Bonaparte Gas Pipeline

Flora & Fauna Studies & Ecological Field Survey Results

Prepared for: Australian Pipeline Trust

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1. EXECUTIVE SUMMARY

The Bonaparte Gas Pipeline (BGP) has been proposed to transport gas from a natural gas plant near Wadeye in the Northern Territory to meet with an existing pipeline 285km eastwards on Ban Ban Springs Station. In order to gain an understanding of the ecology of the region proposed for the BGP, the standard guidelines for the Terrestrial Biodiversity Component of Environmental Impact Assessment were used to design and undertake desktop studies and field surveys. Relevant legislation and codes have been identified, along with sources of information utilised in the desktop studies.

Aquatic environments were thoroughly researched via a desktop study of the existing information. The Daly River has undergone many aquatic surveys within the past few years. Surveys of the Moyle River and Tom Turners Creek were undertaken for the Trans Territory Pipeline in 2004.

Most of the field survey results reflected the results of the desktop studies, but also provided much greater detail on distributions and presence/absence data.

Potential species or habitats of conservation significance were also identified through desktop studies, and their presence confirmed or dismissed through field studies. The field and desktop studies have identified a range of potential ecological issues and these have been either avoided during route selection or have generally been addressed by management strategies that will be applied during and after BGP construction (see draft CEMP, Appendix B of PER): These include:

- weed infestations present that must not be spread, notably; *Xanthium strumarium*, *Andropogon gayanus* and *Mimosa pigra;*
- potential to impact upon *Eucalyptus tintinnans*, a tree that indicates important habitat for endangered Gouldian Finch;
- potential to impact upon migratory species;
- need to avoid impacts to watercourses and associated riparian vegetation; and
- protection needed for fauna species of conservation significance.

In summary, there are no identified ecological impacts associated with the BGP construction that will not be reduced to minimal levels via well planned and executed environmental management. Thorough field and desktop studies have provided baseline data against which the ecological impacts of the BGP can be measured.

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2. INTRODUCTION

EcOz Environmental Services were contracted by Australian Pipeline Trust (APT) to investigate and document the general environmental aspects, including flora and fauna species, vegetation types and soils, and to assess potential environmental issues of the proposed alignment of the Bonaparte Gas Pipeline (BGP). Construction of the pipeline will involve clearing a 30m construction corridor and constructing a pipeline within this corridor. The BGP project has been declared a controlled action under the Commonwealth *Environmental Protection and Biodiversity Conservation Act (EPBC Act)* due to its potential to cause significant impacts on listed threatened species and communities, and on migratory species. This project proposal is also subject to assessment under the NT *Environmental Assessment Act,* and has been determined to be assessed at the level of a Public Environment Report (PER). The project will be assessed under a bilateral agreement between the Australian Government and the Northern Territory Government.

Guidelines were prepared in October 2006 by the Northern Territory Environment Protection Agency. These guidelines were developed to assist APT in preparing a PER for the proposed BGP in accordance with Clause 8 of the Administrative Procedures of the *Environmental Assessment Act*.

The following technical report on the outcomes of the desktop and field investigations documents baseline information to guide the assessment of potential impacts of the project on the environment of the region. It also provides a base from which to develop appropriate management strategies for the construction and operation of the proposed pipeline.

3. APIA CODE & ENVIRONMENTAL LEGISLATION

The following are some of the legislation and the code relevant to the assessment of the pipeline route and to this study.

APIA Code of Environmental Practice (2005)
The Australian Pipeline Industry Association (APIA) *Code of Environmental Practice – Onshore Pipelines*, has been established to encapsulate the Best Practice Techniques and Methods presently available to mitigate or eliminate the environmental impact of pipeline construction and operation on the receiving environment. Essentially the code aims to provide guidance and direction in the management of the environmental aspects of pipeline planning, design, construction, operation and decommissioning.

Commonwealth
Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act)
Protects nationally threatened species and ecological communities.

Northern Territory
Planning Act 1999
Clearing of native vegetation requires a Development Permit.

Pastoral Land Act 2006
Clearing of native vegetation on pastoral land requires a permit.

Territory Parks and Wildlife Conservation Act 2000 (TPWC Act)

Protects protected wildlife, declared 'threatened wildlife' and 'areas of essential habitat'.

Weeds Management Act 2001
Lists declared weeds and ensures control measures are in place to control some species and to prevent further spread of many species.

Water Act 1992
Provides for the protection of waterways, groundwater and tidal water from pollution. The Act also controls the drilling and abstraction of water from bores and the construction of dams or water storage facilities.

Waste Management and Pollution Control Act
Provides for the control of waste, including discharges to the environment.

Environmental Assessment Act 1982
This Act provides for the assessment of the environmental effects of development proposals and for the protection of the environment. The object of the Act is to ensure that each matter affecting the environment is fully examined and taken into account in relation to the formulation of proposals and the carrying out of works and other projects.

4. METHODS

This study was conducted using methods described in the Guidelines for the Terrestrial Biodiversity Component of Environmental Impact Assessment developed by the Biodiversity Conservation Division of DIPE (now NRETA) in 2005. This assessment report includes the following components:

4.1 Desktop studies

Desktop studies of established databases were conducted prior to the field surveys to identify fauna and flora species, vegetation types and environmental constraints present in the route area. The results of the desktop studies can be found in the following Section 5.

NT Fauna Atlas maintained by Parks and Wildlife Service NT (PWSNT).
The NT Fauna Atlas contains point locations of fauna species identified in miscellaneous surveys and from incidental observations. Survey effort has been concentrated in certain areas and there are many areas that are data poor. The area being assessed for the proposed BGP route, being a linear development, traverses both detailed and poorly surveyed areas.

The NT Fauna Atlas was utilised to assess whether or not species classified as Threatened under NT or Commonwealth legislation have been previously recorded in the area being assessed for the proposed BGP.

NT Herbarium database maintained by PWSNT.
The NT Herbarium database contains point locations of flora species identified during miscellaneous surveys. Survey effort has been concentrated in certain areas and other areas are data poor. The area being assessed for the proposed BGP route, being a linear development, traverses both detailed and poorly surveyed areas.

The database was utilised to assess whether or not species classified as Threatened under NT or Commonwealth legislation have been previously recorded in the area being assessed for the proposed BGP.

Rainforest patch GIS coverage maintained by PWSNT.
Rainforest vegetation is considered to be ecologically important and vulnerable to disturbance. Rainforest patches in the Northern Territory have been mapped from aerial photography and satellite imagery by PWSNT.

The database was utilised to determine obvious areas to be avoided during route selection.

Australian Heritage Database, maintained by the Australian Government, Department of the Environment and Water Resources.
The Australian Heritage Database is Australia's national inventory of natural and cultural heritage places that are worth preserving. It contains information about more than 20,000 natural, historic and Indigenous places, including places in:

- The World Heritage List,
- The National Heritage List,
- The Commonwealth Heritage List,
- The Register of the National Estate.

In addition to listed sites, the Australian Heritage Database contains sites that have been nominated but are yet to be assessed, sites that have been listed but are now removed, and sites that have been nominated but were rejected.

EPBC Act database maintained by the Australian Government, Department of the Environment and Water Resources.
This database is provided to assist members of the public in understanding the *Environment Protection and Biodiversity Conservation Act 1999* (*EPBC Act 1999*) and their rights, obligations and requirements under the Act. The database holds mapped locations of World Heritage properties, Ramsar wetlands, threatened, migratory and marine species, threatened ecological communities and protected areas. It is used to determine whether development is likely to affect a matter of National Environmental Significance and consequently require referral for assessment and approval under the *EPBC Act 1999.* Whether or not an action will trigger assessment under the *EPBC Act 1999* depends on the particular location, scope, timing and other circumstances of the proposed action. The EPBC database and data contained in the other datasets listed in this section were used to identify matters of environmental significance that occur in the vicinity of the proposed BGP route.

4.2 Field Surveys

Field surveys of the pipeline route were conducted in November and December of 2006, and during and prior to 2004 for the Trans Territory Pipeline and the Blacktip Gas Project. The purpose of these surveys was to:

- identify an environmentally acceptable route for the pipeline;
- identify environmentally acceptable locations for additional project infrastructure;
- identify environmentally sensitive areas and make recommendations on specific construction techniques and management measures;

- document and describe the environmental aspects that occur within the areas proposed for development; and
- gain a wider understanding of the environment of the pipeline route so that the potential local and regional impacts can be assessed.

Four environmental scientists from EcOz conducted the environmental assessments and two archaeologists conducted the archaeological assessment of the pipeline route during the pipeline surveys (the Archaeological Report is presented as Appendix G of the PER). The survey teams also included a pipeline construction expert, surveyors, anthropologists and Traditional Owners.

The route of the pipeline was traversed during November and December 2006. A differential GPS was used to navigate the proposed route and record the route determined in the field from the Eni Blacktip Gas Plant near Wadeye (Kilometre Point - KP0) to the existing Amadeus Basin to Darwin Gas Pipeline (ADP), east of the Stuart Highway on Ban Ban Springs Station (KP285). The route was traversed by 4WD vehicles, within a general corridor of around 100m, with the intention of defining a pipeline route 30m wide.

The whole route was traversed during November and December 2006, except for two sections in the far west, from KP0 to KP16, and KP36 to KP78, which were surveyed for the Blacktip Gas Plant and the Trans Territory Pipeline in 2003-2004 (EcOz 2004a, EcOz 2004b).

The field investigations involved site surveys spaced no more than 5km apart, and details of vegetation, soils and other environmental aspects recorded within an area of 50m radius while walking around each site. Additional stops were made to survey specific sites whenever environmental issues were evident, and site details recorded. The pipeline route was surveyed continuously from the vehicles between the sites, and general observations were made in transit. A total of 115 sites were surveyed in detail.

Data recorded on prepared data sheets included:

- GPS Coordinates using a hand-held 12-satellite GPS set to GDA94 (accuracy around +/- 5m);
- site description;
- description of physical environment;
- description of the level of disturbance, if any;
- vegetation classification and species identified;
- fire history and impact;
- evidence of weeds and feral animals (scaled from 0=no evidence to 5=evidence of high numbers);
- soil and groundcover description;
- digital photographs;
- management recommendations if required; and
- any other relevant information.

Field identifications of plant species were made using a variety of books and reference materials, including Brock 1993, Brooker & Kleinig 2004, Cowie *et al.* 2000, Hill 1996, Maslin 2001, Milson 2000 (x2), Morcombe 2004, PWCNT 2003, Sharp & Simon 2002, Smith 2002, Wheaton 1994, Wheeler *et al.* 1992, and Wightman & Andrews 1989.

Incidental observations of birds and other fauna were also made, with reference to Barrett *et al.* 2003, Morcombe 2004, and Simpson & Day 1993.

Plant species that could not be identified in the field were sampled and preserved for later identification by the NT Herbarium. Identifications from the NT Herbarium have been applied to the sampled specimens and incorporated into the results. All data have been tabulated and incorporated into a Geographic Information System database.

4.2.1. Route selection

The preferred location of the pipeline was determined in the field by the team. The criteria for route selection included cultural, archaeological, environmental, and physical. The whole team discussed selection of the preferred centreline based on the various criteria, and where there were any potential impediments, such as monsoon forest patches, special trees, waterholes, or other aspects of significance, the route of the pipeline was re-aligned in most cases to avoid these potential impediments. Where there were no alternatives, such as crossing rivers or creeks, the team selected the route with the least potential for negative impacts. This included determining a range of protective measures whilst on site, such as avoiding large trees on creek banks where possible, selecting a crossing on a straight section of creek with a low slope rather than on a bend with steep banks, and selecting a path with the least density of vegetation.

4.3 Assessment of Conservation Significance

The conservation significance of flora, fauna and habitats within and surrounding the project area were assessed with reference to the following:

- species classified as threatened and/or protected in accordance with the *Territory Parks and Wildlife Conservation Act 2000*;
- species classified as threatened in accordance with the *Environmental Protection and Biodiversity Conservation Act 1999*;
- ROTAP (Rare or Threatened Australian Plants) List (Briggs & Leigh 1996); and
- known habitats of threatened species and habitats with outstanding biodiversity values, after discussion with experts from the Dept of Natural Resources, Environment and the Arts.

The ROTAP list has no legal status but it is an important reference for the national status of threatened species, particularly for Rare and Poorly Known species which are not recognised under the *EPBC Act 1999*. Species that are classified as Rare and Poorly Known are also not recognised under the *TPWC Act 2000.*

4.4 Limitations

The 2006 field investigations were undertaken in the very late dry season of 2006. The lengthy dry period and associated fires preceding the investigations resulted in much of the understorey vegetation being absent or unidentifiable (stunted, new growth, or infertile). Approximately 50% of the sites along the route had experienced a fire during 2006. Interpretations and understandings of habitats by experienced environmental scientists can often fill in the gaps in the field, and this is facilitated on a linear development. While some ephemeral species of plants which are visible during only the wet season were not present during this survey, most perennial species occurring along the route were likely to have been encountered and recorded.

There was insufficient time during the route survey to identify any more than easily visible and diurnal species of fauna. No aquatic surveys were conducted in the field, however most of the major rivers and creeks in the area have been studied previously, and the available published works were summarised in the desktop phase.

Fires may have also removed evidence of weed infestations. Proposed weed washdown locations recommended by EcOz are a general indication only (refer Figure 2). These recommendations are based on the distribution of recorded infestations discovered during the field survey. Final decisions on washdown locations need to be made closer to the time of construction, based on:

- distribution and extent of weed infestations of concern (areas highlighted in Figure 2);
- the proposed direction of construction; and
- movements of the vehicles and machinery (i.e. vehicles travelling back along the cleared alignment, or moving around watercourses via dirt and sealed public roads).

5. RESULTS

5.1 Desktop Studies

5.1.1. Vegetation

Vegetation types and extent along the proposed BGP route, extracted from Vegetation of the Australian Tropical Savannas Map (Environmental Protection Agency QLD, 2001) are summarised in Table 1 and mapped in Figure 1. The vegetation is predominantly woodland dominated by *Eucalyptus tectifica* (Darwin Box) and *Corymbia spp.*,with *Sarga* and *Sehima nervosum* grass species in the understorey. The BGP also traverses a small patch of *Eucalyptus tintinnans* woodland, which is important habitat for the endangered Gouldian Finch (see Section 7.2 of this report).

Field surveys showed that while the mapped vegetation is approximately correct, differences were found, as reported in section 5.2.

Photographs documenting vegetation types can be viewed at Appendix 4 of this report.

Table 1: Vegetation types and extent along the BGP

Vegetation Units	KP Ranges	Total Distance Traversed (km)	Percentage of route covered
Eucalyptus tectifica +/- Corymbia foelscheana +/- Corymbia latifolia woodland with *Sarga spp.*, *Sehima nervosum* understorey	0-47, 70-120, 123-130, 135-138, 140-170, 180-219, 225-285	236	82.8
Melaleuca viridiflora, Eucalyptus spp low open woodland	47-70, 120-123, 130-135, 138-140, 219-225	39	13.7
Eucalyptus tintinnans low woodland with *Sarga spp*. Grassland understorey	170-180	10	3.5

5.1.2. Weed infestations

Weed distribution in the project area is generally related to environmental disturbances caused by the construction of roads and tracks, cattle grazing and feral animals. Weeds are most prevalent on land under pastoral lease. In these areas, infestations are generally concentrated around infrastructure such as water points, fence lines and tracks, and also along the banks of watercourses where cattle and feral animals tend to congregate. Through a desk-top study based on data from the Northern Territory Flora Atlas, 55 different weed species from 125 different records have been recorded within a 10km buffer around the proposed pipeline route. According to the Northern Territory Flora Atlas, none of these species are listed as Weeds of National Significance.

In 1998 the Northern Territory Department of Lands, Planning and Environment determined that over 75% of surveyed sites throughout the Daly River catchment riparian zones contained exotic

terrestrial vegetation, and over 50% contained plant species declared noxious in the Northern Territory (Erskine *et al*. 2003).

Figure 1: Australian Tropical Savannas Vegetation Communities Map

5.1.3. Fauna

The main habitats which the BGP route traverses support a diversity of fauna, many of which are widespread and highly mobile. The Northern Territory Fauna Atlas records that fall within the proposed BGP construction corridor include 240 species of birds, 65 species of reptiles, 25 species of amphibians and 32 species of mammals. Fauna species of conservation significance are provided in Table 2, and migratory species are provided in Table 3.

5.1.4. Feral and Invasive Faunal Species

Introduced feral vertebrate species recorded in the BGP surveyed area include: the Cane Toad *Bufo marinus*, Pig *Sus scrofa*, Water Buffalo *Bubalus bubalis*, Horse *Equus caballus* and House Cat *Felis catus.*

Cane toads are present across the project area and concern about their ecological impacts is widespread. Predation, competition and lethal toxic ingestion caused by cane toads are currently nominated for listing as 'key threatening processes' under the *EPBC Act, 1999*. Their current range extends almost to the Northern Territory and Western Australian border, and they continue to invade further west (CSIRO 2006).

Signs of pigs and buffalo were observed throughout the project area, especially in seasonally inundated areas and along watercourses. Buffalo can cause severe environmental degradation and are carriers of bovine tuberculosis (Menkhorst and Knight 2001). Widespread across the Northern Territory but concentrated on floodplain environments, pigs are also a serious pest.

The horse can be quite destructive within its favoured habitat of grassland and shrubland. Northern Territory Fauna Atlas records compiled by Parks and Wildlife, current in 2003, showed 4 records of horses within the BGP surveyed area.

There is one Northern Territory Fauna Atlas record of a feral cat within the BGP study corridor. The Dingo *Canis lupus dingo*, likely introduced to Australia by Indonesian seafarers about 4000 years ago and now naturalized is endangered due to hybridisation with the domestic dog, and through persecution (Menkhorst and Knight 2001). There are two Fauna Atlas records of dingoes within the BGP study corridor.

Table 2: Threatened Terrestrial Fauna Species

Species name and Description	Status	Preferred Habitat and Known Distribution	Likelihood of Occurrence
Bare-rumped Sheathtail Bat (*Saccolaimus saccolaimus nudicluniatus)* This species has been rarely sighted over the past 23 years.	Critically Endangered (*EPBC Act 1999)*	Coastal open woodland, known to roost in *Eucalyptus alba.*	Unlikely – no records in the area.
Northern Quoll (*Dasyurus hallucatus*) Once common across Northern Australia, this species' range has contracted by 75%.	Endangered (*EPBC Act 1999)*	Rocky escarpment, open forest and open woodland.	Probable – there have been several recordings of the Quoll within the BGP surveyed area where the availability of its habitat is widespread.
Gouldian Finch (*Erythrura gouldiae*) Only one sighting has been recorded within the vicinity of the proposed BGP route, and that was approximately 109km away.	Endangered *(EPBC Act 1999)*	Open tropical woodland that has a grassy understorey, often in hilly areas.	Likely, although the nearest recorded sighting to the BGP is approximately 109km away. Some of its preferred habitat occurs within the vicinity of the pipeline, although its habitat is not likely to be significantly affected by the construction due to the scale of construction activity, and its duration.
Water Mouse (*Xeromys myoides)* Formerly known as the False Water Rat, the range and biology of this species are poorly known, having only been recorded in a few localities; 2 of which lie within the BGP surveyed area.	Vulnerable *(EPBC Act 1999)*	Freshwater swamps, riversides, sedgelands and mangroves in the Northern Territory.	Unlikely – two of its known localities are in the vicinity of the proposed BGP route. It is highly unlikely to occur within the corridor due to its specific habitat requirements.
Brush-tailed Phascogale (*Phascogale tapoatafa pirata*) Generally rare Australia-wide, this species is threatened by habitat fragmentation.	Vulnerable *(TPWC Act 2000)*	Tall open forests dominated by *Eucalyptus miniata* and *E. tetrodonta.*	Likely – a large part of the BGP route passes through the preferred territory.
Partridge Pigeon (*Geophaps smithii smithii*) 19 atlas records for this species fall within the BGP surveyed area, particularly in the northern end.	Vulnerable *(EPBC Act 1999)*	Open forest and woodland dominated by *Eucalyptus tetrodonta* and *Eucalyptus miniata* with a structurally diverse understorey.	Probable – lots of records in the area, and much of the BGP runs through its preferred habitat. This habitat type is widely available.
Masked Owl (northern) (*Tyto novaehollandiae kimberli*) Few records exist for this species - it has been recorded within the BGP surveyed area.	Vulnerable *(EPBC Act 1999)*	Forests, woodlands and caves. Tree hollows are also considered to be important to this species.	Likely – very few records exist for this species, though some records lie within the BGP corridor.
Hooded Parrot (*Psephotus dissimilis*) Little information exists on this species, though they are similar in habit to the Golden-shouldered Parrot, and 2 atlas records fall within the BGP surveyed area.	Near Threatened *(TPWC ACT 2000)*	Savanna woodlands.	Likely – it has been recorded within the BGP corridor.
Beach Thick-knee (*Esacus magnirostris*) A large bird, formerly known as the Beach-stone Curlew.	Near Threatened *(IUCN 2001)*	Beaches, reefs, and coastal mudflats.	Unlikely – the start of the pipeline is several kilometres from the coast.
Red-cheeked Dunnart (*Sminthopsis virginiae nitela*) Four atlas records for this species lie within the BGP surveyed area.	Locally Rare *(IUCN 1994)*	Forest margins, savanna grasslands, swamps and soaks, where it is occasionally locally common.	Likely – a large part of the BGP corridor is within the Dunnart's preferred habitat.

Table 3: Migratory Species potentially affected by the BGP

Common and Species Name	Description	Preferred Habitat	Likelihood of occurrence based on habitat.
Melville Cicadabird, *Coracina tenuirostris melvillensis*	Migratory Terrestrial Bird Species	Forests and woodlands.	Likely
Gouldian Finch, *Erythrura gouldiae*	Migratory Terrestrial Bird Species	Open woodland and grassland.	Gouldian Finch records in this area are rare; parts of the route do traverse their preferred habitat.
White-bellied Sea-eagle, *Haliaetus leucogaster*	Migratory Terrestrial Bird Species	Large rivers, fresh and saline lakes, estuaries, reservoirs, coastal seas, and islands.	Probable
Barn Swallow, *Hirundo rustica*	Migratory Terrestrial Bird Species	Open country, cultivated land, urban areas.	Probable
Derby White-browed Robin, *Poecilodryas superciliosa cerviniventris*	Migratory Terrestrial Bird Species	Mangroves, swampy thickets, jungles, streamside vegetation.	Likely
Rufous Fantail, *Rhipidura rufifrons*	Migratory Terrestrial Bird Species	Wet forests, and occasionally more open forests.	Probable
Common Sandpiper, *Actitis hypoleucos*	Migratory Wetland Bird Species	Banks, rocks near water.	Unlikely
Ruddy Turnstone, *Arenaria interpres*	Migratory Wetland Bird Species	Rocky shores.	Very Unlikely
Sanderling, *Calidris alba*	Migratory Wetland Bird Species	Beaches, rarely inland.	Very Unlikely
Great Knot, *Calidris tenuirostris*	Migratory Wetland Bird Species	Tidal mud-flats, rarely inland.	Very Unlikely
Greater Sand Plover, *Charadrius leschenaultii*	Migratory Wetland Bird Species	Shores, marshes, rarely inland.	Very Unlikely
Lesser Sand Plover, *Charadrius mongolus*	Migratory Wetland Bird Species	Shores, marshes, rarely inland.	Very Unlikely
Oriental Plover, *Charadrius veredus*	Migratory Wetland Bird Species	Dry inland plains, occasionally coastal.	Possible
Oriental Pratincole, *Glareola maldivarum*	Migratory Wetland Bird Species	Open plains, bare ground around swamps, claypans.	Possible
Bar-tailed Godwit, *Limosa lapponica*	Migratory Wetland Bird Species	Tidal flats, rarely inland.	Very Unlikely
Little Curlew, *Numenius minutus*	Migratory Wetland Bird Species	Open plains, grasslands, sometimes mud-flats.	Possible
Whimbrel, *Numenius phaeopus*	Migratory Wetland Bird Species	Estuaries, mud-flats, mangroves, sandspits, occasionally inland.	Very Unlikely
Grey Plover, *Pluvialis squatarola*	Migratory Wetland Bird Species	Beaches, mud-flats, sometimes inland.	Very Unlikely
Estuarine Crocodile, *Crocodylus porosus*	Migratory Marine Reptile Species	Estuarine environments, but can be found tens of kilometres upstream of river mouths, and in wetland areas.	Likely

Sources: Department of Environment and Heritage 2006, Simpson and Day 1993, Barrett et al. 2003, Cole & Woinarski 2002, Menkhorst & Knight 2001, IUCN 2006, Department NRETA 2001, DEH 2006b.

