Ecological Assessment Report

*WSGP Phase 3 Eos - Export Pipeline Alignment*

Compiled by BOOBOOK for Senex

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List of Abbreviations

Biosecurity Act  
Biosecurity Act 1994

CSG  
coal seam gas

DEHP  
Department of Environment and Heritage Protection

DoEE  
Department of the Environment and Energy

DSEWPaC  
Department of Sustainability, Environment, Water, Population and Communities

E  
Endangered

EH  
Essential Habitat

EPBC Act  
Environment Protection and Biodiversity Conservation Act 1999

ESA  
Environmentally Sensitive Area

ha  
hectare (s)

HVR  
High Value Regrowth

km  
kilometre (s)

m  
metre (s)

MNES  
Matters of National Environmental Significance

MSES  
Matters of State Environmental Significance

NCAP  
No Concern at Present

NC Act  
Nature Conservation Act 1992

NT  
Near Threatened

OC  
Of Concern

PMST  
Protected Matters Search Tool

RE  
Regional Ecosystem (s)

REDD  
Regional Ecosystem Description Database

SPRAT  
Species Profile and Threats Database.

SLC plant  
Special Least Concern Plant

TEC  
Threatened Ecological Community (ies)

V  
Vulnerable

VM Act  
Vegetation Management Act 1999

WoNS  
Weeds of National Significance

WGSP  
Western Surat Gas Project

Conclusions drawn in this report are based on available information at the time of writing. Any additional information may alter such conclusions and the author reserves the right to do so if such information becomes available. This report has been made as at the date of the report and is not to be used after six (6) months and not if there are any material changes meanwhile. In either event it should be referred back for review. To the extent permitted by law BOOBOOK does not accept liability for any loss or damage which any person may suffer arising from any negligence or breach of contract on its part. This report was prepared for the benefit of the party to whom it is directed only and for the purpose identified within. BOOBOOK does not accept responsibility to any other person for the contents of the report.
Executive Summary

This report provides a description of an ecology survey undertaken for the Senex Western Surat Gas Project (WSGP) Eos export pipeline within PSL2027 located approximately 35 km northeast of Roma, southern inland Queensland. The ecology survey was conducted by BOOBOOK ecologists in August 2017 along the proposed alignment and 50 m buffer. The proposed alignment extends approximately 5.1 km, aligned in an east-northeast direction, connecting the proposed Senex Phase 3 facility and QGP Jemena and Santos CRWP pipelines.

Key findings of the ecological survey are summarised as follows:

**Matters of National Environmental Significance (MNES):**
- No Threatened Ecological Communities (TEC) were detected.
- No *Environmental Protection and Biodiversity Conservation Act* (EPBC Act) listed threatened flora or fauna were detected.
- Two Weeds of National Significance (WoNS) were detected:
  - Velvety Tree Pear (*Opuntia tomentosa*); and
  - Common Pest Pear (*Opuntia stricta*).
- Potentially suitable habitat (<0.5 ha) is present for threatened fauna listed under the EPBC Act including:
  - Koala
  - South-eastern Long-eared Bat
  - Yakka Skink
  - Dunmall’s Snake.

**Matters of State Environmental Significance (MSES):**
- No remnant or regrowth Endangered or Of Concern regional ecosystems (REs) were detected.
- Two remnant patches of one No Concern at Present RE were detected:
  - 11.9.2: Silver-leaved Ironbark (*Eucalyptus melanophloia*) +/- Mountain Coolibah (*E. orgadophila*) woodland on fine-grained sedimentary rocks
- No remnant or regrowth vegetation constituting a Category B or C Environmentally Sensitive Area (ESA) occurred within the Survey Area.
- No *Nature Conservation Act* (NC Act) listed threatened flora or fauna were detected.
- Three species of NC Act Special Least Concern flora were detected.
- Two *Biosecurity Act 2014* restricted invasive plants were detected, these also being the WoNS species listed above.
- Potentially suitable habitat is present for threatened fauna listed under the NC Act (and species also listed above under the EPBC Act) including:
  - Golden-tailed Gecko
  - Koala
  - South-eastern Long-eared Bat
  - Yakka Skink
  - Dunmall’s Snake.
- Watercourse assessments were conducted at six mapped streams all of which were assessed to be drainage features under the *Water Act 2000*.
- No lakes, springs or significant wetlands were detected.
The project will not impact upon any TECs, internationally or nationally important wetlands or other wetlands, lakes and springs. The project will not impact upon any known populations of EPBC and or NC Act listed threatened flora populations or their habitat.

A small amount (<0.3 ha) of No Concern at Present remnant vegetation (RE 11.9.2) occurs within the Survey Area. Although this remnant vegetation has the potential to support EPBC and/or NC Act listed threatened fauna construction of the pipeline is not likely to result in a significant impact upon any of these species or their habitat.
1. Introduction

1.1 Purpose & Scope

This report provides a description of an ecological assessment undertaken for Senex Energy Ltd. (Senex) for the proposed alignment and 50 m buffer for the Western Surat Gas Project (WSGP) Eos export pipeline. The ecology survey was undertaken within defined areas of PSL2027 located approximately 35 km northeast of Roma, southern inland Queensland.

The results of the ecological assessment are based on an initial desktop assessment followed by a field survey to confirm the vegetation communities, flora/fauna species and habitat values present within the Survey Area. The purpose of this report is to provide a description of potential ecological constraints and values within the alignment and 50 m survey buffer.

BOOBOOK was requested to undertake the following assessments for Matters of National Environmental Significance (MNES) and Matters of State Environmental Significance (MSES) within the proposed alignment and 50 m buffer:

- **MNES:**
  - Assess the presence or absence of any listed Threatened Ecological Communities (TEC);
  - Provide location and description of any threatened flora listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act);
  - Record the occurrence of any Weeds of National Significance (WoNS);
  - Assess the likelihood of occurrence of threatened fauna listed under the EPBC Act.

- **MSES:**
  - Perform a vegetation assessment to describe and identify each regional ecosystem (RE) present and utilise methods consistent with the BioCondition Framework;
  - Provide location and description of any threatened flora listed under the *Nature Conservation Act 1992* (NC Act);
  - Provide location and description of any Special Least Concern plants (SLC plants) as listed under the *Nature Conservation (Wildlife Management) Regulation 2006* (NC Mgt Reg);
  - Record the occurrence of any invasive weeds scheduled as restricted biosecurity matter under the *Biosecurity Act 2014* (Biosecurity Act);
  - Assess the likelihood of occurrence of threatened fauna listed under the NC Act;
  - Provide location and characteristics of representative fauna habitat features and breeding places;
  - Undertake stream assessments and comment on the presence, nature and location of watercourses (as defined by the *Water Act 2000*), referable wetlands and springs.

1.2 Survey Team

The field survey described within this report was conducted by Craig Eddie (BOOBOOK, Principal Ecologist) and Rosamund Aisthorpe (BOOBOOK, Botanist) in association with Senex staff between 7th and 8th August 2017.

1.3 Survey Area Description

1.3.1 Location

The Survey Area is located approximately 35 km northeast of Roma, southern inland Queensland, and is situated entirely within the boundary of the Maranoa Regional Council. The survey area includes Lot 1 on Plan WV432, Lot 66 on Plan WV762, Lot 1 on Plan WV432 and a crossing of Mt Saltbush road corridor.
1.3.2 Survey Area Definition

The Survey Area comprises the proposed Eos export pipeline alignment, end of line facility and 50 m buffer (i.e. 100 m assessment corridor) as shown within Appendix A.

1.3.3 Bioregion

The Survey Area is located entirely within Subregion 26 (Southern Downs) of the Brigalow Belt bioregion. This subregion is characterized by low, hilly landscape with Jurassic and Cretaceous sediments or clay plains (Sattler and Williams 1999). Typically present in this subregion are forests of Belah (Casuarina cristata) and Brigalow (Acacia harpophylla) with Poplar Box (Eucalyptus populnea) and Narrow-leaved Ironbark (E. crebra) communities also present.

