF CUNNINGHAM

EASEMENTS

NIL

SCHEDULE OF ENDORSEMENTS

9398007 LEASE TO ONESTEEL MANUFACTURING PTY. LTD. COMMENCING ON 1.2.2002 AND EXPIRING ON 31.1.2101 OF PORTION (E IN GP 231/2002)

NOTATIONS

DOCUMENTS AFFECTING THIS TITLE

NIL

REGISTRAR-GENERAL'S NOTES

PLAN FOR LEASE PURPOSES GP 231/02
AMENDMENT TO DIAGRAM VIDE 193/2002

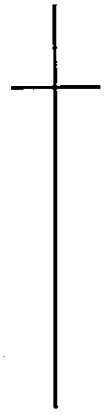
END OF TEXT.

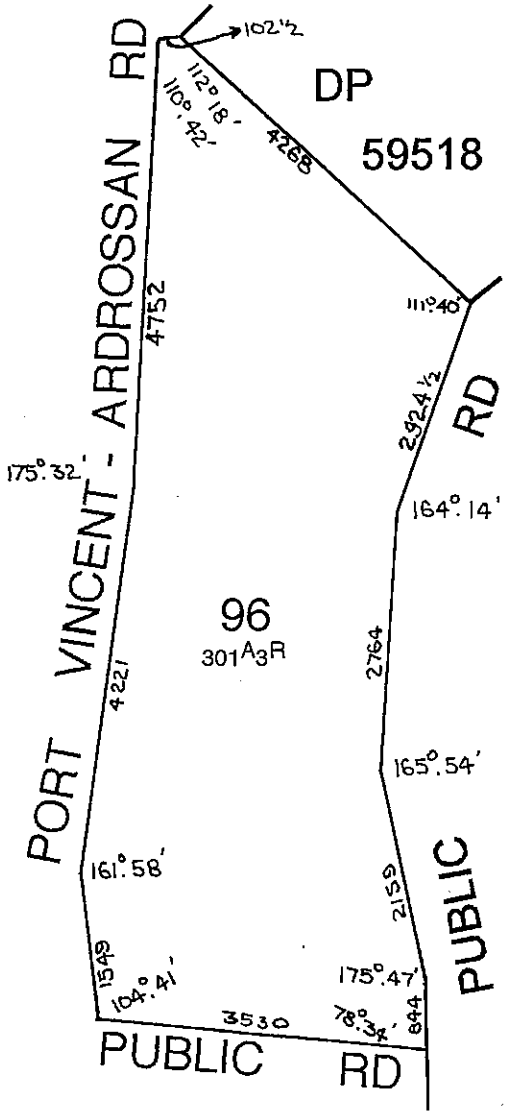
LANDS TITLES OFFICE ADELAIDE SOUTH AUSTRALIA

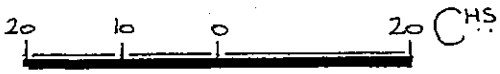
DIAGRAM FOR CERTIFICATE OF TITLE VOLUME 5801 FOLIO 508

SEARCH DATE : 07/09/2007 TIME: 14:38:04

THIS PLAN IS SCANNED FOR CERTIFICATE OF TITLE 3434/198







FOR METRIC CONVERSION		
1 LINK	=	0·201168 METRES
1 CHAIN	=	100 LINKS
1 ACRE	=	0·404686 HECTARES
1 ROOD	=	1011·7 m²
1 PERCH	=	25·29 m²

NOTE: SUBJECT TO ALL LAWFULLY EXISTING PLANS OF DIVISION

Title Register Search

LANDS TITLES OFFICE, ADELAIDE

For a Certificate of Title issued pursuant to the Real Property Act 1886

REGISTER SEARCH OF CERTIFICATE OF TITLE * VOLUME 5830 FOLIO 252 *

COST : $16.80 (GST exempt)	PARENT TITLE : CT 5480/118 & OTHERS
REGION : GROUND FLOOR, L.T.O. - LGHP12	AUTHORITY : VE 8942255
AGENT : GRFL BOX NO : 000	DATE OF ISSUE : 18/12/2000
SEARCHED ON : 07/09/2007 AT : 14:38:23	EDITION : 4

REGISTERED PROPRIETOR IN FEE SIMPLE

AUSBULK LTD. OF 124-130 SOUTH TERRACE ADELAIDE SA 5000

DESCRIPTION OF LAND

ALLOTMENT COMPRISING PIECES 5 AND 6 FILED PLAN 34313
IN THE AREA NAMED ARDROSSAN
HUNDRED OF CUNNINGHAM

EASEMENTS

SUBJECT TO THE EASEMENT OVER THE LAND MARKED A FOR WATER SUPPLY PURPOSES TO THE SOUTH AUSTRALIAN WATER CORPORATION (TG 8942256)

SUBJECT TO THE EASEMENT OVER THE LAND MARKED C TO THE ETSA CORPORATION (TG 8307060)

SCHEDULE OF ENDORSEMENTS

9398007 LEASE TO ONESTEEL MANUFACTURING PTY. LTD. COMMENCING ON 1.2.2002 AND EXPIRING ON 31.1.2101 OF PORTION (PP, CC, C1, C2, C3, TRACK TR2, TRACK TR3, BRIDGE BR1, TUNNEL T1, TUNNEL T2, TUNNEL T3, L AND L2 IN GP 231/2002)

9398008 UNDERLEASE OF PORTION OF LAND IN LEASE 9398007 TO AUSBULK LTD. COMMENCING ON 1.2.2002 AND EXPIRING ON 30.1.2101 (TUNNEL T1, TUNNEL T2, TUNNEL T3, L AND L2 IN GP 231/2002)

NOTATIONS

DOCUMENTS AFFECTING THIS TITLE

NIL

REGISTRAR-GENERAL'S NOTES

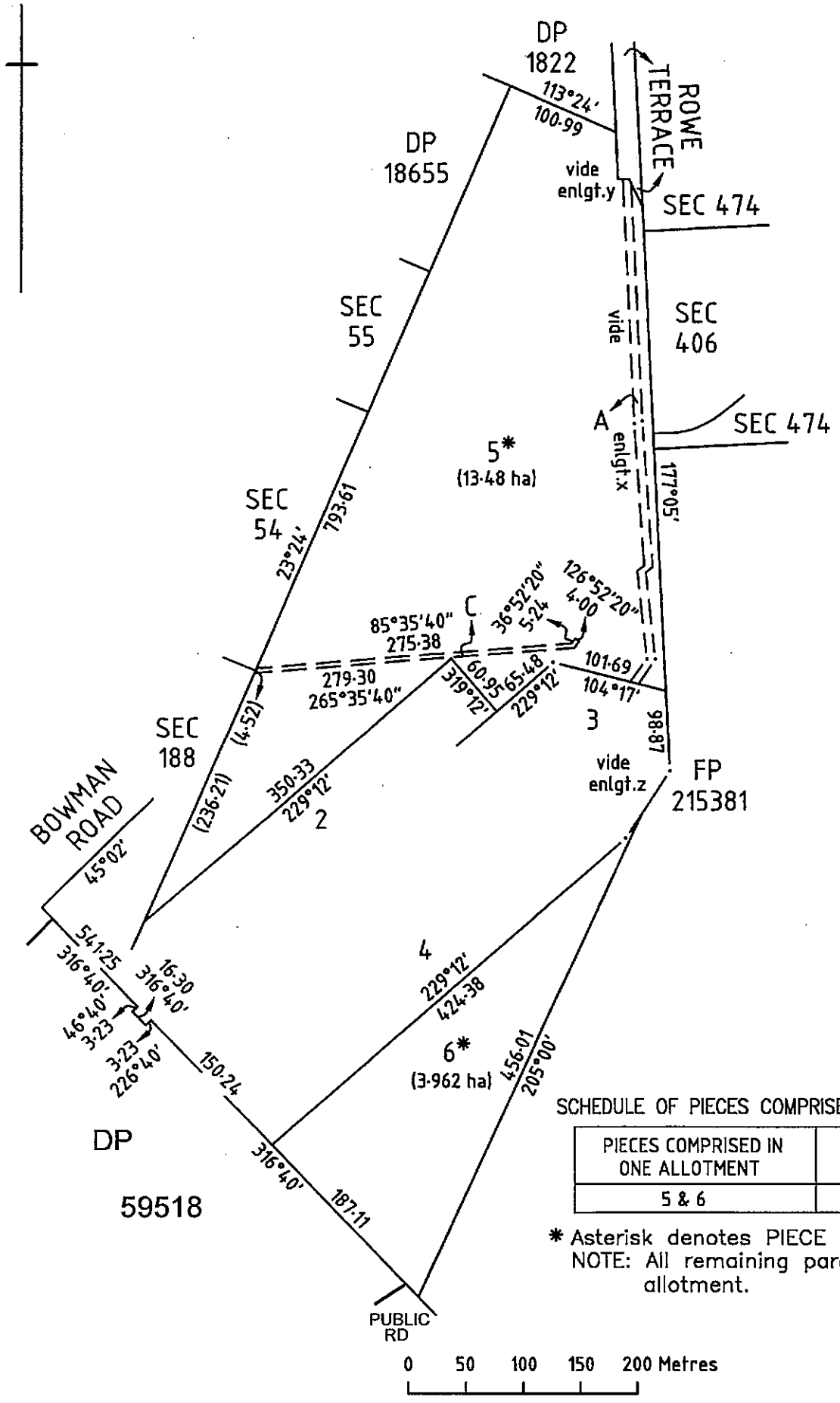
PLAN FOR LEASE PURPOSES GP 231/02
AMENDMENT TO DIAGRAM VIDE 193/2002

END OF TEXT.

LANDS TITLES OFFICE ADELAIDE SOUTH AUSTRALIA

DIAGRAM FOR CERTIFICATE OF TITLE VOLUME 5830 FOLIO 252

SEARCH DATE : 07/09/2007 TIME: 14:38:23



SCHEDULE OF PIECES COMPRISED IN ONE ALLOTMENT

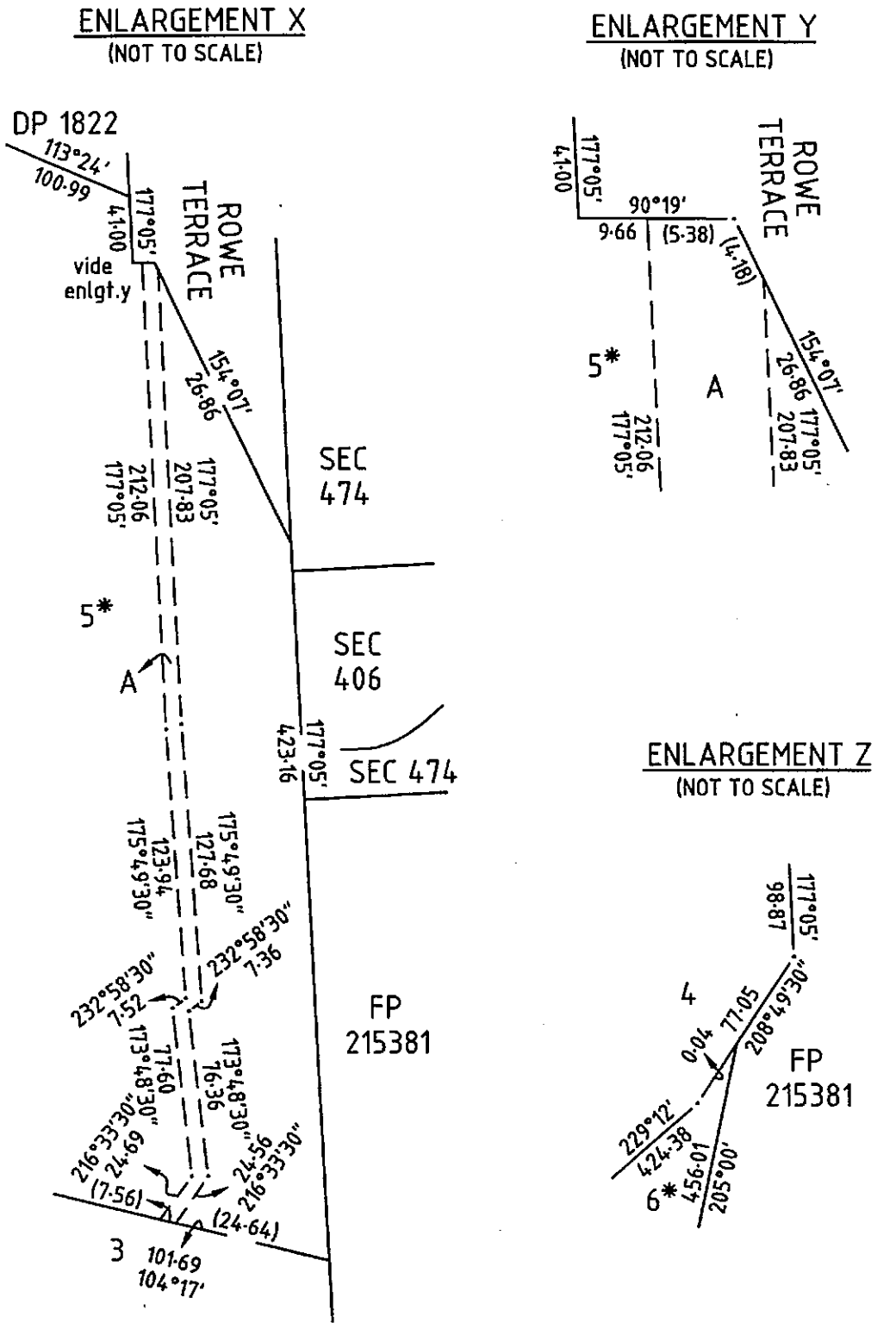
PIECES COMPRISED IN ONE ALLOTMENT	TOTAL AREA
5 & 6	17·44ha

* Asterisk denotes PIECE identifier only.
NOTE: All remaining parcels are each an allotment.

LANDS TITLES OFFICE ADELAIDE SOUTH AUSTRALIA

DIAGRAM FOR CERTIFICATE OF TITLE VOLUME 5830 FOLIO 252

SEARCH DATE : 07/09/2007 TIME: 14:38:23



Title Register Search

LANDS TITLES OFFICE, ADELAIDE

For a Certificate of Title issued pursuant to the Real Property Act 1886

REGISTER SEARCH OF CERTIFICATE OF TITLE * VOLUME 5850 FOLIO 730 *

COST : $16.80 (GST exempt)	PARENT TITLE : CT 3663/122
REGION : GROUND FLOOR, L.T.O. - LGHP12	AUTHORITY : CONVERTED TITLE
AGENT : GRFL BOX NO : 000	DATE OF ISSUE : 10/07/2001
SEARCHED ON : 07/09/2007 AT : 14:38:17	EDITION : 3

REGISTERED PROPRIETOR IN FEE SIMPLE

AUSBULK LTD. OF 124-130 SOUTH TERRACE ADELAIDE SA 5000

DESCRIPTION OF LAND

ALLOTMENT 100 FILED PLAN 215381
IN THE AREA NAMED ARDROSSAN
HUNDRED OF CUNNINGHAM

EASEMENTS

NIL

SCHEDULE OF ENDORSEMENTS

9398007 LEASE TO ONESTEEL MANUFACTURING PTY. LTD. COMMENCING ON 1.2.2002 AND EXPIRING ON 31.1.2101 OF PORTION (GG, C2, C3, TRACK TR4, TUNNEL T2, TUNNEL T3, TUNNEL T4, L AND L2 IN GP 231/2002)

9398008 UNDERLEASE OF PORTION OF LAND IN LEASE 9398007 TO AUSBULK LTD. COMMENCING ON 1.2.2002 AND EXPIRING ON 30.1.2101 (TUNNEL T2, TUNNEL T3, TUNNEL T4, L AND L2 IN GP 231/2002)

NOTATIONS

DOCUMENTS AFFECTING THIS TITLE

NIL

REGISTRAR-GENERAL'S NOTES

PLAN FOR LEASE PURPOSES GP 231/02

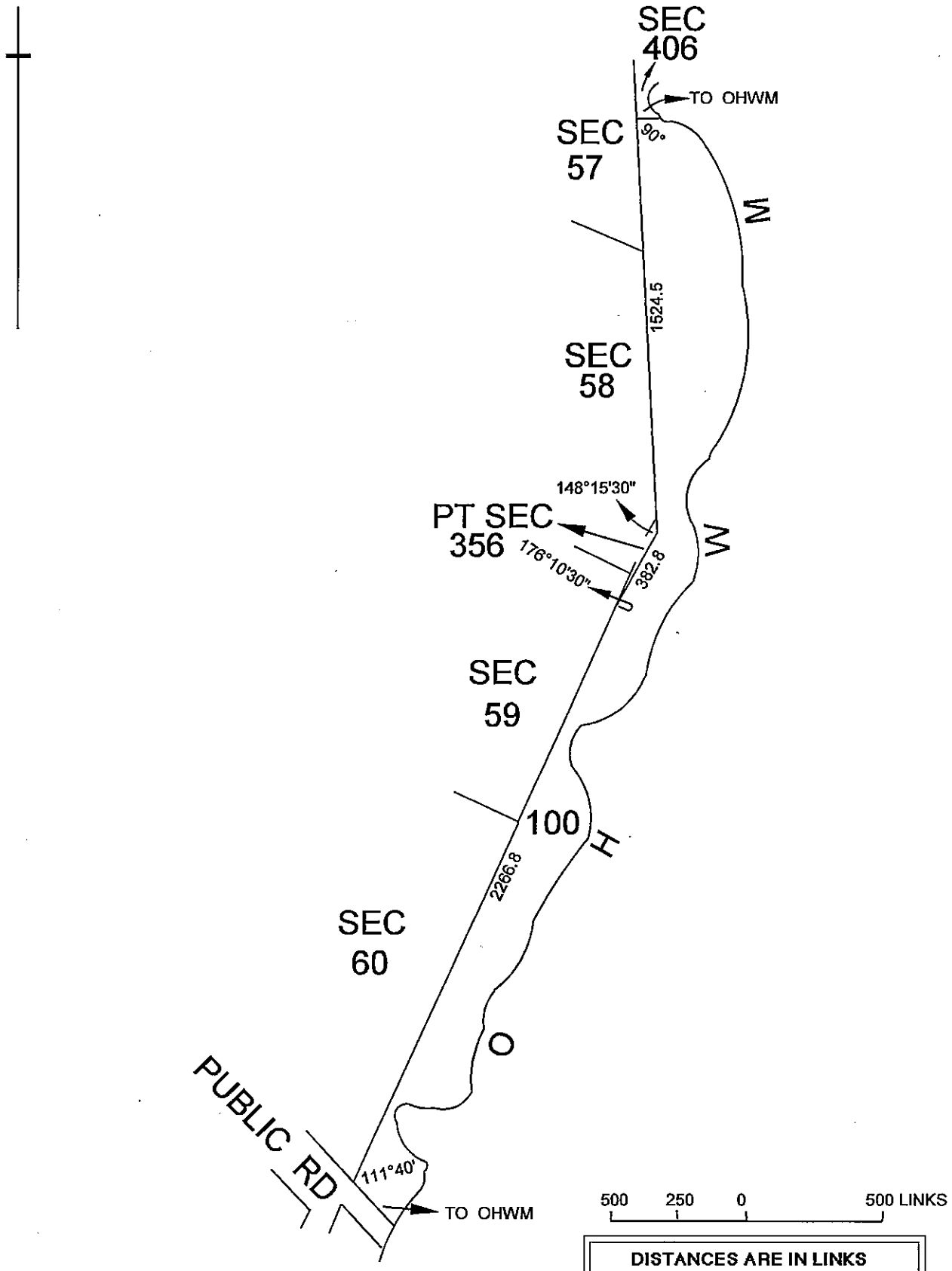
END OF TEXT.

