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Ecological Assessment Report - Lot 8
AB200 & Lot 20 FTY1805

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Document prepared by:



Aurecon Australia Pty Ltd
 ABN 54 005 139 873
 Level 14, 32 Turbot Street
 Brisbane QLD 4000
 Locked Bag 331
 Brisbane QLD 4001
 Australia

T +61 7 3173 8000
F +61 7 3173 8001
E brisbane@aurecongroup.com
W aurecongroup.com

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Name		Kellie Butler	Name		Jane Stark
Title		Ecologist	Title		Environmental Scientist

Fairview Gas Fields

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Aurecon Australia Pty Ltd
ABN 54 005 139 873
Level 14, 32 Turbot Street
Brisbane QLD 4000
Locked Bag 331
Brisbane QLD 4001
Australia

T +61 7 3173 8000
F +61 7 3173 8001
E brisbane@aurecongroup.com
W aurecongroup.com



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1 Background

1.1 Project description

Santos Ltd (Santos) have commissioned Aurecon Australia Pty Ltd (Aurecon) to undertake ecological investigations of proposed areas for the construction of water and gas gathering networks within the Fairview gas fields.

The Fairview gas fields are centred around the Injune area and are characterised by elevated sandstone ranges including the Carnarvon and Expedition Ranges and part of the Mount Hutton and Kongabula Ranges. The Dawson River and other smaller watercourses drain into this area and the vegetation is dominated by Eucalyptus and White Cypress Pine woodland, Brigalow and Semi-evergreen Vine Thicket (Eddie, 2012).

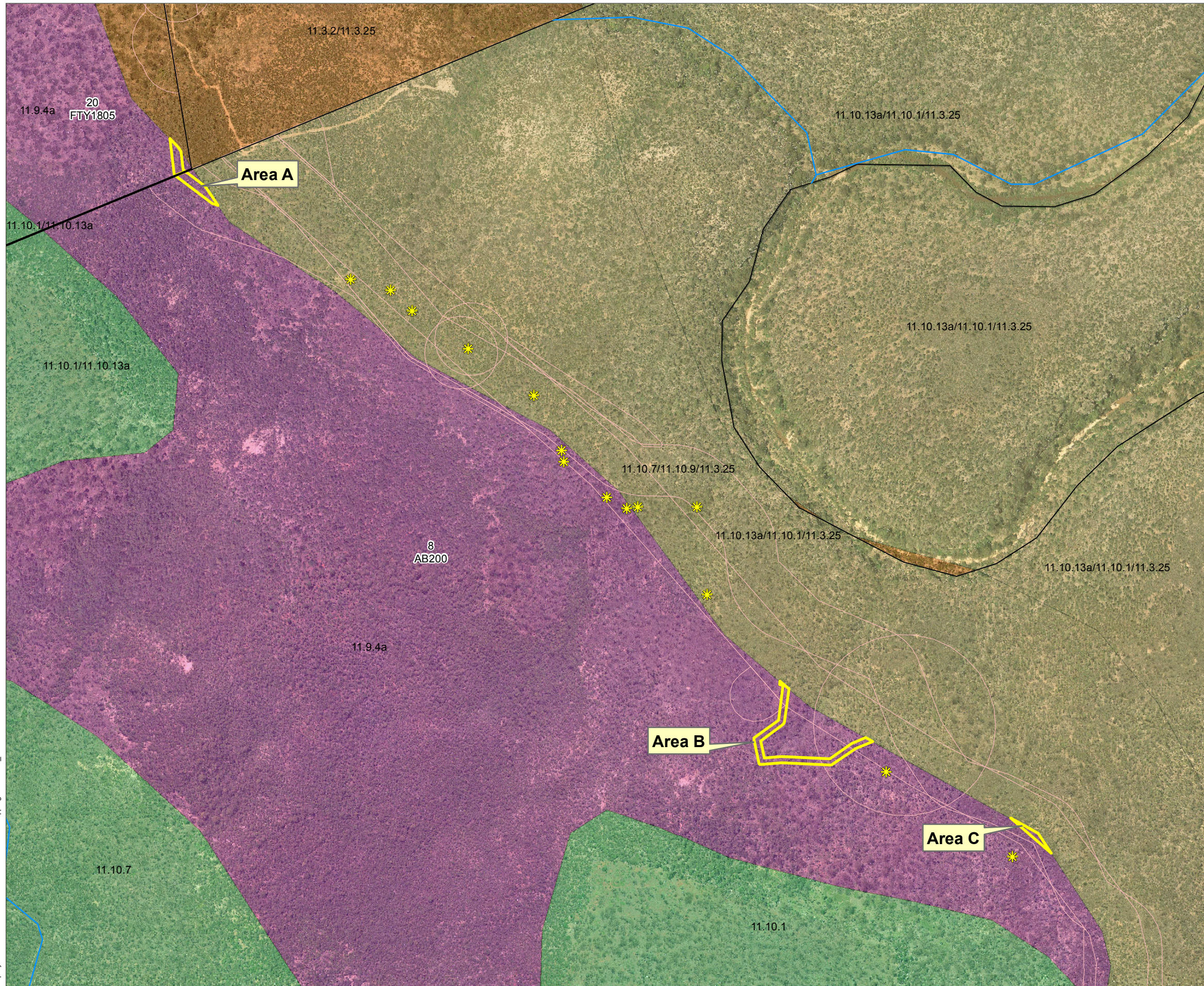
Much of this area has been subjected to cattle grazing and other agricultural practices as well as previous development associated with the gas fields.

This report is specific to the proposed development areas within Lot 8 on AB200 and Lot 20 on FTY1805. It is important to note that an ecological assessment has not been undertaken for the entire proposed alignment and only for the proposed development areas shown in Figure 1.1.

1.2 Purpose of report

The aim of this report is to provide an ecological assessment of the proposed development areas associated with the construction of water and gas gathering networks located on Lot 8 AB200 and Lot 20 FTY1805. As part of this assessment, identification of areas and species of notable ecological or conservation value (ie 'endangered', 'vulnerable', 'near threatened' or 'Type A restricted plant' species as listed under the provisions of the *Nature Conservation Act 1992* [NC Act] or 'critically endangered', 'endangered' or 'vulnerable' species as listed under the provisions of the *Environment Protection and Biodiversity Conservation Act 1999* [EPBC Act]) will be undertaken. This assessment also includes confirmation of the extent of mapped Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions (SEVT), listed as 'endangered' under the provisions of the EPBC Act.

This report does not make any recommendations regarding the proposed development in relation to any Santos Environmental Authorities or other specific approvals.



Legend

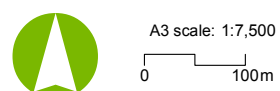
- Notable Species
- Areas requiring RE confirmation
- Drainage (100K)
- Upstream ground truth areas
- Regional Ecosystem (Biodiversity Status)**
- Endangered - Dominant
- Of Concern - Dominant
- Of Concern - Sub-dominant
- Not of Concern

Notes:

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Santos Ecological Assessment Report 8AB200 and 20FTY1805

Figure 1.1: Overview Map



2 Methodology

2.1 Desktop methodology

The proposed development areas were projected on a range of maps provided by Santos. These maps include Regional Ecosystem (RE) Mapping (version 6.1; Department of Environment and Heritage Protection [DEHP]), Environmentally Sensitive Areas (ESA) mapping, drainage mapping and aerial photography. These resources were reviewed to determine the target areas for the field inspection.

It is important to note that the project is not assessable under the *Sustainable Planning Act 2009* (SPA) (and subsequently the *Vegetation Management Act 1999* [VM Act]). The project is however assessable under the *Environmental Protection Act 1994* (EP Act), and therefore the RE classifications used in this report are based on the 'Biodiversity Status' of the vegetation and not the 'Vegetation Management Status' of the vegetation.

2.2 Field methodology

The ecological investigations of the proposed development areas were undertaken on 19 and 20 June 2012, by two Aurecon ecologists (Hayley Poole and Kellie Butler). Maps identifying environmental constraints (eg RE Mapping, ESA mapping etc), as well as high resolution aerial photography, as well as the areas of proposed disturbance, were uploaded onto a 'Toughbook' and taken into the field.

