DRAFT REPORT

Coolimba Power Project
Preliminary Closure Plan

Prepared for

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1.1 Background

Coolimba proposes to construct a CCS ready coal-fired Power Station adjacent to the proven coal resource at the Central West Coal Mine. The Power Station will not only provide up to 450 MW of base load power generation capacity using the CWC coal resource as fuel, but will also provide up to 358 MW of peak load capacity from gas-fired turbines. Electricity generated from the gas-fired turbines will provide energy during periods of peak demand on the grid, and to backup the coal-fired generators during outages.

The Power Station will be connected to the SWIS via a double circuit 330 kV transmission line supported by approximately eighty 40 m high lattice towers spaced at approximately 250 m intervals. The towers will be aligned within a 20 km long, 100 m wide easement linking the Power Station to the proposed Eneabba 330 kV substation. The infrastructure corridor is routed south around the South Eneabba Nature Reserve (SENR) (except for a small portion within the reserve). The width of the easement will be reduced during the detailed design phase.

The coal will be transported to the plant via a conveyor belt linking the coal product stockpiles on the adjoining mine site to the coal day-bins at the Power Station. The coal will be crushed and sized before the Power Station takes delivery of the coal. Coal will be extracted from the coal day-bins and fed to the boiler where it is combusted to heat water and produce steam. The steam expands and rotates the turbines to generate electricity. Lime sand is also injected into the furnace of the boiler, where it reacts with sulphur and reduces sulphur dioxide (SO_2) emissions. Lime sand will be delivered by a third party on a regular basis and stockpiled on site to ensure stocks are maintained. The Power Station's process and cooling water will be sourced primarily from the dewatering of the coal mine, but, a proportion may also be sourced from the Yarragadee aquifer as a makeup and or backup supply if required. Coolimba has sought the relevant approval under the *Rights in Water and Irrigation Act 1914* for this abstraction and does not address that approval process further in this PER.

The waste products of the coal-fired electricity generation process are:

- Gaseous emissions;
- Solid residue; and
- Waste process water.

The gaseous emissions comprise nitrous oxides (NO_x), carbon dioxide (CO_2), small particulate matter (PM_{10}), sulphur dioxide (SO_2) and a number of gases at trace concentrations. The exhaust gas is passed through a bag filter to remove fly ash before being expelled to atmosphere through the 130 m tall stack. Ash from the boilers (bottom-ash) is removed from the fluidised bed in a continuous process. This combined ash component, totalling approximately 820,000 tonnes per annum (tpa) will be collected and returned to the mine via trucks and deposited in the mine void as part of the ongoing mine backfill operation.

Water sourced from dewatering the mine will be transported from the raw water storage pond to the Power Station via a water pipeline. Following treatment, the water will be used both as process water and cooling water for the Power Station operation. Most of the water is consumed in the cooling towers, where water is evaporated and expelled to atmosphere in order to reject low temperature waste heat from the Power Station.

The process water within the water/steam circuit of the power plant is largely recirculated in a closed loop system. Water is heated to make steam in the boiler, expanded through the steam turbine, condensed in a steam condenser and returned to the boiler. Small water losses from this cycle occur in the form of boiler blowdown which is piped to the evaporation pond.

The waste water sources that are directed to the evaporation pond in general contain a concentrated form of the dissolved natural contaminants carried into the plant. These contaminants generally consist of salts, carbonates, silicates, sulphates and other elements at trace levels. The salts and other minor

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constituents are concentrated in the evaporation ponds. Residue (20,000 tpa) that remains after the water has been evaporated will be returned along with the ash to the mine and covered as part of the ongoing mine backfill operation.

Natural gas will fire the gas turbines and will be sourced via an underground pipeline placed within the infrastructure corridor which links the Power Station to the nearby Parmelia Natural Gas Pipeline or the Dampier to Bunbury Natural Gas Pipeline (DBNGP). The OCGT will be air cooled and the gaseous emissions will be released to atmosphere through a 35-40 m high exhaust stack. No solid residue is produced as part of the gas-fired electricity generation process.

The footprint of the Power Station and the easement is approximately 483 hectares (ha) of which 431 ha is cleared farm land and 52 ha is uncleared land (including a 30ha portion within the southern boundary of the SENR).

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1.2 Closure Planning Overview

Coolimba is committed to protecting the environment as reflected in Aviva's Environmental Policy (Aviva, 2008), which states that Aviva "recognises our environmental responsibilities and promotes environmental awareness among its employees and contractors". The policy also states that "our project planning and implementation seeks to prevent or minimise impacts on the environment in all project activities, and compliance with environmental laws and regulations is the minimum requirement for our environmental performance. Our goal is to exceed these requirements." These principles will be applied to the development of an integrated approach to rehabilitation and closure for the Project.

Coolimba recognises the importance of planning for closure during the early stages of project development. This Preliminary Closure Plan is designed to meet the guidelines in the Australian and New Zealand Minerals and Energy Council (ANZMEC) and the Minerals Council of Australia (MCA) (2000) Strategic Framework for Mine Closure, based on the idea that the power station and associated infrastructure are an extension of the mine.

1.3 Purpose of Preliminary Closure Plan

Given the conceptual nature of this Plan, the purpose of this Preliminary Closure Plan is to:

- Provide a framework for closure planning for the Project.
- Identify issues that are necessary to meet legal requirements and other obligations for mine site closure.
- Identify significant closure risks and mitigating actions.
- Identify research requirements to address any significant rehabilitation and closure issues/risks.

1.4 Scope of Preliminary Closure Plan

The specific areas (domains – refer to Section 5.1) covered by this plan comprise:

- Power station.
- Evaporation ponds and power station process water storage pond.
- Infrastructure corridor.

1.5 Relevant Environmental Management Plans

The Preliminary Closure Plan addresses closure and rehabilitation requirements for the Project. However, it is recognised that the implementation of ongoing management strategies during the life of the Project will contribute to the achievement of the closure objectives. Therefore, the Preliminary Closure Plan should be considered in conjunction with the following management plans:

- Water Management Plan.
- Flora and Vegetation Management Plan.
- Terrestrial Fauna Management Plan.
- Air Quality Management Plan.
- Noise Management Plan.

Section 2 Closure Objectives

The Project Area comprises a total disturbance footprint of approximately 483 ha, of which 52 ha requires clearing, the remainder is existing cleared farm land. Of the 52 ha, 30 ha lies within the SENR along its southern boundary. A nature reserve and pastoral activities are the current land uses in the Project Area.

The post operations land use for the Project Area is a return to it's pre-developed state. It is acknowledged that there will be a requirement to discuss the objectives with stakeholders as part of the consultation strategy for the development of the Final Closure Plan.

Objectives for closure have been developed to provide guidance on the outcomes that are intended to be achieved through the closure of the site. The closure objectives for the Project are as follows:

- Establish a safe and stable environment that is compatible with the post-development land use.
- Eliminate or mitigate adverse environmental effects to an acceptable and reasonably practicable level of risk.
- Avoid or minimise financial costs and long-term liabilities to Coolimba Power Pty Ltd, the government and the public.
- Efficiently use resources in the execution of closure activities.
- Comply with legal requirements.
- Undertake monitoring of rehabilitated areas and take appropriate remedial action until the approved completion criteria have been met.

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3.1 Legal Obligations and Commitments

3.1.1 Legislation

The legislation relevant to the closure of the Project includes:

- *Environmental Protection Act 1986.*
- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).
- Environmental Protection (Controlled Waste) Regulations 2004.
- Environmental Protection (Unauthorised Discharges) Regulations 2004.
- *Contaminated Sites Act 2003.*
- *Mining Act 1978.*
- Mining Regulations 1981.
- *Mines Safety and Inspection Act 1994.*
- *Conservation and Land Management Act 1984.*
- *Rights in Water and Irrigation Act 1914.*
- *Wildlife Conservation Act 1950.*
- *Aboriginal Heritage Act 1972.*
- Commonwealth *Native Title Act 1993.*

The legislation listed above is not considered to be exhaustive and a legal review should be undertaken during the first two years of operations to identify the legislation that is applicable to Coolimba closure activities.

3.1.2 Ministerial Conditions

There are likely to be legal requirements that arise from the approvals under the *Environmental Protection Act 1986* and the EPBC Act. The Project is currently being assessed by the WA Environmental Protection Authority (EPA) and by the Commonwealth Department of the Environment Water, Heritage and the Arts (DEWHA). It is anticipated that there will be a number of Ministerial Conditions imposed on the Project prior to receiving state and Commonwealth environmental approval.