1.3.4 Soils and Geology

The Roma 1: 250,000 series SG 55-12 map (Milligan et al. 1967) broadly shows the geological units present within the Survey Area. Lithic sandstone, siltstone and mudstone including bentonite and fossil wood of the Orallo Formation (Juo) and quartzose sandstone of the Mooga Sandstone (Klm) are prominent. Minor occurrences of clayey sandstone and carbonaceous mudstone of the Kingull Member (Klk) were also present. Soils include clays, loams and clay-loams. The topography of the Survey Area is predominantly gently undulating plains and undulating low hills interspersed by occasional drainage features. Gilgai micro-relief is absent from the Survey Area. Land zones (LZ) as defined within Sattler and Williams (1999) occurring within the Survey Area include LZ 9 (fine grained sedimentary rocks).

1.3.5 Current Land Use

Previous land use within the Survey Area has primarily been agricultural (grazing of domestic livestock). This use has involved extensive vegetation modification to the majority of the Survey Area, where narrow vegetated corridors remain along gullies. Disturbances other than grazing include access tracks, farm infrastructure (e.g. dams, fences) and coal seam gas (CSG) infrastructure including existing high pressure gas pipelines, powerlines, well leases and flowlines.

2. Methodology

2.1 Desktop & Literature Review

A desktop assessment was performed prior to the field survey which included interrogation of the following datasets:

- RE and remnant vegetation – biodiversity status (DSITI 2017a);
- Essential Habitat mapping (DNRM 2017);
- Mature Regrowth mapping (DEHP 2012);
- Environmentally Sensitive Area mapping (DEHP 2017a);
- Protected Plants Flora Survey Trigger Map (DEHP 2017b);
- Referable Wetlands mapping (DEHP 2017c);
- Queensland Herbarium specimen data (DSITI 2017b);
- Wildlife Online fauna and flora records (DSITI 2017c);
- Ordered stream mapping (DNRM 2010);
- Atlas of Living Australia (ALA 2017); and
- EPBC Act Protected Matters Search Tool (DoEE 2017a).

The searches were conducted using online spatial layers, and/or searches using lot/plan details as a reference or the coordinates -26.33357°S, 149.02986°E (datum GDA94), which correspond to the approximate centre point of the Survey Area with a 10 km buffer. These datasets provided a baseline for subsequent field assessment.
2.2 Field Survey

Baseline botanical surveys were undertaken to describe dominant flora and vegetation community structure within the Survey Area. Ground-truthing of the Regional Ecosystem (RE) designation (DSITI 2017a) within the Survey Area was undertaken using a combination of the quaternary level of data collection as described by Neldner et al. (2017) and BioCondition as per Eyre et al. (2015).

The vegetation community surveys were undertaken within plots of varying size (50 m x 10 m for quaternary sites and 100 m x 50 m for BioCondition sites) for the purpose of typifying the vegetation community and/or assessing condition of the vegetation under assessment. Vegetation community assessments were undertaken at representative plots within all identified REs and regrowth types within the Survey Area. The locations of the vegetation community survey sites are presented in Appendix B. BioCondition was only completed within vegetation patches of sufficient size to incorporate the 100 m x 50 m plot and associated raw data is provided in Appendix C.

Relative abundance data was collected for each stratum within the vegetation community. Representative photographs were taken of the subject vegetation community using a Canon digital camera. Photograph aspect data was also recorded.

Vegetation community polygons were verified in accordance with Queensland RE description and biodiversity status as per the Regional Ecosystem Description Database (REDD) (DSITI 2017d) and TEC criteria (DoEE 2017b, TSSC 2013).

RE polygons were assigned to remnant or non-remnant status as defined by the Vegetation Management Act 1999. Remnant vegetation was that which had achieved a canopy layer covering more than 50% of that of the undisturbed canopy and a height more than 70% of the undisturbed height of the vegetation. Reference benchmarks for these criteria were obtained from published data (Queensland Herbarium 2017, DSITI 2017d).

Threshold minimum patch sizes used to map RE polygons were generally as per the minimum size limits (for inland areas) of 5 ha and 75 m for linear features (Neldner et al. 2017); however, in some cases where the RE type could be recognised within fragments of vegetation smaller than these limits they have been mapped as remnant RE where practical.

Areas of vegetation that have previously been cleared or disturbed (e.g. by wildfire) and contain well advanced woody vegetation floristically and structurally consistent with the RE but typically <70% of the height and <50% density of the RE are mapped as mature regrowth for the purposes of this assessment. Other regrowth which lacks structural and floristic components (i.e. immature regrowth) is mapped as non-remnant vegetation.

A search was made for EPBC Act and NC Act listed threatened flora and NC Reg SLC plants within the proposed infrastructure disturbance footprint and buffers. Where found the location was established with a Motion tablet and/or hand-held GPS unit and the type of species and number of individuals was recorded. Flora species names for flora follow Bostock and Holland (2017).

Incidental searches were conducted to detect the presence of threatened fauna, however these were confined to active searches only; no detailed fauna surveys were undertaken.

Data was collected for representative fauna habitat features throughout the alignment to inform the likelihood of occurrence assessments for threatened fauna. Fauna habitat assessments included the documentation of potential fauna shelter sites such as hollow-bearing trees and logs, log piles, rocks and rock piles, gilgais, presence/absence of mistletoe and other potential food plants, and termite mounds. Active or potential fauna breeding places within the Survey Area were also recorded where found.

All mapped ordered streams within the Survey Area were assessed at representative survey locations to determine if these mapped features were watercourses or drainage features as defined by the Water Act 2000. Ordered stream assessments included assessment of the presence/absence of a defined channel with bed and banks, riparian vegetation, evidence of extended flow and hydrophytes.
Where potential wetlands (including springs) were encountered they were assessed against the hydrological and biotic criteria of the Queensland Wetland Program wetland definition (DERM 2011).

3. Results & Discussion

3.1 Matters of National Environmental Significance

3.1.1 Threatened Ecological Communities

PMST search results (DoEE 2017a) indicated the potential presence of four TECs within the Survey Area these being:

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

No TECs were detected within the Survey Area. Small clumps of vegetation dominated by Brigalow (Acacia harpophylla) were present within the Survey Area however these did not meet the minimum size threshold of 0.5 ha for Brigalow TEC.

3.1.2 Threatened Flora

PMST search results predicted the occurrence of three EPBC Act-listed threatened flora these being Slender Tylophora (Tylophora linearis), a Bluegrass (Dichanthium setosum) and Ooline (Cadellia pentastylis). No threatened flora listed under the EPBC were identified within searches of Wildlife Online (DEHP 2017a) and ALA (2017) flora databases.

No species of EPBC Act listed threatened flora were detected within the Survey Area. An assessment of the likelihood of occurrence, based on field inspection results, of EPBC Act listed threatened flora species is summarised in Appendix D.

3.1.3 Weeds of National Significance

Weeds of National Significance (WoNS) detected within the Survey Area are listed in Table 1. Representative locations of WoNS recorded are shown within Appendix B.

Table 1: WoNS recorded within the Survey Area.

<table>
<thead>
<tr>
<th>Family</th>
<th>Scientific Name</th>
<th>Common Name</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cactaceae</td>
<td>Opuntia stricta</td>
<td>Common Pest Pear</td>
<td>Occurs throughout the Survey Area at low densities.</td>
</tr>
<tr>
<td>Cactaceae</td>
<td>Opuntia tomentosa</td>
<td>Velvety Tree Pear</td>
<td>Occurs throughout the Survey Area at low densities.</td>
</tr>
</tbody>
</table>

3.1.4 Threatened Fauna

The PMST predicted the occurrence of 15 species of EPBC Act listed threatened fauna. No EPBC Act listed threatened fauna were recorded during the field survey; however, surveys for threatened fauna were confined to incidental observations and active searches i.e. no comprehensive surveys for threatened fauna were undertaken. Yakka Skink (Egernia rugosa) is known within 2 km of the Survey Area (BOOBOOK 2017). This species is listed as Vulnerable under the EPBC Act. Likelihood of occurrence assessments for EPBC Act threatened fauna identified within desktop search results or which may potentially occur within the Survey Area are described within Appendix E. The Survey Area has been largely significantly modified (i.e. cleared of native vegetation) and contained little habitat likely to be utilised by EPBC Act listed threatened species.
3.1.5 Migratory and Marine Fauna

PMST search results predicted the occurrence of 10 migratory and 15 marine species listed under the EPBC Act. Likelihood of occurrence assessments for EPBC Act listed migratory and marine fauna identified within desktop search results or which may potentially occur within the Survey Area are described within Table 2.

Table 2: Likelihood assessment results for EPBC Act migratory and marine fauna identified within database searches.

