Australian Gas Infrastructure Group

FORTESCUE RIVER GAS PIPELINE

ENVIRONMENT PLAN

Revision 4.1

PUBLIC SUMMARY DOCUMENT

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(E-PLN-012)

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Reviewed		
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Contents

1. Introduction

1.1. Background

The Fortescue River Gas Pipeline (FRGP) is an approximately 270 km buried natural gas pipeline, which transports natural gas from the Dampier to Bunbury Natural Gas Pipeline (DBNGP) to the Solomon Power Station (Figure 1-1). The Solomon Power Station is a 125 MW power station which supplies power to Fortescue Metals Group's Iron Ore Mine (the Solomon Hub) in the Pilbara region of Western Australia (WA). The FRGP connects to the DBNGP at Compressor Station 1 (CS1) via an Inlet Station and delivers gas to the Solomon Power Station through a Delivery Station.

The *Petroleum Pipeline (Environment) Regulations 2012* (PPE Regs) require the development and implementation of an Environment Plan (EP) to the satisfaction of the Department of Mines, Industry Regulation and Safety (DMIRS). The Fortescue River Gas Pipeline Environment Plan (FRGP EP) has been prepared to satisfy this requirement. The objective of this document is to provide a succinct and publically available summary of the DMIRS approved FRGP EP (Revision 4) as required under regulation 11(7) of the Regulations.

1.2. Proponent

The Fortescue River Gas Pipeline Joint Venture (FRGP JV), an unincorporated joint venture between DDG Fortescue River Pty Ltd (57%) and TEC Pilbara Pty Ltd (43%) owns the FRGP. DDG Fortescue River Pty Ltd is the manager of the joint venture and the license holder.

The FRGP JV contracts DDG Operations Pty Ltd (DDG) to operate and maintain the FRGP. As part of this arrangement, DDG rely on the services of DBNGP (WA) Nominees Pty Ltd (DBP), the owner of the DBNGP, for the provision of labour and equipment to undertake their business.

The DBP group of companies is part of the Australian Gas Infrastructure Group (AGIG), one of Australia's leading gas infrastructure companies, which comprises a number of gas distribution, transmission and other infrastructure businesses. DDG adopt all AGIG and DBP policies and procedures across the operation of its business.

Public enquiries regarding the FRGP may be directed to DDG via:

Attn: Land Manager
PO Box Z5267
Perth, St Georges Terrace WA 6831
Telephone +61 8 9223 4300
land.management@agig.com.au

1.3. Location

The FRGP is within the Pilbara region, ranging from the near coast to inland Western Australia (Figure 1-1). The FRGP is contained within a 30 m wide corridor, extending 270 km from the DBNGP to the Solomon Power Station (Licence Area). Co-ordinates of the pipeline are provided in Table 1-1.

Table 1-1 FRGP Co-ordinates (GDA 94 Zone 50)

Kilometre Point (KP)	Easting	Northing
KP0	391,389.56	7,627,733.63
KP25	400,058.52	7,606,502.28

KP50	421,525.14	7,604,116.01
KP75	443,840.54	7,608,223.33
KP100	467,648.18	7,605,578.76
KP125	487,534.29	7,597,909.81
KP150	509,906.49	7,599,714.45
KP175	532,026.18	7,588,145.65
KP200	556,001.85	7,581,749.80
KP225	580,360.71	7,578,050.15
KP250	599,293.30	7,564,715.34
KP265	601,215.73	7,550,500.89

1.4. Project Approvals

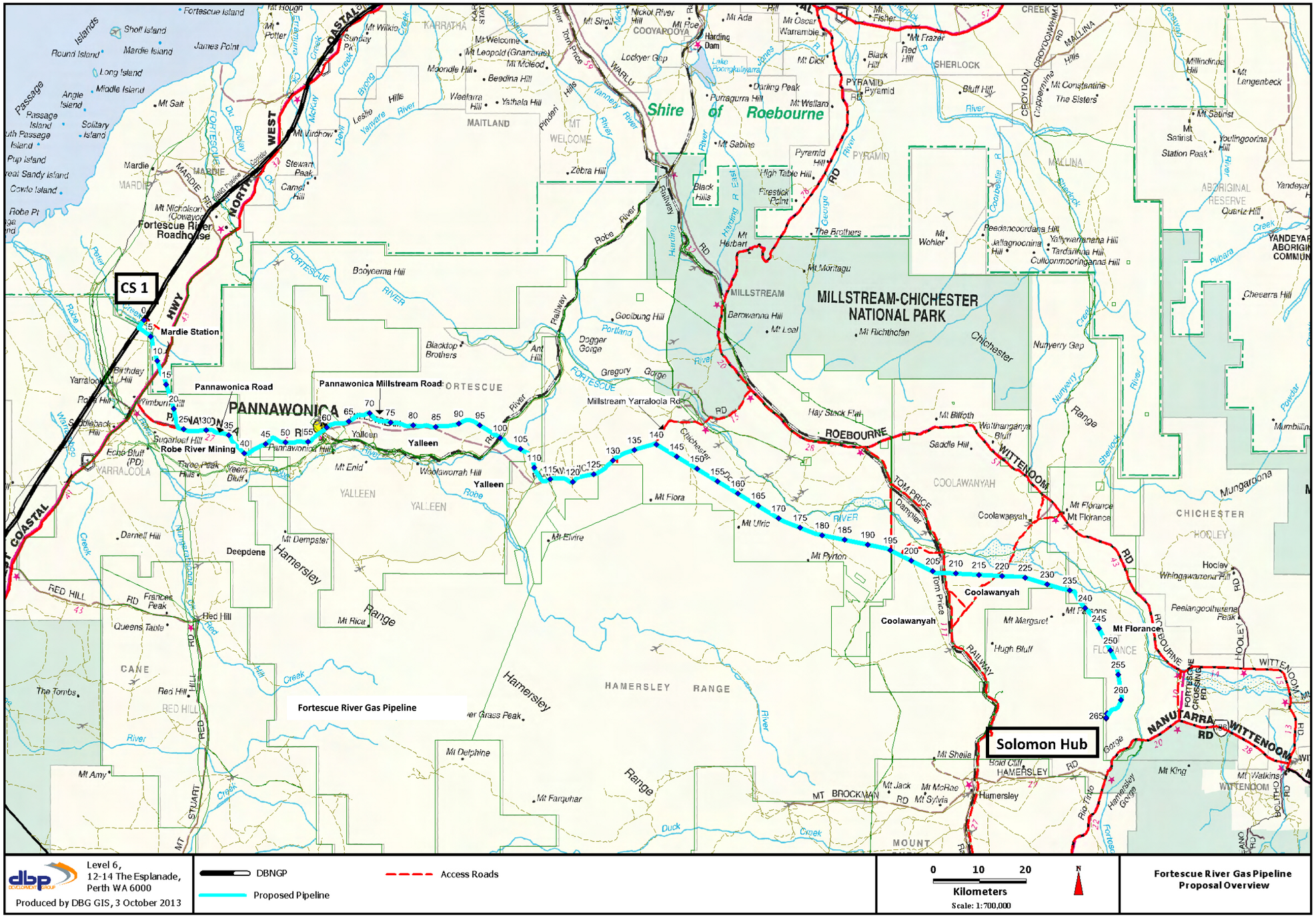
The FRGP has been approved by DMIRS under the *Petroleum Pipelines Act 1969* (PP Act) via issuance of Pipeline Licence (PL) 105. PL10-5 has been operating since 2015.

In association with potential impacts to listed Matters of National Environmental Significance (including the Northern Quoll and the Pilbara Olive Python), DDG referred the FRGP to the Federal Department of the Environment (DoE) for assessment under the *Environment Protection and Biodiversity Conservation* (EPBC) *Act 1999,* (EPBC 2013/7118). A 'Not Controlled Action' determination was received on 19 February 2014.

