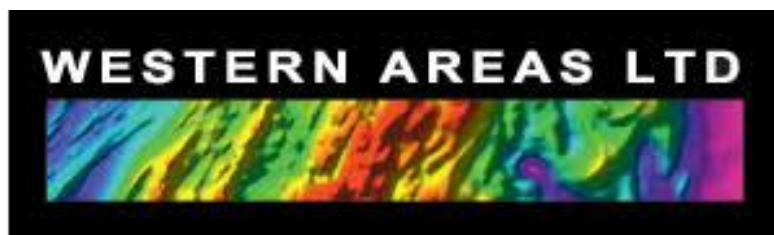


Detailed Flora & Vegetation Survey and Targeted Flora Survey of the New Morning Project

Prepared For



July 2021
Version 2

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Glossary

| Acronym | Description |
|----------------|--|
| ANCA | Australian Nature Conservation Agency. |
| BAM Act | <i>Biosecurity and Agriculture Management Act 2007</i> , WA Government. |
| BC Act | <i>Biodiversity Conservation Act 2016</i> , WA Government. |
| Botanica | Botanica Consulting Pty Ltd. |
| BoM | Bureau of Meteorology. |
| DAFWA | Department of Agriculture and Food (now DPIRD), WA Government. |
| DAWE | Department of Agriculture, Water and Environment (formerly DotEE), Australian Government. |
| DBCAs | Department of Biodiversity, Conservation and Attractions (formerly DPaW), 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 known as DAWE), Australian 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, WA Government |
| EP Act | <i>Environmental Protection Act 1986</i> , WA Government. |
| EP Regulations | Environmental Protection (Clearing of Native Vegetation) Regulations 2004, 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. |
| Km | Kilometre |
| MVG | Major Vegetation Groups. |
| NSR | Northern Star Resources Limited. |
| NVIS | National Vegetation Information System. |
| OEPA | Office of the Environmental Protection Authority (now DWER), WA Government. |
| PEC | Priority Ecological Community. |
| SSC | Species Survival Commission, International. |
| Survey Area | New Morning Project. |
| TEC | Threatened Ecological Community. |
| WA | Western Australia. |
| WAHERB | Western Australian Herbarium. |
| WAM | Western Australian Museum, WA Government. |
| WC Act | <i>Wildlife Conservation Act 1950</i> , WA Government (replaced by BC Act). |

Executive Summary

Botanica Consulting Pty Ltd (Botanica) was commissioned by Western Areas Limited (WSA) to undertake a detailed flora and vegetation survey and targeted flora survey of the New Morning Project (referred to as the 'survey area'), which is located at the WSA Forrestania Nickel Project, approximately 75 km east of Hyden, Western Australia. The survey was conducted over two seasons; spring 2018 (from the 26th to the 29th August 2018) and autumn 2019 (from 23rd to 24th May 2019). The survey area encompasses an approximate area of 1,298 ha. Thirty-six quadrats (20m X 20m) were established during the survey.

Nine vegetation associations were identified within the survey area. These vegetation associations were located within four different landform types and comprised of three major vegetation groups, which were represented by a total of 38 Families, 98 Genera and 280 Taxa (including 12 annual taxa).

Species composition assessments indicate there was minimal heterogeneity in species composition across the survey area, with majority of vegetation associations (particularly the Eucalypt woodland associations) intermixed into floristic groups despite differences in dominant stratum taxa; however, two distinct supergroups were identified. The first supergroup comprised of a mix of vegetation associations identified in the field including quadrats from the clay-loam plain (Eucalypt Woodlands and sand-loam plain (Mallee Woodlands and Shrublands). The second supergroup comprised a mix of quadrats from the sandplains (Mallee Woodlands and Shrublands/ Heathlands) and stony rise (Mallee Woodlands and Shrublands) vegetation associations.

Two Threatened Flora species, pursuant to the *Biodiversity Conservation Act 2016* (BC Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) were identified within the survey area; *Eucalyptus steedmanii* and *Paragoodia crenulata*. Four Priority Flora species were recorded within the survey area; *Eremophila racemosa* (P4), *Eutaxia acanthoclada* (P3), *Microcorys* sp. Forrestania (V. English 2004) and *Stylidium sejunctum* (P3).

No Threatened Ecological Communities (TEC) pursuant to Commonwealth or State legislation were identified within the survey area. The survey area does not contain any world or national heritage places, wetlands of international importance (Ramsar Wetlands) or wetlands of national importance (Australian Nature Conservation Agency (ANCA) wetlands).

The survey area is located within the North Ironcap buffer of the *Ironcap Hills Vegetation Complexes* which is listed by the Department of Biodiversity, Conservation and Attractions (DBCA) as a Priority 3 Ecological Community, however no vegetation representative of this PEC was identified within the survey area.

Approximately 370ha of the north-east corner of survey area lies within the Lake Cronin Environmental Sensitive Area (ESA) and is located approximately 500m west of the Lake Cronin 'A' Class Nature Reserve. The entire survey area is located within the mineralised greenstone belt in the Lake Cronin Region which is proposed by the Environmental Protection Authority (EPA) to be managed under Section 33(2) of the *Conservation Land Management Act 1984* (CALM Act) but not formally reserved.

Based on the vegetation condition rating scale adapted from Keighery, 1994 and Trudgen, 1988 (ranging from 'pristine' to 'completely degraded'), two vegetation associations were rated as 'good' and the remaining seven vegetation associations were rated as 'very good'. Four introduced species were identified within the survey area; *Dittrichia graveolens*, *Lysimachia arvensis*, *Sonchus oleraceus* and *Wahlenbergia capensis*. According to the Department of Primary Industries and Regional Development (DPIRD), none of these species are listed as a Declared Plant under the *Biosecurity and Agriculture Management Act 2007* (BAM Act) or a Weed of National Significance.

1 **Introduction**

1.1 **Project Description**

Botanica Consulting Pty Ltd (Botanica) was commissioned by Western Areas Limited (WSA) to undertake a detailed flora and vegetation survey and targeted flora survey of the New Morning Project (referred to as the 'survey area'), which is located at the WSA Forrestania Nickel Project, approximately 75 km east of Hyden, Western Australia (Figure 1-1). The survey was conducted over two seasons; spring 2018 (from the 26th to the 29th August 2018) and autumn 2019 (from 23rd to 24th May 2019). The survey area encompasses an approximate area of 1,298 ha. Thirty-six quadrats (20m X 20m) were established during the survey.

The New Morning deposit located within the survey area, is a medium grade nickel deposit located between two of Western Areas existing operations; Flying Fox and Spotted Quoll. A map showing the proposed disturbance envelope for the New Morning Project in relation to the survey area is provided in Figure 1-2.

1.2 **Objectives**

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

- 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 III– Vegetation 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 EPA guidelines;
- Assess the species composition of each quadrat using statistical analysis (PATN analysis);
- 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 Plants) within the survey area;
- Provide a map showing the distribution of conservation significant flora/vegetation within the survey area;
- Define and map the condition of vegetation within the survey area in accordance with the vegetation condition rating scale adapted from Keighery, 1994 and Trudgen, 1988;
- Determine the State legislative context of environmental aspects required for the assessment;
- Assess Matters of National Environmental Significance (MNES) and indicate whether potential impacts on MNES as protected under the EPBC Act are likely to require referral of the project to the Commonwealth Department of Agriculture, Water and Environment (DAWE); and
- Determine the need for additional flora and vegetation surveys.

The objectives of the targeted flora and vegetation survey were to:

- Gather background information on flora and vegetation of conservation significance in the local area (literature review, database and map-based searches);
- Based on results of the desktop assessment, identify vegetation associations within the survey area that have the potential to contain flora/vegetation of conservation significance;
- Conduct a field survey to identify flora/vegetation of conservation significance within the project footprint; and
- Provide GPS record and spatial map showing the distribution of flora/vegetation of conservation significance within the survey area.

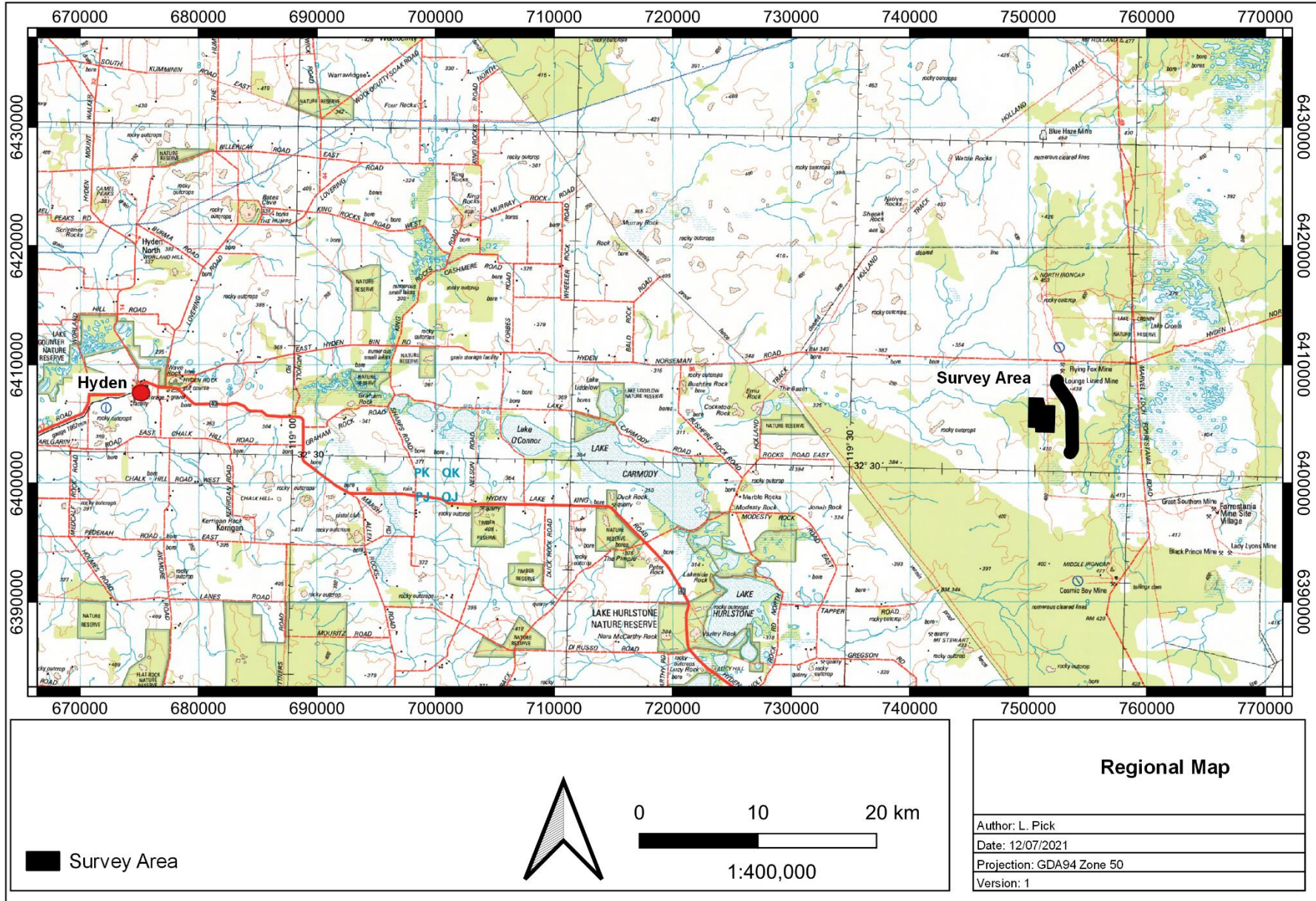


Figure 1-1: Regional location of the New Morning Project survey area



Figure 1-2: New Morning survey area

2 Regional Biophysical Environment

2.1 Regional Environment

Based on the Interim Biogeographic Regionalisation of Australia (IBRA), Version 7 (DotEE, 2012), the survey area is located on the border of the Coolgardie and Mallee Bioregions of the South-West and Interzone. The Coolgardie and Mallee Bioregions are further divided into subregions with the survey area located within the Western Mallee subregion (MAL2) of the Mallee Bioregion and the Southern Cross subregion (COO2) of the Coolgardie Bioregion (Figure 2-1)

The Coolgardie Bioregion forms part of the South-West and Interzone Botanical Province of Western Australia in a region known as the Coolgardie Botanical District (Beard, 1990). The Coolgardie Bioregion is located within the Yilgarn Craton and is characterised by a granite basement which includes Archaean Greenstone intrusions in parallel belts. Drainage is occluded. The Southern Cross subregion comprises gently undulating uplands on granite strata and broad valleys with bands of low greenstone hills (McKenzie, J.E. May and S. McKenna, 2002).

The Mallee Bioregion also forms part of the South-West and Interzone Botanical Province of Western Australia in a region known as the Roe Botanical District. The Mallee Bioregion is located in the south-eastern part of Yilgarn Craton which is gently undulating, with partially occluded drainage. The Western Mallee subregion has more relief than its eastern counterpart. Its main surface-types comprise clays and silts underlain by kankar, exposed granite, sandplains, isolated uplands of laterite pavements and Salt Lake systems on a granite basement (McKenzie, J.E. May and S. McKenna, 2002).

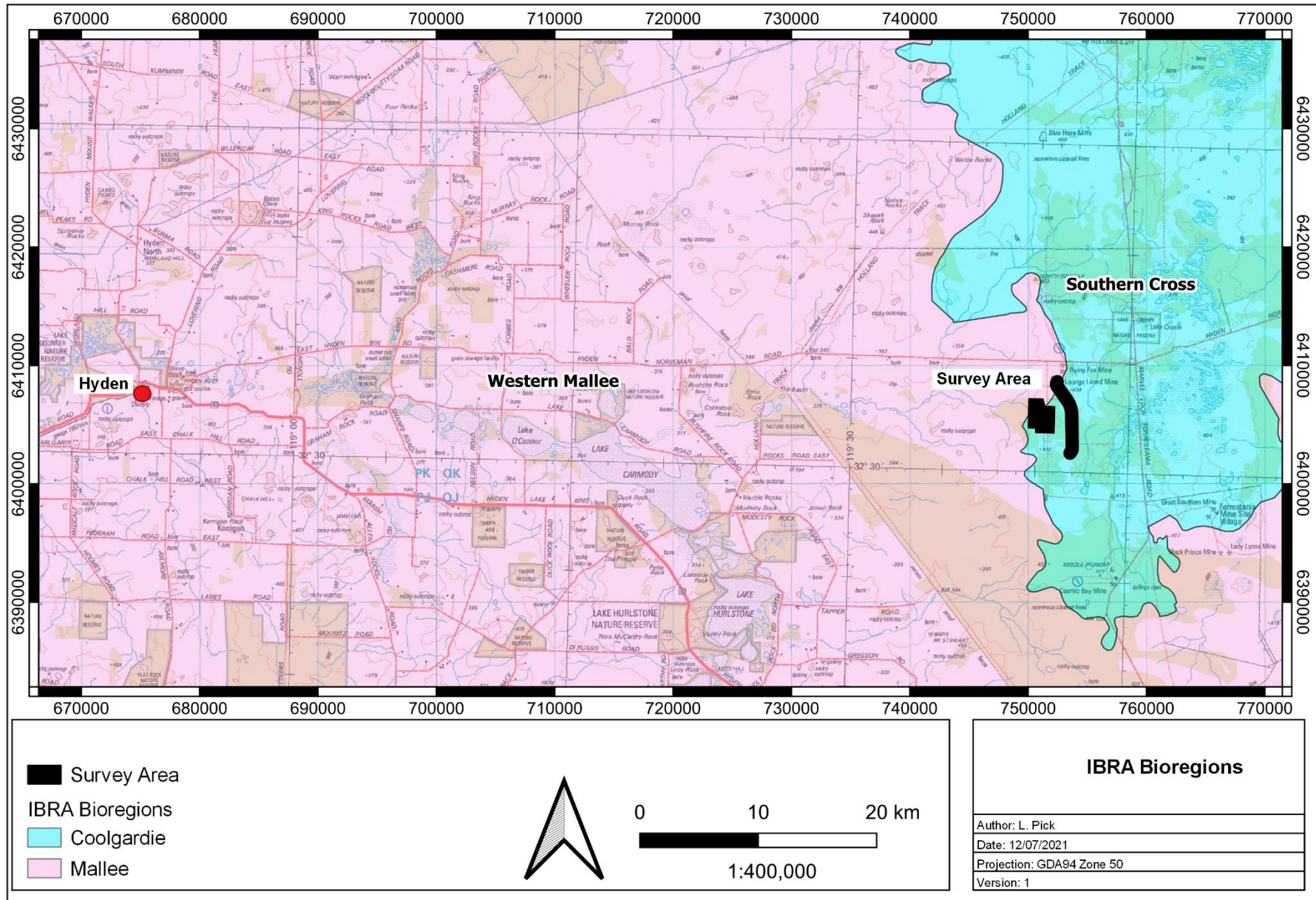


Figure 2-1: Map of IBRA Bioregions in relation to the New Morning Project survey area

2.2 Soils and Landscape Systems

Based on geographic information provided by DPIRD (2019), the survey area is located within the South-eastern Zone of Ancient Drainage (250) of the Avon Province (25) and the Southern Cross Zone (261) of the Kalgoorlie Province (26). The Avon Province is characterised as a laterised plateau (dissected at fringes and with saline drainage lines inland) on deeply weathered mantle and alluvium over granitic rocks of the Yilgarn Craton (and Albany-Fraser Orogen). Soils are comprised of sandy duplexes soils and ironstone gravelly soils with loamy earths, loamy duplexes, sandy earths, deep sands and wet soils. Vegetation is dominated by York gum-wandoo-salmon gum-morrel gimlet woodland and jarrah-marri-karri-wandoo woodlands/forests (with some mallee scrub, tammar-wodjil thickets and scrub-heath). This Province is located in the south-west, between Nannup, Denmark, Jerramungup, Southern Cross, Lake Moore, Carnamah and the Perth Hills (Tille, 2006).

The Kalgoorlie Province is characterised by undulating plains (with some sandplains, hills and salt lakes) on the granitic rocks and greenstone of the Yilgarn Craton. Soils include calcareous loamy earths and red loamy earths with some Salt Lake soils, red deep sands, yellow sandy earths, shallow loams and loamy duplexes. Vegetation is dominated by Eucalypt woodlands with some Acacia-Casuarina thickets, mulga shrublands, halophytic shrublands and spinifex grasslands. This Province is located in the southern Goldfields between Paynes Find, Menzies, Southern Cross and Balladonia (Tille, 2006).

The South-western Zone of Ancient Drainage (250) is characterised by gently undulating terrain (with some salt lake chains and areas of prominent granitic outcrops) on deeply weathered mantle and alluvium over granitic rocks of the Yilgarn Craton. Soils include sandy duplexes (often alkaline) with ironstone gravelly soils and loamy earths (often calcareous) and some loamy duplexes, sandy earths, deep sands and saline wet soils. Mallee scrub and salmon gum-gimlet-morrel woodlands (and some scrub-heath). This zone is located in the southern Wheatbelt between Kondinin, Lake Grace, Gnowangerup, Frank Hann National Park and Mt Holland (Tille, 2006).

The Southern Cross Zone (261) is characterised by undulating plains and uplands (with some salt lake and low hills) on deeply weathered mantle, colluvium and alluvium over greenstone and granitic rocks of the Yilgarn Craton. Soils include calcareous loamy earths, red and yellow loamy earths and alkaline deep and shallow sandy duplexes with some yellow sandy earths, salt lake soils, yellow deep sands and red shallow loamy duplexes. Vegetation is dominated by Salmon gum-gimlet-morrel-York gum woodlands with Acacia/ Casuarina thickets (and some mallee, scrub-heath and halophytic shrublands). This zone is located in the eastern Wheatbelt/south western Goldfields between Bullfinch and Mt Holland. The South-western Zone of Ancient Drainage (259) and Southern Cross Zone (261) are further divided into soil landscape systems within the soil landscape systems of the survey area described in Table 2-1 and shown in Figure 2-2.

Table 2-1: Soil Landscape Systems within the New Morning Project survey area

| Zone | Landscape System/ Mapping Unit | Description | Extent within Disturbance Envelope |
|--|--------------------------------|--|------------------------------------|
| South-eastern Zone of Ancient Drainage (250) | Ms8 | Gently undulating plains with broad shallow drainage depressions | 0 |
| | X17 | Slopes and valleys | 64 ha (100%) |
| Southern Cross Zone (261) | Ya28 | Sandy plains with some clay pans and small salt lakes, dunes, and lunettes | 0 |

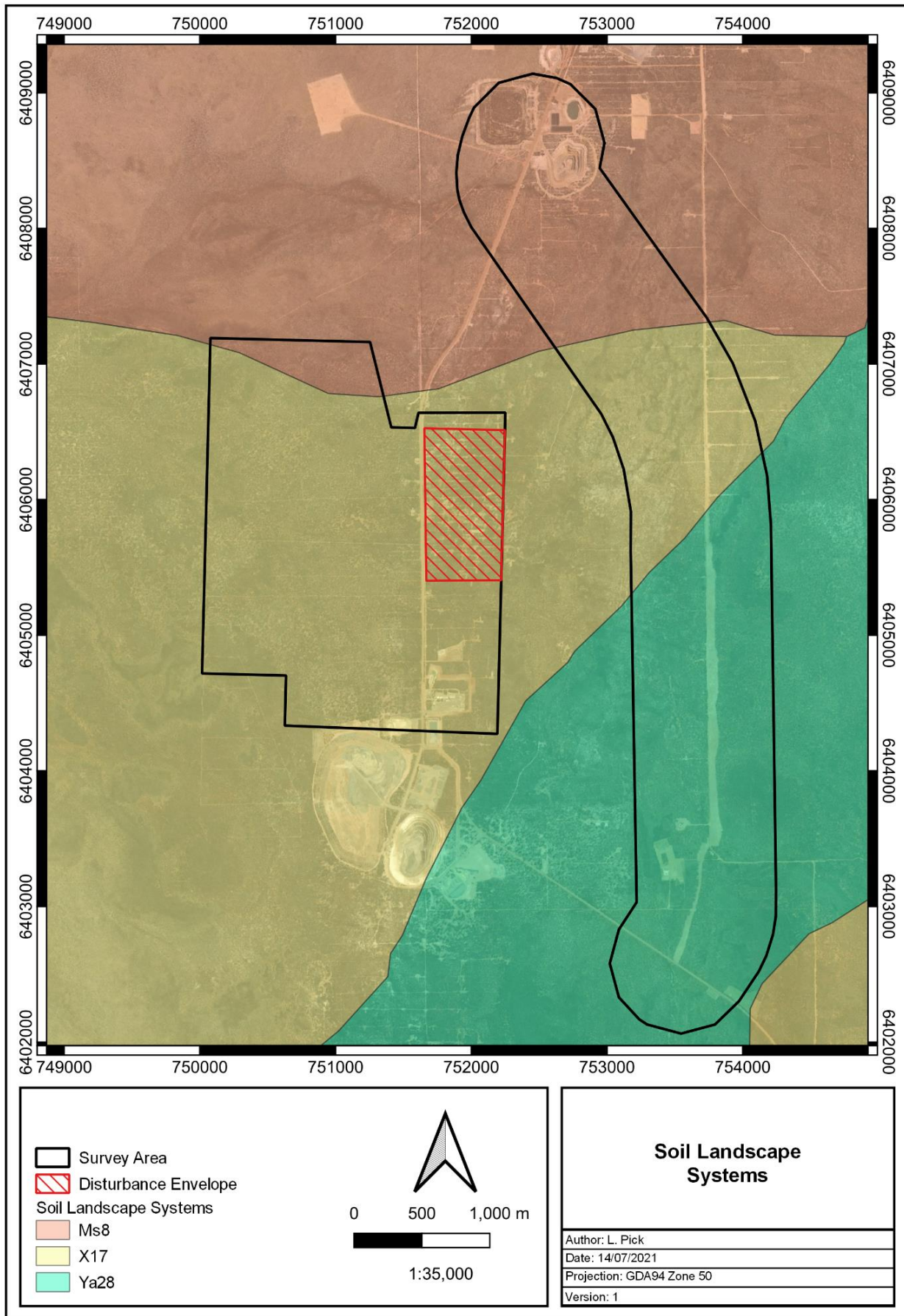


Figure 2-2: Map of Soil Landscape Systems within the New Morning Project survey area

2.3 Remnant Vegetation

The DPIRD GIS file (2018) indicates that the survey area is located within Pre-European Beard vegetation association Forrestania 511 (COO2), Forrestania 2048 (COO2 and MAL2). The extent of these vegetation associations as specified in the *2018 Statewide Vegetation Statistics* (DBCA, 2019) is provided in Table 2-2 and shown in Figure 2-3.

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). Development within the survey area will not significantly reduce the extent of pre-European vegetation.

Table 2-2: Remaining Beard Vegetation Associations within Western Australia (DBCA, 2019)

| IBRA Subregion | Vegetation association | Current Extent (Ha) | Pre-European extent remaining (%) | % of Current extent within DBCA managed lands | Vegetation Description (Beard, 1990) | Extent within Disturbance Envelope |
|----------------|------------------------|---------------------|-----------------------------------|---|--|------------------------------------|
| COO2 | Forrestania 511* | 153,002.24 | 99.58 | 9.72 | Medium woodland; salmon gum & morrel | 0 |
| | Forrestania 2048* | 2,070.85 | 98.91 | 2.41 | Shrublands; scrub-heath in the Mallee Region | 64 ha (100%) |
| MAL2 | Forrestania 2048 | 5,595.69 | 97.56 | 0 | Shrublands; scrub-heath in the Mallee Region | 0 |

*Low Reservation Priority according to the International Union for Conservation of Nature (IUCN)

Vegetation of the Southern Cross subregion in the Coolgardie Botanical District is predominantly Eucalypt woodlands, Mallees, Acacia thickets and scrub-heaths on sandplains. Diverse Eucalypt woodlands occur around salt lakes, on the low greenstone hills, valley alluvials and broad plains of calcareous earths. Salt lakes support dwarf shrublands of samphire. The area is rich in endemic *Acacias* (Cowan, 2001). The Western Mallee subregion vegetation commonly includes Mallee over myrtaceous-proteaceous heaths, *Melaleuca* shrublands, Samphire low shrublands on saline depressions and mixed Eucalypt woodlands. Mallee communities of the Western Mallee subregion occur on a variety of surfaces; Eucalypt woodlands occur mainly on fine textured soils, with scrub-heath on sands and laterite (Beecham & Danks, 2001).



Figure 2-3: Pre-European Vegetation Associations within the New Morning Project survey area

2.4 Climate

The climate of the Southern Cross subregion is characterised as arid to semi-arid Mediterranean with an annual rainfall of 200-300mm (Beard, 1990; Cowan, 2001). The climate of the Western Mallee subregion is characterised as dry warm Mediterranean with an annual rainfall of 300-500mm (Beard, 1990; Beecham & Danks, 2001). Rainfall data for the Lake Carmody weather station (#10670) located approximately 30km south of the survey area is shown in Figure 2-4 (BoM, 2021a).

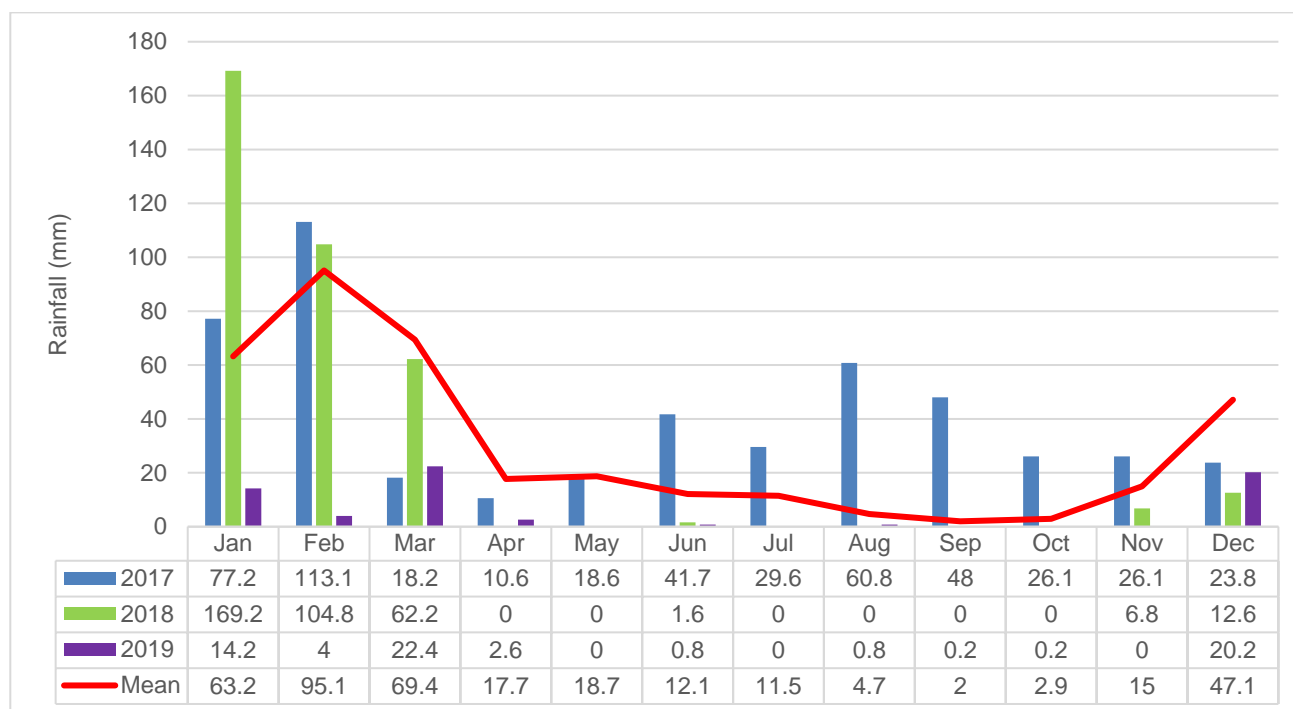


Figure 2-4: Monthly rainfall (January 2017 to December 2019) for the Lake Carmody weather station (#13030) (BoM, 2021a)

2.5 Hydrology

According to the Geoscience Australia database (2015) a minor ephemeral drainage line extends through the northern and western region of the survey area. There are no inland water sources (lakes, playas etc.) within the survey area. The survey area is located approximately 4km east of the Camm paleochannel and 2km west of the Deborah paleochannel. According to the Bureau of Meteorology (2021b) *Groundwater Dependent Ecosystem Atlas*, there are no aquatic or terrestrial ecosystems within the assessment area. One terrestrial GDE has moderate potential to occur within the survey area; *Undulating plains with some sandplains, ferruginous breakaways; ridges of metamorphic rocks and granitic hills and rises; calcretes, large salt lakes and dunes along valleys*. A map showing the regional hydrology and potential GDEs in the local region is provided in Figure 2-5.

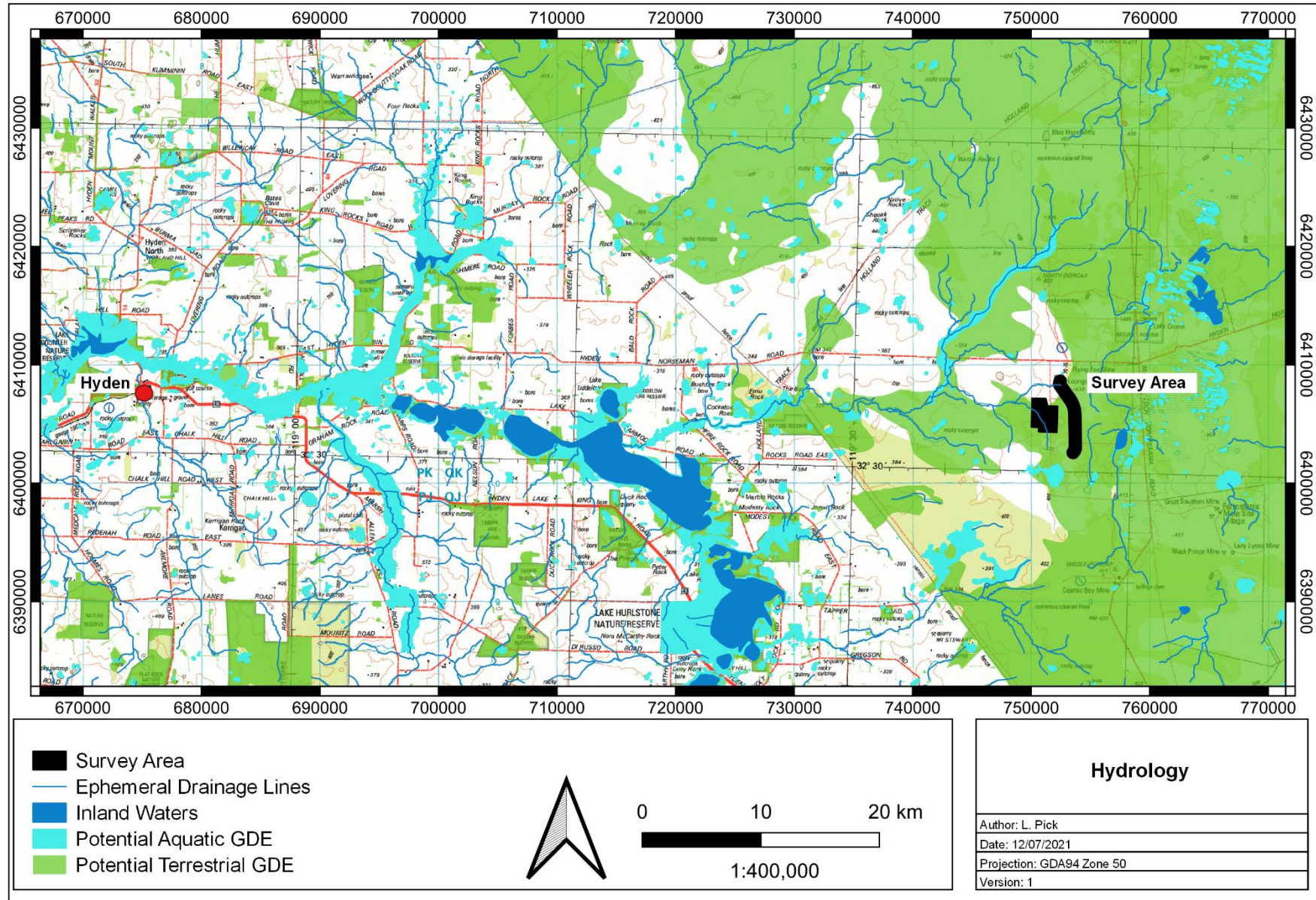


Figure 2-5: Hydrology of the New Morning Project survey area

2.6 Land Use

The dominant land uses of the Southern Cross subregion includes native pastures (17%), Conservation Reserves (11.53%), UCL & Crown Reserves (66.74%) and Cultivation – Dry Land agriculture (2.27%) (Cowan, 2001). The dominant land uses of the Western Mallee subregion includes Dry Land agriculture, UCL & Crown Reserves, roads and other easements.