In accordance with the requirements of the NC Act exemption, all 'Least Concern' flora species were recorded within the area of proposed disturbance. In addition, all fauna species located within or immediately adjacent to the areas of proposed disturbance were recorded. Verification of the DEHP certified RE mapping was also undertaken. Conservation significant flora species or species unable to be identified in the field were collected for submission to the Queensland Herbarium for identification/species confirmation. All species known to be of conservation significance were recorded using the Toughbook.

3 Ecological assessment

3.1 Area A

3.1.1 General

The proposed development area within Area A is located across Lot 8 AB200 and Lot 20 FTY1805 (Figure 1.1). The area is currently mapped as 'endangered' RE 11.9.4a on the DEHP certified RE map. This area is therefore classified a 'Category B' ESA.

However, field investigations confirmed that the vegetation contained within Area A is not consistent with the description of RE 11.9.4a and therefore the mapping is considered to be erroneous. The vegetation contained within Area A is considered to be analogous to a heterogeneous RE polygon consisting of 60% 'no concern at present' RE 11.10.7 and 40% 'no concern at present' RE 11.10.1. This is due to the species composition present on the site. In addition, the land zone of the area is analogous to medium coarse-grained sedimentary rock (ie land zone 10).

A Regional Ecosystem Amendment Report is currently in preparation to change this RE code and will be submitted to the Department of Natural Resources and Mines (DNRM) for approval, on behalf of Santos. These RE codes are described in Table 3.1.

Table 3.1 Regional Ecosystem descriptions

Regional Ecosystem	Description (adapted from REDD 2011 version 6.0b).	Biodiversity Status
11.3.25	<i>Eucalyptus tereticornis</i> or <i>E. camaldulensis</i> woodland fringing drainage lines	'of concern'
11.9.4a	Semi-evergreen vine thicket on fine-grained sedimentary rocks	'endangered'
11.10.1	<i>Corymbia citriodora</i> open forest on coarse-grained sedimentary rocks	'no concern at present'
11.10.7	<i>Eucalyptus crebra</i> woodland on coarse-grained sedimentary rocks	'no concern at present'
11.10.9	<i>Callitris glaucophylla</i> woodland on coarse-grained sedimentary rocks	'no concern at present'

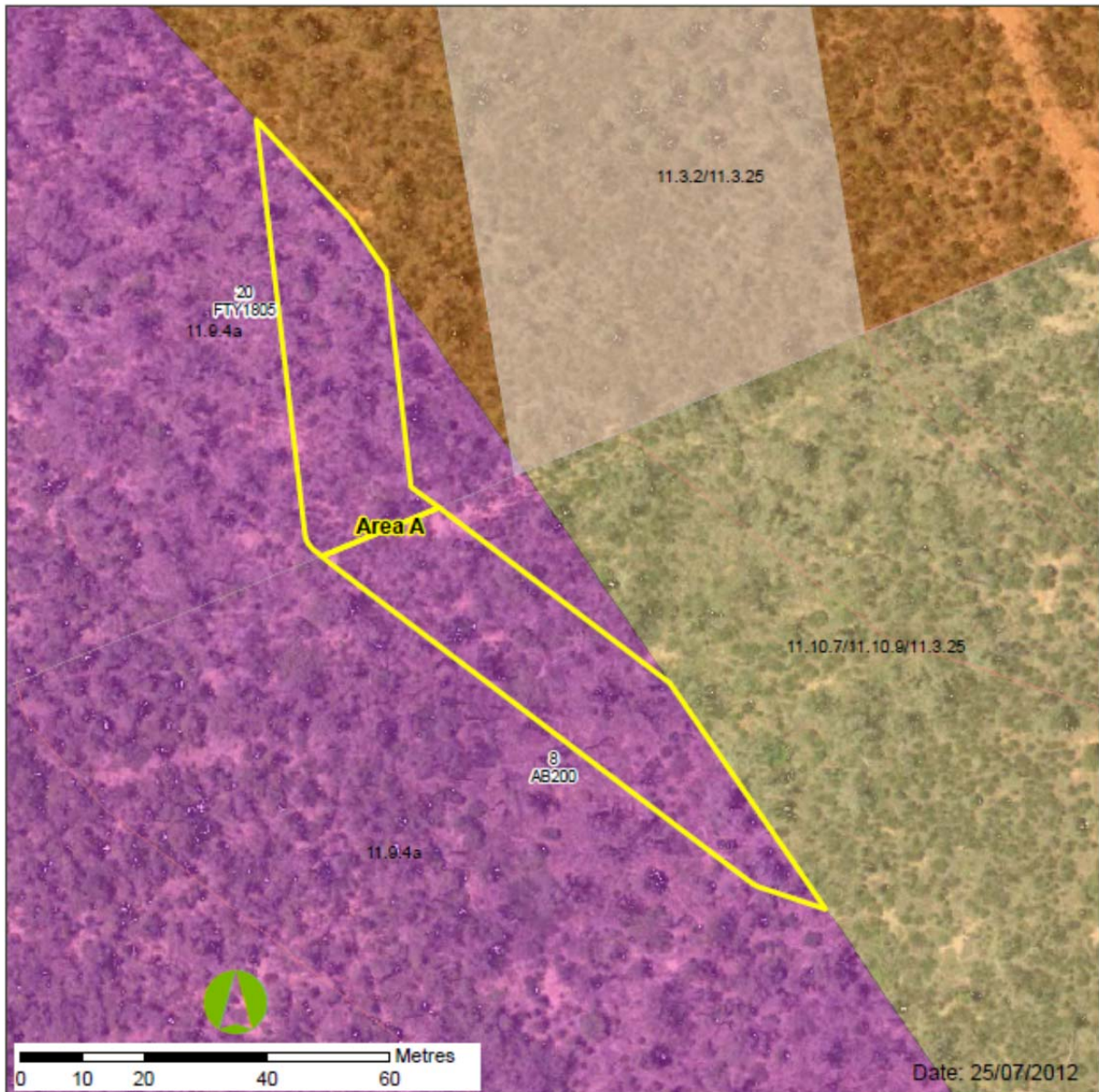


Figure 3.1 Area A located across Lot 8 AB200 & Lot 20 FTY1805

Three ESAs are mapped within or in the locality of Area A, including:

- A 'Category C' ESA is mapped within Area A. This has resulted from the presence of 'essential habitat' for *Acacia calantha*, listed as 'near threatened' under the provisions of the NC Act
- A 'Category C' ESA is located alongside the eastern boundary of Area A. This ESA is due to the presence of mapped 'remnant' 'of concern' vegetation (ie RE 11.10.7/11.10.9/11.3.25) (refer Table 3.1)
- A 'Category A' ESA is located approximately 530 m north-east of the site. This is due to the presence of Expedition National Park (refer Figure 3.1)

A 'stream order 5' watercourse is mapped approximately 1.2 km east of Area A, flowing north-west to south-east through the area (refer Figure 1.1).

Area A is situated on a foot slope of a ridge and has medium brown loam soils present.

3.1.2 Floristics

The canopy stratum within Area A was co-dominated by *Eucalyptus melanophloia* (Silver-leaved Ironbark) and *Callitris glaucophylla* (White Cypress Pine), with several dead trees (stags) also present. The sub-canopy stratum comprised native species, including *Flindersia maculosa* (Leopardwood), *Flindersia australis* (Crow's Ash), *Callitris glaucophylla*, *Eucalyptus melanophloia*, *Petalostigma pubescens* (Quinine), *Notelaea longifolia* (Large Mock-olive) and *Diospyros humilis* (Scrub Ebony). A specimen of a 'Class 2 pest' declared under the *Land Protection (Pest and Stock Route Management) Act 2002* (LP Act) (ie *Opuntia tomentosa* [Velvety Tree Pear]) was observed within the sub-canopy stratum.