3.1.3 Closure Standards

There are no statutory requirements for closure planning in WA. However, there are a number of relevant principles in the following closure guidelines referenced by industry:

- Strategic Framework for Mine Closure. (2000) ANZMEC and MCA.
- Mine Closure Guideline for Minerals Operations in Western Australia. (2000) The Chamber of Minerals and Energy.
- Mine Closure and Completion, Leading Practice Sustainable Development Program for the Mining Industry. (2006a) Commonwealth Department of Industry, Tourism and Resources (DITR).
- It's Not Over When It's Over: Mine Closure Around the World. (2002) World and International Finance Corporation (WIFC).

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- Mine Rehabilitation, Leading Practice Sustainable Development Program for the Mining Industry.(2006b) DITR.
- Managing Acid and Metalliferous Drainage Handbook, Leading Practice Sustainable Development Program for the Mining Industry (Draft). (2006c) DITR.
- Mining in Arid Environments, Mining Environmental Management Guidelines. (2006) Department of Industry and Resources (DoIR).
- Guidelines for Mine Closure Plans. (2007) DoIR.

Although there are no statutory requirements to adhere to the above guidelines, Coolimba Power Pty Ltd agrees, in principle, with these guidelines and will develop a rehabilitation plan based on their advice, its suitability and the relevance to the Project.

This Preliminary Closure Plan aims to incorporate the key aspects of the guidance provided in these standards including:

- Identify desired outcomes from closure and develop performance objectives and criteria to be achieved.
- Identify baseline environmental and socio-economic conditions to enable appropriate completion criteria to be developed.
- Identify legal requirements that must be achieved.
- Identify stakeholder concerns/requirements that should be taken account of during closure planning.
- Define closure options.
- Integrate closure planning into operational and life-of-mine decision making.
- Monitor the implementation of the plan.
- Regularly review and revise the plan to take account of changes to site activities, infrastructure or processes, technological options for mitigating risks, information from monitoring or research activities etc.
- Allocate adequate resources for implementing the plan and adequately represent the cost of closure in company accounts.

3.2 Environmental Setting

3.2.1 Climate

The Eneabba area, in which the Project is located, experiences a Mediterranean climate of hot, dry summers and mild winters (Bureau of Meteorology [BoM], 2008a). Monthly climatic data averages are recorded by the BoM at the Eneabba weather station (Site No. 008225), which include data from 1964 to 2008. The maximum temperature ranges from moderate in winter to high in summer. The average maximum monthly temperature is coolest in July at 19.6°C, and hottest in February at 36.1°C. The lowest mean minimum monthly temperature is 9.0°C in August, and the highest is 19.5°C in February.

Rainfall in the region is low, with extremely low levels over the summer months. Eneabba has an average of 60.6 rain days per year and a total annual average of 504 mm. The highest average volume of rain falls in June, which has an average rainfall of 105.2 mm. January tends to be the driest time of the year, with an annual rainfall of 7.1 mm, and just one rain day.

Evaporation is not recorded at the BoM Eneabba weather station, nor at the three nearest stations (Jurien Bay, Carnamah and Badgingarra). Therefore, average climatic zone evaporation data has been used.

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According to BoM (2008b) evaporation mapping, Eneabba is located within the zone which experiences an average of 2,000 to 2,400 mm total annual evaporation.

The climate conditions experienced in the region may limit the success of rehabilitation. The restrictions on the quantity of water available, particularly during the summer months, will require rehabilitation to be carefully planned.

3.2.2 Topography

The site and the surrounding area are part of the Eneabba Plain, a northern sub-section of the Swan Coastal Plain which stretches east approximately 25 km from the coast to the base of the Western Shield formation. The Gingin Escarpment links the plain to the Western Shield with generally uniform gradient extending over a distance of 10 km from 80 m above sea level (AHD) to 292 m AHD.

The Eneabba Plain is generally flat, comprising areas of low undulations and small isolated rises due primarily to ferricrete outcrop. The broad undulations are generally due to the numerous drainages (now all ephemeral) that have gradually cut very broad shallow valleys into the landscape.

The Power Station's location is consistent in this description. The site is situated on the northern side of a broad flat valley (**Error! Reference source not found.**), with the Power Station proposed for development at the stand of trees shown in the centre of **Error! Reference source not found.**. The Power Station site is located approximately 23 km from the ocean and five kilometres from the start of the escarpment. The site lies at an elevation of 80 m AHD with isolated rises featured to the east. The Brand Highway climbs this rise and at its closest point five kilometres due east is approximately 130 m AHD, which is approximately 50 m higher in elevation than the base of the Power Station.

3.2.3 Soils

The following has been sourced directly from D.C. Blandford & Associates Pty Ltd (Blandford [2008]).

The soils present in the project area are the result of a complex history, and have been strongly influenced by erosion of laterites on the Gingin and Dandaragan Scarps and their subsequent deposition on the coastal plain in outwash fans and extensive channel deposits. These materials have then been buried by fluvial and aeolian sands. Ferricretes form a major component of the project area, occurring as both exhumed and buried masses.

The soils of the project area generally fall into two main types; texture contrast profiles and deep siliceous sands. The deeper sands, which grade into material with increased clay contents at depth, are associated with aeolian sheet sand deposits. These sands generally have a single grain fabric. Pisolitic to nodular ferricrete is present in many of the profiles at varying depths below the surface where the relationship of the gravels to the containing sandy matrix suggests a fluvial origin. Such an observation is consistent with similar deposits elsewhere on the Eneabba Sand Plain (D. Blandford, pers. comm.). The deeper sands have a neutral topsoil pH range of 6.5 to 7.5.

The texture contrast soils are characterised by a sandy A horizon overlying a clay B horizon. The sandy A horizons range in depth from less than 0.30 m to 1.20 m. Spontaneous dispersion is present in many of the clay subsoils.

Topsoils within the project area are generally chemically and physically infertile. Nitrogen is deficient, phosphorus and potassium levels are low, and organic carbon levels are low (<1%) at six sites, and moderate (1-2%) at four sites. The pH of soils across the project area ranges from 6 (slightly acid) to 8.5 (strongly alkaline) (D. Blandford, pers. comm.). These characteristics are important for the Project in terms of what will be required when the project area is rehabilitated and how the soil quality may be maintained during storage.

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3.2.4 Geology and Geochemistry

3.2.5 Overview

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

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

3.2.6 Geology

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 south westerly direction and an Early Cretaceous transtension to the north-west (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, siltstone, claystone and coal seams (URS, 2006a).

3.2.7 Geochemistry

Terrenus Earth Sciences (Terrenus [2008]) geochemically characterised the coal combustion ash from the pilot-scale furnace to identify their acid forming potential. The assessment conducted by Terrenus comprised a desktop review of available Project data followed by a geochemical sampling and testing programme.

Survey and Sampling

There are no specific regulatory requirements that govern sampling practices, but sampling was undertaken in accordance with the relevant guidelines. The geochemical testing for the ash was based on three samples being tested for static acid-base (pH, electrical conductivity, acidity, alkalinity, Total-S, SO_4-S, acid neutralising capacity, net acid generation), three samples tested for multi-elements on solids and three samples for nutrients on solids. A further set of analysis was conducted on three samples for Multi-elements and nutrients in leachate from bottle-tumbling tests.

Geochemical Characterisation and Assessment of Coal Combustion Ash

As the ash waste samples for the assessment were generated from a pilot process, the operational ash materials may have different geochemical characteristics. It is therefore important to note that the assessment should be considered indicative only. The coal combustion ash testing indicated the following:

- The ash is expected to generate alkaline and relatively low-salinity runoff/seepage following surface exposure;
- All of the ash samples tested were Non Acid Forming (NAF);
- The solid ash materials are expected to have total metals and nutrient concentrations (in solids) well below the applied guideline values;

- Leachate from coal combustion ash is likely to contain some dissolved metals in concentrations that may exceed the applied water quality guidelines. The key metals of concern are arsenic (As), boron (B), chromium (Cr), copper (Cu), molybdenum (Mo), selenium (Se) and zinc (Zn).

3.2.8 Groundwater

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

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 CCM 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, 2006a).

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 (Northern Agricultural Catchments Council [NACC], 2002).

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

3.2.9 Surface Water

According to the Northern Agricultural Catchments Council (NACC) (2002), the project area lies within the Logue Catchment, which extends west of the Gingin Scarp onto the Swan Coastal Plain, and east of the North Coastal Dunes. Lakes Logue and Indoon are the largest components of a north-south chain of wetlands perched on aeolian sands. (ATA Environmental, 2001).

