

# Executive Summary





Figure E-1: Regional location of the proposed Yeelirrie Uranium Project

## Executive Summary

Cameco Australia Pty Ltd (Cameco), a wholly owned subsidiary of Cameco Corporation, one of the world's largest uranium producers, is proposing to develop the Yeelirrie Uranium Project (the Project) located approximately 660 km north northeast of Perth in the Shire of Wiluna of Western Australia (WA) (Figure E-1).

This Public Environmental Review (PER) has been prepared as part of the process to seek State and Federal approval for the Project under the State *Environmental Protection Act 1986* (EP Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). This PER is the key document for joint environmental assessment of the Project by the:

- Western Australian Environmental Protection Authority (EPA) and the Minister for Environment under the EP Act; and
- Commonwealth Department of the Environment (DoE) and the Minister of the Environment under the EPBC Act.

The purpose of the PER is to provide a description and environmental review of the principal elements of the Project, including an environmental impact assessment and description of the proposed environmental management measures for the key environmental factors in accordance with the Environmental Scoping Document (ESD) prepared by the EPA in consultation with the DoE (Appendix A).

The PER is available on Cameco's website ([www.cameco.com/australia/yeelirrie/community\\_information](http://www.cameco.com/australia/yeelirrie/community_information)). Hard copies can also be ordered from Cameco's Perth office on +61 (8) 9318 6600.

### Project Overview

#### History

The Yeelirrie deposits were discovered by Western Mining Corporation (WMC) in 1972. Environmental studies were undertaken and a Draft Environmental Impact Statement (EIS) and an Environmental Review and Management Programme (ERMP) were submitted to the WA EPA and Australian Government in 1978. The project was approved by both the Australian and Western Australian governments in 1979.

Between 1980 and 1982 WMC undertook trial mining and operated a pilot processing plant in Kalgoorlie. Following implementation of the Australian Government's 'three mines policy' in 1983, the Yeelirrie project was placed on 'monitored care and maintenance' in 1984.

The Yeelirrie project was purchased by a subsidiary of BHP Billiton Limited (BHP Billiton) in 2005. BHP Billiton referred the proposed Yeelirrie development to the WA EPA under the EP Act in 2009 and the EPA determined the level of assessment as an ERMP with a 10 week public review period. Following the appeals process, the then Minister for Environment determined the public review period be extended to 14 weeks. In 2009 the Federal Environment Minister also determined that the proposed development was a Controlled Action under the EPBC Act. Extensive environmental and mine planning studies were undertaken between 2008 and 2011. This work was finalised and documented in a draft ERMP, however in early 2011, BHP Billiton decided not to proceed with the project and the document was not submitted to Government agencies for review.

In December 2012, Cameco purchased the Project, including the Yeelirrie pastoral lease from BHP Billiton. In November 2014, Cameco terminated the 2009 State referral and submitted a new referral due to changes to the Project. In December 2014, the EPA determined the Project would be assessed as a PER with a 12 week public review period. Cameco also advised the Federal DoE of the change of proponent and proposed variation to the Project. In December 2014, the DoE accepted the proposed variation to the proposal under section 156B of the EPBC Act.

## Project Summary

Cameco is proposing to develop the Project, which comprises a uranium mine and associated treatment facilities (Figure E-2). Ore would be mined from shallow pits using open cut techniques. The ore would be processed using alkaline leaching, including the following steps; comminution via SAG milling, atmospheric alkaline leaching, counter current decantation (CCD), followed by direct precipitation of uranium oxide concentrate (UOC), product drying and packaging.

The current reported resource estimate (JORC Code and NI 43-101 compliant estimate) is 127.3 million pounds (Mlbs) (57,742 tonnes) (measured and indicated) with an average grade of  $U_3O_8$  of 0.16% or 1,600 ppm. Over the anticipated 19 year life of the Project, it will produce an estimated 106 Mlbs (48,081 tonnes) of  $U_3O_8$ -based UOC for export.

The UOC would be transported by road from the mine site to the Port of Adelaide, South Australia, via the Goldfields Highway, and the Eyre Highway. This environmental assessment covers all transport within Western Australia. Transport within South Australia will be the subject of a separate assessment and approvals processes.

## The Proponent

The proponent for the Project is Cameco Australia Pty Ltd, a wholly owned subsidiary of Canadian based uranium miner, Cameco Corporation. Cameco Corporation is one of the world's largest uranium producers with uranium assets on three continents, including Australia. Cameco Corporation's corporate head office is located in Saskatoon, Saskatchewan, Canada.

Cameco Corporation employs more than 3,300 people worldwide, engaged in uranium mining, refining and conversion. Cameco Corporation's vision is to be a dominant nuclear energy company producing uranium fuel. Its goal is to be the supplier, partner, investment and employer of choice in the nuclear industry.

Cameco Corporation measures its safety, environmental, social and financial performance using key performance indicators based around the following four measures of success:

- a safe, healthy and rewarding workplace;
- a clean environment;
- supportive communities; and
- outstanding financial performance.

The overall governance of safety, health, environment and quality at Cameco begins with the Safety Health Environment and Quality (SHEQ) policy, which states the commitment of the senior management of Cameco Corporation to the following principles:

- keeping risks at levels as low as reasonably achievable;
- prevention of pollution;
- complying with, and moving beyond legal and other requirements;
- ensuring quality of processes, products and services; and
- continually improving our overall performance.

Cameco Corporation's results in achieving its key performance indicators are available in the Companies 2014 Sustainable Development Report at [www.cameco.com/sustainable\\_development/2014/](http://www.cameco.com/sustainable_development/2014/).

## Stakeholder Consultation

In developing the stakeholder consultation program, Cameco was conscious that significant work had been completed by BHP Billiton. Based on early feedback from consultation, Cameco has

undertaken targeted consultation to serve three purposes:

- to provide education and build awareness about uranium mining and related matters (such as radiation, dust, implications for bush tucker and transport);
- to inform stakeholders about the proposed development and to gain feedback; and
- to inform stakeholders about Cameco, including for example, the Companies experience as one of the world's leading uranium miners and one of Canada's leading employers of Aboriginal people.

### **Regulatory Stakeholders**

The concerns of regulatory stakeholders are primarily captured in the Environmental Scoping Document (Appendix A1) and are addressed in the PER.

### **Local Aboriginal Community**

Local Aboriginal community members raised concerns across a range of topics, including,

- radiation and the proliferation of nuclear arms with specific reference to Maralinga, Chernobyl and Fukushima;
- radiation and the impact on bush food and the environment;
- protection of heritage places; and
- employment and community and business development opportunities.

Cameco has attempted to address these issues through presentations and discussions in forums arranged by the Central Desert Native Title Service and in meetings with individual family groups. Discussion on the impacts of radiation and the protection of heritage will continue throughout and beyond the public review period.

The desire to maximise the potential employment and community development opportunities that can come from development is also a very high priority for the local community and this will also be a topic for further discussion.

### **Local Government Authorities**

Local Government authorities have expressed interest in the Project and any implications for local and regional services and service delivery. The transport of radioactive product from the Project (and the industry generally, given there are several other proposed Projects in the region) is a key topic and has been the subject of numerous presentations by Cameco and other companies.

Cameco is committed to continuing engagement with stakeholders throughout each phase of the Project to ensure key issues and relevant impacts and benefits are identified, monitored and appropriately managed.

### **Project Justification**

Approximately 85% of the demand for uranium is supplied from mines, with the remainder supplied from uranium stockpiles or other secondary sources. These stockpiles are being drawn down and are expected to contribute less over time, which means that more primary production will be needed from uranium mines in the future. Cameco estimates about 15% of total supply required over the next decade will need to come from new mines not yet in development.

While WA does not have a commercially productive uranium mine in operation, several projects have either obtained or are seeking environmental approval and are being advanced. The Yeelirrie deposit is the largest known uranium deposit in WA. The proposed Project, which proposes to produce up to 7,500 tpa UOC, is well placed to take advantage of the current and expected growth in demand.



## The Project

The Yeelirrie Project would produce up to 7,500 tonnes or 16.5 Mlbs per year of uranium oxide concentrate (UOC) as  $UO_4 \cdot 2H_2O$ . Production will peak at this level in the second year of ore processing and steadily decline as the grade of the ore reduces. The average annual production over the 15 year ore processing period will be approximately 3,850 tonnes or 8,500 Mlbs of UOC.

The open pit footprint is approximately 9 km long, up to 1.5 km wide and about 10 m deep. The open pit would be dewatered, mined and backfilled progressively throughout the life of mine (LOM). Prior to commencement of processing, abstracted water from dewatering of active mine areas will be reinjected into areas that will be mined in the future. Once processing commences, dewatering will be used to supplement process water supply instead of being reinjected.

The ore and waste rock would be stockpiled near the open pit before being processed within the metallurgical plant, or backfilled into the pit. The metallurgical plant would use an alkali tank leaching process, followed by direct precipitation, to produce UOC for containerised export from Port Adelaide. All tailings generated during the metallurgical processing of the ore would be deposited to the tailings storage facility (TSF) constructed within the open pit.

