



# **Dampier to Bunbury Natural Gas Pipeline**

**ENVIRONMENT PLAN  
REVISION 8.1**

***SUMMARY DOCUMENT***

**June 2018**

## DOCUMENT CONTROL

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## 1. Introduction

The Dampier to Bunbury Natural Gas Pipeline (DBNGP) was constructed and commissioned in 1984 to transport natural gas from the north west of Western Australia (starting near the township of Dampier) to commercial, industrial and domestic markets in the south west of the State (finishing at MLV157 (Clifton Road) near the city of Bunbury).

Pipeline licences (PL 38, 40, 41, 47, 69, 91, 94, 95, 100 and 101) have been issued under the Western Australian (WA) *Petroleum Pipelines Act 1969* (PP Act) to allow the DBNGP to be operated (DBNGP Pipeline Licences). The *Petroleum Pipeline (Environment) Regulations 2012* (the Regulations) require the development and implementation of an Environment Plan (EP) to the satisfaction of the Department of Mines and Petroleum (DMP). The DBNGP Environment Plan Revision 5.2 (DBNGP EP) has been prepared to satisfy this requirement.

The objective of this document is to provide a succinct and publically available summary of the DMP approved DBNGP EP as required under regulation 11 (7) of the Regulations.

## 2. Proponent

DBNGP (WA) Transmission Pty Limited (ABN 69 081 609 190) is the nominated Operator of Pipeline Licences 38, 40, 41, 47, 69, 91, 94, 95, 100 and 101. Dampier Bunbury Pipeline (DBP) is the trading name of the DBNGP group of companies.

DBP has been engaged in a range of construction and operational projects associated with its assets located across Western Australia. Most of the activities have been regulated with respect to approval of environmental impacts and management under both State and Federal environmental legislation. These approvals have been subject to a range of compliance audits and environmental performance reviews that demonstrate a good record of responsible environmental management.

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## 3. Location

The DBNGP is a buried pipeline that transports natural gas approximately 1,600km from the Burrup Peninsula, starting near the township of Dampier, running parallel to the west coast of Western Australia and finishing near Bunbury. Figure 1 provides an overview of the route traversed by the DBNGP. The distribution of compressor stations (CS) and main line valves (MLV) along the pipeline is shown in Figure 1 also. Appendix A provides locality coordinates.

## 4. Existing Environment

The DBNGP extends through the following 6 bio-geographical regions:

- Pilbara Region
- Carnarvon Region
- Gascoyne Region
- Yalgoo Region
- Geraldton Sandplains Region
- Swan Coastal Plains Region

Figure 2 provides a spatial representation of the biogeographical regions that the DBNGP traverses.

