PROJECT REPORT

Pre-Clearance Survey Report - Mainline (Midline Station - Mainline Valve 2)

Q-1801-15-RP-0019

Australia Pacific LNG Upstream Phase 1

This document is a pre-clearance ecological survey report for the Mainline (Midline Station - Mainline Valve 2) component of the Australia Pacific LNG Project to meet condition 5(a) of the Gas Transmission Pipeline EPBC Act approval (EPBC 2009/4976), Coordinator General's Report and Environmental Authority (PEN101808610) requirements.

Revision	Date	Description	Originator	Checked	QA/Eng	Approved
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- **May** or **can** indicate a possible course of action.

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1. Executive Summary

Pre-clearance ecological surveys were undertaken for the Mainline component of the Australia Pacific LNG Project (the Project) to address approval conditions at the Commonwealth and State levels. This pre-clearance survey report provides an assessment of the terrestrial ecological values for the portion of the Australia Pacific LNG pipeline Right-of-Way (ROW) between Midline Station (150.4505°, -24.9137°) to Mainline Valve 2 (150.4880°, -24.2771°) which equates to KP 175 and KP 254.8 of the Revision G alignment.

Field surveys determined that one Threatened Ecological Community (TEC), Brigalow (*Acacia harpophylla* dominant and co-dominant), occurs at three sites within the proposed ROW. The ROW will be reduced from 40m to 35m through these areas in order to reduce impacts to these TECs.

No Matters of National Environmental Significance (MNES) flora species listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) were identified during the survey.

Three MNES Migratory species were observed during the surveys; cattle egret (*Ardea ibis*), rainbow bee-eater (*Merops ornatus*) and Latham's snipe (*Gallinago hardwickii*).

Preferred habitat for a number of MNES fauna species listed under the EPBC Act and *Endangered, Vulnerable* or *Near Threatened* (EVNT) fauna species listed under the NC Act is present within the ROW and has been quantified for the purpose of disturbance calculations.

One Regional Ecosystem (RE) with a biodiversity status of *Endangered*, two REs with a biodiversity status of *Of Concern*, and four REs with a biodiversity status of *No Concern at Present* occur within the ROW. Offsets for clearing these vegetation communities will be required as part of a Project-wide offsets package to address the requirements of the Queensland Government Environmental Offsets Policy.

No EVNT flora species were recorded within the ROW.

One EVNT-only fauna species, little pied bat (*Chalinolobus picatus*) - *Near Threatened*, was recorded during the detailed fauna surveys.

This section of the Mainline does not require the clearing of any Essential Habitat mapped by the Department of Natural Resources and Mines (DNRM).

Proposed access roads were surveyed and are predominantly located in suitable areas from an ecological perspective. Recommendations are provided where necessary to ensure minimal impacts upon the surrounding environment.

The results of the pre-clearance surveys have informed the pipeline design team of key ecological constraints within the study area. The process adopted for the Mainline with respect to recommended realignments, recommended areas of ROW narrowing and the assessment and selection of access tracks has demonstrated the avoid, minimise and mitigate approach required by the Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) and the Department of Environment and Heritage Protection (DEHP) within the relevant approval conditions for the Project.

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1.1. Abbreviations

Table 1: Abbreviations

Abbreviation	Description
AWA	Additional Work Area
CG	Coordinator-General
DAFF	Department of Agriculture Fisheries and Forestry
DEIS	Detailed Environmental Infield Studies
DEHP	Department of Environment and Heritage Protection
DERM	Department of Environment and Resource Management
DNRM	Department of Natural Resources and Mines
DSEWPaC	Department of Sustainability, Environment, Water, Population and Communities
E	*Endangered*
EA	Level 1 Environmental Authority (chapter 5A activities)
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
ERE	*Endangered* Regional Ecosystem
ESA	Environmentally Sensitive Area
EVNT	*Endangered*, *Vulnerable* or *Near Threatened* under the NC Act
GPS	Global Positioning System
HVR	High Value Regrowth
KP	Kilometre Point
LNG	Liquefied Natural Gas
M	Migratory
MNES	Matters of National Environmental Significance under the EPBC Act
NC Act	*Nature Conservation Act 1992*
RAW	Route Alignment Walk
RE	Regional Ecosystem
ROW	Right of Way
SDPWO Act	*State Development and Public Works Organisation Act 1971*
TEC	Threatened Ecological Community
TFMP	Threatened Fauna Management Plan
V	*Vulnerable*
VM Act	*Vegetation Management Act 1999*

1.2. Document References

The Project has progressed through an environmental impact assessment phase (EIA), the following references relate to the EIA:

- Australia Pacific LNG (2009a). Environmental Impact Statement – Australia Pacific LNG Project, Volume 3: Pipeline, Chapter 8: Terrestrial Ecology, WorleyParsons.
- Australia Pacific LNG (2009b). Environmental Impact Statement – Australia Pacific LNG Project, Volume 5: Attachments to EIS, Attachment 15: Terrestrial Ecology – Pipeline, WorleyParsons.
- Australia Pacific LNG (2010). Supplemental Information to the EIS – Australia Pacific LNG Project, Terrestrial Ecology – Additional Surveys and Targeted Flora Searches – Pipeline.
- Coordinator-Generals Report – Australia Pacific LNG (2010).Australia Pacific LNG Project, Coordinator-General's report on the environmental impact statement.

Approval was obtained from the Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) to develop operate and decommission a high pressure transmission pipeline network on the 21 February 2011, and the Project was approved by the former Department of Environment and Resource Management (DERM) on the 21 December 2011. A number of management plans have since been developed for the Project as a result of requirements within the conditions of these approvals. Commonwealth and State approval conditions, and the management plans which relate to them, are presented in Table 2.

Table 2: Associated document references

Document Number	Title
EPBC 2009/4976	EPBC Approval to develop, construct, operate and decommission a high pressure gas transmission pipeline network to link the coal seam gas fields to a proposed LNG facility on Curtis Island.
PEN101808610	Level 1 Environmental Authority (chapter 5A activities) for the Australia Pacific LNG Mainline Pipeline, Petroleum Pipeline Licence 163
Q-LNG01-15-MP-0074	Pipeline Threatened Fauna Management Plan
Q-1801-15-MP-0002	Main Pipeline Environmental Management Plan

2. Introduction

Pre-clearance ecological surveys have been undertaken for the Mainline component of the Australia Pacific LNG Project (the Project) to address approval conditions at the Commonwealth and State levels. This report is focused on the portion of the Mainline between the Midline Station (150.4505°, -24.9137°) and Mainline Valve 2 (150.4880°, -24.2771°) and equates to Kilometre Point (KP) 175 and 254.8 of the Revision G alignment.

The Project has progressed through an environmental impact assessment process and has been approved under Commonwealth (EPBC 2009/4976) and State (Coordinator General's Report and Environmental Authority PEN101808610) legislation. The Mainline is within the *Environment Protection and Biodiversity Act 1999* (EPBC Act) approval area for the Gas Transmission Pipeline. State approvals (Coordinator General Report and Environmental Authority(EA)) also apply to the entire length of the alignment. This report has been prepared to meet condition 5(a) of the Gas Transmission Pipeline EPBC Act approval (EPBC 2009/4976), refer Table 3, and contains information on Matters of National Environmental Significance (MNES). It also addresses *Endangered*, *Vulnerable* and/or *Near Threatened* (EVNT) species and *Endangered*, *Of Concern*, and *No Concern at Present* REs under the Environmental Authority (chapter 5a activities) (EA). This report also contains information on the condition and quality of habitat for EVNT and MNES fauna species.

This information is provided in response to specific project approval conditions, namely:

- EPBC Act Approval (EPBC 2009/4976):
  - Conditions 3 (a), (b), (c), 5(a), (b), 6(a), (b), (c), (d), 7, 11(a), 14;
- Coordinator General's (CG's) Report:
  - Appendix 1, Part 1 – Condition 7 (b), (c), 9(1);
  - Appendix 3, Part 3 – Condition 1 (part);
- Environmental Authority (PEN101808610):
  - Schedule D – Condition D17, D18, D19, D27, D28, D40, D41 (part), D43 (part); and
  - Schedule F – Condition F2 (b) (part), (c).

A compliance table for these approval conditions is provided in section 2.1.

Detailed Environmental Infield Study (DEIS) pre-clearance surveys are being undertaken for the Australia Pacific LNG Mainline in a sequence that relates to the anticipated construction sequence; this report presents the results for the Mainline Priority Area 2, and follows the report prepared for Priority Area 1.

This report will be made available on the Australia Pacific LNG Project website and made available to the Department of Sustainability, Environment, Water, Populations and Communities (DSEWPaC) on request in accordance with the requirements of the relevant approval conditions.

2.1. Compliance Table

Table 3: Applicable approval conditions and the relevant section of this report where these are addressed

Approval Condition	Section of report where addressed
EPBC Act Approval (EPBC 2009/4976)	
3 (a) – The Environmental Management Plan must include provisions for detailed pre-clearance surveys by a suitably qualified ecologist along the entire length of the ROW, in accordance with Conditions 5 to 10.	Section 3.3
3 (b) – The Environmental Management Plan must include measures to minimise native and riparian vegetation clearance and to minimise the impact on listed species, their habitat and ecological communities in accordance with management plans required for MNES under this approval.	Sections 4.1, 4.2 and 5.0
3 (c) – The Environmental Management Plan must include measures to manage the impact of clearing on each listed species and ecological community in accordance with management plans required for MNES under this approval.	Sections 4.2 and 5.0
5 (a) – Before the clearance of native vegetation in the pipeline ROW, the proponent must undertake pre-clearance surveys for the presence of listed threatened species and migratory species, their habitat and listed ecological communities.	Sections 3.3 and 3.4
5 (b) – Alternatively, where recent surveys have already been undertaken and those surveys meet the Department's requirements for surveys for the relevant MNES, the proponent may elect to develop management plans based on those surveys in accordance with the requirements of Condition 8.	Section 3.3.1
6 (a) – Pre-clearance surveys must for each listed species, be undertaken in accordance with the Department's survey guidelines in effect at the time of the survey.	Section 3,2 and 3.4
6 (b) – Pre-clearance surveys must be undertaken by a suitably qualified ecologist approved by the Department in writing.	Section 2.4.3
6 (c) – Pre-clearance surveys must document the survey methodology, results and significant findings in relation to MNES.	Sections 3.0, 4.0 and 5.0
6 (d) – Pre-clearance surveys must apply best practice site assessment and ecological survey methods appropriate for each listed threatened species, migratory species, their habitat and listed ecological communities.	Sections 3.0
7. Pre-clearance survey reports (which document the methods used and the results obtained) must be published by the proponent, on its website and be provided to the Department on request.	This report

Approval Condition	Section of report where addressed
11 (a) – The following maximum disturbance limits apply to any disturbances authorised for unavoidable impacts on listed threatened communities and potential habitat for listed threatened species or migratory species as a result of the construction, operation and decommissioning of the pipeline (and all associated activities): • Brigalow TEC – 5.41ha • SEVT TEC – 0.26ha • *Cycas megacarpa* – 200 individuals • *Cadellia pentastylis* – 10 individuals • *Xeromys myoides* – 15.6ha	Section 4.1
14. Disturbance of vegetation related to the construction and maintenance of the pipeline must be confined to the ROW. Any proposed siting of construction camps, vehicle access tracks, extra workspace and pipe lay-down areas outside the ROW during construction must be undertaken so as to minimise potential adverse impacts on MNES.	Section 5.3
CG's Report	
Appendix 1, Part 1, Condition 7 – The proponent must comply with the provisions of the *Nature Conservation Act 1992*, particularly in regard to the following: (b) where the activities of the proponent may cause disturbance to animal breeding places the prior approval of DAFF (Department of Agriculture, Fisheries and Forestry) must be obtained. (c) where there is a need to take fauna, the prior approval of DAFF must be obtained.	Sections 3.4 and 4.2
Appendix 1, Part 1, Condition 9 (1) – Prior to commencement of construction work, the proponent and its contractors must consult with the relevant officers from the Department of Employment, Economic Development and Innovation in respect to the detection and control of weeds and pests.	Section 4.1.4 and 4.2.2
Appendix 3, Part 3 – Condition 1 – The EM Plan must include but not be limited to: - protection of flora and fauna during construction and operation, including reduction of disruption to habitat.	Sections 4 and 5
Environmental Authority (PEN101808610)	
Schedule D – Condition D17 – Prior to conducting petroleum activities that involve significant disturbance to vegetation, an assessment must be undertaken of the condition, type and ecological value of any vegetation in such areas where the activity is proposed to take place.	Sections 3.1, 3.3 and 4.1

Approval Condition	Section of report where addressed
Schedule D – Condition D18 – The assessment required by condition (D17) must be undertaken by a suitably qualified person and include the carrying out of field validation surveys, observations and mapping of any category A, B or C Environmentally Sensitive Areas and the presence of species classed as endangered, vulnerable, rare or near threatened under the *Nature Conservation Act 1992.*	Sections 2.4.3, 3.1, 3.3, 3.4, 4.1 and 4.2
Schedule D – Condition D19 – The holder of this environmental authority, when carrying out petroleum activities in areas of ecological value, must: (a) avoid, minimise or mitigate (in order of preference) any impacts on areas of vegetation or other areas of ecological value; (b) minimise the risk of injury, harm, or entrapment to wildlife and stock; (c) minimise disturbance to land that may otherwise result in land degradation.	Section 5
Schedule D – Condition D21 – Remnant vegetation must not be cleared for the purposes of camps, borrow pits, vehicle access tracks or additional work areas associated with the construction pipeline	Section 3.2.1 and 5.3
Schedule D – Condition D27 – A maximum area of 2585 hectares of vegetation may be cleared within the PPL 163 boundary for the pipeline right of way, receipt station, mainline valves and turnaround bays, comprising: (a) REs with an Endangered biodiversity status – 6ha (b) REs with an Of Concern biodiversity status – 30ha (c) REs with a Not of Concern biodiversity status – 575.5ha (d) Non-remnant vegetation – 1983ha	Section 4.1.2
Schedule D – Condition D28 – The holder of this environmental authority must ensure that clearing of Essential Habitat is only undertaken for the pipeline right of way as follows: (a) *Desmodium macrocarpum* between coordinate (7318608.81, *254088*.09) to (7318661.26, 254173.23); (b) *Acacia pedleyi* between coordinate (7319323.09, 256359.21) to (7318255.15, 258417.06); and (c) *Cycas megacarpa* between coordinate (7319357.86, 263801.16) to (7320836.73, 265455.93) and (7331272.75, 272585.98).	Section 4.1.3

Approval Condition	Section of report where addressed
Schedule D – Condition D40 – The design and construction of the pipeline, including all creek crossings and waterway barriers must: (a) minimise impacts on riparian, aquatic and water dependent flora and fauna; (b) protect flora and fauna during construction and operation, including reduction of disruption to habitat, particularly any potential disruption of endangered species habitat.	Section 5.4
Schedule D – Condition D41 – In the carrying out of petroleum activities the holder of this environmental authority must not clear vegetation or place fill, in or within 100m from any wetland, lake, spring or the high bank of any other watercourse.	Sections 5.4
Schedule D – Condition D43 – Despite conditions (D41 and D42) pipeline and road construction works may be undertaken in watercourses, where there is no practical alternative such as the use of horizontal directional drilling methods, for a maximum period of ten (10) days, provided that the works are conducted in accordance with the following order of preference: (a) conducting work in times of no flow (b) using all reasonable and practical measures to reduce impacts in times of flow; and (c) horizontal directional drilling may be used for the construction of the pipeline unless the construction occurs in times of no flow or an alternative construction methodology is agreed with the administering authority in writing.	Sections 5.4
Schedule F – Condition F2 – The holder of this environmental authority must develop and implement fauna management procedures in such a manner that petroleum activities are undertaken to prevent and/or minimise environmental harm. The fauna management procedures must include but not be limited to: (b) conduct a preconstruction ecological survey to identify the presence of any endangered, vulnerable or rare fauna species and identify and mark hollow-bearing trees (c) minimising the clearing of mature and hollow-bearing trees	Sections 3.1, 3.3 and 3.4

2.2. Approval Conditions and Legislative Constraints

The Project has been subject to an environmental impact assessment process under both the EPBC Act and the *State Development and Public Works Organisation Act 1971*(SDPWO Act). Approval for the Project from both Commonwealth and State regulatory authorities is subject to a range of conditions within the:

- EPBC Act approvals (Gas Transmission Pipeline (EPBC 2009/4976))
- CG's Report; and
- Environmental Authority (PEN101808610) for the Gas Transmission Pipeline.

This report has been prepared to facilitate sound environmental outcomes and to satisfy the requirements of the Pre-Clearance Survey Reports that are a condition of approval for the Project under both the EPBC Act approvals and the EA. A conceptual diagram of project approvals and conditions for the ecological components of the Project is provided in Figure 1.

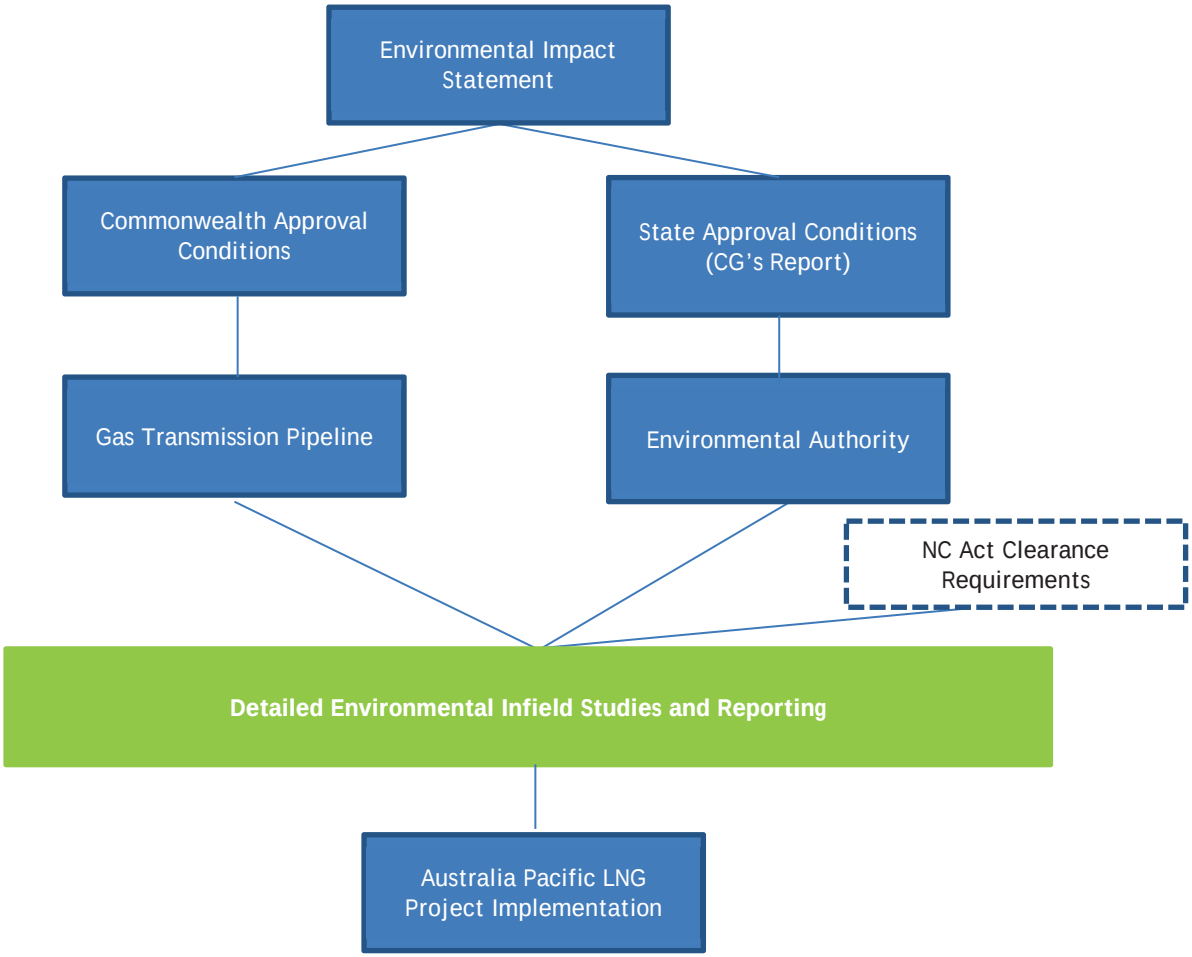

Figure 1: Relationships between Project approvals for the Mainline component of the Australia Pacific LNG Project

2.3. Scope and Purpose

The scope of the DEIS Project is provided in Appendix A. The purpose of this report is to detail the results of the DEIS Pre-clearance survey for the Mainline (Midline Station – Mainline Valve 2).This includes:

- Description of the DEIS pre-clearance survey methodology and response (where applicable) to relevant survey guidelines
- Description of the ecological characteristics of the ROW
- Identification of the presence of any critical ecological constraints within, or in proximity to the ROW
- Identification of areas of preferred habitat for listed species based on RE associations and microhabitat preferences
- Recommendations for revisions to the pipeline alignment in areas of high ecological value
- Constraints mapping for additional work areas and an assessment of presently-proposed additional work areas; and
- Recommendations for required updates to the Project's Threatened Ecological Communities (TECs) and Species Management Plans (SMPs).