5.1.5. Migratory Species

The floodplains of the Moyle and Daly River catchments retain some water all year round in billabongs and several large permanent swamps. The area therefore provides an important dry season habitat for migratory waterbirds. A full list of the potential migratory species identified in a search of the *EPBC* database for the area of the BGP is given in Table 3.

The planned construction of the BGP route during the dry season corresponds with the time of year that waterbirds flock to wetlands. Route selection has avoided areas of open water and where possible provided a buffer to open water areas to minimise the potential short term construction impacts on migratory birds. Floodplain habitats typically regenerate quickly following minor levels of disturbance, as would be associated with the BGP construction, yet the aim will still be to minimise impacts in floodplain areas.

5.1.6. Aquatic Environments

The proposed BGP route crosses two main river catchments:

- the Moyle River catchment which includes the Moyle River and its main tributary, Tom Turners Creek; and
- the Daly River catchment which includes the Daly River and its tributaries Chilling Creek, Green Ant Creek, Sandy Creek, and Hayes Creek.

Hermit Creek crosses between these two main catchments and forms part of the Daly River system. It consists predominantly of a series of small waterholes in the lower reaches and minor creeks in the upper reaches. The fish species recorded in the Daly River from studies prior to 2003, and during aquatic fauna surveys of the Moyle River, and in Tom Turners Creek during 2004 for the proposed Trans Territory Pipeline (Wilson & Brooks, 2004) are presented in Table 4.

In total, 34 stream and river crossings were encountered along the pipeline route. Most of these were dry at the time of survey, and are likely to be dry when the pipeline is constructed. Crossings are identified in Appendix 1, and recommendations on most of the crossings are made in Appendix 2.

Table 4: Records of Fish Species within waterways crossed by the proposed BGP

Scientific Name	Common Name	Conservation Status (if applicable)	Moyle River Presence	Tom Turners Creek Presence	Daly River Presence
Fish Species					
Ambassis agrammus	Sailfin Glassfish				**Y**
Ambassis macleayii	Reticulated Glassfish				**Y**
Ambassis muelleri	Western Glassfish				**Y**
Amniataba percoides	Barred Grunter		**Y**		**Y**
Anodontiglanis dahli	Toothless Catfish				**Y**
Arius graeffei	Lesser Salmon Catfish				**Y**
Arius leptaspis	Salmon Catfish				**Y**
Arius midgleyi	Shovel-nose Catfish				**Y**
Aseraggodes klunzingeri	Tailed Sole				**Y**
Carcharhinus leucas	Bull Shark				**Y**
Craterocephalus stercusmuscarum	Fly-specked Hardyhead		**Y**	**Y**	**Y**
Craterocephalus stramineus	Blackmast				Y
Denariusa bandata	Penny Fish			**Y**	**Y**

Scientific Name	Common Name	Conservation Status (if applicable)	Moyle River Presence	Tom Turners Creek Presence	Daly River Presence
Glossamia aprion	Mouth Almighty		**Y**	**Y**	**Y**
Glossogobius aureus	Golden Goby				**Y**
Glossogobius giurus	Flathead Goby				**Y**
Hephaestus fuliginosus	Sooty Grunter		**Y**	**Y**	**Y**
Himantura chaophraya	Freshwater Whipray	Vulnerable			
Hypseleotris compressa	Carp Gudgeon				**Y**
Hypseleotris sp	Katherine Gudgeon	Data Deficient			**Y**
Kurtus gulliveri	Nursery Fish				**Y**
Lates calcarifer	Barramundi		**Y**	**Y**	**Y**
Leiopotherapon unicolor	Spangled Grunter		**Y**	**Y**	**Y**
Liza alata	Diamond Mullet				**Y**
Megalops cyprinoides	Ox-eye Herring		**Y**	**Y**	**Y**
Melanotaenia australis	Western Rainbowfish		**Y**	**Y**	**Y**
Melanotaenia nigrans	Black-banded Rainbowfish			**Y**	**Y**
Melanotaenia trifasciata	Banded Rainbowfish				**Y**
Melanotaenia splendida	Chequered Rainbowfish				**Y**
Mogurnda mogurnda	Purple Spotted Gudgeon		**Y**	**Y**	**Y**
Nematalosa erebi	Bony Bream				**Y**
Neosilurus ater	Black Catfish		**Y**	**Y**	**Y**
Neosilurus hyrtlii	Hyrtles Catfish		**Y**		**Y**
Ophisternon gutturale	Swamp Eel				**Y**
Oxyeleotris lineolatus	Sleepy Cod				**Y**
Oxyeleotris selheimi	Giant Gudgeon				**Y**
Pingalla midgleyi	Midgely's Grunter	Near Threatened			**Y**
Porochilus obbesi	Obbes Catfish				**Y**
Porochilus rendahli	Rendahl's Catfish				**Y**
Pristis microdon	Freshwater Sawfish	Critically Endangered			**Y**
Pseudomugil gertrudae	Spotted blue-eye			**Y**	**Y**
Scatophagus argus	Spotted Scat				**Y**
Selenotoca multifasciata	Striped Scat				**Y**
Strongylura krefftii	Freshwater Longtom		**Y**		**Y**
Syncomistes butleri	Butler's Grunter				**Y**
Toxotes chatareus	Common Archerfish				**Y**
Toxotes lorentzi	Primitive Archerfish		**Y**		**Y**

Source: The Daly River fish data originates from the Northern Territory Museum records. Fish species records found within the Moyle and Tom Turners Creek came from a survey conducted by Dave Wilson and Steve Brooks in 2003 (Wilson & Brooks, 2004). The conservation status of the species, where noted, originates from a table in Blanch et al. 2005.

Moyle River Catchment

Very little information exists on the aquatic environment of the Moyle River. This is the case for most Northern Territory waterways. A survey conducted by Dave Wilson and Steve Brooks in 2004 (Wilson & Brooks, 2004) found the Primitive Archerfish (*Toxotes lorentzi)* in the Moyle River and Tom Turners Creek, and the Penny Fish (*Denariusa bandata*) in Tom Turners Creek. Both these species were outside their known range, which is most likely the result of data deficiency rather than a range extension. Many of the Northern Territory fish species are classified as Data Deficient because of the paucity of aquatic fauna surveys.

Wilson & Brooks (2004) described Tom Turners Creek as "long, wide, deep pools punctuated by small runs and swampy areas, with low, gently sloping banks on flat open woodland". They described the Moyle River as "a medium sized river with a moderate flow of clear water consisting of long pools ending in fast, wide, shallow sets of runs. The surrounding countryside is low rocky hills supporting open woodland".

No introduced species of aquatic fauna or flora were found in either the Moyle River or Tom Turners Creek.

Daly River Catchment

Emergent aquatic vegetation is the most common type of aquatic vegetation within the Daly River (Erskine *et. al.* 2003). *Vallisneria nana* is the dominant submerged macrophyte in the section of the Daly River where the BGP route will cross. *Vallisneria nana* beds are significant habitats for a variety of turtles, especially the Pig-nosed Turtle *Carettochelys insculpta*, macro-invertebrates and fish. Freshwater Crocodiles *Crocodylus johnstoni*, and Freshwater Whipray *Himantura chaophraya* also frequent these beds.

Spirogyra sp. is another submergent water plant inhabiting the Daly River. This plant is benthic (attaches to the river bottom), and therefore requires a solid substrate on which to attach (sand does not provide suitable attachment). *Spirogyra* is important as a food source and habitat for grazing animals such as turtles, and smaller organisms (Erskine *et. al.* 2003). During the early dry season (May to June) it is absent, but undergoes rapid growth to reach its maximum biomass by August. The distribution of *Spirogyra*, and therefore the fauna it supports, is limited to areas of moderate current speed, and is susceptible to alterations in the natural current.

No exotic aquatic vegetation was recorded in the catchment (Erskine *et. al.* 2003). Overall, the amount of cover provided from all types of aquatic vegetation is generally limited. The most commonly occurring in-stream habitat types are organic debris, (including logs, leaves, twigs, and branches), along with rocks and permanent pools deeper than 1m.

Stream-edge plants recorded in the Daly River Catchment include; the reed (*Phragmites karka*), River Pandanus *Pandanus aquaticus* and the ferns *Blechnum orientale*, and *Ampelopteris prolifera* (Blanch *et. al.* 2005). These and many other emergent, floating leafed and submerged plants occur in the numerous billabongs and on the extensive floodplains during the wet season. One of the most notable plant species is the Lotus Water Lily *Nelumbo nucifera*, which is important in the diet and culture of Aboriginal people. An average of 63% of the bank length provides canopy cover from the riparian vegetation (Faulks 1998). A minimum width of riparian vegetation is necessary for the sustainability of aquatic ecosystems and processes, as well as the sustainability of the riparian buffer itself (Faulks 1998). Protecting riparian habitat will help to maintain a good level of bank stability.

Largely as a result of groundwater inflows throughout the dry season, the Daly River is species rich. Its reaches are inhabited by:

- the Freshwater Sawfish *Pristis microdon,* which is listed as **critically endangered** under the *EPBC Act 1999* (Blanch *et. al.* 2005);
- the Freshwater Whipray *Himantura chaophraya*, which is listed as **vulnerable** under the *EPBC Act 1999* (Blanch *et. al.* 2005)*;*
- eight of the 9 species of Freshwater Turtles recorded in the Northern Territory. This includes the Pig-nosed Turtle *Carettochelys insculpta* which is listed as near threatened under the *Northern Territory Parks and Wildlife Act* (Blanch *et al.* 2005), and is thought to be vulnerable to changes in river flow and degradation of feeding habitat (Erskine *et al.* 2003). The Pig-nosed Turtle is a flagship species whose protection provides *de facto* protection for other species occurring in the same habitat. A sole remaining member of a once widespread Family, the best known Australian population of the species is found in the Daly River;

- 48 species of freshwater and estuarine fish have been recorded in the Daly River Catchment, one of which is endemic to the catchment (the Katherine River Gudgeon *Hypseleotris sp*.) (Blanch et *al.* 2005). In comparison, 33 species occur in the entire Murray Darling Basin. The number of fish species in the Daly River is similar to the numbers of fish species in the neighbouring Victoria River and Alligator Rivers (39 and 53 species respectively, Bishop and Forbes 1991). Most of the species found in the Daly are also found in other Top End streams (Blanch *et al.* 2005); and
- *Aphelocheirus australicus*, an uncommon aquatic bug, is known to occur in the Daly River (Blanch *et al.* 2005). Known from only a few sites in northern Australia, this genus is thought to be restricted to well oxygenated water, and is a reliable indicator of high quality water (Blanch *et al.* 2005).

Erskine *et al.* (2003) noted that 200 species of aquatic macro-invertebrates, including three new species from the Douglas River, were recorded in waterways of the Daly. In a 12km section in the middle reaches of the Daly River, 96 taxa of aquatic insects were recorded. There is a high diversity, but low abundance, of macro-invertebrates; the high diversity possibly reflecting the varied in-stream habitats available (Blanch *et al.* 2005).

The presently identified threats to the Daly River from future agricultural development and consequential land clearing include (Erskine *et al.*2003):

- impacts to soil and altered catchment hydrology, including increased runoff;
- accelerated soil erosion and sediment transfer to rivers;
- reduced groundwater recharge and resultant base-flow discharge; and
- increased incidences of fish kills.

The naturally low levels of nitrogen and phosphorus in the Daly's waters make it highly susceptible to pollution from fertilisers and sediments (Blanch *et al.* 2005). The main threats to bank stability in the Daly River catchment include stock activity and poorly designed road and track crossings. Faulks (1998) advised that extensive clearing within riparian zones should be avoided to allow the banks to have a greater chance of withstanding stock activity and the annual high flows during the wet season.

5.2 Field Surveys

Botanical data and environmental parameters (as identified in section 4.2 above) were collected at 115 sites, at intervals of no greater than 5 kms along the pipeline corridor. All other supporting infrastructure or activities were also surveyed, including the mid line scraper station, at least 4 construction camp sites, all proposed access tracks and existing quarries. The field survey data are summarised in Appendices 1, 2 and 3 of this report.

The surveys generally supported the interpretation of vegetation mapped in the Savanna map (EPA Qld 2001). Differences were observed, however at the finer scale from ground inspections. These are documented in Appendix 2, and include stands of open forest and some tall open forest of Darwin Stringybark *Eucalyptus tetrodonta* and Wollybutt *E. miniata* in the western part of the route, for about 10km and some other short sections of open forest at various locations along the route. The fine nature of these differences was not suitable for mapping at large scale.

5.2.1. Weeds

All field survey sites with recorded weeds are plotted in the map in Figure 2. The major exotic species recorded during field surveys of the BGP route in November / December 2006 included:

- *Hyptis suaveolens* (a noxious forb known as Hyptis or Horehound);
- *Xanthium strumarium* (a noxious forb, commonly known as Noogoora Burr);
- *Sida acuta* (Spinyhead Sida);
- *Stachytarpheta sp.* (a noxious forb, commonly known as Snakeweed);
- *Jatropha gossypifolia* (commonly known as Bellyache Bush);
- *Mimosa pigra* (Giant Sensitive Plant, a Weed of National Significance);
- *Calotropis procera* (a declared noxious weed commonly known as Rubber Bush); and
- *Andropogon gayanus* (an introduced pasture grass, known as Gamba Grass).

Hyptis; *Hyptis suaveolens* is widespread throughout the region, and its seeds can be readily transported via vehicles and clothing (Erskine et al. 2003). It is a declared noxious weed in the Northern Territory; class B/C (growth and spread to be controlled and not to be introduced to the Northern Territory). Hyptis was found in a number of locations along the route.

Noogoora Burr; *Xanthium strumarium* was identified twice in the field surveys of the route in November / December 2006, and these records match those from the Northern Territory Flora Atlas. One infestation is located on the eastern bank of the Daly River, and one infestation is located on the banks of Chilling Creek (to the west of the Daly River). It is a declared noxious weed in the Northern Territory; class B/C (growth and spread to be controlled and not to be introduced to the Northern Territory).

Sida acuta, Stachytarpheta sp., Jatropha gossypifolia, and Mimosa pigra are also all declared noxious weeds in the Northern Territory, class B/C (growth and spread to be controlled and not to be introduced to the Northern Territory). They have scattered records throughout the proposed construction corridor and are in low densities. Each species was encountered once or occasionally along the survey route. *Mimosa pigra*, a Weed of National Significance, was encountered once along the route on a black-soil plain of a southern tributary of the Daly River (it was not recorded in the original desktop assessment which was based on historical records).

Rubber Bush; *Calotropis procera* is a declared noxious weed in the Northern Territory, class B/C (growth and spread to be controlled and not to be introduced to the Northern Territory). Its habitat includes roadsides, disturbed areas, water-courses and river flats. Rubber Bush seeds are dispersed through wind and water. Unmanaged, rubber bush can form dense thickets that out-compete native species and degrade pasture lands (Smith, 2002). During field surveys in November / December 2006, one record of Rubber Bush was found approximately 8km east of where the BGP crosses the Daly River (refer draft CEMP, Appendix B).

Gamba Grass; *Andropogon gayanus* is not a declared weed in the Northern Territory, however, it is recognised as a weed of concern in the Northern Territory. Gamba Grass was deliberately introduced in 1931 for its benefits to pasturelands; however it is also associated with negative environmental impacts due to its invasiveness and impacts on fire regimes (NRETA 2007). It was recorded at two locations between KP200 and KP206, approximately 25km east along the route from the Daly River and around KP276 where the pipeline crosses the Alice Springs to Darwin Railway.

Proposed weed washdown areas were chosen on the following criteria:

- distribution of declared weeds and introduced flora of concern;
- important geographical or land ownership boundaries; and
- landowner request.

The exact locations must be refined closer to the time of construction.

Figure 2: Distribution of Introduced Flora and Weeds from Field Surveys

6. DISCUSSION OF RESULTS

6.1 Vegetation and Flora

Vegetation types along the BGP route were identified both in the field and through desktop studies as predominantly woodland or open forest. The particular vegetation communities identified in Table 1 that the proposed route traverses are widespread throughout the region. In general, the vegetation communities identified in the field surveys matched the communities identified through desktop vegetation mapping. However, subtle differences in vegetation communities were identified much more readily in the field.

According to the Australian Tropical Savannas Vegetation Map, *Eucalyptus tintinnans* low woodland is present on 6.3% of the proposed route. Particular attention in the field surveys was paid to woodland containing *Eucalyptus tintinnans* due to its connection with the endangered Gouldian Finch. Management recommendations were made in the field to avoid *Eucalyptus tintinnans* where possible; usually through a slight readjustment of the route whilst in the field.

Flora species identified in the field were typical of woodland and open forest communities within the region, and particular diversity was noted within the upper and mid-storey species. Reduced diversity within the lower storey and ground cover species may be attributed to the frequent fires within the region. The fires make it hard to identify species, and some species may be seasonal or no longer identifiable late in the dry season.

Discussion of significant aspects is presented in section 7.

6.2 Weeds

It was identified in the desktop studies that weeds are most prevalent on land under pastoral lease. This was confirmed in the field, with a large proportion of weed infestations recorded on Tipperary Station (see map in Figure 2), and very few weed records (the 3 eastern-most records) on Aboriginal Land. Of the major exotic species recorded on the proposed route during field surveys, Noogoora Burr *Xanthium strumarium*, Gamba Grass *Andropogon gayanus*, and Giant Sensitive Plant *Mimosa pigra*, have been flagged by landholders and authorities as the highest priority requiring management to prevent their spread. *Hyptis suaveolens* was the only weed species common throughout the proposed route, but it is not considered a substantial threat to the ecology of the region.

Weed locations were identified in the field, but their extent was not determined during the surveys. Surveys of the pipeline route will be required closer to but prior to construction to determine the extent of infestations, in order to map the extent and determine suitable locations for washdown sites and quarantine areas.

Management strategies, including locations of proposed weed washdown bays, will be required to prevent weed spread. The isolated nature of most of the weed infestations should facilitate weed management strategies. Weed infestations appear to be more prevalent around significant watercourses, and management strategies should be concentrated in these areas. A specific weed management plan should be prepared prior to construction commencing. The plan should include identification mechanisms.

6.3 Fauna

Few fauna species were recorded during the field surveys. Until further fauna surveys go ahead in the dry season of 2007, assessment of fauna within the BGP region will be based on the desktop studies. Desktop studies identified a diversity of species, many of which are widespread and mobile; traits which will minimise the impact the BGP has upon these species.

Fauna surveys of the entire pipeline route were considered to be not feasible. Discussion with the Biodiversity Unit resulted in two recommendations:

- that a set of fauna studies be carried out at targeted locations along the general alignment of the route; and
- thorough surveys of the open pipeline trench and removal and documentation of the fauna which fall into the open trench be undertaken and the results provide to the Biodiversity Unit of the NT Govt.

6.3.1. Further Planned Field Studies

Site specific fauna trapping
The results of the desktop studies were used to help determine the proposed route by avoiding known areas where species of concern may be found. There are significant gaps in knowledge of the fauna of the region which the BGP traverses and discussions with PWSNT suggested that field fauna studies would help increase the Northern Territory fauna knowledge base. These targeted fauna surveys should be undertaken during 2007.

Five targeted fauna survey sites have been determined in consultation with regional fauna experts from the Parks and Wildlife Service of the Northern Territory (PWSNT). The proposed sites are:

1. The only area that has been identified as potential Gouldian Finch habitat. Between Dorat Rd, the Daly River Rd and Fenton Airfield. KP246-255;
2. An area of limestone influenced soils that displayed vegetation distinctly different from anywhere else along the route and also showed many signs of faunal activity. On Tipperary Station around KP233;
3. The riparian zone on the eastern side of the pipeline crossing of the Daly River;
4. The rocky range on the western side of the pipeline crossing of the Daly River (possible pebble mound mouse habitat); and
5. An area of tall forest on red soils near Wadeye at about KP35.

The fauna surveys will follow the widely accepted Bioregional Assessment methods developed by PWSNT. At each survey site a 50m x 50m quadrat will be established with 20 Elliott (box) traps, 4 cage traps and 4 pit traps. Each Elliott and cage trap will be baited with a mix of oats and peanut butter. All traps are opened for 3 consecutive nights and checked early each morning. The pitfall traps are left open for the entire trapping period and each trap checked at least twice during the day to avoid animal deaths.

At each survey site, 3 diurnal and 2 nocturnal active searches, involving raking leaf litter, spotlighting and checking under bark and logs are conducted. Eight diurnal instantaneous bird counts will be conducted in each quadrat. Opportunistic observations made while travelling around the project area will also be recorded.

Open trench fauna handling
The construction of the pipeline will result in disturbance to fauna, especially while the pipeline trench is open. Methods for extracting fauna from open trenches have been developed in recent years (Wilson & Swan c.2005; Woinarski *et al*. 2000), and they have resulted in most animals being released unharmed from the trench. These methods include:

- construction activities should be confined to the dry season when the activity levels of reptiles are lower due to the cooler weather. This reduces the numbers of reptiles falling into the trench. Construction activities should also be planned so that the excavated trench will be open for the minimum amount of time necessary to lay the pipeline;
- fatalities of animals that fall into the trench will be minimised by installing temporary refuges or escape routes at regular intervals (e.g. escape ramps every 500m and damp sawdust filled hessian bags every 250m laid so as to create a shelter) and other devices according to conditions.
- wildlife handlers should be available on-site to inspect the trench daily from sunrise, paying particular attention to areas where work is being done on the pipeline; such as where the pipe is being laid into the trench and where it is being welded. The wildlife handlers would remove wildlife from the trenches, identify, record data, and release the captures into nearby vegetated areas. All wildlife handlers must be legally permitted, trained in appropriate handling protocols, and possess the necessary Personal Protection Equipment (PPE) for handling a wide variety of animals.
- all wildlife data must be given to the PWSNT, and any dead animals found must be preserved and submitted as voucher specimens to the Museum and Art Gallery of the Northern Territory (MAGNT). Animals that are unable to be identified in the field should be taken as voucher specimens and also lodged with MAGNT for identification.

Workers on the alignment should have constant radio contact with the wildlife handlers to attend to fauna issues associated with the trench. The animal handlers will have to be licensed to euthanase badly injured fauna that are found within the trench. Animal handlers must follow The Australian National Health and Medical Research Council's *Australian Code of Practice for the Care and Use of Animals for Scientific Purposes (2004)* when dealing with injured fauna.

A permit to interfere with wildlife from the PWSNT will be required for the wildlife monitoring activities detailed above, as will the appropriate Animal Ethics Clearance from the Charles Darwin University Animal Ethics Committee.

6.4 Feral Animals

Desktop studies identified several feral animal species that were likely to inhabit the BGP region, and field survey records confirmed the presence of several of these species. Records of feral and introduced species noted in the field surveys will provide a rough baseline estimate for their abundance before BGP construction. Feral animals may be affected by the proposed development, which may influence their abundance and range (refer Section 4.4 of PER). Field survey records indicated that pigs and cattle are generally present throughout the route, but in low numbers.

6.5 Migratory Species

The migratory species that potentially occur in the BGP region are generally associated with floodplains, mudflats, coastal environments, wet forests and inland waterways. The Moyle

Floodplain and Hyland Bay Wetland System hold many migratory species, as discussed in Section 7.3 of this report, however only its outer extremities will be traversed by the BGP. As the vegetation communities traversed by the BGP are typically woodland communities, and rarely wetlands, mudflats and open plains (refer Results Table in Appendix 1), it is not expected that many migratory species will be affected through BGP construction. Two species of migratory birds which could possibly be affected by the BGP, based on their preferred habitat type, are the Melville Cicadabird and the Gouldian Finch. The rarity of Gouldian Finch records within the BGP vicinity means they are unlikely to be affected, and very little of their preferred habitat was encountered. None of the surveyed route was considered to be high value habitat for the Gouldian Finch. There are two Fauna Atlas records within the BGP study corridor of the Melville Cicadabird, which prefers forests and woodlands (Simpson & Day 1993), the main vegetation type traversed by the BGP.