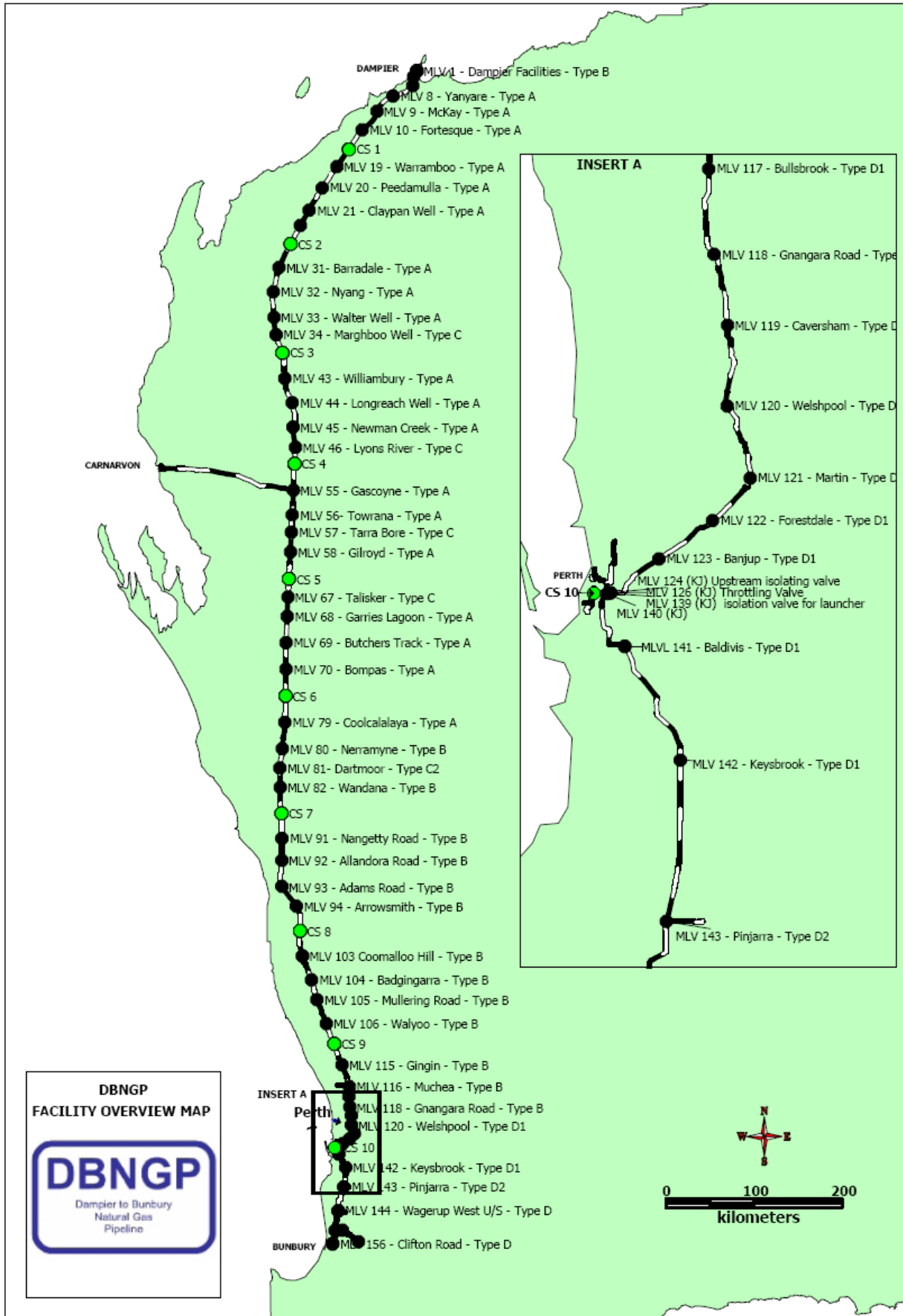


Figure 1 Overview of the DBNGP

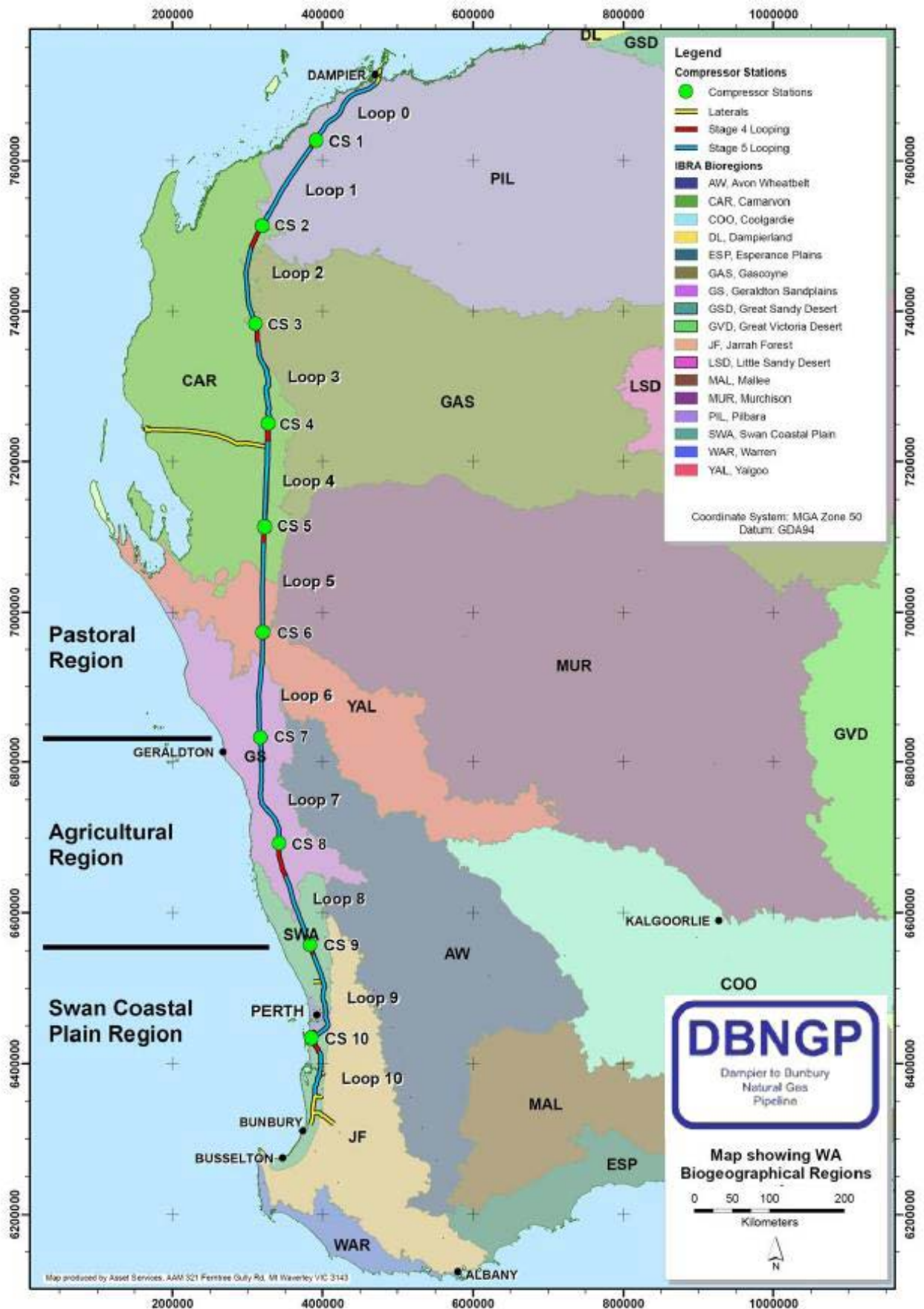


Figure 2 Biogeographical regions traversed by the DBNGP

#### 4.1. Pilbara Region

The Pilbara Region has an arid climate with summer rainfall that is strongly influenced by tropical cyclones. The mean annual rainfall in Karratha is 300.4 mm (BOM 2018).

The Pilbara Region consists of mountainous ranges and plateaus, alluvial plains, granite and basalt plains (LAWA 2001).

The DBNGP within the Pilbara Region is located within the Fortescue Botanical District of the Eremaean Botanical Province as defined by Beard (1975). The vegetation of this area is characterised by tree and shrub-steppe communities. Dominant genera of the area are *Eucalyptus*, *Acacia* and *Triodia* (Mattiske 2006).

Based on publically available information, there is one species of conservation significant flora known to occur within a 50 m buffer of the DBNGP corridor within the Pilbara Bioregion. A survey conducted in 2014 confirmed that *Ryhychosia bungarensis* (P4) was located within the pipeline corridor near KP8 and KP9 with a small population found (Mattiske, 2014).

Floristic aspects of three Priority Ecological Communities (PEC) are inferred to occur within the DBNGP pipeline corridor between KP 0 and 85, namely 'Roebourne Plains coastal grasslands with gilgai microrelief on deep cracking clays (P1)', 'Tanpool Land System (P1)' and 'Horseflat Land System of the Roebourne Plain (P3)' (Mattiske, 2014).

*Terminalia supranitifolia*, a Priority 3 (P3) species, is located in the vicinity of KP 8. The recorded location of this species is represented within the DBP Environmental GIS Database.

Bancroft and Bamford (2006) conducted a Level 1 fauna survey of the entire pipeline corridor in accordance with EPA Position Statement No. 3 (Bancroft and Bamford 2006). A total of 51 species of conservation significance were identified as potentially occurring within the Pastoral region of the DBNGP corridor (i.e. Pilbara, Carnarvon, Gascoyne, Yalgoo and a portion of the Geraldton Sandplains). These species are presented below:

- Gilled Slender Blue-tongue
- Fortescue Grunter
- Western Spiny-tailed Skink
- *Lerista lineata*
- Woma
- *Lerista planiventralis maryani*
- Pilbara Olive Python
- *Lerista yuna*
- Carpet Python
- Grey Falcon
- Malleefowl
- Australian Bustard
- Great Egret
- Bush Stone-curlew
- Glossy Ibis
- Black-footed Rock-wallaby
- Orange Leaf-nosed Bat
- Barking Owl
- White-bellied Sea-Eagle
- Thick-billed Grasswren
- Peregrine Falcon
- Rufous Fieldwren
- Little Curlew
- Slender-billed Thornbill
- Common Greenshank
- White-browed Babbler
- Wood Sandpiper
- Crested Bellbird
- Common Sandpiper
- Spectacled Hare-wallaby
- Red-necked Stint
- Northern Quoll
- Bilby
- Barn Swallow
- Mulgara
- Tammar
- Sharp-tailed Sandpiper
- Ghost Bat
- Curlew Sandpiper
- Short-tailed Mouse
- Oriental Plover
- Western Pebble-mound Mouse
- Oriental Pratincole
- Caspian Tern
- White-winged Black Tern
- Carnaby's Cockatoo
- Major Mitchell's Cockatoo
- Night Parrot
- Fork-tailed Swift
- Rainbow Bee-eater
- Star Finch

The major water courses crossed by the DBNGP in the Pilbara bioregion are summarised below:

- Maitland River
- Melford Creek
- Yanyare River
- Peter's Creek
- Robe River North
- Robe River South
- Warrambo Creek
- Fortescue River
- Trevarton Creek
- Cane River

- Devils Creek
- Du Boulay Creek
- Peedamulla Creek
- Peepingee Creek

Cane River Station (a C class Conservation Park) lies adjacent to the DBNGP corridor between KP 208 and KP 262 (inclusive of former leasehold areas proposed for conservation). It should be noted that the DBNGP corridor is excised from this reserve. Nevertheless, the adjacent area is still classified as “of conservation value” for the purpose of operational activities.

#### 4.2. Carnarvon Region

The coastal areas of the Carnarvon Region experience a semi-desert climate with winter rainfall while the Shark Bay area has a Mediterranean climate. Further inland the climate is arid with a low rainfall which is predominantly received in the winter.

The Carnarvon Region is characterised by low gently undulating relief and open drainage and large undulating sand plains (ECOS 2003). The soils of the Carnarvon system are erodible and disperse readily when they come into contact with water.

This area intersected by the DBNGP is classified as the Carnarvon Botanical District as defined by Beard (1975). Dominant genera are *Acacia* and *Triodia* with occurrences of species from the *Chenopodiaceae* (Chenopods) family such as *Halosarcia*, *Atriplex* and *Maireana* on flats and claypans. Based on publically available information, there are no species of conservation significant flora known to occur within a 50 m buffer of the DBNGP corridor within the Carnarvon Bioregion.

A summary of the fauna species likely to occur within the entire pastoral region (inclusive of the Carnarvon Bioregion) is provided under Section 4.1

A summary of the major water courses crossed by the DBNGP in the Carnarvon bioregion is provided below:

- Ashburton River
- Minglya River South
- Newman Creek
- Davis Creek
- Gascoyne River
- Gascoyne River South
- Wooramel River
- Lyons River

The Toolonga Nature Reserve (a C Class Nature Reserve) lies adjacent to the DBNGP corridor between KP 746 and KP 818, spanning the Carnarvon and Yalgoo bioregions. It should be noted that the DBNGP corridor is excised from this reserve. Nevertheless, the adjacent area is still classified as “of conservation value” for the purpose of operational activities.

#### 4.3. Gascoyne Region

The region experiences a moderate arid tropical climate with very hot summers and warm winters. Rainfall is erratic and unreliable (LAWA 2001).

The Gascoyne region has moderately high relief, a close dendritic drainage pattern and mature valley topography (Payne et al 1987). Soils in the bioregion include shallow stony earthy loams, hard alkaline red soils, acidic or neutral shallow red earths, brown calcareous loams and red sands (Beard 1976).

The region is dominated by acacia shrublands and acacia forests and woodlands. Other shrublands and acacia open woodlands, salt lakes, and chenopod and samphire shrublands occur in the west (LAWA 2001). Based on publically available information, there are no species of conservation significant flora known to occur within a 50 m buffer of the DBNGP corridor within the Carnarvon Bioregion.

A summary of the fauna species likely to occur within the entire pastoral region (inclusive of the Gascoyne Bioregion) is provided under Section 4.1.

The major water courses crossed by the DBNGP in the Gascoyne bioregion are summarised below:

- Yannarie River
- Lyndon River
- Monkey Creek North
- Monkey Creek South
- Minilya River North

There are no areas of conservation estate that intersect the DBNGP corridor within the Gascoyne Bioregion.

#### 4.4. Yalgoo Region

The climate varies from semi-desert to Mediterranean with hot dry summers and mild winters with winter rainfall (LAWA 2001).

This region is characterised by sand and alluvial plains, lateritic breakaways, low ranges and salt lakes. Broad alluvial valleys separate the breakaways and low ranges (LAWA 2001).