DDG has a Native Title Agreement and an Aboriginal Heritage Agreement with the Kuruma Marthudunera group and the Yindjibarndi group. Prior to disturbance for construction purposes, the Licence Area was inspected for sites of Aboriginal Heritage significance in conjunction with the Kuruma Marthudunera and the Yindjibarndi groups. The Licence Area was modified to avoid sites where possible and consent under section 18 of the *Aboriginal Heritage Act 1972* (AH Act) obtained for disturbance to those sites that could not be avoided.

The FRGP has a clearing permit for management of vegetation across the pipeline and associated access track. The permit (CPS 6013/2) covers construction, installation and operations of the FRGP. CPS6013 was extended in 2019 to allow for ongoing operational clearing.

Figure 1-1: FRGP location and regional setting



2. Existing Environment

The objective of this section is to provide a description of the existing natural, social and cultural environment that may be affected by activities associated with the operation of the FRGP

2.1. Biogeographic and regional setting

The FRGP lies within the Pilbara bioregion, which comprises four subregions: Hamersley, Fortescue Plains, Chichester and Roebourne. Whilst the FRGP extends into each of these subregions, it lies predominantly within the Hamersley subregion. Characteristic features of the Hamersley subregion include Proterozoic sedimentary ranges dominated by spinifex grasses dissected by gorges with low mulga woodlands on the valley floor. The deeply incised gorges of the Hamersley Ranges contain extensive permanent spring-fed streams and pools.

2.2. Climate

The Pilbara climate is described as semi-desert- tropical, with an annual average rainfall of 290 mm ranging from 250mm – 400mm per annum. Rainfall is highly variable, although there is a pronounced summer peak associated with cyclonic or thunderstorm events. Winter rain is not uncommon with drainage into either the Fortescue to the north, the Ashburton to the south, or the Robe to the west of the FRGP corridor (Department of Water (DoW) 2009).

Temperatures vary markedly between seasons. In Pannawonica (approximately KP 60) temperatures vary from a maximum temperature averaging 26.7ºC in the cooler months to 41.0ºC in the hotter months. Similarly the minimum temperatures range from 12.6ºC in cooler months to 25.2ºC in the hotter months.

2.3. Geology

The FRGP corridor is situated within the Fortescue Province, which lies over the Pilbara Craton. The Hamersley Ranges, which extend from the north-west to the south-east across the southern region of the Pilbara Craton, were formed on the late Archaean Palaeoproterozoic metamorphosed banded iron formation, shales, dolerite, carbonate, chert and rhyolite of the south Pilbara sub-basin.

The main characteristic of the soils in the Pilbara region is the predominant red colour with the most extensive soils being shallow, stony soils on hills and ranges and sands on sandplains (MWH 2009). Other soil types present in the region include red earths overlying hardpan, cracking and non-cracking clay soils and duplex soils. Based upon a desktop assessment against the Atlas of Australian Acid Sulfate Soils (ASS) (CSIRO 2013) the FRGP lies within an area of low to extremely low probability of ASS occurring.

2.4. Hydrology

2.4.1. Surface water

The FRGP corridor passes through the Lower Fortescue Basin catchment (MWH 2009) and lies within the *Rights in Water and Irrigation Act 1914* (RiWI) Surface Water Proclamation Area of the Pilbara. The eastern section of the FRGP corridor passes through mainly valley systems associated with the Fortescue River whilst the western section runs north of Robe River prior to joining CS1 on the DBNGP alignment on the coastal plain area south of Dampier and Karratha (Mattiske 2013a).

The FRGP traverses in the vicinity of the Fortescue and Robe Rivers. The hydrology of both river systems is typical of ephemeral rivers in the Pilbara bioregion, which experience periods of extremely high flood

flows during cyclonic and significant rainfall events, followed, often closely, by long periods of low or no stream flow (MWH 2009).

Although the FRGP avoids intersecting both of these major watercourses, it does traverse a number of associated minor watercourses and drainage lines (Table 2-1).

Table 2-1: Location of minor watercourse crossings

Minor Watercourses		
KP Start	KP Finish	Name
0.8	1	Peters Creek
188.3	189.1	Calwinga Creek
190.2	191.3	Unnamed
1	1.1	
18.8	18.9	
45.1	45.2	
53.9	54	
83.7	83.8	
110	110.1	
176.6	176.7	
242.3	242.4	
246.5	246.8	
249.9	250	
261.1	261.2	
263	263.1	
264.5	264.7	
266.3	266.4	

2.4.2. Groundwater

The hydrogeology along the western section of the FRGP corridor comprises surficial sediments and shallow aquifers, fractured and weathered rock aquifers and rocks of low permeability. The eastern section of the FRGP corridor, in the Fortescue Valley, passes through differentiated, sedimentary rocks in fractured and weathered aquifers, and surficial sedimentary shallow aquifers. Localised connection between the aquifers may occur where conduits for water flow are formed due to faulting and fracturing (Kendrick 2001).

Depth to groundwater along the FRGP route ranges from 6.37 meters below ground level (mbgl) at KP233 to 38.34 mbgl at KP195.

2.4.3. Millstream Water Reserve

There are several Public Drinking Water Source Areas (PDWSAs) in the Pilbara, mainly located in the west of the region (Figure 2-1). The FRGP corridor partially passes through Priority (P) 1 and P2 areas of Millstream Water Reserve which is gazetted under the *Country Areas Water Supply Act 1947* (CAWS Act) where By-laws apply to protect the quality of the drinking water.

Land within the PDWSA is managed by Water Corp and DWER and all activities within these areas with potential to impact upon groundwater quality are managed in consultation with Water Corp and DWER and in accordance with the management classifications provided above.

2.5. Flora and Vegetation

A desktop assessment of the flora and vegetation values of the FRGP corridor was undertaken by Mattiske (2013a) in July 2013. A subsequent Level 1 flora and vegetation field survey was undertaken by Mattiske in September 2013 (Mattiske 2013b).

Mattiske completed a Rehabilitation Monitoring Survey of the 881 hectares cleared under permit CPS 6013/1, in July/August of 2017, with supporting evidence being submitted to DWER for review. Upon review of the evidence provided, DWER communicated the requirements of Condition 8 for rehabilitation of the clearing permit to be adequately met.

2.5.1. Flora

The desktop assessment identified approximately 450 vascular plant taxa that have the potential to occur in the FRGP corridor (Mattiske 2013a). A total of 353 vascular plant taxa which are representative of 135 plant genera and 43 plant families were recorded within the Level 1 flora and vegetation survey (Mattiske 2013b). The majority of the taxa recorded were representative of the Fabaceae (77 taxa), Poaceae (63 taxa) and Malvaceae (40 taxa) families. Of the 353 taxa recorded 69.4% were perennial, 17.8% were annual and 12.7% were both annual and perennial depending on local conditions.

2.5.2. Threatened and priority flora

There have been no threatened or priority flora identified within the Licence Area. One Threatened flora species was identified as possibly occurring in the FRGP corridor: *Lepidium catapycnon.* Although this species was not recorded during the 2013 flora survey (Mattiske 2013b) it may occur as yet unidentified within the disturbance footprint.

A further 84 Priority flora species were identified as potentially occurring in the FRGP corridor (Mattiske 2013b). Of these, five Priority 3 flora species and one Priority 4 flora species have previously been recorded in proximity (Mattiske 2013a; 2013b):

- Priority 3 flora species:
  - *Astrebla lappacea*
  - *Oldenlandia* sp. Hamersley Station (A.A. Mitchell PRP 1479)
  - *Solanum albostellatum*
  - *Swainsona thompsoniana*
  - *Triodia* sp. Robe River (M.E. Trudgen et al. MET 12367).
- Priority 4 flora species:
  - *Rhynchosia bungarensis*.