6.6 Aquatic Environments

Assessment of crossing types was made in the field based on a number of criteria, including knowledge gained from the desktop studies, field investigations and an understanding of pipeline construction methods. Common pipeline construction methods available for the crossing of watercourses include:

- Open cut (including flow diversion if applicable); and
- Horizontal directional drill (HDD).

All 34 watercourse crossings along the proposed route were inspected during the field investigations. The technical feasibility of each crossing was assessed by the field crew that included surveyors, engineers, environmental scientists, archaeologists and Traditional Owners. The criteria utilized to determine the most suitable crossing type is summarized in Table 6-1.

Table 6-1: Issues and Criteria Considered in Determining Crossing Type. (Alcan 2004)

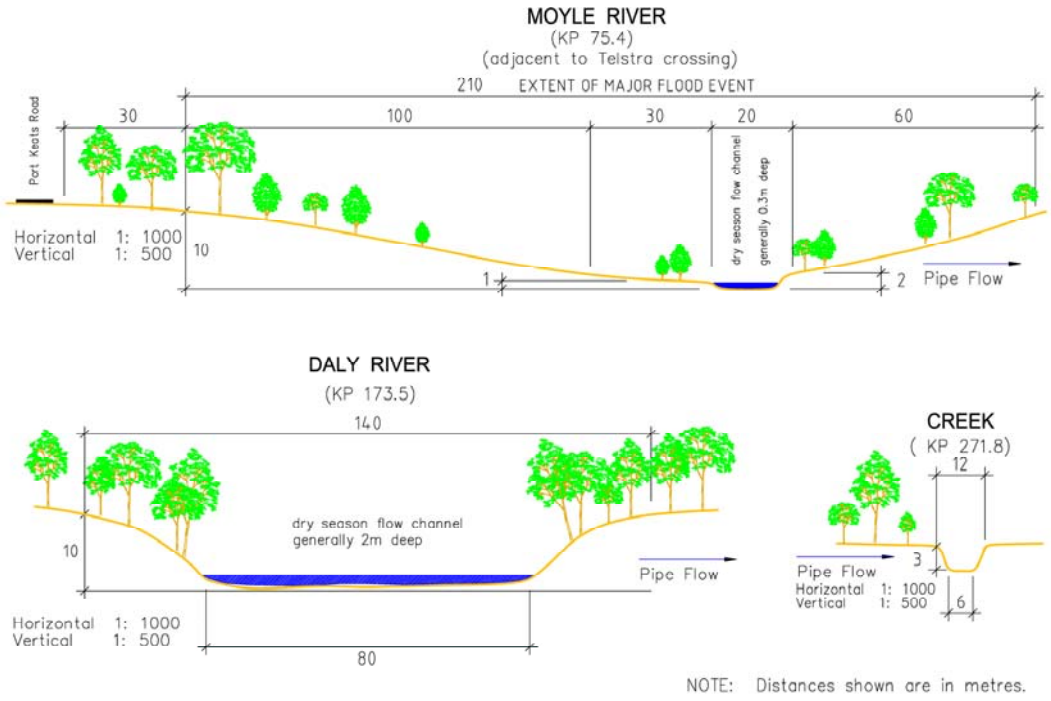
Issue	Criteria
Impact on environmental values	▪ Type and integrity of riparian vegetation. ▪ Susceptibility to erosion and potential to cause downstream sediment impacts. ▪ Ability to stabilize and rehabilitate in a short timeframe between construction and the following wet season. ▪ Type and integrity of in-stream habitat. ▪ Declared beneficial uses of water. ▪ Timing (i.e. season). ▪ Threatened flora and fauna.
Impact on archaeological and heritage sites	▪ Significant archaeological sites or objects. ▪ Significant historic heritage sites.
Impact on social values	▪ Declared beneficial uses of water. ▪ Landowner wishes. ▪ Recreational and tourism use of waterways. ▪ Downstream water users.
Impact on cultural values	▪ Aboriginal sacred sites. ▪ Aboriginal cultural values.
Engineering feasibility	▪ Soil and rock type. ▪ Bank profile. ▪ Geotechnical concerns. ▪ Cost and logistics of construction.

Issue	Criteria
	▪ Ability to stabilize and rehabilitate. ▪ Watercourse width, depth and flow. ▪ Feasibility of trenching.

The watercourse crossings were categorized into three types (refer Figure 6-1 and note vertical scale exaggeration) based on flow rates, bank profile, soil structure and extent of vegetation. The Daly River is planned to be crossed using HDD, the Moyle open cut with flow diversion and the creek with standard open cut. Of the 34 watercourse crossings surveyed and identified on the pipeline route, six have been identified as requiring specific management measures as set out in Table 2-12 of the PER.

Whether or not those proposed techniques are feasible will not be known with certainty until the completion of geotechnical investigations planned for the dry season of 2007. In the unlikely event that a proposed technique is required to be changed (for example, if geotechnical borehole drilling indicates that the HDD will encounter conditions currently unknown which may affect the successful completion of the HDD) then a detailed reassessment of the crossing technique will be made and all environmental impacts appropriately addressed in accordance with the draft CEMP (Appendix B).

Figure 6-1. Crossing Types.



7. ASSESSMENT OF SPECIES AND HABITATS OF CONSERVATION SIGNIFICANCE

7.1 Flora

A summary of the conservation status, current at the time of writing this report, of flora species found within the BGP vicinity is provided in Table 5. See Figure 3 for a distribution map of Threatened flora and fauna species from atlas data.

Table 5: Summary of Flora Conservation Status for BGP

Name	National Status (ROTAP), (Briggs & Leigh 1996)	NT	EPBC Status	Background and Description	2006 Field Survey Records
Nervilia plicata (Orchidaceae)	Listed as *Nervilia sp.1*. Poorly known. Geographic Range in Australia greater than 100km.	Endangered	Not Listed	This localised orchid has a ground-hugging habit and occurs in an open forest, rainforest margins and monsoonal rainforest of the Northern Territory, although it is also found in parts of Queensland, the Philippines, Indonesia and Papua New Guinea. There are 7 records of this species in the Northern Territory Flora Atlas at 3 locations in the region, but well away (from 7.3km to 49km) from the construcction corridor. Dunlop's Hole Vine Thicket (35km NE of the BGP) has National Heritage Listing due to the fact that *Nervilia* and *Schoutenia ovata* have been recorded there.	Not Recorded
Cycas armstrongii (Cycadaceae)	Not Listed.	Vulnerable	Not Listed	Cycad species are regionally endemic and have potential commercial values. They are typically slow growing, have a localised distribution and little is known about their ecology, giving rise to concerns about their sustainable management. *Cycas armstrongii* and another cycad, *C. maconochiei*, are both found in *Eucalyptus miniata* and *E. tetrodonta* forests of the Northern Territory. *C. armstrongii* is locally extremely abundant, not considered to be at risk, although not well reserved (Hill 1996). Frequent fire effectively blocks reproduction and uncontrolled development progressively alienates significant proportions of the habitat (Hill 1996). This cycad has been identified by Northern Territory Flora Atlas at one site within the proposed construction corridor, and also in four other locations at varying distances from 6.6km to 42km from the proposed route.	Not Recorded
Acacia praetermissa (Mimosaceae)	Rare (no current identifiable threat). Australian geographic range >100km. Recorded in Northern Territory only. At least one population within Litchfield N.P. but reserved population size is unknown.	Vulnerable	Vulnerable	An endemic species of Australia, this plant has been collected near Hayes Creek and is restricted to a small area. While little is known about this Acacia, it is believed to grow on rocky hill slopes in skeletal soils. No records of this species exist within the construction corridor according to the Northern Territory Flora Atlas:	Not Recorded
Schoutenia ovata	Rare in Australia, but does not currently have any identifiable threat. Geographic range >100km Reserved on the Arnhem Hwy, size of reserved population not accurately known. Recorded in the Northern Territory only.	Vulnerable	Not Listed	Dunlop's Hole Vine Thicket (4km S of KP146) received National Heritage Listing as an indicative place because it contains both *Schoutenia ovata* and *Nervilia plicata.* Not recorded in the Northern Territory Flora Atlas.	Not Recorded
Fimbristylis compacta (Cyperaceae)	Poorly known, accurate field information inadequate. Australian geographic range >100km. Recorded in the Northern Territory only. At least one population within Kakadu National Park but population size is unknown.	Not Listed	Not Listed	Poorly known	Not Recorded, however a *Fimbristylis sp.* Was recorded near **KP79** (S14.27727, E130.05910)

Name	National Status (ROTAP), (Briggs & Leigh 1996)	NT	EPBC Status	Background and Description	2006 Field Survey Records
Gomphrena involucrata (Amaranthaceae)	Poorly known, accurate field information inadequate. Australian geographic range >100km. Recorded in the Northern Territory only. At least one population within Kakadu National Park but reserved population size is unknown.	Not Listed	Not Listed	Poorly known	Not Recorded
Grevillea benthamiana (Proteaceae)	Rare (no current identifiable threat). Australian geographic range >100km. Recorded in Northern Territory only.	Not Listed	Not Listed	Poorly known	Not Recorded
Helicteres dentata var. procumbens (Sterculiaceae)	Poorly known, accurate field information inadequate. Australian geographic range > 100km. Recorded in Northern Territory only.	Not Listed	Not Listed	Poorly known	Recorded near **KP224** (S13.73486, E131.12582)
Hibbertia muelleri (Dilleniaceae)	Poorly known, accurate field information inadequate. Australian geographic range > 100km. Recorded in Northern Territory only.	Not Listed	Not Listed	Poorly known	Recorded **KP28** (S14.28119, E129.66231) and 1.5km SW **KP34** (S14.33072, E129.67739)
Hibbertia scabra (Dilleniaceae)	Poorly known, accurate field information inadequate. Australian geographic range >100km. At least one population within Kakadu National Park but reserved population size is unknown. Recorded in Northern Territory only.	Not Listed	Not Listed	Poorly known	Not Recorded
Nicotiana debneyi subsp. monoschizocarpa (Solanaceae)	Poorly known, accurate field information inadequate. Australian geographic range <100km. Recorded in Northern Territory only.	Not Listed	Not Listed	Poorly known	Not Recorded
Oldenlandia leptocaulis (Rubiaceae)	Poorly known, accurate field information inadequate. Australian geographic range	Not Listed	Not Listed	Poorly known	Not Recorded

Name	National Status (ROTAP), (Briggs & Leigh 1996)	NT	EPBC Status	Background and Description	2006 Field Survey Records
	>100km. Recorded in Northern Territory only. At least one population within Kakadu National Park but reserved population size is unknown.				
Pupalia micrantha (Amaranthaceae)	*Pupalia sp.1* Poorly known, accurate field information inadequate Geographic range in Australia <100km.	Not Listed	Not Listed	In the National Heritage List, Billawock Hill Vine Thicket (50km NW of the Daly River Township, and 60km NW of the BGP) is the only recorded location for the annual forb, *Pupalia D373899* (since listed as *Pupalia lappacea*, and now *Pupalia micrantha*), a species that is poorly known in Australia. Consultation with the Northern Territory Herbarium in January 2007 revealed that there are now 13 records of *Pupalia micrantha* across the Northern Territory, primarily associated with vine thickets on limestone/calcareous rock outcrops. It did not have a coding in January 2007, however was under proposal to be listed as "Of Least Concern". Apparently it is still unclear as to whether it is an introduced species.	Not Recorded

** Northern Territory Parks and Wildlife Conservation Act 2000*

** *Environment Protection and Biodiversity Conservation Act 1999*

Figure 3: NT Fauna and Flora Atlas Threatened Flora and Fauna

7.2 Fauna

The Northern Territory Fauna Atlas records for the area being assessed for the BGP route identify a number of fauna species which are classified as Threatened under the World Conservation Union (IUCN) criteria, the *EPBC Act 1999* and the *TPWC Act 2000*. The presence of any of these species in the pipeline corridor is dependent on the species range and availability of preferred habitat. A precautionary approach was taken to assessment in assuming that species of conservation significance may occur along the pipeline corridor where habitats preferred by these species exist. Table 6 lists the fauna of conservation significance that may occur within the BGP region.

For the purpose of this assessment, fauna species of conservation significance have been defined as those classified as Threatened according to IUCN criteria and listed under the provisions of the *EPBC Act* 1999 and *TPWC Act 2000*. These species are subject to some level of threat and are protected under legislation. The selection of the BGP route, and later, the construction activities, will be managed to minimise the potential impacts on these species.

Other Threatened species that have been recorded in the area are the Bustard *Ardeotis australis* and Emu *Dromaius novaehollandiae*. Populations of these two species are mobile over a large range across Australia and both are classified as Vulnerable under the *TPWC Act 2000*.

Table 6: Threatened Terrestrial Fauna Species within the BGP region

Species name and Description	Status	Preferred Habitat and Known Distribution	Likelihood of Occurrence
Bare-rumped Sheathtail Bat (*Saccolaimus saccolaimus nudicluniatus)* This species has been rarely sighted over the past 23 years.	Critically Endangered (*EPBC Act 1999)*	Coastal open woodland, known to roost in *Eucalyptus alba.*	Unlikely – no records in the area.
Northern Quoll (*Dasyurus hallucatus*) Once common across Northern Australia, this species' range has contracted by 75%.	Endangered (*EPBC Act 1999)*	Rocky escarpment, open forest and open woodland.	Probable – there have been several recordings of the Quoll within the BGP surveyed area where the availability of its habitat is widespread.
Gouldian Finch (*Erythrura gouldiae*) Only one sighting has been recorded within the vicinity of the proposed BGP route, and that was approximately 109km away.	Endangered *(EPBC Act 1999)*	Open tropical woodland that has a grassy understorey, often in hilly areas.	Likely, although the nearest recorded sighting to the BGP is approximately 109km away. Some of its preferred habitat occurs within the vicinity of the pipeline, although its habitat is not likely to be significantly affected by the construction due to the scale of construction activity, and its duration.
Water Mouse (*Xeromys myoides)* Formerly known as the False Water Rat, the range and biology of this species are poorly known, having only been recorded in a few localities; 2 of which lie within the BGP surveyed area.	Vulnerable *(EPBC Act 1999)*	Freshwater swamps, riversides, sedgelands and mangroves in the Northern Territory.	Unlikely – two of its known localities are in the vicinity of the proposed BGP route. It is highly unlikely to occur within the corridor due to its specific habitat requirements.
Brush-tailed Phascogale	Vulnerable	Tall open forests dominated	Likely – a large part of the

Species name and Description	Status	Preferred Habitat and Known Distribution	Likelihood of Occurrence
(*Phascogale tapoatafa pirata*) Generally rare Australia-wide, this species is threatened by habitat fragmentation.	*(TPWC Act 2000)*	by *Eucalyptus miniata* and *E. tetrodonta.*	BGP route passes through the preferred territory.
Partridge Pigeon (*Geophaps smithii smithii*) 19 atlas records for this species fall within the BGP surveyed area, particularly in the northern end.	Vulnerable *(EPBC Act 1999)*	Open forest and woodland dominated by *Eucalyptus tetrodonta* and *Eucalyptus miniata* with a structurally diverse understorey.	Probable – lots of records in the area, and much of the BGP runs through its preferred habitat. This habitat type is widely available.
Masked Owl (northern) (*Tyto novaehollandiae kimberli*) Few records exist for this species - it has been recorded within the BGP surveyed area.	Vulnerable *(EPBC Act 1999)*	Forests, woodlands and caves. Tree hollows are also considered to be important to this species.	Likely – very few records exist for this species, though some records lie within the BGP corridor.
Hooded Parrot (*Psephotus dissimilis*) Little information exists on this species, though they are similar in habit to the Golden-shouldered Parrot, and 2 atlas records fall within the BGP surveyed area.	Near Threatened *(TPWC ACT 2000)*	Savanna woodlands.	Likely – it has been recorded within the BGP corridor.
Beach Thick-knee (*Esacus magnirostris*) A large bird, formerly known as the Beach-stone Curlew.	Near Threatened *(IUCN 2001)*	Beaches, reefs, and coastal mudflats.	Unlikely – the start of the pipeline is several kilometres from the coast.
Red-cheeked Dunnart (*Sminthopsis virginiae nitela*) Four atlas records for this species lie within the BGP surveyed area.	Locally Rare *(IUCN 1994)*	Forest margins, savanna grasslands, swamps and soaks, where it is occasionally locally common.	Likely – a large part of the BGP corridor is within the Dunnart's preferred habitat.

Sources: Menkhorst & Knight 2001, Cole & Woinarski 2002, Department of NRETA 2001, Morcombe 2004.

7.3 Ecologically Sensitive Habitats

Rainforest vegetation (including monsoon vine forests and monsoon jungles) is a community type that is considered to have high conservation value. Rainforest distribution in the Northern Territory is very patchy, and confined to the northern sector of the Territory (Russel-Smith and Dunlop 1987). Rainforest communities of the Northern Territory have high conservation priority, and the biogeographical significance of these ecosystems is of international stature (Russel-Smith and Dunlop 1987). Rainforest patches are extremely species rich, containing 13% of the total known Northern Territory flora, yet only occupy 0.2% of the land area of the Northern Territory (Price *et al.* 1995). Many rainforest species are rare, including 34 species each of which have been recorded from no more than one of the 1,245 patches surveyed in the Northern Territory (Russell-Smith & Lee 1992). A small number of rainforest patches lay within the BGP survey area, mostly in association with lowland rivers and creeks, and the final BGP route accordingly was aligned to avoid any of these patches. At about KP146, the BGP passes 4km north of Paw Paw Spring Jungle. This site has National Heritage Listing as an indicative place due to it being the second largest (650ha) recorded patch of Type Two wet monsoon jungle in the Northern Territory, and is relatively undamaged.

The BGP passes through areas of riparian vegetation and minor woodland with monsoon vine forest elements associated with limestone karsts as set out in Table 7. While they could be

defined technically as monsoon vine forest patches, the patches are very narrow, open and depauperate, and confined to narrow outcrops of limestone. The patches follow the north-south alignment of the limestone exposures, and the pipeline route crosses the pipeline route approximately at right angles. Construction of the pipeline is not anticipated to cause more than minor short-term effects on these patches.

Table 7: Riparian and Monsoon Vine Forests elements

KP	Location	Description
KP12	Sandfly Creek	Limited riparian vegetation on upper reaches
KP78 and KP84	Moyle River	Three small patches of riparian vegetation along tributaries
KP151	Small creek	Small patch of riparian vegetation
KP186, and KP209	Limestone karst	Two patches of monsoon vine thicket elements
KP254	Two small creeks	Relatively narrow riparian zone

Riparian systems are recognised worldwide as sites of great ecological contrast concentrated in a typically narrow area, and are vital to the functioning of stream ecosystems (Wager and Jackson 1993, Woinarski *et al*. 2000). The communities are extremely important for birds and other biota, and connectivity of the patches is also very important (Woinarski *et al*. 2000).

Between KP20 and KP80 the proposed pipeline corridor traverses just within the nominated boundaries of the Moyle Floodplain and Hyland Bay Wetland System. Dissected by seasonally inundated floodplain habitats and riparian forests associated with Anopheles Creek and Chalanyi Creek (the main surface water inflows to the southern part of the wetland system), this area is a 'Wetland of National Significance' under the *Ramsar Convention 1971*. The Moyle floodplain is considered to be one of the most important areas for colonial breeding waterfowl in the Northern Territory (Chatto 2000, National Land and Water Resources Audit 2002). This large complex of wetlands, occurring across an area of approximately 20km x 30km, was found to support 14 significant waterbird sites and 6 significant breeding sites during waterbird surveys that commenced in 1990. It is the most significant area for waterbirds between Darwin and the Moyle River, with over 30,000 waterbirds recorded in May 1995 (Blanch *et. al.* 2005).

7.4 Species of Indigenous Conservation Significance

"*Aboriginal societies do of course make use of many plants, animals and other environmental elements important to their economics and lifestyles. Riverine resources are a vital part of the Aboriginal subsistence economy, and water, its origins, features and appropriate use, is highly significant to the way of life, sense of identity, economy and cosmology of Aboriginal groups in the Daly. Some Wagiman (from the Daly Region) people are concerned about the impacts of tree clearing on the landscape and their community. It is likely that specific trees are of significance to custodians, as well as important in their ecological roles as habitat, shade, etc. Such trees may not be rare or visually significant.*" This extract is from a report on the cultural values of Aboriginal people in the Daly River Region by the NLC (2004) and sets the framework for the understanding of species of Indigenous Conservation Significance.

Indigenous Traditional Owners accompanied the survey team over the entire route in November/December 2006, noting amongst other things, species, items or features of importance to them. Two specific features were flagged as requiring attention: the avoidance of all large Banyan Trees *Ficus virens*, which often occur along minor watercourses, and the avoidance of large termite mounds where possible in the eastern area of the pipeline route, and specifically in

several locations. In the field, these requests were accommodated by moving the proposed alignment to the satisfaction of the Traditional Owners.

8. CONCLUSIONS AND RECOMMENDATIONS

8.1 Flora

Thirteen species of plants with conservation status were identified as potentially occurring within the BGP region. Only four of these have NT or EPBC Act conservation status and they were not recorded during field surveys. Therefore, if populations of these plants do occur in the region, they are most likely outside the 100m study corridor. It is very unlikely that the proposed BGP will impact upon the flora species of NT and EPBC Act conservation significance.

Two species of plants with ROTAP listings; *Helicteres dentata* and *Hibbertia muelleri* were confirmed present on the proposed alignment during field surveys. They are listed because they are poorly known, and field information is inaccurate, however their geographic range in Australia is greater than 100km. As both species are not listed under NT or EPBC Act criteria, their presence on the proposed alignment is of minor concern.

The pipeline route has been chosen to minimise impacts on significant vegetation communities and habitats. Construction through riparian forests should be kept to the minimum width necessary, avoiding large trees on banks of creeks and rivers.

Construction will follow the APIA (2005) *Code of Environmental Practice – Onshore Pipelines* which details how clearing and grading should be carried out to minimise impacts, and how rehabilitation of the cleared pipeline after construction should be carried out. These recommendations appear sound for the environment through which the proposed pipeline passes and have been incorporated into the draft CEMP (appendix B of the PER).

Principal elements of this Code are that vegetation should be pushed aside and retained so that it acts as seed stock and ground cover after reinstatement, that topsoil is retained so that it also acts as a reservoir for seeds, and that rehabilitation should be implemented immediately post-construction.

A detailed management plan should be prepared for the construction and rehabilitation of the pipeline, addressing specific aspects and issues raised in this report. This plan will include policies, rules, guidelines and actions presented in the draft CEMP as well as exact locations, recommendations and actions detailed on the Construction Alignment Sheets.

8.1.1. Weeds

A number of species of weeds were recorded along the pipeline route during the surveys. Some of the weeds are classified under the Weeds Management Act, and one, Gamba Grass is considered an environmental weed outside pastoral lands. Weed locations have been mapped and recorded in the GIS for the project and suggested weed washdown sites have been identified. Weed extent should be continually monitored at the time of construction to determine if further management or wash-down and quarantine locations are required.

8.2 Fauna

Ten species of native fauna have conservation status under Northern Territory (TPWC Act) or EPBC Act criteria, and potentially inhabit or utilise resources within the BGP region. Of these,

seven require attention, with particular attention needed for the Northern Quoll and the Partridge Pigeon.

The Northern Quoll is endangered under EPBC Act criteria, and the BGP traverses known habitat. The recent invasion of cane toads into the region has most likely decimated the Quoll population. The BGP will also traverse the habitat of the Partridge Pigeon, which is listed as vulnerable under EPBC Act criteria, but it is anticipated that the construction of the pipeline will have minimal short-term effects on habitat and is unlikely to directly affect the birds, other than scaring them away during construction. These species are both mobile and their habitat is widespread over the region, which will substantially reduce the impact of a 30m cleared corridor on these two species.

Other species require attention because their preferred habitat is traversed by the proposed BGP. These species include:

- Red-cheeked Dunnart (locally rare under IUCN criteria);
- Hooded Parrot (near threatened under TPWC criteria);
- Masked Owl (vulnerable under EPBC Act criteria);
- Brushtailed Phascogale (vulnerable under TPWC Act criteria); and
- Gouldian Finch (endangered under EPBC Act criteria).

Disturbances to all fauna species within the vicinity of the pipeline construction will be short-term and probably minimal, as the 30m strip of clearing necessary for the BGP will affect a minimal proportion of their available habitat. Mitigation measures applied during construction and effective rehabilitation will ensure that the impact of the pipeline on fauna species of conservation significance is minimal.

