

Detailed Regional Ecosystem Mapping

PL282



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List of Abbreviations

Abbreviation	Definition
Biodiversity Status:	
E	Endangered
OC	Of Concern
NC	No Concern at Present
VM Class:	
E	Endangered
OC	Of Concern
LC	Least Concern
cm	Centimetre
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DEHP	Queensland Department of Environment and Heritage Protection
DoE	Commonwealth Department of the Environment
DSITIA	Queensland Department of Science, Information Technology, Innovation and the Arts
EPBC Act	Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i>
GLNG	Gladstone Liquid Natural Gas project
ha	Hectare
m	Metre
MNES	Matter of National Environmental Significance
RE	Regional Ecosystem
REDD	Regional Ecosystem Description Database
TEC	Threatened Ecological Community
VM Act	Queensland's <i>Vegetation Management Act 1999</i>

1. Introduction

O2 Ecology was engaged by Santos GLNG to produce a large scale and more robust Regional Ecosystem (RE) mapping layer over petroleum lease (PL) area 282. Due to the scale of Santos GLNG operations and the minimal, normally linear, disturbance footprint, often contained within private property, it is not practical to conduct detailed ecological assessments to verify every polygon of the published RE mapping. The concept and design of large infrastructure, such as compressor sites, commences three to five years prior to development of an area due to geotechnical studies, design constraints and tie-ins required for the infrastructure. The inaccuracies present in the current published RE mapping are resulting in redesigns and rerouting of infrastructure at the point of construction. This leads to increased design costs and to increased contractor and machinery downtime costs while redesigns are completed.

A more robust and permanent RE mapping layer would allow design of key infrastructure to be undertaken more efficiently and Santos GLNG are committed to developing a more workable mapping layer. This layer will also be valuable under the Commonwealth Department of the Environment's (DoE) agreed method for fauna constraints mapping by locking-in large scale RE layers as the basis for all future assessments.

1.1. Objectives

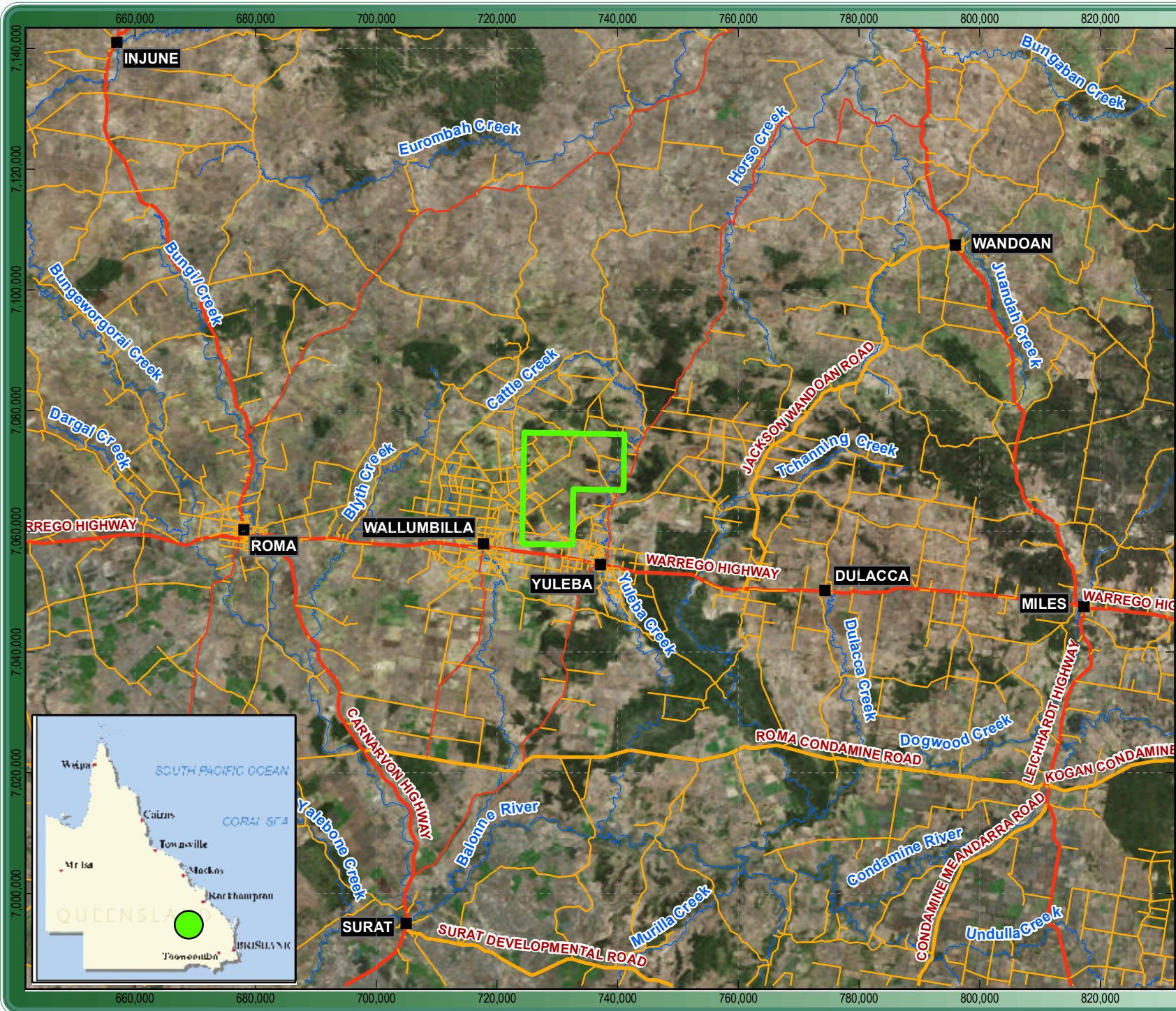
The key objective for this project is to conduct a study over PL282 by producing large scale RE mapping solely based on high resolution imagery made available by Santos GLNG. The resultant mapping may then form part of a business case that Santos GLNG can present to the Queensland Department of Environment and Heritage Protection (DEHP) as part of a 'lock-it-in' assessable vegetation mapping layer.

1.2. Location of Study Area

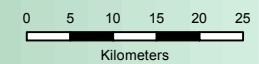
PL282 has been proposed by Santos GLNG for this exercise. PL282 covers some 230 km² and is located approximately 50 km east of Roma. Refer to **Figure 1** for the location of PL282 study area.

A number of second order streams dissect the PL282 study area including Black Gully, Cottage Creek, Georges Gully, Horse Gully, Humpy Creek, Kangaroo Creek, Six Mile Creek, Snake Creek, and Yuleba Creek.

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1:875,000 at A4

Map Projection: Transverse Mercator
 Horizontal Datum: GDA 1994
 Grid: GDA 1994 MGA Zone 55

Legend

- Localities
- Priority Area (PL282)
- Major Waterways
- State Controlled Roads**
- Highways
- Secondary roads
- Local connector roads
- Streets

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Santos Pty Ltd
 Pilot study: large scale
 RE mapping

Regional Context
 Priority Areas

Figure 1

Data Source: DTMR: State Controlled Roads, DNRM: Major watercourse lines - Queensland (April 2014), Geoscience Australia 250k topo: Populated places © State of Queensland (DTMR, DNRM); Imagery: Esri, DigitalGlobe

2. Methods

This section outlines the methods utilised by O2 Ecology to produce large scale RE mapping over PL282. Santos commissioned Aerometrics to fly the entire GLNG gas fields to capture 25 cm high resolution aerial imagery. This imagery was largely flown early in 2013. Two areas were selected by Santos as pilot study areas. O2 Ecology was supplied with orthorectified high resolution imagery over these areas. This imagery was the base layer used for mapping.

O2 Ecology's principal botanist interpreted the imagery, and correlated the observed patterns with other mapping (e.g. geology mapping, existing RE mapping), historical aerial photography, Google Earth imagery, and expert knowledge to produce large scale amended RE mapping over the study area. Digital spatial data for 10 m contours, waterways, weathering intensity mapping, and land system mapping (CSIRO, 1974) were also referred to during map construction. The majority of map polygons were attributed with a single RE and confidence ratings were assigned to indicate accuracy of both the polygon boundary and RE attribution for each polygon (as per (Neldner, et al., 2012)).

Amended RE mapping was produced at a nominal scale of 1:10,000. Mapping at 1:10,000 scale has a minimum polygon size of approximately 0.1 ha, a minimum width for linear features of approximately 10 m, and polygon boundaries with spatial precision of ± 10 m. This compares to the nominal scale of 1:100,000 for the published RE mapping, with a minimum area for mapped features of 5 ha, a minimum width for linear features of 75 m, and line work with positional accuracy of ± 100 m.

It is important to note that initial mapping for the PL282 area was produced without the aid of any field survey results. This approach is not consistent with best practice but was applied in this study in order to test the capacity of O2 Ecology to produce mapping using only desktop assessment and interpretation of the remotely sensed imagery.

2.1. Field Survey

A field survey was conducted to validate the mapping produced by O2 Ecology. A number of sites were selected within the PL282 study area to ground-truth the O2 Ecology RE and mature regrowth mapping. Survey sites were selected to sample representative vegetation communities present in the PL282 area. Verification was based on direct observations of flora and vegetation, including soils, geology and landforms.

2.1.1. Site Selection

Field surveys were undertaken in representative vegetation communities across the PL282 area. Sites were selected on the basis of:

- Aerial photography interpretation of site characteristics;
- Presence of mapped remnant or regrowth vegetation;
- Prior approval from landholders; and
- Potential for close access by vehicle.

2.1.2. Flora and Vegetation Survey Methods

The August 2012 version of the Queensland Herbarium's Regional Ecosystem map modification kit was utilised in field assessments. When the attribution of a RE to a polygon was in doubt, the Regional Ecosystem type assessment form (Sheet D) was completed. In areas where the mapping was correct or when there was an obvious change in the vegetation community, a Quaternary level assessment (Neldner, et al., 2012) was undertaken. Field site assessment included noting the landform, soil type and evidence of

disturbance. A total of 53 sites were assessed in the PL282 area. Survey site locations are shown in **Figure 5**. Site photographs were taken towards the four cardinal compass points.

The remnant/non-remnant status of native vegetation was determined by comparing the existing predominant canopy of a site with that in a normal or undisturbed state. The predominant canopy is defined by the Queensland Herbarium as the ecologically dominant layer (EDL) or that layer of the vegetation which contains the most above ground biomass. The EDL can be defined in terms of growth form, height, cover density and species. In the majority of cases, the EDL is equivalent to the upper stratum of Walker and Hopkins (1990).

The relative dominance of species in each of the strata was assigned as per the definitions in the August 2012 version of the Regional Ecosystem Map Assessment Kit (Queensland Herbarium, 2012) and as described below:

- D (dominant species): A species that contributes most to the overall above-ground biomass of a particular stratum
- C (co-dominant species): Where two or more species contribute more or less equally to form the dominant above-ground biomass of a particular stratum
- S (subdominant species): A species is considered to be subdominant when it contributes less biomass than the dominant species, but occurs as more than an isolated individual. As a general rule, the species must individually contribute more than 10% of the total biomass of the stratum in which it occurs.
- A (associated species): Any species is present in a stratum but does not contribute more than 10% of the total biomass of the stratum in which it occurs.

2.2. Nomenclature

Scientific names for terrestrial flora are consistent with those used in the Census of the Queensland Flora (Bostock & Holland, 2014) and botanical binomials presently accepted by the Queensland Herbarium, (DSITIA). The description of REs follows that of the Regional Ecosystem Description Database (REDD, Version 8.1 (Queensland Herbarium, 2014)).

3. Results and Discussion

3.1. Regional Ecosystems

In Queensland, assessable remnant vegetation is classified into REs. These REs are discrete vegetation communities in a bioregion that are consistently associated with a particular combination of geology, landform and soil. Each RE is identified with a three part label, for example, RE 11.3.25. The first number, 11, indicates the bioregion in which the RE is located, in this case the Brigalow Belt bioregion. The second number, 3, indicates the land zone on which the ecosystem is found, in this case alluvium associated with river and creek flats. The third number, 25, relates to the dominant vegetation, in this case *Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines.

The Queensland Herbarium (DSITIA) is responsible for classifying and mapping REs, using a combination of remotely sensed data sets and on-ground studies. Version 8 of the RE mapping is certified under the *Vegetation Management Act 1999*, includes both a VM Class (e.g. Endangered, Of Concern or Least Concern) and Biodiversity Status (e.g. Endangered, Of Concern or No Concern at Present), and maps the extent of REs as of 2011.

3.2. Bioregion and Subregion

The PL282 area is located entirely within the Southern Downs (BRB26) subregion of the Brigalow Belt bioregion. The Brigalow Belt bioregion covers a total area of 135,500 km² and includes coastal areas, rugged ranges and alluvial plains. Dominant vegetation communities include open forests (dominated by *Acacia harpophylla*, *A. argyrodendron*, *A. cambagei*, *A. shirleyi*, *A. catenulata*, *Eucalyptus cambageana*, *E. camaldulensis*, *E. tereticornis*), woodlands (dominated by *Eucalyptus melanophloia*, *E. crebra*, *E. populnea*, *E. brownii*, *E. persistens*, *E. orgadophila*, *E. coolabah*, *E. camaldulensis*, *E. tereticornis*) and small patches of semi-evergreen vine thicket (Young, et al., 1999).

