



**Dampier Bunbury
Pipeline**

**DAMPIER TO
BUNBURY
NATURAL GAS
PIPELINE**

**ENVIRONMENT PLAN
REVISION 9
E-PLN-000**

***PUBLIC SUMMARY
DOCUMENT***

DOCUMENT CONTROL

Rev	Date	Description
0	07/07/20	Document created for the DBNGP EP Revision 8

	Title
Author	Senior HSE Advisor
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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 9 (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, 101 and 123. 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.

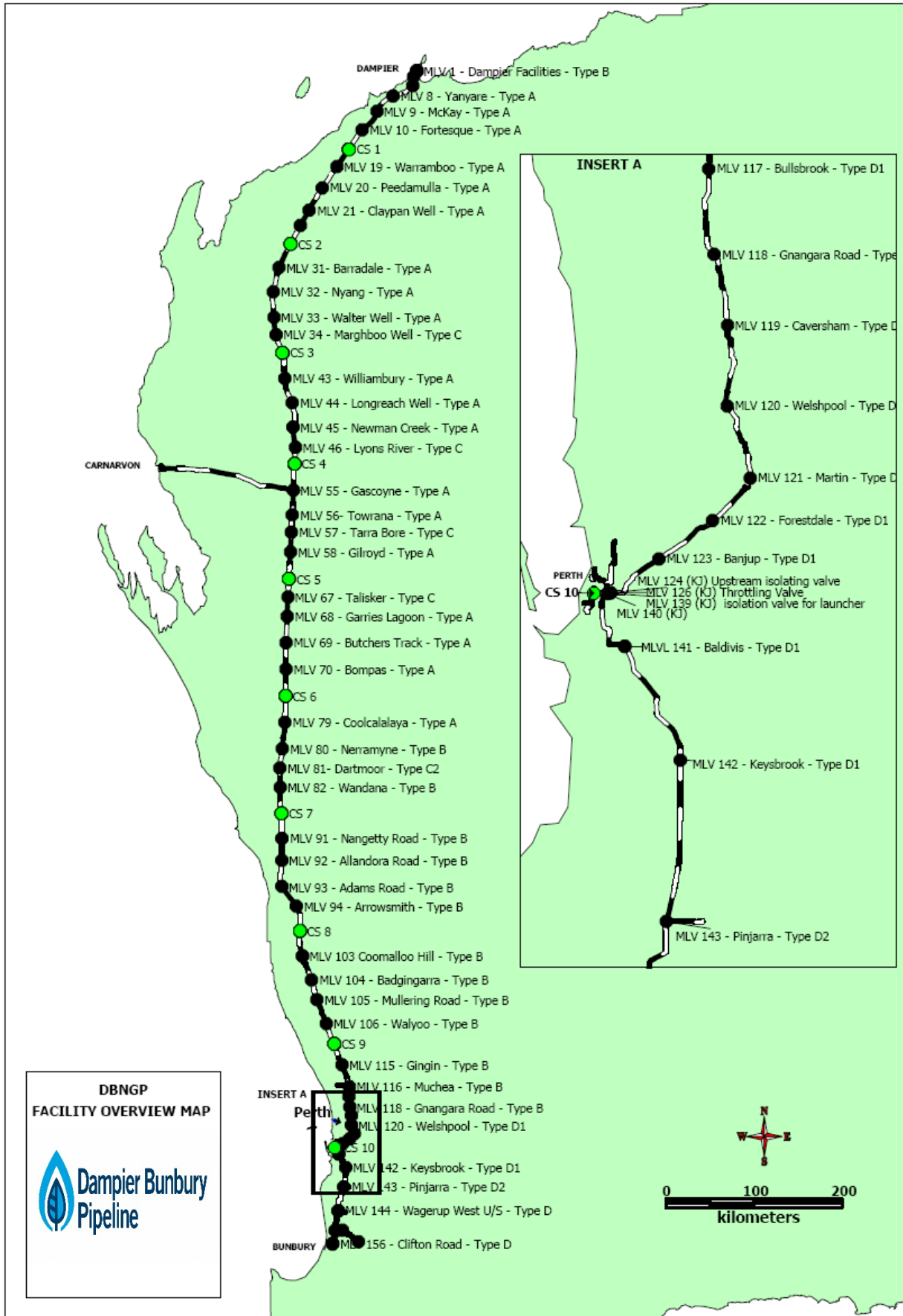


Figure 1 Overview of the DBNGP

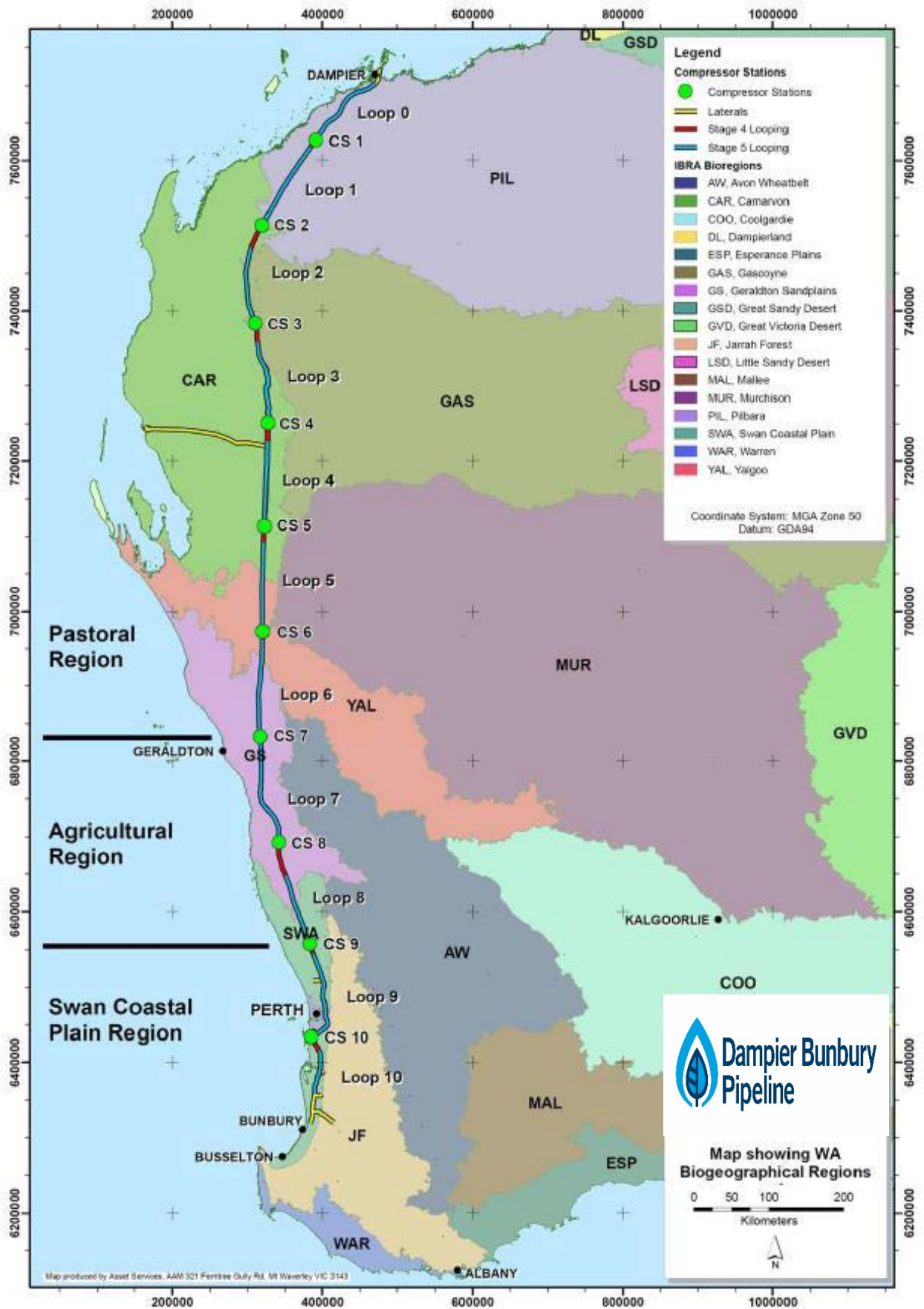


Figure 2 Biogeographical regions traversed by the DBNGP

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 292.4 mm (BOM 2020).