8.2.1. Habitats – Migratory species and Significant habitats

Although the proposed alignment passes through the catchments of the Moyle Floodplain and Hyland Bay Wetland System, the route was chosen to avoid permanent floodplain swamps and sensitive habitats. The array of waterbirds may be disturbed temporarily by construction activities. Paw Paw Spring Jungle will be approximately 4km from the alignment and thus the impact there will be negligible.

Rainforest and riparian vegetation are recognised as extremely important habitats within the region and within the Northern Territory. Riparian habitats are avoided where possible during the route selection phase of the BGP Project, and where the alignment crosses watercourses with significant riparian vegetation, it may be drilled underneath to avoid any impacts on the riparian system. The entire route was traversed during field surveys, and no recognisable patches of significant rainforest vegetation were recorded. PWSNT's Rainforest GIS Coverage identified some very minor patches of rainforest within the proposed corridor, but they were either not evident on the ground, or were associated with riparian vegetation that is to be avoided. Two minor instances of locations which contained monsoon vine-forest elements were recorded, but the likely impacts on these patches is considered to be low and short-term.

8.2.2. Aquatic Environments

Most aquatic environments were avoided in route selection. Thirty four watercourse crossings were traversed by the proposed pipeline route, but most of these are ephemeral and are unlikely to be wet during construction.

Four crossings of creeks and rivers, the Daly River, Tom Turners Creek, and two Green Ant Creek crossings are recommended to be undertaken using HDD techniques. The threatened species known to occur in the Daly River are not likely to be detrimentally affected by HDD techniques.

The other perennial river, the Moyle River could be crossed using open cut trenching techniques with minimal impact on the environment.

Special management attention to creek and river crossings, and to dry watercourse crossings, is recommended for the construction of the pipeline to minimise impacts of aquatic environments.

8.2.3. Species of Indigenous Conservation Significance

Indigenous people continue to value and utilise a vast range of flora and fauna species throughout the year. Protecting species of Indigenous conservation significance will therefore require general mitigation measures applied to the whole landscape likely to be affected by the BGP.

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Appendix 1
Environmental Parameters

Ref ID	Easting GDA94z52	Northing GDA94z52	Site description	Landform	Slope°	Crossing Type	Fire impact	Pig	Cow/Horse/Donkey	Introduced plant species	Soil texture	Gravel %	Erosion presence	Erosion extent:	Soil colour
1	547340	8425276	Possible CP bed next to plant site	flat				0	0		silty loam				reddish brown
2	548333	8425117	Pipe alignment, Port Keats area	flat				0	0		sandy clay loam	0			
3	551883	8422292	Pipe alignment, Port Keats area	flat							sandy clay loam	0			deep red
4	554454	8421000	Pipeline alignment	flat				0	0		sand	0			deep red
5	556079	8421608	Slope increases here to 1 degree.	flat	1			0	0		sand	0			white
6	556499	8421950	Floodplain	flat				0	0		clayey sand	20			
7	557058	8422535	Southern bank Sandfly Creek - falls 100m west of road alignment.	open depression (creek/river)		trenching		0	0		sand	20			
8	557136	8422500	Northern bank Sandfly Creek	open depression (creek/river)		trenching		0	0		sandy loam	20			
9	557496	8423543	Close to gas plant	flat				0	0		sandy loam	0			
10	560654	8423901	Crest at Airforce Hill	crest				1	1		silty loam		present	minor old road	yellow
11	562091	8422756	Floodplain near Airforce Hill, boggy and inundated for part of year. (circumnavigate sacred site.)	flat				0	1		silty loam	80	present	erosion gully	gray
12	563671	8423635	Creek crossing on road. Massive erosion problems and concerns. See	open depression (creek/river)		special	<10%	0	0	Hyptis suaveolens and Passiflora foetida	silty clay loam		present	west side of river on pipeline route	yellowish brown

Ref ID	Easting GDA94z52	Northing GDA94z52	Site description	Landform	Slope°	Crossing Type	Fire impact	Pig	Cow/Horse/Donkey	Introduced plant species	Soil texture	Gravel %	Erosion presence	Erosion extent:	Soil colour
			OFC crossing photos.												
13	568288	8422146	Borrow pit on hill	crest, hillcock								80			yellow
14	571437	8421073	Low open forest	flat							Sandy loam	80			yellow
15	573047	8415590	Access road to KP26. Near route - use as site	flat	1			0	0		sand				yellowish brown
16	573198	8417643	Along road from 103 re-align KP28 back to KP0	flat				0	0		Sandy loam				reddish
17	577793	8414091	Semi permanent creek crossing, Port Keats area	open depression (creek/river)		trenching		4	0		clayey sand	0			
18	598454	8410010	Major seasonal creek crossing, Port Keats area	open depression (creek/river)		trenching		4	0		sandy loam	0			
19	605307	8414014	Major seasonal creek crossing, Port Keats area	open depression (creek/river)		trenching		0	0		sand	0			
20	613215	8426036	Blacksoil plain. May need to weight pipeline to prevent it from floating to the surface.	Flat			50-75%	0	0		clay loam		absent		gray
21	613649	8424770	Creek, road and proposed pipeline route are converging. Discussion to cross to northern side of creek.	Open depression (creek/river)	5°		25-50%	3		Passiflora foetida	Fine silty loam		present	along creek only	Grayish

Ref ID	Easting GDA94z52	Northing GDA94z52	Site description	Landform	Slope°	Crossing Type	Fire impact	Pig	Cow/Horse/Donkey	Introduced plant species	Soil texture	Gravel %	Erosion presence	Erosion extent:	Soil colour
22	613857	8421201	Currowa Creek crossing	Open depression (creek/river)	gentle	trenching	50-75%	2	1	absent	loamy sand/loam		absent		black
23	614240	8421348	HDD Laydown for Moyle crossing	Flat	1°	HDD	25-50%	0	0		sand				yellow
24	614355	8421608	Just after road crossing		13°	Drilling under road	10-25%	0	0	absent	sand		absent, however lots of exposed soil- potential for erosion.	Telstra cable	Reddish
25	614421	8421690	Upper Moyle River crossing	Open depression (creek/river)	20°	Drilling- could be ok to trench	10-25%	2	0	Passiflora foetida	loamy sand		absent		gray
26	614487	8421778	Northern Side of Moyle River, 100m from river.	Mid-slope			10-25%	3	0	absent	sandy loam				Reddish brown
27	615524	8427305	Alternate campsite proposed to one marked on map, gravel pit.	Flat	3°	Campsite	<10%	0	0	absent	sand	70%			reddish
28	615612	8427777	Middle of proposed campsite.	Flat	<1-2°		10-25%	3	0	absent	silty clay loam		absent		gray
29	616746	8428503	Plain near creek. Pipeline >20m from creek.	flat and open depression (creek/river) adjacent	0-2°		25-50%	0	0	absent	sandy loam	0			greyish, yellow brown
30	616924	8428640	Kurrowa Creek. Creek crossing for pipeline avoiding largest trees- surveyed by Rod- approx. 30m from bank to bank.	flat, open depression (creek/river)	20°		25-50%	4	1		loamy sand		absent		gray, yellow
31	616924	8428640													

Ref ID	Easting GDA94z52	Northing GDA94z52	Site description	Landform	Slope°	Crossing Type	Fire impact	Pig	Cow/Horse/Donkey	Introduced plant species	Soil texture	Gravel %	Erosion presence	Erosion extent:	Soil colour
32	619478	8431866	Plain subject to inundation	flat	0		<10%	0	0	absent	light medium clay to medium heavy clay		absent		gray
33	620572	8432522	Deviation around toe of quartzite ridge.												
34	620723	8432719	Pipeline diverts around quartz and hill. Sand sheet to edge of hill.	upper slope			50-75%	0	0	absent	sand		absent		reddish
35	621177	8433121	Slope down to Tom Turners Creek.	lower slope, open depression (creek/river)	2-5°	HDD	100%	0	0	absent	loamy sand	0	absent		grayish, yellow brown
36	621370	8433187	East side of Tom Turners Creek	lower slope, open depression (creek/river)			25-50%	0	0	absent		20%	present	very minor on surface	yellow, yellowish brown
37	624707	8433067	Quarry	mid-slope	10-20°			0	1		sand				
38	624707	8433067													
39	624783	8432857	Part of hillside needs to be cut away to allow room for corridor	lower slope			10-25%	0	0	absent	silty clay loam	30%			reddish brown
40	626038	8432863		crest				0	0	absent	clayey sand	15%			reddish
41	627081	8433616	Flood plain	flat, open depression (creek/river)	1-2°		50-75%	2	2	Minor Hyptis suaveolens on creek.	silty clay loam				
42	630687	8436151	Flat plain with creek.	flat, open depression (creek/ river)		Trench	20-50%	1	1	absent	loamy sand				yellow
43	630981	8435509	Quarry- possible campsite	flat	0°		<10%	0	0		loamy sand		absent		yellow

Ref ID	Easting GDA94z52	Northing GDA94z52	Site description	Landform	Slope°	Crossing Type	Fire impact	Pig	Cow/Horse/Donkey	Introduced plant species	Soil texture	Gravel %	Erosion presence	Erosion extent:	Soil colour
44	630981	8435509													
45	632923	8438177	Narrow plain between higher plain.	open depression (creek/river)	2-5°		<10%	2	2	absent	silty clay loam	5-10%			yellow
46	635059	8440801	Potential CP point if others don't work out.	flat	<1°		<10%		3	absent	sandy clay loam	0	present		grayish
47	638131	8442809	Start of blacksoil plain	flat	<1°		<10%	0	0	Mimosa pigra	medium heavy clay	0	absent		black
48	641252	8445219	Petalostigma and Melaleuca plain starts close to previous WPT. Sands and gravel on surface.	flat	<1°			1	1	absent	sandy clay loam	10%	absent		Yellow
49	643724	8447579	Plain with billabong.	flat, closed depression (lake, lagoon)	<1°		100%	1	1	absent	silty clay loam		absent	Creek bed	yellow
50	644524	8448115	Veg change and soil change-boundary of tall forest with much more sandy soils.	flat	1-2°	Trenching		0	0	absent	loamy sand	35%	absent		yellow/red
51	648967	8450486		Mid-slope	20°	Trenching	25-50%	0	0	absent	loamy sand				yellowish brown
52	649446	8450595	Gravel Pit	Mid-slope		Trenching	10-25%	0	0	absent		67%	absent		reddish
53	650462	8450225		flat	1-2°			0	0	absent	loamy sand	0	absent		yellow
54	652360	8450741	Creek crossing 4m deep 20 wide, with sandy bed.	Open depression (creek/river)		Trenching	10-25%	0	1	absent	loamy sand		present	minor	yellow

Ref ID	Easting GDA94z52	Northing GDA94z52	Site description	Landform	Slope°	Crossing Type	Fire impact	Pig	Cow/Horse/Donkey	Introduced plant species	Soil texture	Gravel %	Erosion presence	Erosion extent:	Soil colour
55	655197	8451338	Creek crossing, 8m deep 100 wide. Sandy clay loam. Floodplain surrounding swamp creek to sandy creek.	Open depression (creek/river)	20°	Trenching	50-75%	2	0	Hyptis suaveolens	sandy clay loam		present		yellow
56	657371	8452006	Sand plain	flat			100%	0	0	absent	loamy sand		absent		red/grey
57	659427	8453608	Sand plain. Scraper station and anode beds, CP array.	flat			100%	0	0	absent	loamy sand				grayish
58	661450	8458191	forest site	flat	2+°		50-75%	1	1		sand				reddish
59	665060	8460555	Creek crossing in Livistona plain	Open depression (creek/river)		Trench	100%	2	1		loamy sand		present	minor	yellow
60	668655	8463028		Open depression (creek/river)	2+°	Trench	100%	3	1		sandy clay loam		absent		grayish
61	671841	8465153	Plain near creek.	lower slope, flat, open depression (creek/river)	5°		100%				loamy sand		absent		yellow
62	675477	8467550		flat	1-2°		100%	0	0		sandy clay loam	2%			yellow
63	677480	8469023	Plain with creek crossing.	Open depression (creek/river)		Trench	50-75%	1	1		sandy clay loam	10%			brown
64	681026	8469102		lower slope, open depression (creek/river)	2-5°		50-75%	2		Minor Hyptis suaveolens.	sandy clay loam	50%	absent		yellow brownish
65	681515	8476024	Existing gravel quarry	Mid-slope			<10%	0	0		loamy sand, silty loam, sandy loam clay.				

Ref ID	Easting GDA94z52	Northing GDA94z52	Site description	Landform	Slope°	Crossing Type	Fire impact	Pig	Cow/Horse/Donkey	Introduced plant species	Soil texture	Gravel %	Erosion presence	Erosion extent:	Soil colour
66	681662	8468079	Grey soil floodplain near creek	flat	2°		100%	1		Hyptis suaveolens on nearby creek.	silty loam		absent		grayish
67	683002	8467460	Chilling Creek crossing- take 2. Surface sand in creek.	Open depression (creek/river)		trench		1	0	Noogoora Burr (Xanthium strumarium) and Passiflora foetida.	loam				yellow
68	683128	8467564	Chilling Creek trench crossing. Surface sand in creek.	Open depression (creek/river)		Trench					sandy loam		present	minor	yellow brown. Grayish
69	685267	8468520	Rock outcrop. Dense rainforest adjactent to rocky outcrop slope.	mid-slope				0	0	Hyptis suaveolens	sand		absent		
70	686501	8468634	Ridges to Daly River transect adjacent to monsoon vine forest.		30°		100%			Hyptis suaveolens	sand				
71	687036	8468429	Daly River floodplain and river	Open depression (creek/river)		HDD				Noogoora Burr (Xanthium strumarium) WPT 071.	clay loam	20%			yellow
72	687906	8468748	Pipe laydown for end of HDD under Daly River	flat	1		<10%	3	0		clay loam	0	present	subsidence	grayish
73	689618	8469159	2.2km east Daly River	flat	1		<10%	3	0		clay loam	0	present	subsidence	grayish
74	690766	8469411	Flat grassy	flat			10-25%	2	2		clay loam				grey
75	694748	8470355	CP bed	flat			100%	3	2		silty loam				grey
76	698623	8470902	track and pipeline junction	flat	1					Rubber Bush (Calotropis procera) WPT093	silty loam				greyish

Ref ID	Easting GDA94z52	Northing GDA94z52	Site description	Landform	Slope°	Crossing Type	Fire impact	Pig	Cow/Horse/Donkey	Introduced plant species	Soil texture	Gravel %	Erosion presence	Erosion extent:	Soil colour
77	701538	8471761	Rocky saddle	hillcock, ridge	3		50-75	1	1		silty loam		absent		yellow, grey
78	702123	8472035		simple slope	1		50-75%	0	1		silty clay loam				grey, black
79	705395	8473719		simple slope	1		50-75%	0	0		clayey sand		absent		grayish
80	709006	8475403	Woodland at edge of clearing	simple slope			<10%	0	1	Gamba Grass	loam		absent		
81	711920	8476763	Grassy woodland							Hyptis suaveolens	Sandy loam	20	present	erosion gully	yellow
82	716385	8477302	Western slope next to fence line		2%					Gamba at WPT080, Hyptis suaveolens	Sandy loam				reddish
83	721142	8476974	Cleared paddock next to open woodland dominated by Eucalyptus and Corymbia	flat			10%			Sida acuta, Hyptis & Snakeweed	silty loam		absent		reddish brown
84	721142	8476974	Closed Woodland and potential site for a weed washdown area on the western side (at weed boundary).	flat			10%				silty loam		absent		reddish brown
85	723287	8476802	Creek crossing, minor erosion scars, generally flat and well grassed	Open depression (creek/river)		trench		1	3	Hyptis suaveolens	Sandy loam				yellowish brown
86	725116	8478316	Cattle country	flat				1	1	Hyptis suaveolens	Sandy loam				yellowish brown
87	726771	8479423	Green Ant Creek, proposed HDD crossing	simple slope, lower slope, open depression (creek/river)				0	1	Hyptis and Snakeweed (Stachytarpheta sp.)					reddish brown

Ref ID	Easting GDA94z52	Northing GDA94z52	Site description	Landform	Slope°	Crossing Type	Fire impact	Pig	Cow/Horse/Donkey	Introduced plant species	Soil texture	Gravel %	Erosion presence	Erosion extent:	Soil colour
88	727344	8479525		flat	<1		<10%	4	2	Hyptis	silty clay loam				grayish
89	729877	8480584	Open cleared area with sapling regrowth	flat	<1		100%	2	3		loamy sand				reddish
90	734150	8483612	Area cleared approx 10 yrs ago- mostly regrowth	flat			10-25%	0	0	Hyptis	silty loam		absent		
91	737358	8486451		flat	1-2		10-25%	0	4						grayish
92	740892	8489631	Karst- minor sinkhole	flat	<1		<10%	0	1	Hyptis	loam				reddish
93	741713	8490197		flat	1-2		10-25%	0	2		loam		absent		reddish brown
94	745401	8491213	Woodland	mid-slope	5		100%	0	2		sandy clay loam	10			yellowish brown
95	748533	8492924	Just before a creek crossing	flat	1		<10%	3	0	Hyptis suaveolens	sandy clay loam	50			yellowish brown
96	750738	8494319	Creek crossing	Open depression (creek/river)		trenching	100%	0	0	Hyptis, Passiflora	silty clay loam		present	creek banks	yellowish brown
97	753469	8496047	Potential campsite	flat	max 2			0	0			30	absent		reddish brown
98	754159	8496600	Hayes Creek - western branch	Open depression (creek/river)	1-2	trenching	50-75%	2	2	Hyptis suaveolens, Passiflora foetida	sandy clay loam				orange
99	754781	8497086		flat			100%	0	1		sandy clay loam	0	absent		grayish
100	755371	8498491	Possible campsite	flat				0	0		sandy clay loam		absent		yellowish brown
101	755493	8498389	Campsite near Fenton Creek. Disturbed site with WW2 rubbish		<2		100%	0	0		loamy sand		absent		reddish brown

Ref ID	Easting GDA94z52	Northing GDA94z52	Site description	Landform	Slope°	Crossing Type	Fire impact	Pig	Cow/Horse/Donkey	Introduced plant species	Soil texture	Gravel %	Erosion presence	Erosion extent:	Soil colour
102	755493	8498389													
103	758803	8500285		ridge	5-10		100%	0	0		silty loam				reddish brown
104	759771	8502813	Rocky hill near road with Eucalyptus tintinnans.	ridge			50-75%	0	0						yellowish brown
105	761360	8504307	Rocky hill, Minor population of Eucalyptus tintinnans. Archaeological site.	hillock			50-75%	0	0		silty loam				yellow
106	763175	8505045	Rocky hill near powerlines and raod	upper slope	10		25-50%	0	0		loamy sand	80	absent		grayish
107	766449	8506398	Creek Crossing	Open depression (creek/river)	varying to 30			0	1	Hyptis, Hibiscus sabdariffa, Passiflora foetida	clay loam		present	in creek bed	yellowish brown
108	767789	8507354		mid-slope			50-75%				sandy loam				yellow
109	769093	8509367	Rail Crossing	flat		HDD	<10%	0	0	Crotalaria goreensis on Railway Line					orange, yellowish brown
110	769943	8510576	Weed Patch							Andropogon gayanus					
111	770969	8511464	Creek Crossing	Open depression (creek/river)		trenching	50-75%	3	0	Hibiscus sabdariffa (Rosella)	silty clay loam		present	creek bed	yellow
112	771509	8511910		flat	<1		100%	2	2		clay loam	0	present	on creek line	yellowish brown
113	773067	8515605		flat	1	trenching	25-50%	0	0		sandy clay loam	0	absent		yellow
114	773628	8518431	Quarry- possible borrow pit	flat	<3		25-50%	0	2	Hyptis along fenceline	loamy sand	55	absent		brown

Ref ID	Easting GDA94z52	Northing GDA94z52	Site description	Landform	Slope°	Crossing Type	Fire impact	Pig	Cow/Horse/Donkey	Introduced plant species	Soil texture	Gravel %	Erosion presence	Erosion extent:	Soil colour
115	773885	8518318	End of the line- NT Gas scraper station, Location for connection of Bonaparte Gas Pipeline to Darwin-Amadeus Gas Pipeline. Testing here as a potential CP point.	flat	<1	trenching	50-75%	0	4		loamy sand	10	absent		grayish

Appendix 2
Species and Community Description

Ref ID	Easting GDA94z52	Northing GDA94z52	Structural formation	All species	Lower	Mid	Upper	Notes
1	547340	8425276	tall open forest	Eucalyptus tetrodonta, Eucalyptus miniata, Terminalia ferdinandiana, Erythrophleum chlorostachys, Eucalyptus microtheca, Cycas maconochiei, Livistona humilis, Brachychiton megaphyllus, Persoonia falcata, Grevillea pluricaulis, Ampelocissus sp., Acacia dimidiata, Pandanus spiralis, Cupaniopsis anacardioides, Sarga intrans	Sarga intrans	Cycas maconochiei, Livistona humilis, Brachychiton megaphyllus, Persoonia falcata, Grevillea pluricaulis, Ampelocissus sp., Acacia dimidiata, Pandanus spiralis, Cupaniopsis anacardioides	Eucalyptus tetrodonta, Eucalyptus miniata, Terminalia ferdinandiana, Erythrophleum chlorostachys, Eucalyptus microtheca	
2	548333	8425117	open forest	Eucalyptus tetrodonta, Eucalyptus miniata, Sarga plumosum	Sarga plumosum		Eucalyptus tetrodonta, Eucalyptus miniata	
3	551883	8422292	tall open forest	Eucalyptus miniata, Eucalyptus tetrodonta, Corymbia porrecta, Livistona humilis, Cycas maconochiei, Acacia auriculiformis, Persoonia falcata, Brachychiton megaphyllus, Sarga plumosum	Brachychiton megaphyllus, Sarga plumosum	Livistona humilis, Cycas maconochiei, Acacia auriculiformis, Persoonia falcata	Eucalyptus miniata, Eucalyptus tetrodonta, Corymbia porrecta	
4	554454	8421000	tall open forest	Eucalyptus tetrodonta, Eucalyptus miniata, Buchanania obovata, Erythrophleum chlorostachys, Corymbia polycarpa, Planchonia careya, Petalostigma pubescens, Persoonia falcata, Grevillea decurrens, Cycas maconochiei, Livistona humilis, Brachychiton megaphyllus, Ampelocissus acetosa, Sarga intrans, Sarga plumosum	Brachychiton megaphyllus, Ampelocissus acetosa, Sarga intrans, Sarga plumosum	Petalostigma pubescens, Persoonia falcata, Grevillea decurrens, Cycas maconochiei, Livistona humilis	Eucalyptus tetrodonta, Eucalyptus miniata, Buchanania obovata, Erythrophleum chlorostachys, Corymbia polycarpa, Planchonia careya	
5	556079	8421608	tall open forest	Eucalyptus tetrodonta, Eucalyptus miniata, Buchanania obovata, Erythrophleum chlorostachys, Corymbia polycarpa, Planchonia careya, Ficus aculeata, Petalostigma pubescens, Persoonia falcata, Grevillea decurrens, Cycas maconochiei, Livistona humilis, Buchnera linearis, Brachychiton megaphyllus, Ampelocissus acetosa, Sarga intrans, Sarga plumosum, Waltheria indica	Brachychiton megaphyllus, Ampelocissus acetosa, Sarga intrans, Sarga plumosum, Waltheria indica	Petalostigma pubescens, Persoonia falcata, Grevillea decurrens, Cycas maconochiei, Livistona humilis, Buchnera linearis	Eucalyptus tetrodonta, Eucalyptus miniata, Buchanania obovata, Erythrophleum chlorostachys, Corymbia polycarpa, Planchonia careya, Ficus aculeata	