<table>
<thead>
<tr>
<th>Scientific / Common Name</th>
<th>EPBC Act Status</th>
<th>Distribution and Known Habitat Use</th>
<th>Likelihood of Occurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actitishypoleucus</td>
<td>Migratory, Marine</td>
<td>Passage migrant to Australia and summer resident using permanent and ephemeral shallow wetlands (Birdlife Australia 2017).</td>
<td>Unlikely to be present. The Survey Area is within the broader distribution of the species however no suitable wetland habitat is present within the Survey Area.</td>
</tr>
<tr>
<td>Common Sandpiper</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apus pacificus</td>
<td>Migratory, Marine</td>
<td>An aerial seasonal migrant to Australia present between October – April (Pizzey and Knight 2010).</td>
<td>Likely to be present. The Survey Area is within the known range of the species and it may overfly any part of Survey Area.</td>
</tr>
<tr>
<td>Fork-tailed Swift</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ardea modesta (as A. alba in PMST)</td>
<td>Marine</td>
<td>Freshwater wetlands, including artificial water-bodies in disturbed habitats (Pizzey and Knight 2010).</td>
<td>Likely to be present. Potentially suitable habitat within streams and a farm dam is present within the Survey Area.</td>
</tr>
<tr>
<td>Eastern Great Egret (as Great Egret, White Egret in PMST)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ardea ibis</td>
<td>Marine</td>
<td>Widely distributed through coastal and near-coastal Australia but a scarce visitor to southern inland Queensland (Birdlife Australia 2017). Frequent freshwater wetlands but often forages in pasture; roosts in wetlands (Pizzey and Knight 2010).</td>
<td>Potentially present. Casual visitor to the region only.</td>
</tr>
<tr>
<td>Cattle Egret</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calidris acuminata</td>
<td>Migratory, Marine</td>
<td>Passage migrant to Australia and summer resident using permanent and ephemeral shallow wetlands (Birdlife Australia 2017) including farm dams.</td>
<td>Potentially present. Potentially suitable foraging habitat is present at a farm dam within the Survey Area.</td>
</tr>
<tr>
<td>Sharp-tailed Sandpiper</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calidris ferruginea</td>
<td>Migratory, Marine</td>
<td>Passage migrant to Australia and summer resident using permanent and ephemeral shallow wetlands (Birdlife Australia 2017). Most common along or within close proximity to the coast but does occur inland (DoEE 2017b). Formerly common the species has undergone a recent decline in numbers (Garnet et al. 2011).</td>
<td>Unlikely to be present. The Survey Area is within the broader distribution of the species however no suitable wetland habitat is present within the Survey Area.</td>
</tr>
<tr>
<td>Curlew Sandpiper</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calidris melanotos</td>
<td>Migratory, Marine</td>
<td>Passage migrant to Australia and summer resident using permanent and ephemeral shallow wetlands (Birdlife Australia 2017). Most common along or within close proximity to the coast but does occur inland (DoEE 2017b).</td>
<td>Unlikely to be present. Rare visitor to the region only. The Survey Area is within the broader distribution of the species however no suitable wetland habitat is present within the Survey Area.</td>
</tr>
<tr>
<td>Pectoral Sandpiper</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cuculus optatus</td>
<td>Migratory, Marine</td>
<td>Summer migrant occurring within woodlands and open forests; distribution encompasses the Survey Area (Birdlife Australia 2017).</td>
<td>Potentially present. Rare visitor to the region only. Potentially suitable foraging habitat is present in remnant RE 11.9.2 in the Survey Area.</td>
</tr>
<tr>
<td>Oriental Cuckoo</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gallinago hardwickii</td>
<td>Migratory, Marine</td>
<td>Passage migrant from Japan in spring and autumn, using permanent and ephemeral shallow wetlands (Birdlife Australia 2017). Feeds on invertebrates found on the margins of freshwater wetlands, including artificial water-bodies (Pizzey and Knight 2010).</td>
<td>Potentially present. Potentially suitable foraging habitat is present at a farm dam within the Survey Area.</td>
</tr>
<tr>
<td>Latham’s Snipe, Japanese Snipe</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>
3.1.6 Internationally and Nationally Important Wetlands

No internationally or nationally significant wetlands are present within or in near proximity to the Survey Area. All Wetlands of International Significance identified within the PMST search are greater than 3-400 km distant from the Survey Area.

3.2 Matters of State Environmental Significance

3.2.1 Regional Ecosystems

State government-mapped RE for the Survey Area is summarised in Table 3. The Survey Area is mapped as non-remnant vegetation apart from five polygons of Mature Regrowth comprising REs 11.9.5a/11.9.5 and 11.10.1/11.10.9.

Table 3: State government-mapped remnant RE, High Value Regrowth and Mature Regrowth mapped within the Survey Area.

<table>
<thead>
<tr>
<th>Remnant / HVR</th>
<th>RE Code</th>
<th>VM Act Class</th>
<th>Biodiversity Status</th>
<th>Short Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mature Regrowth</td>
<td>11.9.5a/11.9.5</td>
<td>E/E</td>
<td>E/E</td>
<td><em>Acacia harpophylla</em> and/or <em>Casuarina cristata</em> open forest on fine-grained sedimentary rocks</td>
</tr>
<tr>
<td>Mature Regrowth</td>
<td>11.10.11/11.10.9</td>
<td>LC/LC</td>
<td>NCAP/NCAP</td>
<td><em>Eucalyptus populnea</em>, <em>E. melanophloia</em> +/- <em>Callitris glaucophylla</em> woodland on coarse-grained sedimentary rocks / <em>Callitris glaucophylla</em> woodland on coarse-grained sedimentary rocks</td>
</tr>
</tbody>
</table>

Ground-truthing within the Survey Area confirmed that it was almost entirely composed of non-remnant vegetation. Two small areas of remnant vegetation were recorded within the Survey Area both being attributable to RE 11.9.2 Appendix B; Table 4). Areas of mapped mature regrowth were noted to have been recently cleared (Figure 1b). Where dead saplings were still present the identifiable species indicated that most of this regrowth was attributable to RE 11.9.2. No regrowth constituting a Category B or C ESA (i.e. Endangered or Of Concern regrowth) occurred within the Survey Area. Ground-truthed REs identified within the Survey Area are listed within Table 3 and mapped in Appendix B.
Table 4: Ground-truthed REs present within the Survey Area.

<table>
<thead>
<tr>
<th>RE Code</th>
<th>VM Act Class</th>
<th>Biodiversity Status</th>
<th>Short Description (as per REDD)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.9.2</td>
<td>LC</td>
<td>NCAP</td>
<td>Eucalyptus melanophloia +/- E. orgadophila woodland on fine-grained sedimentary rocks</td>
<td>Two occurrences within the Survey Area represented by survey sites B01-E and Q01-E (0.0226 and 0.3433 ha respectively).</td>
</tr>
</tbody>
</table>

Structural and floristic features of REs at quaternary survey site Q01-E are provided in spatial data. BioCondition survey results for the B01-E reference site are provided in Appendix C. No BioCondition site was able to be completed at survey site Q01-E as the vegetation was not of sufficient width to incorporate the 100 m x 50 m plot. Representative images of non-remnant vegetation are shown in Figures 1a-b. Representative images for survey sites B01-E and Q01-E are shown in Figures 2a-d and 3a-d respectively.

### 3.2.2 Threatened Flora & Essential Habitat

No threatened flora listed under the NC Act were identified within searches of Wildlife Online (DEHP 2017a) and ALA (2017) flora databases. No part of the proposed infrastructure disturbance footprint or buffer was located within a High Risk Area as shown on a Protected Plants Flora Survey Trigger Map (DEHP 2017b). No Essential Habitat for flora is mapped as present within the Survey Area (DNRM 2017).

No species of NC Act listed threatened flora were detected within the Survey Area. An assessment of the likelihood of occurrence, based on field inspection results, of NC Act listed threatened flora species is summarised in Appendix D.

### 3.2.3 Special Least Concern Flora

Three species of SLC flora were detected within the Survey Area. These species are listed within Table 5. Locations of species detected within the Survey Area are shown in Appendix B.

Table 5: SLC Plants recorded within the Survey Area.