The proposed development would necessitate the construction and operation of infrastructure required to support mining and processing, including the supply of water (from pit dewatering and a dedicated borefield) and electricity, workforce accommodation and infrastructure to transport the product.

At the completion of operations, the pit will be backfilled and capped with an engineered cover; development infrastructure would be decommissioned and removed; and the site would be rehabilitated.

The characteristics of the proposed development are summarised in Table E-1 and E-2 are shown on Figure E-2 and E-3.

**Table E-1: Proposal summary and key characteristics of the proposed development**

<b>Proposal Title:</b>	Yeelirrie Uranium Project	
<b>Proponent Name:</b>	Cameco Australia Pty Ltd	
<b>Short Description:</b>	The proposal is to mine uranium ore from the Yeelirrie deposit, approximately 70 km south west of Wiluna, and the construction of associated mine infrastructure, including ore processing facilities, water abstraction and reinjection infrastructure, roads, accommodation, offices and workshops, stockpile and laydown areas and evaporation pond. Tailings will be discharged back into the mine open pit.	
<b>Physical Elements</b>		
<b>Element</b>	<b>Location</b>	<b>Proposed Extent</b>
Mine Open Pit	See Figures E-2 and E-3	Clearing of approximately 725.9 ha within a 4,874.6 ha development envelope and no deeper than 15 m below ground level.
Associated Infrastructure	See Figures E-2 and E-3	Clearing of approximately 1,695.9 ha within a 4,874.6 ha development envelope.
<b>Operational Elements</b>		
<b>Element</b>	<b>Location</b>	<b>Proposed Extent</b>
Mining Rate	Mining with conventional equipment	Up to 14 Mtpa of mineralised ore and non-mineralised material (annual average of approximately 8 Mt).
Ore Processing (waste)	All tailings deposited in open pit	Deposition of up to approximately 3.0 Mtpa.

Operational Elements		
Element	Location	Proposed Extent
Water Abstraction	Dewatering of pits and production from borefield. See Figures E-2 and E-3	Extraction of up to approximately 4.9 GL/a.
Water ReInjection		Reinjection of up to approximately 1.3 GL/a. <sup>(1)</sup>
GL/a – gigalitres per annum m – metres		Ha – hectares Mtpa – million tonnes per annum
Notes:		
<sup>1</sup> In the early phase of the project, pit dewatering volumes exceed water demands. The surplus water would be re-injected into the local calcrete aquifer within the confines of the mine footprint.		

Table E-2: Other project characteristics

Non-spatial elements	Description
Development operating life	An operational life of 22 years, including 3 years of pre-production dewatering, mining and construction followed by a further 12 years of mining and 15 years of processing. The conclusion of processing would be followed by an estimated 4 years of decommissioning and rehabilitation.
Nature of mineralisation	Shallow-depth alluvial deposit with mineralisation starting from surface to about 10 m below ground level, with a thickness between about 1 to 7 m.
Operations summary	Open pit mining and on-site processing of uranium mineralised ore to produce uranium oxide concentrate.
Mining method	Open pit mining using conventional equipment such as excavators, front-end loaders and haul trucks.
Mining rate	Up to 14 Mtpa of mineralised ore and non-mineralised material (annual average of approximately 8 Mt).
Processing method	Alkali leach and direct precipitation.
Production rate	Up to 7,500 tpa of uranium oxide concentrate produced at peak production in the second year of ore processing. The average annual production over the 15 year ore processing period will be approximately 3,850 tonnes or 8,500 MLbs of UOC as $UO_4 \cdot 2H_2O$ .
Tailings management	In-pit disposal to an engineered tailings storage facility.
Quarry	A quarry supplying approximately 500,000 tonnes of basic raw material would be located about 8 km north of the processing plant.
Waste management facility	A waste management facility would be established on the mining lease, approximately 4 km south east of the metallurgical plant.
Water supply	The development's primary water supply would be sourced from the initial dewatering of the open pit mine and then, as dewatering rates decreased, water would be piped from a network of groundwater wells. Obtaining water from this source would require the construction of pipeline and associated pumping infrastructure. The locations of borefields, access tracks and pipelines have not been finally resolved and are not included in the development drawings.
Annualised (over the 15 year process plant life) average water demand (ML/d)	8.7 ML/d (3.2 GL/a)

Maximum electricity demand (MW)	15
Non-spatial elements	Description
Average electricity consumption (MWh/a)	150,000
Maximum diesel demand (KL/a)	80,000 (excluding product transport diesel)
Accommodation village	A village would be constructed about 20 km east of the processing plant, with sufficient accommodation for up to 1,200 people.
Peak construction workforce	1,200
Average construction workforce	500
Peak operational workforce	300
Average operational workforce	225

## Regional Setting

The Yeelirrie Uranium Project is located in the Shire of Wiluna approximately 660 km north east of Perth and 420 km (or 500 km by road) north of Kalgoorlie-Boulder. The Project area is located in the Murchison bioregion, and in the Eastern Murchison (MUR1) subregion.

The Murchison bioregion is characterised by low hills and mesas separated by flat colluvium and alluvial plains. Vegetation is predominantly low mulga woodlands. The bioregion is one of the main pastoral areas in Western Australia, although mining (gold, iron ore and nickel) is the greatest income generator in the region. The Project is located on Yeelirrie Pastoral Station (owned by Cameco) which is currently destocked. Major population centres are Cue, Laverton, Leinster, Leonora, Meekatharra, Mount Magnet and Wiluna.

The Eastern Murchison subregion is characterised by “its internal drainage, and extensive areas of elevated red desert sandplains with minimal dune development”. It contains salt lake systems associated with the occluded Palaeodrainage system, red sandplains and broad plains of red-brown soils and breakaway complexes. The Project occurs in the Yeelirrie catchment which drains to the southeast into Lake Miranda. The Project is located in the valley floor of the Yeelirrie Playa catchment drainage line on the confluence of two main drainage lines, although there are no permanent surface water drainage features.

Vegetation contains Mulga Woodlands which are often rich in ephemeral species, saltbush shrublands, Halosarcia shrublands and hummock grasslands.