LANDS TITLES OFFICE ADELAIDE SOUTH AUSTRALIA

DIAGRAM FOR CERTIFICATE OF TITLE VOLUME 5850 FOLIO 730

SEARCH DATE : 07/09/2007 TIME: 14:38:17

THIS PLAN IS SCANNED FOR CERTIFICATE OF TITLE 3663/122



NOTE: SUBJECT TO ALL LAWFULLY EXISTING PLANS OF DIVISION

Title Register Search

LANDS TITLES OFFICE, ADELAIDE

For a Certificate of Title issued pursuant to the Real Property Act 1886

REGISTER SEARCH OF CERTIFICATE OF TITLE * VOLUME 5880 FOLIO 832 *

COST : $16.80 (GST exempt)	PARENT TITLE : CT 5480/117 & OTHERS
REGION : GROUND FLOOR, L.T.O. - LGHP12	AUTHORITY : RTD 9318497
AGENT : GRFL BOX NO : 000	DATE OF ISSUE : 03/10/2002
SEARCHED ON : 07/09/2007 AT : 14:38:10	EDITION : 2

REGISTERED PROPRIETOR IN FEE SIMPLE

AUSBULK LTD. OF 124-130 SOUTH TERRACE ADELAIDE SA 5000

DESCRIPTION OF LAND

ALLOTMENT 50 DEPOSITED PLAN 59518
IN THE AREA NAMED ARDROSSAN
HUNDRED OF CUNNINGHAM

EASEMENTS

SUBJECT TO THE EASEMENT OVER THE LAND MARKED B AND C TO DISTRIBUTION LESSOR CORPORATION (SUBJECT TO LEASE 8890000) (TG 8307060)

SUBJECT TO THE EASEMENT OVER THE LAND MARKED A FOR WATER SUPPLY PURPOSES TO THE SOUTH AUSTRALIAN WATER CORPORATION (TG 8530960)

SCHEDULE OF ENDORSEMENTS

9398007 LEASE TO ONESTEEL MANUFACTURING PTY. LTD. COMMENCING ON 1.2.2002 AND EXPIRING ON 31.1.2101 OF PORTION (BB, C1, M, H AND J IN GP 231/2002)

NOTATIONS

DOCUMENTS AFFECTING THIS TITLE

NIL

REGISTRAR-GENERAL'S NOTES

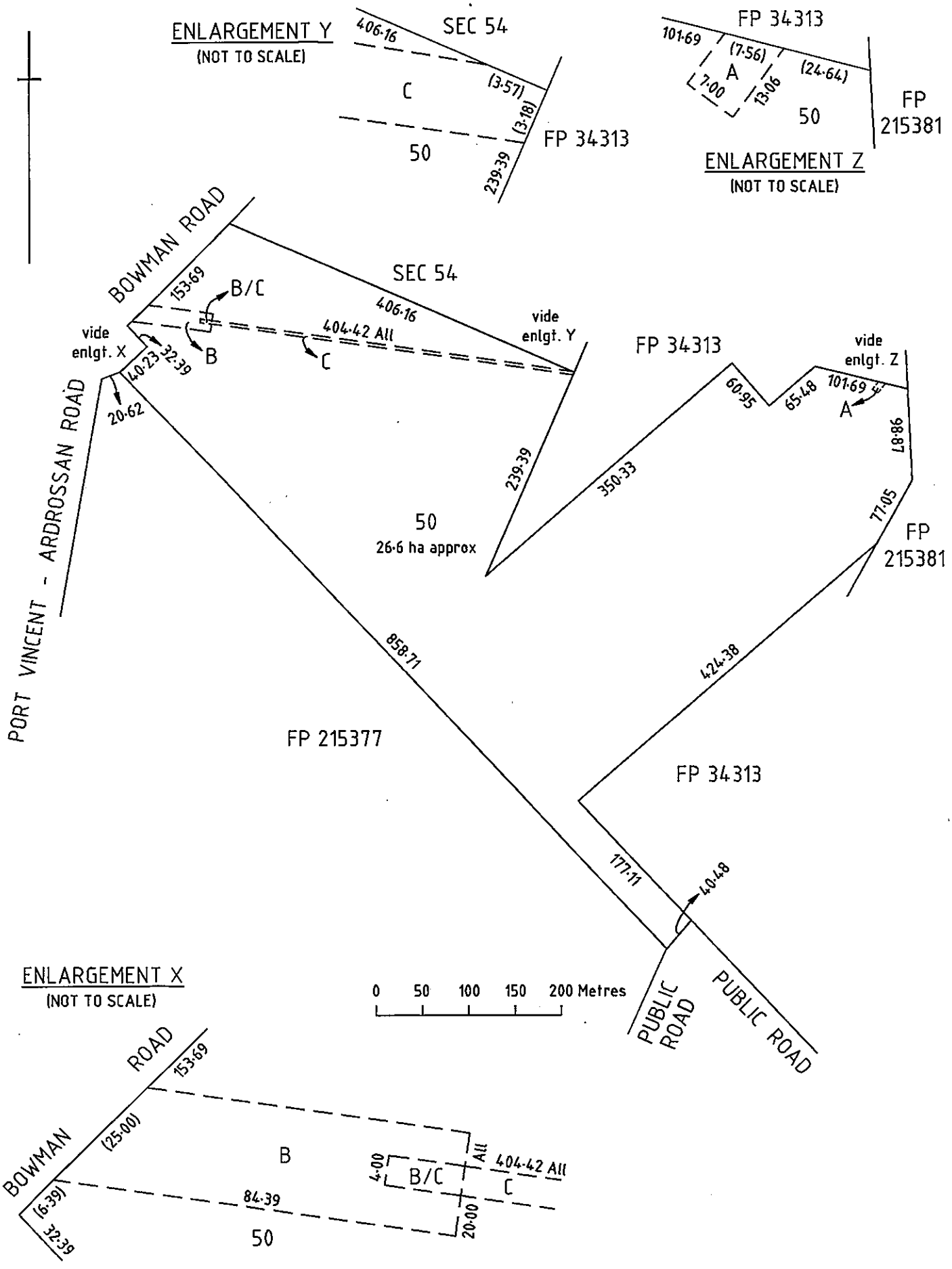
PLAN FOR LEASE PURPOSES GP 231/02

END OF TEXT.

LANDS TITLES OFFICE ADELAIDE SOUTH AUSTRALIA

DIAGRAM FOR CERTIFICATE OF TITLE VOLUME 5880 FOLIO 832

SEARCH DATE : 07/09/2007 TIME: 14:38:10



Appendix B

EBS Flora and fauna report

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Keswick
SA 5035

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ebs
environmental & biodiversity services

Ardrossan Dolomite Mine Expansion Vegetation Survey and Fauna assessment

July 2007

Prepared by Environmental and Biodiversity Services for Parsons Brinckerhoff on behalf of OneSteel

Version 1: 8/08/2007

Table of Contents

1. Introduction

The following report documents a flora survey and fauna assessment of a parcel of land earmarked for a proposed expansion of the current dolomite mine, for OneSteel Manufacturing Pty Ltd. The survey area directly surrounds the current Ardrossan OneSteel dolomite mine, off Main Coast and BHP Road, Ardrossan, which is approximately 150 km from Adelaide, South Australia (Figure 1). The survey was undertaken on the 26th and 27th July 2007.

As part of the environmental assessment associated with the project, a vegetation survey and fauna assessment was undertaken. The survey was undertaken in accordance with the South Australian Native Vegetation Council assessment methodology. This report indicates the state of the existing vegetation as surveyed and its landscape and/or ecological significance, and provide recommendations on ways to moderate the effects of the proposed mine expansion on both flora and fauna communities.

A fauna assessment was also conducted within the proposed project site, whereby recorded fauna species and fauna species expected to occur within the area were identified. Additionally, the vegetation associations found on site were assessed for their habitat potential for native fauna species.

2. Methodology

2.1. Background Research

Department for Environment and Heritage (DEH) and the South Australian Museum (SAM) provided records of flora and fauna species previously recorded near or within the project site (DEH 2007; SAM 2007). The database search was designed to cover a 40 by 40 km^2 area around the project site. The data results have been included and surmised in this report.

A protected matters search of the project area under the EPBC Act (1999) was completed to determine if any matters of national environmental significance have been identified within the survey area. For the protected matters search, a 20 km by 20 km^2 search area was delineated around the project area.

2.2. Taxonomy

Plant taxonomy used in this report follows Jessop and Toelken (1986), which are used in Lang and Kraehenbuehl (2006). The scientific and common names for fauna species used in this report follow Robinson *et al* (2000).

2.3. Vegetation

During the field survey all plant species (native and exotic) were identified and recorded, and vegetation associations were defined. The condition of the vegetation was assessed for health and its biodiversity value to the area, and its associated habitat value for fauna that may potentially reside within the area. Vegetation associations were identified and mapped, with Global Positioning System (GPS) points and photos taken for future reference. Any scattered trees (*Eucalyptus* spp.)

within the area were assessed according to their ecological value and health. Any exotic plant species declared under the *Natural Resources Management Act 2004* (SA) were also recorded and highlighted.

2.4. Scattered trees

The ecological value of indigenous trees were assessed against attributes of height, girth, spread of canopy, hollows, dieback, distance to nearest neighbor, and proximity to other native vegetation. Trees were either assessed as individuals or as a group. When trees were assessed as a group, an average measurement of all trees was taken for each attribute. The relevant data recorded against each attribute was used to calculate the associated significant scattered tree value that will be used to off-set the clearance of these trees. A point-scoring system is assigned to particular attributes to calculate the significance scattered tree value (Table 2). When the total replanting score is > 30, the clearance is considered to be seriously at variance with Native Vegetation Principle b), in that the vegetation has significance as habitat for wildlife.

Table 2: Points allocated to scattered tree attributes in the Point Scoring System (DWLBC 2005).

Attribute	Low Value (1 points)	Medium Value (2 points)	High Value (3 points)
Height Measured in meters	Enter height for each tree to the nearest meter Excel formula calculates the score		
Health Based on % foliage dieback	Enter % Dieback for each tree to the nearest 5 or 10% Excel formula calculates the score		
Hollow entrances Small entrance is diameter ≤5cm Medium is > 5cm to <15cm Large is ≥15cm	No hollows visible = 1 point	1-4 small or 1 medium visible	5+ small; 2+ medium; 1+ large; or 1-4 small and 1 med visible
Suitability for threatened species For feeding, roosting, nesting, shelter etc	None (Common only)	1 Uncommon species (at regional, state or national level)	At least 2 Uncommon, or 1 or more Rare species (at regional, state or national level)
Distance to nearest neighbor (i.e., 'density') Distances measured from tree canopy edge to the nearest other tree canopy edge (Only consider plants 2 or more meters in height)	Widely separated • Single tree greater than 50 meters away from all other trees; or • Two trees which are between 5 and 50m apart, with the next nearest tree being greater than 50m away from both trees	Mid-densely separated • 3 or more trees each within 5 to 50m of at least 1 other tree in the group; or • Two trees with overlapping canopies or less than 5m apart, with at least one being within 5 to 50m of at least one other tree	Close • 3 or more trees with overlapping canopies or less than 5m apart
Proximity to native vegetation Distance from tree to block of native vegetation at least 1 hectare in area	200 meters or more from block of native vegetation	Between 50 and 200m of block of native vegetation	Within 50m of block of native vegetation

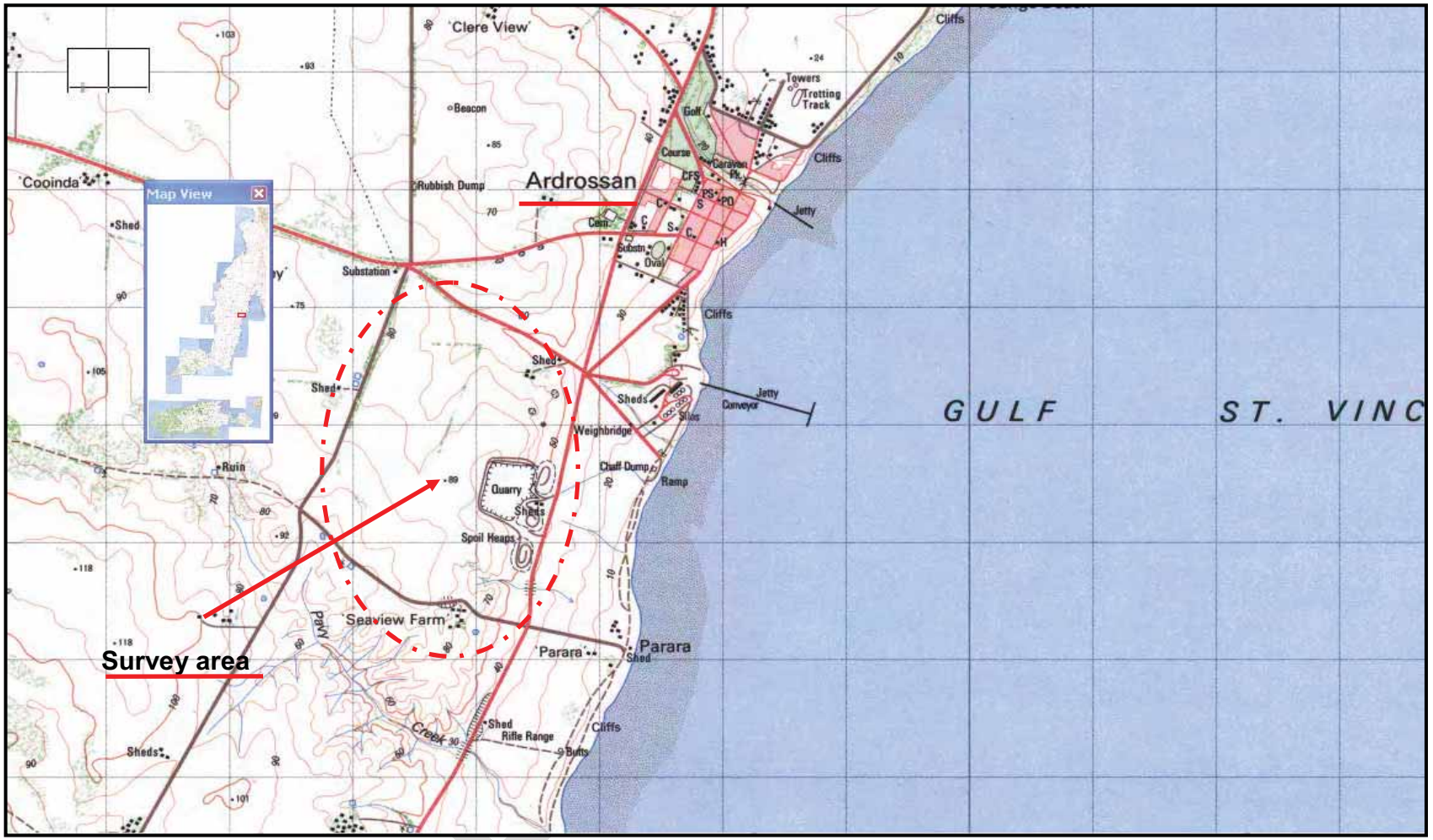

Figure 1. General location of survey area

2.5. Vegetation condition rating

The overview vegetation condition ratings assigned to describe the understorey of vegetation associations recorded from the field surveys was determined using the methodology contained in Table 3, as adapted from Stokes *et al*. (1998). These condition ratings are used to determine the quality of understorey vegetation and its ecological value to the area.

Table 3. Condition ratings of understorey vegetation

Condition Rating	Overview Condition	Description
1	Excellent	Very little or no sign of alien vegetation in the understorey*; resembles probable pre-European condition.
2	Good	High proportion of native species and native cover in the understorey*; reasonable representation of probable pre-European vegetation.
3	Moderate	Substantial invasion of aliens but native understorey* persists; for example, may be a low proportion of native species and a high native cover, or a high proportion of native species and low native cover.
4	Poor	The understorey* consists predominately of alien species, although a small number of natives persist.
5	Very Poor	The understorey* consists only of alien species.
*Or all Strata if the upper and lower strata are difficult to distinguish		
(Adapted from 'Guide to Roadside Vegetation Survey Methodology for South Australia', Stokes *et al* 1998).		

2.6. Fauna

Opportunistic observations (including scats, tracks and skeletal remains) of fauna species during the survey were identified and recorded. Current and potential habitat of the vegetation for faunal species was also recorded. Results from the SAM and DEH database searches, as well as the EPBC Act protected matters search were reviewed to determine potential faunal species that may be present within or around the project site.

2.7. Survey limitations

At the time the survey was undertaken all plant species may not have been visible, such as some orchid species which are only identifiable during small periods in spring. Other species, such as some native grasses, may have been unidentifiable to species level, at the time of the survey, due to a lack of distinguishable features. Therefore, some species which may occur on site may not have been observed or recorded and others were only identified to the genus level.

While a reasonable amount of time was spent on the site, the seasonal nature of bird activity and movements meant that species that may use the site were not observed. Similarly, without carrying out intensive trapping, it is not possible to detect all terrestrial animals that may use the site. However, the assessment of habitats, together with the site observations, and the database records are considered

adequate to make a reasonable assessment of potential impacts of the proposed project on the site's fauna.

3. Legislative Summary

3.1. Native Vegetation Act, 1991

The project area is located south west of Ardrossan and is situated within an area in which the *Native Vegetation Act, 1991* applies. Hence the native vegetation present within the project area is covered by the *Native Vegetation Act, 1991*. An assessment, of the native vegetation found within the project area, against the Principles of the *Native Vegetation Act 1991* was undertaken as part of this study. Table 1 detail the six applicable Principles of the *Native Vegetation Act, 1991* that were used to determine if vegetation clearance within the project site would be seriously at variance with any of the Principles.

Section 6 details the assessment of vegetation clearance against the Native Vegetation Principles for the project site. For Clearance Principle (a) (plant diversity), the total number of indigenous flora species present may be under-represented. This is due to the time the survey was undertaken as some plant species would not have been visible (such as annuals or herbs).

Table 1. A summary of the assessment of native vegetation against the Principles of the Native Vegetation Act, 1991

Clearance principle	Details of principle
a	It comprises a high level of diversity of plants
b	It has significance as a habitat for wildlife
c	It includes plants of a rare, vulnerable or endangered species
d	The vegetation comprises the whole, or a part, of a plant community that is rare, vulnerable or endangered
e	It is significant as a remnant of vegetation in an area which has been extensively cleared
f	It is growing in, or in association with, a wetland environment

3.2. National Parks and Wildlife Act, 1972

The *National Parks and Wildlife Act, 1972*, covers vegetation located within Government parks and reserves, and any conservation significant species listed under Schedules 7, 8, and 9 of the Act. There were no species listed under Schedules 7, 8 and 9 found during the field survey. However, 23 species listed under the Schedules were detected within the area previously, as determined from South Australian Museum (SAM) and Department for Environment and Heritage (DEH) database searches.

3.3. Environment Protection and Biodiversity Conservation Act, 1999

The Commonwealth *Environment Protection and Biodiversity Conservation Act, 1999* (EPBC Act 1999) identifies seven matters of national environmental significance (DEWR 2007a), including;

- World Heritage properties;
- National heritage properties;

- Wetlands of international importance (Ramsar wetlands);
- Threatened species and ecological communities;
- Migratory species;
- Commonwealth marine areas; and
- Nuclear actions (including uranium mining).

It is considered unlikely that works associated with the construction activities at the proposed project site would have any significant impact on a matter of national significance listed under the *EPBC Act* 1999.

According to the Protected Matters Search Tool (search date 20th July 2007) of a 20 km by 20 km area surrounding the project site, the area is not within, or does not contain a World Heritage property, National heritage property, any wetlands of international importance, a Commonwealth marine area or nuclear actions. Seven nationally rated conservation bird species and six plant species are listed under the act, as well as an additional eleven migratory bird species. See section 5.3 for more details.

4. Flora Results

4.1. General Description

The survey area (approximately 203ha) directly surrounds the current OneSteel Ardrossan mine site along Main Coast and BHP Road (Figure 1). The area proposed for mine expansion is divided into several paddocks with the majority being used for stock grazing (sheep) or cereal cropping. Another surveyed area connected to the cropped/grazing paddocks contained an old homestead and several old sheds. Small patches of remnant vegetation are located scattered within the survey area, whilst revegetation has been undertaken over parts of the survey area as well.

The survey area is situated within the District Council of Yorke Penninsula and any clearance of native vegetation located within the survey area is protected under the *Native Vegetation Act* 1991 (SA). The areas of revegetation are not protected by the *Native Vegetation Act* 1991 unless the revegetation has been used as an off-set for previous native vegetation clearance. The "significant tree" legislation under the *Development Act* 1992 does not apply to the project area.