Ref ID	Easting GDA94z52	Northing GDA94z52	Structural formation	All species	Lower	Mid	Upper	Notes
6	556499	8421950	tall open forest	Eucalyptus tetrodonta, Eucalyptus miniata, Corymbia porrecta, Petalostigma pubescens, Livistona humilis, Pandanus spiralis, Lophostemon lactifluus, Gonocarpus leptothecus, Xyris complanata, Eragrostis cumingii, Yakirra nulla, Polygala longifolia	Gonocarpus leptothecus, Xyris complanata, Eragrostis cumingii, Yakirra nulla, Polygala longifolia	Petalostigma pubescens, Livistona humilis, Pandanus spiralis, Lophostemon lactifluus	Eucalyptus tetrodonta, Eucalyptus miniata, Corymbia porrecta	
7	557058	8422535	open woodland/forest with limited riparian vegetation	Barringtonia acutangula, Corymbia porrecta, Eucalyptus tetrodonta, Eucalyptus miniata, Melaleuca viridiflora, Buchanania obovata, Callitris intratropica, Owenia vernicosa, Calytrix exstipulata, Livistona humilis, Grevillea pteridifolia		Owenia vernicosa, Calytrix exstipulata, Livistona humilis, Grevillea pteridifolia	Barringtonia acutangula, Corymbia porrecta, Eucalyptus tetrodonta, Eucalyptus miniata, Melaleuca viridiflora, Buchanania obovata, Callitris intratropica	
8	557136	8422500	tall open forest, limited riparian vegetation	Eucalyptus tetrodonta, Eucalyptus miniata, Corymbia porrecta, Callitris intratropica, Petalostigma pubescens, Livistona humilis		Petalostigma pubescens, Livistona humilis	Eucalyptus tetrodonta, Eucalyptus miniata, Corymbia porrecta, Callitris intratropica	
9	557496	8423543	cleared, scattered regrowth	Sarga sp	Sarga sp			Area highly disturbed - recently cleared by bulldozer. Old rubbish lying around and borrow pits.
10	560654	8423901	open woodland	Acacia sp., Corymbia latifolia, Eucalyptus tectifica, Corymbia greeniana, Corymbia polysciada, Livistona humilis, Terminalia ferdinandiana, Buchanania obovata, Grevillea decurrens, Cycas maconochiei, Sarga sp	Sarga sp	Livistona humilis, Terminalia ferdinandiana, Buchanania obovata, Grevillea decurrens, Cycas maconochiei	Acacia sp., Corymbia latifolia, Eucalyptus tectifica, Corymbia greeniana, Corymbia polysciada	Intersection at Wadeye airstrip was previously surveyed for access road to plant site- see previous data.
11	562091	8422756	Open woodland	Melaleuca dealbata, Terminalia ferdinandiana, Acacia pellita, Corymbia polysciada, Eucalyptus tectifica, Acacia auriculiformis, Corymbia greeniana, Eucalyptus miniata, Calytrix sp., Gardenia sp., Livistona humilis, Grevillea pteridifolia, Cycas maconochiei, Grevillea pteridifolia, Petalostigma quadriloculare, Sarga sp	Sarga sp	Calytrix sp., Gardenia sp., Livistona humilis, Grevillea pteridifolia, Cycas maconochiei, Grevillea pteridifolia, Petalostigma quadriloculare	Melaleuca dealbata, Terminalia ferdinandiana, Acacia pellita, Corymbia polysciada, Eucalyptus tectifica, Acacia auriculiformis, Corymbia greeniana, Eucalyptus miniata	Erosion gully

Ref ID	Easting GDA94z52	Northing GDA94z52	Structural formation	All species	Lower	Mid	Upper	Notes
12	563671	8423635		Eucalyptus tectifica, Eucalyptus microtheca, Eucalyptus miniata, Corymbia foelscheana, Syzygium sp., Melaleuca argentea, Melaleuca viridiflora, Melaleuca leucadendra, Callitris intratropica, Eucalyptus tectifica, Corymbia latifolia, Acacia oncinocarpa, Corymbia porrecta, Erythrophleum chlorostachys, Corymbia latifolia, Livistona humilis, Cycas maconochiei, Acacia sp., Brachychiton megaphyllus, Owenia vernicosa, Persoonia falcata, Calytrix exstipulata, Petalostigma pubescens, Ficus aculeata, Terminalia ferdinandiana, Livistona humilis, Acacia oncinocarpa, Alphitonia excelsa, Grevillea pteridifolia, Terminalia ferdinandiana, Ampelocissus sp., Aristida sp, Heteropogon contortus, Sarga sp, Passiflora foetida, Lomandra sp, Hyptis suaveolens	Ampelocissus sp., Aristida sp., Heteropogon contortus ,Sarga sp., Passiflora foetida, Lomandra sp., Hyptis suaveolens	Livistona humilis, Cycas maconochiei, Acacia sp., Brachychiton megaphyllus, Owenia vernicosa, Persoonia falcata, Calytrix exstipulata, Petalostigma pubescens, Ficus aculeata, Terminalia ferdinandiana, Livistona humilis, Acacia oncinocarpa, Alphitonia excelsa, Grevillea pteridifolia, Terminalia ferdinandiana	Eucalyptus tectifica, Eucalyptus microtheca, Eucalyptus miniata, Corymbia foelscheana, Syzygium sp., Melaleuca argentea, Melaleuca viridiflora, Melaleuca leucadendra, Callitris intratropica, Eucalyptus tectifica, Corymbia latifolia, Acacia oncinocarpa, Corymbia porrecta, Erythrophleum chlorostachys, Corymbia latifolia	Western bank 10m above creek base- steep 60-90 degrees. Eastern bank- rockier, laterite, gentler slope 30 deg for 100m. Erosion present on West side of river on pipeline route. Eastern side of creek vegetation in blue. Eastern side has coffee rock with 5+ cm of pebbles.
13	568288	8422146	open woodland	Eucalyptus tectifica, Terminalia ferdinandiana, Corymbia ferruginea, Petalostigma pubescens, Grevillea decurrens, Cycas maconochiei, Sarga sp	Sarga sp	Petalostigma pubescens, Grevillea decurrens, Cycas maconochiei	Eucalyptus tectifica, Terminalia ferdinandiana, Corymbia ferruginea	
14	571437	8421073	tall open forest	Eucalyptus miniata, Eucalyptus tectifica, Eucalyptus tetrodonta, Erythrophleum chlorostachys, Corymbia polycarpa, Grevillea decurrens, Cycas maconochiei, Livistona humilis, Ampelocissus sp.,Grevillea goodii, Buchanania obovata, Planchonia careya, Pandanus spiralis, Brachychiton megaphyllus, Petalostigma pubescens, Amyema sp., Hibbertia muelleri, Cupaniopsis anacardioides, Sarga sp	Sarga sp	Grevillea decurrens, Cycas maconochiei, Livistona humilis, Ampelocissus sp., Grevillea goodii, Buchanania obovata, Planchonia careya, Pandanus spiralis, Brachychiton megaphyllus, Petalostigma pubescens, Amyema sp., Hibbertia muelleri, Cupaniopsis anacardioides	Eucalyptus miniata, Eucalyptus tectifica, Eucalyptus tetrodonta, Erythrophleum chlorostachys, Corymbia polycarpa	
15	573047	8415590	woodland	Erythrophleum chlorostachys, Eucalyptus tetrodonta, Eucalyptus miniata, Eucalyptus tectifica, Cycas maconochiei, Livistona humilis, Planchonia careya, Grevillea goodii, Pandanus spiralis, Brachychiton megaphyllus, Persoonia falcata, Ampelocissus sp., Acacia sp., Hibbertia muelleri, Petalostigma quadriloculare, Hibbertia sp.,	Sarga intrans, Gardenia sp	Cycas maconochiei, Livistona humilis, Planchonia careya, Grevillea goodii, Pandanus spiralis, Brachychiton megaphyllus, Persoonia falcata, Ampelocissus sp., Acacia sp., Hibbertia muelleri, Petalostigma quadriloculare, Hibbertia sp.,Cupaniopsis anacardioides,Hibbertia	Erythrophleum chlorostachys,Eucalyptus tetrodonta,Eucalyptus miniata,Eucalyptus tectifica	

Ref ID	Easting GDA94z52	Northing GDA94z52	Structural formation	All species	Lower	Mid	Upper	Notes
				Cupaniopsis anacardioides, Hibbertia brownii, Sarga intrans, Gardenia sp		brownii,		
16	573198	8417643	tall open forest	Eucalyptus miniata, Eucalyptus microtheca, Eucalyptus tetrodonta, Erythrophleum chlorostachys, Terminalia ferdinandiana, Livistona humilis, Cycas maconochiei, Buchanania obovata, Pandanus aquaticus, Grevillea decurrens, Calytrix sp., Persoonia falcata, Petalostigma pubescens, Grevillea pteridifolia, Acacia sp., Ampelocissus sp., Brachychiton megaphyllus, Sarga sp	Sarga sp	Livistona humilis, Cycas maconochiei, Buchanania obovata, Pandanus aquaticus, Grevillea decurrens, Calytrix sp., Persoonia falcata, Petalostigma pubescens, Grevillea pteridifolia, Acacia sp., Ampelocissus sp., Brachychiton megaphyllus	Eucalyptus miniata, Eucalyptus microtheca, Eucalyptus tetrodonta, Erythrophleum chlorostachys, Terminalia ferdinandiana	
17	577793	8414091	forest	Eucalyptus tetrodonta, Corymbia confertiflora, Brachychiton megaphyllus	Brachychiton megaphyllus		Eucalyptus tetrodonta, Corymbia confertiflora	Shallow creek with no defined channel. Surrounded by forest. Creek banks have a 5-10 degree slope. Signs of wallaby and dingo.
18	598454	8410010	open forest	Lophostemon lactifluus, Barringtonia acutangula, Acacia auriculiformis, Livistona humilis, Pandanus spiralis, Owenia vernicosa		Livistona humilis, Pandanus spiralis, Owenia vernicosa	Lophostemon lactifluus, Barringtonia acutangula, Acacia auriculiformis	Creek dry during survey, banks 10-30 degree slope, 20-30m wide.
19	605307	8414014	closed forest	Barringtonia acutangula, Melaleuca viridiflora, Pandanus aquaticus, Heteropogon contortus, Aristida sp	Heteropogon contortus, Aristida sp	Pandanus aquaticus	Barringtonia acutangula, Melaleuca viridiflora	
20	613215	8426036	woodland-seasonally inundated.	Melaleuca nervosa, Corymbia sp., Terminalia ferdinandiana, Eucalyptus tetrodonta, Petalostigma pubescens, Grevillea pteridifolia, Pandanus spiralis, Persoonia falcata		Petalostigma pubescens, Grevillea pteridifolia, Pandanus spiralis, Persoonia falcata	Melaleuca nervosa, Corymbia sp., Terminalia ferdinandiana, Eucalyptus tetrodonta	WPT010 (KP82) - Grassy plains, numerous tall angular termite mounds. Photos 29,30.

Ref ID	Easting GDA94z52	Northing GDA94z52	Structural formation	All species	Lower	Mid	Upper	Notes
21	613649	8424770	open forest bordering on riparian	Erythrophleum chlorostachys, Corymbia polycarpa, Lophostemon lactifluus, Melaleuca leucadendra, Corymbia bella, Pandanus spiralis, Grevillea pteridifolia, Buchanania obovata, Terminalia ferdinandiana, Acacia sp., Pandanus aquaticus, Acacia holosericea, Ampelocissus acetosa, Canarium australianum, Passiflora foetida, Ficus hispida, Melastoma malabathricum	Passiflora foetida, Ficus hispida, Melastoma malabathricum	Pandanus spiralis, Grevillea pteridifolia, Buchanania obovata, Terminalia ferdinandiana, Acacia sp., Pandanus aquaticus, Acacia holosericea, Ampelocissus acetosa, Canarium australianum	Erythrophleum chlorostachys, Corymbia polycarpa, Lophostemon lactifluus, Melaleuca leucadendra, Corymbia bella	Creek obviously high-profile at some stage during wet. Steep banks to 2m undercutting and scouring. Bordering on Eucalyptus miniata and E. tetrodonta woodland.
22	613857	8421201	tall open forest with riparian along creek	Melaleuca viridiflora, Buchanania obovata, Erythrophleum chlorostachys, Lophostemon lactifluus, Corymbia latifolia, Acacia sp., Terminalia pterocarya, Syzygium armstrongii, Trachymene rotundifolia, Syzygium suborbiculare, Pandanus spiralis, Pandanus aquaticus, Xanthostemon eucalyptoides, Brachychiton diversifolius, Livistona humilis, Grevillea goodii, Psydrax odorata, Grevillea pluricaulis, Drosera sp., Ampelocissus acetosa, arga intrans, Nymphaea violacea, Sarga plumosum	Drosera sp., Ampelocissus acetosa, Sarga intrans, Nymphaea violacea, Sarga plumosum	Syzygium suborbiculare, Pandanus spiralis, Pandanus aquaticus, Xanthostemon eucalyptoides, Brachychiton diversifolius, Livistona humilis, Grevillea goodii, Psydrax odorata, Grevillea pluricaulis	Melaleuca viridiflora, Buchanania obovata, Erythrophleum chlorostachys, Lophostemon lactifluus, Corymbia latifolia, Acacia sp., Terminalia pterocarya, Syzygium armstrongii, Trachymene rotundifolia	Riparian vegetation along bank. Open woodland elsewhere. Creek is uneven, loamy banks stabilised by lots of veg, lots of pools, some bank areas steep up to 1m in height.
23	614240	8421348	tall open forest	Eucalyptus miniata, Eucalyptus tetrodonta, Erythrophleum chlorostachys, Owenia vernicosa, Terminalia ferdinandiana, Buchanania obovata, Xyris complanata, Petalostigma pubescens, Pandanus spiralis, Livistona humilis, Persoonia falcata, Fimbristylis sp., Hibbertia sp., Sarga intrans	Fimbristylis sp., Hibbertia sp., Sarga intrans	Petalostigma pubescens,Pandanus spiralis,Livistona humilis ,Persoonia falcata	Eucalyptus miniata, Eucalyptus tetrodonta, Erythrophleum chlorostachys, Owenia vernicosa, Terminalia ferdinandiana, Buchanania obovata, Xyris complanata	
24	614355	8421608	tall open forest	Eucalyptus miniata, Eucalyptus tetrodonta, Buchanania obovata, Erythrophleum chlorostachys, Livistona humilis, Acacia dimidiata, Pandanus spiralis, Syzygium suborbiculare, Psydrax odorata, Drosera sp., Sarga sp., Owenia vernicosa, Grevillea goodii ssp pluricaulis	Drosera sp.,Sarga sp., Owenia vernicosa, Grevillea goodii ssp pluricaulis	Livistona humilis, Acacia dimidiata, Pandanus spiralis, Syzygium suborbiculare, Psydrax odorata	Eucalyptus miniata, Eucalyptus tetrodonta, Buchanania obovata, Erythrophleum chlorostachys	May bore under cable as well as the road. Telstra cable existing-installed 1 month ago.

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25	614421	8421690	open woodland with riparian along creek	Barringtonia acutangula, Lophostemon lactifluus, Melaleuca viridiflora, Acacia auriculiformis, Syzygium armstrongii, Grevillea pteridifolia, Strychnos lucida, Livistona humilis, Pandanus aquaticus, Melaluca sp., Psydrax odorata, Passiflora foetida, Sarga sp., Cynodon sp	Passiflora foetida, Sarga sp.,Cynodon sp	Grevillea pteridifolia, Strychnos lucida, Livistona humilis, Pandanus aquaticus, Melaluca sp., Psydrax odorata	Barringtonia acutangula, Lophostemon lactifluus, Melaleuca viridiflora, Acacia auriculiformis, Syzygium armstrongii	Riparian vegetation along creek. Creek low profile, gentle banks and shallow bed. South of crossing is an old sand pit (depression excavated for some resason) very sandy soil, very stable (photos 61, 62).
26	614487	8421778	open woodland	Corymbia polysciada, Erythrophleum chlorostachys, Buchanania obovata, Eucalyptus tectifica, Corymbia porrecta, Brachychiton diversifolius, Erythrina variegata, Pandanus spiralis,Ficus aculeata, Sarga sp., Passiflora foetida, Grewia retusifolia	Sarga sp., Passiflora foetida, Grewia retusifolia	Pandanus spiralis, Ficus aculeata	Corymbia polysciada, Erythrophleum chlorostachys, Buchanania obovata, Eucalyptus tectifica, Corymbia porrecta, Brachychiton diversifolius, Erythrina variegata	
27	615524	8427305	open woodland - low	Erythrophleum chlorostachys, Terminalia ferdinandiana, Eucalyptus tectifica, Melaleuca nervosa, Planchonia careya, Gardenia megasperma, Brachychiton megaphyllus, Petalostigma pubescens, Buchanania obovata, Ampelocissus sp., Grevillea mimosoides, Acacia lamprocarpa, Dolichandrone filiformis		Melaleuca nervosa, Planchonia careya, Gardenia megasperma, Brachychiton megaphyllus, Petalostigma pubescens, Buchanania obovata, Ampelocissus sp., Grevillea mimosoides, Acacia lamprocarpa, Dolichandrone filiformis	Erythrophleum chlorostachys, Terminalia ferdinandiana, Eucalyptus tectifica	Previously disturbed - recently used road quarry large enough to accommodate camp 200x300m. Not much clearing necessary.
28	615612	8427777	open woodland	Erythrophleum chlorostachys, Corymbia polycarpa, Corymbia bella, Corymbia foelscheana, Terminalia ferdinandiana, Corymbia polysciada, Gardenia megasperma, Grevillea pteridifolia, Grevillea decurrens, Petalostigma pubescens, Brachychiton diversifolius, Buchanania obovata, Melaleuca nervosa, Acacia lamprocarpa, Sarga sp., Cymbopogon obtectus, Ampelocissus sp., Grewia retusifolia	Sarga sp., Cymbopogon obtectus, Ampelocissus sp., Grewia retusifolia	Gardenia megasperma, Grevillea pteridifolia, Grevillea decurrens, Petalostigma pubescens, Brachychiton diversifolius, Buchanania obovata, Melaleuca nervosa, Acacia lamprocarpa	Erythrophleum chlorostachys, Corymbia polycarpa, Corymbia bella, Corymbia foelscheana, Terminalia ferdinandiana, Corymbia polysciada	
29	616746	8428503	open forest	Eucalyptus miniata, Erythrophleum chlorostachys, Pandanus spiralis, Livistona humilis , Corymbia bella, Eucalyptus tetrodonta, Terminalia ferdinandiana, Lophostemon lactifluus, Corymbia polycarpa, Buchanania obovata, Owenia	Sarga sp., Eragrostis sp	Buchanania obovata, Owenia vernicosa, Planchonia careya, Alstonia actinophylla	Eucalyptus miniata, Erythrophleum chlorostachys, Pandanus spiralis, Livistona humilis, Corymbia bella, Eucalyptus tetrodonta, Terminalia ferdinandiana, Lophostemon	Adjacent to creek crossed lay pipeline near WPT010, 011.

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				vernicosa, Planchonia careya, Alstonia actinophylla, Sarga sp., Eragrostis sp			lactifluus, Corymbia polycarpa	
30	616924	8428640	tall open forest-on flat, tall closed forest on creek, narrow riparian zone	Eucalyptus miniata, Corymbia bella, Corymbia foelscheana, Eucalyptus tetrodonta, Livistona humilis, Brachychiton diversifolius, Brachychiton megaphyllus, Erythrophleum chlorostachys, Smilax australis, Planchonia careya, Syzygium suborbiculare, Grewia retusifolia, Terminalia ferdinandiana, Syzygium armstrongii, Melastoma malabathricum, Syzygium minutuliflorum, Smilax australis, Psydrax odorata	Syzygium minutuliflorum, Smilax australis, Psydrax odorata	Planchonia careya, Syzygium suborbiculare, Grewia retusifolia, Terminalia ferdinandiana, Syzygium armstrongii, Melastoma malabathricum	Eucalyptus miniata, Corymbia bella, Corymbia foelscheana, Eucalyptus tetrodonta, Livistona humilis, Brachychiton diversifolius, Brachychiton megaphyllus, Erythrophleum chlorostachys, Smilax australis	Very narrow riparian zone of 30-50m
31	616924	8428640		Melaleuca viridiflora, Lophostemon lactifluus, Melastoma malabathricum, Syzygium armstrongii, Smilax australis, Syzygium minutuliflorum, Psydrax odorata	Smilax australis, Syzygium minutuliflorum, Psydrax odorata	Melastoma malabathricum, Syzygium armstrongii	Melaleuca viridiflora, Lophostemon lactifluus	Creek vegetation
32	619478	8431866	open grassland	Lophostemon lactifluus, Corymbia polycarpa, Melaleuca nervosa, Grevillea pteridifolia, Pandanus spiralis, Livistona humilis			Lophostemon lactifluus, Corymbia polycarpa, Melaleuca nervosa, Grevillea pteridifolia, Pandanus spiralis, Livistona humilis	
33	620572	8432522		Livistona humilis		Livistona humilis		Sandplain as far as WPT016. patches of dense Livistona humilis.
34	620723	8432719	open forest	Owenia vernicosa, Corymbia bleeseri, Livistona humilis, Erythrophleum chlorostachys, Eucalyptus miniata, Eucalyptus tetrodonta, Buchanania obovata, Grevillea decurrens, Acacia difficilis, Brachychiton diversifolius, Terminalia ferdinandiana, Petalostigma pubescens, Gardenia megasperma, Persoonia falcata, Brachychiton megaphyllus, Acacia dimidiata, Jacksonia dilatata, Grevillea decurrens		Petalostigma pubescens, Gardenia megasperma, Persoonia falcata, Brachychiton megaphyllus, Acacia dimidiata, Jacksonia dilatata, Grevillea decurrens	Owenia vernicosa,Corymbia bleeseri,Livistona humilis ,Erythrophleum chlorostachys,Eucalyptus miniata,Eucalyptus tetrodonta,Buchanania obovata,Grevillea decurrens,Acacia difficilis,Brachychiton diversifolius,Terminalia ferdinandiana	

Ref ID	Easting GDA94z52	Northing GDA94z52	Structural formation	All species	Lower	Mid	Upper	Notes
35	621177	8433121	tall open forest	Eucalyptus miniata, Eucalyptus tetrodonta, Pandanus spiralis, Livistona humilis, Persoonia falcata, Lophostemon lactifluus, Syzygium suborbiculare, Terminalia ferdinandiana, Corymbia foelscheana, Erythrophleum chlorostachys, Corymbia confertiflora, Buchanania obovata, Alphitonia excelsa,Gardenia megasperma, Jacksonia dilatata, Acacia dimidiata, Owenia vernicosa, Banksia dentata, Sarga sp., Petalostigma pubescens	Sarga sp., Petalostigma pubescens	Buchanania obovata, Alphitonia excelsa, Gardenia megasperma, Jacksonia dilatata, Acacia dimidiata, Owenia vernicosa, Banksia dentata	Eucalyptus miniata, Eucalyptus tetrodonta, Pandanus spiralis, Livistona humilis, Persoonia falcata, Lophostemon lactifluus, Syzygium suborbiculare, Terminalia ferdinandiana, Corymbia foelscheana, Erythrophleum chlorostachys, Corymbia confertiflora	Stringing area west of creek, approximately 250-400m long and approximately 30m wide for access trench and laydown for stringing pipe. Tom Turners Creek:- not surveyed, but dominated by Melaluca viridiflora, Lophostemon lactifluus, Corymbia polycarpa, Grevilia pteridifolia, Livistona carpentariae and Livistonia humilus on upper bank/flood way. Dense grasses away from creek.
36	621370	8433187	open woodland	Melaleuca nervosa, Corymbia porrecta, Livistona humilis, Acacia dimidiata, Acacia difficilis, Petalostigma pubescens, Persoonia falcata, Eucalyptus miniata, Owenia vernicosa, Grevillea decurrens, Corymbia confertiflora, Calytrix exstipulata, Buchanania obovata, Gomphrena canescens, Verticordia cunninghamii, Sarga sp	Sarga sp	Corymbia confertiflora, Calytrix exstipulata, Buchanania obovata, Gomphrena canescens, Verticordia cunninghamii	Melaleuca nervosa, Corymbia porrecta, Livistona humilis, Acacia dimidiata, Acacia difficilis, Petalostigma pubescens, Persoonia falcata, Eucalyptus miniata, Owenia vernicosa, Grevillea decurrens	Very different from SW site. More skeletal soils and sandstone bedrock with poor structure and minor outcrop. Area to be trenched for drilling under Tom Turners Creek. No creek species.
37	624707	8433067	woodland	Acacia difficilis, Calytrix sp., Eucalyptus miniata, Eucalyptus tetrodonta, Erythrophleum chlorostachys, Brachychiton megaphyllus, Petalostigma pubescens, Owenia vernicosa, Eucalyptus tectifica, Corymbia	Gomphrena canescens, Cochlospermum fraseri, Euphorbia muelleri, Trachymene rotundiflolia	Sarga sp., Buchanania obovata, Livistona humilis, Gardenia megasperma, Aristida latifolia	Acacia difficilis, Calytrix sp., Eucalyptus miniata, Eucalyptus tetrodonta, Erythrophleum chlorostachys, Brachychiton megaphyllus, Petalostigma pubescens, Owenia	Existing quarry proposed for extractives for BGP. Extensive area: 300*100m. Pipeline passes to south foot of