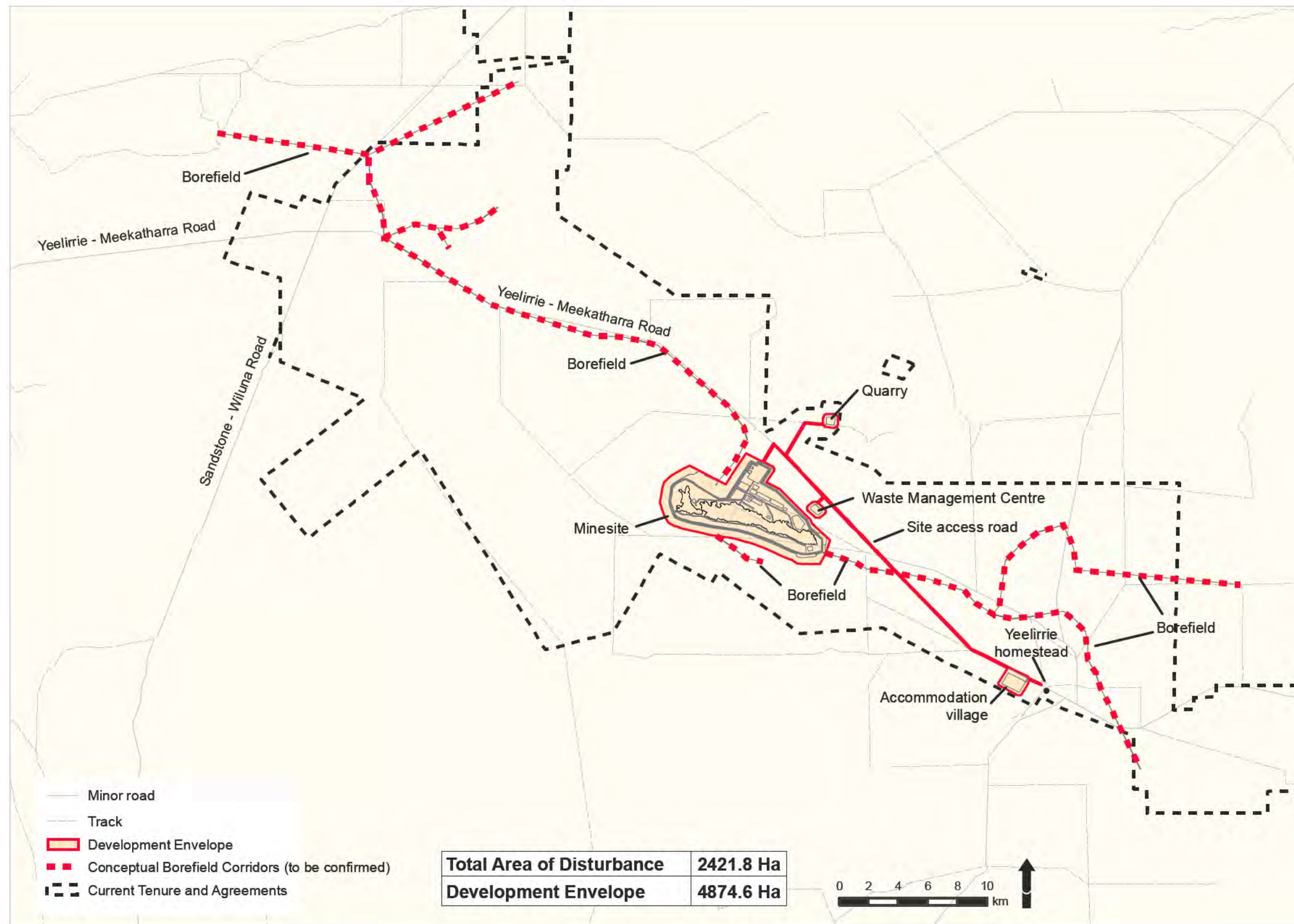


Figure E-2: Project overview



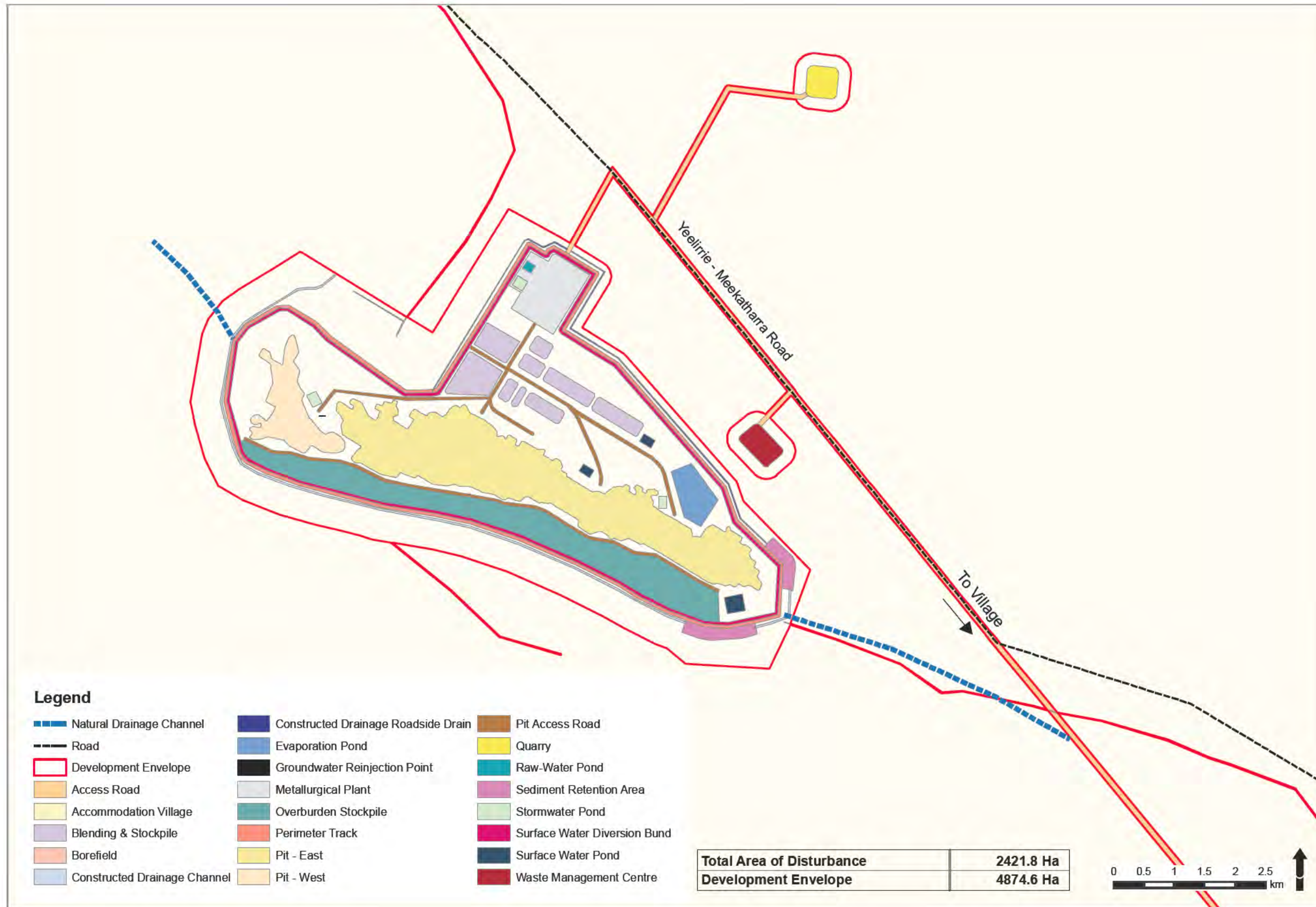


Figure E-3: Conceptual Project layout

There are four heritage sites registered with the WA Department of Aboriginal Affairs (DAA) that are within the Yeelirrie Project area, but not within the areas proposed to be disturbed by the Project.

### Key Environmental Factors, Potential Impacts and Management

The following tables (Table E-3 and Table E-4) summarise the key environmental factors relevant to the Project, their potential impacts, proposed management measures and predicted outcomes.

**Table E-3: Summary of potential impacts, proposed mitigation and management measures and commitments.**

Key Environmental Factors	
Environmental Factor: 1	Flora and Vegetation
EPA Objective:	To maintain the representation, diversity, viability and ecological function at the species, population and community level.
Potential Impacts:	<p><b>General</b></p> <ul style="list-style-type: none"> <li>• Clearing of up to 2,421.8 ha of native vegetation.</li> <li>• Clearing of more than 70% of Mulga <i>Acacia ayersiana</i>, <i>Grevillea berryana</i> Shrubland (CMGbS) on Calcrete from within the Study Area. 99% of this community is also within the predicted 1 m drawdown contour. The component species are widespread and abundant where they occur, however the regional representation of the community is not known (most likely due to low intensity mapping outside local Study Area).</li> <li>• Indirect impacts on groundwater dependent vegetation due to groundwater abstraction and reinjection.</li> <li>• Indirect impacts to vegetation dependent of surface water due to alterations and disruptions to surface water flows.</li> <li>• Introduction and spread of weeds or plants from outside the local area, into mining areas and adjacent native vegetation through movement of vehicles and materials.</li> <li>• Altered fire patterns.</li> <li>• Indirect impacts on flora and vegetation from dust.</li> <li>• Uptake of radionuclides. ERICA modelling indicated the expected dose rate for all plant groups expected to be less than the screening level of 10 µGy/h, with the exception of lichen and bryophytes. These organisms derive most of their nutrients from dust falling on them. However, lichen and bryophytes are known to be particularly radio-resistant and a threshold no-effect dose rate has been estimated to be 125,000 µGy/h, with some diversity reduction observed at 1.1 Gy/h (UNSCEAR 1996). Consequently no effect on lichens and bryophytes is expected from dust emissions from the Project.</li> </ul> <p><b>Conservation Significant Species</b></p> <ul style="list-style-type: none"> <li>• This will include clearing of the Western population of the Threatened species <i>Atriplex</i> sp. Yeelirrie Station, which is present on the orebody.</li> <li>• A small proportion of Priority 3 species <i>Bossiaea eremaea</i> (4.29% of population in Study Area), <i>Eremophila arachnoides</i> subsp. <i>arachnoides</i> (11.84%) and <i>Euryomyrtus inflata</i> (0.3%) will also be affected. There will be no direct impacts on Priority 1 species <i>Rhagodia</i> sp. Yeelirrie Station, but indirect impacts may result from changes to surface water drainage patterns and affect a small proportion of the population within the Study Area (4.8%).</li> </ul>