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). A NatureMap (DBCA) review was also conducted in 2020 with the combined list of species 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
- Ruddy Turnstone
- Lesser Sand Plover
- Broad-billed Sandpiper
- Bar-tailed Godwit
- Eastern Curlew
- 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
- Whimbrel
- Osprey
- Grey Plover
- Little Tern
- Crested Tern
- Terek Sandpiper
- 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
- Sanderling
- Red Knot
- Great Knot
- Long-toed Stint
- Greater Sand Plover
- Grey-tailed Tatter
- Common Greys Shank

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

- Maitland River
- Melford Creek
- Yanyare River
- Devils Creek
- Du Boulay Creek
- Peter's Creek
- Robe River North
- Robe River South
- Warramboe Creek
- Peedamulla Creek
- Fortescue River
- Trevarton Creek
- Cane River
- 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
- Minilya 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 cinnamomi*) 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> subsp <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).

The Wellesley Meter Station crosses a vegetation community of *Banksia* sp shrublands (W1) however does not support a species-rich native understorey, rather weed species dominate and form a contiguous layer (ELA, 2018).

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
- Black Bittern
- Great Egret
- Australasian Bittern
- Rufous Fieldwren
- Common Greenshank
- White-browed Babbler

- 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
- Chuditch
- Lined Skink
- Shield-backed Spider
- Short-tongued Bee
- 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
- White-winged Black Tern
- Western Corella
- Forest red-tailed Black Cockatoo
- Australian Lesser Noddy
- Wood Sandpiper
- Crested Bellbird
- Common Sandpiper
- Brush-tailed Phascogale
- Red-necked Stint
- Quenda
- Sharp-tailed Sandpiper
- Brush Wallaby
- Rainbow Bee-eater
- Western Ringtail Possum
- Southern Giant Petrel
- Blue-billed Duck
- Graceful Sunmoth
- Created Tern

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

- Caren Caren Brook
- Moore River
- Red Gully
- Gingin Brook
- Swan River
- Helena River
- Murray River
- Harvey River
- Canning River
- Serpentine River
- North Dandalup 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 *A Class State Forest*
- Leda Nature Reserve *A Class Nature Reserve*
- 1943/161 *A Class Nature Reserve*
- Myalup State Forest *A Class State Forest*

Additionally the Southern Loop Worsley 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. Pluto Meter Station also includes a small single compressor unit.

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, BEP Interconnect, MLV7 Interconnect, Maitland (Devils Creek), CS1 (Quadrant Harriet Island), Gorgon, Macedon, Wheatstone (via DDG's Wheatstone Ashburton West Pipeline), Dongara (Mondarra Storage Facility – bidirectional), Dongara (Waitsia Inlet) 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. The Wellesley Meter Station will increase this to 55 (62 in total).
- Odourisation is undertaken at some of the Meter Stations depending on the customer requirements. Bulk odourisation to industrial standard is undertaken at the DBNGP WLPG 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

Potential Environmental Impact	Inherent Risk			Controls	Residual Risk		
	Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
Loss of viable topsoil or compaction: Over-handling, anaerobic conditions in large or long term stockpiles, loss due to wind or water erosion, compaction from vehicles, mixing with subsoil, loss of any potential seed bank, changes in soil chemistry.	Frequent	Severe	High	Native Vegetation Clearance Procedure controls including: <ul style="list-style-type: none"> • rehabilitation and reinstatement of non-operational areas • topsoil and subsoil are stockpiled separately • stockpiles <2m high • reinstatement of soil profile following excavation; • ripping of compacted subsoil before reinstating topsoil; and • Authorisation to Clear Vegetation (ACV) or an equivalent process is implemented Management of Erosion Risk Areas Procedure controls include:	Occasional	Minor	Low