The shrub layer was dominated by *Dodonaea filifolia* (Thread-leaf Hopbush), with other species occurring at lesser densities including *Carissa ovata* (Currant Bush), *Psydrax oleifolia* (Hat Stand), *Maireana microphylla* (Small-leaf Bluebush), *Callitris glaucophylla*, *Acacia decora* (Pretty Wattle), *Pittosporum spinescens* (Wallaby Apple), *Grewia latifolia* (Dysentery Plant) and *Senna artemisioides* (Senna).

Table 3.2 provides the heights, Foliage Projective Cover (FPC) and stem counts calculated for the canopy, sub-canopy and shrub layers (adapted from Eyre *et al* 2011, refer Appendix B).

Table 3.2 | Heights, FPC and stem counts for Area A

Stratum	Height	FPC	Stem count
Canopy	12 to 20 m	27%	80 stems/ha
Sub-canopy	4 to 9 m	19%	590 stems/ha
Shrub	1 to 3.5 m	35%	4 920 stems/ha

The ground layer within the north-western portion of Area B2 had approximately 75% vegetation cover, consisting mostly of native grasses (approximately 31%) and leaf litter (approximately 17%) (refer Appendix B). Species observed in the ground layer include *Gahnia aspera* (Saw Sedge), *Swainsona greyana* (Swainsona Pea), *Conyza bonariensis* (Fleabane), *Dianella revoluta* (Spreading Flax-lily), *Dianella caerulea* (Blue Flax-lily), *Chloris ventricosa* (Tall Chloris), *Pennisetum ciliare* (Buffel Grass), *Gossypium sturtianum* (Sturt's Desert Rose), *Dichanthium sericeum* (Queensland Blue Grass) and *Sida subspicata* (Queensland Hemp). Two 'Class 2 pest' species declared under the *Land Protection (Pest and Stock Route Management) Act 2002* (LP Act) (ie *Opuntia tomentosa* and *Opuntia stricta* [Prickly Pear]) were also observed in the ground layer. A full list of species recorded at the site is outlined in Appendix A.

No 'Type A restricted plant' species listed under the provisions of the NC Act were recorded within Area A.

No species of conservation significance listed under the provisions of the NC Act and/or the EPBC Act were recorded within Area A.

3.1.3 Habitat values

Seven bird species were observed during site investigations and are listed in Table 3.3.

Table 3.3 Fauna species observed in Area A

Scientific Name	Common Name
Birds	
<i>Alisterus scapularis</i>	Australian King-parrot
<i>Geopelia humeralis</i>	Bar-shouldered Dove
<i>Lichenostomus leucotis</i>	White-eared Honeyeater
<i>Meliphaga lewinii</i>	Lewin's Honeyeater
<i>Pardalotus striatus</i>	Striated Pardalote
<i>Strepera graculina</i>	Pied Currawong
<i>Taeniopygia bichenovii</i>	Double-barred Finch

The following habitat resources are present within Area A:

- Canopy cover suitable for shelter, foraging and perching
- Hollow-bearing canopy trees and stags
- Fissured tree bark
- Dense groundcover vegetation (ie grassy tussocks)
- Woody debris (ie fallen/felled timber)
- Leaf litter
- Rock cover

The canopy cover, hollow-bearing canopy trees and stags are considered suitable for arboreal mammals and birds, whilst the fissured tree bark, dense groundcover vegetation, woody debris, leaf litter and rock cover may provide suitable habitat for reptiles and small mammals. In addition, highly mobile species, such as birds may fly over the site in transit from the mapped 'stream order 5' watercourse and associated vegetation, located approximately 1.2 km east of the site.

Overall, the habitat value within Area A is considered to be moderate in relation to the ability to support endemic fauna species (refer Figure 3.2).

No conservation significant fauna species listed under the provisions of the NC Act and/or the EPBC Act were recorded within the proposed development area.



Figure 3.2 Photo looking west within Area A

3.2 Area B

3.2.1 General

The proposed development area within Area B is located in the north-east portion of Lot 8 AB200. This area is currently mapped as 'endangered' RE 11.9.4a, however, field investigations confirmed that the DEHP certified RE mapping is considered to be incorrect (refer Figure 3.3). Vegetation within Area B is considered to be analogous to a heterogeneous RE polygon consisting of 60% 'no concern at present' RE 11.10.7 and 40% 'no concern at present' RE 11.10.1. This is due to the species composition present on the site. In addition, the land zone of the area is analogous to medium coarse-grained sedimentary rock (ie land zone 10). A Regional Ecosystem Amendment Report is currently in preparation to amend this RE code and will be submitted to DNRM for approval on behalf of Santos. These RE codes area described in Table 3.1.

Three ESAs are mapped in the vicinity of Area B, including:

- A 'Category C' ESA is mapped approximately 1.2 km north-west of the site. This is due to the presence of 'essential habitat' for *Acacia calantha*, listed as 'near threatened' under the provisions of the NC Act
- A 'Category C' ESA is mapped alongside the eastern boundary of Area B. This is due to a mapped 'remnant' 'of concern' heterogeneous RE polygon (ie RE 11.10.7/11.10.9/11.3.25)
- A 'Category A' ESA is mapped approximately 310 m north-east of the site. This is due to the presence of Expedition National Park (refer Figure 1.1)

A 'stream order 5' watercourse is mapped approximately 320 m north-east of Area B, flowing north-west to south-east through the area (refer Figure 1.1).

The landform of Area B is a rocky ridge line, with shallow brown silty-loam soils and contains evidence of minor fire disturbance.