The Southern Downs subregion is formed primarily on fine grained Jurassic and Cretaceous sediments, forming a low, hilly landscape including the watershed formed by the Great Dividing Range. There are extensive late Cainozoic flood-outs/clay plains in the southern part of the subregion with minor areas of Tertiary volcanics scattered throughout the subregion. Vegetation includes belah (*Casuarina cristata*), brigalow (*Acacia harpophylla*), poplar box (*Eucalyptus populnea*), and narrow-leaved ironbark (*Eucalyptus crebra*) communities, and less extensively spotted gum (*Corymbia citriodora*), dusky leaved ironbark (*Eucalyptus fibrosa* subsp. *nubila*), semi evergreen vine thicket, *Astrebla* and *Acacia* communities (Young, et al., 1999).

3.3. Geology

The 2012 Department of Natural Resources and Mines (DNRM) surface rock unit GIS datasets for the Roma 1:250,000 geology map sheet (Department of Natural Resources and Mines, 2012) (**Figure 3**) identify the PL282 area as containing Quaternary alluvium (Qa), Tertiary aged deposits (T), and a number of Cretaceous aged sedimentary deposits. These geology units are described in more detail below in **Table 1**.

It should be noted that at 1:250,000 scale: line accuracy within the geology map is ± 250 m and was used only as guide.

Table 1 Major surface geology units mapped from the PL282 study area (source: Roma 1:250,000 geology map)

Unit Name	Map Symbol	Age	Lithology Description
Quaternary Alluvium	Qa	Quaternary	Alluvium

Unit Name	Map Symbol	Age	Lithology Description
	Qs/Kld	Quaternary	Sand, gravel, soil with gravel
	T	Tertiary	Quartzose sandstone, conglomerate
Doncaster member	Kld	Lower Cretaceous	Mudstone, some siltstone, quartzose sandstone and coquinite. Shelly fossils
Doncaster member (weathered)	Kld>w		
Minmi member	Kli	Lower Cretaceous	Glauconitic lithic to quartzose sandstone, siltstone, mudstone, bioturbidites. Shelly fossils
Kingull member	Klk	Lower Cretaceous	Clayey sandstone, carbonaceous mudstone
Mooga sandstone	Klm	Lower Cretaceous	Quartzose to labile sandstone, some clayey; some sandstone, conglomerate
Nullawurt Sandstone Member	Kln	Lower Cretaceous	Quartzose to labile sandstone, siltstone, mudstone
Bungil Formation	Kly	Lower Cretaceous	Sandstone, siltstone, mudstone

The stratigraphy of the surface geology is important in understanding the extent and distribution of land zones and Regional Ecosystem mapping over the study area. The stratigraphic profile of an area close to the study area is included in the hard copy of the Roma 1:250,000 geology map and is illustrated in **Figure 2**.

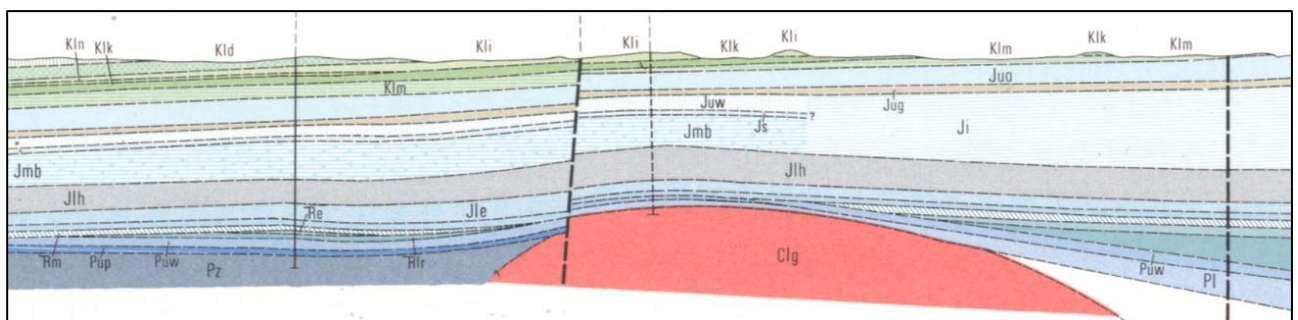


Figure 2 Geological stratigraphy illustrating the layering of the major surface geologies in the vicinity of the PL282 area (Source: Roma 1:250,000 geology map).

The Weathering Intensity Map of Australia dataset shows the degree to which the surface bedrock and sediment are weathered. The degree to which the surface is weathered (or its weathering intensity) is intrinsically linked to the factors involved in soil/regolith formation including parent material, climate, topography, biota and time. The weathering intensity mapping index is based on surface geochemistry (potassium, thorium, uranium) shown by the gamma radiometric data shown in the radiometric map of Australia, and landscape relief from the 90 m SRTM DEM. High weathering intensity values indicate high to

very highly weathered materials. As weathering progresses there is generally a loss of potassium compared with uranium and thorium, which can be retained in residual oxides and clays. Low relief landforms tend to preserve or maintain weathered material. The accuracy of the weathering index though would vary depending on the resolution of the gamma radiometrics, which varies across the country.

It is unclear whether a specific weathering intensity value correlates with deeply weathered profiles. However, the Doncaster Member map unit (Kld>w) in the southwest corner is described as deeply weathered and correlates well with the weathering intensity index. Looking at the radiometrics data for that location, it is low in potassium and high in thorium/uranium, which would explain the high weathering index values. As a consequence, those areas mapped as having a high weathering intensity index were closely scrutinised to determine whether they could be classed as deeply weathered profiles. The underlying geology map and land system map also assisted in determine the extent of deeply weathered areas in the PL282 study area.

Land systems mapped for the PL282 study area are listed in **Table 2** (CSIRO, 1974). Land systems mapping was undertaken at a scale greater than 1:500,000.

Table 2 Land systems and dominant land units mapped for the PL282 study (CSIRO, 1974).

Land System	Dominant Land Unit	Position in landscape	Vegetation	Soils
AX	64	Alluvial plains	Poplar box woodland with some belah	Duplex soils
(S)rNi	20	Low rises with occasional outcrops	Narrow-leaved ironbark woodland with shrubs	Shallow, stony massive earths
(S)uBl	38	Gently undulating plains	Belah forest and some brigalow and shrubs	Deep texture-contrast soils
(S)uBu	31	Undulating lowlands	Eucalypt woodland with bull oak	Texture contrast soils
(S)rBe	22	Rises, rolling terrain	Bendee open forest	Shallow soils
(S)uX	26	Gently undulating lowlands	Poplar box woodlands and shrubs	Deep red earths with sparse surficial ferruginous gravel

Land system codes: A = alluvium, S = shale mudstone and other labile sediments, () = deeply weathered profile, u = undulating relief, r = rolling relief, X = poplar box, Ni = narrow-leaved ironbark, Bl = belah, Bu = bull oak, Be = bendee

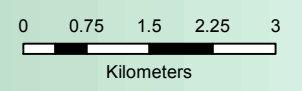
3.4. Land Zones

Land zones represent significant differences in geology and the associated landforms, soils and physical processes and generally correspond to broad geological and geomorphological categories and are a critical component of the RE classification scheme.

Land zones have been delineated across the study area based on the available surface geology mapping. Five land zones have been delineated from the study area and are broadly consistent with the surface geology mapping (**Table 3**).

Table 3 Land zones and associated geologies occurring in the study area. Land zone descriptions as per Wilson and Taylor (2012).

Land zone	Description	Associated geology
3	Recent Quaternary alluvial systems, including closed depressions, palaeo-estuarine deposits currently under fresh water influence, inland lakes and associated wave built lunettes. Excludes colluvial deposits such as talus slopes and pediments. Includes a diverse range of soils, predominantly Vertosols and Sodosols; also with Dermosols, Kurosols, Chromosols, Kandosols, Tenosols, Rudosols and Hydrosols; and Organosols in high rainfall areas.	Qa (not reliably mapped at the scale of the geology mapping over some of the study area)
5	Tertiary-early Quaternary extensive uniform near level or gently undulating plains with sandy or loamy soils. Includes dissected remnants of these surfaces. Also includes plains with sandy or loamy soils of uncertain origin, and plateau remnants with deep soils usually overlying duricrust. Excludes recent Quaternary alluvial systems (land zone 3), exposed duricrust (land zone 7), and soils derived from underlying bedrock (land zones 8 to 12). Soils are usually Tenosols and Kandosols, also minor deep sandy surfaced Sodosols and Chromosols. There may be a duricrust at depth.	Kld>w and other flat deeply weathered areas
7	Cainozoic duricrusts formed on a variety of rock types, usually forming mesas or scarps. Includes exposed ferruginous, siliceous or mottled horizons and associated talus and colluvium, and remnants of these features, for example low stony rises on downs. Soils are usually shallow Rudosols and Tenosols, with minor Sodosols and Chromosols on associated pediments, and shallow Kandosols on plateau margins and larger mesas.	Kld>w
9	Fine grained sedimentary rocks, generally with little or no deformation and usually forming undulating landscapes. Siltstones, mudstones, shales, calcareous sediments, and labile sandstones are typical rock types although minor interbedded volcanics may occur. Includes a diverse range of fine textured soils of moderate to high fertility, predominantly Vertosols, Sodosols, and Chromosols.	Klk, Kln, Kly
10	Medium to coarse-grained sedimentary rocks, with little or no deformation, forming plateaus, benches and scarps. Includes siliceous (quartzose) sandstones, conglomerates and minor interbedded volcanics, and springs associated with these rocks. Excludes overlying Cainozoic sand deposits (land zone 5). Soils are predominantly shallow Rudosols and Tenosols of low fertility, but include sandy surfaced Kandosols, Kurosols, Sodosols and Chromosols.	T, Kli, Klm

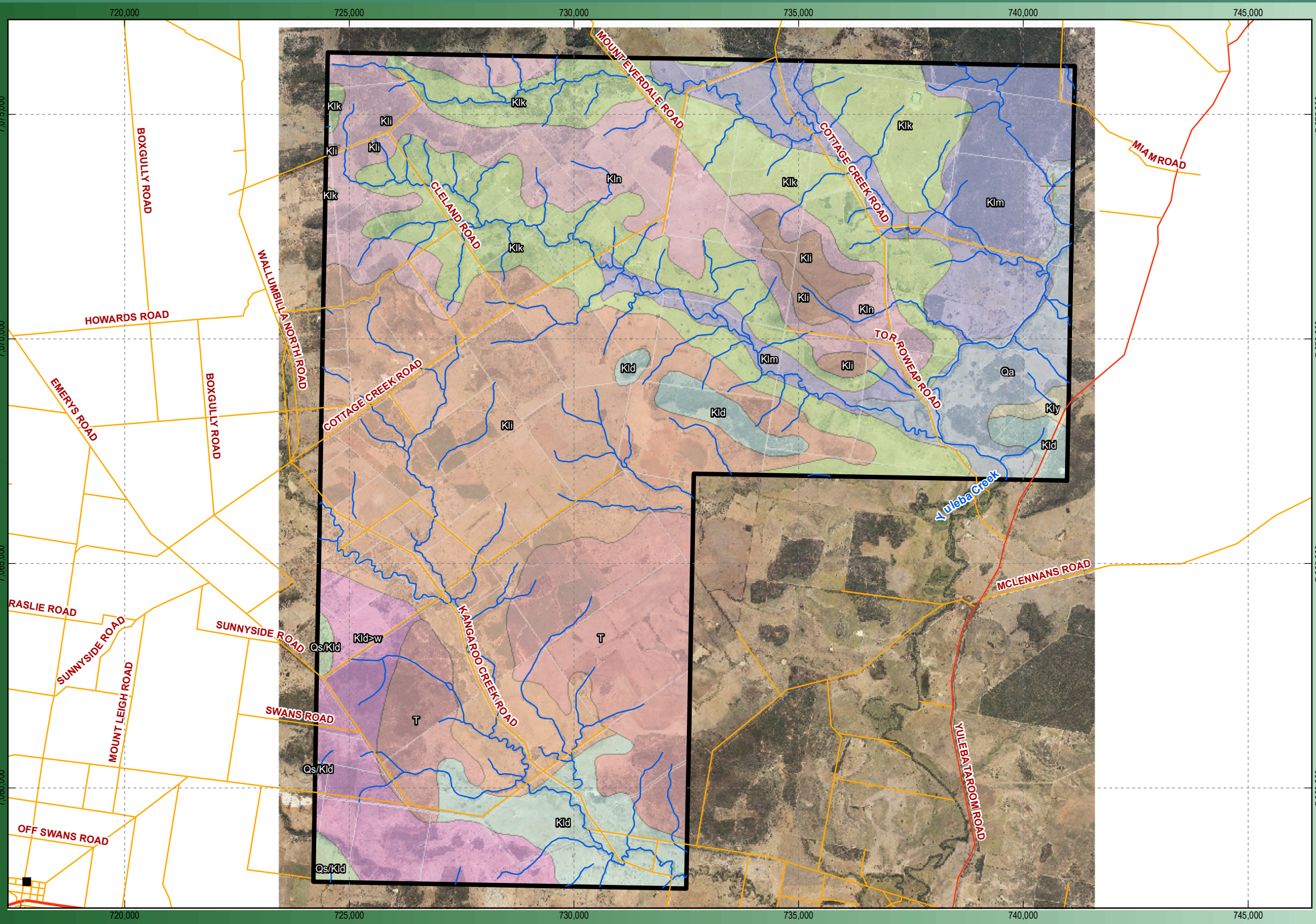


1:90,000 at A3

Map Projection: Transverse Mercator
 Horizontal Datum: GDA 1994
 Grid: GDA 1994 MGA Zone 55

Legend

- Localities
- State Controlled Roads**
 - Highways
 - Secondary roads
 - Local connector roads
 - Streets
 - VM Watercourse
- ▭ PL282
- ▭ Cadastre



Geology 250k

- Kld , Mudstone, some siltstone, quartzose sandstone and coquinite. Shelly fossils
- Kld>w , Km Not known
- Kli , Glauconitic lithic to quartzose sandstone, siltstone, mudstone, bioturbidites. Shelly fossils
- Klk , Clayey sandstone, carbonaceous mudstone
- Klm , Quartzose to labile sandstone, some clayey; some sandstone, conglomerate
- Kln , Quartzose to labile sandstone, siltstone, mudstone
- Kly , Sandstone, siltstone, mudstone; not subdivided east of Yuleba Creek
- Qa , Alluvium
- Qs/Kld , Sand, gravel, soil with gravel
- T , Quartzose sandstone, conglomerate

Santos Pty Ltd
 Pilot study: large scale
 RE mapping

Geology
 PL282

Figure 3

3.5. Regional Ecosystems Mapping

The detailed mapping produced by O2 Ecology over the PL282 study area has identified discrepancies between the published RE map (v8.0) and our mapping. These discrepancies relate to both the remnant extent and attribution of REs. Errors in extent of remnant vegetation can arise through both the scale at which the mapping was undertaken and the misclassification of areas of regrowth vegetation as remnant. The publically available RE mapping (v8.0) was originally undertaken at 1:100,000 scale and involve interpretation of remotely sensed imagery, predominantly satellite imagery at various resolutions. As a consequence of this, the lines appearing on the publically available RE maps have an error factor of ± 100 m. Furthermore, the publically available RE mapping has a time lag associated with it: version 8.0 mapping is based on the extent of vegetation at 2011. Any clearing events that have taken place since 2011 will not be represented on the current versions. Errors in the attribution of RE polygons may arise through misinterpretation of land zone definitions or photo patterns.

