

# **R3T2**

# **FIELD REGIONAL ECOSYSTEM**

# **MAPPING**

**Report prepared for**  
**Santos GLNG Pty Ltd**

March 2016

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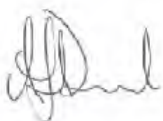
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Date: 4<sup>th</sup> March 2016

# FIELD VALIDATED REGIONAL ECOSYSTEM MAPPING OF R3T2

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## Abbreviations

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
E	Endangered
EPBC Act	Commonwealth Environment Protection and Biodiversity Conservation Act 1999
GLNG	Gladstone Liquid Natural Gas project
ha	Hectare
LC	Least Concern
LZ	Land Zone
MNES	Matter of National Environmental Significance
NC	No Concern at Present
OC	Of Concern
PLA	Petroleum Lease Area
RE	Regional Ecosystem
REDD	Regional Ecosystem Description Database
TEC	Threatened Ecological Community
VM Act	Queensland's Vegetation Management Act 1999

## 1.0 INTRODUCTION

### 1.1. BACKGROUND AND PURPOSE

Santos GLNG require large scale accurate mapping of ecological constraints within its project tenements to facilitate infrastructure design and construction and development of their gas fields of Southern Queensland. The production of accurate regional ecosystem and fauna habitat values mapping will allow Santos GLNG to meet ecological obligations under their EA and EPBC act conditions. To-this-end Terrestria Pty Ltd have been engaged to produce field validated high resolution mapping of regional ecosystems of the R3T2, west Wallumbilla study area.

### 1.2. LOCATION OF STUDY AREA

The study area approximately 11, 282 ha in size, located immediately due west of Wallumbilla immediately north of the Warrego highway, in southern Queensland (**Figure 1.1**). The study is associated with the Roma West 3a project development.

## 2.0 METHODOLOGY

### 2.1. REGIONAL ECOSYSTEM ASSESSMENT

The remnant/non-remnant status of native vegetation was determined using the methods set out in *Guideline for Conducting Vegetation Assessments: A Guide to using the 'Procedure for Conducting Vegetation Assessments' Document Number: 0007-650-GDE-0002* and Neldner et. al., (2012). The relative dominance of species in each strata were assigned as per the definitions in the August 2012 version of the Regional Ecosystem Map Assessment Kit (Queensland Herbarium, 2012) where:

- 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. FUNCTIONAL REGIONAL ECOSYSTEM ASSESSMENT

Endangered (Biodiversity status) regional ecosystems that have not developed a Remnant (VMA, 1999) structure are assessed for their potential to provide for ecological functioning within the landscape. The Santos methodology “Functional Thresholds for Assessing Regional Ecosystem Functionality” was employed to assess whether these non-remnant vegetation patches reach a threshold of functionality. This method includes the assessment of the following criteria:

- Patch width;
- Patch Size;
- Non-native perennial vegetative cover;
- Recruitment to the Ecologically Dominant Layer (EDL);
- Minimum median canopy height;
- Presence of Large trees that are greater than 50% of the benchmark height of EDL;
- Organic Litter cover as a percentage of the mean benchmark; and

- Coarse woody debris as a percentage of the mean benchmark.

### 2.3. PRE-FIELD DESKTOP ASSESSMENT

Priority patches were identified for field verification based primarily of likely Biodiversity status and uncertainty of desktop attribution. That is, those polygons thought likely to contain remnant Endangered or 'functional'<sup>1</sup> endangered vegetation were prioritised for field survey. Site locations are provided in **Figure 3.4**.

### 2.4. POST-FIELD REGIONAL ECOSYSTEM MAPPING

Field data was used in combination with aerial photographic interpretation and available spatially explicit information including geology, contours, soils and land systems to produce reliable fine scale mapping of regional ecosystems. Map polygons were attributed confidence ratings to indicate accuracy of both the polygon boundary and RE attribution for each polygon (as per (Neldner, et al., 2012)). Those patches that had been visited were attributed a high confidence rating whilst those patches that were attributed through the desktop assessment were given a medium confidence rating.

### 2.5. FIELD SURVEY

Due to the small amount of native vegetation occurring across the survey area most patches large enough (> 0.5ha) to be mapped were visited. A Regional ecosystem code assessment form F from the Queensland Herbarium Queensland Herbarium's Regional Ecosystem map modification kit was completed at all sites deemed remnant. Santos' Vegetation Assessment proformas were utilised where vegetation communities were not remnant but were thought to be borderline 'functional' under the definition within *Guideline for Conducting Vegetation Assessments: A Guide to using the 'Procedure for Conducting Vegetation Assessments' Document Number: 0007-650-GDE-0002*. At each location, the HMAT from the *Santos GLNG Procedure for conducting Regulated Fauna Habitat Assessments* was also completed.