				<ul style="list-style-type: none"> • sticking to existing tracks; • rehabilitation of non-operational areas; and • erosion controls implemented on stockpiles (where required) or discharge points 			
Erosion and sedimentation: loss of topsoil offsite from wind or runoff, increased impacts to drainage lines (increase in flow or velocity), sedimentation into drainage lines, water ponding	Occasional	Severe	Intermediate	<p>Induction</p> <p>Management of Erosion Risk Areas Procedure controls include:</p> <ul style="list-style-type: none"> • sticking to existing tracks; • the installation of erosion controls (where required) to prevent sedimentation to waterways; • conducting regular inspections of erosion controls (where implemented); and • completing any required repairs from erosion events. <p>Watercourse Crossing Procedure (E-PRO-017) controls include:</p> <ul style="list-style-type: none"> • Obtaining RiWi Act approval (Beds and Banks) and meet all license requirements; and • Ensuring banks are stabilised and inspected 	Remote	Minor	Negligible
Acid Sulphate soil impacts	Unlikely	Severe	Intermediate	<p>An ASS Management Plan (ASSMP) shall be prepared for any excavation in moderate to high risk soils where:</p> <ul style="list-style-type: none"> • Excavation is > 100 m³ • Dewatering will occur within 3 m of the natural soil surface <p>The ASSMP shall be prepared in accordance with the DWER Guideline – <i>Treatment and Management of soil and water in ASS landscapes (2015)</i>.</p> <p>An ASS Investigation shall be conducted in low to moderate risk soils where;</p> <ul style="list-style-type: none"> • Excavation is > 100 m³ • Dewatering will occur within 3 m of the natural soil surface • Works will occur within 500 m of wetlands <p>ASS investigations shall be conducted in accordance with <i>Identification and investigation of acid sulphate soils and acidic landscapes (DEC, 2013)</i>.</p> <p>Treatment of any volume of moderate to high risk ASS shall occur if the soil is exposed for:</p>	Remote	Minor	Negligible

				<ul style="list-style-type: none"> > 18 hours for sand to loamy sands; and > 70 hours for sandy loams to heavy clays. 			
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6.2. Flora

Potential Environmental Impact	Inherent Risk			Controls	Residual Risk		
	Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
Damage to native vegetation: includes clearing over required areas, clearing outside of approved areas, loss of vegetation through fire and poor rehabilitation	Unlikely	Major	High	Induction Native Vegetation Clearance Procedure controls including the: <ul style="list-style-type: none"> • Authorisation to Clear Vegetation (ACV) is implemented to minimise clearing impacts; • Compliance to regulatory approvals; • Minimisation of clearing including avoidance of ESA's where possible; • Delineation of approved area prior to clear and grade (pegging); <ul style="list-style-type: none"> • Separation of topsoil and subsoil stockpiles; and • Completion of hand pruning in riparian zone (unless mechanical means are essential). E-PRO-003 Management of Erosion Risk Areas Procedure controls include: <ul style="list-style-type: none"> • the minimisation of vehicle movements including sticking to established tracks; and • rehabilitation of non-operational areas (including signage) Authorisation to Clear Vegetation Process controls which include: <ul style="list-style-type: none"> • Environmental impact assessment of clearing; • Clear delineation of approved area of clearing; • Identification of regulatory approval for clearing; • Establishment of controls to manage impacts of clearing; • Documentation of records of actual clearing; and • Internal authorization by HSE Advisor 	Unlikely	Minor	Low
Biodiversity Conservation - Impact on DRF species or Threatened Ecological Communities (TEC's):	Frequent	Severe	High	Induction Native Vegetation Clearing Procedure including <ul style="list-style-type: none"> • Authorisation to Clear Vegetation (ACV) is implemented • Obtain any regulatory approvals prior to clearing 	Remote	Severe	Low

includes unapproved taking of flora				Minimise clearing – Adherence to the ten clearing principles			
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6.3. Weed and pathogens

Potential Environmental Impact	Inherent Risk			Controls	Residual Risk		
	Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
Introduction of weeds / pathogens (dieback) to a previously unaffected area.	Frequent	Severe	High	Induction Stick to existing tracks Operational area civils maintenance (erosion and vegetation management) Frequent visual inspections of vehicles and clean down as required Clean on Entry Procedure <ul style="list-style-type: none"> ▪ 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). Where possible, third party access is restricted through physical barriers or discouraged through signage.	Occasional	Minor	Low
Spread of existing weeds / pathogens if uncontrolled or through movement in area.	Frequent	Severe	High	Induction All fill is certified weed and seed free prior to use. Targeted weed management including: <ul style="list-style-type: none"> ▪ frequent and ongoing weed management; ▪ identification and management of Weeds of National Significance (WONS); ▪ documentation of weed management activities; ▪ landholder liaison on weed management activities; and ▪ keeping records of new or previously unreported weed areas. Rehabilitation and reinstatement of non-operational areas	Occasional	Minor	Low
Impact of herbicides on native vegetation or crops through overspray or poor techniques.	Occasional	Minor	Low	Targeted weed management within facilities (or fire breaks) including: <ul style="list-style-type: none"> ▪ the preferred use of hand spraying ▪ ensuring no overspray or product being sprayed offsite ▪ applying only approved herbicides; and 	Unlikely	Trivial	Negligible

