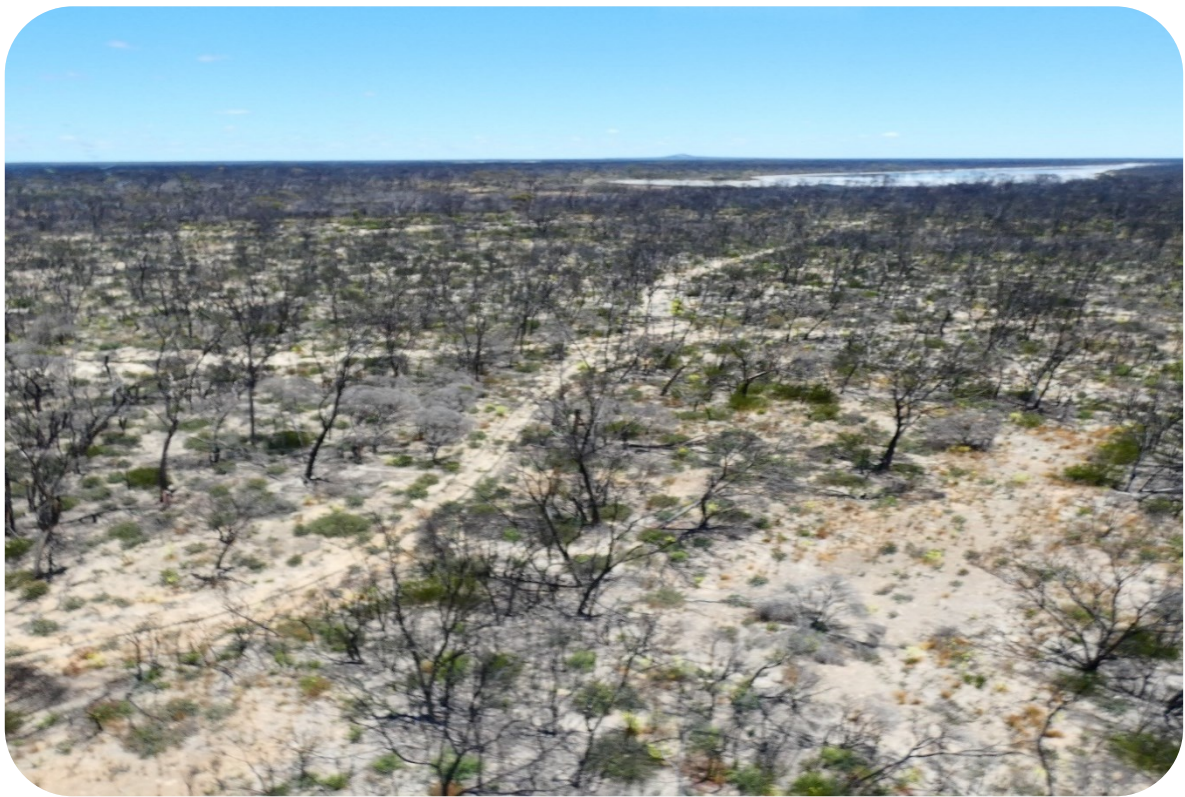


MT RIDLEY RARE EARTH ELEMENTS PROJECT

Exploration Environmental Management Plan

E63/1547, E63/1564, E63/2111, E63/2112, E63/2113 &
E63/2125



Version 1.2
JULY 2022

Prepared by



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Cover Photo: Image of the Project-photo taken by helicopter 20 November 2021

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Appendix A: Flora and Vegetation Surveys
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1 INTRODUCTION

Botanica Consulting Pty Ltd (Botanica) was commissioned by Mount Ridley Mines Limited (MRD) to prepare an Environmental Management Plan (EMP) for proposed exploration activities of the Mt Ridley Rare Earth Elements (RRE) Project. The RRE Project includes exploration activities within tenements E63/1547, E63/1564, E63/2111, E63/2112, E63/2113 and E63/2125 located approximately 62km north-east of Esperance, Western Australia (Figure 1-1). This document has been prepared to support a clearing permit application for the RRE Project, which encompasses an approximate area of 1,943 ha (referred to as the 'assessment area') within which up to 100 ha of clearing is proposed to be conducted. A map of the assessment area is provided in Figure 1-2.