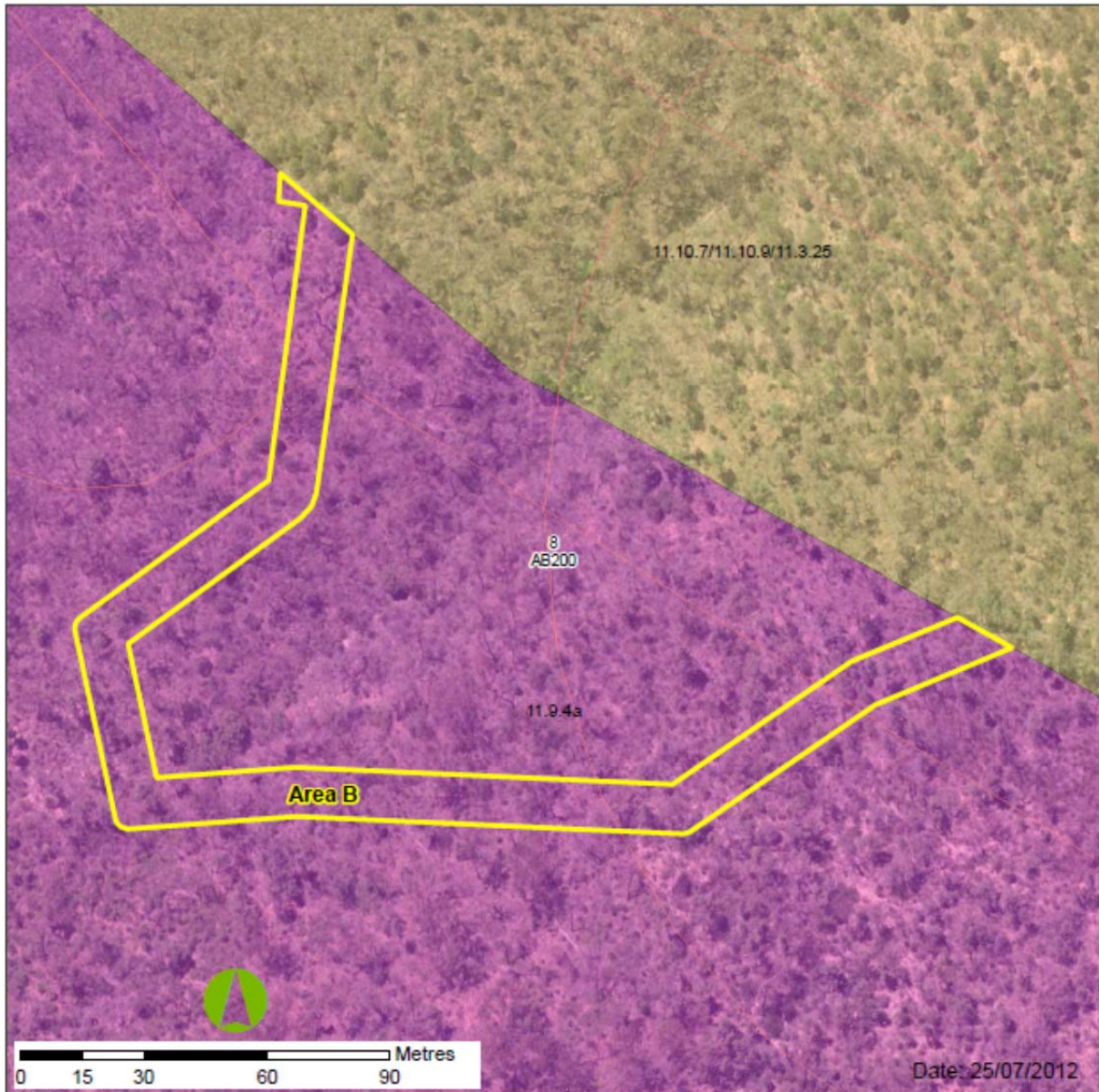


Figure 3.3 Area B located within Lot 8 AB200

3.2.2 Floristics

The canopy stratum within Area B was dominated by *Eucalyptus crebra* (Narrow-leaved Ironbark), with *Callitris glaucophylla*, *Corymbia citriodora* (Spotted Gum), *Corymbia clarksoniana* (Clarkson's Bloodwood), *Eucalyptus melanophloia* and *Acacia shirleyi* (Lancewood) occurring at lower densities. The sub-canopy stratum was dominated by *Acacia longispicata* (Slender-flowered Wattle) in the northern portion of the site and dominated by *Callitris glaucophylla* in the southern portion of the site.

Other species occurring at lower densities included *Corymbia clarksoniana*, *Flindersia australis* and *Petalostigma pubescens*.

The shrub layer consisted of *Acacia longispicata*, *Dodonaea triangularis* (Fan Hopbush), *Dodonaea filifolia*, *Gossypium sturtianum*, *Alphitonia excelsa* (Red Ash), *Grewia latifolia*, *Carissa ovata*, *Lomandra filiformis* (Wattle Mat-rush), *Secamone elliptica* (Corky Milk Vine) and *Capparis lasiantha* (Nipan).

Table 3.4 provides the heights, Foliage Projective Cover (FPC) and stem counts calculated for the canopy, sub-canopy and shrub layers (adapted from Eyre *et al* 2011, refer Appendix C).

Table 3.4 Heights, FPC and stem counts for Area B

Stratum	Height	FPC	Stem count
Canopy	16 to 25 m	60%	120 stems/ha
Sub-canopy	3 to 8 m	38%	1,190 stems/ha
Shrub	1 to 2 m	30%	2,090 stems/ha

The dense ground layer within the southern portion of Area B2 had approximately 85% vegetation cover, consisting mainly of native grasses (approximately 41%) and leaf litter (approximately 22%) (refer Appendix C). The ground layer was dominated by *Themeda avenacea* (Wild Oats Grass), with *Themeda triandra* (Kangaroo Grass), *Pennisetum ciliare*, *Goodenia grandiflora* (Large-flowered Goodenia), *Abutilon oxycarpum* (Chinese Lantern), *Gahnia aspera*, *Sida subspicata*, *Cymbopogon refractus* (Barbwire Grass), *Solanum esuriale* (Brown Potato Bush), *Aristida calycina* (Dark Wiregrass), *Aristida caput-medusae* (Curly Head Wiregrass) and *Chloris ventricosa* occurring at lesser densities. One 'Class 2 pest' declared under the LP Act (ie *Opuntia stricta*) was also observed in the ground layer. A full list of species recorded at the site is outlined in Appendix A.

No 'Type A restricted plant' species listed under the provisions of the NC Act were observed within Area B.

No flora species of conservation significance listed under the provisions of the NC Act and/or the EPBC Act were recorded within Area B.

3.2.3 Habitat values

Twelve fauna species were observed during site investigations, comprising ten birds and two reptiles. Traces of an additional mammal were also recorded on site (refer Table 3.5).

Table 3.5 | Fauna species observed within Area B

Scientific Name	Common Name	Comment
Reptiles		
<i>Carlia foliorum</i>	Tree-base Litter-skink	
<i>Diporiphora australis</i>	Tommy Roundhead	
Birds		
<i>Cracticus tibicen</i>	Australian Magpie	
<i>Geopelia humeralis</i>	Bar-shouldered Dove	
<i>Lichenostomus leucotis</i>	White-eared Honeyeater	
<i>Manorina melanocephala</i>	Noisy Miner	
<i>Meliphaga lewinii</i>	Lewin's Honeyeater	
<i>Pardalotus striatus</i>	Striated Pardalote	
<i>Rhipidura albiscapa</i>	Grey Fantail	
<i>Rhipidura leucophrys</i>	Willie Wagtail	
<i>Smicrornis brevirostris</i>	Weebill	
<i>Strepera graculina</i>	Pied Currawong	
Mammals		
<i>Macropus sp.</i>		Observed scats only

Area B contains the following habitat resources:

- Canopy cover suitable for shelter, foraging and perching
- Flowering Eucalypts
- Fissured tree bark
- Dense groundcover vegetation (ie grassy tussocks)
- Woody debris (ie fallen/felled timber)
- Leaf litter
- Rocky crevices and exposed rocky outcrops
- Rocky gully (not containing any water at the time of the survey)

The canopy cover and flowering Eucalypts are considered suitable for sheltering, perching and foraging resources for arboreal mammals and birds (nectar-feeding and woodland species), whilst the fissured tree bark, dense groundcover vegetation, woody debris, leaf litter, rocky crevices and outcrops may provide suitable habitat for reptiles and mammals. The gully may provide temporary habitat for amphibians, if inundated with water. Overall, the habitat value within Area B is considered to be relatively high in relation to the ability to support endemic fauna species (refer Figure 3.4).

No conservation significant fauna species listed under the provisions of the NC Act and/or EPBC Act were recorded within the proposed development area.



Figure 3.4 Photo looking north-east along the edge of the gully within Area B

3.3 Area C

3.3.1 General

The proposed development area within Area C is located in the north-east portion of Lot 8 AB200 (refer Figure 1.1). This area is mapped as 'endangered' RE 11.9.4a on the DEHP certified RE map and is therefore analogous to a 'Category B' ESA. However upon site investigations, this mapping is considered erroneous. The vegetation contained within Area C is considered to be analogous to heterogeneous RE polygon consisting of 60% 'no concern at present' RE 11.10.7 and 40% 'no concern at present' RE 11.10.1. This is due to the species composition observed during site investigations. In addition, the land zone of the area is analogous to medium coarse-grained sedimentary rock (ie land zone 10). A Regional Ecosystem Amendment Report to change this RE code is currently in preparation and will be submitted to DNRM for approval on behalf of Santos. These RE descriptions are provided in Table 3.1.

A 'Category C' ESA is located alongside the eastern boundary of Area C. This is due to a mapped 'remnant' 'of concern' heterogeneous RE polygon (ie RE 11.10.7/11.10.9/11.3.25). In addition, a 'Category A' ESA is located approximately 530 m north-east of the site. This is due to the presence of Expedition National Park (refer Figure 3.5).

A 'stream order 5' watercourse is mapped approximately 460 m east of Area C, flowing north-west to south-east through the area (refer Figure 1.1).

The landform of Area C is a ledge at 350 Australian Height Datum (AHD) with medium brown loam soils present.