3.2.10 Flora and Vegetation

The following three plant communities were recorded by Mattiske Consulting Pty Ltd (Mattiske [2008]) in the Project Area, with the remaining areas consisting mainly of cleared paddocks with localised remnant trees:

- H3 - Mixed Heath of Proteaceae and Myrtaceae spp. with occasional *Eucalyptus todtiana* on sand.
- T1 - Scrub or Thicket of *Banksia attenuata, Banksia menziesii* over *Banksia sphaerocarpa* var. *sphaerocarpa, Adenanthos cygnorum, Banksia hookeriana* and *Conospermum triplinervium* on sand.
- E4 - Open Low Woodland of *Eucalyptus todtiana* and *Nuytsia floribunda* over *Banksia menziesii* and *Stirlingia latifolia* on sandy drainage lines.

The Rare *Tetratheca nephelioides* (R) was recorded in relatively high numbers along the infrastructure corridor within community T1, and several Rare Eucalypts (*Eucalyptus crispata, Eucalyptus impensa* and *Eucalyptus johnsoniana)* have been recorded historically on and near the infrastructure corridor.

A total of one Rare, four Priority 3 and three Priority 4 taxa were recorded within the Project Area. These comprise:

- *Tetratheca nephelioides* (R).

- *Desmocladus elongatus* (P3).
- *Banksia tortifolia* (P3) (formerly *Dryandra tortifolia).*
- *Daviesia chapmanii* (P4).
- *Daviesia epiphyllum (P3).*
- *Georgeantha hexandra* (P4).
- *Grevillea rudis* (P4).
- *Lepidobolus quadratus* (P3).

The definition of Rare and Priority Flora Species are (Department of Environment and Conservation, 2008):

- Rare (R) - 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.
- Priority 1 (P1) - Taxa with few, poorly known populations on threatened lands.
- Priority 2 (P2) - Taxa with few, poorly known populations on conservation lands, or taxa with several, poorly known populations not on conservation lands.
- Priority 3 (P3) - Taxa with several, poorly known populations, some on conservation lands.
- Priority 4 (P4) - Taxa in need of monitoring.

3.2.11 Dieback

The long-term average annual rainfall for the Project Area is 504 mm, and data over the last seven years ranges from 489 mm maximum in 2003 to 307 mm minimum in 2007. This indicates that the Project Area may be susceptible to dieback, but would likely be marginal to the survival of the *Phytophthora cinnamomi* pathogen. It would therefore be expected that the disease expression throughout the majority of the Project Area would be episodic rather than progressive disease expression observed in areas of higher rainfall. This expression may be impacted by localised conditions, such as water gaining sites or areas with a higher water table (Glevan Consulting [Glevan], 2007).

No visual evidence of the dieback disease was found within the assessable remnant vegetation of the Project Area, or within five soil and tissue samples taken from within the Project Area, during an assessment by Glevan in December 2007. However, Glevan's previous assessment within the Iluka West Mine boundary, found three discrete dieback infestations located north of Rocky Springs Road, and infestation symptoms were also noted adjacent to the Project Area.

3.2.12 Fauna

Vertebrate Fauna

A total of 11 native mammal species, 31 bird species and 25 herpetofauna species were identified during fauna surveys (ecologia Environment, 2008). Two species known to occur in the vicinity of the Project Area are protected under the EPBC Act, comprising:

- **Carnaby's Black-Cockatoo** (*Calyptorhynchus latirostris*) is listed as Endangered under the EPBC Act. This species has been recorded in previous studies in the region, and is known to live in proteaceous scrubs and heaths, eucalypt and pine forests. They mainly feed in shrubland or kwongan heath, foraging on seeding proteaceous species.

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Carnaby's Black-Cockatoo was recorded in the South Eneabba Reserve once during the Spring 2007 survey, while 26 individuals were seen feeding on *Banksia* sp. during the Autumn 2008 survey. As the vegetation in the nature reserve is similar to the adjacent natural vegetation of the Project Area, Carnaby's Black-Cockatoos are likely to use both areas for feeding. Therefore Carnaby's Black-Cockatoos are likely to be seasonal but regular visitors to the Project Area, feeding in remnant native vegetation after moving from inland breeding areas (such as Three Springs and Carnamah) to non-breeding, feeding areas closer to the coast.

- The **Rainbow Bee-eater** (*Merops ornatus*) is listed as Migratory under the EPBC Act. This species has been recorded from multiple surveys in the Eneabba region, and are generally common in the region. This species migrates within Australia and up to Indonesia and Papua New Guinea, and is found almost anywhere suitable for obtaining insects. Breeding occurs in both Papua New Guinea and Australia between the months of October and December. The nests are burrows which are dug, usually at a slight angle, on flat ground, sandy banks or cuttings, and often at the margins of roads or tracks.

  It is expected that the individuals recorded during the surveys of the Project Area are breeding in the area, due to the timing of the survey and the sandy soil types of the region that are suitable for nest burrows.

Desktop studies have identified that two other species listed as Migratory under the EPBC Act may also occur in the Project Area, these are:

- The **Eastern Great Egret** (*Ardea alba*) are most commonly found in both fresh and saline shallow waters, neither of which are found in the Project Area. This species has been recorded in the region, but due to a lack of suitable habitat it is unlikely to be present in the Project Area.
- The **Fork-tailed Swift** (*Apus pacificus*) is a migratory species that spends winter in Australia after breeding in Mongolia and China. Fork-tailed Swifts have previously been recorded from the Lesueur area. Due to the aerial lifestyle and migratory nature of this species, it is expected to be an infrequent visitor and would not directly utilise the fauna habitats of the Project Area.

The fauna surveys recorded one species of State conservation significance that is gazetted under the *Wildlife Conservation Act 1950*. This was **Carnaby's Black-Cockatoo**: discussed previously and listed as Schedule 1 under the *Wildlife Conservation Act 1950*.

Desktop studies have identified that the following three species listed under the *Wildlife Conservation Act 1950* may also occur in the Project Area:

- The **Peregrine Falcon** (*Falco peregrinus*). Listed as Schedule 4, this falcon breeds on all continents except Antarctica. Australia is considered one of the strongholds of the species, as numbers have declined in many other parts of the world. Peregrine Falcons commonly prefer cliffs along the coast, rivers, ranges, wooded watercourses and lakes, and will nest primarily on cliff ledges, granite outcrops and in quarries. Peregrine Falcons have been recorded in the region. No potential breeding sites are present in or near the Project Area but the species may utilise the Project Area for foraging.
- The **Woma** (*Aspidites ramsayi* south-west population). Listed as Schedule 4, the Woma python is a moderately large snake that prefers woodlands, heaths and shrublands on sandplains. Several populations have been identified across Australia, including the south-west population, which has a range that covers the Project Area. However, this population has not been recorded since 1989. Clearing of much of its natural habitat and predation by foxes and cats has resulted in a major population decline. Suitable habitat in the form of heath on sand plains is present within the Project Area, but due to its scarcity and the prevalence of introduced predators in the Project Area, it is unlikely to be present.
- The **Gilled Slender Blue-tongue** *(Cyclodomorphus branchialis)*. Listed as Schedule 1, the Gilled Slender Blue-tongue is a large skink found in semi-arid shrublands in an area between the Murchison and Irwin Rivers. This species has also previously been recorded in the area. Due to the close proximity of these records and the suitable habitat in the Project Area, the Gilled Slender Blue-

tongue could potentially occur in the area. However, if a population is present, it is likely this would have experienced a large population decline due to the large-scale burn in 2005.

The fauna surveys also identified the following two species gazetted under the DEC Priority Fauna List:

- The **Black-striped Snake** (*Neelaps calonotos)* is listed as Priority 3 by the DEC and has previously been recorded between Mandurah and Lancelin, with a single specimen recorded from Port Denison (70 km south of Geraldton). Therefore, this record is approximately 200 km from the nearest previous record.

  This species is rarely seen, and its preferred habitat comprises dunes and sandplains vegetated with heaths and eucalypt/banksia woodlands. This snake is locally abundant on the Swan Coastal Plain and was located east of the Project Area, outside of the South Eneabba Nature Reserve. It is expected to occur throughout the heathy sandplains surrounding the Project Areas.

- The **Rufous Fieldwren** (*Calamanthus campestris montanellus*, western wheatbelt population) is listed as a Priority 4 species on DEC's Priority Fauna List. The western wheatbelt subspecies of the Rufous Fieldwren prefers heath and low shrubland on sandplains, lateritic ridges and saltmarsh or samphire, with or without emergent trees. This species of Rufous Fieldwren was once widespread across most of the south-west of WA, but is now restricted to remnant vegetation due to clearing.

  The Rufous Fieldwren was recorded in kwongan heath in two southern areas of the Project Area, and in the South Eneabba Nature Reserve. It is expected that the individuals recorded are post-breeding residents occupying territories in the remnant vegetation.