			<ul style="list-style-type: none"> ensuring small tractor mounted spray units (or equivalent) are only used in consultation with landholder 			
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6.4. Bushfire

Potential Environmental Impact	Inherent Risk			Controls	Residual Risk		
	Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
Bushfire impacts including: Loss of flora Loss of fauna habitat Erosion Impacts to other locations / services / stakeholders	Occasional	Major	High	Abide by all Bushfire Regulations including total fire ban requirements. Fire-fighting equipment on all mobile plant and vehicles Designated smoking areas Daily checks on fire danger rating and fire bans included in daily pre-start (projects) All plant and equipment comply to fire safety standards Permit to Work and Hot Works Certificate including gas testing for hazardous areas as per the Hot Works procedure including: <ul style="list-style-type: none"> high gas risk areas are demarcated and signed; appropriate firefighting equipment is available at all times; selected personnel are trained in responding to fires; inductions include fire risks (hot works and smoking); and all non-approved items are kept away from hazardous areas 	Remote	Severe	Low

6.5. Fauna

Potential Environmental Impact	Inherent Risk			Controls	Residual Risk		
	Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
Damage to native vegetation fauna habitat including habitat trees and unauthorised clearing outside of approved areas.	Frequent	Severe	High	Stick to existing tracks Native Vegetation Clearance Procedure including: <ul style="list-style-type: none"> Authorisation to Clear Vegetation (ACV) or an equivalent process is implemented Delineation of approved area prior to clear and grade (pegging) Trim vegetation in riparian areas where possible Fauna Interaction Procedure:	Remote	Severe	Low

				<ul style="list-style-type: none"> Minimise clearing of habitat trees Inspection of habitat trees prior to felling Trained personnel to handle fauna (where practicable) 			
<p>Damage to fauna (direct) through vehicle impacts, falling and stuck within trench, predation within trench or post relocation.</p> <p>Fauna in pipe strings</p>	Frequent	Minor	Intermediate	<p>Fauna Interaction Procedure including:</p> <ul style="list-style-type: none"> Speed limits (80km/h unsealed roads) Reduce speeds / minimise travel in dawn and dusk periods No clearing outside of authorised clearing areas Stick to existing tracks Fauna interaction controls (minimise handling, release ASAP to safe location, report all handling events) Selected trained personnel in fauna handling <p>Trench Management controls are implemented including:</p> <ul style="list-style-type: none"> completion of daily trench inspections within 3 hours of sunrise installation of fauna egress from excavations or trenches (i.e. exit ramps every 500m of trench at a minimum) inspection of pipework for fauna prior to welding, including use of caps for pipe sections; installation of fauna shelters every 100m if trench is >500m in length; and completion of a fauna inspection within 30mins prior to lowering in/backfill operations commencing <p>Facility HSE Inspections</p> <p>Ensure gates are left in position found</p>	Frequent	Trivial	Low

6.6. Cultural Heritage and Stakeholder Engagement

Potential Environmental Impact	Inherent Risk			Controls	Residual Risk		
	Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
Impacts to known or unrecorded Aboriginal Heritage Sites:	Occasional	Severe	Intermediate	<p>The induction sets out AH Act controls (includes all DDG personnel)</p> <p>Native Vegetation Clearance Procedure includes checks by a competent person to:</p> <ul style="list-style-type: none"> review the proposed location of clearing and conduct cultural impact assessment; identify sites via the GIS system; 	Remote	Severe	Low