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Common Name</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brachychiton populneus</td>
<td>Kurrajong</td>
<td>Occasional in the Survey Area.</td>
</tr>
<tr>
<td>Brachychiton rupestris</td>
<td>Narrow-leaved Bottle Tree</td>
<td>Two occurrences within the Survey Area.</td>
</tr>
<tr>
<td>Santalum lanceolatum</td>
<td>Commercial Sandalwood</td>
<td>Single occurrence within the Survey Area.</td>
</tr>
</tbody>
</table>

### 3.2.4 Biosecurity Act Weeds

Weeds (invasive plants) prescribed as restricted biosecurity matter under the state Biosecurity Act detected within the Survey Area are listed in Table 6. Locations of Biosecurity Act declared plants recorded are shown within Appendix B.

Table 6: Biosecurity Act restricted invasive plants recorded within the Survey Area.

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Common Name</th>
<th>Biosecurity Act Status</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opuntia stricta</td>
<td>Common Pest Pear</td>
<td>Restricted Matter (Cat. 3)</td>
<td>Occurs throughout the Survey Area at low densities.</td>
</tr>
<tr>
<td>Opuntia tomentosa</td>
<td>Velvety Tree Pear</td>
<td>Restricted Matter (Cat. 3)</td>
<td>Occurs throughout the Survey Area at low densities.</td>
</tr>
</tbody>
</table>

### 3.2.5 Threatened Fauna & Essential Habitat

Desktop review (DSITI 2017c, ALA 2017) indicated the presence of one species of NC Act listed fauna within the search area buffer this being Golden-tailed Gecko (Strophurus taenicauda).
Yakka Skink (*Egernia rugosa*) is also known within close proximity (<3 km) to the Survey Area (BOOBOOK 2017). This species is listed as Vulnerable under both the NC Act. No Essential Habitat for threatened fauna was mapped within the Survey Area (DNRM 2017). Likelihood of occurrence assessments for other threatened fauna identified within desktop search results or which may potentially occur within the Survey Area are described within Appendix E.

### 3.2.6 Fauna Habitat Features & Potential Breeding Places

The results of fauna habitat assessments conducted at survey sites within the Survey Area have been provided within spatial data. Representative examples of hollow-bearing logs, log piles and hollow-bearing trees were recorded throughout the Survey Area (Figures 2a, b). No active fauna breeding places were identified within the Survey Area. Location of fauna habitat features and assessment sites are shown in Appendix B.

### 3.2.7 Wetlands, Lakes & Springs

No springs, lakes or Wetlands of High Ecological Significance or General Ecologically Significant wetlands as shown on a Map of Referable Wetlands (DEHP 2017c) were mapped as present within the Survey Area. No wetlands or springs were ground-truthed as being present within the Survey Area.

### 3.2.8 Watercourses & Drainage Features

Stream order 1 and 2 drainage lines are mapped as occurring within the Survey Area. Stream assessments were undertaken where these features occurred within the Survey Area. Representative images are shown at Figure 3a-f. All mapped streams were assessed to be drainage features (as defined by the *Water Act 2000*) in that they showed no evidence of prolonged flows or retention of water capable of supporting riverine ecosystems and lack of defined bed/banks.

### 3.3 Project Impacts

#### 3.3.1 Threatened Ecological Communities

The project will not impact upon any TEC.

#### 3.3.2 Threatened Flora

The project will not impact upon any known populations of EPBC and/or NC Act listed threatened flora.

#### 3.3.3 Threatened Fauna

Almost all of the Survey Area is non-remnant vegetation apart from two small areas of remnant RE 11.9.2. These two patches are 0.02260 ha (survey site B01-E) and 0.3433 ha (survey site Q01-E) respectively. Hollow-bearing trees and logs are present within both patches of remnant vegetation. This may represent General Habitat for a number of EPBC Act and/or NC Act-listed threatened fauna (see Appendix E). Construction of the proposed pipeline is likely to result in the loss of <0.3 ha of remnant vegetation which potentially constitutes fauna habitat. DOE (2013) documents a number of potential impacts on Matters of National Environmental Significance (MNES) that may result from an action (e.g. construction, operation and decommissioning of gas-field infrastructure). Threatened fauna as listed in Table 6 are at risk of significant impact if an action results in, or has a real possibility of resulting in, any of a series of adverse outcomes. Table 7 lists these outcomes (risks) and assesses the likelihood of a significant impact occurring for each of the threatened species that potentially may occur within the Study Area. Although vegetated areas immediately adjoining the Survey Area are known to support threatened fauna, no ‘important’ populations at the species level are currently known to occur within the Survey Area. Removal of <0.3 ha of remnant vegetation is not likely to result in a significant impact upon any EPBC Act and/or NC Act-listed threatened fauna.

Non-remnant areas contain few fauna habitat features apart from occasional log piles. Table 6 lists the threatened fauna which were assessed in Appendix E as being likely to occur or probably occurring in the Survey Area with a list of potential impacts and their significance.
## Table 7: Impact matrix for MNES and MSES threatened fauna potentially present within the Survey Area.

Likelihood of significant impact: U = unlikely; L = likely; N/A = not assessable

<table>
<thead>
<tr>
<th>Species</th>
<th>Lead to a long-term decrease in the size of an important population of a species</th>
<th>Reduce the area of occupancy of an important population</th>
<th>Fragment an existing important population into two or more populations</th>
<th>Adversely affect habitat critical to the survival of a species</th>
<th>Disrupt the breeding cycle of an important population</th>
<th>Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline</th>
<th>Result in invasive species that are harmful to a species becoming established in the species’ habitat</th>
<th>Introduce disease that may cause the species to decline</th>
<th>Interfere substantially with the recovery of the species</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>South-eastern Long-eared Bat <em>Nyctophilus corbeni</em></td>
<td>U</td>
<td>U</td>
<td>U</td>
<td>U</td>
<td>U</td>
<td>U</td>
<td>U</td>
<td>U</td>
<td>U</td>
<td>Presence of this species within the Survey Area has not been confirmed. Some potential loss of foraging habitat may result from clearing. The scale of clearing (&lt;0.5 ha) is unlikely to significantly affect the species. Some loss of potential roost sites may occur. The scale of clearing would not further impact on dispersal of this species and the landscape is already heavily fragmented.</td>
</tr>
<tr>
<td>Koala <em>Phascolarctos cinereus</em></td>
<td>U</td>
<td>U</td>
<td>U</td>
<td>U</td>
<td>U</td>
<td>U</td>
<td>U</td>
<td>U</td>
<td>U</td>
<td>Most of the Study Area contains poor quality Koala habitat hence an important population is unlikely to be present. There is potential for some clearing of low quality foraging habitat within remnant RE 11.9.2 however this would be &lt;0.5 ha.</td>
</tr>
<tr>
<td>Yakka Skink <em>Egernia rugosa</em></td>
<td>U</td>
<td>U</td>
<td>U</td>
<td>U</td>
<td>U</td>
<td>U</td>
<td>U</td>
<td>U</td>
<td>U</td>
<td>There is potential loss of foraging habitat as well as potential shelter sites including logs and log piles.</td>
</tr>
<tr>
<td>Species</td>
<td>Lead to a long-term decrease in the size of an important population of a species</td>
<td>Reduce the area of occupancy of an important population</td>
<td>Fragment an existing important population into two or more populations</td>
<td>Adversely affect habitat critical to the survival of a species</td>
<td>Disrupt the breeding cycle of an important population</td>
<td>Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline</td>
<td>Result in invasive species that are harmful to a species becoming established in the species’ habitat</td>
<td>Introduce disease that may cause the species to decline</td>
<td>Interfere substantially with the recovery of the species</td>
<td>Comments</td>
</tr>
<tr>
<td>-------------------------</td>
<td>--------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------</td>
<td>---------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------</td>
<td>-------------------------------------------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Dunmall’s Snake</td>
<td>U</td>
<td>U</td>
<td>U</td>
<td>U</td>
<td>U</td>
<td>U</td>
<td>U</td>
<td>U</td>
<td>U</td>
<td>Presence of this species within the Survey Area has not been confirmed. Some potential loss of shelter and foraging habitat may result from clearing (&lt;0.5 ha). The scale of clearing is unlikely to significantly affect the species.</td>
</tr>
<tr>
<td>Furina dunmali</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Golden-tailed Gecko</td>
<td>U</td>
<td>U</td>
<td>U</td>
<td>U</td>
<td>U</td>
<td>U</td>
<td>U</td>
<td>U</td>
<td>U</td>
<td>Some potential loss of shelter and foraging habitat may result from clearing (&lt;0.5 ha). The scale of clearing is unlikely to significantly affect the species.</td>
</tr>
<tr>
<td>Strophurus taenicauda</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3.3.4 Migratory and Marine Fauna

Although six migratory and nine marine EPBC Act listed fauna are either likely to or potentially occur in the Survey Area there are no known significant populations and there is no significant habitat for any of these species occurring within the Survey Area. As a result potential impacts upon migratory and marine species are likely to be minimal.