2.5.3. Vegetation

Eleven broad vegetation mapping types (associations) occur within the FRGP corridor based on Beard (1975). The key vegetation values appear to relate to the diversity of species which are expected on the broad, less undulating slopes of the valley systems and the shift in communities through the different areas from the coastal systems on the Onslow Coastal Plain to the Fortescue Valley through the series of landforms and soils associated with the Stewart Hills, the Abydos Plain - Chichester, Hamersley groupings. The vegetation is dominated by different hummock grasslands, tussock grasslands, bunch grasslands, sedgelands and woodlands which support dominant genera such as Triodia, Acacia, Eucalyptus and Corymbia (Mattiske 2013a). These vegetation associations currently have between 99% and 100% of their pre-European extents remaining (Shepherd et al. 2002).

2.5.4. Vegetation condition

The vegetation condition in the area of the FRGP corridor ranges from cleared to pristine, with the majority being in Very Good to Pristine condition. Large cleared areas are evident around CS1 and the Pannawonica Town site, and around the Pannawonica-Millstream Road at Kilometre Point (KP) 120 to

KP140. Drainage lines between KP50 and KP59 are generally in degraded condition as a result of weed infestations, whereas creeks and drainage lines between KP81 and KP89 are generally in good condition despite evidence of livestock movement.

The total permanent disturbance footprint associated with the operation of the FRGP is approximately 135 ha and is predominantly associated with the permanent access track that runs the entire length of the pipeline.

2.5.5. Priority and Threatened Ecological Communities

Three Priority Ecological Communities (PECs) and one Threatened Ecological Community (TEC) occur near the FRGP corridor (Table 2-2).

The Wona Land System PEC does not occur within the FRGP corridor however it does traverse the buffer of the Wona Land System PEC (Figure 2-1).

Table 2-2: Summary of Threatened and Priority Ecological Communities adjacent to or near the FRGP corridor.

Community ID	Community Description	Conservation Status
Robe Valley Mesas (PEC)	Subterranean invertebrate communities of mesas in the Robe Valley region. A series of isolated mesas occur in the Robe Valley in the State's Pilbara bioregion. The mesas are remnants of old valley infill deposits of the palaeo Robe River. The troglobitic faunal communities occur in an extremely specialised habitat and appear to require the particular structure and hydrogeology associated with mesas to provide a suitable humid habitat. Short range endemism is common in the fauna. The habitat is the humidified pisolitic strata. Threats: Mining Minimum distance to FRGP: 7.2 km (340 m from buffer zone)	Priority 1
Millstream (PEC)	Stygofaunal communities of the Western Fortescue Plains freshwater aquifer. (Previously named: Stygofaunal communities of the Millstream freshwater aquifer) A unique assemblage of subterranean invertebrate fauna. Threats: Groundwater drawdown and salinisation. Minimum distance to FRGP: 9.5 km	Priority 4
Wona Land System (PEC)	Four plant assemblages of the Wona Land System. (Previously named: Cracking clays of the Chichester and Mungaroona Range) A system of basalt upland gilgai plains with tussock grasslands occurs throughout the Chichester Range in the Chichester-Millstream National Park, Mungaroona Range Nature Reserve and on adjacent pastoral leases. There are a series of community types identified within the Wona Land system and gilgai plains that are considered susceptible to known threats such as grazing or have constituent rare/restricted species, as follows:	
	• Cracking clays of the Chichester and Mungaroona Range. This grassless plain of stony gibber community occurs on the tablelands with very little vegetative cover during the dry season, however during the wet a suite of ephemerals/annuals and short-lived	Priority 1

Community ID	Community Description	Conservation Status
	perennials emerge, many of which are poorly known and range-end taxa.	
	• Annual Sorghum grasslands on self mulching clays. This community appears very rare and restricted to the Pannawonica-Robe valley end of Chichester Range.	Priority 1
	• Mitchell grass plains (*Astrebela* spp.) on gilgai.	Priority 3
	• Mitchell grass and Roebourne Plain grass (*Eragrostis xerophila*) plain on gilgai (typical type, heavily grazed). Minimum distance to FRGP: 15.8km note: alignment intersects the Wona Land System buffer zone.	Priority 3
Themeda Grasslands (TEC)	*Themeda* grasslands on cracking clays (Hamersley Station, Pilbara) Grassland plains dominated by the perennial *Themeda* (kangaroo grass) and many annual herbs and grasses. Minimum distance to FRGP: 22km (6.1km from buffer zone)	Vulnerable

2.5.6. Introduced species

Eleven introduced (exotic) taxa were recorded within the FRGP corridor during the Level 1 Flora Survey (Mattiske 2013b):

- *Jatropha gossypiifolia (Bellyache Bush or* cotton-leaf physic-nut)
- *Aerva javanica* (kapok bush)
- *Cenchrus ciliaris* (buffel grass)
- *Cynodon dactylon* (couch grass)
- *Flaveria trinervia* (speedy weed)
- *Malvastrum americanum* (spiked malvastrum)
- *Melochia pyramidata* (broom-wood)
- *Ocimum basilicum* (sweet basil)
- *Setaria verticillata* (whorled pigeon grass)
- *Tribulus terrestris* (yellow vine)
- *Vachellia farnesiana* (mimosa bush)

Additionally, *Argemone ochroleuca* (mexican poppy) is known to occur in the vicinity of KP 141 outside of the Licence Area.

Both *Argemone ochroleuca* and *Jatropha gossypiifolia* are a Declared Pests pursuant to section 22 of the *Biosecurity and Agriculture Management Act 2007* (BAM Act) according to the Western Australian Department of Agriculture and Food (2013). A small population of *Jatropha gossypiifolia* (Bellyache bush) was recorded at approximately KP 61 (within 2 km of Pannawonica).

2.6. Conservation Areas

Approximately 3.75 km of the FRGP corridor traverses the north-eastern corner of the proposed West Hamersley Range Conservation Park (Figure 2-1) (Mattiske 2013a). This portion of the FRGP corridor follows Pannawonica Rd which also intersects the proposed Conservation Park. The total disturbance from the construction corridor in the proposed conservation park is estimated to be 11.25 ha.

Figure 2-1: Threatened and Priority Ecological Communities and the Proposed Conservation Park