As shown in Figure 1-2 and Appendix B, the assessment area contains numerous existing access tracks and drill lines which will be preferentially used to conduct the exploration activities.

1.1 Objectives

The objectives of the EMP is to:

- Provide a summary of the biophysical environment of the assessment area including significant flora, fauna and vegetation with the potential to occur within the assessment area (based on results of database information and existing surveys conducted in the local area);
- Outline the scope of the proposed exploration activities and associated environmental risks; and
- Summarise management measures to be implemented to minimise impacts to the local environment from exploration activities.

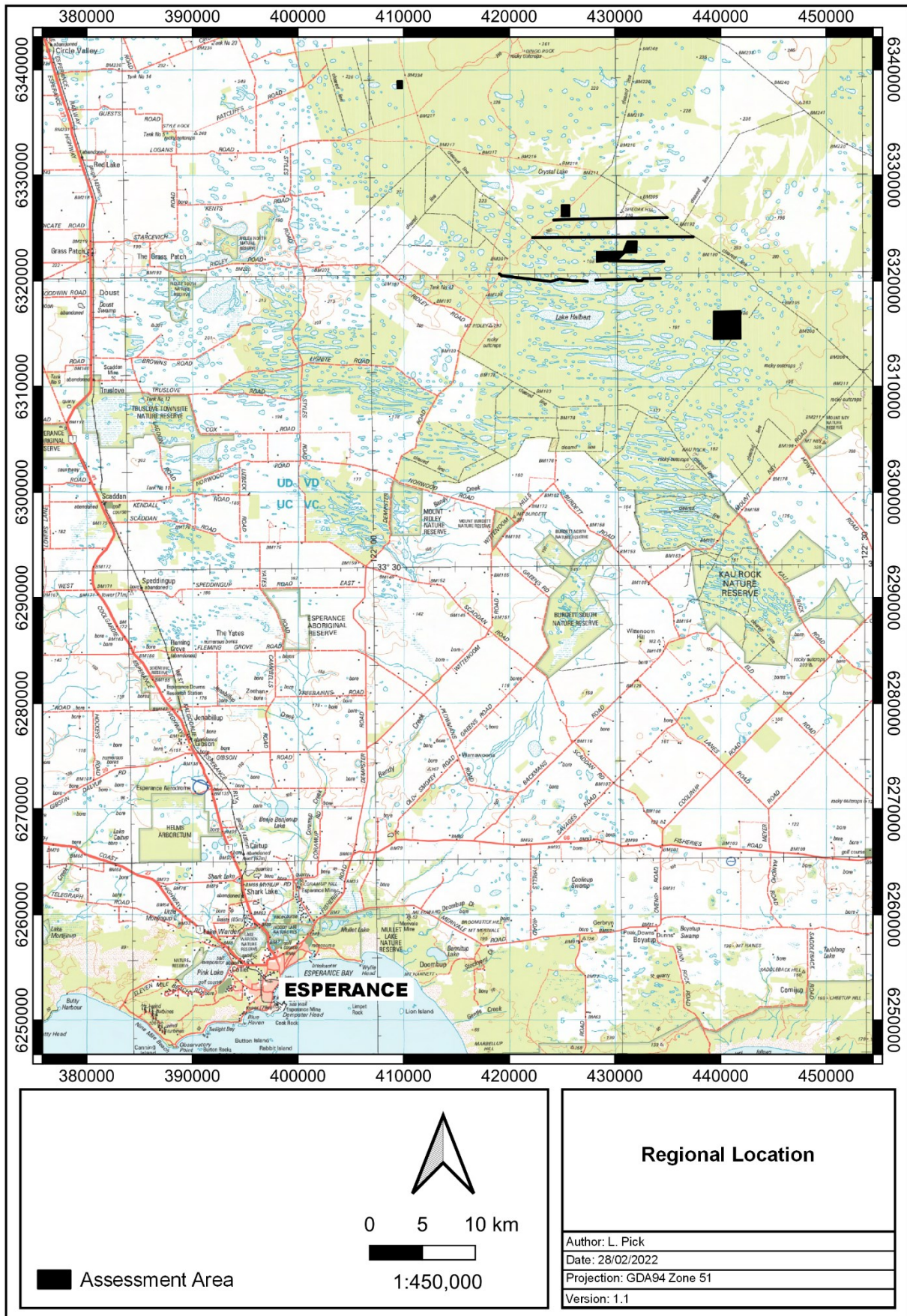


Figure 1-1: Regional location of the assessment area

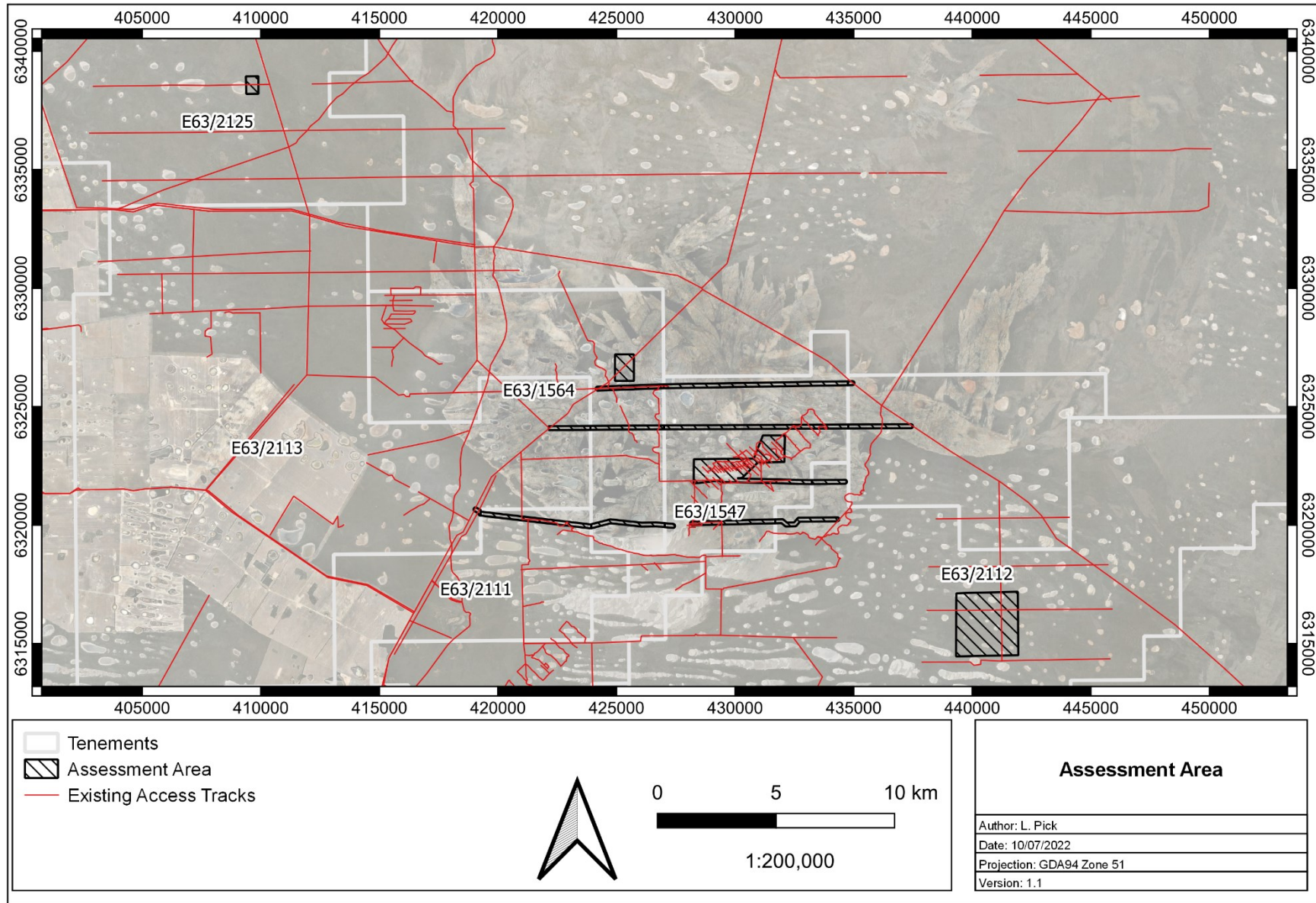


Figure 1-2: Assessment area

2 REGIONAL BIOPHYSICAL ENVIRONMENT

The assessment area lies within the South-West and Interzone of Western Australia (WA). Based on the Interim Biogeographic Regionalisation of Australia (IBRA, Version 7) (DotEE, 2012) the assessment area is located within the Mallee Bioregion of WA. This bioregion is further divided into subregions with the assessment area located within the Eastern Mallee (MAL1) subregion of the Mallee Bioregion (Figure 2-1).

The Mallee Bioregion is located in the south-eastern part of Yilgarn Craton which is gently undulating, with partially occluded drainage. The Western Mallee subregion has more relief than its eastern counterpart. Its main surface-types comprise clays and silts underlain by kankar, exposed granite, sandplains, isolated uplands of laterite pavements and Salt Lake systems on a granite basement (McKenzie, May and McKenna, 2002).

The Eastern Mallee subregion comprises calcareous clays and loams as duplex soils that often contain sheet and modular kankar, outcrops of metamorphosed sandstone, and white and yellow sandplains and loamy plains with numerous saltpans (pan fields). Vegetation includes mallee on sandplains, samphire around small salt lakes, mallee and patches of woodland on clay, and scrub-heath on sandstone (Comer, Gilfillian, Grant, Tiedemann, Barrett & Anderson, 2002).