The survey area is within the hundred of Cunningham and in both the Arthorton Environmental Association (4.6.2) and Urania Environmental Association (4.5.4). The hundred of Cunningham has approximately 5.2% remnant vegetation remaining, Arthorton Environmental Association has 1.8% remaining and Urania Environmental Association has 5.3% remaining. These figures are considered extremely low and reflect the amount of extensive land clearing in the region predominately for agriculture. The landform within the hundred of Cunningham and the Arthorton Environmental Association is described as an undulating plain with rises and areas of dunes, low coastal cliffs with mixed grassland, parkland and cereal crops. The landform within the Urania Environmental Association is described as a calcrete plain with low rises and areas of dunes, low coastal cliffs and dunes and salt lakes with mixed grassland, parkland with understory of sown pastures and cereal crops (Laut, 1978).

4.2. Vegetation Associations

The survey area is dominated by an Exotic Grassland and cropped paddocks. The cropped paddocks contain *Lupinus sp.* (Lupins) whilst *Triticum aestivum* (Wheat) dominates the non cropped areas (Figure 3a). A number of exotic weeds occur scattered throughout the association such as *Asphodelus fistulosus* (Onion weed), *Asteriscus spinosus* (Golden Pallensis) and *Carrichtera annua* (Ward's weed), which were recorded generally along fence lines. Paddocks occuring on the northern side of the survey area are lined with planted vegetation such as *Eucalyptus torquata* (Coral Gum), *Casuarina glauca* (Grey She-oak) and other introduced Eucalypt species with the primary function of the vegetation being as a wind break (Figure 3c).

Small patches of revegetation were recorded within the survey area. The mine's site manager suggested that the revegetation had been started in the mid 1990's with both tubestock planting and direct seeding techniques being used. Indigenous species such as *Acacia brachybotrya* (Grey Mulga-bush), *Acacia pycnantha* (Golden Wattle) and *Dodonaea viscosa* (Sticky Hop-bush) have been planted. The understorey within the revegetation areas is in poor condition and is dominated by exotic species. However, several native species are scattered within the revegetated

areas such as *Enchylaena tomentosa var. tomentosa* (Ruby Saltbush), *Austrostipa nitida* (Balcarra Spear-grass) and *Lepidosperma viscidum* (Sticky Sword-sedge) (Figure 3b).

A number of remnant *Eucalyptus porosa* (Mallee Box) scattered within the survey area and are generally located within the paddocks, along fence lines and within wind breaks as single trees or as small groups. The understorey condition of these *Eucalyptus porosa* patches is considered to be in poor to very poor condition with very few native species being recorded (Figure 3d).

Other native vegetation occuring within the survey area occurs as scattered small areas. Small patches of *Austrostipa nitida* (Balcarra Spear-grass), *Lepidosperma viscidum* (Sticky Sword-sedge) and *Gahnia lanigera* (Black Grass Saw-sedge) also occur within the survey area. All indigenous understorey species identified within the survey area are generally located within rocky areas (which are too rocky to be cropped), along fence lines or within fenced off areas such as the revegetation sites.

Native understorey vegetation occurring within the survey area is considered to be in poor to very poor condition. Figures 2a and 2b illustrate the locations of the vegetation conditions within the survey area. A total of 64 flora species were identified occuring within the survey area with 30 species being native, six of which have been planted, and 34 exotic species, seven of which have been planted around the old homestead (Appendix 1).

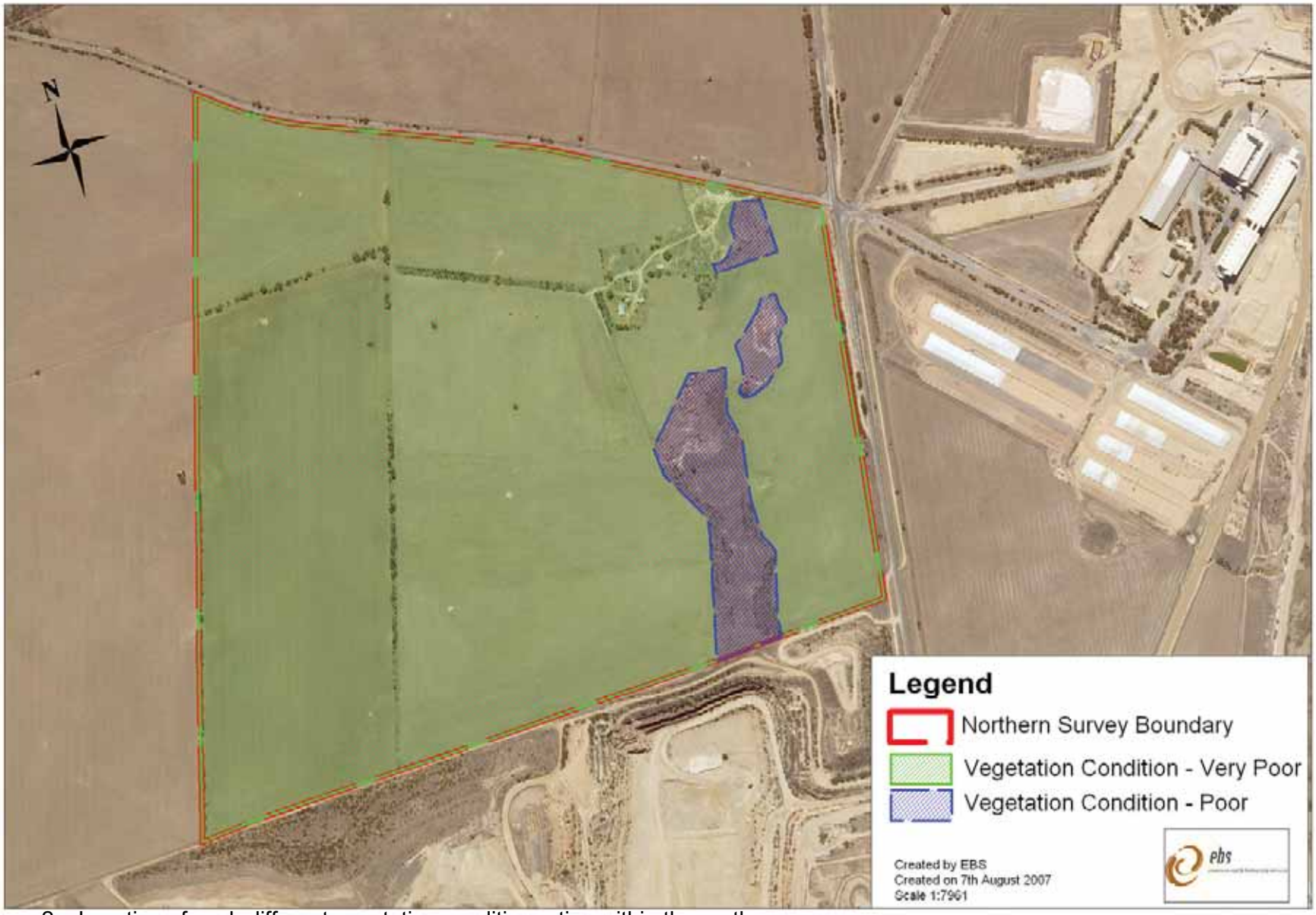

Figure 2a. Location of each different vegetation condition rating within the northern survey area.

Figure 2b. Location of each different vegetation condition rating within the south western survey area.

Figure 3a: General photo of a grazed paddock within the survey area.

Figure 3b: General photo of the survey area showing a revegetation area.

Figure 3c: General photo of the survey area showing a planted windbreak.

Figure 3d: General photo of the survey area showing a patch of *Eucalyptus porosa* (Mallee Box) occuring within the grazed paddock.

4.3. Weeds

A number of declared and environmental weed species occur within the survey area. Seven weed species declared under the *Natural Resources Management Act* (1994) were identified during the field survey and include *Asparagus asparagoides* (Bridal Creeper), *Asphodelus fistulosus* (Onion weed), *Lycium ferocissimum* (African Boxthorn), *Marrubium vulgare* (Horehound), *Olea europaea ssp. Europaea* (Olive), *Oxalis pes-caprae* (Soursob) and *Tamarix aphylla* (Athel Pine). A further 7 species are considered to be environmental weeds.

Table 4. Declared and environmental weeds identified within the survey area.

Key	Species Name	Common Name	Description
#	*Asparagus asparagoides*	Bridal Creeper	Occurs around the old homestead
#	*Asphodelus fistulosus*	Onion Weed	Occurs scattered in low densities along fence lines
*	*Carrichtera annua*	Ward's Weed	Occurs scattered in low densities throughout the survey area with a higher density within revegetation areas
*	*Centaurea calcitrapa*	Star Thistle	Occurs scattered in low densities along fence lines that are adjacent roads
*	*Coprosma repens*	Mirror Bush	Occurs within the old homestead area
#	*Lycium ferocissimum*	African Boxthorn	Occurs in low densities scattered through out the survey area under large trees and along fence lines
#	*Marrubium vulgare*	Horehound	Occurs in low densities within grazed paddocks and revegetation areas
*	*Mesembryanthemum crystallinum*	Common Iceplant	Occurs in medium densities scattered within the old homestead

Key	Species Name	Common Name	Description
#	*Olea europaea ssp. Europaea*	Olive	Occurs scattered in low densities along fence lines and within wind breaks, a planted patch occurs with the old homestead
#	*Oxalis pes-caprae*	Soursob	Occurs scattered throughout the survey area with higher densities in non-cropped and non-grazed areas
*	*Pinus radiata*	Monterey pine	Occurs within the old homestead area, may have been planted
*	*Salvia verbenaca*	Wild Sage	Occurs scattered throughout the survey area, with a higher density under groups of trees and revegetation areas
*	*Solanum nigrum*	Black Nightshade	Occurs within the *Callitris canescens* (Scrubby Cyperus pine) woodland association
#	*Tamarix aphylla*	Athel Pine	Occurs within the old homestead area, may have been planted

Plants which are declared weed species under the Natural Resources Management Act, 2004

* Plants which are considered to be environmental weeds

4.4. Flora Database Search Results

Results from a 40 by 40km^2 database search (DEH and SAM databases) of the survey area revealed a total of 573 flora species that have been previously recorded within close proximity to the survey area. Four hundred and sixty two of these species recorded are indigenous species, while 110 are exotic (appendix 2).

4.5. Flora Species of Conservation Significance

No flora species of state or national conservation significance were recorded within the survey area. However, two species of regional conservation significance (Yorke Peninsula Botanical Region) are located within the survey area. A single patch of *Enneapogon nigricans* (Black-head Grass) is located on the north west area of the survey (Appendix 5) which is rated as rare within the Yorke Peninsula Botanical Region. A single patch of *Cryptandra tomentosa* (Heath Cryptandra), which is rated as rare within the Yorke Peninsula Botanical Region, is located within the paddock on the southern side of the survey area and the plants are heavily grazed (Appendix 6 illustrates the location of *Cryptandra tomentosa*).

Twenty five species of conservation significance were outlined within the database search, eight of these species are nationally significant including *Acacia enterocarpa* (Jumping-jack Wattle), *Caladenia macroclavia* (Large-club Spider-orchid), *Euphrasia collina ssp. osbornii* (Osborn's Eyebright) and *Prostanthera eurybioides* (Monarto Mintbush) are listed as **Endangered**, *Acacia rhetinocarpa* (Resin Wattle), *Caladenia brumalis* (Winter Spider-orchid), *Olearia pannosa ssp. pannosa* (Silver Daisy-bush) and *Senecio macrocarpus* (Large-fruit Groundsel) are listed as **Vulnerable** under the National Parks and Wildlife Act 1972 (SA) (NPW Act 1972). The remaining 17 conservation significant species are state rated species listed under the NPW Act

(1972). Table 5 outlines these species and their likelihood of occuring within the survey area.

Table 5. Flora species of conservation significance recorded within the database searches (DEH 2007a; SAM 2007)

Species Name	Common Name	AUS	SA	Comments
Acacia enterocarpa	Jumping-jack Wattle	EN	E	Occurs in the Yorke Peninsula region around the Curramulka area, mainly associated with woodland to open, forest. Soils; mainly sandy alkaline and hard neutral yellow duplex, red shallow porous loam and grey cracking and self-mulching clays. It is unlikely this species occurs within the survey area as it would have been identified whilst survey was conducted.
Acacia lineata	Streaked Wattle		R	A small local occurrence in the Yorke Peninsula region (northern area) in open scrub vegetation associated with *Eucalyptus socialis* and *E. gracilis*. Soils: brown calcareous earths; rainfall 250-500 mm. . It is unlikely this species occurs within the survey area as it would have been identified whilst survey was conducted.
Acacia rhetinocarpa	Resin Wattle	VU	V	On the Yorke Penninsula the species is mostly found in roadside situations, where groundcovers are mostly introduced grasses and herbs. It is unlikely this species occurs within the survey area as it would have been identified whilst survey was conducted.
Austrostipa multispiculis			R	Occurs in Eucalyptus woodlands, along creek lines and grassland on alkaline, limestone loams and sandy loam soils. It is possible this species may occur within the survey area.
Caladenia brumalis	Winter Spider-orchid	VU	V	Winter Spider-orchids occur on terra-rossa soils or fertile sand over limestone, in mallee-broombrush associations, light woodland or sedge dominated grasslands. Most commonly found within a few kilometers of the sea. It is unlikely this species occurs within the survey area due to the degraded nature of the vegetation.
Caladenia macroclavia	Large-club Spider-orchid	EN	E	Large-club Spider-orchid favor fertile shallow loams in mallee-broombrush associations, usually where other orchids are numerous It is unlikely this species occurs within the survey area due to the degraded nature of the vegetation.
Chenopodium erosum	Papery Goosefoot		R	Occurs in damp disturbed areas such as margins of forests and river banks. It is unlikely this species occurs within the survey area.
Choretrum glomeratum var. chrysanthum	Yellow-flower Sour-bush		R	Hemiparasitic on roots, occurs on red or yellow sands and granitic soils. It is unlikely this species occurs within the survey area.
Daviesia benthamii ssp. humilis	Mallee Bitter-pea		R	Only records within Yorke Penninsula are at Stansbury scrub. Occurs in sand and dune systems and low mallee over*Triodia irritan.* It is unlikely this species occurs within the survey area.
Euphrasia collina ssp. osbornii	Osborn's Eyebright	EN	E	Occurs within swampy sites. It is unlikely this species occurs within the survey area.

Species Name	Common Name	AUS	SA	Comments
Leptorhynchos elongatus	Lanky Buttons		R	Occurs on sandy to sandy loam soils. It is unlikely this species occurs within the survey area
Maireana rohrlachii	Rohrlach's Bluebush		R	Occurs in mallee in heavy soil. It is possible this species occurs within the survey area.
Mentha diemenica	Slender Mint		R	*Mentha diemenica* occurs in grassland and mallee. It is possible this species occurs within the survey area.
Microlepidium pilosulum	Hairy Shepherd's-purse		R	Grows in semi-arid regions. It is unlikely this species occurs within the survey area
Myoporum parvifolium	Creeping Boobialla		R	Grows in clay soils often in saline situations, it is possible this species may occur within the survey area.
Olearia pannosa ssp. pannosa	Silver Daisy-bush	VU	V	Found in mallee, woodland and Forest Communities. It is unlikely this species occurs within the survey area.
Phebalium glandulosum ssp. glandulosum	Glandular Phebalium		E	Occurs in mallee areas. It is possible this species may occur within the survey area.
Phlegmatospermum eremaeum	Spreading Cress		R	Grows in semi-arid regions. It is unlikely this species occurs within the survey area
Pilularia novae-hollandiae	Austral Pillwort		R	Austral Pillwort grows in shallow swamps and waterways, often among grasses and sedges. It is most often recorded in drying mud as this is when it is most conspicuous. It is unlikely this species occurs within the survey area.
Poa fax	Scaly Poa		R	Grows in low-lying areas of moderately low rainfall. It is possible this species may occur within the survey area.
Podolepis jaceoides	Showy Copper-wire Daisy		R	Occurs in grassland, woodland and mallee, typically on soils of higher nutrient status. It is possible this species may occur within the project area
Prasophyllum occultans	Hidden Leek-orchid		R	Little is known on the ecology of this species. It is possible this species occurs within the survey area.
Prostanthera eurybioides	Monarto Mintbush	EN	E	It occurs amongst granite outcrops on sandy loam soils in Eucalyptus-mallee woodland. It is unlikely this species occurs within the survey area.
Senecio macrocarpus	Large-fruit Groundsel	VU	V	Little is known on the ecology of this species. It has been recorded occuring within Themeda grasslands. It is possible this species occurs within the survey area.
Swainsona fuscoviridis	Dark Green Swainson-pea		R	Occurs within mallee, little is known of this species. It is possible it may occur within the survey area.

5. Fauna Results

5.1. Opportunistic Observations

A total of 22 fauna species were observed during the vegetation survey and consisted of 16 bird species, 2 reptile species and 4 mammal species (Appendix 4). The two reptile species, a Sleepy Lizard (*Tiliqua rugosa*) and a small skink (not identified to species level) were observed within vegetation adjacent the roadside reserve. The majority of bird species were observed within the isolated trees or small groups of remnant *Eucalypt*us *porosa* (Mallee Box) or within re-vegetated areas. Three out of the 16 bird species were introduced (House Swallow, Feral Pigeon and Common Starling). These species made up the majority of bird species recorded away from the *Eucalyptus porosa* trees and small groups. A dead Cormorant was found within the grazed paddock, this being the only sign of a marine bird utilizing the area. A cause of death is unknown and it is possible that a fox moved the carcass from another location to the open paddock. All mammal species observed were introduced (dog, sheep, fox and rabbit). *Macropus sp*. (Kangaroo) was the only native mammal species observed within the project site during the field assessment.

5.2. Fauna Database Search Results

Results from the 40 by 40km^2 database search (DEH and SAM) of the survey area revealed a 149 fauna species have been previously recorded within close proximity to the survey area. One hundred and forty of these species recorded are indigenous, while nine are exotic species (Appendix 3).

5.3. Fauna Species of Conservation Significance

Five fauna species listed within the DEH and SAM database search are noted within as conservation significant species (Table 7). Additionally, from the protected matters search of the EPBC Act (1999), 16 fauna species listed as, **Vulnerable**, **Migratory** and/or **Marine**, possible occur within the survey area (Table 8).

Leipoa ocellata (Malleefowl) is listed as nationally **vulnerable** under the EPBC Act (1999), and is listed as **vulnerable** in South Australia under the NWP Act (1972). The Malleefowl occurs in semi-arid and arid zones of temperate Australia, where it occupies shrublands and low woodlands that are dominated by mallee vegetation. It also occurs in other habitat types including eucalypt or native pine *Callitris* woodlands, acacia shrublands, Broombush *Melaleuca uncinata* vegetation or coastal heathlands. The distribution of the Malleefowl within Yorke Peninsula is restricted to Innes National Park, however the DEH and SAM database search reveals 3 recorded sightings in 1985 and 2000 within the 40 by 40km area close to native vegetation within open paddocks. Due to the location of the survey area, the high level of disturbance from mine activity and the lack of suitable habitat it is very unlikely *Leipoa ocellata* (Malleefowl) occurs within the survey area.

It is unlikely any of the other fauna species identified within Table 7 would occur within the survey area due to the lack of preferred habitat (four species are marine or waterbird species), lack of suitable nature corridors (i.e. closed woodlands), and the close proximity of the project area the existing mine and highway; noise, explosions

and light pollution attributed to the existing mine and highway would create significant disturbance levels.

It is considered that clearance of vegetation within the survey area will not significantly affect any migratory and/or marine fauna species (Table 8). Several of these species (e.g. Giant Petrel's) are sea-birds and would not be observed in the area very often whilst a number of the other species are either waterbirds or species which rely on a coastal environment. Whilst the project site is close to the coast (<3km), the project site does not contain suitable habitat for these species to regularly occur within the site. It is considered that, at most, these species may fly over the project site.

