

Scotia Ecology Survey



Scotia Ecology Survey

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1.0 Introduction

1.1 Background

Santos GLNG has engaged AECOM to undertake field validated high resolution mapping of Regional Ecosystems and habitat for selected fauna species on properties within the Santos Scotia Gas Field (Petroleum Lease (PL) 176).

A terrestrial ecology assessment was undertaken by AECOM in November and December 2015. The assessment was a two stage process, involving a literature review, followed by a field survey. The literature review analysed existing biodiversity data to identify conservation significant values including Regional Ecosystems, flora and fauna species. This review formed the basis of the field surveys, in which potentially present conservation significant values were targeted and ecological values documented.

1.2 Study Aims

The aims of the ecology study were to:

- Ground-truth Regional Ecosystem (RE) mapping
- Undertake Functionality tests on Of Concern and Endangered regrowth REs
- Complete Habitat Mapping Assessment Tool (HMAT) assessments at each survey site
- Record incidental observations of Endangered, Vulnerable or Near Threatened (EVNT) flora and fauna.

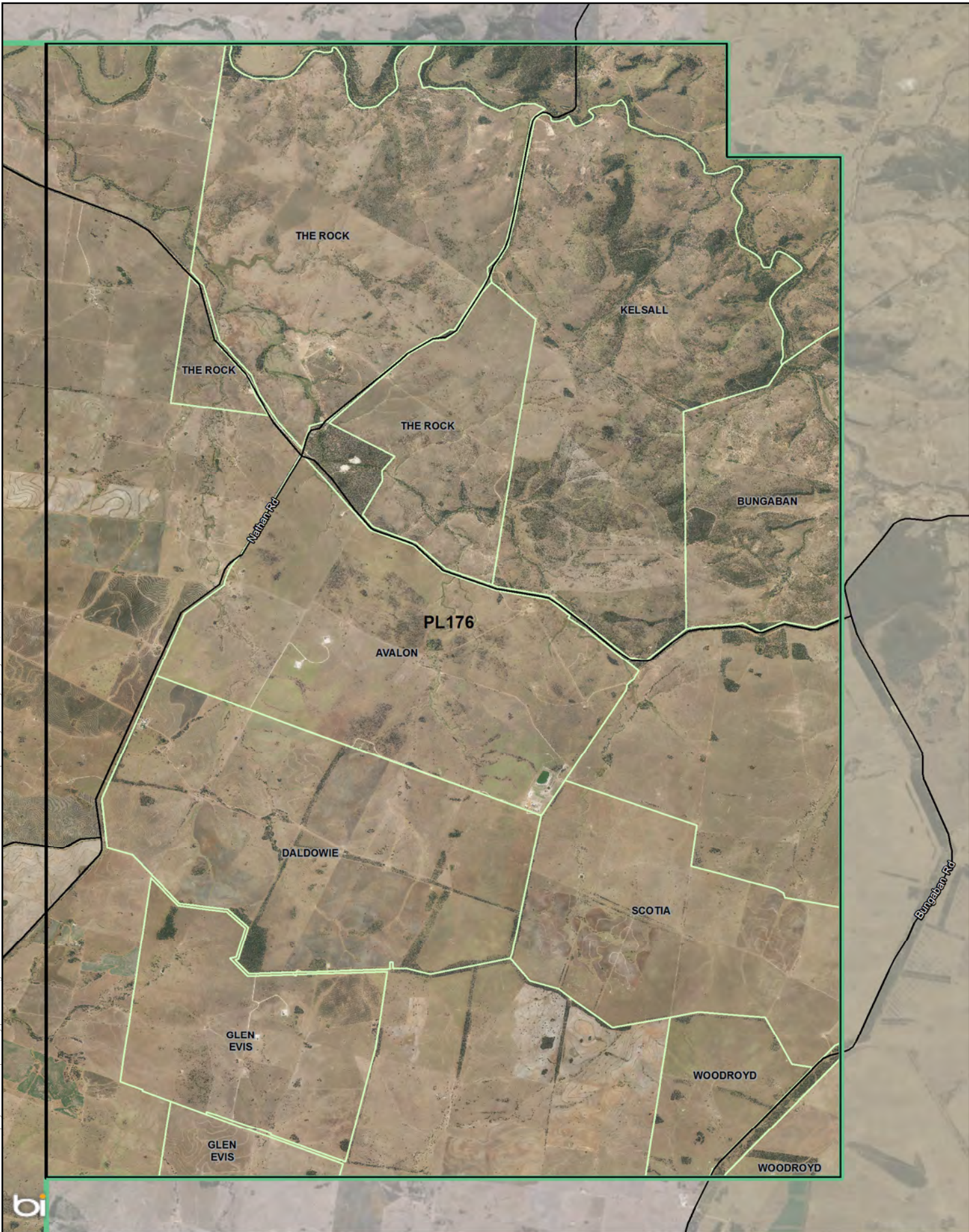
1.3 Project area

The Project area is located in the southern Brigalow Belt bioregion in the Bowen Basin. The Project area is approximately 15 kilometres north east of Wandoan and 140 km north east of Roma, in Central Queensland.

The Project area and surrounding region is predominantly open grazing pasture and agriculture, interspersed with tracts of remnant vegetation and non-remnant vegetation.

The Project area and its position within the region are presented on Figure 1. As identified in Figure 1, the Project area is bounded by PL 176.

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DATUM GDA 1994, PROJECTION MGA ZONE XX
0 650 1,300 2,600
metres

1:80,423 (when printed at A4)

LEGEND

- Locality
- ▭ PL176
- Local road
- Scotia gas field
- Property Boundaries

Data sources:
Client supplied data: Property Boundary
(c) 2015 Streetspro
Base Data: (c) 2015 Santos, (c) 2015 Bing



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Project Area and Regional Setting

Scotia Ecology Survey Report

PROJECT ID 42627591
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Map

1

2.0 Methodology

2.1 Regional Ecosystem Assessment

The flora surveys employed an assessment of floral taxa and vegetation communities, in keeping with the methodology employed by the Queensland Herbarium for the survey of REs (Neldner et al., 2012). Preliminary identification of the vegetation communities and target field survey locations was conducted prior to the commencement of fieldwork via interpretation of colour aerial photography and 1:100,000 RE mapping of the region.