Key Environmental Factors	
<b>Management Measures:</b>	<p><b>General - Avoid and Minimise</b></p> <ul style="list-style-type: none"> <li>• Clearing will be kept to the minimum area required for safe and efficient operation in accordance with the Flora and Vegetation Management Plan to be developed for the project.</li> <li>• Cameo will conduct Level 2 surveys of borefields and corridors and any other areas not covered by the existing Level 2 flora survey and provide a report of the survey as part of an application for a Clearing Permit prior to the commencement of ground disturbing activity.</li> <li>• Cameco will implement ground disturbance procedures that will apply to all clearing activities. Clearing will not be conducted during or immediately after rain to reduce the risk of erosion and damage to soil structure.</li> <li>• All earth moving equipment and other vehicles or machinery will be cleaned of all soil and seeds before mobilisation into new clearing areas. Weed control will be undertaken for infestations with the potential to spread.</li> <li>• A vegetation condition monitoring program will be implemented to monitor potentially groundwater dependent vegetation communities within the drawdown zone and compare with control sites. Contingency measures will be developed, should there be a risk of impacts on groundwater dependent communities.</li> <li>• As part of monitoring of the integrity of surface water diversion and management structures, Cameco will also monitor nearby vegetation health.</li> <li>• Dust management and suppression measures will be undertaken (refer to Environmental Factor 8).</li> <li>• Hot work permits will be required for any work that may generate an ignition source. Fire extinguishers will be available in all work areas and personnel will be trained in their use.</li> </ul> <p><b>General – Rehabilitate</b></p> <ul style="list-style-type: none"> <li>• Vegetation removed during clearing activities will be temporarily stockpiled to be used as mulch and a seed source in revegetation. Overburden material that is suitable for rehabilitation will be stripped and stored in low stockpiles to retain seed viability and be protected from erosion and accidental disturbance.</li> <li>• Disturbed areas that are no longer required will be progressively rehabilitated over the life of the mine. The pit will be progressively backfilled and rehabilitated from year 11.</li> </ul> <p><b>Conservation Significant Species - Avoid and Minimise</b></p> <ul style="list-style-type: none"> <li>• Cameco will continue to implement the Conservation Species Management Plan. Measures will include protection of the Eastern Population of <i>Atriplex</i> sp. Yeelirrie Station and implementation of a research plan and a translocation program for the reestablishment of the Western Population of the species. Work undertaken to date provides reasonable evidence to indicate that this could be achieved.</li> <li>• Cameco will avoid direct disturbance of <i>Rhagodia</i> sp. Yeelirrie Station where practicable. Cameco is proposing to establish a protected area for the known population present inside the Development Envelope.</li> </ul>
<b>Commitments:</b>	<ul style="list-style-type: none"> <li>• Develop and implement a Flora and Vegetation Management Plan.</li> <li>• Develop and implement a Conservation Species Management Plan.</li> </ul>
<b>Outcomes:</b>	<p>Residual impacts on significant flora are predicted to occur as a result of implementation of the Project and therefore offsets are proposed (Section 12.4) Taking into account the Project design, the proposed management measures, and the proposed implementation of a revegetation and offset strategy to replace the Western population genotype of <i>Atriplex</i> sp. Yeelirrie Station, Cameco believes that the Proposal will meet the EPA's objective of maintaining the representation, diversity, viability and ecological function at the species, population and community level.</p>

## Key Environmental Factors

Environmental Factor: 2	Subterranean Fauna
<b>EPA Objective:</b>	To maintain the representation, diversity, viability and ecological function at the species, population and assemblage level.
<b>Potential Impacts:</b>	<p><b>General</b></p> <ul style="list-style-type: none"> <li>• Removal of subterranean fauna habitat through the excavation of the pit.</li> <li>• Habitat loss / alteration of areas within groundwater drawdown contours and reinjection areas.</li> <li>• Impacts to habitat from ground disturbance, stockpiling and surface contamination and backfilling with tailings.</li> </ul> <p><b>Priority Ecological Community (PEC)</b></p> <ul style="list-style-type: none"> <li>• Approximately 37% of the inferred calcrete habitat within the Yeelirrie Priority 1 PEC will experience groundwater drawdown of &gt;0.5 m. Approximately 60% of the adjacent inferred playa area will also experience groundwater drawdown of &gt;0.5 m.</li> </ul>
<b>Management Measures:</b>	<p><b>General - Avoid and Minimise</b></p> <ul style="list-style-type: none"> <li>• Groundwater abstraction rates will be managed to minimise potential environmental impacts and the required Project water supply volume will be reduced as far as practicable throughout the life of the Project.</li> <li>• Groundwater abstraction rates and groundwater levels will be monitored to confirm predicted drawdown levels.</li> <li>• Preferentially locating well fields in the alluvium/weathered bedrock aquifers in the areas north of the valley floor and north of the proposed pit to limit impact to the palaeochannel.</li> <li>• Not locating any abstraction wells within the palaeochannel to the northwest of the pit.</li> <li>• Investigating opportunities to improve the groundwater abstraction scheme and reduce the impact to stygofauna during a Definitive Feasibility Study phase of the Project prior to the commencement of dewatering.</li> </ul> <p><b>Management of the PEC and Restricted Species - Avoid and Minimise</b></p> <ul style="list-style-type: none"> <li>• Cameco will work with DPaW to define the Yeelirrie PEC, determine the impact on the PEC and to develop additional management options.</li> <li>• Cameco is proposing to locate wellfields in the alluvium/weathered bedrock aquifers in the areas north of the valley floor and north of the proposed pit.</li> <li>• Cameco will limit groundwater drawdown in the palaeochannel to the northwest of the pit where there are a number of species that have only been sampled in this area.</li> </ul> <p><b>Rehabilitate</b></p> <ul style="list-style-type: none"> <li>• As per Environmental Factor 12 (Rehabilitation and Decommissioning)</li> </ul>
<b>Commitments:</b>	<ul style="list-style-type: none"> <li>• Develop and implement a Groundwater Operating Strategy including a Groundwater Management Plan.</li> <li>• Develop and implement a Subterranean Fauna Management Plan.</li> </ul>
<b>Outcomes:</b>	<p>Residual impacts on subterranean fauna are predicted to occur as a result of implementation of the Project and therefore offsets are proposed (Section 12.4).</p> <p>Taking into account the Project design, the proposed management measures, and the proposed offset strategy of ongoing investigations to better understand species habitat and expand the range of species potentially impacted, Cameco believes that the Proposal will meet the EPA's objective of maintaining the representation, diversity, viability and ecological function at the species, population and assemblage level.</p>

Key Environmental Factors	
Environmental Factor: 3	Terrestrial Fauna
<b>EPA Objective:</b>	<ul style="list-style-type: none"> <li>To maintain the representation, diversity, viability and ecological function at the species, population and assemblage level.</li> </ul>
<b>Potential Impacts:</b>	<p><b>General</b></p> <ul style="list-style-type: none"> <li>Loss and/or fragmentation of habitat from vegetation clearing, changes to surface water patterns, abstraction and reinjection of water.</li> <li>Increased risk of collisions with vehicles.</li> <li>Exposure of birds to process water ponds in evaporation pond. The uranium concentration in the evaporation pond is expected to be below 60 mg/L. The Uranium No Observable Impact Level (NOAEL) benchmark for ingested water is 68.8 mg/L for birds or 6.995 mg/L for mammals (Sample <i>et al.</i> 1996). Therefore for birds, uranium concentrations are expected to be below NOAEL benchmark. The risk to most mammals is expected to be low as the pond will be fenced to exclude macrofauna.</li> <li>Radiation doses to fauna. ERICA modelling indicated the expected dose rate for all groups of fauna as a result of the Project was below the screening level of 10 µGy/h. Therefore no significant radiation impacts on terrestrial fauna are expected to occur as a result of the Project.</li> <li>Attraction of feral and predatory fauna to areas used for water storage or food wastes, increasing pressure on native fauna.</li> <li>Entrapment of fauna in open excavations.</li> <li>Dust, noise and vibration impacts.</li> <li>Light impacts on nocturnal species.</li> <li>Loss of habitat through changes to the fire regime.</li> </ul> <p><b>Conservation Significant Species</b></p> <ul style="list-style-type: none"> <li>Potential impacts including loss of habitat, changes to hydro-ecology and dust generation on conservation significant vertebrate fauna as a result of the Project are expected to be negligible or minor.</li> <li>Potential impacts including loss of habitat, changes to hydro-ecology and dust generation on conservation significant invertebrate (short-range endemic) fauna as a result of the Project are expected to be negligible or minor with the exception of moderate impacts on the following species: <ul style="list-style-type: none"> <li>Isopods Platyarthridae/Bathytropidae and Pseudolaureola sp.</li> <li>Mygalomorphs <i>Aname</i> 'MYG212' and Barychelidae; and</li> <li>Pseudoscorpion Cheriidiidae.</li> </ul> </li> </ul>
<b>Management Measures:</b>	<p><b>General - Avoid and Minimise</b></p> <ul style="list-style-type: none"> <li>Cameco will minimise habitat loss from ground disturbance and clearing activities in accordance with a Flora and Vegetation Management Plan to be developed for the Project.</li> <li>There will be no unauthorised driving off tracks, night driving will be limited, and vehicle speeds will be restricted around the Project Area and sensitive habitats.</li> <li>The evaporation pond will be inspected daily for fauna and bird access. Should fauna visitations to the facilities be considered significant, measures will be taken to deter fauna.</li> <li>Dust suppression along access roads will be managed in accordance with the Dust Management Plan to be prepared for the Project.</li> <li>Waste disposal areas around the site will be maintained with inert and putrescible waste disposed of to a fenced landfill.</li> <li>The presence of introduced fauna species and pests will be monitored and appropriate control measures implemented if necessary.</li> </ul>