The vegetation in the region is dominated by acacia shrublands, acacia forests and woodlands, hummock grasslands and smaller areas of Eucalypt woodlands and chenopod shrublands and samphire shrublands (LAWA 2001). Based on publically available information, there are no species of conservation significant flora known to occur within a 50 m buffer of the DBNGP corridor within the Yalgoo Bioregion.

A summary of the fauna species likely to occur within the entire pastoral region (inclusive of the Yalgoo Bioregion) is provided under Section 4.1.

Due to the low and erratic rainfall of the region there is little or no surface water. There are numerous salt lakes present in the region. The only major watercourse crossed by the DBNGP in the Yalgoo bioregion is the Murchison River at KP 845.

The Toolonga Nature Reserve (a C Class Nature Reserve) lies adjacent to the DBNGP corridor between KP 746 and KP 818, spanning the Carnarvon and Yalgoo bioregions. It should be noted that the DBNGP corridor is excised from this reserve. Nevertheless, the adjacent area is still classified as “of conservation value” for the purpose of operational activities.

#### 4.5. Geraldton Sandplains Region

The coastal climate is Mediterranean with mild wet winters and hot dry summers. Inland areas experience semi-desert arid climate with low un-seasonal rainfall, hot dry summers and mild dry winters.

The Geraldton bioregion consists of undulating lateritic red sand plains overlaying sediments and gravels or cap-rock (LAWA 2001). Ranges include the flat topped Moresby Ranges near Geraldton, the Weld, Nicholas, Dividing, Montague, and Robinson ranges. However, these are minor and with a few other exceptions the region tends to be relatively flat.

Twenty-nine different vegetation systems have been identified within the Geraldton bioregion reflecting the influences of the high winter rainfall and soils in the region (Beard 1976). Areas in the region that have been cleared are susceptible to wind and water erosion and many areas suffer from land degradation from spread of weeds, uncontrolled fire and overgrazing by introduced pests such as feral goats, foxes and rabbits (WA Planning Commission 1999). The plant disease Dieback (*Phytophthora cinnamom*) occurs in this bioregion. This fungal pathogen is soil borne and kills susceptible vegetation by killing root and tissue cells.

Based on publically available information, there are two species of conservation significant flora known to occur within a 50 m buffer of the DBNGP corridor within the Pilbara Bioregion. *Grevillea florida* (P3) is located in the vicinity of KP 1143. *Eucalyptus ebbanoensis subsp. Photina* (P4) is located in the vicinity of KP 1027.

A survey conducted (ELA, 2014) along the pipeline corridor identified nine priority species in this sub-region including:

- *Dicrasyllis linearifolia*, *Hemiandra* sp. *Mesomelaena sygia* subsp *deflexa* and *Lepidobolus quadratus* (Priority 3)
- *Banksia chamaephyton*, *Banksia scabrella*, *Caulytrix chrysantha*, *Eucalyptus macrocarpa* subsp *elachantha* and *Hypolaena robusta* (Priority 4)

Bancroft and Bamford (2006) conducted a Level 1 fauna survey of the entire pipeline corridor in accordance with EPA Position Statement No. 3 (Bancroft and Bamford 2006). A total of 47 species of conservation significance were identified as potentially occurring within the Agricultural region of the DBNGP corridor (i.e. Geraldton Sandplains and portion of Swan Coastal Plains). These species are listed below:

- |                              |                            |                             |
|------------------------------|----------------------------|-----------------------------|
| • Jewelled Ctenotus          | • Western Swamp Tortoise   | • Sharp-tailed Sandpiper    |
| • Gilled Slender Blue-tongue | • Barking Owl              | • Quenda                    |
| • <i>Lerista lineata</i>     | • White-bellied Sea-Eagle  | • Curlew Sandpiper          |
| • Western Spiny-tailed Skink | • Shy Heathwren            | • Tammar                    |
| • <i>Lerista yuna</i>        | • Peregrine Falcon         | • Hooded Plover             |
| • Woma                       | • Rufous Fieldwren         | • Brush Wallaby             |
| • Black-striped Snake        | • Common Greenshank        | • Caspian Tern              |
| • Carpet Python              | • Slender-billed Thornbill | • Water-rat                 |
| • Black Bittern              | • Wood Sandpiper           | • White-winged Black Tern   |
| • Malleefowl                 | • White-browed Babbler     | • Carnaby's Cockatoo        |
| • Australasian Bittern       | • Common Sandpiper         | • Baudin's Cockatoo         |
| • Great Egret                | • Crested Bellbird         | • Major Mitchell's Cockatoo |
| • Australian Bustard         | • Red-necked Stint         | • Fork-tailed Swift         |
| • Cattle Egret               | • Brush-tailed Phascogale  | • Rainbow Bee-eater         |
| • Bush Stone-curlew          | • Chuditch                 | • Black-footed Rock-wallaby |
| • Glossy Ibis                | • Western Ringtail Possum  |                             |

The major water courses crossed by the DBNGP in the Geraldton Sandplains bioregion are summarised below:

- |                    |                         |                      |
|--------------------|-------------------------|----------------------|
| • Greenough River  | • Donkey Creek          | • Boothendarra Creek |
| • Irwin River      | • Flood Creek           | • Hill River         |
| • Arrowsmith River | • Milyulo Brook (north) | • Mullering Brook    |

The conservation estates intersected by the DBNGP in the Geraldton Sandplains bioregion are summarised below. It should be noted that the DBNGP corridor has been excised from all Conservation Estates listed. Nevertheless, sections of the corridor adjacent to (and intersecting) these reserves are still classified as "of conservation value" for the purpose of operational activities.

- |                             |                               |
|-----------------------------|-------------------------------|
| • Coomaloo nature Reserve   | <i>C Class Nature Reserve</i> |
| • Hill River Nature Reserve | <i>A Class Nature Reserve</i> |
| • Twyata Nature Reserve     | <i>C Class Nature Reserve</i> |
| • Badgingarra National Park | <i>A Class National Park</i>  |
| • Milyulo Nature Reserve    | <i>A Class Nature Reserve</i> |

#### 4.6. Swan Coastal Plains Region

This bioregion experiences a Mediterranean climate with warm dry summers and cool wet winters (LAWA 2001). Rainfall increases with proximity to the western side of the Darling Scarp (Beard 1981).

The vegetation in the region is dominated in the south by eucalypt open forests and eucalypt woodlands with small areas of heath, open forests and woodlands, melaleuca forests and woodlands,

acacia shrublands and shrublands. In the north large areas of eucalypt open woodlands, other forests and woodlands, heath, acacia shrublands and eucalypt woodlands occur (LAWA 2001). Based on publically available information, there are nine species of conservation significant flora known to occur within a 50 m buffer of the DBNGP corridor within the Swan Coastal Plains Bioregion. Table 1 presents the species name, conservation significance and location (via nearest KP) of each.

**Table 1 Conservation significant flora known to occur within the Swan Coastal Plains Bioregion component of the DBNGP corridor**

Species Name	Conservation Status	KP
<i>Verticordia lindleyi</i> supsp <i>lindleyi</i>	Priority 4	1357
<i>Isopogon drummondii</i>	Priority 3	1361
<i>Conospermum undulatum</i>	Threatened (Vulnerable)	1361, 1362 and 1363
<i>Verticordia lindleyi</i> subsp. <i>lindleyi</i>	Priority 4	1362
<i>Diuris purdiei</i>	Threatened (Endangered)	1382
<i>Jacksonia sericea</i>	Priority 4	1382
<i>Drakaea elastica</i>	Threatened (Critical)	1416
<i>Synaphea stenoloba</i>	Threatened (Critical)	1448
<i>Dillwynia dillwynioides</i> (P3)	Priority 3	1510
<i>Acacia semitrullata</i> (P4)	Priority 4	1510
<i>Caladenia procera</i>	Threatened (Critical)	1511
<i>Diuris drummondii</i>	Threatened (Vulnerable)	1513
<i>Boronia juncea</i> subsp <i>juncea</i>	Priority 1	1514

The survey also indicated two locations immediately adjacent to the DBNGP as having floristic elements of the Threatened Ecological Community (TEC); SCP 3a '*Corymbia calophylla* – *Kingia australis* woodlands on heavy soils of the Swan Coastal Plain'. This community is listed as Critically Endangered (CR) under the state level and Endangered at the Commonwealth level near KP1362 and KP1447-1449 (Mattiske, 2014).

One Priority Ecological Community (PEC) was identified 'SCP 21c; Low lying *Banksia attenuata* woodlands or shrublands' around the DBNGP corridor at KP1414-1417 (Mattiske, 2014).