### 2.6. REGIONAL ECOSYSTEM

Orthorectified 25 cm high resolution aerial imagery supplied by Santos Pty Ltd was used to delineate native vegetation communities and areas of potential habitat across the study area. The imagery was captured during June 2014. Digital spatial data including; Herbarium RE mapping (version 8.0), 10 m contours, waterways, Biodiversity Planning Assessment (BPA) mapping, specimen backed records, Geoscience Australia weathering intensity mapping and 250K geology were used to aid in the attribution of regional ecosystems to all mapped vegetation polygons and fauna habitat classification to areas of potential habitat. The amended RE mapping line work was produced at a nominal scale of 1:10,000, which 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  $\pm 10$  m.

### 2.7. NOMENCLATURE

Scientific names for terrestrial flora are consistent with those used in the Census of the Queensland Flora (Bostock & Holland, 2010) and botanical binomials presently accepted by the Queensland Herbarium, (DSITIA). The description of regional ecosystems follows that of the Regional Ecosystem Description Database (REDD, Version 7.1 (Queensland Herbarium, 2013)).

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<sup>1</sup> 'Functional' communities refers to those communities that are deemed to be ecologically functional according to Santos' methodology (see *Guideline for Conducting Vegetation Assessments: A Guide to using the 'Procedure for Conducting Vegetation Assessments' Document Number: 0007-650-GDE-0002*





### 3.0 RESULTS AND DISCUSSION

The study area is dominated by low rolling hills of clay soils derived from cretaceous sandstone. These soils have largely been cleared for cropping and cattle grazing with native vegetation communities confined to small stands, shade lines and riparian areas associated with Wallumbilla and Pickanjinie Creeks that dissect the Study area from north to south.

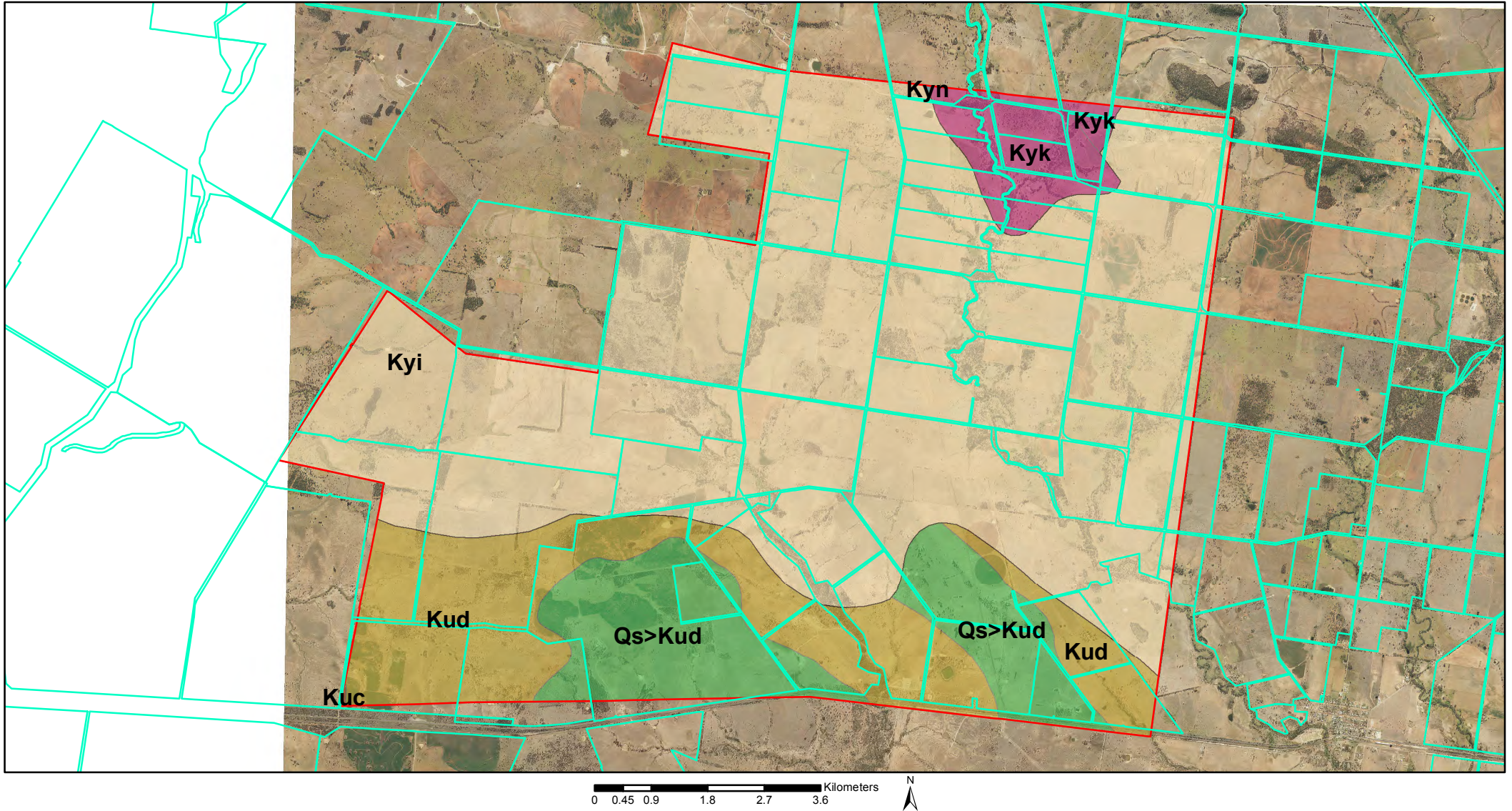
The most common vegetation communities are dominated by; poplar box *Eucalyptus populnea*, brigalow *Acacia harpophylla* or belah *Casuarina cristata* canopies. It is the land zone which drives the regional ecosystem to which these communities are assigned. The derivation of mapped land zones across the Study area are primarily driven by the 250k geology (DNRM, 2012). Where a range of soil types may be derived from the underlying geology the expression of land zone type is determined in the field.