3.3.5 Fauna Habitat

The vast majority of the Survey Area has been cleared. Most fauna habitat has been removed. Two small patches of remnant vegetation (<0.5 ha) occur within the Survey Area; both contain potential fauna shelter and breeding sites including hollow-bearing trees and logs. Other isolated fauna habitat features are scattered throughout the remaining cleared portion of the Survey Area. However, the Survey Area overall has been heavily modified and impacts to fauna habitat are likely to be minimal.

3.3.6 Wetlands, Lakes and Springs

No wetlands, lakes or springs will be impacted within the Survey Area.

4. Conclusions

An ecological assessment within the Survey Area identified the following ecological values/potential constraints to be present:

MNES:
- No TECs occur within the Survey Area.
- No EPBC Act listed threatened flora was recorded within or is expected to occur within the Survey Area.
- Two WoNS occur within the Survey Area:
  - Velvety Tree Pear *Opuntia tomentosa*
  - Common Pest Pear *Opuntia stricta*.
- Potential habitat (<0.5 ha) is present for EPBC Act listed threatened fauna species including South-eastern Long-eared Bat, Koala, Yakka Skink and Dunmall’s Snake.
- No internationally or nationally significantly important wetlands occur within the Survey Area.

MSES:
- No Endangered or Of Concern REs are present within the Survey Area.
- Two small patches (totalling <0.5 ha) of a No Concern at Present RE (11.9.2) are present within the Survey Area.
- Areas of mapped mature regrowth have been cleared. No regrowth constituting a Category B ESA (i.e. endangered regrowth) occurred within the Survey Area.
- Three species of Special Least Concern flora are present within the Survey Area.
- Potential habitat (<0.5 ha) for NC Act listed threatened fauna species including Glossy Black-Cockatoo, South-eastern Long-eared Bat, Koala, Yakka Skink, Dunmall’s Snake and Golden-tailed Gecko is present within the Survey Area.
- Potential fauna breeding and/or shelter places (e.g. hollow-bearing trees, hollow logs, log piles) are present within the Survey Area.
- Two Biosecurity Act restricted invasive plants are present within the Survey Area:
  - Velvety Tree Pear *Opuntia tomentosa*
  - Common Pest Pear *Opuntia stricta*.
- No wetlands (other than a farm dam), lakes or springs occur within the Survey Area.
Six mapped streams are present within the Survey Area all of which were ground-truthed to be drainage features as per Water Act definitions.

The project will not impact upon any TECs, internationally or nationally important wetlands or other wetlands, lakes and springs. The project will not impact upon any known populations of EPBC and or NC Act listed threatened flora populations or their habitat.

A small amount (<0.3 ha) of No Concern at Present remnant vegetation (RE 11.9.2) occurs within the Survey Area. Although this remnant vegetation has the potential to support EPBC and/or NC Act listed threatened fauna construction of the pipeline is not likely to result in a significant impact upon any of these species or their habitat.

5. Recommendations

It is recommended that the findings in this report are considered during detailed development planning such that disturbance to the ecological values within the Survey Area may be avoided wherever practical. Where disturbance is unavoidable, impact mitigation measures should be implemented in accordance with the approved site environmental management plan and regulatory approval conditions.

Clearing of remnant vegetation and fauna habitat/fauna habitat features should be avoided wherever possible. Qualified fauna spotter/catchers should be engaged to assist with the capture/relocation of fauna and salvage of fauna habitat prior to and during proposed clearing within the Survey Area.

6. References


7. Figures

Figure 1a, b: Example of non-remnant vegetation within Survey Area at proposed tie-in point with CRWP and Queensland Gas Pipeline looking east (left); typical non-remnant vegetation (recently blade-ploughed) within the proposed pipeline alignment looking east (right).

Figure 2a, b: Woodland dominated by Silver-leaved Ironbark (*Eucalyptus melanophloia*) – no concern at present RE 11.9.2 at BioCondition site B01-E centre looking north (left) and east (right).

Figure 2c, d: Woodland dominated by Silver-leaved Ironbark (*Eucalyptus melanophloia*) – no concern at present RE 11.9.2 at BioCondition site B01-E centre looking south (left) and west (right).
Figure 3a, b: Woodland dominated by Mountain Coolibah (*E. orgadophila*) – no concern at present RE 11.9.2 narrow strip at quaternary survey site Q01-E looking north (left) and east (right).

Figure 3c, d: Woodland dominated by Mountain Coolibah (*E. orgadophila*) – no concern at present RE 11.9.2 narrow strip at quaternary survey site Q01-E looking south (left) and west (right).

Figure 4a, b: Example fauna habitat features within the Survey Area – a log pile (left) and hollow-bearing tree (right).
Figure 5a, b: Stream assessment sites W01-E looking upstream (left) and W02-E looking upstream (right).

Figure 5c, d: Stream assessment sites W03-E looking downstream (left) and W04-E looking upstream (right).

Figure 5e, f: Stream assessment sites W05-E looking downstream (left) and W06-E looking upstream (right).
Appendix A. Desktop Assessment Results for the Survey Area.
Appendix A: Desktop Assessment Results for the Survey Area.

Legend
- Survey Area
- Endangered, Dominant
- Endangered, Sub-dominant
- Of Concern, Dominant
- No Concern At Present
- Essential Habitat
- Mature Regrowth
- High Ecological Significance (HES) Wetland
- General Ecological Significance (GES) Wetland
- Protected Plants Flora Trigger
- High-Risk Area

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Credits: Source: Enviropix; Data: DigitalEyes; Cardface; Earthview Geographics; ONSW; WWF; UOOS; QLD; QGC; Giscon; Amapnet; RSPB; WWF; GIS; ERMA; IDI; ERMA; ESRI; NSW; NES; QGMAP; GoMA; NMA; Innesman; FFCorp.

The Site
- Roma

Brisbane

Map No: E005
Date: 28/3/2017
Checked: P. Kylemore
Approved: C. Edie
Scale: 1:10,000 @ A3
Datum: GDA94

Rev 0 22
Appendix B.  Ground-truthed Features Occurring within the Survey Area.
Appendix B: Ground-truthed Features Occurring within the Survey Area.

- **Habitat Features**
  - Decorticated trees
  - Log with hollows
  - Stay with hollows
  - Tree with hollows
  - Windrowed timber pile

- **Special Least Concern Flora**
  - Karrajong (Brachychiton populneus)
  - Narrow-leaved Bottle Tree (Brachychiton rupestris)
  - Sandalwood (Santalum lanceolatum)

- **WoNS & Biosecurity Act Invasive Plants**
  - Common Pest Pear (Opuntia stricta)
  - Vellutty Tree Pear (Opuntia stricta)

**Legend**
- Survey Area
- Eos Export Pipeline
- Eos Export Pipeline Facility
- Existing Third party Pipeline
- Property Boundary
- Ground-truthed Regional Ecosystems (Biodiversity Status)
  - Remnant, No Concern At Present

**Map Credits**
- Survey: Ecological Assessment Report – Eos Export Pipeline
- Cartography: Tetra Tech
- Drawn: R. Arthorne
- Scale: 1:250,000 A1
- Date: 11/11/2012
- Approved: C. Oake
- Stormwater, Riparian, EIA-RA, AWA, and the Gas Line Community

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**Revision History**
- Rev 0
**ECOLOGICAL ASSESSMENT REPORT – EOS EXPORT PIPELINE**

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### BIOCONDITION REFERENCE DATASHEET