The DEIS pre-clearance surveys undertaken for the purposes of this report were based on an assessment of the Mainline (Revision F) alignment. Subsequent to these surveys and recommendations resulting from the presence of ecological and other constraints, a revised alignment for the Mainline (Revision G) was designed; this was provided to AMEC Environment and Infrastructure Pty Ltd (AMEC) (formerly Unidel) on 6 March 2012. All impact assessments and impact area calculations contained within this report are based on the Mainline (Revision G) alignment. Areas where the Revision G alignment extended beyond the survey corridor for the Revision F alignment have subsequently been surveyed separately in accordance with the survey methodology outlined in Section 3.3.2.

2.4. Approach to Address Approval Conditions

2.4.1. Reporting

The purpose of the field work undertaken for the Mainline DEIS pre-clearance surveys was designed to meet the requirements of relevant approval conditions, 5(a) of the Gas Transmission Pipeline EPBC Act approval (EPBC 2009/4976) and to provide detailed vegetation and habitat information to inform EPBC Act species management plans and *Nature Conservation Act 1992* (NC Act) clearing permits and rehabilitation plans. Methodologies adopted for these surveys meet the survey guideline requirements for listed species as defined by DSEWPaC.

For the purposes of reporting to Commonwealth and State regulators, this study distinguishes between MNES listed species under the EPBC Act and EVNT species listed under the NC Act, as there are separate reporting requirements for both.

2.4.2. Route Refinement

A consistent theme within the Project approval conditions is the requirement to demonstrate how impacts to areas of ecological value have been (in order of preference):

- Avoided
- Minimised; and
- Mitigated.

Previous stages of the Project have sought to achieve avoidance of impacts on areas of ecological value where practicable, through the:

- Environmental Impact Statement (EIS), where a program of ecological surveys was undertaken to gather information on the ecological constraints within the study area. The results of these surveys assisted in the determination of potential ecological impacts of the Project and were used in the high-level selection of a pipeline alignment that sought to minimise ecological impacts. This EIS formed the basis of Project approval by Commonwealth and State Government departments.
- Route Alignment Walk (RAW); following approval of the Project EIS, where detailed field surveys were undertaken to assess the suitability of the pipeline alignment from a constructability and environmental perspective. The RAW surveys resulted in the identification of areas of particular ecological value that required refinement of the pipeline alignment to avoid or minimise impacts to these ecological values.

While avoidance has largely been achieved through these processes, any critical ecological constraint within the ROW that was subsequently identified during the DEIS pre-clearance surveys (current stage), for which avoidance was preferable, was communicated to the wider study team at the time the constraint was identified.

A major focus for the DEIS has been the minimisation and mitigation of potential impacts on ecological features and values. This three-tiered approach has been a fundamental consideration throughout the development of the Project. Results from the pre-clearance surveys also contributed to changes in the Mainline alignment between Revisions E, F and G.

2.4.3. Surveys

On 28 June 2011, AMEC (formerly Unidel) was approved by DSEWPaC as an entity to undertake DEIS pre-clearance surveys under conditions 5(c), 5(o) (iii) and 8 of the Gas Fields EPBC Approval, and condition 6(b) of the Gas Transmission Pipeline EPBC Approval.

The DEIS pre-clearance surveys were designed to capture field data on vegetation composition and condition, habitat values and species present within the study area, with detailed focus along the entire ROW. The approach to the DEIS pre-clearance survey was to separate the flora and fauna components, such that:

- The flora survey could:
  - Cover the entire ROW and gather detailed information on the ROW; and
  - Gather information on potential Additional Work Area (AWA) corridors either side of the ROW (also yielding information regarding preferred habitat for MNES and EVNT-only species).
- The fauna survey could:
  - Target key and representative areas of potential habitat for MNES and EVNT-only species along the alignment in accordance with any relevant survey guidelines; and
  - Utilise the required trapping/survey techniques.

2.5. Ecological Surveys Undertaken to Date

Throughout the development of the Project there have been several ecological studies undertaken in the Mainline area, prior to the DEIS pre-clearance surveys. These studies include:

- WorleyParsons flora and fauna survey of the pipeline for the Draft EIS (Australia Pacific LNG 2009a, Australia Pacific LNG 2009b)
- WorleyParsons flora and fauna survey of the pipeline for the supplementary EIS (Australia Pacific LNG, 2010); and
- RAW undertaken by WorleyParsons and AMEC (formerly Unidel) for the entire length of the Mainline.

The results of these ecological studies have informed the methodology of the DEIS pre-clearance flora and fauna surveys. The methodologies presented in this report are intended to complement the previous survey effort and provide for seasonal variation. This report also includes the analysis of specific habitat types critical to MNES and EVNT-only species and identified within relevant database searches and previous environmental studies.

3. Detailed Fieldwork Methodology

3.1. Approach

The fieldwork undertaken for the Mainline DEIS pre-clearance surveys was designed to meet the requirements of relevant approval conditions. The following field teams undertook the pre-clearance surveys:

- One flora survey team comprising three experienced and approved ecologists; and
- Two fauna survey team comprising two experienced and approved fauna ecologists.

The methodology prioritised those REs, TECs, MNES and EVNT-only flora and fauna species identified as potentially occurring in the study area by previous reports and desktop analysis of publically available databases. These included:

- Stage 1 report, APLNG Project – Mainline Desktop Assessment and Detailed Environmental Infield Studies (DEIS) Methodology (ORI032-ENV-RPT-0002)
- Commonwealth's Protected Matters Search Tool (The EPBC Act database)
- Environment and Resource Management Wildlife Online database; and
- Previous ecological studies (EIS and RAW reports).

The methodologies were designed to incorporate the specific survey requirements of those communities/species that are known or likely to be present, and used general best practice survey techniques for those communities/species that were considered unlikely to occur.

3.2. Nomenclature

The presentation of nomenclature for species within this report follows the principles outlined in the *Style manual for authors, editors and printers* (Commonwealth of Australia, 2002). For MNES and EVNT-only species, this report uses nomenclature from the relevant Commonwealth or Queensland Government species profiles. For common and introduced species of flora and fauna, nomenclature (common names and binomial scientific names) are derived from the WildNet and HERBRECS databases. Where these references do not provide common names for a particular species, relevant and recognised field guides were used, including:

- Flora of south-eastern Queensland (Stanley and Ross, 1989, 1995, and 2002)
- The grasses of southern Queensland (Tothill and Hacker, 1996)
- The atlas of Australian birds (Blakers *et al*., 1984)
- A field guide to reptiles of Queensland (Wilson, 2005)
- Australian bats (Churchill, 1998)
- Encyclopaedia of Australian Mammals (Ehmann, 1992); and
- Reptiles and amphibians of Australia – 6th edition (Cogger, 2000).

3.3. Flora Survey

3.3.1. Preliminary Assessment and Site Planning

The EPBC Act approval requires that DEIS pre-clearance surveys, in accordance with the relevant survey guidelines, be undertaken along the entire length of the Mainline ROW. Given that there are currently no Commonwealth flora survey guidelines, it was considered that a detailed walk-through survey of the Mainline would adequately address all flora survey approval requirements.

The flora survey involved a detailed walk-through survey of the Mainline ROW and adjacent potential additional work areas for the Mainline. Prior to the commencement of the survey those ecologists involved were briefed on the results of both desktop assessments and previous flora studies to gain a thorough understanding of the ecological communities, REs and flora species that were likely to occur and their potential localities.

3.3.2. Flora Survey Methodology

Flora surveys consisted of three ecologists surveying an area 150m in width along the Mainline. The general approach is as illustrated in Figure 2.

A 150m-wide corridor based on the alignment centreline was surveyed. Detailed surveys were undertaken within a 50m ROW corridor (25m either side of the centreline) and vegetation attributes were recorded within the remaining 100m.

The ROW for the Mainline is generally 40m in width. Therefore, the nominal 50m ROW survey corridor width for the detailed flora surveys (based on the alignment centreline) was a precautionary survey approach to ensure an extensive and comprehensive dataset was captured. The remaining 100m width of the survey corridor was surveyed to gather information on any areas outside the ROW that may be used for additional work areas that would be used during construction.

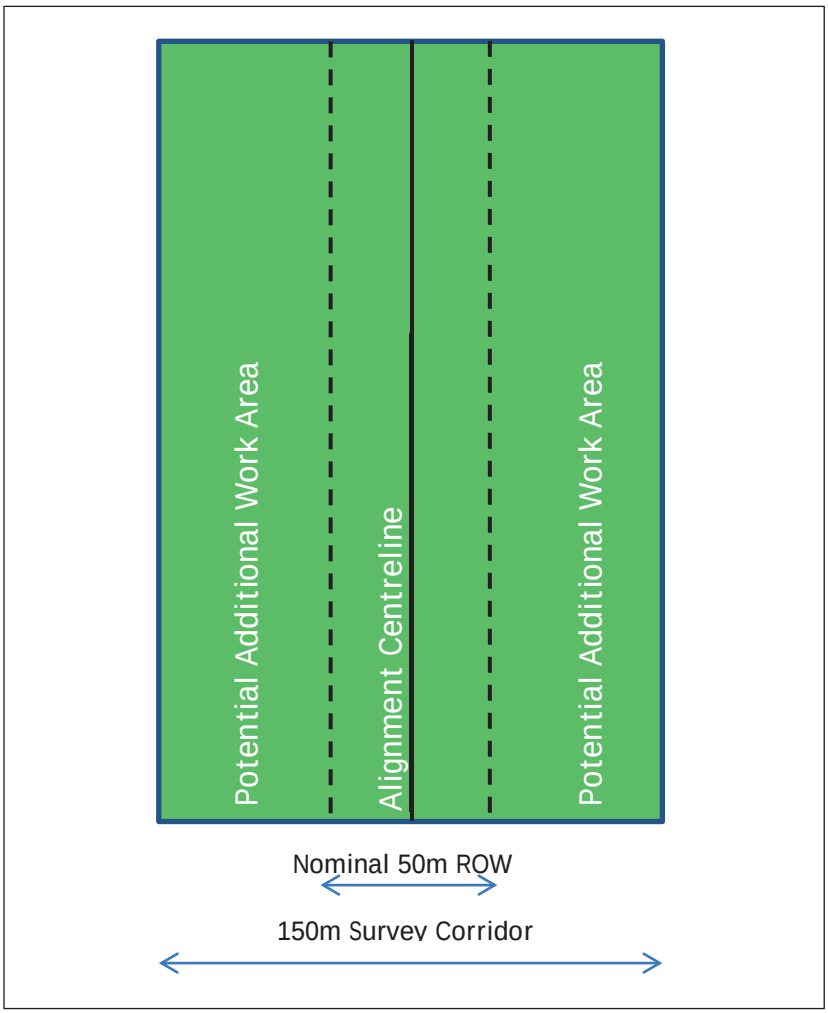

Figure 2: Approach to flora survey of the Mainline (Midline Station – Mainline Valve 2). Three ecologists conducted a walk-through survey of this 150m-wide corridor

The teams of ecologists were accompanied by members of the Australia Pacific LNG construction engineering team, who liaised with the ecologists along the walk of the alignment to discuss engineering constraints and the need for AWAs. Key ecological constraints observed on-site were communicated to the wider study team and were reviewed in a workshop format following the completion of the surveys.

Access Tracks

A total of 29 proposed access tracks along this portion of the alignment were surveyed during the DEIS Pre-clearance surveys. Proposed access tracks for the pipeline were generally located in areas where tracks/roads presently exist. During construction, these access tracks may reach 10m in width to accommodate vehicles and equipment. A survey corridor of 10m either side of each proposed access track centreline was walked by the ecologists. Remnant vegetation and notable habitat features were recorded along the length of each proposed access track within this 20m-wide corridor. Condition D21 of the EA (see Table 3) states that remnant vegetation must not be cleared for vehicle access tracks associated with the construction of the pipeline. Where proposed access tracks were found to be positioned in areas of high ecological value and would require vegetation clearing, the ecologists also surveyed surrounding areas for a more appropriate solution.

3.3.3. Survey Timeframe

Flora surveys for the Mainline (Midline Station – Mainline Valve 2) were undertaken between 1 February 2012 and 22 February 2012. Survey conditions were deemed favourable to detect a wide variety of vascular plants, particularly those that flower, fruit or seed over the summer periods. It is noted, however that these seasonal conditions may not allow for the detection of all plant species, for example those that have particularly short flowing periods (e.g. ground orchids) or those that are winter flowering species.

There are inherent limitations for collecting information about vegetation due to its temporal variation. Further identification of individual species is generally dependent upon the presence of fertile material (flowers or fruit) and is controlled by seasonal conditions. Considering this, it is difficult to identify all species present with one site visit or at any one time. Thus there is a potential for herbaceous and graminaceous plants, as well as those only discernable through flower, fruit or seed, not to have been detectable during the survey period. Notwithstanding the above limitation an analysis of potentially occurring MNES and EVNT-only flora species identified that the timing of the survey was suitable for the identification of all potentially occurring species. It is therefore not considered necessary to undertake further surveys of this alignment for MNES or EVNT-only flora species.

3.3.4. Field Data

Field data was collected by the ecologists using forms and fields uploaded to global positioning system (GPS) units as described in Appendix A.

3.3.5. RE Associations and Micro-habitat Features

The EPBC Act approval condition 5(a) for the Gas Transmission includes a requirement to identify areas that may provide habitat for MNES fauna species. These fauna species are listed in section 3.4.3. A list of REs that may provide suitable habitat for each target species was developed through the EIS process. These are also detailed for each of the species in the Threatened Fauna Management Plan (TFMP) for the Gas Transmission Pipeline (Q-LNG01-15-MP-0074)[1]. It is recognised that the suitability of areas for potential habitat for MNES and MNES migratory fauna is related to RE type as well as the existence of suitable micro-habitat elements.

[1] Accessible online at http://www.aplng.com.au/sites/default/pdf/Pipeline_Threatened_Fauna_Management_Plan_Report.pdf

This study has adopted a combined RE association and micro-habitat preference approach to identify preferred habitat for MNES fauna species to enable the quantification of preferred habitat within the ROW. Thus, an assessment of the presence, abundance and quality of micro-habitat features is critical in determining areas of remnant vegetation that may provide preferred habitat for MNES or MNES migratory fauna species.

A list of micro-habitat features in each patch of remnant vegetation for which data were collected during the flora DEIS pre-clearance surveys is presented in Table 4. Each micro-habitat feature defined within Table 4 is critical for the presence of at least one MNES fauna species. In addition, the likelihood of the occurrence of a species in a patch of remnant vegetation is increased if there are numerous suitable micro-habitat features present.

The following methodology was used to determine if an area of remnant vegetation provides preferred habitat for MNES fauna species:

- A desktop review of each MNES fauna species was conducted with a synopsis of its ecology, preferred and/or required habitats, its known distribution and association with vegetation communities and soil types
- Each listed species was assigned a range of REs (consistent with those presented in the EIS and Species Specific Management Plans) and microhabitat features that have been considered critical and preferred through the desktop review
- Significant micro-habitat features were subsequently noted within each parcel of remnant vegetation during the flora survey
- Any noted micro-habitat features within a parcel of remnant vegetation were scored based on the quality and/or quantity of each feature; '1' being of low quality and/or quantity (i.e. no hollow-bearing trees) and '3' being high quality and/or density of the specific feature; and
- Using spatial mapping software, preferred habitat was determined through the ground-truthed presence of REs and the observation of critical micro-habitat features. Preferred habitat within the study area was then determined for each MNES and MNES migratory fauna species.

This report provides quantification of the preferred habitat for each MNES and MNES migratory fauna species within the Mainline (Midline Station – Mainline Valve 2) and discusses any associated impacts upon these species attributable to the Project. Profiles identifying the critical and preferred micro-habitat features associated with the ecology of each MNES and MNES migratory fauna species are contained within Appendix B. These Profiles are based on information identified in the Pipeline Threatened Fauna Management Plan (TFMP) (Q-LNG01-15-MP-0074) for the Project.

Hollow-bearing trees were also identified during the DEIS pre-clearance flora surveys as required by Schedule F, Condition F2 of EA (PEN101808610).

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Table 4: Micro-habitat features recorded by the flora survey team

Micro-habitat Feature	Score/Rank		
	1	2	3
Patch size	<5ha	5-100ha	>100ha
Connectivity	Limited connectivity (isolated patch or less than 10% of perimeter of patch adjoins adjacent remnant vegetation)	Moderate connectivity (10-50% of perimeter of patch adjoins adjacent remnant vegetation)	High connectivity (50-100% of perimeter of patch adjoins adjacent remnant vegetation)
Small Hollows (<35mm)	Limited abundance <1 per 20x20m	Moderate abundance 1-5 per 20x20m	High abundance >5 per 20x20m
Medium (35-100mm)	Limited abundance <1 per 20x20m	Moderate abundance 1-5 per 20x20m	High abundance >5 per 20x20m
Large Hollows (>100mm)	Limited abundance <1 per 20x20m	Moderate abundance 1-5 per 20x20m	High abundance >5 per 20x20m
Leaf litter and sticks	<10% cover	10-80% cover	>80% cover
Groundcover (vegetation)	<10% cover	10-80% cover	>80% cover
Rocks	Small (<20cm) and/or low density	Medium (20-50cm) and/or moderate density	Large (>50cm) and/or abundant, rocky outcrops and crevices
Cracking clays	Absent	Present and shallow	Present and deep
Gilgai	Absent	Present and infrequent or shallow	Present and abundant or deep
Logs	Limited abundance (<2 per 20x20m)	<30cm diameter and medium abundance (2-10 per 20x20m)	>30cm diameter and high abundance (>10 per 20x20m)
Waterways	None	Ephemeral water and permanent riparian vegetation	Permanent water and riparian vegetation
Burrows	Absent	Present but sparse	Present and common

It is acknowledged that highly mobile fauna potentially persist in areas of non-core habitat or utilise this habitat during migration for foraging, or potentially for denning purposes (i.e. microbats and migratory birds). It is therefore reasonable to suggest that the entire study area provides some level of potential habitat for species that are less-discerning with respect to specific habitat preferences. Conclusions and recommendations within this report also provide reference to these highly mobile species.

A TFMP (Q-LNG01-15-MP-0074) has been prepared for the Project which addresses MNES fauna species. The TFMP details the likely habitats and the potential impacts of the proposed works on each of the MNES fauna species. The TFMP also provides recommended management measures which are to be employed during and post construction. The TFMP was initially derived from a desktop review of available literature and field surveys associated with, and subsequent to, the EIS. The TFMP will be updated to reflect the results of this pre-clearance survey where any additional species, habitats or relevant micro-habitat details are identified.

3.3.6. Data Capture and Field Equipment

Data was collected during the flora surveys utilising field survey data menus developed specifically for the DEIS pre-clearance flora surveys and contained on Trimble GeoExplorer XT/XH GPS units. Records taken on the Trimble GeoExplorer units were post-processed to achieve sub-metre accuracy in the field; enabling an accurate calculation of impact areas and informing the study team about the Project's performance against approved disturbance limits.

The field ecologists were also equipped with cameras to take photos at key areas of interest throughout the survey. The locations of these photos were entered as points on the GPS devices.

3.4. Fauna Survey

Condition 6 (a) of the EPBC Act approval, conditions requires all DEIS pre-clearance surveys to be undertaken in accordance with the relevant EPBC Act survey guidelines. The relevant survey guidelines reviewed in the development of this methodology include:

- EPBC Act significant impact guidelines for 36 migratory shorebird species
- Survey guidelines for Australia's threatened birds
- Survey guide for Australia's threatened bats
- Survey guidelines for Australia's threatened mammals
- Referral guidelines for the *Endangered* northern quoll, *Dasyurus hallucatus*
- Survey guidelines for Australia's threatened reptiles
- Draft referral guidelines for the nationally listed Brigalow Belt reptiles; and
- Survey requirements described in the DSEWPaC Species Profile and Threats Database.

3.4.1. Surveys Undertaken to Date

In October 2008, WorleyParsons undertook fauna surveys for the Gas Transmission Pipeline for the purposes of the Draft EIS. The fauna surveys along the Mainline included a number of sites within the Midline Station – Mainline Valve 2 section. The primary purpose of the WorleyParsons survey was to assess the habitat quality along the alignment. The surveying techniques included:

- Visual and audio (e.g. bird and frog calls) identification
- Dedicated searches under rocks, logs, bark and leaf litter for reptiles
- Dedicated searches of likely faunal hotspots such as riparian vegetation, sources of water (e.g. dams, creeks), rocky areas
- Anabat electronic recording of bat calls
- Dedicated searches for animal signs (e.g. scats and tracks); and
- Opportunistic and incidental observations.