Ref ID	Easting GDA94z52	Northing GDA94z52	Structural formation	All species	Lower	Mid	Upper	Notes
				latifolia, Sarga sp., Buchanania obovata, Livistona humilis, Gardenia megasperma, Aristida latifolia, Gomphrena canescens, Cochlospermum fraseri, Euphorbia muelleri, Trachymene rotundiflolia			vernicosa, Eucalyptus tectifica, Corymbia latifolia	hill - vegetation here is similar.
38	624707	8433067		Acacia oncinocarpa, Persoonia falcata, Grevillea decurrens, Terminalia carpentariae			Acacia oncinocarpa, Persoonia falcata, Grevillea decurrens, Terminalia carpentariae	Quarry Site Species:
39	624783	8432857	woodland	Corymbia dichromophloia, Erythrophleum chlorostachys, Eucalyptus tectifica, Livistona humilis, Pandanus spiralis, Petalostigma pubescens	Petalostigma pubescens	Livistona humilis, Pandanus spiralis	Corymbia dichromophloia, Erythrophleum chlorostachys, Eucalyptus tectifica	
40	626038	8432863		Erythrophleum chlorostachys, Buchanania obovata, Eucalyptus tectifica, Corymbia dichromopholia, Xanthostemon paradoxus, Cochlospermum fraseri, Calytrix exstipulata, Livistona humilis, Grevillea decurrens, Persoonia falcata, Acacia dunnii	Persoonia falcata, Acacia dunnii	Cochlospermum fraseri, Calytrix exstipulata, Livistona humilis, Grevillea decurrens	Erythrophleum chlorostachys, Buchanania obovata, Eucalyptus tectifica, Corymbia dichromopholia, Xanthostemon paradoxus	
41	627081	8433616	open shrubland	Melaleuca nervosa, Pandanus spiralis, Grevillea pteridifolia, Lophostemon lactifluus, Corymbia polycarpa, Asteromyrtus symphyocarpa, Erythrophleum chlorostachys, Pandanus spiralis, Acacia dimidiata, Petalostigma pubescens, Acacia sp., Melaleuca viridiflora			Melaleuca nervosa, Pandanus spiralis, Grevillea pteridifolia, Lophostemon lactifluus, Corymbia polycarpa, Asteromyrtus symphyocarpa, Erythrophleum chlorostachys, Pandanus spiralis, Acacia dimidiata, Petalostigma pubescens, Acacia sp., Melaleuca viridiflora	Topographic variations - higher ground and near creek. Subject to erosion if channelled and not stabilised. Roadside erosion gullies exhibit clay loam to 1m and heavy clay below - c horizon.
42	630687	8436151	open woodland	Corymbia polycarpa, Erythrophleum chlorostachys, Corymbia latifolia, Lophostemon lactifluus, Buchanania obovata, Livistona humilis, Grevillea pteridifolia, Pandanus spiralis, Brachychiton diversifolius, Lophostemon grandiflorus, Acacia dimidiata, Petalostigma pubescens, Gardenia megasperma, Gomphrena canescens, Tinospora smilacina, Acacia dunnii, Dolichandrone filiformis, Sarga intrans	Sarga intrans	Acacia dimidiata, Petalostigma pubescens, Gardenia megasperma, Gomphrena canescens, Tinospora smilacina, Acacia dunnii, Dolichandrone filiformis	Corymbia polycarpa,Erythrophleum chlorostachys,Corymbia latifolia,Lophostemon lactifluus,Buchanania obovata,Livistona humilis ,Grevillea pteridifolia,Pandanus spiralis,Brachychiton diversifolius,Lophostemon grandiflorus	Erosion gully across pipeline-sodic soils are highly erodible and will require erosion control and berms. Headwall gullies are both upstream and downstream of pipeline. Typical

Ref ID	Easting GDA94z52	Northing GDA94z52	Structural formation	All species	Lower	Mid	Upper	Notes
								plain and creek crossing.
43	630981	8435509	open woodland	Erythrophleum chlorostachys, Buchanania obovata, Calytrix exstipulata, Brachychiton megaphyllus, Melaleuca nervosa, Gomphrena canescens, Persoonia falcata, Acacia hemignosta, Petalostigma pubescens, Wrightia saligna, Eucalyptus tectifica, Waltheria indica	Waltheria indica		Erythrophleum chlorostachys, Buchanania obovata, Calytrix exstipulata, Brachychiton megaphyllus, Melaleuca nervosa, Gomphrena canescens, Persoonia falcata, Acacia hemignosta, Petalostigma pubescens, Wrightia saligna, Eucalyptus tectifica	Quarry in use- mostly cleared. Minor regrowth.
44	630981	8435509		Corymbia polysciada, Cochlospermum fraseri, Gardenia megasperma, Asteromyrtus magnifica			Corymbia polysciada, Cochlospermum fraseri, Gardenia megasperma, Asteromyrtus magnifica	Additional species in surrounding vegetation:
45	632923	8438177	open woodland	Acacia holosericea, Melaleuca nervosa, Eucalyptus tectifica, Lophostemon lactifluus, Corymbia bella, Corymbia polycarpa, Cymbidium canaliculatum, Asteromyrtus magnifica, Melaleuca minutifolia, Sarga sp	Sarga sp		Acacia holosericea, Melaleuca nervosa, Eucalyptus tectifica, Lophostemon lactifluus, Corymbia bella, Corymbia polycarpa, Cymbidium canaliculatum, Asteromyrtus magnifica, Melaleuca minutifolia	Gully across plain flowing SE.
46	635059	8440801	open woodland	Melaleuca nervosa, Corymbia polycarpa, Melaleuca viridiflora, Corymbia latifolia, Corymbia bella, Carissa lanceolata, Petalostigma pubescens, Pandanus spiralis, Acacia holosericea, Grewia retusifolia, Themeda triandra	Themeda triandra	Petalostigma pubescens, Pandanus spiralis, Acacia holosericea, Grewia retusifolia	Melaleuca nervosa, Corymbia polycarpa, Melaleuca viridiflora, Corymbia latifolia, Corymbia bella, Carissa lanceolata	Seasonally inundated- highly erodible soils. Lots of horses, possum evidence.
47	638131	8442809	closed grassland	Syzygium eucalyptoides, Barringtonia acutangula, Mimosa pigra, Pandanus spiralis, Grevillea pteridifolia, Melaleuca nervosa		Pandanus spiralis, Grevillea pteridifolia, Melaleuca nervosa	Syzygium eucalyptoides, Barringtonia acutangula, Mimosa pigra	Dense grasses of numerous species. Mimosa pigra infestation begins on floodplains. Scattered along drainage line on a flat floodplain - narrow sections approx 100m long.
48	641252	8445219	shrubland	Petalostigma pubescens, Melaleuca nervosa, Corymbia polysciada, uchanania obovata, Persoonia falcata, Corymbia latifolia, Grevillea pteridifolia, Brachychiton megaphyllus, Corymbia polycarpa,	Eragrostis sp	Acacia dimidiata, Gardenia megasperma, Grevillea decurrens, Melaleuca viridiflora, Gomphrena canescens	Petalostigma pubescens, Melaleuca nervosa, Corymbia polysciada, Buchanania obovata, Persoonia falcata, Corymbia latifolia, Grevillea pteridifolia,	Petalostigma plain starts close to last site. Series of intersecting floodplains and

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				Corymbia confertiflora, Acacia dimidiata, Gardenia megasperma, Grevillea decurrens, Melaleuca viridiflora, Gomphrena canescens, Eragrostis sp			Brachychiton megaphyllus, Corymbia polycarpa, Corymbia confertiflora	elevated plains from here to east.
49	643724	8447579	open grassland	Corymbia bella, Melaleuca nervosa, Corymbia polycarpa, Melaleuca viridiflora, Melaleuca argenta, Pandanus spiralis, Acacia holosericea, Asteromyrtus symphyocarpa		Pandanus spiralis, Acacia holosericea, Asteromyrtus symphyocarpa	Corymbia bella, Melaleuca nervosa, Corymbia polycarpa, Melaleuca viridiflora, Melaleuca argenta	Grasses and sedges.
50	644524	8448115	tall open forest	Eucalyptus miniata, Eucalyptus tetrodonta, Corymbia polysciada, Buchanania obovata, Eucalyptus tectifica, Gardenia megasperma, Corymbia ferruginea, Grevillea decurrens, Petalostigma pubescens, Brachychiton megaphyllus, Calytrix exstipulata, Acacia dunnii, Acacia hemignosta, Verticordia cunninghamii, Sarga plumosum, Gomphrena canescens	Sarga plumosum, Gomphrena canescens	Grevillea decurrens, Petalostigma pubescens, Brachychiton megaphyllus, Calytrix exstipulata, Acacia dunnii, Acacia hemignosta, Verticordia cunninghamii	Eucalyptus miniata, Eucalyptus tetrodonta, Corymbia polysciada, Buchanania obovata, Eucalyptus tectifica, Gardenia megasperma, Corymbia ferruginea	Crossing OFC and main road here.
51	648967	8450486	open forest	Corymbia setosa, Eucalyptus tetrodonta, Eucalyptus miniata, Corymbia latifolia, Corymbia polysciada, Petalostigma pubescens, Calytrix exstipulata, Gardenia megasperma, Livistona humilis, Sarga sp	Sarga sp	Petalostigma pubescens, Calytrix exstipulata, Gardenia megasperma, Livistona humilis	Corymbia setosa, Eucalyptus tetrodonta, Eucalyptus miniata, Corymbia latifolia, Corymbia polysciada	Close to gravel pit.
52	649446	8450595	open forest	Eucalyptus miniata, Buchanania obovata, Eucalyptus tetrodonta, Livistona humilis, Petalostigma pubescens, Persoonia falcata, Calytrix exstipulata, Sarga sp., Sarga intrans, Pterocaulon sphacelatum	Sarga sp., Sarga intrans, Pterocaulon sphacelatum	Livistona humilis, Petalostigma pubescens, Persoonia falcata, Calytrix exstipulata	Eucalyptus miniata, Buchanania obovata, Eucalyptus tetrodonta	
53	650462	8450225	tall open forest.	Eucalyptus miniata, Eucalyptus tetrodonta, Buchanania obovata, Terminalia carpentariae, Terminalia ferdinandiana, Corymbia latifolia, Corymbia polycarpa, Asteromyrtus magnifica, Livistona humilis, Persoonia falcata, Petalostigma pubescens, Grevillea decurrens, Wrightia saligna, Brachychiton megaphyllus, Gardenia megasperma, Sarga intrans, Gomphrena canescens	Sarga intrans, Gomphrena canescens	Livistona humilis, Persoonia falcata, Petalostigma pubescens, Grevillea decurrens, Wrightia saligna, Brachychiton megaphyllus, Gardenia megasperma	Eucalyptus miniata, Eucalyptus tetrodonta, Buchanania obovata, Terminalia carpentariae, Terminalia ferdinandiana, Corymbia latifolia, Corymbia polycarpa, Asteromyrtus magnifica	

Ref ID	Easting GDA94z52	Northing GDA94z52	Structural formation	All species	Lower	Mid	Upper	Notes
54	652360	8450741	open forest	Grevillea pteridifolia ,Melaleuca argenta, Acacia holosericea, Melaleuca viridiflora, Corymbia latifolia, Corymbia polycarpa, Terminalia sp., Syzygium armstrongii, Vitex glabrata, Psydrax odorata, Barringtonia acutangula, Alphitonia excelsa, Pandanus spiralis, Sarga sp. ,Xyris complanata, Murdannia graminea	Pandanus spiralis, Sarga sp. ,Xyris complanata, Murdannia graminea	Psydrax odorata, Barringtonia acutangula, Alphitonia excelsa	Grevillea pteridifolia, Melaleuca argenta ,Acacia holosericea, Melaleuca viridiflora, Corymbia latifolia, Corymbia polycarpa, Terminalia sp., Syzygium armstrongii, Vitex glabrata	
55	655197	8451338	open forest	Corymbia polycarpa, Corymbia latifolia, Callitris intratropica ,Melaleuca argenta,Melaleuca viridiflora, Eucalyp tus bigalerita, Erythrophleum chlorostachys, Acacia holosericea, Corymbia bella, Barringtonia acutangula, Canarium australianum, Brachychiton diversifolius, Corymbia greeniana, Terminalia arostrata, Calytrix exstipulata, Livistona humilis, Pandanus spiralis, Ampelocissus sp., Planchonia careya, Hyptis suaveolens, Lysiphyllum sp., Ficus scobina, Hibiscus sabdariffa, Hypoestes floribunda, Sarga sp., Flagellaria indica, Heteropogon triticeus, Cassytha filiformis, Imperata cylindrica, Tinospora smilacina	Sarga sp., Flagellaria indica, Heteropogon triticeus, Cassytha filiformis, Imperata cylindrica, Tinospora smilacina	Calytrix exstipulata, Livistona humilis , Pandanus spiralis, Ampelocissus sp., Planchonia careya, Hyptis suaveolens, Lysiphyllum sp., Ficus scobina, Hibiscus sabdariffa, Hypoestes floribunda	Corymbia polycarpa, Corymbia latifolia, Callitris intratropica, Melaleuca argenta, Melaleuca viridiflora, Eucalyptus bigalerita, Erythrophleum chlorostachys, Acacia holosericea, Corymbia bella, Barringtonia acutangula, Canarium australianum, Brachychiton diversifolius, Corymbia greeniana, Terminalia arostrata	Pipeline avoids trees such as Corymbia bella. Nearby, there is erosion on pipeline route on small sandy creek - though should be able to trench if managed.
56	657371	8452006	woodland	Erythrophleum chlorostachys, Pandanus spiralis, Acacia dimidiata, Buchanania obovata, Syzygium eucalyptoides, Eucalyptus tetrodonta, Corymbia polycarpa, Terminalia arostrata, Cochlospermum fraseri, Petalostigma pubescens, Gardenia megasperma, Brachychiton megaphyllus, Verticordia cunninghamii, Livistona humilis, Persoonia falcata, Melaleuca nervosa, Grevillea pteridifolia, Grevillea decurrens, Sarga sp., Dioscorea bulbifera, Evolvulus alsinoides	Sarga sp., Dioscorea bulbifera, Evolvulus alsinoides	Brachychiton megaphyllus, Verticordia cunninghamii, Livistona humilis, Persoonia falcata, Melaleuca nervosa, Grevillea pteridifolia, Grevillea decurrens	Erythrophleum chlorostachys, Pandanus spiralis, Acacia dimidiata, Buchanania obovata, Syzygium eucalyptoides, Eucalyptus tetrodonta, Corymbia polycarpa, Terminalia arostrata, Cochlospermum fraseri, Petalostigma pubescens, Gardenia megasperma	Shallow creek nearby on floodplain dominated by Melaleuca nervosa. Floodplain soils are fine silty loam over heavy yellow-red clay - prone to erosion. Sandy in creek bed. Pig damage evident.

Ref ID	Easting GDA94z52	Northing GDA94z52	Structural formation	All species	Lower	Mid	Upper	Notes
57	659427	8453608	open woodland	Corymbia polysciada, Buchanania obovata, Erythrophleum chlorostachys, Corymbia polycarpa, Grevillea pteridifolia, Acacia sp., Terminalia ferdinandiana, Persoonia falcata, Owenia vernicosa, Eucalyptus miniata, Livistona humilis, Brachychiton megaphyllus, Verticordia cunninghamii, Petalostigma pubescens,Cochlospermum fraseri, Planchonia careya, Ficus aculeata, Acacia dunnii, Acacia oncinocarpa, Ampelocissus acetosa, Sarga sp., Gomphrena canescens, Murdannia graminea	Sarga sp., Gomphrena canescens, Murdannia graminea	Livistona humilis, Brachychiton megaphyllus, Verticordia cunninghamii, Petalostigma pubescens, Cochlospermum fraseri, Planchonia careya,F icus aculeata, Acacia dunnii, Acacia oncinocarpa, Ampelocissus acetosa	Corymbia polysciada, Buchanania obovata, Erythrophleum chlorostachys, Corymbia polycarpa, Grevillea pteridifolia, Acacia sp., Terminalia ferdinandiana, Persoonia falcata, Owenia vernicosa, Eucalyptus miniata	
58	661450	8458191	tall open forest	Eucalyptus miniata, Eucalyptus tetrodonta, Corymbia polysciada, Erythrophleum chlorostachys, Eucalyptus tectifica, Corymbia latifolia, Pandanus spiralis, Livistona humilis, Brachychiton megaphyllus, Ampelocissus acetosa, Petalostigma pubescens, Calytrix exstipulata, Verticordia cunninghamii, Sarga sp., Indigofera saxicola, Flemingia D39269 sericea	Sarga sp., Indigofera saxicola, Flemingia D39269 sericea	Livistona humilis, Brachychiton megaphyllus, Ampelocissus acetosa, Petalostigma pubescens, Calytrix exstipulata, Verticordia cunninghamii	Eucalyptus miniata, Eucalyptus tetrodonta, Corymbia polysciada, Erythrophleum chlorostachys, Eucalyptus tectifica, Corymbia latifolia, Pandanus spiralis	
59	665060	8460555	woodland, open riparian	Lophostemon grandiflorus, Melaleuca viridiflora, Corymbia polysciada, Erythrophleum chlorostachys, Corymbia polycarpa, Buchanania obovata, Corymbia foelscheana, Livistona humilis, Pandanus spiralis, Planchonia careya, Hakea arborescens, Persoonia falcata, Canarium australianum, Ficus scobina, Brachychiton megaphyllus, Sarga sp., Triumfetta pentandra	Sarga sp., Triumfetta pentandra	Livistona humilis, Pandanus spiralis, Planchonia careya, Hakea arborescens,P ersoonia falcata, Canarium australianum, Ficus scobina, Brachychiton megaphyllus	Lophostemon grandiflorus, Melaleuca viridiflora, Corymbia polysciada, Erythrophleum chlorostachys, Corymbia polycarpa, Buchanania obovata, Corymbia foelscheana	Creek crossing-pipeline easement to be realigned to cross at straight section 20m wide.
60	668655	8463028	woodland	Corymbia polysciada, Corymbia polycarpa, Corymbia bella, Livistona humilis , Melaleuca viridiflora, Syzygium eucalyptoides, Terminalia arostrata, andanus spiralis, Planchonia careya, Terminalia ferdinandiana, Persoonia falcata, Dolichandrone filiformis,S arga sp	Sarga sp	Pandanus spiralis, Planchonia careya, Terminalia ferdinandiana, Persoonia falcata, Dolichandrone filiformis	Corymbia polysciada, Corymbia polycarpa, Corymbia bella,Livistona humilis, Melaleuca viridiflora, Syzygium eucalyptoides, Terminalia arostrata	Poor site for vegetation. Ephemerial water course - open creek with poorly defined channel. Hyptis along fenceline nearby.

Ref ID	Easting GDA94z52	Northing GDA94z52	Structural formation	All species	Lower	Mid	Upper	Notes
61	671841	8465153	woodland	Buchanania obovata, Livistona humilis, Erythrophleum chlorostachys, Terminalia ferdinandiana, Corymbia latifolia, Corymbia polycarpa, Corymbia polysciada, Brachychiton megaphyllus, Pandanus spiralis, Acacia douglasica, Sarga sp., Aristida sp	Sarga sp., Aristida sp	Brachychiton megaphyllus, Pandanus spiralis, Acacia douglasica	Buchanania obovata, Livistona humilis, Erythrophleum chlorostachys, Terminalia ferdinandiana, Corymbia latifolia, Corymbia polycarpa, Corymbia polysciada	Nearby creek crossing (to be trenched) with erosion gully on track.
62	675477	8467550	woodland	Eucalyptus miniata, Erythrophleum chlorostachys, Corymbia latifolia, Eucalyptus tectifica, Livistona humilis, Terminalia ferdinandiana, Brachychiton megaphyllus, Buchanania obovata, Petalostigma pubescens, Verticordia cunninghamii, Persoonia falcata, Grevillea pteridifolia, Acacia dimidiata, Owenia vernicosa, Acacia dunnii, Acacia humifusa, Sarga sp., Lomandra sp., Aristida sp	Sarga sp., Lomandra sp., Aristida sp	Brachychiton megaphyllus, Buchanania obovata, Petalostigma pubescens, Verticordia cunninghamii, Persoonia falcata, Grevillea pteridifolia, Acacia dimidiata, Owenia vernicosa, Acacia dunnii, Acacia humifusa	Eucalyptus miniata, Erythrophleum chlorostachys, Corymbia latifolia, Eucalyptus tectifica, Livistona humilis, Terminalia ferdinandiana	Melaleuca minitifolia swamp nearby.
63	677480	8469023	woodland	Erythrophleum chlorostachys, Lophostemon lactifluus, Corymbia polycarpa, Corymbia polysciada, Corymbia bella, Eucalyptus tectifica, Eucalyptus miniata, Brachychiton diversifolius, Lophostemon grandiflorus, Syzygium eucalyptoides, Livistona humilis, Ficus scobina, Persoonia falcata, Brachychiton megaphyllus, Buchanania obovata, Canarium australianum, Pandanus spiralis, Sarga sp., Auranticarpa melanosperma, Carissa lanceolata	Sarga sp., Auranticarpa melanosperma, Carissa lanceolata	Livistona humilis, Ficus scobina, Persoonia falcata, Brachychiton megaphyllus, Buchanania obovata, Canarium australianum, Pandanus spiralis	Erythrophleum chlorostachys, Lophostemon lactifluus, Corymbia polycarpa, Corymbia polysciada, Corymbia bella, Eucalyptus tectifica, Eucalyptus miniata, Brachychiton diversifolius, Lophostemon grandiflorus, Syzygium eucalyptoides	
64	681026	8469102	woodland	Erythrophleum chlorostachys, Corymbia polysciada, Corymbia latifolia, Terminalia ferdinandiana, Lophostemon lactifluus, Buchanania obovata, Livistona humilis, Petalostigma pubescens, Acacia sp., Brachychiton megaphyllus, Persoonia falcata, Pandanus spiralis, Grevillea mimosoides, Sarga sp., Themeda triandra, Heteropogon triticeus	Sarga sp., Themeda triandra, Heteropogon triticeus	Buchanania obovata, Livistona humilis, Petalostigma pubescens, Acacia sp., Brachychiton megaphyllus, Persoonia falcata, Pandanus spiralis, Grevillea mimosoides	Erythrophleum chlorostachys, Corymbia polysciada, Corymbia latifolia, Terminalia ferdinandiana, Lophostemon lactifluus	Erosion gully nearby.