				<ul style="list-style-type: none"> obtain any approvals required to ensure compliance to all relevant laws; and establish any conditions necessary in order to avoid or minimise cultural impact. 			
				Stick to existing tracks			
Includes impact from dust, vibration, trampling or inadvertent impact from clearing equipment or vehicle movements	Occasional	Minor	Low	Stick to existing tracks Leave gates as you found them Dust suppression applied when needed Annual landholder communication / consultation program including complaint response and early consultation for enhancement projects	Unlikely	Minor	Low
Impacts to other land users (including pastoral station owners) including clearing outside of approved areas, noise and use of gates etc.	Occasional	Severe	Intermediate	The DBNGP Asset Management Plan includes controls including regular land liaison, signage and pipeline markers and fenced compounds. Leave gates as you found them Native Vegetation Clearance Procedure Fauna Interaction Procedure and trench management controls Landholder notifications completed for specific activities. For example, notification to pastoral stations of aerial surveillance activities.	Unlikely	Trivial	Negligible

6.7. Air emissions including dust and noise

Potential Environmental Impact	Inherent Risk			Controls	Residual Risk		
	Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
Noise	Occasional	Trivial	Low	Compliance with Statutory requirements Project work times (no night works unless authorised through project risk assessment) Reduce pressure to as low as possible prior to venting (minimise noise) Standard design and operating procedures to minimise noise including mobile plant and blasting	Remote	Trivial	Negligible
Dust – impacts offsite to:	Frequent	Minor	Intermediate	Reduced speed limits on unsealed roads and right of way	Occasional	Trivial	Low

Stakeholders, visual amenity and coverage of flora				<p>Minimise time between clear and grade (stripping) and backfill / reinstatement</p> <p>SWMS / JHA to identify dust risk at time of activity and apply controls (i.e. water cart/truck)</p> <p>Minimise grit blasting through other techniques (wire brush) where possible. Install enclosures and containment of overspray particles.</p> <p>Rehabilitation of non-operational areas</p>			
Gas emissions	Unlikely	Major	High	<p>Facility design meets required standards as per Asset Management Plan and includes alarms of pressure relief valves.</p> <p>Gas only introduced post leak testing or pre-commissioning tasks for enhancement works</p> <p>Ongoing maintenance including leak testing as per Asset Management Plan and Safety Case</p> <p>Vehicle maintenance</p> <p>SCADA online real time monitoring of pipeline (accidental release) and emergency response plans, design of pipeline</p>	Unlikely	Minor	Low
Odorant emissions	Frequent	Severe	High	<p>Spill contingency plans and specialized equipment for odorant spills</p> <p>Emergency Response for Odorant Spill procedure</p> <p>Trained and competent personnel</p> <p>Closed system design for odorant transfer and injection</p> <p>Waste incineration location away from sensitive receptors including monitoring and register of use</p> <p>Licensed Dangerous Goods drivers and transport – Odorant transfer</p>	Occasional	Trivial	Low

6.8. Surface and Ground Water

Potential Environmental Impact	Inherent Risk			Controls	Residual Risk		
	Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
Impacts to surface water flow patterns:	Occasional	Severe	Intermediate	<p>Watercourse Crossing Procedure controls including:</p> <ul style="list-style-type: none"> all approvals are in place prior to any impact to beds and banks; 	Unlikely	Minor	Low

including diversion of flow, sedimentation, damming of flow, increased water pooling, turbidity and velocity of water changes			Intermediate	<ul style="list-style-type: none"> water crossings are maintained in a stable condition; and erosion controls are installed where required and inspected. <p>Management of Erosion Risk Areas procedure Designated crossing points to be used at all times Native Vegetation Clearance Procedure (ACV process) Aerial Surveillance including post cyclone events Dewatering managed as per guidelines or license (permit) including volume control, duration and erosion controls. Water disposal (e.g. hydrotest water) is controlled to manage erosion, quality and duration. Only approved chemicals to be used in hydrotesting.</p>			Low
Water quality decrease (pollution / contamination)	Unlikely	Severe	Intermediate	Waste water management including leach drain and RO system maintenance Hazardous Materials Handling and Storage Procedure (S-PRO-016) Avoid hazardous materials handling within 100 m from watercourses (blasting, refueling, decanting etc.).	Remote	Minor	Low
Water quantity decrease (over abstraction impacting local land users or vegetation)	Frequent	Severe	High	Water flow monitoring installed on all active bores Compliance to water abstraction license requirements including volume Minimise water use Maintenance of plant and equipment to eliminate leaks or repair once identified Dewatering managed as per guidelines or license (permit) to ensure volume controls in place.	Remote	Trivial	Negligible