In 2010, WorleyParsons fauna surveys of the Mainline were undertaken for the supplementary EIS between 10 May and 14 May 2010. These fauna surveys concentrated on the previously unsurveyed Gladstone State Development Area, outside of Midline Station – Mainline Valve 2.

The WorleyParsons habitat assessment did not include any fauna trapping methods such as Elliott trapping, pitfall trapping, hair tube sampling or harp trapping.

3.4.2. Preliminary Assessment and Site Planning

To address the requirements of the relevant fauna survey guidelines a series of six fauna survey trapping sites were surveyed along this section of the Mainline between Midline Station – Mainline Valve 2. These sites were selected through consideration of:

- The presence and type of threatened ecological communities and REs (particularly those known to provide habitat for MNES or ENVT species)
- Large un-fragmented areas of remnant vegetation
- Wildlife corridors (e.g. vegetated watercourses)
- Wildlife watering areas (e.g. dams, watercourses); and
- Other significant habitat features as identified by previous field investigations.

Prior to field assessment, habitats present within the corridor were determined from desktop analysis of mapped vegetation communities and aerial photography interpretation. These habitats were validated during the DEIS pre-clearance surveys and were subjected in the field to a variety of sampling techniques to identify component fauna (see section 3.3.4). The surveyed sites are discussed in section 3.5.

3.4.3. Target Fauna Species

Target fauna species for the DEIS pre-clearance surveys were determined based on the results of previous surveys, database search results and known species distributions. The following species were targeted during the fauna surveys in accordance with the EPBC Act approval conditions:

- northern quoll (*Dasyurus hallucatus*), *Endangered*
- large-eared pied bat (*Chalinolobus dwyeri*), *Vulnerable*
- eastern long-eared bat (*Nyctophilus timoriensis*), *Vulnerable*
- grey-headed flying-fox (*Pteropus poliocephalus*), *Vulnerable*
- black-breasted button-quail (*Turnix melanogaster*), *Vulnerable*
- red goshawk (*Erythrotriorchis radiatus*), *Vulnerable*
- Australian painted snipe (*Rostratula australis*), *Vulnerable*
- squatter pigeon (*Geophaps scripta scripta*), *Vulnerable*
- plains-wanderer (*Pedionomus torquatus*), *Vulnerable*
- swift parrot (*Lathamus discolor*), *Endangered*
- collared delma (*Delma torquata*), *Vulnerable*
- boggomoss snail (*Adclarkia dawsonensis*), *Critically Endangered*
- brigalow scaly-foot (*Paradelma orientalis*), *Vulnerable*
- Dunmall's snake (*Furina dunmalli*), *Vulnerable*
- yakka skink (*Egernia rugosa*), *Vulnerable*; and
- ornamental snake (*Denisonia maculata*), *Vulnerable*.

Species listed as MNES Migratory were also targeted during the surveys.

Of these MNES species, 12 carry complimentary listing under the state NC Act. These species which are also EVNT species are:

- swift parrot (*Lathamus discolor*), *Endangered*
- squatter pigeon (*Geophaps scripta scripta*), *Vulnerable*
- black-breasted button-quail (*Turnix melanogaster*) *Vulnerable*
- plains-wanderer (*Pedionomus torquatus*), *Vulnerable*
- red goshawk (*Erythrotriorchis radiates*), *Vulnerable*
- large-eared pied bat (*Chalinolobus dwyeri*), *Vulnerable*
- south-eastern long-eared bat (*Nyctophilus corbeni*), *Vulnerable*
- collared delma (*Delma torquata*), *Vulnerable*
- ornamental snake (*Denisonia maculata*), *Vulnerable*
- yakka skink (*Egernia rugosa*), *Vulnerable*
- Dunmall's snake (*Furina dunmalli*), *Vulnerable;* and
- brigalow scaly-foot (*Paradelma orientalis*), *Vulnerable.*

Further to this, a number of EVNT-only species (species not listed under the EPBC Act), with the potential to occur in the study area were also targeted during the fauna surveys. These included:

- Lewin's rail (*Rallus pectoralis*), *Near Threatened*
- Freckled duck (*Stictonetta naevosa*), *Near Threatened*
- Black-necked stork (*Ephippiorhynchus asiaticus*), *Near Threatened*
- Black-chinned honeyeater (*Melithreptus gularis*), *Near Threatened*
- Painted honeyeater (*Grantiella picta*), *Vulnerable*
- Square-tailed kite (*Lophoictinia isura*), Near Threatened
- Grey goshawk (*Accipiter novaehollandiae*), Near Threatened
- Grey falcon (*Falco hypoleucos*), *Near Threatened*
- Glossy black-cockatoo (*Calyptorhynchus lathami*), *Vulnerable*
- Turquoise parrot (*Neophema pulchella*), *Near Threatened*
- Little pied bat (*Chalinolobus picatus*), *Near Threatened*
- Golden-tailed gecko (*Strophurus taenicauda*), *Near Threatened*
- Woma (*Aspidites ramsayi*), *Near Threatened*
- Common death adder (*Acanthophis antarcticus*), *Near Threatened*
- Grey snake (*Hemiaspis damelii*), *Endangered*
- Rough frog (*Cyclorana verrucosa*), *Near Threatened*
- Bulloak jewel (*Hypochrysops picaeta*), *Endangered*; and
- Pale imperial hairstreak (*Jalmenus eubulus*), *Vulnerable*.

3.4.4. Fauna Survey Methodology

An overview of the survey techniques undertaken at each fauna survey site is provided in Table 5. Survey methodologies have been separated into different target fauna groups that are based on their habitat/distribution patterns.

Extensive fauna trapping surveys were conducted at six sites within this portion of the Mainline study area during the following dates:

- Between 23 October 2011 and 27 October 2011 (sites 2A, 2B, 2C and 2D); and
- Between 28 October and 01 November 2011 (sites 2E and 2F).

Each site was sampled over a five day and five night period by two fauna ecologists. Sampling sites were focused in areas of (DEHP) mapped Remnant, High Value Regrowth (HVR) and Non-Remnant vegetation:

- Remnant vegetation –sites 2A, 2B, 2C and 2D; and
- Non-Remnant vegetation –sites 2E and 2F.

The survey techniques identified in this methodology are reflective of the EPBC Act survey guideline recommendations for the relevant species. The methodology involves combining survey techniques and effort for some groups of fauna, such that the timing requirements are not mutually exclusive.

A typical survey day involved the following:

- 0630-0930: Trap checking and incidental bird observations, call playback
- 0930-1230: Bird and reptile observations, habitat assessments
- 1400-1700: Bird and reptile observations, habitat assessments
- 1700-1800: Trap checking, re-setting of traps, bird observations, call playback
- 1800-2100: Spotlighting, hand-held Anabat recording, call playback; and
- 1800-0630: Unattended Anabat recordings in waterway/flyway areas.

Table 5: Survey methodology for fauna groups

Target Fauna Group	Surveying Techniques	Comments
Bird Species (including migratory)	Transects and point observations at key sites such as water points and flowering trees and shrubs. Call recognition for wetland birds and other cryptic species (including nocturnal birds). Opportunistic survey for the duration of the field assessment. Call playback opportunistically during both diurnal and nocturnal periods.	Most migratory birds are seasonal visitors to Australia only during the spring, summer and early autumn months, departing around late April. The survey period was optimal for detection of birds, including MNES, MNES migratory and EVNT-only species.

Target Fauna Group	Surveying Techniques	Comments
Bats	Ultrasonic recording and harp trapping at watering points and other preferred habitat. Night investigation of flowering trees for grey-headed flying-fox (*Pteropus poliocephalus*)) with binoculars and spotlights.	Bat activity is greater during warm conditions, late spring, especially summer and early autumn. The survey period was therefore optimal for the detection of bat species. Sampling was undertaken during sunset and immediately after sundown when temperatures are highest. Ultrasonic recording occurred at a fixed point for the course of the night after spotlighting ceased.
Snails	Collections following targeted surveys of preferred habitats along creek and drainage lines.	There are difficulties associated with identification of species. Species were to be collected and submitted to a specialist from the Queensland Museum to identify, although for this survey none were found.
Mammals	Placement of Elliott traps and camera traps within preferred and non-preferred habitat for the northern quoll (*Dasyurus hallucatus*). Non-invasive latrine searches in suitable habitat.	Traps are also effective for yakka skink (*Egernia rugosa*).
Reptiles	Pitfall and funnel trap lines set up along fence lines. Transect surveys involving litter raking, turning of rocks, logs and bark debris. Elliott traps were set up in areas where yakka skink (*Egernia rugosa*) burrows potentially occur. Observations during night driving for snakes.	Compliance with the temporal requirements of the EPBC Guidelines was achieved during this survey. This survey identified potentially important habitat to inform any recommendations for mitigation measures along the alignment. Pitfall traps are also useful for amphibians.
Amphibians	Spotlight and hand searches in debris and under logs at each survey site. Call playback of known frog species during nocturnal periods at each survey site and nearby habitat.	The survey period was optimal for detection of the rough frog (*Cyclorana verrucosa*). Deep black soil was used as a proxy to tentatively identify suitable habitat for this species. Identification of this habitat will help to determine where mitigation measures are appropriate for species such as the rough frog (*Cyclorana verrucosa*) and grey snake (*Hemiaspis damelii*). Spotlighting is also effective for mammals, birds and reptiles. Hand searches are also effective for reptiles.

Target Fauna Group	Surveying Techniques	Comments
Insects	Active habitat searches of regrowth and remnant brigalow sites and habitat assessment for bulloak jewel (*Hypochrysops piceata*) and pale imperial hairstreak (*Jalmenus eubulus*) butterflies.	Habitat searches are also effective for amphibians and reptiles.

3.5. Fauna Survey Sites

Locations of the six fauna survey sites are shown on Map 1 (Appendix D). Detailed descriptions of each site are presented in the sections 3.5.1 to 3.5.6.

All sites were sampled over a five day and five night period by two fauna ecologists. These site surveys utilised a number of trapping and observation techniques which included, as a minimum, the following equipment:

- Elliott A traps (two lines of 10 Elliott A traps were utilised at each site to cover all habitat types)
- Elliott B traps (two lines of five Elliott B traps were utilised at each site to cover all habitat types)
- Pitfall Traps (five pit fall traps were established at each site along drift-fencing)
- Funnel traps (ten funnel traps were set along the pitfall fencing and throughout the site)
- Harp traps (four harp traps were established at each site within appropriate flyways)
- Four fixed motion activated cameras
- Small wrecking bars for active herpetofauna searching
- Anabat SD2 bat detection units (data analysed in Analook for Windows)
- Spotlighting equipment and binoculars; and
- Megaphone for call playback surveys.

A wide range of identification and diagnostic resources were utilised during the survey, including digital scales, electronic callipers, magnifying lenses, electronic call playback, and various recognised fauna field guides as described in Section 3.2. Where possible, fauna were photographed (from a distance or prior to release) using a digital camera to assist with positive identification. The cameras optical and digital zoom features were used to define key diagnostic characteristics. Species recorded in the survey have been identified to species level where possible.

Descriptions of each fauna survey site are provided in the following sections. Assessments of the general habitat quality at each site have been determined through consideration of the qualities described in Table 6.

Table 6: Habitat quality definitions for fauna survey sites

Class	Description
Low	Many fauna habitat elements, such as mature, hollow-bearing trees, fallen timber and deep leaf litter, in low quality areas have been removed or altered. Remnant vegetation is often small in area, contains a low number of indigenous species, supports substantial weed infestations and is poorly connected to other areas of remnant vegetation.
Moderate	Some habitat components are present but others are lacking. Remnant vegetation may have a reasonably intact understorey with undisturbed ground logs and a litter layer of medium abundance. Supports a moderate abundance of hollow-bearing trees, with hollows of various sizes. Connectivity with other remnant habitats in the landscape may be limited to moderate.
High	Most habitat components are present, with a complex vegetation community structure and a high number of indigenous species. Remnant vegetation contains old-growth trees, a high abundance of fallen timber, and a lack of weeds. Supports a moderate to high abundance of hollow-bearing trees (with hollows of various sizes) and moderate to high connectivity with other areas of remnant vegetation.

3.5.1. Survey Site 2A

Fauna survey site 2A (see Figure 3 and Appendix D (Map 1, page 1)) is located at approximately KP 177.7 (-24.903. 150.458) and is situated at the northern extent of a large area of vegetation associated with steep sloping areas. This vegetation is mapped as RE 11.12.1/11.3.25 and HVR 11.3.25. Auburn Range State Forest is present to the east of the site (Table 8 contains a detailed floristic description of this HVR patch in which site 2A is situated).

The broader area has been subject to extensive agricultural clearing and controlled burning; with little remnant vegetation retained outside of the riparian habitats. The terrain is undulating with moderate to steep slopes, and a small flat floodplain on either side of South Creek. South Creek has a large, incised northern bank where the site is located. The site was situated on the floodplain, with sandy loam soils typical of landzone 3. Steeper areas to the north and west of the site support igneous derived bedrock with a minimal soil profile typical of landzone 12.

The canopy layer is sparse within the South Creek riparian corridor and is between 18m and 28m high. The canopy layer is dominated by Queensland blue gum (*Eucalyptus tereticornis*) with suppressed Moreton Bay ash (*Corymbia tessellaris*). The canopy layer along South Creek supports a moderate amount of hollowing-bearing features, with a number being utilised at the time of the survey by roosting parrots, pardalotes and glider species. The canopy layer of vegetation situated on the steep slopes outside of the South Creek corridor supports a dense layer of regenerating narrow-leaved red ironbark (*Eucalyptus crebra*) and broad leaved ironbark (*Eucalyptus fibrosa*).

The shrub layer of South Creek is very dense and approximately 8m high. The shrub layer is dominated by bottlebrush (*Melaleuca* sp.) which forms a dense layer enclosing the lower riparian areas. Areas outside the riparian corridor generally lack a shrub layer as a result of historic clearing, cattle grazing and recent moderate intensity fires as a result of controlled burns.

The groundcover layer within South Creek is sparse and occurs to a height of 1m. This layer generally consists of native sedges, *Lomandra* spp. and perennial grasses. Recent controlled burning has reduced the groundcover layer throughout the areas surrounding South Creek, allowing for the regeneration of native and pasture grasses.

Overall the areas associated with South Creek affords moderate-quality habitat forming a linear corridor of remnant vegetation through the landscape; while the remnant vegetation surrounding these areas support lower quality habitats due to the lack of habitat features such as hollow bearing limbs, fallen timber and complex vegetation structure.

Figure 3: South Creek at fauna survey site 2A

3.5.2. Survey Site 2B

Fauna survey site 2B (see Figure 4 and Appendix D (Map 1, page 3)) is located at approximately KP 181.6 (-24.877°, 150.474°) and is situated along the eastern extent of a moderate sized parcel of DEHP mapped and ground-truthed remnant vegetation (RE 11.12.1/11.3.25). The terrain is undulating, with slopes draining to the west into a tributary of South Creek. The soils are generally shallow, igneous, rocky soils typical of landzone 12 (Table 8 contains a detailed floristic description of this woodland patch that Site 2A is situated in).

The site and the broader area have been subject to broad-scale historical and contemporary clearing and controlled burning for the purposes of cattle grazing.

The canopy layer within the site was moderately dense and between 8m and 14m high. The canopy layer was dominated by narrow-leaved red ironbark (*Eucalyptus crebra*) with suppressed variable-barked bloodwood (*Corymbia erythrophloia*). Numerous hollow-bearing trees were recorded throughout the site, some of which were noted as active roosting sites for yellow-bellied sheath-tailed bat (*Saccolaimus flaviventris*) and a variety of glider and reptile species.

The shrub layer at site 2B is absent due to historical clearing and current land management practices. Cattle were seen regularly utilising the site and restricting the regeneration of native canopy and shrub species.

The groundcover layer was moderately and to a height of 0.5m. This layer generally consisted of regenerating perennial native and exotic pasture grass species. Evidence of recent fire

throughout the site was observed and the majority of the grasses were just beginning to re-sprout at the time of survey.

Overall the site supports low to moderate quality habitat due to the lack of ground and mid-strata vegetation structure. The presence of an intact canopy layer and the numerous hollow-bearing trees provide habitat for many arboreal and avifauna; however the pressures from grazing, fire and historical clearing have reduced the overall quality of the habitat and thus the areas ability to support forest-dependant fauna species.

Figure 4: Hollow-bearing features identified at fauna survey site 2B

3.5.3. Survey Site 2C

Fauna survey site 2C (see Figure 5 and Appendix D (Map 1, page 7)) is located at approximately KP189.1 (-24.811°, 150.478°) and is situated atop a large ridge line comprising mapped remnant vegetation (RE 11.12.1/11.3.25). The aspect is easterly and drains steeply to the north into Pump Creek. The soils are generally shallow and support exposed igneous rocks typical of landzone 12. The site and surrounding area has been subject to broad-scale clearing of the understorey and selective thinning of the canopy for cattle grazing purposes. The site had recently undergone a moderate intensity fire with little regeneration of groundcover noted.

The canopy layer was very sparse and is between 18m and 25m high. This layer was dominated by narrow-leaved red ironbark (*Eucalyptus crebra*) and silver-leaved ironbark (*Eucalyptus melanophloia*), with sub-dominant Queensland blue gum (*Eucalyptus tereticornis*) generally associated with lower areas close to Pump Creek.

The shrub layer was absent due to historical clearing, recent fire and current land management practices.

The groundcover layer was generally absent; however, a moderate amount of fallen timber occurred throughout the site, particularly within smaller incised gullies and the Pump Creek corridor.

Overall the site supported low-quality habitat due to the limited vegetative structure throughout the site and the surrounding area. Recent fires have reduced the amount of groundcover significantly as there is little in the way of shelter and foraging resources available for terrestrial fauna.

It should be noted that an active wedge-tailed eagle (*Aquila audax*) nest was present at the site; however as the site is a reasonable distance from the ROW it is unlikely that the proposed alignment will impact this nest.

Figure 5: Fauna survey site 2C

3.5.4. Survey Site 2D

Fauna survey site 2D (see Figure 6 and Appendix D (Map 1, page 8)) is located at approximately KP 190.2(-24.802°, 150.475°) along the outside bend of ground-truthed RE 11.3.25 associated with Pump Creek. The site is formed by a steep sloping rocky outcrop to the north of Pump Creek, with areas of exposed granite forming small cliff faces typical of landzone 12. Flowing water within Pump creek was consistent throughout the survey period, with alluvial areas supporting course sandy plains typical of landzone 3 (Table 8 contains a detailed floristic description of this open forest patch in which Site 2C is situated).

The canopy layer is generally sparse and is between 16m and 22m high. Two distinct areas of canopy vegetation occur, related to the underlying geology. . The alluvial areas associated with Pump Creek are dominated by Queensland blue gum (*Eucalyptus tereticornis*), while the higher slopes and plateaus are dominated by narrow-leaved red ironbark (*Eucalyptus crebra*) and silver-leaved ironbark (*Eucalyptus melanophloia*).

The shrub layer can also be separated into two distinct areas associated with landzone 3 and landzone 12. The shrub layer within the alluvial plains (landzone 3) occurs in sparse patches, but is dense where present and is solely dominated by bottlebrush (*Melaleuca* spp.). The shrub layer is between 3m and 5m high. The shrub layer was absent outside of the alluvial plains (landzone 12) as a result of historical and recent clearing, cattle grazing and recent fire.

The groundcover layer within the alluvial areas of the site supported a mixture of native and pasture grasses and occurred to a height of 1m. These areas supported a large amount of habitat features including larger bodies of water, rocky outcrops, sandy banks, dense grasses and fallen debris. The groundcover layer within the upper slopes of the site, beyond the alluvial areas, had recently suffered broad-scale burning. These areas supported regenerating perennial grasses which were being grazed by cattle. As a result of the impacts of cattle grazing these areas are expected to provide little forage and shelter resource for terrestrial fauna. Small, eroded gullies throughout the steep slopes provide shelter habitat for many terrestrial fauna species.

The site generally supports moderate-quality habitat particularly within the riparian areas of Pump Creek. The incised gullies also contribute to the site's overall habitat value; however, the flat plateaus and higher slopes provided little in the way of terrestrial habitat features and support only low quality habitat.

Figure 6: Fauna survey site 2D

3.5.5. Survey Site 2E

Fauna survey site 2E (see Figure 7 and Appendix D (Map 1, page 19)) is located at approximately KP 214.1(-24.599°, 150.440°) within the non-remnant, broad floodplains of Prospect Creek. Large areas within the floodplain support deep clays typical of landzone 4; however the majority of the floodplain supports deep sandy soils typical of landzone 3. The site has undergone significant broad-scale clearing for the purposes of cattle grazing, and only a

small clump of shrubs has been retained adjacent to the lower areas of the site where natural spring water currently flows.