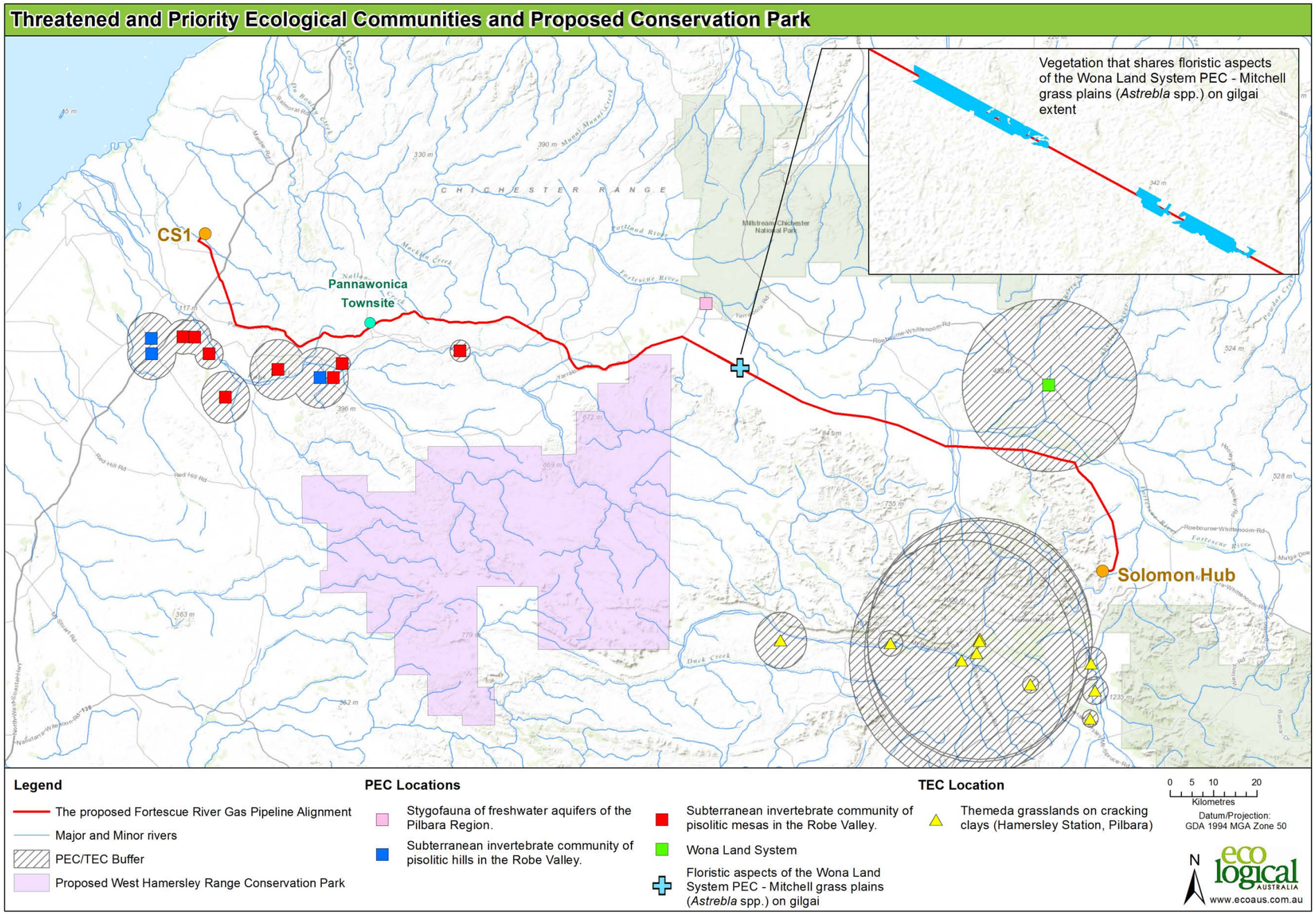
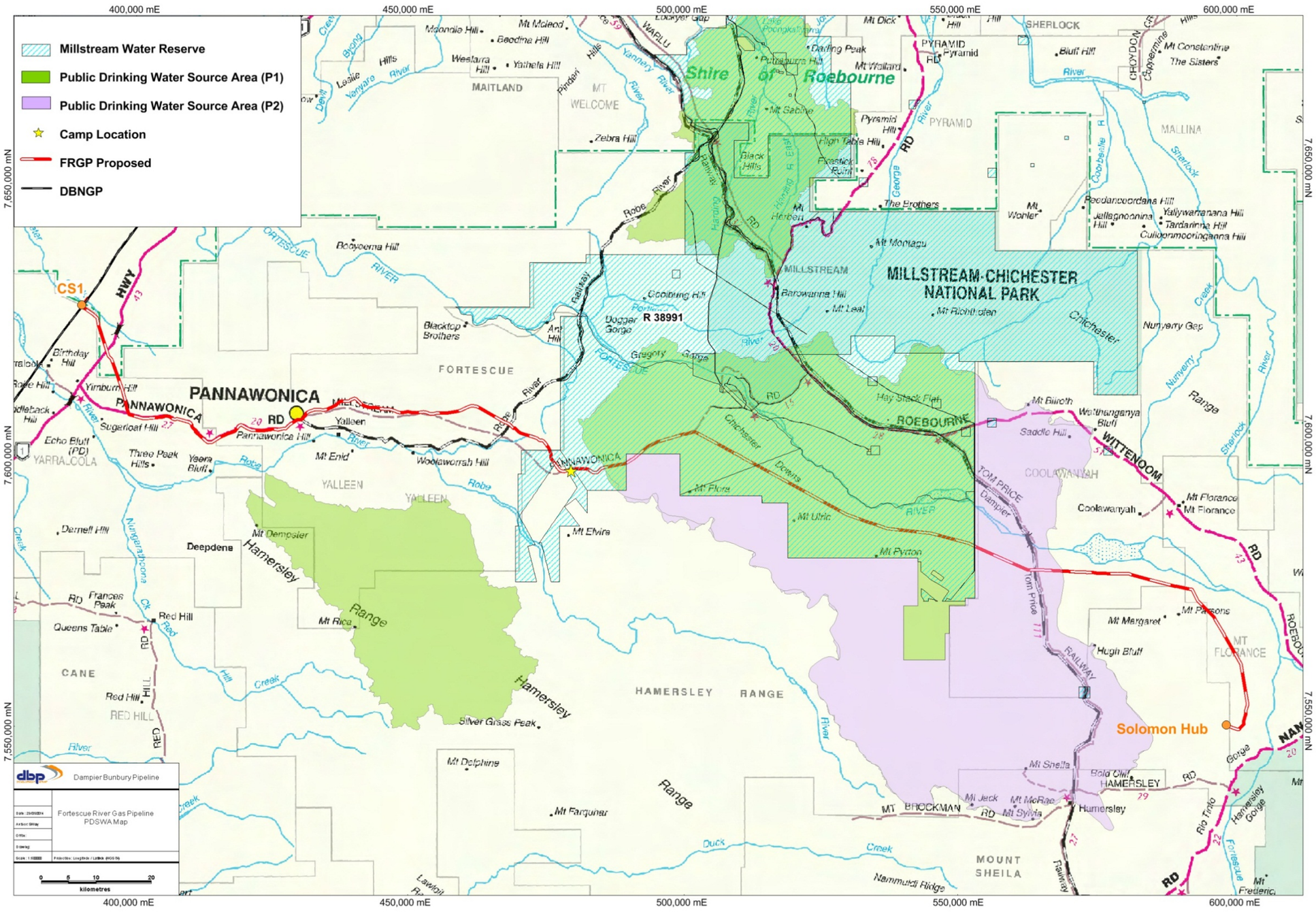


Figure 2-2: Location of Millstream Water Reserve and Public Drinking Water Source Areas



2.7. Fauna

A Level 1 vertebrate fauna study of the FRGP corridor was undertaken by Ninox Wildlife Consulting (Ninox) during 2013 (Ninox 2013a). The study included a detailed desktop assessment including data and literature review. A subsequent ground-truthing survey was undertaken by Ninox in October 2013 (Ninox 2013b). The combination of these two studies satisfies the requirements for a Level 1 Reconnaissance Survey as defined by EPA (2004).

2.7.1. Fauna habitats

The following major fauna habitats were identified in the eastern section of the FRGP corridor during the survey:

1. *Triodia* plains with emergent *Corymbia hamersleyana* and sparse mixed shrubs on rich brown sandy clays with pebble float.
2. Open woodland of *Acacia xiphophylla* and occasional small stands of *Acacia pruinacarpa* over mixed shrubs with dense Triodia on rich brown loamy clays with pebble and/or fine ironstone float.
3. Open woodland of *Acacia xiphophylla* over mixed Acacia shrubs and grasses on cracking clays.
4. Extensive *Triodia* grasslands.
5. Extensive grasslands (including areas dominated by *Astrebla* species) on cracking clays.

The western section of the FRGP corridor contains the habitats described above plus the following additional habitats:

6. Creeks, watercourses and flowlines with *Eucalyptus camaldulensis*, *Eucalyptus victrix* over dense mixed Acacia shrubs with Triodia and introduced Buffel grass on deep red-brown clay loams.
7. Triodia covered rocky ranges and mesas with extensive breakaways and rocky ridges containing many small caves (includes Yandagee Gorge – see below). Occasional *Eucalyptus leucophloia* and mixed Acacia shrubs on very rocky soils.
8. Triodia grasslands with emergent *Acacia inaequilatera* and *Eucalyptus leucophloia* and mixed Acacia shrubs on rocky dolerite hills with occasional termite mounds.
9. Extensive grasslands on cracking clay with flat dolerite rocks and pebbles.

Three fauna habitats of potential significance (due to likelihood of supporting conservation significant species) have been identified to date within the FRGP corridor (Ninox 2013a). These are:

- Cracking clay grasslands – habitat types 3, 4 and 5.
- Yandagee Gorge – a combination of habitat type 6 and 7.
- Riparian habitat– habitat type 6.

