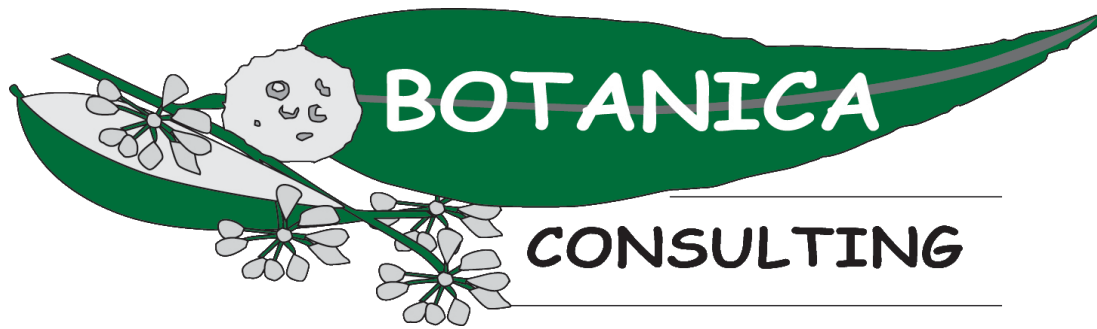


## **APPENDIX 3: LEVEL 1 FLORA AND VEGETATION SURVEY OF THE GRUYERE GOLD PROJECT BOREFIELDS (BOTANICA 2016)**



# Level 1 Flora & Vegetation Survey Gruyere Borefields

Prepared For Gold Road Resources Limited

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FINAL



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## **Acronyms/Abbreviations:**

**BAM Act:** Biosecurity and Agriculture Management Act 2007, WA Government.

**BC:** Botanica Consulting.

**BOM:** Bureau of Meteorology.

**CALM:** Department of Conservation and Land Management (now DPaW), WA Government.

**DAFWA:** Department of Agriculture and Food, WA Government.

**DEC:** Department of Environment and Conservation (now DPaW), WA Government.

**DEH:** Department of Environment and Heritage (now DotE), Australian Government.

**DEP:** Department of Environment Protection (now DER), WA Government.

**DEWHA:** Department of the Environment, Water, Heritage and the Arts (now DotE), Australian Government

**DER:** Department of Environment Regulation (formerly DEC, DoE), WA Government.

**DMP:** Department of Mines and Petroleum (formerly DoIR), WA Government.

**DoE:** Department of Environment (now DER/DPaW), WA Government.

**DoIR:** Department of Industry and Resources (now DMP), WA Government.

**DotE:** Department of the Environment (formerly DSEWPaC, DEWHA, and DEH), Australian Government.

**DPaW:** Department of Parks and Wildlife (formerly DEC, CALM, DoE), WA Government.

**DSEWPaC:** Department of Sustainability, Environment, Water, Population and Communities (now DotE, formerly DEH, DEWHA), Australian Government.

**EP Act:** *Environmental Protection Act 1986*, WA Government.

**EPA:** Environmental Protection Authority, WA Government.

**EPBC Act:** *Environment Protection and Biodiversity Conservation Act 1999*, Australian Government.

**ESA:** Environmentally Sensitive Area.

**Gold Road Resources Limited:** Gold Road

**Ha:** Hectare (10,000 square metres).

**IBRA:** Interim Biogeographic Regionalisation for Australia.

**IUCN:** International Union for the Conservation of Nature and Natural Resources – commonly known as the World Conservation Union.

**Km:** Kilometre (1,000 metres).

**MVG:** Major Vegetation Groups.

**NVIS:** National Vegetation Information System.

**OEPA:** Office of the Environmental Protection Authority, WA Government.

**PEC:** Priority Ecological Community.

**EP Regulations:** *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*, WA Government.

**Survey area:** Gruyere Borefields survey area

**TEC:** Threatened Ecological Community.

**WA:** Western Australia.

**WAHERB:** Western Australian Herbarium.

**WC Act:** *Wildlife Conservation Act 1950*, WA Government.

## **Executive Summary**

BC was commissioned by Gold Road to undertake a Level 1 flora and vegetation survey of the Gruyere Borefields. The survey area consists of two main Borefields (Yeo Borefield and Anne Beadell Borefield) and associated access tracks and pipeline corridors. The survey covered an area of approximately 5,983ha. The Gruyere Borefields survey area is located approximately 66km east of Cosmo Newberry and 135km north-east of Laverton. The survey was conducted from the 15<sup>th</sup> to the 21<sup>th</sup> of November 2015.

The Gruyere Borefields survey area comprised of forty-three broad vegetation communities. No Threatened Flora taxa, pursuant to subsection (2) of section 23F of the WC Act and the Commonwealth EPBC Act were identified within the survey area. No Priority Flora taxa as listed by DPaW were identified within the survey area.

None of the vegetation communities within the survey area were found to have National Environmental Significance as defined by the Commonwealth EPBC Act. No TEC pursuant to Commonwealth or State legislation were recorded within the survey area. The survey area is not located within an ESA as listed under the EP Act, or Schedule 1 Areas. The survey area is not located within a listed or proposed conservation area managed by DPaW. However the Yeo Lake Nature Reserve, which is listed as a "Class A" Nature Reserve managed by DPaW, is located approximately 700m east of the survey area.

One introduced taxon; *Cenchrus ciliaris* (Buffel Grass), was identified within the Gruyere Borefields survey area. According to the DAFWA it is not listed as a Declared Plant under Section 22 of the BAM Act.

## 1 **Introduction**

### 1.1 **Project Description**

BC was commissioned by Gold Road to undertake a Level 1 flora and vegetation survey of the Gruyere Borefields survey area (survey area). The survey area consists of two main Borefields (Yeo Borefield and Anne Beadell Borefield) and associated access tracks and pipeline corridors. The survey covered an area of approximately 5,983ha, which is located within the tenements displayed in Table 1 and Figure 1. The survey area is located approximately 66km east of Cosmo Newbery and 135km north-east of Laverton W.A (Figure 2) The aim of the survey was to produce a vegetation map (Appendix 2) and species list (Appendix 3) as well as to document and map locations of any TEC, PEC, Threatened Flora or Priority Flora species within the survey area (Appendix 1).

**Table 1: Tenements within the Gruyere Borefields survey area**

Tenements	
E 38/1858	E 38/2735
E 38/1932	E 38/2999
E 38/2325	E 38/3076
E 38/2446	L 38/0210
E 38/2447	L 38/0211
E 38/2529	L 38/0237

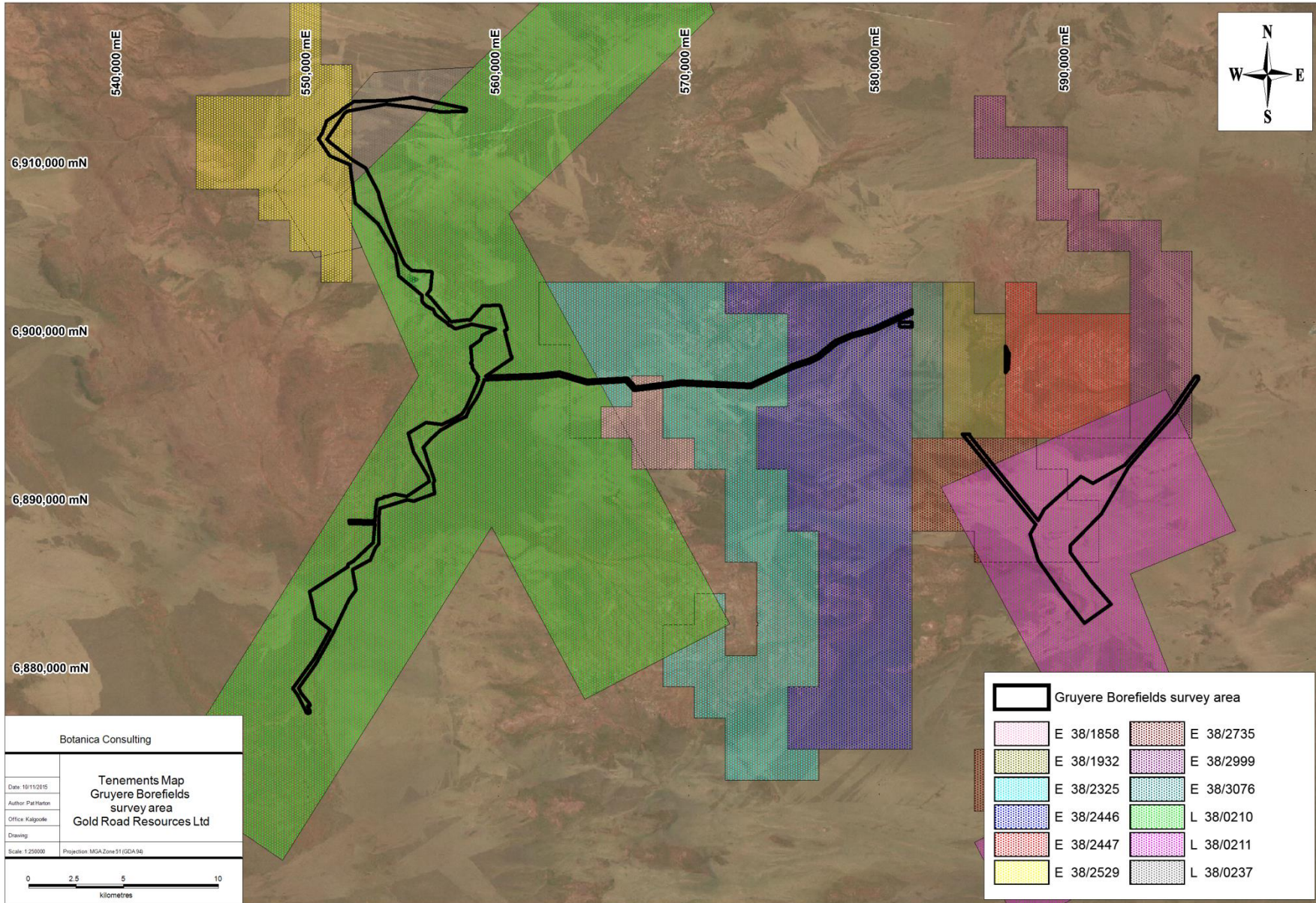


Figure 1: Tenements map of the Gruyere Borefields survey area

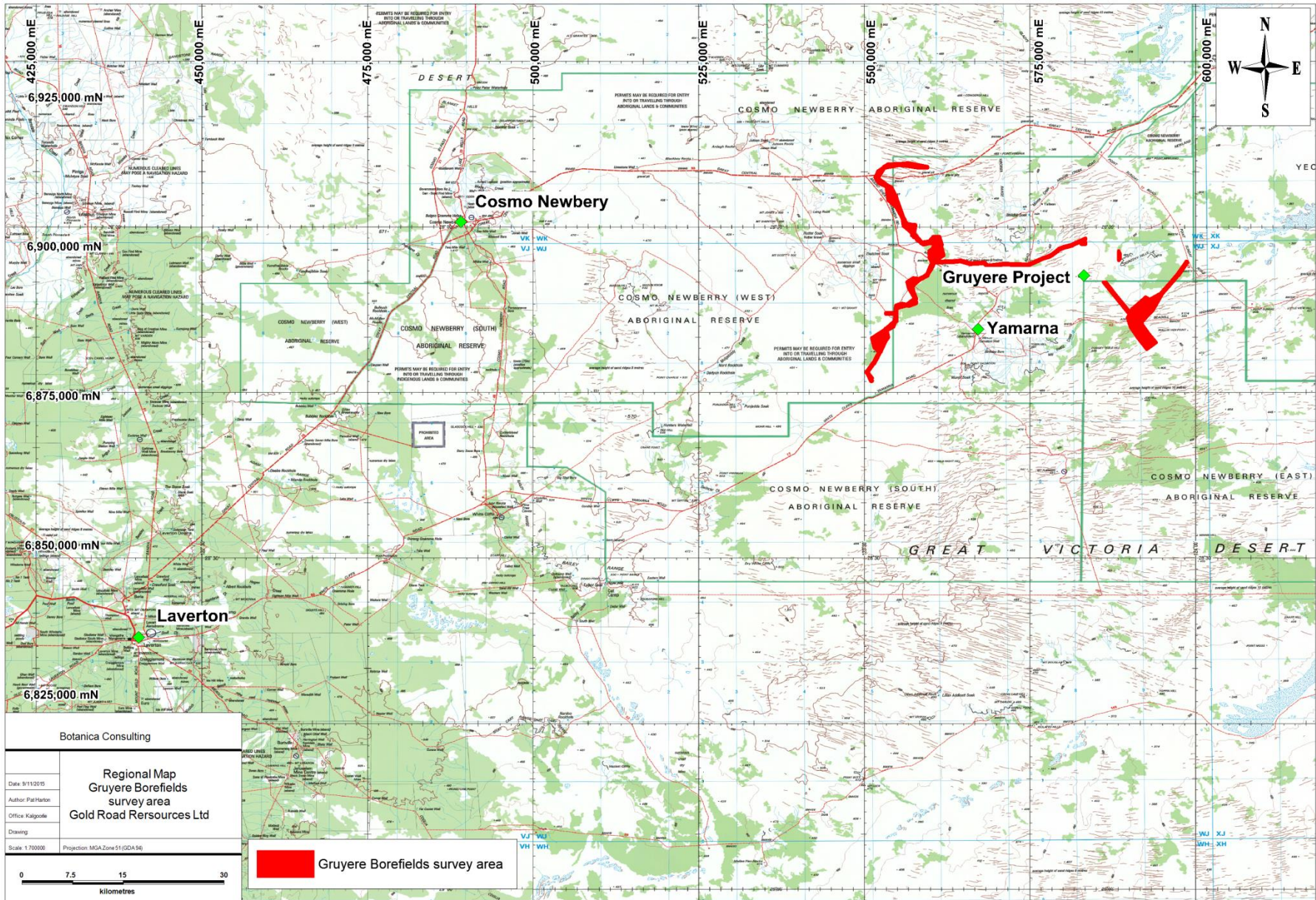


Figure 2: Regional map of the Gruyere Borefields survey area (survey area not to scale)

## **2 Regional Biophysical Environment**

### **2.1 Regional Environment**

The survey area lies within the Austin Botanical District and Helms Botanical District of the Eremaean Province of WA. The Austin Botanical District consists of predominantly of Mulga low woodland on plains and reduces to scrub on hills (Beard, 1990). The Helms Botanical District is described as Mulga low woodland on hardpan soils between dunes. Where this is not prominent tree steppes of *Eucalyptus gongylocarpa*, *E. youngiana* and *Triodia basedowii* occur (Beard, 1990).

Based on the Interim Biogeographic Regionalisation of Australia (IBRA) the Eremaean Province is divided into IBRA regions with the survey area located within the Great Victoria Desert bioregion of Western Australia. The Great Victoria Desert bioregion is further divided into six subregions, Shield, Central, Maralinga, Kintore, Tallaringa and Yellaringa. The survey area is located within the Shield (GVD1 4,741,854 hectares) and Central (GVD2 12,590,867 hectares) of the Great Victoria Desert bioregion (Barton & Cowan, 2001a; Barton & Cowan, 2001b) (Figure 3).



