# FINAL REPORT

# Central West Coal Project
# Environmental Scoping Document

*Prepared for*

**Central West Coal Pty Ltd**

Suite 4, Level 3, South Shore Centre
83-85 The Esplanade
South Perth WA 6151

22 September 2008

42906631/618-F8539.3

URS

Project Manager:

pp Jenny Becher
Senior Associate Environmental Scientist

URS Australia Pty Ltd

Project Director:

Sonia Finucane
Senior Principal Environmental Scientist

Level 3, 20 Terrace Road
East Perth
WA 6004
Australia
Tel: 61 8 9326 0100
Fax: 61 8 9326 0296

Author:

Gillian Lane
Project Environmental Scientist

Date: 22 September 2008
Reference: 42906631/618-F8539.3
Status: Final

# Contents

# Contents

# Contents

# Tables & Figures

## Tables



## Figures



## Appendix



## List of Acronyms

| | |
|---|---|
| ANZECC | Australian and New Zealand Environment Conservation Council |
| ARD | Acid Rock Drainage |
| ARMCANZ | Australian and New Zealand Guidelines for Fresh and Marine Water Quality |
| ATSIC | Australian and Torres Strait Islander Commission |
| BoM | Bureau of Meteorology |
| CSIRO | Commonwealth Scientific and Industrial Research Organisation |
| DEC | Department of Environment and Conservation |
| DEWHA | Department of Environment, Water, Heritage and the Arts |
| DIA | Department of Indigenous Affairs |
| DMA | Decision Making Authority |
| DoCEP | Department of Consumer and Employment |
| DPI | Department of Planning and Infrastructure |
| DRF | Declared Rare Flora |
| DoH | Department of Health |
| DoIR | Department of Industry and Resources |

# Tables & Figures

| | |
|---|---|
| DoW | Department of Water |
| EIA | Environmental Impact Assessment |
| EMP | Environmental Management Plan |
| EPA | Environmental Protection Authority |
| EPASU | Environmental Protection Authority Service Unit |
| EP Act | *Environmental Protection Act* 1986 |
| EPBC Act | *Environment Protection and Biodiversity Conservation Act* 1999 |
| GDE | Groundwater Dependant Ecosystem |
| ha | hectare |
| Mt | million tonnes |
| NACC | North Agriculture Catchment Council |
| NCR | North Country Region |
| NOHSC | National Health and Safety Commission |
| ODAC | Office of Development and Approvals |
| PER | Public Environmental Review |
| PF | Priority Flora |
| ROM | Run Of Mine |
| SRE | Short Range Endemic (species) |
| SWIS | South West Interconnected System |
| TEC | Threatened Ecological Community |

# Section 1 Introduction

## 1.1 Overview

Central West Coal Pty Ltd, a wholly owned subsidiary of Aviva Corporation Limited (Aviva), proposes to develop the Central West Coal Project (the Project) located near Eneabba, WA (Figure 1). The Project will involve the mining of a 75 million tonnes (Mt) sub-bituminous coal deposit (the Central West Coal Deposit) as an energy source for the adjacent proposed Coolimba Power Station (Figure 2).

The Coolimba Power Station is a related project proposed by another proponent which will undergo a separate Environmental Impact Assessment (EIA). Coolimba Power Pty Ltd (a wholly owned subsidiary of Aviva) proposes to construct the 440 MW coal fired power station, which is also shown in Figure 2.

Cumulative impacts between the two projects will be included in each respective Project's documentation.

## 1.2 Purpose of this Document

The Environmental Protection Authority (EPA) Referral for the Central West Coal Project (the Project) was submitted to the EPA on 3 September 2007 and the EPA set the level of assessment at a Public Environmental Review (PER). Appeals on the level of assessment were received in October 2007 and on 8 January 2008 the Minister for Environment overruled the appeals and confirmed the level of assessment at PER.

A referral document (*Environment Protection and Biodiversity Conservation Act* 1999 [EPBC Act] Ref: 2007/3869) was submitted to Department of the Environment, Water, Heritage and the Arts (DEWHA) on 22 November 2007 for assessment under the EPBC Act. On 24 December 2007, the DEWHA decided that the proposal is a controlled action and that it will be assessed bilaterally under the WA process.

This Environmental Scoping Document has been prepared in accordance with the requirements of Part IV of the *Environmental Protection Act* 1986 (EP Act). It also jointly meets the requirements of the Commonwealth EPBC Act in providing Terms of Reference for the purposes of Commonwealth environmental assessment. The purpose of this document is to provide a framework for the formal environmental assessment of the Project. It outlines the basis for assessment by the EPA and DEWHA in respect to the scope of the PER, in addition to providing an indicative timeline for the assessment.

The purpose of this Environmental Scoping Document is to provide the Decision Making Authorities (DMAs) with information about the Project. This document:

- identifies the relevant environmental factors;
- provides a summary of potential environmental and social impacts;
- details the scope of works for the environmental investigations and studies to address the potential environmental impacts; and
- outlines the possible management responses to minimise potential adverse environmental impacts.

## 1.3 The Proponent

Central West Coal Pty Ltd, a wholly owned subsidiary of Aviva, is the proponent for the Project.

**Proponent Details:**

Central West Coal Pty Ltd
Suite 4, Level 3, South Shore Centre
83-85 The Esplanade
SOUTH PERTH WA 6151

# Section 1 Introduction

Telephone: (08) 9367 2344
Facsimile: (08) 9367 2355
Website: http://www.avivacorp.com.au

The contact person for this project is Robert Griffiths, Environmental Manager, Aviva.

Aviva is a Perth-based integrated energy company and is listed on the Australian Stock Exchange. Aviva also has an international presence and is listed on the Botswana Stock Exchange. The company has a portfolio of energy assets, including the Central West Coal Project (and associated Coolimba Power Project) in WA and the Mmamantswe Project in Botswana.

# Section 2 Project Description

## 2.1 Overview and Project Setting

Central West Coal Pty Ltd proposes to develop the Central West Coal Project near Eneabba, WA. The Project will involve the mining of a 75 Mt sub-bituminous coal deposit (the Central West Coal Deposit) as an energy source for the proposed Coolimba Power Station (Figures 2 and 3).

Mining will occur progressively and will comprise an open-cut strip mine to extract approximately 2 to 2.5 million tonnes per annum (Mtpa) of sub-bituminous coal. Based on the current estimate of reserves, the anticipated life of the mine is 30 years.

The mine will progress along the orebody and will have a disturbed open area of approximately 75 ha at any one time, with a continual backfill and progressive rehabilitation programme. Vegetation and topsoil will be cleared and stockpiled for use in progressive rehabilitation. Overburden will then be removed by dozer and transported to the waste dump to be used to backfill the pit. The coal will be trucked to the Run of Mine (ROM) area, crushed, screened and stockpiled ready to be conveyed to the power station (Figure 5).

The project will require pit dewatering, which will supply the Coolimba Power Project for cooling and process purposes. The mine will use approximately 665 kL/day of water for dust suppression, washdown and potable purposes.

The fly-ash and bottom-ash generated by the Coolimba Power Station will be progressively included in the backfill for the pit void. Approximately 380,000 tonnes of fly-ash will be disposed of into the pit each year. The Coolimba Power Project is currently undergoing a separate PER.

## 2.2 Mining Plan

### 2.2.1 The Coal Resource

Coal resources in the region occur within the Jurassic Cattamarra Coal Measures, the upper member of the Cockleshell Gully Formation within the Dandaragan Trough, a major fault bounded subdivision in the deepest part of the Perth Basin (The Minserve Group, 2006).

In the Project Area, three main coal horizons have been identified. In ascending order, these are the Eneabba Main seam (EMS), the Eighty seam (ETYE) and the Maxwell seams (MAX). These coal horizons are characterised by sequences of sandstones, siltstones grading to mudstones and claystones/shales and ultimately coals. The coal seams average between 3 and 5.5 m in thickness, with approximately 50 m between each successive coal horizon.

The deposit contains Measured and Indicated Resources for the EMS seams of 75.4 Mt to a depth of 130 m of which 42.4 Mt is Measured Resources with the potential to be extracted by open cut methods. A further 11.3 Mt of Inferred Resources have also been estimated to be present in the EMS seams to a depth of 130 m. Inferred Resources of approximately 2.5 Mt to a depth of 130 m occurs in the ETYE seam (The Minserve Group, 2006).

### 2.2.2 Site Preparation

Site preparation activities will be conducted prior to, and concurrently with, the progressive mining activities across the Project Area. Areas to be disturbed will be outlined by survey and delineated in the field with survey pegs and flagging tape before ground disturbance commences.

Vegetation and topsoil will be stripped and stockpiled with stockpiles of no more than 2 m high to maintain biological integrity.

Site preparation will include the initial stripping of overburden to allow mining to commence. Overburden will be removed by dozer given the soft nature of the material. No blasting is expected to be required. The

dozer will push the overburden in strips to a dozer trap which is then fed to a conveyor system to transport the overburden to the waste dump.

### 2.2.3 Mining

The resource will be mined as an open cut strip mine progressively removing and backfilling overburden and rehabilitating as mining advances. Approximately 75 ha of the pit will be open at any given time during mining operations (Figure 4). The pit will have an average width of 750 m and an average depth of 120 m.

Continuous miners will be used to mine the coal. Coal mining will proceed following overburden removal exposing a strip of coal and then mining down-dip as quickly as possible. Typical continuous miners can cut approximately 4 m in height, so two passes will be made over an 8 m seam.

## 2.3 Dewatering

Mine dewatering will be required to ensure safe and stable conditions during open pit mining. A hydrogeological investigation is currently being undertaken by Rockwater Pty Ltd (Rockwater) to determine the dewatering requirements and assess the potential hydrogeological impacts for the Central West Coal Project. Water from the dewatering of the mine will be used in the Coolimba Power Station for cooling and process purposes. If water supplied by the mine is in excess of Coolimba's requirements, then the excess will be diverted to an evaporation pond, within the confines of the development footprint of the Central West Coal Project.

## 2.4 Waste Dump

Initially, overburden will be transported to the waste dump adjacent to the pit. Once the continual mining process is established, waste dumping will be carried out as backfill within the pit. The out-of-pit waste dump will be approximately 10 $Mm^3$ in size, and cover an area of 120 ha with a height of 8 m.

## 2.5 Coal Handling

Coal will be transported from the mine area to the ROM coal stockpile by truck or conveyor. Coal delivered to the ROM coal stockpile will be crushed and screened (Figure 5) then transferred by stacker to the ROM coal stockpile for storage. Following this, coal will be transferred from the ROM coal stockpile to the Coolimba Power Plant Project coal stockpile via a conveyance system.

## 2.6 Ash Disposal

Fly-ash and bottom-ash will be transported from the Coolimba Power Project to the Central West Coal Project and be disposed in the mine void during progressive mining and rehabilitation. Central West Coal Pty Ltd is currently characterising the geochemistry of the fly-ash from the Coolimba Power Project and investigating disposal containment structures and methods to minimise any potential impacts due to leaching.

## 2.7 Progressive Rehabilitation

Once the mine process has commenced and the initial prestrip is complete, the overburden removed from the advancing mine face will be placed at the rear of the open cut mine in the mine void. The power station fly-ash will be included in this backfill operation. Sub-surface soils and topsoil will be placed on top of the backfill and the ground surface rehabilitated as the mine progresses, to return the land to be similar to the original contours. At the conclusion of mining, a 100 ha mine void will remain.

# Section 2 Project Description

## 2.8 Resource and Infrastructure Requirements

### 2.8.1 Resource Requirements

***Water***

Water will be required for dust suppression, washdown and potable purposes during construction and operations. The water requirement for the Project will be approximately 243,000 kL/year. It is proposed that Central West Coal Pty Ltd will use mine dewatering to meet the Project's water requirements.

***Power***

The power supply for the coal mine will be sourced from the Coolimba Power Plant, once this is operational. It is anticipated that a connection will be made to either:

- an intermediate voltage supply of the power station; or
- to the high voltage export system with a step-down transformer.

The power transmission to the mine site will be by overhead lines.

During construction, onsite generators will be used to provide the power supply.

### 2.8.2 Support Infrastructure

Supporting infrastructure to the Project will include:

- access roads;
- laydown area;
- workshop;
- stores;
- fuel storage;
- communication systems;
- fire protection system;
- dewatering storage dam;
- waste disposal area; and
- administration offices.

### 2.8.3 Workforce

The construction workforce required for the Project (including for the related Coolimba Power Project) is expected to peak at approximately 600 people, sourced as much as possible from nearby towns such as Eneabba, Leeman, Jurien, Green Head, Coorow, Carnamah, Dongara, Geraldton and Badgingarra, as well as Perth. The construction workforce will be accommodated in an accommodation camp located near Leeman. The construction accommodation camp will be assessed outside the PER as a separate Project. The construction camp is not part of the scope for the PER and will be subject to a separate assessment.

The permanent workforce for the mine and power station will comprise approximately 100 people and it is anticipated that these people will reside in nearby towns.

# Section 3 Project Justification

The demand for energy in the South West Interconnected System (SWIS) continues to grow at approximately 120 MW each year. In addition to the growth in demand for the entire SWIS there is a strong local requirement for power in the Mid West region of WA. One of the recommendations of the MidWest Regional Minerals Study conducted by the Department of Industry and Resources (DoIR) (2000) was to enact policies to stimulate development of large power stations in the region.

A further study was conducted by DoIR (2004) titled “Energy for Minerals Development in the South West Coast Region of Western Australia”. The resulting report gave importance to the development of both energy and industry in the Mid West region. The study recommended that the “development of a northern Perth Basin coal mine as a source of energy supply to facilitate iron ore processing initiatives should be promoted”. The study also considered the contribution to the gross state product and number of long term full time jobs.

Establishing a coal mine and power station in the Mid West will also significantly reduce the “losses” (up to 12%) of energy incurred in transmitting electricity from the southern end of the grid to the far Mid West. In reducing the losses, the greenhouse emissions which are currently created to produce energy that is “lost” in transmission, will be eliminated.

Another benefit of a Mid West based generator would be the balancing of the SWIS. New generation in the Mid West will assist in meeting the State Government’s “Fuel Diversity Policy” and could provide the transmission capacity to support additional renewable energy projects, such as wind projects, in the region.

The Project, in conjunction with the Coolimba Power Project, will generate significant ongoing annual revenue over a life of 30 years. The Project will offer the following benefits to the Mid West and WA:

- Contribution to the local economy due to the provision of full-time employment for 100 personnel during operations, with additional contributions from flow-on impacts on service industries and other sectors of the economy.
- Contribution to the State economy resulting from taxes associated with salaries and the purchase of goods and services.