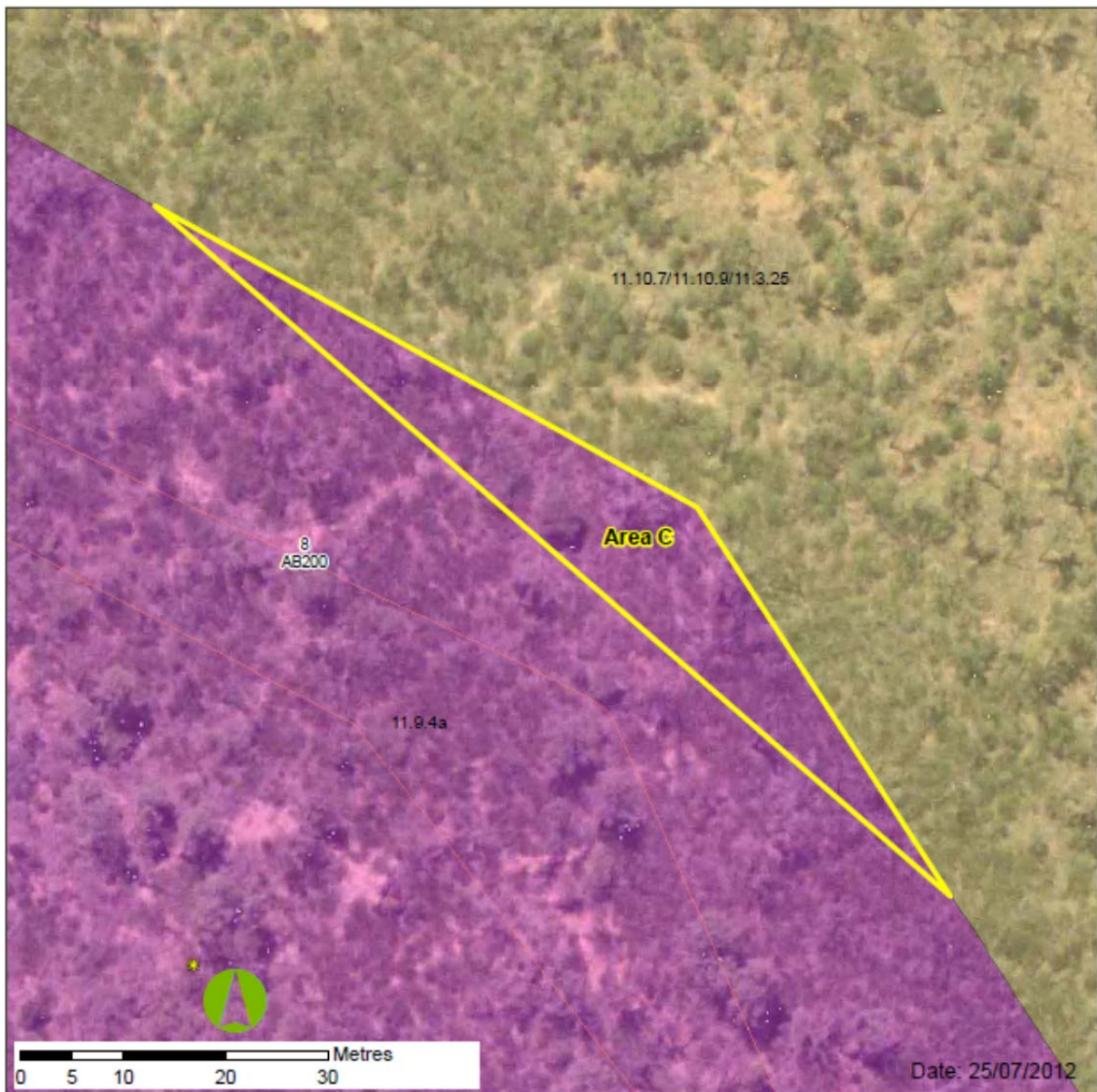


Figure 3.5 Area C located within Lot 8 AB200

3.3.2 Floristics

The sparse canopy layer within Area C contains native species such as *Eucalyptus melanophloia*, *Callitris glaucophylla* and *Brachychiton populneus* (Kurrajong). The sub-canopy layer was also sparse and consisted of native species including *Acacia longispicata*, *Petalostigma pubescens* and *Flindersia australis*. The dense shrub layer was dominated by *Dodonaea filifolia*, with *Grewia latifolia*, *Acacia excelsa* (Ironwood), *Pittosporum spinescens*, juvenile *Callitris glaucophylla*, *Senna artemisioides* and *Carissa ovata* occurring at lower densities. One 'Class 2 pest', declared under the LP Act (ie *Opuntia tomentosa*) was also observed in the shrub layer.

Table 3.6 below provides the heights, Foliage Projective Cover (FPC) and stem counts calculated for the canopy, sub-canopy and shrub layers (adapted from Eyre *et al* 2011, refer Appendix D).

Table 3.6 Heights, FPC and stem counts for Area C

Stratum	Height	FPC	Stem count
Canopy	14 to 20 m	10%	100 stems/ha
Sub-canopy	5 to 8 m	5%	300 stems/ha
Shrub	1 to 4 m	70%	41 300 stems/ha

The patchy ground layer had approximately 55% vegetation cover, consisting mostly of leaf litter (approximately 45%), woody debris (approximately 22%) and leaf litter (approximately 22%) (refer Appendix D). Species occurring in the ground layer include *Themeda avenacea*, *Cymbopogon refractus*, *Panicum effusum*, *Panicum decompositum* (Hairy Panic), *Cheilanthes distans* (Bristly Cloak Fern), *Themeda triandra*, *Sida corrugata* (Corrugated Sida), *Dichanthium sericeum* and *Pennisetum ciliare*. A full list of species recorded at the site is outlined in Appendix A.

One 'Type A restricted plant' species (ie *Brachychiton populneus*) as listed under the provisions of the NC Act was recorded within Area C. The location of this individual is provided in Table 3.7 and shown in Figure 1.1.

Table 3.7 Location of the 'Type A restricted plant' within Area C

Scientific Name	Common Name	Easting (GDA 94, Zone 55)	Northing (GDA 94, Zone 55)
<i>Brachychiton populneus</i>	Kurrajong	706894	7157527

No flora species of conservation significance listed under the provisions of the NC Act and/or the EPBC Act were recorded within Area C.

3.3.3 Habitat values

Seven bird species were observed during site investigations and are listed in Table 3.8.

Table 3.8 Fauna species observed in Area C

Scientific Name	Common Name
Birds	
<i>Cracticus nigrogularis</i>	Pied Butcherbird
<i>Geopelia humeralis</i>	Bar-shouldered Dove
<i>Lichenostomus leucotis</i>	White-eared Honeyeater
<i>Pachycephala pectoralis</i>	Golden Whistler
<i>Pardalotus striatus</i>	Striated Pardalote
<i>Smicrornis brevirostris</i>	Weebill
<i>Strepera graculina</i>	Pied Currawong

Area C contains the following habitat resources:

- Moderate canopy cover suitable for shelter, foraging and perching
- Some fissured tree bark
- Patchy groundcover vegetation (ie grassy tussocks)
- Moderate woody debris (ie fallen/felled timber)
- Leaf litter
- Watercourse located approximately 400 m east of the site

The moderate canopy cover is considered suitable for birds and arboreal mammals, whilst the fissured tree bark, patchy groundcover vegetation, moderate woody debris and leaf litter may provide suitable habitat for reptiles, small mammals and birds. A watercourse is located approximately 400 m east of the site, which may result in highly mobile species (such as birds) flying over the site in transit. Overall, the habitat value within Area C is considered to be relatively moderate in relation to supporting endemic fauna species (refer Figure 3.6).

No conservation significant fauna species listed under the provisions of the NC Act and/or the EPBC Act were recorded within the proposed development area.