The canopy layer was extremely sparse throughout the site and is between 24m and 28m high. The majority of the trees which remain had been retained as paddock trees, with the landscape dominated by Queensland blue gum (*Eucalyptus tereticornis*). Many of the paddock trees observed possessed multiple hollows which, at the time of survey, were being actively used by birds for nesting and roosting purposes.

Within the small clump of retained shrubs, the shrub layer was very dense, ranging between 4m and 6m in height, and was a monoculture dominated by black tea-tree (*Melaleuca bracteata*). No shrub layer was present outside of this small retained patch.

The groundcover layer was dense and generally between 0m and 0.5m high. This layer was dominated by pasture grasses which had been heavily grazed. Multiple piles of pushed up timber have been located to surround the clump of retained shrubs and provide good habitat for many small mammals and reptiles.

Overall, the site provides low-quality habitat due to its limited vegetation structure and its lack of connectivity to intact remnant vegetation. Impacts to the site as a result of cattle grazing are high and would generally exclude many fauna species.

Areas to the north and west of the site support flowing natural spring water, which most likely discharges from the Mesozoic ridges to the west of the site where clay soils become impervious to shallow ground water flow. These areas are expected to provide good foraging resources for migratory and wading birds as well as amphibian and reptile species.

Figure 7: Harp trap installed within the clump of retained shrubs at fauna survey site 2E

3.5.6. Survey Site 2F

Fauna survey site 2F (see Figure 8 and Appendix D (Map 1, page 23)) is located at approximately KP 221.4 (-24.533°, 150.415°) along the alluvial terrace of Prairie Creek, a large tributary of Prospect Creek. The site is generally formed by broad, flat floodplains on alluvial sands; however Prairie Creek is largely incised with steep banks. The site is situated within non-remnant vegetation and has generally undergone broad-scale historic clearing with minimal vegetation retained outside of the riparian areas.

The canopy layer is sparse to absent, however the riparian areas have a moderate canopy cover to 20m high. This layer is dominated by Queensland blue gum (*Eucalyptus tereticornis*), with small pockets dominated by Moreton Bay ash (*Corymbia tessellaris*), and sub-dominant narrow-leaved red ironbark (*Eucalyptus crebra*) and broad-leaved ironbark (*Eucalyptus fibrosa*).

The shrub layer throughout the site is generally absent; however riparian areas support a moderate shrub layer occurring between 4m and 8m high. This shrub layer is dominated by black tea-tree (*Melaleuca bracteata*), but heavily impacted by cats claw creeper (*Macfadyena unguis-cati**[2]) (a declared Class 3 pest plant (under the *Land Protection (Pest and Stock Route Management) Act 2002*) and Weed of National Significance (WONS), which dominates sections of the waterway.

The groundcover layer is dense, and up to 0.5m high. This layer is dominated by native perennial grasses and pasture species. Little to no habitat structure occurs within this layer due to historic blade-ploughing activities and cattle grazing. Overall the site supports only low-quality habitat for fauna species. Canopy vegetation within the Prairie Creek riparian corridor does however provide connectivity throughout the broader landscape, as well as supporting a small number of hollow bearing trees.

Figure 8: Fauna survey site 2F

[2]* exotic species naturalised in Queensland

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4. DEIS Pre-Clearance Survey Results

4.1. Flora Assessment

4.1.1. Threatened Ecological Communities (TECs)

Potential Presence

Four TECs were identified by the protected matters database search as potentially occurring within the Project area. These vegetation TECs were:

- Brigalow (*Acacia harpophylla* dominant and co-dominant);
- Coolibah – Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions;
- Weeping Myall Woodlands; and
- Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions (SEVT).

It is considered that these TECs are detectable in any season given key indicator species are woody, evergreen, perennial species that are persistent all year-round and which are readily identifiable to species level irrespective of seasonality.

Actual Presence

The survey confirmed the presence of one TEC at two locations within the study area; Brigalow (*Acacia harpophylla* dominant and co-dominant).

Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC

The Brigalow TEC was identified at three locations within and close to the ROW (one patch) for this portion of the Mainline (Table 7 and Appendix D (Map series 1, sheets 32 and 33)).

Table 7: Brigalow TEC located within the ROW

TEC	Ground-truthed Structure and Condition	KP In	KP Out	Area within ROW (ha)
Brigalow (*Acacia harpophylla* dominant and co-dominant)	Mapped as non-remnant vegetation by state mapping, this vegetation was ground-truthed as remnant RE11.9.5. The patch extends through the ROW to the east of the survey corridor for some 200 metres (refer sheet 32, map series 1, Appendix D). Whilst the midstorey structure remains moderately intact (it is used as a shade belt for cattle and trampling is evident), by comparison the ground layer is heavily infested with exotic grasses.	239.285	239.323	0.12
Brigalow (*Acacia harpophylla* dominant and co-dominant)	Mapped as remnant RE11.4.3 by state mapping. The patch of occurs immediately adjacent to and the eastern edge of the ROW, extending through the survey corridor and beyond for some 200 metres (refer sheet 33, map series 1, Appendix D). The condition of the patch is moderate, with extensive exotic grass in the understorey.	Not within ROW Within surveyed corridor to east of ROW-240.430	Not within ROW Within surveyed corridor to east of ROW-240.529	Not within ROW

TEC	Ground-truthed Structure and Condition	KP In	KP Out	Area within ROW (ha)
Brigalow (*Acacia harpophylla* dominant and co-dominant)	Patch is not mapped as remnant by state mapping and was ground truthed as a dense stand of regrowth brigalow (*Acacia harpophylla*) analogous with RE11.4.3 to 7m high. It adjoins the mapped RE11.4.3 described above and extends for a similar distance to the east of the survey corridor (refer sheet 33, map series 1, Appendix D). The ground layer is heavily infested with exotic grasses.	240.529	240.648	0.09
Brigalow (*Acacia harpophylla* dominant and co-dominant)	Patch is not mapped as remnant by state mapping and was ground truthed as a dense stand of regrowth brigalow (*Acacia harpophylla*) analogous with RE11.9.5 to 7m high. It is situated some 100 metres to the north of a similar patch of brigalow (refer sheet 33, map series 1, Appendix D). The ground layer is heavily infested with exotic grasses.	240.738	240.802	0.11

4.1.2. Regional Ecosystems and HVR

A number of patches of remnant vegetation and HVR are located within the ROW for this section of the Mainline. These ground-truthed REs and HVR equivalents are listed in Table 8 and a comparison is provided between the ground-truthed RE and the DEHP mapped RE for the same area. Of the seven RE types observed within the ROW during the DEIS pre-clearance survey, one has an *Endangered* biodiversity status, two have an *Of Concern* biodiversity status, and the remaining four have a biodiversity status of *No Concern at Present*.

Information relating to the ground-truthed vegetation communities surveyed within this section of the Mainline is provided in Table 8. The presence and extent of ground-truthed REs within this portion of the Mainline is illustrated in Map 1 (Appendix D).

Table 8: Status and equivalency of DEHP mapped and actual (ground-truthed) Regional Ecosystems and HVR present within the ROW

DEHP Mapped RE / HVR	GTRE RE / HVR	Vegetation Description	Vegetation Management Status (DNRM)	Biodiversity Status (DEHP)	KP In	KP Out	Area (Ha)
Vegetation Communities Identified and Equivalent RE							
HVR	HVR	Regrowth riparian vegetation analogous with RE 11.3.25. Community consists of scattered regrowth with a canopy consisting of Queensland blue gum (*Eucalyptus tereticornis*), Moreton Bay ash (*Corymbia tessellaris*), and black tea tree (*Melaleuca bracteata*) (30% cover) to 24 m high. The shrub layer is absent. The ground layer consists of native perennial grasses (70% cover). Modified regrowth canopy with depauperate, disturbed understorey and shrub layer. Fauna Site 2A is located partially within this vegetation unit.	n/a	n/a	177.404	177.514	0.39
HVR	HVR	Regrowth analogous with RE 11.12.1. Canopy consists of Queensland blue gum (*Eucalyptus tereticornis*) and narrow-leaved red ironbark (*Eucalyptus crebra*) (20-50% cover) to 12m high. Ground layer consists of native perennial grasses (50% cover). Modified regrowth canopy with good native understorey and shrub layer development.	n/a	n/a	177.647	177.835	0.41
HVR	HVR	Regrowth analogous with RE 11.12.1. Canopy consists of scattered, old narrow-leaved red ironbark (*Eucalyptus crebra*) and variable-barked bloodwood (*Corymbia erythrophloia*) (20% cover) to a height of 22m. Shrub layer consist of scattered regrowth (10% cover) to 10m. Ground layer consists of native perennial grasses (95% cover). Modified regrowth canopy with good native understorey and shrub layer.	n/a	n/a	178.984	179.180	0.59

DEHP Mapped RE / HVR	GTRE RE / HVR	Vegetation Description	Vegetation Management Status (DNRM)	Biodiversity Status (DEHP)	KP In	KP Out	Area (Ha)
HVR	HVR	Regrowth analogous with RE 11.12.1. Consists of scattered old narrow-leaved ironbark (*Eucalyptus crebra*) and variable-barked bloodwood (*Corymbia erythrophloia*) (20% cover) to a height of 22m. Shrub layer consist of scattered regrowth (10% cover) to 10m. Ground layer consists of native perennial grasses (95% cover). Modified regrowth with good native understorey and shrub layer.	n/a	n/a	179.221	179.625	1.52
11.12.1 / 11.3.25	11.12.1	Woodland with a canopy of narrow-leaved red ironbark (*Eucalyptus crebra*), and variable-barked bloodwood (*Corymbia erythrophloia*). Ground layer consist of native perennial grasses. Intact remnant canopy with good native understorey and shrub layer. This remnant patch provides good connectivity with the surrounding area. Fauna Site 2B is located within this vegetation unit.	Least Concern	No Concern at Present	179.925	180.975	0.81
11.12.1 / 11.3.25	11.12.2	Open woodland with a canopy of silver-leaved ironbark (*Eucalyptus melanophloia*) and Moreton Bay ash (*Corymbia tessellaris*). Ground layer consists of wire grass (*Aristida* spp.), *Dichanthium* sp., blue grass (*Bothriochloa* sp.) and love grass (*Eragrostis* sp.). Intact remnant canopy with good native understorey and shrub layer. The site possesses poor connectivity to surrounding areas.	Least Concern	No Concern at Present	183.717	183.827	0.44

DEHP Mapped RE / HVR	GTRE RE / HVR	Vegetation Description	Vegetation Management Status (DNRM)	Biodiversity Status (DEHP)	KP In	KP Out	Area (Ha)
11.12.1 / 11.3.25	11.12.2	Open woodland with a canopy of silver-leaved ironbark (*Eucalyptus melanophloia*) and Moreton Bay ash (*Corymbia tessellaris*). Ground layer consists of wire grass (*Aristida* spp.), *Dichanthium* sp., blue grass (*Bothriochloa* sp.) and love grass (*Eragrostis* sp.). Intact remnant canopy with good native understorey and shrub layer. The site possesses poor connectivity to surrounding areas.	Least Concern	No Concern at Present	183.940	184.180	0.82
11.12.1 / 11.3.25	11.12.2	Open woodland with a canopy of silver-leaved ironbark (*Eucalyptus melanophloia*) and Moreton Bay ash (*Corymbia tessellaris*). Ground layer consists of wire grass (*Aristida* spp.), *Dichanthium* sp., blue grass (*Bothriochloa* sp.) and love grass (*Eragrostis* sp.). Intact remnant canopy with good native understorey and shrub layer. The site possesses poor connectivity to surrounding areas.	Least Concern	No Concern at Present	184.418	184.973	2.07
11.12.1 / 11.3.25	11.12.2	Open woodland with a canopy of silver-leaved ironbark (*Eucalyptus melanophloia*) and Moreton Bay ash (*Corymbia tessellaris*). Ground layer consists of wire grass (*Aristida* spp.), *Dichanthium* sp., blue grass (*Bothriochloa* sp.) and love grass (*Eragrostis* sp.). Intact remnant canopy with good native understorey and shrub layer. The site possesses poor connectivity to surrounding areas.	Least Concern	No Concern at Present	185.212	185.369	0.44

DEHP Mapped RE / HVR	GTRE RE / HVR	Vegetation Description	Vegetation Management Status (DNRM)	Biodiversity Status (DEHP)	KP In	KP Out	Area (Ha)
11.12.1	11.12.1	Open woodland with a canopy of silver-leaved ironbark (*Eucalyptus melanophloia*) and Moreton Bay ash (*Corymbia tessellaris*). Ground layer consists of wire grass (*Aristida* spp.), *Dichanthium* sp., blue grass (*Bothriochloa* sp., and love grass (*Eragrostis* sp.). Intact remnant canopy with good native understorey and shrub layer. The site possesses poor connectivity to surrounding areas.	Least Concern	No Concern at Present	186.082	186.944	3.38
HVR	HVR	Regrowth vegetation analogous with RE 11.12.1. Canopy layer consists of scattered mature narrow-leaved red ironbark (*Eucalyptus crebra*), and variable-barked bloodwood (*Corymbia erythrophloia*) (20% cover) to 18m high. Ground layer consists of *Aristida* spp., black speargrass (*Heteropogon contortus*), and kangaroo grass (*Themeda australis*). Modified regrowth canopy with good native understorey and shrub layer.	n/a	n/a	187.573	188.038	1.72
11.3.4 / 11.3.25	11.3.25	Open forest no shrub layer. Ground layer consists of Guinea grass (*Megathyrsus maximus* var *maximus**), *Themeda* sp., Noogoora burr (*Xanthium pungens**), and flax leaf fleabane (*Conyza bonariensis**). Intact remnant canopy with depauperate highly disturbed understorey. Fauna site 2D is located within this vegetation unit.	Least Concern	Of Concern	190.167	190.259	0.32

DEHP Mapped RE / HVR	GTRE RE / HVR	Vegetation Description	Vegetation Management Status (DNRM)	Biodiversity Status (DEHP)	KP In	KP Out	Area (Ha)
11.12.1 / 11.12.2 / 11.3.25	11.11.15	Woodland with a canopy layer consisting of narrow-leaved red ironbark (*Eucalyptus crebra*), silver-leaved ironbark (*Eucalyptus melanophloia*) and variable barked bloodwood (*Corymbia erythrophloia*). Ground layer consists of wire grass (*Aristida* spp.), sabi grass (*Urochloa mosambicensis**), and blue grass (*Bothriochloa* sp.). Intact remnant canopy with depauperate disturbed understorey of native and exotic grasses.	Least Concern	No Concern at Present	190.247	190.678	1.65
11.9.9 / 11.9.2	11.9.2	Woodland with a canopy layer of poplar box (*Eucalyptus populnea*), narrow-leaved red ironbark (*Eucalyptus crebra*) and brigalow (*Acacia harpophylla*). Shrub layer consists of false sandalwood (*Eremophila mitchellii*), scrub boonaree (*Alectryon diversifolius*), cattle bush (*Pittosporum angustifolium*) and peach bush (*Ehretia membranifolia*). Ground layer consists of native perennial grasses including wire grass (*Aristida* spp.). Intact remnant canopy with good native understorey and shrub layer.	Least Concern	No Concern at Present	195.492	195.593	0.05
HVR	HVR	This patch of HVR, which is analogous with RE 11.3.4, has been recently cleared apart from the laneway. Modified regrowth canopy and understorey.	n/a	n/a	211.048	211.100	0.20

DEHP Mapped RE / HVR	GTRE RE / HVR	Vegetation Description	Vegetation Management Status (DNRM)	Biodiversity Status (DEHP)	KP In	KP Out	Area (Ha)
non-rem	11.3.4	Canopy layer consists of silver-leaved ironbark (*Eucalyptus melanophloia*) and poplar box (*Eucalyptus populnea*). Ground layer consists of Rhodes grass (*Chloris gayana**), Queensland bluegrass (*Dichanthium sericeum)*, blue grass (*Bothriochloa* sp.) and wire grass (*Aristida* spp.). Intact remnant canopy with moderately depauperate and disturbed understorey of native and exotic grasses. Unmapped remnant Queensland blue gum (*Eucalyptus tereticornis*) occurs on the creek flats.	Of Concern	Of Concern	212.564	212.778	0.81
non-rem	11.9.2	Previously unmapped open woodland. Canopy and shrub layer consistent with RE 11.9.2. Ground layer consists of black speargrass (*Heteropogon contortus*), love grass (*Eragrostis* sp.*), wire grass (*Aristida* spp.) and blue grass (*Bothriochloa* sp.). Intact remnant canopy with moderately depauperate and disturbed understorey of native and exotic grasses.	Least Concern	No Concern at Present	222.146	222.550	1.54
HVR	HVR	Regrowth vegetation analogous with RE 11.3.25. Open woodland of Queensland blue gum (*Eucalyptus tereticornis*) (10-15% cover) to 25m high. Ground layer consists of a grassland of Queensland bluegrass (*Dichanthium sericeum*), *Themeda* sp., black speargrass (*Heteropogon contortus*) and Indian bluegrass (*Bothriochloa pertusa**). Modified regrowth canopy with good native understorey and shrub layer.	n/a	n/a	225.673	228.823	0.40

DEHP Mapped RE / HVR	GTRE RE / HVR	Vegetation Description	Vegetation Management Status (DNRM)	Biodiversity Status (DEHP)	KP In	KP Out	Area (Ha)
HVR	HVR	Regrowth vegetation analogous with RE 11.3.25, open woodland of Queensland blue gum (*Eucalyptus tereticornis*) (10-15% cover) to 25m high. Ground layer consists of a grassland of Queensland bluegrass (*Dichanthium sericeum*), *Themeda* sp., black speargrass (*Heteropogon contortus*) and Indian bluegrass (*Bothriochloa pertusa**). Modified regrowth canopy with moderate shrub disturbance and understorey of native and exotic grasses.	n/a	n/a	225.969	226.152	0.50
HVR	HVR	Regrowth vegetation analogous with RE 11.3.25. Open woodland of Queensland blue gum (*Eucalyptus tereticornis*) (10-15% cover) to 25m high. Ground layer consists of a grassland of Queensland bluegrass (*Dichanthium sericeum*), *Themeda* sp., black speargrass (*Heteropogon contortus*) and Indian blue (*Bothriochloa pertusa**). Modified regrowth canopy with moderate shrub disturbance and understorey of native and exotic grasses.	n/a	n/a	226.316	226.393	0.02
HVR	HVR	Regrowth analogous with RE 11.3.25 Modified regrowth canopy with moderately depauperate and disturbed understorey of native and exotic grasses.	n/a	n/a	227.856	227.936	0.23

DEHP Mapped RE / HVR	GTRE RE / HVR	Vegetation Description	Vegetation Management Status (DNRM)	Biodiversity Status (DEHP)	KP In	KP Out	Area (Ha)
HVR	HVR	Regrowth woodland analogous with RE 11.12.1. Canopy consists of silver-leaved ironbark (*Eucalyptus melanophloia*), narrow-leaved red ironbark (*Eucalyptus crebra*) and variable-barked bloodwood (*Corymbia erythrophloia).* Modified regrowth canopy with moderately depauperate and disturbed understorey of native and exotic grasses.	n/a	n/a	228.454	228.626	0.09
HVR	HVR	Regrowth analogous with RE 11.12.1. Woodland with a canopy layer consisting of silver-leaved ironbark (*Eucalyptus melanophloia*), variable-barked blood wood (*Corymbia erythrophloia*) and narrow-leaved red ironbark (*Eucalyptus crebra*) (up to 20% cover) to 15m high. Shrub layer is absent. Ground layer consists of grasses and includes Indian bluegrass (*Bothriochloa pertusa**), sabi grass (*Urochloa mosambicensis**), *Themeda* sp., and buffel grass (*Pennisetum ciliare**) (95% cover). Modified regrowth canopy with highly depauperate and disturbed understorey with predominately exotic grasses.	n/a	n/a	229.401	229.622	0.57

DEHP Mapped RE / HVR	GTRE RE / HVR	Vegetation Description	Vegetation Management Status (DNRM)	Biodiversity Status (DEHP)	KP In	KP Out	Area (Ha)
HVR	HVR	Regrowth analogous with RE 11.12.1. Woodland with a canopy layer consisting of silver-leaved ironbark (*Eucalyptus melanophloia*), variable-barked blood wood (*Corymbia erythrophloia*) and narrow-leaved red ironbark (*Eucalyptus crebra*) (up to 20% cover) to 15m high. Shrub layer is absent. Ground layer consists of grasses and includes Indian bluegrass (*Bothriochloa pertusa**), sabi grass (*Urochloa mosambicensis**), *Themeda* sp. and buffel grass (*Pennisetum ciliare**) (95% cover). Modified regrowth canopy with highly depauperate and disturbed understorey with predominately exotic grasses.	n/a	n/a	229.648	230.082	1.02
HVR	HVR	Regrowth analogous with RE 11.12.1.Canopy layer consists of silver leaved ironbark (Eucalyptus melanophloia) (15%cover) to 13m high. Ground layer consists of grasses Indian bluegrass (*Bothriochloa pertusa**), buffel grass (*Pennisetum ciliare**), and sabi grass (*Urochloa mosambicensis**) (70% cover). Modified regrowth canopy with highly depauperate and disturbed understorey with predominately exotic grasses.	n/a	n/a	230.390	230.688	0.78