#### 3.1. GEOLOGY

The Department of Natural Resources and Mines (DNRM) geology dataset for the Roma 1:250,000 geology map sheet (Department of Natural Resources and Mines, 2012) (**Figure 3.1**) identifies the study area as being dominated by Cretaceous aged sedimentary deposits (land Zone 9) with minor occurrences of Quaternary floodout deposits overlying sandstone normally Land Zone 4. The areas mapped as floodout and alluvial geology showed no evidence of a depositional landscape, after consultation with the Queensland Herbarium this area has been mapped as land zone 9 (**Table 3.1**).

**Table 3.1: Major geology units mapped from the study area (source: Roma 1:250,000 geology map)**

Map Symbol	Age	Lithology Description	Land Zone
Kuc	Cretaceous	Siltstone, mudstone, sandstone; commonly glauconitic and calcareous	9
Qs>Kud	Quaternary	Sand, red sandy soil, silt and some gravel; floodout and sheet sand with some alluvium (no evidence of depositional landscape)	9
Kud	Cretaceous	Carbonaceous mudstone, siltstone, minor siltstone; some glauconitic and calcareous; shelly fossils	9
Kyk	Cretaceous	Clayey sandstone and carbonaceous mudstone	9
Kyn	Cretaceous	Quartzose to labile sandstone, siltstone and mudstone	9
Kyi	Cretaceous	Glauconitic lithic to quartzose sandstone, siltstone and mudstone, locally bioturbated with shelly fossils	9



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Aerial imagery courtesy of Bing Maps.

**LEGEND**

- Property Boundaries
- Boundary
- Carbonaceous mudstone, siltstone, minor siltstone; some glauconitic and calcareous; shelly fossils
- Clayey sandstone and carbonaceous mudstone
- Glauconitic lithic to quartzose sandstone, siltstone and mudstone, locally bioturbated with shelly fossils
- Quartzose to labile sandstone, siltstone and mudstone
- Sand, red sandy soil, silt and some gravel; floodout and sheet sand with some alluvium
- Siltstone, mudstone, sandstone; commonly glauconitic and calcareous

**FIGURE 3.1: 1: 250,00  
Surface Geology**

Field Validated  
Regional Ecosystem Mapping  
of R3T2

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### 3.2. REGIONAL ECOSYSTEMS MAPPING

45 Tertiary level sites were recorded on the Queensland Herbarium’s Map modification request, Sheet D (**Table 3.2; Figure 3.4; Appendix A**). This field validation resulted in the mapping of an extra 539ha of vegetation as remnant and functional regional ecosystems (Figures 3.2 & 3.3).

One of the major drivers for the increase in mapped regional ecosystem area is the higher map resolution that allows for the mapping of patches of structurally mature native vegetation communities previously too small to map (< 5.0ha) at the 1:100,000 scale. This is borne out by the increase in mapped remnant polygons of 194 polygons.