Figure 3.6 Photo looking north-east within Area C



4 Conclusion

The ecological assessment indicates that Areas A and C contain moderate potential fauna habitat, whilst Area B was considered to be relatively high in relation to the ability to support endemic fauna species. Areas A, B and C are currently mapped as 'endangered' RE 11.9.4a on the DEHP certified RE mapping and is classified a 'Category B' ESA. However, ground-truthing of these areas indicated that they have been incorrectly mapped as the current DEHP certified mapping does not truly reflect the existing vegetation communities. Ground truthing indicates that Areas A, B and C are analogous to a heterogeneous RE polygon consisting of 60% 'no concern at present' RE 11.10.7 and 40% 'no concern at present' RE 11.10.1. A Regional Ecosystem Amendment Report to change these RE codes will be submitted to DNRM for approval on behalf of Santos.

There were no conservation significant flora or fauna species listed under the provisions of the NC Act and/or the EPBC Act observed within Areas A, B and/or C during site investigations. However, one 'Type A restricted plant' listed under the provisions of the NC Act (ie *Brachychiton populneus*) was observed within Area C.



5 References

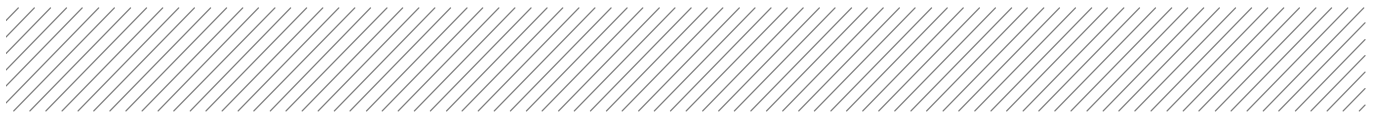
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Appendices





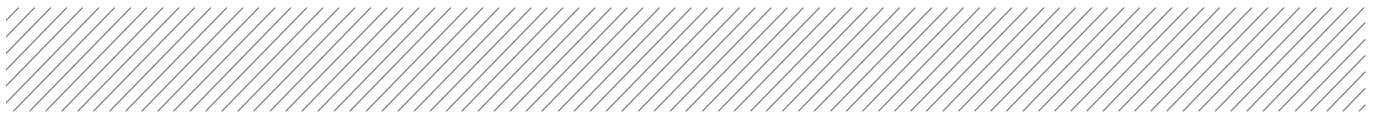
Appendix A

Botanical species list for Areas A, B and C

Botanical species list for Areas A, B and C

Family Name	Scientific Name	Common Name	Notes
Adiantaceae	<i>Cheilanthes distans</i>	Bristly Cloak Fern	
Adiantaceae	<i>Cheilanthes sieberi</i>	Mulga Fern	
Apocynaceae	<i>Carissa ovata</i>	Currant Bush	
Apocynaceae	<i>Marsdenia</i> sp.		
Apocynaceae	<i>Parsonsia</i> sp.		
Apocynaceae	<i>Secamone elliptica</i>	Corky Milk Vine	
Asteraceae	<i>Conyza bonariensis</i>	Fleabane	Non-native
Asteraceae	<i>Pterocaulon redolens</i>	Apple Bush	
Brassicaceae	<i>Lepidium sagittulatum</i>	Pepper Cress	
Cactaceae	<i>Opuntia stricta</i>	Prickly Pear	Non-native LP Act 'Class 2 pest'
Cactaceae	<i>Opuntia tomentosa</i>	Velvety Tree Pear	Non-native LP Act 'Class 2 pest'
Caesalpiaceae	<i>Senna artemisioides</i>	Senna	
Caesalpiaceae	<i>Senna coronilloides</i>	Golden Cassia	
Capparaceae	<i>Capparis lasiantha</i>	Nipan, Wait-a-while	
Celastraceae	<i>Elaeodendron australe</i>	Red-fruited Olive Plum	
Celastraceae	<i>Maytenus cunninghamii</i>	Yellow Berry Bush	
Cupressaceae	<i>Callitris glaucophylla</i>	White Cypress Pine	
Cyperaceae	<i>Gahnia aspera</i>	Saw Sedge	
Ebenaceae	<i>Diospyros humilis</i>	Scrub Ebony	
Fabaceae	<i>Hovea lorata</i>	Hovea	
Fabaceae	<i>Swainsona greyana</i>	Swainsona Pea	
Goodeniaceae	<i>Goodenia grandiflora</i>	Large-flowered Goodenia	
Hemerocallidaceae	<i>Dianella caerulea</i>	Blue Flax-lily	
Hemerocallidaceae	<i>Dianella revoluta</i>	Spreading Flax-lily	
Laxmanniaceae	<i>Lomandra filiformis</i>	Wattle Matrush	
Laxmanniaceae	<i>Lomandra hystrix</i>	Creek Matrush	
Malvaceae	<i>Abutilon oxycarpum</i>	Chinese Lantern	
Malvaceae	<i>Gossypium sturtianum</i>	Sturt's Desert Rose	
Malvaceae	<i>Sida corrugata</i>	Corrugated Sida	
Malvaceae	<i>Sida subspicata</i>	Queensland Hemp	
Mimosaceae	<i>Acacia decora</i>	Pretty Wattle	
Mimosaceae	<i>Acacia excelsa</i>	Ironwood	
Mimosaceae	<i>Acacia leiocalyx</i>	Black Wattle	
Mimosaceae	<i>Acacia longispicata</i>	Slender-flowered Wattle	
Mimosaceae	<i>Acacia shirleyi</i>	Lancewood	
Myrtaceae	<i>Corymbia citriodora</i>	Lemon-scented Gum,	

Family Name	Scientific Name	Common Name	Notes
		Spotted Gum	
Myrtaceae	<i>Corymbia clarksoniana</i>	Clarkson's Bloodwood	
Myrtaceae	<i>Eucalyptus crebra</i>	Narrow-leaved Ironbark	
Myrtaceae	<i>Eucalyptus melanophloia</i>	Silver-leaved Ironbark	
Oleaceae	<i>Jasminum suavissimum</i>	Native Jasmine	
Oleaceae	<i>Notelaea longifolia</i>	Large Mock-olive	
Oleaceae	<i>Notelaea microcarpa</i>	Small-fruited Mock Olive	
Oleaceae	<i>Notelaea</i> sp.	Native Olive	
Picrodendraceae	<i>Petalostigma pubescens</i>	Quinine	
Pittosporaceae	<i>Pittosporum spinescens</i>	Wallaby Apple	
Poaceae	<i>Aristida calycina</i>	Dark Wiregrass	
Poaceae	<i>Aristida caput-medusae</i>	Curly Head Wiregrass	
Poaceae	<i>Aristida</i> sp.	Wiregrass	
Poaceae	<i>Chloris ventricosa</i>	Tall Chloris	
Poaceae	<i>Cymbopogon obtectus</i>	Fluffy Tops	
Poaceae	<i>Cymbopogon refractus</i>	Barbwire Grass	
Poaceae	<i>Dichanthium sericeum</i>	Queensland Blue Grass	
Poaceae	<i>Digitaria ammophila</i>	Digitaria	
Poaceae	<i>Enneapogon oblongus</i>	Purple Head Nineawn	
Poaceae	<i>Eragrostis fallax</i>	Tall Lovegrass	
Poaceae	<i>Panicum decompositum</i>	Hairy Panic	
Poaceae	<i>Panicum effusum</i>	Inquisitive Grass	
Poaceae	<i>Pennisetum ciliare</i>	Buffel Grass	Non-native
Poaceae	<i>Themeda avenacea</i>	Wild Oats Grass	
Poaceae	<i>Themeda triandra</i>	Kangaroo Grass	
Proteaceae	<i>Grevillea striata</i>	Beefwood	
Rhamnaceae	<i>Alphitonia excelsa</i>	Red Ash	
Rubiaceae	<i>Psydrax oleifolia</i>	Hat Stand, Wild Lemon	
Rutaceae	<i>Flindersia australis</i>	Crow's Ash	
Rutaceae	<i>Flindersia maculosa</i>	Leopardwood	
Rutaceae	<i>Geijera parviflora</i>	Wilga	
Santalaceae	<i>Santalum lanceolatum</i>	Sandalwood	
Sapindaceae	<i>Alectryon diversifolius</i>	Scrub Boonaree	
Sapindaceae	<i>Atalaya hemiglauca</i>	Whitewood	
Sapindaceae	<i>Dodonaea filifolia</i>	Thread-leaf Hopbush	
Sapindaceae	<i>Dodonaea triangularis</i>	Fan Hopbush	
Solanaceae	<i>Solanum esuriale</i>	Brown Potato Bush	
Sterculiaceae	<i>Brachychiton populneus</i>	Kurrajong	'Type A restricted plant'
Tiliacea	<i>Grewia latifolia</i>	Dysentery Plant	

