

Line 51 (344.9 -  
346.485 KM)

Fleming Grove  
Road

Gibson, WA 6448

## Targeted Flora and Vegetation Survey Report



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## 1. Introduction, Scope and Background Information

Arc Infrastructure (“the client”) commissioned Bio Diverse Solutions as Environmental Consultants to undertake a targeted flora and vegetation survey within the ‘survey area’, a total of 3.22ha along Line 51 (344.9 - 346.485 Line KM) near Fleming Grove Road in the Shire of Esperance. The targeted flora and vegetation survey presented in this report is herein referred to as the “targeted survey”. This followed the completion of an out-of-season ‘Reconnaissance flora, vegetation and basic fauna survey’ (BDS, 2021), here in referred to as “the reconnaissance survey”. The reconnaissance survey identified one potential threatened flora (*Eremophila glabra* subsp Scaddan, C. Turley c.n. 11/10/2005), but was not flowering at the time of the reconnaissance survey, which is required for identification confirmation. Suitable habitat was present for seven species of priority flora identified in the desktop survey as likely or possible to occur that had significant limitations outside of flowering season. Multiple vegetation types were identified in the reconnaissance survey that were potentially the Threatened Ecological Community (TEC) ‘Proteaceae Dominated Kwongkan Shrublands of the Southeast Coastal Floristic Province (Kwongkan)’. As such, the results from the reconnaissance survey (BDS, 2021) were the basis of the scope of works required for the targeted survey.

The total 3.22ha consists of 12 separate ‘areas’ or zones and 1.87km of linear survey along an existing service road for the railway line and will be used for future laydown areas during the re-construction and re-sleepering of the railway line. The scope of works included:

- Targeted flora survey for *Eremophila scabra* subsp. Scaddan (C. Turley c.n. 10/11/2005) (TF – Critically Endangered), including identification confirmation by the WA Herbarium of threatened flora;
- Targeted flora survey for the seven priority flora species identified in the desktop survey to be likely or possible to occur within the identified suitable habitat. These specifically included *Goodenia turleyae* (P1), *Hibbertia turleyana* (P2), *Hydrocotyle tuberculata* (P2), *Hydrocotyle asterocarpa* (P2), *Dampiera sericantha* (P3), *Daviesia pauciflora* (P3) and *Pterostylis faceta* (P3);
- Targeted vegetation survey to determine the presence of the TEC Kwongkan through quadrat analysis, specifically for vegetation types 2 (Ban arm SL) and 3 (Pro SL), as identified in the reconnaissance survey (BDS, 2021; Appendix D);
- Identification of additional incidental flora species not captured in the reconnaissance survey (out-of-season), including herbarium identification if required;
- GPS and map any populations of threatened species (if applicable);
- Prepare a report on survey outcomes; and
- Provide the client with the IBSA Data package (as required to be submitted by the client).

### 1.1. Site Location and Development Proposal

The ‘survey area’ is defined as the total area being surveyed, consisting of 12 individual areas and 1.87km of linear survey located along Line 51 (344.9 - 346.485 Line KM), near Fleming Grove Road, in the Shire of Esperance. The areas surveyed ranged between 1.14ha and 0.07ha, the total length of the survey area is approximately 3km (Figure 1). These areas have been earmarked by Arc Infrastructure for clearing as part of the required upgrades and ongoing maintenance of the railway track line. This targeted survey provides additional and supporting data to the already completed reconnaissance survey (BDS, 2021), to assist in the environmental approvals required for the clearing and development of these areas.

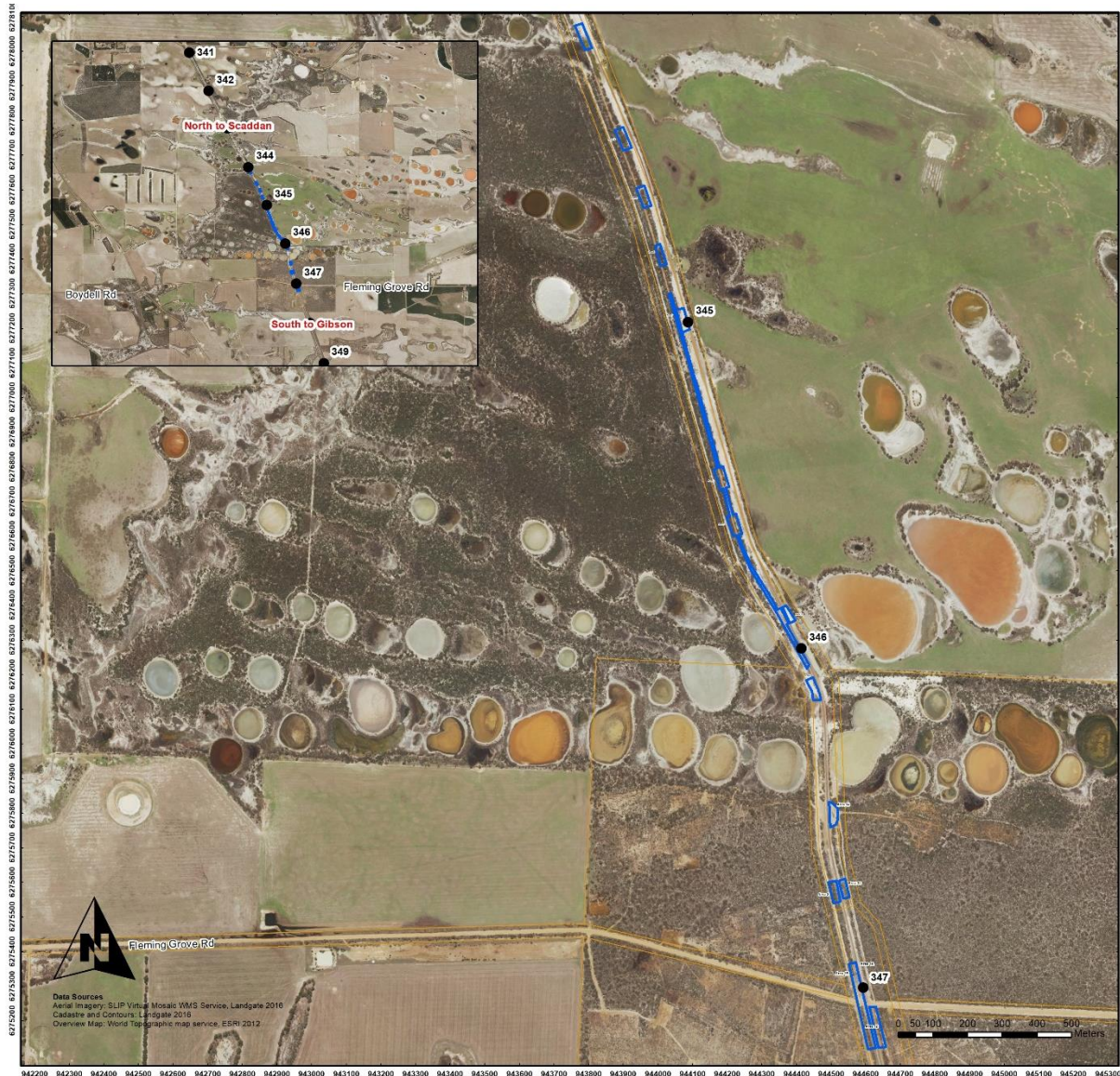


Figure 1: Survey Area Locality

## 2. Desktop Assessment

A thorough desktop assessment was completed in the reconnaissance survey (BDS, 2021), which also included geology and soils, climate, habitat connectivity, water, environmentally sensitive areas, remnant vegetation and conservation significant fauna. As per the results of the reconnaissance survey, this targeted survey only covers and discusses the desktop analysis relevant to conservation significant flora (Section 2.1) and threatened and priority ecological communities (Section 2.2).

### 2.1. Conservation Significant Flora

The desktop inventory of potential conservation significant flora species likely to occur within the survey area was undertaken during the out-of-season reconnaissance survey (June 2021; BDS, 2021), with the list of species identified during this time period. This was compiled using the following databases:

- 10km Nature Map Database Search (combined data from DBCA, WA Museum and WA Herbarium; DBCA, 2007-, WAH 1998-);
- 10km Protected matters search tool (DAWE 2021); and
- 15 km Flora DBCA database records (DBCA, 2021a).

The full species list compiled from all available data (Table A2 in Appendix B) is based on observations from a broader area than the survey area and is likely to include species that would not occur in the actual survey area due to a lack of suitable habitat. The data also includes very old records and in some cases the species in question may have become locally or regionally extinct. Species that have previously been recorded within the study area are shown in Map 2 in Appendix A. Conservation categories for Threatened and Priority flora and ecological communities are presented in Tables A4-A7 in Appendix C.

The conservation significance of flora species has been assessed using data from the following sources:

- *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)*. Administered by the Australian Government Department of Agriculture, Water and the Environment (DAWE);
- *Biodiversity Conservation Act 2016 (BC Act)*. Administered by the Western Australian Department of Biodiversity Conservation and Attractions (DBCA); and
- DBCA Priority Flora list. A non-legislative list maintained by DBCA for management purposes.

The above-mentioned database searches detected a total of 42 conservation-listed flora within a 10-15 km radius of the survey area, consisting of 6 Threatened and 36 Priority species. Refer to Appendix B for likelihood of occurrence analysis.

## 2.2. Threatened and Priority Ecological Communities

Desktop inventory of potential conservation significant flora species likely to occur within 10 to 15km of the survey area was undertaken using the following databases:

- 10 km buffer – Protected matters search tool (DAWE 2021); and
- 15 km buffer – DBCA database records (DBCA 2021b).

Database results indicated that two Threatened (TEC) or Priority Ecological Communities 'Subtropical and Temperate Coastal Saltmarsh (CSM)' and 'Proteaceae Dominated Kwongkan Shrublands of the Southeast Coastal Floristic Province of Western Australia (Kwongkan)' may be present within the survey area. The reconnaissance survey (BDS, 2021) determined that CSM was not present within the survey area, due to no hydrological bodies in direct contact with the coast and subject to tidal influence being present. It also detected that Kwongkan TEC was likely present within two vegetation types (2 Banarm SL and 3 Pro SL; Appendix D).

### Proteaceae Dominated Kwongkan Shrublands of the Southeast Coastal Floristic Province of Western Australia (Kwongkan)

Kwongkan is listed as Priority 3 (P3) PEC within WA under the *Biodiversity Conservation Act 2016 (BC Act)* and as an Endangered Threatened Ecological Community (TEC) under the *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)*. The survey area lies within the southeast botanical province of Western Australia (Hopper and Gioia, 2004), which is the geographical location of Kwongkan. It is defined and assessed in the conservation advice as generally Kwongkan shrubland, ranging from sparse to dense, thicket-forming, where Proteaceous species form a significant component (DoE, 2015). It is confined to the southeast botanical province of Western Australia (Hopper and Gioia, 2004) and primarily occurs on sandplains and marine plains and lower to upper slopes and ridges, as well as uplands across this region. Multiple other ecological communities are listed under the *BC Act 2016* that also meet criteria of Kwongkan TEC and should be considered when assessing whether Kwongkan is present.

Kwongkan is recognised by the below key diagnostic features and minimum condition thresholds outlined in Approved Conservation Advice Guidelines (DoE, 2015):

- 1) Occurs within the South Coastal Floristic Province (Hopper and Gioia, 2004); relating to south west phytogeographic boundaries. Includes Island of the Recherche Archipelago.
- 2) a) Characterised by Proteaceae species having 30% or greater cover of Proteaceae species across all layers of where shrubs occur (crowns measured as if opaque). OR;  
b) Two or more diagnostic Proteaceae species are present that are likely to form a significant vegetative component when regenerated. The use of diagnostic species is for situations in which the cover of Proteaceae species is reduced due to recent disturbance (e.g., fire).

Condition thresholds for the ecological community are described in Table 1.

**Table 1: Condition thresholds and minimum patch size analysis for Kwongkan PEC/TEC diagnostic criteria.**

Condition category	Minimum patch size	Weeds	Dieback
High	1 ha	<30% perennial weed cover	No known Dieback infestation
Moderate	0.5 ha	<70% perennial weed cover	May be present or unknown



### 3. Flora and Vegetation Survey Methodology

The targeted survey was undertaken at the beginning of wildflower season, on the 8<sup>th</sup> of September 2021. It was conducted by Katie White (Botanist/Ecologist) and Charlize van der Mescht (Environmental Consultant) of Bio Diverse Solutions. The survey area was surveyed via meandering traverses on foot, within 5m vicinity of each traverse to target the seven priority species identified during the reconnaissance survey (BDS, 2021) as likely or possibly present, and collection of the possible threatened flora, *E. glabra* subsp. Scaddan (C. Turley c.n. 10/11/2005), as listed below (Table 2). Flora was incidentally recorded within the survey area, to identify annual and herbaceous species not captured during the reconnaissance survey (BDS, 2021). Collection of plant specimens were made where further identification was required, using Katie White's Regulation 60 Flora Taking Licence FTB62000237 where possible. For the suspected Threatened Flora, *E. glabra* subsp. Scaddan (C. Turley c.n. 10/11/2005), a specimen was collected and submitted through Emma Adams (DBCA Esperance District Conservation Officer).

Additionally, a 10x10m quadrat for mid and understorey and 20x20m for overstorey (EPA, 2016) quadrat analysis was undertaken at sites within the survey area identified as potentially Kwongkan TEC (Table 3; DoE, 2015). Four quadrats were systematically sampled within the appropriate area and vegetation type (Appendix D). Vegetation types identified in the reconnaissance survey (BDS, 2021) as possible Kwongkan TEC included Vegetation Type 2 (Ban arm SL) and 3 (Pro SL), as described in further depth in Appendix D.

Information collected within each quadrat included:

- Location: GPS coordinates of the quadrat.
- Date and site code.
- Site description: landform, slope, soil colour and type and hydrology.
- Vegetation description: dominant and non-dominant species present within the different growth forms and percentage cover.
- Vegetation condition.

**Table 2: Conservation significant flora targeted within the targeted survey (flora component). Priority species had been identified within the 10-15km desktop survey and assessed to be likely or possible to be present, but could not be adequately surveyed due to the out-of-season nature of the reconnaissance survey.**

Nt. Abbreviations used include Threatened Flora (TF), Critically Endangered (Cr En) and Priority (P).

Family	Species	Common Name	Cons Code	Potential Suitable Veg types (Appendix D)	Potential Suitable Areas
Scrophulariaceae	<i>Eremophila glabra</i> subsp. Scaddan (C. Turley c.n. 10/11/2005)		TF – Cr En	4 (Chen, Sam) and 5 (Mel SL)	3, between area 3 and 4, between area 4 and 5, 7, between area 7 and 8, 8, 11, 15
Goodeniaceae	<i>Goodenia turleyae</i>		P1	4 (Chen, Sam), and 5 (Mel SL)	3, between area 3 and 4, between area 4 and 5, 7, between area 7 and 8, 8, 11, 15

Table 2 continued.

Family	Species	Common Name	Cons Code	Potential Suitable Veg types (Appendix D)	Potential Suitable Areas
Dilleniaceae	<i>Hibbertia turleyana</i>		P2	1 (Myr SL), 2, (Ban arm SL), 3 (Pro SL), 5 (Mel SL) and 7 (Mal SL)	1a, 1b, 2, between area 3 and 4, between area 4 and 5, 5, 6, 7, between area 7 and 8, 8, 9, 10, 11, 12, 13, 14
Araliaceae	<i>Hydrocotyle tuberculata</i>	Bumpy Fruited Pennywort	P2	4 (Chen, Sam)	3, 15
Araliaceae	<i>Hydrocotyle asterocarpa</i>	Starry Pennywort	P2	4 (Chen, Sam) and 5 (Mel SL)	1a, 1b, 2, 3, 5, 9, 10, 12, 13, 14
Goodeniaceae	<i>Dampiera sericantha</i>		P3	1 (Myr SL), 2, (Ban arm SL), 3 (Pro SL) and 7 (Mal SL)	1a, 1b, 2, 3, 5, 9, 10, 12, 13, 14
Fabaceae	<i>Daviesia pauciflora</i>		P3	1 (Myr SL), 2, (Ban arm SL), 3 (Pro SL), 5 (Mel SL) and 7 (Mal SL)	1a, 1b, 2, 3, 5, 9, 10, 12, 13, 14
Orchidaceae	<i>Pterostylis faceta</i>	Bird Orchid	P3	1 (Myr SL), 2, (Ban arm SL), 3 (Pro SL), 5 (Mel SL) and 7 (Mal SL)	1a, 1b, 2, 3, 5, 9, 10, 12, 13, 14

**Table 3: Areas within the survey area the targeted survey (vegetation component) was conducted, using Quadrat analysis. Following results of the reconnaissance survey (BDS, 2021) of potential areas detected as 'Proteaceae Dominated Kwongkan Shrubland of the South-east Coastal Floristic Province (Kwongkan)' Threatened Ecological Community (TEC).**

Vegetation Type	Area Identified in	Total area (ha)	Comment from reconnaissance survey
2 (Ban arm SL)	1b	0.03	
2 (Ban arm SL)	12	0.18	Unlikely to meet Kwongkan TEC due to historical disturbance.
3 (Pro SL)	2	0.09	
3 (Pro SL)	13	0.06	
3 (Pro SL)	14	0 – no vegetation remaining	Unlikely to meet Kwongkan TEC due to historical disturbance.

### 3.1. Survey Limitations and Constraints

An assessment of potential survey limitations is outlined below in Table 4. No limitations were present that were considered significant to affect the validity of the survey.

**Table 4: Assessment of potential survey limitations.**

Limitation	Constraint	Comment
Experience of personnel	Nil	<p>Katie White has over 4.5 years' experience at conducting targeted and reconnaissance surveys within the Esperance sandplains bioregion and is competent in taxonomic identification and assessment of vegetation in the area. Additionally, she has conducted targeted flora surveys alongside the district DBCA Flora Conservation Officer for a large number of flora species identified on the 10km desktop analysis.</p> <p>Charlize van der Mescht has worked with Bio Diverse Solutions as an environmental consultant and technical assistant for the past 2 years, and is currently completing her masters in Environmental Management.</p>
Survey timing	Minor	<p>The survey was conducted at the beginning of September, during an appropriate time to conduct a flora survey, during the wildflower season for the Esperance Plains IBRA region.</p> <p>Five of the targeted priority flora are typically flowering (WAH, 1998-) within September (<i>Dampiera sericantha</i> P3, <i>Patersonia inaequalis</i> P2, <i>Pterostylis faceta</i> P3, <i>Goodenia turleyae</i> P1 and <i>Hydrocotyle asterocarpa</i> P2). Three species being targeted were typically outside of flowering period, and are discussed in further detail below and in Appendix B;</p> <ul style="list-style-type: none"> <li>• <i>Daviesia pauciflora</i>, P3 – Flowers in October. Locally known to flower with a wide range of time frames and observed at different survey areas by the consultant to be flowering in September in 2021.</li> <li>• <i>Hibbertia turleyana</i>, P2 – Flowers in August. With the flora survey occurring in very early September, there is a high likelihood that if the species was present a few remaining flowers would have been observed late-flowering or fruiting. This is more likely in 2021 as a significantly wet winter was experienced, which often results in longer flowering periods. Some limitation may be present.</li> <li>• <i>Hydrocotyle tuberculata</i>, P2 – Flowers in October. This species is a small annual herbaceous plant, which is distinctive when not flowering. It is likely that if the species flowers in October, it is growing and present in September is therefore likely detectable. Some limitation may be present.</li> </ul>
Access restrictions	Nil	No access restrictions that would affect the conclusiveness of this survey were encountered.
Availability of contextual information	Minor	Publicly available desktop and background information was readily available to give a broad contextual understanding of the site. The reconnaissance survey (BDS, 2021) provides detailed contextual information within the survey area, required for conducting the targeted flora survey.
Survey effort and extent	Nil	<p>A random meandering traverse ensured that all areas within 5m of each other was surveyed, ensuring sufficient survey effort was employed across the survey area.</p> <p>Following the CoA (2013) <i>Draft Survey guidelines for Australia's Threatened Orchids</i>, it is recognised that due to the complex nature of Orchid phenology and physiology, more intensive survey transects and surveys over multiple time periods is required. The site has now been surveyed during June and September, during different seasons. The two visitations likely resulted in traverses within 2m proximity and captured a wide range of Orchid species at different flowering times.</p>

Table 4 continued.

Limitation	Constraint	Comment
Disturbances that may affect results	Minor	<p>Disturbance has the potential to affect the biological representation of species and therefore ecological communities present. For example through the presence of disturbance opportunists, loss of sensitive species from direct impact, increased nutrient loading from runoff or novel ecosystems created through microclimate creation. This was observed across the survey area, through disturbance from the railway track, areas with altered drainage and increased nutrients in ponding from the surrounding agricultural area.</p> <p>No fires had previously occurred and the native vegetation showed indications of being long unburnt (density of leaf litter, age and height of obligate seeders, height of Mallee re-sprouters). It is possible that fire responding ephemeral species are stored in the soil seed bank that were not captured by this survey for areas outside of the salt lakes.</p>
Identification issues	Nil	<p>The vast majority of species present contained sufficient taxonomic information for identification (such as nuts, fruit, leaf structure or flowers). It is estimated that 80-85% of species present were flowering. Due to the timing during wildflower season, annual and herbaceous species were flowering and readily identified. Two species were unable to be identified due to being sterile at the time of surveying.</p>

## 4. Targeted Flora and Vegetation Survey Outcomes

An additional 73 species were identified during the targeted survey incidentally. Therefore, biodiversity of an already incredibly biodiverse site was increased (Table A8 Appendix E). In summary, across the reconnaissance (BDS, 2021) and targeted survey, 220 flora species, consisting of 43 families and 128 genera were found. The most commonly occurring families were Myrtaceae (35 species), Proteaceae (25 species) and Fabaceae (24 species). The list includes 214 native species (refer to Table A10 Appendix D), and five introduced / alien species. Vegetation types present within the survey area were previously identified in the reconnaissance survey (BDS, 2021) and are described in Appendix D. Refer to Map 3a-f in Appendix A for vegetation mapping, and Table A8 Appendix E for full species list.

### 4.1. Invasive Species

Of the additional 73 species identified during the targeted survey, one species was introduced. The reconnaissance survey (BDS, 2021) had previously identified four other invasive species. The additional invasive species identified is *Cotula coronopifolia* (Water Button). It is listed as Permitted (s11) under the *BAM Act 2007*. It is not listed under the WA Weed Strategy (CALM 1999).

### 4.2. Targeted Flora

The scope for this survey was to target suitable habitat for seven priority species identified as likely or possible to be present in the desktop assessment of the reconnaissance survey (BDS 2021), but were unable to be effectively surveyed due to the out-of-season nature of the reconnaissance survey (BDS, 2021; Table 2). In addition, confirmation of the potential threatened flora, *E. glabra* subsp. Scaddan (Critically Endangered; C. Turley s.n. 10/11/2005) was undertaken through the collection of flowering material submitted to the WA Herbarium and a targeted flora survey for any further plants present.

The threatened flora, *E. glabra* subsp. Scaddan (C. Turley s.n. 10/11/2005), was confirmed to be present, with further detail provided below. *Goodenia turleyae* (P1) was also detected, and is discussed in further detail below. The other six potential priority species targeted in the survey were not detected. A summary table from reconnaissance and targeted survey is provided below (Table 5). Further detail on the priority flora identified in the reconnaissance survey can be found in the 'Reconnaissance Flora and Vegetation and Basic Fauna Report' (BDS, 2021). The desktop assessment has been updated to show the results of the targeted survey (Appendix B).

Additional plants of previously identified priority flora were also identified and GPS'd during the targeted survey. Further details are listed below of relevant species identified. This is summarised across the reconnaissance and targeted surveys in Table 5 and Table 9.

- *Personia scabra* (P3) – 1 additional plant identified in Area 2 and 1 additional plant identified in Area 9;
- *Brachyloma mogin* (P3) – 1 additional plant identified in Area 2;
- *Kunzea salina* (P3) – 2 additional plants identified on linear survey between Area 3 and 4;
- *Darwinia* sp. Gibson (R.D. Royce 3569; P1) – 1 additional plant identified on linear survey between Area 4 and 5; and
- *Conostephium marchantiorum* (P3) – 3 additional plants identified in Area 13.

**Table 5: Conservation significant flora identified within the survey area during the reconnaissance and targeted survey.**

Family	Species	Cons Code	Population status	Vegetation Types Present	Areas Present	Abundance
Scrophulariaceae	<i>Eremophila glabra</i> subsp. Scaddan (C. Turley s.n. 10/11/2005)	TF – Cr	New	4 (Chen, Sam)	3	1
Goodeniaceae	<i>Goodenia turleyae</i>	P1	New	5 (Mel SL)	8	15

Table 5 continued.

Family	Species	Cons Code	Population status	Vegetation Types Present	Areas Present	Abundance
Myrtaceae	<i>Darwinia</i> sp. Gibson (R.D. Royce 3569)	P1	Existing	5 (Mel SL)	Between Area 3 and 4, 4, Between Area 4 and 5, 11	52
Ericaceae	<i>Conostephium marchantiorum</i>	P3	Existing	2 (Ban arm SL), 3 (Pro SL), 7 (Mal WL)	2, 5, Between Area 7 and 8, 12, 13	8
Proteaceae	<i>Isopogon alpicornis</i>	P3	Existing	5 (Mel SL), 7 (Mal WL)	Between Area 4 and 5, 5, 6, 10	26
Proteaceae	<i>Persoonia scabra</i>	P3	New	2 (Ban arm SL), 3 (Pro SL), 7 (Mal WL)	2, 9, 10, 12, 13	16
Ericaceae	<i>Brachyloma mogin</i>	P3	New	3 (Pro SL), 5 (Mel SL)	2, Between Area 3 and 4, 4, 7	11
Myrtaceae	<i>Kunzea salina</i>	P3	New	4 (Chen, Sam), 5 (Mel SL)	Between Area 3 and 4, 15	33
Euphorbiaceae	<i>Stachystemon vinosus</i>	P4	New	7 (Mal WL)	6	1

Plant identification of incidental collection of species was undertaken through the most relevant, current and available taxonomic literature, keys and herbarium reference specimens available (Blackall & Grieve 1974; Blackall & Grieve 1975; Fagg, 2009; George 1991; George & Pieroni, 2002; Hollister & Thiele, n.d.a; Hollister & Thiele, n.d.b; JSTOR 2000 - ; Kadereit, 2015; Lowrie, 1999; Maslin, 2018 - ; Orthia et al., 2005; Sainsbury, 2019; Toelken 1996; Weber, 2007). All resources used were the most current to knowledge. Nomenclature used through this report follows the most recent scientific names through the Western Australian Herbarium (WAH, 1998-).

Two non-threatened species were incidentally identified within the survey area that bore close similarities to conservation listed species identified in the 10-15km desktop analysis. Rationale on their differences to priority species are listed below:

- *Senecio glossanthus* (non-threatened) – distinguished from similar *Senecio serratifomis* subsp. *serratifomis* (P1) by associated of saline salt lakes habitat, which is not suitable habitat for the priority one species.
- *Centrolepis polygyna* (non-threatened) – distinguished from similar *Centrolepis cephaloformis* subsp. *murrayi* (P3) due to flowers on specimen being extended on a scape and hidden in spike, which is not suitable for *C. cephaloformis* subsp. *murrayi* with sessile flowers.

**Eremophila glabra subsp. Scaddan (C. Turley s.n. 10/11/2005), TF - Cr En**

A single plant of the critically endangered flora *E. glabra* subsp. *Scaddan* (C. Turley s.n. 10/11/2005) was identified within the survey area and on the active footprint (stone rubble) of the railway line, located in Area 3/Vegetation Type 4 (Chen, Sam), as shown in Map 4b Appendix A. It is located at 346.126 KM. *E. glabra* subsp. *Scaddan* (C. Turley s.n. 10/11/2005) is listed as critically endangered (DAWE, 2019). The habitat the plant was detected in is considered to be suitable habitat. The plant was flowering profusely and a specimen was collected and submitted to the WA Herbarium by DBCA Esperance District Conservation Officer, Emma Adams for confirmation (EA952, retained by WA Herbarium). The plant detected was considered a new population, with no nearby populations present. A Threatened and Priority Report Form (TPFL) was submitted to DBCA

Species district Flora Conservation Office (Emma Adams) and Species and Communities Branch on the 10/12/2021, a licence requirement under FTB2000327 (Appendix F).

*E. glabra* subsp. Scaddan (C. Turley s.n. 10/11/2005) is known from five sub-populations from three locations, with a total of 14 individuals recorded at time of nomination as threatened flora (EPA, 2016). Five plants at time of nomination were senescing or past reproduction. The largest population is nine mature individuals. Three populations are located in Shire road reserves and are at risk from road maintenance, with the other two on private property and unallocated crown land. The sub-species distribution is located within a 20km (east-west) x 25km (north-south) area. It has been recorded within the Eastern Mallee and Recherche IBRA regions and Esperance local government area.

Arc Infrastructure are proposing to install physical barriers around the plant and avoid impact during the works process altogether. This plant will be protected from any clearing. Ongoing discussions are occurring with DBCA, on relevant approvals required for works and operations to occur in the near vicinity of the plant and possible impact of soil seed bank, primarily 'Authorisation to take threatened flora (PTT)' under Section 40 of the BC Act 2016 (Appendix G).



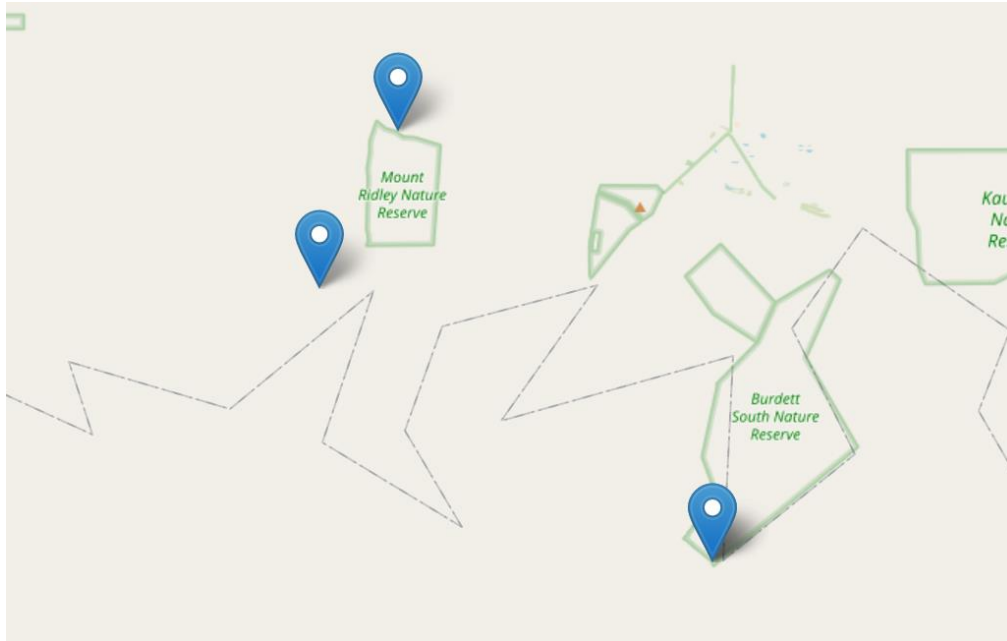


Figure 2: *Eremophila glabra* subsp. *Scaddan* (C. Turley s.n. 10/11/2005), (TF – Cr En) photos within survey area at 326.126KM and regional distribution (WAH, 1998 -).



**Goodenia turleyae, P1**

A new population of *Goodenia turleyae* was detected within the survey area, after being identified as possible to occur in with 10km desktop analysis, based on the description of salt lakes present. It was located specifically within Area 8 at 344.773 KM, within Vegetation Type 5 (Mel SL), consisting of Melaleuca shrublands on salt lake peripheries. The plants were located within a previously disturbed area with bare, open ground consisting of an access track to the railway line, in a large sprawling mass. An estimate of 15 plants were present within a 2x2m<sup>2</sup> area. Due to this being a new population, a specimen was collected (KW186, Accession 9343, specimen not retained by the WA Herbarium). A threatened and priority reporting form (TPFL) was submitted to the DBCA district flora conservation officer (Emma Adams) and species and communities branch on 27/01/2022, a licence requirement under FTB62000327 (Appendix F).

The known distribution records of *G. turleyae* within Florabase (WAH, 1998 - ) indicate that *G. turleyae* is known from a total of 3 locations, with seven collections previously conducted. The species distribution is located within a 100km (east-west) x 20km (north-south) area. It has been recorded within the Eastern Mallee IBRA region and Esperance local government area.



Figure 3: *Goodenia turleyae*, P1 photos within survey area at 344.773 KM and regional distribution (WAH, 1998 -).