In addition to the increase in mapped regional ecosystem area the use of better aerial imagery coupled with more intense on-ground surveys has also led to better community type attribution and the elimination of heterogeneous polygons.

**Table 3.2: Flora Survey sites for PL176 Study Area**

Site No.	Easting	Northing	Regional ecosystem	Structure	functionality
1	708895.634	7061002.03	11.3.17	Remnant	functional
2	709539	7060922	11.9.5	Remnant	functional
3	709890	7061274	11.9.5	Remnant	functional
4	707322.079	7065435.992	11.9.10	Remnant	functional
5	707141.019	7065269.809	11.9.5	non-rem	non-functional
6	712117.16	7067583.64	11.3.2	Remnant	functional
7	713479.012	7066785.074	11.9.7	non-rem	non-functional
8	713523.258	7063626.027	11.9.5	Remnant	functional
9	706094.439	7058021.279	11.9.5	Remnant	functional
10	707651.29	7058994.887	11.9.5	Remnant	functional
11	707648.529	7058996.705	11.9.7	Remnant	functional
12	706646.942	7060104.497	11.9.5	non-rem	non-functional
13	705598.417	7060543.128	11.9.5	Remnant	functional
14	705822.055	7060901.143	11.9.5	Remnant	functional
15	702251.627	7061689.883	11.9.7	Remnant	functional
16	704720.122	7061215.767	11.9.10	non-rem	non-functional
17	703223.098	7060412.845	11.9.7	Remnant	functional
18	702882.191	7059261.946	11.3.2	Remnant	functional
19	702415.041	7063038.878	11.9.5	Remnant	functional
20	702836.075	7062266.194	11.9.7	Remnant	functional
21	708379.84	7064134.764	11.9.10	Remnant	functional
22	710565.288	7058122.423	11.3.2	Remnant	functional
23	712280.485	7061125.38	11.9.5	Remnant	functional
24	711870	7062090	11.9.5	Remnant	functional
25	712136.867	7062169.45	11.3.2	Remnant	functional
26	713222.99	7061155.218	11.3.2	Remnant	functional
27	715443.052	7058890.436	11.3.2	Remnant	functional
28	714665.9	7059368.37	11.3.27	Remnant	functional
29	712014.269	7059602.58	11.9.5	Remnant	functional
30	714601.782	7065469.017	11.9.5	Remnant	functional

Site No.	Easting	Northing	Regional ecosystem	Structure	functionality
31	715036	7065889	11.9.5	Remnant	functional
32	715576	7064621	11.9.5	Remnant	functional
33	714335.072	7064179.439	11.3.2	Remnant	functional
34	714331.229	7063801.794	11.3.2	Remnant	functional
35	713326	7061606	11.9.7	Remnant	functional
36	714206.804	7062066.061	11.3.2	non-rem	non-functional
37	712023.907	7064744.547	11.3.17	Remnant	functional
38	710655.897	7064996.805	11.9.5	Remnant	functional
39	713428.648	7067035.612	11.9.10	Remnant	functional
40	714517.523	7066134.193	11.9.5	Remnant	functional
43	709559.425	7065151.036	11.9.5	non-rem	non-functional
44	708583.773	7064138.529	11.9.5	Remnant	functional
45	708245.907	7061851.826	11.3.2	Remnant	functional
46	710529.341	7058335.143	11.3.17	Remnant	functional
47	710160.831	7058945.236	11.3.1	Remnant	functional
48	709196.301	7060094.307	11.3.2	Remnant	functional
49	708242.91	7061307.718	11.9.7	Remnant	functional
50	708248.018	7062421.216	11.3.2	Remnant	functional
51	706381.669	7065669.201	11.9.5	Remnant	functional
52	706610.925	7065628.372	11.9.5	non-rem	non-functional
53	702661.569	7071707.081	11.3.27	Remnant	functional
54	712798.827	7067533.419	11.9.7	Remnant	functional
55	713473.356	7066792.704	11.9.7	non-rem	non-functional
56	713555.992	7066408.742	11.9.5	Remnant	functional
57	713873.096	7066242.518	11.9.5	Remnant	functional
58	713853.296	7065660.883	11.9.7	Remnant	functional
59	713416.376	7062843.804	11.9.5	Remnant	functional
60	706018.812	7058360.519	11.9.1	Remnant	functional
61	707237.378	7059488.036	11.9.5	Remnant	functional
62	707045.153	7060163.981	11.9.5	non-rem	non-functional
63	706409.702	7060070.658	11.9.5	Remnant	functional
64	706169.926	7060046.275	11.9.1	Remnant	functional
65	702363.186	7061603.779	11.9.10	Remnant	functional
66	702758.097	7061479.818	11.9.10	Remnant	functional
67	703194.026	7060614.895	11.9.5	Remnant	functional
68	703116.079	7060288.655	11.9.5	Remnant	functional
69	702592.706	7059450.071	11.3.2	Remnant	functional
70	702278.549	7060929.77	11.9.7	non-rem	functional
71	702312.866	7061334.171	11.9.10	Remnant	functional
72	700919.594	7061673.241	11.9.10	non-rem	non-functional
73	703541.94	7062727.176	11.9.5	Remnant	functional
74	703109.508	7062343.08	11.3.2	Remnant	functional