Version 8.0 of the RE mapping (**Figure 4**) has mapped approximately 4529 ha of remnant vegetation in the PL282 study area (**Table 4**). O2 Ecology's 1:10,000 RE mapping has increased the extent of remnant vegetation in the study area by 566 ha (**Table 4**). O2 Ecology has tended to err on the side of caution with respect to remnant versus non-remnant vegetation attribution. That is, if it was thought it could be remnant vegetation then it was mapped as such. Furthermore, the increase in mapped remnant area is due in part to the scale of the mapping which O2 Ecology undertook. At 1:10,000 scale and with high resolution aerial photography we could easily map small polygons (at 0.1 ha).

Table 4 Comparison of the area in hectares of each RE mapped from the PL282 study area represented in both version 8.0 RE map, O2 Ecology's pre-field verified map and post-field verified map.

RE	Biodiversity Status	V8.0 RE map (ha)	O2 Ecology map – pre-field (ha)	O2 Ecology map – post-field (ha)
11.3.2	OC	172.48	444.89	407.43
11.3.25	OC	428.68	223.31	255.83
11.5.1	NC	386.78	763.84	693.29
11.5.1a	NC			261.33
11.5.5	NC	388.37	340.89	54.99
11.7.2	NC	1143.772	344.36	
11.7.6	NC	161.62		
11.9.5	E	181.97	29.6	58.05
11.9.5a	E			150.58
11.9.7	OC			11.39
11.9.7a	OC			3.26
11.9.10	E	312.09	338.18	177.7

RE	Biodiversity Status	V8.0 RE map (ha)	O2 Ecology map – pre-field (ha)	O2 Ecology map – post-field (ha)
11.10.1	NC	63.60	231.42	69.98
11.10.3	NC		597.07	566.0
11.10.4	NC			72.11
11.10.4a	NC			21.16
11.10.7	NC			483.77
11.10.9	NC	452.08	16.63	429.79
11.10.11	NC	271.25	1198.5	792.97
Non-remnant		19108.97	18542.98	18515.91
Total (remnant)		3962.7	4528.69	4509.63

Our interpretation of the land zones of the PL282 study area has changed some of the REs mapped as occurring over the study area. One of the major discrepancies between the certified RE mapping and the O2 Ecology map is the delineation of land zones particularly those land zones associated with deeply weathered profiles. While the CSIRO (1974) land system mapping has all non-alluvial areas mapped as deeply weathered, this was not supported by the 1:250,000 surface geology mapping or the weathering intensity mapping. As stated previously, the Doncaster Member map unit (Kld>w) in the southwest corner is described as deeply weathered and correlates well with the weathering intensity mapping. As such, where the weathering intensity mapping indicated that an area was subjected to intense weathering, it was decided to map as either land zone 5 or 7. However, O2 Ecology freely acknowledges that an intensely weathered area may not necessarily support a deeply weathered profile. This approach has significantly reduced the area of REs 11.7.2 and 11.7.6 mapped with some areas remapped as supporting 11.10.3 or 11.10.1 respectively.

Another major discrepancy was the allocation of land zones 9 and 10 to the various sedimentary geologies present in the study area. Many of the sedimentary units were composed of complexes of fine and coarse grained sediments, e.g. “Quartzose to labile sandstone, some clayey”. As a consequence, the geology mapping alone was not sufficient to allow allocation of a land zone. The rocks associated with land zones 9 and 10 weather to form different land forms. The general “soft” nature of fine grained sedimentary rocks and labile to sublabile sandstone weather to form very gently undulating to undulating clay plains while the more coarse grained sedimentary rocks tend to form undulating to steep rises and hills, plateaus, and precipitous cliffs and scarps (Wilson & Taylor, 2012). As such, the aerial imagery supplied by Santos, 10 m contour lines, and Google Earth imagery, with maximum elevation exaggeration, were utilised to differentiate land forms across the study area. It was decided that the lowland undulating sedimentary areas would fit best with land zone 9 while areas of steep rises and hills would correspond with land zone 10.

Furthermore, the original v8.0 RE map represented alluvial areas as heterogeneous polygons of REs 11.3.25/11.3.2. These two REs tend to occur in different parts of the alluvial landscape. RE 11.3.25 occurs

predominantly on fringing levees and banks of major rivers and drainage lines of alluvial plains while RE 11.3.2 occurs on alluvial plains. As such, those areas of riparian forest occurring along stream lines were determined to be RE 11.3.25 and those forests on alluvium away from the channels were mapped as RE 11.3.2.

3.6. Field Survey Results

A total of 53 survey sites were assessed across the PL282 project area by enhanced quaternary level CORVEG plots to verify the extent and attribution of the mapped RE and regrowth and to assist with determination of remnant status. Details of the field survey sites are listed in **Table 5** with their location illustrated in **Figure 5**. Completed site forms are contained in **Appendix A**.

Table 5 Comparison of the pre-field verified RE and verified RE from each of the study sites sampled.

Site No.	Easting	Northing	Mapped RE	Checked RE	Remnant
GLNG01	731052	7058393	11.3.25	11.3.25	Remnant
GLNG01a	728286	7061704	11.3.2	11.3.25	Remnant
GLNG02	727880	7062311	11.10.11	11.10.11	Remnant
GLNG03	727453	7063793	11.3.2	11.3.2	Remnant
GLNG03a	727210	7064103	11.3.2	11.3.25	Remnant
GLNG04	727111	7064192	11.3.2	11.3.2	Remnant
GLNG05	726879	7064612	11.10.11	11.9.7	Remnant
GLNG06	724868	7068057	11.10.11	11.9.5a	Remnant
GLNG07	725284	7068352	11.9.10	11.9.5	Regrowth
GLNG08	726325	7069047	11.9.10	11.9.5a	Remnant
GLNG08a	727282	7069735	11.9.10	11.10.7	Remnant
GLNG08b	727513	7069919	11.9.10 (rg)	11.10.7	Remnant
GLNG09	730445	7071778	11.3.25	11.3.25	Remnant
GLNG10	732038	7072700	11.9.10	11.9.5	Regrowth
GLNG11	732237	7073905	11.9.10	11.9.5a	Remnant
GLNG12	730996	7067053	11.9.5	11.9.5a	Remnant
GLNG12a	729600	7066044	11.9.5 (rem)	11.9.5	Regrowth
GLNG12b	729194	7065774	11.9.5 (rg)	11.9.5	Remnant
GLNG12c	728853	7065540	11.9.5 (rg)	11.9.5	Regrowth
GLNG13	728563	7065317	11.9.5 (rg)	11.9.5	Regrowth
GLNG14	728286	7071304	11.10.3	11.10.3	Remnant
GLNG14a	728537	7070784	non-rem	11.9.7a	Remnant
GLNG14b	724586	7067838	11.10.11	11.9.7a	Remnant
GLNG14c	724191	7066746	non-rem	11.9.5	Regrowth
GLNG14d	725513	7065691	non-rem	11.9.7	Remnant
GLNG15	732281	7074645	11.9.10	11.9.5a	Remnant
GLNG16	731971	7074932	11.9.10	11.9.5a	Regrowth
GLNG17	731315	7075676	11.9.10	11.9.5a	Regrowth

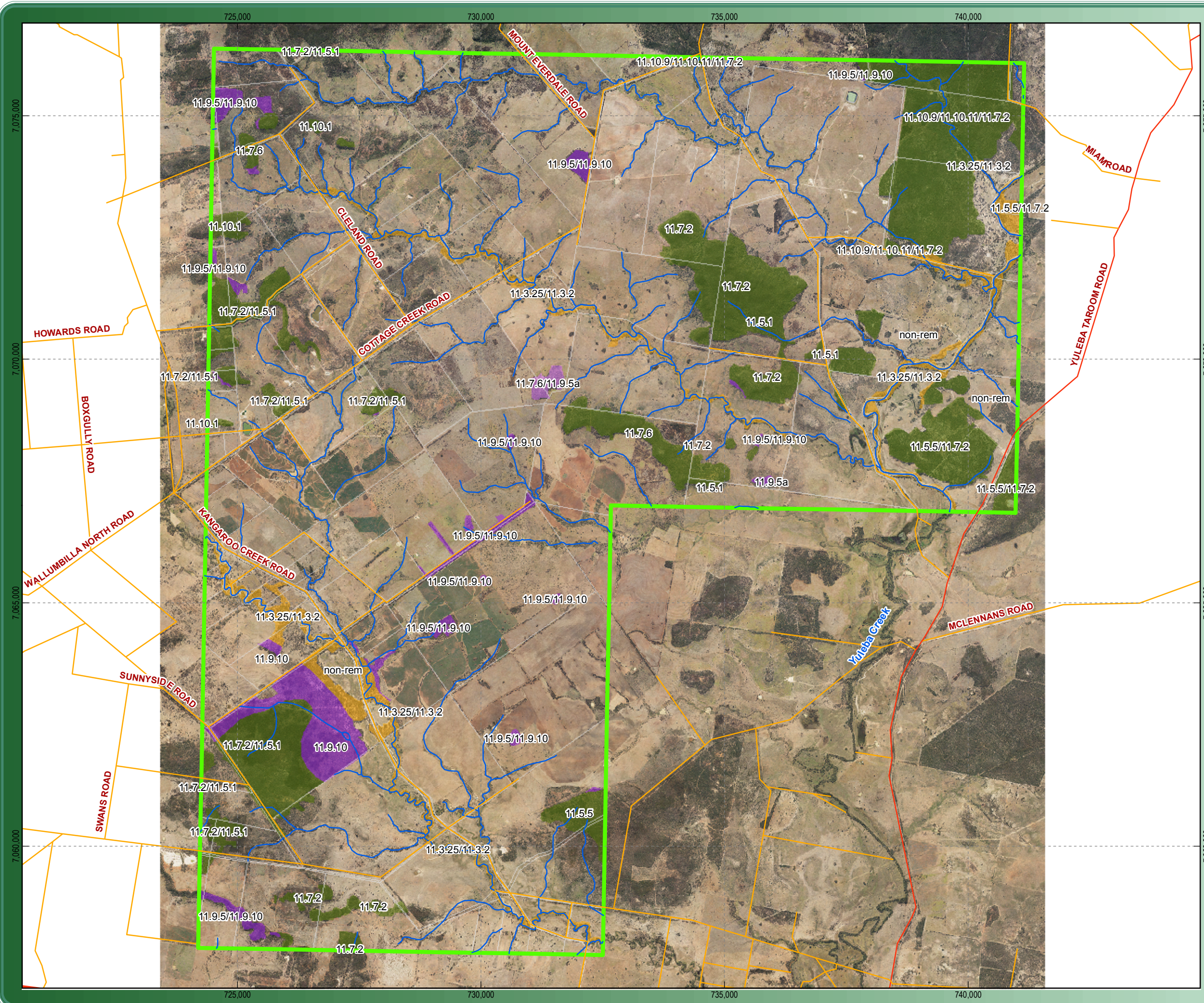
Site No.	Easting	Northing	Mapped RE	Checked RE	Remnant
GLNG18	740692	7067803	11.5.5	11.10.11	Remnant
GLNG19	731320	7067523	11.9.5	11.9.5a	Regrowth
GLNG20	733265	7067452	11.9.10	11.9.5a	Regrowth
GLNG20a	733746	7067538	11.9.10	11.9.5a	Remnant
GLNG21	734090	7067350	11.10.3	11.10.7	Remnant
GLNG21a	734059	7067459	11.10.3	11.10.3	Remnant
GLNG22	731924	7069033	11.10.11	11.10.7	Remnant
GLNG22a	731697	7069049	non-rem	11.9.5a	Regrowth
GLNG23	726047	7073054	11.10.3	11.10.3	Remnant
GLNG23a	725959	7072994	11.10.3 (rg)	11.10.3	Remnant
GLNG24	725141	7072537	11.9.10	11.10.7a	Remnant
GLNG25	725101	7072652	11.10.3	11.10.3	Remnant
GLNG26	726334	7072976	11.9.10	11.10.7a	Regrowth
GLNG27	726104	7072468	11.3.2	11.3.2	Remnant
GLNG28	725485	7071985	11.9.10	11.9.10	Regrowth
GLNG29	724932	7071640	11.10.11	11.10.7	Remnant
GLNG30	731823	7070142	11.9.10	11.9.5	Remnant
GLNG31	731467	7069460	11.10.11	11.10.4	Remnant
GLNG31a	731405	7069507	11.10.11	11.10.4	Remnant
GLNG32	726555	7062922	11.5.1	11.5.1	Remnant
GLNG33	726382	7062935	11.7.2	11.5.1a	Remnant
GLNG37	726394	7071007	11.10.3	11.10.3	Remnant
GLNG37a	726364	7070975	11.10.3	11.10.4a	Remnant
GLNG38	725836	7071758	11.10.11	11.10.3	Remnant
GLNG38a	725045	7071396	11.9.10	11.9.5	Regrowth