Bancroft and Bamford (2006) conducted a Level 1 fauna survey of the entire pipeline corridor in accordance with EPA Position Statement No. 3 (Bancroft and Bamford 2006). A total of 40 species of conservation significance were identified as potentially occurring within the Swan Coastal Plains region of the DBNGP corridor. These species are listed below:

- Western Swamp Tortoise
- Jewelled Ctenotus
- Woma
- *Lerista lineata*
- Carpet Python
- Black-striped Snake
- Malleefowl
- Curlew Sandpiper
- Water-rat
- Hooded Plover
- Baudin's Cockatoo
- Major Mitchell's Cockatoo
- Fork-tailed Swift
- Black Bittern
- Great Egret
- Australasian Bittern
- Cattle Egret
- Australian Bustard
- Glossy Ibis
- Bush Stone-curlew
- White-bellied Sea-Eagle
- Barking Owl
- Peregrine Falcon
- Caspian Tern
- White-winged Black Tern
- Carnaby's Cockatoo
- Rufous Fieldwren
- Common Greenshank
- White-browed Babbler
- Wood Sandpiper
- Crested Bellbird
- Common Sandpiper
- Brush-tailed Phascogale
- Red-necked Stint
- Quenda
- Sharp-tailed Sandpiper
- Brush Wallaby
- Rainbow Bee-eater
- Western Ringtail Possum

- Chuditch

The major water courses crossed by the DBNGP in the Swan Coastal Plains bioregion are summarised below:

- |                     |                |                        |
|---------------------|----------------|------------------------|
| • Caren Caren Brook | • Swan River   | • Canning River        |
| • Moore River       | • Helena River | • Serpentine River     |
| • Red Gully         | • Murray River | • North Dandalup River |
| • Gingin Brook      | • Harvey River | • South Dandalup River |

The corridor traverses numerous wetlands, including wetlands of regional conservation significance. The corridor is also in close proximity to two Ramsar wetlands, Forrestdale Lake and the Peel-Harvey Estuary.

The conservation estates intersected by the DBNGP in the Swan Coastal Plains bioregion. Are summarised below:

- |                                    |                               |
|------------------------------------|-------------------------------|
| • Gnagara-Moore River State Forest | <i>A Class State Forest</i>   |
| • Leda Nature Reserve              | <i>A Class Nature Reserve</i> |
| • 1943/161                         | <i>A Class Nature Reserve</i> |
| • Myalup State Forest              | <i>A Class State Forest</i>   |

Additionally the Southern Loop Worsely Lateral intersects the Harris River State Forest (a Class A State Forest) between KP 41 and KP 58. An unnamed parcel vested to CALM is intersected by the DBNGP between KP 1512 - KP1515 and KP 1518 – KP 1521. It should be noted that unlike in all other bioregions, the DBNGP corridor has not been excised from any areas vested for conservation within the Swan Coastal Plains.

European House Borer (EHB), *Hylotrupes bajulus Linnaeus*, is a destructive pest of seasoned coniferous timber including pine, fir and spruce known to occur at some locations within the Swan Coastal Plain. If allowed to become established it can cause major structural damage to buildings. The adult beetle lays its eggs into cracks, holes and joints in dead pine trees, dead branches, or other dead parts of living trees and untreated pine timber.

The *Agriculture and Related Resources Protection (European House Borer) Regulations 2006* have set Restricted Movement Zones (RMZ) in specific areas within the Swan Coastal Plain. Movement of untreated pine into or out of these areas is restricted.

The corridor traverses numerous conservation category wetlands (CCWs) and wetlands gazetted under the Environmental Protection (Swan Coastal Plain Lakes) Policy 1992 (EPP Lakes).

Between CS9 and CS10 the pipeline traverses within 200 m of Forrestdale Lake (KP1383-1384.5) Forrestdale Lake is a Ramsar listed wetland; 'Forrestdale and Thomsons Lakes' and is identified as a wetland of international importance.

## 5. Activity Description

The DBNGP has twelve loops (Loops 0 to 10 and the South West Loop) and seventeen laterals (branch pipelines) along its length. It also has ten compressor stations (CS) which are equipped with two, three or four compressor units and associated facilities located on or along the pipeline, such as meter stations, mainline valves (MLVs) and communication equipment.

The DBNGP has Transportation Services Control Centre (TSCC) and Head Office located at 12-14 Esplanade in the Perth CBD and an Operations complex located at Jandakot.

A summary description of the DBNGP is below:

- Natural gas from suppliers enters the DBNGP at Burrup Peninsula (North West Shelf Gas), Pluto, MLV 7 Interconnect, Maitland (Quadrant Devil Creek), CS1 (Quadrant Harriet), Gorgon, Macedon, Wheatstone (via DDG's Wheatstone Ashburton West Pipeline), Dongara (Mondarra Storage Facility – bidirectional) and Gingin (Red Gully).
- The gas is cooled at Dampier Facilities and at all mainline Compressor Stations, primarily to minimise potential for the formation of stress corrosion cracking.
- The gas passes through Mainline Valves (MLVs) the primary function of which is to allow isolation of a section or sections of the DBNGP for emergency response purposes as well as for maintenance. These sites contain Communication infrastructures and facilities for generation and storage of power on site to service the MLVs.
- The gas pressure reduces as it travels down the pipeline, due to friction loss. The pressure of the gas is raised through gas turbine driven compressors at the mainline Compressor Stations, which are spaced approximately 150km apart and a new compressor installed at Pluto Meter Station.
- The gas is delivered to shippers through outlet meter stations. The Meter Stations generally comprise of duty and standby meter runs and may contain equipment to reduce pressure, heat the gas and odourise the gas before delivery to the Shippers. There are 61 customer Meter Stations on the DBNGP, of which 54 are operational while 7 are currently not used.
- Odourisation is undertaken at some of the Meter Stations depending on the customer requirements. Bulk odourisation to industrial standard is undertaken at the DBNGP W LPG facility located in Kwinana for all gas delivered into the Kwinana and the pipeline South segments.
- The pipeline is remotely operated through the Supervisor Control and Data Acquisition (SCADA) system from TSCC. The microwave communications system in the areas north of Perth provides back bone for the SCADA system as well as connection for other digital communications systems. Communications system for sites south of Perth largely consists of optic fibre, pilot cable, UHF radio and public cellular networks.
- Minor construction activities may include the installation of a compressor unit, construction of a new repeater or meter station, removal or replacement of older infrastructure, road work, hot tapping, tie-in or interconnect, maintenance or refurbishment of airstrips and helicopter pads or full refurbishment or new ancillary equipment at existing stations.

The DBNGP is buried for its entire length (except at compressor stations). This protects the pipeline from third party damage and severe weather events. Excavation of the pipeline for maintenance purposes is not commonly required as it is preserved via its external coating and cathodic protection. Regular internal inspections are undertaken via intelligent pigging.

Owing to the ongoing high quality maintenance of the infrastructure, the DBNGP has a remaining design life of over 50 years.

## 6. Environmental Risk Management

In order to identify, understand and manage all environmental sources of risk and consequent impacts associated with operation of the DBNGP, a comprehensive Environmental Risk Assessment (ERA) was completed. The ERA was conducted by a multidisciplinary team of in house personnel and followed a structured process which sought to:

- outline key activities undertaken on the DBNGP;
- identify any new risks;
- analyse and evaluate associated hazards and corresponding environmental impacts;
- incorporate risks from the Minor Project Construction EP;
- where necessary, establish suitable controls; and
- systematically assess the residual associated environmental risk.

An Environmental Aspects and Impacts Risk Register was developed to document the ERA outcomes (Appendix B). Each hazard and associated impact identified during the ERA has been addressed with an objective to:

- Define the environmental performance objectives that will be required to be achieved in order to ensure environmental protection
- Define the environmental performance standards that relate to the quality of the performance
- Define the measurement criteria for determining whether the objectives and standards have been met for the activity

An implementation strategy has been developed such that the established performance objectives and standards may be met over the life of the DBNGP. Specific control measures have been developed to direct, review and manage activities so that environmental impacts and risks are continually being reduced to ALARP. Sections 6.1 to 6.10 provide a summary of the key control measures established for identified potential environmental impacts.

### 6.1. Soil and Sediment

Any works impacting the topsoil or soil profile shall abide by the Native Vegetation Clearing Procedure (E-PRO-002) which shall ensure at a minimum the:

- proper segregation of topsoil and subsoil;
- management of topsoil stockpiles to not exceed 2m in height
- minimisation of earthworks in waterway beds and banks; and
- the addition of dust suppression to control soil loss

If erosion is identified associated with DBP activities, erosion repairs shall be undertaken and if warranted, erosion and sediment control structures shall be constructed.

### 6.2. Flora

All clearing is managed through an internal authorisation process which facilitates pre clearing checks by a competent person to:

- review the proposed location and method of clearing and conduct impact assessment;
- obtain any approvals required to ensure compliance to all relevant laws; and
- establish any conditions necessary in order to minimise impact (including at a minimum the segregation and stockpiling of soil to enable reinstatement).