Field surveys involved a botanical assessment at a number of representative sites within each remnant, non-remnant and regrowth vegetation community, as identified from desktop searches. The surveys employed a number of standard methods including quaternary survey sites and random meander search areas.

A number of vehicle traverses of the Project area were undertaken during the survey period, to identify changes in landzones and identify vegetation community boundaries. Community structural formation classes were assessed according to Neldner et al. (2012). RE classification of communities was determined as per Sattler and Williams (1999), and in accordance with the Regional Ecosystems Description Database (REDD) (Queensland Herbarium, 2014).

The flora surveys were undertaken between the 30 November to 2 December 2015 and 15 December to 18 December 2015.

Quaternary surveys were undertaken at 62 survey locations across the Project area (Figure 2). Quaternary-level survey locations were used to verify vegetation units and confirm dominant characteristic species. Structural analysis included recording the height class and life form of the dominant species within the mid and canopy strata as per Neldner et al. (2012). RE classification (Sattler and Williams, 1999) was determined based on estimated structural and floristic analysis.

Several digital photographs were taken at each plot for future reference. The location of each quaternary survey location was recorded using a Trimble Nomad GPS.

2.2 Functional Regional Ecosystem Assessment

Functionality assessments were undertaken on non-remnant vegetation communities listed as Endangered and Of Concern (biodiversity status). The purpose of the functionality assessments was to determine the potential for a non-remnant community to provide for ecological functioning in the landscape. The assessment deployed followed the Santos methodology "Functional Thresholds for Assessing Regional Ecosystem Functionality". The minimum ecosystem attributes for a community to be regarded as functional are identified in Table 1 below.

Table 1 Minimum ecosystem attributes for functional non-grassland ecosystems

Attribute	Cut-off
Patch Size	>0.5ha
Total non-native perennial vegetation cover	<50%
Recruitment to the Ecologically Dominant Layer (EDL)	Yes
Minimum median canopy height	> 1/3 of the median benchmark EDL

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LEGEND

Regional Ecosystem (RE)

- 11.10.11
- 11.10.7
- 11.10.9
- 11.3.1
- 11.3.2
- 11.3.25

● 11.3.39

● 11.3.6

● 11.9.1

● 11.9.10

● 11.9.5

● n/a

● Locality

— Local road

▭ PL176

▭ Scotia gas field

▭ Property Boundaries

Data sources:
Client supplied data: Property Boundary
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Flora Survey Site Locations

Scotia Ecology Survey Report

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LAST MODIFIED	MH - 21-01-2016	
VERSION:	1	

2.3 Habitat Mapping Assessment Tool

Prior to the field program, Santos' predictive habitat mapping tool was reviewed to identify potential fauna habitat within the Project area. During the field program, field based assessments were undertaken at every flora survey site, using the Habitat Mapping and Assessment Tool (HMAT). The HMAT incorporates both landscape and microhabitat factors into the site assessment, including:

- Tenement in which the Habitat Zone is located (Part A of HMAT). This allows a filter based on species distribution. Only the species known or likely to occur within a tenure will be further assessed
- Biodiversity Planning Assessment (BPA) Mapping (Part B of HMAT)
- Proximity to water (Part C of HMAT)
- Underlying vegetation type (Part D of HMAT)
- Specimen backed records (Part E of HMAT)
- Microhabitat features present (Part F).

The output of the HMAT is a prediction of habitat classes of Unlikely, General, Essential or Core habitat for each of the significant species identified in the preliminary desktop assessment. The resulting output of the HMAT habitat prediction is then reviewed and confirmed, or rejected with justification.

2.4 Vegetation Mapping

Following the field assessment of vegetation within the Scotia Project area, vegetation communities were mapped using GIS software in conjunction with field results. Vegetation mapping was undertaken using ortho-rectified 2015 aerial imagery. Both remnant and functional regrowth vegetation communities were mapped. The amended RE mapping was produced at a nominal scale of 1:10,000.

2.5 Habitat mapping

Using detailed vegetation community mapping and the confirmed and reviewed results of the HMAT analysis were used to develop GIS-based mapping of potential habitat for the identified species within the Site. This mapping was produced at a nominal scale of 1:10,000.

2.6 Nomenclature

Taxonomic nomenclature used for the description of floral species is according to Bostock and Holland (2014). Field references utilised for the identification of floral species include Anderson (2003), Brooker and Kleinig (1994), Melzer and Plumb (2011), Santos (2007), Lester (2008) and Leiper et al. (2008).

3.0 Results and Discussion

The Project area is dominated by modified grassland vegetation, associated with cattle grazing land practices. Remnant vegetation within the Project area is typically dominated by *Acacia harpophylla* (brigalow) and *Casuarina cristata* (belah), particularly in areas south of Bungaban Twelve Mile Road where self-mulching clay soils are prevalent. North of Bungaban Twelve Mile Road, remnant vegetation transitions into *Callitris glaucophylla* (white cypress pine) woodland and Eucalypt woodland, including species such as *Eucalyptus populnea* (poplar box), *E. crebra* (narrow-leaved ironbark) and *E. melanophloia* (silver-leaved ironbark). Riparian woodland types dominated by *Eucalyptus tereticornis* and *Angophora floribunda* occur upon Quaternary alluvium sediment along Bungaban Creek in the north of the Project area.

3.1 Geology

The desktop assessment identified the Project area as being dominated by Jurassic aged sedimentary deposits, with small occurrences of Quaternary alluvium present along Bungaban Creek which forms the northern boundary of the Project area. Table 2 below outlines the major geological units mapped within the Project area and provides the analogous land zone unit.