Results of the ground-truthing exercise indicates the importance of field surveys in improving the accuracy of desk-top mapping. Of the 53 sites survey, only 16 (approximately 30%) were found to be mapped accurately. The main issue in the accuracy of attribution of polygons was related to interpretation of the predominant vegetation community as approximately 83% of sites had the correct land zone allocated to them. As stated previously, much the PL282 area supported complexes of sedimentary rock with surface rock units consisting of both coarse-grained and fine-grained sediments. It was decided during the desktop mapping phase to also interpret the land form by using contour lines and Google Earth. Low-lying, undulating to rolling hills were assigned to land zone 9 with comparatively steeper, hillier areas assigned to land zone 10. This decision seems supported by the field results.

In terms of interpretation of vegetation, one of the main issues in the PL282 areas is related to brigalow (*Acacia harpophylla*) communities and areas of poplar box (*Eucalyptus populnea*) with an understorey of brigalow. In some areas, there was a continuum from brigalow dominant areas on fine-grained sediments (RE 11.9.5) to areas of brigalow with emergent poplar box (RE 11.9.5a) to areas of poplar box with brigalow in the understorey (RE 11.9.10). The relative dominance of poplar box was the critical factor in determining

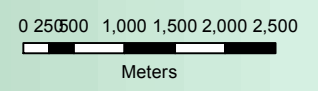
whether the sites were brigalow with emergent poplar box versus poplar box with a brigalow understorey. Hence many sites that were initially interpreted as RE 11.9.10 were remapped as RE 11.9.5a.

19 Jan 2015 Z:\GIS\ECO14_0070\GIS\Maps\Working (Optional)\ECO14_0070_04_reb.mxd



O2 ECOLOGY

SUNSHINE COAST
 8 Grebe Street
 Peregian Beach, QLD, 4566
 t (07) 5448 3288
 ACN: 98 153 475 382 ABN: 153 475 382
 www.o2ecology.com.au



1:75,000 at A3

Map Projection: Transverse Mercator
 Horizontal Datum: GDA 1994
 Grid: GDA 1994 MGA Zone 55

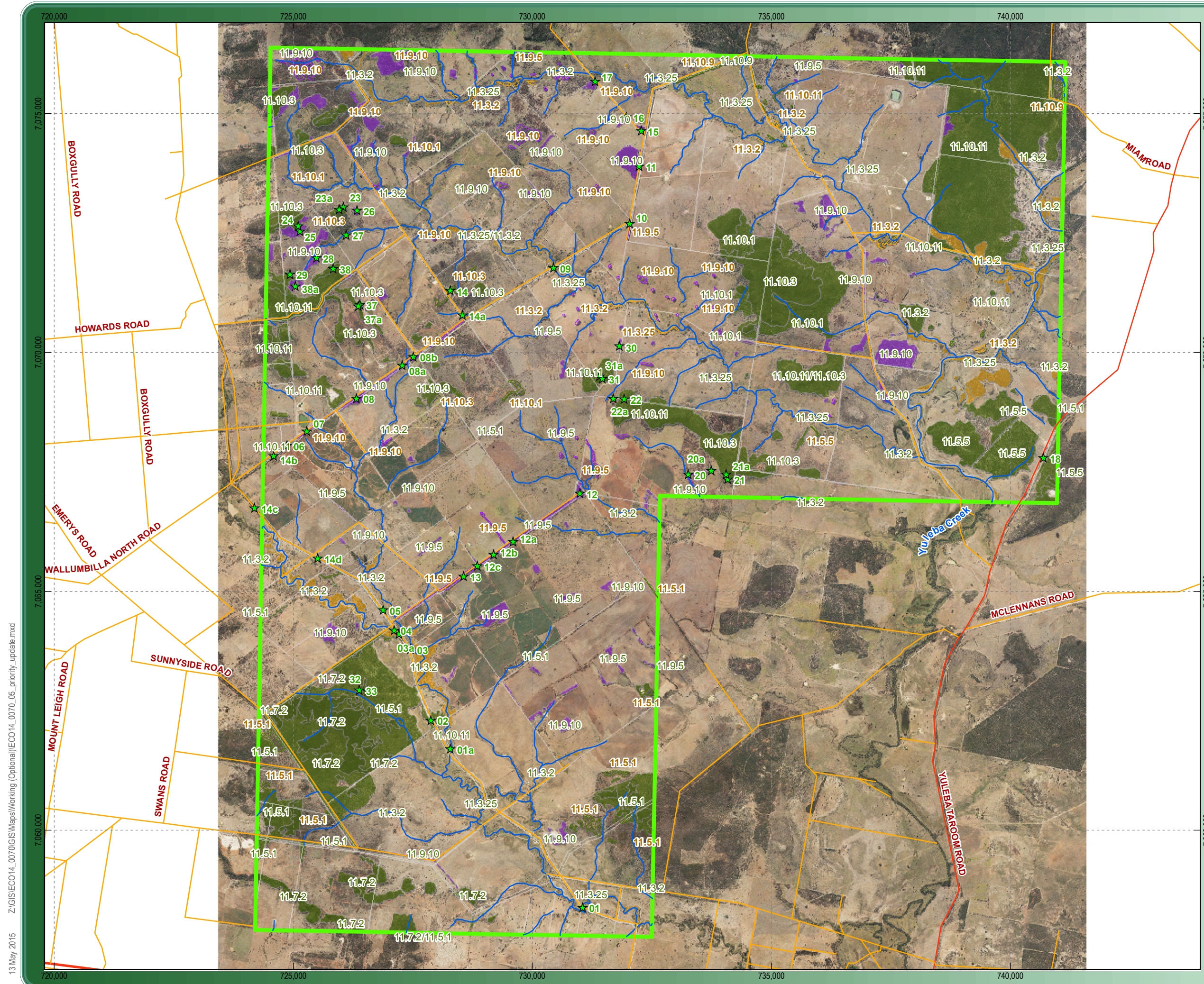
Legend

- Localities
- VM Watercourse
- State Controlled Roads**
 - Highways
 - Secondary roads
 - Local connector roads
 - Streets
- ▭ PL282
- ▭ Cadastre
- Regional Ecosystem (v8.0)**
- Biodiversity Status**
 - Endangered
 - Endangered (Subdom)
 - Of Concern
 - Not of Concern

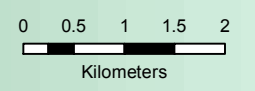
Santos Pty Ltd
 Pilot study: large scale
 RE mapping

Regional Ecosystems v8.0
 PL282

Figure 4



SUNSHINE COAST
 8 Grebe Street
 Peregian Beach, QLD, 4566
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 www.o2ecology.com.au



1:75,000 at A3

Map Projection: Transverse Mercator
 Horizontal Datum: GDA 1994
 Grid: GDA 1994 MGA Zone 55

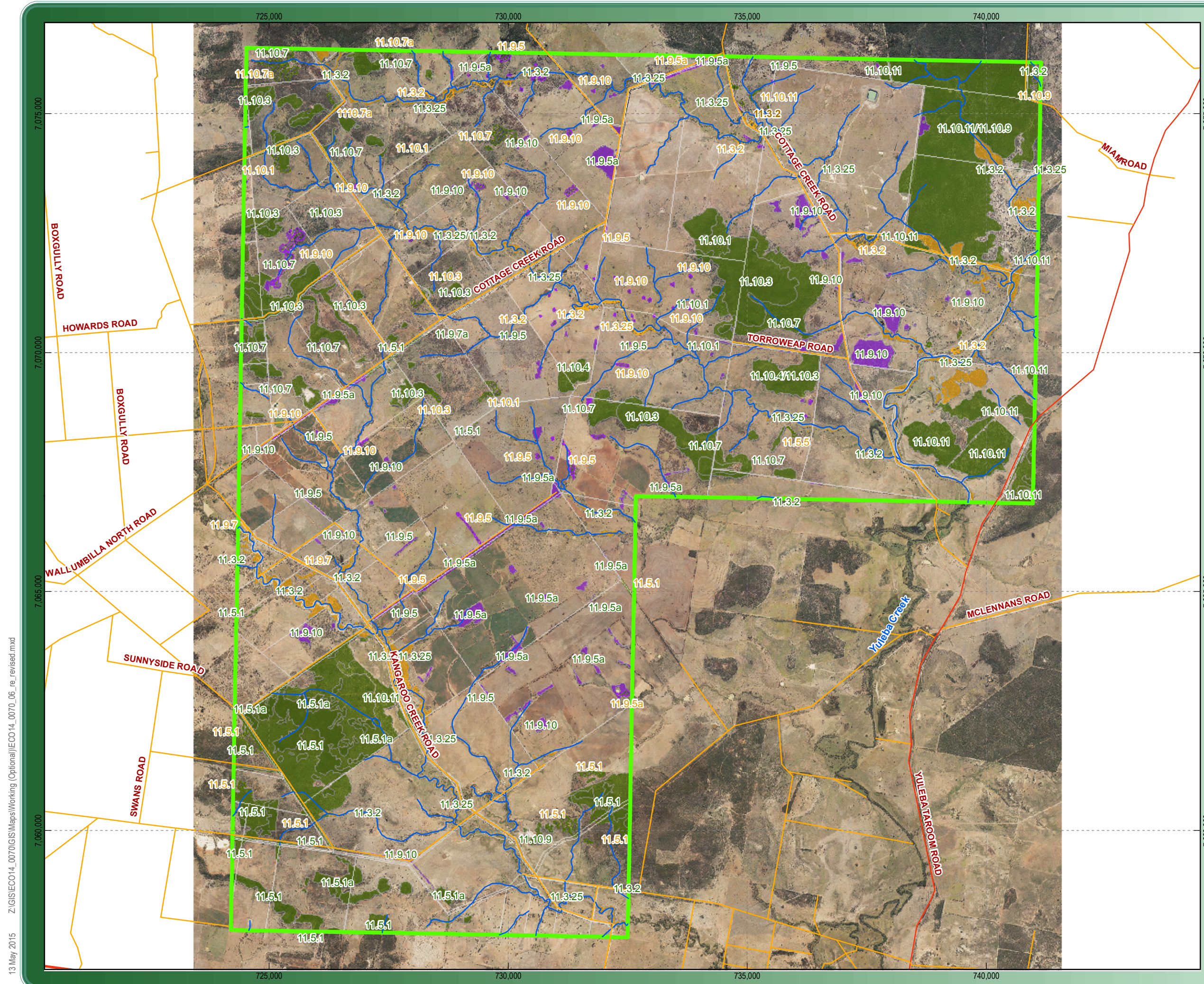
Legend

- ★ Field Sites
- Localities
- VM Watercourse
- State Controlled Roads**
- Highways
- Secondary roads
- Local connector roads
- Streets
- ▭ PL282
- ▭ Cadastre
- RE Survey**
- Biodiversity Status**
- ▭ Endangered
- ▭ Of Concern
- ▭ Not of Concern
- Priority Regrowth**
- Biodiversity Status**
- ▭ Endangered
- ▭ Of Concern
- ▭ Not of Concern

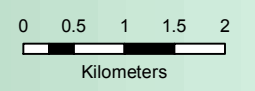
Santos Pty Ltd
 Pilot study: O2 Ecology
 RE mapping (pre-verified)

O2 RE mapping
 Pre-verified - PL282

Figure 5



SUNSHINE COAST
 8 Grebe Street
 Peregian Beach, QLD, 4566
 t (07) 5448 3288
 ACN: 98 153 475 382 ABN: 153 475 382
 www.o2ecology.com.au



1:75,000 at A3

Map Projection: Transverse Mercator
 Horizontal Datum: GDA 1994
 Grid: GDA 1994 MGA Zone 55

Legend

- Localities
- State Controlled Roads**
 - Highways
 - Secondary roads
 - Local connector roads
 - Streets
 - VM Watercourse
 - PL282
 - Cadastre
- Priority Regrowth Revised Biodiversity Status**
 - ▨ Endangered
 - ▨ Of Concern
 - ▨ Not of Concern
- Priority Regional Ecosystem Biodiversity Status**
 - ▨ Endangered
 - ▨ Of Concern
 - ▨ Not of Concern

Santos Pty Ltd
 Pilot study: O2 Ecology
 RE revised mapping

O2 RE mapping
 Revised - PL282

Figure 6

4. Conclusion

High resolution imagery supplied by Santos GLNG was utilised by O2 Ecology to produce large scale RE mapping over PL282, covering some 23,071 ha. The benefits of large scale RE mapping include substantially higher spatial accuracy for polygon boundaries than the published RE mapping. As well as improved scale, the mapping by O2 Ecology identified several inconsistencies between the published RE mapping and geology mapping, resulting in significant changes to the land zones and REs in the study area.