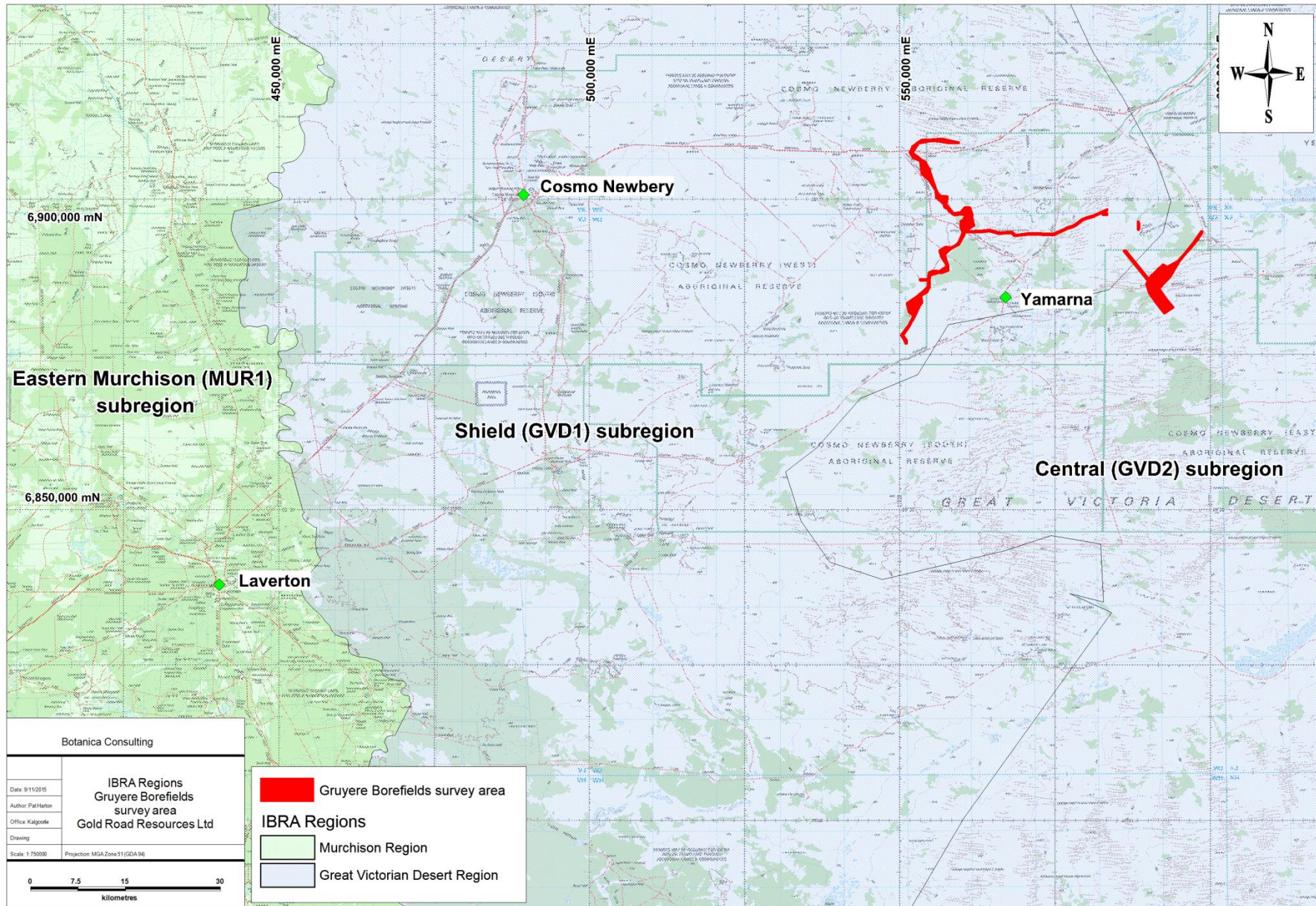


Figure 3: Map of IBRA subregions in the vicinity of the Gruyere Borefields survey area

## 2.2 Vegetation

Vegetation of the Great Victoria Desert and the Helms Botanical District (as described by Beard, 1990) comprises a mosaic of tree and shrub steppe between sand hills and on sandplains, consisting of Marble gum, mallee and spinifex (*Eucalyptus gongylocarpa*, *E. youngiana*, *Triodia basedowii*). Beard states that dunes in the west, are rather thinner, few and weak. *E. gongylocarpa* is comparatively scarce with *E. youngiana* replaced by *E. kingsmillii* and *Acacia aneura* and *A. linophylla* becoming frequent on the sandplain (Beard, 1990; Cowan, 2001).

The DAFWA GIS file (2011) indicates that the survey area is located within Pre-European Beard vegetation associations Great Victoria Desert 18, 24, 45, 84, 85, 239, 676 and 1239 (Figure 4). The extent of these associations as described by the DAFWA is shown in Table 2.

Areas retaining less than 30% of their pre-European vegetation extent generally experience exponentially accelerated species loss, while areas with less than 10% are considered “endangered”. Development within the survey area will not significantly reduce the extent of these vegetation associations.

**Table 2: Remaining Beard Vegetation Associations within Western Australia (DAFWA, 2011)**

Vegetation Association	Pre-European Extent (ha)	Current Extent (ha)	Pre-European extent remaining (%)	% of Current extent within DPaW managed lands	Vegetation Description (Beard, 1990)
Great Victoria Desert 18	497636.98	497636.98	100	0.24	Low woodland; mulga ( <i>Acacia aneura</i> )
Great Victoria Desert 24	21669.70	21669.70	100.00	0	Low woodland; <i>Allocasuarina cristata</i>
Great Victoria Desert 45	10.77	10.77	100	0	Shrublands; mallee scrub (Great Victoria Desert)
Great Victoria Desert 84	876295.94	876295.94	100	15.16	Hummock grasslands, open low tree & mallee steppe; marble gum & mallee ( <i>Eucalyptus youngiana</i> ) over hard spinifex <i>Triodia basedowii</i> between sandhills
Great Victoria Desert 85	788407.28	788407.28	100	8.56	Hummock grasslands, open low tree & mallee steppe; marble gum & mallee ( <i>Eucalyptus youngiana</i> ) over hard spinifex on sandplain
Great Victoria Desert 239	122137.73	122137.73	100	0	Hummock grasslands, open medium tree & mallee steppe; marble gum ( <i>E. gongylocarpa</i> ) & mallee ( <i>Eucalyptus youngiana</i> ) over hard spinifex <i>Triodia basedowii</i> between sandhills
Great Victoria Desert 676	40329.39	40329.39	100	0	Succulent steppe; samphire
Great Victoria Desert 1239	1393810.04	1393810.04	100	2.46	Hummock grasslands, open medium tree & mallee steppe; marble gum & mallee ( <i>E. youngiana</i> ) over hard spinifex <i>Triodia basedowii</i> on sandplain

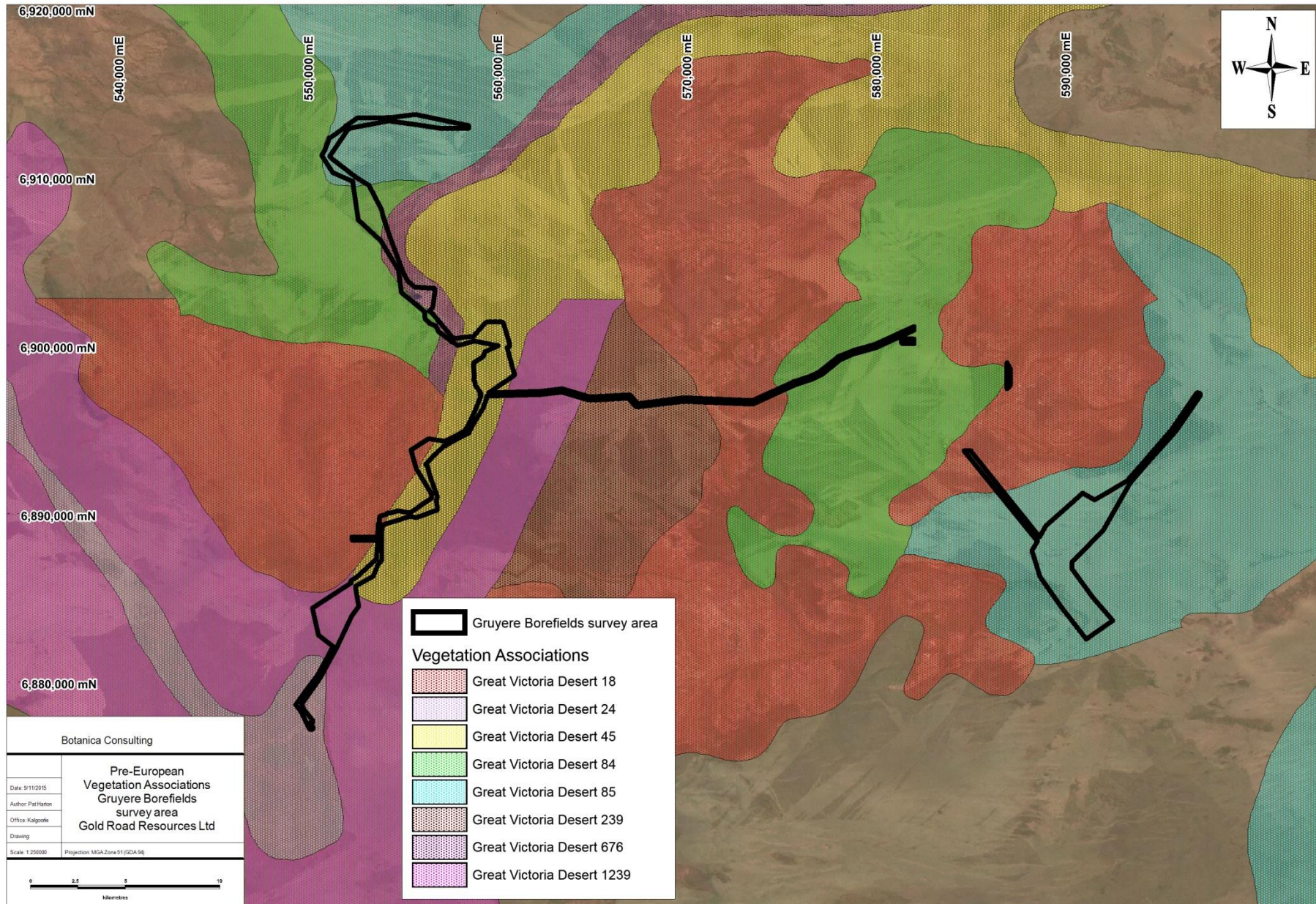


Figure 4: Map of Pre-European Vegetation Associations within the Gruyere Borefields survey area

## 2.3 Topography & Soils

The Great Victoria Desert bioregion forms the southern part of the anti-clockwise whorl of dune fields of Australia. The dominating landforms are dunes and swales. There are local occurrences of playa lakes, associated lee-sided mounds (lunettes) and rocky prominences (Commonwealth Government, 2008b). Playa lakes are a minor, but locally significant landform in the desert, occurring in topographically low-lying regions and many represent the dried remnants of former drainage channels (Shephard, 1995). It consists of active sand-ridge desert of deep Quaternary (less than 65 million years ago) Aeolian sands overlying Permian (251 – 298 million years ago) and Mesozoic (65 - 251 million years ago) units of the Officer Basin (Commonwealth Government, 2008b). The GVD is underlain on its eastern, western and northern margins by an ancient crystalline basement comprising rocks at least 1000 million years old (Shephard, 1995).

The western end of the Shield subregion is underlain by the Yilgarn Craton. Here there is a higher proportion of sandplains in comparison to the entire bioregion. To the east is an arid active sand-ridge desert of deep Quaternary Aeolian sands overlying Permian and Mesozoic strata of the Officer Basin. Landforms consist of salt lakes and major valley floors with lake derived dunes. The sandplains occur with patches of seif dunes running east-west and areas of moderate relief without-cropping and silcrete-capped mesas and plateaus (breakaways). The subregion contains a major paleo channel of Ponton Creek (Cowan, 2001).

The Central subregion is characterised as an arid active sand-ridge desert with extensive dune fields of deep Quaternary aeolian sands overlying Permian strata of the Gunbarrel Basin. Landforms consist of salt lakes and major valley floors with lake derived dunes. Sand plains with extensive seif dunes running east-west, with occasional outcropping (breakaways) and quartzite hills provide minor relief (Barton & Cowan, 2001).

Based on geographic information provided by DAFWA (2014), the survey area is located within the North-western Great Victoria Desert Zone 122 of the Gunbarrel Province 12 and the Leemans Sandplain Zone 274 of the Murchison Province 27. The North-western Great Victoria Desert Zone is characterised by sandplains and dunes (with some undulating plains and uplands) on sedimentary rocks of the Gunbarrel Basin. Soils are comprised of red sandy earths and red deep sands with some red loamy earths and red-brown hardpan shallow loams. Vegetation is predominately mulga shrublands and spinifex grasslands with mallee. The zone is located in the southern Arid Interior sitting between Lake Carnegie, Rason Lake and Warburton.

The Leemans Sandplain Zone is characterised by sandplains (with some gravel plains, mesas and salt lakes) on granitic rocks of the Yilgarn Craton (Eastern Goldfields Super terrane). Soils are comprised of red sandy earths with red loamy earths and some red deep sands, red-brown hardpan shallow loams and Calcareous loamy earths. Vegetation is predominately spinifex grasslands with marble gum, mallee and mulga shrublands (and some halophytic shrublands). The zone is located in the south-western arid interior between Lakes Wells and Minigwal (to the east of Laverton). These zones are further divided into systems, which are displayed below in Tables 3 and Figures 5.