# Section 4 Project Alternatives

Central West Coal Pty Ltd has been seeking commercial utilisation options for its coal resource since securing access to the deposit in May 2004.

The technical characteristics of the coal preclude it from being a viable long term export product so the efforts of the company have been focused on finding domestic uses for the resource. The two options that have been considered are:

- pig iron production using the coal as an iron reductant; and
- energy generation using the coal as a fuel source.

Central West Coal Pty Ltd has selected the energy generation option as there is a ready market for energy in the North Country Region (NCR) of the SWIS and there is no ready supply of low grade iron, the other key ingredient for pig iron production. In addition, the technology for pig iron production from low ranking coals is not yet at a proven level.

# Section 5 Applicable Legislation, Guidelines and Standards

## 5.1 State Legislation

Western Australian State legislation and regulations relevant to the Project are:

- *Aboriginal Heritage Act* 1972.
- *Agriculture and Related Resources Protection Act* 1976.
- *Bush Fires Act* 1954.
- *Conservation and Land Management Act* 1984.
- *Contaminated Sites Act* 2003.
- *Dangerous Goods Safety Act* 2004.
- *Dangerous Goods (Transport) Act* 1998.
- *Environmental Protection Act* 1986.
- Environmental Protection (Noise) Regulations 1997.
- *Explosives and Dangerous Goods Act* 1961.
- *Health Act* 1911.
- *Heritage of Western Australia Act* 1990.
- *Land Administration (Amendments) Act* 1997.
- *Local Government Act* 1995.
- *Main Roads Act* 1930.
- *Mines Safety and Inspection Act* 1994.
- *Mining Act* 1978.
- *Occupational Safety and Health Act* 1984.
- *Planning and Development Act* 2005.
- *Pollution of Waters by Oil and Noxious Substances Act* 1987.
- *Rights in Water And Irrigation Act* 1914.
- *Mineral Sands (Eneabba) Agreement Act* 1975 (State Agreement Act).
- *Wildlife Conservation Act* 1950.
- *Waterways Conservation Act* 1976.
- *Water and Rivers Commission Act* 1995.

## 5.2 Commonwealth Legislation

Commonwealth legislation relevant to the Project is:

- *Australian Energy Market Act* 2004.
- *Australian Heritage Council Act* 2003.
- *Commonwealth Native Title Act* 1993.

- *Environment Protection and Biodiversity Conservation Act* 1999.

## 5.3 Guidelines, Standards and Policies

The following guidelines, standards and policies are relevant to the Project:

- Australian and New Zealand Environment Conservation Council (ANZECC) and Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000).
- Australian and New Zealand Minerals and Energy Council and Minerals Council of Australia Strategic Framework for Mine Closure (2000).
- Australian and Torres Strait Islander Commission (ATSIC), Department of Indigenous Affairs (DIA) and Department of Premier and Cabinet Citizens and Civics Unit – Consulting Citizens: Engaging with Aboriginal Western Australians (2004).
- Chamber of Minerals and Energy WA Inc. Mine Closure Guideline for Mineral Operations in Western Australia (2000).
- Department of Environment and Conservation (DEC) Water Quality Protection Guidelines No. 10 - Mining and Mineral Processing, Above-ground Fuel and Chemical Storage (2000).
- DEC Review of Waste Classification and Waste Definitions 1996 (as amended) (2005).
- DEC Contaminated Sites Management Series Bioremediation of Hydrocarbon-Contaminated Soils in Western Australia (2004a).
- DEC Western Australian State Greenhouse Strategy – WA Greenhouse Task Force (2004b).
- DoIR Mining in Arid Environments, Mining Environmental Management Guidelines (2006a).
- DoIR Mine Closure and Completion (2006b).
- DoIR Managing Acid and Metalliferous Drainage Handbook (2006c).
- DoIR Mine Rehabilitation, Leading Practice Sustainable Development Program for the Mining Industry (2006d).
- Department of Premier and Cabinet Citizens and Civics Unit – Consulting Citizens: A Resource Guide (2002).
- Department of Premier and Cabinet Citizens and Civics Unit – Consulting Citizens: Planning for Success (2003).
- Environment Protection and Heritage Council National Environmental Protection Measure (NEPM) for Ambient Air Quality (2003).
- EPA Position Statement No. 2 – Environmental Protection of Native Vegetation in Western Australia (2000a).
- EPA Position Statement No. 3 – Terrestrial Biological Surveys as an Element of Biodiversity Protection in Western Australia (2003a).
- EPA Position Statement No. 6 – Towards Sustainability (2004a).
- EPA Position Statement No. 7 – Principles of Environmental Protection (2004b).
- EPA Position Statement No. 9 – Environmental Offsets (2006).
- EPA Guidance Statement No. 8 (Draft) – Environmental Noise (2007).
- EPA Guidance Statement No. 12 – Minimising Greenhouse Gases (2002).

# Section 5 Applicable Legislation, Guidelines and Standards

- EPA Guidance Statement No. 18 – Prevention of Air Quality Impacts from Land Development Sites (2000b).
- EPA Guidance Statement No. 41 – Assessment of Aboriginal Heritage (2004c).
- EPA Guidance Statement No. 51 – Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment (2004d).
- EPA Guidance Statement No. 54 and 54a – Sampling of Subterranean Fauna in Groundwater and Caves (2003b).
- EPA Guidance Statement No. 56 – Terrestrial Fauna Surveys for Environmental Impact Assessment (2004e).
- EPA Guidelines for Preparing a Public Environmental Review/ Environmental Review and Management Programme (2008)
- EPA Interim Industry Consultation Guide to Community Consultation (2003c).
- National Occupational Health and Safety Commission (NOHSC). Approved Criteria for Classifying Hazardous Substances (NOHSC: 1008 [2002]).
- Standards Australia AS/NZS 4801 Occupational Health and Safety Management Systems (2001).

# Section 6 Existing Environment

## 6.1 Land Use

The site is located approximately 14 km south - southwest of Eneabba, a town of approximately 250 - 300 residents. This includes a number of farm residences scattered throughout the region, the closest of which is approximately 1.5 km west from the Central West Coal Mine.

The Project Area comprises a total disturbance footprint of approximately 1,500 ha, which includes previously cleared land with pockets of intact native vegetation and rehabilitated native vegetation. The current land uses on the site include pastoral activities, mineral sand mining and exploration. The areas surrounding the Project Area predominantly comprise pastoral land, nature reserves and Iluka's existing mineral sands mining activities.

## 6.2 Climate

The Eneabba region experiences a dry Mediterranean climate. Monthly climatic data averages are recorded by the Bureau of Meteorology (BoM) at the Eneabba weather station. The data indicate that Eneabba experiences mean maximum temperatures ranging from 19.6°C in July to 36.1°C in February and mean minimum temperatures ranging from 9.0°C in August to 19.5°C in February. Rainfall monthly averages range from 7.3 mm in January to 105.2 mm in June, with an annual average of 505.8 mm (BoM, 2007).

## 6.3 Geology

The geology of the region is characterised by tertiary sands overlying the Cockleshell Gully Formation which comprises sandstone, siltstone, shale, claystone and coal (Lowry, 1974). The Cockleshell Gully Formation is further divided into the upper Cattamarra Coal Measures Member and the lower Eneabba Member. The Cattamarra Coal Measures Member consists of interbedded shale, sandstone and coal seams. The Eneabba Member is distinguished by multi-coloured claystone (URS, 2006a).

The Project Area lies within the onshore northern Perth Basin, which is an Early Permian to Holocene extensional basin on the western edge of the Australian Craton. The basin has a complex deformational history, including two major tectonic phases; a Permian extension in a southwesterly direction and an Early-Cretaceous transtension to the northwest (URS, 2006b). The geology of the Project Area is typical of the regional geology, comprising sand overlying the Cattamarra Coal Measures Member of the Cockleshell Gully Formation. The sand layer is believed to be less than 10 m thick and overlies rock comprising interbedded to interlaminated sandstone and siltstone, claystone and coal seams (URS, 2006a).

## 6.4 Landform and Soils

The Project Area is located on the Eneabba Plain, between the Coastal Belt to the west and the Gingin Scarp to the east. The Eneabba Plain is formed by a series of ancient shorelines, lagoon and dune deposits and slopes gently downwards to the north and west (URS, 2006b).

A baseline study has been conducted by URS which indicates that no acid sulphate soils occur within the Project Area. The survey is discussed further in Section 8.2.

## 6.5 Surface Water

According to the Northern Agricultural Catchments Council (NACC) (2002), the Project Area lies within the Logue Catchment, which extends across the Arrowsmith Region, west of the Gingin Scarp onto the Swan Coastal Plain, and east of the North Coastal Dunes.

The Project Area contains a series of watercourses that form the headwaters of the Erindoon Creek. A string of wetlands, including Lake Indoon and Lake Logue are located to the northwest of the Project Area.

# Section 6 Existing Environment

Lakes Logue and Indoon are the largest components of a north-south chain of wetlands perched on aeolian sands. Lake Logue is a large seasonal freshwater lake. Lake Indoon is a permanent brackish lake, which is linked to Lake Logue by groundwater. It is a broad shallow claypan comprising grey soils, heavy bluish-grey clays and silty clays (ATA Environmental, 2001).

## 6.6 Hydrogeology

### 6.6.1 Groundwater

Superficial formations of Quaternary and Tertiary deposits cover the Project Area. Underlying the superficial formations is the Cattamarra Coal Measures.

The superficial formations consist mainly of silt, sand and clay in varying proportions. The superficial formations form an unconfined aquifer system. The aquifer predominantly consists of a shallow marine and aeolian sequence that has been deposited in strandlines parallel to the coast.

The groundwater flow system is bound by the Indian Ocean in the west and by the Gingin Scarp to the east. Upward leakage by discharge from the Cattamarra Coal Measures into the flow system takes place in the coastal area and locally. Throughflow and upward leakage also occurs from the Yarragadee Formation across the Warradarge Fault (URS, 2006b).

Groundwater levels in the Project Area reflect regional groundwater gradients, seasonal and long-term climate changes, groundwater abstraction and land clearing. Limited salinity data prior to 1990 suggest that land clearing has resulted in both local and regional increases in groundwater levels (NACC, 2002).

At the project site, groundwater levels are approximately 7 to 12 m below ground surface (URS, 2006b).

The Project Area is located within the Arrowsmith Area, which is a proclaimed groundwater management area. Existing groundwater users in the area abstract water for pastoral activities and mineral sand mining.

### 6.6.2 Groundwater Dependant Ecosystems

There is potential that the Project Area and surrounding region may contain Groundwater Dependant Ecosystems (GDEs). The types of GDEs that may occur in the region have been identified by Sinclair Knight Mertz (2001) as comprising:

- Terrestrial vegetation;
- River base flow systems;
- Aquifer and cave ecosystems;
- Wetlands; and
- Terrestrial fauna.

The extent of GDEs in the area is currently unknown, and will be investigated as part of the studies for the project.

## 6.7 Vegetation and Flora

### 6.7.1 Vegetation

Vegetation in the region primarily consists of Kwongan (sandplain) with a fairly uniform scrub heath assemblage containing patches of melaleuca thicket, with scattered trees and woodlands (Hopkins and Hnatiuk, 1981). The Kwongan vegetation is known to have high biodiversity values and supports endemic species. The study area described by Hopkins and Hnatiuk (1981) is slightly east of the Project Area, and demonstrated a considerable variation in the number of species recorded at each site.

A band of greatest species richness appeared along the overlap of two zones – the vegetation of the lateritic gravels to the east, and the vegetation of the deep sand of the west.

During spring 2005 and spring 2006, Mattiske Consulting Pty Ltd (Mattiske) conducted flora and vegetation surveys of the areas of vegetation within the relevant leases (Mattiske, 2007). During these surveys, 17 plant communities were recorded, including five heath communities, six scrub and thicket communities, and six eucalypt woodland communities. The remaining land areas consist mainly of cleared paddocks, with localised stands of trees.

### 6.7.2 Flora

The surveys conducted by Mattiske identified a total of 394 taxa (including subspecies and varieties) from 167 genera and 57 families within the survey area. Of these taxa, a total of 30 Priority Flora taxa, were identified, comprising two Priority 1 species, 10 Priority 2 species, 13 Priority 3 species and four Priority 4 species.

Previous records from the DEC indicate that there are potentially 12 Declared Rare Flora (DRF) species within the Project Area. Of these, six species are listed as Endangered and six are listed as Vulnerable under the EPBC Act. The records also indicated that the Project Area may contain Priority Flora, comprising five Priority 1, 11 Priority 2, 28 Priority 3 and 17 Priority 4 species. The locations of species of conservation significance are presented in Figure 6. Definitions of the flora conservation classifications are described in Appendix A.

### 6.7.3 Threatened Ecological Communities

One Threatened Ecological Community (TEC) occurs in the Eneabba region. This TEC, Community 72 Ferricrete Floristic Community, is listed as Vulnerable by the DEC. This TEC occurs to the northeast of the Project Area, and none of the native plant communities found in the survey area match this community.

No TECs listed under the EPBC Act occur near the Project Area.

### 6.7.4 Weeds

Twenty taxa recorded by Mattiske within the survey area are introduced species. None of the introduced species are listed under Section 37 of the *Agriculture and Related Resources Protection Act* 1976.

## 6.8 Fauna

### 6.8.1 Vertebrate Fauna

According to the DEC database, the wider Project Area could potentially support a range of vertebrate fauna species, including seven protected species. These comprise one bat, one skink and five bird species. Of these, three species are listed under Schedule 1 of the *Wildlife Conservation Act* 1950 and four species are listed as Priority 4 by the DEC. These species are listed below and the conservation significance classifications are described in Appendix A.

- Schedule 1:
  - *Cyclodomorphus branchialias* (a skink),
  - *Calyptorhynchus latirostris* (Carnaby's Black Cockatoo); and
  - *Calyptorhynchus baudinii* (White-tailed Black Cockatoo).
- Priority 4:
  - *Macroderma gigas* (Ghost Bat),

- *Ardeotis australis* (Australian Bustard),
- *Calamanthus campestris* (Rufous Fieldwren); and
- *Oreoica gutturalis* (Crested Bellbird).

A search of the EPBC database indicated that six species listed under the EPBC Act could potentially occur within or near the Project Area. These comprise one endangered species and five migratory species:

- Endangered:
  - *Calyptorhynchus latirostris* (Carnaby's Black Cockatoo);
- Migratory:
  - *Haliaeetus leucogaster* (White-bellied Sea-Eagle);
  - *Merops ornatus* (Rainbow Bee-eater);
  - *Ardea alba* (Great Egret, White Egret);
  - *Ardea ibis* (Cattle Egret); and
  - *Apus pacificus* (Fork-tailed Swift).