The key objective for this project was to produce large scale RE mapping over PL282 solely based on high resolution imagery made available by Santos GLNG. Limited ground-truthing of the produced map resulted in greater understanding of the landscape including the vegetation than what is provided in a solely desk-top mapping exercise. While the allocation of land zones from geology, land systems mapping and interpretation of the land forms over the PL282 study area was reasonably accurate, the attribution of polygons with vegetation communities proved less than ideal. One of the main issues was interpreting the relative dominance of poplar box (*Eucalyptus populnea*) in various situations without site data. In some areas, there is a continuum from brigalow dominant areas on fine-grained sediments (RE 11.9.5) to areas of brigalow with emergent poplar box (RE 11.9.5a) to areas of poplar box with brigalow in the understorey (RE 11.9.10).

5. Bibliography

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Appendix A Completed field assessment sheets

Regional Ecosystem Assessment – August 2012

Sheet D – regional ecosystem type assessment site

Location

Site No. 02 Recorder: A.J.Franks Day/Date: 13 APR 2015

Purpose Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town)

GPS: GDA94

5	5
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0	7	2	7	8	8	0
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7	0	6	2	3	1	1
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 Unit: Lat

Vegetation structure

Median height of the EDL is to be measured

Plant species

Record relative (numerical) dominance for each stratum; **d** – dominant; **c** – codominant; **s** - subdominant, **a** – associated.

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	12.0	10-14	S
T2	8.0	6-10	V
T3			
S1	2	2-4	V
S2			
G	0.8	0.1-1.0	M
Structural formation: (including height)			
Woodland			
Ecologically dominant layer:			T1

Str.	Rel. dom.	Scientific Name
T1	D	<i>Eucalyptus populnea</i>
T2	D	<i>Callitris glaucophylla</i>
S1	D	<i>Geijera parviflora</i>
S1	A	<i>Citrus glauca</i>
G	C	<i>Aristida</i> sp.
G	C	<i>Cyperus</i> sp.

Geology, landform, soils

Geology map/scale/year: Roma (SG5_12)/250K

Geology code and rock types: Kli - Minmi Member

Land system: (S)uBl

Landform: Gently undulating

Soils: Light orange clay loam, occasional surface rock

Field observation and notes: _____

Landzone: 10

RE code changes

Existing RE code: 11.3.25/11.3.2

Proposed RE code: 11.10.11

END

Regional Ecosystem Assessment – August 2012



Site 02 facing north



south



Site 02 Soil surface

Regional Ecosystem Assessment – August 2012

Sheet D – regional ecosystem type assessment site

Location

Site No. 03 Recorder: A.J.Franks Day/Date: 13 APR 2015

Purpose Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town)

GPS: GDA94

5	5
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0	7	2	7	4	5	3
---	---	---	---	---	---	---

7	0	6	3	7	9	3
---	---	---	---	---	---	---

 Unit: Lat

Vegetation structure

Median height of the EDL is to be measured

Plant species

Record relative (numerical) dominance for each stratum; **d** – dominant; **c** – codominant; **s** - subdominant, **a** – associated.

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	12.0	10-14	S
T2	8.0	6-10	V
T3	4.0	3-6	V
S1	2	1-3	V
S2	0.9	0.8-1.2	V
G	0.8	0.1-1.0	S
Structural formation: (including height)			
Woodland			
Ecologically dominant layer:			T1

Str.	Rel. dom.	Scientific Name
T1	D	<i>Eucalyptus populnea</i>
T2	D	<i>Acacia excelsa</i>
T3	D	<i>Eucalyptus populnea</i>
S1	D	<i>Geijera parviflora</i>
S1	A	<i>Casuarina cristata</i>
S2	D	<i>Sida hackettiana</i>
G	C	<i>Aristida</i> sp.
G	C	<i>Bothriochloa pertusa</i>
G	A	<i>Paspalidium caespitosum</i>

Geology, landform, soils

Geology map/scale/year: Roma (SG5_12)/250K

Geology code and rock types: Kli - Minmi Member

Land system: (S)uBI

Landform: Plain adjacent to drainage line

Soils: Clay loam

Field observation and notes:

Landzone: 3

RE code changes

Existing RE code: 11.3.25/11.3.2

Proposed RE code: 11.3.2

END

Regional Ecosystem Assessment – August 2012



Site 03 facing south



north



Site 03 Soil surface

Regional Ecosystem Assessment – August 2012

Sheet D – regional ecosystem type assessment site

Location

Site No. 04 Recorder: A.J.Franks Day/Date: 13 APR 2015

Purpose Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town)

GPS: GDA94

5	5
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0	7	2	7	1	1	1
---	---	---	---	---	---	---

7	0	6	4	1	9	2
---	---	---	---	---	---	---

 UTM:

Vegetation structure

Median height of the EDL is to be measured

Plant species

Record relative (numerical) dominance for each stratum; **d** – dominant; **c** – codominant; **s** - subdominant, **a** – associated.

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	15.0	13-17	S
T2	8.0	6-10	M
T3	5.0	4-6	V
S1	3	2-4	M
S2	0.9	0.8-1.2	V
G	0.8	0.1-1.0	M
Structural formation: (including height)			
Woodland			
Ecologically dominant layer:			T1

Str.	Rel. dom.	Scientific Name
T1	D	<i>Eucalyptus populnea</i>
T2	D	<i>Callitris glaucophylla</i>
T2	A	<i>Eucalyptus populnea</i>
T3	C	<i>Bursaria spinosa</i>
T3	C	<i>Eremophila mitchellii</i>
S1	D	<i>Geijera parviflora</i>
S2	D	<i>Enchylaena tomentosa</i>
G	C	<i>Bothriochloa pertusa</i>
G	C	<i>Aristida</i> sp.
G	A	<i>Lomandra longifolia</i>
G	A	* <i>Cenchrus ciliaris</i>
G	A	<i>Cymbopogon refractus</i>

Geology, landform, soils

Geology map/scale/year: Roma (SG5_12)/250K

Geology code and rock types: Kli - Minmi Member

Land system: (S)uBl

Landform: Gently undulating slopes

Soils: Clay loam

Field observation and notes: _____

Landzone: 3

RE code changes

Existing RE code: 11.3.25/11.3.2

Proposed RE code: 11.3.2

END

Regional Ecosystem Assessment – August 2012



Site 04 facing north



south



Site 04 Soil surface

Regional Ecosystem Assessment – August 2012

Sheet D – regional ecosystem type assessment site

Location

Site No. 05 Recorder: A.J.Franks Day/Date: 13 APR 2015

Purpose Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town)

GPS: GDA94

5	5
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0	7	2	6	8	7	9
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7	0	6	4	6	1	2
---	---	---	---	---	---	---

 UTM

Vegetation structure

Median height of the EDL is to be measured

Plant species

Record relative (numerical) dominance for each stratum; **d** – dominant; **c** – codominant; **s** - subdominant, **a** – associated.

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	13.0	12-15	S
T2	7.0	6-10	M
T3	2.0	2-4	M
S1		-	
S2		-	
G	0.8	0.1-1.0	M
Structural formation: (including height)			
Woodland			
Ecologically dominant layer:			T1

Str.	Rel. dom.	Scientific Name
T1	D	<i>Eucalyptus populnea</i>
T2	D	<i>Geijera parviflora</i>
T2	A	<i>Eucalyptus populnea</i>
T2	A	<i>Acacia excelsa</i>
T2	A	<i>Acacia pendula</i>
T3	D	<i>Eremophila mitchellii</i>
G	D	* <i>Cenchrus ciliaris</i>
G	A	<i>Paspalidium caespitosum</i>
G	A	<i>Entolasia stricta</i>

Geology, landform, soils

Geology map/scale/year: Roma (SG5_12)/250K

Geology code and rock types: Kli - Minmi Member

Land system: (S)uBl

Landform: Gently undulating plain

Soils: Fine clay loam

Field observation and notes:

Landzone: 9

RE code changes

Existing RE code: non-remnant/mature regrowth

Proposed RE code: 11.9.7

END

Regional Ecosystem Assessment – August 2012



Site 05 facing north



south



Site 05 Soil surface

Regional Ecosystem Assessment – August 2012

Sheet D – regional ecosystem type assessment site

Location

Site No. 06 Recorder: A.J.Franks Day/Date: 13 APR 2015

Purpose Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town)

GPS: GDA94

5	5
---	---

0	7	2	4	8	6	8
---	---	---	---	---	---	---

7	0	6	8	0	5	7
---	---	---	---	---	---	---

 UTM

Vegetation structure

Median height of the EDL is to be measured

Plant species

Record relative (numerical) dominance for each stratum; **d** – dominant; **c** – codominant; **s** - subdominant, **a** – associated.

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	13.0	10-12	M
T2	7.0	6-8	S
T3			
S1	2.5	2-3	M
S2		-	
G	0.8	0.1-1.0	M
Structural formation: (including height)			
Woodland			
Ecologically dominant layer:			T1

Str.	Rel. dom.	Scientific Name
T1	C	<i>Acacia harpophylla</i>
T1	C	<i>Casuarina cristata</i>
T2	C	<i>Acacia harpophylla</i>
T2	C	<i>Casuarina cristata</i>
T2	A	<i>Geijera parviflora</i>
S1	C	<i>Geijera parviflora</i>
S1	C	<i>Eremophila mitchellii</i>
S1	A	<i>Capparis mitchelliana</i>
G	D	* <i>Cenchrus ciliaris</i>
G	S	<i>Paspalidium caespitosum</i>
G	A	<i>Sporobolus australasicus</i>
G	A	<i>Entolasia stricta</i>

Geology, landform, soils

Geology map/scale/year: Roma (SG5_12)/250K

Geology code and rock types: Kli - Minmi Member

Land system: (S)uBl

Landform: Gently undulating plain

Soils: Clay loam, dark brown with abundant surface organic matter

Field observation and notes: Back down slope to south-west is brigalow/belah with emergent poplar box

Landzone: 9

RE code changes

Existing RE code: non-remnant

Proposed RE code: 11.9.5a

END

Regional Ecosystem Assessment – August 2012



Site 06 facing north



south



Site 06 Soil surface

Regional Ecosystem Assessment – August 2012



Site 07 facing north



south



Site 07 Soil surface

Regional Ecosystem Assessment – August 2012

Sheet D – regional ecosystem type assessment site

Location

Site No. 08 Recorder: A.J.Franks Day/Date: 13 APR 2015

Purpose Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town)

GPS: GDA94

5	5
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0	7	2	6	3	2	5
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7	0	6	9	0	4	7
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 UTM

Vegetation structure

Median height of the EDL is to be measured

Plant species

Record relative (numerical) dominance for each stratum; **d** – dominant; **c** – codominant; **s** - subdominant, **a** – associated.

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E	14	13-15	V
T1	12	10-13	M
T2	6	4-8	M
T3	3.5	3-4	S
S1			
S2		-	
G	0.8	0.1-1.0	S
Structural formation: (including height)			
Open forest			
Ecologically dominant layer:			T1

Str.	Rel. dom.	Scientific Name
E	V	<i>Eucalyptus orgadophila ?</i>
T1	C	<i>Acacia harpophylla</i>
T1	C	<i>Casuarina cristata</i>
T2	C	T1 spp.
T3	C	<i>Eremophila mitchellii</i>
T3	C	<i>Geijera parviflora</i>
T3	A	<i>Alstonia scholaris</i>
S1	D	<i>Carissa ovata</i>
G	C	<i>Enteropogon acicularis</i>
G	C	* <i>Cenchrus ciliaris</i>
G	A	<i>Sporobolus australasica</i>

Geology, landform, soils

Geology map/scale/year: Roma (SG5_12)/250K

Geology code and rock types: Kli - Minmi Member

Land system: (S)uBl

Landform: Top of low rise

Soils: Fine brown clay

Field observation and notes: Evidence of some thinning

GLNG08A: Poplar box over Callitris with occasional belah and wilga Landzone: 9

RE code changes

Existing RE code: non-remnant

Proposed RE code: 11.9.5a

END

Regional Ecosystem Assessment – August 2012



Site 08 facing north



south



Site 08 Soil surface



Site 09 facing north



Site 09 Soil surface

Regional Ecosystem Assessment – August 2012

Sheet D – regional ecosystem type assessment site

Location

Site No. 10 Recorder: A.J.Franks Day/Date: 13 APR 2015

Purpose Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town)

GPS: GDA94

5	5
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0	7	3	2	0	3	8
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7	0	7	2	7	0	0
---	---	---	---	---	---	---

 UTM

Vegetation structure

Median height of the EDL is to be measured

Plant species

Record relative (numerical) dominance for each stratum;
d – dominant; **c** – codominant; **s** - subdominant, **a** – associated.