Table 2 Major geology units mapped from the Project area

Map Symbol	Age	Lithology Description	Land Zone
Qa	Quaternary	Channel and flood plain alluvium; gravel, sand, silt, clay	3
Jsi	Mesozoic	Calcareous lithic sandstone, siltstone, mudstone, coal, conglomerate	9/10
Jsbh	Mesozoic	Poorly sorted, coarse to medium-grained, feldspathic sublabile sandstone (at base) and fine-grained, well-sorted quartzose sandstone (at top); minor carbonaceous siltstone, mudstone, coal and rare pebble conglomerate	9/10

3.2 Regional Ecosystem Mapping

The field assessment recorded ten REs. Of the REs identified four are listed as Endangered, two listed as Of Concern and four listed as No Concern at present (biodiversity status). Table 3 below provides a summary of the REs identified.

Table 3 REs and non-remnant communities surveyed

RE	Short Description	Biodiversity Status	VM Act Status	EPBC Act Status
11.3.1	<i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> open forest on alluvial plains	E	E	E
11.3.2	<i>Eucalyptus populnea</i> woodland on alluvial plains	OC	OC	-
11.3.25	<i>Eucalyptus tereticornis</i> or <i>E. camaldulensis</i> woodland fringing drainage lines	OC	LC	-
11.3.39	<i>Eucalyptus melanophloia</i> +/- <i>E. chloroclada</i> open woodland on undulating plains and valleys with sandy soils	NC	LC	-
11.9.1	<i>Acacia harpophylla</i> - <i>Eucalyptus cambageana</i> woodland to open forest on fine-grained sedimentary rocks	E	E	E
11.9.5	<i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> open forest on fine-grained sedimentary rocks	E	E	E
11.9.10	<i>Eucalyptus populnea</i> open forest with a secondary tree layer of <i>Acacia harpophylla</i> and sometimes <i>Casuarina cristata</i> on fine-grained sedimentary rocks	E	OC	-
11.10.7	<i>Eucalyptus crebra</i> woodland on coarse-grained sedimentary rocks	NC	LC	-

RE	Short Description	Biodiversity Status	VM Act Status	EPBC Act Status
11.10.9	<i>Callitris glaucophylla</i> woodland on coarse-grained sedimentary rocks	NC	LC	-
11.10.11	<i>Eucalyptus populnea</i> , <i>E. melanophloia</i> +/- <i>Callitris glaucophylla</i> woodland on coarse-grained sedimentary rocks	NC	LC	-

E – Endangered, OC – Of Concern, LC – Least concern, NC – No concern at present

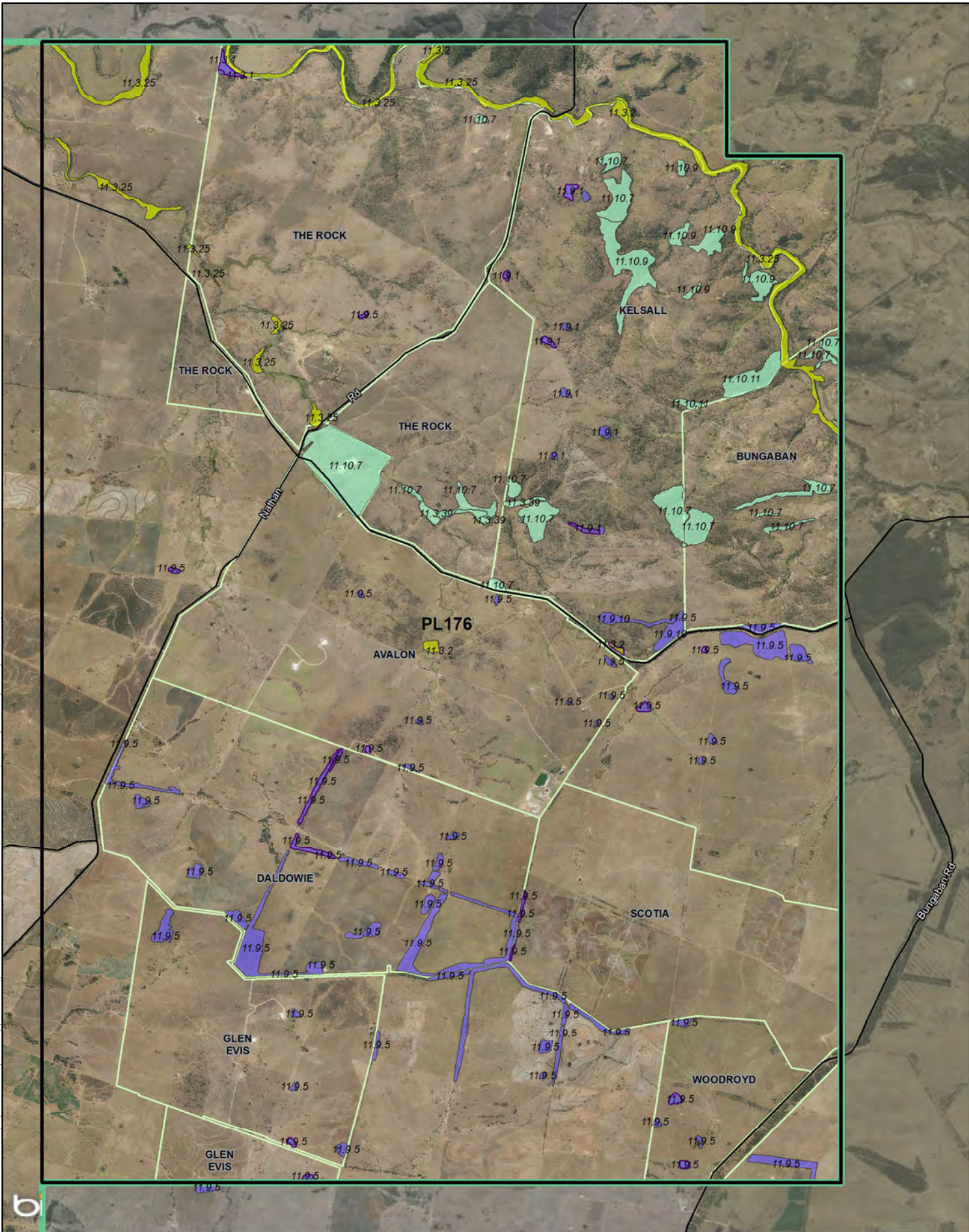
Of the above REs, three Endangered RE types were also mapped as functional regrowth communities, including:

- RE 11.3.1
- RE 11.9.1
- RE 11.9.5.