Table 7. Fauna species of conservation significance from the 40 by 40km^2 database search

Class	Species Name	Common Name	Conservation Status	
			AUS	SA
AVES	*Egretta sacra*	Eastern Reef Egret		**R**
AVES	*Leipoa ocellata*	Malleefowl	**VU**	**V**
AVES	*Plegadis falcinellus*	Glossy Ibis		**R**
AVES	*Sterna nereis*	Fairy Tern		**V**
AVES	*Thinornis rubricollis*	Hooded Plover		**V**
AVES	*Turnix varia*	Painted Button-quail		**V**

Table 8. Fauna species of conservation significance from the EPBC ACT protected matters search

Species Name	Common Name	Conservation Status	Description
		AUS	
Birds			
Rostratula benghalensis australis	Australian Painted Snipe	**Vu**	Species or species habitat may occur within area
Migratory or Marine Species			
Apus pacificus	Fork-tailed Swift	**Mi, Ma**	Species or species habitat may occur within area
Ardea alba	Great Egret	**Mi, Ma, W**	Species or species habitat may occur within area
Ardea ibis	Cattle Egret	**Mi, Ma, W**	Species or species habitat may occur within area
Diomedae gibsoni	Gibson's Albatross	**Vu, Mi, Ma**	Species or species habitat may occur within area
Gallinago hardwickii	Lathams Snipe, Japanese Snipe	**Mi, W**	Species or species habitat may occur within area
Haliaeetus leucogaster	White-bellied Sea-Eagle	**Mi, T**	Species or species habitat may occur within area
Hirundapus caudacutus	White-throated Needletail	**Mi, T**	Species or species habitat may occur within area
Macronectes giganteus	Southern Giant-Petrel	**E, Mi, Ma**	Species or species habitat may occur within area

Species Name	Common Name	Conservation Status	Description
		AUS	
Macronectes halli	Northern Giant-Petrel	**Vu, Mi, Ma**	Species or species habitat may occur within area
Merops ornatus	Rainbow Bee-eater	**Mi, T**	Species or species habitat may occur within area
Rostratula benghalensis s. lat.	Painted Snipe	**Mi, Ma**	Species or species habitat may occur within area
Sterna albifrons	Little Tern	**Mi, Ma**	Species or species habitat may occur within area
Thalassarche bulleri	Buller's Albatross	**Vu, Mi, Ma**	Species or species habitat may occur within area
Thalassarche cauta	Shy Albatross	**Vu, Mi, Ma**	Species or species habitat may occur within area
Thalassarche impavida	Campbell Albatross	**Vu, Mi, Ma**	Species or species habitat may occur within area

Key:
Regions: AUS = Australia, **SA** = South Australia
VU = vulnerable, **Mi** = Migratory, **Ma** = Marine, **V** = Vulnerable, **R** = Rare, **E** = Endangered, **T** = Terrestrial, **W** = Wetland Species

6. Assessment of Native Vegetation Principles

Native vegetation occurring within the proposed land division is subject to the Native Vegetation Act 1991 and should not be cleared if in the opinion of the Native Vegetation Council of South Australia the clearance is considered to be seriously at variance with any of the Principles detailed below (Table 6).

Table 6. Assessment of vegetation clearance against each principle.

Clearance Principle	Details of Principle	Vegetation clearance was found to be seriously at variance
a	It comprises a high level of diversity of plants	N
b	It has significance as a habitat for wildlife	N
c	It includes plants of a rare, vulnerable or endangered species	Y
d	The vegetation comprises the whole, or a part, of a plant community that is rare, vulnerable or endangered	Y
e	It is significant as a remnant of vegetation in an area which has been extensively cleared	Y
f	It is growing in, or in association with, a wetland environment	N

Principle a) *It comprises a high level of diversity of plants;*

The survey area is dominated by exotic grassland and cropping areas. The number of native plant species recorded within the survey area is considered to be low (23 naturally occurring native species) and therefore vegetation clearance is not considered to be seriously at variance with Principle a).

Principle b) *It has significance as a habitat for wildlife;*

A search of the fauna databases maintained by the DEH and SAM identified a total of six fauna species of conservation significance previously recorded in the vicinity of the project site. *Leipoa ocellata* (Mallefowl) has a national conservation rating of **vulnerable**, *Sterna nereis* (Fairy Tern), *Thinornis rubricollis* (Hooded Plover) and *Turnix varia* (Painted Button-Quail) are listed as **vulnerable** within South Australia and *Egretta sacra* (Eastern Reef Egret) and Plegadis falcinellus (Glossy Ibis) are listed as **rare** within South Australia. Additionally, from the protected matters search of the EPBC Act (1999), an additional 17 **Migratory** and/or **Marine** bird species were listed as possibly occuring within the project area. However, it was considered the habitat available within the project area is not the preferred habitat of these species, nor is the vegetation large enough to support any threatened species on a permanent basis. Therefore, vegetation clearance is not considered to be seriously at variance with principle b).

Assessment of scattered trees (Appendix 9) revealed that *Eucalyptus porosa* (Mallee Box) Tree i.d D, E, N and P (illustrated within appendix 7 and 8) were above the cut-off score indicating that this vegetation is significant as habitat for wildlife. The clearance of these scattered trees is considered to be seriously at variance with principle b).

Refer to section 5.3.2 for more detail on the faunal species of conservation significance that have been highlighted from database searches as possibly occuring within the area.

Principle c) *It includes plants of a rare, vulnerable or endangered plant species;*

Two flora species with conservation significance were identified occuring within the survey area. *Cryptandra tomentosa* (Heath Cryptandra) and *Enneapogon nigricans* (Black-head Grass) are rated as **rare** within the Yorke Peninsula Botanical Region (Appendix 1). *Cryptandra tomentosa* (Heath Cryptandra) occurs on rocky outcrops within the south west corner of the survey area in a grazed paddock in low densities across an area approximately 20m by 20m. It is clearly evident that these plants have been grazed recently. *Enneapogon nigricans* (Black-head Grass) occurs on the north west corner within a small fenced off dump. This species occurs within an area of approximately 25m by 25m. The location of these conservation significant species are illustrated in appendices 6 and 7. Clearance of vegetation within the areas containing these conservation significant flora species is seriously at variance with Principle c).

Principle d) *The vegetation comprises the whole, or a part, of a plant community that is rare, vulnerable or endangered;*

The survey area includes groups of remnant *Eucalyptus porosa* (Mallee Box). *Eucalyptus porosa* woodland is not listed under the Provisional list of threatened ecosystems of South Australia (DEH in progress), however Neagle (1995) indicates *Eucalyptus porosa* (Mallee Box) woodlands are poorly conserved within the Yorke Peninsula Botanical Region (Neagle 1995) due to the lack of populations in reserves and the isolated fragmented and often degraded nature of remnants in South Australia. The *Eucalyptus porosa* woodland is locally significant with a total of 303ha of these plant communities protected on Yorke Peninnsula (DEH 2001). However, the few scattered trees occuring within the survey area does not represent a plant community as it is very degraded with little native understory and near total exotic understory. Clearance of areas containing *Eucalyptus porosa* (Mallee Box) is not considered to be at variance with Principle d).

Principle e) *It is significant as a remnant of vegetation in an area which has been extensively cleared;*

The survey area is located within the hundred of Cunningham and in both the Arthorton Environmental Association (4.6.2) and Urania Environmental Association (4.5.4). The hundred of Cunningham has approximately 5.2% remnant vegetation remaining, Arthorton Environmental Association has 1.8% remaining and Urania Environmental Association has 5.3% remaining. These figures are considered to be extremely low and reflect the amount of extensive land clearing in the region predominately for agriculture, it is considered that due to these seriously low remnancy figures that even smaller areas of poorer quality native vegetation or a scattered remnant tree are very significant within the region. Therefore, clearance of native vegetation within the survey area is considered to be seriously at variance with Principle e).

Principle f) *It is growing in, or in association with, a wetland environment;*

The project site is not growing in, or in association with a wetland environment and is therefore not considered seriously at variance with Principle f).

7. RECOMMENDATIONS

The following recommendations have been made to reduce the possible impacts of any works to be undertaken on the native flora and fauna within the area. It is unlikely the future development of the current mine will have a significant impact on the native vegetation and fauna, particularly if these recommendations are implemented. The overall general recommendations for the proposed dolomite mine expansion are:

- Avoid areas containing native vegetation, particularly the *Eucalyptus porosa* trees and the areas containing *Cryptandra tomentosa* and *Enneapogon nigricans*;
- If native vegetation is removed an appropriate Significant Environmental Benefit should be determined and implemented;
- Use existing tracks and access points, if possible;
- If new access points are required, they be should located in areas which do not require the removal or pruning of native vegetation;
- Stockpile sites, vehicle / machinery parking areas and general laydown areas should be located away from any native vegetation and not within the dripline of any trees;
- Control of the declared weed species should be undertaken prior to construction to reduce the likelihood of spreading these species;
- Weed management strategies (including weed hygiene procedures) should be implemented to ensure that weed species are not introduced to the construction area or spread throughout the construction area. This includes any material which is disposed of off-site (i.e. excess fill material). If this occurs, specific management strategies will need to be developed and implemented at the time.

8. REFERENCES

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9. APPENDICES

Appendix 1. Flora species recorded within the survey area.

Species Names	Common Name	Conservation Status		
		AUS	SA	YP
Acacia brachybotrya	Grey Mulga-bush			U
Acacia hakeoides	Hakea Wattle			
Acacia leiophylla	Coast Golden Wattle			
Acacia pycnantha	Golden Wattle			
Acacia spinescens	Spiny Wattle			
Acaena echinata	Sheep's Burr			
Acrotriche patula	Prickly Ground-berry			
Allocasuarina verticillata	Drooping Sheoak			
Austrostipa nitida	Balcarra Spear-grass			
Bursaria spinosa ssp. spinosa	Sweet Bursaria			
Callitris canescens	Scrubby Cypress Pine			
Cryptandra tomentosa	Heath Cryptandra			R
Dianella revoluta	Black-anther Flax-lily			
Dodonaea viscosa	Sticky Hop-bush			
Enchylaena tomentosa var. tomentosa	Ruby Saltbush			
Enneapogon nigricans	Black-head Grass			R
Eucalyptus porosa	Mallee Box			
Gahnia lanigera	Black Grass Saw-sedge			
Hakea leucoptera ssp. leucoptera	Silver Needlewood			
Lasiopetalum behrii	Pink Velvet-bush			
Lepidosperma viscidum	Sticky Sword-sedge			
Lysiana exocarpi ssp. exocarpi	Harlequin Mistletoe			
Maireana brevifolia	Short-leaf Bluebush			
Maireana sedifolia	Bluebush			
Pimelea octophylla	Woolly Riceflower			
Pimelea serpyllifolia ssp. serpyllifolia	Thyme Riceflower			
Pittosporum angustifolium	Native Apricot			
Rhagodia parabolica	Mealy Saltbush			
Senna artemisioides	Desert Senna			
Vittadinia cuneata var. cuneata	Fuzzy New Holland Daisy			
**Asparagus asparagoides*	Bridal Creeper			
**Asphodelus fistulosus*	Onion Weed			
**Asteriscus spinosus*	Golden Pallensis			
**Carmichaelia odorata*	Scented Broom			
**Carrichtera annua*	Ward's Weed			
**Casuarina glauca*	Grey She-oak			
**Centaurea calcitrapa*	Star Thistle			
**Chenopodium album*	Fat Hen			
**Citrullus lanatus*	Bitter Melon			
**Coprosma repens*	Mirror Bush			
**Cucumis myriocarpus*	Paddy Melon			
**Cupressus macrocarpa*	Monterey Cypress			
**Eucalyptus cladocalyx*	Sugar Gum			
**Eucalyptus sp.*	Eucalypt			
**Eucalyptus torquata*	Coral Gum			

Species Names	Common Name	Conservation Status		
		AUS	SA	YP
**Euphorbia helioscopia*	Sun Spurge			
**Hordeum glaucum*	Blue Barley-grass			
**Lycium ferocissimum*	African Boxthorn			
**Malva sp.*	Marshmallow			
**Marrubium vulgare*	Horehound			
**Mesembryanthemum crystallinum*	Common Iceplant			
**Moraea setifolia*	Thread Iris			
**Olea europaea ssp. europaea*	Olive			
**Osteospermum fruticosum*	Shrubby Daisybush			
**Oxalis pes-caprae*	Soursob			
**Pinus radiata*	Monterey pine			
**Salvia verbenaca*	Wild Sage			
**Sisymbrium oriental*	Wild Mustard			
**Sisymbrium sp.*	Mustard			
**Solanum nigrum*	Black Nightshade			
**Tamarix aphylla*	Athel Pine			
**Tecoma capensis*	Cape Honeysuckle			
**Triticum aestivum*	Wheat			
**Urtica urens*	Stinging Nettle			

*Denotes exotic species

Key
Regions: AUS = Australia, **SA** = South Australia, **YP** = Yorke Peninsula

Conservation ratings:
R = Rare
U = Uncommon

Appendix 2. Database search results for flora species previously recorded within close proximity to the survey area (DEH 2007a).

Species Name	Common Name	Conservation Status	
		AUS	SA
**Adonis microcarpa*	Pheasant's Eye		
**Allium neapolitanum*	Naples Onion		
**Aloe arborescens*			
**Alyssum linifolium*	Flax-leaf Alyssum		
**Anagallis arvensis*	Pimpernel		
**Arctotheca calendula*	Cape Weed		
**Asparagus asparagoides*	Bridal Creeper		
**Asphodelus fistulosus*	Onion Weed		
**Avellinia michelii*	Avellinia		
**Avena barbata*	Bearded Oat		
**Avena fatua*	Wild Oat		
**Avena sp.*	Oat		
**Brachypodium distachyon*	False Brome		
**Brassica tournefortii*	Wild Turnip		
**Bromus diandrus*	Great Brome		
**Bromus hordeaceus ssp. hordeaceus*	Soft Brome		
**Bromus madritensis*	Compact Brome		
**Bromus rubens*	Red Brome		
**Buglossoides arvensis*	Sheepweed		
**Cakile maritima ssp. maritima*	Two-horned Sea Rocket		
**Capsella bursa-pastoris*	Shepherd's Purse		
**Carduus tenuiflorus*	Slender Thistle		
**Carrichtera annua*	Ward's Weed		
**Catapodium rigidum*	Rigid Fescue		
**Centaurea calcitrapa*	Star Thistle		
**Centaurium sp.*	Centaury		
**Centaurium tenuiflorum (NC)*	Branched Centaury		
**Cerastium balearicum*	Chickweed		
**Cerastium pumilum*	Chickweed		
**Chenopodium murale*	Nettle-leaf Goosefoot		
**Chloris gayana*	Rhodes Grass		
**Chondrilla juncea*	Skeleton Weed		
**Cucumis myriocarpus*	Paddy Melon		
**Dittrichia graveolens*	Stinkweed		
**Ehrharta calycina*	Perennial Veldt Grass		
**Ehrharta longiflora*	Annual Veldt Grass		
**Erodium botrys*	Long Heron's-bill		
**Erodium cicutarium*	Cut-leaf Heron's-bill		
**Euphorbia terracina*	False Caper		
**Fumaria muralis ssp. muralis*	Wall Fumitory		
**Galium murale*	Small Bedstraw		
**Gazania linearis*	Gazania		
**Gypsophila tubulosa*	Annual Chalkwort		
**Hainardia cylindrica*	Common Barb-grass		
**Hedypnois rhagadioloides (NC)*	Cretan Weed		
**Hordeum glaucum*	Blue Barley-grass		
**Hordeum leporinum*	Wall Barley-grass		

Species Name	Common Name	Conservation Status	
		AUS	SA
**Hornungia procumbens*	Oval Purse		
**Hypochaeris glabra*	Smooth Cat's Ear		
**Hypochaeris radicata*	Rough Cat's Ear		
**Iris germanica (NC)*	Flag Iris		
**Lagurus ovatus*	Hare's Tail Grass		
**Lepidium africanum*	Common Peppercress		
**Lepidium didymum*	Lesser Swine's-cress		
**Limonium companyonis*	Sea-lavender		
**Limonium lobatum*	Winged Sea-lavender		
**Linum strictum ssp. strictum*	Upright Yellow Flax		
**Lolium rigidum*	Wimmera Ryegrass		
**Lolium sp.*	Ryegrass		
**Lycium ferocissimum*	African Boxthorn		
**Marrubium vulgare*	Horehound		
**Medicago minima var. minima*	Little Medic		
**Medicago orbicularis*	Button Medic		
**Medicago polymorpha var. polymorpha*	Burr-medic		
**Medicago truncatula*	Barrel Medic		
**Melilotus indicus*	King Island Melilot		
**Mesembryanthemum crystallinum*	Common Iceplant		
**Minuartia mediterranea*	Slender Sandwort		
**Moraea setifolia*	Thread Iris		
**Narcissus tazetta*	Polyanthus Narcissus		
**Nicotiana glauca*	Tree Tobacco		
**Oenothera stricta ssp. stricta*	Common Evening Primrose		
**Olea europaea ssp.*	Olive		
**Olea europaea ssp. europaea*	Olive		
**Ornithogalum umbellatum*	Star Of Bethlehem		
**Oxalis pes-caprae*	Soursob		
**Parapholis incurva*	Curly Ryegrass		
**Periballia minuta*	Small Hair-grass		
**Phalaris minor*	Lesser Canary-grass		
**Ranunculus repens*	Creeping Buttercup		
**Rapistrum rugosum ssp. rugosum*	Turnip Weed		
**Reichardia tingitana*	False Sowthistle		
**Reseda lutea*	Cut-leaf Mignonette		
**Romulea sp.*	Onion-grass		
**Rosmarinus officinalis*	Rosemary		
**Rostraria cristata*	Annual Cat's-tail		
**Rumex crispus*	Curled Dock		
**Sagina apetala*	Annual Pearlwort		
**Sagina maritima*	Sea Pearlwort		
**Sagina procumbens*	Spreading Pearlwort		
**Salvia verbenaca var. verbenaca*	Wild Sage		
**Schinus molle*	Pepper-tree		
**Schismus barbatus*	Arabian Grass		
**Silene gallica var. gallica*	French Catchfly		
**Silene nocturna*	Mediterranean Catchfly		
**Silene sp.*	Catchfly		
**Silene tridentata*			

Species Name	Common Name	Conservation Status	
		AUS	SA
**Sisymbrium erysimoides*	Smooth Mustard		
**Sisymbrium officinale*	Hedge Mustard		
**Sonchus asper ssp.*	Rough Sow-thistle		
**Sonchus oleraceus (NC)*	Common Sow-thistle		
**Stellaria media*	Chickweed		
**Trifolium sp.*	Clover		
**Urospermum picroides*	False Hawkbit		
**Veronica persica*	Persian Speedwell		
**Vicia monantha*	Spurred Vetch		
**Vulpia bromoides*	Squirrel-tail Fescue		
**Vulpia muralis*	Wall Fescue		
**Vulpia myuros f. myuros*	Rat's-tail Fescue		
**Vulpia sp.*	Fescue		
Acacia ancistrophylla var. lissophylla	Hook-leaf Wattle		
Acacia brachybotrya	Grey Mulga-bush		
Acacia cupularis	Cup Wattle		
Acacia cupularis/ligulata			
Acacia cyclops	Western Coastal Wattle		
Acacia enterocarpa	Jumping-jack Wattle	EN	E
Acacia hakeoides	Hakea Wattle		
Acacia ligulata	Umbrella Bush		
Acacia lineata	Streaked Wattle		R
Acacia longifolia ssp. sophorae	Coastal Wattle		
Acacia microcarpa	Manna Wattle		
Acacia nematophylla	Coast Wallowa		
Acacia notabilis	Notable Wattle		
Acacia nyssophylla	Spine Bush		
Acacia oswaldii	Umbrella Wattle		
Acacia paradoxa	Kangaroo Thorn		
Acacia pycnantha	Golden Wattle		
Acacia rhetinocarpa	Resin Wattle	VU	V
Acacia rigens	Nealie		
Acacia sclerophylla var. sclerophylla	Hard-leaf Wattle		
Acacia sp. Winged (C.R.Alcock 4936)	Angled Wattle		
Acacia spinescens	Spiny Wattle		
Acianthus pusillus	Mosquito Orchid		
Acrotriche cordata	Blunt-leaf Ground-berry		
Acrotriche patula	Prickly Ground-berry		
Actinobole uliginosum	Flannel Cudweed		
Adriana klotzschii (NC)	Coast Bitter-bush		
Adriana quadripartita (NC)	Rare Bitter-bush		
Agrostis avenacea var. avenacea (NC)	Common Blown-grass		
Agrostis sp.	Blown-grass/Bent Grass		
Alectryon oleifolius ssp. canescens	Bullock Bush		
Allocasuarina muelleriana ssp. muelleriana	Common Oak-bush		
Allocasuarina verticillata	Drooping Sheoak		
Alyogyne huegelii	Native Hibiscus		
Alyxia buxifolia	Sea Box		
Amphibromus nervosus	Veined Swamp Wallaby-grass		
Amphipogon caricinus var. caricinus	Long Grey-beard Grass		