The cracking clay grasslands support a number of species that are unlikely to be found elsewhere within the FRGP corridor including Priority species such as *Leggadina lakedownensis* (Lakeland Downs Mouse; P4). These cracking clay communities are similar to the grasslands located south of the Solomon Hub area on the Hamersley Station which comprises largely of small mammals (Ninox 2013b).

The western portion of the FRGP corridor traverses Yandagee Gorge, which may represent important habitat for a number of conservation significant species, in particular *Dasyurus hallucatus* (Northern Quoll) and *Liasis olivaceus barroni* (Pilbara Olive Python) (Ninox 2013b). Pannawonica Road also passes between two hills within the gorge, and as such the FRGP corridor is located as close as possible to the road to enable as much separation from the gorge as practicable.

While no major rivers are intersected by the FRGP corridor, minor creeks supporting riparian vegetation (i.e. dense vegetation and/or eucalypts) are intersected. Riparian habitats have been identified only within the western section of the FRGP corridor, where they provide refuge for a wide range of species, particularly birds, and small terrestrial species which shelter in the leaf litter (Ninox 2013b). Larger eucalypts such as *Eucalyptus camaldulensis* and *Eucalyptus victrix* within some of these creek systems usually contain hollows suitable for nesting and/or roosting by a range of species. These linear habitats of dense vegetation also act as corridors through the more arid and sparsely vegetated country adjacent to them. As such, these corridors may provide safe access from rocky hills and slopes for species such

as the Northern Quoll, which generally dens in the rocky habitat and forages through a wider range of habitats for food. This may also be the case for the Pilbara Olive Python.

2.7.2. Conservation fauna species

The data and literature review identified 358 vertebrate fauna that have previously been recorded or potentially occur within, or in close proximity to, the FRGP corridor including 27 species of conservation significance (i.e. listed under the *Wildlife Conservation Act 1950* (WC Act) and/or listed as Priority species by the Department of Parks and Wildlife (DPaW) and/or listed under the EPBC Act). Each species of conservation significance has been assessed for its likelihood of occurrence around the FRGP corridor based on previous records, habitat preferences and known distribution (Table 2-2)..

Additionally, third parties have undertaken fauna surveys within the vicinity of the FRGP in association with the Solomon Project (located at the south-eastern end of the FRGP)and Brockman Syncline (located 80 km south). Species recorded include the *Apus pacificus* (Fork-tailed Swift), *Ardeotis australis* (Australian Bustard), *Macroderma gigas* (Ghost Bat), *Dasyurus hallucatus* (Northern Quoll), *Pseudomys chapmani* (Western Pebble-mound Mouse), *Notoscincus butleri* (a skink), *Ramphotyphlops ganei* (a blind snake), and *Liasis olivaceus barroni* (Pilbara Olive Python).

Table 2-2: Conservation significant fauna species potentially occurring in proximity to the FRGP corridor

Species	BC ACT or DPaW Priority list	EPBC Act	Likelihood of Occurrence
Northern Quoll (*Dasyurus hallucatus*)	Endangered	Endangered	High
Northern Marsupial Mole (*Notorycytes caurinus*)	Priority 4	Vulnerable	Unlikely
Pilbara Olive Python (*Liasis olivaceus barroni*)	Vulnerable	Vulnerable	High
Peregrine Falcon (*Falco peregrinus*)	OS (other specially protected)	-	High
A blind snake (*Ramphotyphlops ganei*)	Priority 1	-	High
Long-tailed Dunnart (*Sminthopsis longicaudata*)	Priority 4	-	High
Ghost Bat (*Macroderma gigas*)	Vulnerable	Vulnerable	High
Western Pebble-mound Mouse (*Pseudomys chapmani*)	Priority 4	-	High
A skink (*Notoscinus butlerii*)	Priority 4	-	High
A skink (*Ctenotus uber johnstonei*)	Priority 2	-	High
Fork-tailed Swift (*Apus pacificus*)	(Migratory)	Migratory	Seasonally High
Oriental Pratincole (*Glareola maldivarum*)	(Migratory)	Migratory	Moderate
Woma (*Aspidites ramsayi*)	Priority 1	-	Low to Moderate
Lakeland Downs Mouse (*Leggadina lakedownensis*)	Priority 4	-	Low to Moderate
Greater Bilby (*Macrotis lagotis*)	Vulnerable	Vulnerable	Unlikely to Low

Species	BC ACT or DPaW Priority list	EPBC Act	Likelihood of Occurrence
Pilbara Leaf-nosed Bat (*Rhinonicteris aurantia*)	Vulnerable	Vulnerable	Unlikely to Low
Barn Swallow (*Hirundo rustica*)	(Migratory)	Migratory	Unlikely to Low
Oriental Plover (Dotterel) (*Charadrius veredus*)	Schedule 5 (Migratory)	Migratory	Unlikely to Low
Eastern Osprey (*Pandion haliaetus*)	Migratory	Marine Migratory	Unlikely
Australian Painted Snipe (*Rostratula australis*)	Endangered	Endangered	Unlikely
Night Parrot (*Pezoporus occidentalis*)	Critically Endangered	Endangered	Unlikely to Low
Curlew Sandpiper (*Calidris ferruginea*)	Critically Endangered	Critically Endangered	Unlikely to Low
Eastern Curlew (*Numenius madagasdcariensis*)	Critically Endangered	Critically Endangered	Unlikely to Low
Grey Wagtail (*Motacilla cinerea*)	Migratory	Migratory	Unlikely to Low
Yellow Wagtail (*Motacilla flava*)	Migratory	Migratory	Unlikely to Low

2.8. Community

The FRGP corridor traverses five pastoral leases (refer Table 2-3) with numerous exploration and mining leases overlapping. The FRGP alignment passes in close proximity to Pannawonica Townsite: approximately 200 m at the closest point. The town has a permanent population of 686. Rio Tinto Iron Ore employee families, staff on fly-in fly-out ('FIFO') roster from Perth, and those involved in support services (49% residential, 51% FIFO). It is accessible by road, rail and light aircraft.

Table 2-3: Pastoral lease locations

Pastoral Lease	KP Range
Mardie Station	0.2 – 11.6
	11.8 – 17.1
Yarraloola Station	17.1 – 23.8
Yalleen Station	64.1 – 140.9
Coolawanyah Station	196.6 – 208.9
	209.0 – 220.2
Mt Florance	235.3 – 267.9

2.9. Cultural

The FRGP corridor crosses two Native Title areas: the Kuruma Marthudunera and the Yindjibarndi. There are no sites of significance within the Licence Area. Two registered site zones cross the FRGP at KP100-KP102.5. These sites includes artefacts / scatter location and a water source site and the pipeline corridor is away from the known site locations. A linear heritage site (waterway) occurs near Solomon Hub and crosses the pipeline twice (KP264.1 and 266.2).

DDG has heritage agreements in place with both Traditional Owner Groups. Additionally during construction all sections were inspected by Traditional Owners prior to disturbance to confirm no impact to any heritage sites (known or unknown).

3. Activity Description

The FRGP transports DBNGP Specification natural gas through the pipeline from CS1 to the Solomon Power Station. The FRGP is designed to operate under the initial free flow capacity capability of 64 TJ/day and has a fully compressed capacity capability of 334 TJ/d with compression to 15.3MPa. The design life of the pipeline is 75 years. The details of the pipeline are summarised in Table 3-1 below. A general layout of the pipeline is provided in Figure 3-1.