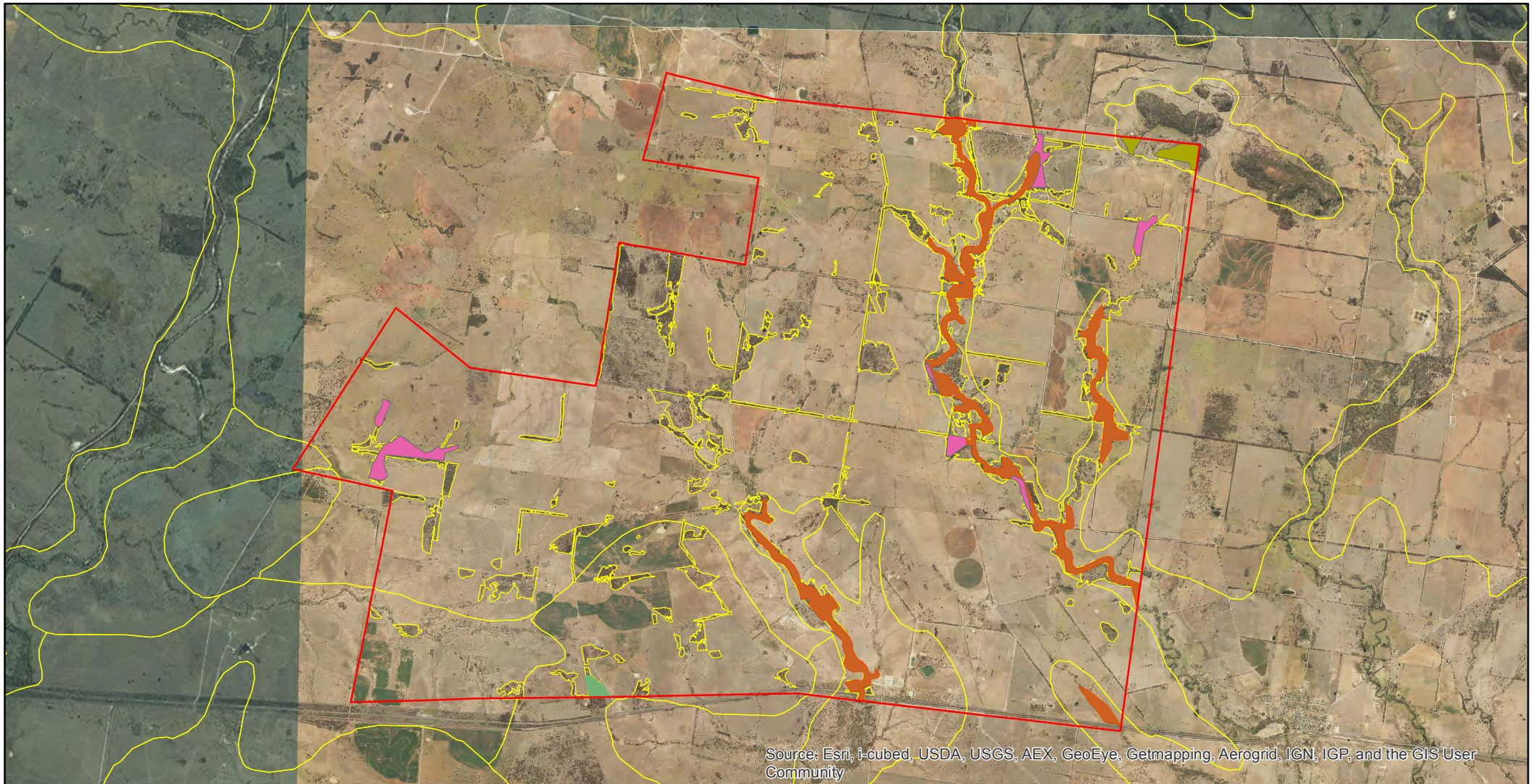
Site No.	Easting	Northing	Regional ecosystem	Structure	functionality
75	708295.593	7063688.069	11.9.10	Remnant	functional
76	710623.701	7058105.499	11.3.2	non-rem	non-functional
77	712994.371	7061019.723	11.9.7	Remnant	TEC
78	715030.372	7058175.556	11.9.7	Remnant	functional
79	712653.165	7059140.755	11.9.10	Remnant	functional
80	711898.751	7059241.978	11.9.5	Remnant	functional
81	711276.512	7059447.693	11.9.5	Remnant	functional
82	716592.737	7059608.216	11.9.5	Remnant	functional
83	714350.299	7061748.672	11.9.5/11.3.1	Remnant	functional
84	714183.289	7062072.551	11.3.2	Remnant	functional
85	715035.3	7065889.094	11.9.5	Remnant	functional
86	714115.944	7063299.575	11.3.2	Remnant	functional
87	714050.703	7062815.232	11.3.2	Remnant	functional
88	713352.44	7062024.288	11.9.10	Remnant	functional
89	708585.354	7065560.955	11.9.5	Remnant	functional
90	713409.254	7067146.322	11.3.2	Remnant	functional
91	713941.846	7066215.545	11.9.5	Remnant	functional
92	715802.266	7065935.356	11.10.3/11.10.7	Remnant	functional
93	709480.556	7065181.144	11.9.5	non-rem	non-functional
94	708592.483	7065533.465	11.9.5	non-rem	non-functional
95	707706.346	7063082.027	11.3.2	Remnant	functional
96	707433.491	7063117.604	11.9.5	non-rem	?
97	703012.981	7057738.264	11.9.7	Remnant	functional
98	704444.428	7057628.273	11.9.5	Remnant	functional
99	705801.223	7057702.519	11.9.5	Remnant	functional
100	713340.548	7057738.241	11.9.5	Remnant	functional
101	714301.429	7061503.67	11.3.2	Remnant	functional
102	714305.223	7062038.364	11.9.7	Remnant	functional
103	708724.362	7064115.509	11.9.5	Remnant	functional
104	709129.775	7064064.438	11.9.5	non-rem	non-functional
105	708442.544	7061691.797	11.3.2/17	non-rem	non-functional
106	719074.622	7066444.511	11.10.3	Remnant	functional