Appendix A summarises the structure and functionality of each vegetation community assessed.

REs ground-truthed within the Project area are depicted in Figure 3.

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LEGEND

- Locality
- ▭ PL176
- ▭ Scotia gas field
- Local road
- ▭ Property Boundaries
- ▭ Functional Regrowth
- Biodiversity Status**
- ▭ Endangered
- ▭ Of Concern
- ▭ Not of Concern

Data sources:
Client supplied data: Property Boundary
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Base Data: (c) 2015 Santos, (c) 2015 Bing



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Regional Ecosystems and
Functional Regrowth
Scotia Ecology Survey Report

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LAST MODIFIED MH - 03-03-2016
VERSION: 1

Map

3

3.2.1 EPBC Act Threatened Ecological Community

Of the REs mapped within the Project area, three align with the *Brigalow (Acacia harpophylla dominant and co-dominant)* EPBC TEC, including RE 11.3.1, 11.9.1 and 11.9.5. Where these communities are present as functional regrowth, EPBC TEC status also applies.

Vegetation communities analogous with the *Brigalow (Acacia harpophylla dominant and co-dominant)* TEC are depicted in Figure 4. Four polygons within these target REs (sites 8, 12, 27 and 44) did not meet the key diagnostic characteristics of the *Brigalow (Acacia harpophylla dominant and co-dominant)* TEC and therefore have been excluded from the TEC mapping.

3.3 Flora Species Diversity

The field trip identified 59 flora species across all survey sites. These species and the sites in which they were recorded are presented in Appendix B. No conservation significant flora species were recorded during the survey. One declared weed was recorded, *Opuntia tomentosa* (velvet tree pear).

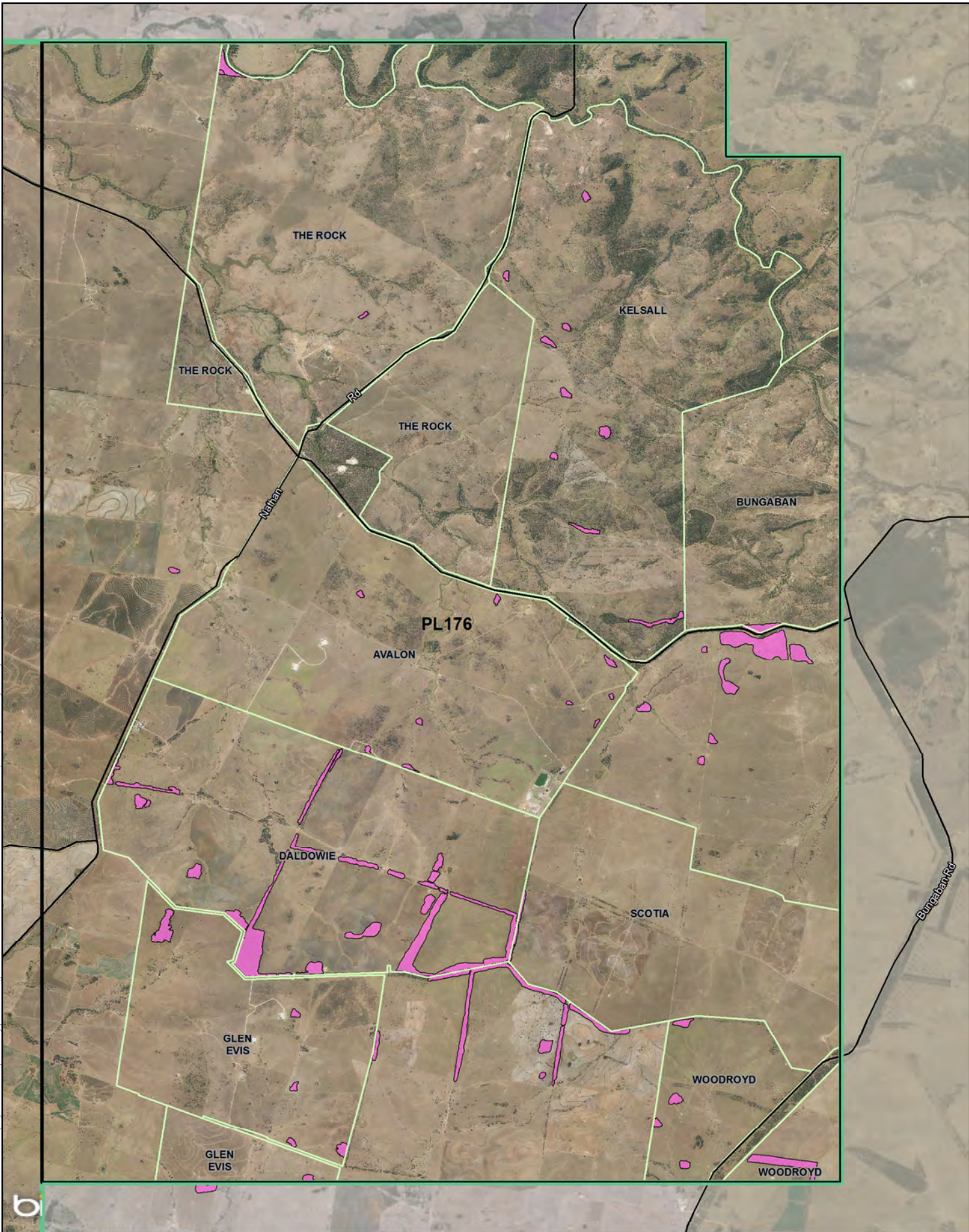
3.4 Habitat Mapping Assessment Tool

The HMAT assessments were carried out at each flora survey site. Potential general habitat for seven conservation significant fauna species was identified. Table 4 below lists these species and identifies the site locations where potential habitat was identified. The results of HMAT were used to map the fauna habitat present across the site and the data was supplied to Santos.