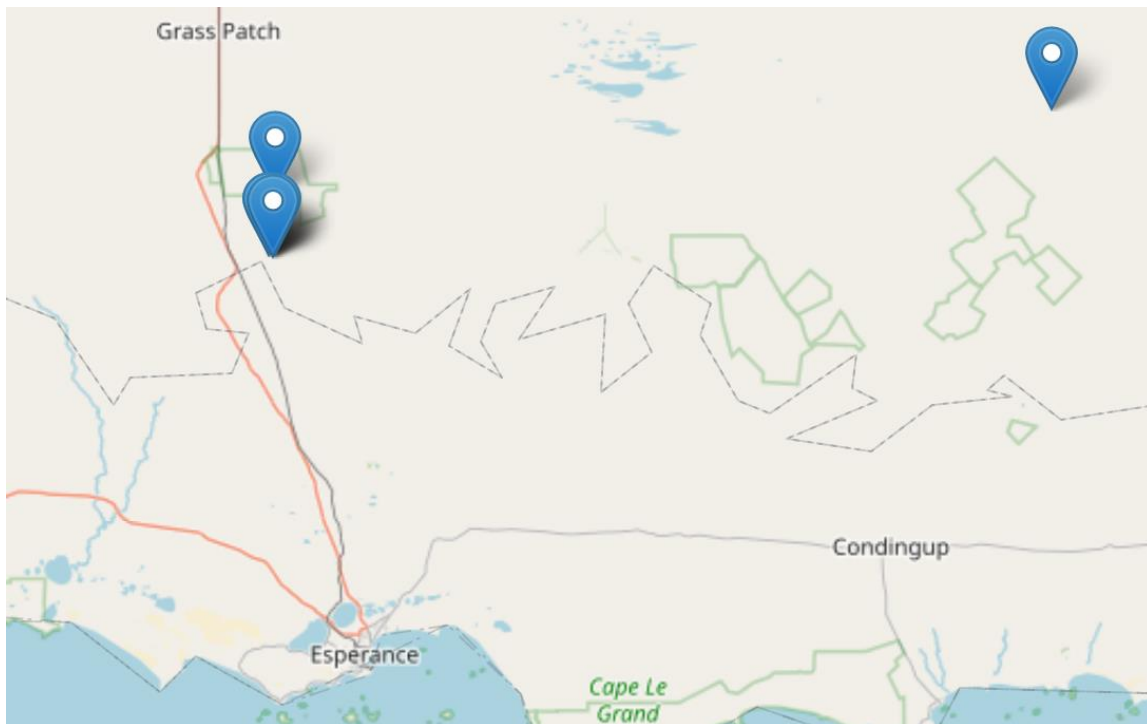


Figure 3 continued.

#### 4.3. Threatened and Priority Ecological Communities

The targeted survey (vegetation component) focused specifically on determining the presence of 'Proteaceae Dominated Kwongkan Shrublands of the Southeast Coastal Floristic Province of Western Australia (Kwongkan)' Threatened (TEC) and Priority (PEC) Ecological Community within vegetation types identified in the reconnaissance survey (BDS, 2021) to potentially meet criteria (Section 2.2). This specifically related to Vegetation Type 2 (Ban arm SL) and 3 (Pro SL), as further described in Appendix D. These vegetation types were recorded in Areas 1b, 2, 12, 13 and 14, with quadrat analysis conducted within each of these areas (Appendix E). Analysis, results and discussion of the quadrat sampling within each of those areas are

outlined below for Vegetation Type 2 (Ban arm SL) and 3 (Pro SL). These quadrats were used as the sample sites for analysis of quantitative and qualitative requirements to meet Kwongkan TEC (Table 6; EPA, 2016).

In summary, all quadrats sampled met Kwongkan PEC/TEC criteria (Table 6), and therefore both Vegetation Type 2 (Ban arm) and 3 (Pro SL) is considered to be the TEC. However, the total area of Kwongkan TEC/PEC present is very small, with 0.21ha for Vegetation type 2 (Ban arm SL) and 0.15ha for Vegetation Type 3 (Pro SL). Overall a total of 0.36ha of Kwongkan TEC/PEC is present within the survey area.

**Table 6: Summary of threatened ecological community targeted survey, determining on presence of ‘Proteaceae Dominated Kwongkan Shrubland of the South-east Coastal Floristic Province (Kwongkan)’ Threatened Ecological Community (TEC) within Vegetation Type 2 and 3.**

Vegetation Type	Area Identified in	Total area (ha)	Quadrat number	Meets Kwongkan diagnostic criteria
2 (Ban arm SL)	1b	0.03	1	Yes
2 (Ban arm SL)	12	0.18	4	Yes
3 (Pro SL)	2	0.09	2	Yes
3 (Pro SL)	13	0.06	3	Yes
3 (Pro SL)	14	0 – no vegetation remaining	No quadrat- no vegetation remaining	No – no native vegetation remaining

### **Vegetation Type 2 (Ban arm SL)**

Two quadrats were sampled within Vegetation Type 2, *Banksia armata* dominated Shrubland (quadrat one and four; Appendix E). Muirs (Muir, 1977) and NVIS Level V descriptions are listed below, as described in the reconnaissance survey (BDS, 2021) and further described in Appendix E. The two areas identified as consisting of Vegetation Type 2 were Area 1b (quadrat 1) and Area 12 (quadrat 4). It was worth noting that Area 12, where quadrat four was sampled, has likely experienced disturbance through clearing or chaining in the past. Area 12 consists of a small, narrow buffer of bush between an existing laydown area directly adjacent to the railway line and an access track.

Vegetation Description (NVIS): U+ *Eucalyptus pleurocarpa*, *Eucalyptus leptocalyx* Mallee; M+ *Hakea corymbosa*, *Banksia armata*, *Allocasuarina humilis* shrub; G *Caustis dioica*, +/- *Lepidosperma carphoides*, *Neurachne alopecuroides* sedge, grass.

Vegetation Description (Muirs): *Eucalyptus pleurocarpa* and *Eucalyptus leptocalyx* Open Mallee mid and low woodland, over *Acacia cyclops* and *Hakea corymbosa* sparse tall shrubland, over *Banksia armata*, *Allocasuarina humilis*, *Beaufortia empetrifolia*, *Calothamnus gracilis* and *Daviesia teretifolia* mid shrubland, over *Hibbertia gracilipes* sparse low shrubland, over *Lepidosperma carphoides*, *Caustis dioica*, *Chorizandra enodis* open tall sedgeland, over *Dampiera lavandulacea* sparse forbland, over *Neurachne alopecuroides* sparse grassland.

**Table 7: Quadrat analysis of Vegetation Type 2 (Ban arm SL) during the targeted survey, determining the presence of 'Proteaceae Dominated Kwongkan Shrubland of the South-east Coastal Floristic Province (Kwongkan)' Threatened Ecological Community (TEC).**

Criteria	Description	Discussion	Meet Criteria
1)	Occurs within the South Coastal Floristic Province (Hopper and Gioia, 2004).	Confirmed in reconnaissance survey (BDS, 2021) that survey area located within province.	Yes
2a)	Characterised by Proteaceae species having 30% or greater cover of Proteaceae species across all layers of where shrubs occur (crowns measured as if opaque).	Both Quadrat one and four had a total cover exceeding 30% of Proteaceous species. Specifically for quadrat one, four Proteaceous species had a cover of <10% and two Proteaceous species had a 10-30% cover. This cumulatively exceeds 30%. Specifically for quadrat four, six Proteaceous species had a cover <10% and one Proteaceous species had a cover of 10-30% cover. This cumulatively exceeds 30%.	Yes
2b)	<p>Two or more diagnostic Proteaceae species are present that are likely to form a significant vegetative component when regenerated.</p> <p>The use of diagnostic species is for situations in which the cover or Proteaceae species is reduced due to recent disturbance (e.g., fire).</p>	<p>Whilst the site had not been recently burnt, which is the basis for this criterion, it does provide an indication of keystone species present within the community.</p> <p>Proteaceous species make up the dominant feature of the vegetation type present, as indicated by the NVIS Level V and Muirs (Muir, 1977) description, which identifies two Proteaceous species in the description. Specifically, <i>Hakea corymbosa</i> and <i>Banksia armata</i> are identified as having mixed dominance and key species of mid-story shrubland.</p> <p>Four Proteaceous species occurred in both quadrat one and four (with cover &lt;10% or 10-30% and deemed as key indicator species). These included <i>Banksia armata</i>, <i>Isopogon polycephalus</i>, <i>Petrophile fastigiata</i>, <i>Grevillea pauciflora</i> and <i>Hakea prostrata</i>.</p> <p>Therefore, two or more diagnostic Proteaceous species form a key ecological marker and are likely to be significant when the ecological community is regenerating.</p>	Yes
Qualitative	<p>Approved conservation Advice guidelines – form and structure of vegetation.</p> <p>Qualitative description of Kwongkan as below:</p> <ul style="list-style-type: none"> <li>• Structure of shrubland, ranging from high to low and varying density;</li> <li>• Mallee Eucalypt often scattered and present, forming independent stratum layer; and</li> <li>• High floristic richness and localised endemism.</li> </ul>	<p>Descriptions of the vegetation indicate that the vegetation is predominately a shrubland structure, with a total of 30-70% cover of all shrubs (as indicated in the NVIS Level V description). The quadrat analysis indicates that 63% and 86% of plant species present were shrubs, for quadrat one and four respectively.</p> <p><i>Eucalyptus pleurocarpa</i> and <i>Eucalyptus leptocalyx</i> were both identified in quadrat one and four, consisting of Mallee Eucalypts. Both were scattered.</p> <p>Quadrat one was highly diverse and evidently incredibly complicated ecologically, with 52 species identified in the 10x10m (and 20x20m for over-story only) quadrat area. Within quadrat four, 34 species were identified, which is comparatively lower, likely due to disturbance. However, it remains significantly diverse compared to other ecological communities.</p>	Yes

Table 7 continued.

Criteria	Description	Discussion	Meet Criteria
Qualitative	Approved Conservation Advice guidelines – key diagnostic species	Of the Proteaceous species identified in quadrat one and four, three species were identified as key diagnostic species within the Approved Conservation Guidelines (DoE, 2015). These included <i>Banksia armata</i> , <i>Isopogon polycephalus</i> and <i>Hakea corymbosa</i> . Overall, 14 Proteaceous species were present within Vegetation Type 2 (Ban arm SL).	Yes
Qualitative	Condition category for minimum patch size – refer to Table 1, Section 2.2.	<p>Patch criteria refers to the size of a discrete and continuous area of the ecological community, opposed to the survey area specifically. The surrounding vegetation outside of the survey area was not surveyed and it is unknown how far the ecological community extends in the surrounding vegetation.</p> <p>Both Area 1b and 12, were locally at a very small scale fragmented from the surrounding large reserve of vegetation through access tracks and the railway line. However, it is believed that ecologically the area behaves as a unit with the surrounding bush.</p> <p>It is therefore highly likely that the survey area meets Patch criteria to be considered Kwongkan.</p>	Yes – limitations

### Vegetation Type 3 (Pro SL)

Two quadrats were sampled within Vegetation Type 3, Proteaceous Shrubland with scattered Mallee (Quadrat 2 and 3; Appendix E). Muirs (Muir, 1977) and NVIS Level V descriptions are listed below, as described in the reconnaissance survey (BDS, 2021) and further described in Appendix E. The two areas identified as consisting of Vegetation Type 3 were area 2 (Quadrat 2) and area 13 (Quadrat 3). No quadrat analysis occurred in Area 14, despite it being identified in Table 3 as potentially meeting Kwongkan criteria. This is due to the small amount of vegetation present being recently cleared. Emergent shrubs remained and surrounding vegetation indicated that Area 14 would likely have consisted of Vegetation Type 3.

Vegetation Description (NVIS): U <sup>^</sup> *Eucalyptus pleurocarpa*, *Eucalyptus leptocalyx* Mallee; M+ <sup>^</sup> *Hakea lissocarpa*, *Isopogon polycephalus*, *Grevillea oligantha* shrub; G <sup>^</sup> *Banksia blechnifolia*, *Hibbertia gracilipes*, *Caustis dioica* low shrub, sedge.

Vegetation Description (Muir): *Eucalyptus pleurocarpa* and *Eucalyptus leptocalyx* Open Mallee Mid Woodland, over *Acacia cyclops* isolated tall shrubs, *Hakea lissocarpa*, *Isopogon polycephalus*, *Grevillea oligantha*, *Daviesia apiculata* and *Calothamnus gracilis* closed mid shrubland, over *Banksia blechnifolia* and *Hibbertia gracilipes* open low shrubland, over *Lepidosperma carphoides*, *Caustis dioica* and *Lepidobolus chaetocephalus* open tall shrubland, over *Dampiera lavandulacea* sparse forbland.

**Table 8: Quadrat analysis of Vegetation Type 3 (Pro SL) during the targeted survey, determining the presence of 'Proteaceae Dominated Kwongkan Shrubland of the South-east Coastal Floristic Province (Kwongkan)' Threatened Ecological Community (TEC).**

Criteria	Description	Discussion	Meet Criteria
1)	Occurs within the South Coastal Floristic Province (Hopper and Gioia, 2004);	Confirmed in reconnaissance survey (BDS, 2021) that survey area located within province.	Yes
2a)	Characterised by Proteaceae species having 30% or greater cover of Proteaceae species across all layers of where shrubs occur (crowns measured as if opaque).	Both quadrat two and three had a total cover exceeding 30% of Proteaceous species. Specifically for quadrat two, four Proteaceous species had cover of <10% and one Proteaceous species of 10-30% cover, which accumulatively exceeds 30%. Specifically for quadrat three, four Proteaceous species had cover <10% and one Proteaceous species of 10-30% cover, which accumulatively exceeded 30%.	Yes
2b)	Two or more diagnostic Proteaceae species are present that are likely to form a significant vegetative component when regenerated. The use of diagnostic species is for situations in which the cover of Proteaceae species is reduced due to recent disturbance (e.g., fire).	<p>Whilst the site had not been recently burnt, which is the basis for this criteria, it does provide an indication of keystone species present within the community.</p> <p>Proteaceous species make up the dominant feature of the vegetation type present, as indicated by the NVIS Level V and Muirs (Muir, 1977) description, which identifies four Proteaceous species in the description. Specifically, <i>Hakea lissocarpa</i>, <i>Isopogon polycephalus</i>, <i>Grevillea oligantha</i> and <i>Banksia blechnifolia</i> are identified as having mixed dominance and key species of midstorey and lower shrubland.</p> <p>One Proteaceous species occurred in both Quadrat one and four (with cover &lt;10% or 10-30% and deemed significant), <i>Grevillea oligantha</i>.</p> <p>Therefore, two or more diagnostic Proteaceous species form a key ecological marker and are likely to be significant when the ecological community is regenerating.</p>	Yes

Table 8 continued.

Criteria	Description	Discussion	Meet Criteria
Qualitative	Approved conservation Advice guidelines – form and structure of vegetation.  Qualitative description of Kwongkan as below: <ul style="list-style-type: none"> <li>• Structure of shrubland, ranging from high to low and varying density;</li> <li>• Mallee Eucalypt often scattered and present, forming independent stratum layer; and</li> <li>• High floristic richness and localised endemism.</li> </ul>	Quadrat analysis and descriptions of the vegetation indicate that the vegetation is predominately a shrubland structure, with a total of 70-100% cover of all shrubs (as indicated in the NVIS Level V description). The quadrat analysis indicates that 50% and 51% of plant species present were shrubs, for quadrat two and three respectively.  <i>Eucalyptus pleurocarpa</i> was identified in quadrat two and three, forming the Mallee Eucalypt structure layer.  Quadrat three was highly diverse and evidently incredibly complicated ecologically, with 42 species identified in the 10x10m (and 20x20m for over-story only) quadrat area. Within quadrat two, 28 species were identified, which is comparatively lower. However, it remains significantly diverse compared to other ecological communities.	Yes
Qualitative	Approved Conservation Advice guidelines – key diagnostic species.	Of the Proteaceous species identified in quadrat two and three, one species was identified as a key diagnostic species within the Approved Conservation Guidelines (DoE, 2015). Specifically, <i>Isopogon polycephalus</i> . Overall, 15 Proteaceous species were present within vegetation type three (Pro SL).	Yes
Qualitative	Condition category for minimum patch size – refer to Table 1, Section 2.2.	Patch criteria refers to the size of a discrete and continuous area of the ecological community, opposed to the survey area specifically. The surrounding vegetation outside of the survey area was not surveyed and it is unknown how far the ecological community extends in the surrounding vegetation.  Both Area 3 and 13, were locally at a very small scale fragmented from the surrounding large reserve of vegetation through access tracks and the railway line. However, it is believed that ecologically the area behaves as a unit with the surrounding bush.  It is therefore highly likely that the survey area meets Patch criteria to be considered Kwongkan.	Yes – limitations

## 5. Summary of Targeted and Reconnaissance Flora and Vegetation Survey

The scope for this targeted survey was to provide the client with additional information on specific targeted flora and vegetation objectives for sections of linear survey and 15 separate laydown areas along the railway corridor adjacent to Fleming Grove Road, 344.9-346.485 KM, Line 51. The targeted survey accompanies results of the reconnaissance survey (BDS, 2021), previously conducted out of season.

Seven vegetation types were recorded during the survey. Namely, Vegetation Types 1 Myrtaceous Shrubland (Myr SL), 2 *Banksia armata* dominated shrubland with scattered Mallee and Acacia (Ban arm SL), 3 Mixed Proteaceous Shrubland with scattered Mallee (Pro SL), 4 Low Chenopod and Samphire forbland on immediate salt lake (Chen, Sam), 5 Closed Melaleuca shrubland on salt lake peripheries (Mel SL), 6 Paperbark Melaleuca woodland wetlands (Mel WL) and 7 Open Mallee Woodland with dense sedgeland (Mal WL). These vegetation types broadly align with different habitat types, at a landscape level of woodland/shrublands on a sandplain and the communities associated with distinct hydrological regimes of inland salt lakes. The condition of the vegetation types ranged from 'Degraded' through to 'Excellent', the majority of the vegetation types being in 'Very Good' or 'Excellent' condition.

Quadrat analysis indicated that both Vegetation Type 2 (Ban arm SL) and 3 (Pro SL) met the Threatened (TEC) and Priority (PEC) Ecological Community 'Proteaceae dominated Kwongkan shrubland of the southeast coastal floristic bioregion (Kwongkan)'. However, a very small amount of vegetation is proposed to be impacted that is considered Kwongkan - a total of 0.36ha.

A total of 220 species of flora were recorded, consisting of 213 native species and seven introduced/non-native species. This indicates the extremely high level of biodiversity recorded within the area, as is typical for the Esperance Sandplain bioregion. A total of nine species of priority or threatened flora were recorded across the survey area, which is summarised below in Table 9, with specific numbers of individual plants per area within the survey area. These included Threatened Flora (Critically Endangered) *E. glabra* subsp. Scaddan (C. Turley s.n. 10/11/2005), P1 *G. turleyae*, P1 *D. sp.* Gibson (R.D. Royce 3569), P3 *I. alpicornis*, P3 *C. marchantiorum*, P3 *B. mogin*, P3 *K. salina*, P3, *P. scabra* and P4 *S. vinous*. Three of these species had been previously recorded within the area, and six were new populations (*E. glabra* subsp. Scaddan [C. Turley s.n. 10/11/2005], *G. turleyae*, *B. mogin*, *K. salina*, *P. scabra* and *S. vinosus*). All species of priority flora recorded had plants counted only within the survey area and not in the broader reserve, with ample habitat likely present surrounding the reserve that may harbour additional plants of the population.

Further approvals are required for operating within the direct vicinity of the Threatened Flora, *E. glabra* subsp. Scaddan (C. Turley s.n. 10/11/2005), primarily a 'Authorisation to take threatened flora (PTT)' under Section 40 of the *BC Act 2016*). The appropriate application and correspondence to DBCA is included in Appendix G.



**Table 9: Summary of priority flora and vegetation limitations from the targeted and reconnaissance survey, broken into the separate areas of the survey area.**

Area	Rail KMs	Vegetation Type	Fauna	Flora
1a	346.97	1		
1b	346.97	2 - Kwongkan TEC Present.	Potential Black Cockatoo Foraging	
2	346.759	3 – Kwongkan TEC Present.	Potential Black Cockatoo Foraging	<ul style="list-style-type: none"> <li>• <i>Conostephium marchantiorum</i> - 1 plant.</li> <li>• <i>Brachyloma mogin</i> – 2 plants.</li> <li>• <i>Persoonia scabra</i> - 4 plants.</li> </ul>
3	346.150	4		<ul style="list-style-type: none"> <li>• <i>E. glabra</i> subsp. Scaddan (C. Turley s.n. 10/11/2005) - 1 plant.</li> </ul>
Linear survey between Area 3 and 4	345.933 to 346.50	5		<ul style="list-style-type: none"> <li>• <i>Darwinia</i> sp. Gibson - 2 plants.</li> <li>• <i>Brachyloma mogin</i> - 5 plants.</li> <li>• <i>Kunzea salina</i> - 31 plants.</li> </ul>
4	345.933	5		<ul style="list-style-type: none"> <li>• <i>Darwinia</i> sp. Gibson - 35 plant.</li> <li>• <i>Brachyloma mogin</i> - 3 plants.</li> </ul>
Linear Survey between Area 4 and 5	345.631 to 345.905	5		<ul style="list-style-type: none"> <li>• <i>Darwinia</i> sp. Gibson - 11 plants.</li> <li>• <i>Isopogon alcicornis</i> - 1 plant.</li> </ul>
5	345.953	6 and 7	Potential Black Cockatoo Foraging	<ul style="list-style-type: none"> <li>• <i>Conostephium marchantiorum</i> - 1 plant.</li> <li>• <i>Isopogon alcicornis</i> - 12 plants.</li> </ul>
6	345.431	7	Potential Black Cockatoo Foraging	<ul style="list-style-type: none"> <li>• <i>Isopogon alcicornis</i> - 6 plants.</li> <li>• <i>Stachystemon vinosus</i> - 1 plant.</li> </ul>
7	345	5		<ul style="list-style-type: none"> <li>• <i>Brachyloma mogin</i> - 1 plant.</li> </ul>
Linear survey between Area 7 and 8	345 to 344.941	5		<ul style="list-style-type: none"> <li>• <i>Conostephium marchantiorum</i> - 1 plant.</li> </ul>
8	344.784	5		<ul style="list-style-type: none"> <li>• <i>Goodenia turleyae</i> - 15 plants</li> </ul>
9	344.446	7	Potential Black Cockatoo Foraging	<ul style="list-style-type: none"> <li>• <i>Persoonia scabra</i> - 4 plants.</li> </ul>
10	344.397	7	Potential Black Cockatoo Foraging	<ul style="list-style-type: none"> <li>• <i>Isopogon alcicornis</i> - 7 plants</li> <li>• <i>Persoonia scabra</i> - 3 plants.</li> </ul>
11	344.083	5		<ul style="list-style-type: none"> <li>• <i>Darwinia</i> sp. Gibson - 4 plants.</li> </ul>
12	347.174	2 – Kwongkan TEC present	Potential Black Cockatoo Foraging	<ul style="list-style-type: none"> <li>• <i>Conostephium marchantiorum</i> - 1 plant.</li> <li>• <i>Persoonia scabra</i> - 1 plant.</li> </ul>
13	346.759	3 - Kwongkan TEC present	Potential Black Cockatoo Foraging	<ul style="list-style-type: none"> <li>• <i>Conostephium marchantiorum</i> - 4 plants.</li> <li>• <i>Persoonia scabra</i> - 4 plants.</li> </ul>
14		2	Potential Black Cockatoo Foraging	
15	345.933	4		<ul style="list-style-type: none"> <li>• <i>Kunzea salina</i> - 2 plants.</li> </ul>

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## **8 Appendices**

Appendix A – Maps

Appendix B – Conservation Significant Values Likelihood of Occurrence Analysis

Appendix C – Conservation Status Definitions and Condition Scale

Appendix D – Vegetation Types defined in the Reconnaissance Flora and Vegetation and Basic Fauna survey (BDS, 2021)

Appendix E – Species Lists and Relevé and Quadrat Data

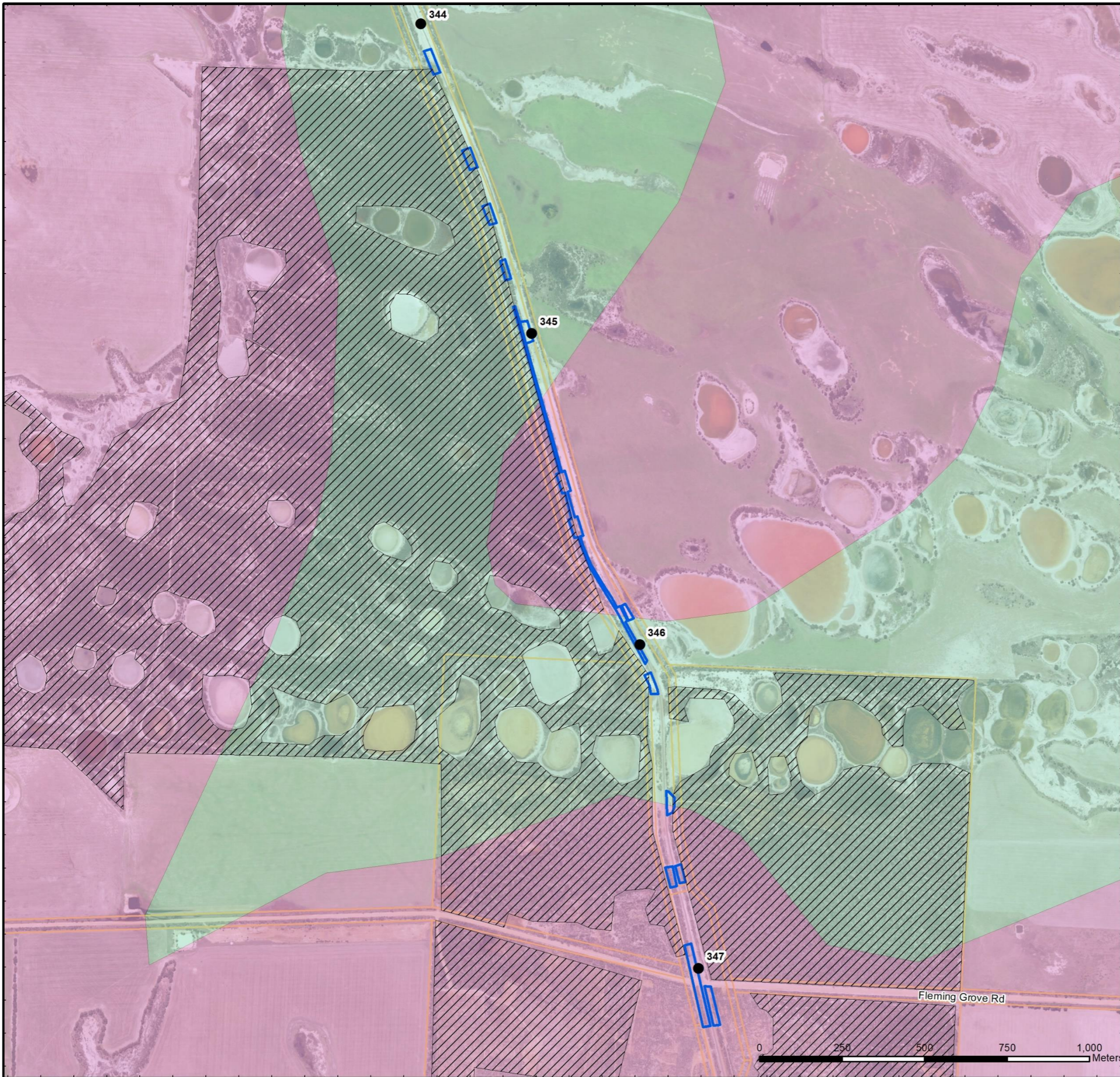
Appendix F – DBCA Threatened and Priority Reporting Forms (TPFL)

Appendix G – Permit to Take Threatened Flora Applications

# Appendix A

## Maps

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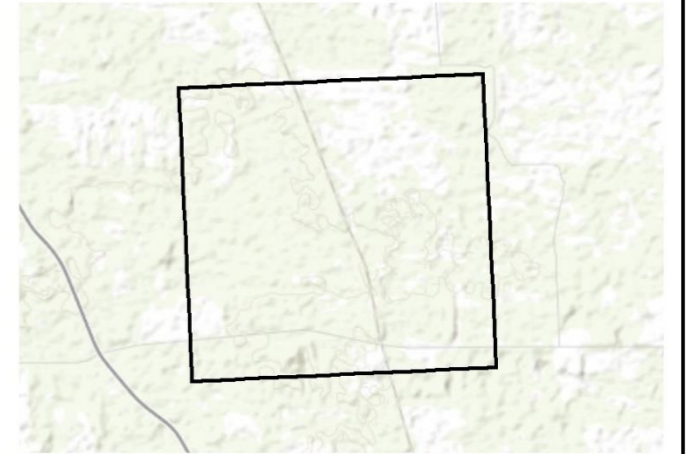


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Overview Map Scale 1:100,000

**Legend**

- Survey Area
- Cadastre
- Rail kilometre points
- Native Vegetation Extent (DPIRD\_005)**
- Native Vegetation Extent (DPIRD\_005)
- Pre European Vegetation (DPIRD\_006)**
- ESPERANCE\_41
- ESPERANCE\_47



Scale  
1:11,500 @ A3  
GDA MGA 94 Zone 50

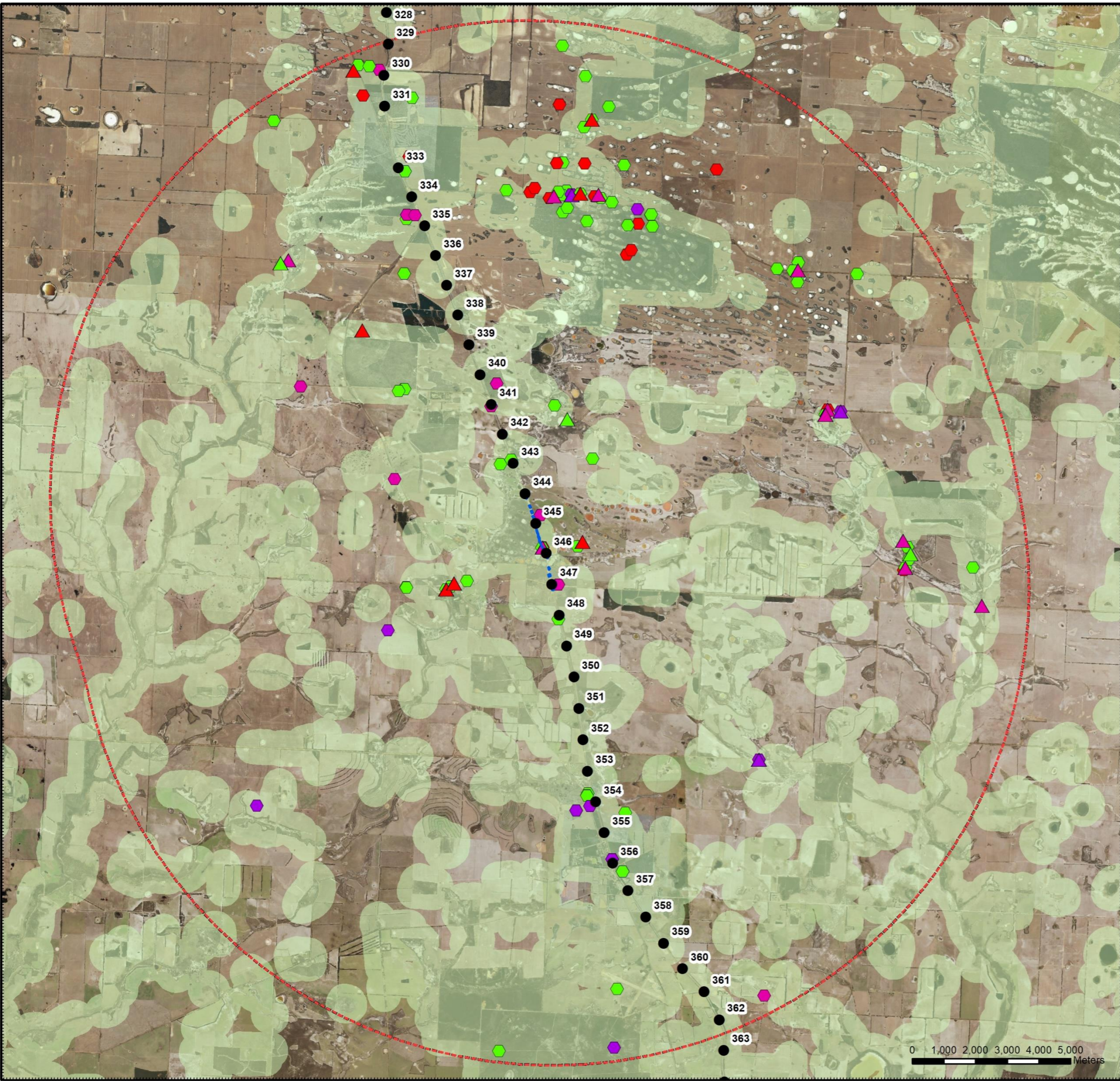
**Data Sources**  
Aerial Imagery: WA Now, Landgate Subscription Imagery  
Cadastre, Relief Contours and Roads: Landgate 2017  
IRIS Road Network: Main Roads Western Australia 2017  
Overview Map: World Topographic map service, ESRI 2012