**Table 3: Soil Landscape Systems within the Gruyere Borefields survey area**

Land System	Description
122My99	Plains with extensive gravel pavements and small tracts of longitudinal dunes
124AB47	Plains and Dunes - longitudinal and ring dunes with interdune corridors and plains; occasional salt pans
274AB47	Plains and Dunes - longitudinal and ring dunes with interdune corridors and plains; occasional salt pans
274BY7	Scarpland - low lateritic breakaway on granites and gneisses
274My99	Plains with extensive gravel pavements and small tracts of longitudinal dunes
274SV10	Shallow valleys with lakes, clay pans, salt pans, calcrete (kunkar) platforms, sand dunes, kopi dunes and calcareous dunes

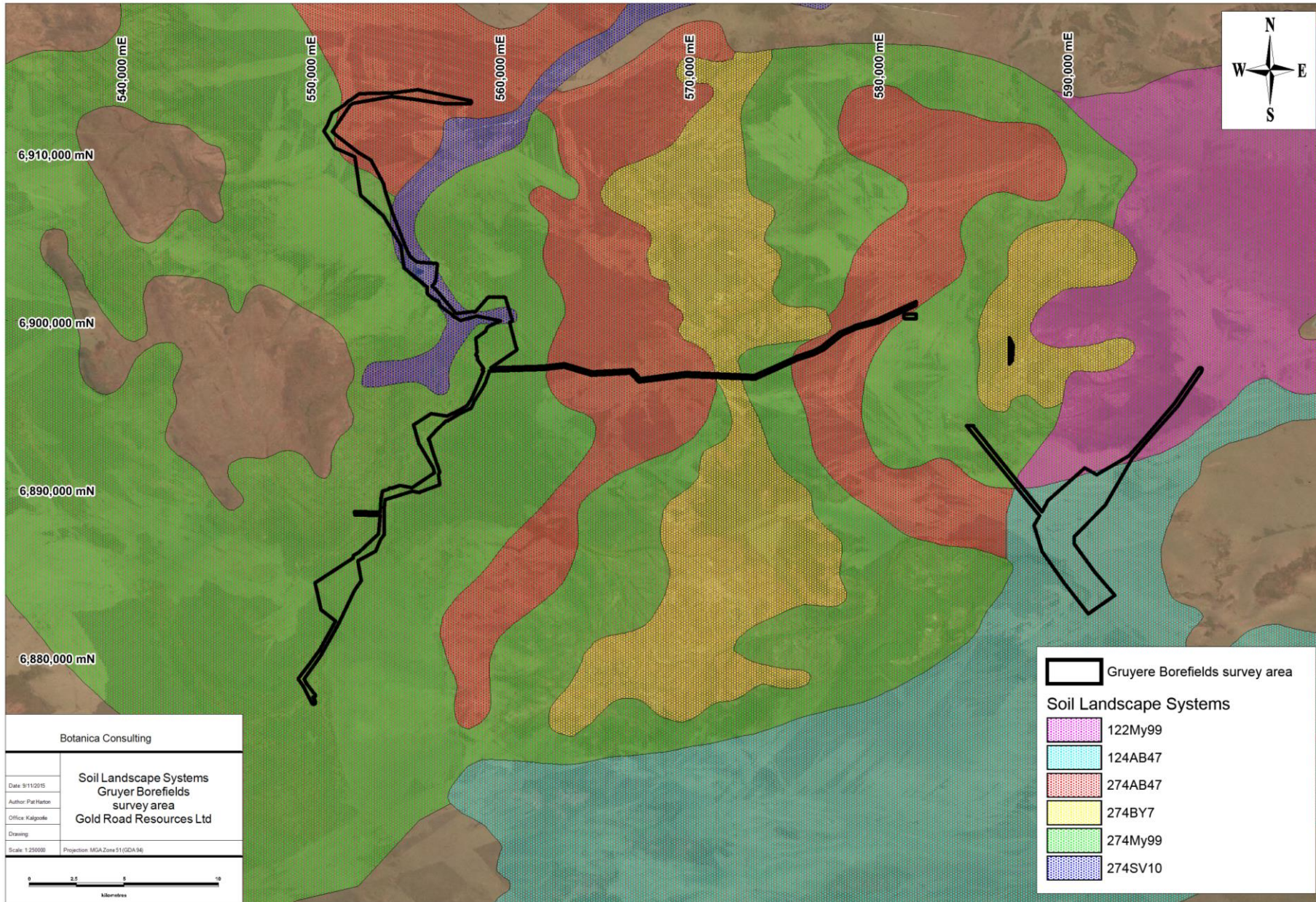


Figure 5: Map of Soil Landscape Systems within the Gruyere Borefields survey area

## 2.4 Regional Hydrology

Findings of a hydrology assessment of the Gruyere Borefield completed by Pennington Scott (2015) indicates the survey area lies within the Yeo Paleo valley Extent, much of which has shallower water tables between 0 and 15 m below ground, which could potentially be accessed by vegetation (Figure 6). Production Bores within the survey area have been proven to be saline, however shallow water, particularly associated with calcrete areas, can be fresh to brackish, within a range that may be conducive to vegetation use (Pennington Scott, 2015)

Potential vegetation use of groundwater in the Yeo Paleo valley was further investigated through "Normalised Difference Vegetation Index Images" (NDVI). Images from the Yeo and Anne Beadell palaeovalley's surrounding the survey area were produced from the Rapid Eye satellite from 18 December 2014, at the end of the dry season (Figure 7).

NDVI images provide an indicator of transpiration. Areas showing a significant NDVI response during a dry period may include vegetation that is transpiring groundwater. The NDVI images highlight patches of higher greenness in the palaeochannel areas which, on review of air photos, appear to correspond to stands of trees (Pennington Scott, 2015).



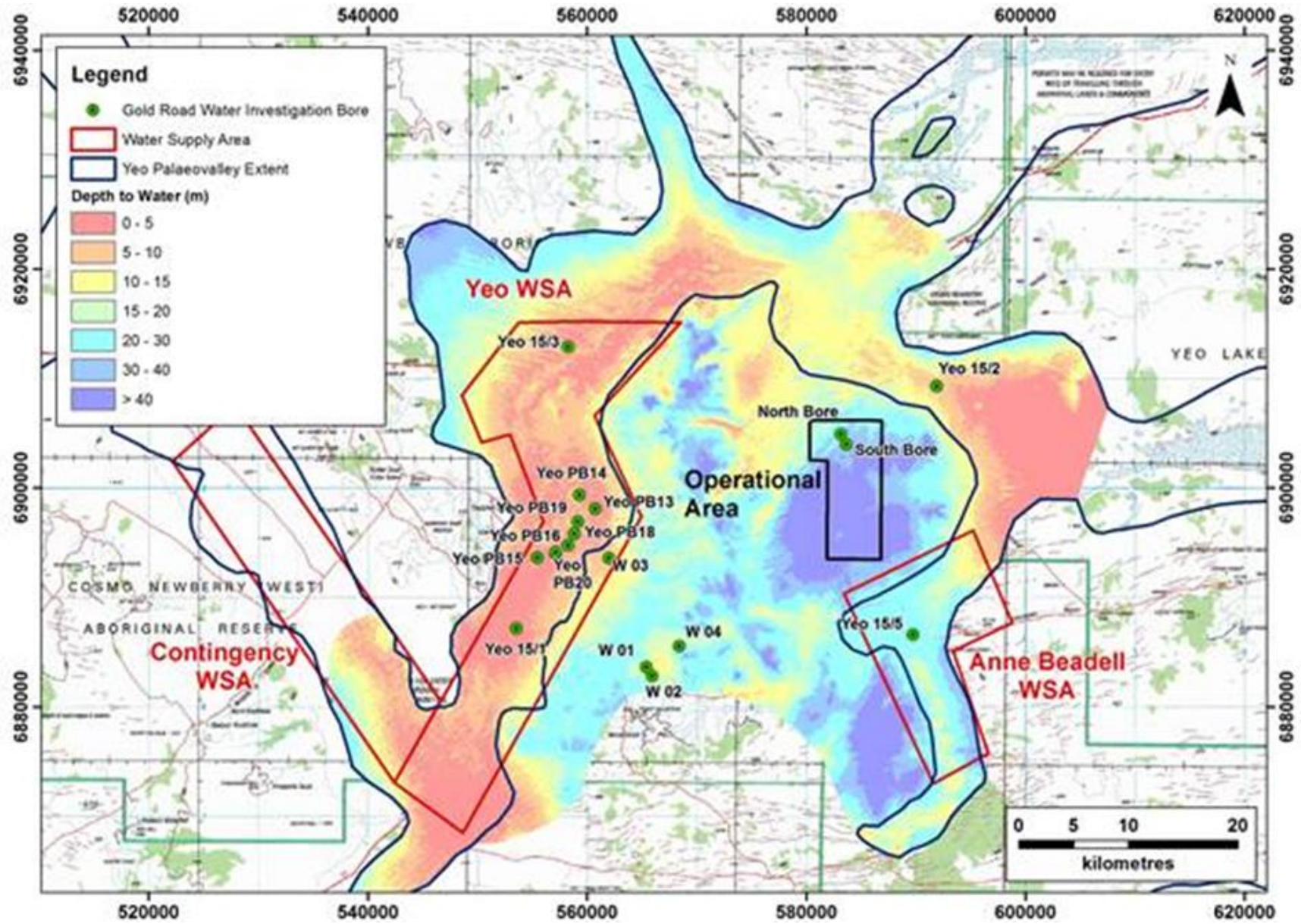


Figure 6: Map of Ground Water Depth within the Gruyere Borefields survey area (Pennington Scott, 2015)

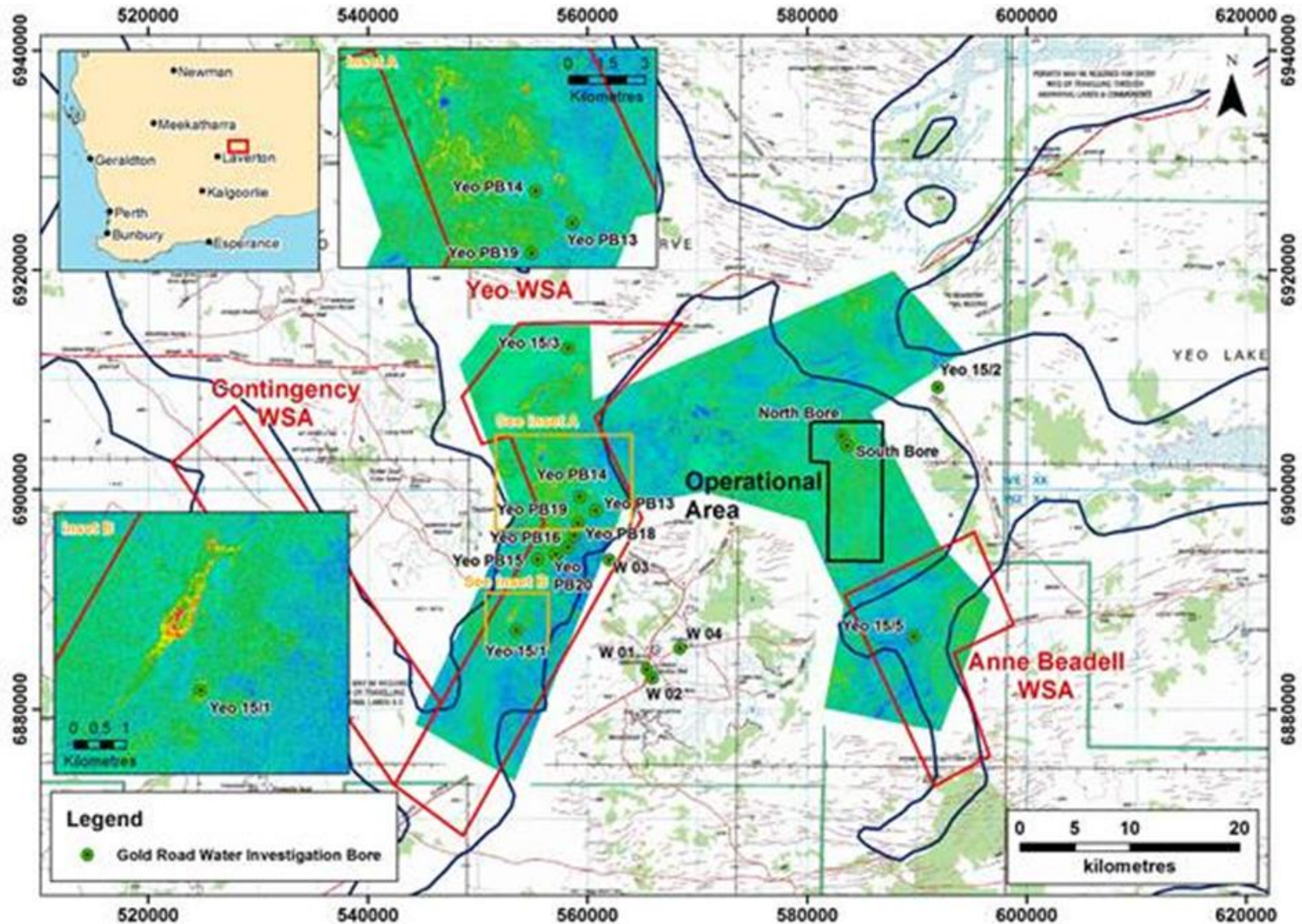


Figure 7: Map of the NDVI image within the Gruyere Borefields survey area (Pennington Scott, 2015)

## 2.5 Climate

The climate of the GVD is characterised as arid with summer and winter rain averaging 150 – 190mm per annum (Cowan, 2001; Barton & Cowan, 2001). Average weather conditions can be interpreted from weather data collected from the closest Bureau of Meteorology weather station; Laverton weather station (#12305), located approximately 160km south-west of the Gruyere Borefields survey area (BOM, 2015). Gold Road established a private weather station in October 2014 at the Yamarna Exploration camp, the weather station is provided by ‘Vista Data Vision’. Mean monthly rainfall results from BOM and Yamarna weather station are displayed in Figure 8 and Figure 9 respectively.

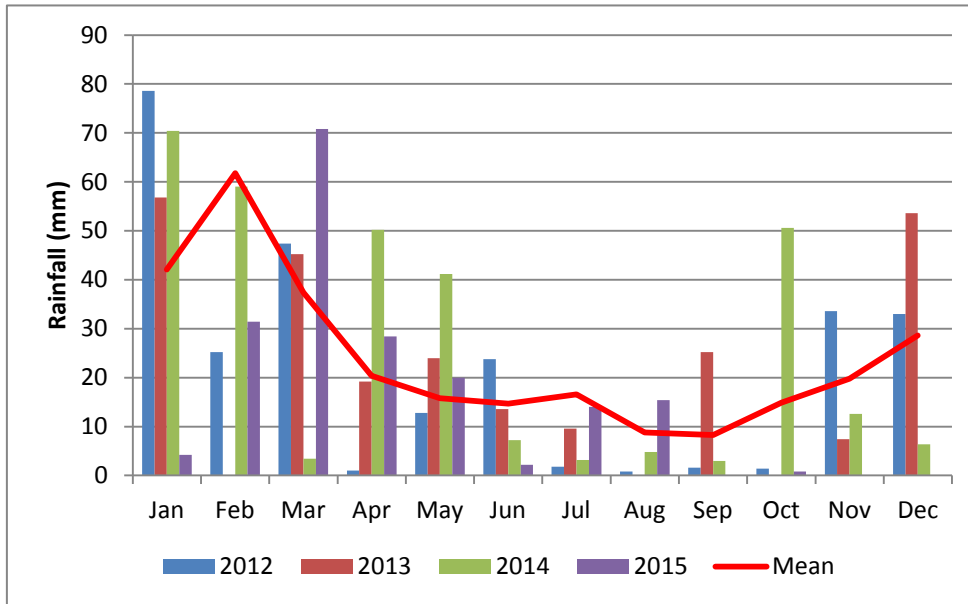


Figure 8: Monthly rainfall from January 2012 to October 2015 and mean monthly rainfall (January 1991 to October 2015) for the Laverton Aero weather station #12305 (BOM, 2015).