Desktop studies have identified that six other species that are gazetted under the DEC Priority Fauna List may also occur in the Project Area. These comprise:

- **Australian Bustard** (*Ardeotis australis*). Listed as a Priority 4 species, the Australian Bustards are large nomadic birds that utilise a number of open habitats, including heathlands in the south of WA. There are no recent records of the Australian Bustard from Eneabba, however, there are a number of historic records in the region. It is possible that the species could use the open vegetation, particularly the cleared agricultural land and regenerating heath, within the Project Area and the adjacent South Eneabba Nature Reserve.

- **White-browed Babbler** (*Pomatostomus superciliosus ashbyi* - western wheatbelt subspecies). Listed as a Priority 4 species, the White-browed Babbler is most often found in thickets of mulga and Acacia as well as uncleared road verges in farmlands. However, more than 50% of its former habitat has been cleared for agriculture. The White-browed Babbler has been previously recorded in the region. No suitable habitat was identified within the Project Area, although vegetation with sufficient structural complexity was observed nearby.

- **Crested Bellbird** (*Oreoica gutturalis*). Listed as a Priority 4 species due to the contraction of its current range to less than 50% of its past distribution. Crested Bellbirds have frequently been recorded in the region, and in the Eneabba area occur on open banksia scrubs and heathland. Crested Bellbirds are likely to occur in the few parts of the Project Area that have adequate trees and shrubs, and are less likely to occur in very open, largely treeless areas and in the South Eneabba Nature Reserve.

- **Brush Bronzewing** (*Phaps elegans).* Formerly widespread across the south-west of WA, the Priority 4 listed Brush Bronzewing is now locally extinct across much of this range. This species prefers dense shrublands with significant vertical vegetation structure and access to water. This habitat is not found within the Project Area. However, sitings of Brush Bronzewings in the nearby Iluka mine site and the Southern Beekeepers Reserve have been recorded.

- **Hooded Plover** (*Charadrius rubricollis).* Listed as a Priority 4 species, Hooded Plovers are restricted to coastal areas, estuaries and salt lakes, and were recorded at Eneabba in 2006. However, they are not expected to occur within the Project Area due to a lack of suitable habitat.

- **Woma** (*Aspidites ramsayi* south-west population). As discussed previously. Also listed as a Priority 1 species.

Fauna Habitats of Significance

The Power Station site is predominantly covered by cleared pasture land, with remnant vegetation occurring along some fence boundaries and parts of the proposed infrastructure corridor. No areas of unique habitat were identified exclusively within the Project Area.

As vertebrate fauna habitat, the vegetation is relatively uniform, whereas the soil substrate varies from lateritic uplands to sandplains. Therefore, the presence of burrowing fauna within the different habitats is expected to vary accordingly. A few burrowing species were recorded during the study, but none were recorded at the site which is characterised by a hard lateritic ridge. It is therefore likely that these landforms may represent a significant barrier to burrowing species.

Short Range Endemics

The 483 ha Power Station footprint and project area was surveyed for SREs using conventional trapping and foraging techniques. The surveys revealed five Arthropod orders. None of the species recorded during either survey were recorded within the footprint of the Project.

3.2.13 Pests and Weeds

Four introduced mammal species were recorded within or adjacent the Project Area. These were the fox (*Vulpes vulpes*), cat (*Felis catus*), rabbit (*Oryctolagus cuniculus*) and house mouse (*Mus musculus*).

Twenty taxa recorded by Mattiske (2008) within the flora and vegetation survey area are introduced species. None of these introduced species are listed under Section 37 of the *Agriculture and Related Resources Protection Act 1976.*

3.3 Social Setting

3.3.1 Regional Land Use

The Mid West region of WA is recognised as an area rich in mineral sands deposits, as well as supporting a variety of pastoral activities and tourism attractions. The area supports large livestock properties as well as crops for wheat, canola, lupins, oats and wildflowers. The wildflower industry also attracts tourists, and wildflower tours are a common feature over the Spring period. Tourism in terms of camping is also a feature of the area, as there are several nature reserves and natural lake systems in the wider area.

Commercial activities in the area generally support these primary industries; agriculture, mining and tourism as well as a historically successful fishing industry from the region's coastal towns.

3.3.2 Aboriginal Heritage

The Aboriginal heritage survey included preliminary archival research followed by a formal field survey and consultation with the Yued Consultants. The Yued consultants are the representatives of the Yued native title claimant group.

The formal survey area covers land which is included in the Amangu and Yued people's claimant area. The ethnographic survey, undertaken by Anthropos Australis Staff and the Yued consultants comprised a walk over the entire survey area. The purpose of the survey was to identify if any 'Not Clear Work Areas' could be identified in the survey area. Not Clear Work Areas are identified as areas that contain or are likely to contain features of ethnographic significance. During the site visit, features of potential ethnographic significance were photographed and precise locations were recorded.

Section 3 Baseline Information

The survey conducted between 1 and 5 September 2008 revealed the existence of two types of ethnographic features, these were the existence of Moodjar Trees and the existence of isolated stone artefacts. The Moodjar Trees are considered to hold ethnographic significance for the Yued people and are referred to also as "spirit trees", as they are the potential site of human burials. All features are located at or adjacent to the creek bed which lies beyond the southern boundary of the Power Station construction footprint.

3.3.3 Socioeconomic Environment

The Mid West region (West Midlands sub-region) includes three local government authorities, comprising the shires of Carnamah, Coorow and Dandaragan, and the main towns of Eneabba, Leeman, Green Head and Jurien. The West Midlands sub-region's estimated resident population taken from 2006 census data was 4,503, which is concentrated in the key settlements of Eneabba, Leeman, Green Head and Jurien (Australian Bureau of Statistics [ABS], 2008). The region comprises 0.2% of the State's population and 0.9% of the population living in regional WA.

The Mid West region has a diverse economy with the major industries comprising, mining, agriculture and fishing. Much of the land east of the Perth to Geraldton Railway was cleared for agriculture towards the end of the 19th Century as part of the railway project. These areas now support extensive cropping and livestock enterprises.

Overall, the agricultural industries are productive and profitable, although poor seasons in recent years (and especially in 2007) have caused financial stress. As in all broad-acre agricultural areas in WA, the long-term decline in terms of trade in agricultural commodities is leading to structural adjustment with a smaller number of larger farming businesses that are increasingly mechanised. The reduced on-farm population reduces shire populations, and the requirement for services such as schools and education.

The mineral sands mining industry is important to the Eneabba and Cataby areas, and there is a talc mine east of Three Springs. The mineral sands mining industry is an important regional employer, and it supports towns such as Eneabba and Leeman. The Iluka operations near Eneabba employ 90 Iluka employees and 290 contractors. Material from the mine is processed at Narngulu near Geraldton and then exported. Further south, Ti-West operates the Cooljarloo mineral sands mine near Cataby.

Rock lobster fishing is an important industry and a major activity in coastal communities including Cervantes, Jurien, Green Head and Leeman. The industry enjoyed high profitability through the 1990s, although increasing costs, and poorer catches in the last two years, and predicted low catches in coming years is causing adjustment in the industry with a reduced number of businesses. However, the industry will continue to be an important contributor to the economy in the area.

Section 4 Stakeholder Consultation

4.1 Consultation Program

Coolimba is committed to an inclusive and transparent environmental assessment process and plans to build on the consultation to date throughout the PER public review period and beyond.

Consultation has been conducted with the following primary objectives:

- Identification of interested or affected parties and individuals and an understanding of the nature of their interest.
- Provision of accurate, relevant and updated information on the Project and its potential impacts.
- Anticipation of regulatory requirements and early initiation of consultation.
- Continuation of open consultation with stakeholders beyond the approvals process, through development and into operation and closure.

The consultation process was conducted through direct and indirect methods.

Direct consultation took the following forms:

- Community briefings in local towns;
- Agency and authority briefings and technical discussions;
- Landholder briefings (including native title claimants); and
- Release of information to the broader market through public announcements and media releases.

Indirect consultation has occurred via regular updates on the Projects in regional and state wide publications, and through the provision of a Project website with contact opportunities.

A consultation register has been developed to record consultation inputs and responses. This register will be maintained throughout the life of the Project. See Section 5.3 for information on consultation to date. This register will be maintained throughout the life of the Project.

4.2 Future Consultation

4.2.1 Public Review Period

Coolimba will continue to engage in consultation with stakeholders throughout the 8 week public review period and during the response to submissions phase of the environmental impact assessment process.

Coolimba will hold community briefings and Q&A sessions in the local communities during the early part of the 8 week process. The local communities will be notified of these events and invited to attend.

Coolimba will provide site visits to regulatory agencies seeking to gain a better understanding of the issues discussed in the PER.

Coolimba will continue to engage with regulatory agencies throughout their review of this PER document and the preparation of Coolimba's responses to any issues raised from submissions.