Ref ID	Easting GDA94z52	Northing GDA94z52	Structural formation	All species	Lower	Mid	Upper	Notes
65	681515	8476024	open woodland	Melaleuca nervosa, Acacia holosericea, Erythrophleum chlorostachys, Eucalyptus tectifica, Calytrix exstipulata, Petalostigma pubescens, Corymbia bella, Asteromyrtus magnifica, Eucalyptus microtheca, Croton sp, Buchanania obovata, Grevillea decurrens, Croton arnhemicus, Acacia hemignosta, Cochlospermum fraseri, Lophostemon lactifluus, Opilia amentacea ,S arga sp., Themeda triandra, Aristida sp., Petalostigma quadriloculare	Sarga sp., Themeda triandra, Aristida sp., Petalostigma quadriloculare	Buchanania obovata, Grevillea decurrens, Croton arnhemicus, Acacia hemignosta, Cochlospermum fraseri, Lophostemon lactifluus, Opilia amentacea	Melaleuca nervosa, Acacia holosericea, Erythrophleum chlorostachys, Eucalyptus tectifica, Calytrix exstipulata, Petalostigma pubescens, Corymbia bella, Asteromyrtus magnifica, Eucalyptus microtheca, Croton sp	Access track from Daly River road to BGP - floodplain and woodland vegetation dominated by Eucalyptus microtheca, Casuarina cunninghamiana, Corymbia bella, Asteromyrtus magnifica, Sarga sp., Themeda triandra, Eragrostis sp., Eriachne sp. Also Eucalyptus camaldulenis, Melaleuca nervosa, Asteromyrtus symphyocarpa, Barringtonia acutangula.
66	681662	8468079	open forest/ woodland	Corymbia latifolia, Planchonia careya, Eucalyptus miniata, Eucalyptus tectifica, Corymbia polycarpa, Buchanania obovata, Corymbia polysciada, Corymbia foelscheana, Erythrophleum chlorostachys, Livistona humilis, Petalostigma pubescens, Acacia douglasica, Cochlospermum fraseri, Amyema sp., Gardenia megasperma, Acacia sp, Sarga sp., Hyptis suaveolens	Sarga sp., Hyptis suaveolens	Livistona humilis, Petalostigma pubescens, Acacia douglasica, Cochlospermum fraseri, Amyema sp., Gardenia megasperma, Acacia sp	Corymbia latifolia, Planchonia careya, Eucalyptus miniata, Eucalyptus tectifica, Corymbia polycarpa, Buchanania obovata, Corymbia polysciada, Corymbia foelscheana, Erythrophleum chlorostachys	
67	683002	8467460	woodland	Melaleuca argenta, Melaleuca viridiflora, Eucalyptus camaldulenis, Melaleuca nervosa, Corymbia polycarpa, Corymbia bella, Acacia auriculiformis, Ficus coronulata, Barringtonia acutangula, Cynodon sp., Passiflora foetida, Xanthium strumarium, Sphaeromorphaea australis	Cynodon sp., Passiflora foetida, Xanthium strumarium, Sphaeromorphaea australis	Ficus coronulata, Barringtonia acutangula	Melaleuca argenta, Melaleuca viridiflora, Eucalyptus camaldulenis, Melaleuca nervosa, Corymbia polycarpa, Corymbia bella, Acacia auriculiformis	
68	683128	8467564	open forest	Syzygium armstrongii, Melaleuca argenta, Corymbia bella, Barringtonia acutangula, Eucalyptus camaldulenis			Syzygium armstrongii, Melaleuca argenta, Corymbia bella, Barringtonia acutangula, Eucalyptus	

Ref ID	Easting GDA94z52	Northing GDA94z52	Structural formation	All species	Lower	Mid	Upper	Notes
							camaldulenis	
69	685267	8468520	tall closed forest	Syzygium suborbiculare, Ficus platypoda, Ficus virens, Canarium australianum, Livistona humilis, Smilax australis, Hyptis suaveolens, Dioscorea sp	Hyptis suaveolens, Dioscorea sp	Canarium australianum, Livistona humilis, Smilax australis	Syzygium suborbiculare, Ficus platypoda, Ficus virens	
70	686501	8468634		Terminalia ferdinandiana, Eucalyptus miniata, orymbia foelscheana, Owenia vernicosa, Erythrophleum chlorostachys, Corymbia latifolia, Acacia holosericea, Asteromyrtus symphyocarpa, Canarium australianum, Pandanus spiralis, Buchanania obovata, Calytrix exstipulata, Livistona humilis, Acacia sp., Gardenia megasperma, Brachychiton megaphyllus, Persoonia falcata, Hyptis suaveolens, Themeda triandra, Aristida sp., Cymbopogon obtectus, Triodia sp., Commelina sp., Petalostigma quadriloculare	Themeda triandra,Aristida sp., Cymbopogon obtectus, Triodia sp., Commelina sp., Petalostigma quadriloculare	Canarium australianum, Pandanus spiralis, Buchanania obovata, Calytrix exstipulata, Livistona humilis, Acacia sp., Gardenia megasperma, Brachychiton megaphyllus, Persoonia falcata, Hyptis suaveolens	Terminalia ferdinandiana, Eucalyptus miniata, Corymbia foelscheana, Owenia vernicosa, Erythrophleum chlorostachys, Corymbia latifolia, Acacia holosericea, Asteromyrtus symphyocarpa	Slight erosion gully near sandstone
71	687036	8468429	woodland	Eucalyptus microtheca, Asteromyrtus symphyocarpa, Atalaya hemiglauca, Nauclea orientalis, Eucalyptus camaldulenis, Melaleuca viridiflora, Casuarina cunninghamiana, Cathormion umbellatum, Flagellaria indica, Bambusa arnhemica, Strychnos lucida, Xanthium strumarium, Basilicum polystachyon	Basilicum polystachyon	Flagellaria indica, Bambusa arnhemica, Strychnos lucida, Xanthium strumarium	Eucalyptus microtheca, Asteromyrtus symphyocarpa, Atalaya hemiglauca, Nauclea orientalis, Eucalyptus camaldulenis, Melaleuca viridiflora, Casuarina cunninghamiana, Cathormion umbellatum	Self mulching soil. Thicket of Noogoora Burr on river bank.
72	687906	8468748	woodland	Corymbia polycarpa, Casuarina cunninghamiana, Corymbia bella, Excoecaria parvifolia, Strychnos lucida, Cathormion umbellatum, Asteromyrtus magnifica, Sarga intrans	Sarga intrans	Cathormion umbellatum, Asteromyrtus magnifica	Corymbia polycarpa, Casuarina cunninghamiana, Corymbia bella, Excoecaria parvifolia, Strychnos lucida	Same patches of stones in areas of bioturbation (high clay content). Soil very spongy- could cause problems with heavy vehicles and subsidence after pipe has been covered over.
73	689618	8469159	woodland	Casuarina cunninghamiana, Corymbia polycarpa, Cathormion umbellatum, Strychnos lucida, Excoecaria parvifolia, Heteropogon contortus, Sarga intrans	Heteropogon contortus, Sarga intrans	Cathormion umbellatum, Strychnos lucida, Excoecaria parvifolia	Casuarina cunninghamiana, Corymbia polycarpa	Noogoora Burr along eastern Daly River bank

Ref ID	Easting GDA94z52	Northing GDA94z52	Structural formation	All species	Lower	Mid	Upper	Notes
74	690766	8469411	woodland	Buchanania obovata, Petalostigma pubescens, Corymbia latifolia, Eucalyptus tectifica, Corymbia foelscheana, Corymbia polycarpa, Corymbia bella, Casuarina cunninghamiana, Barringtonia acutangula, Erythrophleum chlorostachys, Lophostemon lactifluus ,Ampelocissus sp., Brachychiton megaphyllus, Hibiscus sp., Phragmites sp., Asteromyrtus symphyocarpa, Hibiscus tiliaceus, Melaleuca dealbata, Bauhinia malabarica, Sarga sp	Sarga sp	Ampelocissus sp., Brachychiton megaphyllus, Hibiscus sp., Phragmites sp., Asteromyrtus symphyocarpa, Hibiscus tiliaceus, Melaleuca dealbata, Bauhinia malabarica	Buchanania obovata, Petalostigma pubescens, Corymbia latifolia, Eucalyptus tectifica, Corymbia foelscheana, Corymbia polycarpa, Corymbia bella, Casuarina cunninghamiana, Barringtonia acutangula, Erythrophleum chlorostachys, Lophostemon lactifluus	
75	694748	8470355	open woodland and species related to limestone karst	Melaleuca viridiflora, Buchanania obovata, Corymbia foelscheana, Eucalyptus tectifica, Lophostemon lactifluus, Melaleuca dealbata, Melaleuca nervosa, Corymbia bella, Planchonia careya, Brachychiton megaphyllus, Hakea arborescens, Livistona humilis, Sarga sp	Sarga sp	Livistona humilis, Brachychiton megaphyllus, Hakea arborescens, Livistona humilis	Melaleuca viridiflora, Buchanania obovata, Corymbia foelscheana, Eucalyptus tectifica, Lophostemon lactifluus, Melaleuca dealbata, Melaleuca nervosa, Corymbia bella, Planchonia careya	
76	698623	8470902	woodland	Erythrophleum chlorostachys, Buchanania obovata, Corymbia polysciada, Corymbia polycarpa, Corymbia latifolia, Corymbia foelscheana, Acacia platycarpa, Planchonia careya, Opilia sp., Acacia sp., Gardenia sp, Brachychiton megaphyllus, Hakea arborescens, Ampelocissus sp., Persoonia falcata, Petalostigma pubescens, Cochlospermum fraseri, Sarga sp	Sarga sp	Brachychiton megaphyllus, Hakea arborescens, Ampelocissus sp., Persoonia falcata, Petalostigma pubescens, Cochlospermum fraseri	Erythrophleum chlorostachys, Buchanania obovata, Corymbia polysciada, Corymbia polycarpa, Corymbia latifolia, Corymbia foelscheana, Acacia platycarpa, Planchonia careya,Opilia sp., Acacia sp., Gardenia sp	
77	701538	8471761	open woodland	Corymbia polycarpa, Terminalia ferdinandiana, Corymbia polysciada, Corymbia greeniana, Petalostigma pubescens, Buchanania obovata, Livistona humilis, Grevillea decurrens, Ficus aculeata, Cochlospermum fraseri, Ampelocissus sp., Brachychiton megaphyllus, Persoonia falcate, Sarga sp., Hibbertia sp	Sarga sp., Hibbertia sp	Petalostigma pubescens, Buchanania obovata, Livistona humilis, Grevillea decurrens, Ficus aculeata, Cochlospermum fraseri, Ampelocissus sp., Brachychiton megaphyllus, Persoonia falcata	Corymbia polycarpa, Terminalia ferdinandiana, Corymbia polysciada, Corymbia greeniana	
78	702123	8472035	open woodland	Corymbia latifolia, Corymbia polycarpa, Corymbia polysciada, Buchanania obovata, Planchonia careya, Buchanania obovata, Brachychiton megaphyllus, Terminalia ferdinandiana, Acacia sp., Planchonia careya, Sarga sp.,	Sarga sp., Themeda triandra, Dendrolobium polyneurum	Buchanania obovata, Brachychiton megaphyllus, Terminalia ferdinandiana, Acacia sp., Planchonia careya	Corymbia latifolia, Corymbia polycarpa, Corymbia polysciada, Buchanania obovata, Planchonia careya	

Ref ID	Easting GDA94z52	Northing GDA94z52	Structural formation	All species	Lower	Mid	Upper	Notes
				Themeda triandra, Dendrolobium polyneurum				
79	705395	8473719	open woodland	Corymbia latifolia, Erythrophleum chlorostachys, Livistona humilis, Buchanania obovata, Grevillea decurrens, Petalostigma pubescens, Acacia humifusa, Acacia sp., Persoonia falcata, Brachychiton megaphyllus, Acacia lamprocarpa, Grevillea pteridifolia, Terminalia ferdinandiana		Livistona humilis, Buchanania obovata, Grevillea decurrens, Petalostigma pubescens, Acacia humifusa, Acacia sp., Persoonia falcata, Brachychiton megaphyllus, Acacia lamprocarpa, Grevillea pteridifolia, Terminalia ferdinandiana	Corymbia latifolia, Erythrophleum chlorostachys	
80	709006	8475403	woodland	Corymbia latifolia, Corymbia polycarpa, Corymbia polysciada, Lophostemon grandiflorus,A cacia auriculiformis, Brachychiton megaphyllus, Planchonia careya, Buchanania obovata, Pandanus spiralis, Hakea arborescens, Aristida sp., Ampelocissus sp., Themeda triandra, Grewia sp	Aristida sp., Ampelocissus sp., hemeda triandra, Grewia sp	Brachychiton megaphyllus, Planchonia careya, Buchanania obovata, Pandanus spiralis, Hakea arborescens	Corymbia latifolia, Corymbia polycarpa, Corymbia polysciada, Lophostemon grandiflorus, Acacia auriculiformis	
81	711920	8476763	woodland	Melaleuca nervosa, Erythrophleum chlorostachys, Corymbia polycarpa, Terminalia ferdinandiana, Corymbia latifolia, Cochlospermum fraseri, Opilia sp., Gardenia resinosa, Erythrophleum chlorostachys, Corymbia polysciada, Grewia sp., Gardenia sp., Grevillea decurrens, Brachychiton megaphyllus, Themeda triandra, Hyptis suaveolens, Heteropogon contortus	Themeda triandra, Hyptis suaveolens, Heteropogon contortus	Grewia sp., Gardenia sp., Grevillea decurrens, Brachychiton megaphyllus	Melaleuca nervosa, Erythrophleum chlorostachys, Corymbia polycarpa, Terminalia ferdinandiana, Corymbia latifolia, Cochlospermum fraseri, Opilia sp., Gardenia resinosa, Erythrophleum chlorostachys, Corymbia polysciada	Erosion gully 50cm deep.
82	716385	8477302	woodland and species related to limestone karst	Planchonia careya, Corymbia polysciada, Buchanania obovata, Eucalyptus tectifica, Terminalia sp., Erythrophleum chlorostachys, Corymbia bella, Corymbia ferruginea, Corymbia greeniana, Acacia douglasica, Carissa lanceolata, Dendrolobium polyneurum, Ampelocissus sp., Brachychiton megaphyllus, Ficus aculeata, Grevillea decurrens, Petalostigma pubescens, Hakea arborescens, Carissa lanceolata, Sarga sp., Hyptis suaveolens	Sarga sp., Hyptis suaveolens	Ampelocissus sp., Brachychiton megaphyllus, Ficus aculeata, Grevillea decurrens, Petalostigma pubescens, Hakea arborescens, Carissa lanceolata	Planchonia careya, Corymbia polysciada, Buchanania obovata, Eucalyptus tectifica, Terminalia sp., Erythrophleum chlorostachys, Corymbia bella, Corymbia ferruginea, Corymbia greeniana, Acacia douglasica, Carissa lanceolata, Dendrolobium polyneurum	Creek has closed forest dominated by Lophostemon lactifluus, Corymbia bella. Erosion gully with very steep banks of deep black loam.
83	721142	8476974	closed grassland	Corymbia latifolia, Sida acuta, Hyptis suaveolens, Stachytarpheta sp., Brachychiton megaphyllus, Heteropogon contortus	Sida acuta, Hyptis suaveolens, Stachytarpheta sp., Brachychiton megaphyllus, Heteropogon contortus	Corymbia latifolia		Former closed woodland. Change in vegetation type at base of

Ref ID	Easting GDA94z52	Northing GDA94z52	Structural formation	All species	Lower	Mid	Upper	Notes
								clearing.
84	721142	8476974	closed woodland	Eucalyptus tetrodonta, Corymbia polysciada, Corymbia polycarpa, Buchanania obovata, Planchonia careya, Erythrophleum chlorostachys, Pandanus spiralis, Livistona humilis, Hibbertia sp., Petalostigma pubescens, Stylosanthes humilis, Acacia holosericea		Pandanus spiralis, Livistona humilis, Hibbertia sp., Petalostigma pubescens, Stylosanthes humilis, Acacia holosericea	Eucalyptus tetrodonta, Corymbia polysciada, Corymbia polycarpa, Buchanania obovata, Planchonia careya, Erythrophleum chlorostachys	Uncleared part of site next to closed grassland.
85	723287	8476802	woodland	Corymbia bella, Melaleuca nervosa, Melaleuca dealbata, Ficus coronulata, Syzygium sp., Terminalia sp., Corymbia polysciada, Ficus coronulata, Buchanania obovata, Lophostemon grandiflorus, Eucalyptus patellaris, Grevillea decurrens, Grevillea pteridifolia ,Asteromyrtus symphyocarpa, Jacksonia dilatata, Pandanus spiralis, Petalostigma pubescens, Livistona humilis		Grevillea decurrens, Grevillea pteridifolia, Asteromyrtus symphyocarpa ,Jacksonia dilatata, Pandanus spiralis, Petalostigma pubescens, Livistona humilis	Corymbia bella, Melaleuca nervosa, Melaleuca dealbata, Ficus coronulata, Syzygium sp., Terminalia sp., Corymbia polysciada, Ficus coronulata, Buchanania obovata, Lophostemon grandiflorus, Eucalyptus patellaris	
86	725116	8478316	open forest	Erythrophleum chlorostachys, Opilia amentacea, Corymbia polycarpa, Corymbia polysciada, Planchonia careya, Corymbia latifolia, Sterculia quadrifida, Petalostigma pubescens, Persoonia falcata, Livistona humilis, Ficus aculeata, Brachychiton megaphyllus, Terminalia ferdinandiana, Acacia sp., Grewia retusifolia, Hyptis suaveolens, Sarga sp.,Aristida sp	Hyptis suaveolens, Sarga sp., Aristida sp	Petalostigma pubescens, Persoonia falcata, Livistona humilis, Ficus aculeata, Brachychiton megaphyllus, Terminalia ferdinandiana, Acacia sp., Grewia retusifolia	Erythrophleum chlorostachys, Opilia amentacea, Corymbia polycarpa, Corymbia polysciada, Planchonia careya, Corymbia latifolia, Sterculia quadrifida	Creek crossing nearby with minor erosion scars, generally flat, well grassed. Includes: Buchanania obovata, Lophostemon grandiflorus, Eucalyptus patellaris, Livistona Humilis.
87	726771	8479423	woodland, shrubland, riparian zone to be drilled under	Acacia auriculiformis, Eucalyptus tectifica, Erythrophleum chlorostachys, Corymbia bella,Terminalia sp., Melaleuca viridiflora ,Melaleuca dealbata,Lophostemon sp., Corymbia polysciada, Cupaniopsis anacardioides, Petalostigma pubescens, Acacia holosericea, Planchonia careya, Pandanus aquaticus, Jatropha gossypiifolia, Aristida sp	Aristida sp	Petalostigma pubescens, Acacia holosericea, Planchonia careya, Pandanus aquaticus, Jatropha gossypiifolia	Acacia auriculiformis, Eucalyptus tectifica, Erythrophleum chlorostachys, Corymbia bella, Terminalia sp., Melaleuca viridiflora, Melaleuca dealbata, Lophostemon sp., Corymbia polysciada, Cupaniopsis anacardioides	Narrow riparian zone of <10m, steep banks 6m high. Riparian zone not concentrated on due to the fact it will not be impacted upon by machinery (HDD site).

Ref ID	Easting GDA94z52	Northing GDA94z52	Structural formation	All species	Lower	Mid	Upper	Notes
88	727344	8479525	woodland	Corymbia bella, Acacia auriculiformis, Erythrophleum chlorostachys, Corymbia polycarpa, Asteromyrtus magnifica, Melaleuca dealbata, Capparis umbonata, Acacia holosericea, Protasparagus racemosus, Carissa lanceolata, Strychnos lucida, Flueggea virosa, Aristida sp., Atalaya sp., Hyptis suaveolens	Aristida sp., Atalaya sp., Hyptis suaveolens	Melaleuca dealbata, Capparis umbonata, Acacia holosericea, Protasparagus racemosus, Carissa lanceolata, Strychnos lucida, Flueggea virosa	Corymbia bella, Acacia auriculiformis, Erythrophleum chlorostachys, Corymbia polycarpa, Asteromyrtus magnifica	
89	729877	8480584	open woodland	Corymbia confertiflora, Corymbia polysciada, Corymbia greeniana, Acacia dimidiata, Ficus aculeata, Corymbia dunlopiana, Terminalia carpentariae, Brachychiton megaphyllus, Grewia retusifolia, Buchanania obovata, Capparis umbonata, Acacia dimidiate, Sarga sp., Helicteres dentata, Dendrolobium multiflorum	Sarga sp., Helicteres dentata, Dendrolobium multiflorum	Brachychiton megaphyllus, Grewia retusifolia, Buchanania obovata, Capparis umbonata, Acacia dimidiata	Corymbia confertiflora, Corymbia polysciada, Corymbia greeniana, Acacia dimidiata, Ficus aculeata Corymbia dunlopiana, Terminalia carpentariae	Hyptis suaveolens infestation towards Green Ant creek.
90	734150	8483612	woodland-regrowth. Kori Bustards.	Eucalyptus miniata, Eucalyptus tetrodonta, Erythrophleum chlorostachys, Corymbia greeniana, Buchanania obovata, Brachychiton megaphyllus, Livistona humilis, Cochlospermum fraseri, Petalostigma pubescens, Capparis umbonata, Cycas canalis, Sarga intrans, Themeda triandra, Heteropogon contortus, Pterocaulon sphacelatum, Grewia retusifolia, Ampelocissus acetosa	Sarga intrans, Themeda triandra, Heteropogon contortus, Pterocaulon sphacelatum, Grewia retusifolia, Ampelocissus acetosa	Brachychiton megaphyllus, Livistona humilis, Cochlospermum fraseri, Petalostigma pubescens, Capparis umbonata, Cycas canalis	Eucalyptus miniata, Eucalyptus tetrodonta, Erythrophleum chlorostachys, Corymbia greeniana, Buchanania obovata	
91	737358	8486451	Open woodland	Corymbia polycarpa, Eucalyptus tectifica, Terminalia carpentariae, Erythrophleum chlorostachys, Corymbia greeniana, Terminalia ferdinandiana, Corymbia polysciada, Petalostigma pubescens, Melaleuca nervosa, Brachychiton megaphyllus, Capparis umbonata, Livistona humilis, Hakea arborescens, Acacia sp, Themeda triandra, Heteropogon contortus, Ficus aculeata, Buchanania obovata	Themeda triandra, Heteropogon contortus, Ficus aculeata, Buchanania obovata	Petalostigma pubescens, Melaleuca nervosa, Brachychiton megaphyllus, Capparis umbonata,Livistona humilis, Hakea arborescens, Acacia sp	Corymbia polycarpa, Eucalyptus tectifica, Terminalia carpentariae, Erythrophleum chlorostachys, Corymbia greeniana, Terminalia ferdinandiana, Corymbia polysciada	

Ref ID	Easting GDA94z52	Northing GDA94z52	Structural formation	All species	Lower	Mid	Upper	Notes
92	740892	8489631	woodland	Canarium australianum, Erythrina vespertilio, Corymbia confertiflora, Eucalyptus tectifica, Terminalia ferdinandiana, Terminalia carpentariae, Alstonia actinophylla, Casuarina cunninghamiana, Grewia breviflora, Grewia retusifolia, Brachychiton megaphyllus, Acacia douglasica, Buchanania obovata, Ampelocissus acetosa, Hyptis suaveolens, Dioscorea transversa, Dioscorea bulbifera, Themeda triandra, Sarga sp.,Strychnos lucida, Acacia turbata, Cissus adnata	Themeda triandra, Sarga sp., Strychnos lucida, Acacia turbata, Cissus adnata	Grewia breviflora, Grewia retusifolia, Brachychiton megaphyllus, Acacia douglasica, Buchanania obovata, Ampelocissus acetosa, Hyptis suaveolens, Dioscorea transversa, Dioscorea bulbifera	Canarium australianum, Erythrina vespertilio, Corymbia confertiflora, Eucalyptus tectifica, Terminalia ferdinandiana, Terminalia carpentariae, Alstonia actinophylla, Casuarina cunninghamiana	
93	741713	8490197	open woodland	Terminalia ferdinandiana, Eucalyptus tectifica, Capparis umbonata, Buchanania obovata, Amyema sp., Corymbia greeniana, Hakea arborescens, Acacia hemignosta, Cochlospermum fraseri, Brachychiton megaphyllus, Ficus aculeata, Ampelocissus acetosa, Heteropogon contortus, Themeda triandra, Sarga sp., Petalostigma quadriloculare	Ampelocissus acetosa, Heteropogon contortus, Themeda triandra, Sarga sp., Petalostigma quadriloculare	Hakea arborescens, Acacia hemignosta, Cochlospermum fraseri, Brachychiton megaphyllus, Ficus aculeata	Terminalia ferdinandiana, Eucalyptus tectifica, Capparis umbonata, Buchanania obovata, Amyema sp., Corymbia greeniana	
94	745401	8491213	woodland	Erythrophleum chlorostachys, Corymbia confertiflora, Capparis umbonata, Erythrina vespertilio, Eucalyptus tectifica, Terminalia ferdinandiana, Corymbia greeniana, Ampelocissus acetosa, Grevillea decurrens, Sarga sp., Ampelocissus acetosa	Sarga sp., Ampelocissus acetosa	Ampelocissus acetosa, Grevillea decurrens	Erythrophleum chlorostachys, Corymbia confertiflora, Capparis umbonata, Erythrina vespertilio, Eucalyptus tectifica, Terminalia ferdinandiana, Corymbia greeniana	Small ephemeral stream crossing nearby, 2-3m wide. Some banks steep, highly erodible to 1m high. Sandy/gravelly bed with some conglomerate rock. Lots of cattle damage to creek. Another dry creek crossing nearby with very little riparian vegetation, Ficus virens (Banyan Tree), Canarium australis (Large riparian tree).
95	748533	8492924	open woodland	Terminalia ferdinandiana, Corymbia confertiflora, Corymbia greeniana, Capparis umbonata, Eucalyptus oligantha,Grevillea decurrens,	Themeda triandra, Sarga sp., Ampelocissus acetosa, Heteropogon triticeus	Grevillea decurrens, Persoonia falcata, Buchanania obovata, Brachychiton megaphyllus	Terminalia ferdinandiana, Corymbia confertiflora, Corymbia greeniana, Capparis umbonata,	Creek crossing nearby with highly erodible soil, steep