Key Environmental Factors	
	<ul style="list-style-type: none"> <li>• Changes to surface water flow regimes will be managed in accordance with a Surface Water Management Plan to be developed for the Project.</li> <li>• Removal of stock and decommissioning of existing stock watering points (in consultation with stakeholders) across Yeelirrie Station.</li> <li>• Hot work permits will be required prior to commencing any activity that may create an ignition source. Cameco will prepare and implement a Fire Prevention and Management Plan.</li> </ul> <p><b>General – Rehabilitate</b></p> <ul style="list-style-type: none"> <li>• Disturbed areas that are no longer required will be progressively rehabilitated over the life of the mine.</li> <li>• The pit will be progressively backfilled and rehabilitated from year 11.</li> </ul> <p><b>Conservation Significant Species – Avoid and Minimise</b></p> <ul style="list-style-type: none"> <li>• Training on the identification and reporting of conservation-significant fauna species will be included in the Cameco site induction.</li> <li>• The ground disturbance guideline will ensure that areas to be cleared are first inspected by qualified environmental personnel to determine if there are any significant habitats or signs of significant fauna activity. Training on vegetation clearing procedures will be included in an environmental induction.</li> <li>• Work with DPaW and local indigenous groups to assist in the implementation of a landscape scale fire management program to manage habitat for conservation significant species.</li> </ul>
<b>Commitments:</b>	<ul style="list-style-type: none"> <li>• Develop and implement a Fauna Management Plan.</li> </ul>
<b>Outcomes:</b>	Taking into account the project design and proposed management measures to be implemented, Cameco believes that the Proposal will meet the EPA's objective of maintaining the representation, diversity, viability and ecological function at the species, population and assemblage level.

Environmental Factor: 4	Hydrological Processes and Inland Water Quality (Surface Water)
<b>EPA Objective:</b>	<p>To maintain the hydrological regimes of surface water so that existing and potential uses, including ecosystem maintenance, are protected.</p> <p>To maintain the quality of surface water, sediment and biota so that the environmental values, both ecological and social, are protected.</p>
<b>Potential Impacts:</b>	<ul style="list-style-type: none"> <li>• Alteration of the natural water surface water drainage patterns and water balance due to diversion of surface water flows around, and collection of surface water within the Development Envelope.</li> <li>• Alteration of surface water flows which may result in changes to natural erosion and deposition patterns and increase turbidity of surface water.</li> <li>• Alteration of hydrology of creeks from groundwater abstraction and reinjection if there is a connection with the groundwater.</li> <li>• Risk of overtopping TSF or evaporation pond following extreme rainfall events.</li> <li>• Contamination of surface water as a result of loss of containment of ore or pregnant liquor solution.</li> <li>• On closure the backfilled pit is not expected to be inundated except under a 1:1,000 year ARI or Probable Maximum Precipitation (PMP) events, at which time surface water could infiltrate the closed landform.</li> </ul>

Key Environmental Factors	
<b>Management Measures:</b>	<p><b>Avoid and Minimise</b></p> <ul style="list-style-type: none"> <li>• Cameco will develop a Surface Water Management Plan to minimise the impacts on surface water and ensure no release of contaminants to the environment.</li> <li>• Construction of a surface water diversion bund that has been designed to divert water around the mine site.</li> <li>• The surface water diversion bund will be developed in two stages to minimise the amount of runoff and rainfall that would collect within the mine and require management.</li> <li>• Construction of a flood retention bund to retain potentially contaminated floodwater within the bund, from a 1-in-1,000 year ARI flood event.</li> <li>• Manage the diversion and retention bunding to operate the Site as a 'no release' site.</li> <li>• Stormwater runoff will be captured in a series of stormwater ponds located within the mine site designed to capture a 1-in-20 year ARI event. If however, rainfall exceeds design capacity, the stormwater would be directed to inactive pits.</li> <li>• Sedimentation basins will be constructed at the downstream (eastern) ends of the diversion channel.</li> <li>• The ROM pad and other stockpile areas would be compacted to control seepage and would be graded so that runoff and seepage would be directed to a storm water runoff pond. Water captured in the ponds would be used to supplement the water supply for the processing plant.</li> <li>• Storage areas for process chemicals and liquors will be sealed and bunded to ensure that and process spills can be contained and easily cleaned up.</li> </ul> <p><b>Rehabilitate</b></p> <ul style="list-style-type: none"> <li>• On closure, all mineralised material will be processed or placed back into the open pit which will be backfilled and an engineered cover constructed over the in-pit TSF.</li> <li>• Surface water drainage patterns will be reinstated around the final landform.</li> <li>• Other aspects as per Environmental Factor 12 (Rehabilitation and Decommissioning)</li> </ul>
<b>Commitments:</b>	<ul style="list-style-type: none"> <li>• Develop and implement a Surface Water Management Plan.</li> </ul>
<b>Outcomes:</b>	<p>Taking into account the Project design and proposed management measures to be implemented, Cameco believes that the Proposal will meet the EPA's objectives with regards to Hydrological Processes and Inland Water Quality (Surface Water).</p>

Environmental Factor: 5	Hydrological Processes and Inland Water Quality (Groundwater)
<b>EPA Objective:</b>	<p>To maintain the hydrological regimes of groundwater so that existing and potential uses, including ecosystem maintenance, are protected.</p> <p>To maintain the quality of groundwater so that the environmental values, both ecological and social, are protected.</p>

Key Environmental Factors	
<b>Potential Impacts:</b>	<ul style="list-style-type: none"> <li>• The estimated total volume of water from wellfield sources needed to meet the water demand is approximately 46 GL over the life of the Project.</li> <li>• Groundwater abstraction, mine pit dewatering and aquifer recharge, could potentially impact groundwater availability to groundwater dependent ecosystems and other groundwater users.</li> <li>• Maximum groundwater drawdowns in the Western, Northern and Eastern brackish well fields are expected to be approximately 2, 5 and 3 m, respectively. Around the mine pit the drawdown will typically exceed 7 m.</li> <li>• The predicted water level drawdown in the palaeochannel shows that there is no notable interference between the proposed abstraction at Yeelirrie and the Albion Downs palaeochannel wellfield.</li> <li>• Prior to the commencement of processing, water from mine dewatering will be re-injected into the underlying aquifers. Groundwater mounding around the injection wells is predicted to increase groundwater levels to a maximum of 1 m. The reinjection well will be located within the open pit.</li> <li>• Precipitation of solids could occur due to mixing of groundwater chemistry during the reinjection process.</li> <li>• Storage of ore and mine waste in stockpiles, and tailings in the TSF, could result in contamination of the groundwater.</li> <li>• Seepage from the in-pit TSF carrying uranium, vanadium, arsenic and molybdenum may travel several hundred metres longitudinally along the valley, but is not expected to reach beyond the eastern boundary of the pit. Seepage may extend up to 600 m north and 200 m south of the in-pit TSF.</li> <li>• Groundwater levels are expected to recover significantly within 50 years following cessation of dewatering and to baseline levels within 100 years. No discernible change in groundwater flow is expected at the catchment scale.</li> </ul>
<b>Management Measures:</b>	<p><b>Design - Avoid</b></p> <ul style="list-style-type: none"> <li>• Cameco has decided on a Project implementation strategy to allow for storage of tailings in the open pit thereby avoiding additional groundwater impacts from an above-ground facility. The in-pit TSF will have under drainage to capture any leachate for use in the metallurgical plant.</li> </ul> <p><b>General – Avoid and Minimise</b></p> <ul style="list-style-type: none"> <li>• Cameco will prepare and submit a detailed Groundwater Operating Strategy including a Groundwater Management Plan as part of the application of a 5C groundwater license.</li> <li>• Groundwater abstraction rates will be managed to minimise potential environmental impacts and the required Project water supply volume will be reduced as far as possible throughout the life of the Project.</li> <li>• Groundwater abstraction rates and groundwater levels will be monitored to confirm predicted drawdown levels.</li> <li>• Cameco will continue baseline monitoring of groundwater wells to increase levels of confidence around the response of groundwater to rainfall events.</li> </ul> <p><b>Rehabilitate</b></p> <ul style="list-style-type: none"> <li>• As per Environmental Factor 12 (Rehabilitation and Decommissioning).</li> </ul>
<b>Commitments:</b>	<ul style="list-style-type: none"> <li>• Develop and implement a Groundwater Operating Strategy including a Groundwater Management Plan..</li> </ul>
<b>Outcomes:</b>	<p>Taking into account the Project design and proposed management measures to be implemented, Cameco believes that the Proposal will meet the EPA's objectives with regards to Hydrological Processes and Inland Water Quality (Groundwater).</p>