Areas of vegetation disturbance not required for future operational use shall be rehabilitated.

### 6.3. Weed and pathogens

A Clean on Entry protocol shall be established that ensures:

- the delineation and demarcation of locations of high sensitivity to weeds or pathogens (i.e. COE areas);
- the preferential scheduling of work in COE areas for drier periods; and
- the clean down of vehicles prior to entering COE areas (as per GIS database).

A targeted weed management program shall be undertaken to promote control of new or existing populations. Additionally all minor construction projects shall use certified weed and seed free fill only.

### 6.4. Bushfire

All activities are conducted in accordance with relevant fire restrictions (local, state), notifications and permitting procedures. This includes ensuring that:

- all plant and equipment comply to fire safety standards;
- facility fire breaks are in place and maintained
- appropriate firefighting equipment is available at all times; and
- all prohibited items are kept away from hazardous areas

### 6.5. Fauna

All personnel shall abide by the requirements of the Fauna Interaction Procedure (E-PRO-004) including:

- planned interactions in consultation with trained and licensed personnel;

- recording of all fauna interactions including location data and date; and
- capturing all fauna interactions (injury, relocation or fatality) as an event.

DBP shall implement the Native Vegetation Clearing Procedure (E-PRO-002) in relation to:

- the identification of potential conservation significant fauna species as part of the ACV development;
- minimise the clearing of habitat and reduce habitat fragmentation;
- checking for fauna in habitat trees prior to clearing; and
- conducting clearing in a manner that does not trap fauna.

Additionally trench related construction shall include trench inspections completed daily within 3 hours of sunrise, installation of fauna egress (i.e. ramps) and

### 6.6. Cultural Heritage and Stakeholder Engagement

All clearing is managed through an internal authorisation process which facilitates pre clearing checks by a competent person to:

- review the proposed location of clearing and conduct cultural impact assessment;
- obtain any approvals required to ensure compliance to all relevant laws; and
- establish any conditions necessary in order to minimise cultural impact.

All relevant personnel working on or near an Aboriginal site shall be made aware of their responsibilities under the Aboriginal Heritage Act 1972

### 6.7. Air emissions including dust and noise

All gaseous emissions shall be monitored to enable informed operations that minimize emissions to the extent practicable.

Where excessive airborne dust is generated or a substantiated landholder complaint received, any combination of one or more of the following shall be implemented as required. This includes:

- the application of water or stabilisers via water trucks and sprayers to dampen down soil. No run-off should be generated from application. Applications shall be frequent enough to provide persistent dust suppression;
- ensuring vehicles with dust emitting loads must be covered (except when loading and unloading); and
- the potential use of dust stabilisers, water, tarps or geo-textile materials to suppress dust generated from stockpiles.

Noise controls are implemented as required to minimise noise impacts.

### 6.8. Surface and Ground Water

DBP shall develop and implement the Waterway Crossing Procedure (E-PRO-017) including requirements to ensure:

- all approvals are in place prior to any impact to beds and banks;
- water crossings are maintained in a stable condition; and
- erosion controls are installed to prevent sedimentation into waterways.

Prior to excavation to a depth greater than 1m within areas of a moderate – high risk of ASS, conduct a site investigation to quantify actual ASS forming material and if necessary prepare an ASS Management Plan.

Waste water disposal shall be managed as per design and threshold levels for onsite disposal of water. All other waste liquids to be disposed of by a licensed waste contractor.

### 6.9. Hazardous Materials Storage and Handling and Spill response

All chemicals used shall be transported, stored, handled and disposed of in accordance the requirements of the relevant legislation and industry standards. This includes:

- ensuring secondary containment is in place;
- labelling all containers ; and

- the availability of a current MSDS to personnel onsite.

Appropriate spill response equipment, including containment and recovery equipment, shall be available on site and in vehicles undertaking work where there is the potential for fuel or chemical spillage.

All spills shall be contained as soon as possible and clean up actioned as soon as feasible.

Personnel shall be aware of and abide by requirements of the Oil Spill Response Procedure (E-PRO-016)

#### 6.10. Waste management

All personnel shall abide by the Waste Management Procedure (E-PRO-015). This includes requirements for:

- ensuring the labelling of receptacles and that they have lids or appropriate covers;
- ensuring that segregation and containment are appropriate; and
- all liquid chemical waste disposal includes bunding during storage.

All waste (including pigging waste) shall be captured and stored and then disposed of by a licensed contractor to a licensed waste facility (except sewage where treated onsite).

## 7. Monitoring

To monitor the effectiveness of control measures in the management of the environmental impacts and risks, targeted monitoring commitments have been specified where relevant. DBP conducts regular surveillance of the DBNGP corridor to ensure that the integrity of the DBNGP is maintained. These patrols are conducted by 4WD, helicopter, fixed-wing aircraft and by foot with an objective to detect:

- Third party encroachments
- Erosion and changing landforms
- Damaged or missing signage
- Vegetation overgrowth and clearing
- Damaged or missing gates and fences
- Changes in location class
- Indications of gas leaks
- Impediments to and condition of access roads
- Security violations
- Weed infestation
- Water quality and protection of natural flows
- Any other issues of significance to the integrity of the corridor

The DBNGP is subject to an annual environmental compliance review to ensure that the systems and controls detailed within this EP are both adequate and implemented, and also identify opportunities for improvement. DBP shall also undertake an Audit and Evaluation program that assists in assessing compliance to the EP and procedural controls.

## 8. Consultation

Key stakeholders including the Department of Planning, Land and Heritage and DMIRS, along with relevant pipeline operations personnel participated in a HAZID to identify and assess the potential environmental hazards associated with the operations and maintenance activities for the DBNGP. Furthermore, consultation with other stakeholders including the DWER and DBCA is undertaken as the need arises to ensure that operations on the DBNGP are managed in accordance with relevant statutory requirements.

Recent consultation with key regulators is described below:

- Consultation with DWER (OEPA) in relation to close out of rehabilitation for pipeline activities assessed under part IV of the EP Act. DWER reporting is also completed annually and on a 5 year basis for some projects.

- Ongoing discussions with DMIRS in regards to pipeline operator status, annual reporting, new projects, clearing permit and audits
- DWER (previously DoW) licensing for water bores along the route including renewal information.
- DBCA (previously DPaW) in relation to fauna licensing and renewals or updates to the fauna license.

Consultation and communication with relevant landholders, regulatory authorities, Aboriginal and other interest groups and the general public will be undertaken as part of the DBNGP operation activities. The schedule and key messages to be included in the consultation program is governed by the Land Management Plan. All contact with stakeholders will be recorded in the Land Management System (LMS). The Land Management department and the HSE department are responsible for the development and distribution of corporate awareness publications to communicate the details of our environmental commitments to key stakeholders. All other relevant details about land use, foreign crossings, landholder concerns and issues are to be recorded on the LMS for future reference and reporting.

Formal contact with all landholders will be determined relevant to the perceived risk, with ongoing liaison throughout the year. All contacts involve the dissemination of information about the DBNGP, discussion of any concerns and education of pipeline safety to increase awareness. This ongoing process is designed to decrease the risk of third party incidents and to encourage ownership of the activities around the pipeline.

DBP target annual consultation with all landholders. These consultations provide an opportunity for the landowner to advise DBP of any change to their contact details, land use requirements and future expectations. DBP promote awareness of risks and emergency protocols.

## 9. References

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## Appendix A Locality Coordinates

Locality	Easting	Northing
CS 1	391564.4	7627640.4
CS 2	319638.6	7514093.9
CS 3	310908.0	7383648.1
CS 4	327581.3	7251438.5
CS 5	322618.4	7113719.5
CS 6	320489.3	6973600.5
CS 7	317483.6	6832807.2
CS 8	341662.8	6692587.7
CS 9	383392.3	6558132.4
CS 10	384999.6	6433941.1
Dampier	476889.9	7721839.5
Carnarvon	163999.7	7245506.6
Carnarvon	325709.0	7219737.3
Mungarra	318759.6	6802905.8
Mungarra	316423.3	6802918.8
Pinjar	400938.5	6508218.3
Pinjar	387929.2	6508349.2
Russell Road	387872.0	6441436.6
Russell Road	387261.5	6433993.4
Rockingham - WMC	386774.2	6433877.9
W LPG	384999.5	6434723.2
Rockingham - WMC	384142.6	6431213.9
KNC / BP Lateral (Ep	383670.6	6432545.2
KNC / BP Lateral (Ep	384769.3	6433145.7
Alcoa Kwinana	385207.0	6436035.2
Alcoa Kwinana	385106.3	6437416.8
Kwinana West	387135.5	6433992.4
Alcoa Kwinana	384675.5	6436238.8
BP Co-Gen	384756.6	6433121.7
BP Co-Gen	384635.5	6433724.6
Ti-West Co gen	384421.7	6433712.3
CS 10 Interconnect	385011.9	6433960.4
KJN Pipework	387273.8	6434005.3
KJN Pipework	387291.3	6434028.2
W LPG	387195.5	6434025.4
W LPG	387162.3	6434013.5
Alcoa Pinjarra	395943.4	6387054.6
Alcoa Pinjarra	401095.0	6387138.1
Alcoa Wagerup	398346.2	6356708.8
Alcoa Wagerup	390003.3	6358050.1
Worsley Lateral	386819.8	6334555.0
Worsley Lateral	413401.8	6321421.3
Bunbury	384106.5	6318615.3