Descriptions of the conservation significance classifications are provided in Appendix A.

### 6.8.2 Invertebrate Fauna

DEC database searches and literature reviews indicate that there is a rare trapdoor spider species and four Priority invertebrate species known to occur in the region. Of these five species, there is one species listed under Schedule 1 of the *Wildlife Conservation Act* 1950 (Shield-backed Trapdoor Spider), one species is Priority 1 (a scorpion fly), one species is Priority 2 (a stick insect) and two species are Priority 3 (a cricket and a native bee).

The Shield-backed Trapdoor Spider (*Idiosoma nigrum*) is endemic to south-western Australia throughout the semi-arid central and northern wheatbelt, occurring mainly in *Eucalyptus-Acacia* woodlands and sclerophyll open forests. Most of the favourable habitat for the species has been cleared, and consequently its distribution has become fragmented. This species is currently under threat from land use activities, land clearing and from habitat loss caused by rabbits, galahs and secondary salinity (DEWHA, 2005 and Main, 2003).

There is also the potential for native land snails to occur within the Project Area. Advice from Dr Shirley Slack-Smith, a mollusc expert from the Western Australian Museum, indicates that a species of *Bothriembryon* may be present in the Eneabba area. Land snails could potentially be found near any rocky outcrops and surrounding flats within the Project Area.

### 6.8.3 Subterranean Fauna

There is the potential for stygofauna to occur in the vicinity of the Project Area. According to the EPA Guidance Statement No. 54 (EPA, 2003b), stygofauna are aquatic subterranean animals found in a variety of groundwater systems. The stygofauna in WA exhibit high levels of endemism and many of the species appear to have restricted ranges. In addition, the EPA considers that the WA stygofauna species have considerable scientific importance and conservation significance because they appear to represent links to the time when Australia was part of Gondwanaland, bordered by the Tethys Sea (EPA, 2003b).

It is known that stygofauna have been recorded in the Eneabba region. Records from the Western Australian Museum indicate that the copepod, *Metacyclops fiersi*, has been found previously in the groundwater of the Eneabba area (De Laurentiis, Pesce and Humphreys, 2001). This species was found in areas underlain by Tamala Limestone. Although there is no Tamala Limestone within the Project Area,

other areas in the vicinity are underlain by Tamala Limestone that are known to have populations of stygofauna.

## 6.9 Noise

Existing noise levels are generated mainly from existing mining operations and current traffic on the Brand Highway.

## 6.10 Air Quality

The Iluka Eneabba Operations occur near the township of Eneabba and comprise dry mining operations. Dust from these operations has been a concern to the local community. Iluka addressed this concern through meetings with the community and acted to reduce the dust generated at the minesite. The major sources of dust were roads, stripped areas, mining pits, stockpiles and tailings storage facilities. Dust at the site is monitored by dust deposition gauges, high volume air samplers and a real time dust monitor and associated weather station.

In addition to the Iluka operations, fugitive dust is prevalent in the area. Contributions to fugitive dust arise from wind passing over exposed areas of soil or land subject to erosion, suspended dust from vehicle movements over unsealed roads, bushfires, wind blown pollen and agricultural activities. Daily background dust levels vary significantly depending on location, meteorological conditions, proximity of major point sources and fugitive sources.

## 6.11 Conservation Values

There are two nature reserves located in close proximity to the Project. These are the South Eneabba Nature Reserve and Lake Logue Nature Reserve. The locations of the nature reserves are presented in Figure 6.

The South Eneabba Nature Reserve comprises two adjoining nature reserves (Reserves 27886 and 31030) with a total area of approximately 6,192 ha. They are located approximately 7 km south of Eneabba and adjoin the eastern boundary of the Project Area. The reserves are registered on the Register of the National Estate as they contain representative Kwongan vegetation with floristic richness and a high degree of species endemism.

The Lake Logue Nature Reserve is approximately 250 m from the northwest boundary of the Project Area. It is a “C” Class nature reserve vested in the National Parks and Nature Conservation Authority and managed for conservation of flora and fauna by the DEC.

The Lake Logue-Indoon system has been classified as a ‘Nationally Important Wetland’ by DEWHA.

## 6.12 Aboriginal Heritage

Archaeological and ethnographic sites may be present in the proposed mining areas, plant site and infrastructure corridors. All Aboriginal sites in WA are protected by the *Aboriginal Heritage Act* 1972, whether or not they are known to the DIA.

The DIA database provides the locations of known sites of Aboriginal importance. Searches of the DIA register of sites have been undertaken. There are no known sites of Aboriginal ethnographic or archaeological significance within the Project Area.

## 6.13 European Heritage

The Australian Heritage Database contains information about natural, historic and indigenous sites, including places in the following lists and places under consideration for any one of these lists:

- World Heritage List.

- National Heritage List.
- Commonwealth Heritage list.
- Register of the National Estate.

According to the Australian Heritage Database, the nearest place of European heritage found in the searches of the databases is McPherson Homestead in Carnamah, approximately 60 km from Eneabba. However, a number of lakes and reserves located in close proximity to the Project Area are listed on the Australian Heritage Database. The reserves within an approximate 10 km radius of the Project comprise:

- Lake Indoon Reserve;
- Lake Logue Nature Reserve;
- South Eneabba Nature Reserve;
- Beekeepers Nature Reserve; and
- Stockyard Gully Nature Reserve.

# Section 7 Stakeholder Consultation

## 7.1 Overview

The environmental approvals process is a public process and it is expected that proponents will consult with government agencies, Non-Government Organisations (NGOs) and the public to ensure that local issues and concerns are taken into account during the planning and environmental assessment of proposed projects.

Central West Coal Pty Ltd is committed to conducting a comprehensive stakeholder consultation programme and maintaining engagement with all relevant stakeholders throughout the life of the Project. Consultation with government agencies has already commenced and is being facilitated by the Office of Development and Approvals Coordination (ODAC) through the Integrated Project Approvals System (IPAS).

The objectives of Central West Coal Pty Ltd's stakeholder consultation programme are as follows:

- to identify individuals, groups and agencies with an interest in the proposed Project;
- to enable stakeholders to have access to relevant information regarding the Project;
- to provide a means for stakeholders to raise issues and concerns; and
- to identify main areas of environmental concern so that these concerns can be addressed in the EIA documentation being prepared for the Project.

## 7.2 Key Stakeholders

The consultation programme will involve a range of stakeholders, including:

**State Government Ministers**

- Minister for State Development – The Hon Eric Ripper.
- Minister for the Environment – The Hon David Templeman.
- Minister for Energy; Resources; Industry and Enterprise – The Hon Francis Logan.
- Minister for Mid West – The Hon Kim Chance.
- Minister for Communities – The Hon Sue Ellery.
- Minister for Local Government – The Hon Ljiljana Ravlich.
- Minister for Housing and Works, Indigenous Affairs and Heritage – The Hon Michelle Roberts.
- Minister for Planning and Infrastructure – The Hon Alannah MacTiernan.
- Minister for Regional Development and Fisheries – The Hon Jon Ford.
- Minister for Health –The Hon Jim McGinty.
- Minister for Water Resources – The Hon John Kobelke.

**Commonwealth Government**

- Department of the Environment, Water, Heritage and the Arts.
- Department of Agriculture, Fisheries and Forestry.
- National Environmental Protection Council.
- Australian Heritage Commission.

# Section 7 Stakeholder Consultation

**State Government**

- Environmental Protection Authority
- Environmental Protection Authority Service Unit (EPASU).
- ODAC.
- DoIR.
- DEC.
- Department of Water (DoW).
- Office of the Appeals Convenor.
- Department of Planning and Infrastructure (DPI).
- DIA.
- Department of Consumer and Employment Protection (DoCEP).
- Department of Agriculture and Food (DAFWA).
- Office of the Commissioner of Soil and Land Conservation.
- Department of Health (DoH).
- Department of Education and Training (DET).
- Main Roads Western Australia.
- Botanic Gardens and Parks Authority.

**Local Government**

- Shire of Carnamah.
- Shire of Coorow.

**Non-government Organisations (NGOs) and Community Interest Groups**

- Chamber of Minerals and Energy WA.
- Chamber of Commerce and Industry WA.
- Greening Australia - Reconnections Project.
- World Wide Fund For Nature.
- Australian Centre for Mining Environmental Research.
- Conservation Council of WA.
- Wildflower Society of WA.

**Communities**

- Eneabba.
- Leeman.
- Green Head.
- Coorow.

- Carnamah.
- Jurien.
- Dongara.
- Geraldton.
- Badgingarra.

## 7.3 Consultation to Date

A meeting was held with Mr John Güld and Mr Doug Betts of the EPASU on 14 August 2007. This meeting involved a briefing on the Project, discussion about the environmental approvals required and the key environmental issues that need to be addressed in the EIA. The key issues that were raised by the EPASU in relation to this Project were as follows:

- The Environmental Management Plan (EMP) should be submitted with the environmental assessment document.
- The potential impacts of fly-ash disposal into the mine void needs to be addressed.
- The potential impacts of acid rock drainage need to be addressed.
- Approval will be required from the DoIR to mine coal on mineral sands mining leases covered by a State Agreement Act for Iluka's operation.

A meeting with the Shire of Carnamah was held on 15 August 2007. The key issue raised was how the pit will be rehabilitated progressively.

A meeting with the Shire of Coorow was held on 15 August 2007. The meetings included the Councillors and the Chief Executive Officer of the Mid West Development Commission. The issues raised were as follows:

- Will the Project be drive in/drive out?
- Central West Coal Pty Ltd should look at opportunities to source workers from the local communities or house the workers within the local town.

A multi-agency briefing was conducted on 19 September 2007, as arranged by ODAC. The briefing was attended by the DoIR, DEC, DPI, DIA, DoCEP, DoW, DoH and the EPASU. Written comments and advice were received from these agencies. The key issues raised during the meeting were as follows:

- Land tenure and ownership details need to be defined before the EIA document is approved for public review.
- Acid rock drainage issues will need to be addressed in the EIA document.
- Aboriginal heritage surveys should be completed and copies forwarded to DIA.
- Applications for water licences can be assessed in parallel to assessment under Part IV of the EP Act. However, the assessment of applications cannot be finalised until Ministerial approval under Part IV of the EP Act has been received.

A meeting with DoIR was held on 21 September 2007 to obtain feedback and advice regarding the Project. A meeting was also held with the DEC Environmental Management Branch on 9 October 2007 to obtain advice on the scope of works for the environmental studies. The key issues raised were as follows:

- Will the tenure for the Central West Coal Project remain as Mining Lease M267SA or will a new mining lease be required?

# Section 7 Stakeholder Consultation

- Acid drainage issues will need to be considered for the overburden, ROM Pad, fly-ash, bottom-ash and the pit void.
- How will the pit be backfilled?
- Where will the accommodation camp be located?
- Screening should be considered to reduce the visual impact of the project.

An Open Day was held on 26 October 2007 in Eneabba. Approximately 60 members of the public attended and were provided with information on the Project. The key issues raised by community members were as follows:

- The permanent workforce should be housed within the Eneabba town site.
- What is the proposed schedule for the Project?

A briefing meeting was held with DoIR on 5 November 2007 which involved a presentation about the Project followed by questions from DoIR personnel. The key issues relating to the Project were in relation to tenure. DoIR advised that Central West Coal Pty Ltd should resolve whether a new mining lease will be required to mine coal on mineral sands mining leases covered by a State Agreement Act.

Central West Coal Pty Ltd met with the Office of the Appeals Convenor on 7 November 2007 to provide a briefing on the Project to the Appeals Convenor in response to appeals lodged in relation to the level of assessment set by the EPA. No issues were raised by the Appeals Convenor during this meeting.

A meeting with the DoW was held on 7 November 2007 to provide a briefing on the Project progress and discuss the water requirements for the Project. No issues were raised by the DoW during this meeting.

On 15 November 2007, Central West Coal Pty Ltd met with the Yued Working Group at Moora. The issues that were raised during this meeting were as follows:

- Employment opportunities for young people.
- Financial benefits to Yued people.
- Aboriginal heritage survey requirements.

An Initial Screening Meeting was held by the ODAC on 4 December 2007 with relevant government agencies. The purpose of the meeting was to discuss whether the Project Definition Document submitted had adequate information to enable agencies to proceed to scoping the assessment requirements. The agencies agreed that the Project could proceed to scoping the assessment requirements and the main issues raised during screening were:

- DoW – The main concerns are land tenure, water availability and water accessibility.
- DoIR – Land tenure and ownership details need to be addressed.
- DIA – Aboriginal Heritage Surveys should be conducted as soon as possible.
- EPASU – The EMP should not be submitted with the Scoping Document, and the PER must identify impacts and management clearly.
- DPI – Land access, leases and zoning. Other issues concerned environmental and social aspects.
- DEC – The plant type must be defined before the Project can be assessed for a Works Approval. Timelines should be extended for the PER period, and consultation should be increased. Further information is required regarding biodiversity, cumulative impacts and the lime source.
- DoCEP – Although absent from the meeting, DoCEP noted that the Proponent is aware that *Mines Safety and Inspection Act* 1994 approval is required.

- DoH – Emissions, water supply, waste, fauna, flora and vegetation, community infrastructure, public health and transport were all discussed as issues.

An Open Day was held in Leeman and Greenhead on 12 December 2007. The main issues raised were:

- Employment opportunities for local people.
- Opportunities for further consultation.
- Air quality impacts.

A meeting was held with representatives of the Northern Wildflower Conservation Council and the owners of the Western Flora Caravan Park on 12 December 2007. The main issues raised were:

- Clearing of vegetated land.
- Drainage of radioactive water into the Indian Ocean.

A meeting was held on 30 January 2008 with Shire of Coorow and the Shire of Carnamah to identify possible construction camp locations. A location was discussed and a plan to proceed was outlined.

A meeting was held on 7 February 2008 with the DoW to discuss the recent dewatering tests and possible future actions. The main issues raised were:

- Allocation limits in Cattammarra and Yaragadee aquifers surrounding the site.
- Limited available data to assess an allocation limit above the current levels.

A meeting was held on 14 February 2008 with the DEC Parks and Conservation Division. The main issues raised were:

- Direct and indirect impacts on vegetation within the Project Area and surrounding Nature Reserves as it is of high biodiversity and in very good condition.
- The impacts of any groundwater drawdown on the Threatened Ecological Community (TEC), wetlands and vegetation.