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site ID</td>
<td>B01-E</td>
</tr>
<tr>
<td>Entered</td>
<td>26</td>
</tr>
<tr>
<td>Date</td>
<td>08/06/2017 09:54</td>
</tr>
<tr>
<td>Approved</td>
<td>Rose Althorpke, Craig Eddie</td>
</tr>
<tr>
<td>Full Reference Site?</td>
<td>✓</td>
</tr>
<tr>
<td>Partial Reference Site?</td>
<td>✓</td>
</tr>
<tr>
<td>Native plant spp. richness</td>
<td>✓</td>
</tr>
<tr>
<td>Coarse woody debris</td>
<td>✓</td>
</tr>
<tr>
<td>Tree canopy height</td>
<td>✓</td>
</tr>
<tr>
<td>Litter cover</td>
<td>✓</td>
</tr>
<tr>
<td>Tree canopy cover</td>
<td>✓</td>
</tr>
<tr>
<td>Native perennial grass cover</td>
<td>✓</td>
</tr>
<tr>
<td>Shrub layer cover</td>
<td>✓</td>
</tr>
<tr>
<td>Large trees</td>
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</tr>
</tbody>
</table>

### SITE INFORMATION:

#### 100 X 50m AREA:

<table>
<thead>
<tr>
<th>Location (GPS Reference):</th>
<th>Bioregion 11. Brigalow Belt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Datum</td>
<td>AGDA94 (WGS84)</td>
</tr>
</tbody>
</table>
| Road                           | Easting: 702261, Northing: 7085693, Accuracy: 5
| Plot origin                    | Zone: 55, Easting: 702264, Northing: 7085745, Accuracy: 5 |
| Plot bearing                   | N, Plot alignment description: Follows corridor of vegetation in gully |
| Locality description (include tenure and reserve number): | "Mt Hope" Lot 66W762 |

### REGIONAL ECOSYSTEM AND TREE HEIGHT:

- **Habitat description:** Eucalyptus melanophloia woodland with associated Callitris gracilis, midlayer composed of Geijera parviflora, other mixed softwood species and Carex crustata; grassy ground layer dominated by Carex caespitosa and Megathynus maximus.
- **Regional ecosystem:** 11.9.2
- **Median tree canopy height (m):** 13
- **Emergent ht (m):** 32
- **Subcanopy ht (m):** 0

### LANDFORM:

- **Slope position:** Gully (G)
- **Slope angle:** 7
- **Slope Aspect:** 5

### SITE PHOTOS:

- **Plot center:** North BBK6_7522, South BBK6_7525, East BBK6_7524, West BBK6_7526, Other BBK6_7522

### DISTURBANCE:

- **Type:** Wildfire, Prescribed burn, Logging, Treatment, Grazing, Non-native plant cover, Erosion, Regeneration, Storm, Other (Specify): 0

### 100 X 50m AREA: TREE SPP. RICHNESS:

- **Tree species:** Eucalyptus melanophloia, Callitris gracilis, Geijera parviflora, Notelaea microcarpa, Elaeocarpus australis, Arctocyton pubescens, Brachychiton rupestris, Brachychiton populneus, Brachyotum incana, Eremophila mitriformis, Acacia seilbeckii, Acacia diversifolia, Eremaea membranacea
- **Tree spp. count:** 14

### 50 X 20m AREA: COARSE WOODY DEBRIS:

- **Specimen length (mm):** 50
- **Site total (m):** 35.5

### 50 X 10m AREA: NATIVE PLANT SPECIES RICHNESS:

- **Total:** 11

---

**Rev 0**

26
### BIOCONDITION REFERENCE CONDITION cont.

#### 10 X 10m PLOTS: GROUND COVER

<table>
<thead>
<tr>
<th>Ground cover type</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Native perennial (preferred and intermediate) grass</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Native non-preferred grass (if relevant)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Native forbs and other species (non-grass)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Native Shrubs (&lt; 1m height)</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Non-native grass</td>
<td>15%</td>
<td>20%</td>
<td>8%</td>
<td>3%</td>
<td>12%</td>
<td>12%</td>
</tr>
<tr>
<td>Non-native forbs and shrubs</td>
<td>3%</td>
<td>1%</td>
<td>1%</td>
<td>1%</td>
<td>1%</td>
<td>1%</td>
</tr>
<tr>
<td>Litter</td>
<td>40%</td>
<td>74%</td>
<td>10%</td>
<td>5%</td>
<td>78%</td>
<td>41%</td>
</tr>
<tr>
<td>Rock</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Bare ground</td>
<td>42%</td>
<td>5%</td>
<td>81%</td>
<td>91%</td>
<td>9%</td>
<td>46%</td>
</tr>
<tr>
<td>Cryptograms</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

#### 100 X 50m AREA: LARGE TREES

<table>
<thead>
<tr>
<th>Species</th>
<th>Euc (G) or Non-Euc (N)</th>
<th>Diam (cm)</th>
<th>Diameter at breast height (1.3m) (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eucalyptus melanophloia</td>
<td>E</td>
<td>33, 45, 40, 31, 42, 36, 39, 45, 51, 65, 43, 41, 51, 50, 34, 47, 31, 41, 16, 55, 26, 50</td>
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</tr>
<tr>
<td>Calitris glauccophylla</td>
<td>N</td>
<td>28, 22, 30, 32, 39, 36, 37, 30, 26, 31, 27, 28, 24, 27, 32, 30, 31, 27, 23, 21, 26, 21, 26, 27, 23, 26</td>
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<table>
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<tr>
<th>Average DBH (threshold)</th>
<th>Eucalypt benchmark</th>
<th>42 cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of trees &gt;= BM</td>
<td>11</td>
<td>22</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Average DBH (threshold)</th>
<th>Non-Eucalypt benchmark</th>
<th>28 cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of trees &gt;= benchmark</td>
<td>14</td>
<td>28</td>
</tr>
</tbody>
</table>

#### 100m TRANSECT: TREE AND SHRUB CANOPY COVER

<table>
<thead>
<tr>
<th>Type</th>
<th>Distance (m)</th>
<th>Total (m)</th>
<th>Type</th>
<th>Distance (m)</th>
<th>Total (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>18.2</td>
<td>25.0</td>
<td>C</td>
<td>28.9</td>
<td>38.8</td>
</tr>
<tr>
<td>C</td>
<td>77.4</td>
<td>86.3</td>
<td>C</td>
<td>90.1</td>
<td>100.0</td>
</tr>
<tr>
<td>S</td>
<td>66.2</td>
<td>67.0</td>
<td>S</td>
<td>66.2</td>
<td>67.0</td>
</tr>
</tbody>
</table>

- Canopy total: 53.4 m
- Subcanopy total: 14 m
- Shrub total: 12 m
Appendix D. Likelihood of Occurrence Assessment for MNES and MSES Threatened Flora Potentially Occurring within the Survey Area.
### Ecological Assessment Report – Eos Export Pipeline

**Key**: NC Act = *Nature Conservation Act 1992* (Qld); EPBC Act = *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth); E = endangered; V = vulnerable; NT = near threatened. Possible: <50% likelihood of occurrence; Probable: 50-90% likelihood of occurrence; Likely: >90% likelihood of occurrence.

