Detailed Flora and Vegetation Survey of the Redcliffe Gold Project

Prepared For
Dacian Gold Ltd.

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Version FINAL

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Disclaimer

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Glossary

Acronym	Description
ANCA	Australian Nature Conservation Agency.
BA	Birdlife Australia (Formerly RAOU, Birds Australia).
BAM Act	*Biosecurity and Agriculture Management Act* 2007, WA Government.
BC Act	*Biodiversity Conservation Act* 2016, WA Government.
Botanica	Botanica Consulting.
BoM	Bureau of Meteorology.
CAMBA	China Australia Migratory Bird Agreement 1998.
DAFWA	Department of Agriculture and Food (now DPIRD), WA Government.
DAWE	Department Agriculture, Water and Environment (formerly DotEE), Australian Government.
DBCA	Department of Biodiversity, Conservation and Attractions (formerly DPaW), WA Government.
DEC	Department of Environment and Conservation (now DBCA), WA Government.
DER	Department of Environment Regulation (now DWER), WA Government.
DMIRS	Department of Mines, Industry Regulation and Safety (formerly DMP), WA Government.
DMP	Department of Mines and Petroleum (now DMIRS), WA Government.
DotEE	Department of the Environment and Energy (now DAWE), Australian Government.
DoW	Department of Water (now DWER), WA Government.
DPaW	Department of Parks and Wildlife (now DBCA), WA Government.
DPIRD	Department of Primary Industries and Regional Development, WA Government.
DWER	Department of Water and Environmental Regulation (formerly OEPA, DER and DoW), WA 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.
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.
JAMBA	Japan Australia Migratory Bird Agreement 1981.
Km	Kilometre (1,000 metres).
MVG	Major Vegetation Groups.
NVIS	National Vegetation Information System.
PEC	Priority Ecological Community.
RAOU	Royal Australia Ornithologist Union.
ROKAMBA	Republic of Korea-Australia Migratory Bird Agreement 2007.
SRE	Short Range Endemic.
SSC	Species Survival Commission, International.
TEC	Threatened Ecological Community.
UCL	Unallocated Crown Land
WA	Western Australia.
WAHERB	Western Australian Herbarium.
WAM	Western Australian Museum, WA Government.
WC Act	*Wildlife Conservation Act* 1950 (now BC Act), WA Government.

EXECUTIVE SUMMARY

Botanica Consulting Pty Ltd (Botanica) was commissioned by Dacian Gold Ltd. (Dacian) to undertake a detailed flora and vegetation survey of the Redcliffe Gold Project (RGP). The RGP is located approximately 50 km north-east of Leonora, Western Australia. The survey area is 1,731 ha in extent and encompasses the proposed Nambi, Hub, Bindy and Gold Terrace South deposits, as well as the Nambi road alignment. These areas are located within mining tenements M37/134, M37/1286, M37/1276, M37/1295. The flora and vegetations assessment is required to inform and support the development of a Mining Proposal for the RGP.

The study area lies within the Eastern Murchison (MUR1) subregion of the Murchison Bioregion, as defined by the Interim Biogeographic Regionalisation of Australia (IBRA).

The Eastern Murchison comprises the northern parts of the craton's Southern Cross and Eastern Goldfields Terrains and is characterised by internal drainage and extensive areas of elevated red desert sandplains with minimal dune development. Salt Lake systems are associated with the occluded paleodrainage system. Broad plains of red-brown soils and breakaways complexes as well as red sandplains are widespread. Vegetation is dominated by Mulga woodlands and is often rich in ephemerals, hummock grasslands, saltbush shrublands and *Tecticornia* shrublands (Cowan, 2001).

Prior to the field assessment a literature review was undertaken of previous flora assessments conducted within the local region. Documents reviewed included:

- G&G Environmental Pty Ltd (2010). *Flora and Vegetation survey of the Golden Terrace South Tenement, M37/1276*. Unpublished report prepared on behalf of Pacrim Energy Limited.
- Botanica Consulting Pty Ltd (2019). *Reconnaissance Flora/ Vegetation & Fauna Survey Redcliffe Gold Project*. Unpublished report prepared on behalf of NTM Gold Limited.
- Botanica Consulting Pty Ltd. (2021). *Flora, Vegetation and Fauna Assessment of the Leonora-Laverton Road Material Pits (SLK 53, 75 & 76)*. Unpublished report prepared on behalf of Main Roads Western Australia.
- Botanica Consulting Pty Ltd. (2021). *Reconnaissance Flora and Basic Fauna Survey of the Malcom Challenger Project.* Unpublished report prepared on behalf of Kumarina Resources Ltd.

In addition to the literature review, searches of the following databases were undertaken to aid in the compilation of a list of significant flora within the survey area:

- DBCA Threatened/ Priority Flora spatial data (DBCA, 2019a);
- DBCA NatureMap database (DBCA, 2021b); and
- EPBC Protected Matters search tool (DAWE, 2021a).

The NatureMap species search and EPBC Protected Matters search were conducted with a 40 km buffer from the survey area.

The NatureMap search identified 90 vascular flora species as occurring within 40 km of the survey area, representing 50 genera from 25 families. The most diverse families were Scrophulariaceae (16 species), Fabaceae (13 species) and Asteraceae (10 species). Significant genera were *Eremophila* (16 species), *Acacia* (10 species) and *Sclerolaena*, *Atriplex*, *Maireana* and *Eucalyptus* (three species each).

The desktop review identified eight introduced flora (weed) species as potentially occurring in the vicinity of the survey area, representing six families. One species, *Cylindropuntia* spp. (Prickly Pear) is listed as a Declared Pest on the Western Australian Organism List (WAOL) under the *Biosecurity and Agriculture Management* (BAM) *Act 2007* and as a Weeds of National Significance (WONS). In addition, *Tamarix aphylla* (Athel Tamarisk) is also listed as a WONS.

The desktop assessment identified 16 significant flora species recorded within a 40 km radius of the survey area. These are comprised of three Priority 1, seven Priority 3 and one Priority 4 taxa.
These taxa were assessed for distribution and known habitat to determine their likelihood of occurrence within the survey area. The assessment identified two significant flora taxa as likely to occur in the survey area, consisting of one Priority 3 and one Priority 4 taxa. In addition, nine significant taxa were identified as possibly occurring in the survey area, consisting of three Priority 1 and six Priority 3 taxa.

The Protected Matters search (DAWE, 2021a) did not identify any Threatened Ecological Communities as potentially occurring within the survey area. Analysis of the Priority Ecological Communities within the Midwest region (DBCA, 2021a) did not identify any significant communities as likely or possibly occurring within the survey area.

There are no DBCA managed or interest lands located within or adjacent to the survey area.

There are no Environmentally Sensitive Areas located within or adjacent to the survey area.

There are no Nationally Important or RAMSAR wetlands located within or adjacent to the survey area.

The nearest significant environmental feature is an un-named nature reserve (R46847), located approximately 85 km south of the survey area. Development within the survey area is unlikely to impact the environmental values of this area.

Botanica conducted a detailed flora and vegetation survey on the 13th-15th July 2021, with the area traversed on foot and 4WD by Jim Williams (Director/Principal Botanist, Diploma of Horticulture) and Jennifer Jackson (Senior Botanist, BSc (Honours) Environmental Management).

A total of 44 quadrats were installed and surveyed, and opportunistic observations were taken throughout the survey effort.

The field survey identified 122 vascular flora taxa within the survey area. These taxa represented 62 genera across 31 families, with the most diverse families being Fabaceae (19 species), Scrophulariaceae (17 species) and Asteraceae (14 species). The most diverse genera were *Eremophila* (17 species), Acacia (14 species) and *Maireana* (six species). There were no recorded introduced (weed) species.

No Threatened flora species were recorded within the survey area.

No Priority or otherwise significant flora were recorded within the survey area.
A total of eight broad-scale vegetation communities were identified within the survey area. Vegetation community descriptions and extents were determined from field survey results, aerial imagery interpretation and extrapolation of the communities.

The survey found SLP-AFW1 was the most widespread vegetation type in the survey area, occupying 396.7 ha (22.9%), while B-MWS1 was the most restricted with 9.4 ha (0.5%). Species diversity averaged 34 species per quadrat. The most diverse vegetation type was QRP-AFW1 with 64 species (52.5%), while the least diverse was B-MWS1 with 11 species (9.0%).

Native vegetation within the survey area was rated as ‘good‘ to ‘very good’. ‘Very Good’ condition shows relatively slight signs of damage caused by human activities such as the presence of some relatively non-aggressive weeds or occasional vehicle tracks ‘Good’ condition depicts more significant damage

caused by human activity since European settlement, including impacts to vegetation structure and composition from historical clearing, significant grazing, changed fire regimes and/or aggressive weeds. Cleared areas associated with mining operations access roads were rated as ‘completely degraded’.

1 INTRODUCTION

1.1 Project Description

Botanica Consulting Pty Ltd (Botanica) was commissioned by Dacian Gold Ltd. (Dacian) to undertake a detailed flora and vegetation survey of the Redcliffe Gold Project (RGP). The RGP is located approximately 50 km north-east of Leonora, Western Australia (Figure 1-1). The survey area is 1,731 ha in extent and encompasses the proposed Nambi, Hub, Bindy and Gold Terrace South deposits, as well as the Nambi road alignment. These areas are located within mining tenements M37/134, M37/1286, M37/1276, M37/1295. The flora and vegetation assessment is required to inform and support the development of a Mining Proposal for the RGP.

1.2 Objectives

1.2.1 Detailed Flora Survey

The flora/vegetation assessment was conducted in accordance with the requirements of a detailed survey as defined in *Technical Guidance - Flora and Vegetation Surveys for Environmental Impact Assessment – December 2016* (EPA, 2016a). The objectives of the assessment were to:

- Gather background information on flora and vegetation in the desktop study area (literature review, database and map-based searches);
- Conduct a field survey to verify / ground truth the desktop study findings through reconnaissance survey;
- Define and map vegetation communities of the survey area to a scale appropriate for the Bioregion and described according to the National Vegetation Information System (NVIS) classification (NVIS Level V – Association);
- Record the species composition (abundance and diversity) of each vegetation community within the survey area and compile a species list for the survey area by vegetation type;
- Provide quadrat-based data from plots representative of each vegetation type (minimum of three quadrats per vegetation type) according to Environmental Protection Authority (EPA) guidelines;
- Assess the species composition of each quadrat;
- Determine the local and regional conservation significance of flora and vegetation within the survey area;
- Identify and record the locations of any conservation significant flora/vegetation within the survey area;
- Identify and record the locations of any introduced flora species (including Declared Pests) within the survey area;
- Provide a map showing the distribution of conservation significant flora/vegetation within the survey area; and
- Define and map the condition of vegetation within the survey area in accordance with the vegetation condition rating scale specified in the Environmental Protection Authority (EPA) *Technical Guidance - Flora and Vegetation Surveys for Environmental Impact Assessment – December 2016* (EPA, 2016a).

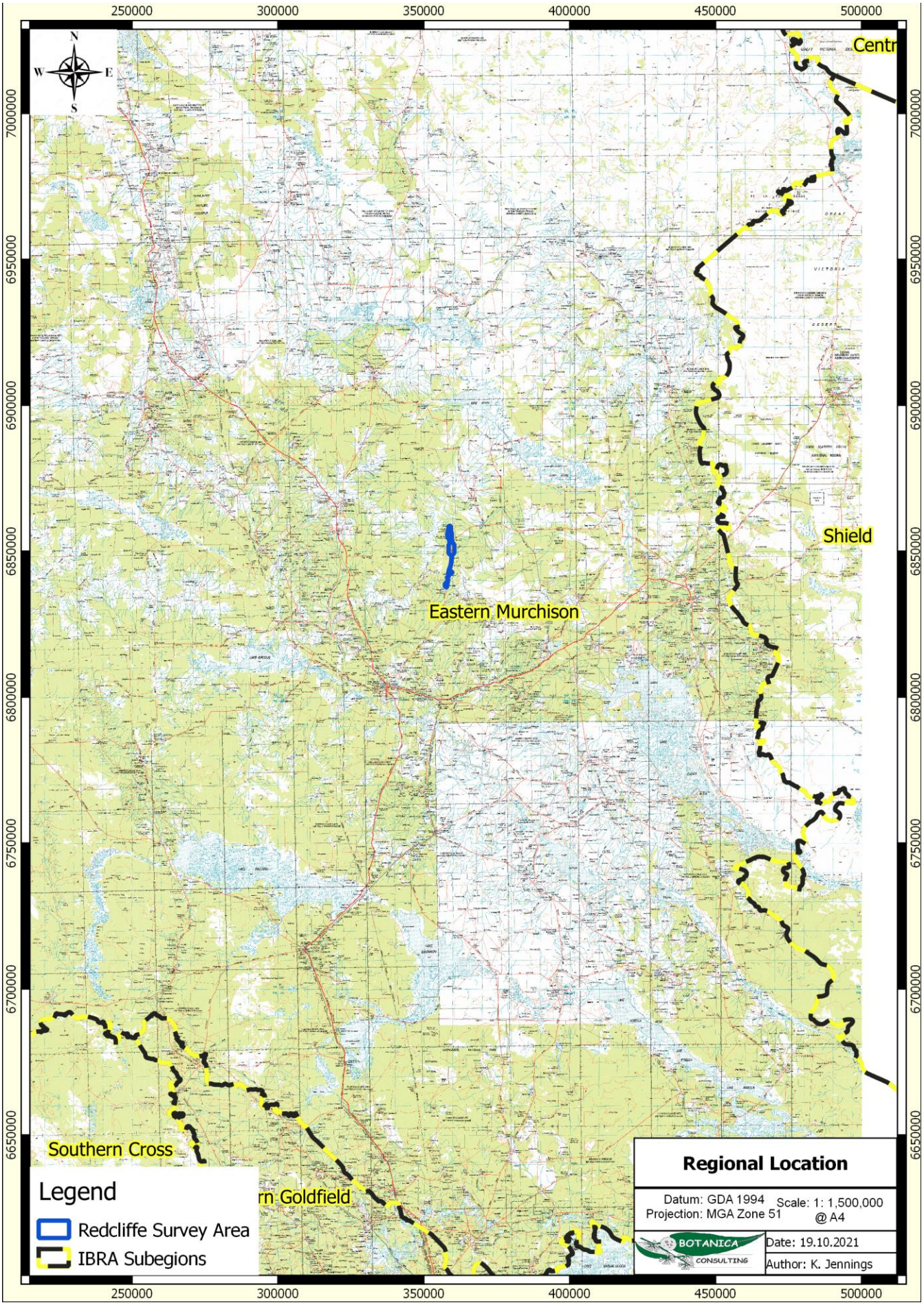

Figure 1-1: Regional location of the survey area

2 BIOPHYSICAL ENVIRONMENT

2.1 Regional Environment

The study area lies within the Eastern Murchison (MUR1) subregion of the Murchison Bioregion, as defined by the Interim Biogeographic Regionalisation of Australia (IBRA).

The Eastern Murchison comprises the northern parts of the craton's Southern Cross and Eastern Goldfields Terrains and is characterised by internal drainage and extensive areas of elevated red desert sandplains with minimal dune development. Salt Lake systems are associated with the occluded paleodrainage system. Broad plains of red-brown soils and breakaways complexes as well as red sandplains are widespread. Vegetation is dominated by Mulga woodlands and is often rich in ephemerals, hummock grasslands, saltbush shrublands and *Tecticornia* shrublands (Cowan, 2001).

In accordance with Beard (1990), the Murchison region is located in the Austin Botanical District within the Eremaean Province of WA. It is defined by the vegetational expression of geological boundaries of the Yilgarn Block, described as Archaean granite with infolded volcanics and meta-sediments (greenstones) of a like age. The topography is undulating, with occasional ranges of low hills and extensive sandplains in the eastern half. The principal soil type is shallow earthy loam overlying red-brown hardpan, with shallow stony loams on hills and red earthy sands on sandplains. The western half of the region more or less coincides with the basin of the Murchison River, the eastern half embraces the drainage of former rivers, now dry, draining towards the Eucla Basin. Vegetation is predominantly mulga low woodland *(Acacia aneura)* on plains, reduced to scrub on hills, with a tree steppe of *Eucalyptus* spp. and *Triodia basedowii* on sandplains. The climate is arid, with summer and winter rains and an average annual precipitation of 200 mm.

2.2 Land Use

The dominant land uses of the Eastern Murchison subregion include grazing native pastures (85.47%), unallocated crown reserves (11.34%), conservation (1.4%) and mining (1.79%) (Cowan, 2001). The survey area is located within the Nambi and Mertondale pastoral stations.

2.3 Soils and Landscape Systems

The study area lies within the Murchison Province, which consists of hardpan wash plains and sandplains (with some stony plains, hills, mesas and salt lakes) on the granitic rocks and greenstone of the Yilgarn Craton. The Murchison Province is located in the inland Mid-west and northern Goldfields between three Springs, the Gascoyne River, Wiluna, Cosmo Newberry and Menzies Soil types consist of red loamy earths, red sandy earths, red shallow loams, red deep sands and red-brown hardpan shallow loams with some red shallow sands and red shallow sandy duplexes present. Vegetation communities are predominately Mulga shrublands with spinifex grasslands, with areas of bowgada shrublands, Eucalypt woodlands and halophytic shrublands (Tille, 2006).

The Murchison Province is further divided into soil-landscape zones, with the survey area located within the Salinaland Plains Zone (279). The Salinaland Plains Zone comprises of sandplains (with hardpan wash plains and some mesas, stony plains and salt lakes) on granitic rocks (and some greenstone) of the Yilgarn Craton. Soils include red sandy earths, red deep sands, red shallow loams and red loamy earths with some red-brown hardpan shallow loams, salt lake soils and red shallow sandy duplexes. Vegetation consists of mulga shrublands with spinifex grasslands (and some halophytic shrublands and eucalypt woodlands). This zone is located in the northern Goldfields from Lakes Barlee and Ballard to Wiluna and Laverton (Tille, 2006).

The Salinaland Plains Zone is further divided into soil landscape systems (Government of Western Australia, 2019), with the survey area located within eight soil landscape systems, as described in Table 2-1 and shown in Figure 2-1.

Table 2-1: Soil landscape systems within the desktop study area/ survey area

System Name	Description	Area (ha)	% of survey area
Bevon System	Irregular low ironstone hills with stony lower slopes supporting mulga shrublands.	144	8.3
Bullimore System	Gently undulating sandplain with occasional linear dunes and stripped surfaces supporting spinifex grasslands with mallees and acacia shrubs.	28	1.6
Desdemona System	Plains with deep sandy or loamy soils supporting mulga tall shrublands and wanderrie grasses.	30	1.7
Jundee System	Hardpan plains with variable gravelly mantles and minor sandy banks supporting weakly groved mulga shrublands.	769	44.4
Monk System	Hardpan plains with occasional sandy banks supporting mulga tall shrublands and wanderrie grasses.	245	14.2
Nubev System	Gently undulating stony plains, minor limonitic low rises and drainage floors supporting mulga and halophytic shrublands.	35	2
Violet System	Gently undulating gravelly plains on greenstone, laterite and hardpan, with low stony rises and minor saline plains; supporting groved mulga and bowgada shrublands and occasionally chenopod shrublands.	447	25.8
Wyarri System	Granite domes, hills and tor fields with gritty-surfaced fringing plains supporting mulga and granite wattle shrublands.	33	1.9

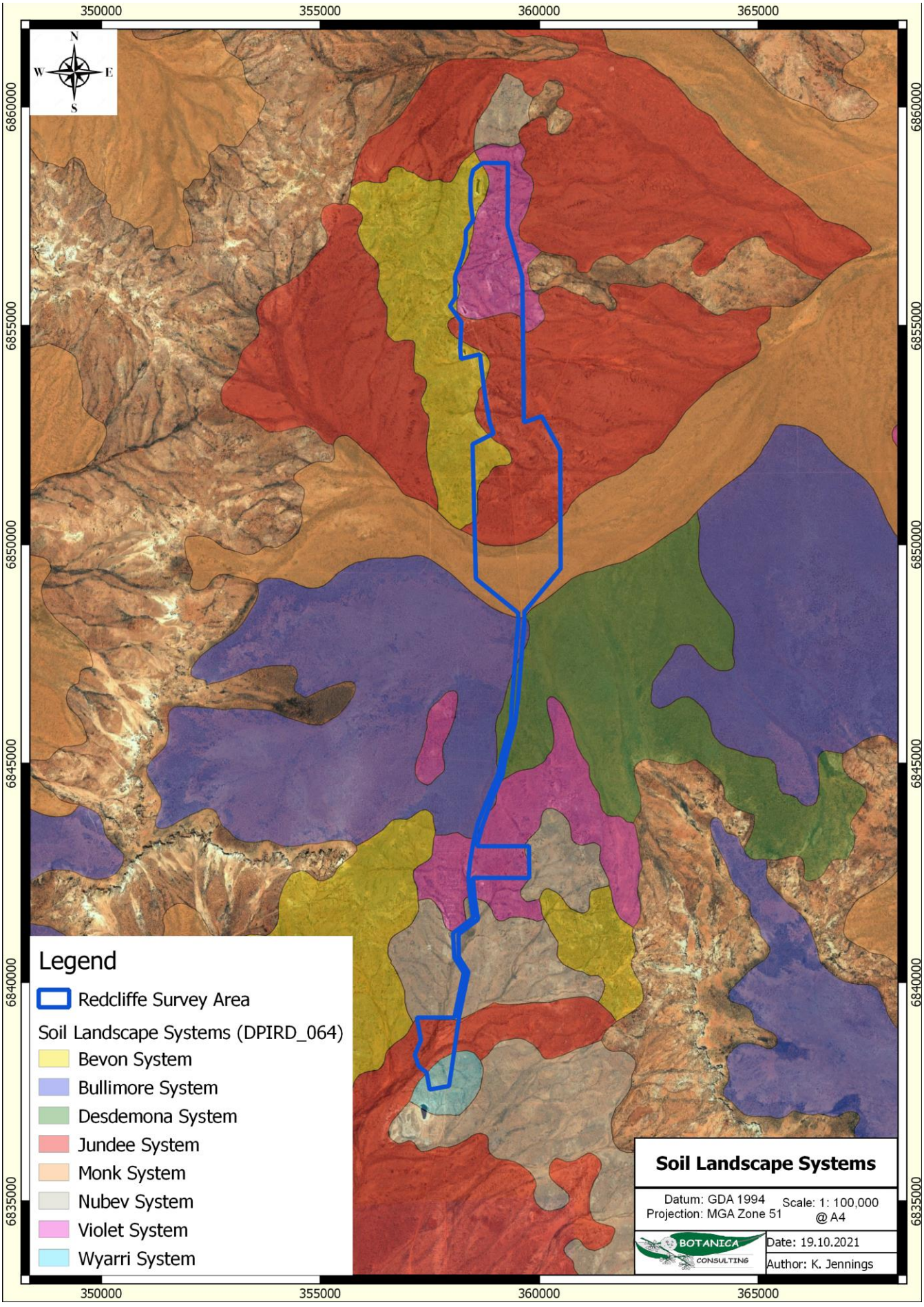

Figure 2-1: Soil landscape systems within the survey area

2.4 Regional Vegetation

The vegetation of the Murchison Bioregion is described by Tille (2006) as Mulga (*Acacia aneura*) shrublands and woodlands with gidgee (*A. pruinocarpa*), kurara (*A. tetragonophylla*), *A. linophylla,* bowgada (*A. ramulosa*), jam (*A. acuminata*), minniritchie (*A. grasbyi*), *Senna* spp. and *Eremophila* spp. which dominate the hardpan wash plains. Denser, taller mulga woodlands are found on groves while the sandy banks support mulga, bowgada and kurara shrublands with an understorey of wanderrie grasses (*Eragrostis* and *Eriachne* spp. and *Monachather paradoxa*). Snakewood (*A. xiphophylla*), bluebush (*Maireana* spp.) and saltbush (*Atriplex* spp.) grow on the saline drainage tracts.