6.9. Hazardous Materials Storage and Handling and Spill response

Potential Environmental Impact	Inherent Risk			Controls	Residual Risk		
	Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
Soil contamination from hydrocarbons or chemicals	Occasional	Severe	Intermediate	Minimise amount of chemicals stored onsite S-PRO-016 Hazardous Materials Storage and Handling Procedure includes the following controls: <ul style="list-style-type: none"> SDS available onsite 	Unlikely	Minor	Low

				<ul style="list-style-type: none"> • Chemical Register available onsite • Spill kits in heavy vehicles and at all storage locations • Licensed DG transport personnel and contractors (includes waste contractor) • Use of drip trays during refueling / vacuum removal from tanks • Self bunded / contained storage vessels in line with AS1940 (including alarms where possible) • Bunding/self-containment of fixed plant and equipment (i.e. generators) • Signage • ChemAlert subscription including risk assessment, maximum storage volumes and approval process • Facility HSE Inspections <p>E-PRO-016 Oil Spill Response procedure sets out the:</p> <ul style="list-style-type: none"> • Response to spills, the 3C approach – control, contain, cleanup; and • Escalation requirements for emergency level spills <p>Onsite storage is located > 100 m away from surface watercourses</p> <p>E-PRO-015 Waste Management Procedure sets out the controls for waste onsite and the disposal process including the:</p> <ul style="list-style-type: none"> • Licensing of waste contractor; • Segregation of waste streams including hydrocarbon waste and batteries; • Collection of all pigging waste in sealed containers; and • Bunding or containment of liquid wastes 			
Groundwater contamination	Occasional	Major	High	<p>S-PRO-016 (as above) and:</p> <ul style="list-style-type: none"> • Tanks meets AS1940 requirements; • Minimise storage onsite; and • Alarms on waste oil storage units (above ground) <p>Frequent removal of waste product to minimise waste hydrocarbon storage time onsite (Vacuum truck)</p> <p>Bund valves locked in closed position (default position)</p> <p>Asset Management Plan requires five year assessment of soils adjacent to underground petroleum storage tanks</p> <p>Monthly inspections of waste oil sumps and tanks</p>	Unlikely	Minor	Low

6.10.Waste management

Potential Environmental Impact	Inherent Risk			Controls	Residual Risk		
	Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
Soil, groundwater or surface water contamination Odour (including associated public complaints)	Occasional	Minor	Low	The DBP Induction includes waste management requirements Facility HSE Inspections / Project Inspections E-PRO-015 Waste Management Procedure controls including the: <ul style="list-style-type: none"> ▪ Segregation of waste streams where possible; ▪ Removal of waste by a licensed contractor to a licensed waste facility; ▪ Covering over skip bins (except scrap metal) to prevent fauna interaction / birds; ▪ Hydrocarbon / liquid waste facilities are banded or contained to prevent spills; ▪ Minimisation of wastes where possible (reduce, reuse); ▪ Labelling of all bins; and ▪ Frequent waste contractor removal of wastes to prevent build up Pigging waste shall be collected over secondary containment (groundsheet/tray) and kept in a sealed container Management of any discharge of water to land Aerial Surveillance and road patrols identify third party waste in the pipeline corridor Waste incineration only at a single approved locations (Compressor Station 9) and only for odorant waste	Remote	Minor	Negligible

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 or 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

ID	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 ₂	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 licenced 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	C. Unlikely	Low
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, periodic 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	4. Major	C. Unlikely	High		Use of approved herbicides, Use correct application procedure and equipment. Register of land owners specific requirements in LMS. Targeted weed management	1. Trivial	C. Unlikely	Negligible
12	Weed control	Herbicide	Spillage	Soil contamination	2. Minor	C. Unlikely	Low		Use of approved herbicides and, Use correct application procedure and equipment. Register of land owners specific requirements in LMS. 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 ₂	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. 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 contamination. Loss of vegetation / crops. Detrimental effect on native fauna and livestock, odour, 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). Trained personnel	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. 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	Odorant	Major spill of odorant	Odour. Soil, groundwater and/or surface water contamination.	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	Native Vegetation	Impact from maintenance – clearing covered under #53	NCC								
26	Use of airstrip	Aircraft	Impact through taxi, take-off and landing	NCC								
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 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, Decrease in local air quality.	3. Severe	C. Unlikely	Intermediate		Standard maintenance procedures, monitoring of pipeline, emergency response	2. Minor	A. Hypothetical	Negligible