Table 4 Summary of HMAT results

Fauna Species Habitat Identified	Habitat Type Confirmed	Survey Locations
Koala	General	16, 17, 18, 19, 24, 26, 27, 28, 29, 30, 31, 37, 39, 40, 41, 42, 43, 44, 45, 46, 47, 49, 51, 52, 53, 54, 59
Squatter pigeon	General	37, 40, 41, 42, 44, 45, 46, 47, 48
South-eastern long-eared bat	General	18, 19, 24, 25, 26, 29, 30, 31, 34, 37, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 56, 57, 58, 59, 62
Dunmall's snake	General	1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 39, 40, 41, 42, 43, 44, 45, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62
Yakka skink	General	1, 3, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 24, 25, 26, 27, 28, 29, 30, 31, 33, 34, 35, 36, 37, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 57, 58, 59, 60, 62
Collared delma	General	1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 39, 40, 41, 42, 43, 44, 45, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62
Australian painted snipe	General	41, 47

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LEGEND

- Scotia gas field
- PL176
- Brigalow (*Acacia harpophylla* dominant and co-dominant) EPBC TEC
- Locality
- Local road
- Property Boundaries

Data sources:
Client supplied data: Property Boundary
(c) 2015 Streetspro
Base Data: (c) 2015 Santos, (c) 2015 Bing



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EPBC Threatened Ecological Communities

Scotia Ecology Survey Report

PROJECT ID	42627591	Map 4
CREATED BY	MH	
LAST MODIFIED	MH - 03-03-2016	
VERSION:	1	

4.0 Conclusion

The field survey undertaken by AECOM identified ten REs within the Project area (Section 2.1). Three REs were also recorded as functional regrowth communities (Section 2.2). Remnant vegetation within the Project area included *Acacia harpophylla* (brigalow) communities, particularly in areas south of the Bungaban Twelve Mile Road. North of Bungaban Twelve Mile Road, remnant vegetation transitions into Eucalypt woodlands and *Callitris glaucophylla* (white cypress pine) woodlands.

Brigalow REs within the Project area is analogous to the EPBC Act *Brigalow (Acacia harpophylla dominant and co-dominant)* TEC (Figure 4). The flora survey identified no flora species of conservation significance.

Fauna habitat within the Project area was restricted to remnant and functional regrowth communities. Habitat for seven fauna species of conservation significance was identified. The greatest areas of potential habitat was identified for the Dunmall's snake (*Furina dunmalli*), yakka skink (*Egernia rugosa*) and collared delma (*Delma torquata*) with micro-habitat features recorded within most regional ecosystem types. Of the remaining species, available habitat was dependent on factors such as the presence of Eucalypts, hollows and proximity to water.

5.0 References

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- Santos (2007). Field Guide to Trees and Shrubs of Eastern Queensland Oil and Gas Fields. Santos, Adelaide.

Appendix A

Quaternary Site Summary

Appendix A Quaternary Site Summary

Site Number	Latitude	Longitude	RE	Structure	Functionality
Q1	-25.96076	150.01921	11.9.5	Remnant	Functional
Q2	-25.984359	150.024103	n/a	Non-rem	Non-functional
Q3	-25.995945	150.108418	11.9.5	Remnant	Functional
Q4	-25.975017	150.09414	11.9.5	Non-rem	Non-functional
Q5	-25.986352	150.093557	11.9.5	Non-rem	Functional
Q6	-25.989843	150.090998	11.9.5	Remnant	Functional
Q7	-25.99525	150.095033	11.9.5	Non-rem	Functional
Q8	-25.992803	150.097447	11.9.5	Remnant	Functional
Q9	-25.966755	150.029318	11.9.5	Remnant	Functional
Q10	-25.94268	150.01581	11.9.5	Remnant	Functional
Q11	-25.935805	150.044128	11.9.5	Non-rem	Functional
Q12	-25.947723	150.060035	11.9.5	Remnant	Functional
Q13	-25.951327	150.046035	11.9.5	Remnant	Functional
Q14	-25.962187	150.04944	11.9.5	Remnant	Functional
Q15	-25.96768	150.054135	11.9.5	Remnant	Functional
Q16	-25.90275439	150.0957529	11.10.7	Remnant	Functional
Q17	-25.90079561	150.1060214	11.10.7	Remnant	Functional
Q18	-25.8751798	150.1160902	11.10.7	Remnant	Functional
Q19	-25.87854639	150.1102502	11.3.25	Remnant	Functional
Q20	-25.91725218	150.1060855	11.9.5	Remnant	Functional
Q21	-25.967959	150.076911	11.9.5	Non-rem	Non-functional
Q22	-25.970887	150.082498	11.9.5	Non-rem	Non-functional
Q23	-25.957132	150.071187	11.9.5	Non-rem	Functional
Q24	-25.915465	150.084892	11.9.10	Remnant	Functional
Q25	-25.91679074	150.0894101	11.9.5	Remnant	Functional
Q26	-25.90377799	150.0942236	11.10.7	Remnant	Functional
Q27	-25.903713	150.08252	11.9.1	Remnant	Functional
Q28	-25.901982	150.078467	11.9.1	Non-rem	Functional
Q29	-25.901395	150.074728	11.10.7	Remnant	Functional
Q30	-25.898555	150.072047	11.3.39	Remnant	Functional
Q31	-25.896575	150.070458	11.10.7	Remnant	Functional