4.2.2 During Development

Should Coolimba be given approval to develop the Project, it will provide for ongoing consultation with stakeholders through both formal and informal channels. Regular community briefings will be conducted over the development period and a number of methods for continuous feedback will be established. These methods will include an extension of the existing website structure, a free-call telephone line and most likely a physical presence in the local communities. During this time it is expected that the Project

Section 4 Stakeholder Consultation

will have a number of employees living in the area who will also be a conduit for consultation with the community.

Coolimba will maintain dialogue with regulatory agencies to ensure that the regulatory requirements throughout development are addressed.

4.2.3 During Operations and at Closure

Once Coolimba begins operating the Power Station it will continue to provide for ongoing consultation with stakeholders through both formal and informal channels. The Project will assess the need and interest for regular community briefings and other feedback options and put consultation processes in place as appropriate.

During this time it is expected that the Project will have a number of employees living in the area who will also be a conduit for consultation with the community.

Also during operations, Coolimba will continue to communicate with various regulatory agencies to ensure that Coolimba adequately addresses the regulatory requirements during operation.

4.3 Consultation to Date

Throughout the planning of the Project and environmental impact assessment process, Coolimba has consulted widely to maximise the possibility of addressing all potential concerns in the most appropriate way.

Table 5-1 shows a list of the stakeholders that have been consulted to date through the process.

Table 4-1 Stakeholder Consultation Events and Dates

Category	Stakeholders	Events and Dates
Local Communities	Eneabba Community Members	26 October 2007 - Project Launch and information day
	Leeman Community Members	12 December 2007 - Information session 19 March 2008 - Information session
	Green Head Community Members	12 December 2007 - Information session
Local landowners	Individuals in the vicinity of the mine	Numerous meetings
	Operators of the Western Flora Caravan Park	12 December 2007 - Briefing
Indigenous Groups	*Yued* Native Title Claimant Group	15 November 2007 - Briefing
	Amangu Native Title Claimant Group	22 May 2008 - Briefing

Section 4 Stakeholder Consultation

Category	Stakeholders	Events and Dates
	Franks Native Title Claimant Group	11 August 2008 - Briefing
	South West Aboriginal Land and Sea Council (SWALSC)	31 March 2008 - Briefing
Interested Groups and Organisations	Conservation Council	25 September 2007 – Mailed referral 14 February 2008 – invitation for a Project briefing – no response 13 March 2009 - Briefing
	Wildflower Society	25 September 2007 – Mailed referral 21 August 2008 - Briefing 13 March 2009 - Briefing
	Northern Heathlands Conservation Group	12 December 2007 - Briefing
	Northern Wildflower Conservation Group	12 December 2007 - Briefing
	Urban Bush Land Council	26 October 2007 – Mailed referral
Local and Regional Business Councils	Mid West Development Commission	Ongoing updates to present through meetings and publications
	Mid West Chamber of Commerce and Industry	Ongoing updates to present including at annual Mid West Resource Forum
Utility and Interest Groups	Western Power Corporation	Numerous discussion and meetings to present on Project details
	Synergy	Numerous discussion and meetings to present on Project details
	Landcorp	17 December 2007 - Discussion of sites for construction camp and land availability
Local Government Authorities	Shire of Carnamah	15 August 2007 – Initial Briefing 30 January 2008 – Camp location

Section 4 Stakeholder Consultation

Category	Stakeholders	Events and Dates
		discussions
	Shire of Coorow	15 August 2007 – Initial Briefing 19 March 2008 – Update Briefing 23 September 2008 – Project update
State Government Agencies	Office of Development Approvals Coordination	19 September 2007 – Multi Agency Briefing Regular updates to ODAC during 2008
	Office of the Appeals Convenor	7 November 2007 - Briefing
	Office of Energy	30 June 2008 – Briefing
	Department of Mines and Petroleum (formerly Department of Industry and Resources)	20 September 2007 - Briefing 21 September 2007 – PDD briefing 9 October 2007 – Briefing 5 November 2007 – Briefing 29 February 2008 – Regulation Branch briefing on CCS etc 27 June 2008 – Environment branch update 8 July 2008 – Petroleum branch, employment and consumer protection briefing 4 August 2008 – Tenure discussions 19 August 2008 - GDE meeting with DEC and DoIR 24 September 2008 – Project update
	Department of Environment and Conservation	9 October 2007 – Briefing 14 February 2008 - Environment Management Branch briefing 18 February 2008 – Parks and Conservation briefing 4 March 2008 – Industry

Section 4 Stakeholder Consultation

Category	Stakeholders	Events and Dates
		Regulation Branch briefing 11 March 2008 – Air Quality Branch briefing 25 March 2008 – Air Quality Branch briefing 24 April 2008 – Parks and Conservation & Industry Regulation Branch briefing 11 June 2008 – Environmental Management Branch briefing 19 August 2008 - GDE meeting with DEC and DoIR 9 September 2008 - SRE update briefing
	Department of Water	7 November 2007 – Briefing 7 February 2008 – Dewatering study scope 18 April 2008 – Briefing on dewatering 19 August 2008 – Briefing on dewatering. 27 January 2009 – Discussion of abstraction from Yarragadee
	Department of Planning and Infrastructure	8 April 2008 – Briefing and accommodation discussions 3 April 2008 – Planning, transport and Land Services briefing
	Department of Indigenous Affairs	11 March 2008 – Briefing
	Department of Consumer and Employment Protection	17 June 2008 – Mine & Industry Safety briefing
	Department of Agriculture	18 September 2008 - Discussed Project with Russell Speed, Geraldton Office.
	Department of Health	27 February 2008 – Briefing 27 March 2008 – Briefing

Section 4 Stakeholder Consultation

Category	Stakeholders	Events and Dates
	Environmental Protection Authority	14 August 2007 – Initial briefing 24 June 2008 – Meeting with EPA Chairman 4 September 2008 – Presentation to EPA 16 October 2008 – CCS Presentation 6 February 2009 – Meeting with Chairman
NGOs and Community Interest Groups	Chamber of Minerals and Energy WA	Ongoing updates as a member organisation
	West Midlands Natural Resource Group Team	17 March 2008 - Briefing
Western Australian Political Representatives	Minister for State Development	27 August 2008 - Briefing
	Office of Minister for the Environment	13 November 2007 – Briefing
	Minister for Energy, Resources	15 July 2008 - Briefing
	Minister for Mid West	26 October 2007 – Public launch of Project

A consultation register has been developed to record consultation inputs from all consultation and the Coolimba response. This register will be maintained throughout the life of the Project.

The key issues raised during the consultation programme to date, with regard to Closure Issues are listed in Table 5-2, along with responses from Coolimba. The responses outline how the issue has been addressed where it is addressed in the PER.

The key issue that was raised in relation to closure is presented in Table 4-2.

Table 4-2 Closure Issues Raised by Stakeholders

Key Issues	Reference in the Preliminary Closure Plan	Other Sources of Information
The proponent would need to provide a closure plan in the PER and must include achievable rehabilitation criteria.	The power station closure plan is appended to the PER.	The proponent would need to provide a closure plan in the PER and must include achievable rehabilitation criteria.

Section 5 Site Description

5.1 Domains

The Project Area can be segregated into "domains", which are land management units within a site. Domains tend to have similar geophysical characteristics and environmental issues. Therefore, the nature of decommissioning, remediation and rehabilitation activities would also be similar. The domains at the Project at the time of closure are anticipated to be as follows:

- Power station and supporting infrastructure.
- Evaporation ponds and process water storage pond.
- Infrastructure corridor.

5.2 Power Station and Supporting Infrastructure

5.2.1 Description

The Power Station will not only provide up to 450 MW of base load power generation capacity using the CWC coal resource as fuel, but will also provide up to 358 MW of peak load capacity from gas-fired turbines. Coal will be transported to the coal handling plant via a conveyor belt linking the coal product stockpiles on the adjoining mine site to the coal day-bins at the Power Station. The coal will be crushed and sized before the Power Station takes delivery of the coal. Coal will be extracted from the coal day-bins and fed to the boiler where it is combusted to heat water and produce steam. The steam expands and rotates the turbines to generate electricity. Lime sand is also injected into the furnace of the boiler, where it reacts with sulphur and reduces sulphur dioxide emissions. Exhaust gas is passed through a bag filter to remove fly ash before being expelled to the atmosphere through the 130 m tall chimney stack. After combustion, ash (bottom-ash) is removed from the fluidised bed in a continuous process. Fine ash (fly-ash) which is entrained in the flue gas stream is collected in the bag filters. This combined ash component will be collected and returned to the mine via trucks.

Natural gas will fire the gas turbines and will be sourced via an underground pipeline placed within the infrastructure corridor which links the Power Station to the nearby Parmelia Natural Gas Pipeline or the Dampier to Bunbury Natural Gas Pipeline. The OCGT will be air cooled and the gaseous emissions will be released to atmosphere through a 35-40 m high exhaust stack.