Ref ID	Easting GDA94z52	Northing GDA94z52	Structural formation	All species	Lower	Mid	Upper	Notes
				Persoonia falcata, Buchanania obovata, Brachychiton megaphyllus, Themeda triandra, Sarga sp., Ampelocissus acetosa, Heteropogon triticeus			Eucalyptus oligantha	banks, sandy bed. Ficus virens (Banyan Tree) present. Hyptis suaveolens present. Cattle. Another narrow creek nearby - 2m deep with loose banks stabilised by vegetation.
96	750738	8494319	open forest	Lophostemon grandiflorus, Erythrina vespertilio, Canarium australianum, Terminalia ferdinandiana, Ficus racemosa, Capparis umbonata, Terminalia carpentariae, Corymbia polycarpa, Corymbia polysciada, Pandanus spiralis, Petalostigma pubescens, Ampelocissus acetosa, Grewia retusifolia, Smilax australis ,Melaleuca nervosa, Mnesithea rottboellioides, Eragrostis spartinoides, Pleurocarpaea denticulata	Ampelocissus acetosa, Grewia retusifolia, Smilax australis ,Melaleuca nervosa, Mnesithea rottboellioides, Eragrostis spartinoides, Pleurocarpaea denticulata	Pandanus spiralis, Petalostigma pubescens	Lophostemon grandiflorus, Erythrina vespertilio, Canarium australianum, Terminalia ferdinandiana, Ficus racemosa, Capparis umbonata, Terminalia carpentariae, Corymbia polycarpa, Corymbia polysciada	Creek has uneven bed- steep banks to 2m - undermined and eroded, sandy/gravelly bed. Conglomerate rock outcrops. Banks stabilised by vegetation now - care needed in re-stabilising.
97	753469	8496047	open woodland	Eucalyptus miniata, Buchanania obovata, Eucalyptus tetrodonta, Corymbia confertiflora, Livistona humilis, Persoonia falcata, Brachychiton megaphyllus, Acacia sp, Ampelocissus acetosa	Ampelocissus acetosa	Livistona humilis, Persoonia falcata, Brachychiton megaphyllus, Acacia sp	Eucalyptus miniata, Buchanania obovata, Eucalyptus tetrodonta, Corymbia confertiflora	
98	754159	8496600	closed forest with 50m riparian zone	Erythrophleum chlorostachys, Corymbia bella ,Canarium australianum, Lophostemon grandiflorus, Nauclea orientalis, Capparis umbonata, Bambusa arnhemica, Ampelocissus acetosa, Ficus aculeata, Hyptis suaveolens, Passiflora foetida, Tinospora smilacina, Smilax australis, Grewia retusifolia, Petalostigma pubescens, Buchanania obovata, Ficus racemosa, Ampelocissus frutescens		Bambusa arnhemica, Ampelocissus acetosa, Ficus aculeata, Hyptis suaveolens, Passiflora foetida, Tinospora smilacina, Smilax australis, Grewia retusifolia, Petalostigma pubescens, Buchanania obovata, Ficus racemosa, Ampelocissus frutescens	Erythrophleum chlorostachys, Corymbia bella, Canarium australianum, Lophostemon grandiflorus, Nauclea orientalis, Capparis umbonata	Relatively narrow riparian zone of approximately 50m, dry creek bed. Fairly gentle profile creek 5m wide,to 2m deep. Channel has steep banks but is situated on a narrow silty clay flood plain. Need to avoid Nauclea orientalis trees.

Ref ID	Easting GDA94z52	Northing GDA94z52	Structural formation	All species	Lower	Mid	Upper	Notes
99	754781	8497086	woodland	Corymbia greeniana, Buchanania obovata, Corymbia foelscheana, Terminalia ferdinandiana, Corymbia confertiflora, Grevillea decurrens, Livistona humilis, Erythrophleum chlorostachys, Sarga timorense, Sarga plumosum	Sarga timorense, Sarga plumosum	Grevillea decurrens, Livistona humilis, Erythrophleum chlorostachys	Corymbia greeniana, Buchanania obovata, Corymbia foelscheana, Terminalia ferdinandiana, Corymbia confertiflora	
100	755371	8498491	open woodland	Erythrophleum chlorostachys, Eucalyptus tintinnans, Terminalia ferdinandiana, Eucalyptus tectifica, Buchanania obovata, Gardenia megasperma, Melaleuca nervosa, Corymbia confertiflora, Livistona humilis, Grevillea decurrens, Brachychiton megaphyllus, Cochlospermum fraseri, Petalostigma pubescens, Calytrix exstipulata, Acacia sp, Ampelocissus acetosa	Ampelocissus acetosa	Livistona humilis, Grevillea decurrens, Brachychiton megaphyllus, Cochlospermum fraseri, Petalostigma pubescens, Calytrix exstipulata, Acacia sp	Erythrophleum chlorostachys, Eucalyptus tintinnans, Terminalia ferdinandiana, Eucalyptus tectifica, Buchanania obovata, Gardenia megasperma, Melaleuca nervosa, Corymbia confertiflora	
101	755493	8498389	open woodland	Eucalyptus tintinnans, Xanthostemon paradoxus, Erythrophleum chlorostachys, Gardenia megasperma, Eucalyptus tectifica, Grevillea formosa, Cochlospermum fraseri, Petalostigma quadriloculare, Livistona humilis, Grevillea decurrens, Acacia sp., Buchanania obovata, Brachychiton megaphyllus, Petalostigma pubescens, Calytrix exstipulata, Pachynema dilatatum, Petalostigma pubescens, Cymbopogon sp	Cymbopogon sp	Grevillea formosa, Cochlospermum fraseri, Petalostigma quadriloculare, Livistona humilis, Grevillea decurrens, Acacia sp., Buchanania obovata, Brachychiton megaphyllus, Petalostigma pubescens, Calytrix exstipulata, Pachynema dilatatum, Petalostigma pubescens	Eucalyptus tintinnans, Xanthostemon paradoxus, Erythrophleum chlorostachys, Gardenia megasperma, Eucalyptus tectifica	Mature Eucalyptus tintinnans to be protected mostly to east of site. Site mostly regrowth, though mature tintinnans were retained.
102	755493	8498389		Eucalyptus tintinnans, Eucalyptus tectifica, Xanthostemon paradoxus, Corymbia dunlopiana, Livistona humilis, Erythrophleum chlorostachys, Grevillea decurrens, Pachynema dilatatum, Terminalia ferdinandiana, Petalostigma quadriloculare, Ampelocissus acetosa, Brachychiton megaphyllus, Sarga plumosum, Grevillea formosa	Sarga plumosum, Grevillea formosa	Livistona humilis, Erythrophleum chlorostachys, Grevillea decurrens, Pachynema dilatatum, Terminalia ferdinandiana, Petalostigma quadriloculare, Ampelocissus acetosa, Brachychiton megaphyllus	Eucalyptus tintinnans, Eucalyptus tectifica, Xanthostemon paradoxus, Corymbia dunlopiana	Vegetation from undisturbed parts of region in red text.

Ref ID	Easting GDA94z52	Northing GDA94z52	Structural formation	All species	Lower	Mid	Upper	Notes
103	758803	8500285	open forest	Corymbia latifolia ,Erythrophleum chlorostachys, Eucalyptus tectifica, Eucalyptus miniata, Terminalia ferdinandiana, Corymbia dunlopiana, Eucalyptus tintinnans, Persoonia falcata, Cochlospermum fraseri, Brachychiton megaphyllus, Petalostigma quadriloculare, Buchanania obovata, Grevillea decurrens, Ampelocissus acetosa, Gardenia megasperma, Capparis umbonata, Eragrostis sp	Eragrostis sp	Persoonia falcata, Cochlospermum fraseri, Brachychiton megaphyllus, Petalostigma quadriloculare, Buchanania obovata, Grevillea decurrens, Ampelocissus acetosa, Gardenia megasperma, Capparis umbonata	Corymbia latifolia, Erythrophleum chlorostachys, Eucalyptus tectifica, Eucalyptus miniata, Terminalia ferdinandiana, Corymbia dunlopiana, Eucalyptus tintinnans	Eucalyptus tintinnans occuring sporadically. Very small creek nearby with minor riparian vegetation to 10m wide. Another small creek with minor riparian vegetation to 5m wide.
104	759771	8502813	woodland, open woodland	Eucalyptus tintinnans, Corymbia bleeseri, Cochlospermum fraseri, Erythrophleum chlorostachys, Corymbia dunlopiana, Grevillea decurrens, Petalostigma quadriloculare, Ampelocissus acetosa, Brachychiton megaphyllus, Livistona humilis, Gardenia megasperma, Sarga sp	Sarga sp	Grevillea decurrens, Petalostigma quadriloculare, Ampelocissus acetosa, Brachychiton megaphyllus, Livistona humilis, Gardenia megasperma	Eucalyptus tintinnans, Corymbia bleeseri, Cochlospermum fraseri, Erythrophleum chlorostachys, Corymbia dunlopiana	Short section- approximately 200m of Eucalyptus tintinnans only.
105	761360	8504307	woodland	Eucalyptus tintinnans, Erythrophleum chlorostachys, Eucalyptus tectifica, Corymbia greeniana,Corymbia dunlopiana, Petalostigma quadriloculare, Cochlospermum fraseri, Brachychiton megaphyllus, Gardenia megasperma, Grevillea formosa, Ampelocissus acetose, Eragrostis sp., Eriachne avenacea	Eragrostis sp., Eriachne avenacea	Petalostigma quadriloculare, Cochlospermum fraseri, Brachychiton megaphyllus, Gardenia megasperma, Grevillea formosa, mpelocissus acetosa	Eucalyptus tintinnans, Erythrophleum chlorostachys, Eucalyptus tectifica, Corymbia greeniana, Corymbia dunlopiana	Archaeological and historical sites on rocky hill nearby. New alignment needed to avoid Achaeological sites and cultural sites, Eucalyptus tintinnans on hill.
106	763175	8505045	open woodland	Eucalyptus tectifica, Erythrophleum chlorostachys, Brachychiton megaphyllus, Grevillea decurrens, Persoonia falcata, Cochlospermum fraseri, Gardenia megasperma, Calytrix exstipulata, Petalostigma quadriloculare, Themeda triandra	Themeda triandra	Brachychiton megaphyllus, Grevillea decurrens, Persoonia falcata, Cochlospermum fraseri, Gardenia megasperma, Calytrix exstipulata, Petalostigma quadriloculare	Eucalyptus tectifica, Erythrophleum chlorostachys	
107	766449	8506398	open forest	Eucalyptus miniata, Corymbia polycarpa, Corymbia polysciada, Lophostemon grandiflorus, Denhamia obscura, Canarium australianum, Acacia auriculiformis, Melaleuca viridiflora, Glochidion xerocarpum, Pittosporum ferrugineum, Erythrophleum chlorostachys, Brachychiton megaphyllus,Banksia dentata,Pandanus spiralis,	Ampelocissus acetosa, Hyptis suaveolens,P assiflora foetida, Hibiscus sabdariffa, Heteropogon triticeus, Grewia retusifolia, Imperata cylindrica	Brachychiton megaphyllus, Banksia dentata, Pandanus spiralis	Eucalyptus miniata, Corymbia polycarpa, Corymbia polysciada, Lophostemon grandiflorus, Denhamia obscura, Canarium australianum, Acacia auriculiformis, Melaleuca viridiflora, Glochidion xerocarpum, Pittosporum ferrugineum, Erythrophleum chlorostachys	Creek bed only 3-4m across, but with very steep banks to 2-3m high. Floodplain grass, Imperata cylindrica (Confirmed ID from Herbarium).

Ref ID	Easting GDA94z52	Northing GDA94z52	Structural formation	All species	Lower	Mid	Upper	Notes
				Ampelocissus acetosa, Hyptis suaveolens, Passiflora foetida, Hibiscus sabdariffa, Heteropogon triticeus, Grewia retusifolia, Imperata cylindrica				
108	767789	8507354	open forest	Eucalyptus miniata, Corymbia confertiflora, Corymbia greeniana, Eucalyptus tintinnans, Corymbia dunlopiana, rythrophleum chlorostachys, Brachychiton megaphyllus, Livistona humilis, Ampelocissus acetosa, Buchanania obovata, Persoonia falcata, Cochlospermum fraseri, Sarga sp., Cayratia trifolia, Cymbopogon bombycinus	Sarga sp., Cayratia trifolia, Cymbopogon bombycinus	Brachychiton megaphyllus, Livistona humilis, Ampelocissus acetosa, Buchanania obovata, Persoonia falcata, Cochlospermum fraseri	Eucalyptus miniata, Corymbia confertiflora, Corymbia greeniana, Eucalyptus tintinnans, Corymbia dunlopiana, Erythrophleum chlorostachys	Cymbopogon bombycinus (confirmed ID of from Herbarium) on gravelly rise with Eucalyptus tintinnans.
109	769093	8509367	woodland	Corymbia confertiflora, Melaleuca nervosa, Buchanania obovata, Terminalia ferdinandiana, Terminalia carpentariae, Corymbia dunlopiana, Corymbia polycarpa, Corymbia greeniana, Wrightia saligna, Cochlospermum fraseri, Acacia difficilis, Acacia dimidiata, Brachychiton megaphyllus, Calytrix exstipulata, Ampelocissus acetosa, Persoonia falcata, Grevillea decurrens, Crotalaria goreensis, Themeda triandra, Terminalia pterocarya, Carissa lanceolata	Themeda triandra, Terminalia pterocarya, Carissa lanceolata	Wrightia saligna, Cochlospermum fraseri, Acacia difficilis, Acacia dimidiata, Brachychiton megaphyllus, Calytrix exstipulata, Ampelocissus acetosa, Persoonia falcata, Grevillea decurrens, Crotalaria goreensis	Corymbia confertiflora, Melaleuca nervosa, Buchanania obovata, Terminalia ferdinandiana, Terminalia carpentariae, Corymbia dunlopiana, Corymbia polycarpa, Corymbia greeniana	HDD directional drilling for rail crossing. Kangaroo scats.
110	769943	8510576		Andropogon gayanus			Andropogon gayanus	Patch of approximately 10m X 10m of tall Gamba Grass - Andropogon gayanus (Confirmed ID from herbarium). Near Fountain Head Road
111	770969	8511464	open woodland	Corymbia confertiflora, Lophostemon grandiflorus, Terminalia carpentariae ,Melaleuca viridiflora, Corymbia bella, Corymbia polycarpa, Acacia auriculiformis, Acacia holosericea, Hibiscus sabdariffa, Bambusa arnhemica, Jasminum molle, Ampelocissus acetosa, Heteropogon triticeus,Cynodon dactylon	Ampelocissus acetosa, Heteropogon triticeus, Cynodon dactylon	Acacia holosericea, Hibiscus sabdariffa, Bambusa arnhemica, Jasminum molle	Corymbia confertiflora, Lophostemon grandiflorus, Terminalia carpentariae, Melaleuca viridiflora, Corymbia bella, Corymbia polycarpa, Acacia auriculiformis	Creek has steep banks- highly erodible soil. Banks to 2.5m high - very steep. Creek bed approx. 5-6m wide with not much stabilising vegetation.

Ref ID	Easting GDA94z52	Northing GDA94z52	Structural formation	All species	Lower	Mid	Upper	Notes
								Wallaby scats.
112	771509	8511910	open shrubland	Melaleuca nervosa, Corymbia polycarpa, Corymbia confertiflora, Asteromyrtus magnifica, Pandanus spiralis, Haemodorum coccineum	Haemodorum coccineum	Pandanus spiralis	Melaleuca nervosa, Corymbia polycarpa, Corymbia confertiflora, Asteromyrtus magnifica	Swampy plain, yellow earth. Vegetation has a grassy understorey.
113	773067	8515605	woodland	Petalostigma pubescens, Corymbia polycarpa, Melaleuca nervosa, Buchanania obovata, Corymbia polysciada, Terminalia carpentariae, Acacia difficilis, Dolichandrone filiformis, Livistona humilis, Themeda triandra, Ampelocissus acetosa, Tinospora smilacina	Themeda triandra, Ampelocissus acetosa, Tinospora smilacina	Acacia difficilis, Dolichandrone filiformis, Livistona humilis	Petalostigma pubescens, Corymbia polycarpa, Melaleuca nervosa, Buchanania obovata, Corymbia polysciada, Terminalia carpentariae	Large termite mounds with no obvious nest holes. Raptor nest in tall Corymbia polycarpa. Need to avoid felling large trees when picking route. Rich grassland with Haemodorum coccineum, Murdannia graminea.
114	773628	8518431	open woodland	Corymbia foelscheana, Terminalia ferdinandiana, Eucalyptus miniata, Corymbia confertiflora, Corymbia dunlopiana, Cochlospermum fraseri, Calytrix exstipulata, Acacia sp. Sarga sp., Ampelocissus acetosa, Petalostigma quadriloculare, Themeda triandra, Hyptis suaveolens, Mitrasacme glaucescens	Sarga sp., Ampelocissus acetosa, Petalostigma quadriloculare, Themeda triandra, Hyptis suaveolens, Mitrasacme glaucescens	Cochlospermum fraseri, Calytrix exstipulata, Acacia sp	Corymbia foelscheana, Terminalia ferdinandiana,E ucalyptus miniata, Corymbia confertiflora, Corymbia dunlopiana	
115	773885	8518318	open shrubland	Melaleuca nervosa, Corymbia confertiflora, Corymbia polysciada, Corymbia polycarpa, Terminalia ferdinandiana, Corymbia grandifolia, Eucalyptus tintinnans, Corymbia foelscheana, Planchonia careya, Dolichandrone filiformis, Corymbia greeniana, Asteromyrtus magnifica, Sarga timorense, Corymbia grandifolia	Sarga timorense, Corymbia grandifolia	Planchonia careya, Dolichandrone filiformis, Corymbia greeniana, Asteromyrtus magnifica	Melaleuca nervosa, Corymbia confertiflora, Corymbia polysciada, Corymbia polycarpa, Terminalia ferdinandiana, Corymbia grandifolia , Eucalyptus tintinnans, Corymbia foelscheana	Access track from here across pipeline, then running parallel to fence NE. Lots of domestic cattle.

Appendix 3
Introduced Flora and Weeds recorded during field surveys

Easting (GDA94 Z52)	Northing (GDA94 Z52)	Photos	Site description	Landform	Crossing Type	weeds	Declared & Major Weed species	structural formation	Notes
563671	8423635	304-321	Creek crossing on road. Massive erosion problems and concerns. See OFC crossing photos.	open depression (creek/river)	special	present	*Hyptis suaveolens*		Western bank 10m above creek base- steep 60-90degrees. Eastern bank- rockier, laterite, gentler slope 30deg for 100m,. Erosion present on West side of river on pipeline route. Eastern side of creek.
627081	8433616	126-129	Flood plain	flat, open depression (creek/river)		sparse	Minor *Hyptis suaveolens* on creek.	open shrubland	
638131	8442809	154-157	Start of blacksoil plain	flat		Common	*Mimosa pigra*	closed grassland	Mimosa begins at WPT35 on floodplains. Scattered along drainage line on a flat floodplain- narrow sections approx 100m long.
655197	8451338	104-182	Creek crossing, 8m deep 100 wide. Sandy clay loam. Floodplain surrounding swamp creek to sandy creek.	Open depression (creek/river)	Trenching	present	*Hyptis suaveolens*	open forest	
681026	8469102	200,201		lower slope, open depression (creek/river)		sparse	Minor *Hyptis suaveolens*.	woodland	
681662	8468079	205	Grey soil floodplain near creek	flat		present	*Hyptis suaveolens* on nearby creek.	open forest/ woodland	
683002	8467460	227, 228	Chilling creek crossing- take 2.	Open depression	trench	present	Noogoora Burr *Xanthium*	woodland	

Easting (GDA94 Z52)	Northing (GDA94 Z52)	Photos	Site description	Landform	Crossing Type	weeds	Declared & Major Weed species	structural formation	Notes
			Surface sand in creek.	(creek/river)			*strumarium*		
685267	8468520	210,211	Rock outcrop. Dense rainforest adjactent to rocky outcrop slope.	mid-slope		present	*Hyptis suaveolens*	tall closed forest	
686501	8468634	212-217	Ridges to daly river transect adjacent to monsoon vine forest.			present	*Hyptis suaveolens*		
687036	8468429	222	Daly River floodplain and river	Open depression (creek/river)	HDD	present	Noogoora Burr *Xanthium strumarium* WPT 071.	woodland	Thicket of Noogoora at WPT071. WPT072
698623	8470902	262, 261	track and pipeline junction	flat		present	Rubber Bush *Calotropis procera* WPT093	woodland	WPT93- Rubber bush
709006	8475403	248, 249	Woodland at edge of clearing	simple slope		sparse	Gamba Grass *Andropogon gayanus*	woodland	WPT083 Gamba Grass
711920	8476763	243, 244, 245	Grassy woodland			sparse	*Hyptis suaveolens*	woodland	
716385	8477302	238, 239	Western slope next to fence line			sparse	Gamba *Andropogon gayanus* at WPT080, *Hyptis suaveolens*	woodland	Plants to creek crossing at WPT 79, photo 240-242. Creek has closed forest dominated by *Lophostemon lactifluus*, *Corymbia bella.*
721142	8476974	229, 230	Cleared paddock next to open woodland dominated by	flat		dense	*Sida acuta , Hyptis suaveolens* & *Stachytarpheta sp.*	closed grassland	Former closed woodland. Need washdown area on Western side (at the weed boundary).

Easting (GDA94 Z52)	Northing (GDA94 Z52)	Photos	Site description	Landform	Crossing Type	weeds	Declared & Major Weed species	structural formation	Notes
			Eucalyptus and Corymbia						
723287	8476802	235, 236, 237	Creek crossing, minor erosion scars, generally flat and well grassed	Open depression (creek/river)	trench	sparse	*Hyptis suaveolens*	woodland	
725116	8478316	231, 232	Cattle country	flat		sparse	*Hyptis suaveolens*	Open forest	
726771	8479423	263, 267, 268, 272, 273	Green Ant Creek, proposed HDD crossing	simple slope, lower slope, open depression (creek/river)		dense	*Hyptis suaveolens,* Snakeweed *Stachytarpheta sp*., Bellyache Bush *Jatropha gossypifolia*	woodland, shrubland	Narrow riparian zone of <10m, steep banks 6m high. WPT095 - Bellyache bush. Photo 270 - dense Snakeweed. WPT096 - HDD crossing (Hyptis).
748533	8492924	409-veg towards creek	Just before a creek crossing	flat		present	*Hyptis suaveolens*	open woodland	
750738	8494319	406-Veg towards creek, 407-Creek bed, 408-erosion in creek bed	Creek crossing	Open depression (creek/river)	trenching	common	*Hyptis suaveolens*	open forest	
754159	8496600	392-Vegetation at river, 393-Creek bed, 394-creek bed	Hayes Creek - western branch	Open depression (creek/river)	trenching	common	*Hyptis suaveolens*	closed forest	
766449	8506398	363-Riparian, 364+365- in creek bed	Creek Crossing	Open depression (creek/river)		common	*Hyptis suaveolens*	open forest	

Easting (GDA94 Z52)	Northing (GDA94 Z52)	Photos	Site description	Landform	Crossing Type	weeds	Declared & Major Weed species	structural formation	Notes
769943	8510576		Weed Patch			Infestation	*Andropogon gayanus*		Patch of approximately 10m X 10m of tall Gamba Grass - *Andropogon gayanus (Confirmed ID of BGP105 from herbarium)*. Near Fountain Head Road
773628	8518431	43,44: erosion on track near KP278	Quarry- possible borrow pit	flat		sparse	*Hyptis suaveolens* along fenceline	open woodland	

Appendix 4; Photographs

Melaleuca spp & Eucalyptus spp low open woodland

Eucalyptus tectifica woodland

Corymbia foelscheana & *Corymbia latifolia* woodland

Eucalyptus tectifica open woodland

Creek and woodland

Eucalyptus tintinnans in low woodland