The survey area also lies within the Great Western Woodlands. The Great Western Woodlands is considered by The Wilderness Society of WA to be of global biological and conservation importance as one of the largest and healthiest temperate woodlands on Earth, containing many endemic species. The region covers almost 16 million hectares, 160,000 square kilometers, from the southern edge of the Western Australian Wheatbelt to the pastoral lands of the Mulga country in the north, the inland deserts to the northeast, and the treeless Nullarbor Plain to the east (Figure 2-6).

The area provides an eastward connection between southwest forests and inland deserts (Gondwana Link) as well as linking the north-west passage to Shark Bay. The majority of the Great Western Woodlands is unallocated crown land (61.1%) with other interests including pastoral leases (20.4%), conservation reserves (15.4%) unallocated crown land ex pastoral managed by the DEC (2%) and private land (approximately 1%) (Watson *et. al.*, 2008).

No specific management strategy applies to the Great Western Woodlands, rather an approach to conservation which occurs across all land tenures and when different stakeholders work together with biodiversity in mind. The central component of this approach is to identify and conserve key large-scale, long term ecological processes that drive connectivity between ecosystems and species. The Great Western Woodlands currently includes towns, highways, roads, railways, private property, Crown Reserves, agricultural activities and mining tenements.

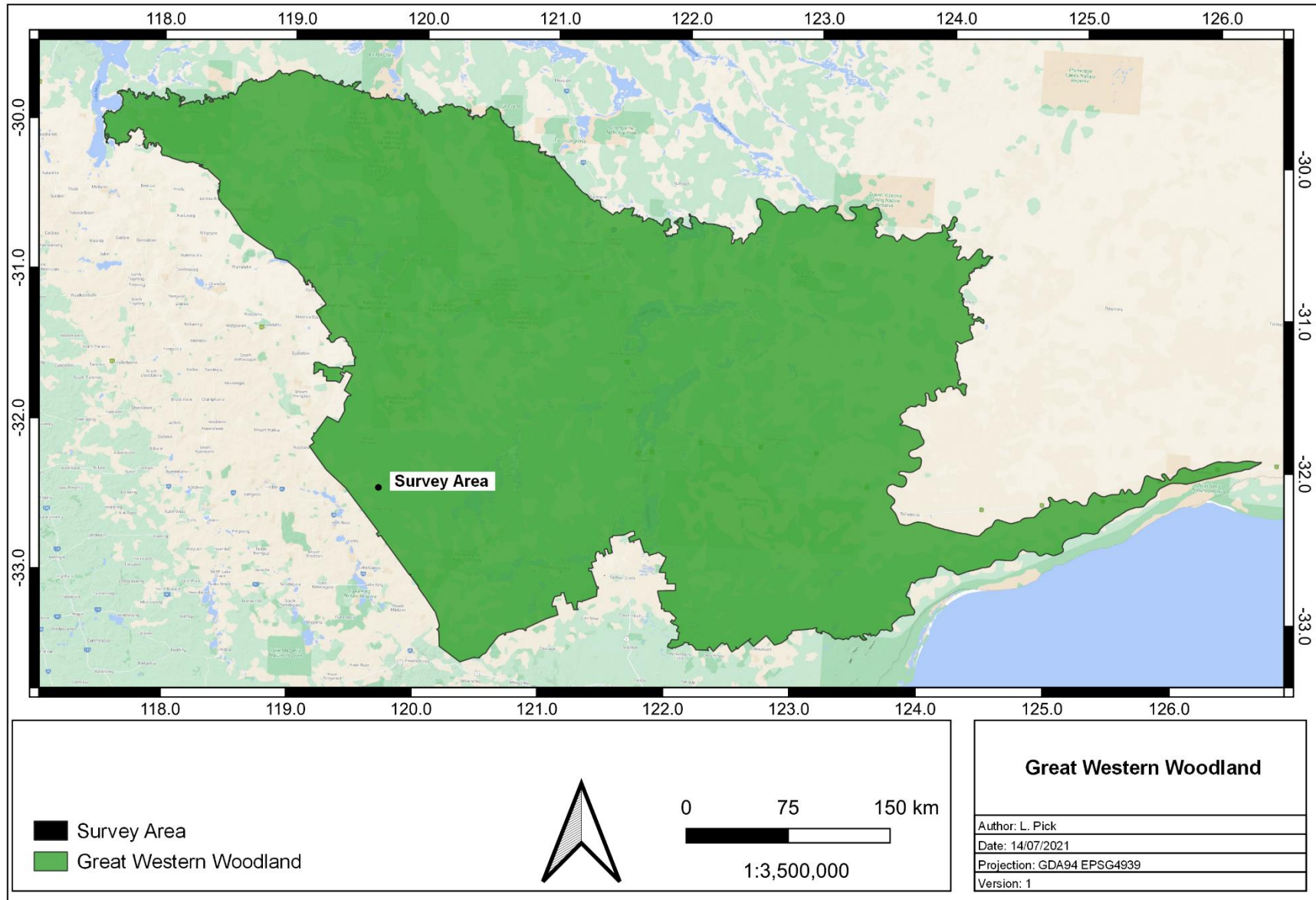


Figure 2-6: Location of survey area within the Great Western Woodlands (survey area no to scale)

3 Survey Methodology

3.1 Desktop Assessment

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

- BC, (2006), Flora and Vegetation Survey of the Flying Fox North East Exploration Area for Western Areas, Botanica Consulting
- BC, (2007a), Vegetation Survey of a Proposed Extension to the Current Clearing Permit Number 691/1 at the Flying Fox mine site prepared for Western Areas, Botanica Consulting
- BC, (2007b), Flora and Vegetation Survey within the Greater Flying Fox mine site prepared for Western Areas, Botanica Consulting
- BC, (2008), Vegetation Survey of New Morning to Spotted Quoll Area within Tenements M77/583 and M77/545, Botanica Consulting
- BC, (2009), Flora and Vegetation Survey within the lounge Lizard/Flying Fox area, Proposed Gravel Pit, prepared for Western Areas, Botanica Consulting
- BC, (2010a), New Morning Flora and Vegetation Survey Prepared for Western Areas, Botanica Consulting
- BC, (2010b), New Morning Flora and Vegetation Survey Prepared for Western Areas, Botanica Consulting
- BC, (2011), Spotted Quoll/Cosmic Boy Haul Road Flora and Vegetation Survey, Prepared for Western Areas NL, Botanica Consulting
- BC (2017) Reconnaissance Flora & Vegetation Survey of the Greater New Morning/Spotted Quoll Area, Prepared for Western Areas Limited, Botanica Consulting
- How, R. A Newbey, K.R Dell, J. Muir, B.G & Hnatiuk, R.J, (1988), *The Biological survey of the Eastern Goldfields of Western Australia: Lake Johnston-Hyden*. Western Australian Museum Supplement No. 30.
- Gibson (2004) Flora and vegetation of the Eastern Goldfields Ranges: Part 7. Middle and South Ironcap, Digger Rock and Hatter Hill. Science Division, Department of Conservation and Land Management,
- JSWT, (2006a), *Vegetation Survey of the Exploration Drilling Program (M77/582 & E77/555)*, Prepared for Western Areas NL, Botanica Consulting
- JSWT, (2006b), *North Flying Fox Drill Lines Flora Survey for Western Areas*, Jim's Seeds, Weeds & Trees
- JSWT, (2006c), *Vegetation Survey of three Proposed Monitoring Bores in the Flying Fox Area*, Prepared for Western Areas, Jim's Seeds, Weeds & Trees

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

- DBCA's Threatened and Priority Flora search (DBCA, 2018a);
- DBCA Priority/ Threatened Ecological Communities Database Search (DBCA, 2018b);
- DBCA NatureMap Database (DBCA, 2018c); and
- DAWE Protected Matters search tool (DotEE, 2018).

The Naturemap and Protected Matters searches were conducted for an area encompassing a 20km radius of the centre coordinates; 32° 27' 45" S, 119° 40' 58" E.

It should be noted that these lists are based on observations from a broader area than the assessment area (20km radius) and therefore may include taxa not present. The databases also often included very old records that may be incorrect or in some cases the taxa in question have become locally or regionally extinct. Information from these sources should therefore be taken as indicative only and local knowledge and information also needs to be taken into consideration when determining what actual species may be present within the specific area being investigated.

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);
- Red List produced by the Species Survival Commission (SSC) of the World Conservation Union (also known as the IUCN Red List – the acronym derived from its former name of the International Union for Conservation of Nature and Natural Resources). The Red List has no legislative power in Australia but is used as a framework for State and Commonwealth categories and criteria; and
- Priority Flora list. A non-legislative list maintained by DBCA for management purposes (released December 2018).

Descriptions of conservation significant species and communities are provided in Appendix 1.

3.2 Field Assessment

Botanica conducted a detailed flora and vegetation survey and targeted flora survey over two seasons; spring 2018 (from the 26th to the 29th August 2018) and autumn 2019 (from 23rd to 24th May 2019). The detailed survey area encompasses covered an approximate area of 1,298 ha. Thirty-six quadrats (20m X 20m) were established during the survey.

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

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

Unknown specimens collected during the survey were identified with the aid of samples housed at the BC Herbarium and WAHERB. Vegetation associations were classified in accordance with the NVIS Vegetation Association (NVIS Level III) classification. Presence/absence data of taxa from sample sites were used to compile the representative floristic groups. The survey area was traversed by two people via 4WD, all-terrain vehicle, and on foot (Figure 3-1).

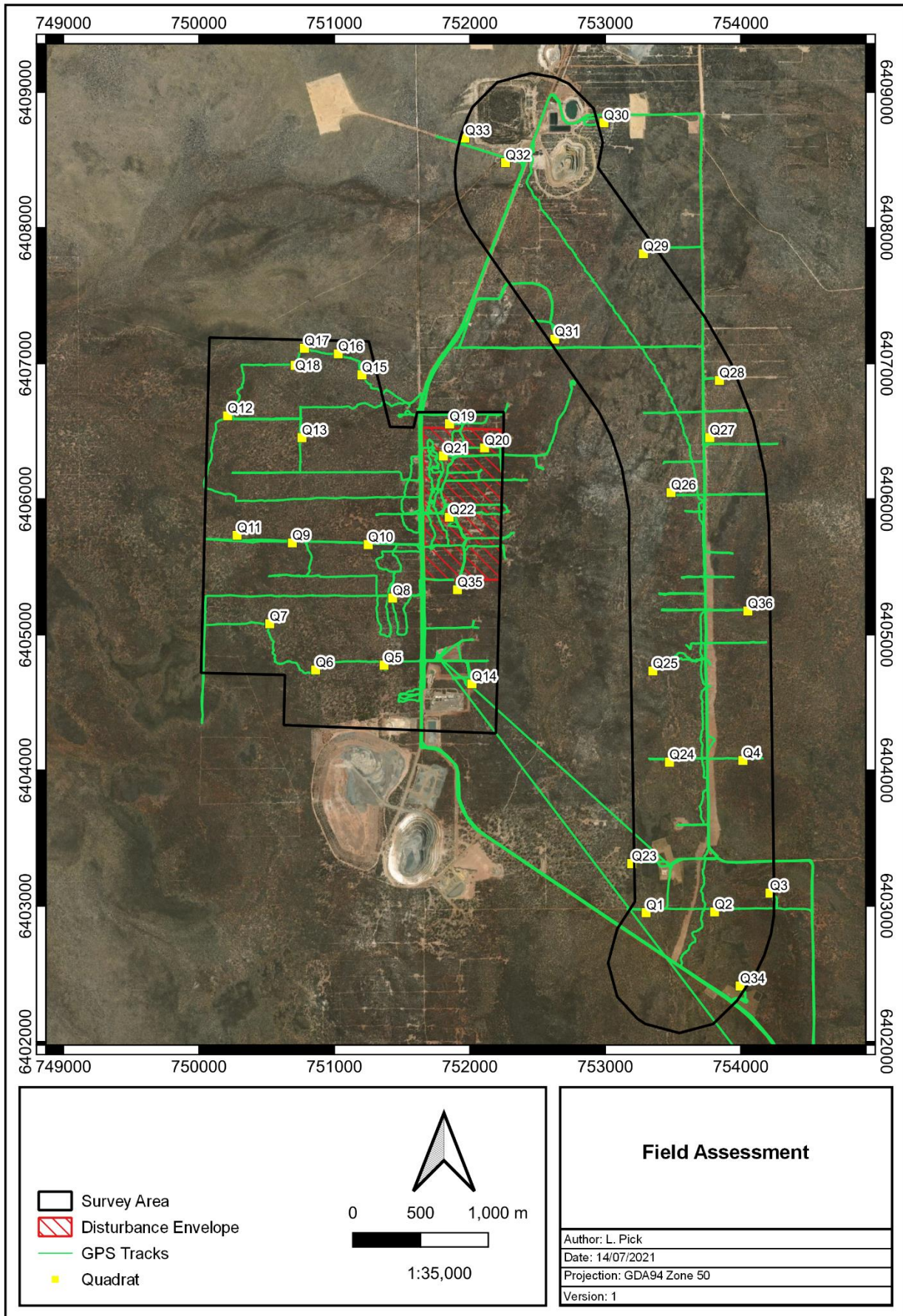


Figure 3-1: Quadrat locations, survey area boundary and GPS tracks traversed throughout the New Morning Project survey area

3.2.1 Sampling Quadrats

Thirty-six 20m x 20m quadrats were established within the survey area (Figure 3-1). The objective was to have at least three quadrats per vegetation type to capture the floristic variations within the survey area. 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 20m x 20m (square quadrats).

Following their establishment and boundary verification, the location of each quadrat was recorded by GPS (Appendix 6) photographed (Appendix 8) and all vascular plants within the quadrat were recorded (Appendix 7). This included recording of dominant taxa from the upper, middle and lower stratum, and sampling of all unknown taxa. Unknown taxa were identified using BC's own reference herbarium and relevant taxonomical 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 7). 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).

3.2.2 Targeted Flora Survey

A targeted search for flora of conservation significance (Priority and Threatened Flora) was conducted within the New Morning Project disturbance envelope (covering an area of ~64 ha). The footprint was systematically searched on foot by two Botanica staff members to identify and record the locations of Threatened and Priority Flora. All locations of Threatened and Priority Flora were recorded using a hand-held GPS and a simple plant count (not differentiated between juvenile/ mature plants, flowering or non-flowering plants) was conducted for each record.

3.2.3 Personnel involved

Jim Williams - Environmental Consultant/ Director (Diploma of Horticulture)
Lauren Pick - Environmental Consultant (BSc Zoology & Conservation Biology)

3.2.4 Scientific licences

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

| Licensed staff | Permit Number | Valid Until |
|----------------|---|--------------------------|
| Jim Williams | SL012391 (Licence to flora for scientific purposes) | 26/05/2018 to 27/05/2019 |
| Lauren Pick | SL012392 (Licence to flora for scientific purposes) | 26/05/2018 to 27/05/2019 |

3.3 Data Analysis Tools

Once the survey was completed the data obtained was analysed to generate a vegetation map. The statistical program PATN was used to assess species composition of the quadrats (Appendix 9).

3.3.1 PATN Analysis

The PATN software package was used to assess the similarities/ dissimilarities between quadrats based on presence/ absence of species. Annual taxa were removed from the data prior to analysis (total of seven annual taxa). Species reconciliation eliminated those sterile taxa that could not be fully identified from the analysis (eleven taxa), and reconciled subsp. and/or variant taxa (two taxa). Singleton taxa were excluded from the analysis (56 taxa). Of the 167 taxa recorded within the quadrats, 93 taxa were used 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 Flora survey limitations and constraints

It is important to note that flora surveys will entail limitations notwithstanding careful planning and design. Potential limitations are listed in Table 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 tracks were located within the survey area, providing ease of access. |
| Competency/ Experience | Not a constraint | The BC personnel that conducted the survey were regarded as suitably qualified and experienced. Coordinating Botanist: Jim Williams Field Staff: Jim Williams, and Lauren Pick Data Interpretation: Jim Williams and Lauren Pick |
| Timing of survey, weather & season | Not a constraint | Fieldwork was conducted over two seasons, consistent with the EPA recommended approximate timing for the South-West and Interzone; Primary survey conducted in spring and |

| Variable | Potential Impact on Survey | Details |
|--|----------------------------|--|
| | | supplementary survey conducted after autumn rains. Majority of the flora was in flower, annual species were present and short-lived species such as Orchids were also present during the survey. |
| Area disturbance | Minor constraint | The majority of the survey area is in very good condition and comprised of native vegetation. Disturbance in the area was a result of exploration and access tracks. |
| Survey Effort/ Extent | Not a constraint | Survey intensity was appropriate for the size/significance of the area with a detailed survey completed to identify vegetation communities, and flora of conservation significance. A targeted search to identify all Priority Flora populations was conducted within the Project disturbance envelope |
| Availability of contextual information at a regional and local scale | Minor constraint | <p>Conservation significant flora database searches provided by the DBCA were used to identify any potential locations of Threatened/Priority Flora species.</p> <p>BoM, DWER, DPIRD, DBCA and DAWE databases were reviewed to obtain appropriate regional desktop information on the biophysical environment of the local region.</p> <p>Botanica have conducted a number of surveys within the Forrestania region and were also able to obtain information about the area from previous research conducted within the area. Results of previous flora assessments in the local area were reviewed to provide context on the local environment</p> |
| Data Analysis | Minor constraint | Botanica staff conducting the PATN statistical analyses are not statistical analysts and have basic statistics training. These analyses are used to provide basic information on the relationships between vegetation communities delineated in the field. |
| Completeness | Not a constraint | <p>In the opinion of Botanica, the survey area was covered sufficiently in order to identify vegetation assemblages. Survey work was conducted over two season including optimal flowering period (Spring). Many of the plants during the survey were in flower and many annual species were present. It is estimated that approximately >90% of the flora within the survey area were able to be fully identified.</p> <p>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).</p> |

4 Results

4.1 Desktop Assessment

4.1.1 Literature Review

Flora and vegetation surveys, assessments and reviews have been undertaken in nearby areas in the past, though not all are publicly available and some could not be referenced. The most significant of those available have been used as the primary reference material for the current vegetation assessment (Table 4-1).

Table 4-1: Previous Flora and Vegetation Surveys within the New Morning Project and surrounding area

| Author & Year | Vegetation | Flora of Conservation Significance |
|--------------------------|---|--|
| Newbey & Hnatiuk, (1988) | <p>Between July 1979 and October 1981, a biological survey of the Lake Johnston-Hyden region covering approximately 20,300km² was conducted.</p> <p>Nine vegetation systems of the Study Area and, when broadly classified, represented 51 vegetation associations. Seven unique vegetation associations and a further five that were rare both within the Study Area and Eastern Goldfields were recorded. Specialised vegetation mosaics were recorded on the banded ironstone formation of Bremer Range, North Ironcap, Middle Ironcap and South Ironcap (the greenstone belt from Hatters Hill to Mt Holland), and on the granites of Peak Charles and Peak Eleanora. Woodlands (15-20 m) were scattered on Broad Valleys, Salt Lake Features and Sandplains. Low woodlands <15 m) dominated Undulating Plains (greenstone) and Broad Valleys. They were scattered on Hills (granite) and present on some of the larger Granite Exposures with substantial run-off. Mallees (3-6 m) were common on Sandplains and Broad Valleys, and scattered on Hills (granite), Salt Lake Features and larger Granite Exposures. Tall shrublands (> 1 m) dominated on Hills (granite), were common on Sandplains, and scattered on Salt Lake Features and Hills (banded ironstone formation). Salt Lake Features were the main areas for low shrublands <1 m) with scattered occurrences on Sandplains. Complexes were common on Breakaways, Granite Exposures, Hills (granite and banded ironstone formation) but rare on Undulating Plains (greenstone).</p> <p>The vascular flora comprised 1076 species, 17 subspecies and 29 varieties of flowering plants and six species of fern. Twenty new species, 79 rarely collected species, of which 39 were endemic to the area, and 14 major range extensions were recorded in the Study Area.</p> | <i>Banksia sphaerocarpa</i> var. <i>dolichostyla</i> (T) |
| Gibson (2004) | <p>Gibson conducted a study of the flora and plant communities of part of Forresteria greenstone belt between Middle Ironcap and Hatter Hill (some 80 km ESE of Hyden). The study recorded a total flora of 345 taxa of which 342 were native and three were introduced. Three species of threatened flora and 29 taxa being considered for listing were found. Ten species are considered to be endemic to the range and a further eight species are restricted to similar landforms within 100 km of the range. Four community types were identified;</p> <p>Community 1- Species-rich shrublands or mallee shrublands on skeletal soils derived from banded ironstone and the massive laterites</p> <p>Community 2- Mallee shrublands or <i>Allocasuarina</i> thickets primarily found on massive laterites.</p> | <p><i>Acacia heterochroa</i> subsp. <i>robertii</i> (P2) <i>Acacia singula</i> (P3) <i>Acacia tetraneura</i> (P1) <i>Banksia rufa</i> subsp. <i>flavescens</i> (P3) <i>Banksia sphaerocarpa</i> var. <i>dolichostyla</i> (T) <i>Banksia viscida</i> (P3) <i>Bentleya diminuta</i> (P2) <i>Boronia revoluta</i> (T) <i>Calamphoreus inflatus</i> (P4) <i>Eremophila racemosa</i> (P4) <i>Eucalyptus exigua</i> (P3)</p> |

| Author & Year | Vegetation | Flora of Conservation Significance |
|-----------------|--|---|
| | <p>Community 3- Eucalypt woodlands dominated or co-dominated by <i>Eucalyptus urna</i> and <i>E. salubris</i> occurring on the colluvial deposits on the flats below the outcrops or on the broad flat ridges along the range generally with an understorey dominated by <i>Melaleuca</i> spp.</p> <p>Community 4- species poor mallee community generally dominated by <i>Eucalyptus calycogona</i> with large emergent <i>Eucalyptus salmonophloia</i> on small colluvial flats</p> | <p><i>Eucalyptus georgei</i> subsp <i>fulgida</i> (P4)</p> <p><i>Eucalyptus rugulata</i> (P4)</p> <p><i>Eutaxia acanthoclada</i> (P3)</p> <p><i>Grevillea insignis</i> subsp <i>elliottii</i> (P3)</p> <p><i>Grevillea lullfitzii</i> (P1)</p> <p><i>Hibbertia axillibarba</i> (P1)</p> <p><i>Hibbertia carinata</i> (P1)</p> <p><i>Leucopogon marginatus</i> (T)</p> <p><i>Leucopogon</i> sp Ironcaps (N Gibson & K Brown 3070) (P3)</p> <p><i>Melaleuca agathosmoides</i> (P1)</p> <p><i>Microcybe pauciflora</i> subsp <i>grandis</i> (P1)</p> <p><i>Mirbelia densiflora</i> (P3)</p> <p><i>Orianthera exilis</i> (P2)</p> <p><i>Phebalium brachycalyx</i> (P3)</p> <p><i>Stenanthemum liberum</i> (P1)</p> <p><i>Stylidium sejunctum</i> (P3)</p> |
| JSWT (2006a) | <p>Jim's Seeds, Weeds and Trees (JSWT) was commissioned by WSA to undertake a Level 1 flora and vegetation survey of the North Flying Fox proposed drill lines, located approximately 80km east of Hyden. The survey was conducted on the 1st and 2nd February 2006, covering an area of approximately 17ha.</p> <p>Two vegetation communities were identified in the survey area; <i>Eucalyptus</i> mallee woodland and sandplain heath. These vegetation communities were represented by a total of 22 Families, 42 Genera and 81 Species (including sub-species and variants).</p> | No flora of conservation significance |
| JSWT (2006b) | <p>JSWT was commissioned by WSA to undertake a Level 1 flora and vegetation survey of the North Flying Fox proposed drill lines, located approximately 100km east of Hyden. The survey was conducted on the 12th April 2005, covering an area of approximately 4.2ha.</p> <p>Two vegetation communities were identified in the survey area; <i>Eucalyptus</i> mallee woodland and sandplain heath. These vegetation communities were represented by a total of 17 Families, 36 Genera and 69 Species (including sub-species and variants).</p> | <i>Verticordia mitodes</i> (P3) |
| JSWT (2006c) | <p>JSWT was commissioned by WSA to undertake a Level 1 flora and vegetation survey of three proposed monitoring bore sites, located approximately 80km east of Hyden. The survey was conducted on the 10th April 2006, covering an area of approximately 1.24ha.</p> <p>Two vegetation communities were identified in the survey area; <i>Eucalyptus salmonophloia</i> woodland and <i>Acacia</i> heath. These vegetation communities were represented by a total of 19 Families, 31 Genera and 53 Species (including sub-species and variants).</p> | <i>Microcorys</i> sp. Forrestania (V. English, 2004) (P4). |
| Botanica (2006) | <p>Botanica was commissioned by WSA to undertake a Level 1 flora and vegetation survey of the Flying Fox North East Area, located approximately 80km east of Hyden. The survey was conducted from the 29th to the 30th October 2006, covering an area of approximately 329.8ha.</p> <p>Four vegetation communities were identified in the survey area; <i>Eucalyptus salmonophloia</i> woodland, <i>Eucalyptus</i></p> | <p><i>Microcorys</i> sp. Forrestania (V. English, 2004) (P4)</p> <p><i>Boronia westringioides</i> (P2)</p> <p><i>Baeckea</i> sp. North Ironcap (P2) and</p> <p><i>Daviesia elongata</i> subsp. <i>implexa</i> (P3)</p> |

| Author & Year | Vegetation | Flora of Conservation Significance |
|------------------|--|--|
| | mallee woodlands, Sandplain Heath and Kwongan vegetation. These vegetation communities were represented by a total of 26 Families, 54 Genera and 132 Species (including sub-species and variants). | |
| Botanica (2007a) | <p>Botanica was commissioned by WSA to undertake a Level 1 flora and vegetation survey at the Flying Fox mine site, located approximately 80km east of Hyden. The survey was conducted on the 1st June 2007, covering an area of approximately 46ha.</p> <p>Two vegetation communities were identified in the survey area; <i>Eucalyptus</i> mallee woodland and sandplain heath. These vegetation communities were represented by a total of 20 Families, 24 Genera and 34 Species (including sub-species and variants).</p> | <i>Daviesia elongata</i> subsp. <i>implexa</i> (P3). |
| Botanica (2007b) | <p>Botanica was commissioned by WSA to undertake a Level 1 flora and vegetation survey at the Flying Fox mine site, located approximately 80km east of Hyden. The survey was conducted on the 8th October 2007, covering an area of approximately 247.83ha.</p> <p>Three vegetation communities were identified in the survey area; <i>Eucalyptus</i> mallee woodland, Sandplain Heath and Rehabilitation vegetation. These vegetation communities were represented by a total of 24 Families, 47 Genera and 106 Species (including sub-species and variants).</p> | <i>Microcorys</i> sp. Forresteria (V. English, 2004) (P4). |
| Botanica (2017) | <p>Botanica was commissioned by WSA to undertake a reconnaissance flora and vegetation survey of the Greater New Morning/Spotted Quoll area. The survey was conducted in October 2017 covering an area of 1,674 ha.</p> <p>A total of eleven vegetation types were identified within the survey area:</p> <ol style="list-style-type: none"> 1. Low woodland of <i>Eucalyptus flocktoniae</i>/<i>Eucalyptus salubris</i>/<i>Eucalyptus urna</i> over low scrub of mixed <i>Acacia</i> and <i>Melaleuca</i>; 2. Open shrub mallee of <i>Eucalyptus celastroides</i>/<i>Eucalyptus cylindrocarpa</i>/<i>Eucalyptus eremophila</i> over low scrub of mixed <i>Acacia</i> and <i>Melaleuca</i>; 3. Low woodland of <i>Eucalyptus salmonophloia</i> over low scrub of mixed <i>Melaleuca</i>; 4. Heath of mixed <i>Acacia</i>, <i>Allocasuarina</i> and <i>Melaleuca</i>; 5. Low woodland of <i>Eucalyptus calycogona</i>/<i>Eucalyptus pileata</i> over low scrub of <i>Acacia hemiteles</i>/<i>Melaleuca hamata</i> on rocky outcrop; 6. Mallee of <i>Eucalyptus eremophila</i>/<i>Eucalyptus steedmanii</i> over mixed dwarf scrub; 7. Heath of <i>Acacia steedmanii</i> subsp. <i>steedmanii</i>/<i>Melaleuca hamata</i> over mixed low scrub; 8. Low scrub of mixed <i>Allocasuarina</i> over mixed dwarf scrub; 9. Open tree mallee of <i>Eucalyptus eremophila</i> over scrub of <i>Melaleuca hamata</i> on stony rise; 10. Burnt open low woodland of <i>Eucalyptus salmonophloia</i> over shrub mallee of <i>Eucalyptus cylindrocarpa</i>/<i>Eucalyptus pileata</i> and mixed low heath (including sub-community Heath of <i>Melaleuca hamata</i>); and 11. Forest of <i>Eucalyptus urna</i> over low scrub of <i>Melaleuca pauperiflora</i> subsp. <i>pauperiflora</i>. <p>These eleven vegetation types were represented by a total of 29 Families, 74 Genera and 205 Species (including sub-species and variants).</p> | <i>Eucalyptus steedmanii</i> (T) <i>Eremophila racemosa</i> (P4) <i>Eutaxia acanthoclada</i> (P3) <i>Microcorys</i> sp. Forresteria (V. English 2004) <i>Stylidium sejunctum</i> (P3). |

The results of the literature review, combined search of the DBCA's Flora of Conservation Significance databases (DBCA, 2018a), NatureMap search (2018c) and DAWE protected matters search (DotEE, 2018) recorded one Threatened Flora and four Priority Flora taxa within the survey area. An additional three Threatened Flora taxa and sixty-five Priority Flora taxa were listed as occurring within an 80 km radius of the survey area. These taxa were assessed and ranked for their likelihood of occurrence within the survey area (Table 4-2). The rankings and criteria used were:

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

Table 4-2: Likelihood of occurrence for Flora of Conservation Significance within the survey area

| Taxon | Conservation Code | | | Description (WAHERB, 2021) | Likelihood of Occurrence |
|--|-------------------|--------|------------------|---|--------------------------|
| | EPBC Act | BC Act | Priority Listing | | |
| <i>Banksia sphaerocarpa</i> var. <i>dolichostyla</i> | VU | VU | | Lignotuberous shrub, 1-3 m high. Fl. yellow-orange, Mar to May. Lateritic gravel, grey sand. | Possible |
| <i>Boronia revoluta</i> | EN | VU | | Shrub, 0.4-0.8 m high. Fl. pink, Jul to Aug. Stony sandy loam or sand. Plains, hillsides & summits. | Unlikely |
| <i>Eucalyptus steedmanii</i> | VU | VU | | Tree, 2-8(-12) m high, bark smooth. Fl. white, Jan to Mar. Gravelly loam over ironstone, sand. Low hills, undulating plains. | Known to occur |
| <i>Paragoodia crenulata</i> | CE | VU | | No description available | Possible |
| <i>Acacia tetraeneura</i> | | | P1 | Low spreading shrub, 0.3-0.4 m high. Fl. yellow, May to Jul. Clay & lateritic gravel. Ridges & low rises. | Possible |
| <i>Austrostipa</i> sp. Mt Holland (W.A. Thompson & J. Allen 948) | | | P1 | No description available | Possible |
| <i>Baeckea</i> sp. Blue Haze Mine (P. Armstrong 06/910) | | | P1 | No description available | Possible |
| <i>Baeckea</i> sp. Crossroads (B.L. Rye & M.E. Trudgen 241186) | | | P1 | No description available | Possible |
| <i>Baeckea</i> sp. Lake Cronin (K.R. Newbey 9191) | | | P1 | Upright, spreading, moderately open shrub. Fl. white/pink, Oct. Well-drained gravelly sands. Moderately exposed, gently undulating plain. | Possible |
| <i>Baeckea</i> sp. North Ironcap (R.J. Cranfield 10580) | | | P1 | Erect, open shrub, to 0.4 m high. Fl. white/pink, Oct. Red clay. Gently undulating sandplains. | Possible |

| Taxon | Conservation Code | | | Description (WAHERB, 2021) | Likelihood of Occurrence |
|--|-------------------|--------|------------------|---|--------------------------|
| | EPBC Act | BC Act | Priority Listing | | |
| <i>Brachyloma nguba</i> | | | P1 | Erect, compact to spreading, mid-dense shrub, to 0.8 m high, leaves discolorous, usually 2-3 mm long; style 0.2-0.25 mm long; disc truncate. Fl. red, Apr to May. White to brown sandy clay, shallow sandy loam. Open mallee woodland, mallee scrub, flat plains. | Possible |
| <i>Dampiera scaevolina</i> | | | P1 | Erect to ascending perennial, herb or shrub, 0.2-0.5 m high. Fl. blue/white, Sep to Nov. Sandy & gravelly soils. | Possible |
| <i>Eucalyptus myriadena</i> subsp. <i>parviflora</i> | | | P1 | Mallee or tree, 3-10 m high, bark rough, coarse & flaky on trunk, smooth above. Loam. Swamps, plains. | Unlikely |
| <i>Gastrolobium tenue</i> | | | P1 | Low, bushy shrub, to 0.6 m high. Fl. Orange & red & purple, Sep to Oct. Yellow sand or sandy clay. Undulating dunes, stony outcrops. | Unlikely |
| <i>Gnephosis intonsa</i> | | | P1 | Prostrate to ascending annual, herb, 0.01-0.04 m high. Fl. yellow-brown, Sep to Oct. Red/brown clay, stony saline loam. | Unlikely |
| <i>Hemigenia</i> sp. Newdegate (E. Bishop 75) | | | P1 | Spindly, erect to spreading shrub, 0.2-0.45 m high, to 0.5 m wide. Fl. blue/purple, Sep to Oct. Clay loam. Disturbed sites. | Possible |
| <i>Hibbertia axillibarba</i> | | | P1 | Shrub, to 0.7 m high. Fl. yellow, Sep to Oct. Lateritic soil. Ranges. | Possible |
| <i>Lepidosperma amantiferrum</i> | | | P1 | Tufted rhizomatous, herb (sedge), leaves 0.15-0.42 m high, culms and leaves distichous. Yellow sandy loam with banded ironstone gravel and rocks. Gentle lower slopes. | Possible |
| <i>Lepidosperma ferriculmen</i> | | | P1 | Tufted rhizomatous, perennial, herb (sedge), leaves 0.16-0.38 m high, culms and leaves distichous. Well-drained orange-red sandy loam with banded ironstone gravel and rocks. Stony slopes. | Possible |
| <i>Scaevola tortuosa</i> | | | P1 | Ascending perennial, herb, 0.1-0.2 m high. Fl. blue-purple/pink, Oct. Sandy clay. Margins of salt lakes. | Unlikely |
| <i>Stenanthemum liberum</i> | | | P1 | Dwarf shrub, ca 0.5 m high. Yellow sandy loam over laterite. | Possible |
| <i>Stylidium validum</i> | | | P1 | Caespitose perennial, herb, 0.06-0.3 m high, Leaves tufted, oblanceolate, 1.5-10 cm long, 2.2-6 mm wide, apex acute to acuminate, margin entire, glabrous, glaucous. Scape glabrous. Inflorescence paniculate. Fl. white/pink, Sep to Oct. Clayey sand or loam, ironstone, greenstone gravel. Hillslopes and hilltops. Eucalypt woodland, mallee shrubland. | Possible |
| <i>Acacia asepala</i> | | | P2 | Diffuse, much-branched shrub, 0.5-1.5 m high. Fl. yellow, Aug. Red-brown sandy loam. Undulating plains, along drainage lines. | Possible |