The sandplains in the east support grasslands of hard spinifex (*Triodia basedowii*). These grasslands occur with an open tree and shrub steppe of mulga, marble gum (*Eucalyptus gongylocarpa*), mallees (*E. kingsmillii*, *E. longissima*, *E. brachycorys* and *E. youngiana*), bowgada and spinifex wattle (*A. coolgardiensis*). In places denser woodlands of mulga, spinifex wattle or mallee are found over the spinifex. On western sandplains shrublands are dominated by bowgada with cypress pine (*Callitris columellaris*), mallees (*e.g. E. leptopoda* and *E. kingsmillii*), mulga and *Grevillea* spp. On the yellow sandplains in the south-west are closed mixed shrublands with *Melaleuca*, *Hakea*, *Calothamnus*, *Baeckea*, *Banksia prionotes*, *Allocasuarina*. and *Acacia* spp. The mesas have bowgada, mulga and *A. linophylla* shrublands above the breakaways, while the footslopes support shrublands with saltbush (*Atriplex* spp.), *Frankenia* spp., *Ptilotus* spp. and *Eremophila pterocarpa*. The hilly terrain has shrublands of mulga, minniritchie, *Eremophila* spp. and cotton bush (*Ptilotus obovatus*). Hills in the far west have woodlands of York gum (*Eucalyptus loxophleba*), salmon gum (*E. salmonophloia*) and jam (*Acacia acuminata).* The stony plains support shrublands of mulga, gidgee, granite wattle (*Acacia quadrimarginea*), minniritchie, prickly wattle, snakewood, jam and *Eremophila* spp. in the valley floors there are shrublands of samphire (*Tecticornia* spp.), saltbush, sage (*Cratystylis subspinescens*) and *Frankenia* spp. surrounding salt lakes. Floodplains along the Murchison and its tributaries have shrublands of bluebush (*Maireana* spp.), saltbush and *Frankenia* spp., as well as mulga, prickly wattle and *Acacia distans* (Tille 2006).

2.5 Conservation Values

The Murchison Bioregion contains 41 vegetation associations (hummock grasslands, succulent steppe or low woodlands) that have at least 85 per cent of their total extent in the Bioregion. The Bioregion is rich and diverse in flora and fauna but most species are wide ranging and usually occur in adjoining regions. A snake (*Pseudechis butleri*) is the only known regionally endemic vertebrate species.

There are six wetlands of national importance in the Bioregion, all of which are salt lakes: Lake Ballard, Lake Barlee, Lake Marmion, Lake Wooleen, Lake Breberle and Lake Anneen. There is one wetland of regional importance within the Murchison Bioregion; the Mungawolagudgi Claypan on Muggon Station.

No ecosystems are listed as threatened under WA State legislation occur within the Murchison Bioregion, but 52 communities and vegetation associations are thought to be at risk for a variety of reasons. Grazing from livestock, goats and rabbits and changed fire regimes are the main threatening processes in the region, with clearing, impacts of mining, erosion and sedimentation also causing significant impacts.

2.6 Climate

The climate of the Eastern Murchison subregion is characterised as an arid climate with mainly winter rainfall and annual rainfall of approximately 200 millimetres (mm) (Beard, 1990); Cowan, 2001b). Rainfall data for the Leonora aero weather station (#12241), located approximately 45 km south-west of the survey area is shown in Figure 2-2. Rainfall received prior to the field survey (July-August) was above average due to significant rains in July, although rain for June was below average. Climate conditions are not expected to be a limiting factor to the survey.

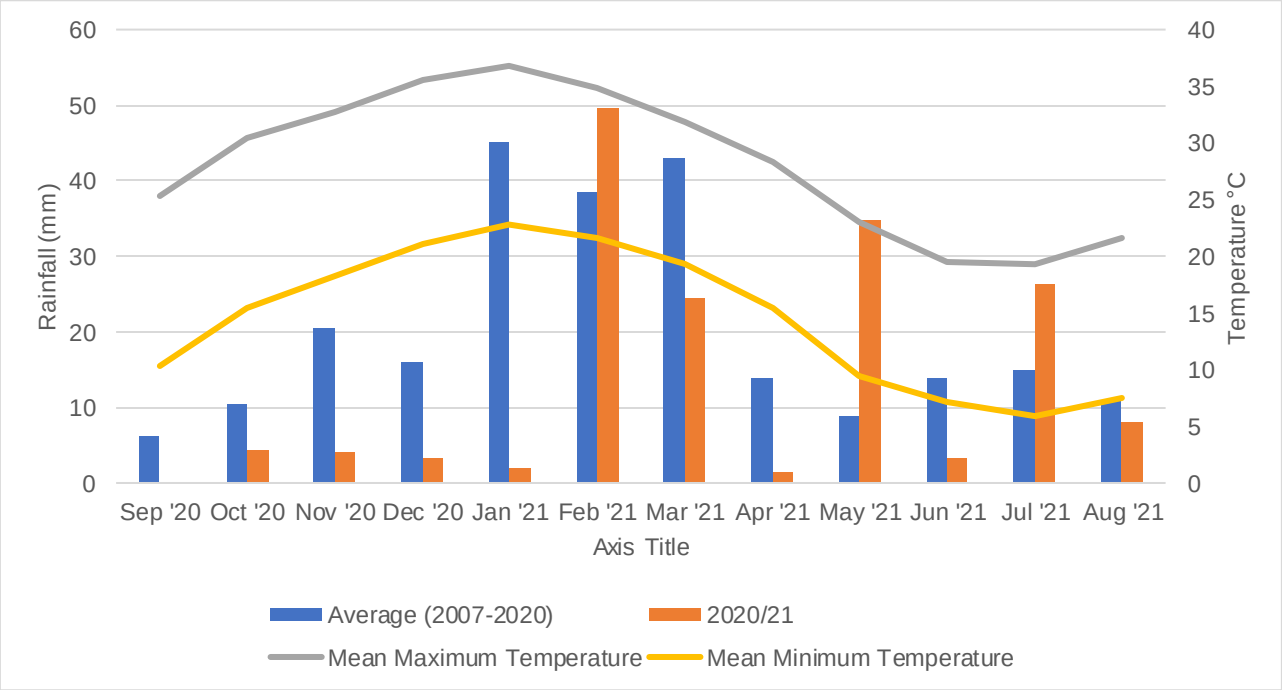

Figure 2-2: Rainfall and temperature data for Leonora aero weather station (#12241) (BOM, 2021a)

2.7 Hydrology

According to the Geoscience Australia database (2015) there are no surface water bodies within the survey area. However, there are several ephemeral drainage lines that intersect the survey area, including Dillon Creek (Figure 2-3).

Groundwater Dependent Ecosystems (GDE) includes biological assemblages of species such as wetlands or woodlands that use groundwater either opportunistically or as their primary water source. For the purposes of this report, a GDE is defined as any vegetation community that derives part of its water budget from groundwater and must be assumed to have some degree of groundwater dependency. According to the BoM *Atlas of Groundwater Dependent Ecosystems* (BoM, 2021b) database, there are no known or potential aquatic GDE's within the survey area (Figure 2-3).
The survey area has low potential to contain a terrestrial GDE, described as 'hardpan plains with occasional sandy banks supporting mulga tall shrublands and wanderrie grasses' (BoM, 2021b).

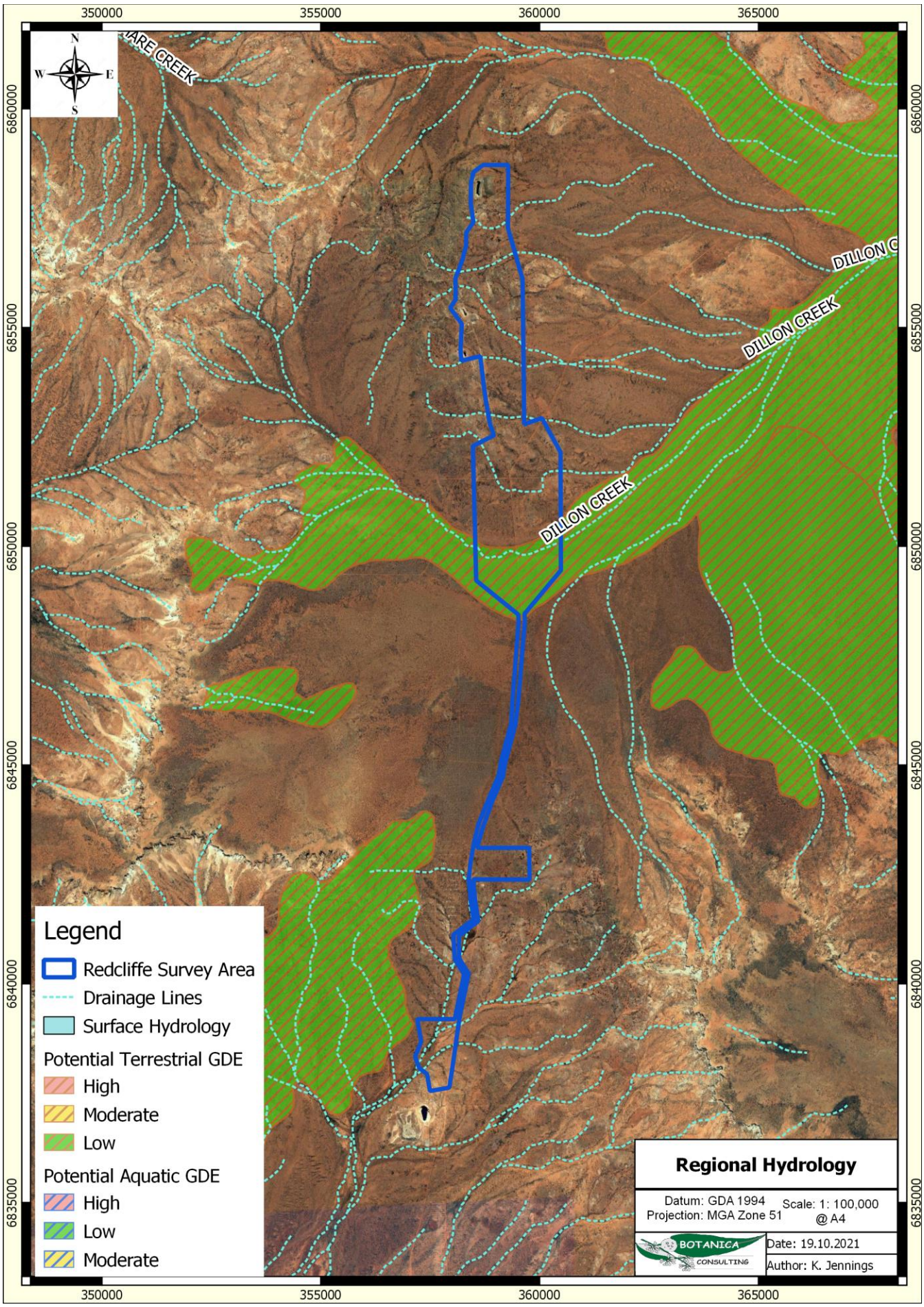

Figure 2-3: Regional hydrology of the survey area

3 SURVEY METHODOLOGY

3.1 Desktop Assessment

Prior to the field assessment a literature review was undertaken of previous flora assessments conducted within the local region. Documents reviewed included:

- G&G Environmental Pty Ltd (2010). *Flora and Vegetation survey of the Golden Terrace South Tenement, M37/1276*. Unpublished report prepared on behalf of Pacrim Energy Limited.
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In addition to the literature review, searches of the following databases were undertaken to aid in the compilation of a list of significant flora within the survey area:

- DBCA Threatened/ Priority Flora spatial data (DBCA, 2019a);
- DBCA NatureMap database (DBCA, 2021b); and
- EPBC Protected Matters search tool (DAWE, 2021a).

The NatureMap species search and EPBC Protected Matters search were conducted with a 40 km buffer from the survey area.

Significant flora identified by the desktop review were assessed with regards to their population extent and distribution and preferred habitat to determine their likelihood of occurrence within the survey area.

The assessment categorised flora species as follows:

- Unlikely- Suitable habitat is not expected to occur and/or the survey area is outside the known range of the species.
- Possible- Suitable habitat may be present, and the area is within the known range of the species. This option is also used when there is insufficient information to determine the preferred habitat of a species.
- Likely- Suitable habitat is expected to occur and there are records within 10 km of the survey area.
- Previously Recorded- A record for this species is located within the survey area. Field survey will ground-truth currently occurring individuals and populations.

It should be noted that these lists are based on observations from a broader area than the assessment area (40 km radius) and therefore may include taxa not present. The databases also often include 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.

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

- *Environment Protection and Biodiversity and Conservation* (EPBC) *Act 1999*. Administered by the Australian Government (DAWE);
- *Biodiversity Conservation* (BC) *Act 2016*. Administered by the WA Government (DBCA); and
- Priority Flora list. A non-legislative list maintained by DBCA for management purposes (released December 2018).

3.2 Flora Field Assessment

Botanica conducted a detailed flora/ vegetation survey on the 13th-15th July 2021, with the area traversed on foot and 4WD by Jim Williams (Director/Principal Botanist, Diploma of Horticulture) and Jennifer Jackson (Senior Botanist, BSc (Honours) Environmental Management).

A total of 44 quadrats were installed and surveyed, and opportunistic observations were taken throughout the survey effort. The location of quadrats within the survey area and the GPS track log from the field survey are shown in Figure 3-1 and Figure 3-2. The geographic locations (Easting/ Northing (GDA 94, Zone 51)) of the north-west corner of the quadrats are listed in Appendix 3.

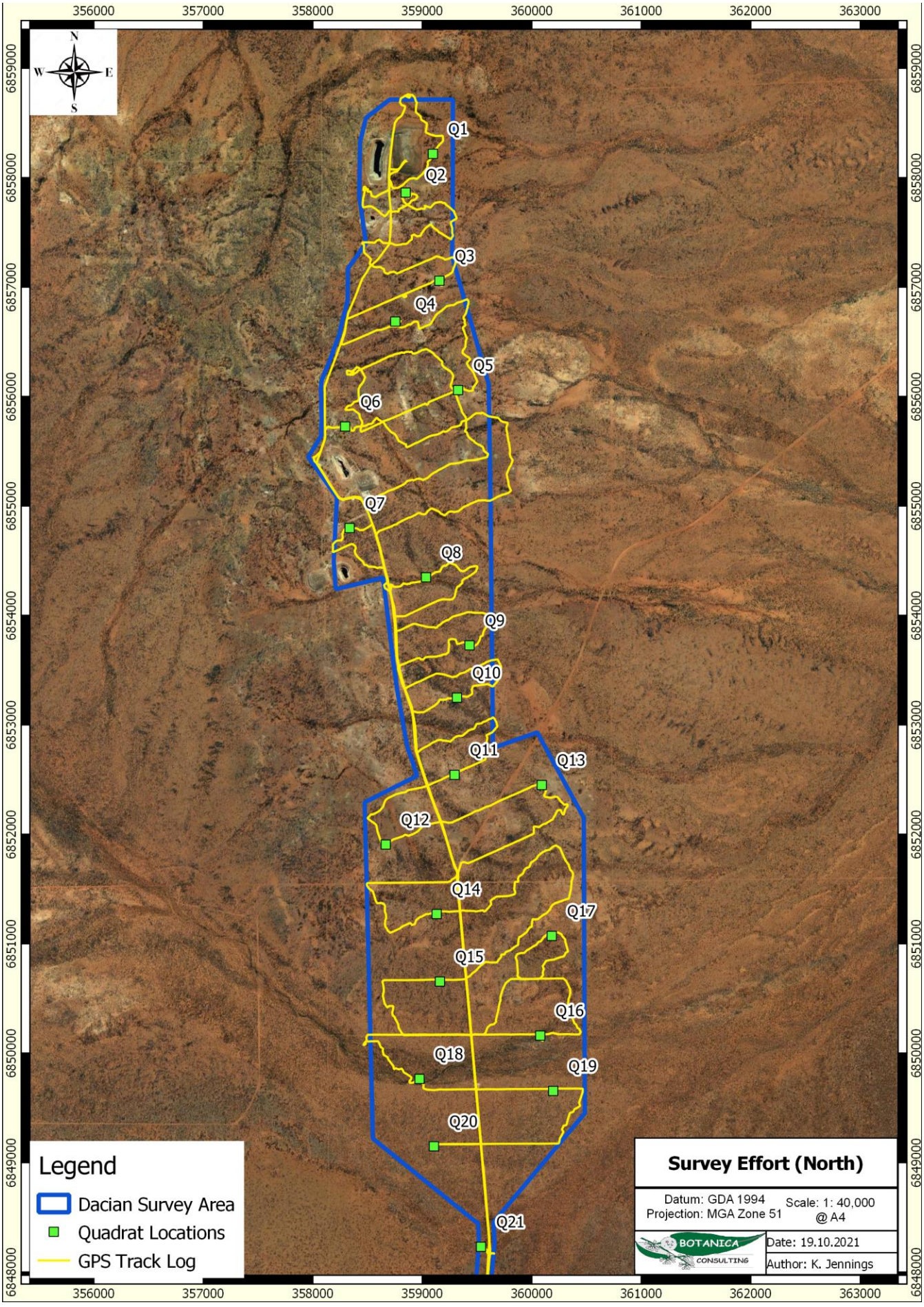


Figure 3-1: Quadrat locations and field survey effort (North)

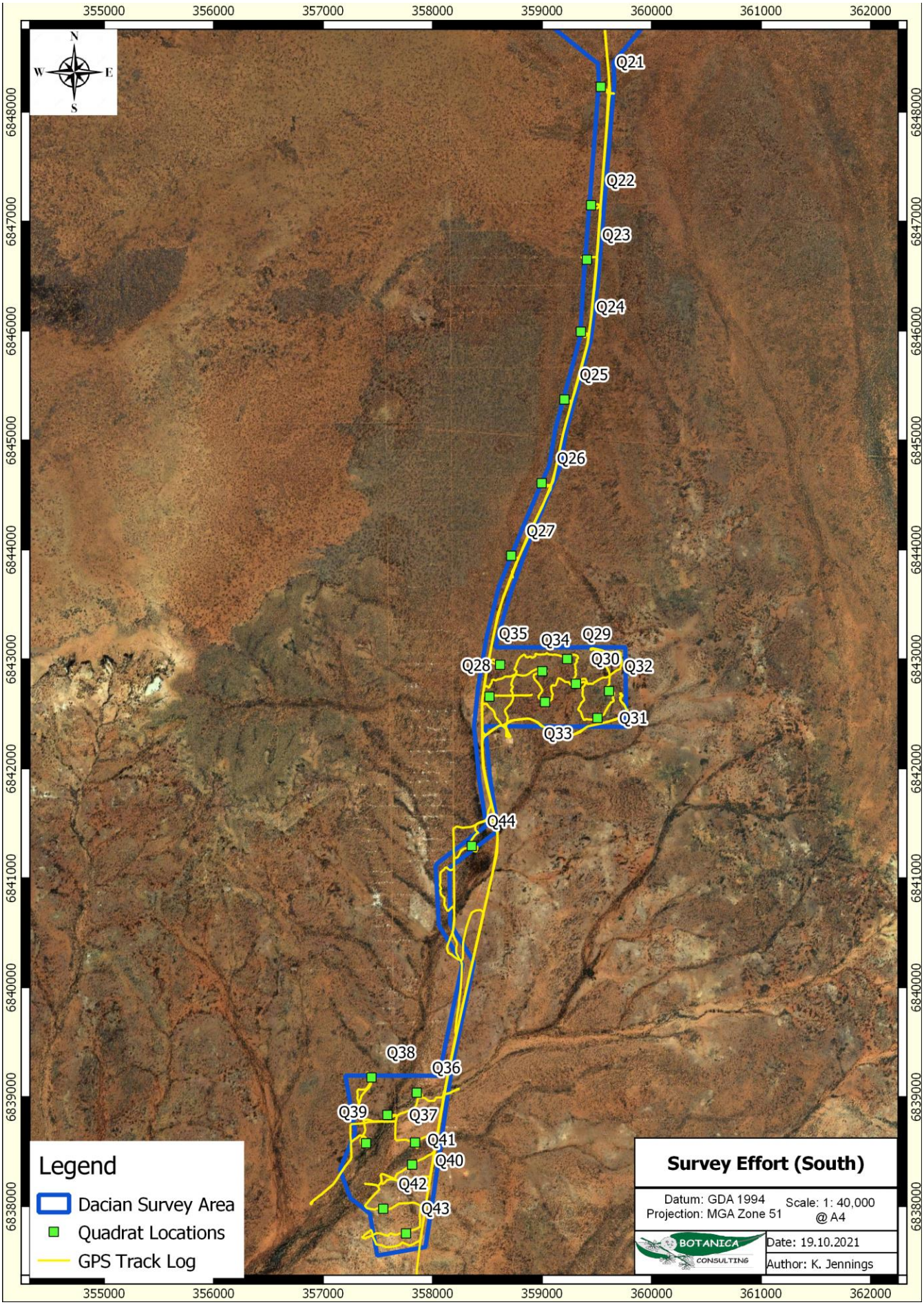


Figure 3-2: Quadrat locations and field survey effort (South)

3.2.1 Vegetation Mapping

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

- GPS location;
- Photograph of vegetation;
- Dominant taxa for each stratum (including height and percentage cover of dominant taxa);
- All vascular taxa (including annual taxa);
- Landform classification;
- Vegetation condition rating;
- Collection and documentation of unknown plant specimens; and
- Collection of flora of conservation significance if encountered.

Vegetation types were classified in accordance with the NVIS Level V-Association classification.

3.2.2 Detailed Flora and Vegetation Survey

A total of 44 quadrats were established within the survey area (Figure 3-1 and Appendix 3). According to the recommended quadrat size specified in the Environmental Protection Authority (EPA) Guidelines, 20m X 20m quadrats are recommended for the Murchison Bioregion. However, due to the low level of species richness present within the survey area, 50m X 50m quadrats were established to allow for a better representation of species composition. The quadrats were established by inserting metal pickets into the NW corner and measuring the length of the resultant boundaries to verify the quadrats were 50 m X 50 m (square quadrats). The objective was to have at least three quadrats per vegetation type to capture the floristic variations within the survey area. Quadrats were not established within regrowth/ modified vegetation.

Following their establishment and boundary verification, the NW corner of each quadrat was recorded by GPS and three photographs of the quadrat were taken from the NW corner. All vascular plants within the quadrat were recorded (Appendix 8). This included recording of dominant taxa from the upper, middle and lower stratum, and sampling of all unknown taxa. Unknown taxa were identified using Botanica's own reference herbarium and relevant taxonomic keys or by a taxonomic consultant. Data on level of disturbance, presence of coarse fragments on surface, topographical position, elevation, aspect, percentage litter, percentage bare ground, percentage surface rock (bedrock and surface deposits), soil types (colour, profile, field texture and surface type), and vegetation structure were collected from each quadrat (Appendix 8). Methods of recording data from these quadrats largely follow those outlined in CSIRO's *Australian Soil and Land Survey Field Handbook* (McDonald *et al.* 1998) and in accordance with EPA Guidelines (2016). Presence/absence data of taxa from sample sites were used to compile the representative vegetation types.

3.2.3 Flora Identification

Unknown specimens collected during the survey were identified with the aid of samples housed at the Botanica Herbarium and the Western Australian Herbarium.

3.3 Data Analysis Tools

Following field assessments, vegetation types and condition were mapped using the GIS program QGIS, and the hectare area/ percentage area of each vegetation type and within the survey area was

calculated. Spatial maps illustrating the location of vegetation types and any significant flora and/or vegetation were generated using QGIS.

3.3.1 PATN Analysis

The PATN software package was used to assess the similarities/ dissimilarities between quadrats based on presence/absence of species. A total of 51 species were excluded from the analysis; 26 annuals and 25 singleton species. A total of 59 taxa recorded within the quadrats were included in the analysis.

The analysis produced a quantitative estimate of the relationship between species composition of each quadrat. The classifications were based upon a Bray-Curtis association matrix using a flexible Unweighted Pair Group Arithmetic Mean (UPGMA) method (with a beta value of -0.1) which standardises the data enabling the analysis to be completed. Semi-strong hybrid (SSH) ordination of the quadrat is then undertaken to show spatial relationships between groups and to elucidate possible environmental correlates with the classification.

The analysis also produced a stress value which is a measure of the 'strength' of the analysis (i.e. how well the quadrats are grouped together into the appropriate floristic groups). The lower the stress value the greater the strength of the analysis with a value of less than 0.3 showing that the analysis appropriately grouped quadrats. A stress value greater than 0.3 suggests that the analysis was unable to group quadrats appropriately due to extraneous variables (i.e. other factors influencing differences in floristic groups other than species composition e.g. fire, clearing disturbance etc.).