Appendix B Environmental Aspects and Impacts Risk Register

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ID	EP Reference	ACTIVITY	ASPECT		IMPACT / CONSEQUENCE	<i>Inherent</i>			Physical Safeguards	Procedural Safeguards	<i>Residual</i>		
			Hazard	Source	Environmental Effect	CONSEQUENCE	LIKELIHOOD	RISK			CONSEQUENCE	LIKELIHOOD	RISK
1		Waste Disposal: Domestic waste	Leachate; Solid Domestic Waste; Liquid Domestic Waste; CO <sub>2</sub>	Inadequate management of domestic waste generated on site.	Odour, Pests, Aesthetics/Visual, Attracts feral animals, Hazard to livestock	3. Severe	D. Occasional	Intermediate	Covered skip bins Designated waste management area	Licensed rubbish removal	1. Trivial	C. Unlikely	Negligible
2		Waste Disposal: Sewage and Grey water to on-site septic tank or BioMax WWTP; treatment prior to disposal onsite	Sewage	Inadequate containment of sewage	Soil, groundwater and/or surface water contamination, Increase in nutrient levels entering natural water systems	2. Minor	D. Occasional	Low		Adequate containment volume, Septic pump out as required by licensed contractor. BioMax maintenance and high level alarm. Onsite treatment and disposal monitoring (i.e. irrigation)	1. Trivial	C. Unlikely	Negligible
3		Waste disposal: RO by-product	Salt	Discharge of saline by product of RO to ground	Creating saline ground, vegetation death, contributing to salinity of shallow groundwater, impacting offsite groundwater users.	3. Severe	D. Occasional	Intermediate		Minimise our need to produce water on site. Import water for compressor wash. Characterise receiving environment to ensure negligible likelihood of offsite migration of impacts (if any). Localised containment of saline discharge. Appropriate disposal based on site specific risk assessment outcome.	1. Trivial	C. Unlikely	Negligible
4		Waste Oil storage (underground)	Waste Oil	Leaching of oil through storage tank walls or floor. Spill during transfer to/from tank.	Soil, groundwater and/or surface water contamination	4. Major	D. Occasional	High	Located away from surface water	Adequate storage (double skin) and / or bunding (AS1940), Spill contingency procedures, Standard handling and safety procedures, Monitoring (where warranted) of soil adjacent to UST, Monitoring of groundwater quality at relevant locations. High level alarms - monthly inspections.	2. Minor	B. Remote	Negligible
5		Fuel / Oil storage	Oil spill	Inadequate containment of failed tank	Soil, groundwater and/or surface water contamination	3. Severe	E. Frequent	High		Adequate storage (double skin) and / or bunding (AS1940), Spill contingency procedures, Standard handling and safety procedures, Monitoring (where warranted) of soil adjacent to UST, Monitoring of groundwater quality at relevant locations. High level alarms - monthly inspections. Validate waste storage is sufficient to contain entire contents of tank.	2. Minor	B. Remote	Negligible

6		Waste Oil Storage (Above ground)	Waste Oil	Inadequate bund capacity or leaching of oil through bund walls or floor	Soil, groundwater and/or surface water contamination	3. Severe	C. Unlikely	Intermediate	Double skin tanks	Spill contingency procedures, Standard handling and safety procedures, reduce the quantity & period of oil storage. High level alarms - monthly inspections. 5 yrly tank monitoring. Adequate bunding (AS1940),	2. Minor	C. Unlikely	Low
7		Waste Oil sump	Waste Oil	Failure of pump out system leading to overflow	Soil, groundwater and/or surface water contamination	2. Minor	C. Unlikely	Low	Design of sumps over large for planned quantity	Monthly inspections.	2. Minor	B. Remote	Negligible
8		Transfer by vacuum truck	Waste Oil	Spill during transfer from tank	Soil, groundwater and/or surface water contamination	2. Minor	D. Occasional	Low	Tank design	Use of drip trays, licenced removalist, spill kits	1. Trivial	C. Unlikely	Negligible
9		GEA at MLV sites	Waste Oil	Spillage of oil during filter change	Soil, groundwater and/or surface water contamination	2. Minor	D. Occasional	Low		Self-contained bunding in building.	1. Trivial	C. Unlikely	Negligible
10		Hazardous waste disposal	Hazardous Waste including lead acid batteries, Asbestos, Oily filters, Oil soaked coalescer	Inappropriate disposal of hazardous waste	Soil, groundwater and/or surface water contamination	2. Minor	E. Frequent	Intermediate		Standard handling and safety procedures, use of licenced waste disposal contractors.	1. Trivial	C. Unlikely	Negligible
11		Weed control	Herbicide	Overspray	Damage to native vegetation, damage to agricultural crops, Soil, groundwater and / or surface water contamination.	4. Major	C. Unlikely	High		Use of approved herbicides, Use correct application procedure and equipment. Register of land owners specific requirements in GIS. Review weed management processes on corridor.	1. Trivial	C. Unlikely	Negligible
12		Weed control	Herbicide	Spillage	Soil, groundwater and/or surface water contamination	2. Minor	C. Unlikely	Low		Use of approved herbicides and, Use correct application procedure and equipment. Register of land owners specific requirements in GIS. Review weed management processes on corridor.	1. Trivial	C. Unlikely	Negligible
13		Venting Purging (e.g. automatic valve operations pressure relief valves compressor casing compressor station start-up/shut down)	Methane CO <sub>2</sub>	Venting, Purging, (Controlled release of gases)	Increase in greenhouse gas emissions, Decrease in local air quality.	3. Severe	E. Frequent	High		Normal operational management (pressure management), minimise starts and stops.	1. Trivial	E. Frequent	Low
14		General operations and venting (pigging)	Noise	Noise	Increase in noise levels at residential locations	3. Severe	E. Frequent	High		Standard maintenance procedures (AMP), appropriate equipment	1. Trivial	E. Frequent	Low

15		Flaring of odourised gas	Smell	Smell	Residential complaints of odour.	4. Major	C. Unlikely	High		Standard operating procedures (AMP), manned operation.	2. Minor	B. Remote	Negligible
16		Failure of relief valve	Methane	Uncontrolled release, noise	Increase in greenhouse gas emissions and noise disturbance. Decrease in local air quality.	4. Major	C. Unlikely	High		Standard maintenance procedures (AMP), alarms for all significant PRV	2. Minor	C. Unlikely	Low
17		General Compressor Operation	Air pollution	Exhaust emissions	Increase in greenhouse gas emissions, Decrease in local air quality	2. Minor	E. Frequent	Intermediate		Adhere to licence conditions, standard maintenance procedures (AMP)	1. Trivial	E. Frequent	Low
18		General Compressor Operation	Air pollution	Excessive Fuel Consumption as a result of inefficient configuration/operation	Increase in greenhouse gas emissions, Decrease in local air quality	2. Minor	E. Frequent	Intermediate		Standard operating procedures (AMP), pipeline efficiency modelling.	1. Trivial	D. Occasional	Low
19		Major Maintenance (Venting)	Methane, noise	Venting major pipeline section for repairs of third party damage	Increase in greenhouse gas emissions, Decrease in local air quality	3. Severe	D. Occasional	Intermediate		Standard operating procedures (AMP), manned operation.	2. Minor	C. Unlikely	Low
20		Draining cooling systems, water bath heaters, radiators etc.	Chemically treated water	Inadequate containment of drained material	Soil, groundwater and/or surface water contamination	2. Minor	C. Unlikely	Low	Design specifications	Standard handling and disposal procedures (S-PRO-016 Hazardous Materials Handling and Storage Procedure).	1. Trivial	B. Remote	Negligible
21		Storage of Hazardous materials / Dangerous Goods e.g. chemicals hydrocarbons, aviation fuel	Oil, chemical, or aviation fuel	Spill of oil, chemical, or aviation fuel	Soil, groundwater and/or surface water contamination. Loss of vegetation / crops. Detrimental effect on native fauna and livestock, odour, Increased risk of fire.	3. Severe	D. Occasional	Intermediate	Bunding	Adequate containment and bunding (AS1940), spill contingency procedures, standard handling and safety procedures (S-PRO-016 Hazardous Materials Handling and Storage Procedure)., minimise quantities of oil and hazardous materials stored.	1. Trivial	C. Unlikely	Negligible
22		Injection and handling of Odorant e.g. Mercaptan	Odorant	Spill of odorant	Soil, groundwater and/or surface water contamination. Loss of vegetation / crops. Detrimental effect on native fauna and livestock, odour, Increased risk of fire, Public alarm and complaints	4. Major	E. Frequent	Extreme	Bunding	Adequate containment and bunding (AS1940), spill contingency procedures , standard handling and safety procedures (S-PRO-016 Hazardous Materials Handling and Storage Procedure)..	1. Trivial	D. Occasional	Low