Species Name	Common Name	Conservation Status	
		AUS	SA
Amyema melaleucae	Tea-tree Mistletoe		
Amyema miquelii	Box Mistletoe		
Amyema preissii	Wire-leaf Mistletoe		
Angianthus tomentosus	Hairy Angianthus		
Apalochlamys spectabilis	Showy Firebush		
Arthropodium fimbriatum	Nodding Vanilla-lily		
Arthropodium minus	Small Vanilla-lily		
Arthropodium sp.	Vanilla-lily		
Arthropodium strictum	Common Vanilla-lily		
Asperula conferta	Common Woodruff		
Asteridea athrixioides f. athrixioides	Wirewort		
Asteridea athrixioides f. athrixioides	Wirewort		
Astroloma humifusum	Cranberry Heath		
Atriplex cinerea	Coast Saltbush		
Atriplex paludosa ssp. cordata	Marsh Saltbush		
Atriplex pumilio	Mat Saltbush		
Atriplex semibaccata	Berry Saltbush		
Atriplex suberecta	Lagoon Saltbush		
Austrodanthonia caespitosa	Common Wallaby-grass		
Austrodanthonia setacea	Small-flower Wallaby-grass		
Austrodanthonia sp.			
Austrostipa acrociliata	Graceful Spear-grass		
Austrostipa drummondii	Cottony Spear-grass		
Austrostipa elegantissima	Feather Spear-grass		
Austrostipa eremophila	Rusty Spear-grass		
Austrostipa flavescens	Coast Spear-grass		
Austrostipa multispiculis			R
Austrostipa mundula	Neat Spear-grass		
Austrostipa nitida	Balcarra Spear-grass		
Austrostipa scabra ssp. falcata	Slender Spear-grass		
Austrostipa sp.	Spear-grass		
Baeckea crassifolia	Desert Baeckea		
Beyeria lechenaultii	Pale Turpentine Bush		
Billardiera cymosa (NC)	Sweet Apple-berry		
Billardiera sericophora	Silky Apple-berry		
Billardiera versicolor	Yellow-flower Apple-berry		
Blennospora drummondii	Dwarf Button-flower		
Boronia coerulescens ssp. coerulescens	Blue Boronia		
Boronia inornata ssp. leptophylla	Dryland Boronia		
Brachyscome ciliaris var.	Variable Daisy		
Brachyscome ciliaris var. ciliaris	Variable Daisy		
Brachyscome ciliaris var. lanuginosa	Woolly Variable Daisy		
Brachyscome lineariloba	Hard-head Daisy		
Brachyscome perpusilla	Tiny Daisy		
Bromus arenarius	Sand Brome		
Bromus sp.	Brome		
Bulbine bulbosa	Bulbine-lily		
Bulbine semibarbata	Small Leek-lily		
Bursaria spinosa ssp. spinosa	Sweet Bursaria		
Caesia calliantha	Blue Grass-lily		

Species Name	Common Name	Conservation Status	
		AUS	SA
Caladenia brumalis	Winter Spider-orchid	VU	V
Caladenia capillata	Wispy Spider-orchid		
Caladenia carnea	Pink Fingers		
Caladenia latifolia	Pink Caladenia		
Caladenia macroclavia	Large-club Spider-orchid	EN	E
Caladenia stricta	Upright Caladenia		
Calandrinia calyptrata	Pink Purslane		
Calandrinia eremaea	Dryland Purslane		
Calandrinia granulifera	Pigmy Purslane		
Calandrinia sp.	Purslane/Parakeelya		
Callitris canescens	Scrubby Cypress Pine		
Callitris gracilis	Southern Cypress Pine		
Callitris sp.	Native Pine		
Calocephalus citreus	Lemon Beauty-heads		
Calostemma purpureum	Pink Garland-lily		
Calotis cymbacantha	Showy Burr-daisy		
Calotis hispidula	Hairy Burr-daisy		
Calytrix involucrata	Cup Fringe-myrtle		
Calytrix tetragona	Common Fringe-myrtle		
Carpobrotus rossii (NC)	Native Pigface		
Cassinia arcuata	Drooping Cassinia		
Cassinia uncata (NC)	Sticky Cassinia		
Cassytha glabella f. dispar	Slender Dodder-laurel		
Cassytha melantha	Coarse Dodder-laurel		
Cassytha peninsularis var. peninsularis	Peninsula Dodder-laurel		
Centipeda cunninghamii (NC)	Common Sneezeweed		
Centrolepis cephaloformis ssp.	Cushion Centrolepis		
Centrolepis polygyna	Wiry Centrolepis		
Chamaescilla corymbosa var. corymbosa	Blue Squill		
Chamaesyce drummondii (NC)	Caustic Weed		
Cheilanthes distans	Bristly Cloak-fern		
Cheiranthera alternifolia	Hand-flower		
Chenopodium cristatum	Crested Goosefoot		
Chenopodium desertorum ssp. microphyllum	Small-leaf Goosefoot		
Chenopodium erosum	Papery Goosefoot		R
Chenopodium pumilio	Clammy Goosefoot		
Choretrum glomeratum var. chrysanthum	Yellow-flower Sour-bush		R
Choretrum glomeratum var. glomeratum	White Sour-bush		
Chrysocephalum apiculatum	Common Everlasting		
Chrysocephalum baxteri	White Everlasting		
Chrysocephalum semipapposum	Clustered Everlasting		
Clematis microphylla var. microphylla	Old Man's Beard		
Comesperma volubile	Love Creeper		
Convolvulus erubescens (NC)	Australian Bindweed		
Convolvulus remotus	Grassy Bindweed		
Correa backhouseana var. coriacea	Thick-leaf Correa		
Corybas sp.	Helmet-orchid		
Cotula australis	Common Cotula		
Craspedia glauca (NC)	Billy-buttons		
Crassula closiana	Stalked Crassula		

Species Name	Common Name	Conservation Status	
		AUS	SA
Crassula colligata ssp. lamprosperma	Australian Stonecrop		
Crassula colorata var.	Dense Crassula		
Crassula colorata var. acuminata	Dense Crassula		
Crassula colorata var. colorata	Dense Crassula		
Crassula decumbens var. decumbens	Spreading Crassula		
Crassula sieberiana ssp. tetramera (NC)	Australian Stonecrop		
Cryptandra amara var. amara (NC)	Spiny Cryptandra		
Cryptandra sp. Floriferous (W.R.Barker 4131)	Pretty Cryptandra		
Cymbonotus preissianus	Austral Bear's-ear		
Cynoglossum suaveolens	Sweet Hound's-tongue		
Cyrtostylis robusta	Robust Gnat-orchid		
Dampiera rosmarinifolia	Rosemary Dampiera		
Danthonia sp. (NC)	Wallaby-grass		
Daucus glochidiatus	Native Carrot		
Daviesia benthamii ssp. humilis	Mallee Bitter-pea		R
Dianella brevicaulis	Short-stem Flax-lily		
Dianella brevicaulis/revoluta var.	Black-anther Flax-lily		
Dianella revoluta var.			
Dianella revoluta var. revoluta	Black-anther Flax-lily		
Dichelachne crinita	Long-hair Plume-grass		
Distichlis distichophylla	Emu-grass		
Diuris palustris	Little Donkey-orchid		
Dodonaea baueri	Crinkled Hop-bush		
Dodonaea bursariifolia	Small Hop-bush		
Dodonaea hexandra	Horned Hop-bush		
Dodonaea humilis	Dwarf Hop-bush		
Dodonaea stenozyga	Desert Hop-bush		
Dodonaea tepperi	Streaked Hop-bush		
Dodonaea viscosa ssp. angustissima	Narrow-leaf Hop-bush		
Dodonaea viscosa ssp. spatulata	Sticky Hop-bush		
Drosera glanduligera	Scarlet Sundew		
Drosera macrantha ssp. planchonii	Climbing Sundew		
Einadia nutans ssp.	Climbing Saltbush		
Einadia nutans ssp. nutans	Climbing Saltbush		
Elachanthus pusillus	Elachanth		
Elymus scaber var. scaber (NC)	Native Wheat-grass		
Enchylaena tomentosa var. tomentosa	Ruby Saltbush		
Eremophila behriana	Rough Emubush		
Eremophila crassifolia	Thick-leaf Emubush		
Eremophila deserti	Turkey-bush		
Eremophila glabra ssp. glabra	Tar Bush		
Eremophila longifolia	Weeping Emubush		
Eriochilus cucullatus	Parson's Bands		
Erodium crinitum	Blue Heron's-bill		
Erodium sp.	Heron's-bill/Crowfoot		
Eucalyptus brachycalyx	Gilja		
Eucalyptus calycogona var. calycogona (NC)	Square-fruit Mallee		
Eucalyptus ceratocorys	Desert Ridge-fruited Mallee		
Eucalyptus gracilis	Yorrell		
Eucalyptus incrassata	Ridge-fruited Mallee		

Species Name	Common Name	Conservation Status	
		AUS	SA
Eucalyptus leptophylla	Narrow-leaf Red Mallee		
Eucalyptus odorata	Peppermint Box		
Eucalyptus oleosa (NC)	Red Mallee		
Eucalyptus phenax (NC)	Sessile-fruit White Mallee		
Eucalyptus phenax ssp. phenax	White Mallee		
Eucalyptus porosa	Mallee Box		
Eucalyptus rugosa	Coastal White Mallee		
Eucalyptus socialis (NC)	Beaked Red Mallee		
Euchiton sphaericus	Annual Cudweed		
Euphrasia collina ssp. osbornii	Osborn's Eyebright	EN	E
Eutaxia diffusa	Large-leaf Eutaxia		
Eutaxia microphylla	Common Eutaxia		
Exocarpos aphyllus	Leafless Cherry		
Exocarpos cupressiformis	Native Cherry		
Exocarpos sparteus	Slender Cherry		
Gahnia deusta	Limestone Saw-sedge		
Gahnia lanigera	Black Grass Saw-sedge		
Galium migrans	Loose Bedstraw		
Galium sp.	Bedstraw		
Geijera linearifolia	Sheep Bush		
Genoplesium nigricans	Black Midge-orchid		
Genoplesium rufum	Red Midge-orchid		
Genoplesium sp.	Midge Orchid		
Geococcus pusillus	Earth Cress		
Geranium retrorsum	Grassland Geranium		
Glischrocaryon behrii	Golden Pennants		
Glycine rubiginosa	Twining Glycine		
Gonocarpus mezianus	Broad-leaf Raspwort		
Goodenia pusilliflora	Small-flower Goodenia		
Goodenia varia	Sticky Goodenia		
Goodenia willisiana	Silver Goodenia		
Goodia medicaginea	Western Golden-tip		
Gramineae sp.	Grass Family		
Grevillea huegelii	Comb Grevillea		
Grevillea ilicifolia var. ilicifolia (NC)	Holly-leaf Grevillea		
Hakea leucoptera ssp. leucoptera	Silver Needlewood		
Hakea mitchellii	Heath Needlebush		
Hakea rugosa	Dwarf Hakea		
Halgania andromedifolia	Scented Blue-flower		
Halgania cyanea	Rough Blue-flower		
Haloragis aspera	Rough Raspwort		
Hardenbergia violacea	Native Lilac		
Harmsiodoxa brevipes var. brevipes	Short Cress		
Helichrysum leucopsideum	Satin Everlasting		
Hibbertia riparia (NC)	Guinea-flower		
Hibbertia sp. Glabriuscula (D.J.Whibley 9012)	Smooth Guinea-flower		
Hibbertia virgata	Twiggy Guinea-flower		
Homoranthus wilhelmii	Wilhelm's Homoranthus		
Hyalosperma demissum	Dwarf Sunray		
Hyalosperma glutinosum ssp. glutinosum	Golden Sunray		

Species Name	Common Name	Conservation Status	
		AUS	SA
Hyalosperma semisterile	Orange Sunray		
Hydrocotyle callicarpa	Tiny Pennywort		
Hydrocotyle capillaris	Thread Pennywort		
Hydrocotyle pilifera var. glabrata	Buttercup Pennywort		
Hydrocotyle rugulosa	Mallee Pennywort		
Hypoxis glabella var. glabella	Tiny Star		
Isoetopsis graminifolia	Grass Cushion		
Isolepis marginata	Little Club-rush		
Isolepis nodosa	Knobby Club-rush		
Juncus bufonius	Toad Rush		
Juncus flavidus	Yellow Rush		
Kennedia prostrata	Scarlet Runner		
Lagenophora huegelii	Coarse Bottle-daisy		
Lasiopetalum baueri	Slender Velvet-bush		
Lasiopetalum behrii	Pink Velvet-bush		
Lasiopetalum schulzenii	Drooping Velvet-bush		
Lepidium rotundum	Veined Peppercress		
Lepidosperma concavum	Spreading Sword-sedge		
Lepidosperma concavum/congestum/laterale	Sword-sedge		
Lepidosperma congestum (NC)	Clustered Sword-sedge		
Lepidosperma gladiatum	Coast Sword-sedge		
Lepidosperma viscidum	Sticky Sword-sedge		
Lepilaena marina	Sea Water-mat		
Leptorhynchos elongatus	Lanky Buttons		R
Leptorhynchos tetrachaetus	Little Buttons		
Leptorhynchos waitzia	Button Immortelle		
Leptospermum coriaceum	Dune Tea-tree		
Leucopogon cordifolius	Heart-leaf Beard-heath		
Leucopogon parviflorus	Coast Beard-heath		
Levenhookia dubia	Hairy Stylewort		
Lichen sp.			
Linum marginale	Native Flax		
Lobelia gibbosa	Tall Lobelia		
Logania linifolia	Flax-leaf Logania		
Logania ovata	Oval-leaf Logania		
Lomandra collina	Sand Mat-rush		
Lomandra densiflora	Soft Tussock Mat-rush		
Lomandra effusa	Scented Mat-rush		
Lomandra leucocephala ssp. robusta	Woolly Mat-rush		
Lomandra multiflora ssp. dura	Hard Mat-rush		
Lotus australis	Austral Trefoil		
Lotus cruentus	Red-flower Lotus		
Lycium australe	Australian Boxthorn		
Lysiana exocarpi ssp. exocarpi	Harlequin Mistletoe		
Maireana brevifolia	Short-leaf Bluebush		
Maireana enchylaenoides	Wingless Fissure-plant		
Maireana erioclada	Rosy Bluebush		
Maireana oppositifolia	Salt Bluebush		
Maireana rohrlachii	Rohrlach's Bluebush		R
Melaleuca acuminata ssp. acuminata	Mallee Honey-myrtle		

Species Name	Common Name	Conservation Status	
		AUS	SA
Melaleuca lanceolata	Dryland Tea-tree		
Melaleuca lanceolata ssp. lanceolata (NC)	Dryland Tea-tree		
Melaleuca pauperiflora (NC)	Boree		
Melaleuca pauperiflora ssp. mutica	Boree		
Melaleuca uncinata (NC)	Broombush		
Mentha diemenica	Slender Mint		R
Microcybe pauciflora ssp. pauciflora	Yellow Microcybe		
Microlepidium pilosulum	Hairy Shepherd's-purse		R
Microseris lanceolata	Yam Daisy		
Microtis sp.	Onion-orchid		
Millotia muelleri	Common Bow-flower		
Millotia myosotidifolia	Broad-leaf Millotia		
Millotia tenuifolia var. tenuifolia	Soft Millotia		
Minuria cunninghamii	Bush Minuria		
Minuria leptophylla	Minnie Daisy		
Mitrasacme paradoxa (NC)	Wiry Mitrewort		
Moss sp.			
Muehlenbeckia adpressa	Climbing Lignum		
Muehlenbeckia gunnii	Coastal Climbing Lignum		
Myoporum brevipes	Warty Boobialla		
Myoporum insulare	Common Boobialla		
Myoporum parvifolium	Creeping Boobialla		R
Myoporum platycarpum ssp.	False Sandalwood		
Myoporum platycarpum ssp. platycarpum	False Sandalwood		
Myoporum viscosum (NC)	Sticky Boobialla		
Neurachne alopecuroidea	Fox-tail Mulga-grass		
Nitraria billardierei	Nitre-bush		
Olearia axillaris	Coast Daisy-bush		
Olearia brachyphylla	Short-leaf Daisy-bush		
Olearia ciliata var. ciliata	Fringed Daisy-bush		
Olearia decurrens	Winged Daisy-bush		
Olearia floribunda var. floribunda	Heath Daisy-bush		
Olearia muelleri	Mueller's Daisy-bush		
Olearia pannosa ssp.	Silver Daisy-bush		
Olearia pannosa ssp. pannosa	Silver Daisy-bush	VU	V
Olearia ramulosa	Twiggy Daisy-bush		
Omphalolappula concava	Burr Stickseed		
Opercularia turpis	Twiggy Stinkweed		
Ophioglossum lusitanicum	Austral Adder's-tongue		
Oxalis perennans (NC)	Native Sorrel		
Ozothamnus retusus	Notched Bush-everlasting		
Pachymitus cardaminoides	Sand Cress		
Parietaria debilis (NC)	Smooth-nettle		
Pelargonium australe	Australian Pelargonium		
Pelargonium littorale	Native Pelargonium		
Pelargonium sp.	Storks-bill		
Phebalium glandulosum ssp. glandulosum	Glandular Phebalium		E
Pheladenia deformis	Bluebeard Orchid		
Phlegmatospermum eremaeum	Spreading Cress		R
Phyllangium divergens	Wiry Mitrewort		

Species Name	Common Name	Conservation Status	
		AUS	SA
Picris angustifolia ssp. angustifolia	Coast Picris		
Pilularia novae-hollandiae	Austral Pillwort		R
Pimelea curviflora var. gracilis	Curved Riceflower		
Pimelea flava ssp. dichotoma	Diosma Riceflower		
Pimelea glauca	Smooth Riceflower		
Pimelea imbricata var. petraea	Rock Woolly Riceflower		
Pimelea micrantha	Silky Riceflower		
Pimelea serpyllifolia ssp. serpyllifolia	Thyme Riceflower		
Pimelea subvillifera	Silky Riceflower		
Pittosporum angustifolium	Native Apricot		
Plantago sp. B (R.Bates 44765)	Little Plantain		
Plantago varia	Variable Plantain		
Poa crassicaudex	Thick-stem Tussock-grass		
Poa fax	Scaly Poa		R
Poa sp.	Meadow-grass/Tussock-grass		
Podolepis canescens	Grey Copper-wire Daisy		
Podolepis jaceoides	Showy Copper-wire Daisy		R
Podolepis tepperi	Delicate Copper-wire Daisy		
Pogonolepis muelleriana	Stiff Cup-flower		
Pomaderris obcordata	Wedge-leaf Pomaderris		
Pomaderris paniculosa ssp.			
Pomaderris paniculosa ssp. paniculosa	Mallee Pomaderris		
Poranthera huegelii	Heath Poranthera		
Poranthera microphylla (NC)	Small Poranthera		
Poranthera triandra	Three-petal Poranthera		
Prasophyllum occultans	Hidden Leek-orchid		R
Prasophyllum odoratum (NC)	Scented Leek-orchid		
Prasophyllum odoratum complex	Leek-orchid		
Prasophyllum sp.	Leek-orchid		
Prostanthera aspalathoides	Scarlet Mintbush		
Prostanthera eurybioides	Monarto Mintbush	EN	E
Prostanthera serpyllifolia ssp. microphylla	Small-leaf Mintbush		
Pseudognaphalium luteoalbum	Jersey Cudweed		
Pterostylis aff. excelsa	Dryland Greenhood		
Pterostylis dolichochila	Mallee Shell-orchid		
Pterostylis longifolia (NC)	Tall Greenhood		
Pterostylis mutica	Midget Greenhood		
Pterostylis pusilla	Small Rusty-hood		
Pterostylis robusta	Large Shell-orchid		
Pterostylis sanguinea	Blood Greenhood		
Pterostylis sp.	Greenhood		
Ptilotus spathulatus f. spathulatus	Pussy-tails		
Pultenaea tenuifolia	Narrow-leaf Bush-pea		
Rhagodia candolleana ssp. candolleana	Sea-berry Saltbush		
Rhagodia crassifolia	Fleshy Saltbush		
Rhagodia parabolica	Mealy Saltbush		
Rhagodia preissii ssp. preissii	Mallee Saltbush		
Rhagodia spinescens	Spiny Saltbush		
Rhodanthe pygmaea	Pigmy Daisy		
Salsola tragus	Buckbush		