| Taxon | Conservation Code | | | Description (WAHERB, 2021) | Likelihood of Occurrence |
|---|-------------------|--------|------------------|---|--------------------------|
| | EPBC Act | BC Act | Priority Listing | | |
| <i>Acacia kerryana</i> | | | P2 | Low, spreading, domed shrub, 0.3-1 m high. Fl. yellow, Oct to Dec or Jan to Feb. Granitic loamy sand, stony clayey loam or clayey sand. Low stony ridges, undulating plains. | Possible |
| <i>Bentleya diminuta</i> | | | P2 | Rosetted rhizomatous, perennial, herb or shrub, 0.02-0.05 m high, growing in small colonies. Fl. white/yellow-green, Sep to Nov. Sandy clay or loam with calcareous nodules. | Unlikely |
| <i>Boronia westringioides</i> | | | P2 | Erect shrub, 0.2-0.75 m high. Fl. pink, Jul to Sep. Loamy sand. Plains. | Possible |
| <i>Conospermum sigmoideum</i> | | | P2 | Erect shrub, 0.2-0.5 m high. Fl. blue, Aug to Sep. Yellow sand. | Unlikely |
| <i>Guichenotia asteriskos</i> | | | P2 | Erect, compact shrub, ca 0.35 m high. Fl. white, Sep to Oct. Sandy clay or loam with gravel. | Possible |
| <i>Olearia laciniifolia</i> | | | P2 | Erect, few-stemmed shrub, 0.6-1.2 m high. Fl. blue/purple & white/yellow, May to Sep. White sand. Around playa lakes. | Unlikely |
| <i>Verticordia multiflora</i> subsp. <i>solox</i> | | | P2 | Erect to spreading shrub, 0.2-0.6 m high. Fl. yellow, Oct to Dec or Jan. Yellow sand over gravel, sand over granite. | Unlikely |
| <i>Acacia repanda</i> | | | P3 | Rounded to obconic, single-stemmed or much-branched shrub, 0.5-2 m high, bark 'minni-ritchi'. Fl. yellow, Jun to Aug. Loam, sandy or gravelly loam. Near granite outcrops. | Unlikely |
| <i>Baeckea</i> sp. Hatter Hill (K.R. Newbey 3284) | | | P3 | Narrow, open, upright shrub, to 1.3 m high. Fl. pink, Jun to Oct. Yellow-orange coarse sandy loam with laterite gravel, red-brown sandy loam with quartz pebbles. Undulating plains. | Possible |
| <i>Banksia viscida</i> | | | P3 | Densely branched, non-lignotuberous shrub, 0.4-1 m high. Fl. yellow-orange, Jul to Oct. Gravelly soils. Lateritic rises. | Possible |
| <i>Comesperma calcicola</i> | | | P3 | Soft perennial, herb, to 0.3 m high. Fl. pink, Oct to Dec or Jan. Calcareous or semi-saline clay loams, limestone. Areas around saline water. | Unlikely |
| <i>Cryptandra polyclada</i> subsp. <i>polyclada</i> | | | P3 | Mat-forming or upright shrub, 0.1-0.7 m high. Fl. white/cream, Jan to May or Aug or Oct. Sand. Sandplains. | Possible |
| <i>Daviesia elongata</i> subsp. <i>implexa</i> | | | P3 | Spreading or sprawling shrub, 0.4-1 m high. Fl. yellow/orange & red, Sep. Sand & laterite. | Possible |
| <i>Daviesia implexa</i> | | | P3 | No description available | Possible |
| <i>Elatine macrocalyx</i> | | | P3 | Prostrate, glabrous, mat-forming annual, herb, sepals 2-3mm long, fruit indehiscent. Fl. white, May to Oct (probably opportunistic). Shallow sands over clay. Margins of playa lakes and clay pans. | Unlikely |

| Taxon | Conservation Code | | | Description (WAHERB, 2021) | Likelihood of Occurrence |
|--|-------------------|--------|------------------|--|--------------------------|
| | EPBC Act | BC Act | Priority Listing | | |
| <i>Eucalyptus exigua</i> | | | P3 | Mallee, 2-5 m high, bark smooth. Fl. white-cream, Mar. Sandy loam, white sand. Sandplains. | Unlikely |
| <i>Eutaxia acanthoclada</i> | | | P3 | Compact, mat-forming, prostrate shrub, to 0.3 m high. Fl. yellow/orange/red, Oct to Nov. Light brown sandy clay, shallow sandy loam, red clay over banded ironstone, gravel. Gently undulating plains. | Known to occur |
| <i>Eutaxia nanophylla</i> | | | P3 | Straggly, rounded shrub, to 0.35 m high. Fl. Yellow & orange & red, Oct to Nov. Clayey sand, red clay, stoney clayey loam. Low-lying areas, damp flats, slopes, undulating plains, low stony ridges. | Possible |
| <i>Eutaxia rubricarina</i> | | | P3 | Straggling shrub, to 0.5 m high. Fl. Orange & yellow & brown, Aug or Oct. Gravelly sand, grey to pinkish-white sandy clay, red loam. Flats, slopes, valley floors, road verges. | Possible |
| <i>Frankenia drummondii</i> | | | P3 | Prostrate shrub. Fl. white. Sand. Lake edges. | Unlikely |
| <i>Grevillea insignis</i> subsp. <i>elliottii</i> | | | P3 | Erect, bushy, non-lignotuberous shrub, 1-2 m high. Fl. red/pink & cream & white, Oct. Gravelly sand or loam over ironstone. Hilltops or rises. | Possible |
| <i>Grevillea pilosa</i> subsp. <i>redacta</i> | | | P3 | Spreading to prostrate, non-lignotuberous shrub, 0.4-1.2 m high. Fl. red, Feb or Oct or Dec. Sand, laterite. | Possible |
| <i>Hibbertia pachyphylla</i> | | | P3 | Shrub, to 0.5 m high. Fl. yellow, Sep to Nov. White to yellow sand, brown sandy gravel, gravelly loam, laterite, granite, quartz. Undulating plains, low rises, valley floors. | Possible |
| <i>Isolepis australiensis</i> | | | P3 | Annual, grass-like or herb (sedge), 0.03-0.055 m high, glumes 0.8-1.2 mm long; stamens 1(-2); style branches 3; nut with abaxial angle acute. Fl. Jun or Sep. Silty sand, sandy clay. Lake margins, pools. | Unlikely |
| <i>Keraudrenia adenogyna</i> | | | P3 | Erect shrub, ca 0.4 m high. Fl. purple-blue, Sep. Heavy loamy clay, loamy gravelly soils. Low-lying area. | Unlikely |
| <i>Melaleuca macronychia</i> subsp. <i>trygonoides</i> | | | P3 | Multi-stemmed, spreading shrub, 1-4 m high, leaves broadly elliptic. Fl. red, Feb or Jul to Aug or Oct. Sandy soils. Granite outcrops. | Unlikely |
| <i>Mirbelia densiflora</i> | | | P3 | Erect or straggling shrub, 0.2-1 m high. Fl. yellow-orange, Oct or Jan. Stony loam, loamy sand. Small ridges, breakaways, undulating plains. | Unlikely |
| <i>Notisia intonsa</i> | | | P3 | No description available | Possible |
| <i>Oxymyrrhine plicata</i> | | | P3 | No description available | Possible |
| <i>Pityrodia scabra</i> subsp. <i>dendrotricha</i> | | | P3 | No description available | Possible |
| <i>Pityrodia</i> sp. Yilgarn (A.P. Brown 2679) | | | P3 | No description available | Possible |

| Taxon | Conservation Code | | | Description (WAHERB, 2021) | Likelihood of Occurrence |
|---|-------------------|--------|------------------|--|--------------------------|
| | EPBC Act | BC Act | Priority Listing | | |
| <i>Pultenaea daena</i> | | | P3 | Dense, prostrate, domed shrub, to 0.07 m high. Fl. yellow, Mar. White to yellow sand or sandy loam, sandy or loamy clay, gravel, limestone, dolomite, laterite. Gently undulating plains, adjacent to salt lakes, in disturbed areas. | Unlikely |
| <i>Rinzia torquata</i> | | | P3 | No description available | Possible |
| <i>Rinzia triplex</i> | | | P3 | No description available | Possible |
| <i>Seringia adenogyna</i> | | | P3 | No description available | Possible |
| <i>Styliidium sejunctum</i> | | | P3 | Caespitose perennial, herb, 0.25-0.45 m high, Leaves tufted, linear to narrowly oblanceolate, 10-30 cm long, 0.8-4 mm wide, apex acute to mucronate, margin involute, glabrous to scabrous. Membraneous scale leaves present at base of mature leaves. Scape glandular throughout. Inflorescence paniculate. Fl. white/pink-purple, Sep to Nov. Clayey sand or loam, laterite. Outcrops, upper slopes, breakaways. Mallee and Allocasuarina shrubland. | Known to occur |
| <i>Teucrium diabolicum</i> | | | P3 | Compact, dwarf shrub, 0.1 m high, to 0.1 m wide. Fl. white, Apr. Hills, road verges. | Possible |
| <i>Verticordia gracilis</i> | | | P3 | Low, slender shrub, 0.15-0.6 m high. Fl. pink, Oct to Nov. Yellow sand, gravelly sand, sandy loam. | Possible |
| <i>Verticordia stenopetala</i> | | | P3 | Shrub, 0.2-0.6(-1.3) m high. Fl. pink/pink-purple-red, Oct to Dec or Jan. Yellow sand, sometimes with gravel. Undulating plains. | Possible |
| <i>Calamphoreus inflatus</i> | | | P4 | Erect, spreading shrub, 0.4-1.6 m high, to 2 m wide. Fl. blue-purple/green, Oct to Dec or Feb to Mar. Clay loam with ironstone gravel. Flats, disturbed sites. | Possible |
| <i>Eremophila biserrata</i> | | | P4 | Prostrate shrub, to 3 m wide. Fl. green/yellow-green, Sep to Nov or Mar. Sandy or sandy clay soils. Alluvial flats, salt flats & lakes. | Unlikely |
| <i>Eremophila racemosa</i> | | | P4 | Erect shrub, 0.5-1.7 m high. Fl. purple-pink-red/white, Mar or Aug to Dec. Sandy or stony loam, clay loam. Undulating plains, roadsides. | Known to occur |
| <i>Eucalyptus cerasiformis</i> | | | P4 | Mallee, 2-3.5 m high, bark smooth, grey to brown. Fl. yellow, Dec or Jan to Mar. Red loamy soils. | Possible |
| <i>Eucalyptus georgei</i> subsp. <i>fulgida</i> | | | P4 | Tree, 4-20 m high, bark smooth, often hanging in ribbons. Fl. cream-white. Sandy loam, clayey sand. Slight depressions. | Unlikely |
| <i>Grevillea prostrata</i> | | | P4 | Loose, prostrate shrub, 0.04-0.1 m high, 0.8-1.2 m wide. Fl. cream-white/pink-red, Aug to Dec or Jan. White, grey or yellow sand, gravel. Sandplains. | Possible |
| <i>Gyrostemon ditrigynus</i> | | | P4 | Shrub, 0.4-1.5 m high. Sand, sandy clay, loam. Plains, low ironstone ridges. | Possible |

| Taxon | Conservation Code | | | Description (WAHERB, 2021) | Likelihood of Occurrence |
|---|-------------------|--------|------------------|---|--------------------------|
| | EPBC Act | BC Act | Priority Listing | | |
| <i>Haegiela tatei</i> | | | P4 | Ascending to erect annual, herb, 0.02-0.08(-0.2) m high. Fl. white-yellow, Aug to Nov. Clay, sandy loam, gypsum. Saline habitats. | Unlikely |
| <i>Lepidosperma lyonsii</i> | | | P4 | Tufted rhizomatous, perennial, herb (sedge), leaves 0.31-0.53 m high, culms and leaves distichous. Pale orange skeletal sandy loam with banded ironstone gravel & rock, well-drained shallow stony loamy with quartz. Gentle hill slopes, upper slopes of large hill. | Possible |
| <i>Microcorys</i> sp. Forrestania (V. English 2004) | | | P4 | Prostrate or erect shrub, 0.35-0.4 m high. Fl. white/purple, Jan or Apr. Yellow sandy clay or red-brown clay. Open woodland or cleared areas. | Known to occur |

4.2 Field Assessment

4.2.1 Vegetation Associations

Nine vegetation associations were identified within the survey area. These vegetation associations were located within four different landform types and comprised three major vegetation groups, and were represented by a total of 38 Families, 98 Genera and 280 Taxa (including 12 annual taxa) (Appendix 3). A map showing the vegetation associations present in the survey area is provided in Figure 4-1 and a summary of vegetation associations is presented in Table 4-3.

Table 4-3: Summary of vegetation associations within the New Morning Project survey area

| Landform | Major Vegetation Group | Vegetation Association | Vegetation Code | Total Area (ha) | Extent within Disturbance Envelope |
|-----------------|--|---|-----------------|-----------------|------------------------------------|
| Clay-Loam Plain | Eucalyptus Woodland (MVG 5) | Low open forest of <i>Eucalyptus flocktoniae</i> / <i>E. salubris</i> / <i>E. urna</i> on clay-loam plain | CLP-EW1 | 322 ha (24.8%) | 28 ha (43.8%) |
| | | Mid open woodland of <i>Eucalyptus salmonophloia</i> on clay-loam plain | CLP-EW2 | 121 ha (9.3%) | 23 ha (35.9%) |
| | | Burnt open low woodland of <i>Eucalyptus salmonophloia</i> over mallee shrubland of <i>E. pileata</i> / <i>E. tephroclada</i> / <i>E. celastroides</i> on clay-loam plain | CLP-EW3 | 281 ha (21.6%) | 0 |
| | | Mid woodland of <i>Eucalyptus longicornis</i> on clay-loam plain | CLP-EW4 | 75 ha (5.8%) | 0 |
| Stony rise | Mallee Woodland and Shrubland (MVG 14) | Mid mallee shrubland of <i>Eucalyptus tephroclada</i> / <i>E. pileata</i> on stony rise | R-MWS1 | 36 ha (2.8%) | 13 ha (20.3%) |
| Sand-Loam Plain | Mallee Woodland and Shrubland (MVG 14) | Mid mallee shrubland of <i>Eucalyptus tephroclada</i> / <i>E. pileata</i> / <i>E. transcontinentalis</i> on sand-loam plain | SLP-MWS1 | 177 ha (13.6%) | 0 |
| | | Mid mallee shrubland of <i>Eucalyptus steedmanii</i> on sand-loam plain | SLP-MWS2 | 51 ha (3.9%) | 0 |

| Landform | Major Vegetation Group | Vegetation Association | Vegetation Code | Total Area (ha) | Extent within Disturbance Envelope |
|--------------|--|---|-----------------|-----------------|------------------------------------|
| Sandplain | Heathlands (MVG 18) | Mid heathland of <i>Allocasuarina corniculata</i> / <i>Acacia acuminata</i> on sandplain | SP-H1 | 112 ha (8.6%) | 0 |
| | Mallee Woodland and Shrubland (MVG 14) | Low open mallee shrubland of <i>Eucalyptus platycorys</i> / <i>E. horistes</i> on sandplain | SP-MWS1 | 19 ha (1.5%) | 0 |
| N/A | N/A | Cleared Vegetation | CV | 104 ha (8.0%) | 0 |
| Total | | | | 1298 ha | 64 |

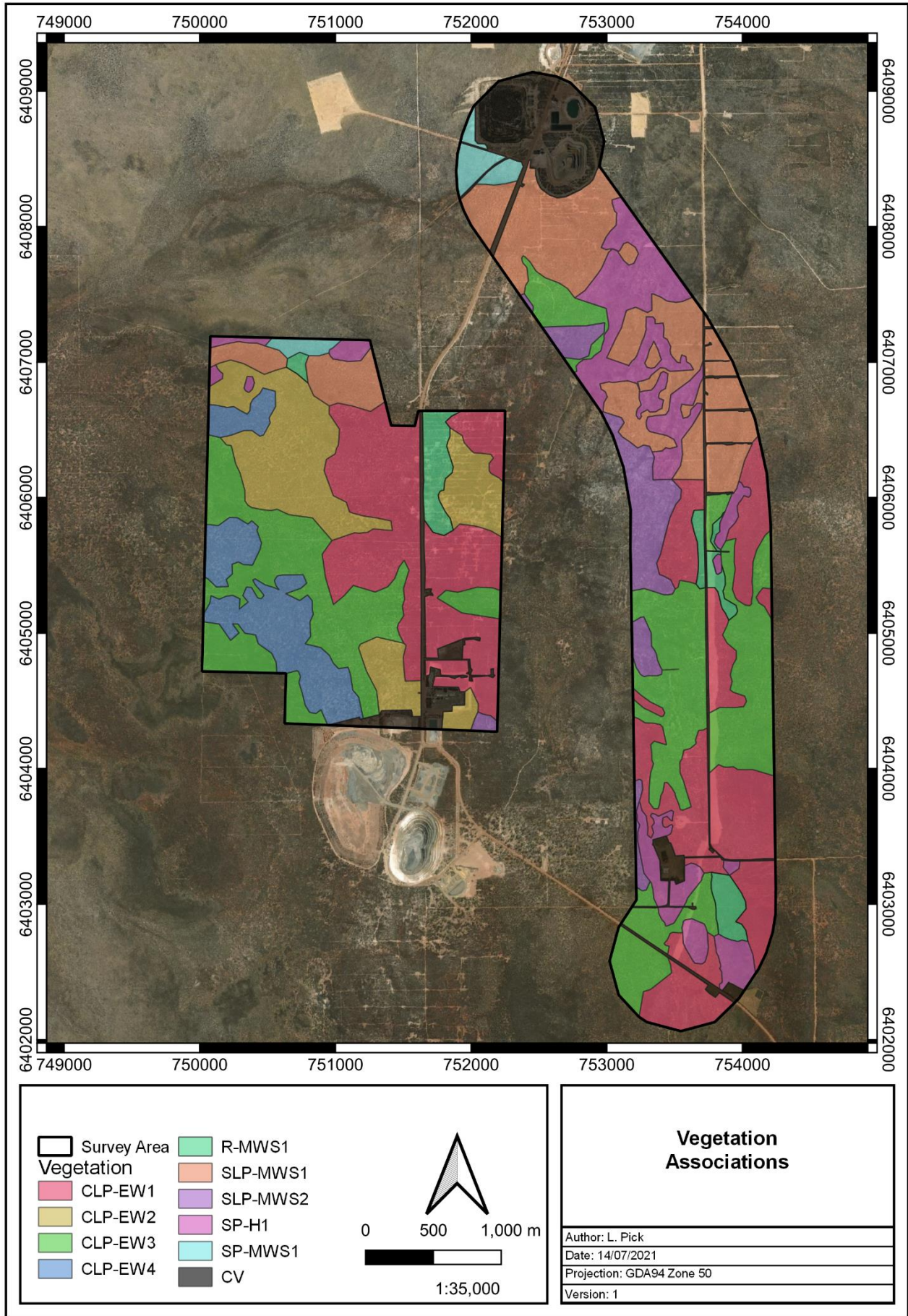


Figure 4-1: Vegetation associations within the survey area

Clay-Loam Plain: Eucalyptus Woodlands

4.2.1.1 Low open forest of *Eucalyptus flocktoniae*/ *E. salubris*/ *E. urna* on clay-loam plain (CLP-EW1)

The total flora recorded within this vegetation association was represented by a total of 24 Families, 43 Genera and 101 Taxa (Plate 1). Dominant taxa from the vegetation assemblage are shown in Table 4-4. According to the NVIS, this community is best represented by the MVG5- Eucalypt Woodlands (DotEE, 2017).

Table 4-4: Vegetation assemblage for Low open forest of *Eucalyptus flocktoniae*/ *E. salubris*/ *E. urna* on clay-loam plain

| Life Form/Height Class | Canopy Cover | Dominant Taxa |
|------------------------|--------------|---|
| Tree <10m | 30-70% | <i>Eucalyptus flocktoniae</i> subsp. <i>flocktoniae</i> <i>Eucalyptus salubris</i> <i>Eucalyptus urna</i> |
| Shrub >2m | 30-70% | <i>Melaleuca cucullata</i> <i>Melaleuca pauperiflora</i> subsp. <i>pauperiflora</i> |
| Shrub 1-2m | 30-70% | <i>Acacia merrallii</i> <i>Dodonaea stenozyga</i> <i>Grevillea obliquistigma</i> |
| Shrub <1m | 30-70% | <i>Acacia intricata</i> <i>Gompholobium gompholobioides</i> <i>Grevillea acuaria</i> <i>Eremophila densiflora</i> <i>Melaleuca cardiophylla</i> <i>Microcybe multiflora</i> <i>Wilsonia humilis</i> |



Plate 1: Low open forest of *Eucalyptus flocktoniae*/ *E. salubris*/ *E. urna* on clay-loam plain

4.2.1.2 Mid open woodland of *Eucalyptus salmonophloia* on clay-loam plain (CLP-EW2)

The total flora recorded within this vegetation type was represented by a total of 19 Families, 33 Genera and 60 Taxa (Plate 2). Dominant taxa from the vegetation assemblage are shown in Table 4-5. According to the NVIS, this community is best represented by the MVG5- Eucalypt Woodlands (DotEE, 2017).

Table 4-5: Vegetation assemblage for Mid open woodland of *Eucalyptus salmonophloia* on clay-loam plain

| Life Form/Height Class | Canopy Cover | Dominant Taxa |
|------------------------|--------------|--|
| Tree >10m | 10-30% | <i>Eucalyptus salmonophloia</i> <i>Eucalyptus salubris</i> |
| Shrub >2m | 10-30% | <i>Melaleuca adnata</i> <i>Melaleuca pauperiflora</i> subsp. <i>pauperiflora</i> |
| Shrub 1-2m | 30-70% | <i>Acacia merrallii</i> <i>Daviesia nematophylla</i> <i>Dodonaea stenozyga</i> <i>Exocarpos aphyllus</i> |
| Shrub <1m | 30-70% | <i>Acacia deficiens</i> <i>Acacia intricata</i> <i>Acacia sphacelata</i> subsp. <i>sphacelata</i> <i>Daviesia benthamii</i> <i>Dodonaea stenozyga</i> <i>Eremophila maculata</i> <i>Grevillea acuaria</i> <i>Wilsonia humilis</i> |



Plate 2: Mid open woodland of *Eucalyptus salmonophloia* on clay-loam plain

4.2.1.3 Burnt open low woodland of *Eucalyptus salmonophloia* over mallee shrubland of *E. pileata*/*E. tephroclada*/*E. celastroides* on clay-loam plain (CLP-EW3)

The total flora recorded within this vegetation type was represented by a total of 17 Families, 25 Genera and 65 Taxa (Plate 3). Dominant taxa from the vegetation assemblage are shown in Table 4-6. According to the NVIS, this community is best represented by the MVG5- Eucalypt Woodlands (DotEE, 2017).

Table 4-6: Vegetation assemblage for Burnt open low woodland of *Eucalyptus salmonophloia* over mallee shrubland of *E. pileata*/*E. tephroclada*/*E. celastroides* on clay-loam plain

| Life Form/Height Class | Canopy Cover | Dominant Taxa |
|------------------------|--------------|--|
| Tree >10m | 10-30% | <i>Eucalyptus salmonophloia</i> |
| Shrub Mallee 3-10m | 30-70% | <i>Eucalyptus celastroides</i> <i>Eucalyptus cylindrocarpa</i> <i>Eucalyptus pileata</i> <i>Eucalyptus tephroclada</i> <i>Eucalyptus urna</i> |
| Shrub >2m | 10-30% | <i>Melaleuca pauperiflora</i> subsp. <i>fastigiata</i> |
| Shrub 1-2m | 10-30% | <i>Acacia hemiteles</i> <i>Daviesia nematophylla</i> <i>Dodonaea stenozyga</i> |
| Shrub <1m | 30-70% | <i>Acacia deficiens</i> <i>Acacia erinacea</i> <i>Acacia intricata</i> <i>Eremophila drummondii</i> <i>Grevillea acuaria</i> <i>Olearia muelleri</i> <i>Templetonia sulcata</i> <i>Wilsonia humilis</i> |



Plate 3: Burnt open low woodland of *Eucalyptus salmonophloia* over mallee shrubland of *E. pileata*/*E. tephroclada*/*E. celastroides* on clay-loam plain

4.2.1.4 Mid woodland of *Eucalyptus longicornis* on clay-loam plain (CLP-EW4)

The total flora recorded within this vegetation type was represented by a total of 10 Families, 15 Genera and 21 Taxa (Plate 4). Dominant taxa from the vegetation assemblage are shown in Table 4-7: Vegetation assemblage for . According to the NVIS, this community is best represented by the MVG5- Eucalypt Woodlands (DotEE, 2017).

Table 4-7: Vegetation assemblage for Mid woodland of *Eucalyptus longicornis* on clay-loam plain

| Life Form/Height Class | Canopy Cover | Dominant Taxa |
|------------------------|--------------|--|
| Tree >10m | 10-30% | <i>Eucalyptus longicornis</i> |
| Shrub >2m | 10-30% | <i>Melaleuca pauperiflora</i> subsp. <i>fastigiata</i> <i>Melaleuca pauperiflora</i> subsp. <i>pauperiflora</i> <i>Melaleuca quadrifaria</i> |
| Shrub 1-2m | 10-30% | <i>Acacia merrallii</i> |
| Shrub <1m | 10-30% | <i>Atriplex stipitata</i> <i>Olearia muelleri</i> |



Plate 4: Mid woodland of *Eucalyptus longicornis* on clay-loam plain

Stony Rise: Mallee Woodlands and Shrublands

4.2.1.5 Mid mallee shrubland of *Eucalyptus tephroclada*/ *E. pileata* on stony rise (R-MWS1)

The total flora recorded within this vegetation type was represented by a total of 22 Families, 43 Genera and 80 Taxa (Plate 5). Dominant taxa from the vegetation assemblage are shown in Table 4-8. According to the NVIS, this community is best represented by the MVG14- Mallee Woodlands and Shrublands (DotEE, 2017).

Table 4-8: Vegetation assemblage for Mid mallee shrubland of *Eucalyptus tephroclada*/ *E. pileata* on stony rise

| Life Form/Height Class | Canopy Cover | Dominant Taxa |
|------------------------|--------------|--|
| Shrub Mallee 3-10m | 30-70% | <i>Eucalyptus tephroclada</i> <i>Eucalyptus pileata</i> |
| Shrub >2m | 30-70% | <i>Melaleuca hamata</i> |
| Shrub <1m | 30-70% | <i>Acacia castanostegia</i> <i>Acacia deficiens</i> <i>Dodonaea bursariifolia</i> <i>Westringia cephalantha</i> var. <i>caterva</i> <i>Darwinia</i> sp. Lake Cobham (K. Newbey 3262) |
| Sedge <1m | 10-30% | <i>Lepidosperma sanguinolentum</i> |



Plate 5: Mid mallee shrubland of *Eucalyptus tephroclada*/ *E. pileata* on stony rise

Sand-Loam Plain: Mallee Woodlands and Shrublands

4.2.1.6 Mid mallee shrubland of *Eucalyptus tephroclada*/ *E. pileata*/ *E. transcontinentalis* on sand-loam plain (SLP-MWS1)

The total flora recorded within this vegetation type was represented by a total of 23 Families, 42 Genera and 109 Taxa (Plate 6). Dominant taxa from the vegetation assemblage are shown in Table 4-9. According to the NVIS, this community is best represented by the MVG14- Mallee Woodlands and Shrublands (DotEE, 2017).

Table 4-9: Vegetation assemblage for Mid mallee shrubland of *Eucalyptus tephroclada*/ *E. pileata*/ *E. transcontinentalis* on sand-loam plain

| Life Form/Height Class | Canopy Cover | Dominant Taxa |
|------------------------|--------------|--|
| Shrub Mallee 3-10m | 10-30% | <i>Eucalyptus celastroides</i> <i>Eucalyptus cylindrocarpa</i> <i>Eucalyptus pileata</i> <i>Eucalyptus tephroclada</i> <i>Eucalyptus transcontinentalis</i> |
| Shrub 1-2m | 10-30% | <i>Acacia coolgardiensis</i> <i>Melaleuca calyptroides</i> <i>Melaleuca hamata</i> <i>Melaleuca lateriflora</i> <i>Melaleuca pauperiflora</i> subsp. <i>pauperiflora</i> |
| Shrub <1m | 10-30% | <i>Acacia deficiens</i> <i>Acacia hemiteles</i> <i>Acacia hystrix</i> subsp. <i>hystrix</i> <i>Ericomyrtus serpyllifolia</i> <i>Dodonaea bursariifolia</i> <i>Grevillea acuaria</i> <i>Melaleuca cordata</i> <i>Phebalium tuberculosum</i> <i>Westringia cephalantha</i> var. <i>caterva</i> |



Plate 6: Mid mallee shrubland of *Eucalyptus tephroclada*/ *E. pileata*/ *E. transcontinentalis* on sand-loam plain

4.2.1.7 Mid mallee shrubland of *Eucalyptus steedmanii* on sand-loam plain (SLP-MWS2)

The total flora recorded within this vegetation type was represented by a total of 20 Families, 36 Genera and 68 Taxa (Plate 7). Dominant taxa from the vegetation assemblage are shown in Table 4-10. According to the NVIS, this community is best represented by the MVG14- Mallee Woodlands and Shrublands (DotEE, 2017).

Table 4-10: Vegetation assemblage for Mid mallee shrubland of *Eucalyptus steedmanii* on sand-loam plain

| Life Form/Height Class | Canopy Cover | Dominant Taxa |
|------------------------|--------------|--|
| Shrub Mallee 3-10m | 30-70% | <i>Eucalyptus steedmanii</i> (T) |
| Shrub 1-2m | 30-70% | <i>Exocarpos aphyllus</i> <i>Melaleuca calyptroides</i> <i>Melaleuca eleuterostachya</i> |
| Shrub <1m | 10-30% | <i>Eremophila drummondii</i> <i>Dodonaea stenozyga</i> <i>Euryomyrtus maidenii</i> <i>Olearia muelleri</i> <i>Phebalium filifolium</i> |



Plate 7: Mid mallee shrubland of *Eucalyptus steedmanii* on sand-loam plain

Sandplain: Heathlands

4.2.1.8 Mid heathland of *Allocasuarina corniculata*/ *Acacia acuminata* on sandplain (SP-H1)

The total flora recorded within this vegetation type was represented by a total of 23 Families, 58 Genera and 131 Taxa (Plate 8). Dominant taxa from the vegetation assemblage are shown in Table 4-11. According to the NVIS, this community is best represented by the MVG18- Heathlands (DotEE, 2017).

Table 4-11: Vegetation assemblage for Mid heathland of *Allocasuarina corniculata*/ *Acacia acuminata* on sandplain

| Life Form/Height Class | Canopy Cover | Dominant Taxa |
|------------------------|--------------|---|
| Heath Shrub >2m | 30-70% | <i>Allocasuarina acutivalvis</i> <i>Allocasuarina campestris</i> <i>Allocasuarina corniculata</i> |
| Heath Shrub 1-2m | 30-70% | <i>Acacia acuminata</i> <i>Acacia fragilis</i> <i>Acacia steedmanii</i> subsp. <i>steedmanii</i> <i>Leptospermum erubescens</i> <i>Melaleuca hamata</i> <i>Melaleuca uncinata</i> <i>Thryptomene kochii</i> |
| Shrub <1m | 30-70% | <i>Acacia sphacelata</i> subsp. <i>sphacelata</i> <i>Euryomyrtus maidenii</i> <i>Leptosema daviesioides</i> <i>Phebalium filifolium</i> <i>Verticordia chrysanthella</i> |
| Sedges <1m | 30-70% | <i>Lepidosperma sanguinolentum</i> <i>Lepidosperma drummondii</i> |



Plate 8: Mid heathland of *Allocasuarina corniculata*/ *Acacia acuminata* on sandplain

Sandplain: Mallee Woodlands and Shrublands

4.2.1.9 Low open mallee shrubland of *Eucalyptus platycorys*/ *E. horistes* on sandplain (SP-MWS1)

The total flora recorded within this vegetation type was represented by a total of 13 Families, 37 Genera and 68 Taxa (Plate 9). Dominant taxa from the vegetation assemblage are shown in Table 4-12. According to the NVIS, this community is best represented by the MVG14- Mallee Woodlands and Shrublands (DotEE, 2017).

Table 4-12: Vegetation assemblage for Low open mallee shrubland of *Eucalyptus platycorys*/ *E. horistes* on sandplain

| Life Form/Height Class | Canopy Cover | Dominant Taxa |
|------------------------|--------------|--|
| Shrub Mallee <3m | 10-30% | <i>Eucalyptus horistes</i> <i>Eucalyptus platycorys</i> |
| Shrub <1m | 30-70% | <i>Banksia laevigata</i> subsp. <i>fuscolutea</i> <i>Beaufortia micrantha</i> <i>Isopogon scabriusculus</i> <i>Melaleuca glaberrima</i> <i>Melaleuca hamata</i> <i>Petrophile merrallii</i> <i>Phebalium lepidotum</i> |
| Sedge <1m | 10-30% | <i>Lepidosperma sanguinolentum</i> |



Plate 9: Low open mallee shrubland of *Eucalyptus platycorys*/ *E. horistes* on sandplain

4.2.2 Vegetation Condition

Based on the vegetation condition rating scale adapted from Keighery, 1994 and Trudgen, 1988 (Appendix 4), two vegetation associations were rated as 'good' and the remaining seven vegetation associations had a vegetation condition rating of 'very good' (Table 4-13). A map of the vegetation condition within the survey area is provided in Figure 4-2.

'Good' condition depicts that vegetation structure has been significantly altered by very obvious signs of multiple disturbances, however it retains its basic vegetation structure or has ability to regenerate it. Disturbance to vegetation structure may be caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.

'Very Good' condition depicts that vegetation structure has been altered by obvious signs of disturbance. Disturbance to vegetation structure may be caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.