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**Map 1: Desktop Vegetation Data**

	QA Check <b>KW</b>	Drawn by <b>BT</b>
STATUS <b>FINAL</b>	FILE <b>AI003</b>	DATE <b>22/07/2021</b>

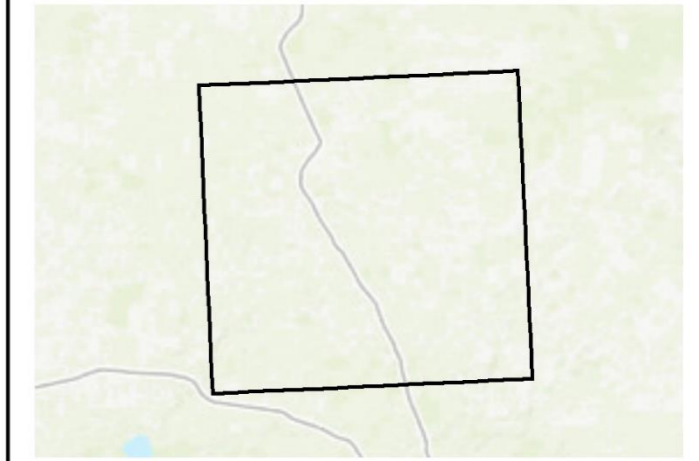
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Overview Map Scale 1:1,000,000

- Legend**
- Survey Area
  - 15km Flora and Ecological Community Study Area
  - Rail kilometre points

**32-0621FL\_TPFL**

- ▲ P1
- ▲ P2
- ▲ P3
- ▲ T

**32-0621FL\_WAHerb**

- P1
- P2
- P3
- P4

**Priority and Threatened Ecological Communities  
State Category, Commonwealth Category**

- Priority 3, Endangered



Scale  
1:120,000@ A3  
GDA MGA 94 Zone 50

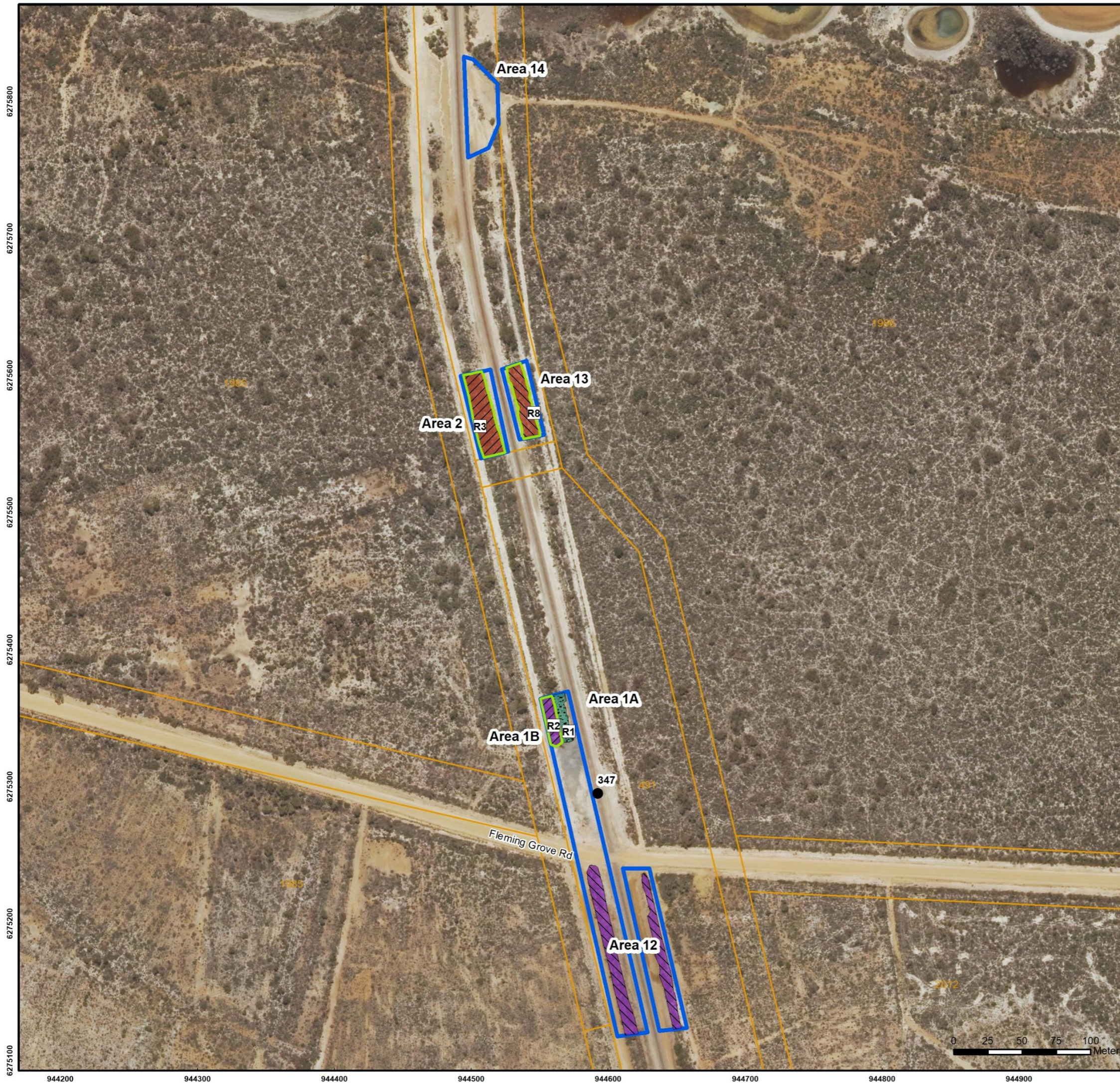
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Aerial Imagery: WA Now, Landgate Subscription Imagery  
Cadastral, Relief Contours and Roads: Landgate 2017  
IRIS Road Network: Main Roads Western Australia 2017  
Overview Map: World Topographic map service, ESRI 2012

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**Map 2: Desktop Flora & TEC/PEC Data**

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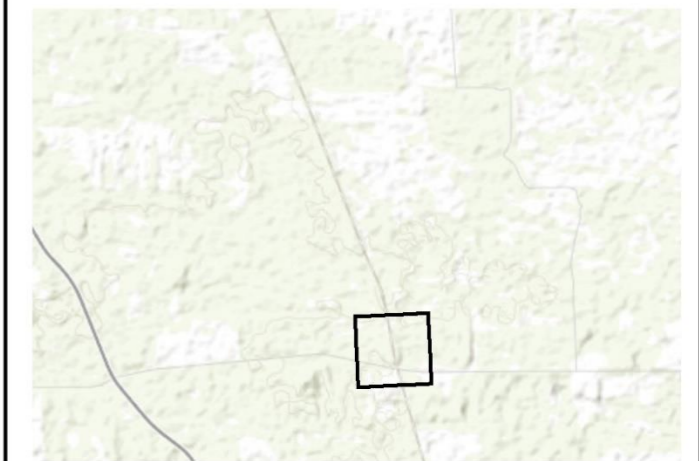
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Overview Map Scale 1:100,000

- Legend**
- Survey Area
  - Cadastre
  - Rail kilometre points
  - Presence of Kwongkan TEC
  - Releve

- Vegetation Type**
- Vegetation Type 1
  - Vegetation Type 2
  - Vegetation Type 3
  - Vegetation Type 4
  - Vegetation Type 5
  - Vegetation Type 6
  - Vegetation Type 7

- Vegetation Condition**
- Excellent
  - Very Good
  - Good
  - Degraded

Scale  
1:2,750 @ A3  
GDA MGA 94 Zone 50

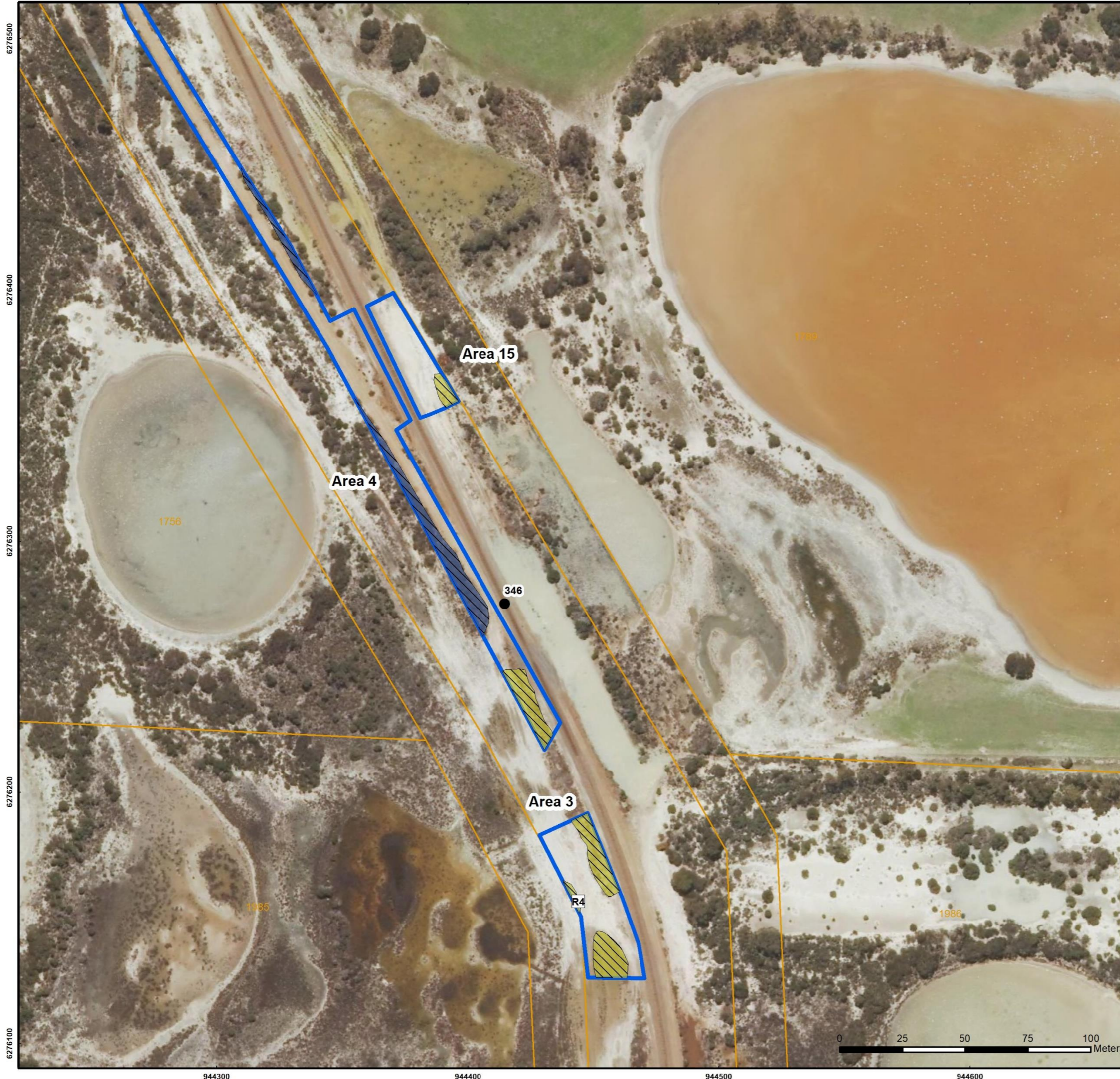
**Data Sources**  
Aerial Imagery: WA Now, Landgate Subscription Imagery  
Cadastre, Relief Contours and Roads: Landgate 2017  
IRIS Road Network: Main Roads Western Australia 2017  
Overview Map: World Topographic map service, ESRI 2012

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### Map 3a: Vegetation Types

	QA Check <b>KW</b>	Drawn by <b>BT</b>
STATUS <b>FINAL</b>	FILE <b>AI003</b>	DATE <b>22/07/2021</b>

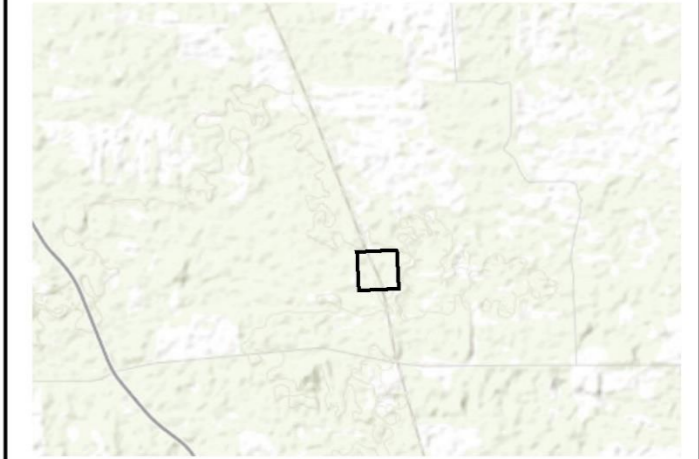




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Overview Map Scale 1:100,000

**Legend**

- Survey Area
- Cadastre
- Rail kilometer points
- Releve

**Vegetation Type**

- Vegetation Type 1
- Vegetation Type 2
- Vegetation Type 3
- Vegetation Type 4
- Vegetation Type 5
- Vegetation Type 6
- Vegetation Type 7

**Vegetation Condition**

- Excellent
- Very Good
- Good
- Degraded



Scale  
1:1,500 @ A3  
GDA MGA 94 Zone 50

**Data Sources**  
Aerial Imagery: WA Now, Landgate Subscription Imagery  
Cadastre, Relief Contours and Roads: Landgate 2017  
IRIS Road Network: Main Roads Western Australia 2017  
Overview Map: World Topographic map service, ESRI 2012

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**Map 3b: Vegetation Types**

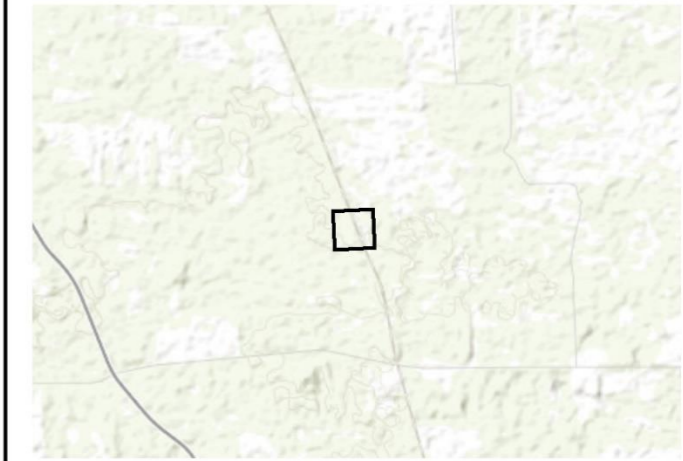
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STATUS <b>FINAL</b>	FILE <b>AI003</b>	DATE <b>22/07/2021</b>



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Overview Map Scale 1:100,000

**Legend**

- Survey Area
- Cadastre
- Rail kilometre points
- Releve

**Vegetation Type**

- Vegetation Type 1
- Vegetation Type 2
- Vegetation Type 3
- Vegetation Type 4
- Vegetation Type 5
- Vegetation Type 6
- Vegetation Type 7

**Vegetation Condition**

- Excellent
- Very Good
- Good
- Degraded



Scale  
1:1,500 @ A3  
GDA MGA 94 Zone 50

**Data Sources**  
Aerial Imagery: WA Now, Landgate Subscription Imagery  
Cadastre, Relief Contours and Roads: Landgate 2017  
IRIS Road Network: Main Roads Western Australia 2017  
Overview Map: World Topographic map service, ESRI 2012

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**Map 3c: Vegetation Types**

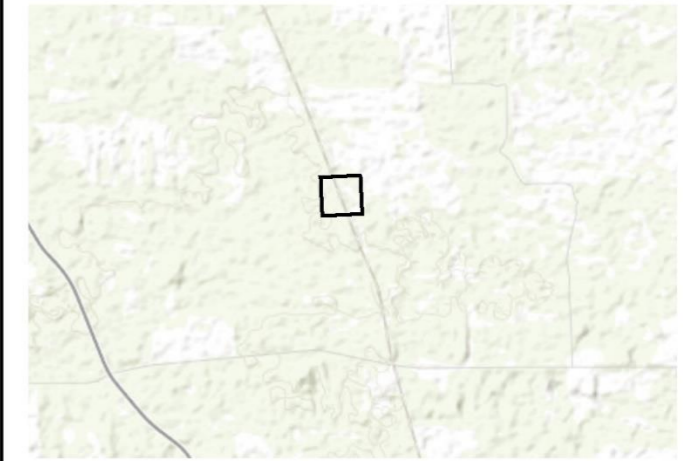
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STATUS <b>FINAL</b>	FILE <b>AI003</b>	DATE <b>22/07/2021</b>



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Overview Map Scale 1:100,000

- Legend**
- Survey Area
  - Cadastre
  - Rail kilometre points
  - Releve

- Vegetation Type**
- Vegetation Type 1
  - Vegetation Type 2
  - Vegetation Type 3
  - Vegetation Type 4
  - Vegetation Type 5
  - Vegetation Type 6
  - Vegetation Type 7

- Vegetation Condition**
- Excellent
  - Very Good
  - Good
  - Degraded



Scale  
1:1,500 @ A3  
GDA MGA 94 Zone 50

**Data Sources**  
Aerial Imagery: WA Now, Landgate Subscription Imagery  
Cadastre, Relief Contours and Roads: Landgate 2017  
IRIS Road Network: Main Roads Western Australia 2017  
Overview Map: World Topographic map service, ESRI 2012

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**Map 3d: Vegetation Types**

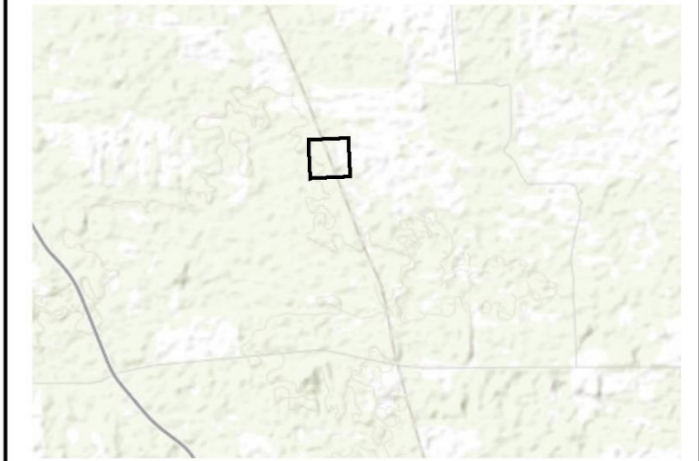
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Overview Map Scale 1:100,000

- Legend**
- Survey Area
  - Cadastre
  - Rail kilometre points
  - Releve

- Vegetation Type**
- Vegetation Type 1
  - Vegetation Type 2
  - Vegetation Type 3
  - Vegetation Type 4
  - Vegetation Type 5
  - Vegetation Type 6
  - Vegetation Type 7

- Vegetation Condition**
- Excellent
  - Very Good
  - Good
  - Degraded



Scale  
1:1,500 @ A3  
GDA MGA 94 Zone 50

**Data Sources**  
Aerial Imagery: WA Now, Landgate Subscription Imagery  
Cadastre, Relief Contours and Roads: Landgate 2017  
IRIS Road Network: Main Roads Western Australia 2017  
Overview Map: World Topographic map service, ESRI 2012

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**Map 3e: Vegetation Types**

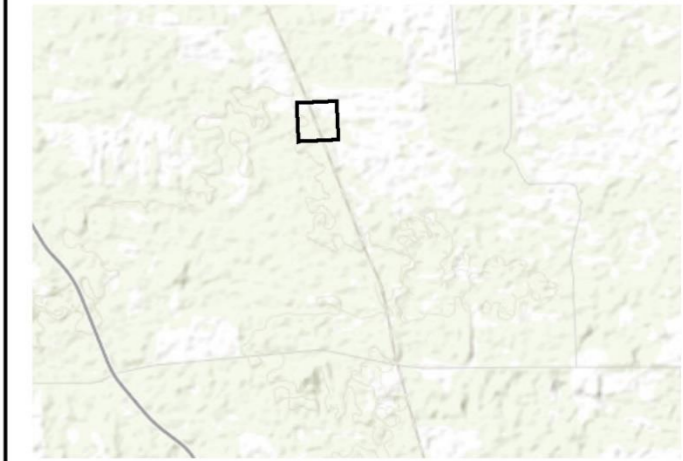
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Overview Map Scale 1:100,000

- Legend**
- Survey Area
  - Cadastre
  - Rail kilometre points
  - Relieve

- Vegetation Type**
- Vegetation Type 1
  - Vegetation Type 2
  - Vegetation Type 3
  - Vegetation Type 4
  - Vegetation Type 5
  - Vegetation Type 6
  - Vegetation Type 7

- Vegetation Condition**
- Excellent
  - Very Good
  - Good
  - Degraded

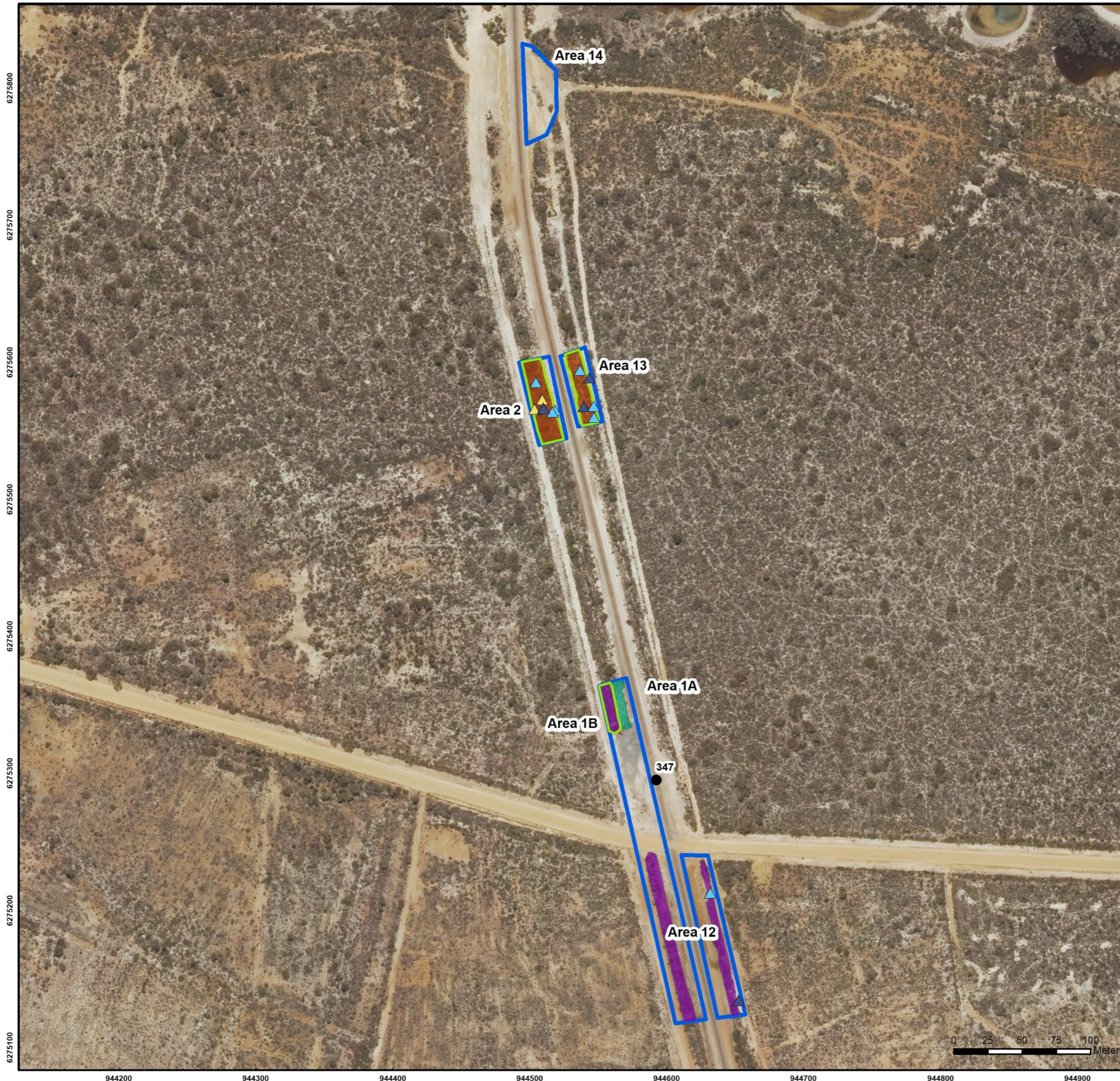
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GDA MGA 94 Zone 50

**Data Sources**  
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Cadastre, Relief Contours and Roads: Landgate 2017  
IRIS Road Network: Main Roads Western Australia 2017  
Overview Map: World Topographic map service, ESRI 2012

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**Map 3f: Vegetation Types**

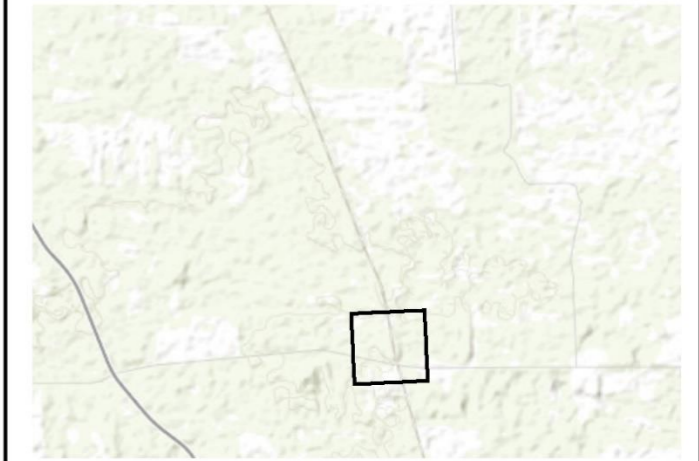
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Legend Overview Map Scale 1:100,000

- Survey Area
  - Rail kilometre points
  - Cadastre
  - Presence of Kwongkan TEC
- Vegetation Unit**
- Vegetation Type 1
  - Vegetation Type 2
  - Vegetation Type 3
  - Vegetation Type 4
  - Vegetation Type 5
  - Vegetation Type 6
  - Vegetation Type 7

- Conservation Significant Flora**
- ▲ *Eremophila glabra* subsp. Scaddan, TF
  - ▲ *Darwinia* sp. Gibson, P1
  - ▲ *Goodenia turleyae*, P1
  - ▲ *Brachyloma mogin*, P3
  - ▲ *Conostephium marchantiorum*, P3
  - ▲ *Isopogon alpicornis*, P3
  - ▲ *Kunzea salina*, P3
  - ▲ *Persoonia scabra*, P3
  - ▲ *Stachystemon vinosus*, P4



Scale  
1:2,750 @ A3  
GDA MGA 94 Zone 50

**Data Sources**  
Aerial Imagery: WA Now, Landgate Subscription Imagery  
Cadastre, Relief Contours and Roads: Landgate 2017  
IRIS Road Network: Main Roads Western Australia 2017  
Overview Map: World Topographic map service, ESRI 2012

**CLIENT**  
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### Map 4a: Conservation Significant Flora

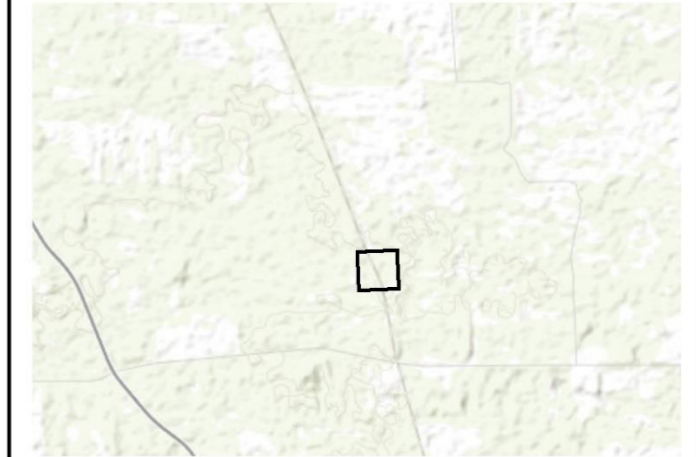
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Overview Map Scale 1:100,000

**Legend**

- Survey Area
- Rail kilometre points
- Cadastre
- Vegetation Unit**
- Vegetation Type 1
- Vegetation Type 2
- Vegetation Type 3
- Vegetation Type 4
- Vegetation Type 5
- Vegetation Type 6
- Vegetation Type 7

**Conservation Significant Flora**

- Eremophila glabra* subsp. Scaddan, TF
- Darwinia* sp. Gibson, P1
- Goodenia turleyae*, P1
- Brachyloma mogin*, P3
- Conostephium marchantiorum*, P3
- Isopogon alpicornis*, P3
- Kunzea salina*, P3
- Persoonia scabra*, P3
- Stachystemon vinosus*, P4



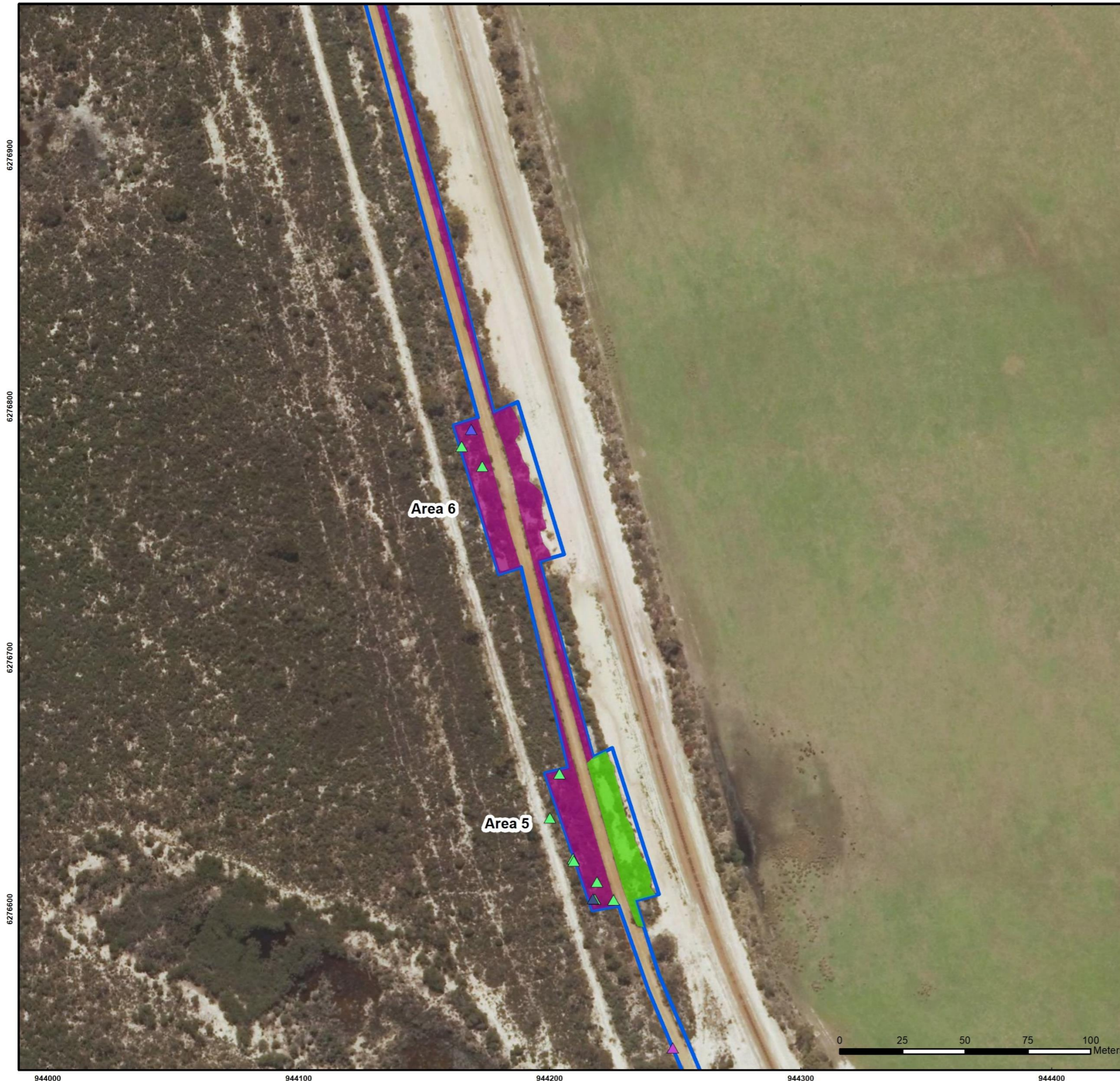
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GDA MGA 94 Zone 50