Table 3-1 Pipeline Details

Fortescue River Gas Pipeline	
From	DBNGP
To	Solomon Power Station
Length (km)	270
Nominal Size (mm)	400
Nominal Wall Thickness (mm)	9.0 (standard) / 12.4 (heavy wall)
Minimum Wall Thickness (mm)	8.06 (standard) / 11.12 (heavy wall)
Critical Defect Length (mm)	74.2 / 146.2
Measurement Length (m)	504
Pipe steel grade(API 5L)	X70
Min yield strength(MPa)	482
Pipe Specification	HFW
Fittings and valves	Class 900
MAOP (MPag)	15.3
Operating temperature range (°C)	0 - 60
Nominal earth cover (mm)	750
External corrosion coating	FBE
Internal flow coating	Epoxy
Cathodic protection	IC
Pipeline corridor width (m)	30

3.1. Facilities

Facilities associated with the FRGP include:

- Fortescue Launcher Facility
- Fortescue Line Valve
- Solomon Meter Station

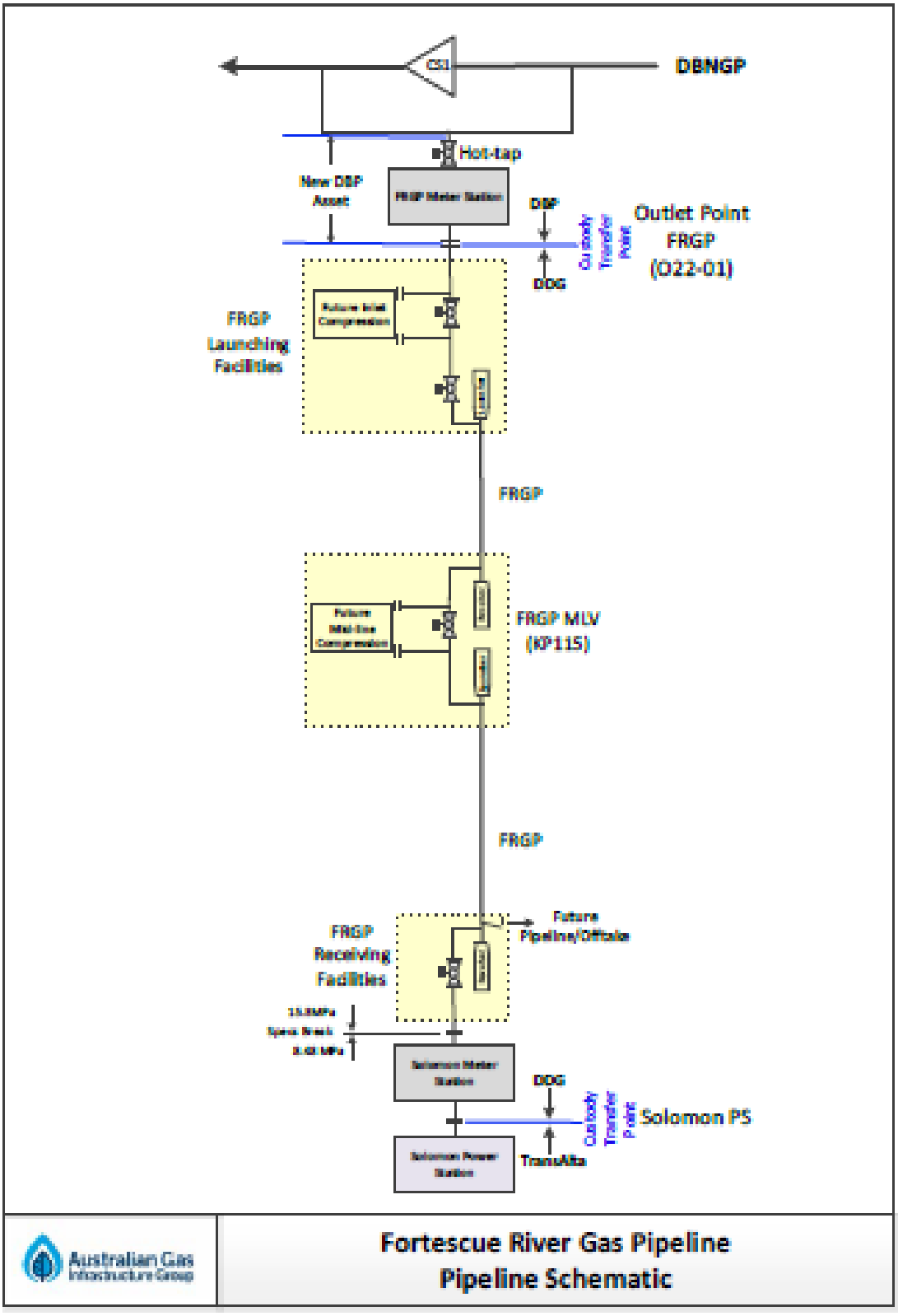
3.2. Communications System

Communications at the Stations is provided via:

- Fortescue Launcher Facility – optic fibre connection to existing communications infrastructure at CS1;
- Fortescue Line Valve – a satellite modem and satellite dish; and

- Solomon Meter Station – a Telstra NextG modem and antenna.

Figure 3-1 FRGP General Layout



3.3. SCADA

A Remote Terminal Unit (RTU) is installed at all three aboveground facilities including switches, nameplates, indication lamps, batteries and chargers.

Site functionality shall be as follows (where applicable):

- Remote and local operational control of the actuated shutdown valves;
- Monitor miscellaneous pressures, temperatures, valve positions and site status; and
- Metering data.

3.4. Access

A permanent access track is maintained throughout the entire length of the Licence Area to enable access for ongoing maintenance and operation except for KP26 to KP60 of the alignment which is transited via sealed public road (Pannawonica Rd) with the pipeline running adjacent to the road reserve.

3.5. Transportation Services Control Centre

The DBP Transportation Services Control Centre (TSCC) is located on Level 7 of 12-14 The Esplanade in Perth. TSCC is designed to monitor FRGP and control remotely operable shutdown valves in the event of an emergency. TSCC is manned 24 hours a day, 365 days a year and utilisers a fully redundant SCADA system including an offsite Disaster Recovery (DR) site and Backup Control Room also located in the Jandakot complex.

3.6. Enhancements and Modifications (Projects)

The FRGP may undergo enhancements and modifications on an ongoing basis as a result of:

- Requests for new connections or modification of existing connections from new or existing customers;
- Improvements initiated by DBP/DDG to allow improve health, safety, environmental impact, reliability, efficiency and/or cost effectiveness operation; and
- Any other influences including but not limited to changes in regulatory requirements, customer requirements, obsolete or redundant equipment or vendor changes.

A brief description of typical enhancement activities is provided in the full EP. Any combination of these generic activities may be required in association with a specific enhancement. For this reason, any such works would only be conducted where supported by a Bridging Document, and subject to approval by DMIRS.

3.7. Decommissioning and Rehabilitation

A decommissioning and rehabilitation plan will be submitted to DMIRS for approval prior to undertaking any removal, decommissioning or rehabilitation works of facilities and pipelines associated with the FRGP. The pipeline design life is 75 years.

3.8. Vegetation Maintenance

As required under AS2885.3 and the FRGP Safety Case, the FRGP undergoes vegetation management to ensure Line of Sight (LOS) between pipeline signs and access to the pipeline is maintained. This process is undertaken in accordance with statutory clearing approvals and managed internally under an internal permit process, referred to as an Authorisation to Clear Vegetation (ACV).

4. Implementation Strategy

In order to identify, understand and manage all environmental sources of risk and consequent impacts associated with operation of the FRGP, a comprehensive Environmental Risk Assessment (ERA) review was completed on 7 November 2019. The ERA included a multidisciplinary team of in house personnel following a structured process which sought to:

- Outline key operational activities;
- Identify, analyse and evaluate associated hazards and corresponding environmental impacts;
- Where necessary, establish suitable controls; and
- Systematically assess the residual associated environmental risk.

The below section sets out key impacts, risks and control measures established to manage risks identified during the ERA.