DEHP Mapped RE / HVR	GTRE RE / HVR	Vegetation Description	Vegetation Management Status (DNRM)	Biodiversity Status (DEHP)	KP In	KP Out	Area (Ha)
HVR	HVR	Regrowth analogous with RE 11.12.1. Canopy layer consists of silver leaved ironbark (*Eucalyptus melanophloia*) (15% cover) to 13m high. Ground layer consists of grasses Indian bluegrass (*Bothriochloa pertusa*),* buffel grass (*Pennisetum ciliare**) and sabi grass (*Urochloa mosambicensis**) (70% cover). Modified regrowth canopy with highly depauperate and disturbed understorey with predominately exotic grasses.	n/a	n/a	230.851	230.981	0.37
HVR	HVR	Regrowth HVR analogous with RE 11.12.1. Canopy consists of silver-leaved ironbark (*Eucalyptus melanophloia*) (25% cover) to 14m high on the slopes. Canopy layer in the creek and flats consists of Moreton Bay ash (*Corymbia tessellaris*), brigalow (*Acacia harpophylla*), black tea tree (*Melaleuca bracteata*) and sally wattle (*Acacia salicina*). Ground layer consists of *Themeda* sp., buffel grass (*Pennisetum ciliare**), Queensland blue grass (*Dichanthium sericeum*) and sabi grass (*Urochloa mosambicensis**). Modified regrowth canopy with highly depauperate and disturbed understorey with predominately exotic grasses.	n/a	n/a	231.159	231.279	0.43

DEHP Mapped RE / HVR	GTRE RE / HVR	Vegetation Description	Vegetation Management Status (DNRM)	Biodiversity Status (DEHP)	KP In	KP Out	Area (Ha)
non-rem	11.9.5	Woodland with a canopy of brigalow (*Acacia harpophylla*), Queensland bottle tree (*Brachychiton rupestris*) and broad-leaved bottle tree (*Brachychiton australis*). Sub canopy consists of scrub boonaree (*Alectryon diversifolius*), small leaved ebony (*Diospyros humilis*), *Planchonella* sp., prickly pine (*Bursaria incana*), peach bush (*Ehretia membranifolia*) and brush wilga (*Geijera salicifolia*). Shrub layer consists of stiff jasmine (*Jasminum simplicifolium*), sandalwood (*Santalum lanceolatum*), scrub boonaree (*Alectryon diversifolius*), currant bush (*Carissa ovata*), warrior bush (*Apophyllum anomalum*), *Marsdenia* sp. and brush wilga (*Geijera parviflora*). This polygon of remnant vegetation has been retained as a shade clump and the ground layer is heavily infested with exotic grass. Intact remnant canopy with moderate shrub layer development and depauperate and predominately disturbed understorey of exotic grasses.	Endangered	Endangered	239.285	239.323	0.12
HVR	HVR	Regrowth Queensland blue gum (*Eucalyptus tereticornis*) with Moreton Bay ash (*Corymbia tessellaris*) and poplar box (*Eucalyptus populneus*) woodland with a grassy understorey on alluvium. Regrowth analogous with 11.3.4. Modified regrowth canopy with highly depauperate and disturbed understorey with predominately exotic grasses.	n/a	n/a	245.385	245.481	0.09

The total areas of RE classification (by biodiversity status) within the ROW between the Midline Station and Mainline Valve 2 are listed in Table 9.

Table 9: Area of RE (by biodiversity status) within the ROW

RE Classification (Biodiversity Status)	Area within ROW (ha)
Endangered	0.12ha
Of Concern	1.13ha
No Concern at Present	11.2ha
HVR	9.33ha
Non-Remnant	293.34ha
TOTAL	**315.12ha**

4.1.3. Recorded Flora Species

MNES Flora Species

Four EPBC Act listed flora species were identified within database searches as potentially occurring within this portion of the Mainline. These Include:

- ooline (*Cadellia pentastylis*)
- finger panic grass (*Digitaria porrecta*)
- king blue-grass (*Dichanthium queenslandicum*); and
- Austral cornflower (*Rhaponticum australe*).

Field based flora surveys for the DEIS pre-clearance surveys did not identify any of these MNES flora species within the ROW or the adjacent study corridor. Given the timing of the survey all four species are considered to have been detectable during the survey period.

EVNT Flora Species

No EVNT-only flora species will be impacted by the construction of the ROW.

Field surveys identified one population of the EVNT-only flora species Blake's spike rush (*Eleocharis blakeana*), containing approximately 150 individuals, outside of the Mainline ROW. As this population is outside the ROW impacts will be avoided and the population will be retained. The location of this population is shown in Map 2 (page 34) of Appendix D.

Essential Habitat

The ROW does not require the clearing of any areas mapped by DEHP as Essential Habitat.

4.1.4. Pest Flora Species

Land Protection (Pest and Stock Route Management) Act 2002

The botanical surveys conducted over this portion of the Mainline alignment located 11 declared pest species under the *Land Protection (Pest and Stock Route Management) Act 2002*. A list of the declared species identified during the surveys is given in Table 10. Detailed mapping of the location of these species is provided in Map 3 of Appendix D.

Table 10: Declared weeds observed within the ROW during the DEIS pre-clearance survey

Scientific Name	Common Name	LP Act Status
Aristolochia elegans	Dutchman's pipe	Class 3
Bryophyllum delagoense and hybrids	mother of millions	Class 2
Cryptostegia grandiflora#	rubber vine	Class 2
Lantana camara#	lantana	Class 3
Lantana montevidensis	creeping lantana	Class 3
Macfadyena unguis-cati#	cat's claw creeper	Class 3
Opuntia stricta#	common pest pear	Class 2
Opuntia tomentosa#	velvety tree pear	Class 2
Parthenium hysterophorus#	parthenium	Class 2
Sporobolus natalensis	giant rat's tail	Class 2
Sporobolus pyramidalis	giant rat's tail	Class 2

# denotes Weed of National Significance (WONS)

All observations of declared species have been recorded via differential GPS that is accurate to a sub-metre level. All declared weed species identified during the pre-clearance survey will be incorporated into a detailed weed management and rehabilitation plan to comply with Condition 9 of the CG approval.

Agricultural Weeds

The DEIS pre-clearance survey identified a number of exotic plant species which are not declared as pest species under the *Land Protection (Pest and Stock Route Management) Act 2002*. Thirteen species considered to be agricultural weeds have been identified during the DEIS pre-clearance survey of this portion of the alignment (Table 11). Detailed mapping of the location of these species is provided within Map 3 (Page 34) of Appendix D.

Praxelis (*Praxelis clematidea**) is an agricultural weed which was identified during the DEIS pre-clearance surveys for this section of the alignment and is on the Commonwealth Government's *Alert List for Environmental Weeds* (http://www.weeds.gov.au/publications/guidelines/alert/p-clematidea.html accessed 27 April 2012). The list compliments the WONS list which includes weed already causing significant forestry, agricultural and environmental damage. Praxelis is established in Queensland along the coast from the Cooktown to Wide Bay pastoral districts (Bostock and Holland eds, 2010).

Table 11: Non-declared weeds observed within the ROW during the DEIS pre-clearance survey

Scientific Name	Common Name
Asclepias sp.	redhead cotton bush
Bryophyllum pinnatum	resurrection plant
Cirsium vulgare	spear thistle
Eragrostis curvula	African lovegrass
Gomphocarpus physocarpus	balloon cotton bush
Heliotropium amplexicaule	blue heliotrope

Hyparrhenia rufa	thatch grass
Praxelis clematidea	praxelis
Rivina humilis	coral berry
Stachytarpheta jamaicensis	snake weed
Tagetes minuta	stinking roger
Xanthium occidentale	Noogoora burr
Xanthium pungens	Noogoora burr

4.2. Fauna Assessment

4.2.1. Recorded Fauna Species

The detailed fauna surveys recorded the following vertebrate fauna species at each site:

- Site 2A – 61 total species, comprising:
  - 4 amphibian species
  - 44 bird species
  - 7 mammal species; and
  - 6 reptile species.
- Site 2B – 32 total species, comprising:
  - 1 amphibian species
  - 27 bird species
  - 1 mammal species; and
  - 3 reptile species.
- Site 2C – 39 total species, comprising:
  - 4 amphibian species;
  - 30 bird species;
  - 5 mammal species; and
  - 0 reptile species.
- Site 2D – 15 total species, comprising:
  - 0 amphibian species;
  - 1 bird species;
  - 9 mammal species; and
  - 5 reptile species.
- Site 2E – 75 total species, comprising:
  - 8 amphibian species;
  - 62 bird species;
  - 3 mammal species; and
  - 2 reptile species.
- Site 2F – 62 total species, comprising:

- 3 amphibian species;
- 54 bird species;
- 2 mammal species; and
- 3 reptile species.

The fauna distribution and abundance records for the sites are broadly consistent with the low to moderate quality habitats present within the locality, especially given the extent of historic clearing and ongoing disturbance to relictual, remnant and regrowth patches of habitat which are being impacted by grazing, exotic weeds and too frequent fire.

Details of all encountered fauna at each fauna survey site, including identification method, sex, age, density, breeding status (where determined) and locality are provided in Appendix E.

The scope of the DEIS pre-clearance flora surveys included the identification of hollow-bearing trees and stags within the survey corridor. These were recorded throughout this section of the alignment. It is considered that all hollow-bearing trees recorded on the GPS devices during the DEIS pre-clearance surveys have potential to provide habitat for fauna species. Data identifying the location of these hollow-bearing trees and stags will be used to ensure that those within the ROW are appropriately investigated by a qualified fauna spotter for resident fauna prior to clearing and that those outside the ROW are avoided, wherever possible. MNES and EVNT-only species that utilise stags and/or hollow-bearing trees are identified in sections 4.2.3 and 4.2.4 respectively.

Animal breeding places were also targeted during the DEIS pre-clearance surveys.

4.2.2. Pest Fauna Species

One declared pest under the *Land Protection (Pest and Stock Route Management) Act* 2002 was identified during the DEIS pre-clearance fauna surveys: feral cat (*Felis catus*) – Class 2 Pest.

Three non-declared pests were also observed: house mouse (*Mus musculus**), cane toad (*Rhinella marina**), and starling (*Sturnus vulgaris**).

4.2.3. MNES Fauna Species

Three MNES Migratory species were observed during the DEIS pre-clearance fauna surveys:

- cattle egret (*Ardea ibis*) – site 2E
- rainbow bee-eater (*Merops ornatus*); - sites 2A, 2B, 2E and 2F and;
- Latham's snipe (*Gallinago hardwickii*) – site 2E.

The potential for MNES species to occur along this portion of the Mainline has been assessed based on RE associations and micro-habitat requirements of each species.

Preferred Habitat

A summary of the preferred habitat for each MNES species potentially occurring within the ROW along this section of the Mainline is provided in Table 12. These areas have been calculated based on RE associations, microhabitat preferences and ground-truthed field data. The areas identified in Table 12 are considered to be the locations within the ROW where these species are more likely to be found. Further detail is provided in Appendix B.

Table 12: Area of preferred habitat for MNES species within the ROW

Scientific Name	Common Name	EPBC Act Listing	NC Act Listing	Preferred Habitat Locations / REs Present	KP In	KP Out	Area within ROW
Geophaps scripta scripta	squatter pigeon	V	V	The squatter pigeon is a highly mobile species that is potentially found in both remnant and disturbed habitats. It is considered likely that this species occurs throughout the corridor, including cleared areas. Preferred habitat (comprising identified REs and microhabitat) identified within the TFMP: REs 11.3.4, 11.3.25.	Entire ROW	Entire ROW	315.12ha
Turnix melanogaster	black-breasted button-quail	V	V	The black-breasted button-quail is found in vine thickets and rainforests that are periodically water-stressed. Preferred habitat (comprising identified REs and microhabitat) identified within the TFMP: RE 11.9.5.	239.284	239.323	0.0.12ha
Pedionomus torquatus	plains-wanderer	V	V	The plains-wanderer is a highly mobile species that is potentially found in both remnant and disturbed habitats. It is considered likely that this species occurs throughout the corridor, including cleared areas. REs present: 11.3.25, 11.3.4, 11.4.3, 11.9.2, 11.9.5, 11.44.15, 11.12.1, 11.12.2.	Entire ROW	Entire ROW	315.12ha
Merops ornatus	rainbow bee-eater	M	n/a	The rainbow bee-eater is a highly mobile species that is potentially found in remnant vegetation throughout the alignment. This species was found at four survey sites (sites 2A, 2B, 2E and 2F) and potentially occurs throughout the entire corridor. Preferred habitat (comprising identified REs and microhabitat) identified within the TFMP: REs 11.3.25, 11.3.4, 11.4.3, 11.9.2, 11.9.5, 11.44.15, 11.12.1, 11.12.2.	Entire ROW	Entire ROW	315.12ha

Scientific Name	Common Name	EPBC Act Listing	NC Act Listing	Preferred Habitat Locations / REs Present	KP In	KP Out	Area within ROW
Rhipidura rufifrons	rufous fantail	M	n/a	The rufous fantail is found in rainforests, eucalypt woodlands, coastal scrub and damp gullies (Serventy, 1982). Preferred habitat (comprising identified REs and microhabitat) identified within the TFMP: REs 11.3.25, 11.9.5.	190.167 239.285	190.259 239.323	0.44ha
Myiagra cyanoleuca	satin flycatcher	M	n/a	Satin flycatchers mainly inhabit eucalypt forests, often near wetlands or watercourses. Preferred habitat (comprising identified REs and microhabitat) identified within the TFMP: REs11.3.25, 11.9.5.	190.167 239.285	190.259 239.323	0.44ha
Lathamus discolor	swift parrot	E	E	This species may utilise riparian vegetation throughout the corridor. Preferred habitat (comprising identified REs and microhabitat) identified within the TFMP: REs 11.3.25, 11.3.4.	190.167 212.564	190.259 212.778	1.13ha
Erythrotriorchis radiatus	red goshawk	V	E	The red goshawk is a highly mobile species that generally prefers riparian areas. This species has a very large home range and therefore it is considered that this species occurs throughout the corridor, particularly where dense riparian habitats occur. Preferred habitat (comprising identified REs and microhabitat) identified within the TFMP: REs 11.3.25, 11.3.4.	190.167 212.564	190.259 212.778	1.13ha

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Scientific Name	Common Name	EPBC Act Listing	NC Act Listing	Preferred Habitat Locations / REs Present	KP In	KP Out	Area within ROW
Pandion cristatus	eastern osprey	M	n/a	The eastern osprey occurs within coastal areas and offshore islands; it occasionally travels inland along major rivers. Preferred habitat (comprising identified REs and microhabitat) identified within the TFMP: there are no preferred habitat locations for this species within this section of the Mainline.	n/a	n/a	n/a
Haliaeetus leucogaster	white-bellied sea-eagle	M	n/a	This species may be present in large areas of open water (larger rivers, swamps, lakes, sea), or flying over a variety of terrestrial habitats. Preferred habitat (comprising identified REs and microhabitat) identified within the TFMP: RE 11.3.25.	190.167	190.259	0.32ha
Egretta sacra	eastern reef egret	M	n/a	This species utilises coastal ecosystems Preferred habitat (comprising identified REs and microhabitat) identified within the TFMP: there are no preferred habitat locations for this species within this section of the Mainline.	n/a	n/a	n/a
Ardea ibis	cattle egret	M	n/a	This species occurs in tropical and temperate grasslands, wooded lands and terrestrial wetlands. It has been recorded on earthen dam walls and ploughed fields. It uses predominately shallow, open and fresh wetlands including meadows and swamps with low emergent vegetation and abundant aquatic flora. It is considered likely that this species occurs throughout the ROW, namely cleared areas and riparian vegetation though critical breeding habitat was not observed.	Non remnant and riparian areas: 190.167 212.564	Non remnant and riparian area: 190.259 212.778	294.47ha

Scientific Name	Common Name	EPBC Act Listing	NC Act Listing	Preferred Habitat Locations / REs Present	KP In	KP Out	Area within ROW
Hydroprogne caspia	Caspian tern	M	n/a	This species utilises coastal ecosystems Preferred habitat (comprising identified REs and microhabitat) identified within the TFMP: there are no preferred habitat locations for this species within this section of the Mainline.	n/a	n/a	n/a
Apus pacificus	fork-tailed swift	M	n/a	The fork-tailed swift is a highly mobile species that is potentially found in both remnant and disturbed habitats. It is considered likely that this species occurs throughout the corridor. The fork-tailed swift effectively lives 'on the wing', foraging and most probably roosting aerially and landing only very occasionally. The species does not breed in Australia. The project is unlikely to interact with the fork-tailed swift. There are no significant threats to the fork-tailed swift in Australia. Preferred habitat (comprising identified REs and microhabitat) identified within the TFMP: REs 11.3.4, 11.4.3, 11.9.2, 11.9.5, 11.11.15, 11.12.1, 11.12.2.	Entire ROW	Entire ROW	315.12ha
Rostratula australis	Australian painted snipe	V	n/a	This species requires terrestrial freshwater and may occur within riparian areas throughout the corridor. Preferred habitat (comprising identified REs and microhabitat) identified within the TFMP: REs 11.3.25, 11.4.3, 11.9.5.	190.167 240.457 239.285	190.259 240.648 239.323	0.67ha

Scientific Name	Common Name	EPBC Act Listing	NC Act Listing	Preferred Habitat Locations / REs Present	KP In	KP Out	Area within ROW
Gallinago hardwickii	Latham's snipe	M	n/a	Latham's Snipe inhabits swamp and marsh margins and in wet pasture; freshwater wetlands on or near the coast, generally among dense cover. They are found in any vegetation around wetlands, in sedges, grasses, lignum, reeds and rushes and also in saltmarsh and creek edges on migration. They also use crops and pasture. This species was observed within a patch of non-remnant vegetation at fauna survey site 2E. Preferred habitat (comprising identified REs and microhabitat) identified within the gasfield TFMP: RE 11.3.25.	190.167	190.259	0.32ha
Dasyurus hallucatus	northern quoll	E	n/a	This species prefers rocky areas and eucalypt forests, utilising rocky outcrops, caves and hollow logs for shelter. This species is likely to occur within remnant vegetation and corridors within landzone 9, 11 and 12 in the study area. Preferred habitat (comprising identified REs and microhabitat) identified within the TFMP: REs 11.9.2, 11.9.5, 11.11.15, 11.12.1, 11.12.2.	179.925 183.717 183.940 184.418 185.212 186.082 190.247 195.492 222.146 239.285	180.975 183.827 184.180 184.973 185.369 186.944 190.678 195.593 222.550 239.323	11.32ha

Scientific Name	Common Name	EPBC Act Listing	NC Act Listing	Preferred Habitat Locations / REs Present	KP In	KP Out	Area within ROW
Chalinolobus dwyeri	large-eared pied bat	V	V	The large-eared pied bat is found in tall open eucalypt forests with an understory of scattered small trees and palms. This species utilises caves and rocky overhangs. Preferred habitat (comprising identified REs and microhabitat) identified within the TFMP: there are no preferred habitat locations for this species within this section of the Mainline.	n/a	n/a	n/a
Nyctophilus corbeni	south-eastern long-eared bat	V	V	This species may be found in the highly-connected remnant and riparian vegetation within this alignment. Preferred habitat (comprising identified REs and microhabitat) identified within the TFMP: RE 11.9.5.	239.285	239.323	0.12ha
Delma torquata	collared delma	V	V	The collared delma favours open eucalypt forest with a shrub and tussock grass understory. The soils of these communities are usually deep cracking clays or stony. Preferred habitat (comprising identified REs and microhabitat) identified within the TFMP: RE 11.9.5.	239.285	239.323	0.12ha
Denisonia maculata	ornamental snake	V	V	Ornamental snake utilises moist areas with ample ground cover in the form of fallen timber, thick Currant Bush (*Carissa ovata*) bushes and small tussock grasses. This species may also occur in non-remnant gilgai country. Preferred habitat (comprising identified REs and microhabitat) identified within the TFMP: RE 11.9.5	239.285	239.323	0.12ha

Scientific Name	Common Name	EPBC Act Listing	NC Act Listing	Preferred Habitat Locations / REs Present	KP In	KP Out	Area within ROW
Egernia rugosa	yakka skink	V	V	This species is found among dense ground vegetation, fallen timber or rock outcrops in open dry sclerophyll forest (ironbark) or woodland, brigalow forest, open shrub land, and lancewood forests Preferred habitat (comprising identified REs and microhabitat) identified within the TFMP: REs 11.4.3, 11.9.5.	240.457 239.285	240.648 239.323	0.35ha
Furina dunmalli	Dunmall's snake	V	V	This species occurs in open forests and woodlands particularly brigalow (*Acacia harpophylla*) forest and woodland, on cracking black clays and clay loam soils. Preferred habitat (comprising identified REs and microhabitat) identified within the TFMP: REs 11.3.25, 11.9.5.	190.167 239.285	190.259 239.323	0.44ha
Paradelma orientalis	brigalow scaly-foot	V	V	This species is found on a wide variety of open forest types on several soils. Preferred habitat (comprising identified REs and microhabitat) identified within the TFMP: RE 11.3.4.	212.564	212.778	0.81ha
Adclarkia dawsonensis	boggomoss snail	CE	n/a	The boggomoss snail favours riparian areas on alluvial flats in the Dawson River Valley. The boggomoss snail has the potential to occur within the alluvial flats of Pump Creek within the southern portion of this alignment. This species was not identified within this area during the DEIS pre-clearance surveys. Preferred habitat (comprising identified REs and microhabitat) identified within the TFMP: RE 11.3.25.	190.167	190.259	0.32ha

A number of the species outlined in Table 12 are identified as having habitat within the ROW. While Appendix B provides better description of the preferred habitat of specific species it should be that that the species identified as being present throughout the ROW are highly mobile species, the movements of which would not be hindered by the extent of habitat removal required for the RoW.