3.3.2 EstimateS

EstimateS software was used to estimate species richness present using the Chao2 richness estimator. For any number of samples, the estimator uses the existing pattern of species accumulation to estimate the true number of species at a site. The estimators tend to under-estimate species number when sample size is small, hence the estimated number of true species can be seen to increase with sample size. This software was also used to compute Coleman rarefaction curves estimates which were used to calculate species accumulation curves.

3.4 Scientific Licences

Table 3-1: Scientific Licences of Botanica Staff coordinating the survey

Licensed staff	Permit Number	Valid Until
Jim Williams	FB62000108 (Licence to flora for scientific purposes)	27/05/2022
Jennifer Jackson	FB62000309 (Licence to take flora for scientific purposes)	11/01/2024

3.5 Survey Limitations and Constraints

It is important to note that flora and vegetation surveys will entail limitations notwithstanding careful planning and design. Potential limitations are listed in Table 3-2.

Table 3-2: Limitations and constraints associated with the flora and vegetation survey

Variable	Potential Impact on Survey	Details
Access problems	Not a constraint	The survey was conducted via 4WD and on foot. Numerous access tracks were present within the survey area providing ease of access.
Competency/ Experience	Not a constraint	The Botanica personnel that conducted the survey were regarded as suitably qualified and experienced. **Coordinating Staff**: Jim Williams (Botanist) **Field Staff**: Jim Williams and Jennifer Jackson **Data Interpretation**: Jim Williams, Jennifer Jackson and Kelby Jennings.
Timing of survey, weather & season	Not a constraint	Fieldwork was conducted in July 2021, within the EPA recommended approximate timing (6-8 weeks post wet season). Flowering material was available and multiple annual species were present and able to be identified to species level.
Area disturbance	Not a constraint	The majority of the survey area was in very good condition and comprised of native vegetation. Disturbance in the area was a result of access roads and historical mining activity.
Survey Effort/ Extent	Not a constraint	Survey intensity was appropriate for the size/significance of the area with a detailed flora and vegetation survey completed to identify vegetation types and significant flora and vegetation.
Availability of contextual information at a regional and local scale	Not a constraint	Conservation significant flora database searches provided by the DBCA were used to identify any potential locations of Threatened/Priority flora species. BoM, DWER, DPIRD, DBCA and DAWE databases were reviewed to obtain appropriate regional desktop information on the biophysical environment of the local region. Botanica has conducted a number of surveys within the Murchison Bioregion and was also able to obtain information about the area from previous research conducted within the area. Results of previous assessments in the local area were reviewed to provide context on the local environment.
Data Analysis	Minor constraint	Botanica staff conducting the PATN statistical analyses are not statistical analysts and have basic statistics training. These analyses were used to provide basic information on the relationships between vegetation communities delineated in the field.
Completeness	Not a constraint	In the opinion of Botanica, the survey area was covered sufficiently in order to identify vegetation assemblages. Survey work was conducted within EPAs recommended approximate timing (6-8 weeks post wet season), and multiple annual species were present and able to be identified to species level. The vegetation associations for this study were based on visual descriptions of locations in the field. The distribution of these vegetation associations outside the study area is not known, however vegetation associations identified were categorised via comparison to vegetation distributions throughout WA given on NVIS (DotEE, 2017).

4 RESULTS

4.1 Desktop Assessment

4.1.1 Flora

The NatureMap search identified 90 vascular flora species as occurring within 40 km of the survey area, representing 50 genera from 25 families. The most diverse families were Scrophulariaceae (16 species), Fabaceae (13 species) and Asteraceae (10 species). Significant genera were *Eremophila* (16 species), *Acacia* (10 species) and *Sclerolaena*, *Atriplex*, *Maireana* and *Eucalyptus* (three species each). This total includes no introduced (weed) species.

4.1.1.1 Introduced Flora

The desktop review identified eight introduced flora (weed) species as potentially occurring in the vicinity of the survey area, representing six families. One species, *Cylindropuntia* spp. (Prickly Pear) is listed as a Declared Pest on the Western Australian Organism List (WAOL) under the *Biosecurity and Agriculture Management* (BAM) *Act 2007* and as a Weeds of National Significance (WONS). In addition, *Tamarix aphylla* (Athel Tamarisk) is also listed as a WONS.

The full list of potential weed species is contained in Appendix 2.

4.1.1.2 Significant Flora

The assessment of the DBCA Priority/ Threatened flora data (DBCA, 2019a), NatureMap search (DBCA, 2021b), Protected Matters searches (DAWE, 2021a) and previous relevant literature identified 12 significant flora species recorded within a 40 km radius of the survey area. These are comprised of three Priority 1, eight Priority 3 and one Priority 4 taxa (Appendix 4).

These taxa were assessed for distribution and known habitat to determine their likelihood of occurrence within the survey area. The assessment identified two significant flora taxa as likely to occur in the survey area, consisting of one Priority 3 and one Priority 4 taxa. In addition, nine significant taxa were identified as possibly occurring in the survey area, consisting of three Priority 1 and six Priority 3 taxa (Table 4-1). The full flora likelihood assessment is listed in Appendix 4. The locations of the DBCA database records are illustrated spatially in Figure 4-1.

Table 4-1: Potentially occurring significant flora species

DBCA Rank	Taxon	Habitat	Comments	Likelihood
P1	*Acacia websteri*	Red sand, clay or loam. Low-lying areas, flats.	Recorded within 40 km, habitat may be present	Possible
	Philotheca tubiflora	Rocky rises & hills, outcrops	Recorded within 40 km, habitat may be present	Possible
	Stenanthemum patens	Rocky hillside.	Recorded within 40 km, habitat may be present	Possible
P3	*Acacia* sp. Marshall Pool (G. Cockerton 3024)	-	Little known, records within 30km.	Possible
	Calytrix praecipua	Skeletal sandy soils over granite or laterite. Breakaways, outcrops.	Recorded within 40 km, habitat may be present	Possible
	Cratystylis centralis	Red sandy loam with ironstone gravel. Flat plains, breakaway country.	Recorded within 40 km, habitat may be present	Possible
	Eremophila annosicaulis	On stony loams (ironstone laterite).	Recorded within 40 km, habitat may be present	Possible
	Eremophila shonae subsp. *diffusa*	Stony yellow or red sandy soils	Recorded within 10 km, habitat may be present	Possible
	Eremophila simulans subsp. *megacalyx*	-	Recorded within 20 km, habitat may be present	Possible
	Hybanthus floribundus subsp. *chloroxanthus*	Dark red-brown soil, never sandy, rich in iron oxide, laterite. Rocky areas, creek banks, along drainage lines.	Recorded within 40 km, habitat may be present	Possible
P4	*Hemigenia exilis*	Laterite. Breakaways, slopes.	Recorded within 40 km, habitat likely to be present	Likely

4.1.2 Vegetation and Ecological Communities

4.1.2.1 Vegetation Associations

The Pre-European vegetation association spatial mapping dataset (DPIRD, 2018) identified two vegetation association as occurring within the survey area (Table 4-2). The association descriptions and their remaining extents, as specified in the 2018 Statewide Vegetation Statistics (DBCA, 2019b) are provided in Table 4-2. 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" (EPA, 2000). All vegetation associations retain >99% of their pre-European extent, and development within the survey area will not significantly reduce the current extent of these vegetation associations.

Table 4-2: Pre-European Vegetation Associations within the survey area

Vegetation Association	Current Extent (ha)	Pre-European extent remaining	% Protected for Conservation	Floristic Description	Extent within Survey Area
Laverton 18	2,339,335	99.95	-	Low woodland; mulga (*Acacia aneura*)	1,669 ha (96.4%)
Laverton 109	152,223	99.37	-	Hummock grasslands, shrub steppe; *Eucalyptus youngiana* over hard spinifex	62 ha (3.6%)

4.1.2.2 Significant Ecological Communities

The Protected Matters search (DAWE, 2021a) did not identify any Threatened Ecological Communities as potentially occurring within the survey area. Analysis of the Priority Ecological Communities within the Midwest region (DBCA, 2021a) did not identify any significant communities as likely or possibly occurring within the survey area.

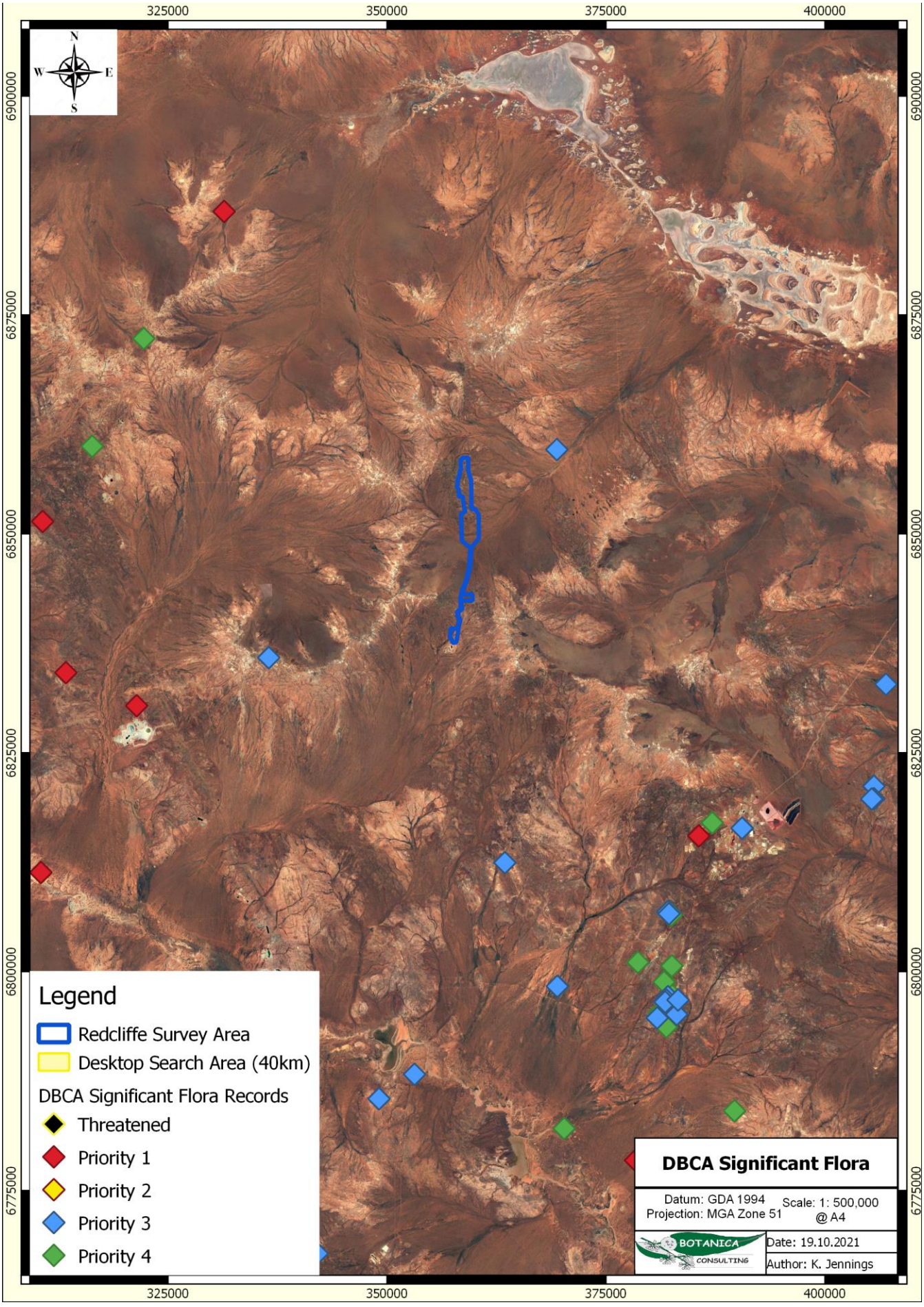


Figure 4-1: Significant flora within the desktop search area (40 km)

4.1.3 Conservation Areas

There are no DBCA managed or interest lands located within or adjacent to the survey area.

There are no Environmentally Sensitive Areas located within or adjacent to the survey area.

There are no Nationally Important or RAMSAR wetlands located within or adjacent to the survey area.

The nearest significant environmental feature is an un-named nature reserve (R46847), located approximately 85 km south of the survey area. Development within the survey area is unlikely to impact the environmental values of this reserve. The location of proposed and vested Conservation Reserves, ESA's and Nationally Important Wetlands in relation to the survey area is provided in Figure 4-2.

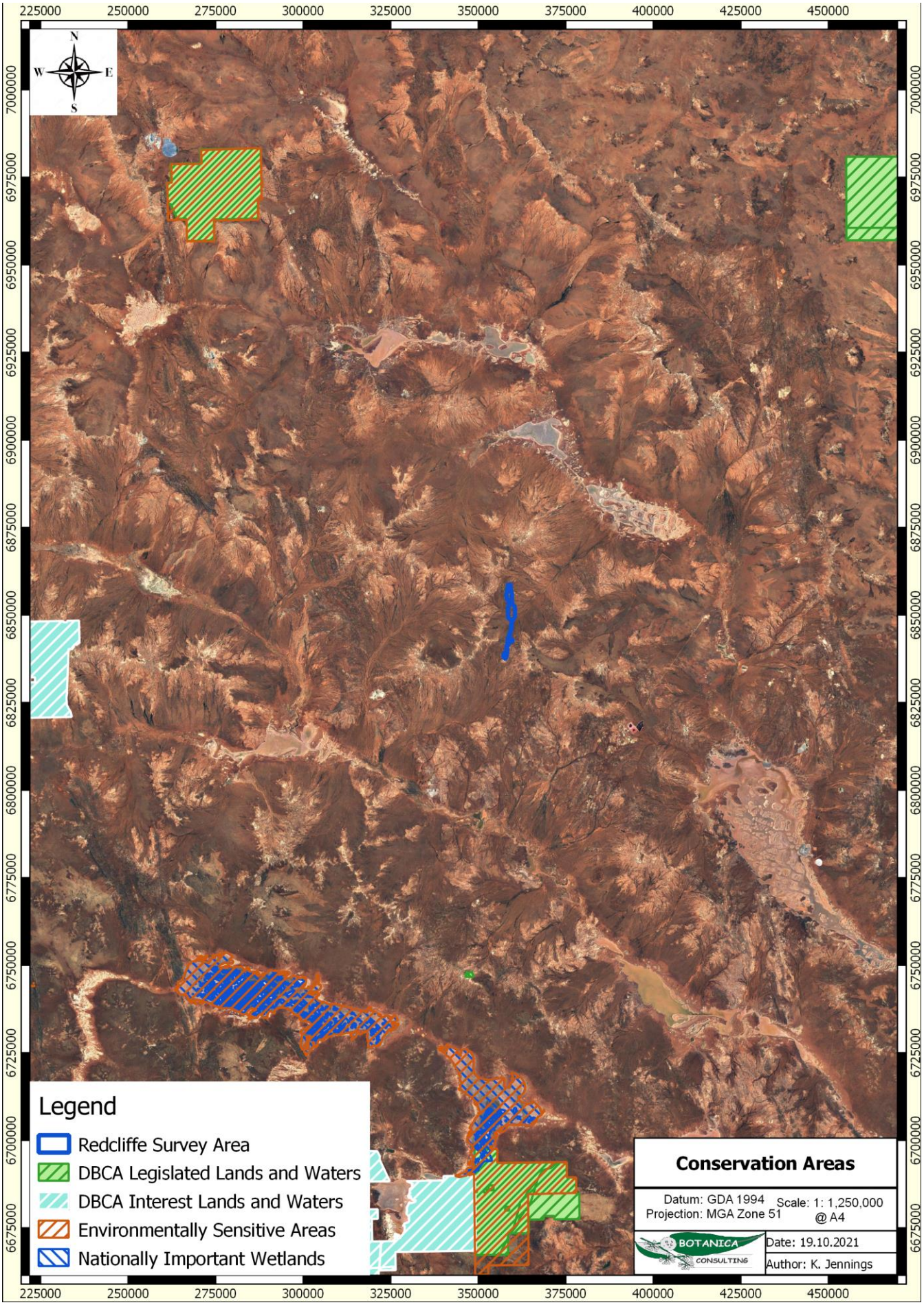


Figure 4-2: Conservation Areas

4.2 Field Assessment

4.2.1 Flora

The field survey identified 122 vascular flora taxa within the survey area. These taxa represented 62 genera across 31 families, with the most diverse families being Fabaceae (19 species), Scrophulariaceae (17 species) and Asteraceae (14 species). The most diverse genera were *Eremophila* (17 species), Acacia (14 species) and *Maireana* (six species). There were no recorded introduced (weed) species. The full field species inventory is listed in Appendix 5.

4.2.1.1 Significant Flora

According to the EPA *Environmental Factor Guideline for Flora and Vegetation* (EPA, 2016b) significant flora includes:

- flora being identified as threatened or priority species;
- locally endemic flora or flora associated with a restricted habitat type (e.g. surface water or groundwater dependent ecosystems);
- new species or anomalous features that indicate a potential new species;
- flora representative of the range of a species (particularly, at the extremes of range, recently discovered range extensions, or isolated outliers of the main range);
- unusual species, including restricted subspecies, varieties or naturally occurring hybrids; and
- flora with relictual status, being representative of taxonomic groups that no longer occur widely in the broader landscape.

No Threatened flora species were recorded within the survey area. No Priority or otherwise significant flora were recorded within the survey area.

4.2.2 Vegetation Communities

A total of eight broad-scale vegetation communities were identified within the survey area. Vegetation community descriptions and extents were determined from field survey results, aerial imagery interpretation and extrapolation of the communities. Vegetation community descriptions and extent are listed below in Table 4-3 and illustrated spatially in Figure 4-3 and Figure 4-4.

The survey found SLP-AFW1 was the most widespread vegetation type in the survey area, occupying 396.7 ha (22.9%), while B-MWS1 was the most restricted with 9.4 ha (0.5%). Species diversity averaged 34 species per quadrat. The most diverse vegetation type was QRP-AFW1 with 64 species (52.5%), while the least diverse was B-MWS1 with 11 species (9.0%).

Table 4-3: Summary of vegetation types within the survey area

Landform	Vegetation Community	Broad Floristic Formation (NVIS III)	Vegetation Description (NVIS V)	Image
Breakaway	B-AFW1 17.8 ha (1.0%)	Acacia Forests and Woodlands (MVG 6)	Low woodland of *Acacia quadrimarginea* over tall shrubland of *Acacia ramulosa* var. *linophylla/ Thryptomene decussata* and low open shrubland of *Calytrix uncinata/ Eremophila latrobei* on breakaway	
Breakaway	B-MWS1 9.4 ha (0.5%)	Mallee Woodlands and Shrublands (MVG 14)	Mid open mallee forest of *Eucalyptus carnei* over mid sparse shrubland of *Eremophila pantonii* and low shrubland of *Olearia muelleri/ Ptilotus obovatus* on breakaway	

Landform	Vegetation Community	Broad Floristic Formation (NVIS III)	Vegetation Description (NVIS V)	Image
Drainage Depression	DD-AFW1 54.5 ha (3.1%)	Acacia Forests and Woodlands (MVG 6)	Low woodland of *Acacia incurvaneura, A. tetragonophylla* and *A. burkittii* over sparse shrubland of *Eremophila citrina, Senna artemisioides* subsp. *artemisioides* and *Grevillea deflexa* over low sparse shrubland of *Ptilotus obovatus* var. *obovatus, Lepidium platypetalum* and *Roepera eremaea*	
Open Depression	OD-AFW1 330.1 ha (15.9%)	Acacia Forests and Woodlands (MVG 6)	Low open forest of *Acacia caesaneura/ A. incurvaneura* over tall shrubland of *Acacia ramulosa/ A. tetragonophylla* and low tussock grassland of *Eragrostis eriopoda* in drainage line	

Landform	Vegetation Community	Broad Floristic Formation (NVIS III)	Vegetation Description (NVIS V)	Image
Quartz Rocky Plain	QRP-AFW1 732.4 ha (42.3%)	Acacia Forests and Woodlands (MVG 6)	Low open forest of *Acacia caesaneura/ A. incurvaneura* over tall open shrubland of *Acacia ramulosa/ A. tetragonophylla* and low shrubland of *Ptilotus obovatus/* low tussock grassland of *Eragrostis eriopoda* on quartz-rocky plain	
Rocky Hillslope	RH-AFW1 22.8 ha (1.3%)	Acacia Forests and Woodlands (MVG 6)	Low open forest of *Acacia incurvaneura/ A. quadrimarginea* over tall shrubland of *Acacia ramulosa* and low shrubland of *Ptilotus obovatus*/ low tussock grassland of *Eragrostis eriopoda* on rocky hillslope	

Landform	Vegetation Community	Broad Floristic Formation (NVIS III)	Vegetation Description (NVIS V)	Image
Sand-Loam Plain	SLP-AFW1 396.7 ha (22.9%)	Acacia Forests and Woodlands (MVG 6)	Low open forest of *Acacia caesaneura/ A. incurvaneura* over mid shrubland of *Eremophila forrestii* subsp. *forrestii/ Eremophila margarethae* and low tussock grassland of *Eragrostis eriopoda* on sand-loam plain	
Sand-Loam Plain	SLP-AFW2 113.5 ha (6.6%)	Acacia Forests and Woodlands (MVG 6)	Open mallee shrubland of *Eucalyptus youngiana/* Low open forest of *Acacia caesaneura/ A. incurvaneura* over mid hummock grassland of *Triodia scariosa* on sand-loam plain	

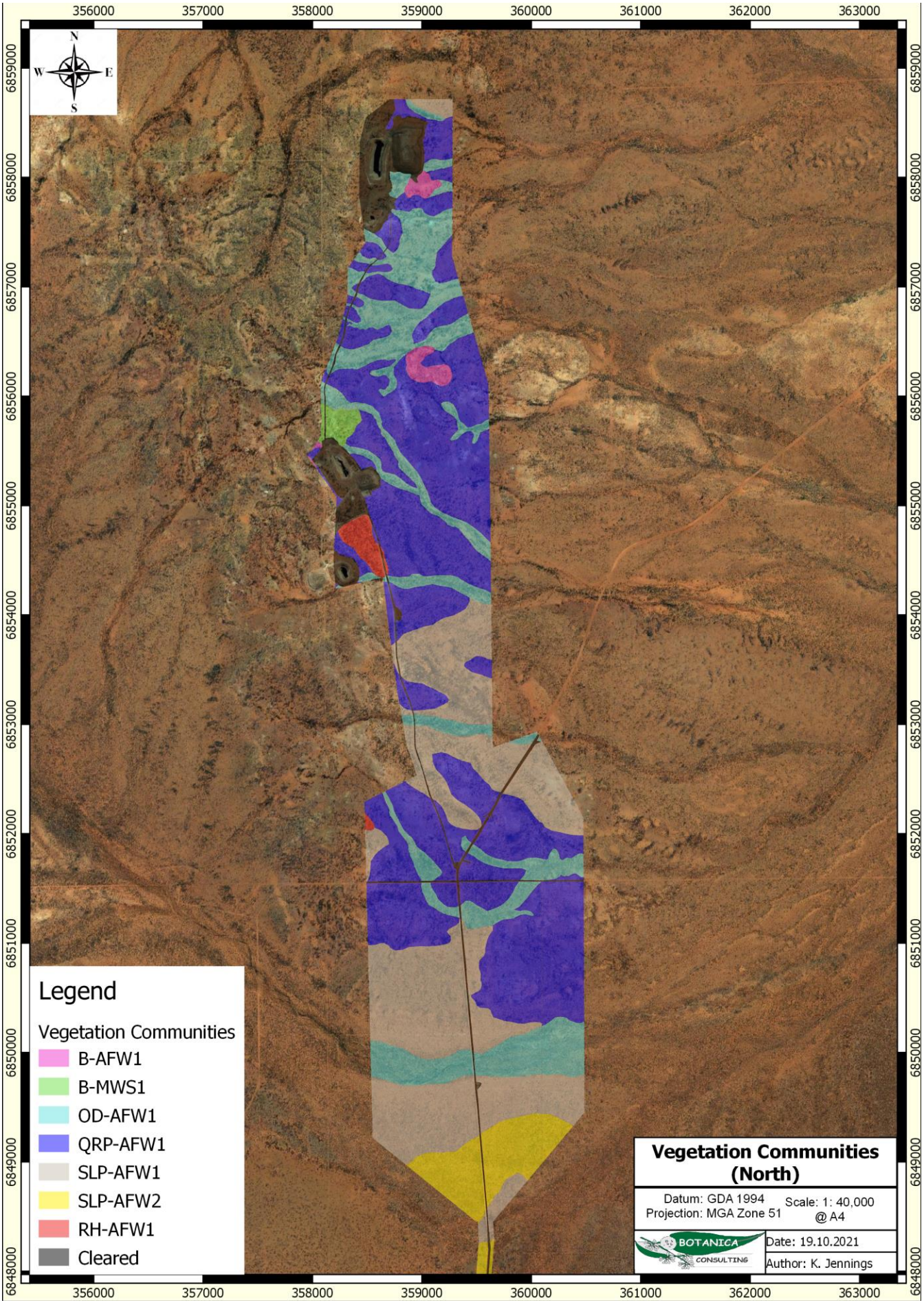


Figure 4-3: Vegetation types within the survey area (North)