Site Number	Latitude	Longitude	RE	Structure	Functionality
Q32	-25.892475	150.075942	11.9.1	Non-rem	Functional
Q33	-25.883407	150.077882	11.9.1	Remnant	Functional
Q34	-25.88861059	150.083001	11.9.1	Remnant	Functional
Q35	-25.875292	150.07513	11.9.1	Non-rem	Functional
Q36	-25.873313	150.07745	11.9.1	Remnant	Functional
Q37	-25.867147	150.088003	11.10.9	Remnant	Functional
Q38	-25.864477	150.08158	11.10.7	Non-rem	Functional
Q39	-25.866152	150.068833	11.9.1	Non-rem	Functional
Q40	-25.842097	150.085585	11.3.2	Remnant	Functional
Q41	-25.841972	150.086488	11.3.25	Remnant	Functional
Q42	-25.859378	150.094478	11.10.9	Remnant	Functional
Q43	-25.881147	150.102437	11.10.11	Remnant	Functional
Q44	-25.85277	150.078315	11.9.1	Non-rem	Functional
Q45	-25.852518	150.08368	11.10.9	Remnant	Functional
Q46	-25.843043	150.065805	11.10.7	Non-rem	Functional
Q47	-25.835947	150.037777	11.3.25	Remnant	Functional
Q48	-25.836278	150.027558	11.3.1	Remnant	Functional
Q49	-25.862905	150.023915	11.3.25	Remnant	Functional
Q50	-25.871538	150.04831	11.9.5	Non-rem	Functional
Q51	-25.876503	150.033535	11.3.25	Remnant	Functional
Q52	-25.900377	150.06161	11.3.39	Remnant	Functional
Q53	-25.899627	150.063538	11.10.7	Remnant	Functional
Q54	-25.919983	150.084297	11.3.2	Non-rem	Functional
Q55	-25.931568	150.082057	11.9.5	Non-rem	Functional
Q56	-25.92726	150.084183	11.9.5	Remnant	Functional
Q57	-25.922015	150.084395	11.9.5	Remnant	Iso recorde
Q58	-25.912983	150.067748	11.9.5	Remnant	Functional
Q59	-25.919602	150.058465	11.3.2	Remnant	Functional
Q60	-25.912608	150.04775	11.9.5	Remnant	Functional
Q61	-25.934818	150.048707	11.9.5	Regrowth	Functional
Q62	-25.937642	150.054453	11.9.5	Remnant	Functional

Appendix B

Species Diversity

Site	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
Regional Ecosystem ID	11.9.5	Non-rem	11.9.5	11.9.5 (NF)	11.9.5 (FR)	11.9.5	11.9.5 (FR)	11.9.5	11.9.5	11.9.5	11.9.5 (FR)	11.9.5	11.9.5	11.9.5	11.9.5
Height min (m)	12	10	8	12	7	12	10	12	12	15	6	12	8	12	10
Height max (m)	16	14	14	18	9	16	14	18	18	18	10	16	12	18	14
Scientific Name	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
<i>Acacia decora</i>															
<i>Acacia excelsa</i>															
<i>Acacia harpophylla</i>	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Acacia salicina</i>															
<i>Acalypha eremorum</i>	x														
<i>Alectryon diversifolius</i>	x			x		x		x	x	x					
<i>Alphitonia excelsa</i>															
<i>Alstonia constricta</i>															
<i>Angophora floribunda</i>															
<i>Apophyllum anomalum</i>			x					x							
<i>Aristida caput-medusae</i>															
<i>Aristida sp.</i>															
<i>Aristida sp.</i>															
<i>Atalaya hemiglauca</i>			x		x					x					
<i>Atriplex muelleri</i>										x					x
<i>Brachychiton rupestris</i>	x	x	x					x		x	x			x	x

Site	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
<i>Brachychiton populneus</i>															
<i>Bryophyllum delagoense</i>															
<i>Bursaria incana</i>	x														
<i>Callitris glaucophylla</i>															
<i>Capparis lasiantha</i>			x	x		x		x			x	x			
<i>Carissa ovata</i>	x			x					x	x					
<i>Casuarina cristata</i>				x		x	x	x				x	x	x	
<i>Cenchrus ciliare</i>	x	x		x			x	x	x	x	x	x	x	x	x
<i>Chloris sp.</i>															
<i>Citrus glauca</i>								x	x					x	x
<i>Corymbia tessellaris</i>															
<i>Cullen tenax</i>															
<i>Cymbopogon refractus</i>															
<i>Diospyros humilis</i>														x	
<i>Ehretia membranifolia</i>						x		x		x	x				
<i>Einadia nutans</i>								x							
<i>Enchylaena tomentosa</i>						x									
<i>Eremophila mitchelli</i>							x		x	x					
<i>Eucalyptus cambageana</i>															
<i>Eucalyptus crebra</i>															

Site	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
<i>Eucalyptus melanophloia</i>															
<i>Eucalyptus populnea</i>															
<i>Eucalyptus tereticornis</i>															
<i>Fimbristylis dichotoma</i>															
<i>Flindersia australis</i>	x														
<i>Geijera parviflora</i>	x		x	x	x	x	x			x	x	x	x		
<i>Glandularia aristigera</i>															
<i>Grevillea striata</i>															
<i>Hakea lorea</i>															
<i>Hovea longipes</i>															
<i>Hovea sp</i>															
<i>Lysiphyllum sp.</i>							x		x	x	x				
<i>Megathyrsus maximus</i>				x					x					x	
<i>Opuntia tomentosa</i>	x			x	x	x			x	x					
<i>Owenia acidula</i>		x													
<i>Perotis rara</i>															
<i>Petalostigma pubescens</i>	x			x						x					
<i>Pittosporum spinescens</i>				x					x					x	
<i>Portulaca oleracea</i>								x							
<i>Psydrax oleifolia</i>				x		x			x		x				

Site	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
<i>Sida hackettiana</i>														x	
<i>Themeda triandra</i>															
<i>Urochloa mutica</i>															

Site	Q16	Q17	Q18	Q19	Q20	Q21	Q22	Q23	Q24	Q25	Q26	Q27	Q28	Q29	Q30
Regional Ecosystem ID	11.10.7	11.10.7	11.10.7	11.3.25	11.9.5	11.9.5 (NF)	11.9.5 (NF)	11.9.5 (FR)	11.9.10	11.9.5	11.10.7	11.9.1	11.9.1 (FR)	11.10.7	11.3.39
Height min (m)	14	10	12	20	12	3	3	5	16	14	10	18	8	16	14
Height max (m)	18	14	16	25	15	4	4	7	18	22	14	21	12	20	17
Scientific Name	Q16	Q17	Q18	Q19	Q20	Q21	Q22	Q23	Q24	Q25	Q26	Q27	Q28	Q29	Q30
<i>Acacia decora</i>			x												
<i>Acacia excelsa</i>			x								x				x
<i>Acacia harpophylla</i>					x	x	x	x	x	x		x			x
<i>Acacia salicina</i>															
<i>Acalypha eremorum</i>													x		
<i>Alectryon diversifolius</i>				x				x	x	x					
<i>Alphitonia excelsa</i>	x													x	
<i>Alstonia constricta</i>											x				
<i>Angophora floribunda</i>				x											
<i>Apophyllum anomalum</i>															
<i>Aristida caput-medusae</i>															