## Key Environmental Factors

Environmental Factor: 6	Human Health (Radiation)
<b>EPA Objective:</b>	To ensure that human health is not adversely affected.
<b>Potential Impacts:</b>	<ul style="list-style-type: none"> <li>• Dust emissions from areas where mineralisation is near the surface, or ore and mineralised waste stockpiles are present.</li> <li>• Radon gas emanation from disturbed areas where mineralisation is near the surface.</li> <li>• Contamination of air, soils, sediments, surface or groundwater by radionuclides through dust emissions, surface water runoff or seepage.</li> <li>• Gamma radiation exposure from potential build-up of radionuclides.</li> <li>• Estimated radiation doses to Cameco's Yeelirrie workforce shows that these are predicted to be less than the guideline dose limits.</li> <li>• The potential radiation exposure pathways for members of the public within the Development Envelope and along the transport routes are: inhalation of radioactive dusts, gamma exposure, inhalation of radon decay products and ingestion of water, animals or plants that come in contact with emissions. The estimated radiation exposure of the general public is predicted to be less than the guideline dose limit of 1 mSv/y (+ background).</li> </ul>
<b>Management Measures:</b>	<p><b>Design - Avoid</b></p> <p>The Project has been designed to ensure that human and ecological radiation exposures are as low as reasonably achievable (ALARA) and comply with Australian Standards, codes of practice and guidelines.</p> <p><b>General</b></p> <ul style="list-style-type: none"> <li>• Cameco will develop a Radiation Management Plan and obtain approval to implement the Plan prior to commencement of the Project. Incident response planning will be included as part of the overall site Emergency Response Plan.</li> <li>• Qualified radiation protection personnel would be employed to implement the management plan.</li> <li>• All personnel will be appropriately trained.</li> <li>• A data management system will be used to store and manage all information relating to radiation management and monitoring.</li> </ul> <p><b>General - Avoid and Minimise</b></p> <ul style="list-style-type: none"> <li>• Operations will be divided into 'clean' and 'potentially contaminated' areas. Access to controlled areas will ensure that only those who have been properly trained in radiological protection measures are admitted.</li> <li>• Movement of vehicles from the potentially contaminated areas will be via a washdown bay to remove all mineralised material. Generally vehicles that are likely to be regularly in contact with higher grade uranium mineralisation will be kept within the contaminated area.</li> <li>• A specific radiation safety work permit system will be implemented.</li> <li>• The time spent in high dose areas by individual workers will be limited, through careful rostering and scheduling of those workers operating ore recovery equipment, backed up by detailed monitoring.</li> <li>• Radiation monitoring results will be reviewed on an ongoing basis to determine the adequacy and effectiveness of engineering and management controls and reduce radiation exposures of people and the environment.</li> <li>• As part of the operational ALARA program, a series of action levels would be established to ensure that radiation exposures remain controlled.</li> </ul>

Key Environmental Factors	
	<p><b>Mining - Avoid and Minimise</b></p> <ul style="list-style-type: none"> <li>• All heavy equipment operating in the pit will have air-conditioned cabs with effective air filtration systems.</li> <li>• Dust management measures will be implemented in accordance with the Dust Management Plan.</li> </ul> <p><b>Process Plant - Avoid and Minimise</b></p> <ul style="list-style-type: none"> <li>• Crushers and conveyor transfer systems will be fitted with appropriate dust control measures, including the use of water sprays and/or dust extraction at dust generating sources.</li> <li>• The process plant uses wet processing which minimises dust generation.</li> <li>• All operational areas in the plant will be bunded. Spillage will be collected and returned to the processing vessels or to the tailings storage facility.</li> </ul> <p><b>Mineralised Waste Management - Avoid and Minimise</b></p> <ul style="list-style-type: none"> <li>• Stockpile areas will be compacted to minimise infiltration and bunded to capture potentially contaminated surface water, which will be transferred to the process plant.</li> <li>• Dust management measures will be implemented in accordance with the Dust Management Plan.</li> </ul> <p><b>Tailings Management - Avoid and Minimise</b></p> <ul style="list-style-type: none"> <li>• Tailings will be pumped from the processing plant to the TSF in a slurry form. Tailings will be kept moist during operations to prevent dust lift off.</li> </ul> <p><b>Waste Water Management - Avoid and Minimise</b></p> <ul style="list-style-type: none"> <li>• Water that has come in contact with mineralised material, such as stormwater runoff from the ore stockpile or from the mineralised overburden stockpile will be captured and transferred to the process plant or evaporation ponds.</li> <li>• Runoff will drain to sedimentation and stormwater ponds which will be designed to retain runoff from a 1-in-20 year ARI event. The surface water retention bund will be capable of retaining runoff within the mine area from a 1-in-1,000 year ARI event.</li> <li>• Waste water from washdown areas and cleanup water would also be captured for treatment and evaporation.</li> </ul> <p><b>General Waste - Avoid and Minimise</b></p> <ul style="list-style-type: none"> <li>• A system of separate collection of potentially contaminated wastes from operational areas will be implemented.</li> <li>• All equipment will be tested for contamination. Where recycling is practicable, items will be decontaminated to approved radiation levels before leaving site. Items that cannot be properly decontaminated, or where recycling is impracticable, will be buried in an approved manner.</li> </ul> <p><b>Transport - Avoid and Minimise</b></p> <ul style="list-style-type: none"> <li>• The dried UOC product would be top-loaded into 205-litre steel drums and sealed with lids and ring-clamps. The drum-filling station would be located in an airlock that maintains negative pressure to prevent uranium entering the work areas. The outside of the drums would be subsequently washed to remove any residual product from the lids and surfaces before labelling and loading into shipping containers for transport and export.</li> <li>• All consignments would have extensive safety, operational, emergency response and security arrangements in place.</li> </ul>

Key Environmental Factors	
	<p><b>Rehabilitate</b></p> <ul style="list-style-type: none"> <li>• All mineralised material will be backfilled to the pit with an engineered cover (refer to Environmental Factor 12).</li> <li>• The post-closure landform will be monitored in accordance with the Mine Closure and Rehabilitation Plan to ensure that it meets surface contamination criteria.</li> <li>• Radiation exposure to members of the public on the rehabilitated landform is expected to be low as the engineered cover will provide an effective barrier to radon by increasing the diffusion time of radon through the cover.</li> <li>• As per Environmental Factor 12 (Rehabilitation and Decommissioning).</li> </ul>
<b>Commitments:</b>	<ul style="list-style-type: none"> <li>• Develop and implement a Radiation Management Plan.</li> <li>• Develop and implement a Transport Radiation Management Plan.</li> </ul>
<b>Outcomes:</b>	Taking into account the Project design and proposed management measures to be implemented, Cameco believes that the Proposal will meet the EPA's objective with regards to Human Health (Radiation).

Environmental Factor: 7	Amenity (Noise)
<b>EPA Objective:</b>	To ensure that impacts to amenity are reduced as low as reasonably practicable.
<b>Potential Impacts:</b>	<ul style="list-style-type: none"> <li>• Noise modelling undertaken for the BHP Billiton Yeelirrie defined project indicated that the impacts on the nearest sensitive receptors were expected to comply with the Environmental Protection (Noise) Regulations 1997 and be very low to zero due to the remoteness of the Yeelirrie Project. As the noise impacts of Cameco's Project are expected to be similar no further modelling was undertaken.</li> <li>• Noise impacts from increased traffic movements at residences located along the transport route are expected to increase by 0.4 dB(A) which is considered negligible. Therefore noise impacts along the transport route were not required to be assessed in detail in accordance with State Planning Policy (SPP) 5.4</li> </ul>
<b>Management Measures:</b>	<p><b>Avoid and Minimise</b></p> <ul style="list-style-type: none"> <li>• Cameco will minimise noise emissions from the Project by operating and maintaining equipment in accordance with the manufacturers requirements.</li> <li>• Cameco will require its transport contractors to regularly maintain and operate vehicles in accordance with manufacturers requirements to minimise noise emissions.</li> </ul>
<b>Commitments:</b>	<ul style="list-style-type: none"> <li>• Comply with the Environmental Protection (Noise) Regulations 1997.</li> </ul>
<b>Outcomes:</b>	Taking into account the Project design and proposed management measures to be implemented, Cameco believes that the Proposal will meet the EPA's objective with regards to Amenity (Noise).