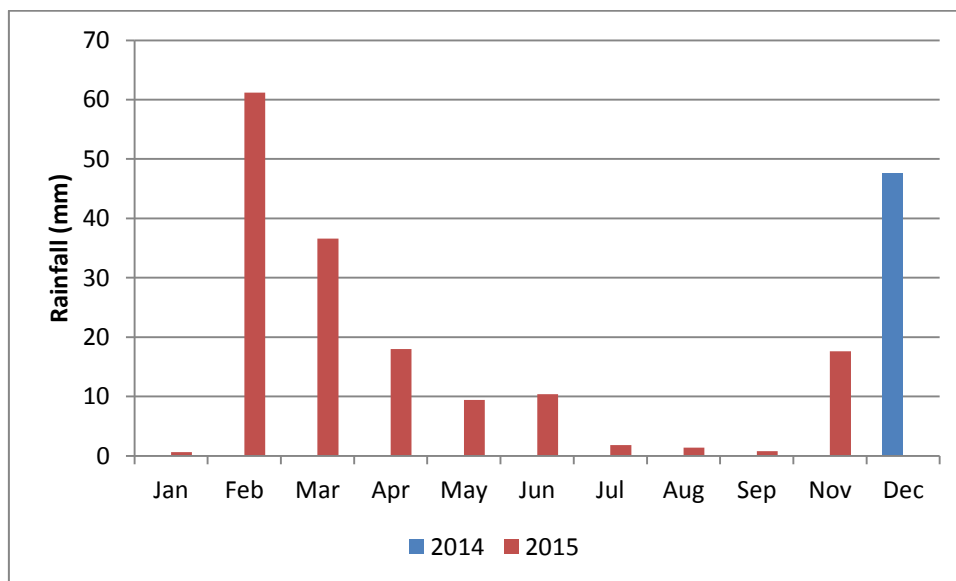


Figure 9: Monthly rainfall recorded at the Yamarna Weather Station (Privately owned by Gold Road) from December 2014 to November 2015.

## 2.6 Land Use

The dominant land uses of the Shield subregion include; Aboriginal reserves (12.3%), Conservation Reserves (7%), grazing-native pastures (24.8%), UCL and Crown Reserves (55.7%) and other-lake and major watercourse (0.1%). The Central subregion dominant land uses include; Aboriginal reserves (7.4%), Conservation Reserves (9.1%), grazing-native pastures (4.4%), UCL and Crown Reserves (78.9%) and other-lake and major watercourse (0.2%) (Cowan, 2001). The Gruyere Borefields survey area is located within the Yamarna pastoral lease.

## 2.7 Survey Objectives

The objectives of the survey undertaken were to:

- Compile broad scale vegetation community flora maps and species list of the survey area (Appendix 2,3, & 4);
- Document and map locations of any Threatened or Priority listed flora species located;
- Assess the regional and local conservation status of plant species and ecological communities within the survey area; and
- Identify and map occurrences of any “Declared and Environmental” weeds within the survey area.

### **3 Survey Methodology**

#### **3.1 Desktop Assessment**

Searches of the following databases were undertaken to aid in the compilation of a list of flora taxon within the survey area:

- DPaW's NatureMap Database (DPaW, 2015a);
- DPaW's Threatened and Priority Flora Database (DPaW, 2015b); and
- DotE Protected Matters search tool (DotE, 2015a).

The searches were conducted for an area encompassing a 40km radius of the centre coordinates – 123.731E, 28.058S. It should be noted that these lists are based on observations from a broader area than the survey area (120km radius) and therefore may include taxon not present. The databases also often included very old records that may be incorrect or in some cases the taxa in question have become locally or regionally extinct. Information from these sources should therefore be taken as indicative only and local knowledge and information also needs to be taken into consideration when determining what actual species may be present within the specific area being investigated.

Prior to the field survey, a combined search of the DPaW's Flora of Conservation Significance databases (DPaW, 2015b) was undertaken within a 40km radius of the survey, the results of which are provided in Appendix 4. These significant flora species were examined on the Western Australian Herbarium's (WAHERB) web page prior to the survey, to familiarise staff with their appearance. Locations of Threatened Flora and Priority Flora were overlaid on aerial photography of the area. Vegetation descriptions and available images of the Priority Flora were also obtained from Florabase.

Priority Flora and their respective vegetation types were targeted and all occurrences were traversed on foot specifically looking for the threatened flora associated with that vegetation description.

The conservation significance of flora taxon was assessed using data from the following sources:

- EPBC Act. Administered by the Australian Government DotE;
- WC Act. Administered by the WA DPaW (Govt. of WA 2015);
- Red List produced by the Species Survival Commission (SSC) of the World Conservation Union (also known as the IUCN Red List – the acronym derived from its former name of the International Union for Conservation of Nature and Natural Resources). The Red List has no legislative power in Australia but is used as a framework for State and Commonwealth categories and criteria; and
- DPaW Priority Flora list. A non-legislative list maintained by DPaW for management purposes (DPaW, 2015b).

Table 4 below represents the definitions of Flora of Conservation Significance ratings extracted from Florabase (WAHERB, 2015).

**Table 4: Definitions of Rare and Priority Flora Species (WAHERB, 2015)**

<b>T: Schedule 1 Threatened Flora under the <i>Wildlife Conservation Act 1950</i></b>
Taxa which have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such.
<b>X: Declared Rare flora – Presumed Extinct Taxa</b>
Taxa which have been adequately searched for and there is no reasonable doubt that the last individual has died, and have been gazetted as such.
<b>1: Priority One – Poorly known Species</b>
Species that are known from one or a few collections or sight records (generally less than five), all on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, Shire, Westrail and Main Roads WA road, gravel and soil reserves, and active mineral leases and under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes.
<b>2: Priority Two – Poorly Known Species</b>
Species that are known from one or a few collections or sight records, some of which are on lands not under imminent threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, vacant Crown land, water reserves, etc. Species may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes.
<b>3: Priority Three – Poorly known Species</b>
Species that are known from collections or sight records from several localities not under imminent threat, or from few but widespread localities with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and known threatening processes exist that could affect them.
<b>4: Priority Four – Rare, Near Threatened and other species in need of monitoring</b>
<ol style="list-style-type: none"> <li>1. Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These species are usually represented on conservation lands.</li> <li>2. Near Threatened. Species that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable.</li> <li>3. Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.</li> </ol>
<b>5: Priority 5 – Conservation Dependent Species</b>
Species that are not threatened but are subject to a specific conservation program, the cessation of which would result in the species becoming threatened within five years.

A search of the DPaW PEC and TEC database was also conducted within a 40km radius of the survey area (DPaW, 2015c).

### 3.2 Field Assessment

The survey was completed from the 15<sup>th</sup> to the 21<sup>th</sup> of November 2015 with the area traversed on foot, ATV and 4WD by two staff members (Figure 10).

Prior to the commencement of field work, aerial photography was inspected and obvious differences in the vegetation assemblages were identified. The different vegetation communities identified were then inspected during the field survey to assess their validity. A handheld GPS unit was used to record the co-ordinates of the boundaries between existing vegetation communities. At each sample point, the following information was recorded:

- GPS location;
- Photograph of vegetation;
- Dominant species;
- Collection and documentation of unknown plant specimens; and
- GPS location, photograph and collection of Threatened Flora if encountered.

Unknown specimens collected during the survey were identified with the aid of samples housed at the BC Herbarium and WAHERB. Presence/absence data of species from sample sites of similar vegetation was then compiled forming the best representative vegetation communities. Similar vegetation communities were recognised visually in the field. Vegetation communities were classified in accordance with the NVIS to a minimum Level 5 classification which includes recording Dominant growth form, height, cover and species for the three traditional strata (*i.e.* Upper, Middle and Ground).

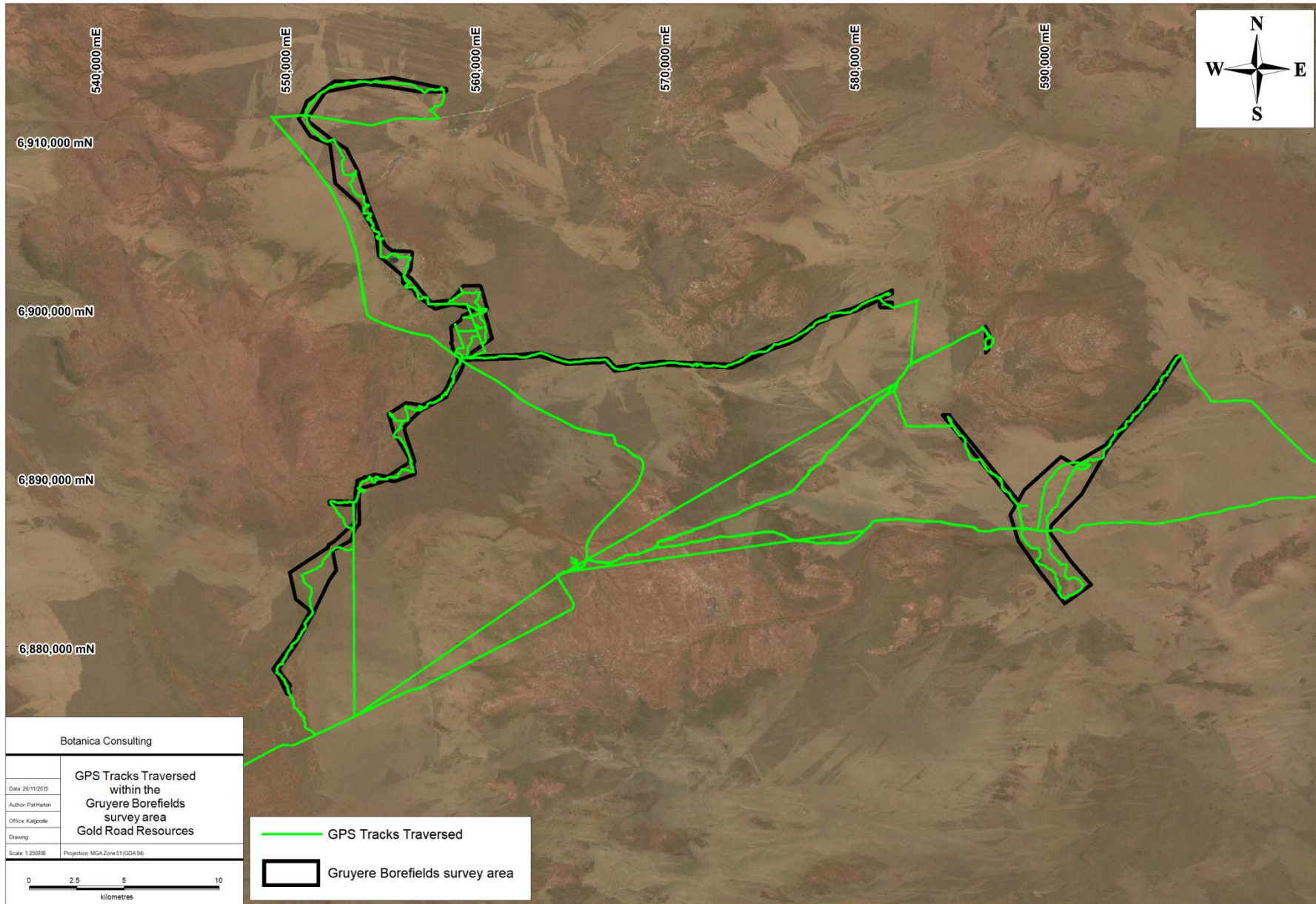


Figure 10: GPS tracks traversed throughout the Gruyere Borefields survey area



### 3.2.1 Personnel involved

Jim Williams - Environmental Consultant/Botanist (Diploma of Horticulture)  
 Andrea Williams - Environmental Consultant (BSc Hons Mineral Resources Management)  
 Emma Williams - Environmental Technician  
 Greg Harewood - Zoologist  
 Cosmo Newberry Traditional Land Owners

### 3.2.2 Scientific licences

**Table 5: Scientific Licences of Botanica Staff coordinating the survey**

Licensed staff	Permit Number	Valid Until
Jim Williams	SL011451	21-05-2016
Andrea Williams	SL011450	21-05-2016

### 3.3 Flora survey limitations and constraints

It is important to note that flora surveys will entail limitations notwithstanding careful planning and design. Potential limitations are listed in Table 6.

**Table 6: Limitations and constraints associated with the flora and vegetation survey.**

Variable	Potential Impact on Survey	Details
<b>Access problems</b>	Not a constraint	The survey was conducted via 4WD, all-terrain vehicle and on foot.
<b>Experience levels</b>	Not a constraint	The BC personnel that conducted the survey were regarded as suitably qualified and experienced. <b>Coordinating Botanist:</b> Jim Williams <b>Field Staff:</b> Jim Williams, Andrea Williams & Emma Williams <b>Data Interpretation:</b> Jim Williams, Lauren Pick & Pat Harton
<b>Timing of survey, weather &amp; season</b>	Not a constraint	Fieldwork was conducted in November within the EPA's recommended timing for flora surveys ( <i>i.e.</i> spring Sept-Nov) for detecting most ephemeral flora and when the majority of species are in flower. However spring occurred early in this region following above average rainfall in autumn (March – May) and as a result the most annual species were not present, however many species were in flower.
<b>Sources of information</b>	Not a constraint	BC was able to obtain information about the area from previous research conducted within the area which enabled adequate background information about the region.
<b>Mapping reliability</b>	Minor constraint	BC were not able to obtain high quality ortho aerial images of the area however aerial imagery obtained was sufficient to reliably determine changes in vegetation within the survey area.
<b>Area disturbance</b>	Minor constraint	Ranged from Good (vegetation significantly altered) to Very Good (some obvious signs of disturbance; fire, camel grazing, exploration tracks etc.), the majority of the survey area was classed as very good. Vegetation in various stages of fire regrowth (<6 months to 10+ years)
<b>Survey Intensity</b>	Not a constraint	Survey intensity was appropriate for the significance of the area with a Level 1 survey completed to identify vegetation communities and any Flora of Conservation Significance.
<b>Resources</b>	Not a constraint	Threatened flora database search provided by the DPaW was

Variable	Potential Impact on Survey	Details
		used to identify any potential locations of Threatened/Priority Flora species. DAFWA, DPaW and DotE databases were reviewed to obtain appropriate regional desktop information on the biophysical environment of the local region.
<b>Completeness</b>	Not a constraint	In the opinion of BC the survey area was covered sufficiently in order to identify vegetation assemblages. Due to the extensive experience and familiarity of the BC staff with flora within the region, it is estimated that approximately 90% of the flora within the survey area was able to be fully identified. The vegetation communities for this study were based on visual descriptions of locations in the field. The distribution of these vegetation communities outside the study area is not known, however vegetation communities identified were categorised via comparison to vegetation distributions throughout WA specified in the NVIS obtained from the Australian Government (DotE, 2015b).

## 4 Results

### 4.1 Desktop Assessment

#### 4.1.1 Flora of Conservation Significance

The results of the combined search of the DPaW's Flora of Conservation Significance databases (DPaW, 2014), recorded no Threatened Flora and no Priority Flora taxon to occur within the survey area. Four Priority Flora taxa were listed by DPaW within a 40km radius of the Gruyere survey area (Appendix 4). These taxa were assessed and ranked for their likelihood of occurrence within the survey area (Table 7). The rankings and criteria used were:

- Unlikely: Area is outside of the currently documented distribution for the species/no suitable habitat (type, quality and extent) was identified as being present during the field/desktop assessment.
- Possible: Area is within the known distribution of the species in question and habitat of at least marginal quality was identified as being present during the field/desktop assessment, supported in some cases by recent records being documented from within or near the area.
- Known to Occur: The species in question was positively identified as being present during the field survey.