**Data Sources**  
Aerial Imagery: WA Now, Landgate Subscription Imagery  
Cadastre, Relief Contours and Roads: Landgate 2017  
IRIS Road Network: Main Roads Western Australia 2017  
Overview Map: World Topographic map service, ESRI 2012

**CLIENT**  
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**Map 4b: Conservation Significant Flora**

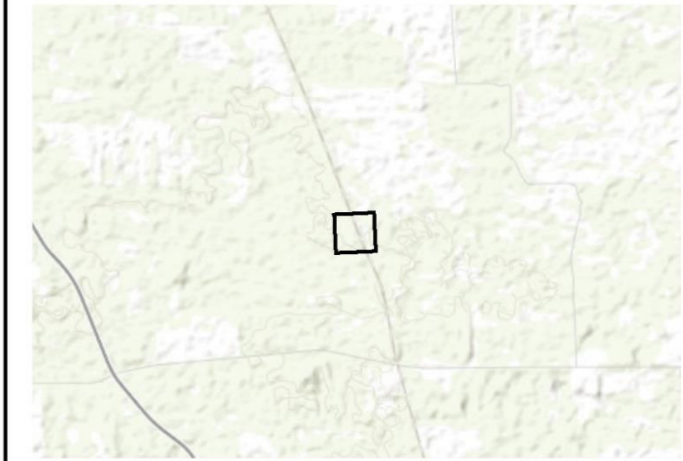
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STATUS <b>FINAL</b>	FILE <b>AI003</b>	DATE <b>08/12/2021</b>



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Legend Overview Map Scale 1:100,000

- Legend**
- Survey Area
  - Rail kilometre points
  - Cadastre
- Vegetation Unit**
- Vegetation Type 1
  - Vegetation Type 2
  - Vegetation Type 3
  - Vegetation Type 4
  - Vegetation Type 5
  - Vegetation Type 6
  - Vegetation Type 7

- Conservation Significant Flora**
- Eremophila glabra* subsp. Scaddan, TF
  - Darwinia* sp. Gibson, P1
  - Goodenia turleyae*, P1
  - Brachyloma mogin*, P3
  - Conostephium marchantiorum*, P3
  - Isopogon alpicornis*, P3
  - Kunzea salina*, P3
  - Persoonia scabra*, P3
  - Stachystemon vinosus*, P4



Scale  
1:1,500 @ A3  
GDA MGA 94 Zone 50

**Data Sources**  
Aerial Imagery: WA Now, Landgate Subscription Imagery  
Cadastre, Relief Contours and Roads: Landgate 2017  
IRIS Road Network: Main Roads Western Australia 2017  
Overview Map: World Topographic map service, ESRI 2012

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**Map 4c: Conservation Significant Flora**

	QA Check <b>KW</b>	Drawn by <b>CV</b>
STATUS <b>FINAL</b>	FILE <b>AI003</b>	DATE <b>08/12/2021</b>

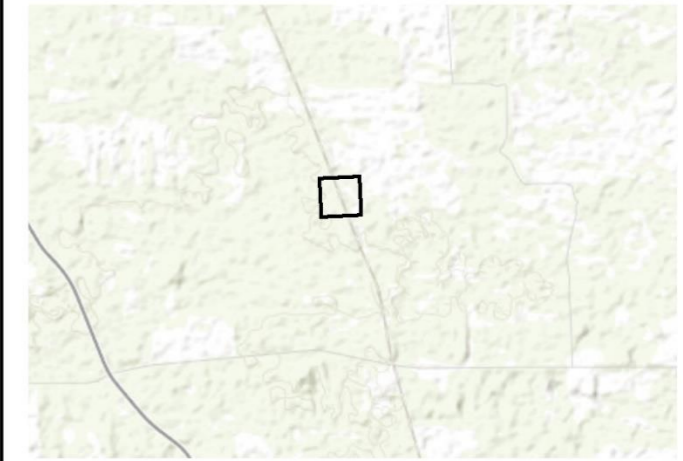




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Legend Overview Map Scale 1:100,000

- Survey Area
- Rail kilometre points
- Cadastre

- Vegetation Unit**
- Vegetation Type 1
  - Vegetation Type 2
  - Vegetation Type 3
  - Vegetation Type 4
  - Vegetation Type 5
  - Vegetation Type 6
  - Vegetation Type 7

- Conservation Significant Flora**
- Eremophila glabra* subsp. Scaddan, TF
  - Darwinia* sp. Gibson, P1
  - Goodenia turleyae*, P1
  - Brachyloma mogin*, P3
  - Conostephium marchantiorum*, P3
  - Isopogon alpicornis*, P3
  - Kunzea salina*, P3
  - Persoonia scabra*, P3
  - Stachystemon vinosus*, P4



Scale  
1:1,500 @ A3  
GDA MGA 94 Zone 50

**Data Sources**  
Aerial Imagery: WA Now, Landgate Subscription Imagery  
Cadastre, Relief Contours and Roads: Landgate 2017  
IRIS Road Network: Main Roads Western Australia 2017  
Overview Map: World Topographic map service, ESRI 2012

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**Map 4d: Conservation Significant Flora**

	QA Check <b>KW</b>	Drawn by <b>CV</b>
STATUS <b>FINAL</b>	FILE <b>AI003</b>	DATE <b>08/12/2021</b>

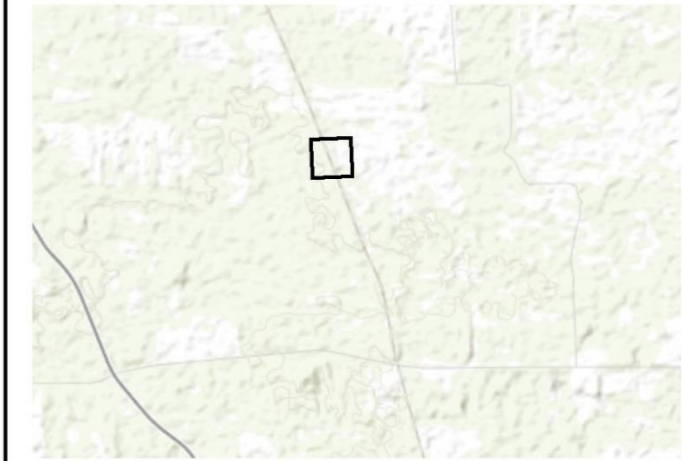
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Overview Map Scale 1:100,000

- Legend**
- Survey Area
  - Rail kilometre points
  - Cadastre
- Vegetation Unit**
- Vegetation Type 1
  - Vegetation Type 2
  - Vegetation Type 3
  - Vegetation Type 4
  - Vegetation Type 5
  - Vegetation Type 6
  - Vegetation Type 7

- Conservation Significant Flora**
- Eremophila glabra* subsp. Scaddan, TF
  - Darwinia* sp. Gibson, P1
  - Goodenia turleyae*, P1
  - Brachyloma mogin*, P3
  - Conostephium marchantiorum*, P3
  - Isopogon alpicornis*, P3
  - Kunzea salina*, P3
  - Persoonia scabra*, P3
  - Stachystemon vinosus*, P4



Scale  
1:1,500 @ A3  
GDA MGA 94 Zone 50

**Data Sources**  
Aerial Imagery: WA Now, Landgate Subscription Imagery  
Cadastre, Relief Contours and Roads: Landgate 2017  
IRIS Road Network: Main Roads Western Australia 2017  
Overview Map: World Topographic map service, ESRI 2012

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**Map 4e: Conservation Significant Flora**

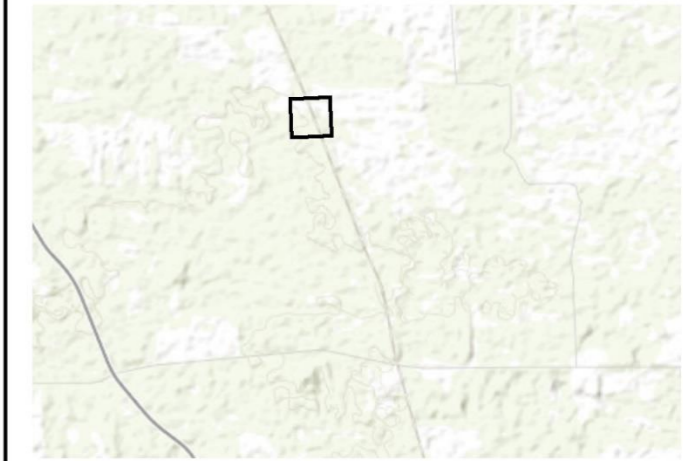
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STATUS <b>FINAL</b>	FILE <b>AI003</b>	DATE <b>08/12/2021</b>



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Legend Overview Map Scale 1:100,000

- Legend**
- Survey Area
  - Rail kilometre points
  - Cadastre
- Vegetation Unit**
- Vegetation Type 1
  - Vegetation Type 2
  - Vegetation Type 3
  - Vegetation Type 4
  - Vegetation Type 5
  - Vegetation Type 6
  - Vegetation Type 7

- Conservation Significant Flora**
- Eremophila glabra* subsp. Scaddan, TF
  - Darwinia* sp. Gibson, P1
  - Goodenia turleyae*, P1
  - Brachyloma mogin*, P3
  - Conostephium marchantiorum*, P3
  - Isopogon alpicornis*, P3
  - Kunzea salina*, P3
  - Persoonia scabra*, P3
  - Stachystemon vinosus*, P4



Scale  
1:1,500 @ A3  
GDA MGA 94 Zone 50

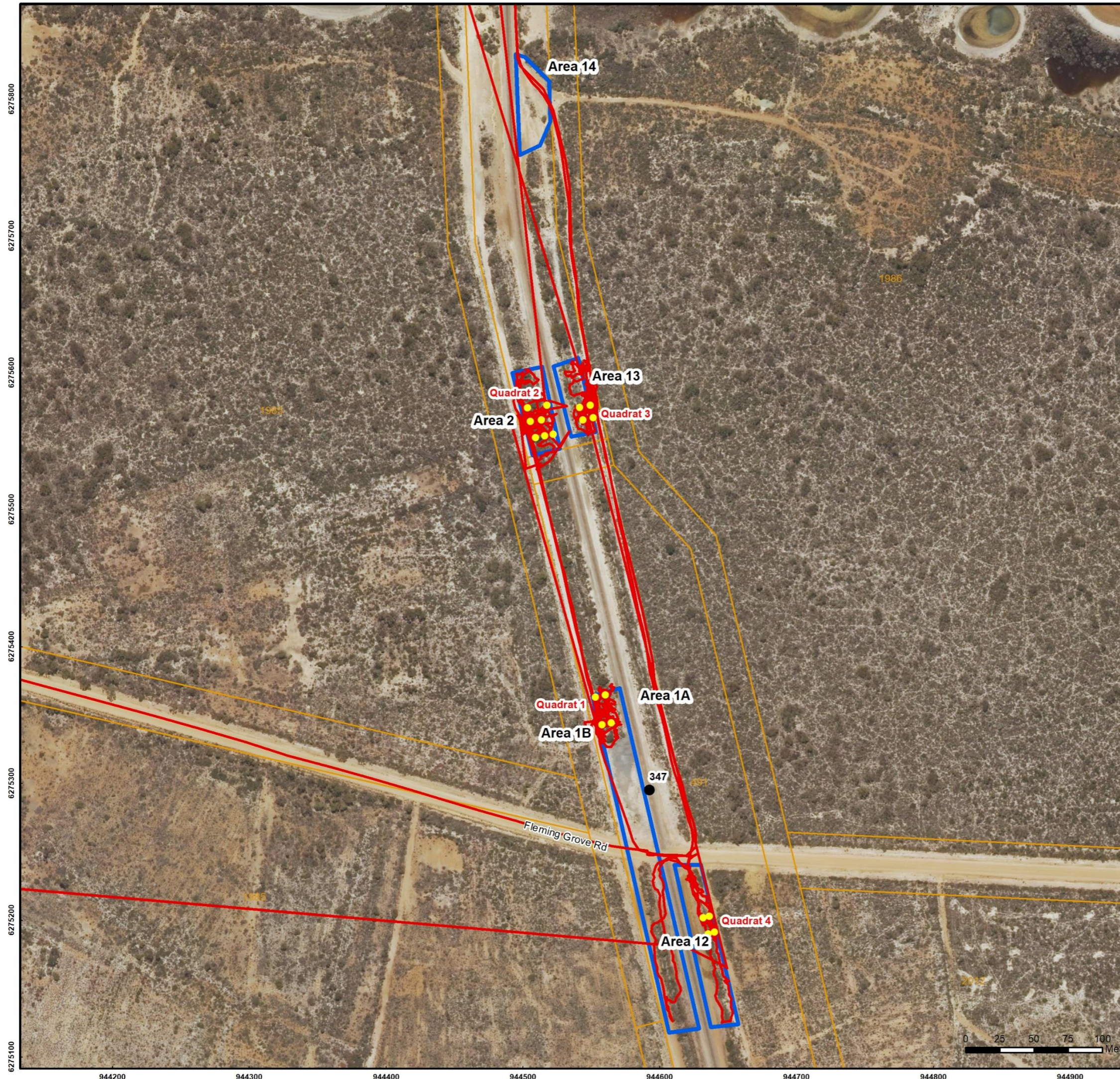
**Data Sources**  
Aerial Imagery: WA Now, Landgate Subscription Imagery  
Cadastre, Relief Contours and Roads: Landgate 2017  
IRIS Road Network: Main Roads Western Australia 2017  
Overview Map: World Topographic map service, ESRI 2012

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**Map 4f: Conservation Significant Flora**

	QA Check <b>KW</b>	Drawn by <b>CV</b>
STATUS <b>FINAL</b>	FILE <b>AI003</b>	DATE <b>08/12/2021</b>

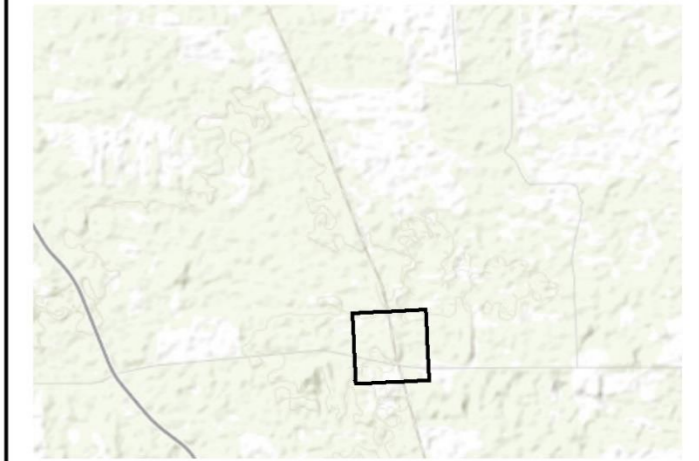
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Overview Map Scale 1:100,000

**Legend**

- Survey Area
- Cadastre
- Rail kilometre points
- Survey Tracks
- Quadrat Corners



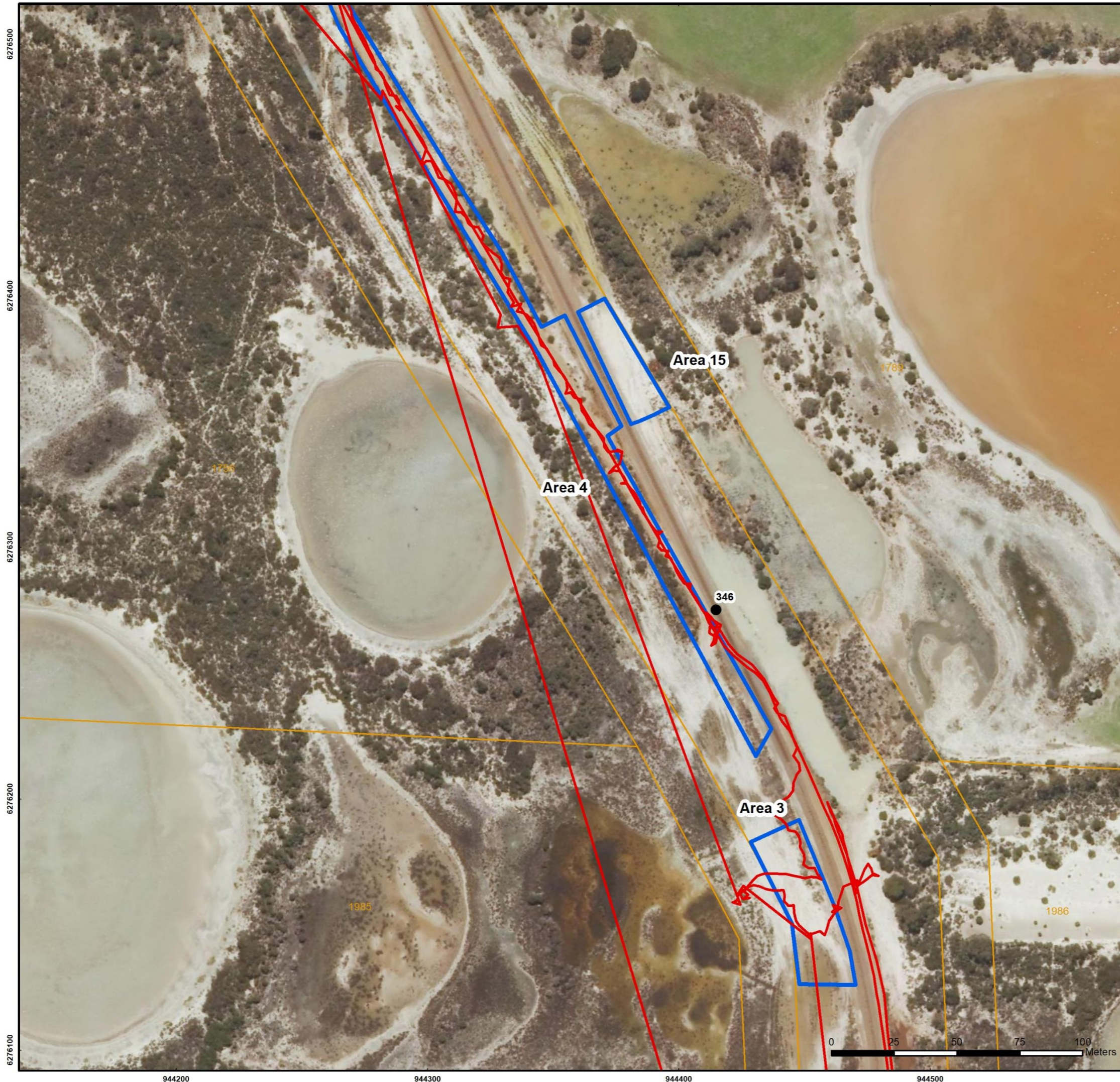
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GDA MGA 94 Zone 50

**Data Sources**  
Aerial Imagery: WA Now, Landgate Subscription Imagery  
Cadastre, Relief Contours and Roads: Landgate 2017  
IRIS Road Network: Main Roads Western Australia 2017  
Overview Map: World Topographic map service, ESRI 2012

**CLIENT**  
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**Map 5a: Survey Effort**

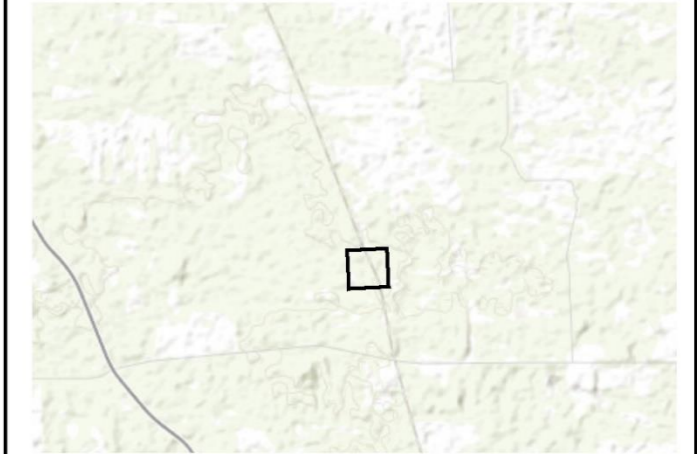
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STATUS <b>FINAL</b>	FILE <b>AI003-002</b>	DATE <b>08/12/2021</b>



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Overview Map Scale 1:100,000

**Legend**

- Survey Area
- Cadastre
- Rail kilometre points
- Survey Tracks



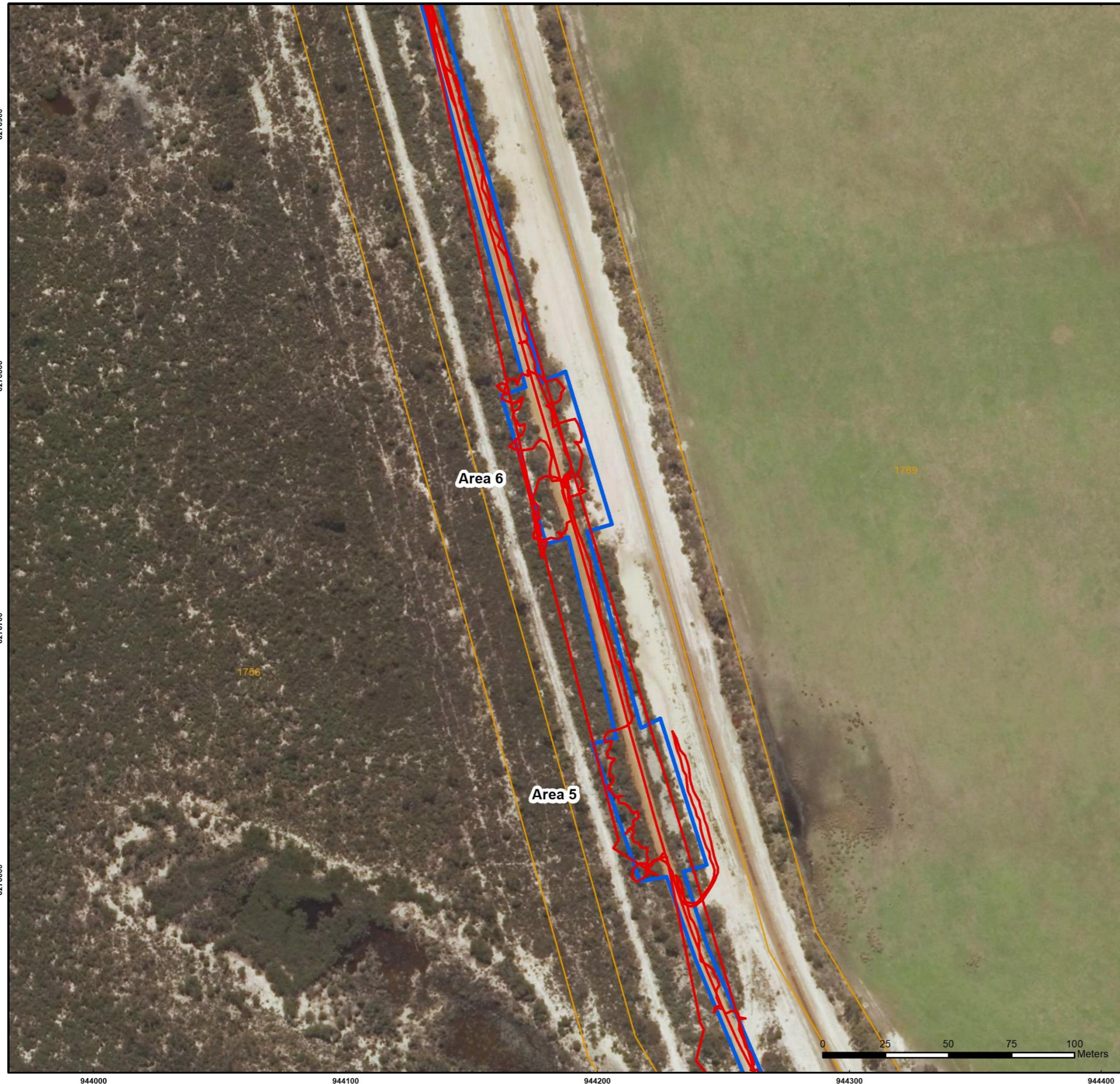
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GDA MGA 94 Zone 50

**Data Sources**  
Aerial Imagery: WA Now, Landgate Subscription Imagery  
Cadastre, Relief Contours and Roads: Landgate 2017  
IRIS Road Network: Main Roads Western Australia 2017  
Overview Map: World Topographic map service, ESRI 2012

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**Map 5b: Survey Effort**

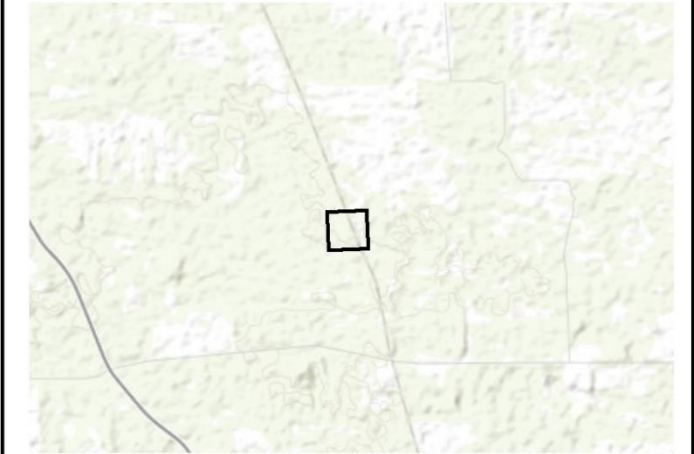
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STATUS <b>FINAL</b>	FILE <b>AI003-002</b>	DATE <b>08/12/2021</b>



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Overview Map Scale 1:100,000

**Legend**

- Survey Area
- Cadastre
- Rail kilometre points
- Survey Tracks



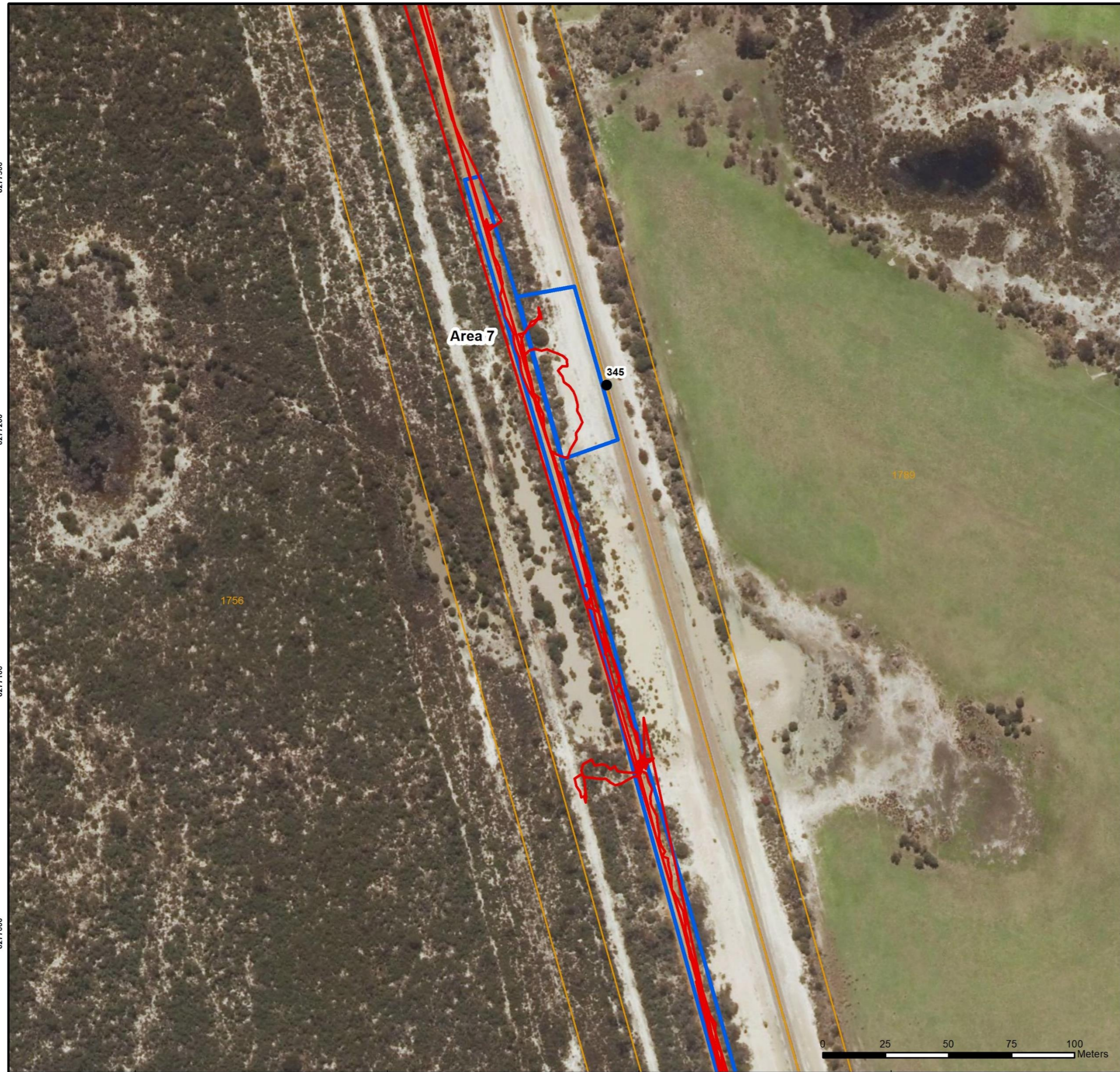
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GDA MGA 94 Zone 50

**Data Sources**  
Aerial Imagery: WA Now, Landgate Subscription Imagery  
Cadastre, Relief Contours and Roads: Landgate 2017  
IRIS Road Network: Main Roads Western Australia 2017  
Overview Map: World Topographic map service, ESRI 2012

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**Map 5c: Survey Effort**

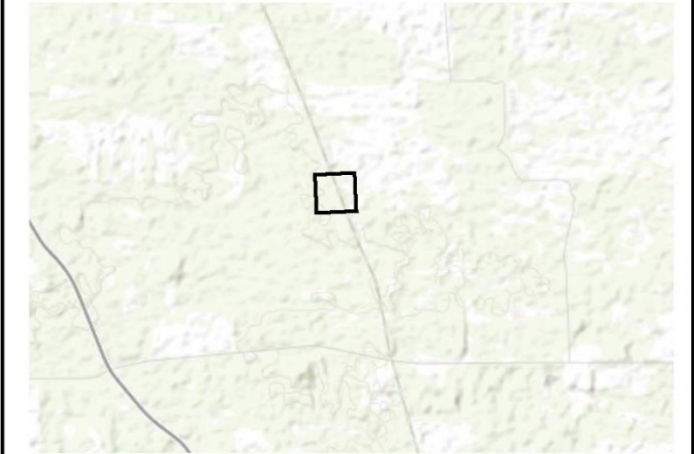
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Overview Map Scale 1:100,000

**Legend**

- Survey Area
- Cadastre
- Rail kilometre points
- Survey Tracks



Scale  
1:1,500 @ A3  
GDA MGA 94 Zone 50

**Data Sources**  
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**Map 5d: Survey Effort**

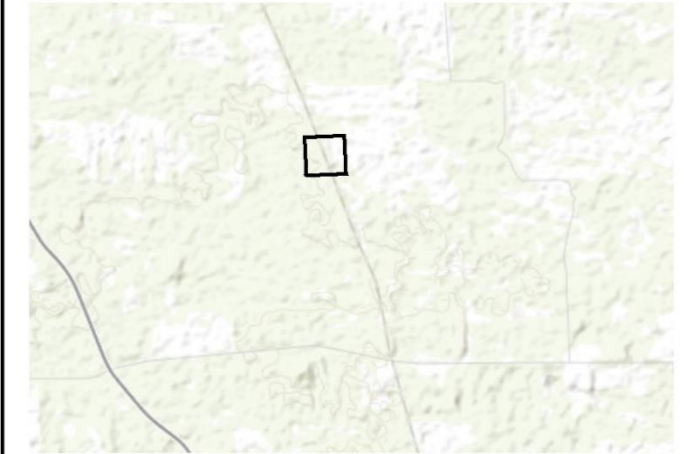
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Overview Map Scale 1:100,000

**Legend**

- Survey Area
- Cadastre
- Rail kilometre points
- Survey Tracks



Scale  
1:1,500 @ A3  
GDA MGA 94 Zone 50

**Data Sources**  
Aerial Imagery: WA Now, Landgate Subscription Imagery  
Cadastre, Relief Contours and Roads: Landgate 2017  
IRIS Road Network: Main Roads Western Australia 2017  
Overview Map: World Topographic map service, ESRI 2012

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**Map 5e: Survey Effort**

	QA Check <b>KW</b>	Drawn by <b>CV</b>
STATUS <b>FINAL</b>	FILE <b>AI003-002</b>	DATE <b>08/12/2021</b>

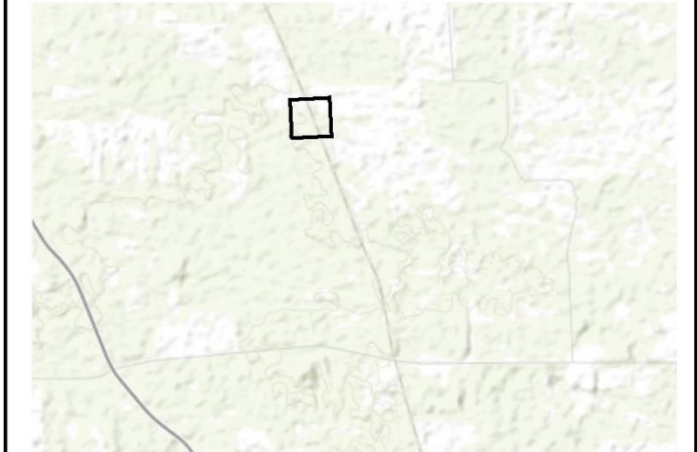




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Overview Map Scale 1:100,000

**Legend**

- Survey Area
- Cadastre
- Rail kilometre points
- Survey Tracks



Scale  
1:1,500 @ A3  
GDA MGA 94 Zone 50

**Data Sources**  
Aerial Imagery: WA Now, Landgate Subscription Imagery  
Cadastre, Relief Contours and Roads: Landgate 2017  
IRIS Road Network: Main Roads Western Australia 2017  
Overview Map: World Topographic map service, ESRI 2012

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**Map 5f: Survey Effort**

	QA Check <b>KW</b>	Drawn by <b>CV</b>
STATUS <b>FINAL</b>	FILE <b>AI003-002</b>	DATE <b>08/12/2021</b>

## **Appendix B**

### Conservation Significant Values Likelihood of Occurrence Analysis

**Table A1: Criteria for assessing the likelihood of occurrence of conservation significant flora within a 10km radius of the survey area.**

Likelihood	Criteria
Present	Species is recorded within the survey area.
Likely	Species has been previously recorded in close proximity and suitable habitat occurs within the survey area.
Possible	Species previously recorded within 10 km and suitable habitat occurs in the survey area.
Unlikely	Suitable habitat for the species does not occur at the survey area OR Suitable habitat may occur but the species has a highly restricted distribution, is very rare and only known from a limited number of populations.
Highly Unlikely	The survey area is outside the species' natural distribution.