Table 4-13: Vegetation Condition Rating for Vegetation associations of the New Morning Project survey area

| Landform | Major Vegetation Group | Vegetation Association | Vegetation Code | Vegetation Condition |
|-----------------|--|---|-----------------|----------------------|
| Clay-Loam Plain | Eucalyptus Woodland (MVG 5) | Low open forest of <i>Eucalyptus flocktoniae</i> / <i>E. salubris</i> / <i>E. urna</i> on clay-loam plain | CLP-EW1 | Good |
| | | Mid open woodland of <i>Eucalyptus salmonophloia</i> on clay-loam plain | CLP-EW2 | Very Good |
| | | Burnt open low woodland of <i>Eucalyptus salmonophloia</i> over mallee shrubland of <i>E. pileata</i> / <i>E. tephroclada</i> / <i>E. celastroides</i> on clay-loam plain | CLP-EW3 | Good |
| | | Mid woodland of <i>Eucalyptus longicornis</i> on clay-loam plain | CLP-EW4 | Very Good |
| Stony rise | Mallee Woodland and Shrubland (MVG 14) | Mid mallee shrubland of <i>Eucalyptus tephroclada</i> / <i>E. pileata</i> on stony rise | R-MWS1 | Very Good |
| Sand-Loam Plain | Mallee Woodland and Shrubland (MVG 14) | Mid mallee shrubland of <i>Eucalyptus tephroclada</i> / <i>E. pileata</i> / <i>E. transcontinentalis</i> on sand-loam plain | SLP-MWS1 | Very Good |
| | | Mid mallee shrubland of <i>Eucalyptus steedmanii</i> on sand-loam plain | SLP-MWS2 | Very Good |
| Sandplain | Heathlands (MVG 18) | Mid heathland of <i>Allocasuarina corniculata</i> / <i>Acacia acuminata</i> on sandplain | SP-H1 | Very Good |
| | Mallee Woodland and Shrubland (MVG 14) | Low open mallee shrubland of <i>Eucalyptus platycorys</i> / <i>E. horistes</i> on sandplain | SP-MWS1 | Very Good |
| N/A | N/A | Cleared Vegetation | CV | Completely Degraded |



Figure 4-2: Vegetation Condition Rating of the New Morning Project survey area

4.2.3 Introduced Plant Species

Four introduced species were identified within the survey area:

1. *Dittrichia graveolens* (Stinkwort);
2. *Lysimachia arvensis* (Pimpernel);
3. *Sonchus oleraceus* (Common Sowthistle); and
4. *Wahlenbergia capensis* (Common Bluebell).

According to the DPIRD database (DPIRD, 2021), none of these species are listed as a Declared Plant under Section 22 of the BAM Act or a Weed of National Significance (WoNS).

4.2.3.1 *Dittrichia graveolens* (Stinkwort)

This species is described as an erect, bushy, viscid, annual herb that grows up to 0.1-0.5m high (Plate 10). It has yellow/yellow-white flowers from January to November, and grows in a variety of soils. It is a weed of waste grounds, along rivers and roadsides (WAHERB, 2021). This species was recorded within one vegetation association; Low open forest of *Eucalyptus flocktoniae*/ *E. salubris*/ *E. urna* on clay-loam plain (CLP-EW1).



Plate 10: *Dittrichia graveolens* (Stinkwort)

4.2.3.2 *Lysimachia arvensis* (Pimpernel)

No description is available for this taxon (WAHERB, 2021). This species was recorded within one vegetation association; Low open forest of *Eucalyptus flocktoniae*/ *E. salubris*/ *E. urna* on clay-loam plain (CLP-EW1).



Plate 11: *Lysimachia arvensis* (Pimpernel)

4.2.3.3 *Sonchus oleraceus* (Common Sowthistle)

This species is described as an erect annual, herb, which grows up to 1.5 m high. It produces yellow flowers from January to December. It occurs on a variety of soils and is a weed of waste places and disturbed ground (WAHERB, 2021). This species was recorded within one vegetation association; Low open forest of *Eucalyptus flocktoniae*/ *E. salubris*/ *E. urna* on clay-loam plain (CLP-EW1).



Plate 12: *Sonchus oleraceus* (Common Sowthistle)

4.2.3.4 *Wahlenbergia capensis* (Common Bluebell)

This species is described as a slender, erect or ascending annual herb which grows between 0.1-0.5 m high. It produces blue/blue-green flowers from September to November. This species occurs on sandy soils within disturbed grounds and plains (WAHERB, 2021). This species was recorded within one vegetation association; Low open forest of *Eucalyptus flocktoniae*/ *E. salubris*/ *E. urna* on clay-loam plain (CLP-EW1).



Plate 13: *Wahlenbergia capensis* (Common Bluebell) (WAHERB, 2021)

4.2.4 Floristic Composition of the New Morning Project Quadrats

This analysis was used to determine the similarities or differences between vegetation associations. Appendix 9 provides the dendrogram, two-way table and ordination graph generated from the PATN statistical analysis. A list of the 36 quadrats and their respective vegetation associations are provided in Table 4-14 below. The PATN analysis produced a stress value of 0.1786.

Table 4-14: Vegetation associations with corresponding quadrats

| Landform | NVIS | Vegetation Association | Vegetation Code | Quadrat |
|-----------------|--|---|-----------------|-----------------------------|
| Clay-Loam Plain | Eucalyptus Woodland (MVG 5) | Low open forest of <i>Eucalyptus flocktoniae</i> / <i>E. salubris</i> / <i>E. urna</i> on clay-loam plain | CLP-EW1 | Q3, Q10, Q14, Q19, Q20, Q35 |
| | | Mid open woodland of <i>Eucalyptus salmonophloia</i> on clay-loam plain | CLP-EW2 | Q5, Q13, Q22 |
| | | Burnt open low woodland of <i>Eucalyptus salmonophloia</i> over mallee shrubland of <i>E. pileata</i> / <i>E. tephroclada</i> / <i>E. celastroides</i> on clay-loam plain | CLP-EW3 | Q1, Q4, Q8, Q9, Q24, Q36 |
| | | Mid woodland of <i>Eucalyptus longicornis</i> on clay-loam plain | CLP-EW4 | Q6, Q7, Q11, Q12 |
| Stony rise | Mallee Woodland and Shrubland (MVG 14) | Mid mallee shrubland of <i>Eucalyptus tephroclada</i> / <i>E. pileata</i> on stony rise | R-MWS1 | Q2, Q18, Q21 |
| Sand-Loam Plain | Mallee Woodland and Shrubland (MVG 14) | Mid mallee shrubland of <i>Eucalyptus tephroclada</i> / <i>E. pileata</i> / <i>E. transcontinentalis</i> on sand-loam plain | SLP-MWS1 | Q15, Q27, Q28, Q30 |
| | | Mid mallee shrubland of <i>Eucalyptus steedmanii</i> on sand-loam plain | SLP-MWS2 | Q23, Q25, Q26, Q31 |
| Sandplain | Heathlands (MVG 18) | Mid heathland of <i>Allocasuarina corniculata</i> / <i>Acacia acuminata</i> on sandplain | SP-H1 | Q16, Q29, Q34 |
| | Mallee Woodland and Shrubland (MVG 14) | Low open mallee shrubland of <i>Eucalyptus platycorys</i> / <i>E. horistes</i> on sandplain | SP-MWS1 | Q17, Q32, Q33 |

Two 'supergroups' were identified in the PATN analysis:

1. Clay-Loam Plain/ Sand-Loam Plain (Eucalypt Woodlands & Mallee Woodlands and Shrublands); and
2. Sandplain/ Stony Rise (Mallee Woodlands and Shrublands & Heathlands)

Nine species groups were identified in the analysis (species group A to I) as shown in the two-way table (Appendix 9).

The 'Clay-Loam Plain/ Sand-Loam Plain' supergroup included six floristic groups; four groups comprising of quadrats from the Clay-Loam Plain vegetation associations (CLP-EW1 to CLP-EW4) and two groups comprising of quadrats from the Sand-Loam Plain vegetation associations (SLP-MWS1 and SLP-MWS2). The first two floristic groups (1-2) which included quadrats from CLP-EW1 and CLP-EW3 were mainly characterised by species group C and had a mean species richness of

14 taxa and 13 taxa per quadrat respectively. The third group comprised of all four SLP-MWS2 quadrats and were characterised by species group C and H, with an average of 16 taxa per quadrat. The fourth floristic group which comprised of all four SLP-MWS1 quadrats was mainly characterised by species group I with an average of 14 taxa per quadrat. The remaining two floristic groups (5 and 6) which included quadrats from the Clay-Loam Plain vegetation associations (CLP-EW2, CLP-EW3 and CLP-EW4) were mainly characterised by species group E with an average of 11 and 7 taxa per quadrat respectively.

The 'Sandplain/ Stony Rise' supergroup was divided into three floristic groups; the first group (Group 7) included two quadrats of R-MWS1 and was characterised by species group G (average species richness of 10 taxa per quadrat). The second group (Group 8) included quadrats from the two sandplain vegetation associations (Heathland and Mallee Woodlands and Shrublands) and the remaining stony rise quadrats, with an average species richness of 17 taxa per quadrat. This group was mainly characterised by species group A. The final group (Group 9) comprised of a single quadrat (Q33) from SP-MWS1 (12 species per quadrat). Comparative to the other quadrats of R-MWS1 (Q17, Q32 which recorded 22 and 20 taxa respectively), Quadrat 33 had a lower species diversity (8-10 species less) and was mainly characterised by species group B.

Based on the results of the PATN analysis, there was minimal heterogeneity in species composition across the survey area, with majority of vegetation associations (particularly the Eucalypt woodland associations) intermixed into floristic groups despite differences in dominant stratum taxa; however, two distinct supergroups were identified. The first supergroup comprised of a mix of vegetation associations identified in the field including quadrats from the clay-loam plain (Eucalypt Woodlands and sand-loam plain (Mallee Woodlands and Shrublands). The second supergroup comprised a mix of quadrats from the sandplains (Mallee Woodlands and Shrublands/ Heathlands) and stony rise (Mallee Woodlands and Shrublands) vegetation associations.

Species Richness and accumulation estimates

The Chao 2 richness estimator provided an estimated species richness of 188 species in 50 sample sites (quadrats). Species richness recorded for the 36 quadrats surveyed was 167 species (including annuals) which indicates survey intensity was adequate.

A species accumulation curve was created to display the rate of species accumulation. The R^2 value (0.99) suggests that the data "fits" the species accumulation curve shown in Figure 4-3. By the twenty-sixth quadrat the rate of species accumulation was calculated at two species per quadrat up to 45 quadrats. Beyond 45 quadrats the rate of species accumulation was calculated to <1 species per quadrat as quadrat number increased to between 45 to 50 quadrats. BC 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.

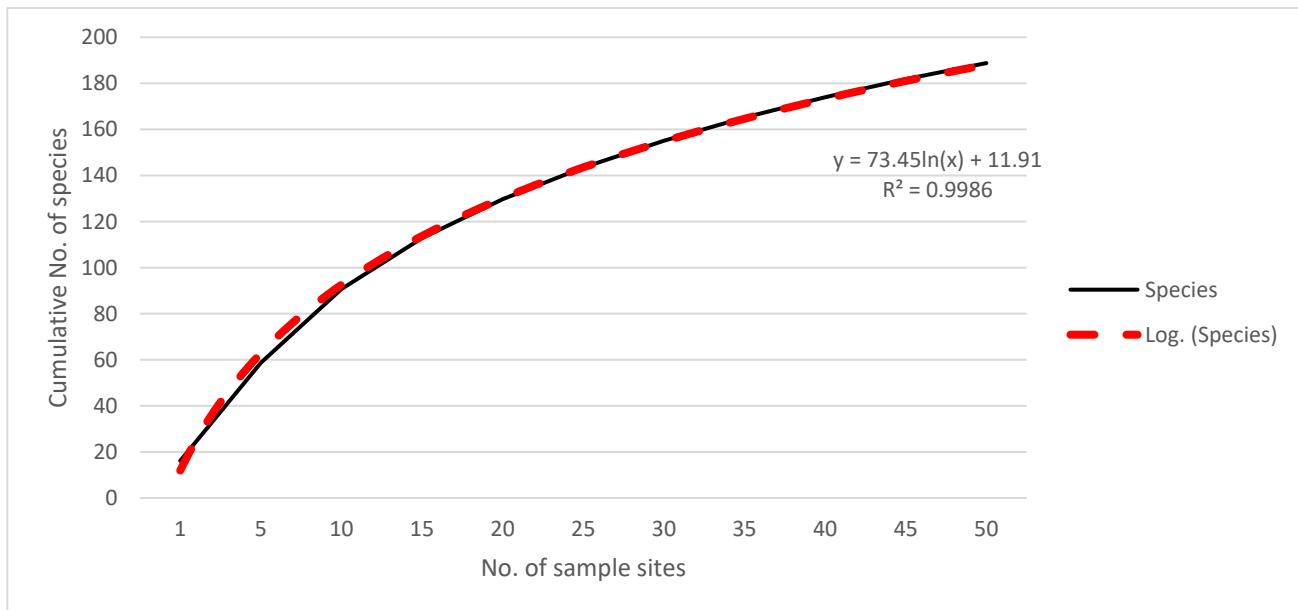


Figure 4-3: Species accumulation curve

4.2.5 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
- flora with relictual status, being representative of taxonomic groups that no longer occur widely in the broader landscape.

Two Threatened Flora taxon pursuant to the BC Act and the EPBC Act were identified within the survey area:

1. *Eucalyptus steedmanii*.
2. *Paragoodia crenulata* (also considered endemic to the area)

Four Priority Flora taxa as listed by DBCA were identified within the survey area:

1. *Eremophila racemosa* (P4);
2. *Eutaxia acanthoclada* (P3);
3. *Microcorys* sp. Forrestania (V. English 2004) (P4); and
4. *Stylidium sejunctum* (P3).

Descriptions of these species are provided in the following sections. A map of significant flora recorded during the survey is provided in Figure 4-4. GPS locations of all Priority Flora recorded by Botanica are provided in Appendix 5 (Threatened Flora locations have been excluded due to the sensitivity of this data). No other significant flora (i.e. groundwater or surface water dependent, new or anomalous species, range extension, relictual or unusual species) were identified within the survey area. An assessment on the potential impacts to significant flora is provided in Table 4-15.

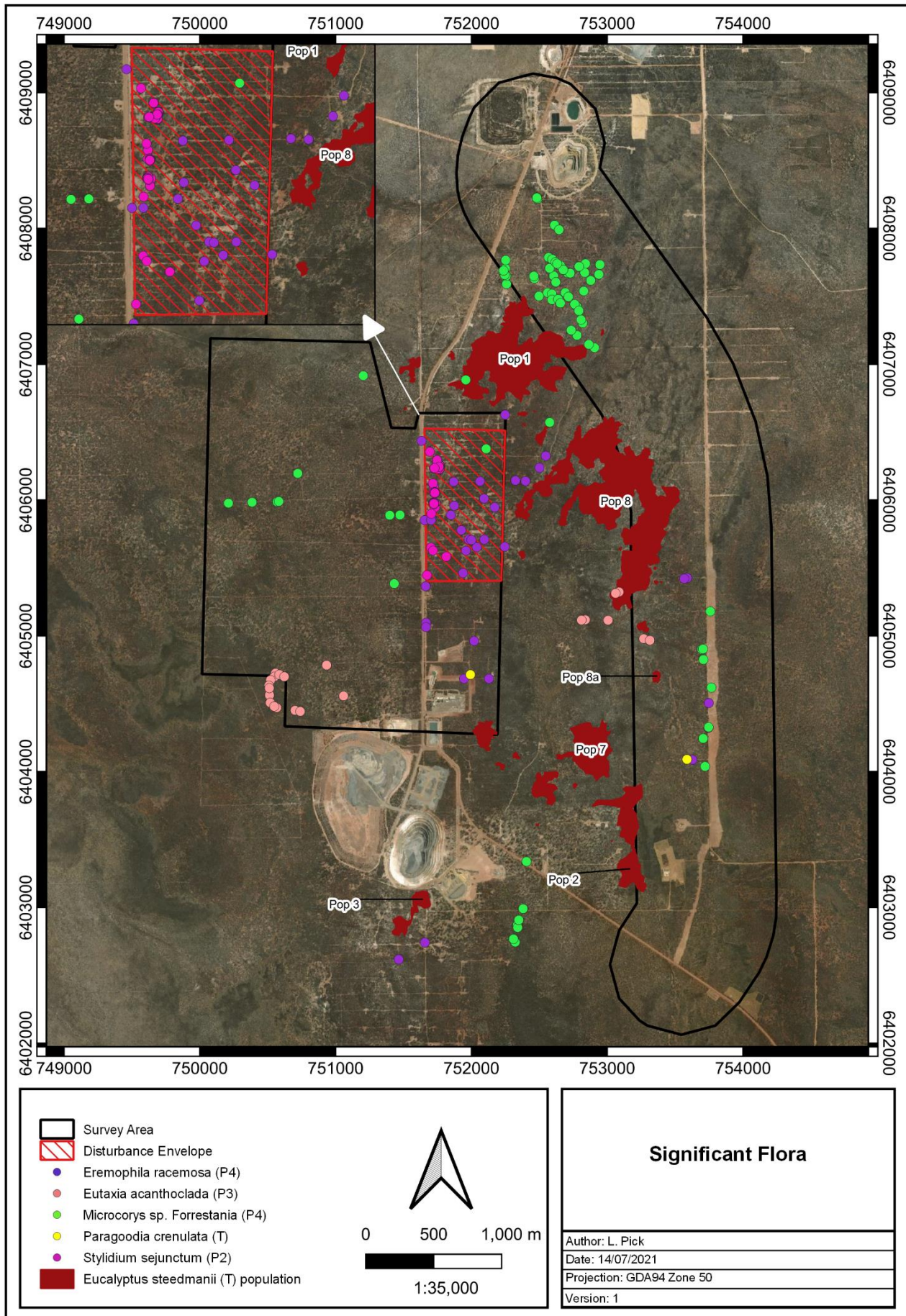


Figure 4-4: Significant flora identified within the New Morning Project survey area

4.2.5.1 *Eucalyptus steedmanii* (T)

Eucalyptus steedmanii is listed as a Threatened Flora taxon (Vulnerable) under the Western Australian BC Act and the Commonwealth EPBC Act. This taxon is described as a tree that grows to 2-8m high (Plate 14). It has smooth bark, and produces white flowers from January to March (WAHERB, 2021). It grows in gravelly loam over ironstone and sand, and it can be found on low hills and undulating plains.

Four previously recorded populations/DBCA known locations were identified within the survey area (referred to as Population 1, 2, 7 and 8). An additional location of this taxon was identified during the survey, located within 500m of the existing Population 8 boundary (tentatively referred to as Population 8a pending determination from DBCA). This newly identified location of *Eucalyptus steedmanii* will be formally lodged with DBCA. This taxon was identified within one vegetation association; Mid mallee shrubland of *Eucalyptus steedmanii* on sand-loam plain (SLP-MWS2).



Plate 14: *Eucalyptus steedmanii* (T)

4.2.5.2 *Paragoodia crenulata* (T)

Paragoodia crenulata is listed as a Threatened Flora taxon (Vulnerable) under the Western Australian BC Act and Critically Endangered under the Commonwealth EPBC Act. This taxon is described as a small herbaceous plant with perennial underground parts (Plate 15). The flower spike has 1–3 flowers that are brown and yellow in colour. The flowering period is from July to August. This taxon is endemic to Western Australia, known from two populations in the Forrestania area (DAWE, 2021).

Two locations of this taxon were recorded within the survey area, neither of which are DBCA listed/known locations. The nearest known DBCA location is approximately 12.7km north-east of the survey area, along the Forrestania-Southern Cross Road. This newly identified locations of *Paragoodia crenulata* will be formally lodged with DBCA. Both locations of this taxon were identified on previously cleared/ rehabilitated drill pads within one vegetation association; Low open forest of *Eucalyptus flocktoniae*/ *E. salubris*/ *E. urna* on clay-loam plain (CLP-EW1). This species is thought to require disturbance (DEC, 2010) which was supported by the current field observations (i.e., located on a previously cleared/ rehabilitated drill pads).



Plate 15: *Paragoodia crenulata* (T)

4.2.5.3 *Eremophila racemosa* (P4)

This taxon is described as an erect shrub that grows up to 0.5-1.7m high (Plate 16). It produces purple-pink-red/white flowers in March or August to December. It grows in sandy or stony loam, clay loam, and can be found on undulating plains and roadsides (WAHERB, 2021). Botanica recorded 35 locations of this taxon within the survey area, two of which are DBCA known locations. This taxon was recorded within four vegetation associations:

1. Low open forest of *Eucalyptus flocktoniae*/ *E. salubris*/ *E. urna* on clay-loam plain (CLP-EW1);
2. Mid open woodland of *Eucalyptus salmonophloia* on clay-loam plain (CLP-EW2);
3. Burnt open low woodland of *Eucalyptus salmonophloia* over mallee shrubland of *E. pileata*/ *E. tephroclada*/ *E. celastroides* on clay-loam plain (CLP-EW3); and
4. Mid mallee shrubland of *Eucalyptus tephroclada*/ *E. pileata* on stony rise (R-MWS1).



Plate 16: *Eremophila racemosa* (P4)

4.2.5.4 *Eutaxia acanthoclada* (P3)

This taxon is described as a compact, mat-forming, prostrate shrub, which grows to 0.3 m high (Plate 17). It produces yellow/orange/red flowers from October to November. This taxon occurs on light brown sandy clay, shallow sandy loam and red clay soils over banded ironstone and gravel. It occurs on gently undulating plains (WAHERB, 2021). Botanica recorded 22 locations of this taxon within the survey area. There are no DBCA records of this taxon located within the survey area. This taxon was identified within three vegetation associations:

1. Burnt open low woodland of *Eucalyptus salmonophloia* over mallee shrubland of *E. pileata*/*E. tephroclada*/*E. celastroides* on clay-loam plain (CLP-EW3);
2. Mid woodland of *Eucalyptus longicornis* on clay-loam plain (CLP-EW4); and
3. Mid mallee shrubland of *Eucalyptus steedmanii* on sand-loam plain (SLP-MWS2).



Plate 17: *Eutaxia acanthoclada* (P3)

4.2.5.5 *Microcorys* sp. Forresteria (V. English 2004) (P4)

This taxon is described as a prostrate or erect shrub that grows up to 0.35-0.4m high (Plate 18). It produces white/purple flowers in January or April. It grows in yellow sandy clay or red-brown clay, and it can be found in open woodland or cleared areas (WAHERB, 2021). Botanica recorded 79 locations of this taxon within the survey area. There are no DBCA records of this taxon located within the survey area. This taxon was recorded within five vegetation associations:

1. Low open forest of *Eucalyptus flocktoniae*/ *E. salubris*/ *E. urna* on clay-loam plain (CLP-EW1);
2. Mid open woodland of *Eucalyptus salmonophloia* on clay-loam plain (CLP-EW2);
3. Burnt open low woodland of *Eucalyptus salmonophloia* over mallee shrubland of *E. pileata*/ *E. tephroclada*/ *E. celastroides* on clay-loam plain (CLP-EW3);
4. Mid mallee shrubland of *Eucalyptus tephroclada*/ *E. pileata*/ *E. transcontinentalis* on sand-loam plain (SLP-MWS1); and
5. Mid mallee shrubland of *Eucalyptus steedmanii* on sand-loam plain (SLP-MWS2).



Plate 18: *Microcorys* sp. Forresteria (V. English 2004) (P4)

4.2.5.6 *Stylidium sejunctum* (P3)

This taxon is described as a caespitose perennial herb that reaches heights of 0.25–0.45 metres (Plate 19). The flowers are white, pink and purple and bloom from September through November. It inhabits sites with clayey sand, loam or laterite on outcrops, upper slopes and breakaways (WAHERB, 2021). Botanica recorded 98 locations of this taxon within the survey area, two of which are DBCA known locations. This taxon was recorded within two vegetation associations:

1. Low open forest of *Eucalyptus flocktoniae*/ *E. salubris*/ *E. urna* on clay-loam plain (CLP-EW1); and
2. Mid mallee shrubland of *Eucalyptus tephroclada*/ *E. pileata* on stony rise (R-MWS1).



Plate 19: *Stylidium sejunctum* (P3)

Table 4-15: Significant Flora Impact Assessment

| Taxon | No. plants within disturbance envelope | No. plants in local area (within 50km) [^] | Disturbance Envelope % impact on local populations |
|--|--|---|--|
| <i>Eucalyptus steedmanii</i> (T) | 0 | 2,236,688 | 0.0 |
| <i>Paragoodia crenulata</i> (T) | 0 | 101 | 0.0 |
| <i>Eremophila racemosa</i> (P4) | 666 | 17,740 | 3.8 |
| <i>Eutaxia acanthoclada</i> (P3) | 0 | 1,326 | 0.0 |
| <i>Microcorys</i> sp. Forrestania (V. English 2004) (P4) | 1 | 15,505 | 0.006 |
| <i>Stylidium sejunctum</i> (P3) | 563 | 2,264 | 24.9 |

[^] Based on both Botanica records and DBCA records (DBCA, 2018a)

4.2.6 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
- vegetation providing an important function required to maintain ecological integrity of a significant ecosystem.

The survey area is located within the North Ironcap buffer of the *Ironcap Hills Vegetation Complexes* which is listed by the DBCA as a Priority 3 Ecological Community (Appendix 2). This vegetation community was first described by Newbey and Hnatiuk (1988) during the biological survey of the Lake Johnston-Hyden area as a BIF complex and was considered one of seven unique vegetation communities to the Lake Johnston-Hyden area. The description of the North Ironcap BIF complex is provided below:

The complex vegetation on banded ironstone formation had a number of species dominant at different sites. Low trees (Acacia lasiocalyx and Eucalyptus flocktoniae [Merritt]) were rare. Mallees of Eucalyptus aff. wandoo (E. livida, E. capillosa subsp. polyclada) were usually present in small areas partially lateritized, while E. eremophila occurred rarely. Tall shrubs that were occasionally present included Allocasuarina campestris ssp. campestris (also low shrub), A. corniculata, Banksia sphaerocarpa var. dolichostyla (Ironcaps), Calothamnus quadrifidus (also low shrub), Dryandra aff. cirsioides, Grevillea pterosperma, Hakea subsulcata, H. scoparia, Leptospermum erubescens, Melaleuca fulgens, M. uncinata, Santalum acuminatum and Trymalium aff. ledifolium; low shrubs were Acacia sulcata var. platyphylla, Acacia sp. (KRN 5226), Chamelaucium ciliatum (south), Cryptandra miliaris, Dodonaea adenophora, D. amblyophylla (west), Dryandra sp. (KRN 5229), Melaleuca cordata, Phebalium filifolium, P. microphyllum, P. tuberculosum ssp. tuberculosum, P. aff. tuberculosum and Platysace maxwellii (west); perennial grasses of Spartochloa scirpoidea; and sedges of Lepidosperma drummondii, L. viscidum var. viscidum, Lepidosperma sp. (KRN 5232), Lepidosperma sp. (KRN 5233) and Lepidosperma sp. (KRN 6488).

The vegetation complex described was not represented within the survey area.

According to the DPIRD (2018) the BIF complex within the Greater North Ironcap area is classified by pre-European vegetation association Forrestania 1413; Shrublands; *Acacia, Casuarina & Melaleuca* thicket which is represented in both the Southern Cross and Western Mallee subregion. Neither of these vegetation associations occur within the survey area (see Section 2.3).

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 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.

Two nationally threatened flora species; *Eucalyptus steedmanii* and *Paragoodia crenulata* were recorded within the survey area. Neither of these species were recorded within the disturbance envelope.

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.

Two threatened flora species; *Eucalyptus steedmanii* and *Paragoodia crenulata* were recorded within the survey area. Neither of these species were recorded within the disturbance envelope. A 50m radius of each Threatened Flora plant is protected as an ESA under Regulation 6 of the *Environmental Protection (Clearing of Native Vegetation) Regulations WA 2004*.

Approximately 215ha of the north-east corner of survey area lies within the Lake Cronin ESA with the survey area located approximately 5km south-west of the Lake Cronin 'A' Class Nature Reserve. The Lake Cronin ESA is not located within the disturbance envelope. A description of the Lake Cronin Region is provided below:

Lake Cronin is a semi-permanent freshwater lake located in the south western region of the Eastern Goldfields and is the largest freshwater lake in the region. The Lake Cronin area is one of a number of areas in the Wheatbelt region that are significant for rare species, due to widespread clearing in the surrounding landscape, and to the high diversity and level of local endemism. The Lake Cronin area supports extensive shrubland, sandplain and woodland environments, including excellent representation of a range of vegetation associations that are now extensively cleared in the Wheatbelt and supports a high number of species that are disjunct. Disjunct populations are those that have become physically separated, resulting in minimal or no gene flow between them, and they are an important precursor to the development of new species. A number of species in Australia have separate eastern and western populations, and some have formed sub-species, reflecting important broader long-term processes such as sea level changes and climatic fluctuations. It also supports a number of species reaching the limit of their distribution range. The number of species at the edge of their range reflects the convergence in the area of the Avon, Mallee and Coolgardie Biogeographic regions (DotEE, 2017).

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 licence. 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.*

Two threatened flora species; *Eucalyptus steedmanii* and *Paragoodia crenulata* listed under the BC Act were recorded within the survey area. Neither of these species were recorded within the disturbance envelope.

4.4.3 Conservation Reserves

According to the EPA (2009) *Advice on Conservation Values and Review of Nature Reserve Proposals in the Lake Cronin Region*, an area of 56,750ha within the mineralised greenstone belt in the Lake Cronin Region (encompassing the entire survey area) is proposed to be managed under Section 33(2) of the *Conservation and Land Management Act (CALM Act) 1984* but not formally reserved.

A proposed 'C' Class Nature Reserve is also proposed in the surrounding area to protect the Lake Cronin catchment and areas of extensive sandplain and woodland vegetation located immediately east of the Wheatbelt, which represents vegetation communities and fauna habitats that have been extensively cleared and fragmented in the adjacent Wheatbelt.

A map showing conservation reserves in relation to the survey area is provided in Appendix 2.

5 Discussion

Nine vegetation associations were identified within the survey area which comprised of four different landform types and three major vegetation groups. These vegetation associations were represented by a total of 38 Families, 98 Genera and 280 Taxa. Species composition assessments indicate there was minimal heterogeneity in species composition across the survey area, with majority of vegetation associations (particularly the Eucalypt woodland associations) intermixed into floristic groups despite differences in dominant stratum taxa; however, two distinct supergroups were identified. The first supergroup comprised of a mix of vegetation associations identified in the field including quadrats from the clay-loam plain (Eucalypt Woodlands and sand-loam plain (Mallee Woodlands and Shrublands). The second supergroup comprised a mix of quadrats from the sandplains (Mallee Woodlands and Shrublands/ Heathlands) and stony rise (Mallee Woodlands and Shrublands) vegetation associations.

No TECs listed under State or Commonwealth legislation are located within the survey area. The survey area is located within the North Ironcap buffer of the *Ironcap Hills Vegetation Complexes* which is listed by the DBCA as a Priority 3 Ecological Community, however no vegetation representative of this PEC was identified within the survey area.

Two Threatened Flora species, pursuant to State and Commonwealth legislation were identified within the survey area; *Eucalyptus steedmanii* and *Paragoodia crenulata*. Four Priority Flora species were recorded within the survey area; *Eremophila racemosa* (P4), *Eutaxia acanthoclada* (P3), *Microcorys* sp. Forrestania (V. English 2004) (P4) and *Stylidium sejunctum* (P3). No Threatened Flora species are located within the disturbance envelope. Three of the four priority flora taxa were identified within the disturbance envelope; *Eremophila racemosa* (P4), *Microcorys* sp. Forrestania (V. English 2004) (P4) and *Stylidium sejunctum* (P3).

No Threatened Ecological Communities (TEC) pursuant to Commonwealth or State legislation were identified within the survey area. The survey area does not contain any world or national heritage places, wetlands of international importance (Ramsar Wetlands) or wetlands of national importance (Australian Nature Conservation Agency (ANCA) wetlands).

The disturbance envelope is located within the Lake Cronin region which is proposed to be managed under Section 33(2) of the CALM Act 1984 but not formally reserved.