**Table 7: Likelihood of occurrence for Flora of Conservation Significance within the Gruyere Borefields survey area**

Taxon	Conservation Code	Description (WAHERB, 2015)	Likelihood of Occurrence
<i>Calytrix warburtonensis</i> <sup>1</sup>	2	Shrub, 0.3-0.6 m high. Fl. white, Mar or Sep to Oct. Rocky hills, breakaways.	Possible
<i>Comesperma viscidulum</i>	4	Shrub, to ca 0.7 m high.	Likely
<i>Conospermum toddii</i>	4	Spreading shrub, 1.2-2 m high. Fl. white/white-yellow, Jul to Oct. Yellow sand. Sand dunes.	Known to Occur
<i>Grevillea secunda</i>	4	Low spreading shrub, 0.3-0.8 m high. Fl. red, Sep to Oct. Yellow or red sand. Sand dunes, sandplains.	Likely
<i>Sauropus</i> sp. Woolgorong (M. Officer s.n. 10/8/94)	3	Slender, much-branched shrub, to 0.3 m high.	Possible
<i>Thryptomene nealensis</i> <sup>2</sup>	3	Shrub, ca 0.3 m high. Fl. pink, Oct. Lateritic breakaways	Possible

#### 4.1.2 Previous Flora Surveys

Flora and vegetation surveys, assessments and reviews have been undertaken in nearby areas in the past, though not all are publically available and could not be referenced. The most significant of those available have been used as the primary reference material for compiling the potential flora and vegetation communities for the general area (Table 8).

<sup>1</sup> Two Priority Flora Taxa: *Calytrix warburtonensis* (P2) and *Thryptomene nealensis* (P3) were not identified on the DPaW database search however have been identified by BC, in previous surveys within a 40km radius of the survey area. Samples have been previously sent to WAHERB for inclusion in the DPaW database.

**Table 8: Previous Flora and Vegetation Surveys within the Gruyere Borefields survey area and surrounding area**

Author & Year	Vegetation/Landforms	Flora of Conservation Significance
DAFWA (1994)	<p>Perennial grasses were common throughout the survey area, divided into two major groups; Wanderrie bunch grasses and Spinifex hummock grasses. <i>Eragrostis eriopoda</i> (woolly butt) being the most widespread and abundant of the Wanderrie grasses with <i>Triodia basedowii</i> (hard spinifex) being the most abundant of the hummock grasses. <i>Triodia basedowii</i> often occurs as vast expanses in the east of the survey area. Tall shrubs are the most dominant stratum on most of the hardpan plains and adjacent uplands. The most widely distributed and common tall shrubs are from the genera <i>Acacia</i> and <i>Eremophila</i>. <i>Acacia</i> tall shrublands on hardpan plains are generally dominated by a single species; <i>Acacia aneura</i> (mulga). Other common Acacias which are occasionally dominant are; <i>A. craspedocarpa</i>, <i>A. linophylla</i>, <i>A. ramulosa</i> and <i>A. tetragonophylla</i>. On stony plains, <i>Eremophila macmillaniana</i>, <i>E. fraseri</i> and <i>E. platycalyx</i> are common or dominant tall shrubs.</p> <p>There are three common groups of mallee (multi-stemmed eucalypts). The first group is found in spinifex sandplains and is most widely represented by <i>Eucalyptus youngiana</i> and <i>E. kingsmillii</i>. The second group of mallee is found on sandy soils over calcareous pans in the south of the survey area. The most common species are <i>E. trichopoda</i> and <i>E. concinna</i>. The third group, which includes <i>E. salubris</i> var. <i>salubris</i>, is found low in the landscape on heavier textured soils in association with <i>Atriplex vesicaria</i>.</p> <p>The most common trees in the survey area are <i>Acacias</i>, <i>Eucalypts</i> and <i>Casuarina cristata</i>. <i>Acacia</i> woodland occurs in broad plains with deep sandy loams or loamy sands over hardpan, most extensively in the south of the survey area. Similar land surfaces further north are dominated more frequently by wanderrie grasses and the tall shrub form of <i>A. aneura</i>. In the north and east of the survey area, <i>Eucalyptus gongylocarpa</i> is common in extensive spinifex hummock grasslands on sandplains and on the sides of sand ridges.</p>	N/A
Hall, N.J., Newbey, K.R., McKenzie, N.L., Keighery, G.J., Rolfe, J.K & Youngson, W. K., (1993)	<p>The Sandstone-Sir Samuel and Laverton-Leonora Study Areas are adjacent, and have a similar climate, geomorphology and biota. Ten landform units are recognized in these Study Areas. The most extensive are Sandplains and Broad Valleys. Salt Lake Features, Calcareous Plains bordering salt lakes, and Undulating Plains are prominent in both Study Areas. Small areas of Dunefields, Breakaways and Granite Exposures are scattered throughout the Study Areas while Hills and Drainage Lines occur largely within Undulating Plains. The main vegetation groups are low woodlands of <i>Acacia aneura</i> (Mulga). Eucalyptus species with an understorey of hummock grasses (<i>Triodia</i>) are dominant on deep sands. Tall and low shrublands occur in limited areas, generally in association with salt lakes and dunes.</p> <p>The known vascular flora comprises 7 species of ferns and 777 taxa of flowering plants, including 303 taxa recorded from Wanjarri Nature Reserve. No species of Threatened Flora were recorded within the Study Areas.</p>	N/A

Author & Year	Vegetation/Landforms	Flora of Conservation Significance
TJV (2009)	<p>Sixteen major vegetation communities were identified within the 131,367ha operational area;</p> <ol style="list-style-type: none"> <li>1. Mixed Eucalypt woodland over mixed open shrubs and <i>Triodia basedowii</i>;</li> <li>2. Isolated <i>Acacia</i> spp. over open low shrubs and moderately dense tussock grasslands;</li> <li>3. Minor clay pan: Scattered <i>Acacia nyssophylla</i>/<i>Grevillea sarissa</i> over open herbs and grasses;</li> <li>4. Dunes: Scattered <i>Eucalyptus gongylocarpa</i> over mixed shrubs and <i>Triodia desertorum</i> or <i>T. basedowii</i>;</li> <li>5. <i>Acacia aneura</i> woodland over grasses ± <i>Triodia basedowii</i>;</li> <li>6. Open to moderately dense <i>A. aneura</i> over <i>Aluta maisonneuvei</i> subsp. <i>articulata</i>/<i>Acacia ramulosa</i> var. <i>ramulosa</i> over <i>Eremophila forrestii</i> subsp. <i>forrestii</i> over <i>Triodia basedowii</i>;</li> <li>7. <i>E. gongylocarpa</i>/<i>E. youngiana</i>/<i>E. concinna</i> over open mixed shrubland over <i>Triodia desertorum</i>;</li> <li>8. Open to moderately dense <i>Casuarina pauper</i> woodland over open mixed shrubs and scattered soft grasses and/or <i>Triodia scariosa</i>;</li> <li>9. Narrow drainage channel: Sparse <i>Acacia aneura</i> over sparse to open shrubs and moderately dense tussock grasses;</li> <li>10. Rock breakaways and associated slopes: Open <i>Acacia quadrimarginea</i>/<i>Dodonaea rigida</i> over sparse mixed shrubs over mixed soft grasses;</li> <li>11. <i>E. gongylocarpa</i> over open shrubland over open <i>Dodonaea viscosa</i> subsp. <i>angustissima</i>/<i>Eremophila platythamnus</i> subsp. <i>platythamnus</i> shrubland over <i>Triodia desertorum</i> or <i>T. basedowii</i>;</li> <li>12. White to grey brown clay pans: Dwarf halophytic shrublands of variable composition over sparse to dense herbs and grasses;</li> <li>13. Pale orange to orange clay pans: Low open to sparse scrub dominated by <i>Frankenia cinerea</i>/<i>Atriplex vesicaria</i> over sparse cover of <i>Eragrostis pergracilis</i>/<i>Aristida contorta</i>;</li> <li>14. Shallow depressions and areas fringing some clay pans: Moderately dense <i>Melaleuca interioris</i> shrubland over sparse chenopods and soft grasses;</li> <li>15. Plains and gentle hill slopes at margins of saline complex: Sparse to open <i>Casuarina pauper</i> ± mallee Eucalypts over <i>Dodonaea viscosa</i> subsp. <i>angustissima</i>/<i>Senna artemisioides</i> subsp. <i>petiolaris</i> over Chenopod species and soft grasses; and</li> <li>16. Open mallee <i>E. concinna</i> over sparse to open low shrubs over open <i>Triodia scariosa</i>.</li> </ol>	<p>Priority Flora taxa as listed by the DPaw were identified within the area:</p> <ol style="list-style-type: none"> <li>1. <i>Baeckea</i> sp. Great Victoria Desert (A.S. Weston 14813) (No longer Priority listed);</li> <li>2. <i>Baeckea</i> sp. Sandstone (C.A. Gardner s.n. 26 Oct. 1963) P3;</li> <li>3. <i>Dampiera eriantha</i> P1;</li> <li>4. <i>Dicrastylis nicholasii</i> P4;</li> <li>5. <i>Malleostemon</i> sp. Officer Basin (D. Pearson 350) P2;</li> <li>6. <i>Olearia arida</i> P4;</li> <li>7. <i>Grevillea secunda</i> P4;</li> <li>8. <i>Acacia eremophila</i> numerous-nerved variant (A.S. George 11924) P3;</li> <li>9. <i>Acacia eremophila</i> var. <i>variabilis</i> P3;</li> <li>10. <i>Dicrastylis cundeeleensis</i> P4;</li> <li>11. <i>Microcorys macredieana</i> (No longer Priority listed);</li> <li>12. <i>Micromyrtus stenocalyx</i> (No longer Priority listed);</li> <li>13. <i>Daviesia purpurascens</i> (No longer Priority listed); and</li> <li>14. <i>Lepidobolus deserti</i> (No longer Priority listed).</li> </ol>
BC (2011)	<p>Five vegetation communities were identified within the survey area;</p> <ol style="list-style-type: none"> <li>1. Mallee/Mulga woodland over Spinifex;</li> <li>2. <i>Eucalyptus youngiana</i> Mallee shrubland over Spinifex;</li> <li>3. Melaleuca shrubland over Spinifex;</li> <li>4. <i>Eucalyptus gypsophila</i> woodland; and</li> <li>5. <i>Eucalyptus gongylocarpa</i> over mixed Mallee and Spinifex.</li> </ol> <p>There were also three sub-communities identified within the survey area;</p> <ol style="list-style-type: none"> <li>1. Burnt Spinifex grassland;</li> <li>2. Spinifex grassland; and</li> <li>3. Burnt Mallee/Mulga woodland over Spinifex.</li> </ol>	N/A

Author & Year	Vegetation/Landforms	Flora of Conservation Significance
BC (2012)	<p>Sixteen vegetation communities were identified within the survey area:</p> <ol style="list-style-type: none"> <li>1. Low forest of Mulga (<i>Acacia aneura</i>) over dense low grass of <i>Eragrostis eriopoda</i>/<i>Eragrostis kennedyae</i>;</li> <li>2. Low forest of Mulga over mixed dwarf scrub;</li> <li>3. Heath of <i>Senna artemisioides</i> subsp. <i>helmsii</i> over low grass of <i>Aristida contorta</i>/<i>Eragrostis kennedyae</i>;</li> <li>4. Low woodland of Mulga over mixed dwarf scrub on breakaway;</li> <li>5. Low woodland of Mulga over low scrub of <i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i> and dense low grass of <i>Eragrostis eriopoda</i>/<i>Eragrostis kennedyae</i> in creekline/drainage area;</li> <li>6. Low Mulga woodland over low scrub of <i>Eremophila latrobei</i> subsp. <i>filiformis</i>/<i>Eremophila abietina</i> subsp. <i>ciliata</i> and mixed dwarf scrub on rocky substrate;</li> <li>7. Low woodland of <i>Casuarina pauper</i> over dwarf scrub of <i>Ptilotus obovatus</i>/<i>Solanum lasiophyllum</i>;</li> <li>8. Open low woodland of Mulga over dwarf scrub of mixed Chenopods;</li> <li>9. Open shrub mallee and thicket of Mulga over mid dense hummock grass of <i>Triodia basedowii</i>;</li> <li>10. Heath of <i>Acacia burkittii</i> over mixed dwarf scrub and mid dense hummock grass of <i>Triodia basedowii</i>;</li> <li>11. Low woodland of <i>Eucalyptus gongylocarpa</i> over mixed open shrub mallee and mid dense hummock grass of <i>Triodia basedowii</i>;</li> <li>12. Open shrub mallee of <i>E. youngiana</i> over dense hummock grass of <i>Triodia basedowii</i>;</li> <li>13. Open shrub mallee of <i>E. youngiana</i> over dwarf scrub of <i>Aluta maisonneuvei</i> and dense hummock grass of <i>Triodia basedowii</i> on sand dune;</li> <li>14. Low open woodland of Mulga over dwarf scrub of <i>Ptilotus obovatus</i>/<i>Solanum lasiophyllum</i>;</li> <li>15. Low woodland of <i>E. gypsophila</i> over dwarf scrub of <i>Senna artemisioides</i> subsp. <i>helmsii</i>, <i>Eremophila scoparia</i> and <i>Ptilotus obovatus</i> on breakaway; and</li> <li>16. Low woodland of Mulga over mid dense hummock grass of <i>Triodia basedowii</i>.</li> </ol> <p>There were also five sub-communities identified within the survey area:</p> <ol style="list-style-type: none"> <li>1. Dwarf scrub of <i>Senna artemisioides</i> subsp. <i>helmsii</i> and <i>Maireana pyramidata</i>;</li> <li>2. Dense thicket of Mulga;</li> <li>3. Low forest of Mulga over dwarf scrub of <i>Eremophila gilesii</i> subsp. <i>variabilis</i>;</li> <li>4. Low forest of <i>Casuarina pauper</i> over mixed dwarf scrub; and</li> <li>5. Mixed open shrub mallee over mid dense hummock grass of <i>Triodia basedowii</i>.</li> </ol>	<p>No Threatened taxa were identified during the spring and autumn surveys; however two Priority taxa species, <i>Calytrix warburtonensis</i> (P2) and <i>Thryptomene nealensis</i> (P3) were recorded within the survey area.</p>
BC (2014a)	<p>Thirty-four broad vegetation communities were identified within the survey area. These communities were represented by a total 37 Families, 82 Genera and 170 Taxa, (including sub-species and variants).</p>	<p>Two Priority Flora taxa, as listed by the DPaW were identified within the survey area; <i>Calytrix warburtonensis</i> (P2) and <i>Thryptomene nealensis</i> (P3).</p>