**Table A2: Potential conservation significant flora located within 10km of the survey area and likelihood of occurrence analysis (post survey).**

NB - Species are sorted by likelihood of presence

Numerous resources specific to Threatened and Priority flora listed below were used in the likelihood assessment (DAWE, 2019; Euclid, n.d.; Hislop, 2009; Hislop, 2014; JSTOR, 2000 - .; Maslin, 2018 - ; Sage &amp; Shepherd, 2007; WAH, 1998 - ; WAH, 2018a; WAH, 2018b; WANOSCG, 2013; Wheeler, 2004)

Family	Species	Common Name	Status (WA)	Desktop Survey			Description - Species	Description - Habitat	Peak Flowering period	Likelihood of occurring – pre field survey	Likelihood of occurring – post field survey
				Naturemap	PMST	DBCA					
Myrtaceae	<i>Darwinia</i> sp. Gibson (R.D. Royce 3569)		P1	X		X	Compact shrub to 0.4 m high. Flowers yellow/orange. Small succulent looking shrub.	Grey-brown sandy clay and white sand on margins of salt lake.	Jun to July	Known existing population - (PERTH06466710) located on western railway line, between and adjacent to track.	<b>Detected within the area.</b>
Proteaceae	<i>Isopogon alpicornis</i>	Elkhorn Coneflower	P3	X		X	Low, lignotubers shrub, 0.3-0.5 m high to 0.6 m wide. Flowers yellow, white, pink. Distinctive shaped leaves forming cluster. No distinct stems.	Sandy soils, skeletal loam, sandhills, sandplains.	Oct to Dec or Feb	Known population at site - (PERTH 05814731) located along the railway line adjacent to salt lakes.	<b>Detected within the area.</b>
Ericaceae	<i>Conostephium marchantiorum</i>		P3	X		X	Erect, much branched shrub. 0.4-1.8 m high. Red, purple, brown and yellow flower. Bright green and hairy leaves.	White/grey sand. Plains on edges of salt lakes.	Mar or Jul or Nov	Known existing population - (PERTH04191161) recorded 400 m north of railway line. Correct suitable habitat present.	<b>Detected within the area.</b>
Ericaceae	<i>Brachyloma mogin</i>		P3	X		X	Compact shrub, 0.4 m high. Flowers red/pink/white.	Grey clayey sand. Swamp flat.	Jun	Likely - immediately adjacent populations present on Fleming Grove Road. Suitable habitat of area traverses through margins of salt lake's and correct distribution.	<b>Detected within area – KW150, Accession 9059.</b>
Myrtaceae	<i>Kunzea salina</i>		P3	X		X	Low shrub <1 m. Very small leaves. Spreading shrub. Flowers white.	Adjacent to salt lake periphery in low shrub margin. Winter wet lowlands with grey sands. Saline water bodies.	Dec to Jan	Likely - Recorded in the general area, suitable soil type and habitat.	<b>Detected within area – KW148, Accession 9059.</b>
Goodeniaceae	<i>Goodenia turleyae</i>		P1			X	Annual herb, 0.03-0.04 m high. White or grey-brown sand over clay, yellow-brown gravelly clay and granite.	Moist sheltered areas near salt lakes.	Sept to Nov	Possible - salt lakes present.	<b>Detected within area – KW186, Accession 9343.</b>
Proteaceae	<i>Grevillea baxteri</i>	Cape Arid Grevillea	P4	X		X	Erect to spreading shrub. 0.8-4 m high. Large and bushy form. Toothbrush grevillea form, flower colour yellow-orange-brown-red.	Sand, sandplains. Wide associated vegetation type. Often associated with gravel.	Feb or May to Jul or Sept to Dec	Known population at site - (PERTH 01076973 and PERTH 08744297) located adjacent Fleming Grove Road and along the railway line.	No further survey required - Not found during out-of-season survey. Suitable habitat present within Vegetation Type 1, 2, 3 and 7. Unlikely that surveying during spring season increases probability of detecting, due being a large, distinctive shrub.
Myrtaceae	<i>Eucalyptus litorea</i>	Saline Mallee	P2	X			Mallee, 2-6 m high. Bark rough at base and smooth above.	Calcareous sand, sandy clam loam and stones. Leeward of primary dunes, around salt lakes.		Likely - Recorded in the general area, suitable soil type and habitat.	No further survey required - Multiple Eucalyptus present, with non-bearing similarities to <i>E. litorea</i> . Associated habitat present in Veg Type 4 (Chen, Sam) and 5 (Mel SL). Unlikely that surveying during spring season increases probability of detecting.
Dilleniaceae	<i>Hibbertia turleyana</i>		P2	X		X	Procumbent shrub to 0.2 , high, to 0.35 m wide. Flowers yellow.	Dry white sand, flats, seasonally wet areas.	Aug	Likely - Recorded in the general area, suitable soil type and habitat.	No further survey required – Not detected during reconnaissance survey or targeted survey. No similar non-threatened flora species identified within survey area. Some limitations may be present with targeted survey, as conducted outside of August flowering time. With the flora survey occurring in very early September, there is a high likelihood that if the species was present a few remaining flowers would have been observed late-flowering or fruiting. This is more likely in 2021 as a significantly wet winter was experienced.

Table A2 continued.

Family	Species	Common Name	Status (WA)	Naturemap	PMST	DBCA	Description - Species	Description - Habitat	Peak Flowering period	Likelihood of occurring – pre field survey	Likelihood of occurring – post field survey
Goodeniaceae	<i>Dampiera sericantha</i>		P3	X		X	Erect, slender perennial, herb, 0.05-0.3(-0.6) m high, stems with blunt angles. Fl. Blue.	Sand, sometimes with gravel. Plains. Associated with disturbance.	May or Aug to Dec.	Likely - suitable habitat, generally associated disturbance such as roads or railways.	No further survey required – Not detected during reconnaissance survey or targeted survey. Similar non-threatened <i>Dampiera</i> 's present ( <i>D. parvifolia</i> and <i>D. sacculata</i> ) but determined as not <i>D. sericantha</i> due to position of flowers within plants, leaf shape and arrangement.
Myrtaceae	<i>Eucalyptus foliosa</i>		P3	X		X	Mallee to 4 m high. Bark smooth.	Grey/white sandy clay, flats adjacent to salt lakes.		Likely - Recorded in the general area, suitable soil type and habitat.	No further survey required - Multiple Eucalyptus present, with non-bearing similarities to <i>E. foliosa</i> . Associated habitat present in Veg Type 4 (Chen, Sam) and 5 (Mel SL). Unlikely that surveying during spring season increases probability of detecting.
Fabaceae	<i>Daviesia pauciflora</i>		P3	X		X	Diffuse, many stemmed, sprawling shrub. 0.3-0.8 m high. Lacking formal leaves. Flowers Yellow and red.	White or grey sand over laterite or limestone. Flats. Associated with deep sands, often with <i>Banksia speciosa</i> or Kwongan shrublands.	Oct to Dec or Jan	Likely - Recorded in the general area, suitable soil type and habitat.	No further survey required – Not detected during reconnaissance survey or targeted survey. No similar non-threatened flora species identified within survey area. Some limitations may be present with targeted survey, as conducted outside of October to January flowering period. However, it is locally known to flower with a wide range of time frames and observed at different survey areas by the consultant to be flowering in September in 2021.
Proteaceae	<i>Persoonia cymbifolia</i>		P3			X	Erect, spreading shrub, 0.2-0.6 (1) m high. Flowers yellow.	Sandy soils. On flats or in rock crevices.	Dec or Jan	Likely - Distributed in general area and correct soil type present.	No further survey required – similar P3, <i>Persoonia scabra</i> , detected within area. Formal verification as P3 <i>P. scabra</i> , opposed to P3, <i>P. cymbifolia</i> .
Myrtaceae	<i>Eucalyptus merrickiae</i>	Goblet Mallee	T- Vu		X	X	Mallee, 2-4(6) m high. Bark rough and flaky. Distinguished by extremely red bud caps. Silver sheen to leaves.	Sandy clay, grey sand. Associated strongly with salt lakes in the Scaddan to Salmon Gums area, Esperance.	Aug to Nov	Possible - Suitable salt lake habitat, be on the extreme southern end of distribution.	No further survey required - Potential habitat present in Veg Type 5 (Mel SL), but distribution slightly too far south to be considered suitable.
Ericaceae	<i>Leucopogon remotus</i>		P1			X	Woody shrub of 1 m high x 8 m wide.	Associated with mixed woodlands and variety of soil types.	Jul	Possible - likely understudied.	No further survey required – Multiple Ericaceae present that were eliminated by structure of flower or shape of leaf. Associated habitat possible in Veg Type 1 (Myr SL), 2 (Ban arm SL), 3 (Pro SL) and 7 (Mal WL). Unlikely that surveying during spring season increases probability of detecting.
Thymelaeaceae	<i>Pimelea pelinos</i>		P1			X	Erect, scraggly shrub, 0.3-0.6 m high. Flowers Cream.	Sandy clay, salt lakes.	Jun to Jul	Possible - distribution mostly too far north, but potential correct habitat present.	No further survey required - Winter survey conducted during flowering time of species. Associated habitat present at Veg Type 5 (Mel SL) and 6 (Mel WL).
Araliaceae	<i>Hydrocotyle asterocarpa</i>	Starry Pennywort	P2			X	Small annual herb, trilobed and toothed leaves. Bright green with purple stem.	Distribution restricted to Truslove Nature reserve. Sandy loam soils on margins of inland salt lakes in sheltered positions of <i>Tecticornia</i> and <i>Frankenia</i> sp.	Winter annual - Sept to Nov	Possible - likely understudied.	No further survey required – Not detected during reconnaissance survey or targeted survey. No similar non-threatened <i>Hydrocotyle</i> species identified within survey area.

Table A2 continued.

Family	Species	Common Name	Status (WA)	Naturemap	PMST	DBCA	Description - Species	Description - Habitat	Peak Flowering period	Likelihood of occurring – pre field survey	Likelihood of occurring – post field survey
Ericaceae	<i>Leucopogon corymbiformis</i>		P2	X		X	Open or erect low shrub with white flowers. <0.5 m high.	Associated with Banksia speciosa woodland and deep white sands.	Aug to Sept	Possible - recorded in general area. Possible vegetation and soil type present.	No further survey required - Multiple Ericaceae present that were eliminated by structure of flower or shape of leaf. Associated habitat possible in Veg 3 (Pro SL) and 7 (Mal WL), but unlikely with gravel duplex likely present.
Iridaceae	<i>Patersonia inaequalis</i>	Unequal bract Patersonia	P2	X		X	Rhizomatous, tufted perennial, herb. 0.2-0.4 m high. Flowers white.	Sandy clay, lateritic or granitic sand.	Aug to Oct	Possible - mostly recorded in Cape Le grand National Park, but single record in the Gibson area. Possible suitable soil type present.	No further survey required – Not detected during out-of-season reconnaissance survey or targeted survey. No similar non-threatened <i>Patersonia</i> species identified within survey area.
Rhamnaceae	<i>Spyridium mucronatum</i> subsp. <i>Multiflorum</i>		P2	X		X	Erect or spreading shrub, 0.15-0.6 m high. Flowers white, cream or yellow.	Gravelly loam or clay	Oct to Dec or Jan	Possible - record nearby and possible suitable soil present	No further survey required - Non-threatened <i>S. mucronatum</i> subsp. <i>Mucronatum</i> detected, eliminated by low number of flower heads in cluster. Associated habitat present in Veg Type 1 (Myr SL), 2 (Ban arm SL), 3 (Pro SL) and 7 (Mal WL). Unlikely that surveying during spring season increases probability of detecting.
Araliaceae	<i>Hydrocotyle tuberculata</i>	Bumpy fruited Pennywort	P2			X	Small herb, 1-3 cm high, 2-4 cm wide, reddish green colour. Simple umbel flowers.	Low shrubs and sapphire with <i>Disphyma</i> and <i>Wilsonia humilis</i> . Full sun area.	Oct	Possible - correct vegetation type. Wide and scattered distribution.	No further survey required – Not detected during reconnaissance survey or targeted survey. No similar non-threatened <i>Hydrocotyle</i> species identified within survey area. Some limitations may be present in timing of Reconnaissance Survey, with the species recorded as flowering in October. However, this species is a small annual herbaceous plant, which is distinctive when not flowering. It is likely that if the species flowers in October, it is growing and present in September.
Malvaceae	<i>Commersonia rotundifolia</i>	Round Leaved Rulingia	P3	X		X	Shrub to 1.5 m high. Semi-erect. Cream flowers, white calyx with green base. Petals cream, ligule on green base, staminodes white. Dull green leaves.	Open Eucalyptus woodland and shrubs, with Eucalyptus platypus or other Mallee or Mallet species. Well drained grey brown loams.		Possible - wide distribution. Recorded in the nearby Gibson vicinity, but in 1931. Likely to be suitable habitat.	No further survey required - Associated habitat present in Veg Type 1 (Myr SL), 2 (Ban arm SL), 3 (Pro SL) and 7 (Mal WL). Unlikely that surveying during spring season increases probability of detecting.
Fabaceae	<i>Acacia bartlei</i>		P3			X	Erect shrub or tree from 1.5-7 m tall. Narrow phyllodes, oblong to elliptic. Glabrous. Pods linear 20-65 mm long, 2.5-3.5 mm wide.	Uncommon, around Esperance. Flat or gently undulating landscape. Waterlogged depressions in brown or grey, sandy loam or clay-loam or in grey sand over clay adjacent to depressions. Tolerates level of salinity.	Late June to Mid Oct	Possible - suitable habitat present and soil type.	No further survey required - Non-threatened <i>A. cyclops</i> present, eliminated by curled pods and red arils. Associated habitat present at Veg Type 5 (Mel SL) and 6 (Mel WL). Unlikely that surveying during spring season increases probability of detecting, due being a large, distinctive shrub.
Scrophulariaceae	<i>Eremophila chamaeophila</i>	Earth Loving Eremophila	P3			X	Low, dome shaped Shrub, 0.1-0.25 m high. 0.2-0.8 m wide. Flowers blue-purple.	White sand, clay. Sandplains and disturbed road verges.	Nov to Dec	Possible - sandplains present and correct soil type. Associated vegetation isn't an exact match.	No further survey required - Associated habitat present is not similar to previous records of the species.

Table A2 continued.

Family	Species	Common Name	Status (WA)	Naturemap	PMST	DBCA	Description - Species	Description - Habitat	Peak Flowering period	Likelihood of occurring – pre field survey	Likelihood of occurring – post field survey
Orchidaceae	<i>Pterostylis faceta</i>	Bird Orchid	P3			X	Annual herb. Flowers green.	Mallee dominated shrubland, dense low heath. Mixed soil types.	Aug to Sept	Possible	No further survey required – Not detected during out-of-season reconnaissance survey or targeted survey. No similar non-threatened <i>Pterostylis</i> species identified within survey area.
Myrtaceae	<i>Darwinia polycephala</i>		P4			X	Diffuse shrub, 0.1-0.5 m high. Flowers red-purple.	Sand, clay. Flats near Salt Lakes.	Mar or May to Jul or Sept	Possible - distribution mostly recorded further north in Grass Patch area but suitable salt lake habitat present.	No further survey required - Similar P1 <i>Darwinia</i> sp. Gibson present. <i>D. polycephala</i> eliminated by structure of flower and previous record of <i>D.</i> sp. Gibson. Associated habitat present in Veg type 4 (Chen, Sam) and 5 (Mel SL). Unlikely that surveying during spring season increases probability of detecting, due to scattered flowering time recorded.
Myrtaceae	<i>Melaleuca fissurata</i>		P4			X	Shrub, 0.5-2 (4) m. Flowers white/yellow.	White/grey sand. Sandy loam. Samphire flats and salt pans.	Jul to Aug	Possible - correct vegetation and soil type, however typically distribution further north towards Grass Patch.	No further survey required - No similar <i>Melaleuca</i> species present. Associated habitat present at Veg Type 5 (Mel SL) and 6 (Mel WL). Unlikely that surveying during spring season increases probability of detecting, due being a large, distinctive shrub. Slightly incorrect distribution for survey area.
Haemodoraceae	<i>Anigozanthos bicolor</i> subsp. <i>minor</i>	Little Kangaroo Paw	T - En		X		Rhizomatous, perennial, herb, 0.05-0.2 m high. Fl. Green & red,	Sand. Well-watered sites. Subcoastal freshwater sumps, off granite.	Aug to Oct	Unlikely - no suitable habitat.	No further survey required - no suitable habitat present.
Scrophulariaceae	<i>Eremophila lactea</i>	Milky Emu Bush	T - En		X		Shrub, 0.3 to 3.5 shrub. Erect and spindly looking. Flowers blue-purple. Small flowers	White sandy clay loam, small area restricted in the Grass Patch area. Open Mallee. Often associated with disturbance, fire or disturbed road verge.	Sept to Nov	Unlikely - incorrect soil type associated.	No further survey required - no suitable habitat present.
Proteaceae	<i>Lambertia echinata</i> subsp. <i>echinata</i>		T - En		X		Prickly, much branched, non-lignotubers shrub. 1.5 m high. Flower orange, red to pink. Leaves with tridentate shape.	Gravelly sandy loam, brown sandy loam, white grey sand, granite, laterite. Entirely restricted or known from Cape Le Grand National Park.	Sept to Oct	Unlikely - Outside distribution.	No further survey required - no suitable habitat present.
Fabroniaceae	<i>Fabronia hampeana</i>		P2			X	Moss species. Silver green species.	Often growing on <i>Macrozamia</i> species. Mixed woodlands.		Unlikely - most records in Western Australia in mixed woodlands with <i>Banksia</i> and coastal <i>Melaleuca</i> species. No <i>Macrozamia</i> species detected.	No further survey required - no suitable habitat present. Not covered by expertise of surveyors.
Goodeniaceae	<i>Goodenia laevis</i> subsp. <i>laevis</i>		P3			X	Erect, woody shrub or subshrub. 0.1-0.25 m high. Largest leaves 15-25 x 1-3 mm, entire. Flowers yellow.	Sandy loam or laterite	Aug to Dec	Unlikely - mostly recorded in dense <i>Eucalyptus</i> mallee or Mallet Woodlands of Grass Patch area.	No further survey required - no suitable habitat present.
Ericaceae	<i>Styphelia rotundifolia</i>		P3			X	Erect, compact shrub to 1.5 m high x 1.5 m wide. Flowers cream and erect.	Mixed heath and shrublands. Mostly recorded in coastal areas.	April	Unlikely - outside of recorded distribution.	No further survey required - Multiple <i>Ericaceae</i> present that were eliminated by structure of flower or shape of leaf. Potential Associated habitat present in Veg Type 1 (Myr SL), 2 (Ban arm SL), 3 (Pro SL) and 7 (Mal WL). Remains outside of recorded distribution.

Table A2 continued.

Family	Species	Common Name	Status (WA)	Naturemap	PMST	DBCA	Description - Species	Description - Habitat	Peak Flowering period	Likelihood of occurring – pre field survey	Likelihood of occurring – post field survey
Myrtaceae	<i>Eucalyptus preissiana</i> subsp. <i>lobata</i>	Bell-fruited Mallee	P4			X	Mallee to 2.5 m high. Bark smooth. Flowers yellow.	Sand. Coastal limestone rises and sand dunes.	Nov	Unlikely - vast majority of records to the far west of Esperance along coastal sandplains. Single record in Gibson area, which given the species is widely commercially available may not be reliable.	No further survey required - no suitable habitat present.
Myrtaceae	<i>Eucalyptus dolichorhyncha</i>	Fuchsia Gum / Pear Mallee	P4	X		X	Mallee or tree, 1-5 m high. Flowers yellow. Distinct elongated operculum bud caps, differentiating from non-threatened <i>Eucalyptus forrestiana</i> .	Sandy clay or clay. Flats. Mallee Woodlands.	Jan to Mar or May	Unlikely - outside the general distribution and lacks suitable vegetation habitat.	No further survey required - no suitable habitat present.
Euphorbiaceae	<i>Ricinocarpos trichophorus</i>	Wedding Bush	T- En		X		Erect, openly branching shrub. 0.3-1 m high. Flowers White.	Sandy clay, loam. Breakaways, among sandstone rock.	May or Aug to Sept	Highly Unlikely - incorrect soil type associated, not recorded in the general Gibson area.	
Fabaceae	<i>Kennedia glabrata</i>	Northcliffe Kennedia	T - Vu		X		Prostrate shrub, 0.05-0.5 m high, to 5 m wide. Fl. Red.	Soil pockets, sandy soils. Granite outcrops.	Aug to Nov.	Highly Unlikely - over 300 km west to nearest known population, outside distribution. Incorrect habitat present, no granite.	
Myrtaceae	<i>Eucalyptus misella</i>		P1			X	Mallee, 1-3 m high. Bark smooth. Flowers cream.	White, yellow or grey sand. Low lying sandplain.	Nov	Highly Unlikely - Distribution entirely associated with Frank Hann Nature Reserve, 350 km north of survey area.	



**Table A3: Potential Threatened and Priority Ecological Communities located within 10km of the survey area.**

Community Name	Source	Status	Description	Survey Outcome
Threatened Ecological Community - Proteaceae Dominated Kwongan Shrublands of the Southeast Coastal Floristic Province of Western Australia	PMST, DBCA Databases	Priority 3 (WA) EN (EPBC Act)	Consists of predominantly obligate seeding proteaceous shrubland and heath (Kwongan) and mallee heath on sandplain, duplex sand/clay and gravels overlying Eocene sediments, quartzite, schist, Yilgarn and Albany Fraser granite and greenstone ranges. Its flora is characterised by high species diversity and a high degree of endemism, particularly in the Stirling Range, Fitzgerald River National Park, Ravensthorpe Range and Russell Ranges. Due to the high levels of endemism, there are few species that exist across the entire range of the dense, obligate seeding Proteaceae dominated shrublands and Kwongan of the Esperance Sandplains, however particular species have been identified as common dominant species in each of its eco-districts (DoE, 2015).	<b>Detected - Present within Vegetation Type 2 (Ban arm) and 3 (Pro SL).</b>  <b>Targeted Flora Survey with quadrat analysis occurred to formally determine.</b>
Subtropical and temperate coastal saltmarsh (synonymous with the Subtropical and Temperate Coastal Saltmarsh EPBC-listed TEC)	DBCA Databases	Priority 3 (WA), Vulnerable (EPBC)	Consists of the assemblage of plants, animals and micro-organisms associated with saltmarsh in coastal regions of sub-tropical and temperate Australia (south of 23oS latitude). It occurs on the coastal margin, along estuaries and coastal embayments and on low wave energy coast in places with at least some tidal connection, including rarely-inundated supratidal areas, intermittently opened or closed lagoons, and groundwater tidal influences. The community occurs on sandy or muddy substrate and may include coastal clay pans and similar habitats. It consists of dense to patchy areas of characteristic coastal saltmarsh plant species that include salt-tolerant herbs, succulent shrubs or grasses, and may also include bare sediment as part of the mosaic. It can occur where the proportional cover by tree canopy such as mangroves, Melaleucas or Casuarinas or seagrass is not greater than 50%. The description, area and condition thresholds that apply to the EPBC-listed TEC of the same name, also apply to this Priority ecological community.	Not present - outside of coastal margin and tidal influence area.

## **Appendix C**

### Conservation Status Definitions and Condition Scale

**Table A4: Conservation code definitions for flora and fauna as listed as threatened or specially protected.**

Threatened, Extinct and Specially Protected fauna or flora are species which have been adequately searched for and are deemed to be, in the wild, threatened, extinct or in need of special protection, and have been gazetted as such.

Threat Category	Definition
Threatened - Critically endangered species (CR)	Facing an extremely high risk of extinction in the wild in the immediate future.
Threatened - Endangered species (EN)	Facing a very high risk of extinction in the wild in the near future.
Threatened - Vulnerable species (VU)	Facing a high risk of extinction in the wild in the medium-term future.
Threatened - Extinct (EX)	There is no reasonable doubt that the last member of the species has died.
Threatened – Extinct in the wild (EW)	Species 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.
Specially protected species - Migratory species (MI)	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; Includes birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and fauna subject to the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention), an environmental treaty under the United Nations Environment Program. Migratory species listed under the BC Act are a subset of the migratory animals that are known to visit Western Australia, protected under the international agreements or treaties, excluding species that are listed as Threatened species.
Specially protected species – Conservation Dependent (CD)	Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened.
Specially protected species – Other specially protected species (OS)	Fauna otherwise in need of special protection to ensure their conservation.

**Table A5: Conservation code definitions for flora and fauna as listed as Priority.**

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.

Threat Category	Definition
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.
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.
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.
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.

**Table A6: Conservation code definitions for ecological communities listed as threatened (TEC).**

Threat Category	Definition
Presumed Totally Destroyed (PD)	An ecological community that has been adequately searched for but for which no representative occurrences have been located. The community has been found to be totally destroyed or so extensively modified throughout its range that no occurrence of it is likely to recover its species composition and/or structure in the foreseeable future.
Critically Endangered (CR)	An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or that was originally of limited distribution and is facing severe modification or destruction throughout its range in the immediate future, or is already severely degraded throughout its range but capable of being substantially restored or rehabilitated.
Endangered (EN)	An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or was originally of limited distribution and is in danger of significant modification throughout its range or severe modification or destruction over most of its range in the near future.
Vulnerable (VU)	An ecological community that has been adequately surveyed and is found to be declining and/or has declined in distribution and/or condition and whose ultimate security has not yet been assured and/or a community that is still widespread but is believed likely to move into a category of higher threat in the near future if threatening processes continue or begin operating throughout its range.

**Table A7: Conservation code definitions for ecological communities listed as priority (PEC).**

Possible threatened ecological communities that do not meet survey criteria or that are not adequately defined are added to the Priority Ecological Community List under priorities 1, 2 and 3.

Threat Category	Definition
Priority One (P1)	Ecological communities that are known from very few occurrences with a very restricted distribution (generally $\leq 5$ occurrences or a total area of $\leq 100$ ha), and appear to be under immediate threat.
Priority Two (P2)	Communities that are known from few occurrences with a restricted distribution (generally $\leq 10$ occurrences or a total area of $\leq 200$ ha). At least some occurrences are not believed to be under immediate threat (within approximately 10 years) of destruction or degradation.
Priority Three (P3)	(i)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: (ii)communities known from a few widespread occurrences, which are either large or with significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat (within approximately 10 years), or; (iii)communities made up of large, and/or widespread occurrences, that may or may not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, inappropriate fire regimes, clearing, hydrological change etc.
Priority Four (P4)	Ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. These communities require regular monitoring.
Priority Five (P5)	Conservation Dependent ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.

## **Appendix D**

Vegetation Types defined in the Reconnaissance Flora and Vegetation and Basic Fauna survey (BDS, 2021)

### 1. Vegetation type 1: Myrtaceous shrubland (Myr SL)

Vegetation Description (NVIS): U +/- *Acacia cyclops*, *Acacia saligna* \shrub\5r; M+ *Guichenotia indutum*, *Cyathostemon ambiguus*, *Grevillea oligantha*, +/- *Micromyrtus imbricata*, *Lysinema ciliatum*, *Daviesia teretifolia* \shrub\3,2c; G *Jacksonia venosa*, *Lepidospermoides carphoides*, *Lepidosperma squamatum* \^sedge, low shrub\1r.

Vegetation Description (Muir): *Acacia cyclops* and *Acacia saligna* sparse tall shrubland, over *Cyathostemon ambiguus*, *Grevillea oligantha* and *Daviesia teretifolia* mid-shrubland, over *Guichenotia indutum*, *Micromyrtus imbricata* and *Lysinema ciliatum* low-shrubland, over *Lepidosperma carphoides* and *Lepidosperma squamatum* sparse low sedgeland.

Area: 0.03ha

Site description: Flat sandplain, with light grey sand and good drainage.

Condition: Very Good

Represented in R1 (refer to Appendix D).

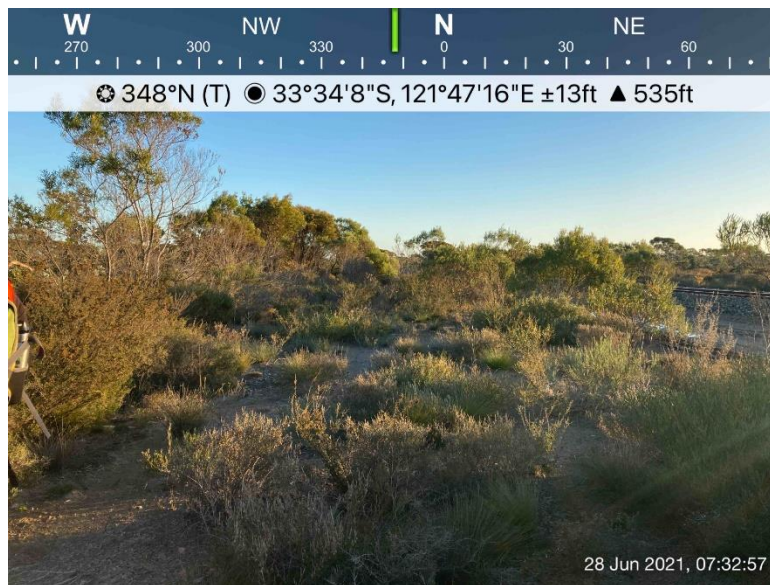


Figure 4: Vegetation Type 1, Myrtaceous Shrubland (Myr SL), present within the survey area

### 2. Vegetation type 2: Banksia armata dominated shrubland with scattered Mallee and Acacia (Ban arm SL)

Vegetation Description (NVIS): U+ *Eucalyptus pleurocarpa*, *Eucalyptus leptocalyx* \Mallee\6r; M+ *Hakea corymbosa*, *Banksia armata*, *Allocasuarina humilis* \shrub\3c; G *Caustis dioica*, +/- *Lepidosperma carphoides*, *Neurachne alopecuroides* \^sedge, grass\2r.