**Table 3.2: Comparison of regional ecosystems areas mapped under both the Qld Herbarium's 1:100,000 (v 8.0) and Santos 1:10,000 mapping**

Polygon Type	Polygon Number		Area (ha)	
	Herbarium	Field Validated	Herbarium	Field Validated
Remnant Endangered	0	148	0	568.45
Dom Endangered	8	0	77	0
Functional endangered	0	0	0	
Of Concern	3	56	313	379
Sub-dominant Of Concern	0	0		
No Concern at Present	2	3	35	16.42
<b>Total mapped vegetation</b>	<b>13</b>	<b>207</b>	<b>425</b>	<b>964</b>

## **4.0 CONCLUSION**

The use of recent high quality high resolution aerial imagery combined with field verification has led to the production of a large scale regional ecosystem map with a high level of certainty of polygon attribution.



0 0.475 0.95 1.9 2.85 3.8 Kilometers



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Aerial imagery courtesy of Bing Maps.

### LEGEND

Boundary

### RE

11.3.25/11.3.2

11.7.1

11.7.6

11.9.5/11.9.10

### FIGURE 3.2: Herbarium 1:100,000 Regional Ecosystem Map (Version 8.0)

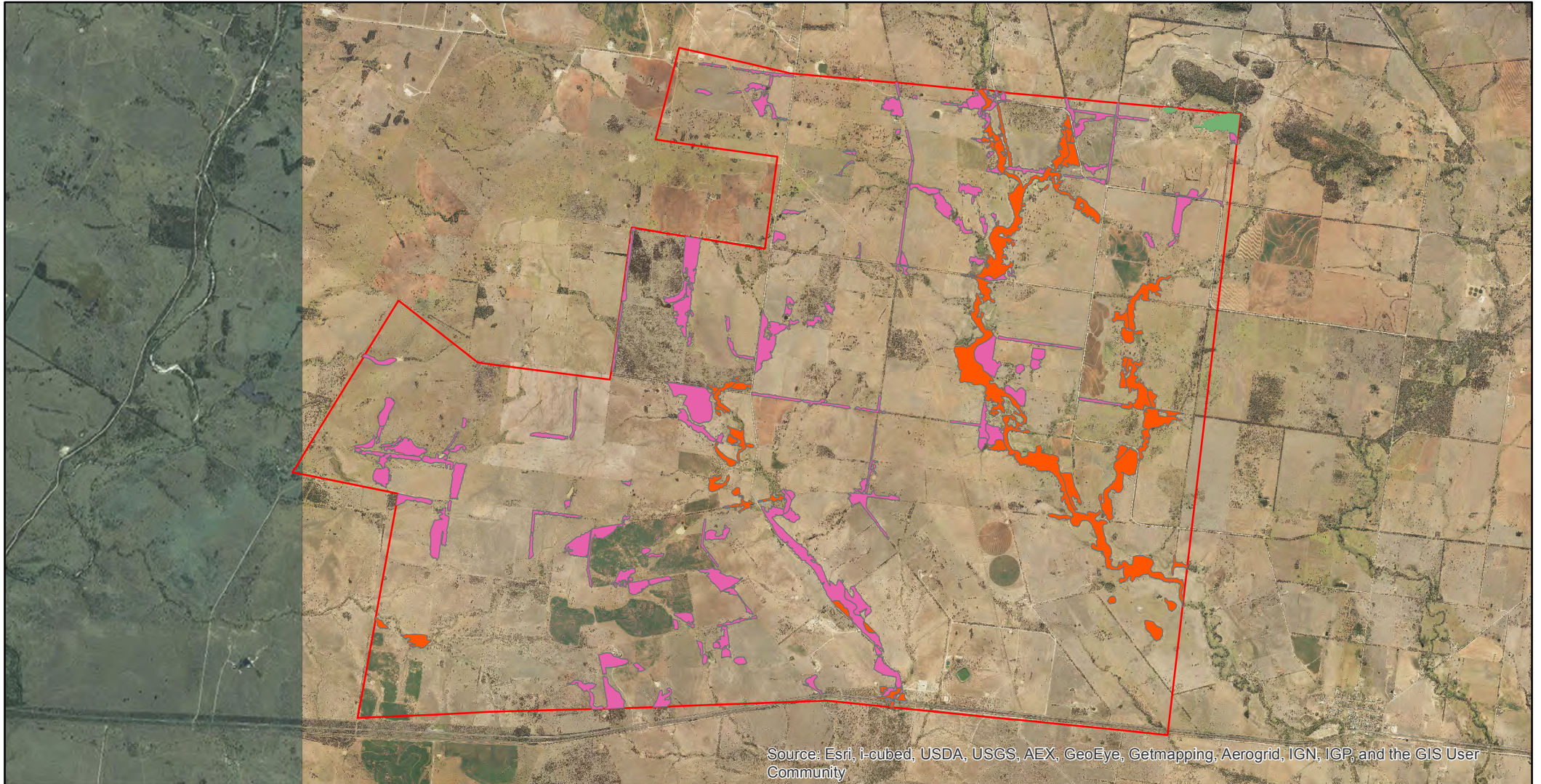
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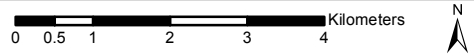
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Aerial imagery courtesy of Bing Maps.