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 Introduction or spread of weed species.	3. Severe	E. Frequent	High		COE Procedure. Landholder liaison prior to visit, Use of buses instead of private vehicles for transport of large workgroups. ACV process for clearing includes weed and dieback review. Stick to existing tracks	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, 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 – stick to existing track, landowner liaison if required.	1. Trivial	D. Occasional	Low
35	Vehicle usage	Vehicle	Accidental collision with native fauna or livestock	Death or injury of animal struck by vehicle	2. Minor	E. Frequent	Intermediate		Driver training, avoid driving at dusk and dawn if possible, speed limits	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 Gates in left in position found	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. Disturbance to known or unidentified aboriginal site.	3. Severe	D. Occasional	Intermediate		Environment Plan, Regular inspection and monitoring, Authorisation to Clear Vegetation (ACV), Landholder liaison. Clearing permit. Restrict/minimise activity in waterways.	3. Severe	C. Unlikely	Intermediate
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. Trench management controls	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.	3. Severe	D. Occasional	Intermediate		ACV, Top Soil and subsoil stockpiled separately. Rehabilitation of non-operational areas, Native Vegetation Clearance Procedure	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.	3. Severe	B. Remote	Low
41	Pipeline excavation for inspection	Potentially acid forming soils at depth Fill introduces weeds	Excavation through Acid Sulphate Soil	When exposed to air formation of sulphuric acid, Groundwater and / or surface water contamination, Damage to aquatic organisms and ecosystems, Corrosion of pipeline. Weeds	3. Severe	C. Unlikely	Intermediate		Assess potential ASS Impacts and if required investigate or develop an Acid Sulphate Soil Management Plan (ASSMP), Treatment in line with DWER guidelines Minimise exposure time to less than 18 hours where practicable. Fill certified weed and seed free	2. Minor	B. Remote	Negligible
42	Pipeline watercourse crossings	Erosion, Flora, Heritage	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. Stick to existing tracks	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		Stick to existing tracks	2. Minor	B. Remote	Negligible
44	Pipeline watercourse crossings	Erosion	Bank re-contoured 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.	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 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 contamination, Detrimental effect on native flora.	2. Minor	D. Occasional	Low		Standard procedures, JHA (Job Hazardous Analysis), capture of waste material (overspray) Training and competency of operators.	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, weeds, Changes to natural drainage. Aesthetics visual.	2. Minor	D. Occasional	Low	Erosion procedure Rehabilitation non-operational areas Stick to existing tracks Native Vegetation Procedure including stockpile management	1. Trivial	C. Unlikely	Negligible
48	Pipeline borrow pits	Changed land contours	Borrow pit fills with water	NCC							
49	Corridor Maintenance	Access /Interference	Third party access	NCC – outside of DBP control (environmentally) Safety Awareness completion – Third party approval process							
50	Waste incineration, including odorant waste	Atmospheric contaminants	Combustion emissions	Reduced air quality	3. Severe	D. Occasional	Intermediate	Emissions monitoring, emission standards, incineration register, standard operating procedure, quarterly reporting	2. Minor	C. Unlikely	Low
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 Vegetation maintenance	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 Inspection of habitat trees prior to felling Brush down soil material prior to entry to COE areas 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) Erosion, clearing, water diversion, fauna impacts ASS, Heritage	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 Trench Management Controls 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 Erosion Procedure 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	Erosion Procedure Erosion controls and monitoring of mud collection areas Approvals for any hazardous chemicals in place prior to use ASS investigation conducted 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	Hot works and vehicle movements Smoking	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 Gas testing PTW Designated smoking areas Fire response training for selected personnel Trained and competent operators	3. Severe	B. Remote	Low
57	Chemical use in testing phases (including disposal of hydrotest water)	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 or offsite 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. 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 to or on vegetation Hot Works Procedure Firebreaks at facility compounds Bushfire controls	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