The RoW represents a small area of potential roost and resource area for the species, and does not provide an important breeding habitat. Considering the large extent of suitable foraging and breeding habitat in the locality and the high mobility of the species, the small area of potential foraging resources on the site is unlikely to represent critical habitat for the species. The extent of proposed habitat removal is unlikely to disrupt an ecologically significant proportion of any population potentially occurring in the area. Therefore, the proposed development is unlikely to have a significant impact on MNES species currently listed on the EPBC Act.

4.2.4. EVNT- Fauna Species

One EVNT-only fauna species was identified during the fauna DEIS pre-clearance surveys, at site 2F:

- little pied bat (*Chalinolobus picatus), Near Threatened*

The little pied bat was confirmed by captured in a harp trap on the evening of 30 October 2011 in a small patch of non-remnant alluvial terrace open forest (canopy) habitat (-24.533°, 150.415°) adjoining Prairie Creek. The habitat at this site has been affected by past thinning and grazing, and consequently its habitat value is relatively low. In contrast Prairie Creek comprises a very narrow band of riparian canopy and affords local dispersal pathways for airborne fauna. The record of the little pied bat within this location is therefore not unusual given the presence of Prairie Creek.

Preferred Habitat

A summary of preferred habitat for EVNT-only species potentially occurring within the ROW is provided in Table 13. This preferred habitat is based on RE associations and represents areas where these species are most likely to occur within the ROW.

In addition to those species outlined in Table 13, 12 MNES species identified in Table 12, carry complimentary listing under the NC Act.

In the field specific animal breeding places (features outlined in Table 4) were searched for and recorded as encountered. Animal breeding places present in this section of the mainline include tree hollows, deep litter, dense groundcover, fallen timber (logs) in remnant vegetation that has good subcanopy structure, waterways and areas where cracking clays and gilgais are present.

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Table 13: Area of preferred habitat for EVNT-only fauna species within the ROW.

Scientific Name	Common Name	NC Act Listing	Preferred habitat within the ROW	KP In	KP Out	Area within ROW
Rallus pectoralis	Lewin's rail	NT	Lewin's rail occurs primarily in coastal regions of eastern Australia. This species inhabits a range of freshwater wetlands that have dense or fringing vegetation and is also known to utilise water bodies with suitable vegetation in non-remnant areas. RE 11.3.25	190.167	190.259	0.32
Stictonetta naevosa	freckled duck	NT	The freckled duck utilises freshwater swamps creeks and wetlands within south-eastern and south-western Australia. RE 11.3.25	190.167	190.259	0.32
Ephippiorhynchus asiaticus	black-necked stork	NT	The black-necked stork may forage within or around estuaries and along intertidal shorelines, such as saltmarshes, mudflats and sand flats, mangrove vegetation and freshwater wetlands. Whilst there are no freshwater wetlands along the ROW, suitable habitat (saltmarshes, mudflats and sand flats, mangrove vegetation) occurs in the Creek, Marshland and Narrows sections, which are not subject to this assessment. RE 11.3.25.	190.167	190.259	0.32
Melithreptus gularis	black-chinned honeyeater	NT	This species is highly nomadic and may potentially utilise the open Queensland blue gum (*Eucalyptus tereticornis)* open forest and riparian corridors within the ROW. REs 11.3.4, 11.3.25.	190.167 212.564	190.259 212.778	1.13ha

Scientific Name	Common Name	NC Act Listing	Preferred habitat within the ROW	KP In	KP Out	Area within ROW
Grantiella picta	painted honeyeater	V	This species is found in boree (*Acacia tephrina*), brigalow and box-gum woodlands and box-ironbark forests. REs 11.3.25, 11.3.4.	190.167 212.564	190.259 212.778	1.13ha
Lophoictinia isura	square-tailed kite	NT	The square-tailed kite is a highly nomadic and mobile and species with the potential to utilise the entire ROW. REs 11.3.25, 11.3.4.	Entire ROW	Entire ROW	315.118ha
Accipiter novaehollandiae	grey goshawk	NT	The grey goshawk is found in most forest types, especially tall closed forests, including rainforests. RE 11.3.25.	190.167	190.259	0.32ha
Falco hypoleucos	grey falcon	NT	The grey falcon is restricted to shrubland, grassland and wooded watercourses of arid and semi-arid regions. RE 11.3.25.	190.167	190.259	0.32ha
Calyptorhynchus lathami	glossy black-cockatoo	V	The glossy black-cockatoo occurs within open forests containing Casuarina and/or Allocasuarina. This species utilises large hollows found within live hollow-bearing trees. REs 11.3.4, 11.4.3, 11.9.5.	212.564 240.457 239.285 240.738	212.778 240.648 239.323 240.802	1.27ha
Neophema pulchella	turquoise parrot	NT	Turquoise parrots occur on the western slopes of the Great Dividing Range from eastern Victoria to south-eastern Queensland in eucalyptus woodlands and open forests, with a groundcover of grasses and a low understorey of shrubs. REs 11.3.25, 11.3.4.	190.167 212.564	190.259 212.778	1.13ha

Scientific Name	Common Name	NC Act Listing	Preferred habitat within the ROW	KP In	KP Out	Area within ROW
Chalinolobus picatus	little pied bat	NT	The little pied bat may utilise hollows found within live and dead hollow-bearing trees within remnant vegetation throughout the entire ROW. This species was identified at fauna survey site 2F. REs 11.3.4, 11.3.25, 11.4.3, 11.9.5.	Entire ROW	Entire ROW	315.12ha
Strophurus taenicauda	golden-tailed gecko	NT	The golden-tailed gecko is endemic to Queensland, confined to the southern half of the brigalow belt bioregion (Richardson, 2006). RE 11.9.5.	239.285	239.323	0.12ha
Aspidites ramsayi	woma	NT	The woma occurs on black soils and in stony ridge country in brigalow (*Acacia harpophylla*) woodland and grasslands (Richardson, 2006). RE 11.9.5.	239.285	239.323	0.12ha
Acanthophis antarcticus	common death adder	NT	The common death adder occurs within open forests to woodlands associated with gilgai formations and wetlands. REs 11.4.3, 11.9.5.	239.285 240.457 240.738	239.323 240.648 240.802	0.46ha
Hemiaspis damelii	grey snake	E	The grey snake favours woodlands on cracking clay soils, particularly in association with water bodies. REs 11.3.4, 11.3.25, 11.4.3, 11.9.5.	190.167 212.564 239.285 240.457 240.738	190.259 212.778 239.323 240.648 240.802	1.59ha

Scientific Name	Common Name	NC Act Listing	Preferred habitat within the ROW	KP In	KP Out	Area within ROW
Cyclorana verrucosa	rough frog	NT	The rough frog is found near seasonal ponds, swamps, creeks and claypans in woodlands and open country; mostly on black soil plains flooded by heavy summer rains and also sandy loams. REs 11.3.25, 11.9.5.	190.167 239.285	190.259 239.323	0.44ha
Hypochrysops picaeta	bulloak jewel	E	Bulloak (*Allocasuarina luehmannii*) at heights of 9m to 15m are essential to the persistence of this species. The ROW does not contain preferred habitat for this species.	n/a	n/a	n/a
Jalmenus eubulus	pale imperial hairstreak	V	The pale imperial hairstreak is found in old-growth brigalow open forests and woodlands. RE 11.9.5.	239.285	239.323	0.12ha

5. Recommendations and Outcomes

This section of the report provides specific recommendations regarding alignment design and construction activities based on consideration of the ecological constraints identified within the study area during the DEIS pre-clearance surveys. These recommendations are provided to demonstrate commitment to the overarching goal of avoiding, minimising and mitigating impacts.

5.1. Proposed Realignments

A key outcome of the DEIS pre-clearance surveys is the identification of areas where ecological characteristics are such that the ecology team recommends a realignment of the Mainline to avoid impact to these values. No proposed realignments were identified during the DEIS pre-clearance surveys along the Mainline ROW between the Midline Station and Mainline Valve 2.

5.2. Proposed ROW Narrowing

The following approach has been taken to identify areas within the ROW which should be narrowed in order to avoid and/or minimise impacts on ecological values. These include:

- areas where the ROW passes through Category B or Category C ESAs have been proposed as areas of narrowed ROW (maximum 35m wide)
- areas where EVNT –only species were recorded and narrowing the ROW will reduce impacts on these species; and
- where any additional sites of particular ecological value along the alignment have been identified and a narrowed ROW will either avoid or minimise impacts to these values.

Using the approach outlined above, a number of locations were recommended for ROW narrowing. These were presented to the construction team and decisions were made regarding the feasibility of these areas for ROW narrowing.

The outcome of this process is presented in Table 14. ROW narrowings have been buffered to ensure adequate protection for the environmental feature cited. As such the distances quoted are marginally greater than KP intercepts quoted in other tables referencing various features.

Table 14: Proposed narrowing of the Mainline (Midline Station – Mainline Valve 2) ROW

KP In	KP Out	Length	Environmental Feature	Notes
190.167	190.259	92m	Of Concern RE 11.3.25 and Category C ESA	Avoidance of this patch of remnant vegetation is not feasible; the area is within a large contiguous stand of vegetation and is associated with a waterway crossing.
212.564	212.778	214m	Of Concern RE 11.3.4 and Category C ESA	Avoidance of this patch of remnant vegetation is not feasible as the area is associated with a necessary waterway crossing.
239.282	239.328	46m	Endangered RE 11.9.5, Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC, and Category B ESA.	**ROW narrowing accepted** – Construction with a narrowed ROW is feasible to reduce the impact upon this TEC and Endangered RE.
240.446	240.658	212m	Regrowth RE 11.4.3, Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC	**ROW narrowing accepted** – Construction with a narrowed ROW is feasible to reduce the impact upon this TEC.

KP In	KP Out	Length	Environmental Feature	Notes
240.736	240.808	72m	Regrowth RE 11.9.5, Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC	**ROW narrowing accepted** – Construction with a narrowed ROW is feasible to reduce the impact upon this TEC.

5.3. Proposed Access Tracks

Condition D21 of the EA states that remnant vegetation must not be cleared for the purposes of camps, borrow pits, vehicle access tracks or additional work areas associated with the construction of the pipeline. While Condition D22 of the EA states that clearing of remnant vegetation may be undertaken for additional work areas – provided that a number of steps are followed in the location of the additional work areas – there is no such allowance for vehicle access tracks.

Survey of the 29 access tracks proposed along this portion of the alignment, outside the ROW, has enabled recommendations regarding the suitability of these proposed access tracks in light of Condition D21. The proposed access tracks are presented in Map 4 (of Appendix D) and are discussed below, with recommendations provided for each, based on field survey results.

Provided that the recommendations listed in the following sections are incorporated into the establishment of access tracks, it is not expected that any access track within this section of the alignment will impact MNES.

5.3.1. Access Track KP 177.50

This proposed access track (see Map 4.1, Appendix D) is approximately 345.8m in length, extending north then north-east and running parallel to the ROW along the existing Crowsdale-Camboon Road. The existing road is 20m wide and is a well graded formed gravel road. The track traverses a ground-truthed watercourse (DNRM stream order 3). The track does not connect with any remnant vegetation. The area surrounding the existing track is highly disturbed in nature and any widening would have minimal impact on existing vegetation or environmental values. Field survey confirmed that the proposed access track would not impact any remnant or protected vegetation and is considered to be a solution that would meet Condition D21 of the EA.

5.3.2. Access Track KP 180.07

This proposed access track (see Map 4.2, Appendix D) is approximately 1073.2m long extending west from the ROW and intersecting the Crowsdale-Camboon Road (unsealed). Field surveys indicate that the access track will transect an area of remnant vegetation consistent with RE 11.12.1 within the survey corridor and ROW. Outside of the survey corridor the track will transect an area mapped as RE 11.12.1/11.3.25. The proposed access track would involve clearing native vegetation and therefore does not meet D21 of the EA. As this access track would require clearing remnant vegetation, this access track should not be developed for this Project. An alternative is to use the exiting access track that intersects the ROW at KP179.

5.3.3. Access Track KP 181.59

This proposed access track (see Map 4.3, Appendix D) is approximately 347.8m long and occurs along an existing 5m wide firebreak. The access track extends west from the ROW to Crowsdale-Camboon Road. Vegetation within the ROW and survey corridor was ground-truthed as being consistent with RE 11.12.1. The vegetation outside of the survey corridor is mapped by DEHP as a mixed polygon of RE 11.12.1/11.3.25. This access track may require clearing some trees comprising remnant vegetation although this is unlikely to affect the ecological structure and functioning of the vegetation unit. It is recommended that this access track is not developed for this Project. No alternative solution that avoided impacts to remnant vegetation was identified for this access track. Should vegetation clearing be required for the establishment of this access track, an amendment to the Project EA should be sought.

5.3.4. Access Track KP 183.20

The proposed access track (see Map 4.4 appendix D) is approximately 863.8m in length and occurs within an existing track possessing a width suitable for the movement of larger vehicles (confirmed during field survey). The track extends north-west from the ROW to Crowsdale-Camboon Road, running adjacent to and transecting the northern edge an area mapped by DEHP as RE 11.12.1/11.3.25. As this access track would require clearing remnant vegetation, it is recommended that this access track at the point it intersects remnant vegetation is not developed. Instead there is a cleared area immediately north of the western section of the proposed access track that may provide an ecologically suitable alternative route that would not impact upon remnant vegetation.

The land is generally cleared and disturbed with no wetland features present. Provided that appropriate erosion and sediment control measures are employed and that an access track realigned in this area is logistically possible; this alternative access track option would not impact any remnant or protected vegetation, and is considered to be a solution that will meet condition D21 of the EA. A suggested alignment is shown.

5.3.5. Access Track KP 184.26

This proposed access track (see Map 4.5 Appendix D) is approximately 193.3m long, running along the existing Rawbelle Road. This existing road is considered wide enough to allow for the movement of large vehicles (confirmed during field survey). The proposed access track transects the ROW extending east from the intersection of Crowsdale-Camboon Road and Rawbelle Road and continuing east along Rawbelle road. The vegetation adjacent to the north of the track has been ground-truthed as previously unmapped RE 11.12.2. No watercourses are within the vicinity of the track. In order to meet condition D21 of the EA, clearing should be limited to the area south of Rawbelle Road to avoid any impact on remnant or protected vegetation.

5.3.6. Access Track KP 187.49

This proposed access track (see Map 4.6 Appendix D) is approximately 987.3m long, extending in a generally north-west to south-east-west direction from Crowsdale-Camboon road along an existing track which runs along a ridge and is cleared to a width of 5m. The proposed access track transects an area mapped by DEHP as RE 11.12.1; this patch of remnant vegetation extends for approximately 115.3m along the proposed access track. As this access track would require clearing remnant vegetation, it is recommended that this access track is not developed for this Project. The proposed access track would involve clearing native vegetation and therefore does not meet D21 of the EA. As this access track would require clearing remnant vegetation, it is recommended that this access track is not developed for this Project. No alternative solution that avoided impacts to remnant vegetation was identified for this access track. Should vegetation clearing be required for the establishment of this access track, an amendment to the Project EA should be sought.

5.3.7. Access Track KP 188.17

This proposed access track (see Map 4.7, Appendix D) is approximately 1555.1m long and extends in a north-east to south-easterly direction extending along an existing track which is cleared to 2.5m. The proposed access track intersects the ROW at KP 188.17. Field survey confirmed that the proposed access track would not impact any remnant or protected vegetation and is considered to be a solution that would meet Condition D21 of the EA.

5.3.8. Access Track KP 190.51

This proposed access track (see Map.4.8, Appendix D) is approximately 514m long and utilises the existing Crowsdale-Camboon Road. The existing road is 8m wide with a gravel surface and transects the ROW in an east to west direction at KP 190.51. Work may involve the straightening and widening of the existing unsealed road to facilitate heavy vehicle movement.

The area is generally cleared and sparsely populated with non-remnant vegetation. However the western end of the access track is adjacent to vegetation mapped by DEHP as RE 11.12.1/11.12.2/11.3.25. Clearing to the south of the existing road may encroach into mapped remnant vegetation. In order to meet condition D21 of the EA, clearing should be limited to the area adjacent to and north of Crowsdale-Camboon Road for the length of potential interaction with mapped remnant vegetation.

Provided that appropriate erosion and sediment control measures are employed and that clearing is limited the access track would not impact any remnant or protected vegetation nor would it affect waterways to the north. Should vegetation clearing be required for the establishment of this access track, an amendment to the Project EA should be sought.

5.3.9. Access Track KP 192.86

This proposed access track (see Map 4.9, Appendix D) is approximately 152.4m long and extends east to west from the Crowsdale-Camboon Road to the ROW along an existing cleared track. The existing track is cleared to 7m wide and sealed with a gravel surface. The track provides the main access for the landholder from their property to Crowsdale-Camboon Road. There is a small drainage area mapped to the south of the proposed access track within the ROW survey corridor. The area is cleared with sparse non-remnant vegetation. Field survey confirmed that the proposed access track would not impact any remnant or protected vegetation. Provided that appropriate erosion and sediment control measures are employed the access track will not impact any remnant or protected vegetation and is considered to be an option that would meet condition D21 of the EA.

5.3.10. Access Track KP 193.56

This proposed access track (see Map 4.10, Appendix D) is approximately 113.3m long and utilises the existing Shawlands Road. The proposed access track extends from Crowsdale-Camboon Road in an east to west direction towards the ROW. Shawlands Road is cleared to 10m wide with a formed gravel surface. The area is generally cleared with scattered eucalypt species, native herbs and perennial grasses. There are no watercourses in the vicinity of the proposed work area. Field survey confirmed that the proposed access track would not impact any remnant or protected vegetation and therefore is considered to be a solution that would meet Condition D21 of the EA.

5.3.11. Access Track KP 200.26

This proposed access track (see Map.4 11, Appendix D) is approximately 150.4m long and utilises an existing cleared track, extending generally east to west from Crowsdale-Camboon Road and intersecting the ROW at KP 200.26. The existing track is cleared to 4m wide with a gravel surface; it is currently being used for farm access. The area is cleared with no remnant vegetation present, and possesses a groundcover of perennial grasses. There are no watercourses within the vicinity of the proposed access track. Field survey confirmed that the proposed access track would not impact any remnant or protected vegetation and is considered to be a solution that would meet Condition D21 of the EA.

5.3.12. Access Track KP 203.96

This proposed access track (see Map 4.12, Appendix D) is approximately 55m long and extends east to west from Crowsdale-Camboon Road to KP 203.96 of the ROW. The majority of the proposed access track falls within the ROW. This access track is proposed within an unformed surface, the area is generally cleared with sparse, non-remnant vegetation, regrowth to 14m and a groundcover of exotic grasses. There are no watercourses within the vicinity of the proposed access track. Field survey confirmed that the proposed access track would not impact any remnant or protected vegetation and is considered to be a solution that would meet Condition D21 of the EA.

5.3.13. Access Track KP 205.64

This proposed access track (see Map 4.13, Appendix D) is approximately 109m long and utilises an existing homestead access track (cleared to approximately 4m wide) that extends generally south west from Crowsdale-Camboon Road. The existing track possesses a gravel surface. Work may involve straightening and widening the existing road to facilitate heavy vehicle movements. The area is cleared with a groundcover of native perennial and exotic grasses. One hollow-bearing tree was noted to the south of the proposed access track, but is unlikely to be impacted by the access track. There are no watercourses within the vicinity of the track. Field survey confirmed that the proposed access track would not impact any remnant or protected vegetation and is considered to be a solution that would meet Condition D21 of the EA.