Supporting infrastructure, which includes the contractors' equipment laydown area, fuel farm, hazardous chemical storage site, package treatment plant for sewage and fencing which extends the entire length of the site's perimeter.

5.2.2 Closure Issues

The closure issues for the Power Station and supporting infrastructure will be as follows:

- After the Power Station and supporting infrastructure has been removed, the sites will have been compacted and the infiltration capacity of the soil will be low, which could result in increased surface runoff and sheet erosion.
- The potential for soil, groundwater and surface water contamination from hydrocarbon spillages.
- There is potential for erosion from the reconstructed landforms prior to vegetation becoming established.
- The drainage pattern formed by the reconstructed landforms could be different to the pre-disturbance drainage pattern and this could have adverse impacts on vegetation due to interruption of drainage.
- There is the potential for the rehabilitated area to become infested with weeds as these species will readily colonise disturbed areas.

Section 5 Site Description

- There is the potential for the rehabilitated and adjacent areas to become infested with the *Phytophthora cinnamomi* pathogen as a result of natural processes or human activities.

5.3 Evaporation Ponds and Process Water Storage Pond

5.3.1 Description

Water sourced from dewatering the CWC mine will be transported from the raw water storage pond to the Power Station via a water pipeline. Following treatment, the water will be used both as process water and cooling water for the Power Station operation. Most of the water is consumed in the cooling towers, where water is evaporated and expelled to atmosphere in order to reject low temperature waste heat from the Power Station.

The process water within the water/steam circuit of the power plant is largely recirculated in a closed loop system. Water is heated to make steam in the boiler, expanded through the steam turbine, condensed in a steam condenser and returned to the boiler. Small water losses from this cycle occur in the form of boiler blowdown which is piped to the evaporation pond.

The waste water sources that are directed to the evaporation pond in general contain a concentrated form of the dissolved natural contaminants carried into the plant. These contaminants generally consist of salts, carbonates, silicates, sulphates and other elements at trace levels. The salts and other minor constituents are concentrated in the evaporation ponds. Residue that remains after the water has been evaporated will be returned along with the ash to the mine and covered as part of the ongoing mine backfill operation.

The evaporation ponds will occupy approximately 150 ha, will be approximately 1.5 m deep (1.2 m working depth) and be lined with an impermeable liner to ensure no leaching of water to the external environment. The resulting capacity of the ponds will be approximately 8 GL of water.

5.3.2 Closure Issues

The closure issues associated with the evaporation ponds and power station process water storage pond are as follows:

- There is the potential for soil, groundwater and surface water contamination if waste sediments are not removed, treated if necessary, and disposed of to the pit prior to the removal of the impermeable liner.
- There is the potential for subsidence if the rehabilitated evaporation ponds are poorly graded.
- The potential for soil, groundwater and surface water contamination from spillages, leaks and overflows.
- The pond sites may have been compacted and the infiltration capacity of the soil will be low, which could result in increased surface runoff and sheet erosion.
- There is the potential for the public and fauna to access the ponds, leading to injury prior to the water evaporating and the pond being rehabilitated.
- There is potential for erosion from the reconstructed landforms prior to vegetation becoming established.
- The drainage pattern formed by the reconstructed landforms could be different to the pre-disturbance drainage pattern and this could have adverse impacts on vegetation due to interruption of drainage.
- There is the potential for the rehabilitated area to become infested with weeds as these species will readily colonise disturbed areas.

Section 5 Site Description

- There is the potential for the rehabilitated and adjacent areas to become infested with the *Phytophthora cinnamomi* pathogen as a result of natural processes or human activities.

5.4 Infrastructure Corridor

5.4.1 Description

Of the Project Area's 455 ha footprint, approximately 100 ha will be allocated to the provision of an infrastructure corridor. The Project has defined a 100 m wide infrastructure corridor which will safely accommodate:

- The 40 m high transmission towers located approximately every 250 m which carry the 330 kV transmission lines to the external grid/network at the Eneabba substation.
- The approximate 300 - 400 mm diameter gas pipeline lateral (final size to be confirmed), buried to a depth of approximately 750 mm.
- The easement also includes an un-sealed observation track which will provide access to the infrastructure within the easement.

The required clearing is likely to be substantially narrower than the 100 m allocated. The allocation of 100 m for the corridor allows flexibility to place the towers and the pipeline with minimal disturbance to any physical/natural features of significance. To minimise the possibility of low frequency induction in the gas pipeline due to its close proximity to the transmission line, a minimum separation distance of 30 m will be maintained between the transmission line and the pipeline within the easement.

The infrastructure corridor extends a distance of approximately 20 km. Where the easement meets the Brand Highway, the route will either head north-east towards the Parmelia Gas Pipeline or continue further east to connect to the Dampier to Bunbury Gas Pipeline. The transmission lines will be aligned from this point to connect to the yet to be constructed 330 kV Eneabba Substation. It is anticipated that Western Power will position this 330 kV substation along the existing power line route and adjacent to the existing 132 kV substation.

The corridor predominantly traverses cleared private land, and minimal clearing of vegetation will be necessary when preparing the corridor except for a small section (maximum 40 ha) proximate to the southern border of, and within, the South Eneabba Nature Reserve. Approximately 30 ha of the area allocated to the corridor will be within the nature reserve.

5.4.2 Closure Issues

The closure issues associated with the infrastructure corridor are as follows:

- The drainage pattern formed by the reconstructed landforms could be different to the pre-disturbance drainage pattern and this could have adverse impacts on vegetation due to interruption of drainage.
- There is the potential for the rehabilitated area to become infested with weeds as these species will readily colonise disturbed areas.
- There is the potential for the rehabilitated and adjacent areas to become infested with the *Phytophthora cinnamomi* pathogen as a result of natural processes or human activities.
- The potential for soil, groundwater and surface water contamination from pipeline breaks and leakages of mine water.

Section 6 Completion Criteria

Completion criteria are an agreed set of environmental indicators that, upon being met, would demonstrate successful rehabilitation and allow Coolimba to relinquish responsibility for the site when the completion criteria have been achieved.

Draft completion criteria have been developed for the Project. These criteria will be refined throughout the life of the Project as a result of stakeholder consultation, any improvements in rehabilitation technology and increased understanding of how the local environmental is able to recover from disturbance. The draft completion criteria are presented in Table 6-1.

Table 6-1 Draft Completion Criteria for the Project

Facility/Component	Completion Criteria
Power station and supporting infrastructure.	All infrastructure has been dismantled and removed from site for sale or recycling, and/or disposed of appropriately. The site has been deep ripped along the contour to relieve compaction. Rehabilitated landforms to be safe, stable and non-polluting. Rehabilitated landforms have self-sustaining native vegetation, of similar species, and at similar densities, to the surrounding environment. Any contamination has been remediated.
Evaporation ponds and power station process water storage pond.	All infrastructure has been dismantled and removed from site for sale and/or disposed of appropriately. Impermeable liners have been removed. The sites have been deep ripped along the contour to relieve compaction. Rehabilitated landforms to be safe, stable and non-polluting. Rehabilitated landforms have self-sustaining native vegetation, of similar species, and at similar densities, to the surrounding environment. Natural drainage patterns have been restored. Any contamination has been remediated.
Infrastructure corridor.	All infrastructure has been dismantled and removed from site for sale and/or disposed of appropriately. Any contamination has been remediated. The site has been deep ripped along the contour to relieve compaction. The rehabilitated landform is safe, stable and non-polluting. The rehabilitated landform has self-sustaining native vegetation, of similar species, and at similar densities, to the surrounding environment. Natural drainage patterns have been restored.

Section 7 Closure Plan Execution

7.1 Overview

This section outlines the:

- Conceptual timeline for closure (Section 7.2).
- Actions that need to be taken to prepare for closure execution including the detailed plans required to be developed and actions that need to be taken, prior to closure, to mitigate environmental and socioeconomic impacts (Section 7.3).
- Closure activities that will be conducted for each domain to meet the closure objectives and criteria (Section 7.4).

7.2 Indicative Closure Planning Schedule

Detailed closure planning would commence no later than five years prior to the expected time of closure, with this Preliminary Closure Plan reviewed at least every three years during operation. Based on the current understanding of the CWC deposit, the Power Station will operate for approximately 30 years. It is estimated that closure activities will take approximately two years to complete and that the post-closure management, maintenance and monitoring phase (refer to Section 8) will continue for at least five to ten years after all closure activities have been completed. The monitoring will continue until the agreed completion criteria are achieved or it can be demonstrated that the completion criteria will be achieved.

7.3 Planning for Closure

Plans and studies required to further develop this Preliminary Closure Plan prior to the commencement of the closure execution phase are listed below.