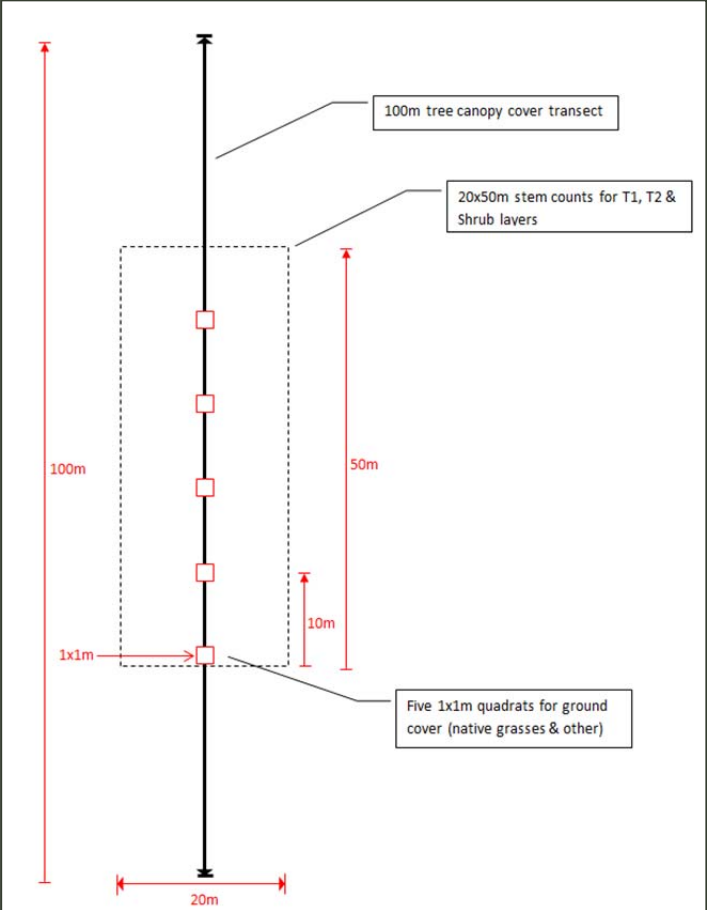


Appendix B

Detailed vegetation survey data collected for Area A

Detailed vegetation survey data collected for Area A

This attachment provides the ground cover, canopy cover and stem count data collected during the field investigation for Area A. The diagram below shows the transect arrangement in the field, and the areas within which the data was collected.



Ground cover data

The following values indicate the percentage of each ground cover category for five 1x1 m quadrats. The average ground cover for each category is also provided in the 'Averages' column.

Groundcover	Q 1 (%)	Q 2 (%)	Q 3 (%)	Q 4 (%)	Q 5 (%)	Averages (%)
Native grasses	66	70	16	0	5	31.4
Native forbs & herbs	3	0	3	0	0	1.2
Non-native grasses	0	0	0	10	0	2
Non-native forbs & herbs	0	0	0	0	0	0
Shrubs	0	0	60	80	50	38
Bare ground	1	3	5	2	5	3.2
Rock	0	2	0	5	0	1.4
Leaf litter	15	20	16	3	30	16.8
Woody debris	15	5	0	0	10	6
Cryptogams	0	0	0	0	0	0

Stem count data

The following table is the stem count data collected during the field investigation for the Canopy (T1), Sub-canopy (T2) and Shrub layer (S1). The heights for each of the stratum are also defined below.

Transect	Stem counts per stratum per 50 x 20 m plots		
	T1 (12-20 m)	T2 (4-9 m)	S1 (1-3.5 m)
0-10 m	4	8	112
10-20 m	1	13	64
20-30 m	1	15	92
30-40 m	0	12	147
40-50 m	2	11	77
Totals	8	59	492

Stems per hectare calculations

- **T1** (12-20 m) – 80 stems per hectare
- **T2** (4-9 m) – 590 stems per hectare
- **S1** (1-3.5 m) – 4920 stems per hectare



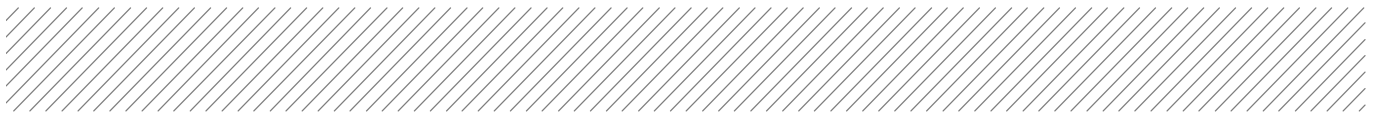
Foliage projective cover data

The total Foliage Projective Cover (FPC) for the T1 and T2 canopies along a 50 m transect, expressed as a percentage is:

- **T1 (12-20 m) – 27.2% FPC**
- **T2 (4-9 m) – 19.2% FPC**

The canopy transect data collected during the field investigation is provided in the following table.

Stratum	Distance Start	End	Total (m)
0-50 m			
T1	2.9	10.4	7.5
T2	8.4	10.9	2.5
T2	14.9	16.3	1.4
T2	18.3	19.7	1.4
T2	21.8	24.1	2.3
T1	30.8	34.5	3.7
T2	37.8	38.0	0.2
T2	38.8	40.6	1.8
T1	47.6	50	2.4

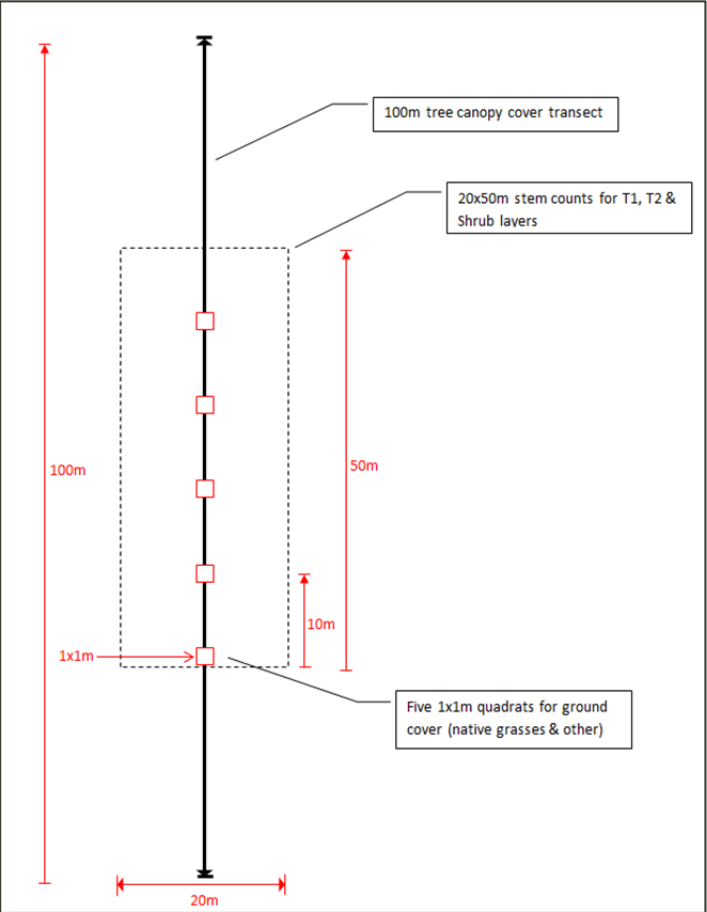


Appendix C

Detailed vegetation survey data collected for Area B

Detailed vegetation survey data collected for Area B

This attachment provides the ground cover, canopy cover and stem count data collected during the field investigation for Area B. The diagram below shows the transect arrangement in the field, and the areas within which the data was collected.