5.3.14. Access Track KP 208.79

This proposed access track (see Map 4.14, Appendix D) is approximately 1554m long and utilises an existing farm paddock access track (cleared to approximately 3m wide), extending south west from Crowsdale-Camboon Road to the ROW. Work will involve the straightening and widening of the existing track to facilitate heavy vehicle movements. The land is generally cleared and dominated by Rhodes grass (*Chloris gayana**), with shallow grass swamp pasture in places on clay soils. The track traverses one stream order 4 watercourse and one stream order 1 DNRM mapped watercourse. No remnant vegetation, mapped or ground-truthed REs, or any mapped wetland features are present within the vicinity of the proposed access track. Appropriate erosion and sediment control measures will be employed. Field survey confirmed that the proposed access track would not impact any remnant or protected vegetation and is considered to be a solution that would meet Condition D21 of the EA.

5.3.15. Access Track KP 210.84

This proposed access track (see Map 4.15, Appendix D) is approximately 1639.2m long and utilises an existing farm track (cleared to approximately 4m wide), extending west from Crowsdale-Camboon Road to the ROW. Work will involve the straightening and widening of the existing track to facilitate heavy vehicle movements. The land is generally cleared with a groundcover layer dominated by native grasses. The track traverses a DNRM mapped stream order 2 on three occasions and one stream order 3 once through a gravel crossing. The stream order 3 watercourse runs parallel to the proposed track for approximately 670.2m. No remnant vegetation, mapped or ground-truthed REs, or any mapped wetland features are present within the vicinity of the proposed access track. Provided that appropriate erosion and sediment control measures are employed, this access track would not impact any remnant or protected vegetation and is considered to be a solution that would meet Condition D21 of the EA.

5.3.16. Access Track KP 214.06

This proposed access track (see Map 4.16, Appendix D) is approximately 1214.3m long and utilises an existing narrow, farm paddock track (cleared to a width of approximately 2.5m), that extends generally south west from Crowsdale-Camboon Road towards the ROW. Work will involve the straightening and widening of the existing track to facilitate heavy vehicle movements. The land is generally cleared with scattered Queensland blue gum (*Eucalyptus tereticornis*) and a groundcover dominated by pasture grasses. The track traverses a DNRM mapped stream order 1 and one stream order 4 outside of the survey corridor. No remnant vegetation, mapped or ground-truthed REs, or any mapped wetland features present within the vicinity of the proposed access track. Field surveys confirmed that, provided appropriate erosion and sediment control measures are employed, the proposed access track would not impact any remnant or protected vegetation and is considered to be a solution that would meet Condition D21 of the EA.

5.3.17. Access Track KP 216.25

This proposed access track (see Map 4.17, Appendix D) is approximately 709m long and utilises an existing 4m wide fire break, extending south west from Crowsdale-Camboon Road to the ROW. Work may involve the straightening and widening of the existing track to facilitate heavy vehicle movements. The land is generally cleared and populated with scattered tree species such as poplar box (*Eucalyptus populnea*) and false sandalwood (*Eremophila mitchellii*); the groundcover layer is dominated by native and exotic grasses on granite soils. No remnant vegetation, mapped or ground-truthed REs, watercourses or wetland features are present within the vicinity of the proposed access track. Field survey confirmed that the proposed access track would not impact any remnant or protected vegetation and is considered to be a solution that would meet Condition D21 of the EA.

5.3.18. Access Track KP 220.82

This proposed access track (see Map 4.18, Appendix D) is approximately 791.9m long extending west along the existing gazetted Calvale Road, from Crowsdale-Camboon Road to the ROW. Work may involve widening of the existing track to facilitate heavy vehicle movements. The land is generally cleared, populated with scattered eucalypt species and possesses a groundcover layer dominated by native and exotic grasses. One hollow-bearing tree is present at the western-most end of the access within the mainline ROW. No remnant vegetation, mapped or ground-truthed REs, watercourses or wetland features are present within the vicinity of the ROW. Field survey confirmed that the proposed access track would not impact any remnant or protected vegetation and is considered to be a solution that would meet Condition D21 of the EA.

5.3.19. Access Track KP 222.39

This proposed access track (see Map 4.19, Appendix D) is approximately 761.3m long extending generally south west along an existing (but poorly maintained) track from Crowsdale-Camboon Road to the ROW. The proposed track is vegetated with HVR eucalypt species. The vegetation traversed by the southern portion of the access track has been ground-truthed as RE 11.9.2 (unmapped by DEHP). This track would therefore not meet Condition D21 of the EA. As this access track would require clearing remnant vegetation, it is recommended that this access track is not developed for this Project.

A more ecologically suitable option is the cleared track to the north, originating from the same property (see alterative alignment Map 4.19, Appendix D). The alternative track is approximately 555m in length, extending from Crowsdale - Camboon Road to the centre of the ROW at approximately KP 223.1. The alternative track passes through cleared pastures and is considered an ecologically suitable alternative for access to the ROW. Work to this alternative option, provided work in this area is logistically possible, may involve straightening and widening of the existing track to facilitate heavy vehicle movements. No remnant vegetation, mapped or ground-truthed REs, watercourses or wetland features are present within the vicinity of this alternative access track option to the north. This alternate access track would not impact any remnant or protected vegetation. Provided and is considered to be a solution that would meet Condition D21 of the EA.

5.3.20. Access Track KP 225.28

This proposed access track (see Map 4.20, Appendix D) is approximately 157.1m long and utilises an existing homestead access track extending east to west from Crowsdale-Camboon Road to the ROW. The existing track is 6m wide with a formed gravel surface. The area is generally cleared with no remnant vegetation and a groundcover of exotic and perennial grasses on clay soil. There are no watercourses within the vicinity of the track. Field survey confirmed that the proposed access track would not impact any remnant or protected vegetation and is considered to be a solution that would meet Condition D21 of the EA.

5.3.21. Access Track KP 227.78

This proposed access track (see Map 4.21, Appendix D) is approximately 120m long and extends east to west from Crowsdale-Camboon Road to the ROW. The proposed track is currently unformed. The area is generally cleared with scattered SEVT regrowth. No remnant vegetation is present within the vicinity of the proposed access track and the groundcover layer consists of exotic grasses. A stream order 2 watercourse occurs 60m to the north of the proposed works and appropriate sediment and erosion control measures should therefore be employed. Field survey confirmed that the proposed access track would not impact any remnant or protected vegetation and is considered to be a solution that would meet Condition D21 of the EA.

5.3.22. Access Track KP 233.33

This proposed access track (see Map 4.22, Appendix D) is approximately 275m long and utilises the existing Dawson Highway, a 10m wide sealed bitumen road, extending east to west and transecting the ROW at KP 233.3. The area contains vegetated roadside verges but is generally cleared with scattered cooba (*Acacia salicina*). No remnant vegetation is present within the vicinity of the proposed access track and the groundcover layer consists of exotic and perennial grasses on clay and loam soil (landzone 9). There are no watercourses within the vicinity of the track. Field survey confirmed that the proposed access track would not impact any remnant or protected vegetation and is considered to be a solution that would meet Condition D21 of the EA.

5.3.23. Access Track KP 237.70

This proposed access track (see Map 4.23, Appendix D) is approximately 321m long and utilises the existing Orange Creek Road, a 8m wide sealed bitumen road, extending east to west and transecting the ROW at KP 237.7. The area contains vegetated roadside verges but is generally clear with non-remnant vegetation and a groundcover of exotic grasses on landzone 4. The proposed access track traverses one DNRM mapped watercourse of stream order 1 and is within an extensive gilgai plain. Appropriate erosion and sediment control measures should be employed to protect the watercourse and the gilgai plain present to the north and south of the track. The access track will not impact any remnant or protected vegetation and is considered to be an option that would meet condition D21 of the EA.

5.3.24. Access Track KP 243.26

This proposed access track (see Map 4.24, Appendix D) is approximately 353m in length and utilises the existing Prospect Creek Road (known also as Goovigen Road), an 8m wide sealed bitumen road, extending north west to south east and transecting ROW at KP 243.26. The area contains vegetated roadside verges however it is generally cleared, composed of non-remnant vegetation with a groundcover layer of exotic grasses on landzone 4. There are no watercourses within the vicinity of the track however a number of gilgais are present within the surrounding area. Appropriate erosion and sediment control measures should be employed to protect the gilgai plains in proximity to the proposed access track. Field survey confirmed that the proposed access track would not impact any remnant or protected vegetation and is considered to be a solution that would meet Condition D21 of the EA.

5.3.25. Access Track KP 246.13

This proposed access track (see Map 4.25, Appendix D) is approximately 526m long and utilises the existing Coreen Water Board Road, extending south west to north east and transecting the ROW at KP 246.13. The existing road is 5m wide with a surface of graded gravel. The area contains vegetated roadside verges, which consist of Queensland blue gum (*Eucalyptus tereticornis)*, hollow-bearing trees and exotic grasses. The surrounding land is cultivated with crops such as maize. The track traverses a riparian zone of a ground-truthed stream (DNRM stream order 6) containing Queensland blue gum (*Eucalyptus tereticornis)* to a height of 30m, a native shrub layer and very dense Guinea grass (*Megathyrsus maximus* var *maximus**).

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Appropriate erosion and sediment control measures should be employed to protect the water course traversed by the proposed track. Field survey confirmed that the proposed access track would not impact any remnant or protected vegetation and is considered to be a solution that would meet Condition D21 of the EA.

5.3.26. Access Track KP 247.81

This proposed access track (see Map 4.26, Appendix D) is approximately 398m long and utilises the existing Burnett Highway, an 8m wide sealed bitumen road, extending north west to south east and transecting the ROW at KP 247.81. The area contains roadside verges which support non-remnant vegetation and a groundcover of exotic grasses. The surrounding land is cleared for crop cultivation and pasture. There are no watercourses within the vicinity of the track apart from a minor gully and a drainage line that runs under the highway. Appropriate erosion and sediment control measures should be employed. Field survey confirmed that the proposed access track would not impact any remnant or protected vegetation and is considered to be a solution that would meet Condition D21 of the EA.

5.3.27. Access Track KP 251.16

This proposed access track (see Map 4.27, Appendix D) is approximately 211m long and utilises the existing Jambin Dakenba Road, an 8m wide sealed bitumen road, extending north west to south east and transecting ROW at KP 251.16. The area contains roadside verges supporting non-remnant vegetation, hollow bearing trees and a groundcover of exotic grasses. The surrounding land is cleared and used for either crop cultivation or pasture. There are no watercourses within the vicinity of the track. Field survey confirmed that the proposed access track would not impact any remnant or protected vegetation and is considered to be a solution that would meet Condition D21 of the EA.

5.3.28. Access Track KP 251.21

This proposed access track (see Map 4.28, Appendix D) is approximately 1124m long, and utilises the existing Jambin Dakenba Road, an 8m wide sealed bitumen road which runs parallel to a railway line. The proposed access track bears north-west to south, transecting the ROW at KP 251.21. The area contains roadside verges which support non-remnant vegetation and a groundcover of exotic grasses. The surrounding land is cleared and used for crop cultivation and pasture. The proposed access track does not traverse any watercourses; however the southern endpoint is in proximity to a DNRM mapped stream order 3 watercourse. Appropriate erosion and sediment control measures should be employed. The access track will not impact any remnant or protected vegetation and is considered to be an option that would meet condition D21 of the EA.

5.3.29. Access track KP 254.45

This proposed access track (see Map 4.29, Appendix D) is approximately 870m long, extending south-east from the ROW along Mallinsons Road. The existing road is cleared to between 8m and 10m width in this area and it is not expected that any vegetation will be impacted by the establishment of this proposed access track. Field survey confirmed that the proposed access track would not impact any remnant or protected vegetation and is considered that this track would meet Condition D21 of the EA.

5.4. Wetlands, Lakes, Springs and Watercourses

Condition D41 of the EA requires a 100m buffer to any wetland, lake, spring or the high bank of any other watercourse. This requirement indicates that there is to be no clearing of vegetation or placement of fill within this buffer area. Condition D43, does however note that:

"Pipeline and road construction works may be undertaken in watercourses, where there is no practicable alternative such as the use of horizontal directional drilling methods, for a maximum period

of ten (10) days, provided that the works are conducted in accordance with the following order of preference:

- *Construction work in times of no flow*
- *Using all reasonable and practical measures to reduce impacts in times of flow; and*
- *Horizontal directional drilling may be used for the construction of the pipeline unless the construction occurs in times of no flow or an alternative construction methodology is agreed with the administering authority in writing."*

For the purposes of this report, a watercourse is defined as any mapped stream (of any order) or unmapped stream observed during the DEIS pre-clearance surveys.

A wetland is as defined within EA (PEN101808610), and is defined under the Queensland Wetlands Program as 'areas of permanent or periodic/intermittent inundation, with water that is static or flowing fresh, brackish or salt, including areas of marine water, the depth of which at low tide does not exceed six metres'.

To be classified as a wetland, the area must have one or more of the following attributes:

- At least periodically, the land supports plants or animals that are adapted to and dependent on living in wet conditions for at least part of their life cycle; or
- The substratum is predominantly undrained soils that are saturated, flooded or ponded long enough to develop anaerobic conditions in the upper layers; or
- The substratum is not soil and is saturated with water, or covered by water at some time.

For the purposes of Chapter 5A (*Environmental Protection Act 1994)* activities, wetlands do not include those that are defined in the document entitled *Wetland Mapping and Classification Methodology* (DERM, 2005) as:

- H2M1 Riverine or ex-riverine (lacustrine) water bodies associated with dams and weirs located in a channel
- H2M3p Ponded pastures
- H2M5 Palustrine/lacustrine water bodies where ecological character has changed due to gross mechanical disturbance (e.g. cropping)
- H2M6 Palustrine/lacustrine water bodies that have been converted, completely or mostly, to a ring tank or other controlled storage
- H2M7 Riverine water bodies that have been converted mostly to canals or irrigation channels
- H3C1 Artificial stand-alone water storages not within a natural water body or channel; or
- H3C2 Artificial Channel drain/canal – bore drains, swales, bores and irrigation channel overflows/ponding.

A summary of where the alignment is located within 100m of a referable wetland and / or any ground-truthed wetland, lake, spring or the high bank of any other watercourse (apart from watercourse crossings) is provided in Table 15. This is also shown spatially in Map 5 (Appendix D). Recommendations in relation to these locations are given in Section 5.6.

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Table 15: Locations where the ROW traverses or is within 100m of a wetland, lake, spring, or high bank of any other watercourse (apart from watercourse crossings)

KP	Wetland, Lake, Spring, Watercourse	Proximity to ROW	Environmental Values of ROW Location
177.060-177.183	Watercourse Stream Order 1	Within 100m of waterway to west of ROW, paralleling the ROW	Watercourse lies within a cleared agricultural landscape. Some riparian (non-remnant) vegetation is present. It provides potential habitat for riparian species and dispersal corridor for fauna.
177.358-177.358	Watercourse Stream Order 1	Within 100m of waterway to west of ROW, paralleling the ROW	Watercourse lies within a cleared agricultural landscape. Some riparian (non-remnant) vegetation is present. It provides potential habitat for riparian species and dispersal corridor for fauna.
177.526-177.526	Watercourse Stream Order 3	Within 100m of waterway to west of ROW	Watercourse containing riparian (non-remnant) vegetation draining a referable rivereine wetland situated 400m to north of ROW. Provides potential habitat for riparian species and dispersal corridor for fauna.
178.226-178.274	Watercourse Stream Order 1	Within 100m of waterway to south of ROW	Watercourse containing riparian (non-remnant) vegetation within a broader patch of non-remnant vegetation. It provides habitat for riparian species and dispersal corridor for fauna.
205.153 – 205.663	Wetland	ROW traverses a wetland area associated with Prospect Creek – within ROW	Wetland lies within a previously cleared agricultural landscape. No remnant vegetation is present. Provides potential habitat for wetland species.
207.695 – 207.794	Drainage area	ROW traverses a drainage area associated with Prospect Creek – within ROW	Drainage area lying within a previously cleared agricultural landscape, affording limted habitat.
209.256 – 209.842	Wetland	ROW traverses a wetland area associated with Prospect Creek and Dry Creek– within ROW	Wetland lies within a previously cleared agricultural landscape. No remnant vegetation is present. Provides potential habitat for wetland species.
210.685-210.685	Watercourse Stream Order 2	Within 100m of waterway to west of ROW	Watercouse with riparian (non-remnant) vegetation within a landscape cleared of woody vegetation for agricultural production. Potential habitat for riparian species and dispersal corridor for fauna.

KP	Wetland, Lake, Spring, Watercourse	Proximity to ROW	Environmental Values of ROW Location
214.432 – 214.532	Waterhole	ROW traverses a waterhole associated with Prospect Creek	Waterhole within a previously cleared agricultural landscape. No remnant vegetation is present. Provides potential habitat for wetland species.
223.430 – 223.498	Waterhole	ROW traverses a waterhole associated with Prospect Creek	Waterhole within a previously cleared agricultural landscape. No remnant vegetation is present. Provides potential habitat for wetland species.
230.585-230.819	Watercourse Stream Order 2	Within 100m of waterway to west of ROW	Watercouse with well developed riparian (non-remnant and HVR) vegetation within a landscape cleared of woody vegetation for agricultural production. Potential habitat for riparian species and dispersal corridor for fauna.
231.667-231.869	Watercourse Stream Order 2	Within 100m of waterway to west of ROW	Watercouse with well developed riparian (non-remnant and HVR) vegetation within a landscape cleared of woody vegetation for agricultural production. Potential habitat for riparian species and dispersal corridor for fauna.
236.710 – 237.804	Wetland	ROW traverses a wetland area associated with Prospect Creek	Wetland area within a previously cleared and modified agricultural landscape. No remnant vegetation, but some (limited) woody regrowth is present. Provides potential habitat for wetland species.
237.160 – 238.344	Wetland – gilgai plain	ROW traverses a gilgai plain associated with Prospect Creek	Gilgai area within a previously cleared and modified agricultural landscape. No remnant vegetation, but some (limited) woody regrowth is present. Provides potential habitat for wetland species.
238.989 – 239.088	Wetland – gilgai plain	ROW traverses a gilgai plain associated with Kroombit Creek and Neville Creek	Gilgai area within a previously cleared and modified agricultural landscape. No remnant vegetation, but some (limited) woody regrowth is present. Provides potential habitat for wetland species.
239.113 – 239.272	Wetland – gilgai plain	ROW traverses a gilgai plain associated with Kroombit Creek and Neville Creek	Gilgai area within a previously cleared and modified agricultural landscape. No remnant vegetation, but some (limited) woody regrowth is present. Provides potential habitat for wetland species.

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KP	Wetland, Lake, Spring, Watercourse	Proximity to ROW	Environmental Values of ROW Location
240.123 – 240.223	Wetland – gilgai plain	ROW traverses a gilgai plain associated with Kroombit Creek and Neville Creek	Gilgai area within a previously cleared and modified agricultural landscape. No remnant vegetation, but some (limited) woody regrowth is present. Provides potential habitat for wetland species.
240.223 – 240.455	Wetland – gilgai plain	ROW traverses a gilgai plain associated with Kroombit Creek and Neville Creek	Gilgai area within a previously cleared and modified agricultural landscape. No remnant vegetation, but some (limited) woody regrowth is present. Provides potential habitat for wetland species.
240.321 – 240.747	Wetland	ROW traverses a wetland area associated with Kroombit Creek and Neville Creek	Wetland area within a previously cleared and modified agricultural landscape. No remnant vegetation, but some (limited) woody regrowth is present. Provides potential habitat for wetland species.
240.489-240.582	Wetland – gilgai plain	ROW traverses a gilgai plain associated with Kroombit Creek and Neville Creek	Gilgai plain area within a previously cleared and modified agricultural landscape. No remnant vegetation, but some (limited) woody regrowth is present. Provides potential habitat for wetland species.
240.591 – 240.679	Wetland – gilgai plain	ROW traverses a gilgai plain associated with Kroombit Creek and Neville Creek	Gilgai plain area within a previously cleared and modified agricultural landscape. Some remnant and regrowth comprising Brigalow TEC present. Provides potential habitat for wetland species.
240.992 – 241.092	Wetland – gilgai plain	ROW traverses a gilgai plain associated with Kroombit Creek and Neville Creek	Gilgai plain area within a previously cleared and modified agricultural landscape. No remnant vegetation, but some (limited) woody regrowth is present. Provides potential habitat for wetland species.
242.562 - 242.662	Wetland – gilgai plain	ROW traverses a gilgai plain associated with Kroombit Creek and Neville Creek	Gilgai plain within a previously cleared and modified agricultural landscape. No remnant or regrowth vegetation is present. Provides minor aquatic habitat value.
242.682 – 242.938	Wetland – gilgai plain	ROW traverses a gilgai plain associated with Prospect Creek and Neville Creek	Gilgai plain within a previously cleared and modified agricultural landscape. No remnant or regrowth vegetation is present. Provides minor aquatic habitat value.