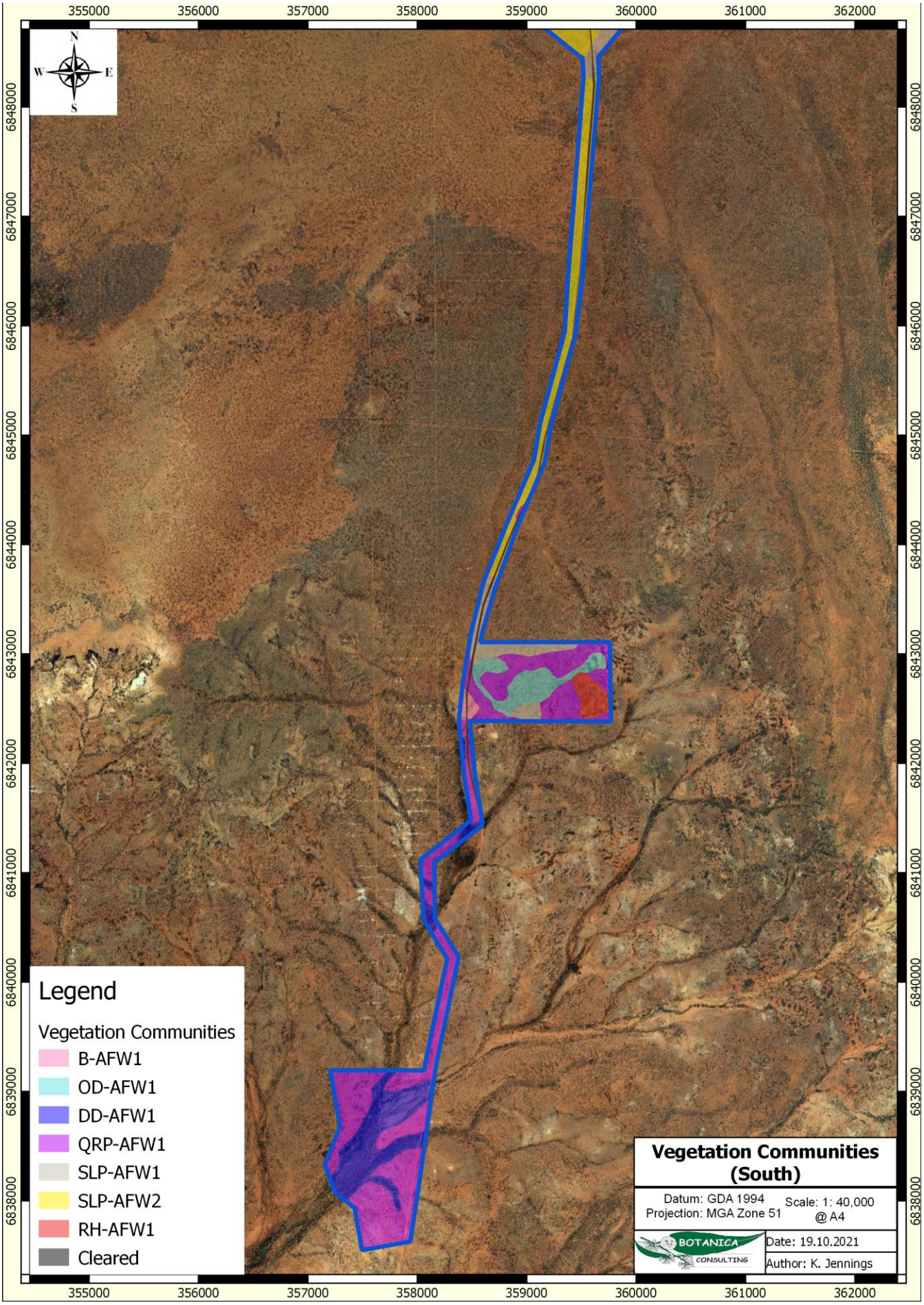


Figure 4-4: Vegetation types within the survey area (South)

4.2.3 Floristic Composition

Statistical analysis was conducted on quadrat data obtained from the survey to determine the similarities or differences in floristic composition between vegetation associations. The dendrogram, two-way table and ordination graph generated from the PATN statistical analysis is provided in Appendix 6. A list of the 44 quadrats and their respective vegetation associations are provided in Table 4-4. The PATN analysis produced a stress value of 0.1816.

Table 4-4: Vegetation communities with corresponding quadrats

Vegetation Community	Vegetation Code	Quadrats
Low open forest of *Acacia caesaneura/ A. incurvaneura* over tall open shrubland of *Acacia ramulosa/ A. tetragonophylla* and low shrubland of *Ptilotus obovatus/* low tussock grassland of *Eragrostis eriopoda* on quartz-rocky plain	QRP-AFW1	Q1, Q3, Q4, Q5, Q8, Q12, Q31, Q41
Open mallee shrubland of *Eucalyptus youngiana/* Low open forest of *Acacia caesaneura/ A. incurvaneura* over mid hummock grassland of *Triodia scariosa* on sand-loam plain	SLP-AFW2	Q19-Q27
Low open forest of *Acacia caesaneura/ A. incurvaneura* over mid shrubland of *Eremophila forrestii* subsp. *forrestii/ Eremophila margarethae* and low tussock grassland of *Eragrostis eriopoda* on sand-loam plain	SLP-AFW1	Q9-Q11, Q13, Q14, Q16-Q18, Q33, Q36, Q38, Q40, Q42
Acacia incurvaneura, A. tetragonophylla and *A. burkittii* low woodland over *Eremophila citrina, Senna artemisioides* subsp. *artemisioides* and *Grevillea deflexa* sparse shrubland over *Ptilotus obovatus* var. *obovatus, Lepidium platypetalum* and *Roepera eremaea* low sparse shrubland	DD-AFW1	Q 37, Q39, Q44
Low open forest of *Acacia caesaneura/ A. incurvaneura* over tall shrubland of *Acacia ramulosa/ A. tetragonophylla* and low tussock grassland of *Eragrostis eriopoda* in drainage line	OD-AFW1	Q7, Q29, Q30, Q32, Q34, Q35, Q43
Low woodland of *Acacia quadrimarginea* over tall shrubland of *Acacia ramulosa* var. *linophylla/ Thryptomene decussata* and low open shrubland of *Calytrix uncinata/ Eremophila latrobei* on breakaway	B-AFW1	Q2, Q28
Mid open mallee forest of *Eucalyptus carnei* over mid sparse shrubland of *Eremophila pantonii* and low shrubland of *Olearia muelleri/ Ptilotus obovatus* on breakaway	B-MWS1	Q6
Low open forest of *Acacia incurvaneura/ A. quadrimarginea* over tall shrubland of *Acacia ramulosa* and low shrubland of *Ptilotus obovatus/* low tussock grassland of *Eragrostis eriopoda* on rocky hillslope	RH-AFW1	Q7, Q31, Q32

Seven species groups were identified in the analysis (species group A to G) as shown in the two-way table (Appendix 6).

The first floristic group was characterised by species group E (see two-way table provided in Appendix 7), with an average species richness of 18 taxa per quadrat (ranged from 12 to 25 taxa per quadrat).

The second floristic group was mostly characterised by species groups B, D and E (Appendix 6). This floristic group had an average species richness of 15 taxa per quadrat.

The third floristic group was mostly characterised by species groups B and E. This floristic group had an average species richness of 14.3 taxa per quadrat (ranged from 12 to 19 taxa per quadrat).

The fourth floristic group was characterised by species groups B and C, with an average species richness of 13.8 taxa per quadrat (ranged from seven to 24 taxa per quadrat).

The fifth floristic group was characterised by species groups A and B, with an average species richness of 16.7 taxa per quadrat (ranged from 16 to 17 taxa per quadrat).

The sixth floristic group was characterised by species group B, with an average species richness of 7.5 taxa per quadrat (ranged from seven to eight taxa per quadrat).

The seventh floristic group was characterised by species groups B and F, with an average species richness of 8.2 taxa per quadrat (ranged from five to 11 taxa per quadrat).

Field based observations of vegetation type delineations were mostly supported by the results of the PATN analysis.

Species Richness and Accumulation Estimates

A total of 111 species were recorded within the 44 quadrats. The Chao 2 richness estimator provided an estimated species richness of 122 species in 60 sample sites (quadrats). A species accumulation curve was created to display the rate of species accumulation. The R^2 value (0.98) suggests that the data "fits" the species accumulation curve shown in Figure 4-5. Species accumulation ranged from 10 to two species per quadrat from 1-24 sample sites, and one species per quadrat between 25-60 sample sites. Botanica has determined that according to this data a sufficient number of quadrats were established in the survey area to adequately assess the floristic composition of the area.

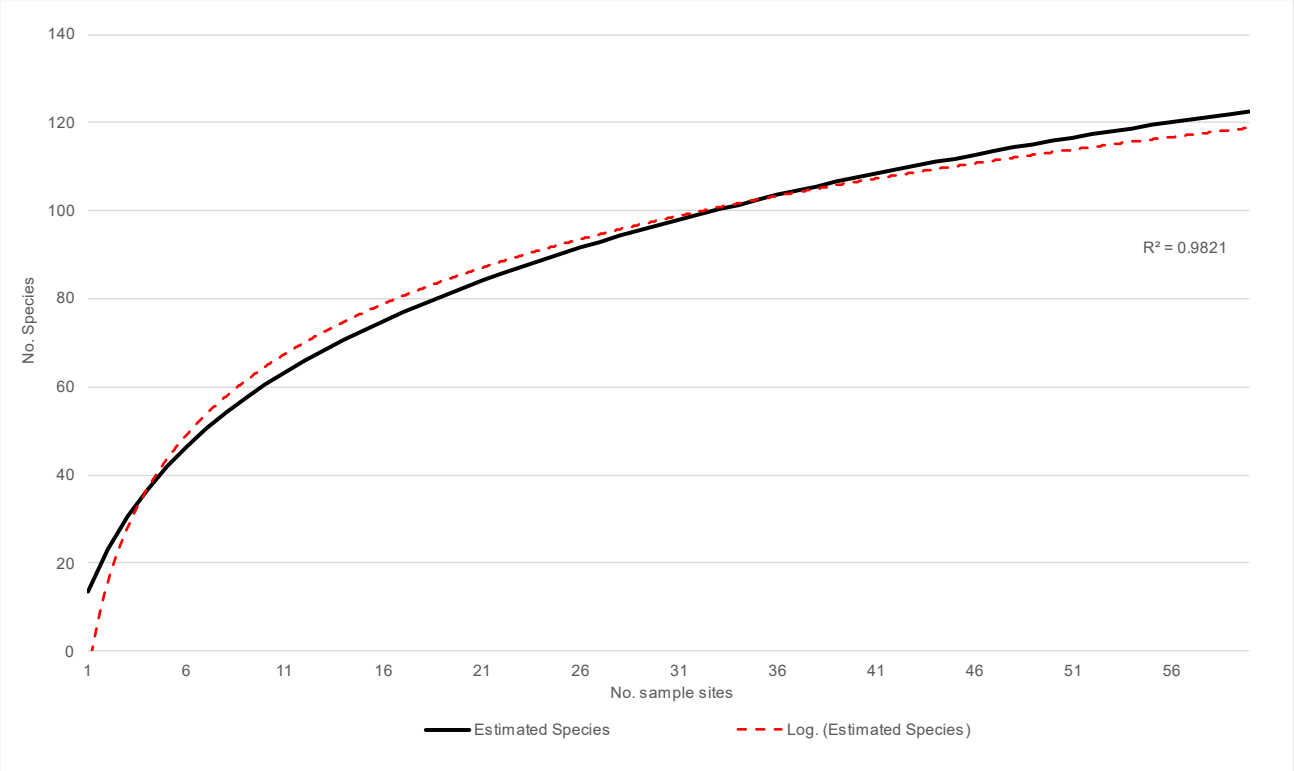


Figure 4-5: Species accumulation curve

4.2.4 Significant Vegetation

According to the EPA *Environmental Factor Guideline for Flora and Vegetation* (EPA, 2016b) significant vegetation includes:

- vegetation being identified as Threatened or Priority Ecological Communities;
- vegetation with restricted distribution;
- vegetation subject to a high degree of historical impact from threatening processes;
- vegetation which provides a role as a refuge; and
- vegetation providing an important function required to maintain ecological integrity of a significant ecosystem.

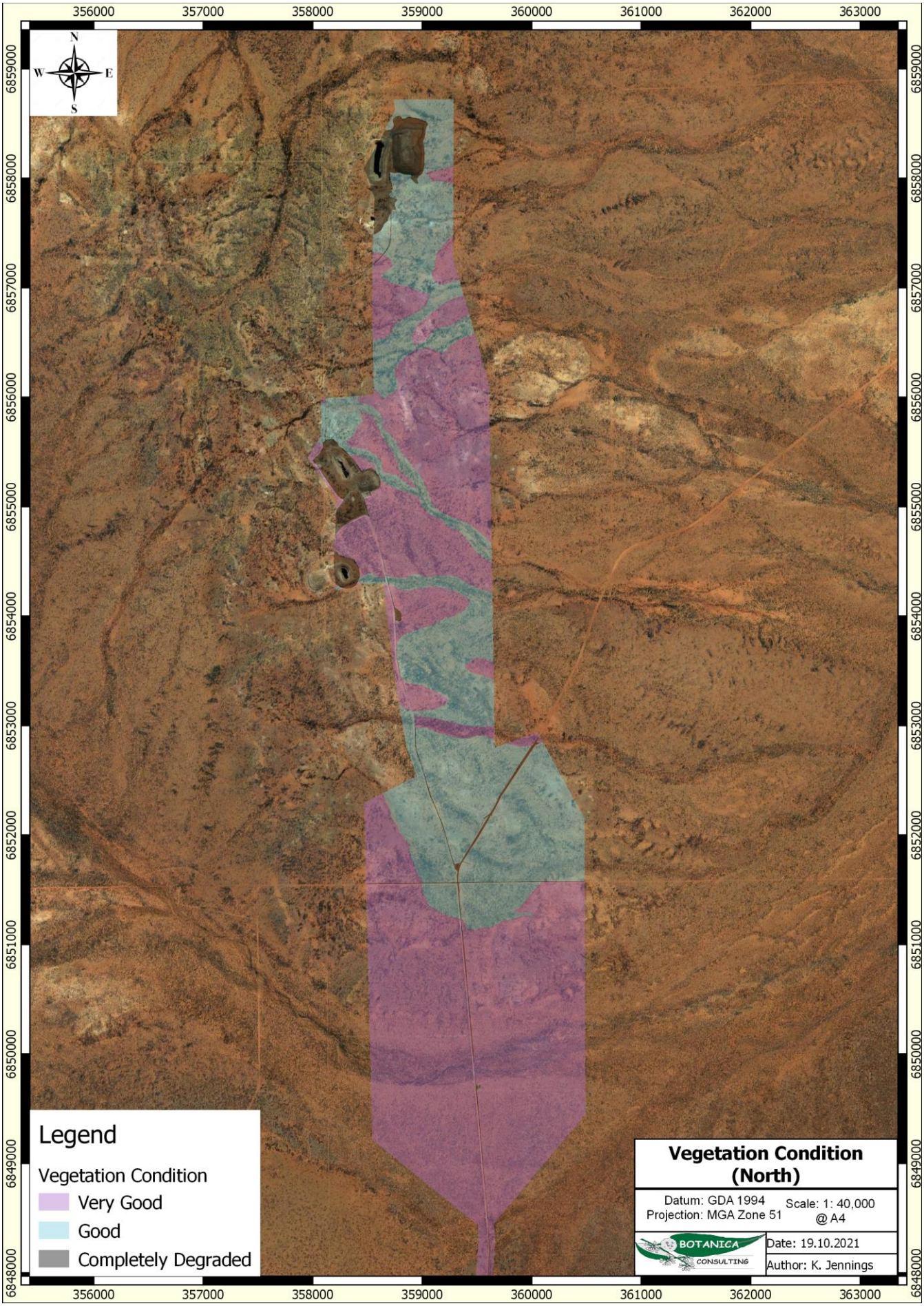
No significant vegetation as described above was identified within the survey area.

4.2.5 Vegetation Condition

Based on the vegetation condition rating scale obtained from the EPA (2016a), provided in Appendix 7, the majority of native vegetation was rated as 'good' to 'very good' (Table 4-5). 'Disturbance in the area was a result of existing mining operations and access roads. These areas were categorised as completely degraded. Vegetation condition within the survey area is shown spatially in Figure 4-6.

Table 4-5: vegetation condition within the survey area

Condition rating	Description (EPA, 2016a)	Area (ha)	Area (%)
Very Good	Relatively slight signs of damage caused by human activities such as the presence of some relatively non-aggressive weeds or occasional vehicle tracks	1,128	65 %
Good	More obvious signs of damage caused by human activity since European settlement, including historical clearing, grazing by introduced animals, changed fire regimes and the presence of aggressive weed species.	495	29%
Completely Degraded	Existing gravel extraction pits, access roads and water discharge areas	108	6%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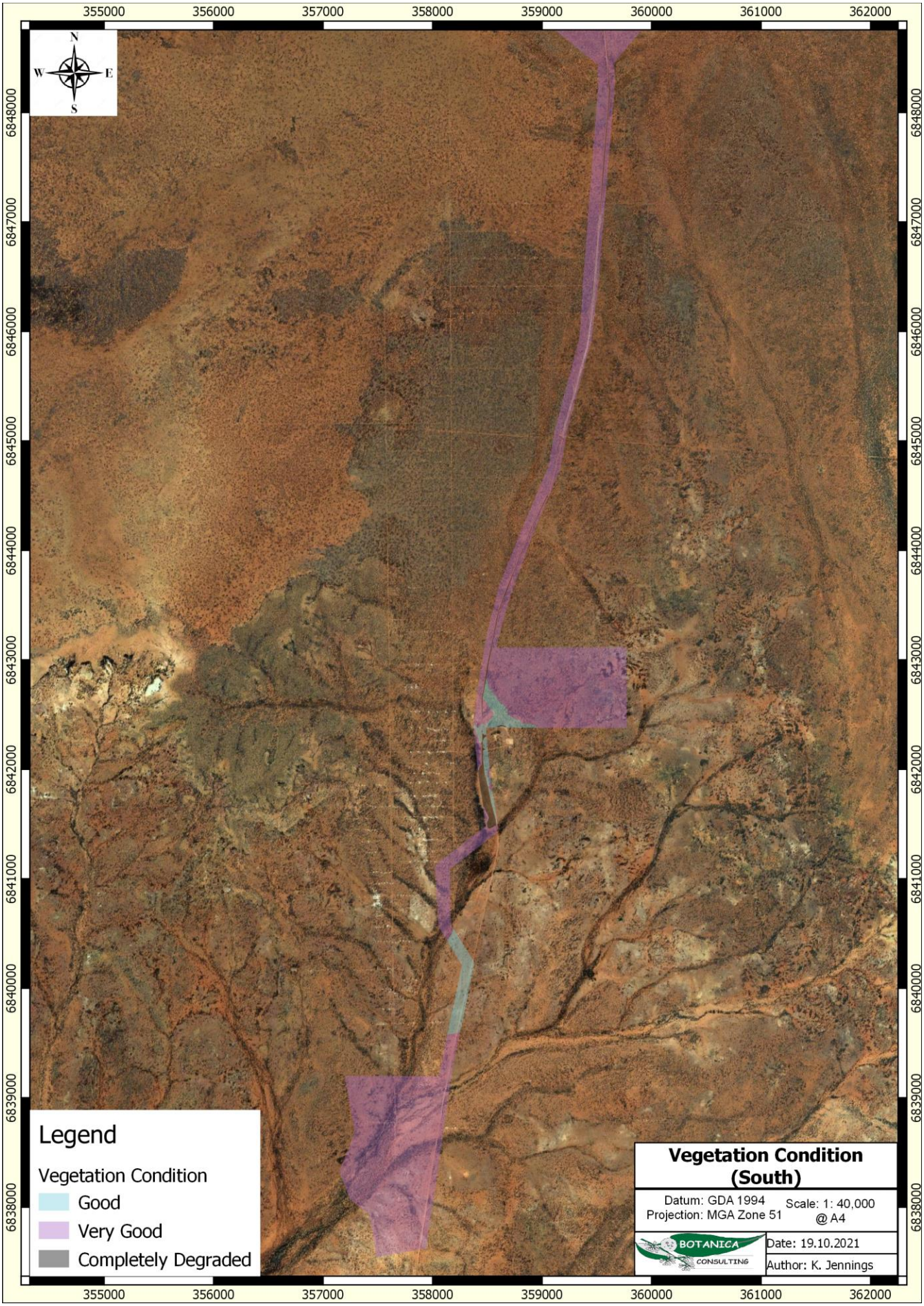
Vegetation Condition (North)
Datum: GDA 1994
Projection: MGA Zone 51
Scale: 1: 40,000 @ A4
BOTANICA CONSULTING
Date: 19.10.2021
Author: K. Jennings

Figure 4-6: Vegetation condition rating of the survey area (North)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Vegetation Condition
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Very Good
Completely Degraded
Vegetation Condition (South)
Datum: GDA 1994
Projection: MGA Zone 51
Scale: 1: 40,000 @ A4
BOTANICA CONSULTING
Date: 19.10.2021
Author: K. Jennings

Figure 4-7: Vegetation condition rating of the survey area (South)

4.3 Matters of National Environmental Significance

4.3.1 *Environment Protection and Biodiversity Conservation Act 1999*

The EPBC Act protects matters of national environmental significance and is used by the Commonwealth DAWE to list threatened taxa and ecological communities into categories based on the criteria set out in the Act (www.environment.gov.au/epbc/index.html). The Act provides a national environmental assessment and approval system for proposed developments and enforces strict penalties for unauthorised actions that may affect matters of national environmental significance. Matters of national environmental significance as defined by the Commonwealth EPBC Act include:

- Nationally threatened flora and fauna species;
- World heritage properties;
- National heritage places;
- Wetlands of international importance (often called 'Ramsar' wetlands after the international treaty under which such wetlands are listed);
- Nationally threatened ecological communities;
- Commonwealth marine area;
- The Great Barrier Reef Marine Park; and
- Nuclear actions (including uranium mining) a water resource, in relation to coal seam gas development and large coal mining development.

No matters of national environmental significance as defined by the Commonwealth EPBC Act were identified within the survey area.

4.4 Matters of State Environmental Significance

4.4.1 *Environmental Protection Act WA 1986*

The EP Act provides for the prevention, control and abatement of pollution and environmental harm, for the conservation, preservation, protection, enhancement and management of the environment. The Act is administered by The Department of Water and Environment Regulation (DWER), which is the State Government's environmental regulatory agency.

Under Section 51C of the EP Act and the *Environmental Protection (Clearing of Native Vegetation) Regulations (Regulations) WA 2004* any clearing of native vegetation in Western Australia that is not eligible for exemption under Schedule 6 of the *EP Act 1986* or under the Regulations 2004 requires a clearing permit from the DWER or DMIRS. Under Section 51A of the *EP Act 1986* native vegetation includes aquatic and terrestrial vegetation indigenous to Western Australia, and intentionally planted vegetation declared by regulation to be native vegetation, but not vegetation planted in a plantation or planted with commercial intent. Section 51A of the *EP Act 1986* defines clearing as "the killing or destruction of; the removal of; the severing or ringbarking of trunks or stems of; or the doing of substantial damage to some or all of the native vegetation in an area, including the flooding of land, the burning of vegetation, the grazing of stock or an act or activity that results in the above". Exemptions under Schedule 6 of the EP Act and the EP Regulations do not apply in ESAs as declared under Section 51B of the EP Act or TEC listed under State and Commonwealth legislation.