Key Environmental Factors

Environmental Factor: 8	Air Quality
<b>EPA Objective:</b>	To maintain air quality for the protection of the environment and human health and amenity.
<b>Potential Impacts:</b>	<ul style="list-style-type: none"> <li>• Generation of dust (including dust containing radioactive material) resulting from mining, stockpiling, transporting, processing, crushing and milling resulting in impacts at sensitive receptors.</li> <li>• Atmospheric emissions from the on-site diesel power generators may impact on the air quality at the sensitive receptors.</li> <li>• The results of the dispersion modelling indicate that:               <ul style="list-style-type: none"> <li>• fugitive dust emissions from the Project are not likely to result in unacceptable air quality impacts at any of the sensitive receptors; and</li> <li>• emissions from the on-site diesel power generators will not result in unacceptable air quality impacts at any of the sensitive receptors.</li> </ul> </li> </ul>
<b>Management Measures:</b>	<p><b>General – Avoid and Minimise</b></p> <ul style="list-style-type: none"> <li>• The Project has been designed to minimise atmospheric emissions as a result of its operation and comply with all relevant air quality standards and guidelines.</li> <li>• The process plant uses wet processing and the plant has been designed to minimise particulate emissions.</li> <li>• Tailings will be deposited to the in-pit TSF as a slurry and kept moist throughout operations to prevent dust generation at the surface.</li> <li>• The power station will be maintained to operate efficiently.</li> <li>• A Dust Management Plan will be prepared for the Project. The plan will include ambient monitoring of PM<sub>10</sub> concentrations and dust deposition rates. In the unlikely event that the monitoring results show exceedances of the standards, they will be used to develop management targets for PM<sub>10</sub> concentrations to allow adequate response time for Cameco to apply mitigation measures (e.g. additional water application) to reduce the risk of exceeding the NEPM standard.</li> <li>• Within the mining and stockpile areas conventional dust management techniques, including the use of water sprays, dust suppressants and progressive rehabilitation, will be used to manage dust emissions.</li> </ul> <p><b>Rehabilitate</b></p> <ul style="list-style-type: none"> <li>• Disturbed areas that are no longer required will be progressively rehabilitated over the life of the mine to reduce the potential for fugitive dust generation.</li> <li>• The pit will be progressively backfilled and rehabilitated from year 11.</li> <li>• As per Environmental Factor 12 (Rehabilitation and Decommissioning).</li> </ul>
<b>Commitments:</b>	<ul style="list-style-type: none"> <li>• Develop and implement the Dust Management Plan.</li> </ul>
<b>Outcomes:</b>	Taking into account the Project design and proposed management measures to be implemented, Cameco believes that the Proposal will meet the EPA's objective with regards to Air Quality.

### Key Environmental Factors

Environmental Factor: 9	Air Quality (Greenhouse Gas Emissions)
<b>EPA Objective:</b>	To minimise the emission of greenhouse and other atmospheric gases through the application of best practice.
<b>Potential Impacts:</b>	<ul style="list-style-type: none"> <li>• Greenhouse gas emissions (GHG) from land clearing, fuel combustion, desorption from the TSF, breakdown of wastes and leakage of synthetic gases.</li> <li>• Total gross emissions are predicted to be approximately <math>3.76 \times 10^6</math> t CO<sub>2</sub>-e across the Project life of 22 years. When sequestration due to rehabilitation of the site is included into the calculated emissions, the net GHG emissions are estimated to be <math>3.73 \times 10^6</math> t CO<sub>2</sub>-e.</li> </ul>
<b>Management Measures:</b>	<p><b>Avoid and Minimise</b></p> <ul style="list-style-type: none"> <li>• Optimisation of the mining fleet size in order to best meet the targets of the mine plan and minimise diesel demand for the mining fleet.</li> <li>• Optimisation of the metallurgical process to reduce the electricity and steam requirements, including the capture and use of waste heat where possible, to reduce the site diesel demand.</li> <li>• Incorporation of energy efficiency measures for the accommodation and administration facilities.</li> <li>• Solar hot water systems and solar photovoltaic systems for the site administration and accommodation facilities.</li> <li>• Solar photovoltaic power systems for powering the remote groundwater wells and associated pumping stations.</li> <li>• Cameco will continue to investigate GHG emission abatement projects throughout the life of the Project as technologies improve.</li> </ul> <p><b>Rehabilitate</b></p> <ul style="list-style-type: none"> <li>• Disturbed areas that are no longer required for the operation of the Project will be progressively rehabilitated over the life of the mine to offset GHG emissions from clearing.</li> </ul>
<b>Commitments:</b>	<ul style="list-style-type: none"> <li>• Develop a GHG and Energy Management Plan.</li> </ul>
<b>Outcomes:</b>	Taking into account the Project design and proposed management measures to be implemented, Cameco believes that the Proposal will meet the EPA's objective with regards to Air Quality (Greenhouse Gas Emissions).

Environmental Factor: 10	Terrestrial Environmental Quality
<b>EPA Objective:</b>	To maintain the quality of land and soils so that the environment values, both ecological and social, are protected.
<b>Potential Impacts:</b>	<ul style="list-style-type: none"> <li>• Mineralised material being deposited outside of the mining areas during hauling process.</li> <li>• Erosion and sedimentation (refer to Environmental Factor 4).</li> <li>• Flooding and overtopping of water storage facilities (refer to Environmental Factor 4).</li> <li>• Accidental spills (refer to Environmental Factor 4).</li> <li>• Seepage from TSF and waste storage (refer to Environmental Factor 5).</li> <li>• Dust deposition (refer to Environmental Factor 8).</li> </ul>
<b>Management Measures:</b>	<p><b>Avoid and Minimise</b></p> <ul style="list-style-type: none"> <li>• Vehicle and equipment hygiene measures will be implemented in accordance with the Radiation Management Plan to ensure that contaminated material is not transported off-site. In general, vehicles that are likely to be regularly in contact with higher grade uranium mineralisation will be kept within the contaminated area (refer to Environmental Factor 6).</li> </ul>

Key Environmental Factors	
	<ul style="list-style-type: none"> <li>• Minimise dust impacts in accordance with the Dust Management Plan (refer to Environmental Factor 8).</li> <li>• Implement surface water management measures in accordance with the Surface Water Management Plan to prevent release of contaminated runoff (refer to Environmental Factor 4).</li> <li>• Implement spill control procedures as required.</li> </ul> <p><b>Rehabilitate</b></p> <ul style="list-style-type: none"> <li>• Prior to commencement of construction, Cameco will have ascertained the availability and volumes of key materials required for rehabilitation. The results of these investigations will be presented in a revised version of the Mine Closure and Rehabilitation Plan to be submitted prior to the commencement of construction (refer to Environmental Factor 12).</li> <li>• Topsoils will be mapped and preferentially stockpiled for use in rehabilitation and revegetation. Topsoil will be stored in low stockpiles to retain seed viability and will be protected from erosion. Topsoil will not be handled when wet to avoid damaging soil structure. Soils that are not suitable for use in rehabilitation or construction (e.g. dispersive, saline soils) will be buried within the final landforms.</li> <li>• Cameco will ensure that all ore or mineralised waste is either processed through the processing plant, or buried in-pit at the end of mine life.</li> </ul>
<b>Commitments:</b>	<ul style="list-style-type: none"> <li>• Develop and implement surface water management measures as outlined in the Surface Water Management Plan.</li> <li>• Develop and implement a Radiation Management Plan.</li> <li>• Develop and implement a Dust Management Plan.</li> </ul>
<b>Outcomes:</b>	Taking into account the Project design and proposed management measures to be implemented, Cameco believes that the Proposal will meet the EPA's objective with regards to Terrestrial Environmental Quality.

Environmental Factor: 11	Heritage
<b>EPA Objective:</b>	To ensure that historical and cultural associations, and natural heritage, are not adversely affected.
<b>Potential Impacts:</b>	<ul style="list-style-type: none"> <li>• The Project will not have an impact on any Registered Aboriginal Sites.</li> <li>• The Project will impact a number of places where archaeological material and culturally modified trees have been identified. Disturbance to some of these places will be unavoidable during development of the Project.</li> </ul>
<b>Management Measures:</b>	<p><b>General</b></p> <ul style="list-style-type: none"> <li>• Cameco will consult with the Department of Aboriginal Affairs (DAA) regarding the status and management of archaeological sites across the Development Envelope.</li> <li>• Cameco will undertake consultation with members of the Tjiwarl Native Title claimants and with other Aboriginal groups with an interest in the area about the archaeological material and sites.</li> </ul> <p><b>General – Avoid and Minimise</b></p> <ul style="list-style-type: none"> <li>• Cameco will undertake investigations for archaeological sites on land that has not been previously surveyed.</li> <li>• Cameco will minimise ground disturbance and clearing activities in accordance with a Cultural Heritage Management Plan to be developed for the Project. This will include a pre-disturbance protocol to check for areas of significance.</li> </ul>
<b>Commitments:</b>	<ul style="list-style-type: none"> <li>• Cameco will develop and implement a Cultural Heritage Management Plan.</li> </ul>
<b>Outcomes:</b>	Taking into account the Project design and proposed management measures to be implemented, Cameco believes that the Proposal will meet the EPA's objective with regards to Heritage.