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Appendix 1: Conservation Ratings 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 | <p>Critically Endangered</p> <p>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”.</p> <p>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.</p> |
| EN | <p>Endangered</p> <p>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”.</p> <p>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.</p> |
| VU | <p>Vulnerable</p> <p>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”.</p> <p>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.</p> |
| 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 | <p>Extinct</p> <p>Species where “<i>there is no reasonable doubt that the last member of the species has died</i>”, and listing is otherwise in accordance with the ministerial guidelines (section 24 of the BC Act).</p> <p>Published as presumed extinct under schedule 4 of the <i>Wildlife Conservation (Specially Protected Fauna) Notice 2018</i> for extinct fauna or the <i>Wildlife Conservation (Rare Flora) Notice 2018</i> for extinct flora.</p> |
| EW | <p>Extinct in the Wild</p> <p>Species that “<i>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</i>”, and listing is otherwise in accordance with the ministerial guidelines (section 25 of the BC Act).</p> <p>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.</p> |
| 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. | |
| IA | <p>International Agreement/ Migratory</p> <p>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).</p> <p>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 <i>Convention on the Conservation of Migratory Species of Wild Animals</i> (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,</p> |

| Code | Category |
|--|---|
| | 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 <i>Wildlife Conservation (Specially Protected Fauna) Notice 2018</i> . |
| 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 <i>Wildlife Conservation (Specially Protected Fauna) Notice 2018</i> . |
| 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 <i>Wildlife Conservation (Specially Protected Fauna) Notice 2018</i> . |
| 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 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, |

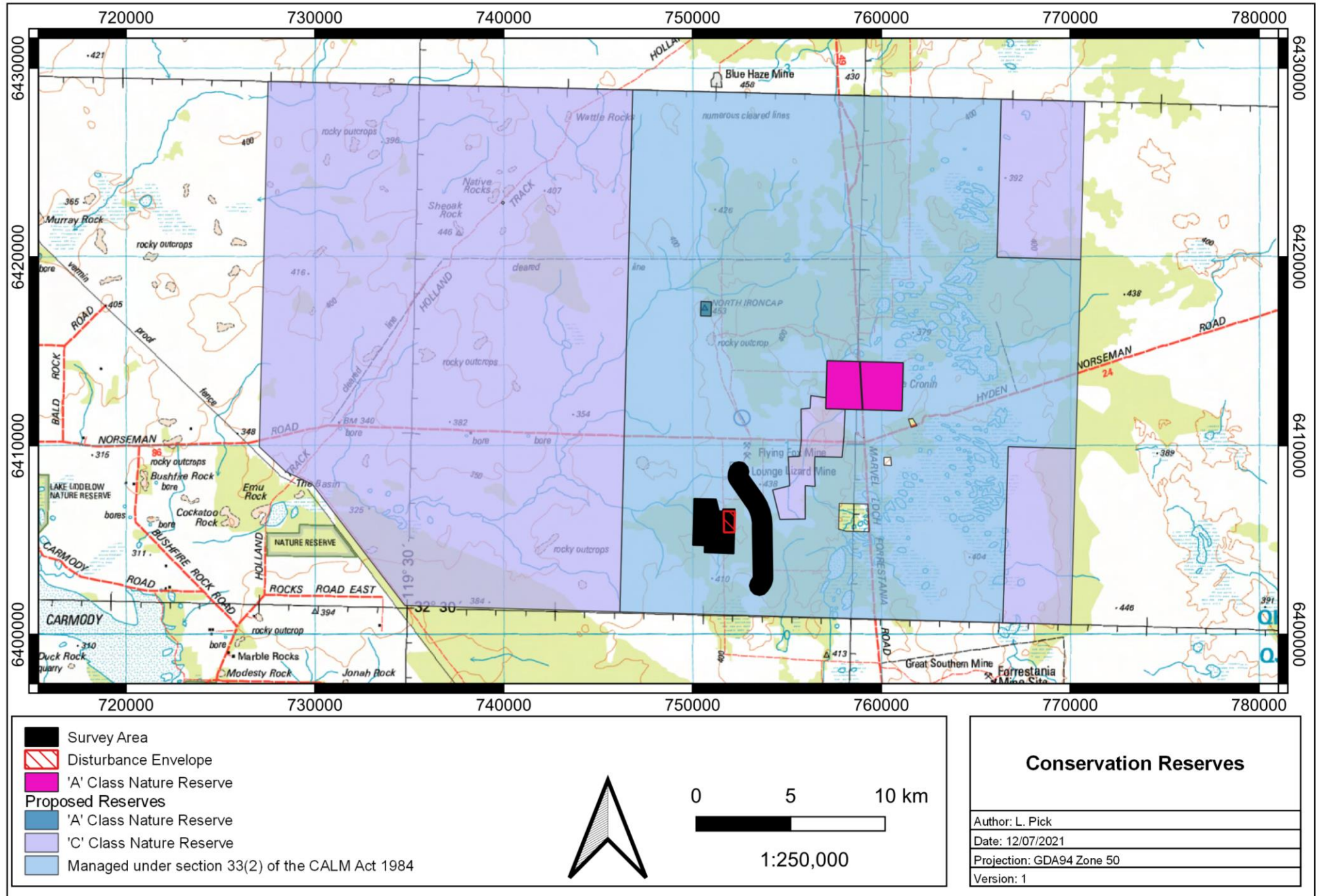
| Code | Category |
|------|--|
| | at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form. |
| CR | Critically Endangered Taxa that are facing an extremely high risk of extinction in the wild in the immediate future, as 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. |

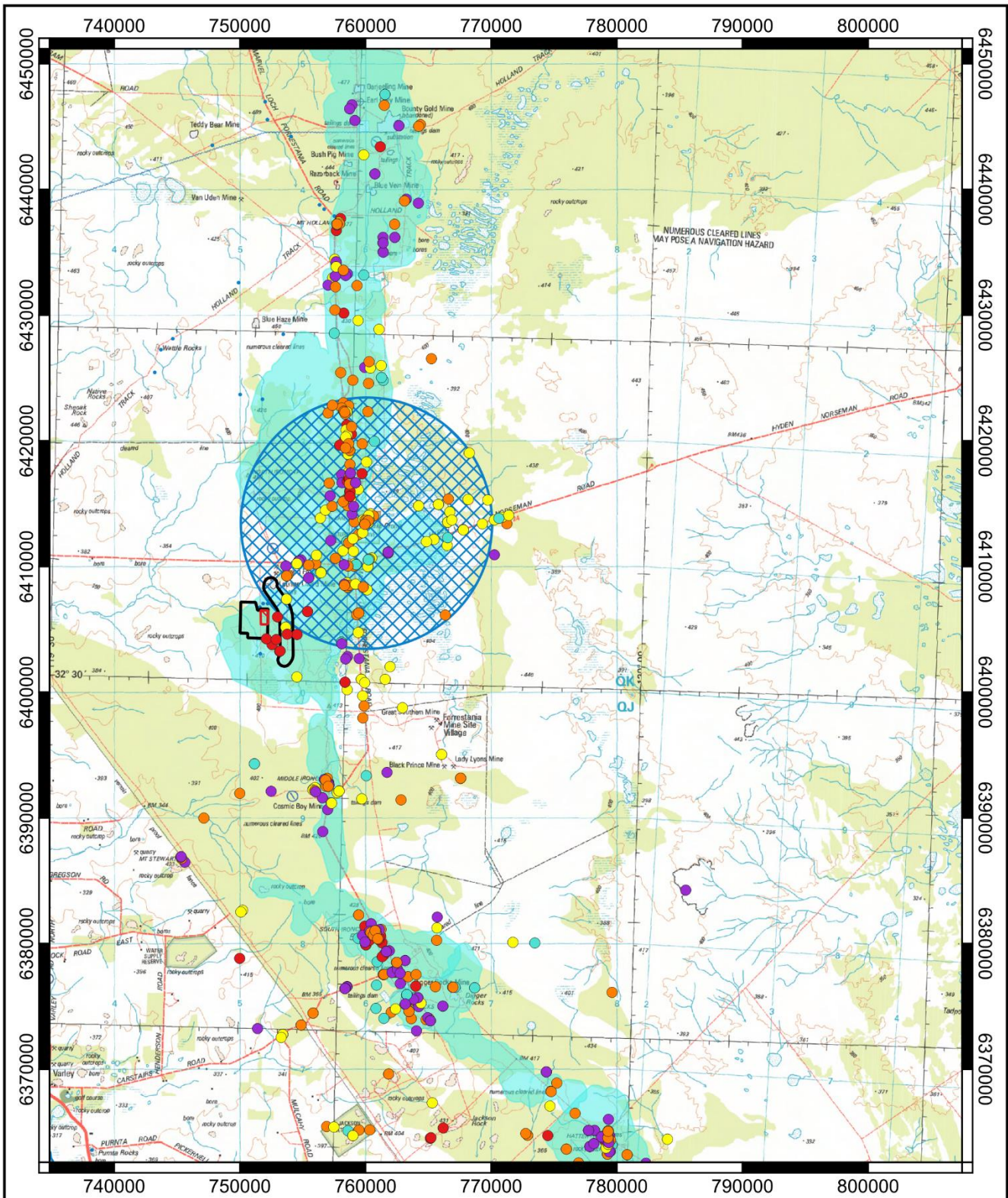
Definitions of Conservation Significant Communities

| 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: <ul style="list-style-type: none"> 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. |

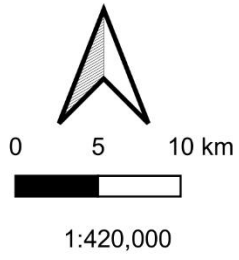
| Category Code | Category |
|---|--|
| VU | <p>Vulnerable</p> <p>An ecological community will be listed as Vulnerable when it has been adequately surveyed and is not Critically Endangered or Endangered but is facing high risk of total destruction in the medium to long term future. The ecological community must meet any one of the following criteria:</p> <p>The ecological community exists largely as modified occurrences that are likely to be able to be substantially restored or rehabilitated;</p> <p>The ecological community may already be modified and would be vulnerable to threatening process, and restricted in range or distribution;</p> <p>The ecological community may be widespread but has potential to move to a higher threat category due to existing or impending threatening processes.</p> |
| Commonwealth categories of Threatened Ecological Communities (TEC) | |
| CE | <p>Critically Endangered</p> <p>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).</p> |
| EN | <p>Endangered</p> <p>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).</p> |
| VU | <p>Vulnerable</p> <p>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).</p> |
| Priority Ecological Communities (PEC) | |
| P1 | <p>Poorly-known ecological communities</p> <p>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.</p> |
| P2 | <p>Poorly-known ecological communities</p> <p>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.</p> |
| P3 | <p>Poorly known ecological communities</p> <p>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:</p> <p>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;</p> <p>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.</p> |
| P4 | <p>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.</p> |
| P5 | <p>Conservation Dependent ecological communities</p> <p>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.</p> |

Appendix 2: Regional maps of the survey area in relation to conservation areas





- Survey Area
- Disturbance Envelope
- Lake Cronin ESA
- Ironcaps BIF (PEC3)
- Significant Flora**
- Threatened
- Priority 1
- Priority 2
- Priority 3
- Priority 4



Significant Flora & Vegetation

Author: L. Pick
 Date: 14/07/2021
 Projection: GDA94 Zone 50
 Version: 1

Appendix 3: List of species identified within each vegetation association

(A) Blue text Denotes Annual species; (W) Green text Denotes Introduced species; (P/T) Red text Denotes Flora of Conservation Significance

| Family | Genus | Taxon | CLP-EW1 | CLP-EW2 | CLP-EW3 | CLP-EW4 | R-MWS1 | SLP-MWS1 | SLP-MWS2 | SP-H1 | SP-MWS1 |
|----------------|----------------------|---|---------|---------|---------|---------|--------|----------|----------|-------|---------|
| Apiaceae | <i>Platysace</i> | <i>maxwellii</i> | | | | | * | | | * | |
| Asparagaceae | <i>Thysanotus</i> | <i>dichotomus</i> | | | | | * | | * | | |
| Geraniaceae | <i>Pelargonium</i> | <i>havlasae</i> | * | | | | | | | | |
| Poaceae | <i>Austrostipa</i> | sp. (sterile) | * | | * | * | | | | | |
| Aizoaceae | <i>Disphyma</i> | <i>crassifolium</i> subsp. <i>clavellatum</i> | | * | | | | | | | |
| Asparagaceae | <i>Thysanotus</i> | <i>sparteus</i> | | * | | | | | | * | |
| Asphodelaceae | <i>Bulbine</i> | <i>semibarbata</i> | * | | | | | | | | |
| Asteraceae | <i>Angianthus</i> | <i>tomentosus</i> (A) | * | | | | * | | | | |
| Asteraceae | <i>Calotis</i> | <i>hispidula</i> (A) | * | | | | | | | | |
| Asteraceae | <i>Dittrichia</i> | <i>graveolens</i> (W) | * | | | | * | | | | |
| Asteraceae | <i>Erymophyllum</i> | <i>ramosum</i> subsp. <i>ramosum</i> (A) | | * | | | | | | | |
| Asteraceae | <i>Gnephosis</i> | <i>tenuissima</i> (A) | * | | | | | | | | |
| Asteraceae | <i>Olearia</i> | <i>muelleri</i> | * | * | * | * | * | * | * | | |
| Asteraceae | <i>Olearia</i> | <i>pimeleoides</i> | * | | * | | | | | | |
| Asteraceae | <i>Sonchus</i> | <i>oleraceus</i> (W) | * | | | | | | | | |
| Campanulaceae | <i>Wahlenbergia</i> | <i>capensis</i> (W) | * | | | | | | | | |
| Casuarinaceae | <i>Allocasuarina</i> | <i>acutivalvis</i> | | | | | * | * | | * | |
| Casuarinaceae | <i>Allocasuarina</i> | <i>campestris</i> | * | | | | * | | | * | |
| Casuarinaceae | <i>Allocasuarina</i> | <i>corniculata</i> | | | | | * | * | * | * | * |
| Casuarinaceae | <i>Allocasuarina</i> | <i>helmsii</i> | * | | | | | * | | | |
| Casuarinaceae | <i>Allocasuarina</i> | <i>microstachya</i> | | | | | | | | | * |
| Casuarinaceae | <i>Allocasuarina</i> | sp. (sterile) | | | * | | * | | | | * |
| Chenopodiaceae | <i>Atriplex</i> | <i>stipitata</i> | * | * | | * | * | | | | |
| Chenopodiaceae | <i>Atriplex</i> | <i>vesicaria</i> | | | | * | | | | | |
| Chenopodiaceae | <i>Maireana</i> | <i>georgei</i> | * | * | | | | | | | |
| Chenopodiaceae | <i>Maireana</i> | <i>oppositifolia</i> | * | | | | | | | | |
| Chenopodiaceae | <i>Rhagodia</i> | <i>drummondii</i> | | | | * | | | | | |
| Chenopodiaceae | <i>Sclerolaena</i> | <i>diacantha</i> | * | * | | | | | | | |
| Chenopodiaceae | <i>Sclerolaena</i> | <i>parviflora</i> | * | * | * | * | | | | | |
| Chenopodiaceae | <i>Sclerolaena</i> | <i>uniflora</i> | * | * | | | | * | | | |

| Family | Genus | Taxon | CLP-EW1 | CLP-EW2 | CLP-EW3 | CLP-EW4 | R-MWS1 | SLP-MWS1 | SLP-MWS2 | SP-H1 | SP-MWS1 |
|----------------|---------------------|--|---------|---------|---------|---------|--------|----------|----------|-------|---------|
| Convolvulaceae | <i>Wilsonia</i> | <i>humilis</i> | * | * | * | * | | * | * | | |
| Cupressaceae | <i>Callitris</i> | <i>preissii</i> | * | | | | * | * | * | * | |
| Cyperaceae | <i>Gahnia</i> | <i>ancistrophylla</i> | | | | | * | | | | |
| Cyperaceae | <i>Gahnia</i> | <i>aristata</i> | | | | | | | | | * |
| Cyperaceae | <i>Lepidosperma</i> | <i>sanguinolentum</i> | | | | | * | * | | * | * |
| Cyperaceae | <i>Lepidosperma</i> | <i>brunonianum</i> | | * | * | | | * | | * | |
| Cyperaceae | <i>Lepidosperma</i> | <i>carphoides</i> | | | | | | | | | * |
| Cyperaceae | <i>Lepidosperma</i> | aff. sp. Maggie Hills (R. Barrett) | | | | | | | | * | |
| Cyperaceae | <i>Lepidosperma</i> | <i>drummondii</i> | | | | | * | * | * | * | |
| Cyperaceae | <i>Lepidosperma</i> | <i>pubisquameum</i> | | | | | | | | * | |
| Dilleniaceae | <i>Hibbertia</i> | <i>eatoniae</i> | | | | | | | | * | * |
| Dilleniaceae | <i>Hibbertia</i> | <i>exasperata</i> | | | | | * | | | | * |
| Dilleniaceae | <i>Hibbertia</i> | <i>gracilipes</i> | | | | | * | * | | * | * |
| Dilleniaceae | <i>Hibbertia</i> | <i>pungens</i> | | | | | * | * | * | * | |
| Droseraceae | <i>Drosera</i> | <i>macrantha</i> (A) | | | | | * | | | * | * |
| Ericaceae | <i>Astroloma</i> | <i>serratifolium</i> | | | | | * | * | * | * | * |
| Ericaceae | <i>Leucopogon</i> | ?sp. Newdegate (M. Hislop 3585) | | | | | | | | | * |
| Ericaceae | <i>Leucopogon</i> | <i>cuneifolius</i> | | | | | | * | * | * | |
| Ericaceae | <i>Leucopogon</i> | sp. outer wheatbelt (M. Hislop 30) | | | | | | | | * | |
| Ericaceae | <i>Leucopogon</i> | sp. Wheatbelt (S. Murray 257) | | | | | | | | | * |
| Ericaceae | <i>Lysinema</i> | <i>ciliatum</i> | | | | | | | | * | * |
| Ericaceae | <i>Lysinema</i> | <i>pentapetalum</i> | | | | | | | | | * |
| Euphorbiaceae | <i>Beyeria</i> | <i>brevifolia</i> | | | | | * | | | * | |
| Fabaceae | <i>Acacia</i> | <i>acanthoclada</i> subsp. <i>acanthoclada</i> | * | | | | * | | * | * | |
| Fabaceae | <i>Acacia</i> | <i>acuaria</i> | | * | | | | | | | |
| Fabaceae | <i>Acacia</i> | <i>acuminata</i> | * | | | | | * | | * | |
| Fabaceae | <i>Acacia</i> | <i>assimilis</i> subsp. <i>assimilis</i> | | | | | | | | * | * |
| Fabaceae | <i>Acacia</i> | <i>brachyclada</i> | | | | | | | | * | |
| Fabaceae | <i>Acacia</i> | <i>camptoclada</i> | * | | | | * | * | * | * | |
| Fabaceae | <i>Acacia</i> | <i>castanostegia</i> | | | | | * | | | | * |
| Fabaceae | <i>Acacia</i> | <i>collettioides</i> | | | | * | | | | | |
| Fabaceae | <i>Acacia</i> | <i>coolgardiensis</i> | | | | | | * | | * | |
| Fabaceae | <i>Acacia</i> | <i>deficiens</i> | * | * | * | | * | * | * | * | |

| Family | Genus | Taxon | CLP-EW1 | CLP-EW2 | CLP-EW3 | CLP-EW4 | R-MWS1 | SLP-MWS1 | SLP-MWS2 | SP-H1 | SP-MWS1 |
|-------------------|-----------------------|--|---------|---------|---------|---------|--------|----------|----------|-------|---------|
| Fabaceae | <i>Paragoodia</i> | <i>crenulata</i> (T) | * | | | | | | | | |
| Fabaceae | <i>Pultenaea</i> | aff. <i>arida</i> | * | | | | | | | | |
| Fabaceae | <i>Pultenaea</i> | <i>arida</i> | | | | | | * | | | |
| Fabaceae | <i>Senna</i> | <i>artemisioides</i> subsp. <i>x artemisioides</i> | | | | * | | | | | |
| Fabaceae | <i>Senna</i> | <i>artemisioides</i> subsp. <i>filifolia</i> | * | | * | | * | | | | |
| Fabaceae | <i>Senna</i> | <i>cardiosperma</i> | * | | | | | | | | |
| Fabaceae | <i>Templetonia</i> | <i>egena</i> | | | | | | * | | | |
| Fabaceae | <i>Templetonia</i> | <i>sulcata</i> | | * | * | | * | | * | | |
| Goodeniaceae | <i>Cooperhooikia</i> | <i>strophiolata</i> | | * | | | | * | * | * | |
| Goodeniaceae | <i>Dampiera</i> | <i>angulata</i> | | | | | * | * | | * | |
| Goodeniaceae | <i>Goodenia</i> | <i>dyeri</i> (A) | * | | | | | | | | |
| Goodeniaceae | <i>Goodenia</i> | <i>pinifolia</i> | | * | * | | * | * | | * | |
| Goodeniaceae | <i>Goodenia</i> | <i>viscida</i> | * | | | | | * | * | | |
| Goodeniaceae | <i>Scaevola</i> | <i>spinescens</i> | | * | | * | * | | | * | |
| Haloragaceae | <i>Glischrocaryon</i> | <i>roei</i> | | | | | | * | | | |
| Hemerocallidaceae | <i>Dianella</i> | <i>revoluta</i> | * | * | * | | * | * | | * | |
| Lamiaceae | <i>Microcorys</i> | sp. <i>Forrestania</i> (V. English 2004) (P4) | * | * | * | | | * | * | | |
| Lamiaceae | <i>Westringia</i> | <i>cephalantha</i> var. <i>caterva</i> | * | * | * | | * | * | * | * | |
| Lamiaceae | <i>Westringia</i> | <i>rigida</i> | * | * | * | | | | | * | |
| Lauraceae | <i>Cassytha</i> | <i>melantha</i> (A) | * | * | | | * | * | * | * | |
| Lauraceae | <i>Cassytha</i> | <i>pomiformis</i> (A) | | | | | | | | * | |
| Malvaceae | <i>Thomasia</i> | <i>sarotes</i> | | | | | | | | | * |
| Myrtaceae | <i>Cyathostemon</i> | <i>heterantherus</i> | | | | | | | | * | |
| Myrtaceae | <i>Ericomyrtus</i> | <i>serpyllifolia</i> | | | | | * | * | | * | |
| Myrtaceae | <i>Baeckea</i> | sp. (sterile) | | | | | | * | | | |
| Myrtaceae | <i>Beaufortia</i> | <i>micrantha</i> | | | | | | | | | * |
| Myrtaceae | <i>Beaufortia</i> | <i>schaueri</i> | | | | | | | | * | * |
| Myrtaceae | <i>Calothamnus</i> | <i>quadrifidus</i> subsp. <i>seminudus</i> | | | | | | | | * | |
| Myrtaceae | <i>Calytrix</i> | <i>brevisetata</i> subsp. <i>stipulosa</i> | | | | | | * | | * | |
| Myrtaceae | <i>Chamelaucium</i> | ? <i>virgatum</i> | | | | | | | | * | |
| Myrtaceae | <i>Chamelaucium</i> | <i>ciliatum</i> | | | | | | | | * | * |
| Myrtaceae | <i>Cyathostemon</i> | <i>tenuifolius</i> | | | | | * | | * | * | |
| Myrtaceae | <i>Darwinia</i> | sp. Lake Cobham (K. Newbey 3262) | | | | | * | * | | * | * |

| Family | Genus | Taxon | CLP-EW1 | CLP-EW2 | CLP-EW3 | CLP-EW4 | R-MWS1 | SLP-MWS1 | SLP-MWS2 | SP-H1 | SP-MWS1 |
|-------------|--------------------|--|---------|---------|---------|---------|--------|----------|----------|-------|---------|
| Myrtaceae | <i>Verticordia</i> | <i>plumosa</i> | | | | | | | | * | |
| Myrtaceae | <i>Verticordia</i> | <i>roei</i> | | | | | | | | * | |
| Olacaceae | <i>Olax</i> | <i>benthamiana</i> | | | | | | | | | * |
| Orchidaceae | <i>Caladenia</i> | <i>hirta</i> (A) | | | | | * | | * | * | |
| Orchidaceae | <i>Pterostylis</i> | <i>arbuscula</i> (A) | * | | | | | | | | |
| Orchidaceae | <i>Pterostylis</i> | <i>mutica</i> (A) | * | | | | | | * | | |
| Orchidaceae | <i>Thelymitra</i> | <i>petrophila</i> (A) | | | | | | | * | | |
| Primulaceae | <i>Lysimachia</i> | <i>arvensis</i> (W) | * | | | | | | | | |
| Proteaceae | <i>Adenanthos</i> | <i>argyreus</i> | | | | | | | | | * |
| Proteaceae | <i>Banksia</i> | <i>audax</i> | | | | | | | | | * |
| Proteaceae | <i>Banksia</i> | <i>cirsioides</i> | | | | | | | | * | |
| Proteaceae | <i>Banksia</i> | <i>densa</i> var. Wheatbelt (M. Pieroni s.n. PERTH 04083407) | | | | | | | | | * |
| Proteaceae | <i>Banksia</i> | <i>elderiana</i> | | | | | | | | * | |
| Proteaceae | <i>Banksia</i> | <i>erythrocephala</i> var. <i>erythrocephala</i> | | | | | | | | * | * |
| Proteaceae | <i>Banksia</i> | <i>laevigata</i> subsp. <i>fuscolutea</i> | | | | | | | | * | * |
| Proteaceae | <i>Conospermum</i> | <i>brownii</i> | | | | | | | * | * | * |
| Proteaceae | <i>Grevillea</i> | <i>acuaria</i> | * | * | * | | * | * | * | * | |
| Proteaceae | <i>Grevillea</i> | <i>cagiana</i> | * | | | | | | | * | * |
| Proteaceae | <i>Grevillea</i> | <i>decipiens</i> | | | | | | | | * | |
| Proteaceae | <i>Grevillea</i> | <i>eriostachya</i> | | | | | | * | | * | * |
| Proteaceae | <i>Grevillea</i> | <i>huegelii</i> | * | * | * | * | | * | | | * |
| Proteaceae | <i>Grevillea</i> | <i>obliquistigma</i> | * | | | | | | | * | |
| Proteaceae | <i>Grevillea</i> | <i>oligantha</i> | * | | | | | | | | |
| Proteaceae | <i>Grevillea</i> | <i>oncogyne</i> | | * | | | | * | | * | |
| Proteaceae | <i>Grevillea</i> | <i>pterosperma</i> | | | | | | * | | * | * |
| Proteaceae | <i>Hakea</i> | <i>commutata</i> | * | | | | | * | | | |
| Proteaceae | <i>Hakea</i> | <i>corymbosa</i> | * | | | | * | | | * | * |
| Proteaceae | <i>Hakea</i> | <i>erecta</i> | | | | | * | | | * | * |
| Proteaceae | <i>Hakea</i> | <i>francisiana</i> | | | | | | | | * | |
| Proteaceae | <i>Hakea</i> | <i>kippistiana</i> | | | | | | | | * | |
| Proteaceae | <i>Hakea</i> | <i>multilineata</i> | | | | | | * | * | * | |
| Proteaceae | <i>Hakea</i> | <i>newbeyana</i> | | | | | | * | | | |

| Family | Genus | Taxon | CLP-EW1 | CLP-EW2 | CLP-EW3 | CLP-EW4 | R-MWS1 | SLP-MWS1 | SLP-MWS2 | SP-H1 | SP-MWS1 |
|--------------|--------------------|--|---------|---------|---------|---------|--------|----------|----------|-------|---------|
| Proteaceae | <i>Hakea</i> | <i>platysperma</i> | | | | | | * | | * | * |
| Proteaceae | <i>Hakea</i> | <i>scoparia</i> subsp. <i>scoparia</i> | | | | | * | * | | * | |
| Proteaceae | <i>Hakea</i> | <i>subsulcata</i> | | | | | * | | * | * | |
| Proteaceae | <i>Hakea</i> | <i>erecta</i> | | | | | * | | | | |
| Proteaceae | <i>Hakea</i> | <i>multilineata</i> | | | | | | | | * | |
| Proteaceae | <i>Hakea</i> | sp. (sterile) | | | | | | | | | * |
| Proteaceae | <i>Isopogon</i> | <i>axillaris</i> | | | | | | | | * | |
| Proteaceae | <i>Isopogon</i> | <i>scabriusculus</i> subsp. <i>pubifloris</i> | | | | | | | | * | * |
| Proteaceae | <i>Isopogon</i> | <i>scabriusculus</i> subsp. <i>scabriusculus</i> | | | | | | | | | * |
| Proteaceae | <i>Persoonia</i> | <i>cordifolia</i> | | | | | | | | | * |
| Proteaceae | <i>Persoonia</i> | <i>coriacea</i> | | | | | | | | * | * |
| Proteaceae | <i>Persoonia</i> | <i>helix</i> | | | | | | | | * | |
| Proteaceae | <i>Petrophile</i> | <i>divaricata</i> | | | | | | | | * | |
| Proteaceae | <i>Petrophile</i> | <i>merrallii</i> | | | | | | | | | * |
| Proteaceae | <i>Petrophile</i> | <i>trifida</i> | | | | | | | | * | |
| Proteaceae | <i>Synaphea</i> | <i>interioris</i> | | | | | | | | * | |
| Restionaceae | <i>Chordifex</i> | <i>sphacelatus</i> | | | | | | | | | * |
| Rhamnaceae | <i>Cryptandra</i> | <i>aridicola</i> | | * | * | | | | | | |
| Rhamnaceae | <i>Cryptandra</i> | <i>intonsa</i> | | * | | | | | | | |
| Rhamnaceae | <i>Cryptandra</i> | <i>minutifolia</i> subsp. <i>minutifolia</i> | * | | * | | | * | | * | |
| Rhamnaceae | <i>Cryptandra</i> | <i>nutans</i> | | | | | | | | * | |
| Rhamnaceae | <i>Trymalium</i> | <i>myrtillus</i> | | | | | | | * | | |
| Rutaceae | <i>Boronia</i> | <i>inornata</i> subsp. <i>inornata</i> | | * | | | | * | * | * | |
| Rutaceae | <i>Boronia</i> | <i>inornata</i> subsp. <i>leptophylla</i> | | | | | | * | | | |
| Rutaceae | <i>Drummondita</i> | <i>hassellii</i> | | | | | | | | * | |
| Rutaceae | <i>Microcybe</i> | <i>multiflora</i> | * | | * | | | | | | |
| Rutaceae | <i>Microcybe</i> | <i>ambigua</i> | | | | | | * | | * | |
| Rutaceae | <i>Phebalium</i> | <i>filifolium</i> | | | | | * | | * | * | * |
| Rutaceae | <i>Phebalium</i> | <i>lepidotum</i> | | | | | | | | | * |
| Rutaceae | <i>Phebalium</i> | <i>megaphyllum</i> | | | | | | | | * | |
| Rutaceae | <i>Phebalium</i> | <i>microphyllum</i> | | | * | | * | | | | |
| Rutaceae | <i>Phebalium</i> | sp. (sterile) | | | | | | | | * | |
| Rutaceae | <i>Phebalium</i> | <i>tuberculosum</i> | * | * | | | | * | * | * | |

| Family | Genus | Taxon | CLP-EW1 | CLP-EW2 | CLP-EW3 | CLP-EW4 | R-MWS1 | SLP-MWS1 | SLP-MWS2 | SP-H1 | SP-MWS1 |
|------------------|-------------------|--|---------|---------|---------|---------|--------|----------|----------|-------|---------|
| Rutaceae | <i>Philothea</i> | <i>rhomboidea</i> | * | | | | | | | | |
| Santalaceae | <i>Exocarpos</i> | <i>aphyllus</i> | * | * | * | | * | * | * | * | |
| Santalaceae | <i>Exocarpos</i> | <i>sparteus</i> | | | | | * | * | | | * |
| Santalaceae | <i>Santalum</i> | <i>acuminatum</i> | * | * | * | * | * | * | * | * | * |
| Santalaceae | <i>Santalum</i> | <i>murrayanum</i> | | | | | | | | | * |
| Sapindaceae | <i>Dodonaea</i> | <i>bursariifolia</i> | | * | * | | * | * | * | * | |
| Sapindaceae | <i>Dodonaea</i> | <i>microzyga</i> | * | | | | | * | | | |
| Sapindaceae | <i>Dodonaea</i> | <i>microzyga</i> var. <i>acrolobata</i> | | | | | | | | * | |
| Sapindaceae | <i>Dodonaea</i> | <i>stenozyga</i> | * | * | * | | * | * | * | | |
| Sapindaceae | <i>Dodonaea</i> | <i>viscosa</i> subsp. <i>spatulata</i> | * | | | | * | | * | | |
| Scrophulariaceae | <i>Eremophila</i> | <i>decipiens</i> subsp. <i>decipiens</i> | * | * | * | | | | * | | |
| Scrophulariaceae | <i>Eremophila</i> | <i>densifolia</i> | * | * | | | | * | | | |
| Scrophulariaceae | <i>Eremophila</i> | <i>densifolia</i> subsp. <i>capitata</i> | | | * | | | | * | | |
| Scrophulariaceae | <i>Eremophila</i> | <i>dichroantha</i> | * | | * | | | * | | | |
| Scrophulariaceae | <i>Eremophila</i> | <i>drummondii</i> | * | | * | | | * | * | * | |
| Scrophulariaceae | <i>Eremophila</i> | <i>ionantha</i> | | * | * | | | | | | |
| Scrophulariaceae | <i>Eremophila</i> | <i>maculata</i> | * | * | * | * | | | | | |
| Scrophulariaceae | <i>Eremophila</i> | <i>racemosa</i> (P4) | * | * | * | | * | | | | |
| Stylidiaceae | <i>Stylidium</i> | <i>sejunctum</i> (P3) | * | | | | * | | | | |
| Thymelaeaceae | <i>Pimelea</i> | <i>aeruginosa</i> | | | | | | * | | * | |

Appendix 4: 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. | |
| 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 | | 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 5: Priority Flora Locations Recorded by Botanica