<table>
<thead>
<tr>
<th>Family</th>
<th>Scientific/ Common Name</th>
<th>EPBC Act Status</th>
<th>NC Act Status</th>
<th>General Habitat Requirements</th>
<th>Potentially Suitable RE</th>
<th>Likelihood of Occurrence</th>
<th>Field Survey Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apocynaceae</td>
<td>Tylophora linearis</td>
<td>E</td>
<td>E</td>
<td>Dry sclerophyll woodland (TSSC 2008a). The Survey Area is &gt;100 km north of the only collection site in Queensland (DSITI 2017b).</td>
<td>11.9.2</td>
<td>Unlikely to be present. Potentially suitable habitat (i.e. dry sclerophyll woodland) is present but the species has only been collected once in Queensland near Glenmorgan.</td>
<td>Not recorded within the Survey Area.</td>
</tr>
<tr>
<td></td>
<td>Slender Tylophora</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poaceae</td>
<td>Dichanthium setosum</td>
<td>V</td>
<td></td>
<td>Occurs in Queensland and north-eastern NSW (ALA 2017). In Queensland, it is patchily recorded from Toowoomba in the south to the upper Burdekin River catchment in the north. It grows on basaltic black clays and hard-setting red-brown loams (DoEE 2017a) in woodland or open grassy woodland dominated by Brigalow (<em>Acacia harpophylla</em>) and/or eucalypt species (DSITI 2017b). In Queensland and NSW it has also been found in moderately disturbed areas such as cleared woodland, grassy roadside remnants and highly disturbed pasture (DoEE 2017a).</td>
<td>Unknown in Survey Area</td>
<td>Unlikely to be present. Although potentially suitable habitat is present this species is not currently known from at or near the Survey Area. Specimen records closest to the Survey Area occur at Carnarvon NP and the Springsure / Emerald area (ALA 2017, DSITI 2017b).</td>
<td>Not recorded within the Survey Area.</td>
</tr>
<tr>
<td></td>
<td>Bluegrass</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Poaceae</td>
<td>Homopholis belsonii</td>
<td>V</td>
<td>E</td>
<td>In Brigalow Belt usually found on flat to gently undulating alluvial areas/clay plains supporting <em>Casuarina cristata</em> and <em>Acacia harpophylla</em> forest (DoEE 2017b, TSSC 2008b) where it grows preferentially in shaded areas. Other associated species include <em>Eucalyptus populnea</em>, <em>E. melanophloia</em>, <em>A. melvillei</em> and <em>Geijera parviflora</em> (DSITI 2017b).</td>
<td>nil</td>
<td>Unlikely to be present. No suitable habitat is present within the Survey Area. Records closest to the Survey Area occur 30 km to the south (ALA 2017, DSITI 2017b).</td>
<td>Not recorded within the Survey Area.</td>
</tr>
<tr>
<td></td>
<td>Belson’s Panic</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Solanaceae</td>
<td>Solanum stenopterum</td>
<td>-</td>
<td>V</td>
<td>Inhabits grassland or woodlands of Belah (<em>Casuarina cristata</em>) and Poplar Box (<em>Eucalyptus populnea</em>) on black, brown or red clay loam soils. It also grows on loamy ridges, along roadsides and in paddocks. (Bean 2004).</td>
<td>nil</td>
<td>Unlikely to be present. Suitable habitat is present within the Survey Area. Records closest to the Survey Area occur 58 km to the southeast (ALA 2017, DSITI 2017b).</td>
<td>Not recorded within the Survey Area.</td>
</tr>
<tr>
<td></td>
<td>Winged Nightshade</td>
<td></td>
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</tbody>
</table>

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<table>
<thead>
<tr>
<th>Family</th>
<th>Scientific/ Common Name</th>
<th>EPBC Act Status</th>
<th>NC Act Status</th>
<th>General Habitat Requirements</th>
<th>Potentially Suitable RE</th>
<th>Likelihood of Occurrence</th>
<th>Field Survey Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surianaceae</td>
<td><em>Cadellia pentastylis</em></td>
<td>V</td>
<td>V</td>
<td>Occurs on ridge slopes and undulating plains within Brigalow (<em>Acacia harpophylla</em>) woodland - open forest and semi-evergreen vine thicket (SEVT) (TSSC 2008c, Santos 2012).</td>
<td>nil</td>
<td>Unlikely to be present.</td>
<td>Not recorded within the Survey Area.</td>
</tr>
<tr>
<td></td>
<td>Ooline</td>
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Unlikely to be present.
No suitable habitat is present within the Survey Area. Specimen records closest to the Survey Area occur 60 km to the east-northeast (ALA 2017, DSITI 2017b).
Appendix E. Likelihood of Occurrence Assessment for MNES and MSES Threatened Fauna Potentially Occurring within the Survey Area.
### Ecological Assessment Report – Eos Export Pipeline

**Key:** NC Act = *Nature Conservation Act 1992* (Qld); EPBC Act = *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth); E = endangered; V = vulnerable; NT = near threatened; SLC = special least concern. Possible: <50% likelihood of occurrence; Probable: 50-90% likelihood of occurrence; Likely: >90% likelihood of occurrence.