No evidence of the survey area containing any TEC or Threatened flora was found during the survey period. The survey area is not located within an ESA.

4.4.2 *Biodiversity Conservation Act 2016*

This Act is used by the Western Australian DBCA for the conservation and protection of biodiversity and biodiversity components in Western Australia and to promote the ecologically sustainable use of biodiversity components in the State. Taxa are classified as 'Threatened" when their populations are geographically restricted or are threatened by local processes (see following sections for Threatened definitions). Under this Act all native flora and fauna are protected throughout the State. Financial penalties are enforced under this Act if threatened species are collected without an appropriate license.

Under Section 54(1) of the BC Act, habitat is eligible for listing as critical habitat if:

a) it is critical to the survival of a threatened species or a threatened ecological community; and
b) its listing is otherwise in accordance with the ministerial guidelines.

No threatened species or critical habitat listed under the BC Act were recorded within the survey area.

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Appendix 1: Conservation Significant Species/ Communities Categories (BC Act and EPBC Act)

Definitions of Conservation Significant Species

Code	Category
State categories of Threatened and Priority species	
Threatened Species (T) Listed by order of the Minister as Threatened in the category of critically endangered, endangered or vulnerable under section 19(1), or is a rediscovered species to be regarded as Threatened species under section 26(2) of the Biodiversity Conservation Act 2016 (BC Act).	
CR	**Critically Endangered** Threatened species considered to be "facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines". Listed as critically endangered under section 19(1)(a) of the BC Act in accordance with the criteria set out in section 20 and the ministerial guidelines. Published under schedule 1 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for critically endangered fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for critically endangered flora.
EN	**Endangered** Threatened species considered to be "facing a very high risk of extinction in the wild in the near future, as determined in accordance with criteria set out in the ministerial guidelines". Listed as endangered under section 19(1)(b) of the BC Act in accordance with the criteria set out in section 21 and the ministerial guidelines. Published under schedule 2 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for endangered fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for endangered flora.
VU	**Vulnerable** Threatened species considered to be "facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines". Listed as vulnerable under section 19(1)(c) of the BC Act in accordance with the criteria set out in section 22 and the ministerial guidelines. Published under schedule 3 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for vulnerable fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for vulnerable flora.
Extinct species Listed by order of the Minister as extinct under section 23(1) of the BC Act as extinct or extinct in the wild.	
EX	**Extinct** Species where "*there is no reasonable doubt that the last member of the species has died*", and listing is otherwise in accordance with the ministerial guidelines (section 24 of the BC Act). Published as presumed extinct under schedule 4 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for extinct fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for extinct flora.
EW	**Extinct in the Wild** Species that *"is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form"*, and listing is otherwise in accordance with the ministerial guidelines (section 25 of the BC Act). Currently there are no Threatened fauna or Threatened flora species listed as extinct in the wild. If listing of a species as extinct in the wild occurs, then a schedule will be added to the applicable notice.
Specially protected species Listed by order of the Minister as specially protected under section 13(1) of the BC Act. Meeting one or more of the following categories: species of special conservation interest; migratory species; cetaceans; species subject to international agreement; or species otherwise in need of special protection. Species that are listed as Threatened species (critically endangered, endangered or vulnerable) or extinct species under the BC Act cannot also be listed as Specially Protected species.	

Code	Category
IA	**International Agreement/ Migratory** Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth; and listing is otherwise in accordance with the ministerial guidelines (section 15 of the BC Act). Includes birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and fauna subject to the *Convention on the Conservation of Migratory Species of Wild Animals* (Bonn Convention), an environmental treaty under the United Nations Environment Program. Migratory species listed under the BC Act are a subset of the migratory animals, that are known to visit Western Australia, protected under the international agreements or treaties, excluding species that are listed as Threatened species. Published as migratory birds protected under an international agreement under schedule 5 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.
CD	**Species of special conservation interest** Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as Threatened, and listing is otherwise in accordance with the ministerial guidelines (section 14 of the BC Act). Published as conservation dependent fauna under schedule 6 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.
OS	**Other specially protected species** Fauna otherwise in need of special protection to ensure their conservation, and listing is otherwise in accordance with the ministerial guidelines (section 18 of the BC Act). Published as other specially protected fauna under schedule 7 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.
Priority species Possibly Threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of Priority for survey and evaluation of conservation status so that consideration can be given to their declaration as Threatened Fauna or Flora. Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring. Assessment of Priority codes is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations.	
P1	**Priority 1: Poorly-known species** Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.
P2	**Priority 2: Poorly-known species** Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.
P3	**Priority 3: Poorly-known species** Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations 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 locations but do not meet adequacy of survey requirements

Code	Category
	and known threatening processes exist that could affect them. Such species are in need of further survey.
P4	**Priority 4: Rare, Near Threatened and other species in need of monitoring** (a) 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. (b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for vulnerable but are not listed as Conservation Dependent. (c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.
Commonwealth categories of Threatened species	
EX	**Extinct** Taxa where there is no reasonable doubt that the last member of the species has died.
EW	**Extinct in the Wild** Taxa where it is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
CR	**Critically Endangered** Taxa that are facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
EN	**Endangered** Taxa which are not critically endangered and is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.
VU	**Vulnerable** Taxa which are not critically endangered or endangered and is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
CD	**Conservation Dependent** Taxa which are the focus of a specific conservation program the cessation of which would result in the species becoming vulnerable, endangered or critically endangered; or (b) the following subparagraphs are satisfied: (i) the species is a species of fish; (ii) the species is the focus of a plan of management that provides for actions necessary to stop the decline of, and support the recovery of, the species so that its chances of long term survival in nature are maximised; (iii) the plan of management is in force under a law of the Commonwealth or of a State or Territory; (iv) cessation of the plan of management would adversely affect the conservation status of the species.

Definitions of conservation significant communities

Category Code	Category
State categories of Threatened Ecological Communities (TEC)	
PD	**Presumed Totally Destroyed** An ecological community will be listed as Presumed Totally Destroyed if there are no recent records of the community being extant and either of the following applies: • records within the last 50 years have not been confirmed despite thorough searches or known likely habitats or; • all occurrences recorded within the last 50 years have since been destroyed.
CR	**Critically Endangered** An ecological community will be listed as Critically Endangered when it has been adequately surveyed and is found to be facing an extremely high risk of total destruction in the immediate future, meeting any one of the following criteria: The estimated geographic range and distribution has been reduced by at least 90% and is either continuing to decline with total destruction imminent, or is unlikely to be substantially rehabilitated in the immediate future due to modification; The current distribution is limited i.e. highly restricted, having very few small or isolated occurrences, or covering a small area; The ecological community is highly modified with potential of being rehabilitated in the immediate future.
EN	**Endangered** An ecological community will be listed as Endangered when it has been adequately surveyed and is not Critically Endangered but is facing a very high risk of total destruction in the near future. The ecological community must meet any one of the following criteria: The estimated geographic range and distribution has been reduced by at least 70% and is either continuing to decline with total destruction imminent in the short-term future, or is unlikely to be substantially rehabilitated in the short-term future due to modification; The current distribution is limited i.e. highly restricted, having very few small or isolated occurrences, or covering a small area; The ecological community is highly modified with potential of being rehabilitated in the short-term future.
VU	**Vulnerable** An ecological community will be listed as Vulnerable when it has been adequately surveyed and is not Critically Endangered or Endangered but is facing high risk of total destruction in the medium to long term future. The ecological community must meet any one of the following criteria: The ecological community exists largely as modified occurrences that are likely to be able to be substantially restored or rehabilitated; The ecological community may already be modified and would be vulnerable to threatening process, and restricted in range or distribution; The ecological community may be widespread but has potential to move to a higher threat category due to existing or impending threatening processes.
Commonwealth categories of Threatened Ecological Communities (TEC)	
CE	**Critically Endangered** If, at that time, an ecological community is facing an extremely high risk of extinction in the wild in the immediate future (indicative timeframe being the next 10 years).
EN	**Endangered** If, at that time, an ecological community is not critically endangered but is facing a very high risk of extinction in the wild in the near future (indicative timeframe being the next 20 years).
VU	**Vulnerable** If, at that time, an ecological community is not critically endangered or endangered, but is facing a high risk of extinction in the wild in the medium–term future (indicative timeframe being the next 50 years).

Category Code	Category
Priority Ecological Communities (PEC)	
P1	**Poorly-known ecological communities** Ecological communities with apparently few, small occurrences, all or most not actively managed for conservation (e.g. within agricultural or pastoral lands, urban areas, active mineral leases) and for which current threats exist.
P2	**Poorly-known ecological communities** Communities that are known from few small occurrences, all or most of which are actively managed for conservation (e.g. within national parks, conservation parks, nature reserves, State forest, un-allocated Crown land, water reserves, etc.) and not under imminent threat of destruction or degradation.
P3	**Poorly known ecological communities** Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or: Communities known from a few widespread occurrences, which are either large or within significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat, or; Communities made up of large, and/or widespread occurrences, that may or not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing and inappropriate fire regimes.
P4	**Ecological communities that are adequately known, rare but not threatened** or meet criteria for near threatened, or that have been recently removed from the threatened list. These communities require regular monitoring.
P5	**Conservation Dependent ecological communities** Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.

Appendix 2: Potentially Occurring Introduced (Weed) Flora Species

Family	Taxon	Common Name	WAOL Status	Control Category	WONS
Brassicaceae	*Carrichtera annua*	Ward's Weed	Permitted - s11	No Control Category	No
Cactaceae	*Cylindropuntia* spp.	Prickly Pears	Declared Pest - s22(2)	C3 Management, Whole of State	Yes
Cucurbitaceae	*Cucumis myriocarpus* subsp. *myriocarpus*	-	Permitted - s11	No Control Category	No
Geraniaceae	*Erodium cicutarium*	Common Storksbill	Permitted - s11	No Control Category	No
Poaceae	*Cenchrus ciliaris*	Buffel Grass	Permitted - s11	No Control Category	No
Primulaceae	*Lysimachia arvensis*	Pimpernel	Permitted - s11	No Control Category	No
Tamaricaceae	*Tamarix aphylla*	Athel Tamarisk	Exempt	No Control Category	Yes

Appendix 3: Quadrat locations (NW Corner)(GDA94, Zone 51J))

Quadrat	Easting	Northing
Q1	359097	6858219
Q2	358848	6857865
Q3	359156	6857059
Q4	358754	6856686
Q5	359327	6856060
Q6	358295	6855727
Q7	358336	6854799
Q8	359034	6854349
Q9	359432	6853727
Q10	359317	6853249
Q11	359295	6852544
Q12	358666	6851906
Q13	360091	6852450
Q14	359131	6851272
Q15	359161	6850654
Q16	360077	6850161
Q17	360183	6851072
Q18	358975	6849765
Q19	360195	6849655
Q20	359106	6849149
Q21	359536	6848231
Q22	359447	6847149
Q23	359409	6846651
Q24	359354	6845993
Q25	359203	6845373
Q26	358996	6844609
Q27	358718	6843946
Q28	358519	6842658
Q29	359229	6843002
Q30	359309	6842776
Q31	359506	6842463
Q32	359611	6842709
Q33	359026	6842609
Q34	359002	6842890
Q35	358616	6842949
Q36	357855	6839039
Q37	357587	6838836
Q38	357441	6839178
Q39	357392	6838576
Q40	357840	6838583
Q41	357813	6838381
Q42	357549	6837978
Q43	357757	6837753
Q44	358357	6841293

Appendix 4: Significant Flora Likelihood Assessment

DBCA Rank	Taxon	Habitat	Comments	Likelihood
P1	*Acacia websteri*	Red sand, clay or loam. Low-lying areas, flats.	Recorded within 40 km, habitat may be present	Possible
	Philotheca tubiflora	Rocky rises & hills, outcrops	Recorded within 40 km, habitat may be present	Possible
	Stenanthemum patens	Rocky hillside.	Recorded within 40 km, habitat may be present	Possible
P3	*Acacia* sp. Marshall Pool (G. Cockerton 3024)	-	Little known, records within 30km.	Possible
	Calytrix praecipua	Skeletal sandy soils over granite or laterite. Breakaways, outcrops.	Recorded within 40 km, habitat may be present	Possible
	Cratystylis centralis	Red sandy loam with ironstone gravel. Flat plains, breakaway country.	Recorded within 40 km, habitat may be present	Possible
	Eremophila annosicaulis	On stony loams (ironstone laterite).	Recorded within 40 km, habitat may be present	Possible
	Eremophila shonae subsp. *diffusa*	Stony yellow or red sandy soils	Recorded within 10 km, habitat may be present	Possible
	Eremophila simulans subsp. *megacalyx*	-	Recorded within 20 km, habitat may be present	Possible
	Hybanthus floribundus subsp. *chloroxanthus*	Dark red-brown soil, never sandy, rich in iron oxide, laterite. Rocky areas, creek banks, along drainage lines.	Recorded within 40 km, habitat may be present	Possible
P4	*Hemigenia exilis*	Laterite. Breakaways, slopes.	Recorded within 40 km, habitat likely to be present	Likely

Appendix 5: List of species identified within each vegetation community

Family	Taxon	B-AFW1	B-MWS1	DD-AFW1	OD-AFW1	QRP-AFW1	RH-AFW1	SLP-AFW2	SLP-AF1
Amaranthaceae	*Ptilotus aervoides (A)*					X			
	Ptilotus exaltatus					X			
	Ptilotus helipteroides				X	X	X		
	Ptilotus obovatus var. *obovatus*	X		X	X	X	X		X
	Ptilotus schwartzii	X			X	X	X		X
Apocynaceae	*Leichardtia australis*	X		X	X	X	X		X
Asparagaceae	*Thysanotus manglesii*							X	
Asteraceae	*Angianthus milnei (A)*				X				
	Brachyscome ciliaris (A)				X				X
	Bulbine semibarbata (A)			X					
	Calotis multicaulis (A)					X			
	Cephalipterum drummondii (A)					X			X
	Cratystylis subspinescens					X			
	Helipterum craspedioides (A)							X	
	Lemooria burkittii (A)					X			X
	Olearia muelleri					X			
	Podolepis capillaris (A)					X			
	Podotheca wilsonii (A)				X				
	Rhodanthe charsleyae (A)			X					X
	Rhodanthe chlorocephala (A)								X
	Rhodanthe chlorocephala subsp. *rosea (A)*				X		X		
Brassicaceae	*Lepidium platypetalum*			X					
Casuarinaceae	*Casuarina pauper*	X				X	X		

Family	Taxon	B-AFW1	B-MWS1	DD-AFW1	OD-AFW1	QRP-AFW1	RH-AFW1	SLP-AFW2	SLP-AF1
Chenopodiaceae	*Atriplex bunburyana*					X			
	Enchylaena tomentosa			X					X
	Maireana convexa								X
	Maireana georgei			X	X	X	X		X
	Maireana pyramidata								X
	Maireana sedifolia					X			
	Maireana trichoptera					X			
	Maireana triptera			X	X		X		X
	Rhagodia eremaea		X	X	X	X	X	X	X
	Sclerolaena densiflora					X			
	Sclerolaena diacantha					X			
Convolvulaceae	*Convolvulus remotus*			X					
	Duperreya commixta								X
Euphorbiaceae	*Euphorbia boophthona (A)*					X			
Fabaceae	*Acacia aptaneura*					X			X
	Acacia ayersiana			X	X	X	X		X
	Acacia burkittii			X		X	X		X
	Acacia caesaneura		X	X	X	X	X	X	X
	Acacia craspedocarpa	X							X
	Acacia effusifolia							X	
	Acacia incurvaneura		X	X	X	X	X	X	X
	Acacia kempeana					X	X		
	Acacia mulganeura	X			X	X			X
	Acacia oswaldii					X			
	Acacia quadrimarginea	X			X	X	X		

Family	Taxon	B-AFW1	B-MWS1	DD-AFW1	OD-AFW1	QRP-AFW1	RH-AFW1	SLP-AFW2	SLP-AF1
	Acacia ramulosa				X		X	X	X
	Acacia tetragonophylla			X	X	X	X	X	X
	Acacia youngiana							X	
	Senna artemisioides subsp. *artemisioides*			X					X
	Senna artemisioides subsp. *filifolia*			X		X	X		X
	Senna cardiosperma					X			
	Senna charlesiana								X
	Senna manicula								X
Frankeniaceae	*Frankenia georgei*					X			
Geraniaceae	*Erodium crinitum (A)*			X		X			
Goodeniaceae	*Brunonia australis*							X	
	Goodenia macroplectra (A)				X	X	X		
	Goodenia peacockiana (A)			X					
	Goodenia rosea (A)			X		X		X	X
	Goodenia xanthosperma (A)					X		X	X
	Scaevola spinescens	X			X	X	X		X
Haloragaceae	*Haloragis odontocarpa*			X					
Hemerocallidaceae	*Dianella revoluta*		X					X	X
Lamiaceae	*Teucrium teucriiflorum*				X	X		X	X
Loranthaceae	*Amyema fitzgeraldii*					X			
Malvaceae	*Abutilon otocarpum*							X	
	Androcalva luteiflora							X	
	Brachychiton gregorii				X				
	Sida calyxhymenia	X			X	X	X	X	X

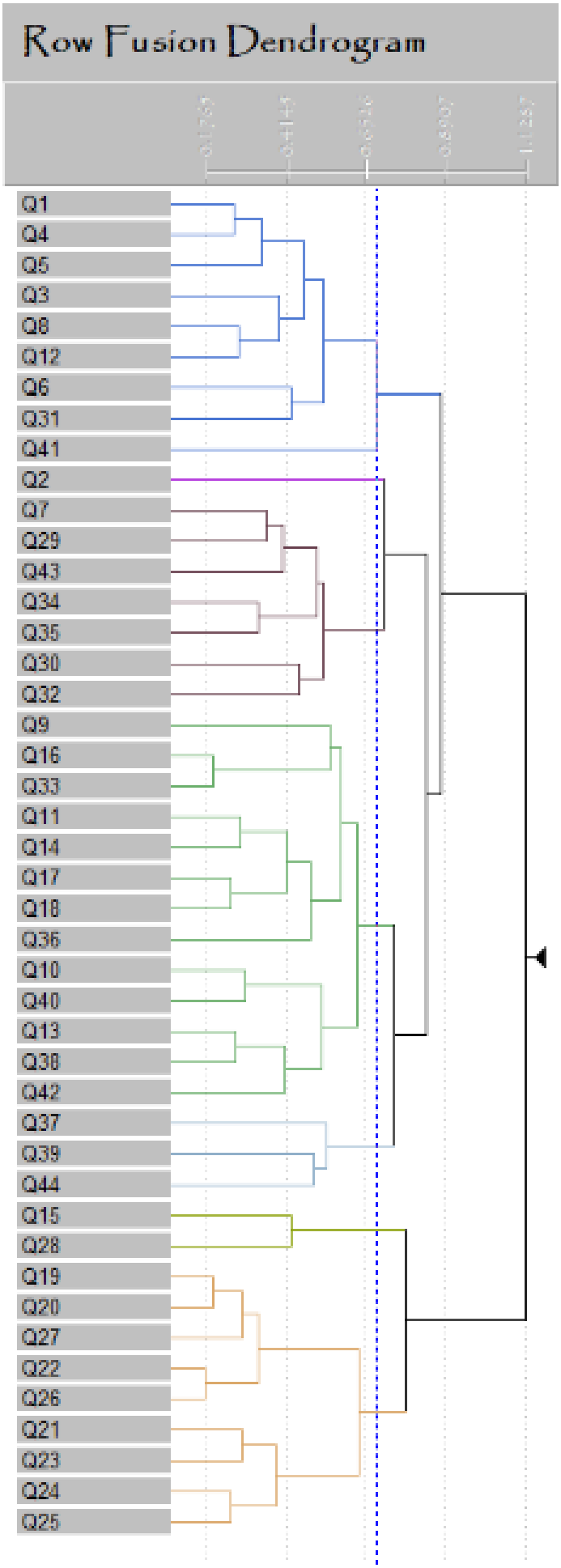
Family	Taxon	B-AFW1	B-MWS1	DD-AFW1	OD-AFW1	QRP-AFW1	RH-AFW1	SLP-AFW2	SLP-AF1
	Sida sp. Excedentifolia (J.L. Egan 1925)					X	X		X
	Sida sp. Golden calyces glabrous (H.N. Foote 32)	X				X			
Montiaceae	*Calandrinia balonensis*			X		X			
	Calandrinia eremaea								X
Myrtaceae	*Calytrix erosipetala*	X							
	Eucalyptus carnei					X			
	Eucalyptus kingsmillii		X					X	
	Eucalyptus lucasii				X				
	Eucalyptus youngiana							X	
	Thryptomene decussata		X						
Pittosporaceae	*Pittosporum angustifolium*					X			
Plantaginaceae	*Plantago drummondii (A)*								X
Poaceae	*Aristida contorta (A)*	X							
	Cymbopogon ambiguus	X							
	Enneapogon caerulescens					X			
	Eriachne maculata (A)				X				
	Eriachne scleroides (A)					X			
	Monacantha paradoxa				X				
	Triodia rigidissima							X	
Proteaceae	*Grevillea acuaria*					X			
	Grevillea berryana			X					
	Grevillea deflexa			X					
	Hakea kippistiana								X

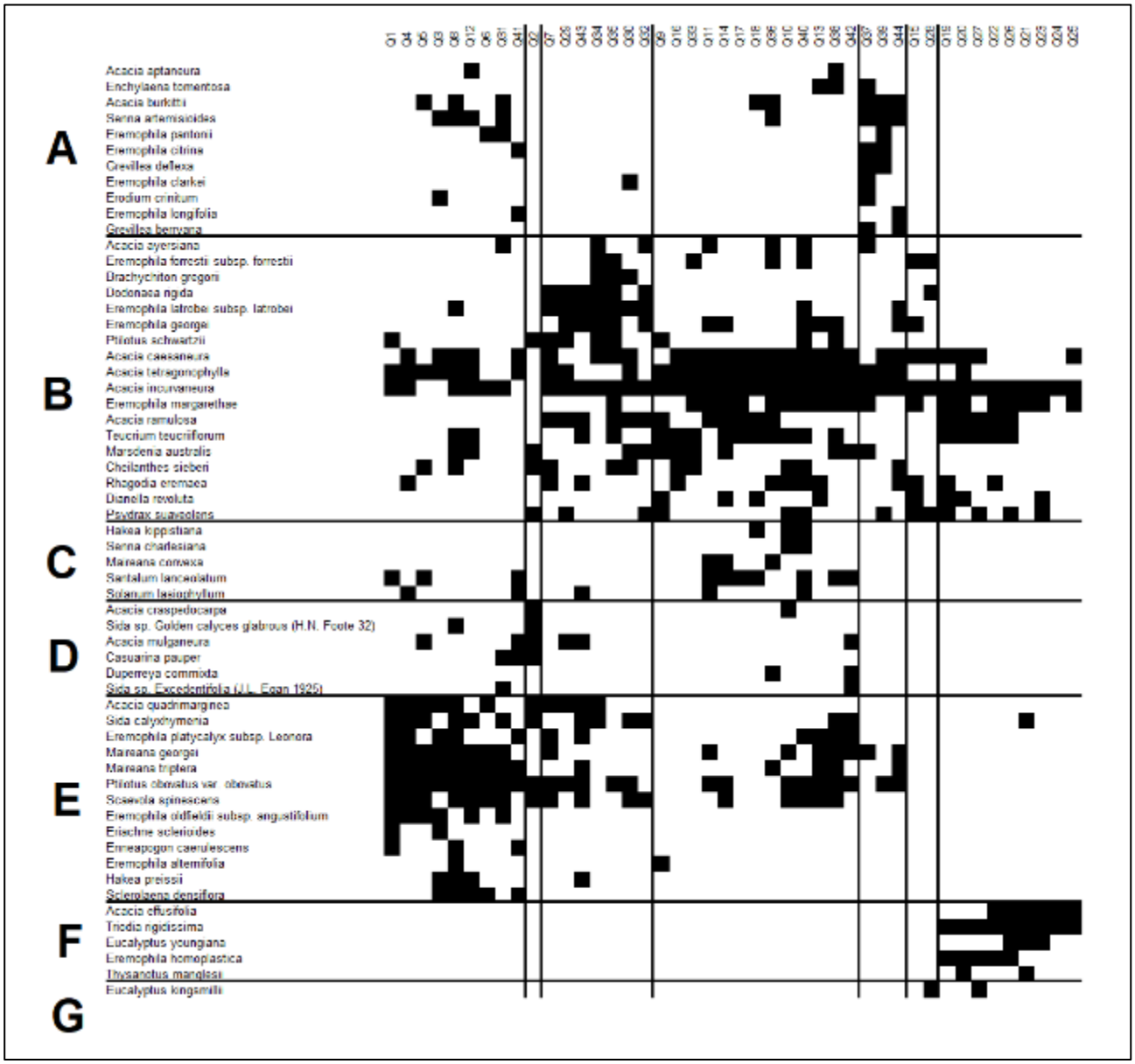
Family	Taxon	B-AFW1	B-MWS1	DD-AFW1	OD-AFW1	QRP-AFW1	RH-AFW1	SLP-AFW2	SLP-AF1
	Hakea preissii				X	X			
Pteridaceae	*Cheilanthes sieberi*	X		X	X		X		X
Rubiaceae	*Psydrax latifolia*				X		X		
	Psydrax suaveolens	X	X	X	X		X	X	X
Santalaceae	*Santalum lanceolatum*					X			X
	Santalum spicatum					X			
Sapindaceae	*Dodonaea rigida*		X		X		X		
Scrophulariaceae	*Eremophila alternifolia*					X			X
	Eremophila citrina			X		X			
	Eremophila clarkei			X	X				
	Eremophila eriocalyx				X		X		
	Eremophila forrestii subsp. *forrestii*		X		X				X
	Eremophila georgei		X	X	X		X		X
	Eremophila gilesii								X
	Eremophila granitica	X							
	Eremophila homoplastica							X	
	Eremophila latrobei subsp. *latrobei*			X	X	X	X		X
	Eremophila longifolia			X		X			
	Eremophila malacoides					X			
	Eremophila margarethae		X	X	X			X	X
	Eremophila oldfieldii subsp. *angustifolium*					X	X		
	Eremophila oppositifolia								
	Eremophila pantonii			X		X	X		