Site	Q16	Q17	Q18	Q19	Q20	Q21	Q22	Q23	Q24	Q25	Q26	Q27	Q28	Q29	Q30
<i>Aristida sp.</i>	x		x												
<i>Aristida sp.</i>															
<i>Atalaya hemiglauca</i>															
<i>Atriplex muelleri</i>								x							
<i>Brachychiton rupestris</i>															
<i>Brachychiton populneus</i>															
<i>Bryophyllum delagoense</i>															
<i>Bursaria incana</i>										x					
<i>Callitris glaucophylla</i>	x	x									x				
<i>Capparis lasiantha</i>					x				x	x					
<i>Carissa ovata</i>									x			x			
<i>Casuarina cristata</i>	x	x	x		x				x	x					
<i>Cenchrus ciliare</i>	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
<i>Chloris sp.</i>															x
<i>Citrus glauca</i>										x					
<i>Corymbia tessellaris</i>															
<i>Cullen tenax</i>															
<i>Cymbopogon refractus</i>															
<i>Diospyros humilis</i>															

Site	Q16	Q17	Q18	Q19	Q20	Q21	Q22	Q23	Q24	Q25	Q26	Q27	Q28	Q29	Q30
<i>Ehretia membranifolia</i>															
<i>Einadia nutans</i>															
<i>Enchylaena tomentosa</i>															
<i>Eremophila mitchelli</i>	x				x		x		x				x	x	
<i>Eucalyptus cambageana</i>													x		
<i>Eucalyptus crebra</i>	x	x	x								x			x	
<i>Eucalyptus melanophloia</i>															x
<i>Eucalyptus populnea</i>			x						x					x	x
<i>Eucalyptus tereticornis</i>				x											
<i>Fimbristylis dichotoma</i>															
<i>Flindersia australis</i>															
<i>Geijera parviflora</i>		x		x	x				x	x			x	x	x
<i>Glandularia aristigera</i>															
<i>Grevillea striata</i>			x								x				
<i>Hakea lorea</i>		x													
<i>Hovea longipes</i>		x													
<i>Hovea sp.</i>												x			
<i>Lysiphylum sp.</i>															
<i>Megathyrus maximus</i>				x		x	x	x	x			x			

Site	Q16	Q17	Q18	Q19	Q20	Q21	Q22	Q23	Q24	Q25	Q26	Q27	Q28	Q29	Q30
<i>Opuntia tomentosa</i>					x		x				x				
<i>Owenia acidula</i>		x													
<i>Perotis rara</i>															
<i>Petalostigma pubescens</i>															
<i>Pittosporum spinescens</i>															
<i>Portulaca oleracea</i>															
<i>Psydrax oleifolia</i>										x					
<i>Sida hackettiana</i>															
<i>Themeda triandra</i>															
<i>Urochloa mutica</i>				x											

Site	Q31	Q32	Q33	Q34	Q35	Q36	Q37	Q38	Q39	Q40	Q41	Q42	Q43	Q44	Q45	Q46
Regional Ecosystem ID	11.10.7	11.9.1 (FR)	11.9.1	11.9.1	11.9.1 (FR)	11.9.1	11.10.9	11.10.7 (FR)	11.9.1 (FR)	11.3.2	11.3.25	11.10.9	11.10.11	11.9.1 (FR)	11.10.7	11.10.7 (FR)
Height min (m)	12	5	12	15	8	10	15	10	8	15	15	15	10	12	12	8
Height max (m)	15	8	16	20	12	14	20	12	12	18	22	20	16	15	18	12
Scientific Name	Q31	Q32	Q33	Q34	Q35	Q36	Q37	Q38	Q39	Q40	Q41	Q42	Q43	Q44	Q45	
<i>Acacia decora</i>													x			x
<i>Acacia excelsa</i>							x								x	

Site	Q31	Q32	Q33	Q34	Q35	Q36	Q37	Q38	Q39	Q40	Q41	Q42	Q43	Q44	Q45	Q46
<i>Acacia harpophylla</i>		x	x	x	x	x			x					x	x	
<i>Acacia salicina</i>										x						
<i>Acalypha eremorum</i>																
<i>Alectryon diversifolius</i>				x					x							
<i>Alphitonia excelsa</i>																
<i>Alstonia constricta</i>								x								
<i>Angophora floribunda</i>											x					
<i>Apophyllum anomalum</i>																
<i>Aristida caput-medusae</i>	x												x			
<i>Aristida sp.</i>																
<i>Aristida sp.</i>										x						
<i>Atalaya hemiglauca</i>																
<i>Atriplex muelleri</i>																
<i>Brachychiton rupestris</i>			x	x												

Site	Q31	Q32	Q33	Q34	Q35	Q36	Q37	Q38	Q39	Q40	Q41	Q42	Q43	Q44	Q45	Q46
<i>Brachychiton populneus</i>																
<i>Bryophyllum delagoense</i>																
<i>Bursaria incana</i>			x					x								
<i>Callitris glaucophylla</i>							x	x				x	x		x	
<i>Capparis lasiantha</i>																
<i>Carissa ovata</i>		x		x	x	x									x	
<i>Casuarina cristata</i>	x		x		x	x										
<i>Cenchrus ciliare</i>	x	x	x	x		x	x	x	x			x		x	x	x
<i>Chloris sp.</i>											x					
<i>Citrus glauca</i>																
<i>Corymbia tessellaris</i>																
<i>Cullen tenax</i>					x											
<i>Cymbopogon refractus</i>	x											x				
<i>Diospyros humilis</i>																
<i>Ehretia membranifolia</i>																