Note: Records of Threatened Flora excluded due to sensitivity of the data

| Taxon | DBCAs known location | Zone | Easting | Northing |
|----------------------------------|----------------------|------|---------|----------|
| <i>Eremophila racemosa</i> (P4) | N | 50 H | 753589 | 6405427 |
| <i>Eremophila racemosa</i> (P4) | N | 50 H | 753747 | 6404325 |
| <i>Eremophila racemosa</i> (P4) | N | 50 H | 753748 | 6404506 |
| <i>Eremophila racemosa</i> (P4) | N | 50 H | 753628 | 6404088 |
| <i>Eremophila racemosa</i> (P4) | N | 50 H | 753567 | 6405422 |
| <i>Eremophila racemosa</i> (P4) | N | 50 H | 752249 | 6406629 |
| <i>Eremophila racemosa</i> (P4) | N | 50 H | 752548 | 6406326 |
| <i>Eremophila racemosa</i> (P4) | N | 50 H | 752502 | 6406239 |
| <i>Eremophila racemosa</i> (P4) | N | 50 H | 752325 | 6406145 |
| <i>Eremophila racemosa</i> (P4) | N | 50 H | 752399 | 6406141 |
| <i>Eremophila racemosa</i> (P4) | N | 50 H | 751980 | 6405710 |
| <i>Eremophila racemosa</i> (P4) | N | 50 H | 752246 | 6405657 |
| <i>Eremophila racemosa</i> (P4) | N | 50 H | 752040 | 6405654 |
| <i>Eremophila racemosa</i> (P4) | N | 50 H | 751960 | 6405628 |
| <i>Eremophila racemosa</i> (P4) | N | 50 H | 751939 | 6405463 |
| <i>Eremophila racemosa</i> (P4) | N | 50 H | 751663 | 6405366 |
| <i>Eremophila racemosa</i> (P4) | N | 50 H | 751667 | 6405097 |
| <i>Eremophila racemosa</i> (P4) | N | 50 H | 751666 | 6405065 |
| <i>Eremophila racemosa</i> (P4) | N | 50 H | 752129 | 6404685 |
| <i>Eremophila racemosa</i> (P4) | N | 50 H | 751946 | 6404685 |
| <i>Eremophila racemosa</i> (P4) | N | 50 H | 752020 | 6404963 |
| <i>Eremophila racemosa</i> (P4) | N | 50 H | 751656 | 6405853 |
| <i>Eremophila racemosa</i> (P4) | N | 50 H | 751704 | 6405853 |
| <i>Eremophila racemosa</i> (P4) | N | 50 H | 751633 | 6406437 |
| <i>Eremophila racemosa</i> (P4) | N | 50 H | 752001 | 6405707 |
| <i>Eremophila racemosa</i> (P4) | N | 50 H | 752095 | 6405710 |
| <i>Eremophila racemosa</i> (P4) | N | 50 H | 751926 | 6405779 |
| <i>Eremophila racemosa</i> (P4) | N | 50 H | 751849 | 6405891 |
| <i>Eremophila racemosa</i> (P4) | N | 50 H | 752172 | 6405948 |
| <i>Eremophila racemosa</i> (P4) | N | 50 H | 751874 | 6405960 |
| <i>Eremophila racemosa</i> (P4) | N | 50 H | 751870 | 6406136 |
| <i>Eremophila racemosa</i> (P4) | N | 50 H | 752064 | 6406139 |
| <i>Eremophila racemosa</i> (P4) | N | 50 H | 752093 | 6406012 |
| <i>Eremophila racemosa</i> (P4) | N | 50 H | 751658 | 6402742 |
| <i>Eremophila racemosa</i> (P4) | N | 50 H | 751465 | 6402618 |
| <i>Eutaxia acanthoclada</i> (P3) | N | 50 H | 753087 | 6405324 |
| <i>Eutaxia acanthoclada</i> (P3) | N | 50 H | 753062 | 6405314 |
| <i>Eutaxia acanthoclada</i> (P3) | N | 50 H | 752811 | 6405117 |
| <i>Eutaxia acanthoclada</i> (P3) | N | 50 H | 752839 | 6405119 |
| <i>Eutaxia acanthoclada</i> (P3) | N | 50 H | 753007 | 6405116 |
| <i>Eutaxia acanthoclada</i> (P3) | N | 50 H | 750934 | 6404785 |
| <i>Eutaxia acanthoclada</i> (P3) | N | 50 H | 750622 | 6404700 |
| <i>Eutaxia acanthoclada</i> (P3) | N | 50 H | 750586 | 6404715 |
| <i>Eutaxia acanthoclada</i> (P3) | N | 50 H | 750558 | 6404726 |
| <i>Eutaxia acanthoclada</i> (P3) | N | 50 H | 750549 | 6404700 |
| <i>Eutaxia acanthoclada</i> (P3) | N | 50 H | 750521 | 6404675 |
| <i>Eutaxia acanthoclada</i> (P3) | N | 50 H | 750509 | 6404634 |
| <i>Eutaxia acanthoclada</i> (P3) | N | 50 H | 750512 | 6404616 |
| <i>Eutaxia acanthoclada</i> (P3) | N | 50 H | 750513 | 6404564 |
| <i>Eutaxia acanthoclada</i> (P3) | N | 50 H | 750519 | 6404508 |
| <i>Eutaxia acanthoclada</i> (P3) | N | 50 H | 750548 | 6404481 |
| <i>Eutaxia acanthoclada</i> (P3) | N | 50 H | 750566 | 6404472 |
| <i>Eutaxia acanthoclada</i> (P3) | N | 50 H | 750702 | 6404452 |
| <i>Eutaxia acanthoclada</i> (P3) | N | 50 H | 750740 | 6404444 |
| <i>Eutaxia acanthoclada</i> (P3) | N | 50 H | 751059 | 6404558 |

| Taxon | DBCAs known location | Zone | Easting | Northing |
|--|----------------------|------|---------|----------|
| <i>Eutaxia acanthoclada</i> (P3) | N | 50 H | 753315 | 6404968 |
| <i>Eutaxia acanthoclada</i> (P3) | N | 50 H | 753269 | 6404980 |
| <i>Microcorys</i> sp. Forrestania (V. English 2004) (P4) | N | 50 H | 753747 | 6404328 |
| <i>Microcorys</i> sp. Forrestania (V. English 2004) (P4) | N | 50 H | 751399 | 6405889 |
| <i>Microcorys</i> sp. Forrestania (V. English 2004) (P4) | N | 50 H | 750570 | 6405988 |
| <i>Microcorys</i> sp. Forrestania (V. English 2004) (P4) | N | 50 H | 750385 | 6405985 |
| <i>Microcorys</i> sp. Forrestania (V. English 2004) (P4) | N | 50 H | 750211 | 6405978 |
| <i>Microcorys</i> sp. Forrestania (V. English 2004) (P4) | N | 50 H | 753698 | 6404901 |
| <i>Microcorys</i> sp. Forrestania (V. English 2004) (P4) | N | 50 H | 751474 | 6405891 |
| <i>Microcorys</i> sp. Forrestania (V. English 2004) (P4) | N | 50 H | 750582 | 6405991 |
| <i>Microcorys</i> sp. Forrestania (V. English 2004) (P4) | N | 50 H | 750721 | 6406197 |
| <i>Microcorys</i> sp. Forrestania (V. English 2004) (P4) | N | 50 H | 753706 | 6404904 |
| <i>Microcorys</i> sp. Forrestania (V. English 2004) (P4) | N | 50 H | 753709 | 6404826 |
| <i>Microcorys</i> sp. Forrestania (V. English 2004) (P4) | N | 50 H | 753768 | 6404620 |
| <i>Microcorys</i> sp. Forrestania (V. English 2004) (P4) | N | 50 H | 753707 | 6404245 |
| <i>Microcorys</i> sp. Forrestania (V. English 2004) (P4) | N | 50 H | 753721 | 6404039 |
| <i>Microcorys</i> sp. Forrestania (V. English 2004) (P4) | N | 50 H | 752482 | 6408227 |
| <i>Microcorys</i> sp. Forrestania (V. English 2004) (P4) | N | 50 H | 752486 | 6408219 |
| <i>Microcorys</i> sp. Forrestania (V. English 2004) (P4) | N | 50 H | 752613 | 6408026 |
| <i>Microcorys</i> sp. Forrestania (V. English 2004) (P4) | N | 50 H | 752646 | 6407992 |
| <i>Microcorys</i> sp. Forrestania (V. English 2004) (P4) | N | 50 H | 751204 | 6406917 |
| <i>Microcorys</i> sp. Forrestania (V. English 2004) (P4) | N | 50 H | 753760 | 6405181 |
| <i>Microcorys</i> sp. Forrestania (V. English 2004) (P4) | N | 50 H | 751432 | 6405385 |
| <i>Microcorys</i> sp. Forrestania (V. English 2004) (P4) | N | 50 H | 752259 | 6407592 |
| <i>Microcorys</i> sp. Forrestania (V. English 2004) (P4) | N | 50 H | 752257 | 6407652 |
| <i>Microcorys</i> sp. Forrestania (V. English 2004) (P4) | N | 50 H | 752246 | 6407660 |
| <i>Microcorys</i> sp. Forrestania (V. English 2004) (P4) | N | 50 H | 752240 | 6407672 |
| <i>Microcorys</i> sp. Forrestania (V. English 2004) (P4) | N | 50 H | 752238 | 6407679 |
| <i>Microcorys</i> sp. Forrestania (V. English 2004) (P4) | N | 50 H | 752237 | 6407691 |
| <i>Microcorys</i> sp. Forrestania (V. English 2004) (P4) | N | 50 H | 752253 | 6407768 |
| <i>Microcorys</i> sp. Forrestania (V. English 2004) (P4) | N | 50 H | 752460 | 6407650 |
| <i>Microcorys</i> sp. Forrestania (V. English 2004) (P4) | N | 50 H | 752498 | 6407503 |
| <i>Microcorys</i> sp. Forrestania (V. English 2004) (P4) | N | 50 H | 752594 | 6407476 |
| <i>Microcorys</i> sp. Forrestania (V. English 2004) (P4) | N | 50 H | 752735 | 6407252 |
| <i>Microcorys</i> sp. Forrestania (V. English 2004) (P4) | N | 50 H | 752778 | 6407214 |
| <i>Microcorys</i> sp. Forrestania (V. English 2004) (P4) | N | 50 H | 752907 | 6407123 |
| <i>Microcorys</i> sp. Forrestania (V. English 2004) (P4) | N | 50 H | 752251 | 6407707 |
| <i>Microcorys</i> sp. Forrestania (V. English 2004) (P4) | N | 50 H | 752464 | 6407632 |
| <i>Microcorys</i> sp. Forrestania (V. English 2004) (P4) | N | 50 H | 752562 | 6407528 |
| <i>Microcorys</i> sp. Forrestania (V. English 2004) (P4) | N | 50 H | 752594 | 6407519 |
| <i>Microcorys</i> sp. Forrestania (V. English 2004) (P4) | N | 50 H | 752639 | 6407480 |
| <i>Microcorys</i> sp. Forrestania (V. English 2004) (P4) | N | 50 H | 752656 | 6407451 |
| <i>Microcorys</i> sp. Forrestania (V. English 2004) (P4) | N | 50 H | 752865 | 6407147 |
| <i>Microcorys</i> sp. Forrestania (V. English 2004) (P4) | N | 50 H | 752820 | 6407304 |
| <i>Microcorys</i> sp. Forrestania (V. English 2004) (P4) | N | 50 H | 752808 | 6407329 |
| <i>Microcorys</i> sp. Forrestania (V. English 2004) (P4) | N | 50 H | 752792 | 6407395 |
| <i>Microcorys</i> sp. Forrestania (V. English 2004) (P4) | N | 50 H | 752779 | 6407427 |
| <i>Microcorys</i> sp. Forrestania (V. English 2004) (P4) | N | 50 H | 752773 | 6407432 |
| <i>Microcorys</i> sp. Forrestania (V. English 2004) (P4) | N | 50 H | 752761 | 6407443 |
| <i>Microcorys</i> sp. Forrestania (V. English 2004) (P4) | N | 50 H | 752715 | 6407498 |
| <i>Microcorys</i> sp. Forrestania (V. English 2004) (P4) | N | 50 H | 752692 | 6407529 |
| <i>Microcorys</i> sp. Forrestania (V. English 2004) (P4) | N | 50 H | 752622 | 6407606 |
| <i>Microcorys</i> sp. Forrestania (V. English 2004) (P4) | N | 50 H | 752606 | 6407652 |
| <i>Microcorys</i> sp. Forrestania (V. English 2004) (P4) | N | 50 H | 752576 | 6407708 |
| <i>Microcorys</i> sp. Forrestania (V. English 2004) (P4) | N | 50 H | 752569 | 6407788 |
| <i>Microcorys</i> sp. Forrestania (V. English 2004) (P4) | N | 50 H | 752596 | 6407774 |
| <i>Microcorys</i> sp. Forrestania (V. English 2004) (P4) | N | 50 H | 752620 | 6407753 |
| <i>Microcorys</i> sp. Forrestania (V. English 2004) (P4) | N | 50 H | 752632 | 6407742 |

| Taxon | DBCA known location | Zone | Easting | Northing |
|---------------------------------|---------------------|------|---------|----------|
| <i>Stylidium sejunctum</i> (P3) | N | 50 H | 751705 | 6405900 |
| <i>Stylidium sejunctum</i> (P3) | N | 50 H | 751703 | 6405651 |
| <i>Stylidium sejunctum</i> (P3) | N | 50 H | 751718 | 6405629 |
| <i>Stylidium sejunctum</i> (P3) | Y | 50 H | 751815 | 6405584 |
| <i>Stylidium sejunctum</i> (P3) | Y | 50 H | 751673 | 6405448 |

Appendix 6: Quadrat Locations

| Quadrat | Vegetation Code | Zone | Easting | Northing | Elevation (m) |
|---------|-----------------|------|---------|----------|---------------|
| Q1 | CLP-EW3 | 50 H | 753302 | 6402951 | 401 m |
| Q2 | R-MWS1 | 50 H | 753807 | 6402956 | 405 m |
| Q3 | CLP-EW1 | 50 H | 754216 | 6403095 | 414 m |
| Q4 | CLP-EW3 | 50 H | 754016 | 6404073 | 414 m |
| Q5 | CLP-EW2 | 50 H | 751367 | 6404776 | 371 m |
| Q6 | CLP-EW4 | 50 H | 750862 | 6404741 | 390 m |
| Q7 | CLP-EW4 | 50 H | 750523 | 6405081 | 392 m |
| Q8 | CLP-EW3 | 50 H | 751430 | 6405271 | 384 m |
| Q9 | CLP-EW3 | 50 H | 750690 | 6405678 | 381 m |
| Q10 | CLP-EW1 | 50 H | 751250 | 6405665 | 386 m |
| Q11 | CLP-EW4 | 50 H | 750282 | 6405734 | 377 m |
| Q12 | CLP-EW4 | 50 H | 750212 | 6406615 | 376 m |
| Q13 | CLP-EW2 | 50 H | 750761 | 6406454 | 379 m |
| Q14 | CLP-EW1 | 50 H | 752015 | 6404638 | 399 m |
| Q15 | SLP-MWS1 | 50 H | 751204 | 6406917 | 396 m |
| Q16 | SP-H1 | 50 H | 751029 | 6407072 | 396 m |
| Q17 | SP-MWS1 | 50 H | 750779 | 6407113 | 398 m |
| Q18 | R-MWS1 | 50 H | 750711 | 6406987 | 395 m |
| Q19 | CLP-EW1 | 50 H | 751851 | 6406555 | 409 m |
| Q20 | CLP-EW1 | 50 H | 752109 | 6406378 | 410 m |
| Q21 | R-MWS1 | 50 H | 751805 | 6406320 | 406 m |
| Q22 | CLP-EW2 | 50 H | 751848 | 6405867 | 394 m |
| Q23 | SLP-MWS2 | 50 H | 753196 | 6403312 | 391 m |
| Q24 | CLP-EW3 | 50 H | 753474 | 6404061 | 420 m |
| Q25 | SLP-MWS2 | 50 H | 753351 | 6404733 | 405 m |
| Q26 | SLP-MWS2 | 50 H | 753486 | 6406049 | 417 m |
| Q27 | SLP-MWS1 | 50 H | 753772 | 6406454 | 416 m |
| Q28 | SLP-MWS1 | 50 H | 753843 | 6406876 | 416 m |
| Q29 | SP-H1 | 50 H | 753282 | 6407810 | 426 m |
| Q30 | SLP-MWS1 | 50 H | 752990 | 6408776 | 420 m |
| Q31 | SLP-MWS2 | 50 H | 752627 | 6407181 | 417 m |
| Q32 | SP-MWS1 | 50 H | 752264 | 6408482 | 416 m |
| Q33 | SP-MWS1 | 50 H | 751965 | 6408664 | 414 m |
| Q34 | SP-H1 | 50 H | 753996 | 6402410 | 410 m |
| Q35 | CLP-EW1 | 50 H | 751909 | 6405332 | 391 m |
| Q36 | CLP-EW3 | 50 H | 754053 | 6405175 | 417 m |

Appendix 7: Quadrat Datasheets

| | | |
|---|---|--|
| Project Name: New Morning | | |
| Date: 24/05/2019 | Botanist: Jim Williams / Lauren Pick | |
| Vegetation Group: CLP-EW3 | | |
| Quadrat No: Q1 | Quadrat size/shape: 20m x 20m/ Square | Photo number (NW corner): 335-337 |
| Zone: 50 H | Easting: 753302 | Northing: 6402951 |
| Altitude: 401 m | Fire (yrs): >7 yrs | Health rating: Very Good |
| Landform: Flat Plain | | |
| Coarse fragments on the surface: large pebbles/ 20-50%/ subangular | | |
| Rock outcrop (abundance/runoff): No bedrock exposed/ very slow | | |
| Soil (profile/field texture/soil surface): Red-Brown/ Uniform / Sand Clay Loam / Surface Crust | | |
| %Cover leaf litter: 80% | | |
| %Cover bare ground: 20% | | |
| | | |
| Tallest stratum | Mid-stratum | Lower stratum |
| Growth form: | Growth form: Shrub Mallee | Growth form: Shrub |
| Height: | Height: 3-6m | Height: 0.5-1m |
| Crown cover %: | Crown cover %: 30-70 | Crown cover %: 30-70 |
| Dominant taxa: | Dominant taxa: | Dominant taxa: |
| N/A | <i>Eucalyptus urna</i> | <i>Acacia intricata</i> |
| | <i>Eucalyptus tephroclada</i> | |
| ALL SPECIES | | |
| <i>Acacia deficiens</i> | | |
| <i>Acacia erinacea</i> | | |
| <i>Acacia hemiteles</i> | | |
| <i>Acacia intricata</i> | | |
| <i>Allocasuarina</i> sp. (sterile) | | |
| <i>Dianella revoluta</i> | | |
| <i>Dodonaea bursariifolia</i> | | |
| <i>Eremophila dichroantha</i> | | |
| <i>Eucalyptus celastroides</i> subsp. <i>virella</i> | | |
| <i>Eucalyptus cylindriflora</i> | | |
| <i>Eucalyptus cylindrocarpa</i> | | |
| <i>Eucalyptus tephroclada</i> | | |
| <i>Eucalyptus urna</i> | | |
| <i>Exocarpos aphyllus</i> | | |
| <i>Gompholobium gompholobioides</i> | | |
| <i>Grevillea acuaria</i> | | |
| <i>Melaleuca lanceolata</i> | | |
| <i>Melaleuca teuthidoides</i> | | |

| | | |
|---|---|--|
| Project Name: New Morning | | |
| Date: 24/05/2019 | Botanist: Jim Williams / Lauren Pick | |
| Vegetation Group: R-MWS1 | | |
| Quadrat No: Q2 | Quadrat size/shape: 20m x 20m/ Square | Photo number (NW corner): 338-340 |
| Zone: 50 H | Easting: 753807 | Northing: 6402956 |
| Altitude: 405 m | Fire (yrs): > 4 yrs | Health rating: Very Good |
| Landform: Lower Slope | | |
| Coarse fragments on the surface: Large pebbles/ 50-90%/ subrounded | | |
| Rock outcrop (abundance/runoff): Nil / slow | | |
| Soil (profile/field texture/soil surface): Red-Brown/ Uniform / Sand Clay Loam / Surface Crust | | |
| %Cover leaf litter: 90% | | |
| %Cover bare ground: 5% | | |
| | | |
| Tallest stratum | Mid-stratum | Lower stratum |
| Growth form: Shrub Mallee | Growth form: Shrub | Growth form: Sedge |
| Height: 3-6m | Height: 1-3m | Height: 0.5-1m |
| Crown cover %: 30-70 | Crown cover %: 30-70 | Crown cover %: 10-30 |
| Dominant taxa: | Dominant taxa: | Dominant taxa: |
| <i>Eucalyptus pileata</i> | <i>Melaleuca hamata</i> | <i>Lepidosperma sanguinolentum</i> |
| | | |
| ALL SPECIES | | |
| <i>Acacia sulcata</i> | | |
| <i>Allocasuarina</i> sp. (sterile) | | |
| <i>Dodonaea bursariifolia</i> | | |
| <i>Drosera macrantha</i> (A) | | |
| <i>Ericomyrtus serpyllifolia</i> | | |
| <i>Eucalyptus pileata</i> | | |
| <i>Grevillea acuaria</i> | | |
| <i>Hibbertia exasperata</i> | | |
| <i>Lepidosperma sanguinolentum</i> | | |
| <i>Melaleuca hamata</i> | | |
| <i>Melaleuca lanceolata</i> | | |
| <i>Phebalium microphyllum</i> | | |
| <i>Platysace maxwellii</i> | | |
| <i>Santalum acuminatum</i> | | |
| <i>Westringia cephalantha</i> | | |

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|---|---|--|
| Project Name: New Morning | | |
| Date: 24/05/2019 | Botanist: Jim Williams / Lauren Pick | |
| Vegetation Group: CLP-EW1 | | |
| Quadrat No: Q3 | Quadrat size/shape: 20m x 20m/ Square | Photo number (NW corner): 341-343 |
| Zone: 50 H | Easting: 754216 | Northing: 6403095 |
| Altitude: 414 m | Fire (yrs): >50 yrs | Health rating: Very Good |
| Landform: Lower Slope | | |
| Coarse fragments on the surface: Large pebbles/ 50-90%/ subrounded | | |
| Rock outcrop (abundance/runoff): Nil / slow | | |
| Soil (profile/field texture/soil surface): Red-Brown/ Uniform / Sand Clay Loam / Surface Crust | | |
| %Cover leaf litter: 70% | | |
| %Cover bare ground: 40% | | |
| | | |
| Tallest stratum | Mid-stratum | Lower stratum |
| Growth form: Tree | Growth form: Shrub | Growth form: Shrub |
| Height: 6-12m | Height: 1-3m | Height: <0.5m |
| Crown cover %: 10-30 | Crown cover %: 10-30 | Crown cover %: 30-70 |
| Dominant taxa: | Dominant taxa: | Dominant taxa: |
| <i>Eucalyptus flocktoniae</i> subsp. <i>flocktoniae</i> | <i>Dodonaea stenozyga</i> | <i>Gompholobium gompholobioides</i> |
| <i>Eucalyptus salubris</i> | | |
| ALL SPECIES | | |
| <i>Acacia deficiens</i> | | |
| <i>Acacia erinacea</i> | | |
| <i>Acacia evenulosa</i> | | |
| <i>Austrostipa</i> sp. (sterile) | | |
| <i>Dodonaea stenozyga</i> | | |
| <i>Eucalyptus flocktoniae</i> subsp. <i>flocktoniae</i> | | |
| <i>Eucalyptus salubris</i> | | |
| <i>Gompholobium gompholobioides</i> | | |
| <i>Microcybe multiflora</i> | | |
| <i>Santalum acuminatum</i> | | |

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|---|---|--|
| Project Name: New Morning | | |
| Date: 24/05/2019 | Botanist: Jim Williams / Lauren Pick | |
| Vegetation Group: CLP-EW3 | | |
| Quadrat No: Q4 | Quadrat size/shape: 20m x 20m/ Square | Photo number (NW corner): 329-331 |
| Zone: 50 H | Easting: 754016 | Northing: 6404073 |
| Altitude: 414 m | Fire (yrs): >30 yrs | Health rating: Very Good |
| Landform: Simple Slope | | |
| Coarse fragments on the surface: Medium pebbles/ 50-90%/ subrounded | | |
| Rock outcrop (abundance/runoff): Nil / slow | | |
| Soil (profile/field texture/soil surface): Red-Brown/ Uniform / Sand Clay Loam / Surface Crust | | |
| %Cover leaf litter: 90% | | |
| %Cover bare ground: 10% | | |
| | | |
| Tallest stratum | Mid-stratum | Lower stratum |
| Growth form: Tree | Growth form: Shrub Mallee | Growth form: Shrub |
| Height: 6-12m | Height: 3-6m | Height: <0.5m |
| Crown cover %: <10 | Crown cover %: 30-70 | Crown cover %: 30-70 |
| Dominant taxa: | Dominant taxa: | Dominant taxa: |
| <i>Eucalyptus salmonophloia</i> | <i>Eucalyptus pileata</i> | <i>Acacia intricata</i> |
| | <i>Eucalyptus celastroides</i> | |
| ALL SPECIES | | |
| <i>Acacia deficiens</i> | | |
| <i>Acacia erinacea</i> | | |
| <i>Acacia hemiteles</i> | | |
| <i>Acacia intricata</i> | | |
| <i>Dodonaea stenozyga</i> | | |
| <i>Eremophila dichroantha</i> | | |
| <i>Eucalyptus celastroides</i> subsp. <i>virella</i> | | |
| <i>Eucalyptus pileata</i> | | |
| <i>Eucalyptus salmonophloia</i> | | |
| <i>Exocarpos aphyllus</i> | | |
| <i>Grevillea acuaria</i> | | |
| <i>Melaleuca lanceolata</i> | | |
| <i>Melaleuca pauperiflora</i> subsp. <i>fastigiata</i> | | |
| <i>Phebalium microphyllum</i> | | |
| <i>Santalum acuminatum</i> | | |

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| Project Name: New Morning | | |
| Date: 24/05/2019 | Botanist: Jim Williams / Lauren Pick | |
| Vegetation Group: CLP-EW2 | | |
| Quadrat No: Q5 | Quadrat size/shape: 20m x 20m/ Square | Photo number (NW corner): 261-263 |
| Zone: 50 H | Easting: 751367 | Northing: 6404776 |
| Altitude: 371 m | Fire (yrs): >40 yrs | Health rating: very good |
| Landform: Flat Plain | | |
| Coarse fragments on the surface: Medium pebbles/ 50-90%/ subangular | | |
| Rock outcrop (abundance/runoff): Nil / slow | | |
| Soil (profile/field texture/soil surface): Red-Brown / Uniform / Clay Loam / Cracking | | |
| %Cover leaf litter: 90% | | |
| %Cover bare ground: 40% | | |
| | | |
| Tallest stratum | Mid-stratum | Lower stratum |
| Growth form: Tree | Growth form: Shrub | Growth form: Shrub |
| Height: 6-12m | Height: 1-3m | Height: 0.5-1m |
| Crown cover %: 10-30 | Crown cover %: 30-70 | Crown cover %: 10-30 |
| Dominant taxa: | Dominant taxa: | Dominant taxa: |
| <i>Eucalyptus salmonophloia</i> | <i>Daviesia nematophylla</i> | <i>Grevillea acuaria</i> |
| | | |
| ALL SPECIES | | |
| <i>Acacia erinacea</i> | | |
| <i>Acacia hemiteles</i> | | |
| <i>Acacia merrallii</i> | | |
| <i>Atriplex stipitata</i> | | |
| <i>Daviesia nematophylla</i> | | |
| <i>Eremophila maculata</i> | | |
| <i>Eucalyptus salmonophloia</i> | | |
| <i>Exocarpos aphyllus</i> | | |
| <i>Grevillea acuaria</i> | | |
| <i>Grevillea huegelii</i> | | |
| <i>Olearia muelleri</i> | | |
| <i>Sclerolaena parviflora</i> | | |
| <i>Senna cardiosperma</i> | | |
| <i>Wilsonia humilis</i> | | |

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| Project Name: New Morning | | |
| Date: 24/05/2019 | Botanist: Jim Williams / Lauren Pick | |
| Vegetation Group: CLP-EW4 | | |
| Quadrat No: Q6 | Quadrat size/shape: 20m x 20m/ Square | Photo number (NW corner): 264-266 |
| Zone: 50 H | Easting: 750862 | Northing: 6404741 |
| Altitude: 390 m | Fire (yrs): >40 yrs | Health rating: Very Good |
| Landform: Flat Plain | | |
| Coarse fragments on the surface: small pebbles/ 10-20%/ subrounded | | |
| Rock outcrop (abundance/runoff): Nil / slow | | |
| Soil (profile/field texture/soil surface): Red-Brown / Uniform / Clay Loam / Cracking | | |
| %Cover leaf litter: 80% | | |
| %Cover bare ground: 40% | | |
| | | |
| Tallest stratum | Mid-stratum | Lower stratum |
| Growth form: Tree | Growth form: Shrub | Growth form: Chenopod Shrub |
| Height: 12-20m | Height: 1-3m | Height: 0.5-1m |
| Crown cover %: 10-30 | Crown cover %: 10-30 | Crown cover %: 30-70 |
| Dominant taxa: | Dominant taxa: | Dominant taxa: |
| <i>Eucalyptus longicornis</i> | <i>Melaleuca pauperiflora</i> subsp. <i>fastigiata</i> | <i>Atriplex stipitata</i> |
| | | |
| ALL SPECIES | | |
| <i>Acacia colletioides</i> | | |
| <i>Acacia hemiteles</i> | | |
| <i>Acacia merrallii</i> | | |
| <i>Atriplex stipitata</i> | | |
| <i>Atriplex vesicaria</i> | | |
| <i>Austrostipa</i> sp. (sterile) | | |
| <i>Daviesia nematophylla</i> | | |
| <i>Eremophila maculata</i> | | |
| <i>Eucalyptus longicornis</i> | | |
| <i>Grevillea huegelii</i> | | |
| <i>Melaleuca pauperiflora</i> subsp. <i>fastigiata</i> | | |
| <i>Olearia muelleri</i> | | |
| <i>Sclerolaena parviflora</i> | | |

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|---|---|--|
| Project Name: New Morning | | |
| Date: 24/05/2019 | Botanist: Jim Williams / Lauren Pick | |
| Vegetation Group: CLP-EW4 | | |
| Quadrat No: Q7 | Quadrat size/shape: 20m x 20m/ Square | Photo number (NW corner): 42-44 |
| Zone: 50 H | Easting: 750047 | Northing: 6405238 |
| Altitude: 392 m | Fire (yrs): >40 yrs | Health rating: Very Good |
| Landform: Mid Slope | | |
| Coarse fragments on the surface: Large pebbles/ 10-20%/ subangular | | |
| Rock outcrop (abundance/runoff): Nil / slow | | |
| Soil (profile/field texture/soil surface): Red-Brown/ Uniform / Sand Clay Loam / Surface Crust | | |
| %Cover leaf litter: 80% | | |
| %Cover bare ground: 70% | | |
| | | |
| Tallest stratum | Mid-stratum | Lower stratum |
| Growth form: Tree | Growth form: Shrub | Growth form: Shrub |
| Height: 6-12m | Height: 1-3m | Height: 0.5-1m |
| Crown cover %: 30-70 | Crown cover %: 10-30 | Crown cover %: 10-30 |
| Dominant taxa: | Dominant taxa: | Dominant taxa: |
| <i>Eucalyptus longicornis</i> | <i>Melaleuca pauperiflora</i> subsp. <i>pauperiflora</i> | <i>Olearia muelleri</i> |
| | <i>Melaleuca pauperiflora</i> subsp. <i>fastigiata</i> | |
| ALL SPECIES | | |
| <i>Acacia hemiteles</i> | | |
| <i>Atriplex stipitata</i> | | |
| <i>Austrostipa</i> sp. (sterile) | | |
| <i>Eremophila maculata</i> | | |
| <i>Eucalyptus longicornis</i> | | |
| <i>Melaleuca pauperiflora</i> subsp. <i>fastigiata</i> | | |
| <i>Melaleuca pauperiflora</i> subsp. <i>pauperiflora</i> | | |
| <i>Olearia muelleri</i> | | |
| <i>Rhagodia drummondii</i> | | |
| <i>Santalum acuminatum</i> | | |

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|---|---|--|
| Project Name: New Morning | | |
| Date: 24/05/2019 | Botanist: Jim Williams / Lauren Pick | |
| Vegetation Group: CLP-EW3 | | |
| Quadrat No: Q8 | Quadrat size/shape: 20m x 20m/ Square | Photo number (NW corner): 258-260 |
| Zone: 50 H | Easting: 751430 | Northing: 6405271 |
| Altitude: 384 m | Fire (yrs): >30 yrs | Health rating: Very Good |
| Landform: Flat Plain | | |
| Coarse fragments on the surface: Nil | | |
| Rock outcrop (abundance/runoff): Nil / slow | | |
| Soil (profile/field texture/soil surface): Red-Brown/ Uniform / Sand Clay Loam / Surface Crust | | |
| %Cover leaf litter: 95% | | |
| %Cover bare ground: 5% | | |
| | | |
| Tallest stratum | Mid-stratum | Lower stratum |
| Growth form: Tree | Growth form: Shrub Mallee | Growth form: Shrub |
| Height: 6-12m | Height: 3-6m | Height: 1-3m |
| Crown cover %: 10-30 | Crown cover %: 10-30 | Crown cover %: 30-70 |
| Dominant taxa: | Dominant taxa: | Dominant taxa: |
| <i>Eucalyptus salmonophloia</i> | <i>Eucalyptus pileata</i> | <i>Daviesia nematophylla</i> |
| | | |
| ALL SPECIES | | |
| <i>Acacia erinacea</i> | | |
| <i>Acacia hemiteles</i> | | |
| <i>Acacia merrallii</i> | | |
| <i>Austrostipa</i> sp. (sterile) | | |
| <i>Daviesia nematophylla</i> | | |
| <i>Eremophila dichroantha</i> | | |
| <i>Eremophila maculata</i> | | |
| <i>Eucalyptus pileata</i> | | |
| <i>Eucalyptus salmonophloia</i> | | |
| <i>Grevillea acuaria</i> | | |
| <i>Grevillea huegelii</i> | | |
| <i>Olearia muelleri</i> | | |
| <i>Olearia pimeleoides</i> | | |
| <i>Santalum acuminatum</i> | | |
| <i>Senna artemisioides</i> subsp. <i>filifolia</i> | | |
| <i>Westringia rigida</i> | | |

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| Project Name: New Morning | | |
| Date: 24/05/2019 | Botanist: Jim Williams / Lauren Pick | |
| Vegetation Group: CLP-EW3 | | |
| Quadrat No: Q9 | Quadrat size/shape: 20m x 20m/ Square | Photo number (NW corner): 252-254 |
| Zone: 50 H | Easting: 750690 | Northing: 6405678 |
| Altitude: 381 m | Fire (yrs): >40 yrs | Health rating: very good |
| Landform: Flat Plain | | |
| Coarse fragments on the surface: Small pebbles/ 2-10%/ subrounded | | |
| Rock outcrop (abundance/runoff): Nil / slow | | |
| Soil (profile/field texture/soil surface): Red-Brown/ Uniform / Clay Loam / Surface Crust | | |
| %Cover leaf litter: 95% | | |
| %Cover bare ground: 5% | | |
| | | |
| Tallest stratum | Mid-stratum | Lower stratum |
| Growth form: Tree | Growth form: Shrub Mallee | Growth form: Shrub |
| Height: 6-12m | Height: 3-6m | Height: 1-3m |
| Crown cover %: 10-30 | Crown cover %: <10 | Crown cover %: 30-70 |
| Dominant taxa: | Dominant taxa: | Dominant taxa: |
| <i>Eucalyptus salmonophloia</i> | <i>Eucalyptus celastroides</i> | <i>Daviesia nematophylla</i> |
| | | |
| ALL SPECIES | | |
| <i>Acacia erinacea</i> | | |
| <i>Acacia hemiteles</i> | | |
| <i>Acacia merrallii</i> | | |
| <i>Daviesia nematophylla</i> | | |
| <i>Eremophila ionantha</i> | | |
| <i>Eremophila maculata</i> | | |
| <i>Eucalyptus celastroides</i> subsp. <i>virella</i> | | |
| <i>Eucalyptus salmonophloia</i> | | |
| <i>Grevillea huegelii</i> | | |
| <i>Sclerolaena parviflora</i> | | |

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|---|---|--|
| Project Name: New Morning | | |
| Date: 24/05/2019 | Botanist: Jim Williams / Lauren Pick | |
| Vegetation Group: CLP-EW1 | | |
| Quadrat No: Q10 | Quadrat size/shape: 20m x 20m/ Square | Photo number (NW corner): 249-251 |
| Zone: 50 H | Easting: 751250 | Northing: 6405665 |
| Altitude: 386 m | Fire (yrs): >20 yrs | Health rating: very good |
| Landform: Flat Plain | | |
| Coarse fragments on the surface: Nil | | |
| Rock outcrop (abundance/runoff): Nil / slow | | |
| Soil (profile/field texture/soil surface): Red-Brown/ Uniform / Clay Loam / Firm | | |
| %Cover leaf litter: 95% | | |
| %Cover bare ground: 20% | | |
| | | |
| Tallest stratum | Mid-stratum | Lower stratum |
| Growth form: Tree | Growth form: Shrub | Growth form: Shrub |
| Height: 3-6m | Height: 1-3m | Height: <0.5m |
| Crown cover %: >70 | Crown cover %: 10-30 | Crown cover %: 10-30 |
| Dominant taxa: | Dominant taxa: | Dominant taxa: |
| <i>Eucalyptus salubris</i> | <i>Acacia merrallii</i> | <i>Grevillea acuaria</i> |
| | <i>Dodonaea stenozyga</i> | |
| ALL SPECIES | | |
| <i>Acacia hemiteles</i> | | |
| <i>Acacia merrallii</i> | | |
| <i>Daviesia nematophylla</i> | | |
| <i>Dodonaea stenozyga</i> | | |
| <i>Eremophila dichroantha</i> | | |
| <i>Eremophila ionantha</i> | | |
| <i>Eremophila maculata</i> | | |
| <i>Eucalyptus ?salmonophloia</i> | | |
| <i>Eucalyptus salubris</i> | | |
| <i>Eucalyptus urna</i> | | |
| <i>Exocarpos aphyllus</i> | | |
| <i>Grevillea acuaria</i> | | |
| <i>Hakea ?corymbosa</i> | | |
| <i>Melaleuca adnata</i> | | |
| <i>Melaleuca pauperiflora</i> subsp. <i>fastigiata</i> | | |
| <i>Santalum acuminatum</i> | | |
| <i>Wilsonia humilis</i> | | |

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|---|---|--|
| Project Name: New Morning | | |
| Date: 24/05/2019 | Botanist: Jim Williams / Lauren Pick | |
| Vegetation Group: CLP-EW4 | | |
| Quadrat No: Q11 | Quadrat size/shape: 20m x 20m/ Square | Photo number (NW corner): 255-257 |
| Zone: 50 H | Easting: 750282 | Northing: 6405734 |
| Altitude: 377 m | Fire (yrs): >40 yrs | Health rating: Very Good |
| Landform: Simple Slope | | |
| Coarse fragments on the surface: Nil | | |
| Rock outcrop (abundance/runoff): Nil / slow | | |
| Soil (profile/field texture/soil surface): Red-Brown/ Uniform / Sand Clay Loam / Surface Crust | | |
| %Cover leaf litter: 90% | | |
| %Cover bare ground: 60% | | |
| | | |
| Tallest stratum | Mid-stratum | Lower stratum |
| Growth form: Tree | Growth form: Shrub | Growth form: Chenopod Shrub |
| Height: 6-12m | Height: 1-3m | Height: <0.5m |
| Crown cover %: 10-30 | Crown cover %: 10-30 | Crown cover %: 10-30 |
| Dominant taxa: | Dominant taxa: | Dominant taxa: |
| <i>Eucalyptus longicornis</i> | <i>Melaleuca quadrifaria</i> | <i>Atriplex stipitata</i> |
| | | |
| ALL SPECIES | | |
| <i>Acacia merrallii</i> | | |
| <i>Atriplex stipitata</i> | | |
| <i>Eucalyptus longicornis</i> | | |
| <i>Melaleuca pauperiflora</i> subsp. <i>fastigiata</i> | | |
| <i>Melaleuca quadrifaria</i> | | |
| <i>Olearia muelleri</i> | | |
| <i>Wilsonia humilis</i> | | |