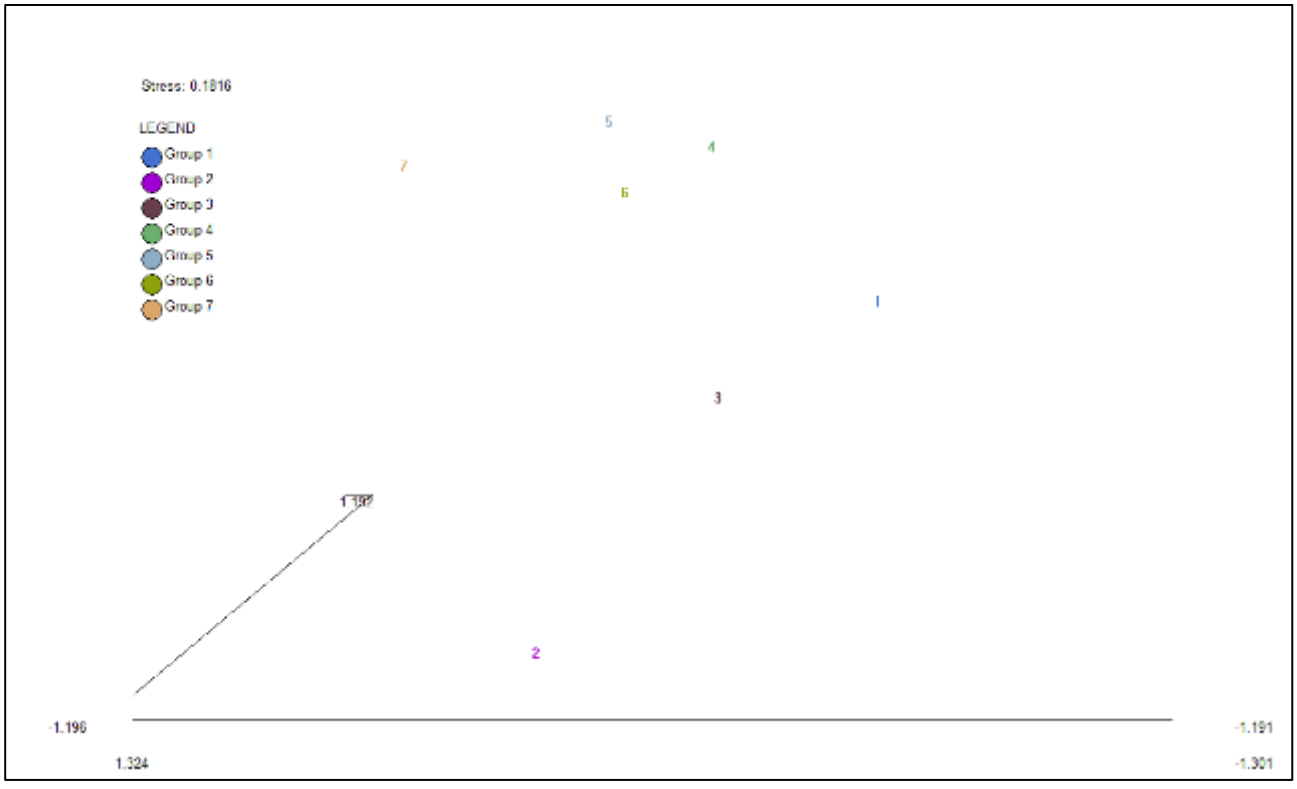
Family	Taxon	B-AFW1	B-MWS1	DD-AFW1	OD-AFW1	QRP-AFW1	RH-AFW1	SLP-AFW2	SLP-AF1
	Eremophila platycalyx subsp. Leonora				X	X	X		X
Solanaceae	*Solanum lasiophyllum*				X	X			X
Zygophyllaceae	*Roepera eremaea (A)*			X	X	X	X		X
	Zygophyllum eremaeum (A)					X	X		

(A) Denotes annual species

Appendix 6: PATN Analysis




A
Acacia aptaneura
Enchylaena tomentosa
Acacia burkittii
Senna artemisioides
Eremophila pantonii
Eremophila citrina
Grevillea dellexa
Eremophila clarkei
Erodium crinitum
Eremophila longifolia
Grevillea berryana
B
Acacia ayersiana
Eremophila forrestii subsp. forrestii
Brachychiton gregorii
Dodonaea ngida
Eremophila latrobei subsp. latrobei
Eremophila georgei
Ptilotus schwartzii
Acacia caesaneura
Acacia tetragonophylla
Acacia incurvaneura
Eremophila margarethae
Acacia ramulosa
Teucrium teucriiforum
Marsdenia australis
Cheilanthes sieberi
Rhagodia eremaea
Dianella revoluta
Paydrax suaveolens
C
Hakea lorquinsiana
Senna charlesiana
Maireana convexa
Santalum lanceolatum
Solanum lasiophyllum
D
Acacia craspedocarpa
Sida sp. Golden calyces glabrous (H.N. Foote 32)
Acacia mulganeura
Casuarina pauper
Dysphania commixta
Sida sp. Excedentifolia (J.L. Egan 1925)
E
Acacia quadrimarginea
Sida calyxhymenia
Eremophila platycalyx subsp. Leonora
Maireana georgei
Maireana triptera
Ptilotus obovatus var. obovatus
Scaevola spinescens
Eremophila oldfieldii subsp. angustifolium
Eriachne scleroides
Enneapogon caerulescens
Eremophila alternifolia
Hakea preissii
Sclerolaena densiflora
F
Acacia effusifolia
Triodia irritissima
Eucalyptus youngiana
Eremophila homoplastica
Thysanotus manglesii
G
Eucalyptus longicornis


Stress: 0.1816
LEGEND
Group 1
Group 2
Group 3
Group 4
Group 5
Group 6
Group 7
5
4
7
6
1
3
1.197
2
-1.196
-1.191
1.324
-1.301

Appendix 7: Vegetation Condition Rating

Vegetation Condition Rating	South West and Interzone Botanical Provinces	Eremaean and Northern Botanical Provinces
Pristine	Pristine or nearly so, no obvious signs of disturbance or damage caused by human activities since European settlement.	N/A
Excellent	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species. Damage to trees caused by fire, the presence of non-aggressive weeds and occasional vehicle tracks.	Pristine or nearly so, no obvious signs of damage caused by human activities since European settlement.
Very Good	Vegetation structure altered, obvious signs of disturbance. Disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.	Some relatively slight signs of damage caused by human activities since European settlement. For example, some signs of damage to tree trunks caused by repeated fire, the presence of some relatively non-aggressive weeds, or occasional vehicle tracks.
Good	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.	More obvious signs of damage caused by human activity since European settlement, including some obvious impact on the vegetation structure such as that caused by low levels of grazing or slightly aggressive weeds.
Poor	N/A	Still retains basic vegetation structure or ability to regenerate it after very obvious impacts of human activities since European settlement, such as grazing, partial clearing, frequent fires or aggressive weeds.
Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds at high density, partial clearing, dieback and grazing.	Severely impacted by grazing, very frequent fires, clearing or a combination of these activities. Scope for some regeneration but not to a state approaching good condition without intensive management. Usually with a number of weed species present including very aggressive species.
Completely Degraded	The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native trees and shrubs.	Areas that are completely or almost completely without native species in the structure of their vegetation; i.e. areas that are cleared or 'parkland cleared' with their flora comprising weed or crop species with isolated native trees or shrubs.

Appendix 8: Quadrat Data Sheets

Project Name: Dacian		
Date: 13/07/2021	**Botanist:** JW/JJ	**Photo (NW corner):** 185-187
Quadrat: Q1	**Quadrat size:** 50m x 50m	**Waypoint (NW corner):** 31
Coordinates (GDA94): 51 J 359097 6858219		
Aspect: SW	**Fire (yrs):** >20	**Condition rating:** Very Good
Landform: Flat		
Coarse fragments on the surface: Quartz, ironstone/ 50-90%/ 20-60mm		
Rock outcrop (abundance/runoff): Nil/ slow		
Soil (profile/field texture/soil surface): Red-brown/ Clay Loam		
Cover leaf litter: 20%		
Cover bare ground: 70%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form:** Shrub	**Growth form:** Shrub
Height: 5-12 m	**Height:** 1-3 m	**Height:** 0.5-1 m
Crown cover: 10-30%	**Crown cover:** <10%	**Crown cover:** <10%
Dominant taxa		
Acacia incurvaneura	*Eremophila oldfieldii* subsp. *angustifolia*	*Ptilotus obovatus* var. *obovatus*
Other Taxa		
Acacia quadrimarginea	*Eremophila platycalyx*	*Maireana triptera*
Santalum lanceolatum	*Sida calyxhymenia*	*Maireana georgei*
	Senna cardiosperma	*Ptilotus schwartzii*
	Scaevola spinescens	*Ptilotus helipteroides*
	Acacia tetragonophylla	*Roepera eremaea*
		Eriachne sclerioides
		Marsdenia australis
		Goodenia peacockiana
		Enneapogon caerulescens

Project Name: Dacian		
Date: 13/07/2021	**Botanist:** JW/JJ	**Photo (NW corner):** 194-196
Quadrat: Q2	**Quadrat size:** 50m x 50m	**Waypoint (NW corner):** 37
Coordinates (GDA94): 51 J 358848 6857865		
Aspect: SW	**Fire (yrs):** >20	**Condition rating:** Very Good
Landform: Midslope		
Coarse fragments on the surface: Laterite/ 50-90%/ 6-20 mm		
Rock outcrop (abundance/runoff): Nil/ rapid		
Soil (profile/field texture/soil surface): Red-brown/ Clay Loam		
Cover leaf litter: 10%		
Cover bare ground: 60%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form:** Shrub	**Growth form:** Shrub
Height: 3-5 m	**Height:** 0.5-1 m	**Height:** 0.5-1 m
Crown cover: 30-70%	**Crown cover:** 10-30%	**Crown cover:** <10%
Dominant taxa		
Acacia mulganeura	*Calytrix erosipetala*	*Ptilotus obovatus* var. *obovatus*
Other Taxa		
Acacia quadrimarginea	*Dodonaea rigida*	*Aristida contorta*
Casuarina pauper	*Sida calyxhymenia*	*Cymbopogon ambiguus*
	Acacia craspedocarpa	*Ptilotus schwartzii*
	Scaevola spinescens	*Sida sp.* Golden calyces glabrous
	Psydrax suaveolens	*Cheilanthes sieberi*
	Eremophila granitica	*Marsdenia australis*

Project Name: Dacian		
Date: 13/07/2021	**Botanist:** JW/JJ	**Photo (NW corner):** 197-199
Quadrat: Q3	**Quadrat size:** 50m x 50m	**Waypoint (NW corner):** 43
Coordinates (GDA94): 51 J 359156 6857059		
Aspect: SW	**Fire (yrs):** >20	**Condition rating:** Very Good
Landform: Flat		
Coarse fragments on the surface: Quartz, ironstone/ 50-90%/ 20-60mm		
Rock outcrop (abundance/runoff): Nil/ slow		
Soil (profile/field texture/soil surface): Brown/ Clay Loam		
Cover leaf litter: 50%		
Cover bare ground: 50%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form:** Shrub	**Growth form:** Chenopod Shrub
Height: 5-12 m	**Height:** 0.5-1 m	**Height:** 0.5-1 m
Crown cover: 30-70%	**Crown cover:** 10-30%	**Crown cover:** 10-30%
Dominant taxa		
Acacia caesaneura	*Ptilotus obovatus* var. *obovatus*	*Maireana triptera*
Other Taxa		
Acacia quadrimarginea	*Eremophila platycalyx*	*Goodenia peacockiana*
Acacia oswaldii	*Eremophila longifolia*	*Maireana georgei*
	Senna artemisioides subsp. *filifolia*	*Ptilotus aervoides*
	Hakea preissii	*Ptilotus helipteroides*
	Acacia tetragonophylla	*Roepera eremaea*
	Eremophila oldfieldii subsp. angustifolia	*Ptilotus exaltatus*
		Sclerolaena densiflora
		Sclerolaena diacantha
		Eriachne sclerioides
		Erodium crinitum

Project Name: Dacian		
Date: 13/07/2021	**Botanist:** JW/JJ	**Photo (NW corner):** 200-202
Quadrat: Q4	**Quadrat size:** 50m x 50m	**Waypoint (NW corner):** 49
Coordinates (GDA94): 51 J 358754 6856686		
Aspect: SW	**Fire (yrs):** >20	**Condition rating:** Very Good
Landform: Flat		
Coarse fragments on the surface: Limestone/ 10-20%/ 6-20		
Rock outcrop (abundance/runoff): Nil/ Rapid		
Soil (profile/field texture/soil surface): Brown/ Clay Loam		
Cover leaf litter: 40%		
Cover bare ground: 60%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form:** Shrub	**Growth form:** Chenopod Shrub
Height: 5-12 m	**Height:** 0.5-1 m	**Height:** <0.25 m
Crown cover: 30-70%	**Crown cover:** 30-70%	**Crown cover:** <10%
Dominant taxa		
Acacia incurvaneura	*Ptilotus obovatus var. obovatus*	*Maireana georgei*
Other Taxa		
Acacia quadrimarginea	*Eremophila platycalyx*	*Maireana triptera*
Acacia caesaneura	*Sida calyxhymenia*	*Ptilotus exaltatus*
Eremophila oldfieldii subsp. *angustifolia*	*Rhagodia eremaea*	*Ptilotus aervoides*
	Scaevola spinescens	*Ptilotus helipteroides*
	Acacia tetragonophylla	*Roepera eremaea*
		Solanum lasiophyllum
		Goodenia rosea
		Goodenia peacockiana
		Calotis multicaulis

Project Name: Dacian		
Date: 13/07/2021	**Botanist:** JW/JJ	**Photo (NW corner):** 204-206
Quadrat: Q5	**Quadrat size:** 50m x 50m	**Waypoint (NW corner):** 54
Coordinates (GDA94): 51 J 359327 6856060		
Aspect: SW	**Fire (yrs):** >20	**Condition rating:** Very Good
Landform: Midslope		
Coarse fragments on the surface: Laterite/>90%/ 20-60mm		
Rock outcrop (abundance/runoff): Nil/ rapid		
Soil (profile/field texture/soil surface): Brown/ Clay Loam		
Cover leaf litter: 20%		
Cover bare ground: 80%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form:** Shrub	**Growth form:** Chenopod Shrub
Height: 3-5 m	**Height:** 0.5-1 m	**Height:** <0.25 m
Crown cover: 30-70%	**Crown cover:** 10-30%	**Crown cover:** <10%
Dominant taxa		
Acacia mulganeura	*Scaevola spinescens*	*Maireana triptera*
Other Taxa		
Acacia quadrimarginea	*Eremophila pantonii*	*Maireana georgei*
Acacia burkittii	*Sida calyxhymenia*	*Ptilotus obovatus* var. *obovatus*
Eremophila oldfieldii subsp. *angustifolia*	*Acacia tetragonophylla*	*Cheilanthes sieberi*
Santalum lanceolatum		

Project Name: Dacian		
Date: 13/07/2021	**Botanist:** JW/JJ	**Photo (NW corner):** 210-212
Quadrat: Q6	**Quadrat size:** 50m x 50m	**Waypoint (NW corner):** 62
Coordinates (GDA94): 51 J 358295 6855727		
Aspect: SW	**Fire (yrs):** >20	**Condition rating:** Very Good
Landform: Midslope		
Coarse fragments on the surface: Laterite/ >90%/ 20-60mm		
Rock outcrop (abundance/runoff): Nil/ rapid		
Soil (profile/field texture/soil surface): Red-brown/ Clay Loam		
Cover leaf litter: 20%		
Cover bare ground: 80%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form:** Shrub	**Growth form:** Chenopod Shrub
Height: 5-12 m	**Height:** 1-3 m	**Height:** 0.5-1 m
Crown cover: 10-30%	**Crown cover:** <10%	**Crown cover:** <10%
Dominant taxa		
Eucalyptus carnei	*Eremophila pantonii*	*Maireana georgei*
Other Taxa		
Acacia quadrimarginea	*Ptilotus obovatus* var. *obovatus*	*Maireana triptera*
Acacia incurvaneura	*Scaevola spinescens*	*Frankenia georgei*
		Ptilotus exaltatus
		Olearia muelleri
		Sclerolaena densiflora
		Maireana trichoptera

Project Name: Dacian		
Date: 14/07/2021	**Botanist:** JW/JJ	**Photo (NW corner):** 213-215
Quadrat: Q7	**Quadrat size:** 50m x 50m	**Waypoint (NW corner):** 69
Coordinates (GDA94): 51 J 358336 6854799		
Aspect: SW	**Fire (yrs):** >20	**Condition rating:** Very Good
Landform: Flat		
Coarse fragments on the surface: Quartz, ironstone/ 50-90%/ 20-60mm		
Rock outcrop (abundance/runoff): Nil/ very slow		
Soil (profile/field texture/soil surface): Red-brown/ Clay Loam		
Cover leaf litter: 20%		
Cover bare ground: 80%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form:** Shrub	**Growth form:** Shrub
Height: 3-5 m	**Height:** 1-3 m	**Height:** 0.5-1 m
Crown cover: 30-70%	**Crown cover:** <10%	**Crown cover:** <10%
Dominant taxa		
Acacia incurvaneura	*Eremophila platycalyx*	*Ptilotus schwartzii*
Other Taxa		
Acacia quadrimarginea	*Ptilotus obovatus* var. *obovatus*	*Cheilanthes sieberi*
Acacia caesaneura	*Dodonaea rigida*	*Maireana georgei*
	Eremophila latrobei subsp. latrobei	
	Scaevola spinescens	
	Acacia tetragonophylla	
	Acacia ramulosa	
	Psydrax latifolia	
	Rhagodia eremaea	

Project Name: Dacian		
Date: 13/07/2021	**Botanist:** JW/JJ	**Photo (NW corner):** 216-218
Quadrat: Q8	**Quadrat size:** 50m x 50m	**Waypoint (NW corner):** 73
Coordinates (GDA94): 51 J 359034 6854349		
Aspect: SW	**Fire (yrs):** >20	**Condition rating:** Very Good
Landform: Open Depression		
Coarse fragments on the surface: Quartz, ironstone/ 50-90%/ 20-60mm		
Rock outcrop (abundance/runoff): Nil/ slow		
Soil (profile/field texture/soil surface): Brown/ Clay Loam		
Cover leaf litter: 35%		
Cover bare ground: 65%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form:** Shrub	**Growth form:** Chenopod Shrub
Height: 5-12 m	**Height:** 1-3 m	**Height:** 0<.25 m
Crown cover: 30-70%	**Crown cover:** <10%	**Crown cover:** <10%
Dominant taxa		
Acacia incurvaneura	*Eremophila latrobei* subsp. *latrobei*	*Maireana triptera*
Other Taxa		
Acacia quadrimarginea	*Eremophila platycalyx*	*Dysphania kalpari*
Acacia caesaneura	*Sida calyxhymenia*	*Maireana georgei*
Acacia burkittii	*Senna artemisioides* subsp. *filifolia*	*Ptilotus exaltatus*
Acacia tetragonophylla	*Scaevola spinescens*	*Cheilanthes sieberi*
Santalum spicatum	*Eremophila alternifolia*	*Roepera eremaea*
	Hakea preissii	*Teucrium teucriiflorum*
	Sida sp. Golden calyces glabrous	*Marsdenia australis*
	Amyema fitzgeraldii	*Goodenia peacockiana*
	Sclerolaena densiflora	*Ptilotus obovatus* var. *obovatus*
		Enneapogon caerulescens

Project Name: Dacian		
Date: 14/07/2021	**Botanist:** JW/JJ	**Photo (NW corner):** 219-221
Quadrat: Q9	**Quadrat size:** 50m x 50m	**Waypoint (NW corner):** 77
Coordinates (GDA94): 51 J 359432 6853727		
Aspect: SW	**Fire (yrs):** >20	**Condition rating:** Very Good
Landform: Flat		
Coarse fragments on the surface: Quartz, ironstone/ 20-50%/ 20-60mm		
Rock outcrop (abundance/runoff): Nil/ very slow		
Soil (profile/field texture/soil surface): Brown/ Clay Loam		
Cover leaf litter: 20%		
Cover bare ground: 80%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form:** Shrub	**Growth form:** Shrub
Height: 5-12 m	**Height:** 1-3 m	**Height:** <0.25 m
Crown cover: 30-70%	**Crown cover:** 10-30%	**Crown cover:** <10%
Dominant taxa		
Acacia incurvaneura	*Eremophila alternifolia*	*Ptilotus schwartzii*
Other Taxa		
Acacia ramulosa	*Acacia tetragonophylla*	*Marsdenia australis*
	Psydrax suaveolens	*Teucrium teucriiflorum*
		Dianella revoluta

Project Name: Dacian		
Date: 14/07/2021	**Botanist:** JW/JJ	**Photo (NW corner):** 222-122487
Quadrat: Q10	**Quadrat size:** 50m x 50m	**Waypoint (NW corner):** 83
Coordinates (GDA94): 51 J 359317 6853249		
Aspect: SW	**Fire (yrs):** >20	**Condition rating:** Very Good
Landform: Flat		
Coarse fragments on the surface: Quartz, ironstone/ 20-50%/ 20-60mm		
Rock outcrop (abundance/runoff): Nil/ very slow		
Soil (profile/field texture/soil surface): Brown/ Clay Loam		
Cover leaf litter: 40%		
Cover bare ground: 60%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form:** Shrub	**Growth form:** Shrub
Height: 5-12 m	**Height:** 1-3 m	**Height:** 0.25-0.5 m
Crown cover: >70%	**Crown cover:** <10%	**Crown cover:** <10%
Dominant taxa		
Acacia incurvaneura	*Eremophila margarethae*	*Ptilotus obovatus* var. *obovatus*
Other Taxa		
Acacia caesaneura	*Scaevola spinescens*	*Cheilanthes sieberi*
Acacia craspedocarpa	*Rhagodia eremaea*	*Maireana georgei*
Acacia tetragonophylla	*Senna charlesiana*	*Teucrium teucriiflorum*
	Psydrax suaveolens	
	Hakea kippistiana	