Ground cover data

The following values indicate the percentage of each ground cover category for five 1x1 m quadrats. The average ground cover for each category is also provided in the 'Averages' column.

Groundcover	Q 1 (%)	Q 2 (%)	Q 3 (%)	Q 4 (%)	Q 5 (%)	Averages (%)
Native grasses	83	59	0	50	15	41.4
Native forbs & herbs	2	2	0	2	0	1.2
Non-native grasses	0	0	78	0	0	15.6
Non-native forbs & herbs	0	2	0	0	0	0.4
Shrubs	0	0	0	0	12	2.4
Bare ground	0	2	0	0	1	0.6
Rock	0	5	0	5	10	4
Leaf litter	10	15	10	28	47	22
Woody debris	5	15	12	15	15	12.4
Cryptogams	0	0	0	0	0	0

Stem count data

The following table is the stem count data collected during the field investigation for the Canopy (T1), Sub-canopy (T2) and Shrub layer (S1). The heights for each of the stratum are also defined below.

Transect	Stem counts per stratum per 50 x 20 m plots		
	T1 (16-25 m)	T2 (3-8 m)	S1 (1-2 m)
0-10 m	3	34	79
10-20 m	6	16	37
20-30 m	0	33	37
30-40 m	2	24	32
40-50 m	1	12	24
Totals	12	119	209

Stems per hectare calculations

- **T1** (16-25 m) – 120 stems per hectare
- **T2** (3-8 m) – 1190 stems per hectare
- **S1** (1-2 m) – 2090 stems per hectare

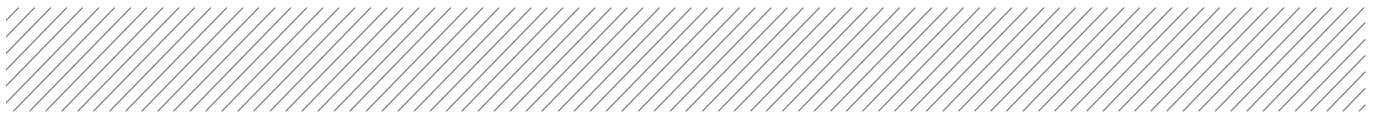
Foliage projective cover data

The total Foliage Projective Cover (FPC) for the T1 and T2 canopies along a 50 m transect, expressed as a percentage is:

- **T1 (12-20 m) – 60.4% FPC**
- **T2 (4-9 m) – 38.4% FPC**

The canopy transect data collected during the field investigation is provided in the following table.

Stratum	Distance Start	End	Total (m)
0-50 m			
T1	0	3.1	3.1
T2	1.3	1.6	0.3
T1	4.6	14.6	10
T2	5.5	8.4	2.9
T2	9.4	11.6	2.2
T2	15.2	17.5	2.3
T2	18.2	22.0	3.8
T2	23.2	24.5	1.3
T2	25.3	26.2	0.9
T2	26.9	28.2	1.3
T1	29.9	33.1	3.2
T1	36.1	50	13.9
T2	40.2	40.9	0.7
T2	41.4	43.4	2
T2	44.7	46.2	1.5

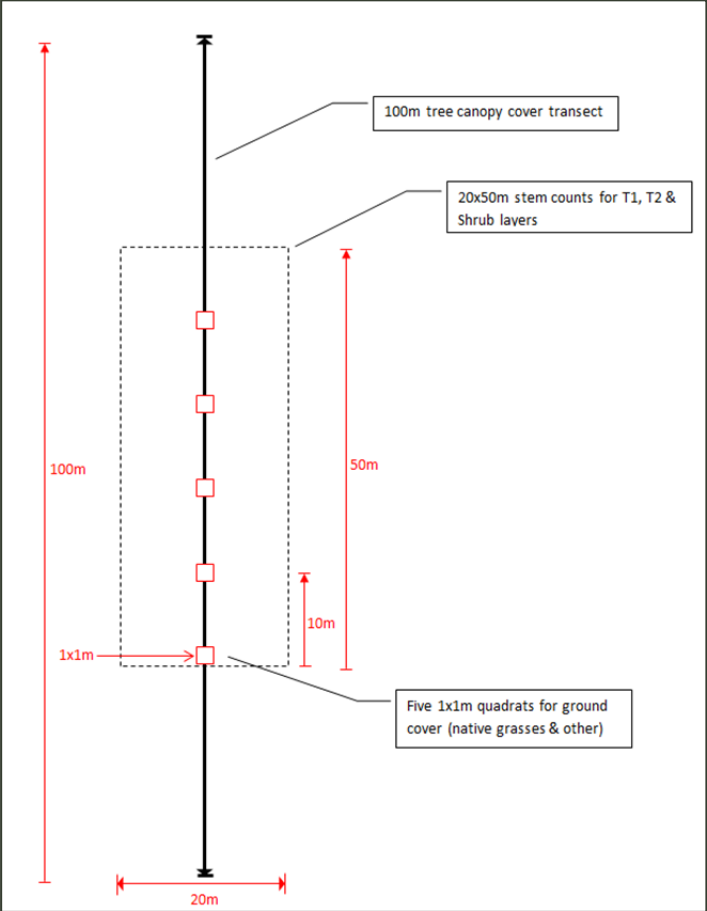


Appendix D

Detailed vegetation survey data collected for Area C

Detailed vegetation survey data collected for Area C

This attachment provides the ground cover, canopy cover and stem count data collected during the field investigation for Area C. The diagram below shows the transect arrangement in the field, and the areas within which the data was collected.



Ground cover data

The following values indicate the percentage of each ground cover category for five 1x1 m quadrats. The average ground cover for each category is also provided in the 'Averages' column.

Groundcover	Q 1 (%)	Q 2 (%)	Q 3 (%)	Q 4 (%)	Q 5 (%)	Averages (%)
Native grasses	0	2	2	10	5	3.8
Native forbs & herbs	2	0	2	0	1	1
Non-native grasses	85	0	0	18	5	21.6
Non-native forbs & herbs	0	0	0	0	0	0
Shrubs	0	3	10	2	10	5
Bare ground	2	2	0	5	1	2
Rock	0	10	0	0	0	2
Leaf litter	11	83	66	0	63	44.6
Woody debris	0	0	30	65	15	22
Cryptogams	0	0	0	0	0	0

Stem count data

The following table is the stem count data collected during the field investigation for the Canopy (T1), Sub-canopy (T2) and Shrub layer (S1). The heights for each of the stratum are also defined below.

Transect	Stem counts per stratum per 5 x 20 m plots		
	T1 (14-20 m)	T2 (5-8 m)	S1 (1-4 m)
0-10 m			55
10-20 m		1	82
20-30 m		1	98
30-40 m			121
40-50 m	1	1	57
Totals	1	3	413

Stems per hectare calculations

- **T1** (14-20 m) – 100 stems per hectare
- **T2** (5-8 m) – 300 stems per hectare
- **S1** (1-4 m) – 41300 stems per hectare



Foliage projective cover data

The total Foliage Projective Cover (FPC) for the T1 and T2 canopies along a 50 m transect, expressed as a percentage is:

- **T1 (12-20 m) – 9.6% FPC**
- **T2 (4-9 m) – 0% FPC**

The canopy transect data collected during the field investigation is provided in the following table.

Stratum	Distance Start	End	Total (m)
0-50 m			
T1	4.8	6.5	1.7
T1	45.7	48.8	3.1



Aurecon Australia Pty Ltd

ABN 54 005 139 873

Level 14, 32 Turbot Street
Brisbane QLD 4000

Locked Bag 331
Brisbane QLD 4001
Australia

T +61 7 3173 8000

F +61 7 3173 8001

E brisbane@aurecongroup.com

W aurecongroup.com

Aurecon offices are located in:

Angola, Australia, Botswana, China,
Ethiopia, Hong Kong, Indonesia,
Lesotho, Libya, Malawi, Mozambique,
Namibia, New Zealand, Nigeria,
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