A meeting was held on 4 March 2008 with the DEC Industry Regulation Branch. The main issues raised were:

- The proponent would need to provide a mine closure plan in the PER and must include achievable rehabilitation criteria.
- A good dust management plan is essential for the Project.
- Appropriate air quality meteorological station data were essential to enabling accurate modelling of the ambient dust emissions.

A meeting was held on 13 March 2008 with the air quality branch of the EPASU. The main issues raised were:

- The proponent should ensure all criteria pollutants are included in the air quality modelling and any pollutants which are significant in their own right.
- The air quality assessment should examine chronic and acute health effects.
- Accurate meteorological data is key to accurate dust modelling.

A meeting was held on 11 March 2008 with the Department of Indigenous Affairs. The main issues raised were:

- The DIA agreed that the archaeological and ethnographic surveys would be conducted initially on a limited area to enable information to be submitted to the PER.

- A scope of future progressive archaeological and ethnographic studies would be included in the PER to ensure that all areas likely to be disturbed are covered by the appropriate survey.

A presentation was provided for the West Midlands Natural Resource Group at Dandaragan on 17 March 2008. The main issues raised were:

- Impact of dewatering on Lake Logue; and
- Rehabilitation of mine.

A presentation was given to the Shire of Coorow council meeting on 19 March 2008. The main issues raised were:

- Employment opportunities for local people; and
- Timetable for construction and operations.

An open day was held at Leeman on 19 March 2008 at the Leeman Recreation Centre. The main issues raised were:

- Employment and business opportunities for local people;
- Location of construction camp;
- Location and number of permanent workforce;
- Impact of dewatering on farmers' bores; and
- Timetable for construction and operations.

A meeting was held with the Southwest Aboriginal Land and Sea Council representing the Yued Group on 31 March 2008. The main issues raised were:

- Indigenous employment and training;
- Indigenous employment opportunities; and
- Heritage agreement.

## 7.4 Stakeholder Consultation Programme

Central West Coal Pty Ltd has developed a Stakeholder Consultation Plan which provides a framework for the consultation programme. The plan outlines Central West Coal Pty Ltd's commitment to involve all interested parties in full and frank disclosure of the plans for, benefits of, and impacts from the Project.

Numerous and continuous opportunities for all levels of the community will be created and welcomed as part of the consultation process. Community information days will be held in the immediate communities and with any other communities that request one. A mailout to all residents will be also be conducted inviting feedback.

Briefings/presentations will be offered to the following groups:

- Government Ministers.
- Government Agencies (including local shires).
- NGOs and Community Interest Groups.

Regular newsletters updating progress on the EIA and Project development will be circulated to interested parties and made available on the Company website.

# Section 8 Potential Environmental Impacts, Scope of Work and Management Commitments

## 8.1 Summary

Table 8-1 provides a summary of environmental factors relevant to the Project, the Proponent's objectives, the potential impacts, the investigations required and potential management activities.

The sections following Table 8-1 provide further information regarding the scope of work for the more detailed studies. These are:

- Landforms and soils;
- Acid rock drainage;
- Surface water;
- Vegetation and flora;
- Vertebrate fauna; and
- Invertebrate fauna.

# Section 8 Potential Environmental Impacts, Scope of Work and Management Commitments

## Table 8-1 Relevant Environmental Factors, Potential Impacts and Scope of Investigation

| Environmental Factor | Environmental Objectives | Potential Impacts | Investigations Required | Potential Management Activities |
|---|---|---|---|---|
| Conservation Values | To protect the environmental values of areas near the Project Area identified as having significant conservation value. | There are two nature reserves located in close proximity to the Project. These are the South Eneabba Nature Reserve and Lake Logue Nature Reserve.<br>There is potential for indirect impacts on conservation values from the Project such as:<br>• Wildfire.<br>• Weed infestation.<br>• Dieback infestation.<br>• Dust.<br>• Modification of local hydrology and hydrogeology. | A number of field surveys and technical investigations will be undertaken to define the environmental values and their conservation significance of the Project Area and surrounds. These investigations comprise:<br>• Baseline soil and acid sulphate soil surveys.<br>• Acid drainage study.<br>• Flora and vegetation surveys.<br>• Dieback survey.<br>• Vertebrate and invertebrate fauna surveys.<br>• Surface water study.<br>• Groundwater investigations.<br>• Air quality modelling.<br>• Aboriginal heritage survey.<br>• European heritage study.<br>The results of the above surveys and investigations will be used to conduct a desktop assessment of the potential impacts of the project on the conservation values in the area. Cumulative impacts will be examined between the coal mine and the proposed adjacent power station, where they are likely to be significant. Management measures will be developed following the assessment of the potential impacts on the conservation values in the area. | Management measures will be developed following the assessment of the potential impacts on the conservation values in the area. These measures will aim to prevent impacts to conservation areas, however where this will not be possible, measures will be developed to minimise the potential impacts. |

# Section 8 Potential Environmental Impacts, Scope of Work and Management Commitments

| Environmental Factor | Environmental Objectives | Potential Impacts | Investigations Required | Potential Management Activities |
|---|---|---|---|---|
| Landform and Soils | To maintain the integrity, ecological functions and environmental values of soils and landforms in the Project Area.<br>To minimise the footprint of disturbance during the life of the Project.<br>To maximise the retention and viability of topsoils for future rehabilitation activities. | The potential impacts to landform and soils in the Project Area are as follows:<br>• Increased erosion through changes in surface water regimes.<br>• Accumulated sedimentation downstream of the Project Area.<br>• Modification of landforms within the Project Area.<br>• Release of acid and metals as a result of acid sulphate soils being disturbed during construction and mine dewatering activities lowering the water table and exposing acid sulphate soils. | A baseline soil assessment is currently being undertaken, including a site and soil description with physical and chemical soil analyses on representative soil types.<br>An acid sulphate soil survey will be undertaken to determine whether acid sulphate soils exist within the Project Area and surrounds.<br>The results of the surveys will be used to assess the impacts of the Project on landform and soils. Cumulative impacts will be examined between the coal mine and the proposed adjacent, power station where they are likely to be significant.<br>The scope of work for the soil survey is described further in Section 8.2. | The landform and soil issues will be managed by implementing measures such as:<br>• Minimise the area of land that is exposed to erosion.<br>• Replace the subsoil (0 to 5-10 m) and topsoil as part of the backfilling process.<br>• Implement a progressive rehabilitation programme.<br>• Optimise Project design measures to minimise erosion and sediment transport.<br>• Define the location of acid sulphate soils and avoid disturbance of acid sulphate soils, where possible. Where it cannot be avoided, manage this material so that the potential for acid generation is minimised.<br>• Develop an Acid Sulphate Soil Management Plan (if required) detailing the handling, storage, encapsulation, rehabilitation and monitoring of acid sulphate soils in accordance with the relevant guidelines. |
| Acid Drainage | Minimise the risk to the environment resulting from potentially acid forming materials. | The potential impacts from acid rock drainage are as follows:<br>• Changes to soil characteristics from acid rock drainage exposure and resultant metal releases.<br>• Contamination of surface water and groundwater, and subsequent impacts to vegetation from acid forming materials.<br>• Potential contamination to groundwater as a result of fly-ash and | An acid rock drainage investigation is currently being undertaken, as described in Section 8.3. The investigation includes:<br>• Review of existing information on the geochemical characteristics of the overburden, coal rejects (seam roof and seam floor) and coal.<br>• Sampling and laboratory testing of drill core/cuttings representing overburden, coal and potential coal rejects.<br>• Characterisation and assessment of the | If the acid rock drainage investigation indicates that there are potentially acid forming materials, this will be managed by management measures such as:<br>• Developing procedures for handling, placement and storage of these materials, such as containment or encapsulation.<br>• Using acid neutralising materials, such as lime, where appropriate.<br>• Monitoring and characterisation of mine wastes as mining progresses and/or as |

# Section 8 Potential Environmental Impacts, Scope of Work and Management Commitments

| Environmental Factor | Environmental Objectives | Potential Impacts | Investigations Required | Potential Management Activities |
|---|---|---|---|---|
| Acid Drainage (cont.'d) | | bottom-ash leachate. | materials, including an assessment of the results in context with the mining methodology, geology, climate and regulatory requirements to determine the potential for overburden, coal and potential coal reject materials to generate acid and potentially release metals and salts into the surrounding environment.<br>• Assessment of the coal seams, which will be exposed during mining, so as to determine their acid producing potential.<br>• Geochemical testing of ash and bottom-ash to determine the potential impacts of the ash disposal at the Central West Coal Mine Project.<br>Cumulative impacts will be examined between the coal mine and the proposed adjacent, power station where they are likely to be significant. | operations change in order to monitor changes in waste rock chemistry.<br>In addition, a disposal method for ash will be developed to contain any material with the potential to impact groundwater. |
| Surface Water | To maintain the quantity and quality of surface water so that environmental values, including ecosystem maintenance, are protected. | The potential impacts to surface water in the Project Area are as follows:<br>• Changes to surface water flows due to the presence of waste rock dumps, pit and other infrastructure.<br>• Diversion of watercourses of Erindoon Creek as the pit is likely to intersect two watercourses in the upper catchment of Erindoon Creek.<br>• Increased sedimentation and erosion due to the land disturbance required for the Project. | A surface water study is currently being undertaken and is described in Section 8.4. The study comprises:<br>• Review of hydrological, topographic and acid sulphate soils data.<br>• Characterisation of baseline surface water runoff such as runoff volume, peak discharge rate and water quality.<br>• Assessment of potential impacts of the Project on surface water hydrology and quality in the Project Area and the region, including the Lake Logue Nature Reserve. Cumulative impacts will be | The potential surface water management strategies are as follows:<br>• Optimise design parameters to manage surface water and minimise impact on existing hydrological regimes.<br>• Manage erosion and sedimentation from disturbed areas.<br>• Implement a Surface Water Management Plan to maintain the quantity and quality of surface water so that environmental values, including ecosystem function, are protected. |

| Environmental Factor | Environmental Objectives | Potential Impacts | Investigations Required | Potential Management Activities |
|---|---|---|---|---|
| Surface Water (cont.'d) | | There is potential for the Project to lead to changes to the water balance and to surface water flows due to the presence of waste rock dumps, open pit void and other infrastructure. This has the potential to lead to modification of sediment transport, erosion and depositional patterns. | examined between the coal mine and the proposed adjacent power station,where they are likely to be significant.<br>• Development of the conceptual surface water management system for the mine site. The surface water management system will also include a diversion facility (proposed alignment and geometry) to divert intersected water courses to minimise the impact on downstream water quality and quantity.<br>Further information is provided in Section 8.4 | |
| Groundwater | To maintain the quantity and quality of ground water so that existing and potential environmental values, including ecosystem function, are protected. | There are a number of potential issues associated with the management and use of groundwater for the Project. The potential impacts to groundwater are as follows:<br>• Alteration to local and regional ground water regimes, as a result of pit dewatering and changes to recharge patterns.<br>• Potential contamination to groundwater as a result of ash leachate or hydrocarbon spills.<br>• Potential for groundwater drawdown to impact on nearby groundwater dependent ecosystems and other groundwater users.<br>• Potential for groundwater drawdown to result in the exposure of acid sulphate soils in nature reserves to | A hydrogeological investigation is currently being undertaken as follows:<br>• Conduct a drilling and test pumping programme to determine the quantity of water required to be dewatered in advance of mining activities.<br>• Characterisation of the quality of water that will be extracted as part of the future dewatering activities.<br>• Groundwater modelling to estimate the real and vertical extent of drawdown impact of the dewatering activities on the surrounding farmland, native bush and groundwater flows.<br>• Final pit void study to determine the post-rehabilitation hydrology.<br>Geochemical testing of ash will be undertaken as part of the Coolimba Power Project by URS. The testing will include solid analysis and | The management measures will be developed based on the results of the hydrogeological investigation. The following management measures may be implemented to minimise groundwater impacts:<br>• Review and optimise pumping regimes to minimise impacts on groundwater resources (e.g. water levels at ephemeral water bodies).<br>• Implement a Groundwater Management Plan to maintain the quantity and quality of groundwater so that environmental values, including ecosystem function, are protected.<br>• Implement a groundwater monitoring programme to enable assessment and management of the drawdown.<br>• Develop an ash disposal method to contain any material with the potential to impact groundwater. |

# Section 8 Potential Environmental Impacts, Scope of Work and Management Commitments

| Environmental Factor | Environmental Objectives | Potential Impacts | Investigations Required | Potential Management Activities |
|---|---|---|---|---|
| Groundwater (cont.'d) | | the northwest of the Project Area. | bottle tumbling test work on solid ash mix samples. The results will be analysed to determine the potential impacts of the disposal of ash at the Central West Coal Mine Project. If the constituents of the ash produce acidic seepage, geochemical modelling will be undertaken to assess the impacts of any seepage from the disposed ash on groundwater quality in the region, including Lake Logue Nature Reserve.<br>Cumulative impacts will be examined between the coal mine and the proposed adjacent power station. | |
| Vegetation and Flora | To maintain the abundance, diversity, geographic distribution and productivity of flora at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge. | The potential impacts of the Project on vegetation and flora are as follows:<br>• Reduced regional representation of flora and plant communities.<br>• Loss/degradation of riparian vegetation due to vegetation clearing.<br>• Potential loss of Declared Rare and Priority Flora species.<br>• Potential loss of vegetation due to changes in water flows and groundwater levels.<br>• Increased weed infestation<br>• Degradation of flora and vegetation due to dust deposition.<br>• Transport and spread of dieback from vegetation clearing, earthmoving activities, disturbance to native vegetation and increased vehicle | A vegetation and flora assessment is currently being undertaken and includes:<br>• Integration of findings with previous studies so that the impacts on flora and vegetation can be assessed in a local and regional context.<br>• Searching targeted areas for declared rare flora and priority flora.<br>• Vegetation mapping, including TECs and GDEs.<br>• An assessment of the potential impacts (direct and indirect) of the Project on vegetation and flora. This assessment will include the potential impacts of dust on flora, including DRF. Cumulative impacts will be examined between the coal mine and the proposed adjacent power station t.<br>• A peer review of the vegetation and flora | The potential management measures to minimise impacts on vegetation and flora are as follows:<br>• Optimise Project design/footprint to avoid or minimise clearing.<br>• Implement clearing control procedures during construction and operation.<br>• Implement a progressive rehabilitation programme.<br>• Develop a Flora and Vegetation Management Plan, which includes protection of DRF and weed and dieback management procedures.<br>• Implement a monitoring and eradication programme for weeds within the Project Area during construction and operation.<br>• Implement dust control measures. |

| Environmental Factor | Environmental Objectives | Potential Impacts | Investigations Required | Potential Management Activities |
|---|---|---|---|---|
| Vegetation and Flora (cont.'d) | | traffic. This could include the spread of dieback into sensitive areas. | report will be undertaken by a botanist with experience with Kwongan vegetation.<br>In addition, a dieback survey of the Project Area will be conducted.<br>The scope of work for these surveys is described further in Section 8.5. | |
| Vertebrate Fauna<br><br>Vertebrate | To maintain the abundance, diversity, geographic distribution and productivity of fauna at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge. | The potential impacts on vertebrate fauna include:<br>• Direct removal or disturbance of fauna habitat.<br>• Effect of noise, dust or artificial light impacts on sensitive fauna.<br>• Alterations to hydrology including groundwater drawdown associated with pit dewatering may affect vertebrate fauna habitat.<br>• Secondary impacts, such as collisions with vehicles and deaths/injuries as a result of fire. | Two vertebrate fauna surveys have been undertaken. These comprise a Level 2 survey in Spring 2007, and a Level 1 survey in Autumn 2008. The scope of work for the assessment includes:<br>• Survey methods compliant with DEC requirements and EPA guidance statements.<br>• Undertaking a desktop fauna assessment incorporating searches of all relevant databases and background information, including previous surveys in the regional and local area.<br>• Conducting a reconnaissance survey to determine fauna communities, fauna habitat values and the likelihood of occurrence of conservation significant fauna.<br>• Conducting two detailed fauna survey, using trapping and foraging techniques.<br>The results of the desktop assessments, fauna survey and other environmental studies (such as vegetation and groundwater drawdown) will be used to assess the impacts of the Project | The potential management measures to minimise the impacts on vertebrate fauna are as follows:<br>• Optimise Project design/footprint to avoid or minimise disturbance.<br>• Implement dust control measures.<br>• Impose speed restrictions around the site to reduce the chance of vehicles colliding with fauna.<br>• Retain large trees, in areas where this is possible.<br>• Fencing ponds.<br>• Directional lighting. |