KP	Wetland, Lake, Spring, Watercourse	Proximity to ROW	Environmental Values of ROW Location
243.299 – 243.399	Wetland – gilgai plain	ROW traverses a gilgai plain associated with Prospect Creek and Neville Creek	Gilgai plain within a previously cleared and modified agricultural landscape. No remnant or regrowth vegetation is present. Provides minor aquatic habitat value.
249.386 – 249.474	Waterhole	ROW traverses a waterhole associated with Callide Creek.	Waterhole (low-lying area) within a previously cleared and modified agricultural landscape used for cropping. No remnant vegetation. Minor habitat for wetland species.
254.473 - 254.673	Wetland – gilgai plain	ROW traverses through the gilgai plain (and associated buffer) in this area.	Gilgai within a previously cleared and modified agricultural landscape. No remnant or regrowth vegetation. Provides minor aquatic habitat value.

5.5. Environmentally Sensitive Areas

ESAs are divided into three categories being Category A, Category B and Category C. Category A and B are prescribed by section 25 and 26 respectively of the *Environmental Protection Regulation 2008*. Category C ESAs are:

- Nature Refuges defined under the NC Act
- Koala Habitat Areas as defined under the *Nature Conservation (Koala) Conservation Plan 2006*
- State Forests or Timber Reserves as defined under the *Forestry Act 1959*
- Declared catchment areas under the *Water Act 2000*
- Resources reserves under the NC Act
- An area identified as 'Essential Habitat' under the *Vegetation Management Act 1999*, for an EVNT species
- Any wetland shown on the Map of referable wetlands; and
- *Of Concern* Regional Ecosystems.

EA Condition D18 and D19 require the identification of ESA by field based survey and the avoidance, minimisation or mitigation of impacts upon ESAs.

Three field-validated ESAs, one Category B and two Category C were identified along the ROW. No Category A areas are present. These are outlined in Table 16.

Table 16: Locations Category B and Category C Environmentally Significant Areas along the ROW

Area (KPs)	ESA Type	Description of Environmental Values	Environmental Values of ROW Location
190.167 - 190.259	Category C	*Of Concern* RE11.3.25	Extensive area of state mapped and ground-truthed remnant riparian vegetation along Pump Creek.
212.564 - 212.778	Category C	*Of Concern RE*11.3.4	Patch of ground-truthed remnant vegetation associated with a tributary of Prospect Creek. Not mapped by state mapping.
239.285 - 239.323	Category B	*Endangered* RE11.9.5 and Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC	Western edge of a remnant patch of RE11.9.5 that extends some 300m to the east of the ROW. Not mapped by state mapping.

5.6. Summary of Recommendations

A summary of recommendations is contained in Table 17. This includes recommendations from a qualified and approved ecologist for the disturbance of areas considered to be of higher ecological value, as required by the project's approval conditions.

Table 17: Summary of recommendations

Area (KPs)	Approval Constraint	Rationale / Justification for Alignment in this Area	Recommendations
177.060-177.183	Watercourse (high bank)	No clearing of remnant vegetation in area. Placement of fill in ROW is necessary and unavoidable owing to the construction protocols employed. No placement of fill outside of ROW necessary in this area	No disturbance off the approved ROW, no storage of fill, material stockpiles outside of ROW; appropriate erosion and sediment control is to be implemented.
177.358-177.358	Watercourse(high bank)	No clearing of remnant vegetation in area. Placement of fill in ROW is necessary and unavoidable owing to the construction protocols employed. No placement of fill outside of ROW necessary in this area	No disturbance off the approved ROW, no storage of fill, material stockpiles outside of ROW; appropriate erosion and sediment control is to be implemented.
177.526-177.526	Watercourse (high bank)	No clearing of remnant vegetation in area. Placement of fill in ROW is necessary and unavoidable owing to the construction protocols employed. No placement of fill outside of ROW necessary in this area	No disturbance off the approved ROW, no storage of fill, material stockpiles outside of ROW; appropriate erosion and sediment control is to be implemented.
178.226-178.274	Watercourse (high bank)	No clearing of remnant vegetation in area. Placement of fill in ROW is necessary and unavoidable owing to the construction protocols employed. No placement of fill outside of ROW necessary in this area	No disturbance off the approved ROW, no storage of fill, material stockpiles outside of ROW; appropriate erosion and sediment control is to be implemented.
190.167 – 190.259	*Of Concern* RE 11.3.25, and Category C ESA	Avoidance of this patch of remnant vegetation is not possible; the area is within a large contiguous stand of vegetation that extends to the east, south west and west of the ROW and is associated with a waterway crossing of Pump Creek.	No disturbance off the approved ROW except for approved additional work areas (AWAs). Offsets to be provided for clearing.
205.153 – 205.663	Wetland	The pipeline in this area has been collocated adjacent an existing road and boundary fence line. The low lying wetland area is extensive extending some 400m upstream (west) of the ROW and, upstream of a waterway that lies some 130m to the east of the ROW. It is therefore not possible to avoid this area without significant realignment.	Where possible, minimise disturbance. Ensure that appropriate erosion and sediment control is implemented.

Area (KPs)	Approval Constraint	Rationale / Justification for Alignment in this Area	Recommendations
207.695 – 207.794	Drainage area associated with Prospect Creek	The alignment in this area has been determined to avoid a significant drainage feature (Prospect Creek) to the east while also trying to maintain perpendicular crossing of other drainage features (a stream order 3 watercourse at KP208). The proposed alignment is an acceptable alignment with the landholder and avoids cropping land to the east.	Where possible, minimise disturbance. Ensure that appropriate erosion and sediment control is implemented.
209.256 – 209.842	Wetland	The alignment in this area has been determined to avoid a significant drainage feature (Prospect Creek) to the east while also trying to maintain perpendicular crossing of other drainage features. The wetland area extends to the east and west of the ROW and the proposed alignment is an acceptable alignment with the landholder and avoids cropping land to the east.	Where possible, minimise disturbance. Ensure that appropriate erosion and sediment control is implemented.
210.685-210.685	Watercourse (high bank)	No clearing of remnant vegetation in area. Placement of fill in ROW is necessary and unavoidable owing to the construction protocols employed. No placement of fill outside of ROW necessary in this area	No disturbance off the approved ROW, no storage of fill, material stockpiles outside of ROW; appropriate erosion and sediment control is to be implemented.
212.564 – 212.778	*Of Concern* RE 11.3.4 and Category C ESA	Avoidance of this patch of remnant vegetation is not possible as it extends several hundred metres to the east and west of the ROW and is associated with a waterway crossing. The existing crossing point is a generally acceptable crossing point and avoids Prospect Creek to the East.	No disturbance off the approved ROW except for approved AWAs. Ensure that appropriate erosion and sediment control is implemented. Offsets to be provided for clearing.

Area (KPs)	Approval Constraint	Rationale / Justification for Alignment in this Area	Recommendations
214.432 – 214.532	Waterhole associated with Prospect Creek	The alignment in this area has been determined to avoid a significant drainage feature (Prospect Creek) to the east while also trying to maintain perpendicular crossing of other drainage features (KP214.1). The waterhole extends to the east of the ROW and occupies an area of impeded drainage on the upstream western side of Prospect Creek. The ROW crosses the upstream limit of the waterhole and as such the majority of the feature is avoided. Impacts may be further enhanced by appropriate erosion and sediment controls. Therefore the proposed alignment is an acceptable alignment with the landholder and avoids cropping land to the east.	Where possible, minimise disturbance. Ensure that appropriate erosion and sediment control is implemented.
223.430 – 223.498	Waterhole associated with Prospect Creek	The waterhole extends to the west of the ROW and is associated with a tributary (stream order 1) of Prospect Creek. Crossing of this waterhole and associated watercourse is necessary as the pipeline in the area is constrained by Crowsdale Camboon Road and cropping land to the north and avoids Prospect Creek to the east. Realignment to the west would result in greater impact upon cropping land to the north of the waterhole.	Where possible, minimise disturbance and ensure that appropriate erosion and sediment control is implemented.
230.585-230.819	Watercourse (high bank)	No clearing of remnant vegetation in area. Placement of fill in ROW is necessary and unavoidable owing to the construction protocols employed. No placement of fill outside of ROW necessary in this area.	No disturbance off the approved ROW, no storage of fill, material stockpiles outside of ROW; appropriate erosion and sediment control is to be implemented.
231.667-231.869	Watercourse (high bank)	No clearing of remnant vegetation in area. Placement of fill in ROW is necessary and unavoidable owing to the construction protocols employed. No placement of fill outside of ROW necessary in this area.	No disturbance off the approved ROW, no storage of fill, material stockpiles outside of ROW; appropriate erosion and sediment control is to be implemented.

Area (KPs)	Approval Constraint	Rationale / Justification for Alignment in this Area	Recommendations
236.710 – 237.804	Wetland associated with Prospect Creek	There is an extensive low lying area within and adjacent to the alignment in this area that is adjoined to the north by gilgai plain. These features extend at least 400m either side of the ROW. Due to the broad nature of feature, realignment of the pipeline is not feasible. In the north, the pipeline also aligns itself with a property boundary, thus reducing potential impacts on agricultural (cropping) land as requested by the landholder.	Where possible, minimise disturbance. Ensure that appropriate erosion and sediment control is implemented.
237.160 – 238.344	Wetland – gilgai plain	There is an extensive gilgai within and adjacent to the alignment in this area that is adjoined by a seasonally impeded drainage area to the south. These features extend at least 400m either side of the ROW. Due to the broad nature of feature, realignment of the pipeline is not feasible. In the north, the pipeline also aligns itself with a property boundary, thus reducing potential impacts on agricultural (cropping) land as requested by the landholder.	Where possible, minimise disturbance to gilgais and associated micro-habitat. Ensure that appropriate erosion and sediment control is implemented.
238.989 – 239.088	Wetland – gilgai plain	Gilgai area that is patchily distributed in the broader area to the east of the ROW, extending towards Prospect Creek Road. The ROW at this point is bounded to the west by cropping land (extensive contoured area) and further beyond by Queensland Government mapped Of Concern RE11.7.1/11.7.2. Realignment to the west is not possible on account of the arable land, Of Concern vegetation and a rural residence. Realignment to the east is not feasible as this would impact on an area of mapped brigalow TEC immediately to the north (KP239.285-239.323) – and area of accepted ROW reduction, see Table 14). The pipeline is collocated along a boundary fence in the area to minimise impacts on existing agricultural land uses.	Where possible, minimise disturbance to gilgais and associated micro-habitat. Ensure that appropriate erosion and sediment control is implemented.

Area (KPs)	Approval Constraint	Rationale / Justification for Alignment in this Area	Recommendations
239.113 – 239.272	Wetland – gilgai plain	Gilgai area that is patchily distributed in the broader area to the east of the ROW, extending towards Prospect Creek Road. The ROW at this point is bounded to the west by cropping land (extensive contoured area) and further beyond by Queensland Government mapped Of Concern RE11.7.1/11.7.2. Realignment to the west is not possible on account of the arable land, Of Concern vegetation and a rural residence and a realignment to the east is not feasible as this would impact on an area of mapped brigalow TEC immediately to the north (KP239.285-239.323 – and area of accepted ROW reduction, see Table 14), and brigalow regrowth (not a TEC to the south (KP237.85-238.1), The pipeline is collocated along a boundary fence in the area to minimise impacts on existing agricultural land uses.	Where possible, minimise disturbance to gilgais and associated micro-habitat. Ensure that appropriate erosion and sediment control is implemented.
239.285 – 239.323	*Endangered* RE 11.9.5, Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC and Category B ESA	Alignment, with narrowed ROW, will reduce the extent of clearing of brigalow TEC.	Narrow ROW. No disturbance off the approved ROW except for approved AWAs. Offsets to be provided for clearing.
240.123 – 240.223	Wetland – gilgai plain	This gilgai forms part of a gilgai / regrowth and remnant brigalow community complex (including Brigalow TEC) that extends from KP240.430 to the south, extending northwards to KP240.802. Furthermore it extends some 700m westwards and 300m eastwards of the ROW and it is therefore not feasible to avoid this extensive low lying area	Where possible, minimise disturbance to gilgais and associated micro-habitat. Ensure that appropriate erosion and sediment control is implemented.

Area (KPs)	Approval Constraint	Rationale / Justification for Alignment in this Area	Recommendations
240.223 – 240.455	Wetland – gilgai plain	This gilgai forms part of a gilgai / regrowth and remnant brigalow community complex (including Brigalow TEC) that extends from KP240.430 to the south northwards to KP240.802. Furthermore it extends some 700m westwards and 300m eastwards of the ROW and therefore it is not feasible to avoid this extensive low lying area and it is therefore not feasible to avoid this extensive low lying area	Where possible, minimise disturbance to gilgais and associated micro-habitat. Ensure that appropriate erosion and sediment control is implemented.
240.529 – 240.648	Regrowth RE 11.4.3, Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC	This TEC forms part of gilgai / regrowth and remnant brigalow community complex that extends from KP240.123 to the south northwards to KP240.802. Brigalow remnant and regrowth (TEC) lies extensively to the east and west of the alignment and therefore realignment is not possible. The ROW has been narrowed to reduce the extent of clearing of Brigalow TEC.	Narrow ROW. No disturbance off the approved ROW except for approved AWAs. Offsets to be provided for clearing.
240.321 – 240.747	Wetland	This wetland forms part of a gilgai / regrowth and remnant brigalow community complex (including Brigalow TEC) that extends from KP240.430 to the south northwards to KP240.802. Furthermore it extends some 700m westwards and 300m eastwards of the ROW and it is therefore not feasible to avoid this extensive low lying area.	Where possible, minimise disturbance. Ensure that appropriate erosion and sediment control is implemented.
240.489- 240.582	Wetland – gilgai plain	This wetland forms part of a gilgai / regrowth and remnant brigalow community complex (including Brigalow TEC) that extends from KP240.430 to the south northwards to KP240.802. Furthermore it extends some 700m westwards and 300m eastwards of the ROW and it is therefore not feasible to avoid this extensive low lying area.	Where possible, minimise disturbance to gilgais and associated micro-habitat. Ensure that appropriate erosion and sediment control is implemented.

Area (KPs)	Approval Constraint	Rationale / Justification for Alignment in this Area	Recommendations
240.591 – 240.679	Wetland – gilgai plain	This wetland forms part of a gilgai / regrowth and remnant brigalow community complex (including Brigalow TEC) that extends from KP240.430 to the south northwards to KP240.802. Furthermore it extends some 700m westwards and 300m eastwards of the ROW and it is therefore not feasible to avoid this extensive low lying area.	Where possible, minimise disturbance to gilgais and associated micro-habitat. Ensure that appropriate erosion and sediment control is implemented.
240.738 – 240.802	Regrowth RE 11.9.5, Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC	This wetland forms part of a gilgai / regrowth and remnant brigalow community complex (including Brigalow TEC) that extends from KP240.430 to the south northwards to KP240.802. Furthermore it extends some 700m westwards and 300m eastwards of the ROW and therefore it is not feasible to avoid this extensive low lying area. The ROW has been narrowed to reduce the extent of clearing of brigalow TEC.	Narrow ROW. No disturbance off the approved ROW except for approved AWAs. Offsets to be provided for clearing.
240.992 – 241.092	Wetland – gilgai plain	It is not feasible to avoid this extensive low lying area owing to the alignment being constrained by the features outlined above.	Where possible, minimise disturbance to gilgais and associated micro-habitat. Ensure that appropriate erosion and sediment control is implemented.
242.562 - 242.662	Wetland – gilgai plain	It is not feasible to avoid this extensive low lying area through re-alignment owing to the presence of the EVNT Eleocharis blakeana adjacent to the ROW which was found some 150m to the north. The existing ROW has been identified as being clear of this constraint.	Where possible, minimise disturbance to gilgais and associated micro-habitat. Ensure that appropriate erosion and sediment control is implemented.
242.682 – 242.938	Wetland – gilgai plain	It is not feasible to avoid this extensive low lying area through re-alignment owing to the presence of the EVNT Eleocharis blakeana adjacent to the ROW. The existing ROW has been identified as being clear of this constraint.	Where possible, minimise disturbance to gilgais and associated micro-habitat. Ensure that appropriate erosion and sediment control is implemented.
Adjacent to 242.835	*Eleocharis blakeana* – Near Threatened under NC Act	Eleocharis blakeana is extensive throughout the gilgai plain adjacent to the ROW. 150 individuals occur outside of the ROW and will therefore be avoided.	No disturbance off the approved ROW.

Area (KPs)	Approval Constraint	Rationale / Justification for Alignment in this Area	Recommendations
243.299 – 243.399	Wetland – gilgai plain	It is not feasible to avoid this extensive low lying area through re-alignment owing to the presence of the EVNT Eleocharis blakeana adjacent to the ROW which was found some 470m to the south. The existing ROW has been identified as being clear of this constraint.	Where possible, minimise disturbance to gilgais and associated micro-habitat. Ensure that appropriate erosion and sediment control is implemented.
249.386 – 249.474	Waterhole associated with Callide Creek	The pipeline alignment between KP237.8 and the Callide Creek Crossing has been aligned to minimise impacts upon arable cropping land. An alignment further east adjoining Callide Road is not feasible as it would impact on two rural residential properties. An alignment slightly to the east would take the pipeline along a mapped watercourse which has functional riparian habitat, and travers a patch of *Of Concern* RE11.3.4. Realignment to the west is not feasible owing to impact on cropping land. Crossing of this waterhole and associated watercourse at a point where there is no riparian vegetation is necessary.	Where possible, minimise disturbance to waterhole and associated micro-habitat. Ensure that appropriate erosion and sediment control is implemented.
254.473-254.673	Wetland – gilgai plain	It is not feasible to avoid this extensive gilgai plain. The ROW in this area has been aligned to enable a perpendicular crossing of Mallinsons Road.	Where possible, minimise disturbance to gilgais and associated micro-habitat. Ensure that appropriate erosion and sediment control is implemented.

6. Conclusion

This DEIS pre-clearance survey report provides an assessment of the terrestrial ecological values of that portion of the Mainline pipeline alignment between the Midline Station and Mainline Valve 2 which equates to KPs 175 and 254.8 of the Revision G alignment.

Detailed flora and fauna DEIS pre-clearance surveys were undertaken within the study area in accordance with relevant survey guidelines. The results from the DEIS pre-clearance surveys have determined that:

- One TEC, brigalow (*Acacia harpophylla* dominant and co-dominant), occurs at three locations within the proposed ROW. The ROW is proposed to be reduced from 40m to 35m wide through these areas
- One RE with a biodiversity status of *Endangered*, two REs with a biodiversity status of *Of Concern* and four REs with a biodiversity status of *No Concern at Present* occur within the ROW
- No MNES flora species were observed within the ROW
- One population of the EVNT flora species Blake's spike rush (*Eleocharis blakeana*) was observed outside of the ROW during the flora DEIS pre-clearance surveys. This population will not be impacted by the construction of the ROW.
- No DNRM mapped Essential Habitat is present within this section of the alignment
- Eight Class 2, and four Class 3 pest weed species declared under the *Land Protection (Pest and Stock Route Management) Act 2002* were observed within the ROW and will require management in accordance with the Project weed management plan. All observations of declared pest species have been recorded via differential GPS that is accurate to a sub-metre level
- Thirteen agricultural weed species were also observed within the ROW and some of these will require management in accordance with the Project weed management plan
- Three MNES Migratory species were observed within during the DEIS pre-clearance surveys:
  - rainbow bee-eater (*Merops ornatus*)
  - satin flycatcher (*Myiagra cyanoleuca*); and
  - Latham's snipe (*Gallinago hardwickii*).
- One EVNT-only fauna species, little pied bat (*Chalinolobus picatus*), Near Threatened, was recorded during the detailed fauna surveys:
- Preferred habitat for a number of MNES (based on RE associations and micro-habitat features) and EVNT- species (based on RE associations) is present within the ROW and has been quantified for the purpose of disturbance calculations; and
- Access tracks to the ROW in this section of the alignment have been assessed and recommendations provided regarding the suitability of these from an ecological perspective. This has shown that:
  - 21 of the proposed access tracks comply with condition D21 of the EA and will not result in the clearing of remnant vegetation
  - 5 of the proposed track partially comply with condition D21, and should specific planning and on site measure be taken to avoid remnant vegetation, these would comply; and
  - 3 of the proposed access track would result in the clearing of some remnant vegetation do not comply with EA condition D21and should not be used unless amendments to the DA are sought by Australia Pacific LNG.

The results of the DEIS pre-clearance surveys have informed the pipeline design team of key ecological constraints within the study area. The process adopted for the Mainline with respect to recommended realignments, recommended areas of ROW narrowing and the assessment and selection of access tracks

has demonstrated the avoid, minimise and mitigate approach required by DSEWPaC and DERM within the relevant approval conditions for the Project.

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