Species Name	Common Name	Conservation Status	
		AUS	SA
Samolus repens	Creeping Brookweed		
Santalum acuminatum	Quandong		
Santalum murrayanum	Bitter Quandong		
Sarcocornia blackiana	Thick-head Samphire		
Scaevola angustata	Coast Fanflower		
Scaevola spinescens	Spiny Fanflower		
Schoenus apogon	Common Bog-rush		
Schoenus breviculmis	Matted Bog-rush		
Schoenus deformis	Small Bog-rush		
Schoenus nanus	Little Bog-rush		
Schoenus sp.	Bog-rush		
Sclerolaena birchii	Galvanised Burr		
Sclerolaena diacantha	Grey Bindyi		
Sebaea ovata	Yellow Sebaea		
Senecio glossanthus (NC)	Annual Groundsel		
Senecio macrocarpus	Large-fruit Groundsel	VU	V
Senecio pinnatifolius	Variable Groundsel		
Senecio quadridentatus	Cotton Groundsel		
Senecio tenuiflorus (NC)	Woodland Groundsel		
Senna artemisioides ssp. filifolia	Fine-leaf Desert Senna		
Senna artemisioides ssp. petiolaris (NC)	Flat-stalk Senna		
Siloxerus multiflorus	Small Wrinklewort		
Solanum capsiciforme	Capsicum Kangaroo-apple		
Solanum simile	Kangaroo Apple		
Spinifex sericeus (NC)	Rolling Spinifex		
Spyridium eriocephalum var.	Heath Spyridium		
Spyridium eriocephalum var. eriocephalum	Heath Spyridium		
Spyridium phylicoides	Narrow-leaf Spyridium		
Spyridium subochreatum var. subochreatum (NC)	Velvet Spyridium		
Stackhousia monogyna	Creamy Candles		
Stenanthemum leucophractum	White Cryptandra		
Stenopetalum lineare	Narrow Thread-petal		
Stenopetalum sphaerocarpum	Round-fruit Thread-petal		
Stuartina muelleri	Spoon Cudweed		
Suaeda australis	Austral Seablite		
Swainsona fuscoviridis	Dark Green Swainson-pea		R
Swainsona phacoides	Dwarf Swainson-pea		
Templetonia retusa	Cockies Tongue		
Templetonia sp.	Templetonia		
Templetonia sulcata	Flat Mallee-pea		
Tetragonia implexicoma	Bower Spinach		
Teucrium sessiliflorum	Mallee Germander		
Thelymitra antennifera	Lemon Sun-orchid		
Thelymitra nuda (NC)	Scented Sun-orchid		
Themeda triandra	Kangaroo Grass		
Threlkeldia diffusa	Coast Bonefruit		
Thryptomene ericaea	Heath Thryptomene		
Thysanotus patersonii	Twining Fringe-lily		
Trachymene cyanopetala	Purple Trachymene		
Trachymene pilosa	Dwarf Trachymene		

Species Name	Common Name	Conservation Status	
		AUS	SA
Trichostomopsis australasiae			
Tricoryne tenella	Tufted Yellow Rush-lily		
Triglochin centrocarpum (NC)	Dwarf Arrowgrass		
Velleia arguta	Toothed Velleia		
Vittadinia australasica var. australasica	Sticky New Holland Daisy		
Vittadinia australasica var. subglabra	New Holland Daisy		
Vittadinia blackii	Narrow-leaf New Holland Daisy		
Vittadinia cervicularis var. cervicularis	Waisted New Holland Daisy		
Vittadinia cuneata var. cuneata f. cuneata	Fuzzy New Holland Daisy		
Vittadinia cuneata var. morrisii	New Holland Daisy		
Vittadinia gracilis	Woolly New Holland Daisy		
Vittadinia megacephala	Giant New Holland Daisy		
Vittadinia sp.	New Holland Daisy		
Wahlenbergia communis	Tufted Bluebell		
Wahlenbergia gracilenta	Annual Bluebell		
Wahlenbergia luteola	Yellow-wash Bluebell		
Wahlenbergia sp.	Native Bluebell		
Westringia rigida	Stiff Westringia		
Wurmbea dioica ssp. dioica (NC)	Early Star-lily		
Xerochrysum bracteatum	Golden Everlasting		
Zygophyllum ammophilum (NC)	Sand Twinleaf		
Zygophyllum aurantiacum ssp. aurantiacum (NC)	Shrubby Twinleaf		
Zygophyllum crenatum	Notched Twinleaf		
Zygophyllum ovatum	Dwarf Twinleaf		
Zygophyllum simile	White Twinleaf		

*Denotes exotic species

Key
Regions: AUS = Australia, **SA** = South Australia

Conservation ratings:
E = Endangered, **V** = Vulnerable, **R** = Rare,
EN = Endangered, **VU** = Vulnerable

Appendix 3. Database search results for fauna species previously recorded within close proximity to the survey area (DEH 2007a; SAM 2007).

Class	Species Name	Common Name	Conservation Status	
			AUS	SA
AMPHIBIA	*Limnodynastes tasmaniensis*	Spotted Grass Frog		
AVES	**Alauda arvensis*	Eurasian Skylark		
AVES	**Anas platyrhynchos*	Mallard		
AVES	**Columba livia*	Rock Dove		
AVES	**Passer domesticus*	House Sparrow		
AVES	**Streptopelia chinensis*	Spotted Turtle-dove		
AVES	**Turdus merula*	Eurasian Blackbird		
AVES	*Acanthagenys rufogularis*	Spiny-cheeked Honeyeater		
AVES	*Acanthiza apicalis*	Inland Thornbill		
AVES	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill		
AVES	*Acanthiza pusilla*	Brown Thornbill		
AVES	*Acanthiza reguloides*	Buff-rumped Thornbill		
AVES	*Accipiter cirrhocephalus*	Collared Sparrowhawk		
AVES	*Anas castanea*	Chestnut Teal		
AVES	*Anas gracilis*	Grey Teal		
AVES	*Anas superciliosa*	Pacific Black Duck		
AVES	*Anthochaera carunculata*	Red Wattlebird		
AVES	*Anthochaera chrysoptera*	Little Wattlebird		
AVES	*Anthus novaeseelandiae*	Richard's Pipit		
AVES	*Ardea alba*	Great Egret, (White Egret)		
AVES	*Ardea pacifica*	White-necked Heron		
AVES	*Arenaria interpres*	Ruddy Turnstone		
AVES	*Artamus cyanopterus*	Dusky Woodswallow		
AVES	*Artamus superciliosus*	White-browed Woodswallow		
AVES	*Aythya australis*	Hardhead (White-eyed Duck)		
AVES	*Cacatua roseicapilla*	Galah		
AVES	*Cacatua sp.*			
AVES	*Calidris ferruginea*	Curlew Sandpiper		
AVES	*Calidris ruficollis*	Red-necked Stint		
AVES	*Charadrius bicinctus*	Double-banded Plover		
AVES	*Charadrius mongolus*	Lesser Sand Plover		
AVES	*Charadrius ruficapillus*	Red-capped Plover		
AVES	*Chenonetta jubata*	Australian Wood Duck, (Maned Duck)		
AVES	*Chlidonias hybridus*	Whiskered Tern		
AVES	*Chrysococcyx basalis*	Horsfield's Bronze-cuckoo		
AVES	*Circus approximans*	Swamp Harrier		
AVES	*Colluricincla harmonica*	Grey Shrike-thrush		
AVES	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike		
AVES	*Corvus coronoides*	Australian Raven		
AVES	*Corvus mellori*	Little Raven		
AVES	*Corvus sp.*			
AVES	*Coturnix pectoralis*	Stubble Quail		
AVES	*Cracticus torquatus*	Grey Butcherbird		
AVES	*Daphoenositta chrysoptera*	Varied Sittella		
AVES	*Dicaeum hirundinaceum*	Mistletoebird		
AVES	*Egretta novaehollandiae*	White-faced Heron		

Class	Species Name	Common Name	Conservation Status	
			AUS	SA
AVES	*Egretta sacra*	Eastern Reef Egret		R
AVES	*Elanus axillaris*	Black-shouldered Kite		
AVES	*Eudyptula minor*	Little Penguin		
AVES	*Eurostopodus argus*	Spotted Nightjar		
AVES	*Falco berigora*	Brown Falcon		
AVES	*Falco cenchroides*	Nankeen Kestrel		
AVES	*Falco longipennis*	Australian Hobby		
AVES	*Falco subniger*	Black Falcon		
AVES	*Fulica atra*	Eurasian Coot		
AVES	*Gallinula ventralis*	Black-tailed Native-hen		
AVES	*Geopelia placida*	Peaceful Dove		
AVES	*Glossopsitta porphyrocephala*	Purple-crowned Lorikeet		
AVES	*Grallina cyanoleuca*	Magpie-lark		
AVES	*Gymnorhina tibicen*	Australian Magpie		
AVES	*Haematopus fuliginosus*	Sooty Oystercatcher		
AVES	*Haematopus longirostris*	Pied Oystercatcher		
AVES	*Heteroscelus brevipes*	Grey-tailed Tattler		
AVES	*Hirundo neoxena*	Welcome Swallow		
AVES	*Larus novaehollandiae*	Silver Gull		
AVES	*Larus pacificus*	Pacific Gull		
AVES	*Leipoa ocellata*	Malleefowl	VU	V
AVES	*Lichenostomus cratitius*	Purple-gaped Honeyeater		
AVES	*Lichenostomus ornatus*	Yellow-plumed Honeyeater		
AVES	*Lichenostomus penicillatus*	White-plumed Honeyeater		
AVES	*Lichenostomus virescens*	Singing Honeyeater		
AVES	*Limosa lapponica*	Bar-tailed Godwit		
AVES	*Malurus cyaneus*	Superb Fairy-wren		
AVES	*Malurus lamberti*	Variegated Fairy-wren		
AVES	*Manorina flavigula*	Yellow-throated Miner		
AVES	*Melanodryas cucullata*	Hooded Robin		
AVES	*Melithreptus brevirostris*	Brown-headed Honeyeater		
AVES	*Melopsittacus undulatus*	Budgerigar		
AVES	*Microeca fascinans*	Jacky Winter		
AVES	*Morus serrator*	Australasian Gannet		
AVES	*Ocyphaps lophotes*	Crested Pigeon		
AVES	*Oreoica gutturalis*	Crested Bellbird		
AVES	*Pachycephala pectoralis*	Golden Whistler		
AVES	*Pachycephala rufiventris*	Rufous Whistler		
AVES	*Pardalotus punctatus*	Spotted Pardalote		
AVES	*Pardalotus striatus*	Striated Pardalote		
AVES	*Pelecanus conspicillatus*	Australian Pelican		
AVES	*Petrochelidon ariel*	Fairy Martin		
AVES	*Petrochelidon nigricans*	Tree Martin		
AVES	*Petroica goodenovii*	Red-capped Robin		
AVES	*Phalacrocorax carbo*	Great Cormorant		
AVES	*Phalacrocorax fuscescens*	Black-faced Cormorant		
AVES	*Phalacrocorax sulcirostris*	Little Black Cormorant		
AVES	*Phalacrocorax varius*	Pied Cormorant		
AVES	*Phaps chalcoptera*	Common Bronzewing		
AVES	*Phaps elegans*	Brush Bronzewing		

Class	Species Name	Common Name	Conservation Status	
			AUS	SA
AVES	*Phylidonyris novaehollandiae*	New Holland Honeyeater		
AVES	*Plegadis falcinellus*	Glossy Ibis		R
AVES	*Pluvialis fulva*	Pacific Golden Plover		
AVES	*Podargus strigoides*	Tawny Frogmouth		
AVES	*Poliocephalus poliocephalus*	Hoary-headed Grebe		
AVES	*Pomatostomus superciliosus*	White-browed Babbler		
AVES	*Psephotus haematonotus*	Red-rumped Parrot		
AVES	*Pterodroma lessonii*	White-headed Petrel		
AVES	*Rhipidura albiscapa*	Grey Fantail		
AVES	*Rhipidura leucophrys*	Willie Wagtail		
AVES	*Smicrornis brevirostris*	Weebill		
AVES	*Sterna bergii*	Crested Tern		
AVES	*Sterna caspia*	Caspian Tern		
AVES	*Sterna nereis*	Fairy Tern		V
AVES	*Strepera versicolor*	Grey Currawong		
AVES	*Sturnus vulgaris*	Common Starling		
AVES	*Tachybaptus novaehollandiae*	Australasian Grebe, (Little Grebe)		
AVES	*Tadorna tadornoides*	Australian Shelduck		
AVES	*Thinornis rubricollis*	Hooded Plover		V
AVES	*Trichoglossus haematodus*	Rainbow Lorikeet		
AVES	*Tringa nebularia*	Common Greenshank		
AVES	*Tringa stagnatilis*	Marsh Sandpiper		
AVES	*Turnix varia*	Painted Button-quail		V
AVES	*Vanellus miles*	Masked Lapwing		
AVES	*Zosterops lateralis*	Silvereye		
MAMMALIA	**Felis catus*	Cat		
MAMMALIA	**Oryctolagus cuniculus*	Rabbit		
MAMMALIA	**Vulpes vulpes*	Fox		
MAMMALIA	*Macropus fuliginosus*	Western Grey Kangaroo		
MAMMALIA	*Macropus sp.*			
MAMMALIA	*Trichosurus vulpecula*	Common Brushtail Possum		
REPTILIA	*Acanthophis antarcticus*	Common Death Adder		
REPTILIA	*Christinus marmoratus*	Marbled Gecko		
REPTILIA	*Cryptoblepharus virgatus*	Striped Wall Skink		
REPTILIA	*Ctenophorus pictus*	Painted Dragon		
REPTILIA	*Ctenotus orientalis*	Eastern Spotted Ctenotus		
REPTILIA	*Ctenotus schomburgkii*	Sandplain Ctenotus		
REPTILIA	*Delma molleri*	Adelaide Snake-lizard		
REPTILIA	*Diplodactylus vittatus*	Eastern Stone Gecko		
REPTILIA	*Hemiergis decresiensis*	Three-toed Earless Skink		
REPTILIA	*Hemiergis peronii*	Four-toed Earless Skink		
REPTILIA	*Lerista dorsalis*	Southern Four-toed Slider		
REPTILIA	*Lerista edwardsae*	Myall Slider		
REPTILIA	*Menetia greyii*	Dwarf Skink		
REPTILIA	*Morethia obscura*	Mallee Snake-eye		
REPTILIA	*Nephrurus milii*	Barking Gecko		
REPTILIA	*Pogona barbata*	Eastern Bearded Dragon		
REPTILIA	*Pseudonaja sp.*			
REPTILIA	*Pseudonaja textilis*	Eastern Brown Snake		
REPTILIA	*Ramphotyphlops bituberculatus*	Rough-nosed Blind Snake		

Class	Species Name	Common Name	Conservation Status	
			AUS	SA
REPTILIA	*Strophurus intermedius*	Southern Spiny-tailed Gecko		
REPTILIA	*Tiliqua rugosa*	Sleepy Lizard		
REPTILIA	*Varanus gouldii*	Sand Goanna		

*Denotes exotic species

Key
Regions: AUS = Australia, **SA** = South Australia

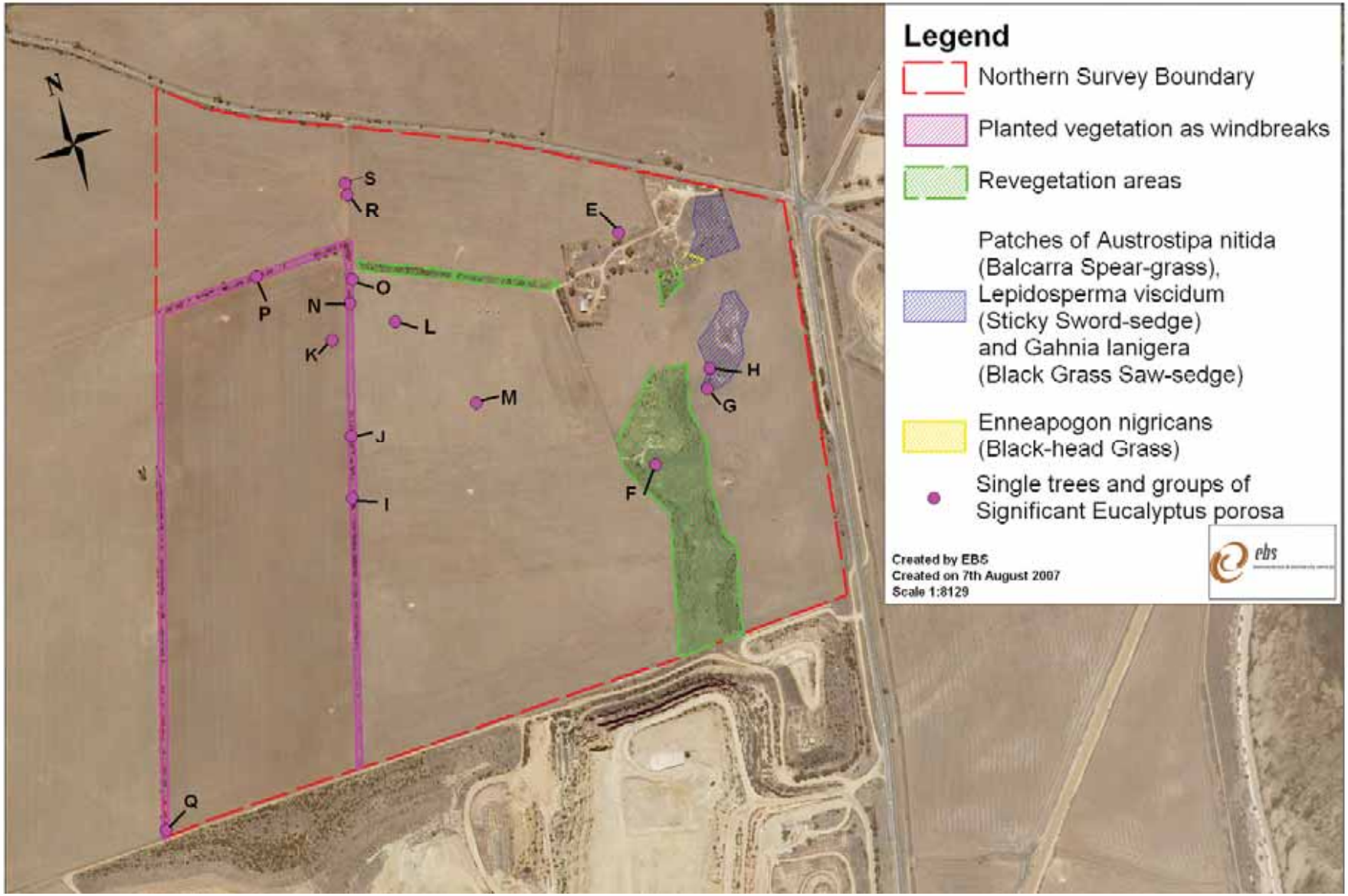
Conservation ratings:
V = Vulnerable, **R** = Rare,
VU = Vulnerable

Appendix 4. Opportunistic fauna observations recorded within the survey area.