4.1. Soils and Sediment

Risk Assessment and Mitigation Measures							
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 including: • 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: • Minimisation of vehicle movements; and • Erosion controls implemented on stockpiles	Occasional	Minor	Low
Erosion and sedimentation: loss of topsoil offsite from wind or runoff, increased	Frequent	Minor	Intermediate	Management of Erosion Risk Areas Procedure controls include: • the minimisation of vehicle movements including sticking to established tracks;	Remote	Minor	Negligible

impacts to drainage lines (increase in flow or velocity), sedimentation into drainage lines, water ponding				• the installation of erosion controls to prevent sedimentation to waterways; • undertaking remediation works if erosion occurs; • conducting regular inspections of erosion control; and • managing water discharge through filters, screens or rocks Watercourse Crossing Procedure (E-PRO-017) controls include: • RiWi Act approval requirements (Beds and Banks) • Bank stabilization methodology Aerial Surveillance Pipeline design			

4.2. Flora

Risk Assessment and Mitigation Measures							
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	Frequent	Severe	High	Site survey and alignment sheets including GIS data Native Vegetation Clearance Procedure including: • Authorisation to Clear Vegetation (ACV) or an equivalent process is implemented • Minimise clearing • Hand pruning in riparian zone Additional controls include management of grit blasting during painting such as screens and capture of waste material.	Unlikely	Minor	Low
Biodiversity Conservation - Impact on DRF species or Threatened Ecological Communities (TEC's): includes unapproved taking of flora	Frequent	Severe	High	Native Vegetation Clearing Procedure including • Authorisation to Clear Vegetation (ACV) is implemented • Obtain any regulatory approvals prior to clearing • GIS database utilised to conduct ACV checks Minimise clearing	Remote	Severe	Low

4.3. Weeds

Risk Assessment and Mitigation Measures							
Potential Environmental Impact	Inherent Risk			Controls	Residual Risk		
	Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
Introduction of new weeds	Frequent	Severe	High	Travel on designated tracks (captured under 4.1) Clean and inspection of vehicles prior to mobilization including weed hygiene certificate Vegetation maintenance and access track maintenance Visual inspections of vehicles	Occasional	Minor	Low
Spread of existing weeds	Frequent	Severe	High	Construction projects require that all fill is certified weed and seed free prior to use. Targeted weed management	Occasional	Minor	Low
Impact of herbicides on native vegetation	Occasional	Minor	Low	Targeted weed management within facilities (or fire breaks) including: • Hand spraying only • Use of approved herbicides • No facilities within the PDWSA	Unlikely	Trivial	Negligible

4.4. Bushfire

Risk Assessment and Mitigation Measures							
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	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 Fire training for selected personnel (i.e. fire watch)	Remote	Severe	Low

Impacts to other locations / services / stakeholders				Experienced operator Firebreaks around all compounds			

4.5. Fauna

Risk Assessment and Mitigation Measures							
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	Site survey and alignment sheets Designated turn around areas Native Vegetation Clearance Procedure including: • Authorisation to Clear Vegetation (ACV) or an equivalent process is implemented • Delineation prior to clear and grade (pegging) Fauna Interaction Procedure: • Minimise clearing of habitat trees • Inspection of habitat trees prior to felling	Remote	Severe	Low
Damage to fauna (direct) through vehicle impacts, falling and stuck within trench, predation within trench or post relocation. Fauna in pipe strings	Occasional	Severe	Intermediate	Fauna Interaction Procedure including: • Speed limits (80km/h unsealed roads) • Reduce speeds / minimise travel in dawn and dusk periods • No clearing outside of authorised clearing areas • Stick to access track • Fauna interaction management controls Daily excavation / trench inspections Inspection of trench prior to backfill Egress from excavation (ramps) Backfill as soon as possible Fauna shelters (hessian bags, rags, wood) every 500m Inspections	Occasional	Trivial	Low

4.6. Cultural Heritage and Stakeholder Engagement

Risk Assessment and Mitigation Measures							
Potential Environmental Impact	Inherent Risk			Controls	Residual Risk		
	Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
Impacts to known or unrecorded Aboriginal Heritage Sites: Includes impact from dust, vibration, trampling or inadvertent impact from clearing equipment or vehicle movements	Occasional	Severe	Intermediate	DBP Induction sets out AH Act controls (includes all DDG personnel) Native Vegetation Clearing Procedure includes checks of heritage values, landholder notification and required approvals Stick to existing tracks (as per Section 6.1) Leave gates as you found them (as per Section 6.1) Annual landholder communication / consultation program including complaint response	Unlikely	Minor	Low
Impacts to other land users (including pastoral station owners) including clearing outside of approved areas and use of gates etc. NOTE dust and noise emissions are covered in Section 6.7	Occasional	Severe	Intermediate	FRGP Asset Management Plan includes controls including regular land liaison, signage and pipeline markers, fenced compounds.	Unlikely	Trivial	Negligible

4.7. Air Emissions including Dust and Noise

Risk Assessment and Mitigation Measures							
Potential Environmental Impact	Inherent Risk			Controls	Residual Risk		
	Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
Noise Stakeholder impacts	Occasional	Trivial	Low	Compliance with Statutory requirements Work times (no night works planned)	Remote	Trivial	Negligible

				Stakeholder notifications			
Dust – impacts offsite to: Stakeholders, visual amenity and coverage of flora	Frequent	Minor	Intermediate	Reduced speed limits on unsealed roads and right of way Minimise driving to daylight hours where possible Minimise time between clear and grade (stripping) and backfill / reinstatement SWMS / JHA to identify risk at time of activity and apply controls (i.e. water cart/truck)	Occasional	Trivial	Low
Gas emissions	Occasional	Severe	Intermediate	Facility design meets required standards Gas only introduced post leak testing and pre-commissioning tasks Ongoing maintenance including leak testing Vehicle maintenance	Unlikely	Minor	Low

4.8. Surface and Groundwater

Risk Assessment and Mitigation Measures							
Potential Environmental Impact	Inherent Risk			Controls	Residual Risk		
	Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
Impacts to surface water flow patters: including diversion of flow, sedimentation, damming of flow, increased water pooling, turbidity and velocity of water changes	Occasional	Severe	Intermediate	Weather monitoring Watercourse Crossing Procedure controls including: • Approvals prior to any works (RiWi Act) • Hand pruning in riparian zone (to extent practicable) No vegetation maintenance (Line of Sight) clearing in T2 watercourses Designated crossing points to be used at all times GIS database of watercourse locations Native Vegetation Clearance Procedure (ACV process) Aerial Surveillance Erosion controls (as per Section 6.1)	Unlikely	Minor	Low

Water quality decrease (pollution / contamination)	Unlikely	Severe	Intermediate	Waste water management Ensure activities are away from watercourses (blasting, refueling etc.)	Remote	Minor	Low

4.9. Hazardous Materials Storage and Handling

Risk Assessment and Mitigation Measures							
Potential Environmental Impact	Inherent Risk			Controls	Residual Risk		
	Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
Soil contamination from hydrocarbons or chemicals during minor works (not permanently stored onsite)	Occasional	Severe	Intermediate	S-PRO-016 Hazardous Materials Storage and Handling Procedure includes the following controls: • SDS available onsite • Chemical Register available onsite • Spill kits in heavy vehicles and at all storage locations • No bulk storage permanently onsite • Suitably licensed DG transport and waste company • Use of drip trays during refueling • Self bunded / contained storage vessels in line with AS1940 • Bunding/self-containment of fixed plant and equipment (i.e. generators) • ChemAlert subscription • Facility HSE Inspection E-PRO-016 Oil Spill Response procedure set out the: • Response to spills, the 3C approach – control, contain, cleanup • Escalation requirements for emergency level spills	Remote	Minor	Low
Groundwater contamination	Unlikely	Severe	Intermediate	S-PRO-016 (as above) and: • No storage within PDWSA • No hydrocarbon storage permanently onsite	Remote	Minor	Negligible
Fire	Unlikely	Severe	Intermediate	See Bushfire Additionally fire extinguishers in mobile plant and on generators Prestart inspections of equipment	Remote	Minor	Negligible

4.10. Waste Management

Risk Assessment and Mitigation Measures							
Potential Environmental Impact	Inherent Risk			Controls	Residual Risk		
	Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
Contamination of soil, water or other impacts (fauna) from poor waste management.	Occasional	Minor	Low	Induction Facility HSE Inspections / Project Inspections Waste Management Procedure controls including: ▪ Segregation of waste streams where possible ▪ Removal of waste by a licensed contractor to a license waste facility ▪ Covering over skip bins (except scrap metal) to prevent fauna interaction / birds ▪ Hydrocarbon waste facilities are bunded ▪ No bins kept permanently onsite ▪ Self-contained ablutions with volume monitoring (project works) Pigging waste shall be collected over secondary containment (groundsheet/tray)	Remote	Minor	Negligible

5. Environmental Management System

This chapter describes the documented systems and processes of the Environmental Management System (EMS) used for the safe operation of the FRGP. DDG adopt all AGIG and DBP policies and procedures across the operation of its business. Implementation of DBP's EMS ensures that hazards are identified and assessed to eliminate or minimise the risk to the environment to a level that is ALARP throughout operation of the FRGP.