Site	Q31	Q32	Q33	Q34	Q35	Q36	Q37	Q38	Q39	Q40	Q41	Q42	Q43	Q44	Q45	Q46
<i>Einadia nutans</i>																
<i>Enchylaena tomentosa</i>																
<i>Eremophila mitchelli</i>	x	x	x	x	x					x				x	x	x
<i>Eucalyptus cambageana</i>		x	x	x	x	x			x					x		
<i>Eucalyptus crebra</i>	x							x							x	
<i>Eucalyptus melanophloia</i>							x					x	x			x
<i>Eucalyptus populnea</i>							x	x		x	x		x		x	x
<i>Eucalyptus tereticornis</i>											x					
<i>Fimbristylis dichotoma</i>										x						
<i>Flindersia australis</i>																
<i>Geijera parviflora</i>	x	x	x	x	x	x	x		x		x	x	x	x	x	
<i>Glandularia aristigera</i>										x						
<i>Grevillea striata</i>	x														x	
<i>Hakea lorea</i>																

Site	Q31	Q32	Q33	Q34	Q35	Q36	Q37	Q38	Q39	Q40	Q41	Q42	Q43	Q44	Q45	Q46
<i>Hovea longipes</i>									x							
<i>Hovea sp</i>																
<i>Lysiphyllum sp.</i>																
<i>Megathyrus maximus</i>											x					
<i>Opuntia tomentosa</i>					x											
<i>Owenia acidula</i>			x	x		x										
<i>Perotis rara</i>												x				
<i>Petalostigma pubescens</i>																
<i>Pittosporum spinescens</i>			x													
<i>Portulaca oleracea</i>																
<i>Psydrax oleifolia</i>						x									x	
<i>Sida hackettiana</i>																
<i>Themeda triandra</i>																
<i>Urochloa mutica</i>																x

Site	Q47	Q48	Q49	Q50	Q51	Q52	Q53	Q54	Q55	Q56	Q57	Q58	Q59	Q60	Q61	Q62
Regional Ecosystem ID	11.3.25	11.3.1	11.3.25	11.9.5a (FR)	11.3.25	11.3.39	11.10.7	11.3.2 (FR)	11.9.5 (FR)	11.9.5a (FR)	11.9.5a	11.9.5a	11.3.2	11.9.5	11.9.5 (FR)	11.9.5
Height min (m)	20	14	15	10	14	15	12	15	4	12	14	10	14	12	4	10
Height max (m)	25	18	20	13	20	20	20	21	8	16	18	13	18	18	8	15
Scientific Name	Q47	Q48	Q49	Q50	Q51	Q52	Q53	Q54	Q55	Q56	Q57	Q58	Q59	Q60	Q61	Q62
<i>Acacia decora</i>							x									
<i>Acacia excelsa</i>			x			x	x	x								
<i>Acacia harpophylla</i>		x		x		x			x	x	x	x	x	x	x	x
<i>Acacia salicina</i>																
<i>Acalypha eremorum</i>									x							
<i>Alectryon diversifolius</i>														x	x	
<i>Alphitonia excelsa</i>																
<i>Alstonia constricta</i>																
<i>Angophora floribunda</i>	x		x		x											
<i>Apophyllum anomalum</i>																
<i>Aristida caput-</i>							x									

Site	Q47	Q48	Q49	Q50	Q51	Q52	Q53	Q54	Q55	Q56	Q57	Q58	Q59	Q60	Q61	Q62
<i>medusae</i>																
<i>Aristida sp.</i>																
<i>Aristida sp.</i>																
<i>Atalaya hemiglauca</i>				x												
<i>Atriplex muelleri</i>																
<i>Brachychiton rupestris</i>												x				
<i>Brachychiton populneus</i>	x															
<i>Bryophyllum delagoense</i>											x					
<i>Bursaria incana</i>																
<i>Callitris glaucophylla</i>						x	x									
<i>Capparis lasiantha</i>										x						
<i>Carissa ovata</i>												x				
<i>Casuarina cristata</i>									x					x		x
<i>Cenchrus ciliare</i>	x	x		x			x	x	x	x	x	x	x	x		x
<i>Chloris sp.</i>																
<i>Citrus glauca</i>																

Site	Q47	Q48	Q49	Q50	Q51	Q52	Q53	Q54	Q55	Q56	Q57	Q58	Q59	Q60	Q61	Q62
<i>Corymbia tessellaris</i>							x									
<i>Cullen tenax</i>				x												
<i>Cymbopogon refractus</i>								x								
<i>Diospyros humilis</i>																
<i>Ehretia membranifolia</i>																
<i>Einadia nutans</i>										x						
<i>Enchylaena tomentosa</i>																
<i>Eremophila mitchelli</i>		x											x		x	
<i>Eucalyptus camageana</i>																
<i>Eucalyptus crebra</i>							x									
<i>Eucalyptus melanophloia</i>						x	x									
<i>Eucalyptus populnea</i>			x				x	x		x		x	x			x
<i>Eucalyptus tereticornis</i>	x		x		x	x	x	x								
<i>Fimbristylis dichotoma</i>																

Site	Q47	Q48	Q49	Q50	Q51	Q52	Q53	Q54	Q55	Q56	Q57	Q58	Q59	Q60	Q61	Q62
<i>Flindersia australis</i>																
<i>Geijera parviflora</i>	x	x	x	x				x	x	x	x		x	x	x	x
<i>Glandularia aristigera</i>			x													
<i>Grevillea striata</i>																
<i>Hakea lorea</i>																
<i>Hovea longipes</i>																
<i>Hovea sp</i>						x										
<i>Lysiphllum sp.</i>		x												x		x
<i>Megathyrsus maximus</i>					x											
<i>Opuntia tomentosa</i>		x												x		
<i>Owenia acidula</i>												x	x			
<i>Perotis rara</i>																
<i>Petalostigma pubescens</i>																
<i>Pittosporum spinescens</i>																
<i>Portulaca oleracea</i>																

Site	Q47	Q48	Q49	Q50	Q51	Q52	Q53	Q54	Q55	Q56	Q57	Q58	Q59	Q60	Q61	Q62
<i>Psyrax oleifolia</i>										x						
<i>Sida hackettiana</i>																
<i>Themeda triandra</i>					x			x								
<i>Urochloa mutica</i>			x		x											