Project Name: Dacian		
Date: 14/07/2021	**Botanist:** JW/JJ	**Photo (NW corner):** 226-228
Quadrat: Q11	**Quadrat size:** 50m x 50m	**Waypoint (NW corner):** 88
Coordinates (GDA94): 51 J 359295 6852544		
Aspect: SW	**Fire (yrs):** >20	**Condition rating:** Very Good
Landform: Flat		
Coarse fragments on the surface: Quartz, ironstone/ 50-90%/ 20-60mm		
Rock outcrop (abundance/runoff): Nil/ slow		
Soil (profile/field texture/soil surface): Red-brown/ Clay Loam		
Cover leaf litter: 20%		
Cover bare ground: 80%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form:** Shrub	**Growth form:** Chenopod Shrub
Height: 5-12 m	**Height:** 0.5-1 m	**Height:** 0.25-0.5 m
Crown cover: 30-70%	**Crown cover:** <10%	**Crown cover:** <10%
Dominant taxa		
Acacia incurvaneura	*Eremophila georgei*	*Maireana georgei*
Other Taxa		
Acacia caesaneura	*Maireana convexa*	*Ptilotus obovatus* var. *obovatus*
Acacia ayersiana	*Acacia tetragonophylla*	*Solanum lasiophyllum*
Santalum lanceolatum	*Acacia ramulosa*	
	Eremophila margarethae	

Project Name: Dacian		
Date: 14/07/2021	**Botanist:** JW/JJ	**Photo (NW corner):** 229-231
Quadrat: Q12	**Quadrat size:** 50m x 50m	**Waypoint (NW corner):** 93
Coordinates (GDA94): 51 J 358666 6851906		
Aspect: SW	**Fire (yrs):** >20	**Condition rating:** Very Good
Landform: Flat		
Coarse fragments on the surface: Quartz, ironstone/ 20-50%/ 20-60mm		
Rock outcrop (abundance/runoff): Nil/ very slow		
Soil (profile/field texture/soil surface): Brown/ Clay Loam		
Cover leaf litter: 20%		
Cover bare ground: 80%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form:** Shrub	**Growth form:** Chenopod Shrub
Height: 3-5 m	**Height:** 1-3 m	**Height:** 0.25-0.5 m
Crown cover: <10%	**Crown cover:** 10-30%	**Crown cover:** <10%
Dominant taxa		
Acacia incurvaneura	*Eremophila oldfieldii subsp. angustifolia*	*Maireana georgei*
Other Taxa		
Acacia aptaneura	*Acacia tetragonophylla*	*Maireana triptera*
Acacia caesaneura	*Sida calyxhymenia*	*Ptilotus obovatus* var. *obovatus*
Psydrax suaveolens	*Senna artemisioides subsp. filifolia*	*Marsdenia australis*
Santalum spicatum	*Scaevola spinescens*	*Roepera eremaea*
	Hakea preissii	*Sclerolaena densiflora*
		Teucrium teucriiflorum

Project Name: Dacian		
Date: 14/07/2021	**Botanist:** JW/JJ	**Photo (NW corner):** 232-234
Quadrat: Q13	**Quadrat size:** 50m x 50m	**Waypoint (NW corner):** 97
Coordinates (GDA94): 51 J 360091 6852450		
Aspect: SW	**Fire (yrs):** >20	**Condition rating:** Very Good
Landform: Flat		
Coarse fragments on the surface: Quartz, ironstone/ 50-90%/ 20-60mm		
Rock outcrop (abundance/runoff): Nil/ very slow		
Soil (profile/field texture/soil surface): Brown/ Clay Loam		
Cover leaf litter: 20%		
Cover bare ground: 80%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form:** Shrub	**Growth form:** Chenopod Shrub
Height: 3-5 m	**Height:** 1-3 m	**Height:** 0.25-0.5 m
Crown cover: 10-30%	**Crown cover:** 10-30%	**Crown cover:** <10%
Dominant taxa		
Acacia caesaneura	*Eremophila platycalyx*	*Maireana georgei*
Other Taxa		
Acacia incurvaneura	*Eremophila georgei*	*Dianella revoluta*
	Eremophila margarethae	*Maireana triptera*
	Rhagodia eremaea	*Enchylaena tomentosa*
	Scaevola spinescens	*Ptilotus obovatus* var. *obovatus*
	Acacia tetragonophylla	

Project Name: Dacian		
Date: 14/07/2021	**Botanist:** JW/JJ	**Photo (NW corner):** 235-237
Quadrat: Q14	**Quadrat size:** 50m x 50m	**Waypoint (NW corner):** 101
Coordinates (GDA94): 51 J 359131 6851272		
Aspect: SW	**Fire (yrs):** >20	**Condition rating:** Very Good
Landform: Flat		
Coarse fragments on the surface: Quartz, ironstone/ 20-50%/ 20-60mm		
Rock outcrop (abundance/runoff): Nil/ slow		
Soil (profile/field texture/soil surface): Brown/ Clay Loam		
Cover leaf litter: 15%		
Cover bare ground: 85%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form:** Shrub	**Growth form:** Chenopod Shrub
Height: 3-5-12 m	**Height:** 0.5-1 m	**Height:** 0.5-1 m
Crown cover: 30-70%	**Crown cover:** <10%	**Crown cover:** <10%
Dominant taxa		
Acacia incurvaneura	*Eremophila margarethae*	*Maireana convexa*
Other Taxa		
Acacia caesaneura	*Eremophila georgei*	*Dianella revoluta*
Acacia tetragonophylla	*Acacia ramulosa*	*Marsdenia australis*
Santalum lanceolatum	*Scaevola spinescens*	*Ptilotus obovatus* var. *obovatus*
		Teucrium teucriiflorum

Project Name: Dacian		
Date: 14/07/2021	**Botanist:** JW/JJ	**Photo (NW corner):** 238-240
Quadrat: Q15	**Quadrat size:** 50m x 50m	**Waypoint (NW corner):** 105
Coordinates (GDA94): 51 J 359161 6850654		
Aspect: SW	**Fire (yrs):** >20	**Condition rating:** Very Good
Landform: Flat		
Coarse fragments on the surface: Quartz, ironstone/ 2-10%/ 2-6mm		
Rock outcrop (abundance/runoff): Nil/ very slow		
Soil (profile/field texture/soil surface): Brown/ Clay Loam		
Cover leaf litter: 20%		
Cover bare ground: 80%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form:** Shrub	**Growth form:** Shrub
Height: 5-12 m	**Height:** 1-3 m	**Height:** 0.5-1 m
Crown cover: 30-70%	**Crown cover:** <10%	**Crown cover:** <10%
Dominant taxa		
Acacia incurvaneura	*Eremophila forrestii* subsp. *forrestii*	*Eremophila margarethae*
Other Taxa		
Acacia caesaneura	*Eremophila georgei*	*Dianella revoluta*
Psydrax suaveolens	*Rhagodia eremaea*	

Project Name: Dacian		
Date: 16/07/2021	**Botanist:** JW/JJ	**Photo (NW corner):** 241-243
Quadrat: Q16	**Quadrat size:** 50m x 50m	**Waypoint (NW corner):** 109
Coordinates (GDA94): 51 J 360077 6850161		
Aspect: SW	**Fire (yrs):** >20	**Condition rating:** Very Good
Landform: Flat		
Coarse fragments on the surface: Quartz, ironstone/ 10-20%/ 20-60mm		
Rock outcrop (abundance/runoff): Nil/ very slow		
Soil (profile/field texture/soil surface): Brown/ Clay Loam		
Cover leaf litter: 20%		
Cover bare ground: 80%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form:** Shrub	**Growth form:** Shrub
Height: 5-12 m	**Height:** 1-3 m	**Height:** <0.25 m
Crown cover: 30-70%	**Crown cover:** <10%	**Crown cover:** <1%
Dominant taxa		
Acacia incurvaneura	*Acacia tetragonophylla*	*Rhodanthe chlorocephala*
Other Taxa		
Acacia caesaneura	*Rhagodia eremaea*	*Cheilanthes sieberi*
Santalum spicatum		*Marsdenia australis*
		Rhodanthe charsleyae
		Teucrium teucriiflorum

Project Name: Dacian		
Date: 14/07/2021	**Botanist:** JW/JJ	**Photo (NW corner):** 244-246
Quadrat: Q17	**Quadrat size:** 50m x 50m	**Waypoint (NW corner):** 113
Coordinates (GDA94): 51 J 360183 6851072		
Aspect: SW	**Fire (yrs):** >20	**Condition rating:** Very Good
Landform: Flat		
Coarse fragments on the surface: Quartz/ 2-10%/ 6-20 mm		
Rock outcrop (abundance/runoff): Nil/ slow		
Soil (profile/field texture/soil surface): Brown/ Clay Loam		
Cover leaf litter: 15%		
Cover bare ground: 85%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form:** Shrub	**Growth form:** Chenopod Shrub
Height: 5-12 m	**Height:** 1-3 m	**Height:** 0.5-1 m
Crown cover: 30-70%	**Crown cover:** <10%	**Crown cover:** <10%
Dominant taxa		
Acacia incurvaneura	*Acacia tetragonophylla*	*Maireana georgei*
Other Taxa		
Acacia caesaneura	*Acacia ramulosa*	*Maireana convexa*
Santalum lanceolatum	*Eremophila margarethae*	*Ptilotus schwartzii*
	Scaevola spinescens	*Ptilotus obovatus* var. *obovatus*
		Teucrium teucriiflorum

Project Name: Dacian		
Date: 14/07/2021	**Botanist:** JW/JJ	**Photo (NW corner):** 247-249
Quadrat: Q18	**Quadrat size:** 50m x 50m	**Waypoint (NW corner):** 117
Coordinates (GDA94): 51 J 358975 6849765		
Aspect: SW	**Fire (yrs):** >20	**Condition rating:** Very Good
Landform: Open Depression		
Coarse fragments on the surface: Quartz, ironstone/ 20-50%/ 20-60mm		
Rock outcrop (abundance/runoff): Nil/ slow		
Soil (profile/field texture/soil surface): Brown/ Clay Loam		
Cover leaf litter: 20%		
Cover bare ground: 80%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form:** Shrub	**Growth form:** Shrub
Height: 3-5 m	**Height:** 1-3 m	**Height:** 0.5-1 m
Crown cover: 30-70%	**Crown cover:** <10%	**Crown cover:** <10%
Dominant taxa		
Acacia incurvaneura	*Acacia tetragonophylla*	*Eremophila gilesii*
Other Taxa		
Acacia caesaneura	*Acacia ramulosa*	*Brachyscome ciliaris*
Santalum lanceolatum	*Acacia burkittii*	*Dianella revoluta*
	Eremophila margarethae	*Goodenia rosea*
	Hakea kippistiana	*Rhodanthe charsleyae*
		Teucrium teucriiflorum

Project Name: Dacian		
Date: 13/07/2021	**Botanist:** JW/JJ	**Photo (NW corner):** 250-252
Quadrat: Q19	**Quadrat size:** 50m x 50m	**Waypoint (NW corner):** 121
Coordinates (GDA94): 51 J 360195 6849655		
Aspect: SW	**Fire (yrs):** >20	**Condition rating:** Very Good
Landform: Flat		
Coarse fragments on the surface: Ironstone/ 20-50%/ 2-6mm		
Rock outcrop (abundance/runoff): Nil/ very slow		
Soil (profile/field texture/soil surface): Sandy clay loam		
Cover leaf litter: 12%		
Cover bare ground: 85%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form:** Shrub	**Growth form:** Hummock Grass
Height: 3-5-12 m	**Height:** 1-3 m	**Height:** 0.5-1 m
Crown cover: <10%	**Crown cover:** <10%	**Crown cover:** 10-30%
Dominant taxa		
Acacia caesaneura	*Acacia ramulosa*	*Triodia rigidissima*
Other Taxa		
Acacia incurvaneura	*Eremophila margarethae*	*Dianella revoluta*
Psydrax suaveolens	*Eremophila homoplastica*	*Teucrium teucriiflorum*
	Rhagodia eremaea	

Project Name: Dacian		
Date: 14/07/2021	**Botanist:** JW/JJ	**Photo (NW corner):** 253-255
Quadrat: Q20	**Quadrat size:** 50m x 50m	**Waypoint (NW corner):** 125
Coordinates (GDA94): 51 J 359106 6849149		
Aspect: SW	**Fire (yrs):** >20	**Condition rating:** Good
Landform: Flat		
Coarse fragments on the surface: Quartz, ironstone/ 10-20%/ 2-6mm		
Rock outcrop (abundance/runoff): Nil/ very slow		
Soil (profile/field texture/soil surface): Brown/ Sandy Clay Loam		
Cover leaf litter: 15%		
Cover bare ground: 85%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form:** Shrub	**Growth form:** Hummock Grass
Height: 3-5 m	**Height:** 0.5-1 m	**Height:** 0.25-0.5 m
Crown cover: 30-70%	**Crown cover:** 10-30%	**Crown cover:** 30-70%
Dominant taxa		
Acacia caesaneura	*Eremophila margarethae*	*Triodia rigidissima*
Other Taxa		
Acacia incurvaneura	*Acacia ramulosa*	*Dianella revoluta*
	Acacia tetragonophylla	*Teucrium teucriiflorum*
	Eremophila homoplastica	*Thysanotus manglesii*

Project Name: Dacian		
Date: 14/07/2021	**Botanist:** JW/JJ	**Photo (NW corner):** 256-258
Quadrat: Q21	**Quadrat size:** 50m x 50m	**Waypoint (NW corner):** 132
Coordinates (GDA94): 51 J 359536 6848231		
Aspect: SW	**Fire (yrs):** >20	**Condition rating:** Good
Landform: Flat		
Coarse fragments on the surface: Ironstone/ 20-50-90%/ 2-6mm		
Rock outcrop (abundance/runoff): Nil/ very slow		
Soil (profile/field texture/soil surface): Brown/ Sandy Clay Loam		
Cover leaf litter: 20%		
Cover bare ground: 80%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree Mallee	**Growth form:** Shrub	**Growth form:** Hummock Grass
Height: 5-12 m	**Height:** 3-5 m	**Height:** 0.25-0.5 m
Crown cover: <10%	**Crown cover:** >70%	**Crown cover:** 30-70%
Dominant taxa		
Acacia youngiana	*Acacia effusifolia*	*Triodia rigidissima*
Other Taxa		
Acacia incurvaneura	*Eremophila margarethae*	*Goodenia xanthosperma*
	Sida calyxhymenia	*Malvaceae yellow*
		Androcalva luteiflora
		Thysanotus manglesii

Project Name: Dacian		
Date: 14/07/2021	**Botanist:** JW/JJ	**Photo (NW corner):** 259-261
Quadrat: Q22	**Quadrat size:** 50m x 50m	**Waypoint (NW corner):** 137
Coordinates (GDA94): 51 J 359447 6847149		
Aspect: SW	**Fire (yrs):** >20	**Condition rating:** Very Good
Landform: Flat		
Coarse fragments on the surface: Ironstone/ 10-20%/ 2-6mm		
Rock outcrop (abundance/runoff): Nil/ very slow		
Soil (profile/field texture/soil surface): Brown/ Clay Loam		
Cover leaf litter: 20%		
Cover bare ground: 80%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form:** Shrub	**Growth form:** Shrub
Height: 5-12 m	**Height:** 1-3 m	**Height:** 0.25-0.5 m
Crown cover: <10%	**Crown cover:** 30-70%	**Crown cover:** 10-30%
Dominant taxa		
Acacia incurvaneura	*Acacia ramulosa*	*Eremophila homoplastica*
Other Taxa		
	Acacia effusifolia	*Teucrium teucriiflorum*
	Eremophila margarethae	*Triodia rigidissima*
	Rhagodia eremaea	

Project Name: Dacian		
Date: 14/07/2021	**Botanist:** JW/JJ	**Photo (NW corner):** 262-264
Quadrat: Q23	**Quadrat size:** 50m x 50m	**Waypoint (NW corner):** 141
Coordinates (GDA94): 51 J 359409 6846651		
Aspect: SW	**Fire (yrs):** >20	**Condition rating:** Good
Landform: Flat		
Coarse fragments on the surface: Ironstone/ 2-10%/ 2-6mm		
Rock outcrop (abundance/runoff): Nil/ slow		
Soil (profile/field texture/soil surface): Brown/ Clay Loam Sandy		
Cover leaf litter: 20%		
Cover bare ground: 80%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree mallee	**Growth form:** Shrub	**Growth form:** Hummock Grass
Height: 5-12 m	**Height:** 1-3 m	**Height:** 0.25-0.5 m
Crown cover: <1%	**Crown cover:** <10%	**Crown cover:** >70%
Dominant taxa		
Eucalyptus youngiana	*Acacia effusifolia*	*Triodia rigidissima*
Other Taxa		
Acacia incurvaneura	*Psydrax suaveolens*	*Dianella revoluta*
	Eremophila margarethae	

Project Name: Dacian		
Date: 14/07/2021	**Botanist:** JW/JJ	**Photo (NW corner):** 265-267
Quadrat: Q24	**Quadrat size:** 50m x 50m	**Waypoint (NW corner):** 145
Coordinates (GDA94): 51 J 359354 6845993		
Aspect: SW	**Fire (yrs):** >20	**Condition rating:** Very Good
Landform: Flat		
Coarse fragments on the surface: Ironstone/ 10-20%/ 2-6mm		
Rock outcrop (abundance/runoff): Nil/ slow		
Soil (profile/field texture/soil surface): Brown/ Clay Loam		
Cover leaf litter: 20%		
Cover bare ground: 60%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form:** Shrub	**Growth form:** Hummock Grass
Height: 5-12 m	**Height:** 1-3 m	**Height:** 0.5-1 m
Crown cover: 10-30%	**Crown cover:** <10%	**Crown cover:** <10%
Dominant taxa		
Eucalyptus youngiana	*Acacia effusifolia*	*Triodia rigidissima*
Other Taxa		
Acacia incurvaneura		*Goodenia xanthosperma*
		Goodenia rosea
		Brunonia australis

Project Name: Dacian		
Date: 14/07/2021	**Botanist:** JW/JJ	**Photo (NW corner):** 268-270
Quadrat: Q25	**Quadrat size:** 50m x 50m	**Waypoint (NW corner):** 149
Coordinates (GDA94): 51 J 359203 6845373		
Aspect: SW	**Fire (yrs):** >20	**Condition rating:** Good
Landform: Flat		
Coarse fragments on the surface: Ironstone/ 10-20%/ 2-6mm		
Rock outcrop (abundance/runoff): Nil/ very slow		
Soil (profile/field texture/soil surface): Brown/ Clay Loam Sandy		
Cover leaf litter: 20%		
Cover bare ground: 30%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree Mallee	**Growth form:** Shrub	**Growth form:** Hummock grass
Height: 5-12 m	**Height:** 1-3 m	**Height:** 0.5-1 m
Crown cover: <1%	**Crown cover:** 30-70%	**Crown cover:** <10%
Dominant taxa		
Eucalyptus youngiana	*Acacia effusifolia*	*Triodia rigidissima*
Other Taxa		
Acacia caesaneura	*Acacia ramulosa*	
Acacia incurvaneura	*Eremophila margarethae*	

Project Name: Dacian		
Date: 14/07/2021	**Botanist:** JW/JJ	**Photo (NW corner):** 271-273
Quadrat: Q26	**Quadrat size:** 50m x 50m	**Waypoint (NW corner):** 153
Coordinates (GDA94): 51 J 358996 6844609		
Aspect: SW	**Fire (yrs):** >20	**Condition rating:** Good
Landform: Flat		
Coarse fragments on the surface: Ironstone/ 10-20%/ 2-6mm		
Rock outcrop (abundance/runoff): Nil/ very slow		
Soil (profile/field texture/soil surface): Brown/ Clay Loam Sandy		
Cover leaf litter: 15%		
Cover bare ground: 70%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form:** Shrub	**Growth form:** Hummock grass
Height: 5-12 m	**Height:** 1-3 m	**Height:** 0.25-0.5 m
Crown cover: <10%	**Crown cover:** 10-30%	**Crown cover:** 30-70%
Dominant taxa		
Acacia incurvaneura	*Acacia ramulosa*	*Triodia rigidissima*
Other Taxa		
Acacia caesaneura	*Eremophila margarethae*	*Teucrium teucriiflorum*
Eucalyptus youngiana	*Eremophila homoplastica*	
	Psydrax suaveolens	

Project Name: Dacian		
Date: 14/07/2021	**Botanist:** JW/JJ	**Photo (NW corner):** 274-276
Quadrat: Q27	**Quadrat size:** 50m x 50m	**Waypoint (NW corner):** 157
Coordinates (GDA94): 51 J 358718 6843946		
Aspect: SW	**Fire (yrs):** >20	**Condition rating:** Very Good
Landform: Flat		
arse fragments on the surface: Ironstone/ 2-10%/ 2-6mm		
Rock outcrop (abundance/runoff): Nil/ very slow		
Soil (profile/field texture/soil surface): Brown/ Clay Loam		
Cover leaf litter: 25%		
Cover bare ground: 65%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form:** Shrub	**Growth form:** Shrub
Height: 3-5 m	**Height:** 1-3 m	**Height:** 0.25-0.5 m
Crown cover: >70%	**Crown cover:** <10%	**Crown cover:** <10%
Dominant taxa		
Acacia caesaneura	*Acacia ramulosa*	*Eremophila homoplastica*
Other Taxa		
Acacia incurvaneura	*Psydrax suaveolens*	*Teucrium teucriiflorum*
Eucalyptus kingii		*Triodia rigidissima*

Project Name: Dacian		
Date: 14/07/2021	**Botanist:** JW/JJ	**Photo (NW corner):** 277-279
Quadrat: Q28	**Quadrat size:** 50m x 50m	**Waypoint (NW corner):** 161
Coordinates (GDA94): 51 J 358519 6842658		
Aspect: SW	**Fire (yrs):** >20	**Condition rating:** Good
Landform: Flat		
Coarse fragments on the surface: Ironstone/ 20-50%/ -6-20 mm		
Rock outcrop (abundance/runoff): Nil/ slow		
Soil (profile/field texture/soil surface): Brown/ Clay Loam		
Cover leaf litter: 25%		
Cover bare ground: 70%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form:** Shrub	**Growth form:** -
Height: 3-5 m	**Height:** 0.5-1 m	**Height:** -
Crown cover: 30-70%	**Crown cover:** <10%	**Crown cover:** -
Dominant taxa		
Acacia caesaneura	*Eremophila forrestii* subsp. *forrestii*	-
Other Taxa		
Acacia incurvaneura	*Dodonaea rigida*	
Eucalyptus kingsmillii	*Psydrax suaveolens*	
	Thryptomene decussata	

Project Name: Dacian		
Date: 15/07/2021	**Botanist:** JW/JJ	**Photo (NW corner):** 280-282
Quadrat: Q29	**Quadrat size:** 50m x 50m	**Waypoint (NW corner):** 165
Coordinates (GDA94): 51 J 359229 6843002		
Aspect: SW	**Fire (yrs):** >20	**Condition rating:** Very Good
Landform: Midslope		
Coarse fragments on the surface: Quartz, ironstone/ 50-90%/ 20-60mm		
Rock outcrop (abundance/runoff): Nil/ moderate		
Soil (profile/field texture/soil surface): Brown/ Clay Loam		
Cover leaf litter: 10%		
Cover bare ground: 90%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form:** Shrub	**Growth form:** Shrub
Height: 3-5 m	**Height:** 1-3 m	**Height:** 0.25-0.5 m
Crown cover: 10-30%	**Crown cover:** <10%	**Crown cover:** <10%
Dominant taxa		
Acacia mulganeura	*Eremophila latrobei* subsp. *latrobei*	*Ptilotus schwartzii*
Other Taxa		
Acacia quadrimarginea	*Acacia ramulosa*	*Eriachne maculata*
Acacia incurvaneura	*Acacia tetragonophylla*	*Ptilotus obovatus* var. *obovatus*
	Dodonaea rigida	
	Eremophila georgei	
	Psydrax suaveolens	

Project Name: Dacian		
Date: 15/07/2021	**Botanist:** JW/JJ	**Photo (NW corner):** 283-285
Quadrat: Q30	**Quadrat size:** 50m x 50m	**Waypoint (NW corner):** 169
Coordinates (GDA94): 51 J 359309 6842776		
Aspect: SW	**Fire (yrs):** >20	**Condition rating:** Very Good
Landform: Flat		
Coarse fragments on the surface: Quartz, ironstone, laterite/ 20-50%/ 6-20mm		
Rock outcrop (abundance/runoff): Nil/ slow		
Soil (profile/field texture/soil surface): Brown/ Clay Loam		
Cover leaf litter: 25%		
Cover bare ground: 70%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form:** Shrub	**Growth form:** Shrub
Height: 5-12 m	**Height:** 1-3 m	**Height:** <0.25 m
Crown cover: 30-70%	**Crown cover:** 10-30%	**Crown cover:** <10%
Dominant taxa		
Acacia caesaneura	*Eremophila latrobei* subsp. *latrobei*	*Podotheca wilsonii*
Other Taxa		
Acacia incurvaneura	*Acacia ramulosa*	*Angianthus milnei*
Brachychiton gregorii	*Acacia tetragonophylla*	*Cheilanthes sieberi*
Santalum spicatum	*Eremophila clarkei*	*Marsdenia australis*
	Ptilotus obovatus var. *obovatus*	*Ptilotus helipteroides*
	Sida calyxhymenia	*Roepera eremaea*
	Scaevola spinescens	