Class	Species Name	Common Name	No. observed	Comments
AVES	*Acanthiza chrysorrhoa*	Yellow-rumped Thornbill	2	Observed within a patch of *Eucalyptus porosa* within the grazed paddock
AVES	**Colomba livia*	Feral Pigeon	>50	Observed within the old homested area nesting in old sheds
AVES	*Coracina novanaehollandiae*	Black-faced Cuckoo-shrike	1	Observed within the paddock wind break area
AVES	*Corvus coronoides*	Australian Raven	3	Feeding within the open paddocks
AVES	*Eolophus roseicapillus*	Galah	2	Flew over survey area
AVES	*Grallina cyanoleuca*	Magpie Lark	2	Observed within a patch of *Eucalyptus porosa* within the grazed paddock
AVES	*Gymnorhima tibicen*	Australian Magpie	4	Feeding within the open paddocks
AVES	*Lichenosomus virescens*	Singing Honeyeater	2	Observed within a patch of *Eucalyptus porosa* within the grazed paddock
AVES	*Malurus lyaneus*	Supurb Blue Fairy-wren	>6	Observed within a patch of *Eucalyptus porosa* within the grazed paddock
AVES	*Manorina melanocephrys*	Noisy Miner	2	Observed within the old homested area
AVES	*Myiagra inquieta*	Restless Flycatcher	1	Observed within a patch of *Eucalyptus porosa* within the grazed paddock
AVES	*Ocyphaps lopohotes*	Crested Pigeon	>100	Observed scattered throughout the survey area
AVES	**Passer domesticus*	House swallow	>10	Observed within the old homested area
AVES	*Phalacrocorax sp.*	Cormorant	1	Dead individual found in grazed paddock
AVES	*Rhipidura leucophrys*	Willie Wag-tail	1	Observed near a patch of *Eucalyptus porosa* within the grazed paddock
AVES	**Stumus vulgaris*	Common Starling	>100	Observed scattered throughout the survey area
MAMMALIA	*Macropus sp*	Kangaroo		Scats found
MAMMALIA	**Oryctolagus cuniculus*	European Rabbit	1	Scats, warrens and 1 individual observed
MAMMALIA	**Ovis aries*	Sheep	>100	Grazing within the grazed paddocks
MAMMALIA	**Vulpes vulpes*	Fox	1	Observed within the revegetation area
REPTILLIA	*Tiliqua rugosa*	Sleepy Lizard	1	Observed on the western roadside near vegetation within the roadside reserve
REPTILLIA		Skink sp.	1	Observed on the eastern roadside within the roadside reserve

*Denotes exotic species

Appendix 7 Scattered trees and locations of species of conservation significance within the northern section of the survey area



Appendix 8 Scattered trees and locations of species of conservation significance within the southern section of the survey area

Appendix 9 Datasheets for scattered trees and small groups of trees

Tree ID	Species Name	NATIVE VEGETATION (Y N)	NO IN GROUP	SINGLE-STEMMED(S) OR MULTI-STEMMED(MS) SPECIMEN	BUTT DIA (M). IN GROUP AND/OR MS SITUATIONS INSERT **HIGHEST** RANGE READING	BUTT DIA (M). ONLY USE THIS COLUMN IN A GROUP AND/OR MS SITUATION INSERT **LOWEST** RANGE	NO IN GROUP WITH BUTT DIA. 0.15+ OR MS 0.10+	HEIGHT (M). IN GROUP SITUATIONS INSERT **HIGHEST** RANGE READING	HEIGHT (M). ONLY USE THIS COLUMN IN A GROUP SITUATION INSERTING **LOWEST** RANGE READING	SPREAD (M). IN GROUP AND/OR MS SITUATIONS INSERT **HIGHEST** RANGE READING	SPREAD (M). ONLY USE THIS COLUMN IN A GROUP SITUATION INSERTING **LOWEST** RANGE READING	HEALTH & CONDITION * (VG G F P D)	EXISTING ECOLOGICAL VALUE ** (VHV HV MV LV NV)	EXISTING LANDSCAPE/AMENITY VALUE ** (VHV HV MV LV NV)	RADIUS OF CANOPY (METRES)	CANOPY AREA (m2)	% DIEBACK	HOLLOWS (NUMBER)	HOLLOW ENTRANCE SIZE (METRES)	WILDLIFE HABITAT VALUE CATEGORIES (LABELLED 1 - 6)										TOTAL SCORE	RECOMMENDATION	REPLANTING AREA REQUIRED (HA)	ADJUSTED REPLANTING AREA (HA)
																						1. HEIGHT (WEIGHTED)	**2.** HEALTH (WEIGHTED)	HOLLOWS 1, 2 OR 3 POINTS	**3.** HOLLOWS (WEIGHTED)	SUITABILITY FOR THREATENED SPECIES	**4.** THREATENED SPECIES (WEIGHTED) F	DENSITY	**5.** DENSITY (WEIGHTED) MV	PROXIMITY TO OTHER VEG	**6.** PROXIMITY TO OTHER VEG. (WEIGHTED)				
A	*Eucalyptus porosa*	Y	1	S	0.40			8		8		F	MV	MV	4.0	50	10	0	0.00	3.15	5.60	1	1.45	1	0.65	1	0.40	1	0.35	28.12	**0**	0.19	0.19
B	*Eucalyptus porosa*	Y	1	S/MS	0.26	0.45		8		12		G	HV	MV	6.0	113	5	0	0.00	3.15	5.80	1	1.45	1	0.65	1	0.40	1	0.35	29.60	**0**	0.20	0.20
C	*Eucalyptus porosa*	Y	80	S/MS	0.20	0.10	56	12	10	15	8	G	HV	HV	7.5	177	25	0	0.00	3.15	5.00	1	1.45	1	0.65	2	0.80	1	0.35	26.69	**0**	0.18	0.18
D	*Eucalyptus porosa*	Y	29	S/MS	0.71	0.14	9	12	8	8	3	G	HV	HV	4.0	50	5	0	0.00	3.15	5.80	1	1.45	1	0.65	2	0.80	1	0.35	32.72	**1**	FALSE	0.22
E	*Eucalyptus porosa*	Y	1	MS	0.46	0.17	1	9		10		G	HV	HV	5.0	79	2	0	0.00	3.15	5.92	1	1.45	1	0.65	1	0.40	1	0.35	30.52	**1**	FALSE	0.20
F	*Eucalyptus porosa*	Y	1	MS	0.52	0.30	1	9		10		G	MV	MV	5.0	79	15	0	0.00	3.15	5.40	1	1.45	1	0.65	1	0.40	1	0.35	26.69	**0**	0.18	0.18

Tree ID	Species Name	Y N	NO IN GROUP	SINGLE-STEMMED(S) OR MULTI-STEMMED(MS) SPECIMEN	BUTT DIA (M), IN GROUP AND/OR MS SITUATIONS INSERT **HIGHEST** RANGE READING	BUTT DIA (M), ONLY USE THIS COLUMN IN A GROUP AND/OR MS SITUATION INSERT **LOWEST** RANGE	NO IN GROUP WITH BUTT DIA 0.15+ OR MS 0.10+	HEIGHT (M), IN GROUP SITUATIONS INSERT **HIGHEST** RANGE READING	HEIGHT (M), ONLY USE THIS COLUMN IN A GROUP SITUATION INSERTING **LOWEST** RANGE READING	SPREAD (M), IN GROUP AND/OR MS SITUATIONS INSERT **HIGHEST** RANGE READING	SPREAD (M), ONLY USE THIS COLUMN IN A GROUP SITUATION INSERTING **LOWEST** RANGE READING	VG G F P D	VHV HV MV LV NV	VHV HV MV LV NV	RADIUS OF CANOPY (METRES)	CANOPY AREA (m2)	% DIEBACK	HOLLOWS (NUMBER)	HOLLOW ENTRANCE SIZE (METRES)	WILDLIFE HABITAT VALUE CATEGORIES (LABELLED 1 - 6)										TOTAL SCORE	RECOMMENDATION	REPLANTING AREA REQUIRED (HA)	ADJUSTED REPLANTING AREA (HA)
		NATIVE VEGETATION										HEALTH & CONDITION *	EXISTING ECOLOGICAL VALUE**	EXISTLANDSCAPE/AMENITY VALUE **						**1.** HEIGHT (WEIGHTED)	**2.** HEALTH (WEIGHTED)	HOLLOWS 1, 2 OR 3 POINTS	**3.** HOLLOWS (WEIGHTED)	SUITABILITY FOR THREATENED SPECIES	**4.** THREATENED SPECIES (WEIGHTED) F	DENSITY	**5.** DENSITY (WEIGHTED) MV	PROXIMITY TO OTHER VEG	**6.** PROXIMITY TO OTHER VEG. (WEIGHTED)				
G	*Eucalyptus porosa*	Y	5	MS	0.38	0.14	5	7	5	8	12	G	HV	HV	4.0	50	30	0	0.00	3.15	4.80	1	1.45	1	0.65	2	0.80	1	0.35	25.31	**0**	0.17	0.17
H	*Eucalyptus porosa*	Y	1	S	0.43		1	4		5		G	HV	MV	2.5	20	10	0	0.00	2.10	5.60	1	1.45	1	0.65	1	0.40	1	0.35	21.16	**0**	0.14	0.14
I	*Eucalyptus porosa*	Y	1	MS	0.39	0.31	1	4		12		G	HV	HV	6.0	113	5	0	0.00	2.10	5.80	1	1.45	1	0.65	1	0.40	1	0.35	22.38	**0**	0.15	0.15
J	*Eucalyptus porosa*	Y	1	MS	0.40	0.31	1	8		12		G	HV	MV	6.0	113	15	0	0.00	3.15	5.40	1	1.45	1	0.65	1	0.40	1	0.35	26.69	**0**	0.18	0.18
K	*Eucalyptus porosa*	Y	1	MS	0.48	0.32	1	7		12		G	HV	MV	6.0	113	5	0	0.00	3.15	5.80	1	1.45	1	0.65	1	0.40	1	0.35	29.60	**0**	0.20	0.20
L	*Eucalyptus porosa*	Y	1	MS	0.56	0.11	1	9		14		G	HV	MV	7.0	154	5	0	0.00	3.15	5.80	1	1.45	1	0.65	1	0.40	1	0.35	29.60	**0**	0.20	0.20
M	*Eucalyptus porosa*	Y	1	MS	0.50	0.36	1	8		12		F	MV	MV	6.0	113	5	0	0.00	3.15	5.80	1	1.45	1	0.65	1	0.40	1	0.35	29.60	**0**	0.20	0.20

Tree ID	Species Name	NATIVE VEGETATION (Y N)	NO IN GROUP	SINGLE-STEMMED(S) OR MULTI-STEMMED(MS) SPECIMEN	BUTT DIA (M). IN GROUP AND/OR MS SITUATIONS INSERT **HIGHEST** RANGE READING	BUTT DIA (M). ONLY USE THIS COLUMN IN A GROUP AND/OR MS SITUATION INSERT **LOWEST** RANGE	NO IN GROUP WITH BUTT DIA 0.15+ OR MS 0.10+	HEIGHT (M). IN GROUP SITUATIONS INSERT **HIGHEST** RANGE READING	HEIGHT (M). ONLY USE THIS COLUMN IN A GROUP SITUATION INSERTING **LOWEST** RANGE READING	SPREAD (M). IN GROUP AND/OR MS SITUATIONS INSERT **HIGHEST** RANGE READING	SPREAD (M). ONLY USE THIS COLUMN IN A GROUP SITUATION INSERTING **LOWEST** RANGE READING	HEALTH & CONDITION * (VG G F P D)	EXISTING ECOLOGICAL VALUE** (VHV HV MV LV NV)	EXIST LANDSCAPE/AMENITY VALUE ** (VHV HV MV LV NV)	RADIUS OF CANOPY (METRES)	CANOPY AREA (m2)	% DIEBACK	HOLLOWS (NUMBER)	HOLLOW ENTRANCE SIZE (METRES)	WILDLIFE HABITAT VALUE CATEGORIES (LABELLED 1 - 6)										TOTAL SCORE	RECOMMENDATION	REPLANTING AREA REQUIRED (HA)	ADJUSTED REPLANTING AREA (HA)
																						1. HEIGHT (WEIGHTED)	**2.** HEALTH (WEIGHTED)	HOLLOWS 1, 2 OR 3 POINTS	**3.** HOLLOWS (WEIGHTED)	SUITABILITY FOR THREATENED SPECIES	**4.** THREATENED SPECIES (WEIGHTED) F	DENSITY	**5.** DENSITY (WEIGHTED) MV	PROXIMITY TO OTHER VEG	**6.** PROXIMITY TO OTHER VEG. (WEIGHTED)				
N	*Eucalyptus porosa*	Y	4	S/MS	0.81	0.22	4	10	8	8	6	G	HV	HV	4.0	50	10	0	0.00	3.15	5.60	1	1.45	1	0.65	2	0.80	1	0.35	31.14	**1**	FALSE	0.21
O	*Eucalyptus porosa*	Y	1	MS	0.37	0.30		9		12		G	HV	MV	6.0	113	10	0	0.00	3.15	5.60	1	1.45	1	0.65	1	0.40	1	0.35	28.12	**0**	0.19	0.19
P	*Eucalyptus porosa*	Y	2	S/MS	0.40	0.31	2	9	7	12	8	G	HV	MV	6.0	113	10	0	0.00	3.15	5.60	1	1.45	1	0.65	2	0.80	1	0.35	31.14	**1**	FALSE	0.21
Q	*Eucalyptus porosa*	Y	34	S/MS	0.30	0.10	30	10	4	12	3	G	HV	MV	6.0	113	15	0	0.00	3.15	5.40	1	1.45	1	0.65	2	0.80	1	0.35	29.60	**0**	0.20	0.20
R	*Eucalyptus porosa*	Y	1	MS	0.28	0.20	1	10		15		G	HV	MV	7.5	177	5	0	0.00	3.15	5.80	1	1.45	1	0.65	1	0.40	1	0.35	29.60	**0**	0.20	0.20
S	*Eucalyptus porosa*	Y	1	MS	0.29	0.15	1	11		10		G	HV	MV	5.0	79	10	0	0.00	3.15	5.60	1	1.45	1	0.65	1	0.40	1	0.35	28.12	**0**	0.19	0.19

Appendix C

Engineering design details

4750 E
5000 E
5250 E
5500 E
5750 E
6000 E

N

4750 N
4500 N
4250 N
4000 N
3750 N
3500 N

RL x 90.7
RL x 92.2
RL x 92.0
RL x 91.7
RL x 92.4

RL×106.4
RL×99.9
RL×95.8
RL×91.3
RL×106.6
RL×101.7
RL×95.8
RL×92.5

TOE LINE ON NATURAL SURFACE
0.5%
ROAD
EXISTING
PERIMETER
ROAD
EXISTING
ROAD
TOE LINE ON NATURAL SURFACE
PERIMETER
ROAD
TOE LINE ON NATURAL SURFACE
0.5%
AIRSTRIP
DUMP No. 6
FENCE
FENCE
TOE LINE ON NATURAL SURFACE
0.5%
TOE LINE ON NATURAL SURFACE
FENCE
FENCE

10% SLOPE
50% SLOPE
50% SLOPE
10% SLOPE
10% SLOPE

95.0
90.0
90.0
85.0
85.0
80.0
80.0
95.0
85.0
95.0
100.0
105.0
100.0
105.0
100.0
105.0
100.0
TOE LINE ON NATURAL SURFACE
95.0

50 0 50 100 150 Metres

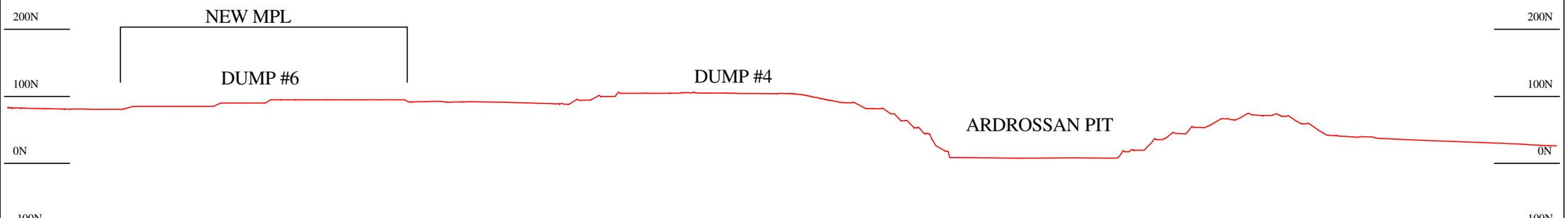
SCALE 1 : 2500 AT A1

HATCH				
DESIGNED BY E. McDONALD	DATE FEB. 06	DRAWN BY G. ASHWORTH	DATE FEB. 06	ONESTEEL - ARDROSSAN OPERATION WASTE DUMP EXPANSION AS DUMPED
CHECKED BY	DATE	DISCIP. ENGR.	DATE	
PROJ. DES. COORD.	DATE	PROJ. ENGR.	DATE	
PROJ. MGR. DATE		SCALE 1:2500 OR AS NOTED	DRG. NO. 321609-C-62-0001	REV. A

4600E 4700E 4800E 4900E 5000E 5100E 5200E 5300E 5400E 5500E 5600E 5700E 5800E 5900E 6000E 6100E 6200E 6300E 6400E 6500E 6600E 6700E 6800E

800N 700N 600N 500N 400N 300N 200N 100N 0N -100N -200N -300N -400N -500N -600N

EASTING GRID IS ACTUAL
NORTHING RUNS ACROSS THE PAGE
NORTHING GRID REPRESENTS HEIGHTS



4600E 4700E 4800E 4900E 5000E 5100E 5200E 5300E 5400E 5500E 5600E 5700E 5800E 5900E

section_1_str

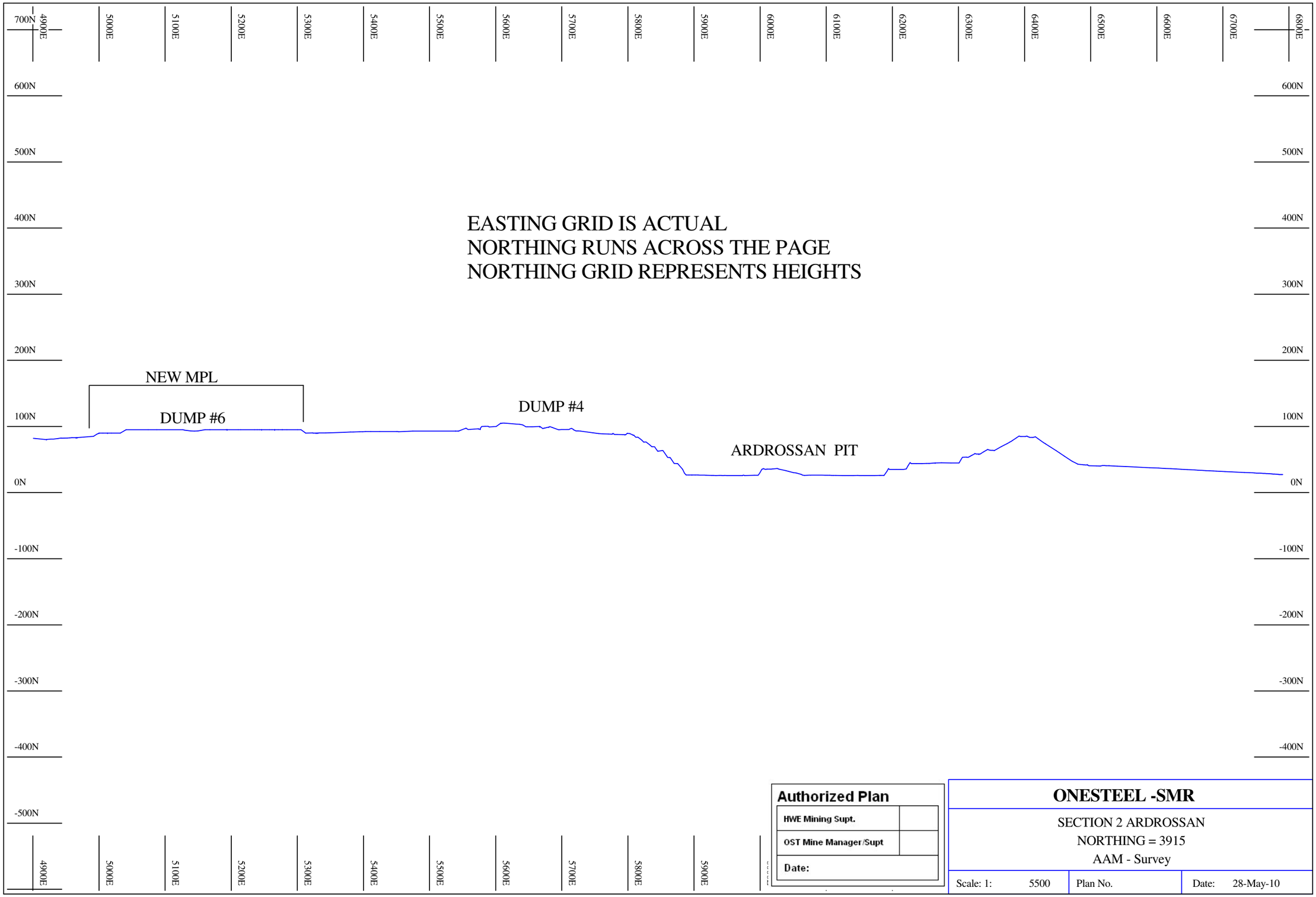
Authorized Plan	
HWE Mining Supt.	
OST Mine Manager/Supt	
Date:	