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| Project Name: New Morning | | |
| Date: 24/05/2019 | Botanist: Jim Williams / Lauren Pick | |
| Vegetation Group: CLP-EW4 | | |
| Quadrat No: Q12 | Quadrat size/shape: 20m x 20m/ Square | Photo number (NW corner): 57-59 |
| Zone: 50 H | Easting: 750212 | Northing: 6406615 |
| Altitude: 376 m | Fire (yrs): >40 yrs | Health rating: very good |
| Landform: Flat Plain | | |
| Coarse fragments on the surface: Small pebbles/ 2-10%/ rounded | | |
| Rock outcrop (abundance/runoff): Nil / slow | | |
| Soil (profile/field texture/soil surface): Red-Brown/ Uniform / Clay Loam / Cracking | | |
| %Cover leaf litter: 90% | | |
| %Cover bare ground: 60% | | |
| | | |
| Tallest stratum | Mid-stratum | Lower stratum |
| Growth form: Tree | Growth form: Shrub | Growth form: Chenopod Shrub |
| Height: 6-12m | Height: 1-3m | Height: <0.5m |
| Crown cover %: 30-70 | Crown cover %: 10-30 | Crown cover %: 10-30 |
| Dominant taxa: | Dominant taxa: | Dominant taxa: |
| <i>Eucalyptus longicornis</i> | <i>Acacia merrallii</i> | <i>Atriplex stipitata</i> |
| | | |
| ALL SPECIES | | |
| <i>Acacia merrallii</i> | | |
| <i>Atriplex stipitata</i> | | |
| <i>Austrostipa</i> sp. (sterile) | | |
| <i>Eremophila maculata</i> | | |
| <i>Eucalyptus longicornis</i> | | |
| <i>Rhagodia drummondii</i> | | |
| <i>Santalum acuminatum</i> | | |
| <i>Scaevola spinescens</i> | | |
| <i>Senna artemisioides</i> subsp. <i>xartemisioides</i> | | |

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| Project Name: New Morning | | |
| Date: 24/05/2019 | Botanist: Jim Williams / Lauren Pick | |
| Vegetation Group: CLP-EW2 | | |
| Quadrat No: Q13 | Quadrat size/shape: 20m x 20m/ Square | Photo number (NW corner): 246-248 |
| Zone: 50 H | Easting: 750761 | Northing: 6406454 |
| Altitude: 379 m | Fire (yrs): >40 yrs | Health rating: Very Good |
| Landform: Simple Slope | | |
| Coarse fragments on the surface: Nil | | |
| Rock outcrop (abundance/runoff): Nil / slow | | |
| Soil (profile/field texture/soil surface): Red-Brown/ Uniform / Sand Clay Loam / Surface Crust | | |
| %Cover leaf litter: 90% | | |
| %Cover bare ground: 30% | | |
| | | |
| Tallest stratum | Mid-stratum | Lower stratum |
| Growth form: Tree | Growth form: Shrub | Growth form: Shrub |
| Height: 6-12m | Height: 1-3m | Height: <0.5m |
| Crown cover %: 10-30 | Crown cover %: 30-70 | Crown cover %: <10 |
| Dominant taxa: | Dominant taxa: | Dominant taxa: |
| <i>Eucalyptus salmonophloia</i> | <i>Acacia merrallii</i> | <i>Eremophila maculata</i> |
| | | |
| ALL SPECIES | | |
| <i>Acacia hemiteles</i> | | |
| <i>Acacia merrallii</i> | | |
| <i>Eremophila maculata</i> | | |
| <i>Eucalyptus salmonophloia</i> | | |
| <i>Exocarpos aphyllus</i> | | |
| <i>Grevillea huegelii</i> | | |
| <i>Scaevola spinescens</i> | | |
| <i>Wilsonia humilis</i> | | |

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| Project Name: New Morning | | |
| Date: 24/05/2019 | Botanist: Jim Williams / Lauren Pick | |
| Vegetation Group: CLP-EW1 | | |
| Quadrat No: Q14 | Quadrat size/shape: 20m x 20m/ Square | Photo number (NW corner): 267-269 |
| Zone: 50 H | Easting: 752015 | Northing: 6404638 |
| Altitude: 399 m | Fire (yrs): >20 yrs | Health rating: very good |
| Landform: Flat Plain | | |
| Coarse fragments on the surface: Large pebbles/ 20-50%/ subangular | | |
| Rock outcrop (abundance/runoff): Nil / slow | | |
| Soil (profile/field texture/soil surface): Red-Brown/ Uniform / Clay Loam / Self-Mulching | | |
| %Cover leaf litter: 90% | | |
| %Cover bare ground: 15% | | |
| | | |
| Tallest stratum | Mid-stratum | Lower stratum |
| Growth form: Tree | Growth form: Shrub | Growth form: Shrub |
| Height: 3-6m | Height: 1-3m | Height: <0.5m |
| Crown cover %: 30-70 | Crown cover %: 30-70 | Crown cover %: <10 |
| Dominant taxa: | Dominant taxa: | Dominant taxa: |
| <i>Eucalyptus salubris</i> | <i>Melaleuca pauperiflora</i> subsp. <i>pauperiflora</i> | <i>Gompholobium gompholobioides</i> |
| | | |
| ALL SPECIES | | |
| <i>Acacia merrallii</i> | | |
| <i>Dodonaea stenozyga</i> | | |
| <i>Eremophila maculata</i> | | |
| <i>Eucalyptus salubris</i> | | |
| <i>Exocarpos aphyllus</i> | | |
| <i>Gompholobium gompholobioides</i> | | |
| <i>Grevillea acuaria</i> | | |
| <i>Melaleuca eleuterostachya</i> | | |
| <i>Melaleuca pauperiflora</i> subsp. <i>pauperiflora</i> | | |
| <i>Sclerolaena parviflora</i> | | |
| <i>Wilsonia humilis</i> | | |

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| Project Name: New Morning | | |
| Date: 24/05/2019 | Botanist: Jim Williams / Lauren Pick | |
| Vegetation Group: SLP-MWS1 | | |
| Quadrat No: Q15 | Quadrat size/shape: 20m x 20m/ Square | Photo number (NW corner): 231-236 |
| Zone: 50 H | Easting: 751204 | Northing: 6406917 |
| Altitude: 396 m | Fire (yrs): >30 yrs | Health rating: very good |
| Landform: Lower Slope | | |
| Coarse fragments on the surface: Nil | | |
| Rock outcrop (abundance/runoff): Nil / slow | | |
| Soil (profile/field texture/soil surface): Light Brown/ Uniform / Sandy Clay Loam / Hard Setting | | |
| %Cover leaf litter: 80% | | |
| %Cover bare ground: 10% | | |
| | | |
| Tallest stratum | Mid-stratum | Lower stratum |
| Growth form: Shrub Mallee | Growth form: Shrub | Growth form: Shrub |
| Height: 3-6m | Height: 0.5-1m | Height: <0.5m |
| Crown cover %: 30-70 | Crown cover %: 30-70 | Crown cover %: <10 |
| Dominant taxa: | Dominant taxa: | Dominant taxa: |
| <i>Eucalyptus pileata</i> | <i>Acacia hystrix</i> subsp. <i>hystrix</i> | <i>Acacia deficiens</i> |
| <i>Eucalyptus tephroclada</i> | | |
| ALL SPECIES | | |
| <i>Acacia deficiens</i> | | |
| <i>Acacia hystrix</i> subsp. <i>hystrix</i> | | |
| <i>Boronia inornata</i> | | |
| <i>Eremophila dichroantha</i> | | |
| <i>Eucalyptus cylindriflora</i> | | |
| <i>Eucalyptus pileata</i> | | |
| <i>Eucalyptus tephroclada</i> | | |
| <i>Exocarpos aphyllus</i> | | |
| <i>Grevillea oncogyne</i> | | |
| <i>Melaleuca lateriflora</i> | | |
| <i>Melaleuca pauperiflora</i> subsp. <i>fastigiata</i> | | |
| <i>Melaleuca sparsiflora</i> | | |
| <i>Microcorys</i> sp. <i>Forrestania</i> (V. English 2004) (P4) | | |
| <i>Wilsonia humilis</i> | | |

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|---|---|--|
| Project Name: New Morning | | |
| Date: 24/05/2019 | Botanist: Jim Williams / Lauren Pick | |
| Vegetation Group: SP-H1 | | |
| Quadrat No: Q16 | Quadrat size/shape: 20m x 20m/ Square | Photo number (NW corner): 237-239 |
| Zone: 50 H | Easting: 751029 | Northing: 6407072 |
| Altitude: 396 m | Fire (yrs): >20 years | Health rating: Very Good |
| Landform: Mid Slope | | |
| Coarse fragments on the surface: Large pebbles/ 50-90%/ angular | | |
| Rock outcrop (abundance/runoff): Nil / slow | | |
| Soil (profile/field texture/soil surface): Light Brown/ Uniform / Sandy Clay Loam / Hard Setting | | |
| %Cover leaf litter: 90% | | |
| %Cover bare ground: 5% | | |
| | | |
| Tallest stratum | Mid-stratum | Lower stratum |
| Growth form: Shrub | Growth form: Shrub | Growth form: Sedge |
| Height: 1-3m | Height: 0.5-1m | Height: <0.5m |
| Crown cover %: >70 | Crown cover %: 30-70 | Crown cover %: 10-30 |
| Dominant taxa: | Dominant taxa: | Dominant taxa: |
| <i>Allocasuarina corniculata</i> | <i>Thryptomene kochii</i> | <i>Lepidosperma sanguinolentum</i> |
| | | |
| ALL SPECIES | | |
| <i>Acacia neurophylla</i> subsp. <i>neurophylla</i> | | |
| <i>Allocasuarina corniculata</i> | | |
| <i>Astroloma serratifolium</i> | | |
| <i>Caladenia hirta</i> (A) | | |
| <i>Darwinia</i> sp. Lake Cobham (K. Newbey 3262) | | |
| <i>Drosera macrantha</i> (A) | | |
| <i>Grevillea decipiens</i> | | |
| <i>Hibbertia eatoniae</i> | | |
| <i>Jacksonia</i> sp.(sterile) | | |
| <i>Lepidosperma drummondii</i> | | |
| <i>Lepidosperma sanguinolentum</i> | | |
| <i>Melaleuca cordata</i> | | |
| <i>Platysace maxwellii</i> | | |
| <i>Thryptomene kochii</i> | | |

| | | |
|---|---|--|
| Project Name: New Morning | | |
| Date: 24/05/2019 | Botanist: Jim Williams / Lauren Pick | |
| Vegetation Group: SP-MWS1 | | |
| Quadrat No: Q17 | Quadrat size/shape: 20m x 20m/ Square | Photo number (NW corner): 240-242 |
| Zone: 50 H | Easting: 750779 | Northing: 6407113 |
| Altitude: 398 m | Fire (yrs): >20 yrs | Health rating: Very Good |
| Landform: Upper Slope | | |
| Coarse fragments on the surface: Nil | | |
| Rock outcrop (abundance/runoff): Nil / slow | | |
| Soil (profile/field texture/soil surface): Light brown-yellow/ Uniform/ Sandy Loam/ Firm | | |
| %Cover leaf litter: 60% | | |
| %Cover bare ground: 5% | | |
| | | |
| Tallest stratum | Mid-stratum | Lower stratum |
| Growth form: Shrub Mallee | Growth form: Shrub | Growth form: Sedge |
| Height: 1-3m | Height: 0.5-1m | Height: <0.5m |
| Crown cover %: 10-30 | Crown cover %: 30-70 | Crown cover %: <10 |
| Dominant taxa: | Dominant taxa: | Dominant taxa: |
| <i>Eucalyptus platycorys</i> | <i>Melaleuca glaberrima</i> | <i>Lepidosperma sanguinolentum</i> |
| | | |
| ALL SPECIES | | |
| <i>Acacia assimilis</i> subsp. <i>assimilis</i> | | |
| <i>Acacia fragilis</i> | | |
| <i>Acacia neurophylla</i> subsp. <i>neurophylla</i> | | |
| <i>Allocasuarina corniculata</i> | | |
| <i>Banksia erythrocephala</i> var. <i>erythrocephala</i> | | |
| <i>Darwinia</i> sp. Lake Cobham (K. Newbey 3262) | | |
| <i>Drosera macrantha</i> (A) | | |
| <i>Eucalyptus platycorys</i> | | |
| <i>Exocarpos sparteus</i> | | |
| <i>Gastrolobium trilobum</i> | | |
| <i>Grevillea eriostachya</i> | | |
| <i>Hakea corymbosa</i> | | |
| <i>Hakea francisiana</i> | | |
| <i>Hibbertia eatoniae</i> | | |
| <i>Isopogon scabriusculus</i> subsp. <i>pubifloris</i> | | |
| <i>Lepidosperma sanguinolentum</i> | | |
| <i>Leptospermum spinescens</i> | | |
| <i>Lysinema pentapetalum</i> | | |
| <i>Melaleuca cordata</i> | | |
| <i>Melaleuca glaberrima</i> | | |
| <i>Melaleuca hamata</i> | | |
| <i>Melaleuca hamulosa</i> | | |
| <i>Micromyrtus erichsenii</i> | | |
| <i>Persoonia coriacea</i> | | |
| <i>Petrophile merrallii</i> | | |
| <i>Phebalium filifolium</i> | | |
| <i>Santalum acuminatum</i> | | |
| <i>Thryptomene kochii</i> | | |

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|---|---|--|
| Project Name: New Morning | | |
| Date: 24/05/2019 | Botanist: Jim Williams / Lauren Pick | |
| Vegetation Group: R-MWS1 | | |
| Quadrat No: Q18 | Quadrat size/shape: 20m x 20m/ Square | Photo number (NW corner): 243-245 |
| Zone: 50 H | Easting: 750711 | Northing: 6406987 |
| Altitude: 395 m | Fire (yrs): >20 yrs | Health rating: very good |
| Landform: Mid Slope | | |
| Coarse fragments on the surface: Medium pebbles/ 10-20%/ subrounded | | |
| Rock outcrop (abundance/runoff): Nil / slow | | |
| Soil (profile/field texture/soil surface): Light brown-yellow/ Uniform/ Sandy Loam/ Firm | | |
| %Cover leaf litter: 10% | | |
| %Cover bare ground: 5% | | |
| | | |
| Tallest stratum | Mid-stratum | Lower stratum |
| Growth form: Shrub Mallee | Growth form: Shrub | Growth form: Shrub |
| Height: 1-3m | Height: 1-3m | Height: <0.5m |
| Crown cover %: 10-30 | Crown cover %: 30-70 | Crown cover %: 30-70 |
| Dominant taxa: | Dominant taxa: | Dominant taxa: |
| <i>Eucalyptus tephroclada</i> | <i>Melaleuca hamata</i> | <i>Darwinia</i> sp. Lake Cobham (K. Newbey 3262) |
| | | |
| ALL SPECIES | | |
| <i>Acacia neurophylla</i> subsp. <i>neurophylla</i> | | |
| <i>Astroloma serratifolium</i> | | |
| <i>Caladenia hirta</i> (A) | | |
| <i>Cyathostemon tenuifolius</i> | | |
| <i>Darwinia</i> sp. Lake Cobham (K. Newbey 3262) | | |
| <i>Eucalyptus tephroclada</i> | | |
| <i>Exocarpos sparteus</i> | | |
| <i>Hakea erecta</i> | | |
| <i>Lepidosperma drummondii</i> | | |
| <i>Lepidosperma sanguinolentum</i> | | |
| <i>Leptospermum ?roei</i> | | |
| <i>Melaleuca ?laxiflora</i> | | |
| <i>Melaleuca hamata</i> | | |
| <i>Melaleuca lateriflora</i> | | |
| <i>Phebalium filifolium</i> | | |
| <i>Santalum acuminatum</i> | | |
| <i>Thryptomene kochii</i> | | |
| <i>Westringia cephalantha</i> | | |

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| Project Name: New Morning | | |
| Date: 24/05/2019 | Botanist: Jim Williams / Lauren Pick | |
| Vegetation Group: CLP-EW1 | | |
| Quadrat No: Q19 | Quadrat size/shape: 20m x 20m/ Square | Photo number (NW corner): 209-213 |
| Zone: 50 H | Easting: 751851 | Northing: 6406555 |
| Altitude: 409 m | Fire (yrs): >20 yrs | Health rating: very good |
| Landform: Lower Slope | | |
| Coarse fragments on the surface: Cobbles/ 50-90%/ subangular | | |
| Rock outcrop (abundance/runoff): Nil / slow | | |
| Soil (profile/field texture/soil surface): Light brown-yellow/ Uniform/ Sandy Clay Loam/ Firm | | |
| %Cover leaf litter: 70% | | |
| %Cover bare ground: 30% | | |
| | | |
| Tallest stratum | Mid-stratum | Lower stratum |
| Growth form: Tree | Growth form: Shrub | Growth form: Shrub |
| Height: 3-6m | Height: 1-3m | Height: <0.5m |
| Crown cover %: 30-70 | Crown cover %: 30-70 | Crown cover %: 10-30 |
| Dominant taxa: | Dominant taxa: | Dominant taxa: |
| <i>Eucalyptus salubris</i> | <i>Melaleuca cucullata</i> | <i>Gompholobium gompholobioides</i> |
| | <i>Melaleuca pauperiflora</i> subsp. <i>pauperiflora</i> | |
| ALL SPECIES | | |
| <i>Acacia acanthoclada</i> | | |
| <i>Acacia deficiens</i> | | |
| <i>Dodonaea stenozyga</i> | | |
| <i>Eucalyptus salubris</i> | | |
| <i>Eucalyptus urna</i> | | |
| <i>Exocarpos aphyllus</i> | | |
| <i>Gompholobium gompholobioides</i> | | |
| <i>Melaleuca adnata</i> | | |
| <i>Melaleuca calyptroides</i> | | |
| <i>Melaleuca cucullata</i> | | |
| <i>Melaleuca pauperiflora</i> subsp. <i>pauperiflora</i> | | |
| <i>Santalum acuminatum</i> | | |
| <i>Wilsonia humilis</i> | | |

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| Project Name: New Morning | | |
| Date: 24/05/2019 | Botanist: Jim Williams / Lauren Pick | |
| Vegetation Group: CLP-EW1 | | |
| Quadrat No: Q20 | Quadrat size/shape: 20m x 20m/ Square | Photo number (NW corner): 279-281 |
| Zone: 50 H | Easting: 752109 | Northing: 6406378 |
| Altitude: 410 m | Fire (yrs): >40 yrs | Health rating: very good |
| Landform: Flat Plain | | |
| Coarse fragments on the surface: Medium pebbles/ 50-90%/ subrounded | | |
| Rock outcrop (abundance/runoff): Nil / slow | | |
| Soil (profile/field texture/soil surface): Red-Brown / Uniform / Clay loam / Hard setting | | |
| %Cover leaf litter: 90% | | |
| %Cover bare ground: 30% | | |
| | | |
| Tallest stratum | Mid-stratum | Lower stratum |
| Growth form: Tree | Growth form: Shrub | Growth form: Shrub |
| Height: 6-12m | Height: 1-3m | Height: <0.5m |
| Crown cover %: 30-70 | Crown cover %: 30-70 | Crown cover %: 10-30 |
| Dominant taxa: | Dominant taxa: | Dominant taxa: |
| <i>Eucalyptus salubris</i> | <i>Melaleuca pauperiflora</i> subsp. <i>fastigiata</i> | <i>Acacia intricata</i> |
| <i>Eucalyptus urna</i> | <i>Melaleuca cucullata</i> | |
| ALL SPECIES | | |
| <i>Acacia intricata</i> | | |
| <i>Acacia merrallii</i> | | |
| <i>Eucalyptus salubris</i> | | |
| <i>Eucalyptus urna</i> | | |
| <i>Exocarpos aphyllus</i> | | |
| <i>Gompholobium gompholobioides</i> | | |
| <i>Grevillea acuaria</i> | | |
| <i>Melaleuca cucullata</i> | | |
| <i>Melaleuca pauperiflora</i> subsp. <i>fastigiata</i> | | |
| <i>Melaleuca pauperiflora</i> subsp. <i>pauperiflora</i> | | |
| <i>Melaleuca sparsiflora</i> | | |
| <i>Microcorys</i> sp. <i>Forrestania</i> (V. English 2004) (P4) | | |
| <i>Microcybe multiflora</i> | | |
| <i>Santalum acuminatum</i> | | |

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| Project Name: New Morning | | |
| Date: 24/05/2019 | Botanist: Jim Williams / Lauren Pick | |
| Vegetation Group: R-MWS1 | | |
| Quadrat No: Q21 | Quadrat size/shape: 20m x 20m/ Square | Photo number (NW corner): 276-278 |
| Zone: 50 H | Easting: 751805 | Northing: 6406320 |
| Altitude: 406 m | Fire (yrs): > 30 yrs | Health rating: very good |
| Landform: Upper Slope | | |
| Coarse fragments on the surface: Cobbles/ 50-90%/ Subangular | | |
| Rock outcrop (abundance/runoff): Nil / slow | | |
| Soil (profile/field texture/soil surface): Brown / Uniform / Sandy Clay Loam / Hard setting | | |
| %Cover leaf litter: 90% | | |
| %Cover bare ground: 15% | | |
| | | |
| Tallest stratum | Mid-stratum | Lower stratum |
| Growth form: Shrub Mallee | Growth form: Shrub | Growth form: Shrub |
| Height: 3-6m | Height: 1-3m | Height: 0.5-1m |
| Crown cover %: 30-70 | Crown cover %: 30-70 | Crown cover %: 30-70 |
| Dominant taxa: | Dominant taxa: | Dominant taxa: |
| <i>Eucalyptus pileata</i> | <i>Melaleuca hamata</i> | <i>Acacia castanostegia</i> |
| | | |
| ALL SPECIES | | |
| <i>Acacia castanostegia</i> | | |
| <i>Dodonaea viscosa</i> subsp. <i>spatulata</i> | | |
| <i>Eucalyptus pileata</i> | | |
| <i>Exocarpos sparteus</i> | | |
| <i>Hibbertia gracilipes</i> | | |
| <i>Lepidosperma sanguinolentum</i> | | |
| <i>Melaleuca hamata</i> | | |
| <i>Westringia cephalantha</i> | | |

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| Project Name: New Morning | | |
| Date: 24/05/2019 | Botanist: Jim Williams / Lauren Pick | |
| Vegetation Group: CLP-EW2 | | |
| Quadrat No: Q22 | Quadrat size/shape: 20m x 20m/ Square | Photo number (NW corner): 273-275 |
| Zone: 50 H | Easting: 751848 | Northing: 6405867 |
| Altitude: 394 m | Fire (yrs): >50 yrs | Health rating: very good |
| Landform: Flat Plain | | |
| Coarse fragments on the surface: Medium pebbles/ 20-50%/ subangular | | |
| Rock outcrop (abundance/runoff): Nil / slow | | |
| Soil (profile/field texture/soil surface): Brown / Uniform / Clay Loam / Surface Crust | | |
| %Cover leaf litter: 60% | | |
| %Cover bare ground: 50% | | |
| | | |
| Tallest stratum | Mid-stratum | Lower stratum |
| Growth form: Tree | Growth form: Shrub | Growth form: Shrub |
| Height: 6-12m | Height: 1-3m | Height: <0.5m |
| Crown cover %: 10-30 | Crown cover %: 10-30 | Crown cover %: 10-30 |
| Dominant taxa: | Dominant taxa: | Dominant taxa: |
| <i>Eucalyptus salmonophloia</i> | <i>Dodonaea stenozyga</i> | <i>Acacia intricata</i> |
| | <i>Acacia merrallii</i> | |
| ALL SPECIES | | |
| <i>Acacia deficiens</i> | | |
| <i>Acacia erinacea</i> | | |
| <i>Acacia intricata</i> | | |
| <i>Acacia merrallii</i> | | |
| <i>Dodonaea stenozyga</i> | | |
| <i>Eremophila maculata</i> | | |
| <i>Eucalyptus salmonophloia</i> | | |
| <i>Exocarpos aphyllus</i> | | |
| <i>Gompholobium gompholobioides</i> | | |
| <i>Maireana trichoptera</i> | | |
| <i>Santalum acuminatum</i> | | |
| <i>Sclerolaena parviflora</i> | | |
| <i>Templetonia sulcata</i> | | |
| <i>Wilsonia humilis</i> | | |

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| Project Name: New Morning | | |
| Date: 24/05/2019 | Botanist: Jim Williams / Lauren Pick | |
| Vegetation Group: SLP-MWS2 | | |
| Quadrat No: Q23 | Quadrat size/shape: 20m x 20m/ Square | Photo number (NW corner): 108-110 |
| Zone: 50 H | Easting: 753196 | Northing: 6403312 |
| Altitude: 391 m | Fire (yrs): > 20 yrs | Health rating: very good |
| Landform: Lower slope | | |
| Coarse fragments on the surface: Large pebbles/ 10-20%/ subangular | | |
| Rock outcrop (abundance/runoff): Nil / slow | | |
| Soil (profile/field texture/soil surface): Brown / Uniform / Sandy Clay Loam / Hard setting | | |
| %Cover leaf litter: 85% | | |
| %Cover bare ground: 40% | | |
| | | |
| Tallest stratum | Mid-stratum | Lower stratum |
| Growth form: Shrub Mallee | Growth form: Shrub | Growth form: Shrub |
| Height: 3-6m | Height: 1-3m | Height: 0.5-1m |
| Crown cover %: 30-70 | Crown cover %: 30-70 | Crown cover %: 30-70 |
| Dominant taxa: | Dominant taxa: | Dominant taxa: |
| <i>Eucalyptus steedmanii</i> (T) | <i>Melaleuca eleuterostachya</i> | <i>Phebalium filifolium</i> |
| | | |
| ALL SPECIES | | |
| <i>Acacia deficiens</i> | | |
| <i>Acacia erinacea</i> | | |
| <i>Acacia hemiteles</i> | | |
| <i>Astroloma serratifolium</i> | | |
| <i>Caladenia hirta</i> (A) | | |
| <i>Dianella revoluta</i> | | |
| <i>Dodonaea bursariifolia</i> | | |
| <i>Dodonaea stenozyga</i> | | |
| <i>Dodonaea viscosa</i> subsp. <i>spatulata</i> | | |
| <i>Drosera macrantha</i> (A) | | |
| <i>Eucalyptus steedmanii</i> (T) | | |
| <i>Eucalyptus urna</i> | | |
| <i>Exocarpos aphyllus</i> | | |
| <i>Grevillea acuaria</i> | | |
| <i>Melaleuca eleuterostachya</i> | | |
| <i>Melaleuca hamata</i> | | |
| <i>Phebalium filifolium</i> | | |
| <i>Thysanotus dichotomus</i> (A) | | |

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| Project Name: New Morning | | |
| Date: 24/05/2019 | Botanist: Jim Williams / Lauren Pick | |
| Vegetation Group: CLP-EW3 | | |
| Quadrat No: Q24 | Quadrat size/shape: 20m x 20m/ Square | Photo number (NW corner): 332-334 |
| Zone: 50 H | Easting: 753474 | Northing: 6404061 |
| Altitude: 420 m | Fire (yrs): >30 yrs | Health rating: very good |
| Landform: Flat Plain | | |
| Coarse fragments on the surface: Medium pebbles/ 50-90%/ rounded | | |
| Rock outcrop (abundance/runoff): Nil / slow | | |
| Soil (profile/field texture/soil surface): Red-Brown / Uniform / Sandy Clay Loam / Hard setting | | |
| %Cover leaf litter: 90% | | |
| %Cover bare ground: 10% | | |
| | | |
| Tallest stratum | Mid-stratum | Lower stratum |
| Growth form: Tree | Growth form: Shrub | Growth form: Shrub |
| Height: 6-12m | Height: 1-3m | Height: 0.5-1m |
| Crown cover %: 10-30 | Crown cover %: 10-30 | Crown cover %: 30-70 |
| Dominant taxa: | Dominant taxa: | Dominant taxa: |
| <i>Eucalyptus salmonophloia</i> | <i>Melaleuca pauperiflora</i> subsp. <i>fastigiata</i> | <i>Dodonaea stenozyga</i> |
| | | |
| ALL SPECIES | | |
| <i>Acacia deficiens</i> | | |
| <i>Acacia erinacea</i> | | |
| <i>Acacia hemiteles</i> | | |
| <i>Dodonaea stenozyga</i> | | |
| <i>Eucalyptus salmonophloia</i> | | |
| <i>Exocarpos aphyllus</i> | | |
| <i>Gompholobium gompholobioides</i> | | |
| <i>Grevillea acuaria</i> | | |
| <i>Melaleuca adnata</i> | | |
| <i>Melaleuca pauperiflora</i> subsp. <i>fastigiata</i> | | |
| <i>Microcybe multiflora</i> | | |
| <i>Santalum acuminatum</i> | | |

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| Project Name: New Morning | | |
| Date: 24/05/2019 | Botanist: Jim Williams / Lauren Pick | |
| Vegetation Group: SLP-MWS2 | | |
| Quadrat No: Q25 | Quadrat size/shape: 20m x 20m/ Square | Photo number (NW corner): 117-119 |
| Zone: 50 H | Easting: 753351 | Northing: 6404733 |
| Altitude: 405 m | Fire (yrs): >10 yrs | Health rating: Very Good |
| Landform: Mid slope | | |
| Coarse fragments on the surface: Cobbles/ 50-90%/ subangular | | |
| Rock outcrop (abundance/runoff): Greenstone 2-10%/ slow | | |
| Soil (profile/field texture/soil surface): Red-Brown / Uniform / Sandy Clay Loam / Hard setting | | |
| %Cover leaf litter: 90% | | |
| %Cover bare ground: 20% | | |
| | | |
| Tallest stratum | Mid-stratum | Lower stratum |
| Growth form: Shrub Mallee | Growth form: Shrub | Growth form: Shrub |
| Height: 3-6m | Height: 1-3m | Height: 0.5-1m |
| Crown cover %: 30-70 | Crown cover %: 10-30 | Crown cover %: 10-30 |
| Dominant taxa: | Dominant taxa: | Dominant taxa: |
| <i>Eucalyptus steedmanii</i> (T) | <i>Exocarpos aphyllus</i> | <i>Dodonaea stenozyga</i> |
| | | |
| ALL SPECIES | | |
| <i>Acacia deficiens</i> | | |
| <i>Acacia erinacea</i> | | |
| <i>Acacia hemiteles</i> | | |
| <i>Caladenia hirta</i> (A) | | |
| <i>Dodonaea bursariifolia</i> | | |
| <i>Dodonaea stenozyga</i> | | |
| <i>Eucalyptus steedmanii</i> (T) | | |
| <i>Exocarpos aphyllus</i> | | |
| <i>Grevillea acuaria</i> | | |
| <i>Lepidosperma sanguinolentum</i> | | |
| <i>Melaleuca cardiophylla</i> | | |
| <i>Melaleuca eleuterostachya</i> | | |
| <i>Melaleuca hamata</i> | | |
| <i>Senna cardiosperma</i> | | |
| <i>Thelymitra petrophila</i> (A) | | |
| <i>Thysanotus dichotomus</i> (A) | | |
| <i>Trymalium myrtillus</i> | | |

| | | |
|--|---|--|
| Project Name: New Morning | | |
| Date: 24/05/2019 | Botanist: Jim Williams / Lauren Pick | |
| Vegetation Group: SLP-MWS2 | | |
| Quadrat No: Q26 | Quadrat size/shape: 20m x 20m/ Square | Photo number (NW corner): 321-323 |
| Zone: 50 H | Easting: 753486 | Northing: 6406049 |
| Altitude: 417 m | Fire (yrs): >20 yrs | Health rating: good |
| Landform: Mid slope | | |
| Coarse fragments on the surface: Cobbles/ >90%/ subangular | | |
| Rock outcrop (abundance/runoff): Quartz/ <2%/ Slow | | |
| Soil (profile/field texture/soil surface): Light-Brown / Uniform/ Sandy Clay Loam/ Hard setting | | |
| %Cover leaf litter: 80% | | |
| %Cover bare ground: 30% | | |
| | | |
| Tallest stratum | Mid-stratum | Lower stratum |
| Growth form: Shrub Mallee | Growth form: Shrub | Growth form: Shrub |
| Height: 3-6m | Height: 1-3m | Height: <0.5m |
| Crown cover %: 30-70 | Crown cover %: 10-30 | Crown cover %: <10 |
| Dominant taxa: | Dominant taxa: | Dominant taxa: |
| <i>Eucalyptus steedmanii</i> (T) | <i>Exocarpos aphyllus</i> | <i>Euryomyrtus maidenii</i> |
| | | |
| ALL SPECIES | | |
| <i>Acacia deficiens</i> | | |
| <i>Acacia erinacea</i> | | |
| <i>Acacia hemiteles</i> | | |
| <i>Caladenia hirta</i> (A) | | |
| <i>Callitris preissii</i> | | |
| <i>Dodonaea stenozyga</i> | | |
| <i>Dodonaea viscosa</i> subsp. <i>spatulata</i> | | |
| <i>Eremophila maculata</i> | | |
| <i>Eucalyptus steedmanii</i> (T) | | |
| <i>Euryomyrtus maidenii</i> | | |
| <i>Exocarpos aphyllus</i> | | |
| <i>Grevillea acuaria</i> | | |
| <i>Melaleuca adnata</i> | | |
| <i>Melaleuca cucullata</i> | | |
| <i>Melaleuca eleuterostachya</i> | | |
| <i>Melaleuca pauperiflora</i> subsp. <i>pauperiflora</i> | | |
| <i>Melaleuca</i> sp. (sterile) | | |
| <i>Templetonia sulcata</i> | | |
| <i>Wilsonia humilis</i> | | |

| | | |
|---|---|--|
| Project Name: New Morning | | |
| Date: 24/05/2019 | Botanist: Jim Williams / Lauren Pick | |
| Vegetation Group: SLP-MWS1 | | |
| Quadrat No: Q27 | Quadrat size/shape: 20m x 20m/ Square | Photo number (NW corner): 316-318 |
| Zone: 50 H | Easting: 753772 | Northing: 6406454 |
| Altitude: 416 m | Fire (yrs): > 10 yrs | Health rating: very good |
| Landform: Flat Plain | | |
| Coarse fragments on the surface: Medium pebbles/ 10-20%/ rounded | | |
| Rock outcrop (abundance/runoff): Nil / slow | | |
| Soil (profile/field texture/soil surface): Light-Brown / Uniform/ Sandy Loam/ Hard setting | | |
| %Cover leaf litter: 70% | | |
| %Cover bare ground: 5% | | |
| | | |
| Tallest stratum | Mid-stratum | Lower stratum |
| Growth form: Shrub Mallee | Growth form: Shrub | Growth form: Shrub |
| Height: 6-12m | Height: 1-3m | Height: <0.5m |
| Crown cover %: 10-30 | Crown cover %: >70 | Crown cover %: <10 |
| Dominant taxa: | Dominant taxa: | Dominant taxa: |
| <i>Eucalyptus transcontinentalis</i> | <i>Melaleuca calyptroides</i> | <i>Acacia deficiens</i> |
| <i>Eucalyptus tephroclada</i> | <i>Melaleuca lateriflora</i> | |
| ALL SPECIES | | |
| <i>Acacia deficiens</i> | | |
| <i>Acacia hemiteles</i> | | |
| <i>Daviesia benthamii</i> subsp. <i>acanthoclada</i> | | |
| <i>Eremophila dichroantha</i> | | |
| <i>Eucalyptus tephroclada</i> | | |
| <i>Eucalyptus transcontinentalis</i> | | |
| <i>Eucalyptus urna</i> | | |
| <i>Exocarpos aphyllus</i> | | |
| <i>Grevillea huegelii</i> | | |
| <i>Melaleuca acuminata</i> | | |
| <i>Melaleuca adnata</i> | | |
| <i>Melaleuca calyptroides</i> | | |
| <i>Melaleuca eleuterostachya</i> | | |
| <i>Melaleuca lateriflora</i> | | |
| <i>Santalum acuminatum</i> | | |
| <i>Wilsonia humilis</i> | | |