### LEGEND

- Boundary
- E
- OC
- NC

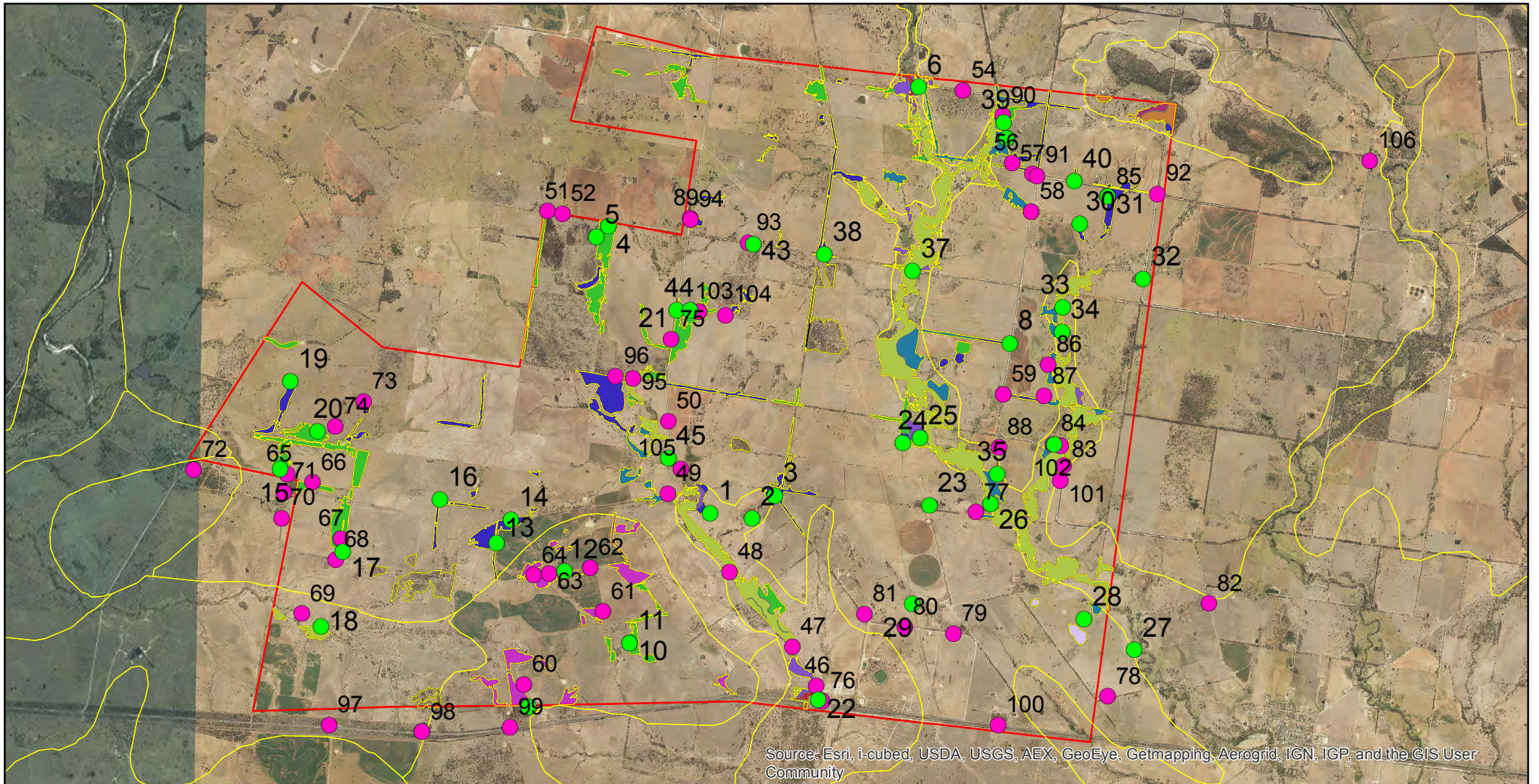
### FIGURE 3.3: Field Verified Regional Ecosystem Mapping

R3T2 Regional Ecosystem Mapping

Created by AD on 14/12/2015

Job No. 0086





0 0.425 0.85 1.7 2.55 3.4 Kilometers



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Aerial imagery courtesy of Bing Maps.

### LEGEND

- Flora Sites PL176
- Flora Quaternary Sites
- Boundary

### FIGURE 3.4: Flora Field Site Locations

Field Validated Regional Ecosystem Mapping of R3T2

Created by AD 02/12/2015

Job No. 0086



## 5.0 BIBLIOGRAPHY

Department of Natural Resources and Mines (DNRM) geology dataset for the Roma 1:250,000 geology map sheet (Department of Natural Resources and Mines, 2012)

Bostock, P. & Holland, A. eds., 2014. Census of the Queensland Flora. Brisbane: Queensland Herbarium, Department of Environment and Resource Management.

Department of Natural Resources and Mines, 2012. Queensland geological digital data, Brisbane: Queensland Government.

Neldner, V., Wilson, B., Thompson, E. & Dillewaard, H., 2012. Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland. Version 3.2 ed. Brisbane: Queensland Herbarium, Department of Science, Information Technology, Innovation and the Arts.

Queensland Herbarium, 2014. Regional Ecosystem Description Database (REDD) Version 8.1, Brisbane: DSITIA.

Wilson, P. & Taylor, P., 2012. Land Zones of Queensland, Brisbane: Queensland Herbarium, Department of Science, Information Technology, Innovation and the Arts.

Young, P. et al., 1999. Brigalow Belt. In: P. Sattler & R. Williams, eds. The Conservation Status of Queensland's Bioregional Ecosystems. Brisbane: Environmental Protection Agency, Queensland Government, pp. 11/1-11/81.