<table>
<thead>
<tr>
<th>Class</th>
<th>Scientific Name</th>
<th>Common name</th>
<th>Status</th>
<th>Distribution and General Habitat Requirements</th>
<th>Likelihood of Occurrence</th>
<th>Field Survey Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birds</td>
<td>Calyptorhynchus lathami</td>
<td>Glossy Black-Cockatoo</td>
<td>V</td>
<td>The Survey Area is within the known range of the species (Birdlife Australia 2017). Dependent on the fruits of several species of <em>Casuarina</em> and <em>Allocasuarina</em> spp. and occurs in a variety of forest types (Pizzey and Knight 2010, Garnett <em>et al</em>. 2011). It will visit isolated trees and remnant patches where food trees are present (Holmes 2012). Nesting habitat is hollow-bearing live or dead trees (Higgins 1999).</td>
<td>Unlikely to be present. Food trees (<em>Casuarina cristata</em>, <em>Allocasuarina huehnnii</em>) and potential nesting resources (i.e. tree hollows) are in very low abundance present within the Survey Area.</td>
<td>Not recorded within the Survey Area.</td>
</tr>
<tr>
<td>Birds</td>
<td>Calidris ferruginea</td>
<td>Curlew Sandpiper</td>
<td>SLC</td>
<td>The broader range of this species incorporates the Survey Area (Birdlife Australia 2017). Passage migrant to Australia and summer resident using permanent and ephemeral shallow wetlands (Birdlife Australia 2017). Most common along or within close proximity to the coast but does occur inland (DoEE 2017b). Formerly common the species has undergone a recent decline in numbers (Garnett <em>et al</em>. 2011).</td>
<td>Unlikely to be present. The Survey Area is within the broader distribution of the species however no suitable wetland habitat is present within the Survey Area.</td>
<td>Not recorded within the Survey Area.</td>
</tr>
<tr>
<td>Birds</td>
<td>Erythtratriorchis radiatus</td>
<td>Red Goshawk</td>
<td>E</td>
<td>The Survey Area is on the margin of the species’ broader range (Birdlife Australia 2017). A highly mobile species with a large home range; breeding habitat is in intact tall forest associated with major drainage lines, especially near permanent water bodies and where there is high avian prey diversity, but the species could potentially forage much further away from these areas (Marchant and Higgins 1993).</td>
<td>Unlikely to be present. Although the Survey Area contains a small amount of potentially suitable foraging habitat there are no recent records at or near the Survey Area (Birdlife Australia 2017).</td>
<td>Not recorded within the Survey Area.</td>
</tr>
<tr>
<td>Birds</td>
<td>Geophaps scripta scripta</td>
<td>Squatter Pigeon (southern)</td>
<td>V</td>
<td>The Survey Area is within the historical range of the species (Birdlife Australia 2007). Inhabits grassy woodlands with open areas for foraging habitat usually within proximity to a nearby water source (Higgins and Davies 1996).</td>
<td>Unlikely to be present. Although the Survey Area contains potentially suitable foraging habitat there are no recent records at or near the Survey Area (Birdlife Australia 2017).</td>
<td>Not recorded within the Survey Area.</td>
</tr>
<tr>
<td>Class</td>
<td>Scientific Name</td>
<td>Common name</td>
<td>Status</td>
<td>NC Act</td>
<td>EPBC Act</td>
<td>Distribution and General Habitat Requirements</td>
</tr>
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<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Birds</td>
<td><em>Grantiella picta</em></td>
<td>Painted Honeyeater</td>
<td>V</td>
<td>-</td>
<td></td>
<td>The Survey Area is within the species known range (Birdlife Australia 2017); lives/breeds in woodlands and open forests with high densities of suitable food plants (mistletoes, family Loranthaceae) (Higgins et al. 2001).</td>
</tr>
<tr>
<td>Birds</td>
<td><em>Neochmia ruficauda ruficauda</em></td>
<td>Star Finch (eastern, southern)</td>
<td>E</td>
<td>E</td>
<td></td>
<td>The Survey Area is within the species’ known historical range (Birdlife Australia 2017) but the subspecies is possibly extinct (Garnett et al. 2011). Formerly used tall grasslands associated with watercourses (DoEE 2017b).</td>
</tr>
<tr>
<td>Birds</td>
<td><em>Rostratula australis</em></td>
<td>Australian Painted Snipe</td>
<td>V</td>
<td>E</td>
<td></td>
<td>The Survey Area is within the species’ known range (Birdlife Australia 2017); forages at shallow edges and adjacent vegetated margins of freshwater wetlands (DoEE 2017b).</td>
</tr>
<tr>
<td>Fish</td>
<td><em>Maccullochella peelii</em></td>
<td>Murray Cod</td>
<td></td>
<td>V</td>
<td></td>
<td>In Queensland naturally-occurring populations of this species are confined to permanent water in riverine environments in the Condamine, Maranoa-Balonne, Weir and Moowie River catchments (Lintermans 2007).</td>
</tr>
<tr>
<td>Insects</td>
<td><em>Jalmenus eubulus</em></td>
<td>Pale Imperial Hairstreak</td>
<td>V</td>
<td>-</td>
<td></td>
<td>The Survey Area is within the species’ known range (Braby 2000). Adults and larvae usually associated with Brigalow (<em>Acacia harpophylla</em>) open forests and woodlands (Valentine and Johnson 2012).</td>
</tr>
<tr>
<td>Mammals</td>
<td><em>Chalinolobus dwyeri</em></td>
<td>Large-eared Pied Bat</td>
<td>V</td>
<td>V</td>
<td></td>
<td>The Survey Area is within the species’ broader range (Churchill 2008); inhabits woodlands and roosts primarily in caves/rock crevice (DoEE 2017b). All known occurrences of this species are within or near forested landscapes with relatively high relief (DSITI 2017e).</td>
</tr>
<tr>
<td>Class</td>
<td>Scientific Name</td>
<td>Common name</td>
<td>Status</td>
<td>Distribution and General Habitat Requirements</td>
<td>Likelihood of Occurrence</td>
<td>Field Survey Results</td>
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<td>------------------------------------------</td>
</tr>
<tr>
<td>Mammals</td>
<td><em>Dasyurus hallucatus</em></td>
<td>Northern Quoll</td>
<td>LC</td>
<td>Formerly widespread in south-central Queensland this species has declined markedly and is now confined to rugged and remote areas throughout its distribution (Burnett 2012). The Survey Area is within the species' historical range (Oakwood 2008). Occurs in forested uplands with high relief and/or containing abundant rock outcrops and other den sites (DoEE 2017b).</td>
<td>Unlikely to be present. Although the Survey Area is within the historical distribution of the species there are no recent records of the species.</td>
<td>Not recorded within the Survey Area.</td>
</tr>
<tr>
<td>Mammals</td>
<td><em>Nyctophilus corbeni</em></td>
<td>South-eastern Long-eared Bat</td>
<td>V</td>
<td>The Survey Area is within the species’ known range (Churchill 2008). Inhabits woodlands and roosts in tree hollows and crevices and under loose bark (DoEE 2017b).</td>
<td>Possible. The Survey Area is within the species range, contains potentially suitable woodland foraging habitat and contains some potential shelter sites (i.e. hollow-bearing trees).</td>
<td>Not recorded within the Survey Area.</td>
</tr>
<tr>
<td>Mammals</td>
<td><em>Petauroides volans</em></td>
<td>Greater Glider</td>
<td>V</td>
<td>The Survey Area is on the margin of the species’ broader range (ALA 2017). Occurs in eucalypt woodlands and open forest particularly those containing large hollows (TSSC 2016).</td>
<td>Unlikely to be present. The Survey Area contains limited suitable habitat.</td>
<td>Not recorded within the Survey Area.</td>
</tr>
<tr>
<td>Mammals</td>
<td><em>Phascolarctos cinereus</em></td>
<td>Koala</td>
<td>V</td>
<td>The Survey Area is within the species’ known range (Martin et al. 2008). Requires eucalypt woodland and forest habitat with suitable food trees (primarily Eucalyptus spp.) (DoEE 2017b).</td>
<td>Possible. The Survey Area contains small areas of woodland dominated by Myrtaceae spp. and several potential food plants are present (e.g. Eucalyptus populnea, E. melanophloia, E. orgadophila).</td>
<td>Not recorded within the Survey Area.</td>
</tr>
<tr>
<td>Reptiles</td>
<td><em>Acanthophis antarcticus</em></td>
<td>Common Death Adder</td>
<td>V</td>
<td>The Survey Area is within the species’ historical range (Wilson 2015). Occupies woodlands, open forests, heathlands, requires abundant shelter/ambush predation cover e.g. low shrubs, rocks, logs, dense leaf litter (Wilson 2015). Has undergone significant local decline in range and abundance.</td>
<td>Unlikely to be present. Habitat within the Survey Area does not contain suitable shelter sites.</td>
<td>Not recorded within the Survey Area.</td>
</tr>
<tr>
<td>Class</td>
<td>Scientific Name</td>
<td>Common name</td>
<td>Status</td>
<td>Distribution and General Habitat Requirements</td>
<td>Likelihood of Occurrence</td>
<td>Field Survey Results</td>
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</tr>
<tr>
<td>Reptiles</td>
<td>Delma torquata</td>
<td>Collared Delma</td>
<td>V V</td>
<td>Within species known/predicted range (DSEWPaC 2011) though occupancy within range apparently patchy; occupies eucalypt woodlands and open forests; lives under surface rock and large woody debris (Wilson 2015).</td>
<td>Unlikely to be present. Habitat within the Survey Area does not contain suitable shelter sites.</td>
<td>Not recorded within the Survey Area.</td>
</tr>
<tr>
<td>Reptiles</td>
<td>Denisonia maculata</td>
<td>Ornamental Snake</td>
<td>V V</td>
<td>The Survey Area is not within the known range of the species (ALA 2017). Preys on frogs and is associated with ephemeral and permanent wetlands where it shelters in soil cracks and under debris e.g. logs, rocks (Wilson 2005, DoEE 2017b).</td>
<td>Unlikely to be present. The Survey Area is outside the species’ range and does not contain suitable habitat with cracking clays or gilgais.</td>
<td>Not recorded within the Survey Area.</td>
</tr>
<tr>
<td>Reptiles</td>
<td>Egernia rugosa</td>
<td>Yakka Skink</td>
<td>V V</td>
<td>The Survey Area is within the species’ known range (Wilson 2015); lives in woodland and open forests, also grassland with regrowth trees; requires suitable soils for burrows, sinkholes, abandoned rabbit warrens or large fallen woody material for shelter (Eddie 2012).</td>
<td>Possible. The Survey Area contains potentially suitable shelter sites (e.g. log piles).</td>
<td>Not recorded within the Survey Area.</td>
</tr>
<tr>
<td>Reptiles</td>
<td>Furina dunmalli</td>
<td>Dunmall’s snake</td>
<td>V V</td>
<td>The Survey Area is within the species’ known range (DSEWPaC 2011). Occupies woodlands and open forests, may be reliant on presence of abundant fallen woody debris (Hobson 2012a).</td>
<td>Possible. The Survey Area is within the species range, contains potentially suitable woodland foraging habitat and contains potential shelter sites (e.g. log piles).</td>
<td>Not recorded within the Survey Area.</td>
</tr>
<tr>
<td>Reptiles</td>
<td>Hemiaspis damelii</td>
<td>Grey Snake</td>
<td>E -</td>
<td>The Survey Area is at the margin of the species’ known range (Wilson 2015, ALA 2017). Strongly associated with seasonally inundated plains, especially those with cracking clays and gilgai development (Hobson 2012b).</td>
<td>Unlikely to be present. The survey Area is within the species range but does not contain potentially suitable substrate (i.e. soil cracks).</td>
<td>Not recorded within the Survey Area.</td>
</tr>
<tr>
<td>Reptiles</td>
<td>Rheodytes leukops</td>
<td>Fitzroy River Turtle</td>
<td>V V</td>
<td>The Survey Area is outside the known species’ range (ALA 2017). Dependent on permanent streams with a preference for deep pools often with intervening riffle zones (DoEE 2017b). Not recorded from the Maranoa-Balonne River catchment (Limpus et al. 2011).</td>
<td>Unlikely to be present. No suitable riverine habitat is available within the Survey Area and the species is not known to occur outside the Fitzroy River catchment.</td>
<td>Not recorded within the Survey Area.</td>
</tr>
<tr>
<td>Class</td>
<td>Scientific Name</td>
<td>Common name</td>
<td>Status</td>
<td>Distribution and General Habitat Requirements</td>
<td>Likelihood of Occurrence</td>
<td>Field Survey Results</td>
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</tr>
<tr>
<td>Reptiles</td>
<td><em>Strophurus taenicauda</em></td>
<td>Golden-tailed Gecko</td>
<td>NT</td>
<td>Within species known range (Wilson 2005, DSITI 2017c). Lives in dry open forest and woodlands, especially those with well-developed shrub layer; shelters in tree hollows and splits, under loose bark (QMDC 2008).</td>
<td>Possible. The Survey Area is within the species range and contains potentially suitable woodland foraging habitat. Recorded within close proximity to the Survey Area (DSITI 2017c).</td>
<td>Not recorded within the Survey Area.</td>
</tr>
</tbody>
</table>