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|--|---|--|
| Project Name: New Morning | | |
| Date: 24/05/2019 | Botanist: Jim Williams / Lauren Pick | |
| Vegetation Group: SLP-MWS1 | | |
| Quadrat No: Q28 | Quadrat size/shape: 20m x 20m/ Square | Photo number (NW corner): 313-315 |
| Zone: 50 H | Easting: 753843 | Northing: 6406876 |
| Altitude: 416 m | Fire (yrs): >10 yrs | Health rating: very good |
| Landform: Flat Plain | | |
| Coarse fragments on the surface: Medium pebbles/ 10-20%/ rounded | | |
| Rock outcrop (abundance/runoff): Nil / slow | | |
| Soil (profile/field texture/soil surface): Light-Brown/ Uniform/ Sandy Loam/ Hard setting | | |
| %Cover leaf litter: 70% | | |
| %Cover bare ground: 30 | | |
| | | |
| Tallest stratum | Mid-stratum | Lower stratum |
| Growth form: Shrub Mallee | Growth form: Shrub | Growth form: Shrub |
| Height: 3-6m | Height: 0.5-1m | Height: <0.5m |
| Crown cover %: 10-30 | Crown cover %: >70 | Crown cover %: <10 |
| Dominant taxa: | Dominant taxa: | Dominant taxa: |
| <i>Eucalyptus tephroclada</i> | <i>Melaleuca calyptroides</i> | <i>Acacia deficiens</i> |
| | | |
| ALL SPECIES | | |
| <i>Acacia deficiens</i> | | |
| <i>Acacia hemiteles</i> | | |
| <i>Baeckea</i> sp. (sterile) | | |
| <i>Cassyltha melantha</i> (A) | | |
| <i>Cryptandra minutifolia</i> subsp. <i>minutifolia</i> | | |
| <i>Daviesia benthamii</i> subsp. <i>acanthoclada</i> | | |
| <i>Eucalyptus tephroclada</i> | | |
| <i>Exocarpos aphyllus</i> | | |
| <i>Grevillea oncogyne</i> | | |
| <i>Melaleuca acuminata</i> | | |
| <i>Melaleuca adnata</i> | | |
| <i>Melaleuca calyptroides</i> | | |
| <i>Melaleuca lateriflora</i> | | |
| <i>Melaleuca quadrifaria</i> | | |

| | | |
|--|---|--|
| Project Name: New Morning | | |
| Date: 24/05/2019 | Botanist: Jim Williams / Lauren Pick | |
| Vegetation Group: SP-H1 | | |
| Quadrat No: Q29 | Quadrat size/shape: 20m x 20m/ Square | Photo number (NW corner): 310-312 |
| Zone: 50 H | Easting: 753282 | Northing: 6407810 |
| Altitude: 426 m | Fire (yrs): >20 yrs | Health rating: very good |
| Landform: Flat Plain | | |
| Coarse fragments on the surface: Medium pebbles/ 10-20%/ rounded | | |
| Rock outcrop (abundance/runoff): Nil / slow | | |
| Soil (profile/field texture/soil surface): Light-Brown/ Uniform/ Sandy Loam/ Hard setting | | |
| %Cover leaf litter: 90% | | |
| %Cover bare ground: 10% | | |
| | | |
| Tallest stratum | Mid-stratum | Lower stratum |
| Growth form: Shrub | Growth form: Shrub | Growth form: Shrub |
| Height: 1-3m | Height: 0.5-1m | Height: <0.5m |
| Crown cover %: >70 | Crown cover %: 30-70 | Crown cover %: 10-30 |
| Dominant taxa: | Dominant taxa: | Dominant taxa: |
| <i>Allocasuarina corniculata</i> | <i>Acacia fragilis</i> | <i>Euryomyrtus maidenii</i> |
| | | |
| ALL SPECIES | | |
| <i>Acacia acuminata</i> | | |
| <i>Acacia assimilis</i> subsp. <i>assimilis</i> | | |
| <i>Acacia fragilis</i> | | |
| <i>Acacia neurophylla</i> subsp. <i>neurophylla</i> | | |
| <i>Allocasuarina corniculata</i> | | |
| <i>Astroloma serratifolium</i> | | |
| <i>Banksia laevigata</i> subsp. <i>fuscolutea</i> | | |
| <i>Caladenia hirta</i> (A) | | |
| <i>Cassytha melantha</i> (A) | | |
| <i>Cassytha pomiformis</i> (A) | | |
| <i>Chamelaucium ?virgatum</i> | | |
| <i>Cyathostemon tenuifolius</i> | | |
| <i>Darwinia</i> sp. Lake Cobham (K. Newbey 3262) | | |
| <i>Drosera macrantha</i> (A) | | |
| <i>Eucalyptus tephroclada</i> | | |
| <i>Euryomyrtus maidenii</i> | | |
| <i>Grevillea eriostachya</i> | | |
| <i>Grevillea oncogyne</i> | | |
| <i>Hakea scoparia</i> subsp. <i>scoparia</i> | | |
| <i>Hibbertia gracilipes</i> | | |
| <i>Lepidosperma pubisquameum</i> | | |
| <i>Melaleuca cordata</i> | | |
| <i>Melaleuca hamata</i> | | |
| <i>Phebalium filifolium</i> | | |
| <i>Santalum acuminatum</i> | | |
| <i>Thryptomene kochii</i> | | |
| | | |

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|--|---|---|
| Project Name: New Morning | | |
| Date: 24/05/2019 | Botanist: Jim Williams / Lauren Pick | |
| Vegetation Group: SLP-MWS1 | | |
| Quadrat No: Q30 | Quadrat size/shape: 20m x 20m/ Square | Photo number (NW corner): 200-202 blue camera |
| Zone: 50 H | Easting: 752990 | Northing: 6408776 |
| Altitude: 420 m | Fire (yrs): > 10 yrs | Health rating: very good |
| Landform: Flat Plain | | |
| Coarse fragments on the surface: Nil | | |
| Rock outcrop (abundance/runoff): Nil / slow | | |
| Soil (profile/field texture/soil surface): Light-Brown/ Uniform/ Sandy Loam/ Hard setting | | |
| %Cover leaf litter: 60% | | |
| %Cover bare ground: 25% | | |
| | | |
| Tallest stratum | Mid-stratum | Lower stratum |
| Growth form: Shrub Mallee | Growth form: Shrub | Growth form: Shrub |
| Height: 3-6m | Height: 0.5-1m | Height: <0.5m |
| Crown cover %: 10-30 | Crown cover %: >70 | Crown cover %: <10 |
| Dominant taxa: | Dominant taxa: | Dominant taxa: |
| <i>Eucalyptus transcontinentalis</i> | <i>Melaleuca calyptroides</i> | <i>Wilsonia humilis</i> |
| | | |
| ALL SPECIES | | |
| <i>Acacia hemiteles</i> | | |
| <i>Acacia sulcata</i> | | |
| <i>Cryptandra minutifolia</i> subsp. <i>minutifolia</i> | | |
| <i>Daviesia benthamii</i> subsp. <i>acanthoclada</i> | | |
| <i>Dianella revoluta</i> | | |
| <i>Dodonaea bursariifolia</i> | | |
| <i>Dodonaea stenozyga</i> | | |
| <i>Eucalyptus transcontinentalis</i> | | |
| <i>Exocarpos aphyllus</i> | | |
| <i>Grevillea oncogyne</i> | | |
| <i>Melaleuca adnata</i> | | |
| <i>Melaleuca calyptroides</i> | | |
| <i>Melaleuca hamulosa</i> | | |
| <i>Melaleuca lateriflora</i> | | |
| <i>Santalum acuminatum</i> | | |
| <i>Wilsonia humilis</i> | | |

| | | |
|---|---|--|
| Project Name: New Morning | | |
| Date: 24/05/2019 | Botanist: Jim Williams / Lauren Pick | |
| Vegetation Group: SLP-MWS2 | | |
| Quadrat No: Q31 | Quadrat size/shape: 20m x 20m/ Square | Photo number (NW corner): 220-222 |
| Zone: 50 H | Easting: 752627 | Northing: 6407181 |
| Altitude: 417 m | Fire (yrs): >20 yrs | Health rating: very good |
| Landform: Lower slope | | |
| Coarse fragments on the surface: Small pebbles/ >90%/ rounded | | |
| Rock outcrop (abundance/runoff): Nil / slow | | |
| Soil (profile/field texture/soil surface): Light-Brown/ Uniform/ Sandy Clay Loam/ Hard setting | | |
| %Cover leaf litter: 70% | | |
| %Cover bare ground: 20% | | |
| | | |
| Tallest stratum | Mid-stratum | Lower stratum |
| Growth form: Shrub Mallee | Growth form: Shrub | Growth form: Shrub |
| Height: 3-6m | Height: 1-3m | Height: <0.5m |
| Crown cover %: 30-70 | Crown cover %: 10-30 | Crown cover %: 10-30 |
| Dominant taxa: | Dominant taxa: | Dominant taxa: |
| <i>Eucalyptus steedmanii</i> (T) | <i>Melaleuca eleuterostachya</i> | <i>Euryomyrtus maidenii</i> |
| | <i>Melaleuca calyptroides</i> | |
| ALL SPECIES | | |
| <i>Acacia camptoclada</i> | | |
| <i>Astroloma serratifolium</i> | | |
| <i>Callitris preissii</i> | | |
| <i>Cassytha melantha</i> (A) | | |
| <i>Conospermum brownii</i> | | |
| <i>Cyathostemon tenuifolius</i> | | |
| <i>Dodonaea bursariifolia</i> | | |
| <i>Eucalyptus steedmanii</i> (T) | | |
| <i>Euryomyrtus maidenii</i> | | |
| <i>Exocarpos aphyllus</i> | | |
| <i>Gompholobium gompholobioides</i> | | |
| <i>Grevillea acuaria</i> | | |
| <i>Hakea subsulcata</i> | | |
| <i>Leucopogon cuneifolius</i> | | |
| <i>Melaleuca calyptroides</i> | | |
| <i>Melaleuca cardiophylla</i> | | |
| <i>Melaleuca eleuterostachya</i> | | |
| <i>Melaleuca hamata</i> | | |
| <i>Phebalium filifolium</i> | | |
| <i>Santalum acuminatum</i> | | |
| <i>Templetonia sulcata</i> | | |
| <i>Thysanotus dichotomus</i> (A) | | |
| <i>Westringia cephalantha</i> | | |

| | | |
|---|---|--|
| Project Name: New Morning | | |
| Date: 24/05/2019 | Botanist: Jim Williams / Lauren Pick | |
| Vegetation Group: SP-MWS1 | | |
| Quadrat No: Q32 | Quadrat size/shape: 20m x 20m/ Square | Photo number (NW corner): 206-208 |
| Zone: 50 H | Easting: 752264 | Northing: 6408482 |
| Altitude: 416 m | Fire (yrs): > 10 yrs | Health rating: Very Good |
| Landform: Mid slope | | |
| Coarse fragments on the surface: Small pebbles/ 10-20%/ rounded | | |
| Rock outcrop (abundance/runoff): Nil / slow | | |
| Soil (profile/field texture/soil surface): Light brown-yellow/ Uniform/ Sandy Loam/ Firm | | |
| %Cover leaf litter: 60% | | |
| %Cover bare ground: 5% | | |
| | | |
| Tallest stratum | Mid-stratum | Lower stratum |
| Growth form: Shrub Mallee | Growth form: Shrub | Growth form: Sedge |
| Height: 1-3m | Height: 0.5-1m | Height: <0.5m |
| Crown cover %: 10-30 | Crown cover %: 30-70 | Crown cover %: <10 |
| Dominant taxa: | Dominant taxa: | Dominant taxa: |
| <i>Eucalyptus platycorys</i> | <i>Melaleuca hamata</i> | <i>Lepidosperma sanguinolentum</i> |
| <i>Eucalyptus horistes</i> | | |
| ALL SPECIES | | |
| <i>Acacia castanostegia</i> | | |
| <i>Allocasuarina</i> sp. (sterile) | | |
| <i>Astroloma serratifolium</i> | | |
| <i>Banksia densa</i> var. Wheatbelt (M. Pieroni s.n. PERTH 04083407) | | |
| <i>Beaufortia schaueri</i> | | |
| <i>Chamelaucium ciliatum</i> | | |
| <i>Darwinia</i> sp. Lake Cobham (K. Newbey 3262) | | |
| <i>Daviesia lancifolia</i> | | |
| <i>Daviesia polyphylla</i> | | |
| <i>Eucalyptus horistes</i> | | |
| <i>Eucalyptus platycorys</i> | | |
| <i>Exocarpos sparteus</i> | | |
| <i>Gahnia aristata</i> | | |
| <i>Grevillea eriostachya</i> | | |
| <i>Grevillea huegelii</i> | | |
| <i>Hakea</i> sp. (sterile) | | |
| <i>Hibbertia gracilipes</i> | | |
| <i>Isopogon scabriusculus</i> subsp. <i>pubifloris</i> | | |
| <i>Leucopogon</i> ?sp. Newdegate (M. Hislop 3585) | | |
| <i>Lepidosperma sanguinolentum</i> | | |
| <i>Leptospermum roei</i> | | |
| <i>Melaleuca calyptroides</i> | | |
| <i>Melaleuca cordata</i> | | |
| <i>Melaleuca hamata</i> | | |
| <i>Melaleuca johnsonii</i> | | |
| <i>Micromyrtus erichsenii</i> | | |
| <i>Olax benthamiana</i> | | |
| <i>Persoonia cordifolia</i> | | |
| <i>Petrophile merrallii</i> | | |
| <i>Phebalium filifolium</i> | | |
| <i>Phebalium lepidotum</i> | | |
| <i>Thomasia sarotes</i> | | |

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|---|---|--|
| Project Name: New Morning | | |
| Date: 24/05/2019 | Botanist: Jim Williams / Lauren Pick | |
| Vegetation Group: SP-MWS1 | | |
| Quadrat No: Q33 | Quadrat size/shape: 20m x 20m/ Square | Photo number (NW corner): 203-205 |
| Zone: 50 H | Easting: 751965 | Northing: 6408664 |
| Altitude: 414 m | Fire (yrs): >10 yrs | Health rating: very good |
| Landform: Mid slope | | |
| Coarse fragments on the surface: Small pebbles/ 20-50%/ rounded | | |
| Rock outcrop (abundance/runoff): Nil / slow | | |
| Soil (profile/field texture/soil surface): Light brown-yellow/ Uniform/ Sandy Loam/ Firm | | |
| %Cover leaf litter: 30% | | |
| %Cover bare ground: 5% | | |
| | | |
| Tallest stratum | Mid-stratum | Lower stratum |
| Growth form: | Growth form: Shrub | Growth form: Shrub |
| Height: | Height: 0.5-1m | Height: <0.5m |
| Crown cover %: | Crown cover %: 10-30 | Crown cover %: 30-70 |
| Dominant taxa: | Dominant taxa: | Dominant taxa: |
| N/A | <i>Banksia laevigata</i> subsp. <i>fuscolutea</i> | <i>Beaufortia micrantha</i> |
| | | |
| ALL SPECIES | | |
| <i>Adenanthos argyreus</i> | | |
| <i>Allocasuarina microstachya</i> | | |
| <i>Allocasuarina</i> sp. (sterile) | | |
| <i>Banksia audax</i> | | |
| <i>Banksia densa</i> var. <i>Wheatbelt</i> (M. Pieroni s.n. PERTH 04083407) | | |
| <i>Banksia erythrocephala</i> var. <i>erythrocephala</i> | | |
| <i>Beaufortia micrantha</i> | | |
| <i>Chordifex sphacelatus</i> | | |
| <i>Conospermum brownii</i> | | |
| <i>Grevillea cagiana</i> | | |
| <i>Grevillea pterosperma</i> | | |
| <i>Hakea erecta</i> | | |
| <i>Hakea platysperma</i> | | |
| <i>Hibbertia exasperata</i> | | |
| <i>Hibbertia gracilipes</i> | | |
| <i>Isopogon scabriusculus</i> subsp. <i>pubifloris</i> | | |
| <i>Jacksonia nematoclada</i> | | |
| <i>Lepidosperma carphoides</i> | | |
| <i>Leptosema daviesioides</i> | | |
| <i>Leptospermum roei</i> | | |
| <i>Leucopogon</i> sp. <i>Wheatbelt</i> (S. Murray 257) | | |
| <i>Lysinema ciliatum</i> | | |
| <i>Melaleuca cordata</i> | | |
| <i>Melaleuca johnsonii</i> | | |
| <i>Persoonia coriacea</i> | | |
| <i>Santalum murrayanum</i> | | |
| <i>Verticordia eriocephala</i> | | |

| | | |
|--|---|--|
| Project Name: New Morning | | |
| Date: 24/05/2019 | Botanist: Jim Williams / Lauren Pick | |
| Vegetation Group: SP-H1 | | |
| Quadrat No: Q34 | Quadrat size/shape: 20m x 20m/ Square | Photo number (NW corner): 302-304 |
| Zone: 50 H | Easting: 753996 | Northing: 6402410 |
| Altitude: 410 m | Fire (yrs): >20 yrs | Health rating: very good |
| Landform: Upper slope | | |
| Coarse fragments on the surface: Small pebbles/ 50-90%/ rounded | | |
| Rock outcrop (abundance/runoff): Nil / slow | | |
| Soil (profile/field texture/soil surface): Brown / Uniform/ Sandy Clay Loam/ Hard setting | | |
| %Cover leaf litter: 85% | | |
| %Cover bare ground: 5% | | |
| | | |
| Tallest stratum | Mid-stratum | Lower stratum |
| Growth form: Shrub | Growth form: Shrub | Growth form: Sedge |
| Height: 1-3m | Height: 0.5-1m | Height: <0.5m |
| Crown cover %: >70 | Crown cover %: 30-70 | Crown cover %: 30-70 |
| Dominant taxa: | Dominant taxa: | Dominant taxa: |
| <i>Allocasuarina corniculata</i> | <i>Phebalium filifolium</i> | <i>Lepidosperma sanguinolentum</i> |
| | | |
| ALL SPECIES | | |
| <i>Acacia assimilis</i> subsp. <i>assimilis</i> | | |
| <i>Acacia fragilis</i> | | |
| <i>Allocasuarina corniculata</i> | | |
| <i>Beyeria brevifolia</i> | | |
| <i>Caladenia hirta</i> (A) | | |
| <i>Calothamnus quadrifidus</i> subsp. <i>seminudus</i> | | |
| <i>Chamelaucium ciliatum</i> | | |
| <i>Conospermum brownii</i> | | |
| <i>Cyathostemon tenuifolius</i> | | |
| <i>Dodonaea bursariifolia</i> | | |
| <i>Drosera macrantha</i> (A) | | |
| <i>Drummondita hassellii</i> | | |
| <i>Euryomyrtus maidenii</i> | | |
| <i>Grevillea oncogyne</i> | | |
| <i>Grevillea pterosperma</i> | | |
| <i>Hibbertia gracilipes</i> | | |
| <i>Lepidosperma sanguinolentum</i> | | |
| <i>Melaleuca cardiophylla</i> | | |
| <i>Melaleuca cordata</i> | | |
| <i>Melaleuca hamata</i> | | |
| <i>Persoonia coriacea</i> | | |
| <i>Phebalium filifolium</i> | | |
| <i>Phebalium tuberculosum</i> | | |
| <i>Platysace maxwellii</i> | | |
| <i>Santalum acuminatum</i> | | |
| <i>Thryptomene kochii</i> | | |

| | | |
|---|---|--|
| Project Name: New Morning | | |
| Date: 24/05/2019 | Botanist: Jim Williams / Lauren Pick | |
| Vegetation Group: CLP-EW1 | | |
| Quadrat No: Q35 | Quadrat size/shape: 20m x 20m/ Square | Photo number (NW corner): 270-272 |
| Zone: 50 H | Easting: 751909 | Northing: 6405332 |
| Altitude: 391 m | Fire (yrs): >30 yrs | Health rating: very good |
| Landform: Flat Plain | | |
| Coarse fragments on the surface: Small pebbles/ 10-20%/ subangular | | |
| Rock outcrop (abundance/runoff): Nil / very slow | | |
| Soil (profile/field texture/soil surface): Red-Brown / Uniform/ Clay Loam/ Surface Crust | | |
| %Cover leaf litter: 90% | | |
| %Cover bare ground: 5% | | |
| | | |
| Tallest stratum | Mid-stratum | Lower stratum |
| Growth form: Tree | Growth form: Shrub | Growth form: Shrub |
| Height: 3-6m | Height: 1-3m | Height: <0.5m |
| Crown cover %: >70 | Crown cover %: 30-70 | Crown cover %: 10-30 |
| Dominant taxa: | Dominant taxa: | Dominant taxa: |
| <i>Eucalyptus salmonophloia</i> | <i>Acacia merrallii</i> | <i>Grevillea acuaria</i> |
| | | |
| ALL SPECIES | | |
| <i>Acacia deficiens</i> | | |
| <i>Acacia erinacea</i> | | |
| <i>Acacia hemiteles</i> | | |
| <i>Acacia merrallii</i> | | |
| <i>Austrostipa</i> sp. (sterile) | | |
| <i>Dodonaea stenozyga</i> | | |
| <i>Eremophila maculata</i> | | |
| <i>Eucalyptus salmonophloia</i> | | |
| <i>Eucalyptus urna</i> | | |
| <i>Exocarpos aphyllus</i> | | |
| <i>Gompholobium gompholobioides</i> | | |
| <i>Grevillea acuaria</i> | | |
| <i>Olearia muelleri</i> | | |
| <i>Pterostylis mutica</i> (A) | | |
| <i>Pultenaea</i> aff. <i>arida</i> | | |
| <i>Santalum acuminatum</i> | | |
| <i>Sclerolaena parviflora</i> | | |
| <i>Senna cardiosperma</i> | | |

| | | |
|--|---|--|
| Project Name: New Morning | | |
| Date: 24/05/2019 | Botanist: Jim Williams / Lauren Pick | |
| Vegetation Group: CLP-EW3 | | |
| Quadrat No: Q36 | Quadrat size/shape: 20m x 20m/ Square | Photo number (NW corner): 326-328 |
| Zone: 50 H | Easting: 754053 | Northing: 6405175 |
| Altitude: 417 m | Fire (yrs): >30 yrs | Health rating: very good |
| Landform: Flat Plain | | |
| Coarse fragments on the surface: Small pebbles/ 10-20%/ rounded | | |
| Rock outcrop (abundance/runoff): Nil / slow | | |
| Soil (profile/field texture/soil surface): Red-Brown / Uniform/ Clay Loam/ Hard Setting | | |
| %Cover leaf litter: 90% | | |
| %Cover bare ground: 30% | | |
| | | |
| Tallest stratum | Mid-stratum | Lower stratum |
| Growth form: Tree | Growth form: Shrub Mallee | Growth form: Shrub |
| Height: 6-12m | Height: 3-6m | Height: 0.5-1m |
| Crown cover %: <10 | Crown cover %: 30-70 | Crown cover %: 30-70 |
| Dominant taxa: | Dominant taxa: | Dominant taxa: |
| <i>Eucalyptus salmonophloia</i> | <i>Eucalyptus urna</i> | <i>Dodonaea stenozyga</i> |
| | <i>Eucalyptus tephroclada</i> | |
| ALL SPECIES | | |
| <i>Acacia deficiens</i> | | |
| <i>Acacia erinacea</i> | | |
| <i>Acacia evenulosa</i> | | |
| <i>Acacia hemiteles</i> | | |
| <i>Acacia intricata</i> | | |
| <i>Dodonaea stenozyga</i> | | |
| <i>Eremophila dichroantha</i> | | |
| <i>Eucalyptus celastroides</i> subsp. <i>virella</i> | | |
| <i>Eucalyptus pileata</i> | | |
| <i>Eucalyptus salmonophloia</i> | | |
| <i>Eucalyptus tephroclada</i> | | |
| <i>Eucalyptus urna</i> | | |
| <i>Exocarpos aphyllus</i> | | |
| <i>Grevillea acuaria</i> | | |
| <i>Melaleuca adnata</i> | | |
| <i>Melaleuca lateriflora</i> | | |
| <i>Melaleuca pauperiflora</i> subsp. <i>fastigiata</i> | | |
| <i>Melaleuca pauperiflora</i> subsp. <i>pauperiflora</i> | | |
| <i>Microcybe multiflora</i> | | |
| <i>Olearia muelleri</i> | | |
| <i>Santalum acuminatum</i> | | |
| <i>Wilsonia humilis</i> | | |

Appendix 8: Quadrat Photographs



Quadrat 1 Spring 2018



Quadrat 1 Autumn 2019





Quadrat 2 Spring 2018



Quadrat 2 Autumn 2019



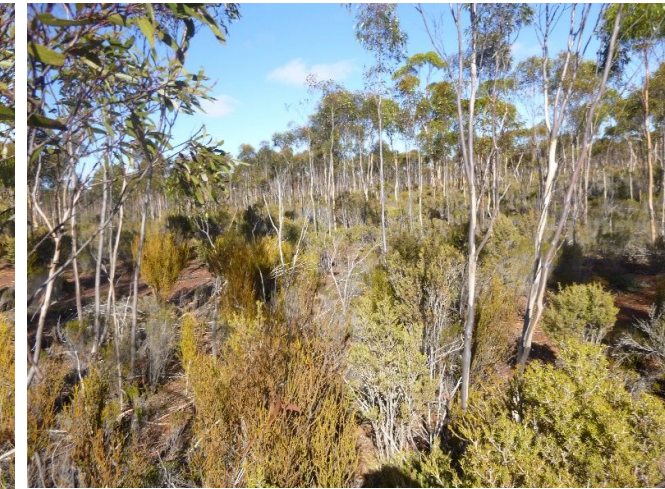
Quadrat 3 Spring 2018



Quadrat 3 Autumn 2019



Quadrat 4 Spring 2018



Quadrat 4 Autumn 2019



Quadrat 5 Spring 2018



Quadrat 5 Autumn 2019



Quadrat 6 Spring 2018



Quadrat 6 Autumn 2019



Quadrat 7 Spring 2018



Quadrat 7 Autumn 2019



Quadrat 8 Spring 2018



Quadrat 8 Autumn 2019



Quadrat 9 Spring 2018



Quadrat 9 Autumn 2019



Quadrat 10 Spring 2018



Quadrat 10 Autumn 2019



Quadrat 11 Spring 2018



Quadrat 11 Autumn 2019



Quadrat 12 Spring 2018



Quadrat 12 Autumn 2019



Quadrat 13 Spring 2018



Quadrat 13 Autumn 2019



Quadrat 14 Spring 2018



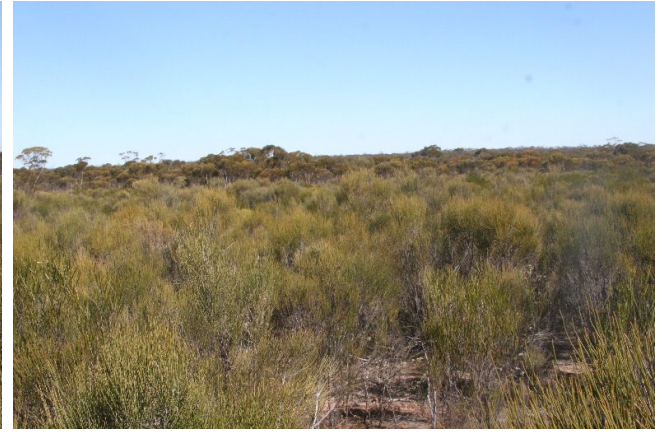
Quadrat 14 Autumn 2019



Quadrat 15 Spring 2018



Quadrat 15 Autumn 2019



Quadrat 16 Spring 2018



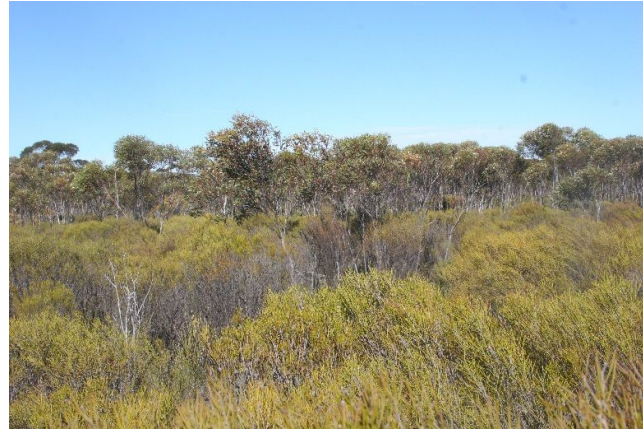
Quadrat 16 Autumn 2019



Quadrat 17 Spring 2018



Quadrat 17 Autumn 2019



Quadrat 18 Spring 2018



Quadrat 18 Autumn 2019



Quadrat 19 Spring 2018



Quadrat 19 Autumn 2019



Quadrat 20 Spring 2018



Quadrat 20 Autumn 2019



Quadrat 21 Spring 2018



Quadrat 21 Autumn 2019



Quadrat 22 Spring 2018



Quadrat 22 Autumn 2019



Quadrat 23 Spring 2018



Quadrat 23 Autumn 2019



Quadrat 24 Spring 2018



Quadrat 24 Autumn 2019



Quadrat 25 Spring 2018



Quadrat 25 Autumn 2019



Quadrat 26 Spring 2018



Quadrat 26 Autumn 2019



Quadrat 27 Spring 2018



Quadrat 27 Autumn 2019



Quadrat 28 Spring 2018



Quadrat 28 Autumn 2019



Quadrat 29 Spring 2018



Quadrat 29 Autumn 2019



Quadrat 30 Spring 2018



Quadrat 30 Autumn 2019



Quadrat 31 Spring 2018



Quadrat 31 Autumn 2019



Quadrat 32 Spring 2018



Quadrat 32 Autumn 2019



Quadrat 33 Spring 2018



Quadrat 33 Autumn 2019



Quadrat 34 Spring 2018



Quadrat 34 Autumn 2019



Quadrat 35 Spring 2018



Quadrat 35 Autumn 2019

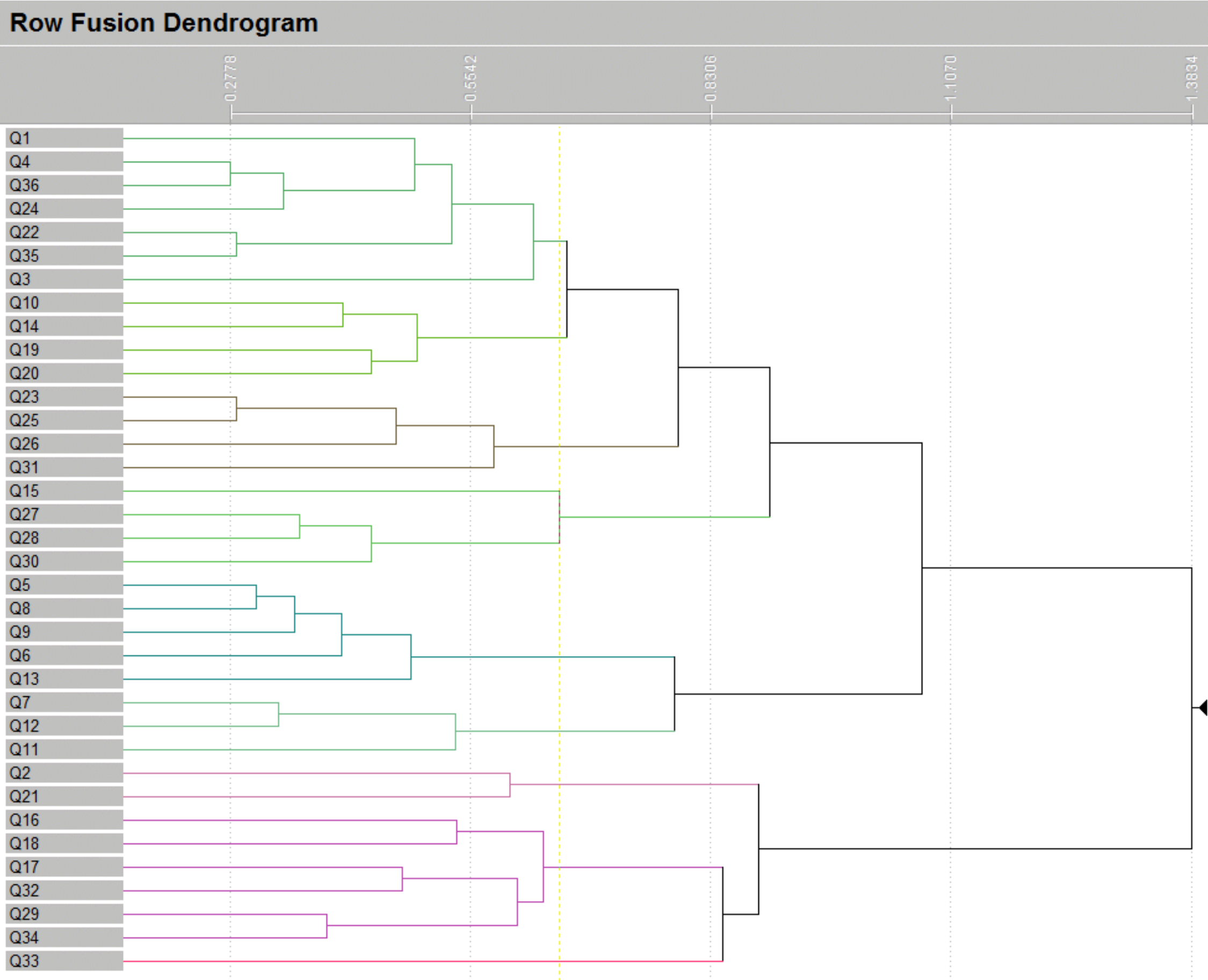


Quadrat 36 Spring 2018



Quadrat 36 Autumn 2019

Appendix 9: PATN Analysis results



Stress: 0.1786

LEGEND

- Group 1
- Group 2
- Group 3
- Group 4
- Group 5
- Group 6
- Group 7
- Group 8
- Group 9

PATN groups