Vegetation Description (Muir): *Eucalyptus pleurocarpa* and *Eucalyptus leptocalyx* Open Mallee mid and low woodland, over *Acacia cyclops* and *Hakea corymbosa* sparse tall shrubland, over *Banksia armata*, *Allocasuarina humilis*, *Beaufortia empetrifolia*, *Calothamnus gracilis* and *Daviesia teretifolia* mid shrubland, over *Hibbertia gracilipes* sparse low shrubland, over *Lepidosperma carphoides*, *Caustis dioica*, *Chorizandra enodis* open tall sedgeland, over *Dampiera lavandulacea* sparse forbland, over *Neurachne alopecuroidea* sparse grassland.

Area: 0.21ha

Site description: Flat sandplain, with light grey sand and good drainage.

Condition: Good, Excellent

Represented in R2 (refer to Appendix D).

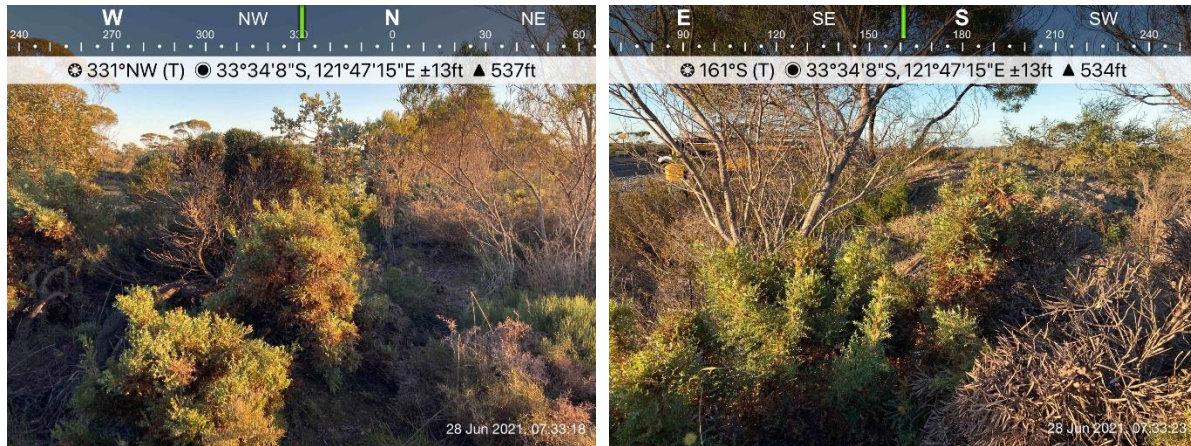


Figure 5: Vegetation Type 2, *Banksia armata* dominated shrubland with scattered Mallee and Acacia (Ban arm SL) present within the survey area

### 3. Vegetation type 3: Mixed Proteaceous Shrubland with Scattered Mallee (Pro SL)

Vegetation Description (NVIS): U <sup>^</sup> *Eucalyptus pleurocarpa*, *Eucalyptus leptocalyx* \Mallee\6\; M+ <sup>^</sup> *Hakea lissocarpa*, *Isopogon polycephalus*, *Grevillea oligantha* \shrub\3\; G <sup>^</sup> *Banksia blechnifolia*, *Hibbertia gracilipes*, *Caustis dioica* \low shrub, sedge\1\.

Vegetation Description (Muirs): *Eucalyptus pleurocarpa* and *Eucalyptus leptocalyx* Open Mallee Mid Woodland, over *Acacia cyclops* isolated tall shrubs, *Hakea lissocarpa*, *Isopogon polycephalus*, *Grevillea oligantha*, *Daviesia apiculata* and *Calothamnus gracilis* closed mid shrubland, over *Banksia blechnifolia* and *Hibbertia gracilipes* open low shrubland, over *Lepidosperma carphoides*, *Caustis dioica* and *Lepidobolus chaetocephalus* open tall shrubland, over *Dampiera lavandulacea* sparse forbland.

Area: 0.16ha.

Site description: Flat sandplain, with light grey sand and good drainage

Condition: Good, Excellent

Represented in R3 and R8 (refer to Appendix D).

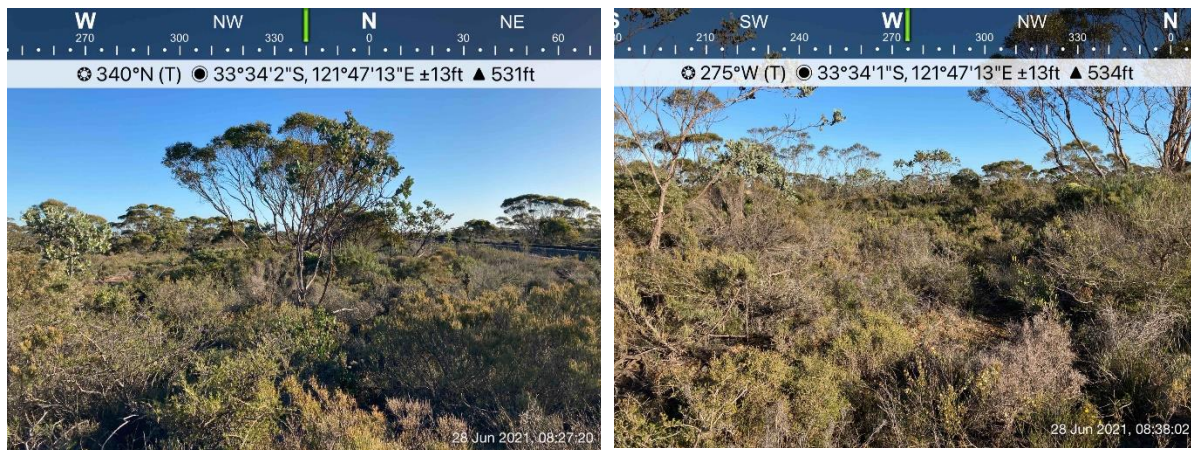


Figure 6: Vegetation Type 3, Mixed Proteaceous Shrubland with scattered Mallee (Pro SL) present within the survey area

### 4. Vegetation type 4: Low Chenopod and Sampire forbland on immediate salt lakes (Chen, Sam)

Vegetation Description (NVIS): U +/- *Melaleuca brevifolia* \shrub\3\; <sup>^</sup> *Dianella brevicaulis*, *Austrostipa juncifolia* \dwarf shrub, grass\1\; G+ <sup>^</sup> *Disphyma crassifolium*, *Salicornia* sp. *Tecticornia* sp., *Frankenia tetrapetala* \forb\1\c

Vegetation Description (Muir): *Melaleuca brevifolia* sparse mid shrubland, over *Dianella brevicaulis* sparse low shrubland, over *Austrostipa juncifolia* sparse tall grassland, over *Disphyma crassifolium*, *Salicornia* sp., *Tecticornia* sp., *Frankenia tetrapetala* forbland, over *Myriophyllum tillaeoides* sparse aquatics.

Area: 0.07ha

Site description: Flat drainage depression of a salt lake with light grey sand overlying clay and poor drainage.

Condition: Good

Represented in R4 (refer to Appendix D).



Figure 7: Vegetation Type 4, Low Chenopod and Samphire Forbland on immediate salt lakes (Chen, Sam), present within the survey area

##### 5. Vegetation type 5: Closed Melaleuca shrubland on salt lake peripheries (Mel SL)

Vegetation Description (NVIS): U+ *Melaleuca brevifolia*, *Melaleuca calycina*, +/- *Hakea cinerea* shrubland; M *Cyathostemon ambiguus*, +/- *Acacia patagiata*, *Darwinia vestita* shrubland; G *Loxocarya striata*, *Coopermookia strophiolata*, +/- *Drosera glanduligera* rush, forbland

Vegetation Description (Muir): *Melaleuca brevifolia*, *Melaleuca calycina*, *Hakea cinerea* and *Melaleuca cuticularis* closed tall shrubland, over *Cyathostemon ambiguus*, *Acacia patagiata*, *Darwinia vestita*, *Grevillea oligantha* mid shrubland, over *Loxocarya striata* tall rushland, over *Coopermookia strophiolata*, *Drosera glanduligera* and *Drosera macrantha* sparse forbland.

Area: 0.24ha

Site description: Gentle slope on periphery of salt lake drainage depression, with light grey, seasonally wet clay sand.

Condition: Degraded, Good

Represented in R7 (refer to Appendix D).



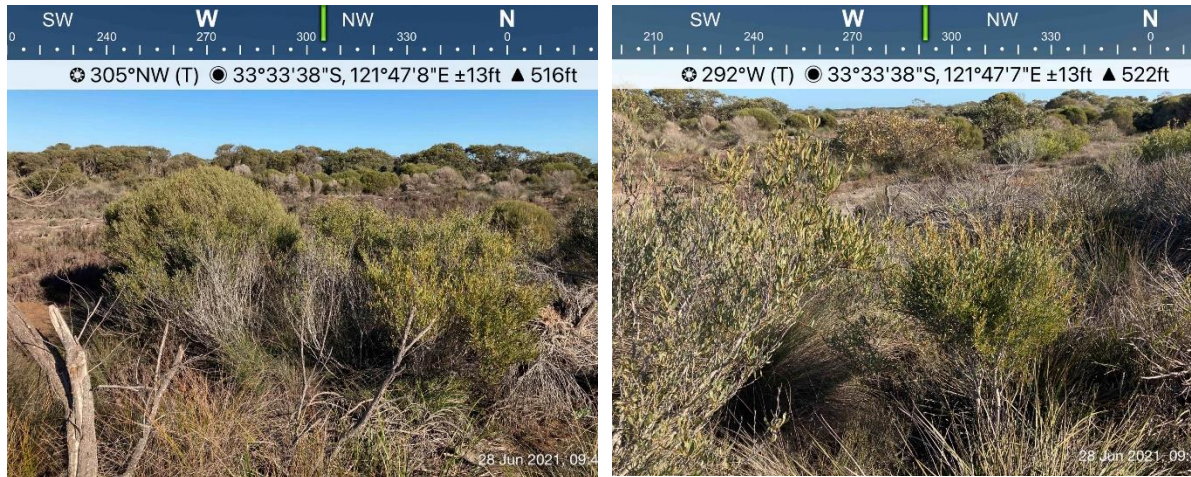


Figure 8: Vegetation Type 5, Closed Melaleuca Shrublands on salt lake peripheries (Mel SL) vegetation type present within the survey area

**6. Vegetation type 6: Paperbark Melaleuca woodland wetland (Mel WL)**

Vegetation Description (NVIS): U+ *Melaleuca calycina* shrub; M *Grevillea oligantha*, *Cyathostemon ambiguus*, +/- *Chamelaucium ciliatum* shrub; G+ *Ficinia nodosa*, *Loxocarya striata*, *Lepidosperma carphoides* sedge, rush

Vegetation Description (Muir): *Melaleuca calycina* tall shrubland, over *Grevillea oligantha* and *Cyathostemon ambiguus* open mid shrubland, over *Chamelaucium ciliatum* open low shrubland, over *Ficinia nodosa* and *Lepidosperma carphoides* tall sedgeland, over *Loxocarya striata* tall rushland.

Area: 0.06ha

Site description: Drainage depression with poor drainage and light grey clay sand.

Condition: Good

Represented in R5 (refer to Appendix D).

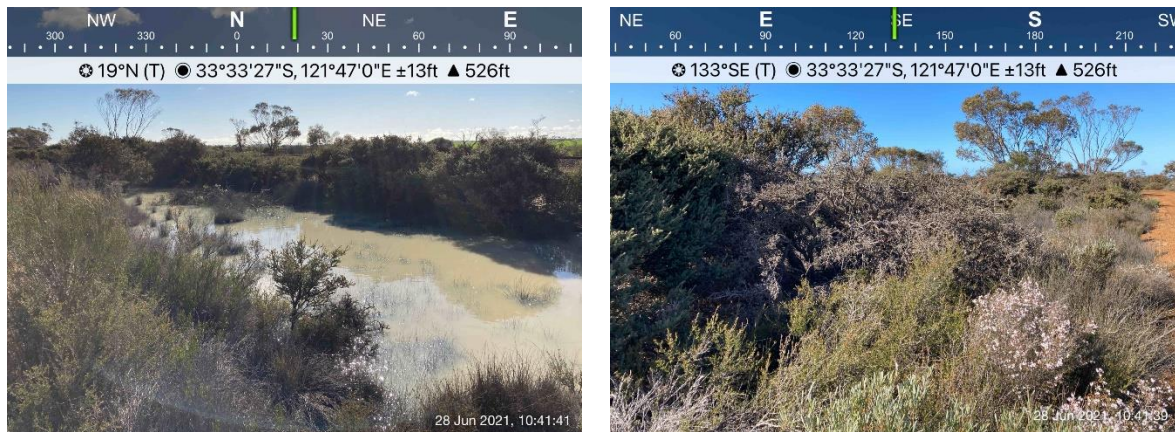


Figure 9: Vegetation Type 6, Paperbark Melaleuca Woodland wetland (Mel WL) present within the survey area

**7. Vegetation type 7: Open Mallee Woodland with dense Sedgeland (Mal WL)**

Vegetation Description (NVIS): U *Eucalyptus uncinata*, *Hakea cinerea*, *Hakea cygna*, *Melaleuca pulchella* Mallee, Shrub; M+ *Allocasuarina humilis*, *Acacia pulchella*, *Grevillea pauciflora*, *Cyathostemon ambiguus* shrub; G *Coopernookia strophiolata*, *Gahnia ancistrophylla*, *Loxocarya striata* dwarf shrub, sedge, rush.

Vegetation Description (Muir): *Eucalyptus uncinata* open mallee woodland, over *Hakea cinerea*, *Hakea cygna* and *Melaleuca pulchella* open tall shrubland, over *Allocasuarina humilis*, *Acacia pulchella*,

*Grevillea pauciflora* and *Cyathostemon ambiguus* mid shrubland, over *Cooperhookea strophiolata* isolated low shrubland, over *Gahnia ancistrophylla* tall sedgeland, over *Loxocarya striata* tall rushland, over *Cassytha* sp. isolated clumps of vines over *Drosera glanduligera* and *Orchid* sp. isolated forbs.

Area: 0.48ha

Site description: Flat sandplain, with light grey clay sand and good drainage.

Condition: Very Good, Excellent

Represented in R6 (refer to Appendix D).



Figure 10: Vegetation Type 7, Open Mallee Woodland with dense sedgeland (Mal WL), present within the survey area

## **Appendix E**

### Species Lists and Relevé and Quadrat Data

**Table A8: Flora Species List recorded within survey area, across reconnaissance and targeted survey.**
**Note. Additional recordings of species in targeted survey marked by bold.**

Family	Species	Common Name	Cons Code	1 (Myr SL)	2 (Ban arm SL)	3 (Pro SL)	4 (Chen, Sam)	5 (Mel SL)	6 (Mel WL)	7 (Mal WL)
Aizoaceae	<i>Carpobrotus modestus</i>	Inland Pigface				X		X		
Aizoaceae	<i>Disphyma crassifolium</i>	Round leaved Pigface					X			
Anarthriaceae	<i>Anarthria gracilis</i>				X	X				
Anarthriaceae	<i>Anarthria laevis</i>							X		
Apiaceae	<i>Daucus glochidiatus</i>	Australian Carrot				X		X		
Apiaceae	<i>Platysace effusa</i>	Youlk, Native Carrot				X				
<b>Apiaceae</b>	<b><i>Trachymene pilosa</i></b>	<b>Native Parsnip</b>			<b>X</b>					
Apiaceae	<i>Xanthosia huegelii</i>			<b>X</b>	X	<b>X</b>				X
<b>Asparagaceae</b>	<b><i>Laxmannia minor</i></b>									<b>X</b>
Asparagaceae	<i>Laxmannia ramosa</i>	Branching Lilly				X				X
Asparagaceae	<i>Lomandra effusa</i>	Scented Mat Rush								X
Asparagaceae	<i>Thysanotus patersonii</i>	Twining Fringe Lilly			X	X				X
Asphodelaceae	<i>Bulbine semibarbata</i>	Native Leek		X	X	X				
<b>Asteraceae</b>	<b><i>Angianthus tomentosus</i></b>	<b>Camel Grass</b>								<b>X</b>
<b>Asteraceae</b>	<b><i>Argentipallium niveum</i></b>	<b>White Paper Daisy</b>								<b>X</b>
<b>Asteraceae</b>	<b><i>Blennospora drummondii</i></b>					<b>X</b>				<b>X</b>
<b>Asteraceae</b>	<b><i>Cotula coronopifolia</i></b>	<b>Water Button</b>	*			<b>X</b>				
<b>Asteraceae</b>	<b><i>Cotula cotuloides</i></b>	<b>Smooth Cotula</b>					<b>X</b>	<b>X</b>		
<b>Asteraceae</b>	<b><i>Hyalosperma demissum</i></b>			<b>X</b>	<b>X</b>	<b>X</b>				<b>X</b>
<b>Asteraceae</b>	<b><i>Millotia tenuifolia</i> var. <i>tenuifolia</i></b>	<b>Soft Millotia</b>								<b>X</b>
<b>Asteraceae</b>	<b><i>Olearia axillaris</i></b>	<b>Coastal Daisy</b>						<b>X</b>		

Table A8 continued.

Family	Species	Common Name	Cons Code	1 (Myr SL)	2 (Ban arm SL)	3 (Pro SL)	4 (Chen, Sam)	5 (Mel SL)	6 (Mel WL)	7 (Mal WL)
Asteraceae	<i>Onopordum acanthium</i>	Scotch Thistle	*					X		
Asteraceae	<i>Panaetia tepperi</i>							X		
Asteraceae	<i>Podotheca angustifolia</i>	Sticky Longheads		X	X	X				
Asteraceae	<i>Pterochaeta paniculata</i>	Wooly Waitzia		X	X	X				X
Asteraceae	<i>Senecio glossanthus</i>						X	X		
Asteraceae	<i>Ursinia anthemoides</i>	Ursinia	*							X
Casuarinaceae	<i>Allocasuarina helmsii</i>				X	X				X
Casuarinaceae	<i>Allocasuarina humilis</i>	Dwarf Sheoak			X	X				
Casuarinaceae	<i>Allocasuarina thyoides</i>	Horned Sheoak			X					X
Centrolepidaceae	<i>Centrolepis humillima</i>	Dwarf Centrolepis						X		
Centrolepidaceae	<i>Centrolepis polygyna</i>	Wiry Centrolepis						X		
Chenopodiaceae	<i>Atriplex semibaccata</i>	Berry Saltbush								X
Chenopodiaceae	<i>Rhagodia preissii</i> subsp. <i>Preissii</i>	Ruby Salt Bush						X		X
Chenopodiaceae	<i>Salicornia</i> sp.	Samphire					X			
Chenopodiaceae	<i>Tecticornia</i> sp.	Samphire					X	X		
Convolvulaceae	<i>Wilsonia humilis</i>	Silky Wilsonia						X		
Crassulaceae	<i>Crassula closiana</i>									X
Crassulaceae	<i>Crassula tetramera</i>					X				
Cyperaceae	<i>Caustis dioica</i>	Puzzle Grass		X	X	X				
Cyperaceae	<i>Chorizandra enodis</i>	Black Bristlebrush			X	X				

Table A8 continued.

Family	Species	Common Name	Cons Code	1 (Myr SL)	2 (Ban arm SL)	3 (Pro SL)	4 (Chen, Sam)	5 (Mel SL)	6 (Mel WL)	7 (Mal WL)
Cyperaceae	<i>Ficinia nodosa</i>	Knotted Club Rush						X	X	
Cyperaceae	<i>Gahnia ancistrophylla</i>	Hooked Leaf Saw Sedge								X
Cyperaceae	<i>Gahnia trifida</i>	Coastal Saw Sedge						X		
Cyperaceae	<i>Lepidosperma carphoides</i>	Black Rapier Sedge		X	X	X				
Cyperaceae	<i>Lepidosperma gracile</i>	Slender Sword Sedge			X	X				X
Cyperaceae	<i>Lepidosperma squamata</i>			X	X	X		X	X	
<b>Cyperaceae</b>	<b><i>Schoenus breviculmis</i></b>	<b>Moss Bog rush</b>		<b>X</b>	<b>X</b>	<b>X</b>				
Dasypogonaceae	<i>Calectasia gracilis</i>									X
Dilleniaceae	<i>Hibbertia acerosa</i>	Needle Leaved Guinea Flower		X	X					X
Dilleniaceae	<i>Hibbertia gracilipes</i>	Australian Butter Cup			X	X		X		X
Dilleniaceae	<i>Hibbertia racemosa</i>	Stalked Guinea Flower		X		X				
Dilleniaceae	<i>Hibbertia ulicifolia</i>					X				
Droseraceae	<i>Drosera glanduligera</i>	Pimpernel Sundew		<b>X</b>	<b>X</b>			X		X
<b>Droseraceae</b>	<b><i>Drosera huegelii</i></b>	<b>Bold Sundew</b>				<b>X</b>				<b>X</b>
<b>Droseraceae</b>	<b><i>Drosera menziesii</i></b>	<b>Pink Rainbow</b>				<b>X</b>		<b>X</b>		<b>X</b>
<b>Droseraceae</b>	<b><i>Drosera ramellosa</i></b>	<b>Branched Sundew</b>								<b>X</b>
<b>Droseraceae</b>	<b><i>Drosera zonaria</i></b>	<b>Painted Sundew</b>								<b>X</b>
Ericaceae	<i>Brachyloma mogin</i>		P3 - KW150, Acc 9059			X		X		

Table A8 continued.

Family	Species	Common Name	Cons Code	1 (Myr SL)	2 (Ban arm SL)	3 (Pro SL)	4 (Chen, Sam)	5 (Mel SL)	6 (Mel WL)	7 (Mal WL)
Ericaceae	<i>Conostephium marchantiorum</i>		P3 - known population	X	X				X	
Ericaceae	<i>Dielsiodoxa oligarrhenoides</i>							X		
Ericaceae	<i>Leucopogon assimilis</i>				X					X
Ericaceae	<i>Leucopogon carinatus</i>			X	X	X		X		
Ericaceae	<i>Leucopogon</i> sp. Coujinup (M. A. Burgman 1085)				X	X				X
Ericaceae	<i>Lysinema ciliatum</i>	Curry Plant		X	X	X				
Euphorbiaceae	<i>Stachystemon vinosus</i>		P4 - KW149, Acc 9059							X
<b>Euphorbiaceae</b>	<b><i>Stachystemon virgatus</i></b>									<b>X</b>
Fabaceae	<i>Acacia aemula</i>			<b>X</b>	X	X				
<b>Fabaceae</b>	<b><i>Acacia biflora</i></b>						<b>X</b>	<b>X</b>		
Fabaceae	<i>Acacia chrysella</i>							X		
Fabaceae	<i>Acacia chrysocephala</i>									X
Fabaceae	<i>Acacia cyclops</i>	Coastal Wattle, Red Eyed-Wattle		X	X			X		X
Fabaceae	<i>Acacia flavipila</i> var. <i>flavipila</i>									X
Fabaceae	<i>Acacia gonophylla</i>			X	<b>X</b>	X				
Fabaceae	<i>Acacia myrtifolia</i>			X	X	X				
Fabaceae	<i>Acacia patagiata</i>			X				X		
Fabaceae	<i>Acacia pulchella</i>	Prickly Moses						<b>X</b>		X

Table A8 continued.

Family	Species	Common Name	Cons Code	1 (Myr SL)	2 (Ban arm SL)	3 (Pro SL)	4 (Chen, Sam)	5 (Mel SL)	6 (Mel WL)	7 (Mal WL)
Fabaceae	<i>Acacia saligna</i>	Orange Wattle		X		X				
Fabaceae	<i>Chorizema aciculare</i>			X	X	X		X		X
Fabaceae	<i>Daviesia apiculata</i>				X	X				
Fabaceae	<i>Daviesia lancifolia</i>									X
Fabaceae	<i>Daviesia teretifolia</i>			X	X	X				X
Fabaceae	<i>Gastrolobium spinosum</i>	Prickly Poison			X	X				
Fabaceae	<b><i>Gompholobium tomentosum</i></b>	Hairy Yellow Pea				X				
Fabaceae	<b><i>Gompholobium viscidulum</i></b>				X					X
Fabaceae	<i>Hovea pungens</i>	Devil Pins				X				
Fabaceae	<i>Isotropis drummondii</i>	Lamb Poison								X
Fabaceae	<i>Jacksonia venosa</i>			X	X	X				
Fabaceae	<b><i>Pultenaea barbata</i></b>				X		X	X		
Fabaceae	<b><i>Pultenaea indira</i> subsp. <i>indira</i></b>							X		X
Fabaceae	<b><i>Pultenaea rotundifolia</i></b>							X		X
Frankeniaceae	<i>Frankenia tetrapetala</i>	Four Petaled Frankenia					X	X		
Goodeniaceae	<i>Cooperhooia stropholata</i>				X	X				X
Goodeniaceae	<i>Dampiera lavandulacea</i>				X	X				X
Goodeniaceae	<b><i>Dampiera leptoclada</i></b>	Slender Shouted Dampiera								X
Goodeniaceae	<b><i>Dampiera parvifolia</i></b>				X					



Table A8 continued.

Family	Species	Common Name	Cons Code	1 (Myr SL)	2 (Ban arm SL)	3 (Pro SL)	4 (Chen, Sam)	5 (Mel SL)	6 (Mel WL)	7 (Mal WL)
Goodeniaceae	<i>Dampiera sacculata</i>				X					
Goodeniaceae	<i>Goodenia incana</i>	Hoary Goodenia			X	X				X
Goodeniaceae	<i>Goodenia turleyae</i>		P1 - send to WA Herb					X		
Goodeniaceae	<i>Goodenia scapigera</i>				X	X				
Goodeniaceae	<i>Scaevola thesioides</i> subsp. <i>filiformis</i>									X
Haemodoraceae	<i>Conostylis bealiana</i>	Angels Trumpet		X	X					
Haemodoraceae	<i>Conostylis breviscapa</i>				X					
Haemodoraceae	<i>Conostylis vaginata</i>			X		X		X		
Haemodoraceae	<i>Tribonanthes violacea</i>	Violet Tiurndin								X
Haloragaceae	<i>Glischrocaryon aureum</i>	Common Pop Flower								X
Haloragaceae	<i>Glischrocaryon roei</i>	Pop Flower				X		X		X
Haloragaceae	<i>Myriophyllum tillaeoides</i>	Water Milfoil					X			
Hemerocallidaceae	<i>Chamaescilla corymbosa</i>	Blue Squill		X	X	X		X		X
Hemerocallidaceae	<i>Dianella brevicaulis</i>	Blueberry Flax Lilly				X	X	X		
Iridaceae	<i>Patersonia occidentalis</i>	Purple Flag				X		X		X
Juncaginaceae	<i>Triglochin mucronata</i>							X		
Lauraceae	<i>Cassytha micrantha</i>									X
Lauraceae	<i>Cassytha</i> sp.			X		X			X	X
Malvaceae	<i>Guichenotia ledifolia</i>			X	X	X				X

Table A8 continued.

Family	Species	Common Name	Cons Code	1 (Myr SL)	2 (Ban arm SL)	3 (Pro SL)	4 (Chen, Sam)	5 (Mel SL)	6 (Mel WL)	7 (Mal WL)
Myrtaceae	<i>Beaufortia empetrifolia</i>	South Coast Beaufortia			X					
Myrtaceae	<i>Beaufortia micrantha</i>	Little Bottlebrush		X	X	X				
Myrtaceae	<i>Beaufortia schaueri</i>	Pink Beaufortia			X					X
Myrtaceae	<i>Calothamnus gracilis</i>	One sided Bottlebrush			X	X				
<b>Myrtaceae</b>	<b><i>Calytrix leschenaultii</i></b>			<b>X</b>		<b>X</b>				
Myrtaceae	<i>Chamelaucium ciliatum</i>				X			X	X	X
Myrtaceae	<i>Conothamnus aureus</i>				X	X				<b>X</b>
Myrtaceae	<i>Cyathostemon ambiguus</i>			X	<b>X</b>	X		X	X	X
Myrtaceae	<i>Darwinia</i> sp. Gibson (R.D. Royce 3569)		P1 - known population					X		
Myrtaceae	<i>Darwinia vestita</i>	Pom-pom Darwinia		X	X	<b>X</b>		<b>X</b>		
Myrtaceae	<i>Eucalyptus leptocalyx</i>	Hopetoun Mallee			X	X				
Myrtaceae	<i>Eucalyptus pleurocarpa</i>	Tallerack			X	X				
Myrtaceae	<i>Eucalyptus uncinata</i>	Hook Leaved Mallee								X
<b>Myrtaceae</b>	<b><i>Kunzea acuminata</i> affin.</b>			<b>X</b>	<b>X</b>	<b>X</b>				
Myrtaceae	<i>Kunzea salina</i>		P3 - KW148, Acc 9059					X		
Myrtaceae	<i>Leptospermum erubescens</i>	Roadside Tea Tree		X		X				
Myrtaceae	<i>Leptospermum spinescens</i>					X				

Table A8 continued.

Family	Species	Common Name	Cons Code	1 (Myr SL)	2 (Ban arm SL)	3 (Pro SL)	4 (Chen, Sam)	5 (Mel SL)	6 (Mel WL)	7 (Mal WL)
Myrtaceae	<i>Melaleuca brevifolia</i>						X	X		
Myrtaceae	<i>Melaleuca calycina</i>								X	X
Myrtaceae	<i>Melaleuca cuticularis</i>	Saltwater Paperbark						X		
Myrtaceae	<i>Melaleuca pulchella</i>	Crab Claw Flower						X		X
Myrtaceae	<i>Melaleuca rigidifolia</i>					X				X
Myrtaceae	<i>Melaleuca scabra</i>	Rough honeymyrtle			X	X				
Myrtaceae	<i>Melaleuca societatis</i>	Soccer Ball Melaleuca			X	X				X
Myrtaceae	<i>Melaleuca striata</i>					X				
Myrtaceae	<i>Melaleuca tuberculata</i>					X		X		X
Myrtaceae	<i>Micromyrtus elobata</i> subsp. <i>elobata</i>			X	X	X				X
Myrtaceae	<i>Micromyrtus imbricata</i>			X	X	X				X
Myrtaceae	<i>Phymatocarpus maxwellii</i>							X	X	X
<b>Myrtaceae</b>	<b><i>Regelia inops</i></b>				X					
Myrtaceae	<i>Taxandria spathulata</i>				X	X				
Myrtaceae	<i>Tetrapora preissiana</i>			X	X					
<b>Myrtaceae</b>	<b><i>Verticordia minutifolia</i></b>				X					
<b>Myrtaceae</b>	<b><i>Verticordia plumosa</i> var. <i>grandiflora</i></b>	Plumed Feather Flower						X		X
Myrtaceae	<i>Verticordia vicinella</i>	Feather Flower			X					
<b>Olacaceae</b>	<b><i>Olax benthamiana</i></b>				X					
<b>Orchidaceae</b>	<b><i>Caladenia attingens</i> subsp. <i>gracillima</i></b>				X	X				
<b>Orchidaceae</b>	<b><i>Caladenia cairnsiana</i></b>	Zebra Orchid				X				

Table A8 continued.

Family	Species	Common Name	Cons Code	1 (Myr SL)	2 (Ban arm SL)	3 (Pro SL)	4 (Chen, Sam)	5 (Mel SL)	6 (Mel WL)	7 (Mal WL)
Orchidaceae	<i>Caladenia decora</i>	Esperance King Spider			X	X				X
Orchidaceae	<i>Caladenia discoidea</i>	Dancing Orchid				X				
Orchidaceae	<i>Caladenia flava</i> subsp. <i>flava</i>	Cowslip Orchid		X	X	X		X		X
Orchidaceae	<i>Caladenia heberleana</i>	Esperance King Spider			X	X				X
Orchidaceae	<i>Cyanicula aperta</i>	Blue China Orchid			X					X
Orchidaceae	<i>Diuris laxiflora</i>	Bee Orchid								X
Orchidaceae	<i>Diuris littoralis</i>	Donkey Orchid						X		X
Orchidaceae	<i>Elythranthera brunonis</i>	Purple Enamel Orchid			X	X		X	X	X
Orchidaceae	<i>Leporella fimbriata</i>	Hare Orchid				X				
Orchidaceae	<i>Prasophyllum</i> sp.			X	X				X	
Orchidaceae	<i>Pterostylis recurva</i>	Jug Orchid			X	X				X
Orchidaceae	<i>Pterostylis sanguinea</i>	Dark Banded Greenhood						X		
Orchidaceae	<i>Pterostylis setulosa</i>	Hairy Stemmed Snail				X				X
Orchidaceae	<i>Pterostylis vittata</i>	Green Banded Greenhood			X	X		X		X
Orchidaceae	<i>Pyrorchis nigricans</i>	Fire Orchid			X					
Orchidaceae	<i>Thelymitra antennifera</i>	Vanilla Orchid						X		X
Phyllanthaceae	<i>Poranthera microphylla</i>	Small Poranthera								X
Pittosporaceae	<i>Billardiera fusiformis</i>	Australian Blue bell		X	X			X		
Poaceae	<i>Austrostipa juncifolia</i>						X	X		
Poaceae	<i>Briza maxima</i>	Blowfly Grass	*					X		
Poaceae	<i>Ehrharta longiflora</i>	Annual Veldt Grass	*					X		

Table A8 continued.