# Section 8 Potential Environmental Impacts, Scope of Work and Management Commitments

| Environmental Factor | Environmental Objectives | Potential Impacts | Investigations Required | Potential Management Activities |
|---|---|---|---|---|
| Fauna (cont.'d) | | | on fauna and their habitat.<br>Cumulative impacts will be examined between the coal mine and the proposed adjacent power station. The scope of work for the survey is described further in Section 8.6. | |
| Invertebrate Fauna<br><br>Invertebrate Fauna (cont.'d) | To maintain the abundance, diversity, regional distribution and productivity of invertebrate fauna at the species and ecosystem levels through the avoidance or management of adverse impacts. | The potential impacts to surface invertebrate fauna are as follows:<br>• Direct removal or disturbance of invertebrate fauna habitat.<br>• Loss of some surface invertebrates. | A surface invertebrate fauna assessment is currently being undertaken, targeting SRE species. The assessment comprises:<br>• Survey methods compliant with DEC requirements and EPA guidance statements.<br>• Undertaking a desktop invertebrate fauna assessment incorporating searches of all relevant databases and background information, including previous surveys in the regional and local area.<br>• Conducting a single season, opportunistic surface invertebrate fauna survey in Autumn 2008, using trapping and foraging techniques with the aim of collecting a representative sample of SRE taxa in the local area.<br>The impacts of the project on invertebrate fauna will be assessed using the results of the survey. Cumulative impacts will be examined the coal mine and the proposed adjacent power station.<br>The scope of work for the survey is described further in Section 8.7. | The potential management measures to minimise impacts on invertebrate fauna are as follows:<br>• Optimise Project design/footprint to avoid or minimise disturbance.<br>• Adopt appropriate design measures that maintain fauna movement across the landscape.<br>• Implement a post disturbance fauna monitoring program to enable a comparison of baseline data (i.e. predisturbance of habitat).<br>• Mitigation and management measures for fauna and, if required, contingency plans will be addressed. |

# Section 8 Potential Environmental Impacts, Scope of Work and Management Commitments

| Environmental Factor | Environmental Objectives | Potential Impacts | Investigations Required | Potential Management Activities |
|---|---|---|---|---|
| Subterranean Fauna | To maintain the abundance, diversity, regional distribution and productivity of subterranean fauna at the species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge. | The potential impacts to subterranean fauna include:<br>• Degradation of stygofauna habitat/loss of stygofauna due to groundwater abstraction for pit dewatering.<br>• Degradation of stygofauna habitat due to impacts on groundwater quality.<br>• Disturbance of troglofauna and troglofauna habitat in nearby areas. | A stygofauna assessment is currently being undertaken. Two stygofauna sampling events have been completed, in accordance with advice from the DEC and EPA Guidance Statement No. 54 and 54a – Sampling of Subterranean Fauna in Groundwater and Caves (EPA, 2003b). This involved the sampling of existing bores within and outside of the Project Area.<br>Further regional survey work is planned and will be aimed specifically at the bathynellid syncarid, on advice from the DEC.<br>In addition, a desktop assessment of the likelihood of prospective troglofauna habitat occurring in the Project Area is currently being undertaken. In the event that troglofauna habitat is found within the Project Area, a field survey will be undertaken.<br>The results of the studies will be used to determine the impacts of the project on subterranean fauna. The impacts of the project on fauna will be assessed using the results of the survey. Cumulative impacts will be examined between the coal mine and the proposed adjacent, power station where they are likely to be significant. | The potential management measures that will be implemented to minimise impacts to subterranean fauna are as follows:<br>• Where practicable, minimise groundwater abstraction in areas of known populations of stygofauna.<br>• If required, develop and implement a Stygofauna Management Plan.<br>• Where practicable, minimise disturbance in areas of known populations of troglofauna (if present).<br>• If relevant, develop mitigation and management measures for troglofauna. |
| Air Quality<br><br>Air Quality (cont.'d) | To ensure that emissions and dust do not adversely affect environmental values or the health, | The potential impacts of air emissions from the Project include:<br>• Generation of dust during construction and operational activities. | An air quality assessment is currently being undertaken and comprises:<br>• Description of neighbouring land use and potential sensitive air quality receptors.<br>• Assessment of meteorology and existing | A range of management and mitigation strategies will be identified to minimise dust emissions and impacts at sensitive locations. These strategies will be based on the outcomes of the air quality impact assessment and dispersion modelling. |

# Section 8 Potential Environmental Impacts, Scope of Work and Management Commitments

| Environmental Factor | Environmental Objectives | Potential Impacts | Investigations Required | Potential Management Activities |
|---|---|---|---|---|
| | welfare and amenity of people and land users. | • Generation of dust as a result of vehicle movements.<br>• Reduced visual amenity.<br>• Dust deposition on surrounding vegetation. | air quality in the vicinity of the Project Area.<br>• Dispersion modelling to predict dust emissions levels and assess the impacts of the project and the cumulative impacts with the proposed Coolimba Power Station. | Management activities may include:<br>• Develop a Dust Management Plan.<br>• Dust monitoring during construction and operations, in accordance with DEC guidelines.<br>• Dust suppression measures such as water sprays.<br>• Restrict vehicle speeds to minimise dust generation from vehicle movement.<br>• Restrict vehicle speeds to minimise dust generation from vehicle movement.<br>• Weather forecasting to predict strong wind events. |
| Greenhouse Gases<br><br>Greenhouse Gases (cont.'d) | To minimise emissions to levels as low as practicable on an ongoing basis and consider offsets to further reduce cumulative emissions. | The main impact of the Project on greenhouse gases is the release of greenhouse gases as a result of fuel consumption by vehicles and mining equipment. As a result, the Project will contribute to Western Australia's greenhouse gas emissions. | A greenhouse gas assessment is currently being undertaken, comprising:<br>• Development of a greenhouse gas inventory for the Project.<br>• Investigation of the best practice greenhouse gas reduction and mitigation measures that would be applicable to the Project.<br>• Assessment of the Project's proposed control and mitigation measures and provide a greenhouse gas emissions mitigation action plan, if needed.<br>Cumulative impacts will be examined between the coal mine and the proposed adjacent power station, where they are likely to be | The potential management measures to minimise greenhouse gas emissions from the Project are as follows:<br>• Incorporate energy efficient technologies within the Project design.<br>• Identify strategies to reduce power (electrical) and diesel consumption. |

| Environmental Factor | Environmental Objectives | Potential Impacts | Investigations Required | Potential Management Activities |
|---|---|---|---|---|
| | | | significant. | |
| Noise | To protect the amenity of sensitive receptors. | The main noise impact from the Project is the generation of noise as a result of mining activities (e.g. loading, vehicle movements and reversing alarms at night) which may impact on sensitive receptors. | A noise assessment is currently being conducted and will include:<br>• Developing sound power levels for the equipment to be used for the Project.<br>• Identifying all potential noise sensitive locations around the mine.<br>• Developing a noise model based on the construction case and on operational phases plus worst case noise impacts at noise sensitive locations. The assessment will include cumulative impacts with the proposed Coolimba Power Station.<br>• Assessing ambient noise levels at potential receiver locations.<br>• Comparing predicted noise levels with the assigned noise levels allowed under the Environmental Protection (Noise) Regulations 1997. | If there is potential for the noise levels to exceed allowable noise levels, relevant noise mitigation measures will be developed. |
| Visual Amenity<br><br>Visual Amenity (cont.'d) | To ensure that aesthetic values are considered and measures are adopted to reduce visual impacts on the landscape as low as reasonably practicable. | The potential impact on visual amenity will be the permanent alteration to the existing landscape. | A desktop visual impact assessment is currently being undertaken using project description information and the following data:<br>• Site topography.<br>• Surrounding landforms and vegetation.<br>• Plant layout.<br>• Plant design.<br>• Modelling would be conducted if the desktop assessment indicated that modelling was required. | The potential management measures that may be implemented to minimise the impact on visual amenity include:<br>• Implement a progressive rehabilitation programme.<br>• Consult with local stakeholders throughout the project planning and construction phases to seek feedback on the views of the planned changes to the landscape.<br>• Establish screening (e.g. vegetation) around the Project to reduce the visual impact from |

# Section 8 Potential Environmental Impacts, Scope of Work and Management Commitments

| Environmental Factor | Environmental Objectives | Potential Impacts | Investigations Required | Potential Management Activities |
|---|---|---|---|---|
| | | | Cumulative impacts will be examined between the coal mine and the proposed adjacent power station where they are likely to be significant. | the main road. |
| Aboriginal Heritage | To ensure that changes to the biophysical environment do not adversely affect historical and cultural associations and comply with relevant heritage legislation.<br>To avoid impacts to Aboriginal cultural sites. | The potential impacts on Aboriginal heritage include:<br>• Disturbance to, or removal of, Aboriginal heritage sites as a result of land clearing.<br>• Direct and indirect disturbance from construction activities. | Aboriginal heritage archaeological and ethnographic surveys are currently being undertaken.<br>The results of the surveys will be used to assess the impacts of the project on Aboriginal heritage. Cumulative impacts will be examined between the coal mine and the proposed adjacent power station where they are likely to be significant. | Central West Coal Pty Ltd will comply with the requirements of the *Aboriginal Heritage Act* 1972-1980 in the event an Aboriginal heritage site is identified during heritage surveys or uncovered during ground disturbing activities during construction and operation. |
| European Heritage<br><br>European Heritage (cont.'d) | To ensure that changes to the biophysical environment do not adversely affect historical and cultural associations and comply with relevant heritage legislation. | The potential impacts to European heritage include:<br>• Disturbance to heritage sites as a result of land clearing.<br>• Direct and indirect disturbance from construction activities. | A desktop study of the European cultural and heritage values of the Project Area is currently being undertaken, comprising searches of the following databases:<br>• Australian Heritage Places Inventory.<br>• Register of the National Estate Database.<br>• The National Trust.<br>• Heritage Council of Western Australia.<br>• Shire of Coorow Municipal Inventory.<br>• Shire of Carnamah Municipal Inventory.<br>An assessment of the potential impacts of the | Management measures will be developed relevant to the results of the impact assessment. |

# Section 8 Potential Environmental Impacts, Scope of Work and Management Commitments

| Environmental Factor | Environmental Objectives | Potential Impacts | Investigations Required | Potential Management Activities |
|---|---|---|---|---|
| | | | Project on these values will be conducted. Cumulative impacts will be examined between the coal mine and the proposed adjacent power station,where they are likely to be significant. | |
| Public Health and Safety – Road Transportation | To minimise changes to local traffic where possible, and ensure road safety. | The potential impacts on public health and safety comprise the impact to other road users due to increased traffic as a result of the Project. | A traffic impact assessment is currently being undertaken, comprising:<br>• Review of existing documents, plans and traffic data.<br>• Assess the construction and operational traffic and traffic flow.<br>• Traffic modelling to estimate Project-related traffic.<br>• Establish the impact of the proposed development on the adjacent road network. Cumulative impacts will be examined between the coal mine and the proposed adjacent power station,where they are likely to be significant. | Traffic management measures/plans will be identified to accommodate the Project-related traffic as appropriate. |
| Public Health and Safety – Water treatment | To ensure the potable water supply and sewerage are managed to maintain human health and safety. | There is potential for water to cause illness to workers and the public if not treated and managed adequately. | Water treatment methods will be investigated for suitability for the project, taking into account advice from the Department of Health, prior to selection. | Water treatment will be undertaken in accordance with the relevant standards and guidelines, Shire approvals and any advice provided by DoH. |
| Public Health and Safety – Mosquito | To minimise the potential for mosquito population | There is potential for the Project to provide environments which may lead to an increase in mosquito populations and | Initial consultation with DoH has indicated that mosquitoes are unlikely to be an issue for this Project. | If there is deemed to be risk from the Project, Central West will consult with DoH to determine the relevant management measures required to |

# Section 8 Potential Environmental Impacts, Scope of Work and Management Commitments

| Environmental Factor | Environmental Objectives | Potential Impacts | Investigations Required | Potential Management Activities |
|---|---|---|---|---|
| Management | increase that may be attributed to effects from the Project | therefore increased risk of mosquito-borne diseases. | Further consultation will be undertaken with DoH to investigate the relevant mosquito risk factors for the Project. | manage mosquito populations. |
| Public Health and Safety – Radiological Properties of Ash | To ensure any radioactive materials associated with fly-ash and bottom-ash are suitably captured and disposed of. | Any radioactive materials associated with fly-ash and bottom-ash have the potential to leach out of the ash and into the surrounding environment during stockpiling or once it has been backfilled into the pit void. | An assessment of the radioactive materials in the ash will be conducted. The scope of work is currently being prepared. | If the ash is found to have levels of radioactive materials which require management, measures may include:<br>• Backfilling the ash as soon as possible to minimise leaching and dust-lift-off during stockpiling.<br>• Suitable mixing of ash into backfilling material to ensure low levels of ash and prevent the creation of 'hot spots'. |
| Land Use and Community | To maximise social and economic benefits to the local community. | The Project will provide employment opportunities for local people and businesses. | A desktop social impact assessment is currently being undertaken, establishing the baseline social profile of the region in order to identify potential impacts and design appropriate management and/or mitigation measures.<br>The objectives of the social impact assessment include:<br>• Establishment of a social profile of the Mid-West region;<br>• Identification of potential impacts of the Project;<br>• Outline of community attitudes towards the Project;<br>• Assessment of likely magnitude and | Appropriate management and/or mitigation measures will be developed based on the results of the social impact assessment. |

# Section 8 Potential Environmental Impacts, Scope of Work and Management Commitments

| Environmental Factor | Environmental Objectives | Potential Impacts | Investigations Required | Potential Management Activities |
|---|---|---|---|---|
| | | | significance of impacts of the Project; and<br>• Identification of impact management.<br>The regional community profile will include the population trends, number of households and the socioeconomic characteristics. Information from the Aboriginal heritage survey and community consultation programme will be integrated with the social impact assessment. The demand and provision of public services, including transport infrastructure, housing, education, health and social services will also be assessed. | |

## 8.2 Landforms and Soils

A baseline soil assessment is currently being undertaken to identify and describe the soils in the proposed Project Area and identify any issues that could affect rehabilitation activities.