23		Transport and handling of Hazardous material / Dangerous Goods e.g. chemicals hydrocarbons, aviation fuel, radioactive sources	Oil, chemical, or aviation fuel	Spill of oil, chemical, or aviation fuel	Soil, groundwater and/or surface water contamination. Loss of vegetation / crops. Detrimental effect on native fauna and livestock, Odour, Increased risk of fire.	2. Minor	C. Unlikely	Low	Vessel design and specifications	Adequate Transport equipment, spill contingency procedures, standard handling and safety procedures (S-PRO-016 Hazardous Materials Handling and Storage Procedure)., Use of competent contractors and staff. Licenced Dangerous Goods Transport - where required.	2. Minor	B. Remote	Negligible
24		Transport of Odourant e.g. Mercaptan (WA Only)	Odorant	Major spill of odorant	Soil, groundwater and/or surface water contamination. Loss of vegetation / crops. Detrimental effect on native fauna and livestock.	3. Severe	C. Unlikely	Intermediate	Vessel design and specifications	Adequate Transport equipment, Licenced Dangerous Goods Transport, spill contingency procedures, standard handling and safety procedures (S-PRO-016 Hazardous Materials Handling and Storage Procedure)..	3. Severe	A. Hypothetical	Negligible
25		Airstrip maintenance	Grader	Vegetation clearance and grading	Loss of vegetation / habitat. Disturbance of native vegetation, Soil erosion and sedimentation	2. Minor	D. Occasional	Low		Maintain and inspect strip as required.	1. Trivial	B. Remote	Negligible
26		Use of airstrip	Aircraft	Impact through taxi, take-off and landing	Loss of vegetation / habitat. Disturbance of native vegetation, Soil erosion and sedimentation	2. Minor	C. Unlikely	Low		Only use air strip in priority response. Medivacs, etc. Only CS5 for crew changes.	1. Trivial	B. Remote	Negligible
27		Pigging	Waste Material from inside pipeline	Waste material is not contained, is spilled or is incorrectly disposed of	Soil, groundwater and/or surface water contamination	2. Minor	E. Frequent	Intermediate		Adequate facilities, define waste disposal method (E-PRO-015 Waste Management Procedure), standard maintenance procedures (AMP)	1. Trivial	B. Remote	Negligible
28		Filter changes	Oil and Gas Filter	Waste oil and filter is not contained, is spilled or is incorrectly disposed of.	Soil, groundwater and/or surface water contamination	2. Minor	E. Frequent	Intermediate		Adequate facilities, define waste disposal method, standard maintenance procedures	1. Trivial	B. Remote	Negligible
29		Construction and use of water bores	Abstraction	Use of groundwater for compressor station operations	Decrease in ground water level, Decrease in ground water available to other landowners	3. Severe	E. Frequent	High		Obtain permit and adhere to conditions, identify and implement water use minimisation measures.	1. Trivial	B. Remote	Negligible
30		Failure of pipeline	Methane	Unplanned release of methane	Increase in greenhouse gas emissions,	3. Severe	C. Unlikely	Intermediate		Standard maintenance procedures, monitoring and auditing of pipeline, emergency response	2. Minor	A. Hypothetical	Negligible

					Decrease in local air quality.								
31		Pipeline maintenance resulting in release e.g. Filter Change	Methane	Release of Methane	Increase in greenhouse gas emissions, Decrease in local air quality.	2. Minor	E. Frequent	Intermediate		Standard maintenance procedures (AMP)	1. Trivial	E. Frequent	Low
32		Cathodic Protection Deep well anode drilling	Drilling - soil contamination	Soil and Ground Water table pollution	Cross contamination of water table.	3. Severe	C. Unlikely	Intermediate		Standard design procedures (Basis of Design), appropriate assessment prior to installation	1. Trivial	B. Remote	Negligible
33		Vehicle usage	Weed or pathogen infected soil	Soil build up on vehicle	Introduction or spread of dieback disease in native forests / remnant vegetation potentially reducing quality of the forest, causing species loss and / or loss of fauna habitat, Introduction or spread of weed species.	4. Major	E. Frequent	Extreme		Establish COE areas, record their location on GIS, and advertise their occurrence to staff. Wash down offsite prior to travel to COE area. Landholder liaison prior to visit, Use of buses instead of private vehicles for transport of large workgroups. Record dieback areas on GIS.	3. Severe	D. Occasional	Intermediate
34		Vehicle usage	Vehicle	Driving vehicle on corridor	Compaction of topsoil, Loss of vegetation cover. Formation of erosion channels, Sedimentation resulting in a decrease in water quality, Disturbance of native fauna and / or livestock. Decrease in depth of cover or exposure of pipeline.	2. Minor	D. Occasional	Low		Corridor not to be used as general thoroughfare When use cannot be avoided, standard operating procedures, landowner liaison, obtain permits as required. Consult GIS for specific sensitivities.	1. Trivial	D. Occasional	Low
35		Vehicle usage	Vehicle	Accidental collision with native fauna or livestock	Death or injury of animal, Decrease in depth of cover or exposure of pipeline.	2. Minor	E. Frequent	Intermediate		Driver training, avoid driving at dusk and dawn	1. Trivial	E. Frequent	Low
36		Vehicle usage	Access /Interference	Gates left open	Escape of livestock and entry of other animal species.	2. Minor	D. Occasional	Low		Minimise stock crossing points Landholder liaison prior to visit Driver training	1. Trivial	D. Occasional	Low
37		Pipeline maintenance - Slashing and clearing	Slasher / mulching	Slashing of non-target vegetation	Damage or loss of protected flora species or habitat areas. Soil erosion, Sedimentation resulting in a decrease in water quality.	3. Severe	D. Occasional	Intermediate		Environment Plan, Regular inspection and monitoring, Visually flag sensitive areas to be avoided, Landholder liaison. Application Purpose Permit for Native Vegetation. Restrict activity in waterways.	3. Severe	C. Unlikely	Intermediate

					Disturbance to unidentified aboriginal site.								
38		Pipeline excavation for inspection	Open excavation	Excavation left open overnight	Native fauna and or livestock fall into the excavation resulting in injury and death. Decrease in population of protected species.	2. Minor	D. Occasional	Low		Fence excavation in sensitive areas, Environment Plan, Identify potential sites, Continual liaison with landholders and include in all project aspects.	1. Trivial	D. Occasional	Low
39		Pipeline excavation for inspection	Degradation of top soil and impact flora	Machinery used for clearing and excavation	Scouring of water course bank, loss of species and habitat area.	3. Severe	D. Occasional	Intermediate		Adequate Separation of top Soil from spoil. Seeding and replanting where required and respread of vegetation.	2. Minor	C. Unlikely	Low
40		Pipeline excavation for inspection	Disturbance to Unearth cultural heritage artefacts or site	Machinery used for clearing and excavation	Disturbance of and / or damage to cultural heritage site or artefacts	3. Severe	C. Unlikely	Intermediate		Cultural Heritage Site listed on GIS - standard operating procedures, staff training and awareness.	2. Minor	B. Remote	Negligible
41		Pipeline excavation for inspection	Potentially acid forming soils at depth	Excavation through Acid Sulphate Soil and or contaminated sites	When exposed to air formation of sulphuric acid, Groundwater and / or surface water contamination, Damage to aquatic organisms and ecosystems, Corrosion of pipeline.	3. Severe	C. Unlikely	Intermediate		Operating Procedure Acid sulphate soils listed on GIS. Acid Sulphate Soil Management plan,	2. Minor	B. Remote	Negligible
42		Pipeline watercourse crossings	Erosion	Clearing of riparian vegetation	Scouring of water course bank, loss of species and habitat area. Disturbance within aboriginal site of ethnographic significance.	3. Severe	C. Unlikely	Intermediate		Don't clear / trim riparian zone unless essential - consider relocation of signs.	2. Minor	B. Remote	Negligible
43		Pipeline watercourse crossings	Vehicle	Vehicles drive through watercourse	Damage to watercourse banks and bed, Damage to riparian vegetation, introduction or spread of waterborne weeds	3. Severe	D. Occasional	Intermediate		Keep to designated roads	2. Minor	B. Remote	Negligible