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	6	5-7	M
T2	4	3-5	S
T3			
S1	2	1-3	S
S2		-	
G	0.8	0.1-1.0	S
Structural formation: (including height)			
Low open forest (regrowth)			
Ecologically dominant layer:			T1

Str.	Rel. dom.	Scientific Name
T1	D	<i>Acacia harpophylla</i>
T1	S	<i>Casuarina cristata</i>
T2	C	T1 spp.
T2	A	<i>Geijera parviflora</i>
S1	C	<i>Denhamia cunninghamii</i>
S1	C	<i>Casuarina cristata</i>
G	D	<i>Enteropogon acicularis</i>

Geology, landform, soils

Geology map/scale/year: Roma (SG5_12)/250K

Geology code and rock types: Kln - Nullawurt Sandstone Member

Land system: (S)uBl

Landform: Uper slope of rolling hill

Soils: Reddish clay loam

Field observation and notes:

Occasional remnant *Casuarina cristata* tree Landzone: 9

RE code changes

Existing RE code: non-remnant

Proposed RE code: 11.9.5 (regrowth)

END



Site 10 facing north



Site 10 Soil surface

Regional Ecosystem Assessment – August 2012



Site 11 facing south



north



Site 11 Soil surface

Regional Ecosystem Assessment – August 2012

Sheet D – regional ecosystem type assessment site

Location

Site No. 12 Recorder: A.J.Franks Day/Date: 14 APR 2015

Purpose Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town)

GPS: GDA94

5	5	0	7	3	0	9	9	6	7	0	6	7	0	5	3
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Date

Vegetation structure

Median height of the EDL is to be measured

Plant species

Record relative (numerical) dominance for each stratum; **d** – dominant; **c** – codominant; **s** - subdominant, **a** – associated.

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E	14	12-16	V
T1	11	10-12	M
T2	6	5-7	S
T3	3	2-4	M
S1	0.8	0.5-1.0	S
S2		-	
G	1.0	0.5-1.0	M
Structural formation: (including height)			
Open forest			
Ecologically dominant layer:			T1

Str.	Rel. dom.	Scientific Name
E	D	<i>Eucalyptus populnea</i>
T1	D	<i>Acacia harpophylla</i>
T1	A	<i>Casuarina cristata</i>
T2	D	<i>Acacia harpophylla</i>
T3	D	<i>Geijera parvifolia</i>
S1	C	<i>Carissa ovata</i>
S1	C	<i>Apophyllum anomalum</i>
G	C	<i>Paspalidium caespitosum</i>

Geology, landform, soils

Geology map/scale/year: Roma (SG5_12)/250K

Geology code and rock types: Kli - Minmi Member

Land system: (S)uBl

Landform: Gently undulating

Soils: Reddish clay loam

Field observation and notes:

Landzone: 9

RE code changes

Existing RE code: 11.9.5/11.9.10

Proposed RE code: 11.9.5a

END



Site 12 facing north

Sheet D – regional ecosystem type assessment site

Location

Site No. 13 Recorder: A.J.Franks Day/Date: 14 APR 2015

Purpose Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town)

GPS: GDA94

5	5
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0	7	2	8
---	---	---	---

5	6	3
---	---	---

7	0	6	5	3	1	7
---	---	---	---	---	---	---

 UTM: Date:

Vegetation structure

Median height of the EDL is to be measured

Plant species

Record relative (numerical) dominance for each stratum; **d** – dominant; **c** – codominant; **s** - subdominant, **a** – associated.

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E			
T1	6	5-7	M
T2	3	3-4	M
T3		-	
S1	0.8	0.5-1.0	S
S2		-	
G	1.0	0.5-1.0	M
Structural formation: (including height)			
Low open forest (regrowth)			
Ecologically dominant layer:			T1

Str.	Rel. dom.	Scientific Name
T1	D	<i>Acacia harpophylla</i>
T2	C	<i>Geijera parvifolia</i>
T2	C	<i>Ehretia membranacea</i>
S1	D	<i>Eremophila mitchellii</i>
S1	A	<i>Carissa ovata</i>
S1	A	<i>Jasminum didymum</i>
G	D	<i>Paspalidium caespitosum</i>

Geology, landform, soils

Geology map/scale/year: Roma (SG5_12)/250K

Geology code and rock types: Kli - Minmi Member

Land system: (S)uBl

Landform: Gently undulating

Soils: Reddish clay loam

Field observation and notes: _____

Landzone: 9

RE code changes

Existing RE code: non-remnant

Proposed RE code: 11.9.5 (regrowth)

END



Site 14 facing south



Site 14 Soil surface

Regional Ecosystem Assessment – August 2012

Sheet D – regional ecosystem type assessment site

Location

Site No. 15 Recorder: A.J.Franks Day/Date: 14 APR 2015

Purpose Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town)

GPS: GDA94

5	5
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0	7	3	2	2	8	1
---	---	---	---	---	---	---

7	0	7	4	6	4	5
---	---	---	---	---	---	---

 UTM

Vegetation structure

Median height of the EDL is to be measured

Plant species

Record relative (numerical) dominance for each stratum; **d** – dominant; **c** – codominant; **s** - subdominant, **a** – associated.

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	11	10-12	S-M
T2	6	5-7	S
T3			
S1	2.5	2-3	M
S2			
G	0.6	0.1-1.0	S
Structural formation: (including height)			
Open forest			
Ecologically dominant layer:			T1

Str.	Rel. dom.	Scientific Name
T1	D	<i>Acacia harpophylla</i>
T1	S	<i>Casuarina cristata</i>
T2	C	<i>Acacia harpophylla</i>
T2	C	<i>Casuarina cristata</i>
S1	C	<i>Geijera parviflora</i>
S1	C	<i>Casuarina cristata</i>
G	C	<i>Entolasia stricta</i>
G	C	<i>Enteropogon acicularis</i>
G	A	<i>Jasminum didymum</i>

Geology, landform, soils

Geology map/scale/year: Roma (SG5_12)/250K

Geology code and rock types: Klk - Kingull Member

Land system: (S)uBl

Landform: Gentle slope.

Soils: Light brown clay loam with abundant surface organic matter

Field observation and notes:

Landzone: 9

RE code changes

Existing RE code: non-remnant

Proposed RE code: 11.9.5a

END

Regional Ecosystem Assessment – August 2012



Site 15 facing north



south



Site 15 Soil surface

Regional Ecosystem Assessment – August 2012



Site 16 facing north



south



Site 16 Soil surface

Sheet D – regional ecosystem type assessment site

Location

Site No. 17 Recorder: A.J.Franks Day/Date: 14 APR 2015

Purpose Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town)

GPS: GDA94

5	5
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0	7	3	1	3	1	5
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7	0	7	5	6	7	6
---	---	---	---	---	---	---

 Unit: Lat

Vegetation structure

Median height of the EDL is to be measured

Plant species

Record relative (numerical) dominance for each stratum; **d** – dominant; **c** – codominant; **s** - subdominant, **a** – associated.

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	6.0	6-7	S
T2	4.0	3-5	M
T3	2	1-3	S
S1	0.8	0.5-1.0	V
S2			
G	0.6	0.1-0.8	S
Structural formation: (including height)			
Low woodland			
Ecologically dominant layer:			T1

Str.	Rel. dom.	Scientific Name
T1	C	<i>Casuarina cristata</i>
T1	C	<i>Acacia harpophylla</i>
T1	A	<i>Eremophila mitchellii</i>
T2	C	<i>Geijera parvifolia</i>
T2	C	<i>Eremophila mitchellii</i>
T2	A	<i>Acacia excelsa</i>
T3	D	<i>Apophyllum anomalum</i>
S1	D	<i>Carissa ovata</i>
G	C	<i>Paspalidium caespitosum</i>
G	C	* <i>Cenchrus ciliaris</i>

Geology, landform, soils

Geology map/scale/year: Roma (SG5_12)/250K

Geology code and rock types: Klk - Kingull Member

Land system: (S)uBl

Landform: Gentle slope. Mid-slope of undulating landscape

Soils: Clay loam with some surface rock

Field observation and notes:

Landzone: 9

RE code changes

Existing RE code: non-remnant

Proposed RE code: 11.9.5a (regrowth)

END

Regional Ecosystem Assessment – August 2012



Site 17 facing north



south



Site 17 Soil surface

Regional Ecosystem Assessment – August 2012

Sheet D – regional ecosystem type assessment site

Location

Site No. 18 Recorder: A.J.Franks Day/Date: 14 APR 2015

Purpose Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town)

GPS: GDA94

5	5
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0	7	4	0	6	9	2
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7	0	6	7	8	0	3
---	---	---	---	---	---	---

 UTM

Vegetation structure

Median height of the EDL is to be measured

Plant species

Record relative (numerical) dominance for each stratum; **d** – dominant; **c** – codominant; **s** - subdominant, **a** – associated.

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	11.0	10-12	S
T2	7.0	6-8	M
T3			
S1	2	2-3	S
S2			
G	0.8	0.1-1.0	S-M
Structural formation: (including height)			
Woodland			
Ecologically dominant layer:			T1

Str.	Rel. dom.	Scientific Name
T1	D	<i>Eucalyptus crebra</i>
T1	S	<i>Corymbia clarksoniana</i>
T1	S	<i>Callitris glaucophylla</i>
T1	A	<i>Eucalyptus chloroclada</i>
T2	D	<i>Callitris glaucophylla</i>
T2	A	<i>Alphitonia excelsa</i>
T3	D	<i>Geijera parviflora</i>
G	C	<i>Aristida caput-medusae</i>
G	C	<i>Cymbopogon refractus</i>

Geology, landform, soils

Geology map/scale/year: Roma (SG5_12)/250K

Geology code and rock types: Kld - Doncaster Member

Land system: (S)rNi

Landform: Slope

Soils: White sandy loam with some surface rock

Field observation and notes: Further up-slope is *Eucalyptus crebra* + *Acacia shirleyi*

Landzone: 10

RE code changes

Existing RE code: 11.5.5/11.7.2

Proposed RE code: 11.10.11

END

Regional Ecosystem Assessment – August 2012



Site 18 facing north



south



Site 18 Soil surface

Regional Ecosystem Assessment – August 2012

Sheet D – regional ecosystem type assessment site

Location

Site No. 19 Recorder: A.J.Franks Day/Date: 14 APR 2015

Purpose Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town)

GPS: GDA94

5	5
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0	7	3	1	3	2	0
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7	0	6	7	5	2	3
---	---	---	---	---	---	---

UAT

Vegetation structure

Median height of the EDL is to be measured

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E	12	11-13	V
T1	6	5-7	M
T2		-	
T3		-	
S1	1.8	1.5-2.5	V
S2		-	
G	1.0	0.5-1.0	S
Structural formation: (including height)			
Low open forest (regrowth)			
Ecologically dominant layer:			T1

Plant species

Record relative (numerical) dominance for each stratum; **d** – dominant; **c** – codominant; **s** - subdominant, **a** – associated.

Str.	Rel. dom.	Scientific Name
E	D	<i>Eucalyptus populnea</i>
T1	D	<i>Acacia harpophylla</i>
S1	C	<i>Alectryon diversifolius</i>
S1	C	<i>Apophyllum anomalum</i>
S1	C	<i>Atalaya hemiglauca</i>
G	C	<i>Enteropogon acicularis</i>
G	C	<i>Aristida</i> sp.

Geology, landform, soils

Geology map/scale/year: Roma (SG5_12)/250K

Geology code and rock types: Kli - Minmi Member

Land system: (S)uBI

Landform: Lower slop of gently sloping low hill

Soils: Red brown clay loam with some surface rock

Field observation and notes: _____

Landzone: 9

RE code changes

Existing RE code: non-remnant

Proposed RE code: 11.9.5 (regrowth)

END

Regional Ecosystem Assessment – August 2012



Site 19 facing north



south



Site 19 Soil surface

Regional Ecosystem Assessment – August 2012

Sheet D – regional ecosystem type assessment site

Location

Site No. 20 Recorder: A.J.Franks Day/Date: 14 APR 2015

Purpose Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town) Glenesk

GPS: GDA94

5	5	0	7	3	3	2	6	5	7	0	6	7	4	5	2
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Utm: East

Vegetation structure

Median height of the EDL is to be measured

Plant species

Record relative (numerical) dominance for each stratum; **d** – dominant; **c** – codominant; **s** - subdominant, **a** – associated.

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	10	8-12	S
T2	6	5-7	M
T3	4	3-5	M
S1	0.8	0.5-1.0	V
S2		-	
G	1.0	0.5-1.0	V
Structural formation: (including height)			
Woodland			
Ecologically dominant layer:			T1

Str.	Rel. dom.	Scientific Name
T1	D	<i>Acacia harpophylla</i>
T1	A	<i>Casuarina cristata</i>
T2	C	T1 spp.
T3	C	<i>Eremophila mitchellii</i>
T3	C	<i>Geijera parvifolia</i>
T3	A	<i>Casuarina cristata</i>
S1	D	<i>Acacia harpophylla</i>
G	C	<i>Paspalidium caespitosum</i>
G	C	<i>Eragrostis</i> sp.

Geology, landform, soils

Geology map/scale/year: Roma (SG5_12)/250K

Geology code and rock types: Kli - Minmi Member

Land system: (S)uBl

Landform: Gently sloping/undulating

Soils: Clay loam with fair amount of surface organic matter

Field observation and notes: _____

Landzone: 9

RE code changes

Existing RE code: non-remnant

Proposed RE code: 11.9.5a

END

Regional Ecosystem Assessment – August 2012



Site 20 facing north



south



Site 20 Soil surface

Regional Ecosystem Assessment – August 2012

Sheet D – regional ecosystem type assessment site

Location

Site No. 21 Recorder: A.J.Franks Day/Date: 14 APR 2015

Purpose Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town)

GPS: GDA94

5	5	0	7	3	4	0	9	0	7	0	6	7	3	5	0
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

 UTM

Vegetation structure

Median height of the EDL is to be measured

Plant species

Record relative (numerical) dominance for each stratum; **d** – dominant; **c** – codominant; **s** - subdominant, **a** – associated.