5.1. Induction and Training

All staff and contractors shall be required to undertake an environmental awareness induction prior to commencement of works on the FRGP. The environmental awareness induction is targeted to educate staff and contractors regarding AGIG's environmental objectives and their individual responsibilities for environmental management. The environmental awareness induction covers off on the following key topics:

- Flora;
- Fauna;
- Weeds and pathogens;
- Erosion and topsoil protection;
- Fire controls including Total Fire Bans;
- Cultural heritage;
- Community and landholders;
- Air emissions including noise and dust;
- Hazardous materials and spill response; and
- Waste management.

The induction additionally ensures that all personnel are capable of implementing the JHA process to identify and manage risks.

All personnel are required to undergo refresher training once every three years. All visitors receive a site-specific induction appropriate in length and content for the type of work being undertaken.

Employees are trained and provided with appropriate resources to ensure compliance with environmental laws, codes and standards and company policies. These additional specific training needs are addressed on an as needs basis. DBP maintains a record of training for all personnel.

5.2. Incident Management

It is a mandatory requirement for any personnel working for or on behalf of DDG to respond to all hazards and events that have affected or have the potential to adversely affect the environment.

A Significant Environmental Incident is an event which:

- may but does not necessarily result in any permanent damage to the environment but requires the use of additional personnel or contractors external to the site and additional remediation equipment; or
- the regulatory authority deems as notifiable; or
- is likely to result in wide spread public complaints and anger.

5.3. Emergency Preparedness and Response

DBP has three tiers of emergency and crisis response: Incident, Emergency and Crisis. The Emergency Response Plan (ERP) provides for an Emergency Management Team (EMT) and an Incident Management Team (IMT) who are responsible for managing emergencies and minor incidents.

The Crisis Management Plan (CMP) establishes the Crisis Management Team (CMT) which is responsible for managing Crisis events, being those that are likely to be associated with personnel, public safety, supply, pipeline license or DDG reputation issues.

In the event that an emergency deteriorates and can no longer be managed effectively by the Emergency Management Team the CMT would be activated.

5.4. Monitoring

In accordance with Section 33 of the Regulations, DDG shall conduct monitoring of all applicable emissions and discharges. The Quarterly Emissions and Discharge Report shall consolidate the results of all monitoring for submission to the DMIRS as specified in the EP.

5.5. Inspections and Audits

The pipeline may be subject to land settlement and other effects on the right of way where the pipeline crosses rivers, roads and pastoral grazing areas. The pipeline is located in the 'pastoral region' and is surveyed by aerial surveillance once monthly and by a ground survey annually.

Gas accounting on the pipeline is based on gas metered into the pipeline at FRGP Meter Station located at CS1, use by the customer metered at Solomon Meter Station and the monitoring of linepack.

Third party activities and corrosion are considered the most significant threats to the integrity and pressure containment capacity of pipelines. The FRGP is protected with Fusion Bonded Epoxy (FBE) coating system which is supplemented by a cathodic protection system to prevent the corrosion of the pipeline and consequential leaks. The condition of the coating system is surveyed using a DCVG technique on a 5 yearly basis (or as set out in the Asset Management Plan) and repairs are carried out as necessary. Cathodic protection system's effectiveness is conducted on an annual basis to ensure the pipeline is protected if there is any defect on the coating system.

Facility HSE Inspections are undertaken every six months by maintenance personnel to ensure implementation of environmental controls.

Project Environmental Inspections are conducted on specific enhancement or modification works and can target activities including clearing, watercourse crossing and excavations.

5.5.1. EP Review and Compliance Audit

The FRGP shall be subject to an annual environmental compliance audit to ensure that the systems and controls detailed within this EP are both adequate and implemented, and also to identify opportunities for improvement. Additionally, DDG may from time to time engage an independent auditor on an as needs basis. Each auditor shall complete a review of all relevant documentation prior to conducting the audit, which shall include the identification of key regulatory requirements.

5.6. Review and Improvement

The achievement of compliance with environmental management obligations shall be considered in annual business planning sessions, enabling the identification of issues to upper management and the allocation of resources where necessary to implement improvements.

5.7. Reporting

To demonstrate and maintain compliance against legislative requirements, routine external reporting to key regulatory agencies shall be conducted. It should be noted that the FRGP does not trigger reporting thresholds for the National Greenhouse and Energy Reporting scheme (NGERs) or the National Pollutant Inventory (NPI). This requirement shall be reassessed annually through review of this EP or earlier if in response to a material change to the activities and/or the use of equipment at the FRGP.

5.8. Consultation

The purpose of consultation is to:

- Obtain appropriate input into the ongoing improvement of this EP;
- Keep key stakeholders up to date with activities at the FRGP;
- Ensure timely response to landholder issues; and
- Maintain dialogue with regulatory authorities, including local councils.

DDG target annual consultation with all landholders. This consultation provides an opportunity for the landowners to advise DDG of their land use requirements and future expectations and also provides DDG an opportunity to disseminate information about the FRGP and promote awareness of all risks and emergency protocols. This ongoing process is designed to decrease the risk of third party incidents and to encourage ownership of the activities around the pipeline.

DDG continues to consult with stakeholders in regards to the FRGP, a brief summary is included in the below table.

Table 2: Brief Summary of Consultation

Consultation date	Stakeholder	Outcomes
Ongoing	DWER	Close out of rehabilitation requirements – in October 2018 following successful completion of rehabilitation DDG requested that DWER review requirements under Condition 8e of the permit and close out the rehabilitation requirements. DWER responded on 8 March 2019 agreeing that Condition 8 of the permit was met. Clearing permit reporting - annual reporting against CPS 6013 is required as a condition of the permit. This is completed and submitted annually in December. Clearing permit extension – 5th July 2019 DDG requested an extension to CPS 6013 to allow for ongoing maintenance and operational works (vegetation maintenance). DWER through consultation to ensure landholder access DWER granted the extension on 10 October 2019. This extends the expiry date of the permit to July 2029.
Ongoing (annual at a minimum)	DPLH	Easement management including fees, access rights and determination of easement location.
Ongoing	Kuruma Marthudunera	Section 18 consent was granted on 4 July 2014. Consultation ongoing including site visit held September 2017.
August 2013 and ongoing	Yindjibarndi	Consultation resulted in DDG and the Yindjibarndi group entering into an active Heritage and Native Title Agreement. Detailed survey of the proposed FRGP

Consultation date	Stakeholder	Outcomes
		footprint was conducted in the presence of Yindjibarndi representatives. No sites of significance that could not be avoided were identified.
2013-2015	Water Corporation	Early discussions were held with Water Corporation in October 2013 to provide an overview of the FRGP and identify environmentally sensitive areas required to be avoided. This resulted in revision to the FRGP alignment to ensure that neither the temporary accommodation camp or hydrocarbon storage would occur within a Public Drinking Water Source Area (PDWSA), Priority 1 (P1) zone (see Section 6.10). Further consultation was held in February 2014 when a risk assessment was conducted to identify and address pipeline activities requiring management within the PDWSA.
Ongoing	Landholders	Annual site visits (minimum) Access and approvals for crossings

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