- Stakeholder consultation plan - Develop a plan to ensure that relevant stakeholders are identified. The plan should contain a strategy for the engagement of these stakeholders, including the local community.
- Retrenchment/redeployment plan - Conceptual-level planning should be undertaken for the retrenchment or alternative employment of employees.
- Socioeconomic impact management plan - Prepare a plan to minimise the socioeconomic impact of the closure of the power station. The plan should consider the impacts on local businesses, and organisations that provide services such as air transport and traffic.
- Decommissioning and demolition plan - Develop a plan that includes removal of the power station and other infrastructure, prior to demolition.
- Contaminated site investigation - Conduct an environmental site assessment to identify whether any residual contamination exists. In the event that contaminated areas are identified, a remediation action plan would be developed.
- Rehabilitation plan - Develop a detailed rehabilitation plan to achieve the agreed completion criteria for all rehabilitated areas. This will include a mass balance reconciliation of available growth media.
- Waste management strategy - Develop a strategy to ensure that material is reused or recycled, where practical.
- Health and safety strategy - Develop a strategy for the identification of safety hazards and hazardous materials. Health and safety records should also be considered during the contractor selection process.
- Costings - Estimate closure costs and refine costings during Project life to ensure adequate provisioning and economic feasibility.

Section 7 Closure Plan Execution

7.4 Rehabilitation and Closure Activities for Each Domain

A description of the closure activities for each domain is provided in Sections 7.4.1 – 7.4.3.

7.4.1 Power Station and Supporting Infrastructure

The rehabilitation and closure activities for the Power Station and supporting infrastructure mainly relate to the decommissioning and removal of infrastructure (see Table 7-1).

Table 7-1 Rehabilitation and Closure Activities for the Power Station and Supporting Infrastructure

Power Station and Supporting Infrastructure	
Infrastructure to be Retained	Access to the Power Station and supporting infrastructure for the site contamination assessment, remediation (where required) and rehabilitation monitoring.
Engineering Works • Identify all infrastructure and services that Coolimba owns or has responsibility for, and establish an assets register. • Determine whether any other parties have requested handover of infrastructure at closure. • Purge and clean plant/station where appropriate, and disconnect and terminate all services. • Dismantle the station and supporting infrastructure and determine whether this will be sold or recycled. • Remove any transportable buildings and determine whether the infrastructure will be sold or recycled. • Concrete slabs and footings to be cracked *in situ* and then buried. • Remove all pipelines and services. Leave buried services >500 mm depth in place. • Cart all waste (including empty reagent stores) and debris except for concrete to the landfill. **Environmental Works** • Conduct a site contamination assessment and undertake remedial action required. Any hydrocarbon contaminated areas that do not meet relevant criteria will be excavated and bioremediated onsite. • Reprofile the Power Station and supporting infrastructure area by grading to reinstate the natural drainage patterns. • Establish additional drainage where required in the final stages of land profiling. • Deep rip along the contour to a minimum of 0.5 m depth and at a maximum spacing of three metres to maximise infiltration. • Prior to spreading topsoil, inspect the Power Station and supporting infrastructure area and remove any rubbish and debris. • Spread layer of topsoil to depth of 120 mm. • Seed area with local provenance species.	

7.4.2 Evaporation Ponds and Process Water Pond

The rehabilitation and closure activities for the evaporation ponds and process water pond are presented in Table 7-2.

7.4.3 Infrastructure Corridor

The activities associated with the rehabilitation and closure of the infrastructure corridor are described in Table 7-3.

Section 7 Closure Plan Execution

Table 7-2 Rehabilitation and Closure Activities for the Evaporation Ponds and Process Water Pond

Evaporation Ponds and Process Water Pond	
Infrastructure to be Retained	Access to the evaporation ponds and process water pond for rehabilitation monitoring.
Engineering Works • Remove all pipelines and services. Leave buried services >500 mm depth in place. • After the water has been allowed to evaporate from the ponds, remove the sediments within the ponds, test and neutralise, if necessary, prior to dumping within the open pit. • Remove the impermeable liner. • Cart all waste and debris except for concrete to landfill. • Conduct a site contamination assessment and undertake remedial action required. **Environmental Works** • Reprofile the pond areas and reinstate natural drainage patterns. • Contour rip (generally to compacted areas) to minimum of 0.5 m depth at maximum spacing of three metres to maximise infiltration. • Prior to spreading topsoil, inspect area and remove any rubbish and debris. • Spread layer of topsoil to depth of 120 mm. • Seed with local provenance species.	

Table 7-3 Rehabilitation and Closure Activities for the Infrastructure Corridor

Infrastructure Corridor	
Infrastructure to be Retained	Access to the infrastructure corridor for rehabilitation monitoring.
Engineering Works • Disconnect and terminate all services. • Remove any transportable buildings and determine whether the infrastructure will be sold or recycled. • Dismantle fixed surface structures and determine whether the infrastructure will be sold or recycled. • Concrete slabs to be cracked *in situ* and then buried. • Remove all pipelines and services. Leave buried services (e.g. pipelines) >500 mm depth in place. • Remove all fencing. • Cart all waste and debris except for concrete and dispose to landfill. **Environmental Works** • Conduct a contamination assessment of pipeline route. • Reprofile the area and reinstate natural drainage patterns. • Contour rip (compacted areas) to minimum of 0.5 m depth at maximum spacing of three metres to maximise infiltration. • Prior to spreading topsoil, inspect area and remove any rubbish and debris. • Spread layer of topsoil to depth of 120 mm. • Seed with local provenance species.	

7.5 Progressive Rehabilitation

Options for progressive rehabilitation during the Project are minimal but may arise. Undertaking progressive rehabilitation and other closure activities during the operational phase of the Project will assist in minimising closure costs.

Section 7 Closure Plan Execution

7.6 Topsoil

It is of paramount importance to ensure that similar characteristics to that in the pre-disturbance soil profile are maintained in reconstructed profiles as part of rehabilitation strategies. Blandford (2008) states that the fundamental reconstructed profile should contain:

- A topsoil horizon.
- An upper subsoil sand horizon.
- A lower subsoil horizon comprising weathering ferricrete/gravel/sand.

Generally in the Project Area there will not be a requirement to excavate or stockpile subsoil. Topsoil in the Project Area footprint will be stripped, wherever possible, prior to infrastructure establishment, and will be stockpiled for re-spreading during rehabilitation when it can not be directly used in rehabilitation. Topsoils within the Project Area are generally chemically and physically infertile. Nitrogen is deficient, phosphorus and potassium levels are low, and organic carbon levels are <1% (low) at six sites, and moderate (1-2%) at four sites.

Prior to stripping, the physical and chemical characteristics of the topsoil will be defined and assessed for specific management requirements and the most appropriate topsoil stripping technique will be investigated and identified. The characteristics to be defined will include:

- Basic chemical characteristics including Electrical Conductivity (EC), Total Dissolved Solids (TDS), pH, and aggregate stability.
- Particle Size Distribution (PSD) and permeability.

Stockpiles of topsoil will not exceed two media in height and will be clearly signposted. Any topsoil to be stockpiled for more than six months will be seeded with local plant species to protect the material against erosion, encourage soil biological processes and viability, and discourage weeds.

In the event that there is a shortage of topsoil for use in rehabilitation activities, Coolimba will investigate alternative sources of growth media. Trials will also be established to determine the suitability of these materials for use as a growth media.

Section 8 Monitoring and Maintenance

8.1 Rehabilitation Performance Monitoring

8.1.1 Overview

The following monitoring programmes, which will be conducted in areas undergoing progressive rehabilitation and in areas undergoing post closure rehabilitation, will ascertain rehabilitation performance.

8.1.2 Landscape Function Analysis

Landscape Function Analysis (LFA), which was developed by Tongway and Hindley (2004), is a monitoring programme that has successfully been used for measuring rehabilitation success. LFA may be used, or an alternative monitoring programme will be developed, to monitor the health and functionality of soils and vegetation at the landscape scale.

8.1.3 Vegetation Monitoring

The vegetation monitoring programme would include measuring the abundance and diversity of plants that return to rehabilitated areas. Permanent vegetation plots would be established in rehabilitated areas and also in undisturbed areas. The results from the rehabilitated plots would be compared with the results of the undisturbed plots.

8.1.4 Dieback Monitoring

The assessment for the presence of dieback within rehabilitated sites will continue to be conducted post closure. This will provide a determination of the success of the rehabilitation and of negating the spread and introduction of the dieback pathogen. It will be important to monitor dieback to ensure rehabilitated sites have not been infected. It will also be important to ensure that monitoring procedures do not introduce or spread the dieback pathogen.