Author & Year	Vegetation/Landforms	Flora of Conservation Significance
BC (2014b)	<p>One hundred and four vegetation communities were identified within the Sunrise Dam to Tropicana survey area, These communities comprised of six landform types. These vegetation communities were represented by a total of 43 Families, 114 Genera and 281 Taxa.</p> <ol style="list-style-type: none"> <li>1. Breakaway: Casuarina Forests and Woodlands, Mallee Woodlands and Shrublands</li> <li>2. Clay-Loam Plains: Acacia Forests and Woodlands, Acacia Shrublands, Mallee Open Woodlands and Shrublands, Acacia Open Woodlands, Casuarina Forests and Woodlands, Chenopod shrublands, samphire shrublands and forblands, Eucalypt Woodlands, Mallee Woodlands and Shrublands,.</li> <li>3. Closed Depression: Acacia Forests and Woodlands, Acacia Shrublands, Other Shrublands</li> <li>4. Dunes: Eucalypt Woodlands, Mallee Woodlands and Shrublands, Other Shrublands</li> <li>5. Interdune Swales and Sandplain: Acacia Forests and Woodlands, Eucalypt Woodlands, Mallee Woodlands and Shrublands, Eucalypt Open Woodlands, Heathlands, Regrowth, modified native vegetation,</li> <li>6. Rocky Hillslopes: Acacia Forests and Woodlands, Casuarina Forests and Woodlands</li> </ol>	<p>Seven Priority Flora taxa, as listed by the DPaW were identified within the survey area:</p> <ol style="list-style-type: none"> <li>1. <i>Acacia eremophila</i> numerous-nerved variant (A.S. George 11924) (P3);</li> <li>2. <i>Caesia talingka</i> (P2);</li> <li>3. <i>Dicrastylis cundeeleensis</i> (P4);</li> <li>4. <i>Grevillea secunda</i> (P4);</li> <li>5. <i>Labichea eremaea</i> (P3);</li> <li>6. <i>Melaleuca apostiba</i> (P3); and</li> <li>7. <i>Olearia arida</i> (P4).</li> </ol>
BC (2014c)	<p>Twenty vegetation communities were identified within the survey area. These communities comprised of five landform types and five NVIS broad vegetation groups These vegetation communities were represented by a total of 35 Families, 91 Genera and 168 Taxa (including sub-species and variants).</p> <ol style="list-style-type: none"> <li>1. Clay-Loam Plains: Acacia Forest and Woodlands, Casuarina Forests and Woodlands, Mallee Woodlands and Shrublands</li> <li>2. Dunes: Eucalypt Woodlands</li> <li>3. Interdune Swales and Sandplain: Eucalypt Woodland, Mallee Woodland and Shrubland</li> <li>4. Rocky Hillslope: Acacia Forest and Woodlands</li> </ol> <p>Closed Depression: Mallee Woodlands and Shrublands</p>	<p>Two Priority Flora taxa, as listed by the DPaW and one plant of conservation significance were identified within the survey area:</p> <ol style="list-style-type: none"> <li>1. <i>Conospermum toddii</i> (P4);</li> <li>2. <i>Olearia arida</i> (P4); and</li> <li>3. <i>Lawrencia</i> aff. <i>cinerea</i> (Species of conservation significance)</li> </ol>
BC (2015a)	<p>Thirty-two vegetation communities were identified within the survey area. These communities comprised of seven different landform types and seven NVIS broad vegetation groups. These communities were represented by a total 44 Families, 104 Genera and 240 Taxa, (including sub-species and variants).</p> <ol style="list-style-type: none"> <li>1. Breakaways: Acacia Shrublands</li> <li>2. Clay-Loam Plains: Acacia Forests and Woodlands, Acacia Shrublands, Mallee Open Woodlands and Shrublands</li> <li>3. Drainage Depression: Acacia Open Woodlands and Acacia Forests and Woodlands</li> <li>4. Quartz/Rocky Plain: Acacia Forests and Woodlands, Acacia Open Woodlands</li> <li>5. Rocky Hillslope: Acacia Forest and Woodland</li> <li>6. Sand Dune: Eucalyptus Woodlands/ Mallee Woodlands and Shrubs</li> <li>7. Sandplain: Acacia Forests and Woodlands, Eucalypt Woodland, Mallee Woodlands and Shrublands</li> </ol>	N/A

Author & Year	Vegetation/Landforms	Flora of Conservation Significance
BC (2015b)	<p>The Gas Pipeline survey area comprised of eighty-five broad vegetation communities. These communities comprised of seven different landform types and nine NVIS major vegetation groups.</p> <ol style="list-style-type: none"> <li>1. Breakaways: Casuarina forests and woodlands, Acacia forests and woodlands</li> <li>2. Clay-Loam Plains: Acacia forests and woodlands, Acacia open woodlands, Mallee woodlands and shrublands</li> <li>3. Drainage Depressions: Acacia forests and woodlands, Acacia open woodlands, Mallee woodlands and shrublands</li> <li>4. Closed Depressions: Chenopods shrublands, Mallee woodlands and shrublands</li> <li>5. Quarts/Rocky Plains: Acacia forests and woodlands, Acacia open woodlands, Casuarina forests and woodlands, Eucalypt woodlands</li> <li>6. Rocky Hillslopes: Acacia forests and woodlands</li> <li>7. Sandplains: Acacia forests and woodlands, Acacia open woodlands, Eucalypt woodlands, Mallee woodlands and shrublands, Heathlands, Regrowth, modified native vegetation</li> <li>8. Sand Dune: Eucalypt woodland, Mallee woodlands and shrublands, Regrowth modified native vegetation</li> </ol>	<p>Two Priority Flora taxa, as listed by the DPaW and were identified within the survey area:</p> <ol style="list-style-type: none"> <li>1. <i>Conospermum toddii</i> (P4);</li> <li>2. <i>Olearia arida</i> (P4);</li> </ol>



## **4.2 Field Assessment**

### **4.2.1 Flora of Conservation Significance**

Flora of conservation significance identified in the desktop assessment as potentially occurring within the survey area were targeted during the field assessment. No Threatened Flora taxa pursuant to subsection (2) of section 23F of the WC Act and the EPBC Act were identified within the survey area. No Priority Flora taxa have been identified within the Gruyere Borefields survey area.

### 4.3 Vegetation Communities

A total of forty-three vegetation communities were identified within the Gruyere Borefields survey area. These communities comprised of seven different landform types and nine NVIS major vegetation groups as listed in Table 9 below. A summary of vegetation communities (including area) of vegetation communities is provided in Table 9 below.

**Table 9: Vegetation Communities identified within the Gruyere Borefields survey area**

Landform	NVIS Vegetation Group	Code	Vegetation Community	Area (ha)	Area (%)
Clay-Loam Plain	Acacia Forests and Woodlands	CLP-AFW1	Low woodland of <i>Acacia caesaneura</i> / <i>A. aptaneura</i> / <i>A. incurvaneura</i> over heath of <i>Senna artemisioides</i> subsp. <i>x artemisioides</i> / <i>Senna artemisioides</i> subsp. <i>helmsii</i> and low heath of <i>Ptilotus obovatus</i> on clay-loam plain	12	0.2
	Acacia Shrublands	CLP-AS1	Scrub of <i>Acacia burkittii</i> over low scrub of <i>Senna artemisioides</i> subsp. <i>filifolia</i> and dwarf scrub of <i>Ptilotus obovatus</i> / low grass of <i>Aristida contorta</i> on clay-loam plain	150	2.5
	Mallee Open Woodlands and Sparse Mallee Shrublands	CLP-MOW/SMS1	Very open tree mallee of <i>Eucalyptus lucasii</i> / low woodland of <i>Acacia caesaneura</i> / <i>A. incurvaneura</i> over heath of <i>Eremophila latrobei</i> subsp. <i>glabra</i> and very open low grass of <i>Eragrostis eriopoda</i> on clay-loam plain	10	0.2
Closed Depression	Acacia Forests and Woodlands	CD-AFW1	Open low woodland of <i>Acacia caesaneura</i> over open dwarf scrub of <i>Eremophila maculata</i> subsp. <i>brevifolia</i> and low heath of <i>Frankenia interioris</i> var. <i>parviflora</i> in playa	7	0.1
		CD-AFW2	Low woodland of <i>Acacia aptaneura</i> / <i>A. incurvaneura</i> over scrub of <i>A. tetragonophylla</i> / <i>Melaleuca interioris</i> and open low grass of <i>Eragrostis falcata</i> in playa	39	0.7
	Casuarina Forests and Woodlands/ Mallee Woodlands and Shrublands	CD-CFS/MWS1	Open tree mallee of <i>Eucalyptus gypsophila</i> / low woodland of <i>Casuarina pauper</i> over low scrub of <i>Melaleuca interioris</i> and open hummock grass of <i>Triodia basedowii</i> on playa edge	137	2.3
	Chenopod Shrublands, Samphire Shrublands and Forblands	CD-CSSSF1	Low heath of <i>Tecticornia undulata</i> / <i>T. halocnemoides</i> on playa	76	1.3
	Mallee Woodlands and Shrublands	CD-MWS1	Very open tree mallee of <i>Eucalyptus gypsophila</i> over open low scrub of <i>Eremophila scoparia</i> and dwarf scrub of <i>Atriplex bunburyana</i> on playa edge	7	0.1
Drainage Depression	Acacia Forests and Woodlands	DD-AFW1	Low woodland of <i>Acacia aptaneura</i> / <i>A. caesaneura</i> over open low scrub of <i>Eremophila latrobei</i> subsp. <i>latrobei</i> and dwarf scrub of <i>Eremophila gilesii</i> / <i>Eremophila malacoides</i> with occasional <i>Eragrostis eriopoda</i> in drainage depression	8	0.1
	Acacia Open Woodlands	DD-AOW1	Open low woodland of <i>Acacia incurvaneura</i> over dwarf scrub of <i>Maireana pyramidata</i> and low heath of <i>Frankenia georgei</i> / <i>Sclerolaena densiflora</i> in drainage depression	14	0.2
		DD-AOW2	Open low woodland of <i>Acacia caesaneura</i> / <i>A. macraneura</i> / <i>A. ayersiana</i> over low scrub of <i>A. ramulosa</i> var. <i>ramulosa</i> / <i>Eremophila forrestii</i> subsp. <i>forrestii</i> / <i>Eremophila margarethae</i> / <i>Maireana triptera</i> and open low grass of <i>Eragrostis laniflora</i> in drainage depression	16	0.3
	Mallee Woodlands and Shrublands	DD-MWS1	Open tree mallee of <i>Eucalyptus concinna</i> over low scrub of <i>Melaleuca interioris</i> and low grass of <i>Eragrostis pergracilis</i> in drainage depression	125	2.1
Quartz/Rocky Plain	Acacia Forests and Woodlands	QRP-AFW1	Low woodland of <i>Acacia aptaneura</i> / <i>A. caesaneura</i> / <i>A. incurvaneura</i> over heath of <i>Senna artemisioides</i> subsp. <i>x artemisioides</i> / <i>Senna artemisioides</i> subsp. <i>helmsii</i> and low heath of <i>Ptilotus obovatus</i> / <i>Maireana triptera</i> on quartz/rocky plain	11	0.2
		QRP-AFW2	Low woodland of <i>Acacia incurvaneura</i> over heath of <i>Eremophila latrobei</i> subsp. <i>latrobei</i> and low heath of <i>Eremophila exilifolia</i> on quartz/rocky plain	21	0.4
		QRP-AFW3	Forest of <i>Acacia caesaneura</i> / <i>A. incurvaneura</i> over low scrub of <i>Eremophila latrobei</i> subsp. <i>glabra</i> / <i>Prostanthera campbellii</i> and very open low grass of <i>Eragrostis eriopoda</i> / open hummock grass of <i>Triodia irritans</i> quartz/rocky plain	29	0.5

Landform	NVIS Vegetation Group	Code	Vegetation Community	Area (ha)	Area (%)
		QRP-AFW4	Open low woodland of <i>Acacia caesaneura</i> over low scrub of <i>A. grasbyi</i> / <i>Senna artemisioides</i> subsp. <i>filifolia</i> and low heath of <i>Scaevola spinescens</i> on quartz/rocky plain	5	0.1
	Casuarina Forests and Woodlands	QRP-CFW1	Low woodland of <i>Casuarina pauper</i> over low scrub of <i>Acacia burkittii</i> and dwarf scrub of <i>Ptilotus obovatus</i> on quartz/rocky plain	138	2.3
	Mallee Woodlands and Shrublands	QRP-MWS1	Open tree mallee of <i>Eucalyptus gypsophila</i> over low scrub of <i>Acacia burkittii</i> and open hummock grass of <i>Triodia irritans</i> on quartz/rocky plain	80	1.3
		QRP-MWS2	Low woodland of <i>Eucalyptus lucasii</i> over heath of <i>Acacia colletioides</i> / <i>Eremophila scoparia</i> and open low grass of <i>Eragrostis pergracilis</i> / hummock grass of <i>Triodia irritans</i> on quartz/ rocky plain	51	0.9
Sand Dune	Eucalypt Woodlands/Mallee Woodlands and Shrublands	SD-EW/MWS1	Open low woodland of <i>Eucalyptus gongylocarpa</i> over open shrub mallee of <i>Eucalyptus youngiana</i> and mid-dense hummock grass of <i>Triodia basedowii</i> on sand dune	219	3.7
	Mallee Woodlands and Shrublands	SD-MWS1	Very open tree mallee of <i>Eucalyptus youngiana</i> over scrub of <i>Grevillea juncifolia</i> subsp. <i>juncifolia</i> and dwarf scrub of <i>Aluta maisonneuvei</i> subsp. <i>auriculata</i> / hummock grass of <i>Triodia basedowii</i> on sand dune	33	0.6
Sand-Loam Plain	Acacia Forests and Woodlands	SLP-AFW1	Low woodland of <i>Acacia caesaneura</i> over low scrub of <i>Senna artemisioides</i> subsp. <i>filifolia</i> and hummock grass of <i>Triodia basedowii</i> on sandy-loam plain	144	2.4
		SLP-AFW2	Forest of <i>Acacia caesaneura</i> over heath of <i>Cratystylis subspinescens</i> and mid-dense hummock grass of <i>Triodia basedowii</i> on sand-loam plain	30	0.5
	Regrowth, modified native vegetation	SLP-RMNV1	Regrowth open tree mallee of <i>Eucalyptus ?concinna</i> / <i>E. ?mannensis</i> over heath of <i>Melaleuca interioris</i> and mid-dense hummock grass of <i>Triodia basedowii</i> on sand-loam plain	82	1.4
Sandplain	Acacia Forests and Woodlands	S-AFW1	Low forest of <i>Acacia caesaneura</i> / <i>A. incurvaneura</i> over dense hummock grass of <i>Triodia basedowii</i> in sandplain	480	8.0
		S-AFW2	Low forest of <i>Acacia caesaneura</i> / <i>A. incurvaneura</i> over low scrub of mixed shrubs and dwarf scrub of <i>Eremophila gilesii</i> / open hummock grass of <i>Triodia irritans</i> in sandplain	285	4.8
		S-AFW3	Low woodland of <i>Acacia incurvaneura</i> / <i>Hakea lorea</i> over heath of <i>Melaleuca interioris</i> and mid-dense hummock grass of <i>Triodia basedowii</i> in sandplain	376	6.3
		S-AFW4	Low woodland of <i>Acacia caesaneura</i> / <i>A. incurvaneura</i> over dwarf scrub of <i>Eremophila forrestii</i> subsp. <i>forrestii</i> and mid-dense hummock grass of <i>Triodia irritans</i> in sandplain	43	0.7
		S-AFW5	Scrub of <i>Acacia grasbyi</i> over heath of <i>A. desertorum</i> and mid-dense hummock grass of <i>Triodia irritans</i> in sandplain	14	0.2
	Eucalypt Woodlands	S-EW1	Low woodland of <i>Eucalyptus gongylocarpa</i> over heath of <i>Acacia ligulata</i> and dense hummock grass of <i>Triodia basedowii</i> in sandplain	292	4.9
	Eucalypt Woodlands/Mallee Woodlands and Shrublands	S-EW/MWS1	Low woodland of <i>Eucalyptus gongylocarpa</i> over shrub mallee of <i>Eucalyptus youngiana</i> and mid-dense hummock grass of <i>Triodia basedowii</i> in sandplain	718	12.0
		S-EW/MWS2	Low woodland of <i>Eucalyptus gongylocarpa</i> over open tree mallee of <i>Eucalyptus youngiana</i> and low heath of <i>Aluta maisonneuvei</i> subsp. <i>auriculata</i> / mid-dense hummock grass of <i>Triodia basedowii</i> in sandplain	29	0.5
	Mallee Woodlands and Shrublands	S-MWS1	Open tree mallee of <i>Eucalyptus youngiana</i> over dense hummock grass of <i>Triodia basedowii</i> in sandplain	1445	24.2
		S-MWS2	Open tree mallee of <i>Eucalyptus youngiana</i> over heath of <i>Acacia caesaneura</i> and mid-dense hummock grass of <i>Triodia basedowii</i> in sandplain	5	0.1
		S-MWS3	Open tree mallee of <i>Eucalyptus youngiana</i> over heath of <i>Acacia desertorum</i> / <i>A. grasbyi</i> and low heath of <i>Aluta maisonneuvei</i> subsp. <i>auriculata</i> / mid-dense hummock grass of <i>Triodia irritans</i> in sandplain	56	0.9