Family	Species	Common Name	Cons Code	1 (Myr SL)	2 (Ban arm SL)	3 (Pro SL)	4 (Chen, Sam)	5 (Mel SL)	6 (Mel WL)	7 (Mal WL)
Poaceae	<i>Eragrostis curvula</i>	African lovegrass	*					X		
Poaceae	<i>Neurachne alopecuroidea</i>	Foxtail Mulga Grass		X	X	X			X	X
<b>Polygonaceae</b>	<b><i>Muehlenbeckia adpressa</i></b>	<b>Climbing Lignum</b>								X
<b>Primulaceae</b>	<b><i>Lysimachia arvensis</i></b>	<b>Pimpernel</b>	*				X			
Proteaceae	<i>Banksia armata</i>	Prickly Dryandra			X	X				
<b>Proteaceae</b>	<b><i>Banksia blechnifolia</i></b>					X				
Proteaceae	<i>Banksia nivea</i>	Honeypot Dryandra								X
Proteaceae	<i>Banksia obtusa</i>	Shining Honey Pot				X				
<b>Proteaceae</b>	<b><i>Banksia pilostylis</i></b>									X
Proteaceae	<i>Banksia pulchella</i>	Teasel Banksia			X					
Proteaceae	<i>Banksia repens</i>				X	X				
Proteaceae	<i>Grevillea nudiflora</i>					X				
Proteaceae	<i>Grevillea pauciflora</i>	Few Flowered Grevillea		X	X	X			X	X
Proteaceae	<i>Hakea cinerea</i>	Ashy Hakea			X			X		X
Proteaceae	<i>Hakea corymbosa</i>	Cauliflower Hakea			X	X				
Proteaceae	<i>Hakea cygnus</i>	Swan Hakea							X	X
Proteaceae	<i>Hakea lissocarpha</i>	Honey Bush			X	X		X		X
Proteaceae	<i>Hakea prostrata</i>	Harsh Hakea			X	X				
Proteaceae	<i>Hakea trifurcata</i>	Two Leaf Hakea			X	X				
Proteaceae	<i>Isopogon alpicornis</i>	Elkhorn Coneflower	P3					X		X
Proteaceae	<i>Isopogon polycephalus</i>	Clustered Coneflower			X	X				

Table A8 continued.

Family	Species	Common Name	Cons Code	1 (Myr SL)	2 (Ban arm SL)	3 (Pro SL)	4 (Chen, Sam)	5 (Mel SL)	6 (Mel WL)	7 (Mal WL)
Proteaceae	<i>Isopogon</i> sp. Fitzgerald River (D.B. Foreman 813)									X
Proteaceae	<i>Lambertia inermis</i> subsp. <i>Inermis</i>	Chiddick, Native Honeysuckle			X					
Proteaceae	<i>Persoonia scabra</i>		P3 - KW151, Acc 9059		X	X				X
Proteaceae	<i>Petrophile fastigiata</i>			X	X	X				
Proteaceae	<i>Petrophile squamata</i> subsp. Northern (J. Monks 40)					X				
<b>Proteaceae</b>	<b><i>Synaphea media</i></b>				<b>X</b>	<b>X</b>				
Proteaceae	<i>Synaphea oligantha</i>			X	X	X				
Proteaceae	<i>Synaphea polymorpha</i>			X		X				
Restionaceae	<i>Desmocladius</i> sp.					X				X
Restionaceae	<i>Lepidobolus chaetocephalus</i>	Bristle headed Chaff Rush			X	X				
Restionaceae	<i>Lepidobolus</i> sp.				<b>X</b>					X
Restionaceae	<i>Loxocarya striata</i>							X		X
Rhamnaceae	<i>Cryptandra myriantha</i>			X	X	X				
Rhamnaceae	<i>Cryptandra pungens</i>			X	<b>X</b>	X				
Rhamnaceae	<i>Spyridium mucronatum</i> subsp. <i>mucronatum</i>					X				
Rhamnaceae	<i>Stenanthemum notiale</i>			X	X	X				
Rubiaceae	<i>Opercularia vaginata</i>	Dogweed		<b>X</b>	X	<b>X</b>				X

Table A8 continued.

Family	Species	Common Name	Cons Code	1 (Myr SL)	2 (Ban arm SL)	3 (Pro SL)	4 (Chen, Sam)	5 (Mel SL)	6 (Mel WL)	7 (Mal WL)
Rutaceae	<i>Boronia crassifolia</i>									X
Rutaceae	<i>Cyanothamnus ramosus</i> subsp. <i>anethifolius</i>				X	X				
Stylidiaceae	<i>Levenhookia pusilla</i>	Midget Stylewort		X	X	X				
Stylidiaceae	<i>Stylidium calcaratum</i>	Book Triggerplant								X
Thymelaeaceae	<i>Pimelea cracens</i>							X		
Violaceae	<i>Hybanthus epacroides</i>	Spiny Hybanthus					X			
Violaceae	<i>Hybanthus floribunda</i>									X

<b>Quadrat</b>	Q1	<b>Veg Code</b>	Veg Type 2: Ban arm SL	<b>Date Surveyed</b>	08/09/2021
<b>Location</b>	Area 1b Line 51 (344.9 – 346.485), Fleming Grove Road, Gibson Esperance				
<b>GPS (Lat, Long)</b>	33°34'8"S, 121°47'16"E				
<b>Landform and Slope</b>	Flat slope on sandplain				
<b>Soils</b>	Light grey sand				
<b>Hydrology</b>	Good drainage				
<b>Vegetation description</b>	(NVIS): U+ ^^ <i>Eucalyptus pleurocarpa</i> , <i>Eucalyptus leptocalyx</i> Mallee; M+ ^^ <i>Hakea corymbosa</i> , <i>Banksia armata</i> , <i>Allocasuarina humilis</i> shrub; c; G ^ <i>Caustis dioica</i> , +/- <i>Lepidosperma carphoides</i> , <i>Neurachne alopecuroidea</i> sedge, grass; 2r  (Muir): <i>Eucalyptus pleurocarpa</i> and <i>Eucalyptus leptocalyx</i> Open Mallee mid and low woodland, over <i>Acacia cyclops</i> and <i>Hakea corymbosa</i> sparse tall shrubland, over <i>Banksia armata</i> , <i>Allocasuarina humilis</i> , <i>Beaufortia empetrifolia</i> , <i>Calothamnus gracilis</i> and <i>Daviesia teretifolia</i> mid shrubland, over <i>Hibbertia gracilipes</i> sparse low shrubland, over <i>Lepidosperma carphoides</i> , <i>Caustis dioica</i> , <i>Chorizandra enodis</i> open tall sedgeland, over <i>Dampiera lavandulacea</i> sparse forbland, over <i>Neurachne alopecuroidea</i> sparse grassland.				
<b>Condition</b>	Excellent				
<b>Comments</b>	Quadrat shape changed to 5x15m, as shape of native vegetation not conducive to 10x10m.				
<b>Species Name</b>	<b>Form</b>	<b>Height</b>	<b>Cover (%)</b>	<b>Flowering/Fruiting</b>	
<i>Allocasuarina thyoidea</i>	S-shrub	1	bi ≈0	Fruiting	
<i>Beaufortia micrantha</i>	S-shrub	1	r <10%	Fruiting	
<i>Micromyrtus imbricata</i>	S-shrub	0.5	r <10%	Flowering	
<i>Lysinema ciliatum</i>	S-shrub	0.5	r <10%	Flowering	
<i>Dampiera sacculata</i>	S-shrub	0.5	bi ≈0	Flowering	
<i>Dampiera parvifolia</i>	S-shrub	0.5	bi ≈0	Flowering	
<i>Synaphea media</i>	S-shrub	0.5	bi ≈0	Flowering	
<i>Synaphea oligantha</i>	S-shrub	0.5	bi ≈0	Flowering	
<i>Dampiera lavandulacea</i>	S-shrub	0.5	r <10%	Flowering	
<i>Hibbertia acerosa</i>	S-shrub	0.2	r <10%	Flowering	
<i>Banksia armata</i>	S-shrub	1.2	i 10-30%	Flowering	
<i>Lepidosperma squamatum</i>	V-sedge	1	bi ≈0	Fruiting	
<i>Eucalyptus leptocalyx</i>	M-mallee	3	r <10%	Fruiting	
<i>Eucalyptus pleurocarpa</i>	M-mallee	3	i 10-30%	Fruiting	
<i>Acacia cyclops</i>	S-shrub	2	r <10%	Fruiting	
<i>Isopogon polycephalus</i>	S-shrub	2	i 10-30%	Flowering	
<i>Guichenotia ledifolia</i>	S-shrub	1	r <10%	Flowering	
<i>Daviesia teretifolia</i>	S-shrub	1	r <10%	Flowering	
<i>Olax bentharii</i>	S-shrub	1	r <10%	Flowering	
<i>Grevillea pauciflora</i>	S-shrub	2	r <10%	Flowering	
<i>Allocasuarina long nuts</i>	S-shrub	2	i 10-30%	Fruiting	
<i>Hakea corymbosa</i>	S-shrub	2	r <10%	Fruiting	
<i>Calothamnus gracilis</i>	S-shrub	1	i 10-30%	Flowering	
<i>Acacia gonophylla</i>	S-shrub	1	r <10%	Fruiting	
<i>Cryptandra myriantha</i>	S-shrub	1	r <10%	Fruiting	
<i>Tetrapora preissiana</i>	S-shrub	1	bi ≈0	Fruiting	
<i>Petrophile fastigiata</i>	S-shrub	2	r <10%	Flowering	
<i>Conothamnus aureus</i>	S-shrub	2	r <10%	Flowering	
<i>Allocasuarina humilis</i>	S-shrub	2	r <10%	Fruiting	
<i>Hakea prostrata</i>	S-shrub	2	r <10%	Flowering	
<i>Cyathostemon ambiguus</i>	S-shrub	2	r <10%	Flowering	
<i>Caustis dioica</i>	V-sedge	0.5	r <10%		
<i>Neurachne alopecuroidea</i>	G-grass	0.2	bi ≈0	Flowering	
<i>Opercularia vaginata</i>	V-sedge	0.2	r <10%	Flowering	
<i>Gompholobium viscidulum</i>	S-shrub	0.2	bi ≈0	Flowering	



Quadrat 1 continued.

Species Name	Form	Height	Cover (%)	Flowering/Fruiting
<i>Hyalosperma demissum</i>	H-herb	0.1	bi ≈0	Flowering
<i>Pterochaeta paniculata</i>	H-herb	0.1	bi ≈0	Flowering
<i>Podotheca angustifolia</i>	H-herb	0.1	bi ≈0	Flowering
<i>Lepidosperma squamatum</i>	V-sedge	0.5	r <10%	Fruiting
<i>Cyanothamnus ramosus</i> subsp. <i>anethifolius</i>	S-shrub	0.5	r <10%	
<i>Prasophyllum</i> sp.	H-herb	0.2	bi ≈0	Flowering
<i>Cyanicula aperta</i>	H-herb	0.2	bi ≈0	Flowering
<i>Lepidosperma gracile</i>	V-sedge	0.2	r <10%	Flowering
<i>Thysanotus patersonii</i>	V-sedge	0.2	bi ≈0	Flowering
<i>Conostylis bealiana</i>	V-sedge	0.2	bi ≈0	Flowering
<i>Anarthria scabra</i>	V-sedge	0.2	r <10%	Flowering
<i>Chorizema aciculare</i>	S-shrub	0.2	r <10%	Flowering
<i>Drosera glanduligera</i>	H-herb	0.01	bi ≈0	Flowering
<i>Lepidobolus chaetocephalus</i>	V-sedge	0.1	bi ≈0	Flowering
<i>Pterostylis recurva</i>	H-herb	0.1	bi ≈0	Flowering
<i>Jacksonia venosa</i>	S-shrub	0.1	bi ≈0	Flowering
<i>Stenanthera locale</i>	S-shrub	0.5	r <10%	Flowering



<b>Quadrat</b>	Q2	<b>Veg Code</b>	Veg Type 3: Pro SL	<b>Date Surveyed</b>	08/09/2021
<b>Location</b>	Area 2 Line 51 (344.9 – 346.485), Fleming Grove Road, Gibson Esperance				
<b>GPS (Lat, Long)</b>	33°34'11"S, 121°47'13"E				
<b>Landform and Slope</b>	Flat slope on sandplain				
<b>Soils</b>	Light grey sand				
<b>Hydrology</b>	Good drainage				
<b>Vegetation description</b>	<p>(NVIS): U <sup>^^</sup> <i>Eucalyptus pleurocarpa</i>, <i>Eucalyptus leptocalyx</i> \Mallee\6\; M+ <sup>^^</sup> <i>Hakea lissocarpha</i>, <i>Isopogon polycephalus</i>, <i>Grevillea oligantha</i> \shrub\3\; G <sup>^^</sup> <i>Banksia blechnifolia</i>, <i>Hibbertia gracilipes</i>, <i>Caustis dioica</i> \low shrub, sedge\1\.</p> <p>(Muir): <i>Eucalyptus pleurocarpa</i> and <i>Eucalyptus leptocalyx</i> Open Mallee Mid Woodland, over <i>Acacia cyclops</i> isolated tall shrubs, <i>Hakea lissocarpha</i>, <i>Isopogon polycephalus</i>, <i>Grevillea oligantha</i>, <i>Daviesia apiculata</i> and <i>Calothamnus gracilis</i> closed mid shrubland, over <i>Banksia blechnifolia</i> and <i>Hibbertia gracilipes</i> open low shrubland, over <i>Lepidosperma carphoides</i>, <i>Caustis dioica</i> and <i>Lepidobolus chaetocephalus</i> open tall shrubland, over <i>Dampiera lavandulacea</i> sparse forbland.</p>				
<b>Condition</b>	Excellent				
<b>Comments</b>					
<b>Species Name</b>	<b>Form</b>	<b>Height</b>	<b>Cover (%)</b>	<b>Flowering/Fruiting</b>	
<i>Tetrapora preissiana</i>	S-shrub	2	r <10%	Fruiting	
<i>Cyathostemon ambiguus</i>	S-shrub		r <10%	Flowering	
<i>Calytrix leschenaultii</i>	S-shrub	1	bi ≈0		
<i>Calothamnus gracilis</i>	S-shrub	1	r <10%	Flowering	
<i>Hakea lissocarpha</i>	S-shrub	1	r <10%	Flowering	
<i>Hakea trifurcata</i>	S-shrub	2	r <10%	Flowering	
<i>Melaleuca rigidifolia</i>	S-shrub	2	r <10%		
<i>Allocasuarina helmsii</i>	S-shrub	2	r <10%	Fruiting	
<i>Grevillea pauciflora</i>	S-shrub	2	r <10%	Flowering	
<i>Melaleuca tuberculata</i>	S-shrub	2	bi ≈0		
<i>Isopogon polycephalus</i>	S-shrub	2	r <10%	Flowering	
<i>Conothamnus aureus</i>	S-shrub	1	i 10-30%	Flowering	
<i>Beaufortia micrantha</i>	S-shrub	1	r <10%	Fruiting	
<i>Lepidosperma squamatum</i>	V-sedge	1	r <10%	Fruiting	
<i>Caustis dioica</i>	V-sedge	1	r <10%	Fruiting	
<i>Dampiera lavandulacea</i>	H-herb	0.5	r <10%	Flowering	
<i>Synaphea oligantha</i>	H-herb	0.2	bi ≈0	Flowering	
<i>Opercularia vaginata</i>	H-herb	0.2	r <10%	Flowering	
<i>Banksia blechnifolia</i>	S-shrub	0.5	i 10-30%	Fruiting	
<i>Elythranthera brunonis</i>	H-herb	0.2	bi ≈0	Flowering	
<i>Neurachne alopecuroidea</i>	G-grass	0.2	bi ≈0	Flowering	
<i>Restionaceae sp.</i>	V-sedge	0.2	bi ≈0	Flowering	
<i>Xanthosia huegelii</i>	H-herb	0.2	bi ≈0	Flowering	
<i>Drosera menziesii</i>	H-herb	0.2	bi ≈0	Flowering	
<i>Chamaescilla corymbosa</i>	H-herb	0.2	bi ≈0	Flowering	
<i>Pterochaeta paniculata</i>	H-herb	0.2	bi ≈0	Flowering	
<i>Levenhookia pusilla</i>	H-herb	0.2	bi ≈0	Flowering	
<i>Goodenia incana</i>	H-herb	0.2	bi ≈0	Flowering	

Quadrat 2 continued.

Species Name	Form	Height	Cover (%)	Flowering/Fruiting
<i>Acacia aemula</i>	S-shrub	0.2	bi ≈0	Fruiting
<i>Leucopogon</i> sp. Coujinup (M.A. Burgman 1085)	S-shrub	0.5	bi ≈0	Fruiting
<i>Conostylis bealiana</i>	V-sedge	0.5	bi ≈0	Fruiting
<i>Lepidosperma gracile</i>	V-sedge	0.5	bi ≈0	Fruiting
<i>Cryptandra pungens</i>	S-shrub	0.5	bi ≈0	Flowering
<i>Daviesia teretifolia</i>	S-shrub	1	r <10%	Fruiting
<i>Eucalyptus pleurocarpa</i>	M-mallee	3	i 10-30%	Fruiting
<i>Eucalyptus uncinata</i>	M-mallee	6	i 10-30%	Fruiting
<i>Eucalyptus leptocalyx</i>	M-mallee	3	r <10%	Fruiting
<i>Acacia cyclops</i>	S-shrub	3	r <10%	Fruiting



<b>Quadrat</b>	Q3	<b>Veg Code</b>	Veg Type 3: Pro SL	<b>Date Surveyed</b>	08/09/2021
<b>Location</b>	Area 13 Line 51 (344.9 – 346.485), Fleming Grove Road, Gibson Esperance				
<b>GPS (Lat, Long)</b>	33°34'1"S, 121°47'14"E				
<b>Landform and Slope</b>	Flat slope on sandplain				
<b>Soils</b>	White sand				
<b>Hydrology</b>	Good drainage				
<b>Vegetation description</b>	(NVIS): U ^ Eucalyptus pleurocarpa, Eucalyptus leptocalyx\Mallee\6r; M+ ^Hakea lissocarpha, Isopogon polycephalus, Grevillea oligantha\shrub\3d; G ^Banksia blechnifolia, Hibbertia gracilipes, Caustis dioica\low shrub, sedge\1i.  (Muir): Eucalyptus pleurocarpa and Eucalyptus leptocalyx Open Mallee Mid Woodland, over Acacia cyclops isolated tall shrubs, Hakea lissocarpha, Isopogon polycephalus, Grevillea oligantha, Daviesia apiculata and Calothamnus gracilis closed mid shrubland, over Banksia blechnifolia and Hibbertia gracilipes open low shrubland, over Lepidosperma carphoides, Caustis dioica and Lepidobolus chaetocephalus open tall shrubland, over Dampiera lavandulacea sparse forbland.				
<b>Condition</b>	Good				
<b>Comments</b>					
<b>Species Name</b>	<b>Form</b>	<b>Height</b>	<b>Cover (%)</b>	<b>Flowering/Fruiting</b>	
<i>Allocasuarina humilis</i>	S-shrub	1	i 10-30%	FL/FR	
<i>Leptospermum spinescens</i>	S-shrub	1	bi ≈0	Flowering	
<i>Leucopogon assimilis</i>	S-shrub	1	r <10%	Flowering	
<i>Darwinia vestita</i>	S-shrub	1	r <10%	Flowering	
<i>Grevillea pauciflora</i>	S-shrub	1	i 10-30%	Flowering	
<i>Hakea prostrata</i>	S-shrub	2	r <10%	Flowering	
<i>Daviesia teretifolia</i>	S-shrub	2	r <10%		
<i>Acacia gonophylla</i>	S-shrub	1	r <10%		
<i>Cyathostemon ambiguus</i>	S-shrub	1	r <10%	Flowering	
<i>Acacia cyclops</i>	S-shrub	2	bi ≈0		
<i>Melaleuca tuberculata</i>	S-shrub	1	bi ≈0	Fruiting	
<i>Banksia obtusa</i>	S-shrub	0.2	r <10%		
<i>Banksia repens</i>	S-shrub	0.2	r <10%		
<i>Dampiera lavandulacea</i>	H-herb	0.2	r <10%	Flowering	
<i>Cassutha</i> sp.	H-herb		bi ≈0		
<i>Caustis dioica</i>	V-sedge	0.2	r <10%		
<i>Persoonia scabra</i>	S-shrub	0.2	r <10%		
<i>Caladenia attingens</i> subsp. <i>gracillima</i>	H-herb	0.2	r <10%	Flowering	
<i>Hibbertia ulicifolia</i>	S-shrub	0.2	r <10%	Flowering	
<i>Xanthosia huegellii</i>	H-herb	0.1	bi ≈0	Flowering	
<i>Drosera menziesii</i>	H-herb	0.1	bi ≈0	Flowering	
<i>Restionaceae</i> sp.	V-sedge	0.1	bi ≈0	Flowering	
<i>Opercularia vaginata</i>	H-herb	0.1	bi ≈0	Flowering	
<i>Hyalosperma demissum</i>	H-herb	0.1	bi ≈0	Flowering	
<i>Podotheca angustifolia</i>	H-herb	0.1	bi ≈0	Flowering	
<i>Pterochaeta paniculata</i>	H-herb	0.1	bi ≈0	Flowering	
<i>Pterostylis recurva</i>	H-herb	0.1	bi ≈0	Flowering	
<i>Chamaescilla corymbosa</i>	H-herb	0.1	bi ≈0	Flowering	
<i>Hovea pungens</i>	H-herb	0.1	bi ≈0	Flowering	
<i>Synaphea media</i>	S-shrub	0.1	bi ≈0	Flowering	
<i>Leucopogon</i> sp. Coujinup (M.A. Burgman 1085)	H-herb	0.1	bi ≈0	Flowering	
<i>Hibbertia gracilipes</i>	S-shrub	0.1	bi ≈0	Flowering	
<i>Chorizema aciculare</i>	S-shrub	0.1	bi ≈0	Flowering	

Quadrat 3 continued.

<i>Lepidosperma squamatum</i>	V-sedge	0.1	bi ≈0	Flowering
<i>Elythranthera brunonis</i>	H-herb	0.1	bi ≈0	Flowering
<i>Caladenia cairnsiana</i>	H-herb	0.1	bi ≈0	Flowering
<i>Synaphea oligantha</i>	S-shrub	0.2	bi ≈0	Flowering
<i>Glischrocaryon roei</i>	H-herb	0.2	bi ≈0	Flowering
<i>Conostephium marchantiorum</i>	S-shrub	0.2	bi ≈0	Flowering
<i>Schoenus breviculmis</i>	V-sedge	0.1	bi ≈0	
<i>Anarthria gracilis</i>	V-sedge	0.1	bi ≈0	
<i>Eucalyptus pleurocarpa</i>	M-mallee	6	r <10%	Fruiting
<i>Eucalyptus leptocalyx</i>	M-mallee	3	r <10%	Fruiting
<i>Lysinema ciliatum</i>	S-shrub	1	bi ≈0	Flowering



<b>Quadrat</b>	Q4	<b>Veg Code</b>	Veg Type 2: Ban arm SL	<b>Date Surveyed</b>	08/09/2021
<b>Location</b>	Area 12 Line 51 (344.9 – 346.485), Fleming Grove Road, Gibson Esperance				
<b>GPS (Lat, Long)</b>	33°34'12"S, 121°47'19"E				
<b>Landform and Slope</b>	Flat slope on sandplain				
<b>Soils</b>	Orange/brown sand				
<b>Hydrology</b>	Good drainage				
<b>Vegetation description</b>	<p>(NVIS): U+ ^ Eucalyptus pleurocarpa, Eucalyptus leptocalyx\Mallee\6r; M+ ^^Hakea corymbosa, Banksia armata, Allocasuarina humilis\shrub\3c; G ^Caustis dioica, +/-Lepidosperma carphoides, Neurachne alopecuroides\^sedge, grass\2r</p> <p>(Muir): Eucalyptus pleurocarpa and Eucalyptus leptocalyx Open Mallee mid and low woodland, over Acacia cyclops and Hakea corymbosa sparse tall shrubland, over Banksia armata, Allocasuarina humilis, Beaufortia empetrifolia, Calothamnus gracilis and Daviesia teretifolia mid shrubland, over Hibbertia gracilipes sparse low shrubland, over Lepidosperma carphoides, Caustis dioica, Chorzandra enodis open tall sedgeland, over Dampiera lavandulacea sparse forbland, over Neurachne alopecuroides sparse grassland.</p>				
<b>Condition</b>	Good				
<b>Comments</b>					
<b>Species Name</b>	<b>Form</b>	<b>Height</b>	<b>Cover (%)</b>	<b>Flowering/Fruiting</b>	
<i>Daviesia apiculata</i>	S-shrub	2	r <10%	Flowering	
<i>Acacia cyclops</i>	S-shrub	2	r <10%		
<i>Lepidosperma squamatum</i>	V-sedge	0.5	i 10-30%	Fruiting	
<i>Micromyrtus imbricata</i>	S-shrub	0.5	r <10%	Flowering	
<i>Cyathostemon ambiguus</i>	S-shrub	1	i 10-30%	Flowering	
<i>Darwinia vestita</i>	S-shrub	1	r <10%	Flowering	
<i>Banksia armata</i>	S-shrub	2	i 10-30%	Flowering	
<i>Acacia myrtifolia</i>	S-shrub	1	r <10%	Flowering	
<i>Synaphea media</i>	S-shrub	0.2	r <10%	Flowering	
<i>Isopogon polycephalus</i>	S-shrub	1	r <10%	Flowering	
<i>Hibbertia gracilipes</i>	S-shrub	0.3	r <10%	Flowering	
<i>Goodenia scapigera</i>	H-herb	0.2	r <10%	Flowering	
<i>Chorzema aciculare</i>	S-shrub	0.2	r <10%	Flowering	
<i>Agonis baxteri</i>	S-shrub	2	r <10%	Flowering	
<i>Petrophile fastigiata</i>	S-shrub	1	r <10%	Flowering	
<i>Allocasuarina humilis</i>	S-shrub	1	r <10%	Fruiting	
<i>Caustis dioica</i>	V-sedge	0.5	r <10%		
<i>Hakea prostrata</i>	S-shrub	2	r <10%	Flowering	
<i>Lysinema ciliatum</i>	S-shrub	0.2	bi ≈0	Flowering	
<i>Calothamnus gracilis</i>	S-shrub	1	bi ≈0		
<i>Grevillea pauciflora</i>	S-shrub	1	r <10%	Flowering	

Quadrat 4 continued.



## **Appendix F**

DBCA Threatened and Priority Reporting Forms (TPFL)



## **Appendix G**

### Permit to Take Threatened Flora Application



# Threatened and Priority Flora Report Form

Version 1.4 March 2021

**Please complete as much of the form as possible, with emphasis on those sections bordered in black.** For information on how to complete the form please refer to the Threatened & Priority Flora Report Form (TPRF) manual on the DBCA website at [www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/threatened-plants](http://www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/threatened-plants)

<b>TAXON:</b> <u>Eremophila glabra subsp. Scaddan</u>		<b>TPFL Pop. No.:</b> _____
<b>OBSERVATION DATE:</b> <u>08/09/2021</u>	<b>CONSERVATION STATUS:</b> <u>TF – Cr En</u>	<b>New population</b> <input checked="" type="checkbox"/>
<b>OBSERVER/S:</b> <u>Katie White and Charlize van der Mescht</u>		<b>PHONE</b> <u>0439 993 451</u>
<b>ROLE:</b> <u>Environmental Consultants</u>	<b>ORGANISATION:</b> <u>Bio Diverse Solutions</u>	
<b>EMAIL:</b> <u>Katie@biodiversesolutions.com.au ; enquiry@biodiversesolutions.com.au</u>		

<b>DESCRIPTION OF LOCATION</b> (Provide at least nearest town/named locality, and the distance and direction to that place): <u>~40 km north-north east of Esperance. On railway line, single plant ~915 m north of Fleming Grove Rd crossing, on the Railway line. On western side of the railway line. Gibson area.</u>		
		<b>Reserve No.:</b> _____
<b>DBC DISTRICT:</b> <u>South Coast</u>	<b>LGA:</b> <u>Esperance</u>	Land manager present: <input type="checkbox"/>
<b>DATUM:</b>	<b>COORDINATES:</b> (If UTM coords provided, Zone is also required)	<b>METHOD USED:</b>
GDA94 / MGA94 <input checked="" type="checkbox"/>	DecDegrees <input type="checkbox"/> DegMinSec <input type="checkbox"/> UTM <input checked="" type="checkbox"/>	GPS <input type="checkbox"/> Differential GPS <input type="checkbox"/> Map <input checked="" type="checkbox"/>
AGD84 / AMG84 <input type="checkbox"/>	<b>Lat / Northing:</b> <u>944472.445</u>	No. satellites: _____ Map used: <u>ArcGIS</u>
WGS84 <input type="checkbox"/>	<b>Long / Easting:</b> <u>6276135.148</u>	Boundary polygon captured: <input type="checkbox"/> Map scale: _____
Unknown <input type="checkbox"/>	<b>ZONE:</b> <u>51H</u>	
<b>LAND TENURE:</b>		
Nature reserve <input type="checkbox"/>	Timber reserve <input type="checkbox"/>	Private property <input type="checkbox"/>
National park <input type="checkbox"/>	State forest <input type="checkbox"/>	Pastoral lease <input type="checkbox"/>
Conservation park <input type="checkbox"/>	Water reserve <input type="checkbox"/>	UCL <input type="checkbox"/>
		Rail reserve <input checked="" type="checkbox"/>
		MRWA road reserve <input type="checkbox"/>
		SLK/Pole <u>346.146</u> to _____
		Shire road reserve <input type="checkbox"/>
		Other Crown reserve <input type="checkbox"/>
		Specify other: _____

<b>AREA ASSESSMENT:</b> Edge survey <input checked="" type="checkbox"/> Partial survey <input type="checkbox"/> Full survey <input type="checkbox"/>	Area observed (m <sup>2</sup> ): _____															
<b>EFFORT:</b> Time spent surveying (minutes): <u>8 hr</u>	No. of minutes spent / 100 m <sup>2</sup> : _____															
<b>POP'N COUNT ACCURACY:</b> Actual <input checked="" type="checkbox"/> Extrapolation <input type="checkbox"/> Estimate <input type="checkbox"/>	Count method: _____ (Refer to field manual for list)															
<b>WHAT COUNTED:</b> Plants <input checked="" type="checkbox"/> Clumps <input type="checkbox"/> Clonal stems <input type="checkbox"/>																
<b>TOTAL POP'N STRUCTURE:</b>																
	<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>Mature:</th> <th>Juveniles:</th> <th>Seedlings:</th> <th>Totals:</th> </tr> </thead> <tbody> <tr> <td>Alive</td> <td style="text-align: center;">1</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Dead</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		Mature:	Juveniles:	Seedlings:	Totals:	Alive	1				Dead				
	Mature:	Juveniles:	Seedlings:	Totals:												
Alive	1															
Dead																
	Area of pop (m <sup>2</sup> ): _____															
	Note: Pls record count as numbers (not percentages) for database.															
<b>QUADRATS PRESENT:</b> No. _____ Size _____ Data attached <input type="checkbox"/>	Total area of quadrats (m <sup>2</sup> ): _____															
<b>Summary Quad. Totals: Alive</b>																
<b>REPRODUCTIVE STATE:</b> Clonal <input type="checkbox"/> Vegetative <input type="checkbox"/> Flowerbud <input type="checkbox"/> Flower <input checked="" type="checkbox"/>	Percentage in flower: <u>100%</u>															
Immature fruit <input type="checkbox"/> Fruit <input type="checkbox"/> Dehisced fruit <input type="checkbox"/>																

**CONDITION OF PLANTS:** Healthy  Moderate  Poor  Senescent

**COMMENT:** Present directly on the edge of the railway line, amongst ballast rock

THREATS - type, agent and supporting information:	Current impact (N-E)	Potential Impact (L-E)	Potential Threat Onset (S-L)
Eg clearing, too frequent fire, weed, disease. Refer to field manual for list of threats & agents. <b>Specify agent</b> where relevant. Rate current and potential threat impact: N=Nil, L=Low, M=Medium, H=High, E=Extreme Estimate time to potential impact: S=Short (<12mths), M=Medium (<5yrs), L=Long (5yrs+)			
• Potential impact from infrastructure works / clearing proposed along the railway line	<u>S-M</u>	<u>M-H</u>	<u>S</u>
• Increased runoff from surrounding agricultural lands – observed algal blooms in northern	_____	_____	_____
•	_____	_____	_____



# Threatened and Priority Flora Report Form

**HABITAT INFORMATION:**

<b>LANDFORM:</b>	<b>ROCK TYPE:</b>	<b>LOOSE ROCK:</b>	<b>SOIL TYPE:</b>	<b>SOIL COLOUR:</b>	<b>DRAINAGE:</b>
Crest <input type="checkbox"/>	Granite <input type="checkbox"/>	(on soil surface; eg gravel, quartz fields)	Sand <input type="checkbox"/>	Red <input type="checkbox"/>	Well drained <input type="checkbox"/>
Hill <input type="checkbox"/>	Dolerite <input type="checkbox"/>		Sandy loam <input type="checkbox"/>	Brown <input type="checkbox"/>	Seasonally inundated <input checked="" type="checkbox"/>
Ridge <input type="checkbox"/>	Laterite <input type="checkbox"/>	0-10% <input type="checkbox"/>	Loam <input type="checkbox"/>	Yellow <input type="checkbox"/>	Permanently inundated <input type="checkbox"/>
Outcrop <input type="checkbox"/>	Ironstone <input type="checkbox"/>	10-30% <input checked="" type="checkbox"/>	Clay loam <input type="checkbox"/>	White <input checked="" type="checkbox"/>	Tidal <input type="checkbox"/>
Slope <input type="checkbox"/>	Limestone <input type="checkbox"/>	30-50% <input type="checkbox"/>	Light clay <input checked="" type="checkbox"/>	Grey <input checked="" type="checkbox"/>	
Flat <input type="checkbox"/>	Quartz <input type="checkbox"/>	50-100% <input type="checkbox"/>	Peat <input type="checkbox"/>	Black <input type="checkbox"/>	
Open depression <input type="checkbox"/>	Specify other:		Specify other:	Specify other:	
Drainage line <input type="checkbox"/>	<u>Salt Lake</u>				
Closed depression <input checked="" type="checkbox"/>	Specific <b>Landform</b> Element:				
Wetland <input type="checkbox"/>	(Refer to field manual for additional values)				

**Surrounding Inland salt lake, typical of the Scaddan region**

**CONDITION OF SOIL:** Dry  Moist  Waterlogged  Inundated

**VEGETATION CLASSIFICATION\*:**

Eg: 1. Banksia woodland (B. attenuata, B. ilicifolia);  
2. Open shrubland (Hibbertia sp., Acacia spp.);  
3. Isolated clumps of sedges (M.tetragona)

1. *Melaleuca brevifolia* sparse mid shrubland, over *Dianella brevicaulis* sparse low shrubland, over *Austrostipa juncifolia* sparse tall grassland, over *Disphyma crassifolium*, *Salicornia* sp., *Tecticornia* sp., *Frankenia tetrapetala* forbland, over *Myriophyllum tillaeoides* sparse aquatics.