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	13	12-14	S
T2	6	5-7	M
T3			S
S1	0.7	0.5-1.0	M
S2		-	
G	0.8	0.5-1.0	M-D
Structural formation: (including height)			
Woodland			
Ecologically dominant layer:			T1

Str.	Rel. dom.	Scientific Name
T1	D	<i>Eucalyptus populnea</i>
T1	S	<i>Eucalyptus ? crebra</i>
T1	A	<i>Eucalyptus woollsiana</i>
T2	D	<i>Eremophila mitchellii</i>
T2	S	<i>Geijera parviflora</i>
T2	A	<i>Acacia harpophylla</i>
T2	A	<i>Brachychiton</i>
T3	D	<i>Geijera parviflora</i>
T3	A	<i>Apophyllum anomalum</i>
S1	D	<i>Carissa ovata</i>
G	D	<i>Ancistrachne uncinulata</i>
G	A	<i>*Cenchrus ciliaris</i>

Geology, landform, soils

Geology map/scale/year: Roma (SG5_12)/250K

Geology code and rock types: Kli - Minmi Member

Land system: (S)uBl

Landform: Lower-slope of hill

Soils: Hard setting clay loam

Field observation and notes:

Landzone: 10

RE code changes

Existing RE code: 11.7.6

Proposed RE code: 11.10.7

END

Regional Ecosystem Assessment – August 2012



Site 21A facing north



south



Site 21A Soil surface

Regional Ecosystem Assessment – August 2012

Sheet D – regional ecosystem type assessment site

Location

Site No. 22 Recorder: A.J.Franks Day/Date: 14 APR 2015

Purpose Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town) Glenesk

GPS: GDA94

5	5
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0	7	3	1	9	2	4
---	---	---	---	---	---	---

7	0	6	9	0	3	3
---	---	---	---	---	---	---

 UTM:

Vegetation structure

Median height of the EDL is to be measured

Plant species

Record relative (numerical) dominance for each stratum; **d** – dominant; **c** – codominant; **s** - subdominant, **a** – associated.

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	13.0	12-14	S
T2	5.0	4-7	S-M
T3	3	2-5	S
S1	0.8	0.5-1.0	
S2			
G	0.6	0.1-0.8	M-D
Structural formation: (including height)			
Woodland			
Ecologically dominant layer:			T1

Str.	Rel. dom.	Scientific Name
T1	D	<i>Eucalyptus crebra</i>
T1	A	<i>Eucalyptus decorticans?</i>
T2	D	<i>Acacia shirleyi</i>
T3	C	<i>Psyrdrax oleifolius</i>
T3	C	<i>Geijera parvifolia</i>
S1	D	<i>Psyrdrax oleifolius</i>
G	D	<i>Ancistrachne uncinulata</i>
G	A	<i>Gahnia aspera</i>
G	A	<i>Aristida sp.</i>

Geology, landform, soils

Geology map/scale/year: Roma (SG5_12)/250K

Geology code and rock types: Kld - Doncaster Member

Land system: (S)uBl

Landform: Top of low hill hill

Soils: Sandy loam with surface rock

Field observation and notes: _____

Landzone: 10

RE code changes

Existing RE code: 11.7.6

Proposed RE code: 11.10.7

END

Regional Ecosystem Assessment – August 2012



Site 22 facing north



south



Site 22 Soil surface

Sheet D – regional ecosystem type assessment site

Location

Site No. 23 Recorder: A.J.Franks Day/Date: 15 APR 2015

Purpose Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town)

GPS: GDA94

5	5
---	---

0	7	2	6	0	4	7
---	---	---	---	---	---	---

7	0	7	3	0	5	4
---	---	---	---	---	---	---

 UTM

Vegetation structure

Median height of the EDL is to be measured

Plant species

Record relative (numerical) dominance for each stratum; **d** – dominant; **c** – codominant; **s** - subdominant, **a** – associated.

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	9.0	8-10	M
T2	6.0	5-7	V
T3		-	
S1	1.0	0.8-1.5	V
S2			
G	0.8	0.1-1.0	M
Structural formation: (including height)			
Low open forest			
Ecologically dominant layer:			T1

Str.	Rel. dom.	Scientific Name
T1	D	<i>Acacia shirleyi</i>
T2	D	<i>Acacia shirleyi</i>
T2	S	<i>Callitris glaucophylla</i>
S1	C	<i>Grevillea striata</i>
S1	C	<i>Acacia shirleyi</i>
G	D	<i>Ancistrachne uncinatum</i>

Geology, landform, soils

Geology map/scale/year: Roma (SG5_12)/250K

Geology code and rock types: Kln - Nullawurt Sandstone Member

Land system: (S)uBl

Landform: Lower slope of small jump-up

Soils: Fine sandy loam

Field observation and notes: GLN623a: top of jump up. *Acacia shirleyi* with ironbark removed

Landzone: 10

RE code changes

Existing RE code: non-remnant/mature regrowth

Proposed RE code: 11.10.3

END



Site 23 facing north



Site 23 Soil surface

Regional Ecosystem Assessment – August 2012

Sheet D – regional ecosystem type assessment site

Location

Site No. 24 Recorder: A.J.Franks Day/Date: 15 APR 2015

Purpose Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town)

GPS: GDA94

5	5
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0	7	2	5	1	4	1
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7	0	7	2	5	3	7
---	---	---	---	---	---	---

 Unit: Uat

Vegetation structure

Median height of the EDL is to be measured

Plant species

Record relative (numerical) dominance for each stratum; **d** – dominant; **c** – codominant; **s** - subdominant, **a** – associated.

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	11	10-12	S
T2	7	6-8	M
T3			
S1			
S2		-	
G	0.8	0.1-1.0	S
Structural formation: (including height)			
Woodland			
Ecologically dominant layer:			T1

Str.	Rel. dom.	Scientific Name
T1	C	<i>Eucalyptus fibrosa?</i>
T1	C	<i>Eucalyptus crebra</i>
T2	D	<i>Callitris glaucophylla</i>
G	C	<i>Aristida sp.</i>
G	C	<i>Cymbopogon refractus</i>

Geology, landform, soils

Geology map/scale/year: Roma (SG5_12)/250K

Geology code and rock types: Kln - Nullawurt Sandstone Member

Land system: (S)uBl

Landform: Lower slope of hill

Soils: Sandy loam

Field observation and notes: _____

Landzone: 10

RE code changes

Existing RE code: 11.10.1

Proposed RE code: 11.10.7a

END

Regional Ecosystem Assessment – August 2012



Site 24 facing south



north

Regional Ecosystem Assessment – August 2012

Sheet D – regional ecosystem type assessment site

Location

Site No. 25 Recorder: A.J.Franks Day/Date: 15 APR 2015

Purpose Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town)

GPS: GDA94

5	5
---	---

0	7	2	5	1	0	1
---	---	---	---	---	---	---

7	0	7	2	6	5	2
---	---	---	---	---	---	---

 Unit: Lat

Vegetation structure

Median height of the EDL is to be measured

Plant species

Record relative (numerical) dominance for each stratum; **d** – dominant; **c** – codominant; **s** - subdominant, **a** – associated.

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	6.0	5-7	M
T2	3.0	2-4	V
T3			
S1			
S2			
G	0.4	0.3-0.5	V
Structural formation: (including height)			
Low open forest			
Ecologically dominant layer:			T1

Str.	Rel. dom.	Scientific Name
T1	D	<i>Acacia shirleyi</i>
T2	D	<i>Acacia shirleyi</i>
T2	A	<i>Santalum lanceolatum</i>
G	D	<i>Entolasia stricta</i>
G	A	<i>Aristida sp.</i>

Geology, landform, soils

Geology map/scale/year: Roma (SG5_12)/250K

Geology code and rock types: Kln - Nullawurt Sandstone Member

Land system: (S)uBl

Landform: Lower- to mid-slope of hill

Soils: Rocky sandy loam

Field observation and notes: _____

Landzone: 10

RE code changes

Existing RE code: 11.10.1

Proposed RE code: 11.10.3

END

Regional Ecosystem Assessment – August 2012



Site 25 facing north



south



Site 25 Soil surface

Regional Ecosystem Assessment – August 2012

Sheet D – regional ecosystem type assessment site

Location

Site No. 26 Recorder: A.J.Franks Day/Date: 15 APR 2015

Purpose Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town)

GPS: GDA94

5	5
---	---

0	7	2	6	3	3	4
---	---	---	---	---	---	---

7	0	7	2	9	7	6
---	---	---	---	---	---	---

 UTM

Vegetation structure

Median height of the EDL is to be measured

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	11.0	10-12	V
T2	7.0	6-8	S
T3	3	2-4	S
S1	1.3	1-1.5	V
S2	1	0.8-1.0	V
G	0.8	0.1-1.0	M
Structural formation: (including height)			
Open woodland			
Ecologically dominant layer:			T1

Plant species

Record relative (numerical) dominance for each stratum; **d** – dominant; **c** – codominant; **s** - subdominant, **a** – associated.

Str.	Rel. dom.	Scientific Name
T1	D	<i>Eucalyptus crebra</i>
T1	S	<i>Corymbia clarksoniana</i>
T2	D	<i>Callitris glaucophylla</i>
T2	S	<i>Bursaria incana</i>
T3	C	<i>Bursaria spinosa</i>
T3	C	<i>Callitris glaucophylla</i>
S1	D	<i>Geijera parviflora</i>
S2	D	<i>Carissa ovata</i>
G	D	<i>Ancistrachne uncinatum</i>
G	S	<i>Aristida caput-medusae</i>
G	A	<i>Sida sp.</i>

Geology, landform, soils

Geology map/scale/year: Roma (SG5_12)/250K

Geology code and rock types: Kln – Nullawurt Sandstone Member

Land system: (S)uBl

Landform: Gentle slope

Soils: Clay loam

Field observation and notes:

Landzone: 10

RE code changes

Existing RE code: non-remnant/mature regrowth

Proposed RE code: 11.10.7a (regrowth)

END

Regional Ecosystem Assessment – August 2012



Site 26 facing north



south



Site 26 Soil surface

Regional Ecosystem Assessment – August 2012

Sheet D – regional ecosystem type assessment site

Location

Site No. 27 Recorder: A.J.Franks Day/Date: 15 APR 2015

Purpose Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town)

GPS: GDA94

5	5
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0	7	2	6	1	0	4
---	---	---	---	---	---	---

7	0	7	2	4	6	8
---	---	---	---	---	---	---

 UTM:

Vegetation structure

Median height of the EDL is to be measured

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	15	14-16	S
T2	7	6-8	S-M
T3	3	3-4	V
S1	1.5	1.0-2.0	V
S2	1.0		V
G	0.8	0.1-1.0	M-D
Structural formation: (including height)			
Woodland			
Ecologically dominant layer:			T1

Plant species

Record relative (numerical) dominance for each stratum; **d** – dominant; **c** – codominant; **s** - subdominant, **a** – associated.

Str.	Rel. dom.	Scientific Name
T1	C	<i>Eucalyptus populnea</i>
T1	C	<i>Eucalyptus crebra</i>
T2	D	<i>Callitris glaucophylla</i>
T2	S	<i>Eucalyptus populnea</i>
T2	A	<i>Acacia excelsa</i>
T2	A	<i>Eremophila mitchellii</i>
T3	D	<i>Geijera parviflora</i>
S1	D	<i>Geijera parviflora</i>
S2	D	<i>Carissa ovata</i>
G	D	<i>Ancistrachne uncinatum</i>
G	A	<i>Themeda triandra</i>

Geology, landform, soils

Geology map/scale/year: Roma (SG5_12)/250K

Geology code and rock types: Klk - Kingull Member

Land system: (S)uBl

Landform: Lower slope adjacent to drainage line

Soils: Grey clay loam

Field observation and notes: Some tree deaths (possibly poison).

Landzone: 3

RE code changes

Existing RE code: non-remnant

Proposed RE code: 11.3.2

END

Regional Ecosystem Assessment – August 2012



Site 27 facing north



south



Site 27 Soil surface

Regional Ecosystem Assessment – August 2012

Sheet D – regional ecosystem type assessment site

Location

Site No. 28 Recorder: A.J.Franks Day/Date: 15 APR 2015

Purpose Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town)

GPS: GDA94

5	5	0	7	2	5	4	8	5	7	0	7	1	9	8	5
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 UTM

Vegetation structure

Median height of the EDL is to be measured

Plant species

Record relative (numerical) dominance for each stratum; **d** – dominant; **c** – codominant; **s** - subdominant, **a** – associated.