Project Name: Dacian		
Date: 15/07/2021	**Botanist:** JW/JJ	**Photo (NW corner):** 286-288
Quadrat: Q31	**Quadrat size:** 50m x 50m	**Waypoint (NW corner):** 173
Coordinates (GDA94): 51 J 359506 6842463		
Aspect: SW	**Fire (yrs):** >20	**Condition rating:** Very Good
Landform: Flat		
Coarse fragments on the surface: Limestone/ 50-90%/ 20-60mm		
Rock outcrop (abundance/runoff): Nil/ slow		
Soil (profile/field texture/soil surface): Brown/ Clay Loam		
Cover leaf litter: 25%		
Cover bare ground: 75%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form:** Shrub	**Growth form:** Shrub
Height: 5-12 m	**Height:** 1-3 m	**Height:** 0.5-1 m
Crown cover: 30-70%	**Crown cover:** 10-30%	**Crown cover:** <10%
Dominant taxa		
Casuarina pauper	*Eremophila oldfieldii* subsp. *angustifolia*	*Ptilotus obovatus* var. *obovatus*
Other Taxa		
Acacia incurvaneura	*Eremophila pantonii*	*Maireana triptera*
Acacia kempeana	*Sida calyxhymenia*	*Maireana georgei*
Acacia ayersiana	*Sida* sp. Excedentifolia (J.L. Egan 1925)	*Ptilotus helipteroides*
Acacia burkittii	*Senna artemisioides* subsp. *filifolia*	*Roepera eremaea*
	Scaevola spinescens	

Project Name: Dacian		
Date: 15/07/2021	**Botanist:** JW/JJ	**Photo (NW corner):** 289-291
Quadrat: Q32	**Quadrat size:** 50m x 50m	**Waypoint (NW corner):** 177
Coordinates (GDA94): 51 J 359611 6842709		
Aspect: SW	**Fire (yrs):** >20	**Condition rating:** Very Good
Landform: Crest (BIF)		
Coarse fragments on the surface: Ironstone, laterite/ 50-90%/ 20-60mm		
Rock outcrop (abundance/runoff): 2-10%/ moderate		
Soil (profile/field texture/soil surface): Brown/ Clay Loam		
Cover leaf litter: 10%		
Cover bare ground: 90%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form:** Shrub	**Growth form:** Shrub
Height: 3-5 m	**Height:** 1-3 m	**Height:** 0.5-1 m
Crown cover: 10-30%	**Crown cover:** 10-30%	**Crown cover:** 10-30%
Dominant taxa		
Acacia incurvaneura	*Eremophila latrobei* subsp. *latrobei*	*Eremophila eriocalyx*
Other Taxa		
Acacia ayersiana	*Acacia ramulosa*	*Rhodanthe chlorocephala* subsp. *rosea*
	Dodonaea rigida	*Marsdenia australis*
	Eremophila georgei	*Goodenia macroplectra*
	Psydrax suaveolens	
	Scaevola spinescens	
	Sida calyxhymenia	

Project Name: Dacian		
Date: 15/07/2021	**Botanist:** JW/JJ	**Photo (NW corner):** 292-294
Quadrat: Q33	**Quadrat size:** 50m x 50m	**Waypoint (NW corner):** 182
Coordinates (GDA94): 51 J 359026 6842609		
Aspect: SW	**Fire (yrs):** >20	**Condition rating:** Very Good
Landform: Flat		
Coarse fragments on the surface: Quartz, ironstone/ 50-90%/ 6-20mm		
Rock outcrop (abundance/runoff): Nil/ slow		
Soil (profile/field texture/soil surface): Brown/ Clay Loam		
Cover leaf litter: 25%		
Cover bare ground: 75%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form:** Shrub	**Growth form:** Shrub
Height: 5-12 m	**Height:** 1-3 m	**Height:** 0.25-0.5 m
Crown cover: 10-30%	**Crown cover:** <10%	**Crown cover:** <10%
Dominant taxa		
Acacia caesaneura	*Acacia tetragonophylla*	*Cheilanthes sieberi*
Other Taxa		
Acacia incurvaneura	*Eremophila forrestii* subsp. *forrestii*	*Marsdenia australis*
	Eremophila margarethae	*Teucrium teucriiflorum*

Project Name: Dacian		
Date: 15/07/2021	**Botanist:** JW/JJ	**Photo (NW corner):** 295-297
Quadrat: Q34	**Quadrat size:** 50m x 50m	**Waypoint (NW corner):** 186
Coordinates (GDA94): 51 J 359002 6842890		
Aspect: SW	**Fire (yrs):** >20	**Condition rating:** Very Good
Landform: Flat		
Coarse fragments on the surface: Quartz, ironstone/ 50-90%/ 20-60mm		
Rock outcrop (abundance/runoff): Nil/ slow		
Soil (profile/field texture/soil surface): Brown/ Clay Loam		
Cover leaf litter:		
Cover bare ground:		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form:** Shrub	**Growth form:** Shrub
Height: 3-5 m	**Height:** 1-3 m	**Height:** 0.25-0.5 m
Crown cover: 10-30%	**Crown cover:** 10-30%	**Crown cover:** <1%
Dominant taxa		
Acacia incurvaneura	*Acacia quadrimarginea*	*Ptilotus schwartzii*
Other Taxa		
Acacia ayersiana	*Dodonaea rigida*	
Acacia caesaneura	*Eremophila forrestii* subsp. *forrestii*	
Brachychiton gregorii	*Eremophila georgei*	
Eucalyptus lucasii	*Eremophila latrobei* subsp. *latrobei*	
	Sida calyxhymenia	

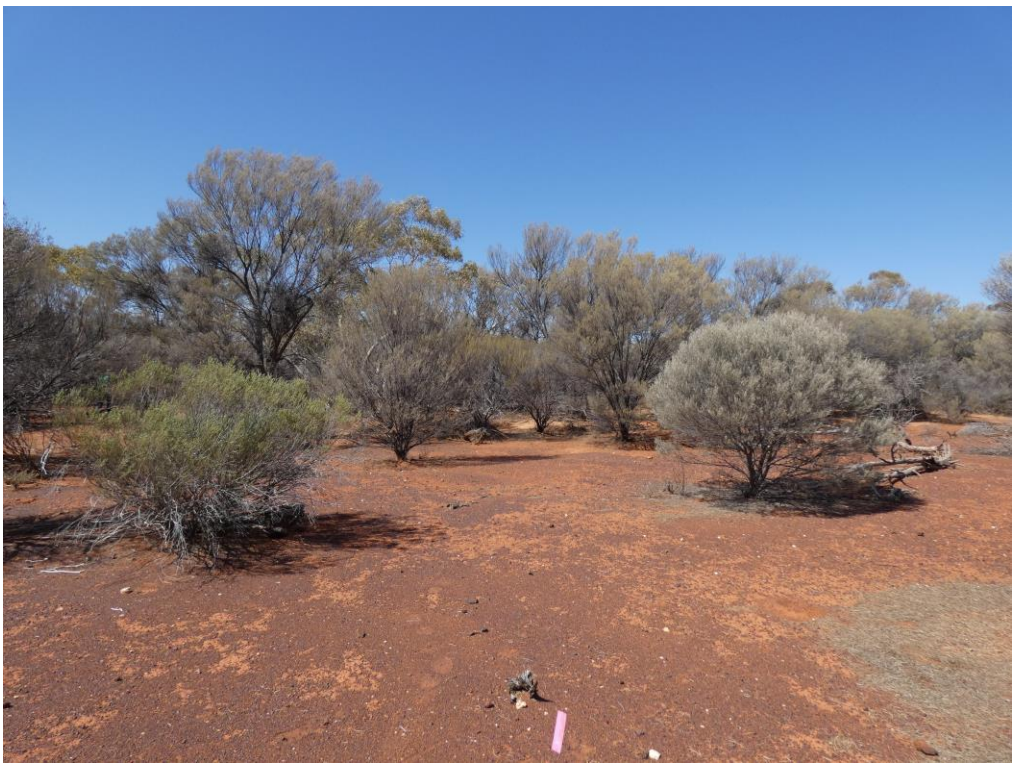
Project Name: Dacian		
Date: 15/07/2021	**Botanist:** JW/JJ	**Photo (NW corner):** 298-300
Quadrat: Q35	**Quadrat size:** 50m x 50m	**Waypoint (NW corner):** 190
Coordinates (GDA94): 51 J 358616 6842949		
Aspect: SW	**Fire (yrs):** >20	**Condition rating:** Very Good
Landform: Flat		
Coarse fragments on the surface: Ironstone/ 50-90%/ 6-20mm		
Rock outcrop (abundance/runoff): Nil/ very slow		
Soil (profile/field texture/soil surface): Brown/ Clay Loam		
Cover leaf litter: 20%		
Cover bare ground: 80%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form:** Shrub	**Growth form:** Shrub
Height: 3-5 m	**Height:** 1-3 m	**Height:** 0.25-0.5 m
Crown cover: 10-30%	**Crown cover:** <10%	**Crown cover:** <1%
Dominant taxa		
Acacia caesaneura	*Acacia ramulosa*	*Ptilotus schwartzii*
Other Taxa		
Acacia incurvaneura	*Dodonaea rigida*	*Cheilanthes sieberi*
Brachychiton gregorii	*Eremophila forrestii* subsp. *forrestii*	*Ptilotus obovatus* var. *obovatus*
	Eremophila georgei	*Teucrium teucriiflorum*
	Eremophila margarethae	
	Eremophila latrobei subsp. latrobei	

Project Name: Dacian		
Date: 15/07/2021	**Botanist:** JW/JJ	**Photo (NW corner):** 301-303
Quadrat: Q36	**Quadrat size:** 50m x 50m	**Waypoint (NW corner):** 194
Coordinates (GDA94): 51 J 357855 6839039		
Aspect: SW	**Fire (yrs):** >20	**Condition rating:** Very Good
Landform: Flat		
Coarse fragments on the surface: Quartz, ironstone, limestone		
Rock outcrop (abundance/runoff): 10-20%/ slow		
Soil (profile/field texture/soil surface): Brown/ Sandy Loam		
Cover leaf litter:		
Cover bare ground:		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form:** Shrub	**Growth form:** Shrub
Height: 5-12 m	**Height:** 1-3 m	**Height:** 0.25 m
Crown cover: <10%	**Crown cover:** 10-30%	**Crown cover:** <10%
Dominant taxa		
Eucalyptus lucasii	*Acacia tetragonophylla*	*Roepera eremaea*
Other Taxa		
Acacia ayersiana	*Acacia burkittii*	*Maireana convexa*
Acacia caesaneura	*Acacia ramulosa*	*Maireana triptera*
Acacia incurvaneura	*Eremophila forrestii subsp. forrestii*	*Cephalipterum drummondii*
	Eremophila margarethae	*Calandrinia eremaea*
	Maireana pyramidata	*Plantago drummondii*
	Lemooria burkittii	*Duperreya commixta*
	Senna artemisioides subsp. artemisioides	*Teucrium teucriiflorum*
	Senna artemisioides subsp. filifolia	*Goodenia rosea*
		Helipterum craspedioides

Project Name: Dacian		
Date: 15/07/2021	**Botanist:** JW/JJ	**Photo (NW corner):** 304-306
Quadrat: Q37	**Quadrat size:** 50m x 50m	**Waypoint (NW corner):** 198
Coordinates (GDA94): 51 J 357587 6838836		
Aspect: SW	**Fire (yrs):** >20	**Condition rating:** Very Good
Landform: Open depression		
Coarse fragments on the surface: Mixed/ 50-90%/ 6-20mm		
Rock outcrop (abundance/runoff): Sandstone (creek)/ moderate		
Soil (profile/field texture/soil surface): Brown/ Clay Loam Sandy		
Cover leaf litter: 35%		
Cover bare ground: 60%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form:** Shrub	**Growth form:** Shrub
Height: 5-12 m	**Height:** 1-3 m	**Height:** 0.25-0.5 m
Crown cover: <10%	**Crown cover:** 30-70%	**Crown cover:** <1%
Dominant taxa		
Eucalyptus lucasii	*Acacia tetragonophylla*	*Enchylaena tomentosa*
Other Taxa		
Acacia ayersiana	*Acacia burkittii*	*Erodium crinitum*
Acacia incurvaneura	*Eremophila citrina*	*Lepidium platypetalum*
	Eremophila clarkei	*Maireana georgei*
	Eremophila margarethae	*Marsdenia australis*
	Grevillea berryana	*Rhodanthe charsleyae*
	Grevillea deflexa	*Rhodanthe chlorocephala*
	Senna artemisioides subsp. *artemisioides*	*Roepera eremaea*
	Senna artemisioides subsp. filifolia	

Project Name: Dacian		
Date: 15/07/2021	**Botanist:** JW/JJ	**Photo (NW corner):** 309-311
Quadrat: Q38	**Quadrat size:** 50m x 50m	**Waypoint (NW corner):** 202
Coordinates (GDA94): 51 J 357441 6839178		
Aspect: SW	**Fire (yrs):** >20	**Condition rating:** Very Good
Landform: Flat		
Coarse fragments on the surface: Ironstone/ 50-90%/ 20-60mm		
Rock outcrop (abundance/runoff): Nil/ very slow		
Soil (profile/field texture/soil surface): Brown/ Clay Loam		
Cover leaf litter: 10%		
Cover bare ground: 90%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form:** Shrub	**Growth form:** Chenopod Shrub
Height: 3-5 m	**Height:** 0.5-1 m	**Height:** 0.25-0.5 m
Crown cover: 10-30%	**Crown cover:** 10-30%	**Crown cover:** 10-30%
Dominant taxa		
Acacia incurvaneura	*Ptilotus obovatus var. obovatus*	*Maireana triptera*
Other Taxa		
Acacia aptaneura	*Acacia tetragonophylla*	*Enchylaena tomentosa*
Acacia caesaneura	*Eremophila georgei*	*Maireana georgei*
Santalum lanceolatum	*Eremophila margarethae*	*Leichardtia australis*
	Eremophila platycalyx subsp. Leonora	*Ptilotus helipteroides*
	Scaevola spinescens	*Ptilotus schwartzii*
	Sida calyxhymenia	*Teucrium teucriiflorum*

Project Name: Dacian		
Date: 15/07/2021	**Botanist:** JW/JJ	**Photo (NW corner):** 312-314
Quadrat: Q39	**Quadrat size:** 50m x 50m	**Waypoint (NW corner):** 206
Coordinates (GDA94): 51 J 357392 6838576		
Aspect: SW	**Fire (yrs):** >20	**Condition rating:** Good
Landform: Open depression		
Coarse fragments on the surface: Ironstone/ 50-90%/ 20-60mm		
Rock outcrop (abundance/runoff): 2-10%/ moderate		
Soil (profile/field texture/soil surface): Brown/ Clay Loam		
Cover leaf litter: 35%		
Cover bare ground: 65%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form:** Shrub	**Growth form:** Shrub
Height: 5-12 m	**Height:** 1-3 m	**Height:** 0.25-0.5 m
Crown cover: <10%	**Crown cover:** 10-30%	**Crown cover:** <10%
Dominant taxa		
Eucalyptus lucasii	*Acacia tetragonophylla*	*Ptilotus obovatus* var. *obovatus*
Other Taxa		
Acacia burkittii	*Eremophila citrina*	*Goodenia peacockiana*
Acacia caesaneura	*Eremophila pantonii*	*Rhodanthe charsleyae*
Acacia incurvaneura	*Grevillea deflexa*	*Haloragis odontocarpa*
	Psydrax suaveolens	*Roepera eremaea*
	Senna artemisioides subsp. *artemisioides*	*Convolvulus remotus*
		Bulbine semibarbata
		Goodenia rosea



Project Name: Dacian		
Date: 15/07/2021	**Botanist:** JW/JJ	**Photo (NW corner):** 315-317
Quadrat: Q40	**Quadrat size:** 50m x 50m	**Waypoint (NW corner):** 210
Coordinates (GDA94): 51 J 357840 6838583		
Aspect: SW	**Fire (yrs):** >20	**Condition rating:** Good
Landform: Flat		
Coarse fragments on the surface: Quartz, ironstone/ 20-50%/ 20-60mm		
Rock outcrop (abundance/runoff): Nil/ slow		
Soil (profile/field texture/soil surface): Brown/ Clay Loam		
Cover leaf litter: 30%		
Cover bare ground: 70%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form:** Shrub	**Growth form:** Shrub
Height: 3-5 m	**Height:** 1-3 m	**Height:** 0.5-1 m
Crown cover: 30-70%	**Crown cover:** 10-30%	**Crown cover:** 10-30%
Dominant taxa		
Acacia caesaneura	*Acacia tetragonophylla*	*Ptilotus obovatus* var. *obovatus*
Other Taxa		
Acacia ayersiana	*Eremophila forrestii* subsp. *forrestii*	*Cheilanthes sieberi*
Acacia incurvaneura	*Eremophila margarethae*	*Goodenia rosea*
Hakea kippistiana	*Eremophila georgei*	*Goodenia xanthosperma*
Psydrax suaveolens	*Eremophila latrobei* subsp. *latrobei*	*Ptilotus schwartzii*
Santalum lanceolatum	*Eremophila platycalyx* subsp. Leonora	*Podotheca wilsonii*
	Rhagodia eremaea	*Lemooria burkittii*
	Scaevola spinescens	*Rhodanthe charsleyae*
	Senna charlesiana	*Teucrium teucriiflorum*
		Solanum lasiophyllum

Project Name: Dacian		
Date: 15/07/2021	**Botanist:** JW/JJ	**Photo (NW corner):** 318-320
Quadrat: Q41	**Quadrat size:** 50m x 50m	**Waypoint (NW corner):** 214
Coordinates (GDA94): 51 J 357813 6838381		
Aspect: SW	**Fire (yrs):** >20	**Condition rating:** Good
Landform: Flat		
Coarse fragments on the surface: Quartz, ironstone/ 50-90%/ 20-60mm		
Rock outcrop (abundance/runoff): Nil/ slow		
Soil (profile/field texture/soil surface): Brown/ Clay Loam		
Cover leaf litter: 10%		
Cover bare ground: 90%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form:** Shrub	**Growth form:** Shrub
Height: 3-5 m	**Height:** 1-3 m	**Height:** 0.25-0.5 m
Crown cover: 10-30%	**Crown cover:** 10-30%	**Crown cover:** 10-30%
Dominant taxa		
Acacia caesaneura	*Maireana sedifolia*	*Maireana triptera*
Other Taxa		
Acacia mulganeura	*Acacia tetragonophylla*	*Maireana georgei*
Santalum lanceolatum	*Eremophila citrina*	*Lemooria burkittii*
	Eremophila longifolia	*Cephalipterum drummondii*
	Eremophila malacoides	*Goodenia xanthosperma*
	Eremophila platycalyx subsp. Leonora	*Ptilotus helipteroides*
	Calandrinia balonensis	*Ptilotus exaltatus*
	Calandrinia eremaea	*Ptilotus aervoides*
	Enneapogon caerulescens	*Ptilotus obovatus* var. *obovatus*
	Roepera eremaea	*Solanum lasiophyllum*
		Sclerolaena densiflora

Project Name: Dacian		
Date: 15/07/2021	**Botanist:** JW/JJ	**Photo (NW corner):** 321-323
Quadrat: Q42	**Quadrat size:** 50m x 50m	**Waypoint (NW corner):** 218
Coordinates (GDA94): 51 J 357549 6837978		
Aspect: SW	**Fire (yrs):** >20	**Condition rating:** Good
Landform: Flat		
Coarse fragments on the surface: Quartz/ 50-90%/ 20-60mm		
Rock outcrop (abundance/runoff): Nil/ slow		
Soil (profile/field texture/soil surface): Brown/ Clay Loam		
Cover leaf litter: 10%		
Cover bare ground: 90%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form:** Shrub	**Growth form:** Shrub
Height: 5-12 m	**Height:** 1-3 m	**Height:** 0.25-0.5 m
Crown cover: 10-30%	**Crown cover:** <10%	**Crown cover:** <10%
Dominant taxa		
Acacia caesaneura	*Acacia tetragonophylla*	*Maireana georgei*
Other Taxa		
Acacia incurvaneura	*Eremophila platycalyx* subsp. Leonora	*Leichardtia australis*
Acacia mulganeura	*Eremophila margarethae*	*Ptilotus obovatus* var. *obovatus*
Santalum lanceolatum	*Sida calyxhymenia*	*Roepera eremaea*
	Sida sp. Excedentifolia *(J.L. Egan 1925)*	*Cephalipterum drummondii*
		Ptilotus helipteroides
		Duperreya commixta
		Podotheca wilsonii
		Helipterum craspedioides

Project Name: Dacian		
Date: 15/07/2021	**Botanist:** JW/JJ	**Photo (NW corner):** 324-326
Quadrat: Q43	**Quadrat size:** 50m x 50m	**Waypoint (NW corner):** 222
Coordinates (GDA94): 51 J 357757 6837753		
Aspect: SW	**Fire (yrs):** >20	**Condition rating:** Good
Landform: Mid-slope		
Coarse fragments on the surface: Quartz/ 50-90%/ 20-60mm		
Rock outcrop (abundance/runoff): Nil/ slow		
Soil (profile/field texture/soil surface): Brown/ Clay Loam		
Cover leaf litter: 10%		
Cover bare ground: 90%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form:** Shrub	**Growth form:** Shrub
Height: 3-5 m	**Height:** 1-3 m	**Height:** 0.5-1 m
Crown cover: <10%	**Crown cover:** <10%	**Crown cover:** 10-30%
Dominant taxa		
Acacia mulganeura	*Acacia ramulosa*	*Ptilotus obovatus* var. *obovatus*
Other Taxa		
Acacia incurvaneura	*Eremophila latrobei* subsp. *latrobei*	*Brachyscome ciliaris*
Acacia quadrimarginea	*Eremophila georgei*	*Maireana triptera*
	Eremophila platycalyx subsp. Leonora	*Ptilotus helipteroides*
	Dodonaea rigida	*Roepera eremaea*
	Scaevola spinescens	*Solanum lasiophyllum*
	Sida calyxhymenia	*Teucrium teucriiflorum*
	Rhagodia eremaea	
	Hakea preissii	

Project Name: Dacian		
Date: 15/07/2021	**Botanist:** JW/JJ	**Photo (NW corner):** 327-329
Quadrat: Q44	**Quadrat size:** 50m x 50m	**Waypoint (NW corner):** 226
Coordinates (GDA94): 51 J 358357 6841293		
Aspect: SW	**Fire (yrs):** >20	**Condition rating:** Good
Landform: Open depression		
Coarse fragments on the surface: Ironstone/ 20-50%/ 20-60 mm		
Rock outcrop (abundance/runoff): Nil/ slow		
Soil (profile/field texture/soil surface): Brown/ Clay Loam		
Cover leaf litter: 35%		
Cover bare ground: 65%		
Upper stratum	**Mid-stratum**	**Lower stratum**
Growth form: Tree	**Growth form:** Shrub	**Growth form:** Shrub
Height: 5-12 m	**Height:** 1-3 m	**Height:** 0.5-1 m
Crown cover: >70%	**Crown cover:** 10-30%	**Crown cover:** <10%
Dominant taxa		
Acacia incurvaneura	*Acacia tetragonophylla*	*Rhagodia eremaea*
Other Taxa		
Acacia burkittii	*Eremophila latrobei* subsp. *latrobei*	*Cheilanthes sieberi*
Acacia caesaneura	*Eremophila georgei*	*Calandrinia balonensis*
Eremophila longifolia	*Senna artemisioides subsp. artemisioides*	*Maireana georgei*
Grevillea berryana	*Senna artemisioides subsp. filifolia*	*Maireana triptera*
		Ptilotus obovatus var. *obovatus*

Appendix 9: NatureMap Species List (40km buffer)

Appendix 10: EPBC Protected Matters Search (40km buffer)