## Key Environmental Factors

Environmental Factor: 12	Rehabilitation and Decommissioning
<b>EPA Objective:</b>	To ensure that premises are decommissioned and rehabilitated in an ecologically sustainable manner.
<b>Potential Impacts:</b>	<ul style="list-style-type: none"> <li>• Residual soil or groundwater contamination and radon exhalation from the final landform.</li> <li>• Groundwater levels fail to recover following closure.</li> <li>• Backfilled soil profiles may restrict surface water channel and cause increased fluvial erosion and sediment transport (refer to Environmental Factor 4).</li> <li>• Erosion of final rehabilitated landform.</li> <li>• Inundation of the backfilled pits during peak rainfall events.</li> <li>• Spread of weed species inhibiting local species re-establishment.</li> <li>• Visual impacts from closed Project.</li> <li>• Post-mine radiation assessment has shown that ambient radiation doses will comply with relevant guidelines and be similar to the pre-mine environment (refer to Environmental Factor 6).</li> <li>• Post-closure modelling of seepage from the in-pit TSF carrying uranium, vanadium, arsenic and molybdenum may travel several hundred metres longitudinally along the valley, but typically not beyond the eastern boundary of the pit. Seepage may extend up to 600 m north and 200 m south of the in-pit TSF (refer to Environmental Factor 5).</li> <li>• Groundwater levels are expected to recover significantly within 50 years following cessation of dewatering and to baseline levels within 100 years. No discernible change in groundwater flow is expected at the catchment scale (refer to Environmental Factor 5).</li> <li>• Landform evolution modelling has shown that the final landform will be stable for at least 10,000 years.</li> <li>• On closure the backfilled pit is not expected to be inundated except under 1:1,000 year ARI or Probable Maximum Precipitation (PMP) events, where surface water could infiltrate the closed landform.</li> </ul>
<b>Management Measures:</b>	<p><b>General</b></p> <ul style="list-style-type: none"> <li>• Review and implementation of the Mine Closure Plan prior to commencement of operations. This will include establishment of rehabilitation objectives and completion criteria in consultation with key stakeholders.</li> </ul> <p><b>Rehabilitate</b></p> <ul style="list-style-type: none"> <li>• All plant and associated infrastructure will be demolished and removed at the conclusion of operations, subject to negotiations with key stakeholders.</li> <li>• Conduct progressive rehabilitation in accordance with the Mine Closure and Rehabilitation Plan. Commencement of rehabilitation during operations will enable rehabilitation methods to be refined throughout the LOM.</li> <li>• The backfilled pit will be constructed with an engineered cover as determined by geotechnical modelling.</li> <li>• The surface of the backfilled pit will be raised above the surrounding topography similar to the pre-mining topography and surface water flows will be reinstated around the final landform.</li> <li>• As no surface mining features (other than the slightly-raised backfilled pit) will be present post-closure, there are not expected to be any significant visual impacts from the Project following closure.</li> </ul>
	<ul style="list-style-type: none"> <li>• Ongoing weed management throughout operations and weed monitoring and control post-closure until completion criteria are achieved.</li> <li>• Implementation of the monitoring programs outlined in the Mine Closure and Rehabilitation Plan, until agreed completion criteria are achieved.</li> </ul>

Key Environmental Factors	
<b>Commitments:</b>	<ul style="list-style-type: none"> <li>Develop, review and implement the Mine Closure and Rehabilitation Plan.</li> </ul>
<b>Outcomes:</b>	<p>Construction of a safe, stable, non-polluting post-mine landform that is capable of sustaining agreed post operational land use, and does not impact on surrounding environmental values or uses.</p> <p>Taking into account the Project design and proposed management measures to be implemented, Cameco believes that the Proposal will meet the EPA's objective with regards to Rehabilitation and Decommissioning.</p>

Other Factors	
Environmental Factor: 13	Amenity
<b>EPA Objectives:</b>	To ensure impacts to amenity are reduced to as low as reasonably practical.
<b>Potential Impacts:</b>	<ul style="list-style-type: none"> <li>Some road works would be required to upgrade the existing road infrastructure for use by heavy vehicles and to construct the proposed borefield water supply pipeline. The result of such work would be improved access for road users and short term amenity impacts will be managed.</li> <li>The Project is expected to moderately increase daily traffic along the public roads, which would also have the effect of making Yeelirrie and its surrounds more accessible and decreasing its 'remoteness'.</li> <li>Given the distances to nearby occupied homesteads and the number of anticipated daily flights, the impact on amenity from air traffic and operation of the Project is expected to be low.</li> <li>Refer to Environmental Factors 7 for Amenity (Noise) and 8 for Air Quality and Atmospheric Gases.</li> </ul>
<b>Management Measures:</b>	<p><b>Avoid and Minimise</b></p> <ul style="list-style-type: none"> <li>Road upgrades and maintenance would be undertaken in consultation with road owners and landholders and in a manner that minimises disruption to traffic movements.</li> <li>The intersection of the Albion Downs–Yeelirrie Road and the Goldfields Highway will be upgraded to provide appropriate traffic measures, such as slip lanes and turning lanes, for vehicles entering or leaving the Goldfields Highway at this intersection.</li> </ul>
<b>Outcomes:</b>	Taking into account the Project design and proposed management measures to be implemented, Cameco believes that the Proposal will meet the EPA's objective with regards to Amenity.

Table E-4: Summary of potential impacts, proposed management and commitments -  
(Commonwealth Environment Protection and Biodiversity Conservation Act 1999)

Matters of National Environmental Significance (MNES)	
Environmental Factor: 13	Listed Threatened and Migratory Fauna
<b>Potential Impacts:</b>	<p>Refer to Environmental Factor 3.</p> <ul style="list-style-type: none"> <li>• Habitat loss (leading to population decline and fragmentation).</li> <li>• Habitat degradation due to weed invasion or changes to hydroecology.</li> <li>• Habitat change due to altered fire regimes.</li> <li>• Ongoing mortality (leading to population decline).</li> <li>• Species interactions (feral or overabundant native species).</li> <li>• Dust impacts.</li> <li>• Radiation exposure and bioaccumulation.</li> <li>• Potential impacts on conservation significant vertebrate fauna as a result of the Project are expected to be negligible or minor.</li> <li>• Potential impacts on the conservation significant Shield-backed Trapdoor Spider are expected to be minor.</li> </ul>
<b>Management Measures:</b>	<p>Refer to Environmental Factor 3.</p> <ul style="list-style-type: none"> <li>• The evaporation pond will be inspected daily for fauna and bird access. Should fauna visitations to the facilities be considered significant, measures will be taken to deter fauna.</li> <li>• Training on the identification and reporting of conservation-significant fauna species will be included in the Cameco site induction.</li> <li>• The ground disturbance protocol will ensure that areas to be cleared are first inspected by qualified environmental personnel to determine if there are any significant habitats or signs of significant fauna activity. Training on vegetation clearing procedures will be included in the environmental induction.</li> <li>• Dust suppression will be undertaken in accordance with the Dust Management Plan.</li> <li>• Work with DPaW and local indigenous groups to assist in the implementation of a landscape scale fire management program.</li> </ul>
<b>Commitments:</b>	<ul style="list-style-type: none"> <li>• Develop and implement a Fauna Management Plan.</li> </ul>
<b>Outcomes:</b>	No significant impacts to listed Threatened or Migratory Fauna.

Environmental Factor: 14	Nuclear Actions
<b>Potential Impacts:</b>	<p>Refer to Environmental Factor 6.</p> <ul style="list-style-type: none"> <li>• Estimated radiation doses to Cameco's Yeelirrie workforce are expected to easily comply with the guideline dose limits.</li> <li>• Radiation exposure of the general public will easily comply with the guideline dose limit of 1 mSv/y (+ background).</li> <li>• Radiation exposure to members of the public on the rehabilitated landform is expected to be low as the engineered cover will provide an effective barrier to radon by increasing the diffusion time of radon through the cover.</li> <li>• ERICA modelling indicated that the expected dose rate for all groups of fauna as a result of the Project was below the screening level of 10 µGy/h. Therefore no significant radiation impacts on terrestrial fauna are expected to occur as a result of the Project.</li> </ul>



Matters of National Environmental Significance (MNES)	
	<ul style="list-style-type: none"> <li>ERICA modelling indicated the expected dose rate for all plant groups expected to be less than the screening level of 10 <math>\mu\text{Gy/h}</math>, with the exception of lichen and bryophytes. These organisms derive most of their nutrients from dust falling on them. However, lichen and bryophytes are known to be particularly radio-resistant and a threshold no-effect dose rate has been estimated to be 125,000 <math>\mu\text{Gy/h}</math>, with some diversity reduction observed at 1.1 Gy/h (UNSCEAR 1996). Consequently no effect on lichens and bryophytes is expected from dust emissions from the Project.</li> </ul>
<b>Management Measures:</b>	<p>Refer to Environmental Factor 6.</p> <ul style="list-style-type: none"> <li>Design, construct and operate the proposed Yeelirrie operation to ensure that human and ecological radiation exposures are ALARA and comply with Australian standards, codes of practice and guidelines.</li> <li>Develop a Radiation Management Plan and obtain approval to implement the Plan prior to commencement of the Project. This will ensure compliance with the radiation dose limits for workers outlined in the Radiation Safety (General) Regulations 1983 and limit radiation exposure to members of the public to less than 1 mSv per year over and above background.</li> <li>Development and implementation of a Transport Radiation Management Plan which includes an Emergency Response Assistance Plan (ERAP).</li> <li>Closure and rehabilitation of the Project in accordance with the Mine Closure and Rehabilitation Plan (refer to Environmental Factor 12).</li> </ul>
<b>Commitments:</b>	<ul style="list-style-type: none"> <li>Develop and implement a Radiation Management Plan.</li> <li>Develop and implement a Transport Radiation Management Plan.</li> </ul>
<b>Outcomes:</b>	No significant radiological impacts on human health or the environment.