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	9	8-10	S
T2	7	6-8	V
T3	3	2-4	M
S1	1	1.0-2.0	S
S2			
G	0.8	0.1-1.0	S-M
Structural formation: (including height)			
Low woodland			
Ecologically dominant layer:			T1

Str.	Rel. dom.	Scientific Name
T1	D	<i>Eucalyptus populnea</i>
T2	D	<i>Acacia harpophylla</i>
T3	C	<i>Acacia harpophylla</i>
T3	C	<i>Casuarina cristata</i>
S1	D	<i>Casuarina cristata</i>
G	D	<i>Ancistrachne uncinatum</i>
G	S	<i>Aristida</i> sp.
G	S	<i>Enteropogon acicularis</i>

Geology, landform, soils

Geology map/scale/year: Roma (SG5_12)/250K

Geology code and rock types: Kln - Nullawurt Sandstone Member

Land system: (S)uBl

Landform: Toe slope/gently undulating

Soils: Reddish fine sandy loam with some surface pebbles

Field observation and notes:

Landzone: 9

RE code changes

Existing RE code: non-remnant/mature regrowth

Proposed RE code: 11.9.10 (regrowth)

END

Regional Ecosystem Assessment – August 2012



Site 28 facing north



south



Site 28 Soil surface

Regional Ecosystem Assessment – August 2012

Sheet D – regional ecosystem type assessment site

Location

Site No. 29 Recorder: A.J.Franks Day/Date: 15 APR 2015

Purpose Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town)

GPS: GDA94

5	5
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0	7	2	4	9	3	2
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7	0	7	1	6	4	0
---	---	---	---	---	---	---

 UTM

Vegetation structure

Median height of the EDL is to be measured

Plant species

Record relative (numerical) dominance for each stratum; **d** – dominant; **c** – codominant; **s** - subdominant, **a** – associated.

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	9	8-10	S
T2	6	5-7	S-M
T3	3	2-4	S
S1	1.5	1.0-2.0	V
S2			
G	0.8	0.1-1.0	M
Structural formation: (including height)			
Low woodland			
Ecologically dominant layer:			T1

Str.	Rel. dom.	Scientific Name
T1	D	<i>Eucalyptus populnea</i>
T1	A	<i>Eucalyptus crebra</i>
T2	D	<i>Callitris glaucophylla</i>
T2	S	<i>Casuarina cristata</i>
T3	D	<i>Eremophila mitchellii</i>
S1	D	<i>Geijera parviflora</i>
G	C	<i>Ancistrachne uncinatum</i>
G	C	<i>Aristida sp.</i>

Geology, landform, soils

Geology map/scale/year: Roma (SG5_12)/250K

Geology code and rock types: Kln - Nullawurt Sandstone Member

Land system: (S)uBl

Landform: Gentle slope

Soils: Reddish clay loam

Field observation and notes: Poor condition. Some tree death of poplar box and belah, possibly poison

Landzone: 10

RE code changes

Existing RE code: 11.9.5/11.9.10

Proposed RE code: 11.10.7

END

Regional Ecosystem Assessment – August 2012



Site 29 facing north



south



Site 29 Soil surface

Sheet D – regional ecosystem type assessment site

Location

Site No. 30 Recorder: A.J.Franks Day/Date: 14 APR 2015

Purpose Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town)

GPS: GDA94

5	5
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0	7	3	1	8	2	3
---	---	---	---	---	---	---

7	0	7	0	1	4	2
---	---	---	---	---	---	---

 UTM

Vegetation structure

Median height of the EDL is to be measured

Plant species

Record relative (numerical) dominance for each stratum; **d** – dominant; **c** – codominant; **s** - subdominant, **a** – associated.

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	11	10-12	M
T2	4	3-5	S
T3	2		V
S1	1	0.8-1.2	V
S2		-	V
G	0.5	0.1-1.0	S
Structural formation: (including height)			
Open forest			
Ecologically dominant layer:			T1

Str.	Rel. dom.	Scientific Name
T1	D	<i>Acacia harpophylla</i>
T1	A	<i>Casuarina cristata</i>
T2	D	<i>Acacia harpophylla</i>
T2	A	<i>Brachychiton</i>
T3	D	<i>Geijera parviflora</i>
S1	D	<i>Geijera parviflora</i>
S1	A	<i>Casuarina cristata</i>
S2	D	<i>Carissa ovata</i>
G	D	<i>Ancistrachne uncinulata</i>
G	A	<i>Sclerolaena divaricata</i>

Geology, landform, soils

Geology map/scale/year: Roma (SG5_12)/250K

Geology code and rock types: Kli - Minmi Member

Land system: (S)uBl

Landform: Mid-slope of low hill

Soils: Light brown/grey clay loam with some of surface rock and lots of fallen timber

Field observation and notes:

Landzone: 9

RE code changes

Existing RE code: non-rem

Proposed RE code: 11.9.5

END

Regional Ecosystem Assessment – August 2012



Site 30 facing north



south



Site 30 Soil surface

Sheet D – regional ecosystem type assessment site

Location

Site No.	31A	Recorder:	A.J.Franks	Day/Date:	14 APR 2015												
Purpose	Regional Ecosystem Assessment																
Locality: (inc. distance/direction to nearest town)																	
GPS: GDA94	5	5	0	7	3	1	4	0	5	7	0	6	9	5	0	7	Uat

Vegetation structure

Median height of the EDL is to be measured

Plant species

Record relative (numerical) dominance for each stratum; **d** – dominant; **c** – codominant; **s** - subdominant, **a** – associated.

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	13	12-14	S
T2	9	8-10	S-M
T3			
S1	2	1-4	variable
S2	1	0.8-1.2	V
G	0.5	0.1-1.0	M
Structural formation: (including height)			
Woodland			
Ecologically dominant layer:			T1

Str.	Rel. dom.	Scientific Name
T1	D	<i>Eucalyptus crebra</i>
T2	C	<i>Acacia shirleyi</i>
T2	C	<i>Bursaria spinosa</i>
T2	A	<i>Alphitonia excelsa</i>
S1	C	<i>Croton insularis</i>
S1	C	<i>Hovea acutifolia</i>
S2	D	<i>Carissa ovata</i>
G	D	<i>Ancistrachne uncinulata</i>
G	A	* <i>Cenchrus ciliaris</i>
G	A	<i>Eragrostis sp.</i>
G	A	<i>Aristida sp.</i>

Geology, landform, soils

Geology map/scale/year:	Roma (SG5_12)/250K
Geology code and rock types:	Kld - Doncaster Member
Land system:	(S)uBl
Landform:	Top of low hill
Soils:	Light grey sandy loam with loads of surface rock
Field observation and notes:	GLN631: <i>Eucalyptus crebra</i> over <i>Croton insularis</i> with some <i>Hovea</i> . Dense shrub layer with sparse ground cover.
Landzone:	10

RE code changes

Existing RE code:	11.7.6/11.9.5a
Proposed RE code:	11.10.4

END

Regional Ecosystem Assessment – August 2012



Site 31A facing north



south



Site 31A Soil surface

Regional Ecosystem Assessment – August 2012

Sheet D – regional ecosystem type assessment site

Location

Site No. 32 Recorder: A.J.Franks Day/Date: 14 APR 2015

Purpose Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town)

GPS: GDA94

5	5
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0	7	2	6
---	---	---	---

5	5	5
---	---	---

7	0	6	2
---	---	---	---

9	2	2
---	---	---

 Unit:

Vegetation structure

Median height of the EDL is to be measured

Plant species

Record relative (numerical) dominance for each stratum; **d** – dominant; **c** – codominant; **s** - subdominant, **a** – associated.

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	11	10-12	S-M
T2	7	6-8	V
T3	3	2-4	M
S1	1.5	1-2	S
S2		-	
G	0.5	0.1-1.0	M
Structural formation: (including height)			
Woodland to open forest			
Ecologically dominant layer:			T1

Str.	Rel. dom.	Scientific Name
T1	D	<i>Eucalyptus populnea</i>
T2	C	<i>Eucalyptus populnea</i>
T2	C	<i>Allocasuarina luehmannii</i>
T3	C	<i>Geijera parviflora</i>
T3	C	<i>Eremophila mitchellii</i>
S1	C	<i>Eremophila mitchellii</i>
S1	C	<i>Acacia</i> sp.
G	C	<i>Aristida</i> spp.
G	A	<i>Enteropogon acicularis</i>
G	A	<i>Cyperus</i> sp.
G	A	<i>Eragrostis</i> sp.

Geology, landform, soils

Geology map/scale/year: Roma (SG5_12)/250K

Geology code and rock types: T

Land system: AX

Landform: Gently undulating

Soils: Sandy clay loam

Field observation and notes: _____

Landzone: 5

RE code changes

Existing RE code: 11.9.10

Proposed RE code: 11.5.1

END

Regional Ecosystem Assessment – August 2012



Site 32 facing north



south



Site 32 Soil surface

Regional Ecosystem Assessment – August 2012

Sheet D – regional ecosystem type assessment site

Location

Site No. 33 Recorder: A.J.Franks Day/Date: 14 APR 2015

Purpose Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town)

GPS: GDA94

5	5
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0	7	2	6	3	8	2
---	---	---	---	---	---	---

7	0	6	2	9	3	5
---	---	---	---	---	---	---

 Unit: met

Vegetation structure

Median height of the EDL is to be measured

Plant species

Record relative (numerical) dominance for each stratum; **d** – dominant; **c** – codominant; **s** - subdominant, **a** – associated.

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E		-	
T1	13	12-14	S
T2	7	6-8	M
T3	3	2-4	S
S1		-	
S2		-	
G	0.5	0.1-1.0	V
Structural formation: (including height)			
Woodland			
Ecologically dominant layer:			T1

Str.	Rel. dom.	Scientific Name
T1	D	<i>Eucalyptus populnea</i>
T2	D	<i>Allocasuarina luehmannii</i>
T2	A	<i>Acacia excelsa</i>
T3	D	<i>Eremophila mitchellii</i>
G	C	<i>Ancistrachne uncinulata</i>
G	A	<i>Enteropogon acicularis</i>

Geology, landform, soils

Geology map/scale/year: Roma (SG5_12)/250K

Geology code and rock types: T

Land system: AX

Landform: Gently undulating

Soils: Sandy loam

Field observation and notes: _____

Landzone: 5

RE code changes

Existing RE code: 11.7.2/11.5.1

Proposed RE code: 11.5.1a

END

Regional Ecosystem Assessment – August 2012



Site 33 facing north



south



Site 33 Soil surface

Sheet D – regional ecosystem type assessment site

Location

Site No. 37 Recorder: A.J.Franks Day/Date: 15 APR 2015

Purpose Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town)

GPS: GDA94

5	5
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0	7	2	6	3	9	4
---	---	---	---	---	---	---

7	0	7	1	0	0	7
---	---	---	---	---	---	---

 Unit: Uat

Vegetation structure

Median height of the EDL is to be measured

Plant species

Record relative (numerical) dominance for each stratum; **d** – dominant; **c** – codominant; **s** - subdominant, **a** – associated.

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E	11	10-12	V
T1	9	8-10	M
T2	5	3-6	M
T3			
S1			
S2			
G	0.8	0.1-1.0	V
Structural formation: (including height)			
Low open forest			
Ecologically dominant layer:			T1

Str.	Rel. dom.	Scientific Name
E	D	<i>Eucalyptus crebra</i>
E	A	<i>Eucalyptus decorticans</i>
T1	D	<i>Acacia shirleyi</i>
T2	D	<i>Acacia shirleyi</i>
G	D	<i>Entolasia stricta</i>
G	S	<i>Aristida sp.</i>

Geology, landform, soils

Geology map/scale/year: Roma (SG5_12)/250K

Geology code and rock types: Kli - Minmi Member

Land system: (S)uBl

Landform: Slope of hill/jump-up

Soils: Rocky sandy loam

Field observation and notes: GLN637A: Eucalyptus crebra grassy woodland on top of jump-up (11.10.4a)

Landzone: 10

RE code changes

Existing RE code: non-remnant/mature regrowth

Proposed RE code: 11.10.3

END

Regional Ecosystem Assessment – August 2012



Site 37 facing north



south



Site 37 Soil surface

Regional Ecosystem Assessment – August 2012

Sheet D – regional ecosystem type assessment site

Location

Site No. 38 Recorder: A.J.Franks Day/Date: 15 APR 2015

Purpose Regional Ecosystem Assessment

Locality: (inc. distance/direction to nearest town)

GPS: GDA94

5	5
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0	7	2	5	8	3	6
---	---	---	---	---	---	---

7	0	7	1	7	5	8
---	---	---	---	---	---	---

 UTM

Vegetation structure

Median height of the EDL is to be measured

Plant species

Record relative (numerical) dominance for each stratum; **d** – dominant; **c** – codominant; **s** - subdominant, **a** – associated.

Stratum	Median height	Height interval	Est. cover density (D,M,S,V)
E	11	10-12	V
T1	9	8-10	M
T2	7	6-8	S
T3			
S1	1	0.5-1.5	V
S2			
G	0.4	0.1-0.5	M
Structural formation: (including height)			
Low open forest			
Ecologically dominant layer:			T1

Str.	Rel. dom.	Scientific Name
E	D	<i>Eucalyptus fibrosa?</i>
T1	D	<i>Acacia shirleyi</i>
T1	A	<i>Callitris glaucophylla</i>
T2	C	T1 spp.
S1	D	<i>Acacia shirleyi</i>
G	C	<i>Aristida</i> sp.
G	C	<i>Entolasia stricta</i>

Geology, landform, soils

Geology map/scale/year: Roma (SG5_12)/250K

Geology code and rock types: Kln - Nullawurt Sandstone Member

Land system: (S)uBl

Landform: Mid slope of jump-up

Soils: Rocky brown sandy loam

Field observation and notes: Lower slopes: less rock, more ironbark and pine. Molly box on edges

GLNG38A: brigalow regrowth Landzone: 10

RE code changes

Existing RE code: 11.7.2/11.5.1

Proposed RE code: 11.10.3

END

Regional Ecosystem Assessment – August 2012



Site 38 facing north



south



Site 38 Soil surface