Landform	NVIS Vegetation Group	Code	Vegetation Community	Area (ha)	Area (%)
		S-MWS4	Open tree mallee of <i>Eucalyptus concinna</i> over low scrub of <i>Eremophila latrobei</i> subsp. <i>glabra</i> and mid-dense hummock grass of <i>Triodia irritans</i> in sandplain	39	0.7
		S-MWS5	Open tree mallee of <i>Eucalyptus concinna</i> / <i>E. mannensis</i> over heath of mixed shrubs and hummock grass of <i>Triodia basedowii</i> in sandplain	297	5.0
		S-MWS6	Open tree mallee of <i>Eucalyptus concinna</i> over heath of mixed shrubs and mid-dense hummock grass of <i>Triodia basedowii</i> in sandplain	98	1.6
		S-MWS7	Very open tree mallee of <i>Eucalyptus youngiana</i> over low heath of <i>Aluta maisonneuvei</i> subsp. <i>auriculata</i> and hummock grass of <i>Triodia basedowii</i> in sandplain	8	0.1
		S-MWS8	Very open tree mallee of <i>Eucalyptus leptopoda</i> subsp. <i>elevata</i> / <i>E. youngiana</i> / open scrub of <i>Grevillea pterosperma</i> over heath of <i>Aluta maisonneuvei</i> subsp. <i>auriculata</i> and mid-dense hummock grass of <i>Triodia basedowii</i> in sandplain	28	0.5
	Regrowth, modified native vegetation	S-RMNV3	Regrowth open tree mallee of <i>Eucalyptus youngiana</i> over heath of <i>Acacia desertorum</i> / <i>Grevillea didymobotrya</i> subsp. <i>didymobotrya</i> and mid-dense hummock grass of <i>Triodia basedowii</i> in sandplain	79	1.3
		S-RMNV1	Regrowth open tree mallee of <i>Eucalyptus leptopoda</i> subsp. <i>elevata</i> over heath of <i>Aluta maisonneuvei</i> subsp. <i>auriculata</i> and low heath of <i>Leptosema chambersii</i> / mid-dense hummock grass of <i>Triodia basedowii</i> in sandplain	100	1.7
		S-RMNV2	Regrowth open tree mallee of <i>Eucalyptus trivalva</i> over very open shrub mallee of <i>E. youngiana</i> and low heath of <i>Alyogyne pinoniana</i> / <i>Sida calyxhymenia</i> in sandplain	147	2.5
<b>Total</b>				<b>5983</b>	<b>100</b>

**Clay-Loam Plain: Acacia Forests and Woodlands**

**4.3.1 Low woodland of *Acacia caesaneura*/ *A. aptaneura*/ *A. incurvaneura* over heath of *Senna artemisioides* subsp. *x artemisioides*/ *Senna artemisioides* subsp. *helmsii* and low heath of *Ptilotus obovatus* on clay-loam plain (CLP-AFW1)**

The total flora recorded within this vegetation community was represented by a total of 18 Families, 28 Genera and 49 Taxa (Plate 1). No Threatened or Priority Flora taxa were identified within this vegetation community. No introduced taxa were recorded within this vegetation community. Dominant taxa from the vegetation assemblage are shown in Table 10. According to the NVIS, this vegetation community is best represented by the MVG6-Acacia Forests and Woodlands (DotE, 2015b).

**Table 10: Vegetation assemblage for Low woodland of *Acacia caesaneura*/ *A. aptaneura*/ *A. incurvaneura* over heath of *Senna artemisioides* subsp. *x artemisioides*/ *Senna artemisioides* subsp. *helmsii* and low heath of *Ptilotus obovatus* on clay-loam plain**

Life Form/Height Class	Canopy Cover	Dominant taxa present
Tree 5-15m	10-30%	<i>Acacia caesaneura</i> <i>Acacia aptaneura</i> <i>Acacia incurvaneura</i>
Shrub 1.5-2m	30-70%	<i>Senna artemisioides</i> subsp. <i>x artemisioides</i> <i>Senna artemisioides</i> subsp. <i>helmsii</i>
Shrub 0.5-1m	30-70%	<i>Ptilotus obovatus</i>



**Plate 1: Low woodland of *Acacia caesaneura*/ *A. aptaneura*/ *A. incurvaneura* over heath of *Senna artemisioides* subsp. *x artemisioides*/ *Senna artemisioides* subsp. *helmsii* and low heath of *Ptilotus obovatus* on clay-loam plain**

**Clay-Loam Plain: Acacia Shrublands**

**4.3.2 Scrub of *Acacia burkittii* over low scrub of *Senna artemisioides* subsp. *filifolia* and dwarf scrub of *Ptilotus obovatus*/ low grass of *Aristida contorta* on clay-loam plain (CLP-AS1)**

The total flora recorded within this vegetation community was represented by a total of 19 Families, 28 Genera and 46 Taxa (Plate 2). No Threatened or Priority Flora taxa were identified within this vegetation community. No introduced taxa were recorded within this vegetation community. Dominant taxa from the vegetation assemblage are shown in Table 11. According to the NVIS, this vegetation community is best represented by the MVG16- Acacia Shrublands (DotE, 2015b).

**Table 11: Vegetation assemblage for Scrub of *Acacia burkittii* over low scrub of *Senna artemisioides* subsp. *filifolia* and dwarf scrub of *Ptilotus obovatus*/low grass of *Aristida contorta* on clay-loam plain**

Life Form/Height Class	Canopy Cover	Dominant taxa present
Shrub >2m	10-30%	<i>Acacia burkittii</i>
Shrub 1.5-2m	10-30%	<i>Senna artemisioides</i> subsp. <i>filifolia</i>
Shrub <0.5m	10-30%	<i>Ptilotus obovatus</i>
Bunch Grass <0.5	30-70%	<i>Aristida contorta</i>



**Plate 2: Scrub of *Acacia burkittii* over low scrub of *Senna artemisioides* subsp. *filifolia* and dwarf scrub of *Ptilotus obovatus*/low grass of *Aristida contorta* on clay-loam plain**

**Clay-Loam Plain: Mallee Open Woodlands and Sparse Mallee Shrublands**

**4.3.3 Very open tree mallee of *Eucalyptus lucasii*/ low woodland of *Acacia caesaneural* *A. incurvaneura* over heath of *Eremophila latrobei* subsp. *glabra* and very open low grass of *Eragrostis eriopoda* on clay-loam plain (CLP-MOW/SMS1)**

The total flora recorded within this vegetation community was represented by a total of 18 Families, 28 Genera and 45 Taxa (Plate 3). No Threatened or Priority Flora taxa were identified within this vegetation community. No introduced taxa were recorded within this vegetation community. Dominant taxa from the vegetation assemblage are shown in Table 12. According to the NVIS, this vegetation community is best represented by the MVG32- Mallee Open Woodlands and Sparse Mallee Shrublands (DotE, 2015b).

**Table 12: Vegetation assemblage for Very open tree mallee of *Eucalyptus lucasii*/ low woodland of *Acacia caesaneural* *A. incurvaneura* over heath of *Eremophila latrobei* subsp. *glabra* and very open low grass of *Eragrostis eriopoda* on clay-loam plain**

Life Form/Height Class	Canopy Cover	Dominant taxa present
Mallee Tree Form	2-10%	<i>Eucalyptus lucasii</i>
Tree <5m	10-30%	<i>Acacia caesaneura</i> <i>Acacia incurvaneura</i>
Shrub 1.5-2m	30-70%	<i>Eremophila latrobei</i> subsp. <i>glabra</i>
Bunch Grass <0.5m	10-30%	<i>Eragrostis eriopoda</i>



**Plate 3: Very open tree mallee of *Eucalyptus lucasii*/ low woodland of *Acacia caesaneural* *A. incurvaneura* over heath of *Eremophila latrobei* subsp. *glabra* and very open low grass of *Eragrostis eriopoda* on clay-loam plain**

**Closed Depression – Acacia Forests and Woodlands**

**4.3.4 Open low woodland of *Acacia caesaneura* over open dwarf scrub of *Eremophila maculata* subsp. *brevifolia* and low heath of *Frankenia interioris* var. *parviflora* in playa (CD-AFW1)**

The total flora recorded within this vegetation community was represented by a total of 8 Families, 13 Genera and 16 Taxa (Plate 4). No Threatened or Priority Flora taxa were identified within this vegetation community. No introduced taxa were recorded within this vegetation community. Dominant taxa from the vegetation assemblage are shown in Table 13. According to the NVIS, this vegetation community is best represented by the MVG6-Acacia Forests and Woodlands (DotE, 2015b).

**Table 13: Vegetation assemblage for Open low woodland of *Acacia caesaneura* over open dwarf scrub of *Eremophila maculata* subsp. *brevifolia* and low heath of *Frankenia interioris* var. *parviflora* in playa**

Life Form/Height Class	Canopy Cover	Dominant taxa present
Tree 5-15m	10-30%	<i>Acacia caesaneura</i>
Shrub 0.5-1m	2-10%	<i>Eremophila maculata</i> subsp. <i>brevifolia</i>
Shrub <0.5m	30-70%	<i>Frankenia interioris</i> var. <i>parviflora</i>



**Plate 4: Open low woodland of *Acacia caesaneura* over open dwarf scrub of *Eremophila maculata* subsp. *brevifolia* and low heath of *Frankenia interioris* var. *parviflora* in playa**



#### 4.3.5 Low woodland of *Acacia aptaneura*/ *A. incurvaneura* over scrub of *A. tetragonophylla*/ *Melaleuca interioris* and open low grass of *Eragrostis falcata* in playa (CD-AFW2)

The total flora recorded within this vegetation community was represented by a total of 5 Families, 9 Genera and 13 Taxa (5). No Threatened or Priority Flora taxa were identified within this vegetation community. No introduced taxa were identified within this vegetation community. Dominant taxa from the vegetation assemblage are shown in Table 14. According to the NVIS, this vegetation community is best represented by the MVG6-Acacia Forests and Woodlands (DotE, 2015b).

**Table 14: Vegetation assemblage for Low woodland of *Acacia aptaneura*/ *A. incurvaneura* over scrub of *A. tetragonophylla*/  
*Melaleuca interioris* and open low grass of *Eragrostis falcata* in playa**

Life Form/Height Class	Canopy Cover	Dominant taxa present
Tree 5-15m	10-30%	<i>Acacia aptaneura</i> <i>Acacia incurvaneura</i>
Shrub >2m	10-30%	<i>Acacia tetragonophylla</i> <i>Melaleuca interioris</i>
Bunch Grass <0.5m	30-70%	<i>Eragrostis falcata</i>



**Plate 5: Low woodland of *Acacia aptaneura*/ *A. incurvaneura* over scrub of *A. tetragonophylla*/  
*Melaleuca interioris* and open low grass of *Eragrostis falcata* in playa**

**Closed Depression – Casuarina Forest and Woodlands/ Eucalypt Woodlands**

**4.3.6 Open tree mallee of *Eucalyptus gypsophila* low woodland of *Casuarina pauper* over low scrub of *Melaleuca interioris* and open hummock grass of *Triodia basedowii* on playa edge (CD-CFS/MWS1)**

The total flora recorded within this vegetation community was represented by a total of 8 Families, 13 Genera and 18 Taxa (6). No Threatened or Priority Flora taxa were identified within this vegetation community. No introduced taxa were recorded within this vegetation community. Dominant taxa from the vegetation assemblage are shown in Table 15. According to the NVIS, this vegetation community is best represented by the MVG8-Casuarina Forests and Woodlands and MVG14- Mallee Woodlands and Shrublands (DotE, 2015b).

**Table 15: Vegetation assemblage for Open tree mallee of *Eucalyptus gypsophila* low woodland of *Casuarina pauper* over low scrub of *Melaleuca interioris* and open hummock grass of *Triodia basedowii* on playa edge**

Life Form/Height Class	Canopy Cover	Dominant taxa present
Mallee Tree Form	10-30%	<i>Eucalyptus gypsophila</i>
Tree 5-15m	10-30%	<i>Casuarina pauper</i>
Shrub 1-1.5m	10-30%	<i>Melaleuca interioris</i>
Hummock Grass	2-10%	<i>Triodia basedowii</i>



**Plate 6: Open tree mallee of *Eucalyptus gypsophila* low woodland of *Casuarina pauper* over low scrub of *Melaleuca interioris* and open hummock grass of *Triodia basedowii* on playa edge**

**Closed Depression - Chenopod Shrublands, Samphire Shrublands and Forblands**

**4.3.7 Low heath of *Tecticornia undulata*/ *T. halocnemoides* on playa (CD-CSSSF1)**

The total flora recorded within this vegetation community was represented by a total of 2 Families, 2 Genera and 4 Taxa (Plate 7). No Threatened or Priority Flora taxa were identified within this vegetation community. No introduced taxa were recorded within this vegetation community. Dominant taxa from the vegetation assemblage are shown in Table 16. According to the NVIS, this vegetation community is best represented by the MVG22- Chenopod Shrublands, Samphire Shrublands and Forblands (DotE, 2015b).