44	Pipeline watercourse crossings	Erosion	Bank recontoured and restored post flood	Inadequate revegetation of riparian zone, Erosion of bank, Sedimentation resulting in a decrease in water quality, Decrease in depth of cover or exposure of pipeline, Loss of pipeline integrity, Cultural impacts	3. Severe	C. Unlikely	Intermediate	Regular patrol, particularly post cyclones	2. Minor	B. Remote	Negligible
45	Pipeline operation / maintenance grit blasting/painting	Noise, Grit, Paint, Thinners	Dust and Noise emission	Disturbance of native fauna and or livestock. Disturbance of landowner.	2. Minor	D. Occasional	Low	Use of wire brush technique, Adequate equipment, Enclose operations, Conduct operations during daylight hours, Standard Operating Procedures, Landholder liaison	1. Trivial	C. Unlikely	Negligible
46	Pipeline operation / maintenance grit blasting/painting	Grit, paint or thinners	Spill or overspray of grit, paint or thinners	Soil, groundwater and/or surface water contamination, loss of vegetation crops. Detrimental effect on native fauna and livestock.	2. Minor	D. Occasional	Low	Standard procedures, JHA (Job Hazardous Analysis), Training.	1. Trivial	C. Unlikely	Negligible
47	Pipeline borrow pits	Erosion	Inadequate restoration of borrow pit area, Inappropriate excavation of materials	Inadequate revegetation, cave in. Unstable ground, Soil Erosion, Changes to natural drainage. Aesthetics visual.	2. Minor	D. Occasional	Low	Keep pit size to a minimum Restoration procedures	1. Trivial	C. Unlikely	Negligible
48	Pipeline borrow pits	Changed land contours	Borrow pit fills with water	Habitat suitable for mosquito breeding	3. Severe	C. Unlikely	Intermediate	Appropriately shaped pits, with external bunding to avoid filling with water. Use of existing borrow pits. Landowner Liaison, use of local pits to avoid importation of weeds and pathogens.	1. Trivial	C. Unlikely	Negligible
49	Corridor Maintenance	Access /Interference	Third party access	Dumping of rubbish, excavation, Reduction of integrity of pipeline. Damage to pipeline, Erosion water, soil, etc. Contamination of soil and water etc.	4. Major	E. Frequent	Extreme	Discourage access, dirt mounds, locked gates, Signage in accordance with AS2885, Education of landholders, contractors, third parties, etc. Surveillance in accordance with AS2885	1. Trivial	E. Frequent	Low
50	Waste incineration, including odorant waste	Atmospheric contaminants	Combustion emissions	Reduced air quality	3. Severe	D. Occasional	Intermediate	Validation and verification monitoring, emission standards, incineration	2. Minor	C. Unlikely	Low

									register, standard operating procedure, quarterly reporting				
51		Construction Planning	Pre planning	Construction	Disturbance to infrastructure, nearby residents and land use activities. Increase public risk from site of project.	4. Major	C. Unlikely	High		Engage in early consultation with land users regarding proposed works Identify and obtain all necessary approvals	2. Minor	C. Unlikely	Low
52		ESA impacts	Activities associated with Environmentally Sensitive Areas	Clearing of vegetation	Clearing of vegetation and flora in environmentally sensitive areas.	3. Severe	C. Unlikely	Intermediate		Minimise clearing footprint Avoid ESAs where possible Obtain approvals where required	2. Minor	B. Remote	Negligible
53		Clearing	Clear and Grade	Clearing of vegetation	Impacts on vegetation and flora Disturbance to declared rare flora (DRF) Impacts on fauna Spreading of weeds to detriment of native vegetation Impacts on watercourses, wetlands, ground or surface water Spread of dieback to detriment of native vegetation Cultural Heritage disturbance Noise Dust generation	4. Major	C. Unlikely	High		Native Vegetation Clearing Procedure ACV process Minimise clearing footprint Maintain GIS database Conduct pre-clearing checks Obtain approvals as required Where possible, avoid disturbance to trees with large hollows Brush down soil material prior to entry to COE areas Manage water abstraction and discharge through monitoring and treatment Avoid construction near surface waters and wetlands where possible Maintain within DBNGP or gain cultural heritage approvals as required Stop work and create buffer zones if cultural material found Use and maintain proper equipment Trained and competent operators Plan to avoid noisy work during sensitive times or close to sensitive receptors Minimise earthworks in windy conditions Use water spray or other suppressants to manage dust.	3. Severe	B. Remote	Low

54	Construction	Trenching and Excavation (incl dewatering)	Trenching excavation and	Alteration to hydrological regimes (surface drainage) and sedimentation. Soil erosion Fauna impacts (death / injury by falling into excavation or by trenching) Damage to other land uses Disturbance to ASS Cultural Heritage disturbance	3. Severe	C. Unlikely	Intermediate	Pipeline design (including depth) and route	Fauna Interaction Procedure Fauna handlers prior to any clearing Daily fauna inspections of trench and excavations Fauna inspection prior to lowering in and backfill Soil stockpiles segregate topsoil and subsoil and vegetation stockpiled separately Soil stockpiles inspected for erosion and controls applied as required ASSMP implemented as required ACV reviews cultural heritage impacts Notification to other stakeholders / service providers ESCP implemented if required Dewatering managed to minimise erosion as per DWER guidelines Dewatering volumes measured Dewatering process inspected every two hours while in operation	2. Minor	B. Remote	Negligible
55	Construction	Drilling/boring	HDD boring or drilling for anodes / foundations	Soil erosion. Sedimentation Disturbance to ASS Contamination of surface and/or ground water Noise	3. Severe	C. Unlikely	Intermediate	Pipeline design (including depth) and route	ESCP implemented if required Erosion controls and monitoring of mud collection areas Approvals for any hazardous chemicals in place prior to use Management of mud pits Managed to avoid any frack out of water ASSMP implemented if required Daily fauna inspections of mud pits Stockpiles segregated and separated as required under Native Vegetation Clearing Procedure	1. Trivial	D. Occasional	Low
56	Bushfire	Stringing, bending and welding	Hot work, ignition source use	Potential to cause fire that will impact on flora, fauna and other land uses.	4. Major	D. Occasional	High	Spark arrestors, diesel fuel vehicles	Native Vegetation Clearing Procedure No hot works next to or on vegetation Knowledge of local fire bans and inclusion of risk in JHA Fire equipment as required Emergency Response Plan	3. Severe	B. Remote	Low

57	Chemical use in testing phases	Testing and Commissioning	Abrasives, corrosives and cleaning and paint products	Erosion Contamination of local environment	3. Severe	C. Unlikely	Intermediate	Avoid chemical use in hydrotesting where possible	Water testing Approved chemicals only to be used in hydrotesting Management for collection of waste prior to disposal NATA accredited lab for water testing Biodegradable chemicals if possible Reuse of water for other sections if possible Erosion controls in place for any onsite disposal Waste products disposed of licensed contractor Hazardous waste managed as per Hazardous Materials Storage and Handling Procedure	2. Minor	B. Remote	Negligible
58	Trench backfill Pipe installation	Lowering-in, padding and backfilling	Pipeline construction	Trapping of fauna in trench. Dust	2. Minor	E. Frequent	Intermediate		Inspections prior to backfill, trained and licensed fauna handlers Minimise open trench time Where possible do not leave open over night Capping of open pipes Inspection of pipes prior to lowering in Dust suppression	2. Minor	B. Remote	Negligible
59	Rehabilitation	Lack of clean-up and poor rehabilitation success	Post construction	Lack of vegetation can lead to erosion, Sedimentation, Visual amenity and alterations in hydrological regimes. Disturbance to existing vegetation and fauna habitat. Dust	3. Severe	C. Unlikely	Intermediate		Maintenance of drainage lines and culverts/drains as required for projects and DBP access roads and tracks Monitoring of rehabilitation success Signage of rehabilitation areas Induction Dust suppression	2. Minor	B. Remote	Negligible
60	Hot works and vehicle use	Vehicle Use Hot works Ignition sources	Vehicle use and access to sites, hot works	Destruction to native vegetation Bushfire Fauna death / injury	3. Severe	C. Unlikely	Intermediate	Vehicle specifications	Do not drive over vegetation, stick to access tracks Maintenance of access tracks No hot works adjacent or on vegetation Firebreaks at facility compounds	3. Severe	B. Remote	Low
61	Water use	Groundwater abstraction	Water needs for project including dust suppression and construction water	Hydrological changes Groundwater drawdown Impact to groundwater dependent ecosystems, Impact to other groundwater users.	3. Severe	D. Occasional	Intermediate	Abstraction monitoring	Monitoring of water abstraction to license conditions GWL / SWL in place Consultation with local landholders / pastoral leases No abstraction without permit in place	2. Minor	C. Unlikely	Low