A site and soil description for soil pits will be completed with physical and chemical soil analyses undertaken on representative soil types. Soil testing will likely comprise:

- pH ($CaCl_2$, water) and salinity ECe (saturation paste) for all samples.
- Emerson dispersion and slaking for samples with clay content from hand texture of sandy clay loam or greater.
- Total phosphorus, total nitrogen, available nitrogen, phosphorus and potassium, % organic carbon and trace elements (copper, zinc, manganese and iron) for topsoil samples.
- Lead analyses, if a site is believed to be contaminated.
- Exchangeable cations for selected samples.

Results will be presented in a report that will present a description of soils within the Project Area, identification of soil materials that may affect rehabilitation activities and a soil map of the Project Area.

A preliminary acid sulphate soils assessment is currently being undertaken in conjunction with the soil survey. The results of the preliminary survey will be used to determine whether a detailed investigation is required. The objective of the acid sulphate soils investigation is to obtain sufficient information on the characteristics of any acid sulphate soils material present in the vicinity of the Project Area, including the Lake Logue Nature Reserve, Lake Indoon and along creek systems of the Project Area. The acid sulphate soils characterisation will be used to conduct an assessment of the potential impacts to the environment as a result of the Project, particularly in relation to dewatering activities.

The scope of work for the preliminary acid sulphate soils assessment includes:

- Desktop review of all available data including available geotechnical logs, topographic maps, geological and environmental series maps and a search of existing groundwater bores within a predetermined radius of the Project Area.
- A search for any previous acid sulphate soils investigations and associated geochemical data conducted within the Eneabba region and more specifically within the Lake Logue Nature Reserve, Lake Indoon Reserve and along creek systems of the Project Area.
- A site visit to characterise the site, identifying soil and water indicators of potential acid sulphate soils and conducting nominal soil sampling (to 1 m below ground level via hand auger) in areas identified as “hot spots”. This site visit would be conducted in conjunction with the proposed soil survey.
- In situ field tests for pH and $pH_{fox}$ of the subsurface profile at sampling sites and pH values of surface waters.

## 8.3 Acid Drainage

An acid rock drainage investigation is currently being undertaken, comprising four components, as described below.

1. *Review of existing information*

Available existing information on the geochemical characteristics of the overburden, coal rejects (seam roof and seam floor) and coal will be reviewed to enable a suitable sampling and testing programme to be developed.

2. *Sampling and laboratory testing*

Sample collection is expected to primarily include drill core/cuttings representing overburden, coal and potential coal reject from the proposed mine. Existing drillcore/cuttings from previous drilling campaigns are unlikely to be suitable for use in the proposed geochemical assessment programme due the likelihood of existing soil and rock materials having already started to oxidise, or potentially having fully oxidised. The coal seams will also be tested for their acid producing potential, which may occur when they are exposed during the mining operations. Testing is expected to comprise three components:

a) Static testing of all collected materials to determine the acid generating potential of the materials.

b) Multi-element testing of selected materials, typically composites of materials of similar rock type and acid generating potential.

c) Kinetic column leach testing of selected materials may be required, particularly those materials with some potential to generate acidic leachate.

3. *Characterisation and assessment*

Characterisation and assessment of the materials will be conducted, including an assessment of the results in context with the mining methodology, geology, climate and regulatory requirements, to determine the potential for overburden, coal and potential coal reject materials to generate acid and potentially release metals and salts into the surrounding environment.

4. *Geochemical testing of ash*

Geochemical testing of ash will be undertaken as part of the Coolimba Power Project. The testing will include solid analysis and bottle tumbling test work on solid ash mix samples. The results will be analysed to determine the potential impacts of the disposal of ash at the Central West Coal Mine Project. If the constituents of the ash may produce seepage, geochemical modelling will be undertaken to assess the impacts of any seepage from the disposed ash on groundwater quality.

## 8.4 Surface Water

The surface water study is currently being undertaken and comprises four components, as described below.

1. *Review of hydrological and topographic data and site visit.*

A detailed review of available topographic, climatic and hydrologic information will be conducted, including the identification of catchment boundaries and natural flow paths using the topographic maps provided. A site visit will be undertaken to confirm the results of the desktop review.

2. *Characterisation of baseline surface water runoff such as runoff volume and peak discharge rate and water quality.*

A rainfall and runoff model will be developed to predict surface runoff volumes and flow rates associated with specified rainfall events of specific annual recurrence interval. The pre- and post-project conditions will be investigated to assess the potential impacts by the proposed mine.

3. *Assessment of potential impacts of the Project on surface water hydrology.*

The potential impacts of the Project on surface hydrology, including cumulative impacts between the Mine and the Power Station, will be assessed based on the project description (i.e. plant layout, plant design, and proposed construction and operational activities) and the outcomes from the baseline surface runoff characterisation.

The assessment will include impacts on surface water flow and quality outside the Project Area, including Lake Logue Nature Reserve.

4. *Development of the conceptual surface water management system for the mine site.*

An on-site surface water drainage system will be developed, including acid rock drainage runoff segregation control measures. The surface water management system will also include a diversion facility to divert intersected water courses and any detention ponds and pumping facilities required.

## 8.5 Vegetation and Flora

A vegetation and flora assessment is currently being undertaken in accordance with EPA Guidance Statement No. 51 – Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment (EPA, 2004d) and the principles set out in EPA Position Statement No. 3 - Terrestrial Biological Surveys as an Element of Biodiversity Protection in Western Australia (EPA, 2003a).

Following a search of DEC and DEWHA databases, a thorough literature review will be carried out. The results will provide the basis of a list of vascular flora species that could potentially occur within the Project Area. From this list, the rare, threatened and vulnerable species will be identified and any additional species of special conservation interest will be highlighted.

Field work will be conducted to clarify the site preferences of the rare, threatened or vulnerable species and to locate any flora or vegetation communities of particular significance. Therefore, targeted areas will be searched for Declared Rare Flora (DRF) and Priority Flora species. All vascular species within the area will be collected and identified. Specimens will then be identified and confirmed after returning to Perth at the State Herbarium.

The findings will be integrated with those of previous studies so that the impacts on flora and vegetation can be assessed in a local and regional context. The vegetation and flora assessment results will be integrated with the results of the dust modelling data to assess the potential impacts of dust on flora and vegetation, including DRF.

A peer review of the vegetation and flora report will be undertaken by a botanist with experience with Kwongan vegetation.

In addition, a dieback survey of the Project Area will be conducted. Any dieback detected in the survey area will be mapped to determine the potential impacts of the Project on the spread of dieback.

## 8.6 Vertebrate Fauna

Two vertebrate fauna surveys have been undertaken. These comprise a Level 2 survey in Spring 2007, and a Level 1 survey in Autumn 2008, in accordance with EPA Guidance Statement No. 56 – Terrestrial Fauna Surveys for Environmental Impact Assessment (EPA, 2004e) and the principles set out in EPA Position Statement No. 3 - Terrestrial Biological Surveys as an Element of Biodiversity Protection in Western Australia (EPA, 2003a). The primary objective of the surveys is to provide baseline data on the fauna and fauna habitats of the Project Area, as well as determining potential risks to conservation significant fauna.

The results of the desktop assessments, fauna survey and other environmental studies (such as vegetation and groundwater drawdown) will be used to assess the impacts of the Project on fauna and their habitat.

## 8.7 Invertebrate Fauna

A surface invertebrate fauna assessment is currently being undertaken in accordance with EPA Guidance Statement No. 56 – Terrestrial Fauna Surveys for Environmental Impact Assessment (EPA, 2004e) and EPA Position Statement No. 3 - Terrestrial Biological Surveys as an Element of Biodiversity Protection in Western Australia (EPA, 2003a). The survey will be conducted during April 2008 to collect SRE invertebrate species by trapping and foraging in target areas. The aim of the work is to provide information on the SRE fauna and habitats of the Project Area, as well as determining potential risks to SREs.

The results of the surveys and desktop assessments will be used to assess the impacts of the Project on invertebrate fauna.

# Section 9 Study Team

The environmental assessment document for the Central West Coal Project will be prepared by URS Australia Pty Ltd on behalf of Central West Coal Pty Ltd, with assistance from a team of specialist consultants.

**Central West Pty Ltd Team**

- Mr Lindsay Reed, Chief Executive Officer.
- Mr Mark Chatfield, General Manager Energy.
- Mr Richard Harris, General Manager Development.
- Mr Stephen Jones, Chief Financial Officer.
- Mr Robert Griffiths, Environmental Manager.

**URS Project Team**

- Ms Sonia Finucane, Senior Principal Environmental Scientist.
- Ms Jenny Becher, Senior Associate Environmental Scientist.
- Ms Karen Ariyaratnam, Associate Environmental Scientist.
- Mr Chris Thomson, Senior Environmental Scientist
- Ms Gillian Lane, Project Environmental Scientist.
- Mr Rob Wallis, Principal Hydrogeologist.
- Mr Boon Eow, Senior Hydrologist.
- Mr Andrew Mussell, Project Hydrologist.
- Mr Fanie Van der Linde, Senior Design Engineer.
- Mr Venky Narayanaswamy, Principal Engineering and Technical Sustainability.
- Mr Chacko Thomas, Environmental Engineer.
- Mr Don Burnside, Principal Natural Resource Scientist.
- Ms Gaye McKenzie, Principal Social Scientist.

**Subconsultant Team Leaders**

- Dr Geoff Kew, Kew Wetherby Soil Survey.
- Mr Grant Bolton, Rockwater Pty Ltd.
- Dr Libby Mattiske, Mattiske Consulting Pty Ltd.
- Mr Evan Brown, Glevan Consulting.
- Mr Stewart Ford and Mr Jarrad Clark, *ecologia* Environment.
- Mr Stefan Eberhard, Subterranean Ecology.
- Ms Christine Killip, Katestone Environmental.
- Mr Paul Keswick, SVT Engineering.
- Mr Nicholas Green, Anthropos Australis.
- Mr Benham Bordbar, Transcore Pty Ltd.

# Section 9 Study Team

- Mr Adam White, CAD Resources.
- Mr Ian Swane, Terrenus Pty Ltd.

**Peer Reviewers**

- Mr Doug Blandford, consultant soil scientist.
- Mr Ted Griffin, consultant botanist.

# Section 10 Schedule and Timing

## 10.1 Project Schedule

Central West Coal Pty Ltd proposes to commence construction activities in May 2009 following receipt of environmental and other approvals. Based on the current estimate of reserves, the anticipated life of the mine is 30 years. The Project milestones are outlined in Table 10-1.

Table 10-1 Project Milestones

| Project Stage | Timing |
|---|---|
| Commence construction | August 2009 |
| Boxcut/Pre-strip Development | May 2011 |
| Mining | December 2011 |
| Progressive Rehabilitation Programme | 2011 – 2045 |
| Completion of Mining | 2041 |

## 10.2 Environmental Impact Assessment Schedule

The level of assessment for the Project is set as a PER with an eight week public review period. An indicative project assessment schedule is provided in Table 10-2.

Table 10-2 Environmental Impact Assessment Schedule

| Project Stage | Timing |
|---|---|
| EPA Finalisation of Scope for PER | August 2008 |
| Baseline Studies | October 2007 - October 2008 |
| Stakeholder Consultation | October 2007 – March 2009 |
| First Draft PER submitted to EPASU | November 2008 |
| Final PER submitted to EPASU | December 2008 |
| Public Review Period (8 weeks) | January/February 2009 |
| Summary of Submissions provided by Proponent | March 2009 |
| Proponent's Draft Response to Public Submissions submitted to EPASU | April 2009 |
| EPA Bulletin (Report and Recommendations) | April 2009 |
| EPA Bulletin Appeals Period (2 weeks) | May 2009 |
| Ministerial Approval Issued (assuming no appeals) | June 2009 |
| Commonwealth Ministerial Approval Issued | August 2009 |

It is assumed that DEWHA will review the relevant assessment documents through the EPA, as the Project will be assessed bilaterally under the WA process.

# Section 11 References

ATA Environmental (2001) *Lake Indoon Catchment Management Plan*. Report reference: 2000/85

Ahern et al. (1998) *Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils in Queensland.*

Australian and New Zealand Environment Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand (2000) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*. October 2000.

Australian and New Zealand Minerals and Energy Council and Minerals Council of Australia (2000) *Strategic Framework for Mine Closure*. Canberra, Australia.

Australian and Torres Strait Islander Commission, Department of Indigenous Affairs and Department of Premier and Cabinet Citizens and Civics Unit (2004) *Consulting Citizens: Engaging with Aboriginal Western Australians*. Department of Premier and Cabinet, 2004.

Bureau of Meteorology (2007) http://www.bom.gov.au/ Accessed 5 November 2007.

Chamber of Minerals and Energy WA Inc (2000). *Mine Closure Guideline for Mineral Operations in Western Australia*.

Cale D.J., Halse S.A., and Walker C.D. (2004). *Wetland monitoring in the wheatbelt of south-west Western Australia: site descriptions, waterbird, aquatic invertebrate and groundwater data*. Conservation Science Western Australia 5(1), pp. 20-136

Department of Environment (2000) *Water Quality Protection Guidelines No. 10 - Mining and Mineral Processing, Above-ground Fuel and Chemical Storage*.