ONESTEEL -SMR

SECTION 1 ARDROSSAN
NORTHING = 4200
AAM - Survey

Scale: 1: 6500	Plan No.	Date: 28-May-10

SURPAC - Gemcom Software



section_2_str_01

Authorized Plan	
HWE Mining Supt.	
OST Mine Manager/Supt	
Date:	

ONESTEEL -SMR

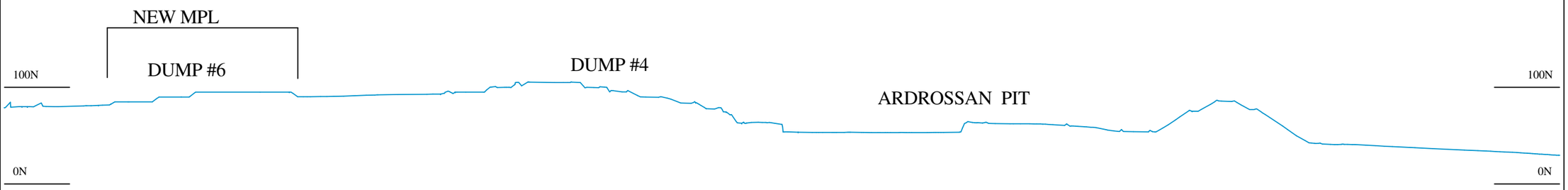
SECTION 2 ARDROSSAN
NORTHING = 3915
AAM - Survey

Scale: 1:	5500	Plan No.	Date:	28-May-10

5100E 5200E 5300E 5400E 5500E 5600E 5700E 5800E 5900E 6000E 6100E 6200E 6300E 6400E 6500E 6600E

500N
400N
300N
200N
100N
0N
-100N
-200N
-300N
-400N

EASTING GRID IS ACTUAL
NORTHING RUNS ACROSS PAGE
NORTHING GRID REPRESENTS HEIGHTS



5100E 5200E 5300E 5400E 5500E 5600E 5700E 5800E 5900E 6000E

section_3_str

Authorized Plan	
HWE Mining Supt.	
OST Mine Manager/Supt	
Date:	

ONESTEEL -SMR

SECTION 3 ARDROSSAN
NORTHING = 3760
AAM - Survey

Scale: 1:	4500	Plan No.	Date:	28-May-10

SURPAC - Gemcom Software

Appendix D

Environment risk assessment register

ID	Aspect	Impact	Inherent Risk Level			Design Control Measure	Operational Management Measures	Residual Risk Level			Predicted Outcome	Assessment Criteria
			Likelihood	Consequence	Risk			Likelihood	Consequence	Risk		
Flora and Native Vegetation												
MPL_01	Clearing of vegetation for waste rock dump	Potential for reduced species abundance both locally and regionally due to clearing activities	Unlikely	Insignificant	Low	Waste rock dump designed to minimise amount of vegetation clearance	Rehabilitation to include local and regionally endemic species	Unlikely	Insignificant	Low	Predicted outcomes and assessment criteria have only been developed for environmental aspects with an IRL of moderate or higher.	Predicted outcomes and assessment criteria have only been developed for environmental aspects with an IRL of moderate or higher.
MPL_02	Clearing of vegetation for waste rock dump	Adverse effects on threatened species due to clearing activities	Rare	Moderate	Moderate	No design control measures proposed	Vegetation surveys have not identified any threatened species on site and rehabilitation is to include local and regionally endemic species	Rare	Moderate	Moderate	All clearance of native vegetation is authorised under appropriate legislation.	Actual clearance boundaries versus authorised clearance boundaries (output from site GIS).
Fauna												
MPL_03	Clearing of agricultural land for the waste rock dump	Reduction in amount of land available for grazing	Likely	Insignificant	Moderate	No design control measures proposed	Site rehabilitation procedure and activities will facilitate agricultural land use post mine operation.	Unlikely	Insignificant	Low	To recreate a safe, stable, vegetated landform that is consistent with surrounding conditions and allows the re-establishment of agricultural land use.	The post mining landscape is resilient, self sustaining and indicating that the agricultural land use function will ultimately be achieved.
MPL_04	Clearing of agricultural land for the waste rock dump	Adverse effects on available habitat and reduction in species abundance due to vegetation clearing	Unlikely	Minor	Low	Design to minimise amount of vegetation clearance	Progressive clearing and revegetation	Unlikely	Insignificant	Low	Predicted outcomes and assessment criteria have only been developed for environmental aspects with an IRL of moderate or higher.	Predicted outcomes and assessment criteria have only been developed for environmental aspects with an IRL of moderate or higher.
Pest Plants												
MPL_05	Importation or spreading of weed propagules	Spread of existing or introduction of new weed infestation on site	Likely	Moderate	High	No design control measures proposed	Weed management procedures and activities have been developed and are currnetly being implemented on site (including vehicle washdown instructions). These existing procedures and requirements will cover the operations associted with the waste rock dump.	Possible	Minor	Moderate	No introduction of new weeds, plant pathogens or pests (including feral animals), nor increase in abundance of existing weed or pest species in the MPL and adjacent areas caused by mining operations.	Ongoing surveys of feral / pest animals. Comparison of results against existing site information to demonstrate no long term unmanageable introduction of feral species or increase in abundance within the MPL area.
MPL_06	Importation or spreading of plant pathogens	Introduction plant pathogens to site	Unlikely	Minor	Low	No design control measures proposed	Weed management procedures and activities have been developed and are currnetly being implemented on site (including vehicle washdown instructions). These existing procedures and requirements will cover the operations associted with the waste rock dump.	Unlikely	Minor	Low	Predicted outcomes and assessment criteria have only been developed for environmental aspects with an IRL of moderate or higher.	Predicted outcomes and assessment criteria have only been developed for environmental aspects with an IRL of moderate or higher.
Dust and Air Quality (including Greenhouse Gas)												
MPL_07	Wind generated dust	Dust generated from site impacts nearby sensitive receiver(s)	Unlikely	Moderate	Moderate	No design control measures proposed	Existing site dust suppression activities will include the new waste rock dump. Site dust montitoring activities will continue.	Unlikely	Minor	Low	No longterm increase in monitored dust levels on an around operations.	Ongoing dust monitoring. Comparison of results against existing site information to demonstrate no longterm increase in dust generation from site operations.
MPL_08	Haulage vehicle generated dust	Dust generated from haulage vehicle impacts users of Main Coast Rd	Unlikely	Moderate	Moderate	Haul road designed with suitable surface for use.	Existing site dust suppression activities will include the new waste rock dump. Site dust montitoring activities will continue.	Unlikely	Minor	Low	No longterm increase in monitored dust levels on an around operations.	Ongoing dust monitoring. Comparison of results against existing site information to demonstrate no longterm increase in dust generation from site operations.
Noise and Vibration												
MPL_09	Generation of noise and vibration (associated with vehicles and mine machinery)	Possible disturbance to nearby sensitive receiver(s)	Possible	Moderate	High	No design control measures proposed	Noise and vibration management activities developed and implemented on site will continue and will cover the new waste rock dump.	Unlikely	Moderate	Moderate	No longterm increase in monitored noise levels associated with mine operations.	Ongoing noise monitoring. Comparison of results against existing site informatino to demonstrate no longterm increase in noise generation from site operations.
Radiation and Asbestiform materials												
MPL_10	Radiation	Radiation impacts to soil, water, air and biological impacts	Unlikely	Minor	Low	No design control measures proposed	No specific operational management measures proposed.	Unlikely	Minor	Low	Predicted outcomes and assessment criteria have only been developed for environmental aspects with an IRL of moderate or higher.	Predicted outcomes and assessment criteria have only been developed for environmental aspects with an IRL of moderate or higher.
MPL_11	Asbestiform materials	Adverse impacts to workers or fauna	Unlikely	Minor	Low	No design control measures proposed	No specific operational management measures proposed.	Unlikely	Minor	Low	Predicted outcomes and assessment criteria have only been developed for environmental aspects with an IRL of moderate or higher.	Predicted outcomes and assessment criteria have only been developed for environmental aspects with an IRL of moderate or higher.
Land Use and Visual Amenity												
MPL_12	Operation of waste rock dump	Reduced availability of agricultural land	Likely	Insignificant	Moderate	No design control measures proposed	Site rehabilitation procedure and activities will facilitate agricultural land use post mine operation.	Unlikely	Insignificant	Low	To recreate a safe, stable, vegetated landform that is consistent with surrounding conditions and allows the re-establishment of agricultural land use.	PIRSA sign off indicating acceptable rehabilitation and post mining landform. Landowner sign off indicating acceptable rehabilitation and post mining landforms.
MPL_13	Operation of waste rock dump	Reduced visual amenity in project area (local and regional)	Likely	Minor	High	Soil and overburden stockpiles will be designed to address appropriate height and gradient requirements.	Site rehabilitation procedure and activities will facilitate agricultural land use post mine operation.	Possible	Insignificant	Low	To recreate a safe, stable, vegetated landform that is consistent with surrounding conditions and allows the re-establishment of agricultural land use.	PIRSA sign off indicating acceptable rehabilitation and post mining landform. Landowner sign off indicating acceptable rehabilitation and post mining landforms.
Air Traffic												
MPL_14	Operation of waste rock dump	Decreased safey of airfield users associated with overburden stockpile heights	Unlikely	Moderate	Moderate	Overbudern stockpile design (heights) to be designed to address CASA requirements and facilitate ongoing use of airfield.	Waste rock stockpile heights to be maintained to design heights. Stockpile heights to be checked as per current site mangement requirements and schedule.	Unlikely	Minor	Low	There are no air traffic incidents resulting from mine operations that could have been reasonably prevented.	Investigation evidence (records, reports etc)

ID	Aspect	Impact	Inherent Risk Level			Design Control Measure	Operational Management Measures	Residual Risk Level			Predicted Outcome	Assessment Criteria
			Likelihood	Consequence	Risk			Likelihood	Consequence	Risk		
Surface Water												
MPL_15	Operation of waste rock dump	Increased flows to to existing surface water drainage system.	Unlikely	Minor	Low	Drainage system design to include collection and storage. Design to be complementary to currnet site drainage system and requirements.	Site maintenance schedule to be updated to inlcude additional site drainage elements associated waste rock dump	Unlikely	Minor	Low	Predicted outcomes and assessment criteria have only been developed for environmental aspects with an IRL of moderate or higher.	Predicted outcomes and assessment criteria have only been developed for environmental aspects with an IRL of moderate or higher.
MPL_17	Operation of waste rock dump	Impacts to off site stormwater quality associated with release of sediment laden water.	Likely	Minor	High	All stockpiles / dumps will be constructed in a manner so as to minimise water run-off and erosion.	Monitoring dump drainage and appropriate sediment / erosion control developed.	Possible	Minor	Moderate	Migration or infiltration of any leakage to the surrounding environment is prevented (in accordance with the Environment Protection Authority Code of Practice for Stormwater Pollution Prevention).	Demonstrate that facilities are designed in accordance with EPA Code of Practice for Stormwater Pollution Prevention (via a post construction audit).
Groundwater												
Waste rock dump establishment and operation will not involve extraction or interaction with groundwater. As a result, no risk assesment has been underataken for this aspect of the project.												
Aboriginal Heritage												
MPL_18	Operation of mining operation	Disturbance to Aboriginal sites of Aboriginal significance (without prior approval)	Unlikely	Moderate	Moderate	No design control measures proposed	Procedures to be implemented in the event a discovery is made. Procedure will be included in mine operational management plans. Protocol will address all statutory reporting requirements.	Unlikely	Minor	Low	No disturbance to Aboriginal artefacts or sites of significance unless prior approval under the relevant legislation is obtained.	Demonstration that no operations have been undertaken in areas for which heritage clearance has not been gained. Demonstration of compliance with regulatory requirements in the event of a discovery (through internal incident reporting procedure and requirements).
Non-Aboriginal Heritage												
MPL_19	Operation of mining operation	Disturbance to non-indigenous historic and cultural heritage sites	Unlikely	Moderate	Moderate	No design control measures proposed	Procedures to be implemented in the event a discovery is made. Procedure will be included in mine operational management plans. Protocol will address all statutory reporting requirements.	Unlikely	Minor	Low	No disturbance to Non-Aboriginal items or sites unless prior approval under the relevant legislation is obtained.	Demonstration of compliance with regulatory requirements in the event of a discovery (through internal incident reporting procedure and requirements).
Hydrocarbon and Chemical Storage												
No hydrocarbon and chemical storage facilities / activities will be undertaken on the waste rock dump. As a result, no risk assessment has been undertaken for this activity.												
Solid Waste Disposal (excluding waste rock)												
No solid waste collection or storage facilities / activities will be undertaken on the area associated with the extension. As a result, no risk assessment has been undertaken for this activity.												
Rehabilitation												
MPL_20	Vegetation establishment	Rehabilitation failure due to poor preparation and vegetation establishment in rehabilitation areas	Likely	Minor	High	No design control measures proposed	Site procedures and method statements to identify rehabilitation requirements including rehabilitation area preparation, species requirements.	Unlikely	Minor	Low	To recreate a safe, stable, vegetated landform that is consistent with surrounding conditions and allows the re-establishment of agricultural land use.	The post mining landscape is resilient, self sustaining and indicating that the agricultural land use function will ultimately be achieved.
MPL_21	Soil Management	Rehabilitation failure associated with long-term compaction and stockpiling during operations.	Possible	Moderate	High	Stockpile heights to be designed to maintain soil viability and use in rehabilitation activities.	Site procedures and method statements to identify management requirements addressing soil compaction minimisation and soil stockpile management.	Unlikely	Moderate	Moderate	To recreate a safe, stable, vegetated landform that is consistent with surrounding conditions and allows the re-establishment of agricultural land use.	The post mining landscape is resilient, self sustaining and indicating that the agricultural land use function will ultimately be achieved.
MPL_22	Soil stability	Unacceptable erosion rates resulting in rehabilitation failure	Likely	Moderate	High	Stockpile heights to be designed to maintain soil viability and use in rehabilitation activities.	Site procedures and method statements to identify management requirements addressing erosion and sedimentation management, inspections and corrective action requirements.	Unlikely	Moderate	Moderate	To recreate a safe, stable, vegetated landform that is consistent with surrounding conditions and allows the re-establishment of agricultural land use.	The post mining landscape is resilient, self sustaining and indicating that the agricultural land use function will ultimately be achieved.
Closure												
MPL_23	Post-mining landform	Reduced availability of agricultural land	Possible	Minor	Moderate	Final mine landform to be designed to maximise agricultural use where possible	Rehabilitation procedure to include extended mine area and address rehabilitation of agricultural land post mine use.	Possible	Minor	Moderate	To recreate a safe, stable, vegetated landform that is consistent with surrounding conditions and allows the re-establishment of agricultural land use.	PIRSA sign off indicating acceptable rehabilitation and post mining landform. Landowner sign off indicating acceptable rehabilitation and post mining landforms.
MPL_24	Post-mining landform	Injury or death of land owners and/or public due to subsidence or failure of pit walls/slopes.	Unlikely	Major	High	All final landform slopes to be designed to be consistent with existing slope angles	Inspection of slope stability and photo monitoring at completion of rehabilitation.	Rare	Major	High	To recreate a safe, stable, vegetated landform that is consistent with surrounding conditions and allows the re-establishment of agricultural land use.	PIRSA sign off indicating acceptable rehabilitation and post mining landform. Landowner sign off indicating acceptable rehabilitation and post mining landforms.
MPL_25	Post-mining landform	Reduced visual amenity in project area (local and regional)	Likely	Minor	High	Final mine landform to be designed to address visual amenity	Rehabilitation procedure to include extended mine area and address rehabilitation of agricultural land post mine use.	Unlikely	Insignificant	Low	To recreate a safe, stable, vegetated landform that is consistent with surrounding conditions and allows the re-establishment of agricultural land use.	PIRSA sign off indicating acceptable rehabilitation and post mining landform. Landowner sign off indicating acceptable rehabilitation and post mining landforms.

Appendix E

EMS Certification

Certified
Environmental
Management

CERTIFICATE OF REGISTRATION

OneSteel Manufacturing Pty Limited

ABN 42 004 651 325

Whyalla Steelworks & Trak-Lok

Port Augusta Road WHYALLA SA 5600 AUSTRALIA
38 Heath Street LONSDALE SA 5160 AUSTRALIA
Alternate Highway One WHYALLA SA 5600 AUSTRALIA
Lot 4827 Section 32 Bowman Road ARDROSSAN SA 5571 AUSTRALIA
Iron Duke Mines Port Augusta Road WHYALLA SA 5600 AUSTRALIA

complies with the requirements of

AS/NZS ISO 14001:2004

Environmental Management Systems - Specification with Guidance for Use.

for the following capability

The registration covers the Environmental Management System for the manufacture of a range of steel products principally for the construction, rail and re-rolling industries. The registration includes open cut mining and ore processing, export of ore products, iron ore pelletising, coke making, iron making, steel making, casting, rolling, despatch and manufacture of railway sleeper systems at the Whyalla and Lonsdale sites. The registration also covers support services including environment, power and services, engineering, maintenance services and administration.

Registered by:

SAI Global Certification Services Pty Ltd (ACN 108 716 669) 286 Sussex Street Sydney NSW 2000 Australia with SAI Global Limited ("SAI Global") and subject to the SAI Global Terms and Conditions for Certification. While all due care and skill was exercised in carrying out this assessment, SAI Global accepts responsibility only for proven negligence. This certificate remains the property of SAI Global and must be returned to SAI Global upon its request.

Originally certified to AS/NZS ISO14001:1996 on 27 November 2001

Certificate No.: C10317
Issue Date: 27 February 2008

Certified Date: 05 December 2005
Expiry Date: 27 November 2010

Alex Ezrakhovich
General Manager Certification
for and on behalf of
SAI Global Limited

Tony Wilson
Authorised Local Signatory, SAI Global

SAI GLOBAL

ANAB ACCREDITED

SAI Global standards assurance innovation SAI Global

JAS-ANZ

IAF MEMBER OF MULTILATERAL RECOGNITION ARRANGEMENT

IQNet THE INTERNATIONAL CERTIFICATION NETWORK
MEMBER

Appendix F

Adjacent land owners


Mr Trevor Nixon &
Mrs Julie Nixon,
Maitland Road
Ardrossan 5571 SA
2km from proposed
MPL.
GM & AT Smith
BHP Road
Ardrossan SA 5571
500m from proposed
MPL
AP & GM Wheare
Goverment Road
Ardrossan 5571 SA
1 km from proposed
MPL