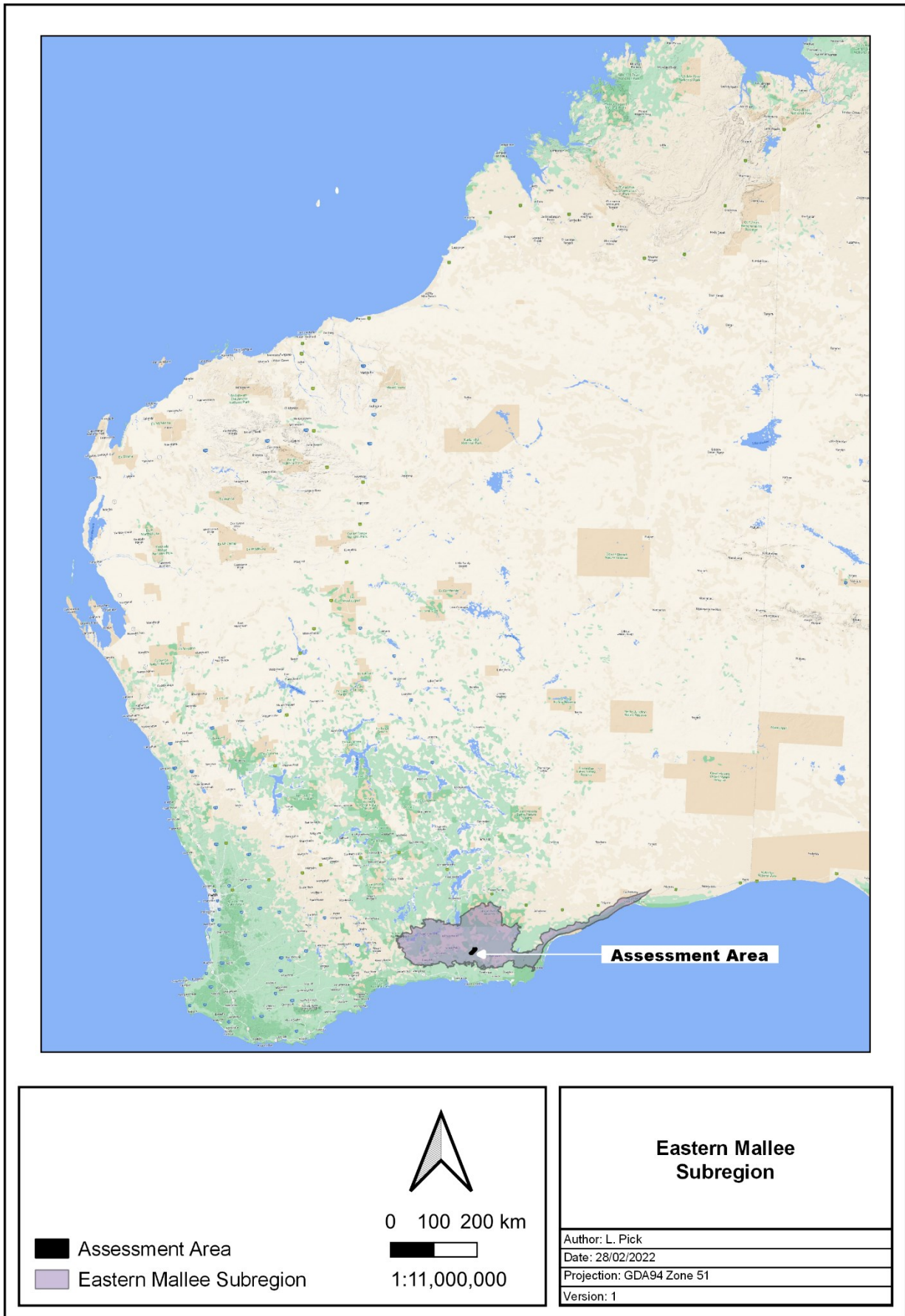


Figure 2-1: Eastern Mallee Subregion in relation to the assessment area

2.1 Soil and Landscape Systems

The assessment area lies within the Stirling Province of Western Australia. The Stirling Province consists of undulating plains and laterised plateau (dissected at fringes and with some emergent quartzite ranges) on deeply weathered mantle and Bremer Basin sediments over granitic rocks of the Yilgarn Craton and Albany-Fraser Orogen (with some metasediments and greenstone). Soils are characterised by grey shallow sandy duplexes (mostly alkaline), calcareous loamy earths, grey deep sandy duplexes and pale deep sands (with some Salt lakes soils and alkaline grey shallow loamy duplexes). Vegetation includes mallee scrub with mallee heath and eucalypt woodlands (and some scrub-heath). This Province is located in the South Coast district between Albany, Gnowangerup, Norseman and Israelite Bay (Tille, 2006). The Stirling Province is further divided into soil-landscape zones, with the assessment area located within the Salmon Gums Mallee Zone (246).

The Salmon Gums Mallee Zone comprises of flat to undulating plains (with some salt lakes) on deeply weathered mantle and alluvium over Bremer Basin sediments on granite and gneiss of the Yilgarn Craton and Albany-Fraser Orogen. Soils are characterised by calcareous loamy earths and alkaline grey shallow sandy duplexes with salt lake soils and some alkaline grey shallow