Department of Environment (2003) *Identification and Investigation of Acid Sulfate Soils and Groundwater*. August 2003.

Department of Environment (2004a) *Contaminated Sites Management Series Bioremediation of Hydrocarbon- Contaminated Soils in Western Australia*. October 2004.

Department of Environment (2004b) *Western Australian State Greenhouse Strategy - WA Greenhouse Task Force*.

Department of Environment (2005) *Review of Waste Classification and Waste Definitions 1996* (as amended). June 2005.

Department of Environment and Conservation (2007) *Western Australian Flora Conservation Taxa* Available online at: http://florabase.calm.wa.gov.au/conservationtaxa . Accessed 17 December 2007.

Department of Industry and Resources (2000) *MidWest Regional Minerals Study*. Perth, Western Australia. June 2000.

Department of Industry and Resources (2004) *Energy for Minerals Development in the South West Coast Region of Western Australia*. Study Report. December 2004. Prepared by Sleeman Consulting in alliance with GBRM.

Department of Industry and Resources (2006a) *Mining in Arid Environments, Mining Environmental Management Guidelines*. December 2006.

Department of Industry and Resources (2006b) *Mine Closure and Completion*. October 2006.

Department of Industry and Resources (2006c) *Managing Acid and Metalliferous Drainage Handbook*. October 2006.

Department of Industry and Resources (2006d) *Mine Rehabilitation, Leading Practice Sustainable Development Program for the Mining Industry*.

Department of Premier and Cabinet Citizens and Civics Unit (2002) *Consulting Citizens: A Resource Guide. Department of Premier and Cabinet Citizens and Civics Unit*. April 2002.

# Section 11 References

Department of Premier and Cabinet Citizens and Civics Unit (2003) *Consulting Citizens: Planning for Success. Department of Premier and Cabinet Citizens and Civics Unit*. June 2003.

De Laurentiis, P., Pesce, G.L. and Humphrys, W.F. (2001) *Copepods from ground waters of Western Australia, V1. Cyclopidae (Crustacea: Copepoda) from the Yilgarn Region and the Swan Coastal Plain*. Records of the Western Australian Museum Supplement No. 64: 115-131.

Environmental Protection and Heritage Council (2003) *National Environmental Protection Measure for Ambient Air Quality*. May 2003.

Environmental Protection Authority (2000a) *EPA Position Statement No. 2 - Environmental Protection of Native Vegetation in Western Australia*. December 2000.

Environmental Protection Authority (2000b) *EPA Guidance Statement No. 18 ? Prevention of Air Quality Impacts from Land Development Sites*. March 2000.

Environmental Protection Authority (2002) *EPA Guidance Statement No. 12 – Minimising Greenhouse Gases*. October 2002.

Environmental Protection Authority (2003a) *EPA Position Statement No. 3 - Terrestrial Biological Surveys as an Element of Biodiversity Protection in Western Australia*. March 2003.

Environmental Protection Authority (2003b) *EPA Position Statement No. 54. Consideration of Subterranean Fauna in Groundwater and Caves during Environmental Impact Assessment in Western Australia*. Environmental Protection Authority, December 2003.

Environmental Protection Authority (2003c) *Interim Industry Guide to Community Involvement.* Environmental Protection Authority. December 2003.

Environmental Protection Authority (2004a) *EPA Position Statement No. 6 – Towards Sustainability*. August 2004.

Environmental Protection Authority (2004b) *EPA Position Statement No. 7 – Principles of Environmental Protection*. August 2004.

Environmental Protection Authority (2004c) *EPA Guidance Statement No. 41 – Assessment of Aboriginal Heritage*. April 2004.

Environmental Protection Authority (2004d) *EPA Guidance Statement No. 51 – Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment*. June 2004.

Environmental Protection Authority (2004e) *EPA Position Statement No. 56. Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia.* Environmental Protection Authority, June 2004.

Environmental Protection Authority (2006) *EPA Position Statement No. 9 – Environmental Offsets*. January 2006.

Environmental Protection Authority (2007) *EPA Guidance Statement No. 8 (Draft) – Environmental Noise.* May 2007.

Environmental Protection Authority (2008) *Guidelines for Preparing a Public Environmental Review/ Environmental Review and Management Programme*. June 2008.

Hopkins, A.J.M. and Hnatiuk, R.J. (1981) *An Ecological Survey of the Kwongan South of Eneabba, Western Australia*. Wildlife Research Bulletin Number 9. Western Australian Wildlife Research Centre, Department of Fisheries and Wildlife, Perth, Western Australia.

Jasinska, E.J., Knott, B. and Poulter, N. (1993) *Spread of the introduced yabby, Cherax* sp. *(Crustacea*: *Decapoda: Parastacidae), beyond the natural range of freshwater crayfishes in Western Australia*. Journal of Royal Society of Western Australia 76: 67-69.

# Section 11 References

Lowry, D.C. (1974) *Explanatory Notes on the Dongara – Hill River Geological Sheet*. Australian Government Publishing Service, Canberra.

Mattiske Consulting Pty Ltd (2007) *Flora and Vegetation Assessment of Aviva Lease Area, South Eneabba*. Unpublished report prepared for URS Australia Pty Ltd on behalf of Aviva Corporation Ltd. February 2007.

National Occupational Health and Safety Commission (2002) *Approved Criteria for Classifying Hazardous Substances* (NOHSC: 1008 [2002]). National Occupational Health and Safety Commission, Canberra.

Northern Agricultural Catchments Council Inc. (2002) *West Midlands Hydrology Project, Stage One Report: The Impacts of Hydrological Issues on Biodiversity and Agriculture in the West Midlands Region*. January 2002.

Rockwater Pty Ltd (2007) *Stygofauna Sampling for the Central West Project*. Unpublished report prepared for Aviva Corporation. October 2007.

Sinclair Knight Merz (2001) *Environmental Water Requirements of Groundwater Dependent Ecosystems.* Environmental Flows Initiative Technical Report Number 2, Commonwealth of Australia, Canberra.

Standards Australia (2001) AS/NZS 480: *Occupational Health and Safety Management Systems*.

The Minserve Group Pty Ltd (2006) *Pre-Feasibility Study Report- Mining and Coal Preparation*. Unpublished report prepared for Aviva Corporation Ltd, September 2006.

URS Australia Pty Ltd (2006a) *Pre-Feasibility Study – Geotechnical Investigation and Design of Central West Coal Project*. Unpublished report prepared for Aviva Corporation Ltd. January 2006.

URS Australia Pty Ltd (2006b) *An Evaluation of Groundwater and Surface Water Characteristics for the Central West Iron Project Pre-Feasibility Study*. Unpublished report prepared for Aviva Corporation Ltd. March 2006.

# Section 12 Limitations

URS Australia Pty Ltd (URS) has prepared this report in accordance with the usual care and thoroughness of the consulting profession for the use of Central West Coal Pty Ltd and only those third parties who have been authorised in writing by URS to rely on the report. It is based on generally accepted practices and standards at the time it was prepared. No other warranty, expressed or implied, is made as to the professional advice included in this report. It is prepared in accordance with the scope of work and for the purpose outlined in Proposal 3047413 dated 9 October 2007.

The methodology adopted and sources of information used by URS are outlined in this report. URS has made no independent verification of this information beyond the agreed scope of works and URS assumes no responsibility for any inaccuracies or omissions. No indications were found during our investigations that information contained in this report as provided to URS was false.

This report was prepared between November 2007 and April 2008 and is based on the information reviewed at the time of preparation. URS disclaims responsibility for any changes that may have occurred after this time.

This report should be read in full. No responsibility is accepted for use of any part of this report in any other context or for any other purpose or by third parties. This report does not purport to give legal advice. Legal advice can only be given by qualified legal practitioners.

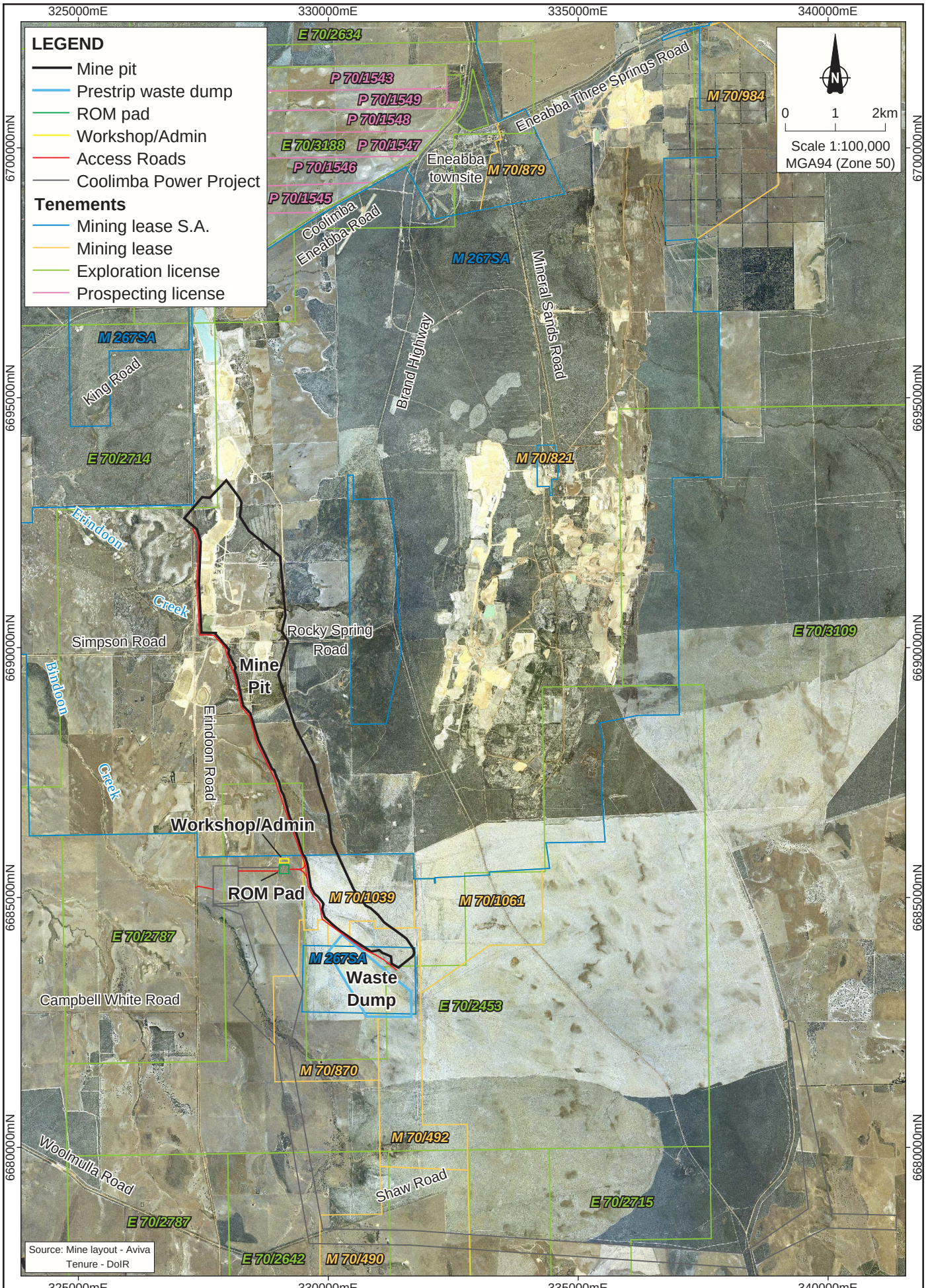
# Figures


AVIVA CORPORATION LTD

**Central West Coal Project**

**Location**

| | | |
|---|---|---|
| Consultant: URS | URS Job No: 42906631 | Figure No: 1 |
| Drawn: CAD Resources | CAD Resources File No: g1570_CW_ESD_f001 | |




AVIVA CORPORATION LTD

**Central West Coal Project**

**Land Tenure**

| | | |
|---|---|---|
| Consultant: URS | URS Job No: 42906631 | Figure No: 2 |
| Drawn: CAD Resources | CAD Resources File No: g1571_CW_ESD_f003 | |

330000mE
335000mE
340000mE
6695000mN
6690000mN
6685000mN
6680000mN

**LEGEND**

- Mine pit
- Prestrip waste dump
- Supporting infrastructure
- Access Roads
- Coolimba Power Project
- Nature reserve
- Cadastral boundary
- Major road
- Minor road/track
- Water course
- Gas Pipeline

N

0 0.5 1km

Scale 1:60,000
MGA94 (Zone 50)

Brand Highway
Mineral Sands Road
Parmelia Gas Pipeline
Mine Pit
Rocky Spring Road
Erindoon Road
Workshop/Admin
ROM Pad
Waste Dump
South Eneabba Nature Reserve
Dampier to Bunbury Gas Pipeline
Eneabba Substation
Shaw Road
Woolmulla Road