2. \_\_\_\_\_

3. \_\_\_\_\_

4. \_\_\_\_\_

**ASSOCIATED SPECIES:**

Other (non-dominant) spp \_\_\_\_\_

\* Please record up to four of the most representative vegetation layers (with up to three dominant species in each layer). Structural Formations should follow 2009 *Australian Soil and Land Survey Field Handbook* guidelines – refer to field manual for further information and structural formation table.

**CONDITION OF HABITAT:** Pristine  Excellent  Very good  Good  Degraded  Completely degraded

**COMMENT:** Range of conditions – mostly from disturbance through vehicles driving along railway line for maintenance

**FIRE HISTORY:** Last Fire: Season/Month: \_\_\_\_\_ Year: \_\_\_\_\_ Fire Intensity: High  Medium  Low  No signs of fire

**FENCING:** Not required  Present  Replace / repair  Required  Length req'd: \_\_\_\_\_

**ROADSIDE MARKERS:** Not required  Present  Replace / reposition  Required  Quantity req'd: \_\_\_\_\_

**OTHER COMMENTS:** (Please include recommended management actions and/or implemented actions - include date. Also include details of additional data available, and how to locate it.)

Report submitted to Arc Infrastructure – ‘Bio Diverse Solutions (2021) Reconnaissance flora and vegetation and basic fauna survey report, Line 51 (344.9 – 346.485), Fleming Grove Rd, Gibson WA’. And follow up in wildflower season ‘Bio Diverse Solutions (2021) Targeted flora and vegetation survey report, Line 51 (344.9 – 346.485), Fleming Grove Rd, Gibson WA’

Specimen submitted by Emma Adams, District flora conservation officer (EA952). Confirmation by WA Herbarium of specimen.

**FLORA AUTHORISATION / LICENCE No:** Note if only observing plants (i.e. no specimens or plant material is taken) then no authorisation/licence is required. For further information on authorisation and licencing requirements see the Threatened Flora and Wildlife Licensing pages on DBCA’s website. Any actions carried out under authorisations/licences should be recorded above in the OTHER COMMENTS section.

**SPECIMEN:** Collectors No: \_\_\_\_\_ WA Herb.  Regional Herb.  District Herb.  Other: \_\_\_\_\_

**LODGEMENT:** WA Herb Lodgement No: \_\_\_\_\_

**ATTACHED:** Map  Mudmap  Photo  GIS data  Field notes  Other: \_\_\_\_\_

**COPY SENT TO:** Regional Office  District Office  Other: \_\_\_\_\_

Submitter of Record: Katie White Role: Botanist/Ecologist Signed: KW Date: 10/12/2021



# Threatened and Priority Flora Report Form

Version 1.4 March 2021

**Please complete as much of the form as possible, with emphasis on those sections bordered in black.** For information on how to complete the form please refer to the Threatened & Priority Flora Report Form (TPRF) manual on the DBCA website at [www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/threatened-plants](http://www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/threatened-plants)

<b>TAXON:</b> <u>Goodenia turleyae</u>		<b>TPFL Pop. No.:</b> _____
<b>OBSERVATION DATE:</b> <u>08/09/2021</u>	<b>CONSERVATION STATUS:</b> <u>P1</u>	<b>New population</b> <input checked="" type="checkbox"/>
<b>OBSERVER/S:</b> <u>Katie White and Charlize van der Mescht</u>		<b>PHONE</b> <u>0439 993 451</u>
<b>ROLE:</b> <u>Botanist / Environmental Consultants</u>	<b>ORGANISATION:</b> <u>Bio Diverse Solutions</u>	
<b>EMAIL:</b> <u><a href="mailto:katie@biodiversesolutions.com.au">katie@biodiversesolutions.com.au</a> <a href="mailto:enquiry@biodiversesolutions.com.au">enquiry@biodiversesolutions.com.au</a></u>		

**DESCRIPTION OF LOCATION** (Provide at least nearest town/named locality, and the distance and direction to that place):  
~40 km north-north east of Esperance. On the railway line, at 2.26 km north of Fleming Grove Rd crossing, on western side of railway line.

<b>DBC DISTRICT:</b> <u>South coast</u>		<b>LGA:</b> <u>Shire of Esperance</u>	<b>Reserve No.:</b> _____
<b>DATUM:</b>		<b>COORDINATES:</b> (If UTM coords provided, Zone is also required)	<b>METHOD USED:</b>
GDA94 / MGA94 <input checked="" type="checkbox"/>	DecDegrees <input type="checkbox"/>	DegMinSec <input type="checkbox"/>	UTMs <input checked="" type="checkbox"/>
AGD84 / AMG84 <input type="checkbox"/>	<b>Lat / Northing:</b> <u>944021.61</u>	GPS <input checked="" type="checkbox"/>	Differential GPS <input type="checkbox"/>
WGS84 <input type="checkbox"/>	<b>Long / Easting:</b> <u>6277433</u>	Map <input type="checkbox"/>	No. satellites: _____
Unknown <input type="checkbox"/>	<b>ZONE:</b> <u>51H</u>	Boundary polygon captured: <input type="checkbox"/>	Map used: <u>ArcGIS</u>
<b>LAND TENURE:</b>		Map scale: _____	
Nature reserve <input type="checkbox"/>	Timber reserve <input type="checkbox"/>	Private property <input type="checkbox"/>	Rail reserve <input checked="" type="checkbox"/>
National park <input type="checkbox"/>	State forest <input type="checkbox"/>	Pastoral lease <input type="checkbox"/>	MRWA road reserve <input type="checkbox"/>
Conservation park <input type="checkbox"/>	Water reserve <input type="checkbox"/>	UCL <input type="checkbox"/>	SLK/Pole <u>344.773</u> to _____
			Shire road reserve <input type="checkbox"/>
			Other Crown reserve <input type="checkbox"/>
			Specify other: _____

<b>AREA ASSESSMENT:</b> Edge survey <input type="checkbox"/>	Partial survey <input checked="" type="checkbox"/>	Full survey <input type="checkbox"/>	Area observed (m <sup>2</sup> ): _____
<b>EFFORT:</b> Time spent surveying (minutes): <u>8 hrs</u>	No. of minutes spent / 100 m <sup>2</sup> : _____		
<b>POP'N COUNT ACCURACY:</b> Actual <input type="checkbox"/>	Extrapolation <input type="checkbox"/>	Estimate <input checked="" type="checkbox"/>	Count method: _____
(Refer to field manual for list)			
<b>WHAT COUNTED:</b>	Plants <input checked="" type="checkbox"/>	Clumps <input type="checkbox"/>	Clonal stems <input type="checkbox"/>
<b>TOTAL POP'N STRUCTURE:</b>	<b>Mature:</b>	<b>Juveniles:</b>	<b>Seedlings:</b>
Alive	<u>15 plants</u>		
Dead			
Area of pop (m <sup>2</sup> ): <u>2x2m</u>			
Note: Pls record count as numbers (not percentages) for database.			
<b>QUADRATS PRESENT:</b>	No. _____	Size _____	Data attached <input type="checkbox"/>
Total area of quadrats (m <sup>2</sup> ): _____			
<b>Summary Quad. Totals: Alive</b>			
<b>REPRODUCTIVE STATE:</b>	Clonal <input type="checkbox"/>	Vegetative <input type="checkbox"/>	Flowerbud <input type="checkbox"/>
Immature fruit <input type="checkbox"/>	Fruit <input type="checkbox"/>	Dehisced fruit <input type="checkbox"/>	Flower <input checked="" type="checkbox"/>
Percentage in flower: <u>80%</u>			

**CONDITION OF PLANTS:** Healthy  Moderate  Poor  Senescent

**COMMENT:** \_\_\_\_\_

THREATS - type, agent and supporting information:	Current impact (N-E)	Potential Impact (L-E)	Potential Threat Onset (S-L)
Eg clearing, too frequent fire, weed, disease. Refer to field manual for list of threats & agents. <b>Specify agent</b> where relevant. Rate current and potential threat impact: N=Nil, L=Low, M=Medium, H=High, E=Extreme Estimate time to potential impact: S=Short (<12mths), M=Medium (<5yrs), L=Long (5yrs+)			
• Railway maintenance of access track or new laydown areas created – directly adjacent to active railway line	<u>H</u>	<u>H</u>	<u>S</u>
•	_____	_____	_____

Please return completed form to **Species And Communities Program DBCA**,  
 Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983 **OR** email to: [flora.data@dbca.wa.gov.au](mailto:flora.data@dbca.wa.gov.au)

**RECORDS:** Please forward to **Flora Administrative Officer**, Species and Communities Program.

Record entered by: \_\_\_\_\_ Sheet No.: \_\_\_\_\_ Record Entered in Database



# Threatened and Priority Flora Report Form

Version 1.4 March 2021

## HABITAT INFORMATION:

<b>LANDFORM:</b>	<b>ROCK TYPE:</b>	<b>LOOSE ROCK:</b>	<b>SOIL TYPE:</b>	<b>SOIL COLOUR:</b>	<b>DRAINAGE:</b>
Crest <input type="checkbox"/>	Granite <input type="checkbox"/>	(on soil surface; eg gravel, quartz fields)	Sand <input type="checkbox"/>	Red <input type="checkbox"/>	Well drained <input type="checkbox"/>
Hill <input type="checkbox"/>	Dolerite <input type="checkbox"/>		Sandy loam <input type="checkbox"/>	Brown <input type="checkbox"/>	Seasonally inundated <input checked="" type="checkbox"/>
Ridge <input type="checkbox"/>	Laterite <input type="checkbox"/>	0-10% <input type="checkbox"/>	Loam <input type="checkbox"/>	Yellow <input type="checkbox"/>	Permanently inundated <input type="checkbox"/>
Outcrop <input type="checkbox"/>	Ironstone <input type="checkbox"/>	10-30% <input type="checkbox"/>	Clay loam <input type="checkbox"/>	White <input type="checkbox"/>	Tidal <input type="checkbox"/>
Slope <input type="checkbox"/>	Limestone <input type="checkbox"/>	30-50% <input type="checkbox"/>	Light clay <input type="checkbox"/>	Grey <input checked="" type="checkbox"/>	
Flat <input type="checkbox"/>	Quartz <input type="checkbox"/>	50-100% <input type="checkbox"/>	Peat <input type="checkbox"/>	Black <input type="checkbox"/>	
Open depression <input type="checkbox"/>	Specify other: _____		Specify other: _____	Specify other: _____	
Drainage line <input type="checkbox"/>			Clay-Sand _____		
Closed depression <input checked="" type="checkbox"/>					
Wetland <input type="checkbox"/>	Specific <b>Landform</b> Element: (Refer to field manual for additional values)		<u>Periphery of Scaddan Salt Lake</u>		

**CONDITION OF SOIL:** Dry  Moist  Waterlogged  Inundated

## VEGETATION CLASSIFICATION\*:

Eg: 1. Banksia woodland (B. attenuata, B. ilicifolia);  
2. Open shrubland (Hibbertia sp., Acacia spp.);  
3. Isolated clumps of sedges (M.tetragona)

1. Closed Melaleuca Shrubland on periphery of salt lake

2.

3.

4.

## ASSOCIATED SPECIES:

Melaleuca brevifolia, Hakea cinerea, Melaleuca calycina, Darwinia vestita, Cooperookia strophiolata, Drosera macrantha

Other (non-dominant) spp \_\_\_\_\_

\* Please record up to four of the most representative vegetation layers (with up to three dominant species in each layer). Structural Formations should follow 2009 *Australian Soil and Land Survey Field Handbook* guidelines – refer to field manual for further information and structural formation table.

**CONDITION OF HABITAT:** Pristine  Excellent  Very good  Good  Degraded  Completely degraded

**COMMENT:** Plants located within previously cleared area, consisting of bare, open ground. Forming access track adjacent to railway line.

**FIRE HISTORY:** Last Fire: Season/Month: \_\_\_\_\_ Year: \_\_\_\_\_ Fire Intensity: High  Medium  Low  No signs of fire

**FENCING:** Not required  Present  Replace / repair  Required  Length req'd: \_\_\_\_\_

**ROADSIDE MARKERS:** Not required  Present  Replace / reposition  Required  Quantity req'd: \_\_\_\_\_

**OTHER COMMENTS:** (Please include recommended management actions and/or implemented actions - include date. Also include details of additional data available, and how to locate it.)

Targeted survey for population size did not occur – only surveyed within the railway corridor and specific identified laydown areas.

Results presented in 'Targeted Flora and Vegetation Survey Report – Line 51 (344.9 – 346.485), Fleming Grove Rd, Gibson WA 6448'. Pending submission on IBSA portal.

Specimen not retained by WA Herbarium

**FLORA AUTHORISATION / LICENCE No:** FB62000327 Note if only observing plants (i.e. no specimens or plant material is taken) then no authorisation/licence is required. For further information on authorisation and licencing requirements see the Threatened Flora and Wildlife Licencing pages on DBCA's website. Any actions carried out under authorisations/licences should be recorded above in the OTHER COMMENTS section.

**SPECIMEN:** Collectors No: KW186 WA Herb.  Regional Herb.  District Herb.  Other: \_\_\_\_\_

**LODGEMENT:** WA Herb Lodgement No: Acc 9343

**ATTACHED:** Map  Mudmap  Photo  GIS data  Field notes  Other: \_\_\_\_\_

**COPY SENT TO:** Regional Office  District Office  Other: \_\_\_\_\_

Submitter of Record: Katie White Role: Botanist / Environmental Consultant Signed: KW Date: 27/1/2022

Please return completed form to **Species And Communities Program DBCA,**

Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983 OR email to: flora.data@dbca.wa.gov.au

**RECORDS:** Please forward to **Flora Administrative Officer,** Species and Communities Program.

Record entered by: \_\_\_\_\_ Sheet No.: \_\_\_\_\_ Record Entered in Database

Hi Katie

Thank you for your email and happy new year to you as well.

I can confirm that you will require an authorisation to take threatened flora to cover inadvertent damage and the potential taking of the soil seed bank. Please fill out the management operations application form at the link in your email below and send it through to [flora.data@dbca.wa.gov.au](mailto:flora.data@dbca.wa.gov.au).

Kind regards

***Kelly Griffiths***

**Conservation Officer (Flora) – Part Time (Part days: Mon, Tues, Wed, Thurs & Fri)**

Species and Communities Program | Biodiversity & Conservation Science

**Department of Biodiversity, Conservation & Attractions**

☎ (08) 9219 9371 | [flora.data@dbca.wa.gov.au](mailto:flora.data@dbca.wa.gov.au)



Department of **Biodiversity,  
Conservation and Attractions**



*We're working for  
Western Australia.*



**From:** [katie@biodiversesolutions.com.au](mailto:katie@biodiversesolutions.com.au) <[katie@biodiversesolutions.com.au](mailto:katie@biodiversesolutions.com.au)>  
**Sent:** Thursday, 6 January 2022 4:33 PM  
**To:** Kelly Griffiths <[Kelly.Griffiths@dbca.wa.gov.au](mailto:Kelly.Griffiths@dbca.wa.gov.au)>  
**Cc:** 'Environment' <[environment@arcinfra.com](mailto:environment@arcinfra.com)>; 'Robbie Tanna' <[Robbie.Tanna@arcinfra.com](mailto:Robbie.Tanna@arcinfra.com)>; [kath@biodiversesolutions.com.au](mailto:kath@biodiversesolutions.com.au); Emma Adams <[Emma.Adams@dbca.wa.gov.au](mailto:Emma.Adams@dbca.wa.gov.au)>  
**Subject:** Eremophila glabra ssp Scaddan, TF - permit to take required? AI003-002

[External Email] This email was sent from outside the department – be cautious, particularly with links and attachments.  
Hi Kelly,

Merry Christmas and Happy New Year! Your email was shared with me by Emma Adams.

I've got a query regarding when a Permit to Take Threatened Flora is required or not.... Bio Diverse Solutions has been engaged by Arc Infrastructure to complete the flora/fauna surveys along railway line area in the Esperance region. We detected a new population of Eremophila glabra ssp Scaddan (TF), ~915m north of Fleming Grove Rd intersection on the western railway. The plant is within 3m of the ballast and 5m of the railway sleepers. Arc Infrastructure have indicated they will avoid impacting the plant directly, with an exclusion boundary fenced around the plant of 2x2m. However, there may be some impact to the soil seed bank and operations will be occurring in the direct vicinity of the plant.

Attached is the TPFL form, previously submitted to Emma and flora.data and some photos to demonstrate proximity of plant to railway line.

Can you please clarify if a Permit to Take Threatened Flora is required – to cover only for potential soil seed bank impact?

<https://www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/threatened-plants/200-authorisation-to-take-threatened-plants>

As far as I know, this is the only plant known so far in this population. We were only surveying within the railway corridor. I know Emma has intentions of surveying in the surrounding reserve, which has ample suitable habitat.

Thanks,

*Katie White*

Ecologist  
Bio Diverse Solutions  
Mob: 0439 993 451  
Ph: 9072 1382

**Please note my hours are 8:30 am to 5 pm Tuesday to Friday.**  
**For urgent enquiries outside this time, please email [enquiry@biodiversesolutions.com.au](mailto:enquiry@biodiversesolutions.com.au)**



◇ Environmental ◇ Bushfire ◇ Hydrology ◇ GIS  
29 Hercules Crescent      7/40 South Coast Highway      2A/113 Dempster Street  
Albany WA 6330      Denmark WA 6333      Esperance WA 6450



**APPLICATION FOR AUTHORISATION  
UNDER SECTION 40 OF THE *BIODIVERSITY CONSERVATION ACT 2016*  
TO TAKE THREATENED FLORA  
IN A MANAGEMENT OPERATION (NON-DBCA)**

**NOTE TO APPLICANTS:**

- Please complete ALL sections.
- Applications for Threatened Flora Authorisations must be submitted at least 6 weeks prior to the proposed "taking" of the species.
- **Completed application form to be scanned and emailed to:** [flora.data@dbca.wa.gov.au](mailto:flora.data@dbca.wa.gov.au) with all relevant attachments, or forwarded to: Flora Administrative Officer, Species and Communities Program, Department of Biodiversity, Conservation and Attractions, Locked Bag 104 Bentley Delivery Centre WA 6983.
- To take includes to gather, pluck, cut, pull up, destroy, dig up, remove, harvest or damage flora by any means.
- An application for a Threatened Flora Authorisation should also be completed for any activity that has the potential, whether directly or indirectly, of taking Threatened Flora for a determination as to whether Authorisation is required.
- A submission will be forwarded to the Hon Minister for Environment (or their delegate), based on this application.
- Information on the location of Threatened Flora populations can be requested through Species and Communities Program by emailing [flora.data@dbca.wa.gov.au](mailto:flora.data@dbca.wa.gov.au)
- A list of the current Threatened Flora can be obtained from DBCA's website at <http://www.dbca.wa.gov.au/plants-and-animals/threatened-species-and-communities/threatened-plants>
- Further information may be obtained from the department's Flora Administrative Officer, **9219 9513**. Species & Communities Program, Department of Biodiversity, Conservation and Attractions.

Draft – to be reviewed and confirmed by Arc Infrastructure at time of report completion. Details below may change upon finalization of application.

**SECTION 1**

<b>1. Applicant details (Name of the individual to whom a permit is to be issued):</b>			
<b>Title:</b> Mr	<b>Surname:</b> Robbie	<b>First name:</b> Tanna	
<b>Job title:</b> Project Engineer		<b>Contact phone number:</b> 0436 840 377	
<b>Company/group/institution (if applicable):</b> Arc Infrastructure			
<b>Residential/Street address:</b> Level 3, 1 George Wiencke Drive, Perth Airport WA			<b>Postcode:</b> 6105
<b>Postal address:</b> GPO Box S1411, Perth WA			<b>Postcode:</b> 6845
<b>Previous permit no.</b> NA		<b>Email address:</b> Robbie.Tanna@arcinfra.com	
<b>Expiry date:</b>			
<b>2. Signed:</b>		<b>Date:</b>	



## SECTION 2

<b>3. Scientific name(s) of Threatened Flora to be taken:</b> (if more than one taxon please list all)			
<i>Eremophila glabra</i> subsp. Scaddan (C. Turley s.n. 10/11/2005)			
<b>4. Date(s) of the proposed activity which will result in taking of Threatened Flora:</b>			
March 2022	to	March 2023	
<b>5. Location of proposed activity: (please attach a map)</b>			
~40km north-north east of Esperance townsite. Gibson area. On the western side of the railway, ~915m north of Fleming Grove Rd. Located at Railway KM 346.13. The plant is within 3m of the railway ballast and 5m of the active railway sleepers.			
Located at 944472.445m N, 6276135.148m E (UTM, Zone 51H; GDA94).			
<b>6. Nature of the proposed activity</b> (for burning indicate likely fire intensity and relevant information such as ignition plan, time since last fire):			
Note: "to take" also refers to inadvertent or accidental impact to the Threatened Flora and surrounding habitat. If <u>renewing</u> a Threatened Flora Authorisation, also include details here of what was taken under the previous authorisation and why you require the authorisation to be renewed.			
To take – application to cover incidental or accidental impact and possible impact to soil seed bank. Intention to avoid impact entirely, with plant currently marked out and caged off to prevent impact.			
<b>(a) Purpose of and need for the proposed activity:</b>			
Proposed works include re-construction of railway through replacement of sleepers and ballast along the railway line, due to the disrepair and extended period (over 30 years) without maintenance. Current state of railway is unsafe and at risk of de-railing without proposed works.			
Physical operations will be occurring on the railway line itself, which is in close proximity to the plant (3m to rock ballast, 5m to active sleepers) and adjacent to the railway in the railway corridor to form laydown bays for storage of materials and machinery.			
<b>(b) Consequence of not carrying out the operation:</b>			
Railway safety – long term, the railway line will become at high risk of derailment and significant safety incidents without maintenance or proposed upgrades. Higher risk of injury to people and infrastructure.			
Railway inactive for period – without maintenance the railway line will no longer be able to be used. Impact to current services by necessity of finding alternate transport solutions for commodities being transported, such as mined basic raw materials and fuel. Large impact to private industry, public revenue and government.			
Railway decommissioned – long term impact of railway line no longer servicing the greater Esperance-Coolgardie district (Line 51 running Coolgardie to Esperance). Lack of infrastructure for future transport of goods or services.			
<b>(c) Mitigation process:</b>			
Demonstrate that impacts to the Threatened Flora have been avoided or minimised where possible. Where a significant impact to the Threatened Flora may occur as a result of the proposed activity, detail what steps will be taken to reduce the longer-term impact.			
Proposed works originally included impact to threatened flora through the placement of a laydown bay (store materials and vehicle operation space). However, following environmental impact assessment and spatial review of the project, impact to the threatened flora is to be avoided through placement of laydown area in different location.			

<b>(d) Cost of alternative measures:</b> (eg. to exclude Threatened Flora from burning; include any change in fire risks)	
Re-routing railway line along different alignment is the only way to entirely prevent likelihood of accidental or inadvertent impact to plant – significant costs of constructing railway line on different alignment physically, purchasing of adjacent tenure required to re-route, likely higher impact to surrounding native vegetation, higher likelihood of closure of railway for extended period of time. Significantly higher cost to project overall (millions of dollars).	
<b>7. Registered DBCA Database Population Number/s of the Threatened Flora</b> (if known):	New population – not known of population number assigned
<b>(a) Total number(s) and condition of plants in Threatened Flora population(s) subject to the proposed activity (include reproductive maturity):</b>	
<p>One plant of <i>Eremophila glabra</i> subsp. Scaddan (C. Turley s.n. 10/11/2005) detected in Targeted Flora survey in September 2021, with survey area only covering the railway corridor. Large area in adjacent intact vegetated reserve with suitable habitat present (myriad of salt lakes). Therefore, possible that population is larger than the single plant. However, at present, only one plant present within the population.</p> <p>The plant is healthy, robust and actively growing. It is currently ~1m in height and was observed to be actively flowering profusely in September 2021.</p>	
<b>(b) Number(s) of plants and parts of plants likely to be taken</b> (e.g. leaves, flowers, fruits, seeds on ground, stem, roots, above ground plants, whole plants) <b>at the time proposed:</b>	
<p>The single plant within the population will be avoided, but is at a low risk of inadvertent or accidental damage. Most likely impact would be trimming or removal of branch if required.</p> <p>Impact to soil seed bank (unknown if present, quantity or location) may occur.</p>	
<b>8. Total number of populations, number of plants and condition of the species:</b>	
<b>(a) in the local context:</b>	
<p>Emma Adams (DBCA Esperance district flora officer) collected a green flowering <i>Eremophila</i> species in 2009, which was recently (December 2021) reassigned as <i>E. glabra</i> subsp. Scaddan (C. Turley s.n. 10/11/2005), after previously being identified as non-threatened <i>Eremophila subfloccosa</i> subsp. <i>glandulosa</i>. These plants will form part of the local population, being in close proximity to the single plant being discussed in this application. It is unknown the total number of plants and condition of the plants in this separate population. A targeted search has been proposed by Emma to quantify the local population.</p>	
<b>(b) on all lands if known:</b> (attach a table if necessary)	
<p>Excerpt from 'Targeted Flora and Vegetation Survey Report' for the site and based off the Conservation Advice for <i>E. glabra</i> subsp. Scaddan (C. Turley s.n. 10/11/2005) (<a href="http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=89454">http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=89454</a>) for the species – “<i>E. glabra</i> subsp. Scaddan (C. Turley s.n. 10/11/2005) is known from five sub-populations from three locations, with a total of 14 individuals recorded at time of nomination as threatened flora (EPA, 2016). Five plants at time of nomination were senescing or past reproduction. The largest population is nine mature individuals. Three populations are located on Shire Road reserves and are at risk from road maintenance, with the other two on private property and unallocated crown land. The sub-species distribution is located within a 20km (east-west) x 25km (north-south) area. It has been recorded within the Eastern Mallee and Recherche IBRA regions and Esperance local government area.”</p>	
<b>9. Detail regenerative characteristics of the Threatened Flora as applicable to activity, e.g. recovery after fire:</b>	
<p>No regeneration required following activity, as impact to the plant will be avoided.</p> <p>Potential impact to soil seed bank – disturbance and mechanical scarification from machinery may result in promotion of germination (as common with other <i>Eremophila</i> species in the Esperance region).</p> <p>If inadvertent impact occurs (such as trimming, root damage), then the plant will not be further impacted and left to regenerate.</p>	
<b>10. Detail proposals for monitoring the effect of the activity on the Threatened Flora:</b>	

Due to the highly environmentally sensitive nature of the site and the potential impact of proposed works, an independent environmental consultant (Bio Diverse Solutions) will be present at time of works to supervise and ensure no impact to the plant occurs.

Currently no ongoing monitoring proposed following completion of activity.

#### 11. Presence of other conservation significant species or communities

- A. Are there any known or potential populations of **Priority Flora** on the lands to be affected by the activity?:  
NO  YES  Please complete question 12.
- B. Are there any known or potential **Threatened and/or Priority Ecological Communities** within lands to be affected by the activity?:  
NO  YES  You may require a Threatened Ecological Community Authorisation. Please refer to [\[https://www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/wa-s-threatened-ecological-communities\]](https://www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/wa-s-threatened-ecological-communities)

#### Detail the species and its critical habitat

The species typically occurs on the periphery of salt lakes in the Scaddan-Gibson region.

#### 12. Please list known or potential Priority flora which occur within area under application and whether the proposed activity has the potential to impact these species. This is to ensure that Priority Flora will not be adversely impacted under the authorisation.

Eight other priority flora species were identified in the close proximity/railway corridor of proposed works of the Fleming Grove Rd area, namely P1 *Goodenia turleyae* (TBC, pending WA herbarium confirmation), P1 *Darwinia* sp. Gibson (R.D. Royce 3569), P3 *Isopogon alcornis*, P3 *Conostephium marchantiorum*, P3 *Brachyloma mogin*, P3 *Kunzea salina*, P3 *Persoonia scabra* and P4 *Stachystemon vinosus*. Species were identified during reconnaissance and targeted flora and vegetation surveys, conducted by Bio Diverse Solutions (2021). These reports can be provided if necessary.

Clearing permit applied for (CPS number not yet assigned) and clearing will not occur without approval. Authorization of this permit will not authorize impact to these other priority flora.

#### 13. Other relevant information: (e.g. whether the proposed activity is going through any other approvals process e.g. clearing permit application, PoW, EPA Assessment).

Clearing permit applied for at DWER. Consultation and conversation occurring with DWER Native Clearing branch.

Will not be assessed by EPA.

Internal environmental approval and permit process with the Arc Infrastructure HSE team.

Threatened Ecological Community 'Proteaceae Dominated Kwongan Shrubland' present within the survey area and surrounding habitat. A proposed 0.36ha is likely to be impacted during the activities. Due to the low area impacted and surrounding large reserve, further approvals are not required.

#### 13. Additional comments in support of application: (e.g. discussion with DBCA District staff, Species and Communities Program).

Regulation liaison and communication has occurred with the district flora conservation officer, Emma Adams. Upon initial detection in June 2021 of a species with leaves and structure similar to *E. glabra* subsp. Scaddan (C. Turley s.n. 10/11/2005) but was not flowering, consultation with DBCA was undertaken. TPFL form submitted to Emma Adams and Species and Communities branch (Flora.data@dbca.wa.gov) on 10/12/2021.