**Table 16: Vegetation assemblage Low heath of *Tecticornia undulata*/ *T. halocnemoides* on playa**

Life Form/Height Class	Canopy Cover	Dominant taxa present
Shrub <0.5m	30-70%	<i>Tecticornia undulata</i> <i>Tecticornia halocnemoides</i>



**Plate 7: Low heath of *Tecticornia undulata*/ *T. halocnemoides* on playa**

## **Closed Depression – Mallee Woodlands and Shrublands**

### **4.3.8 Very open tree mallee of *Eucalyptus gypsophila* over open low scrub of *Eremophila scoparia* and dwarf scrub of *Atriplex bunburyana* on playa edge (CD-MWS1)**

The total flora recorded within this vegetation community was represented by a total of 9 Families, 10 Genera and 10 Taxa (Plate 8). No Threatened or Priority Flora taxa were identified within this vegetation community. No introduced taxa were recorded within this vegetation community. Dominant taxa from the vegetation assemblage are shown in Table 17. According to the NVIS, this vegetation community is best represented by the MVG14- Mallee Woodlands and Shrublands (DotE, 2015b).

**Table 17: Vegetation assemblage for Very open tree mallee of *Eucalyptus gypsophila* over open low scrub of *Eremophila scoparia* and dwarf scrub of *Atriplex bunburyana* on playa edge**

Life Form/Height Class	Canopy Cover	Dominant taxa present
Mallee Tree Form	2-10%	<i>Eucalyptus gypsophila</i>
Shrub 1-1.5m	2-10%	<i>Eremophila scoparia</i>
Shrub <0.5m	10-30%	<i>Atriplex bunburyana</i>



**Plate 8: Very open tree mallee of *Eucalyptus gypsophila* over open low scrub of *Eremophila scoparia* and dwarf scrub of *Atriplex bunburyana* on playa edge**

**Drainage Depression – Acacia Forests and Woodlands**

**4.3.9 Low woodland of *Acacia aptaneura*/ *A. caesaneura* over open low scrub of *Eremophila latrobei* subsp. *latrobei* and dwarf scrub of *Eremophila gilesii*/ *Eremophila malacoides* with occasional *Eragrostis eriopoda* in drainage depression (DD-AFW1)**

The total flora recorded within this vegetation community was represented by a total of 19 Families, 31 Genera and 54 Taxa (Plate 9). No Threatened or Priority Flora taxa were identified within this vegetation community. No introduced taxon was recorded within this vegetation community. Dominant taxa from the vegetation assemblage are shown in Table 18. According to the NVIS, this vegetation community is best represented by the MVG6-Acacia Forests and Woodlands (DotE, 2015b).

**Table 18: Vegetation assemblage for Low woodland of *Acacia aptaneura*/ *A. caesaneura* over open low scrub of *Eremophila latrobei* subsp. *latrobei* and dwarf scrub of *Eremophila gilesii*/ *Eremophila malacoides* with occasional *Eragrostis eriopoda* in drainage depression**

Life Form/Height Class	Canopy Cover	Dominant taxa present
Tree 5-15m	10-30%	<i>Acacia aptaneura</i> <i>Acacia caesaneura</i>
Shrub 1.5-2m	2-10%	<i>Eremophila latrobei</i> subsp. <i>filiformis</i>
Shrub <0.5m	10-30%	<i>Eremophila gilesii</i> <i>Eremophila malacoides</i>
Bunch Grass <0.5m	2-10%	<i>Eragrostis eriopoda</i>



**Plate 9: Low woodland of *Acacia aptaneura*/ *A. caesaneura* over open low scrub of *Eremophila latrobei* subsp. *latrobei* and dwarf scrub of *Eremophila gilesii*/ *Eremophila malacoides* with occasional *Eragrostis eriopoda* in drainage depression**

**Drainage Depression: Acacia Open Woodlands**

**4.3.10 Low woodland of *Acacia aptaneura*/ *A. incurvaneura* over scrub of *A. tetragonophylla*/  
*Melaleuca interioris* and open low grass of *Eragrostis falcata* in drainage depression (DD-  
 AOW1)**

The total flora recorded within this vegetation community was represented by a total of 10 Families, 17 Genera and 29 Taxa (Plate 10). No Threatened or Priority Flora taxa were identified within this vegetation community. No introduced taxa were recorded within this vegetation community. Dominant taxa from the vegetation assemblage are shown in Table 19. According to the NVIS, this vegetation community is best represented by the MVG13- Acacia Open Woodlands (DotE, 2015b).

**Table 19: Vegetation assemblage for Low woodland of *Acacia aptaneura*/ *A. incurvaneura* over scrub of *A. tetragonophylla*/  
*Melaleuca interioris* and open low grass of *Eragrostis falcata* in drainage depression**

Life Form/Height Class	Canopy Cover	Dominant taxa present
Tree 5-15m	10-30%	<i>Acacia aptaneura</i> <i>Acacia caesaneura</i>
Shrub >2m	10-30%	<i>Acacia tetragonophylla</i> <i>Melaleuca interioris</i>
Bunch Grass <0.5m	10-30%	<i>Eragrostis falcata</i>



**Plate 10: Low woodland of *Acacia aptaneura*/ *A. incurvaneura* over scrub of *A. tetragonophylla*/  
*Melaleuca interioris* and open low grass of *Eragrostis falcata* in drainage depression**

**4.3.11 Open low woodland of *Acacia caesaneura*/*A. macraneura*/*A. ayersiana* over low scrub of *A. ramulosa* var. *ramulosa*/*Eremophila forrestii* subsp. *forrestii*/*Eremophila margarethae*/*Maireana triptera* and open low grass of *Eragrostis laniflora* in drainage depression (DD-A0W2)**

The total flora recorded within this vegetation community was represented by a total of 18 Families, 27 Genera and 51 Taxa (Plate 11). No Threatened or Priority Flora taxa were identified within this vegetation community. No introduced taxa were recorded within this vegetation community. Dominant taxa from the vegetation assemblage are shown in Table 20. According to the NVIS, this vegetation community is best represented by the MVG13- Acacia Open Woodlands (DotE, 2015b).

**Table 20: Vegetation assemblage for Open low woodland of *Acacia caesaneura*/*A. macraneura*/*A. ayersiana* over low scrub of *A. ramulosa* var. *ramulosa*/*Eremophila forrestii* subsp. *forrestii*/*Eremophila margarethae*/*Maireana triptera* and open low grass of *Eragrostis laniflora* in drainage depression**

Life Form/Height Class	Canopy Cover	Dominant taxa present
Tree 5-15m	2-10%	<i>Acacia ayersiana</i> <i>Acacia caesaneura</i> <i>Acacia macraneura</i>
Shrub 1-1.5m	10-30%	<i>Acacia ramulosa</i> var. <i>ramulosa</i> <i>Eremophila forrestii</i> subsp. <i>forrestii</i> <i>Eremophila margarethae</i> <i>Maireana triptera</i>
Bunch Grass <0.5m	10-30%	<i>Eragrostis laniflora</i>



**Plate 11: Open low woodland of *Acacia caesaneura*/*A. macraneura*/*A. ayersiana* over low scrub of *A. ramulosa* var. *ramulosa*/*Eremophila forrestii* subsp. *forrestii*/*Eremophila margarethae*/*Maireana triptera* and open low grass of *Eragrostis laniflora* in drainage depression**

**Drainage Depression: Mallee Woodlands and Shrublands**

**4.3.12 Open tree mallee of *Eucalyptus concinna* over low scrub of *Melaleuca interioris* and low grass of *Eragrostis pergracilis* in drainage depression (DD-MWS1)**

The total flora recorded within this vegetation community was represented by a total of 10 Families, 16 Genera and 22 Taxa (Plate 12). No Threatened or Priority Flora taxa were identified within this vegetation community. One introduced taxa were recorded within this vegetation community; *Cenchrus ciliaris* (Buffel Grass). Dominant taxa from the vegetation assemblage are shown in Table 21. According to the NVIS, this vegetation community is best represented by the MVG14-Mallee Woodlands and Shrublands (DotE, 2015b).

**Table 21: Vegetation assemblage for Open tree mallee of *Eucalyptus concinna* over low scrub of *Melaleuca interioris* and low grass of *Eragrostis pergracilis* in drainage depression**

Life Form/Height Class	Canopy Cover	Dominant taxa present
Mallee Tree Form	10-30%	<i>Eucalyptus concinna</i>
Shrub 1-1.5m	10-30%	<i>Melaleuca interioris</i>
Bunch Grass <0.5m	30-70%	<i>Eragrostis pergracilis</i>



**Plate 12: Open tree mallee of *Eucalyptus concinna* over low scrub of *Melaleuca interioris* and low grass of *Eragrostis pergracilis* in drainage depression**



**Quartz/Rocky Plain: Acacia Forests and Woodlands**

**4.3.13 Low woodland of *Acacia aptaneura*/ *A. caesaneura*/ *A. incurvaneura* over heath of *Senna artemisioides* subsp. *x artemisioides*/ *Senna artemisioides* subsp. *helmsii* and low heath of *Ptilotus obovatus*/ *Maireana triptera* on quartz/rocky plain (QRP-AFW1)**

The total flora recorded within this vegetation community was represented by a total of 18 Families, 27 Genera and 59 Taxa (Plate 13). No Threatened or Priority Flora taxa were identified within this vegetation community. No introduced taxa were recorded within this vegetation community. Dominant taxa from the vegetation assemblage are shown in Table 22. According to the NVIS, this vegetation community is best represented by the MVG6-Acacia Forests and Woodlands (DotE, 2015b).

**Table 22: Vegetation assemblage for Low woodland of *Acacia aptaneura*/ *A. caesaneura*/ *A. incurvaneura* over heath of *Senna artemisioides* subsp. *x artemisioides*/ *Senna artemisioides* subsp. *helmsii* and low heath of *Ptilotus obovatus*/ *Maireana triptera* on quartz/rocky plain**

Life Form/Height Class	Canopy Cover	Dominant taxa present
Tree 5-15m	10-30%	<i>Acacia aptaneura</i> <i>Acacia caesaneura</i> <i>Acacia incurvaneura</i>
Shrub 1.5-2m	30-70%	<i>Senna artemisioides</i> subsp. <i>x artemisioides</i> <i>Senna artemisioides</i> subsp. <i>helmsii</i>
Shrub <0.5m	30-70%	<i>Ptilotus obovatus</i> <i>Maireana triptera</i>



**Plate 13: Low woodland of *Acacia aptaneura*/ *A. caesaneura*/ *A. incurvaneura* over heath of *Senna artemisioides* subsp. *x artemisioides*/ *Senna artemisioides* subsp. *helmsii* and low heath of *Ptilotus obovatus*/ *Maireana triptera* on quartz/rocky plain**

**4.3.14 Low woodland of *Acacia incurvaneura* over heath of *Eremophila latrobei* subsp. *latrobei* and low heath of *Eremophila exilifolia* on quartz/rocky plain (QRP-AFW2)**

The total flora recorded within this vegetation community was represented by a total of 22 Families, 30 Genera and 47 Taxa (Plate 14). No Threatened or Priority Flora taxa were identified within this vegetation community. No introduced taxa were recorded within this vegetation community. Dominant taxa from the vegetation assemblage are shown in Table 23. According to the NVIS, this vegetation community is best represented by the MVG6-Acacia Forests and Woodlands (DotE, 2015b).

**Table 23: Vegetation assemblage for Low woodland of *Acacia incurvaneura* over heath of *Eremophila latrobei* subsp. *latrobei* and low heath of *Eremophila exilifolia* on quartz/rocky plain**

Life Form/Height Class	Canopy Cover	Dominant taxa present
Tree 5-15m	10-30%	<i>Acacia incurvaneura</i>
Shrub 1-1.5m	30-70%	<i>Eremophila latrobei</i> subsp. <i>latrobei</i>
Shrub <0.5m	10-30%	<i>Eremophila exilifolia</i>



**Plate 14: Low woodland of *Acacia incurvaneura* over heath of *Eremophila latrobei* subsp. *latrobei* and low heath of *Eremophila exilifolia* on quartz/rocky plain**

**4.3.15 Forest of *Acacia caesaneura*/ *A. incurvaneura* over low scrub of *Eremophila latrobei* subsp. *glabra*/ *Prostanthera campbellii* and very open low grass of *Eragrostis eriopoda* open hummock grass of *Triodia irritans* quartz/rocky plain (QRP-AFW3)**

The total flora recorded within this vegetation community was represented by a total of 6 Families, 7 Genera and 17 Taxa (Plate 15). No Threatened or Priority Flora taxa were identified within this vegetation community. No introduced taxa were recorded within this vegetation community. Dominant taxa from the vegetation assemblage are shown in Table 24. According to the NVIS, this vegetation community is best represented by the MVG6-Acacia Forests and Woodlands (DotE, 2015b).

**Table 24: Vegetation assemblage for Forest of *Acacia caesaneura*/ *A. incurvaneura* over low scrub of *Eremophila latrobei* subsp. *glabra*/ *Prostanthera campbellii* and very open low grass of *Eragrostis eriopoda* open hummock grass of *Triodia irritans* quartz/rocky plain**

Life Form/Height Class	Canopy Cover	Dominant taxa present
Tree 5-15m	30-70%	<i>Acacia caesaneura</i> <i>Acacia incurvaneura</i>
Shrub 1-1.5m	10-30%	<i>Eremophila latrobei</i> subsp. <i>glabra</i> <i>Prostanthera campbellii</i>
Bunch Grass <0.5m	2-10%	<i>Eragrostis eriopoda</i>
Hummock Grass	2-10%	<i>Triodia irritans</i>



**Plate 15: Forest of *Acacia caesaneura*/ *A. incurvaneura* over low scrub of *Eremophila latrobei* subsp. *glabra*/ *Prostanthera campbellii* and very open low grass of *Eragrostis eriopoda* open hummock grass of *Triodia irritans* quartz/rocky plain**

**4.3.16 Open low woodland of *Acacia caesaneura* over low scrub of *A. grasbyi*/ *Senna artemisioides* subsp. *filifolia* and low heath of *Scaevola spinescens* on quartz/rocky plain (QRP-AFW4)**

The total flora recorded within this vegetation community was represented by a total of 11 Families, 14 Genera and 24 Taxa (Plate 16). No Threatened or Priority Flora taxa were identified within this vegetation community. No introduced taxa were recorded within this vegetation community. Dominant taxa from the vegetation assemblage are shown in Table 25. According to the NVIS, this vegetation community is best represented by the MVG6-Acacia Forests and Woodlands (DotE, 2015b).

**Table 25: Vegetation assemblage for Open low woodland of *Acacia caesaneura* over low scrub of *A. grasbyi*/ *Senna artemisioides* subsp. *filifolia* and low heath of *Scaevola spinescens* on quartz/rocky plain**

Life Form/Height Class	Canopy Cover	Dominant taxa present
Tree 5-15m	2-10%	<i>Acacia caesaneura</i>
Shrub 1-1.5m	10-30%	<i>Acacia grasbyi</i> <i>Senna artemisioides</i> subsp. <i>filifolia</i>
Shrub <0.5m	30-70%	<i>Scaevola spinescens</i> <i>Ptilotus obovatus</i>



**Plate 16: Open low woodland of *Acacia caesaneura* over low scrub of *A. grasbyi*/ *Senna artemisioides* subsp. *filifolia* and low heath of *Scaevola spinescens* on quartz/rocky plain**