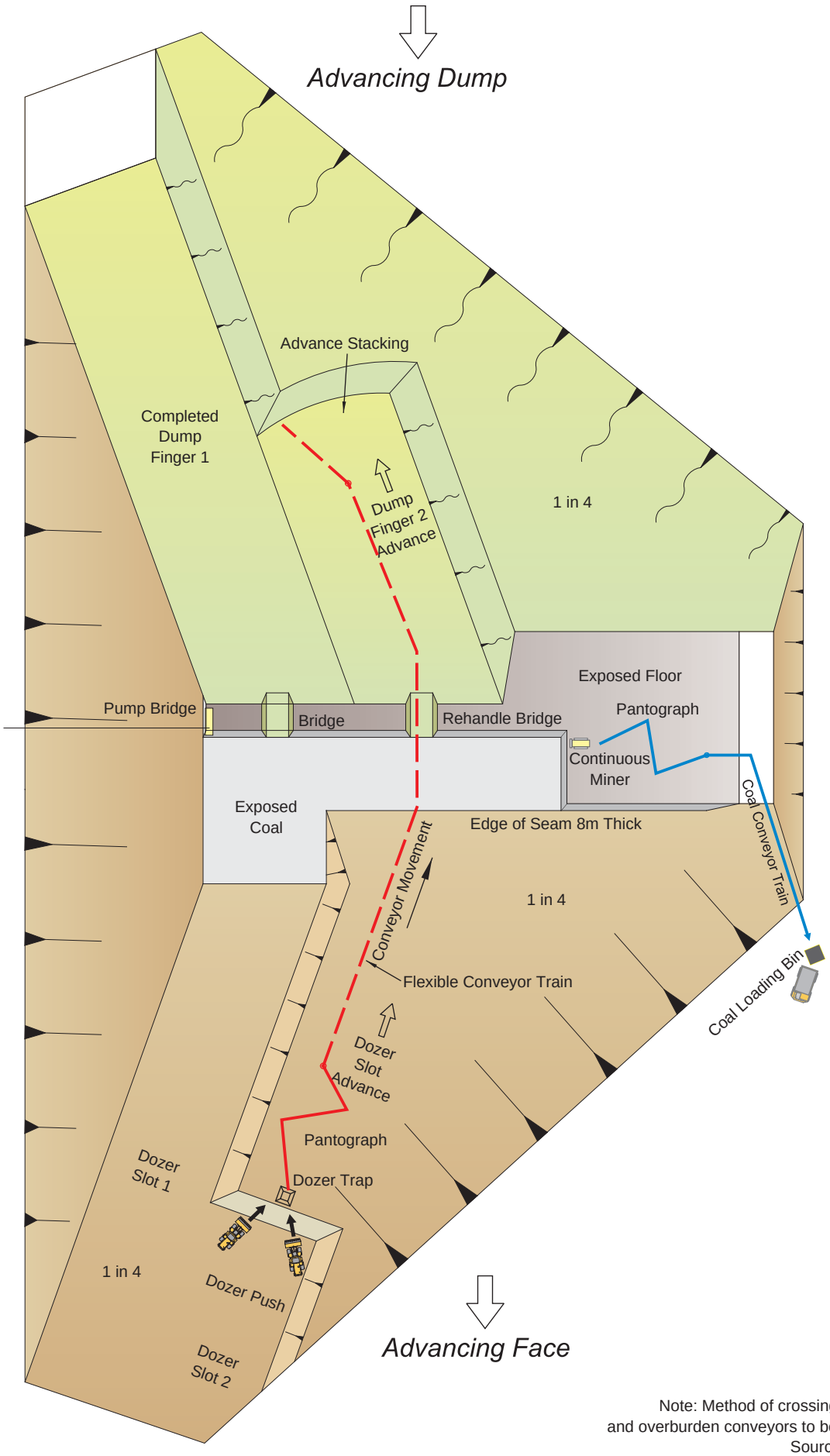
Source: Mine layout - Aviva
Topography - Aviva
Cadastral - Landgate

AVIVA CORPORATION LTD

**Central West Coal Project**

**Conceptual Site Layout**

Consultant: URS
Drawn: CAD Resources
URS Job No: 42906631
CAD Resources File No: g1571_CW_ESD_f002
Figure No: 3



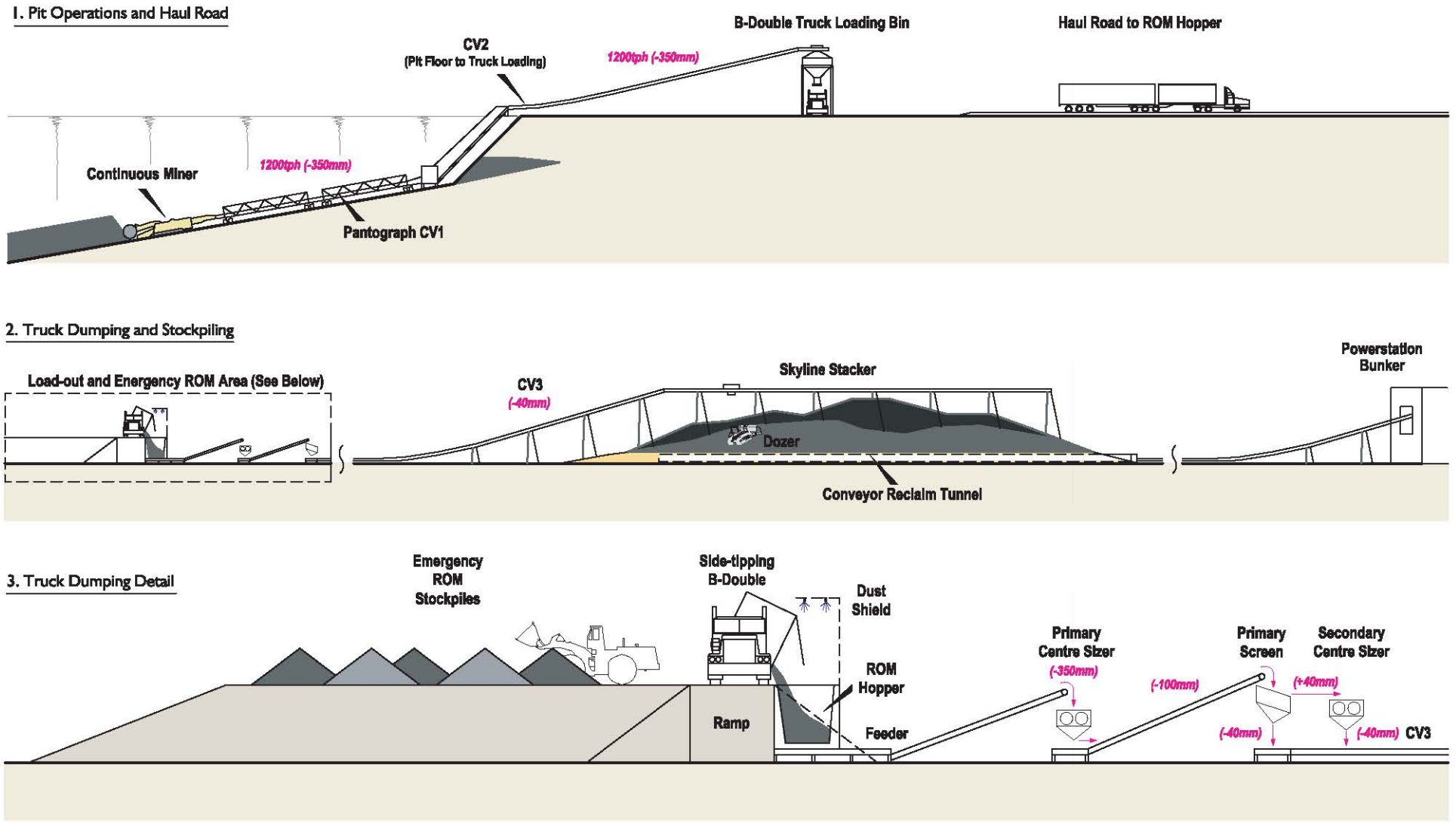

Note: Method of crossing over coal and overburden conveyors to be resolved.
Source: MinServ

AVIVA CORPORATION LTD

**Central West Coal Project**

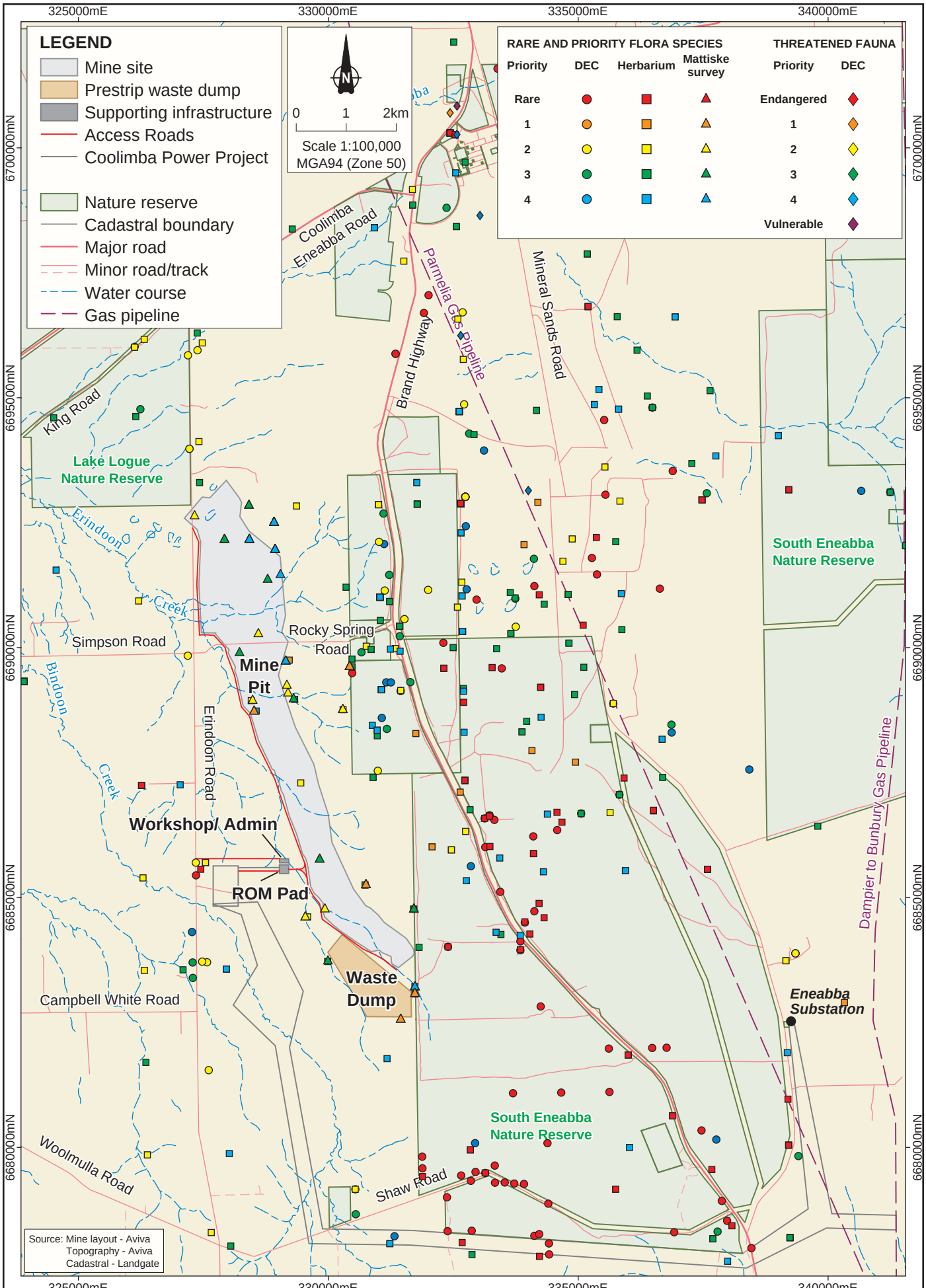
**Coal Mining Method with Full Strip Offset**

| | | |
|---|---|---|
| Consultant: URS | URS Job No: 42906631 | Figure No: 4 |
| Drawn: CAD Resources | CAD Resources File No: g1570_CW_ESD_f004.dgn | |




Source: MinServ

| | | | | |
|---|---|---|---|---|
| AVIVA CORPORATION LTD<br>Central West Coal Project | Conceptual Process Flow Diagram | Consultant: URS<br>Drawn: CAD Resources | URS Job No: 42906631<br>CAD Resources File No: g1570_CW_ESD_f005 | Figure No: 5 |




AVIVA CORPORATION LTD

**Central West Coal Project**

**Species of Conservation Significance**

Consultant: URS
Drawn: CAD Resources

URS Job No: 42906631
CAD Resources File No: g1571_CW_ESD_f006

Figure No: 6

# Appendix A Conservation Significance Classifications

## Flora

### *Definition of Rare and Priority Flora Species (Department of Environment and Conservation)*

Declared Rare Flora - Presumed Extinct: taxa which have not been collected, or otherwise verified, over the past 50 years despite thorough searching, or of which all known wild populations have been destroyed more recently, and have been gazetted as such, following approval by the Minister for the Environment, after recommendation by the State's Endangered Flora Consultative Committee.

Declared Rare Flora - Extant: taxa which have been adequately searched for, and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such, following approval by the Minister for the Environment, after recommendation by the State's Endangered Flora Consultative Committee.

P1: Priority One - Poorly Known: taxa which are known from one or a few (generally <5) populations which are under threat, either due to small population size, or being on lands under immediate threat, e.g. road verges, urban areas, farmland, active mineral leases, etc., or the plants are under threat, e.g. from disease, grazing by feral animals, etc. May include taxa with threatened populations on protected lands. Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.

P2: Priority Two - Poorly Known: taxa which are known from one or a few (generally <5) populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.

P3: Priority Three - Poorly Known: taxa which are known from several populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as 'rare flora', but are in need of further survey.

P4: Priority Four - Rare: taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not currently threatened by any identifiable factors. These taxa require monitoring every 5–10 years.

### *Categories of Threatened Flora Species (Environment Protection and Biodiversity Conservation Act 1999)*

Extinct - Taxa for which there is no reasonable doubt that the last member of the species has died.

Extinct in the Wild - Taxa which are known only to survive in cultivation, in captivity or as naturalised populations well outside past ranges; or have not been recorded in known and/or expected habitats, at appropriate seasons, anywhere in past ranges, despite exhaustive surveys over time frames appropriate to their life cycles and forms.

Critically Endangered - Taxa which face an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.

Endangered - Taxa which are not critically endangered and face a very high risk of extinction in the wild in the immediate or near future, as determined in accordance with the prescribed criteria.

Vulnerable - Taxa which are not critically endangered or endangered and face a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.

Conservation Dependent - Taxa which are the foci of specific conservation programs, the cessation of which would result in the species becoming vulnerable, endangered or critically endangered within a period of 5 years.

# Appendix A Conservation Significance Classifications

## Fauna

### *Definition of Rare and Priority Fauna Species (Department of Environment and Conservation)*

Wildlife Conservation Act 1950 Schedule 1 - Fauna that is rare or likely to become extinct

DEC Priority Species classifications:

Priority 1- Taxa with few, poorly known populations on threatened lands

Priority 2- Taxa with few, poorly known populations on conservation lands

Priority 3 - Taxa with several, poorly known populations, some on conservation lands

Priority 4 - Taxa in need of monitoring

### *Categories of Threatened Fauna Species (Environment Protection and Biodiversity Conservation Act 1999)*

A native species is eligible to be included in the endangered category at a particular time if, at that time: (a) it is not critically endangered; and (b) it is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.

Listed migratory species include species listed in the Convention on the Conservation of Migratory Species of Wild Animals; the Agreement between the Government of Australia and the Government of the Peoples Republic of China for the Protection of Migratory Birds and their Environment (CAMBA); and the Agreement between the Government of Japan and the Government of Australia for the Protection of Migratory Birds and Birds in Danger of Extinction and their Environment (JAMBA). Listed migratory species also include any native species identified in an international agreement approved by the Commonwealth Environment Minister. The Minister may approve an international agreement for this purpose if satisfied that it is an agreement relevant to the conservation of migratory species.