8.1.5 Fauna Monitoring

Permanent fauna monitoring plots would be established in rehabilitated and undisturbed areas in order to monitor whether fauna are returning to and utilising the rehabilitated areas. This will provide a determination of the success of the rehabilitation as suitable habitat for fauna.

The rehabilitation performance monitoring programme will continue to occur until the DoIR is satisfied that the rehabilitation will or has already reached the targets outlined in agreed completion criteria.

8.2 Groundwater Monitoring

Groundwater monitoring will be conducted to measure any contamination to groundwater and monitor cover system performance. The monitoring will be conducted annually for at least five years after rehabilitation (progressive or post-closure). Monitoring will continue until the agreed completion criteria are achieved or it can be demonstrated that the completion criteria will be achieved. The groundwater monitoring programme would involve the monitoring of groundwater chemistry from adjacent monitoring bores to the evaporation ponds.

8.3 Surface Water Monitoring

At closure, pre-mining surface water drainage will be re-instated, where possible. A surface water quality monitoring programme will be implemented that would involve the monitoring of the turbidity and water quality from reinstated drainage lines.

Section 8 Monitoring and Maintenance

8.4 Reporting Procedures and Schedule

Comprehensive records of the planning and implementation of all rehabilitation and closure works would be maintained for each domain and would include:

- Data on the pre-disturbance condition of each site.
- An assets register of all infrastructure and services that Coolimba owns or maintains responsibility for.
- Details on the rehabilitation treatment(s) used (i.e. rehabilitation earthworks, seed bed preparation, species used in the seeding programme and any fertiliser/soil amendments).
- The results of the rehabilitation monitoring programme.
- The scope of any remedial work (e.g. re-ripping, re-seeding and weed control).

The documentation required for each stage in planning for, and implementing, site closure is listed in Table 8-1.

Table 8-1 Documentation Relevant to Stages of Site Closure

Stage	Documentation
Project planning and development	• Public Environmental Review which will include commitments to closure and draft completion criteria. • Preliminary Closure Plan.
Operations	• Report on progress made in planning for, and working towards, closure in Annual Environmental Reports (AERs). • On a triennial basis review and update the Preliminary Closure Plan.
Five years prior to closure or at a time agreed with the regulators	• Prepare the Final Closure Plan.
Site closure	• Update and implement the Final Closure Plan. • Report on progress in AERs.
Care and maintenance	• Report on progress of mine closure in AERs.
Relinquishment	• Written sign-off by decision-making authorities. • Retirement of any bonds.

Section 9 Closure Plan Review

The Preliminary Closure Plan will be first reviewed and updated (if required) on a triennial basis. The closure plan will be updated to take into account new information, technology, learnings and changes to operations. Audits of the closure plan and the closure planning process will be undertaken as required.

Review and auditing of the closure plan is the responsibility of the Environment Manager, with auditing reports provided to the site Manager. Any progress made in planning for, and working towards, closure would be reported within the AER.

Coolimba would prepare a Final Closure Plan at least five years prior to the anticipated date of closure or at a time agreed with the regulators.

Section 10 Contingency Plan

10.1 Overview

There may be a number of unforeseen circumstances that could lead to temporary or unplanned closure (care and maintenance). Typically operations would be expected to recommence, but if circumstances remain adverse to the operating of the Power Station, then an accelerated closure process would need to be implemented. In these circumstances, a Decommissioning and Closure Plan would be prepared and implemented based on the most current version of the closure plan for the Project.

The Project could also be put on care and maintenance just prior to closure as part of the project life cycle. During the care and maintenance phase of the Project, Coolimba recognises that it will still need to meet ongoing environmental obligations. Therefore, it is necessary to have a care and maintenance plan for the power station and the management of all environmental aspects of the site during this phase. It is also essential that public safety is considered during the care and maintenance phase.

10.2 Care and Maintenance

When a decision has been made to place the site on care and maintenance, the following steps will be undertaken as part of the contingency plan for the care and maintenance phase:

- Undertake an environmental audit of the site to determine the status (environmental risk) of all components of the site.
- Significant volumes of hydrocarbons could be stored onsite when care and maintenance is initiated and there would be the potential for these materials to cause soil, groundwater or surface water contamination if not stored or disposed of correctly. It is therefore important to develop a Care and Maintenance Plan to manage/ameliorate this environmental risks.
- Establish an Emergency Response Action Plan, if monitoring indicates that there is a potentially serious environmental problem. If a catastrophic event does occur, it is essential that there is a plan in place to minimise injury and damage.
- Regular monitoring and reporting to government agencies carried out during operations will need to be continued through the care and maintenance stage.

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

Australian Bureau of Statistics (2008) *Census Data for 1996, 2001 and 2006.*

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

Aviva Corporation Ltd (2008) *Aviva Environment Policy.*

BoM (2008a) *Australian Climatic Zones*. Available online at: http://www.bom.gov.au/climate/environ/travel/IDCJCM0000_tmp_rh_climaticzones.shtml

BoM (2008b) *Average Monthly and Annual Evaporation Maps.* Available online at: http://www.bom.gov.au/climate/averages/climatology/evaporation/IDCJCM0006_evaporation.shtml

D.C. Blandford & Associates Pty Ltd (2008) Key Findings & Key Issues Relating to Soils and Soil Landscapes, Central West Coal & Coolimba Power Project. Prepared for URS Australia Pty Ltd, November 2008.

Department of Environment and Conservation (2008) *Florabase*. Department of Environment and Conservation. http://www.calm.wa.gov.au/science/florabase.html

Department of Industry and Resources (1997) *Safety Bund Walls Around Abandoned Open Pit Mines Guideline.* Department of Industry and Resources, Perth, Western Australia, December 1997.

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

Department of Industry and Resources (2007) *Guidelines for Mine Closure Plans.* DoIR. May 2007.

Department of Industry, Tourism and Resources (2006a) *Mine Closure and Completion, Leading Practice Sustainable Development Program for the Mining Industry*. DITR, October 2006. Available online at: http://www.doir.wa.gov.au/documents/environment/mine_closure.pdf. Accessed 24 May 2007.

Department of Industry, Tourism and Resources (2006b) *Mine Rehabilitation, Leading Practice Sustainable Development Program for the Mining Industry*. DITR, October 2006. Available online at: http://www.doir.wa.gov.au/documents/environment/mine_rehab.pdf. Accessed on 21 May 2007.

Department of Industry, Tourism and Resources (2006c) *Managing Acid and Metalliferous Drainage Handbook, Leading Practice Sustainable Development Program for the Mining Industry (Draft)*. DITR, October 2006. Available online at: http://www.industry.gov.au/assets/documents/itrinternet/Draft_AMD20061006172511.pdf. Accessed on 24 May 2007.

Glevan Consulting (2007) *Dieback Assessment.* Coolimba Power Project. Central West Coal Project. Unpublished Report Prepared for Aviva Resources Ltd.

Hancock, P. J., Boulton, A. J. and Humphreys, W. F. (2005). *Aquifers and hyporheic zones: Towards an ecological understanding of groundwater*. Journal of Hydrogeology (2005) 13:98-111.

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

Mattiske Consulting Pty Ltd (2008) *Flora and Vegetation Assessment of Aviva Lease Area*. Unpublished Report Prepared for URS Australia Pty Ltd on Behalf of Aviva Corporation Ltd. November 2008.

Minserve (2006) *Pre-feasibility Study Report*. Central West Coal Project, Western Australia. Prepared for Aviva Corporation. September 2006.

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 (2008) *Stygofauna Sampling for the Central West Coal Project.* Unpublished report prepared for Aviva Corporation Ltd. June 2008.

Subterranean Ecology Scientific Environmental Services (2007) *Central West Coal Project & Coolimba Power Project Troglofauna Desktop Assessment.* Unpublished report prepared for Aviva Corporation Ltd. November 2007.

Terrenus Earth Sciences (2008) *Geochemical Assessment of Overburden, Potential Coal Reject and Coal Combustion Ash.* Central West Coal Project and Coolimba Power Project. Draft Report Prepared June 2008.

The Chamber of Minerals and Energy (2000) *Mine Closure Guideline for Minerals Operations in Western Australia*. CME, October 2000.

Tongway, D. J. and Hindley, N. L. (2004) *Landscape Function Analysis: Procedures for Monitoring and Assessing Landscapes with Special Reference to Minesites and Rangelands*. CSIRO Sustainable Ecosystems, Canberra, ACT.

URS Australia Pty Ltd (2006a) *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.

URS Australia Pty Ltd (2006b) Geotechnical Investigation and Design of Central West Coal Project - Prefeasibility Study. Unpublished report prepared for Aviva Corporation.

World and International Finance Corporation (2002) It's Not Over When It's Over: Mine Closure Around the World. WIFC.