loamy duplexes and pale deep sands. Vegetation includes merrit-coral gum-salmon gum-red mallee woodlands with mallee scrub and some mallee heath. This zone is located in the South Coast district between Pyramid Lake, Scaddan, Norseman and Mt Ragged (Tille, 2006). The Salmon Gums Mallee Zone is further divided into soil landscape systems, with the assessment area located within the soil landscape systems listed in Table 2-1 and shown in Figure 2-2 below.

Table 2-1: Soil landscape systems within the assessment area

Soil Landscape System	Description	Extent within Assessment Area
Buraminya System	Level to very gently undulating plain on Tertiary sediments with aeolian accessions fringing the north eastern part of the mallee zone. Soils are calcareous loams, grey non-cracking clays and alkaline grey shallow sandy duplex soils.	117 ha (6.0%)
Halbert System	Level to gently undulating plain with numerous salt lakes within a paleo valley on Tertiary marine sediments (Plantagenet and Werrilup formations). Soils are alkaline grey shallow sandy duplex soils and salt lake soils.	1,803 ha (92.8%)
Scaddan System	Level to gently undulating plain with numerous clay pans and salt lakes, and small areas of undulating rises. The geology comprises Tertiary sediments overlying Proterozoic granites with some minor Pleistocene sand sheets.	6 ha (0.3%)
Wittenoom System	Scattered low hills and hills on Archaean granite and gneiss with slopes of mixed colluvium	17 ha (0.9%)

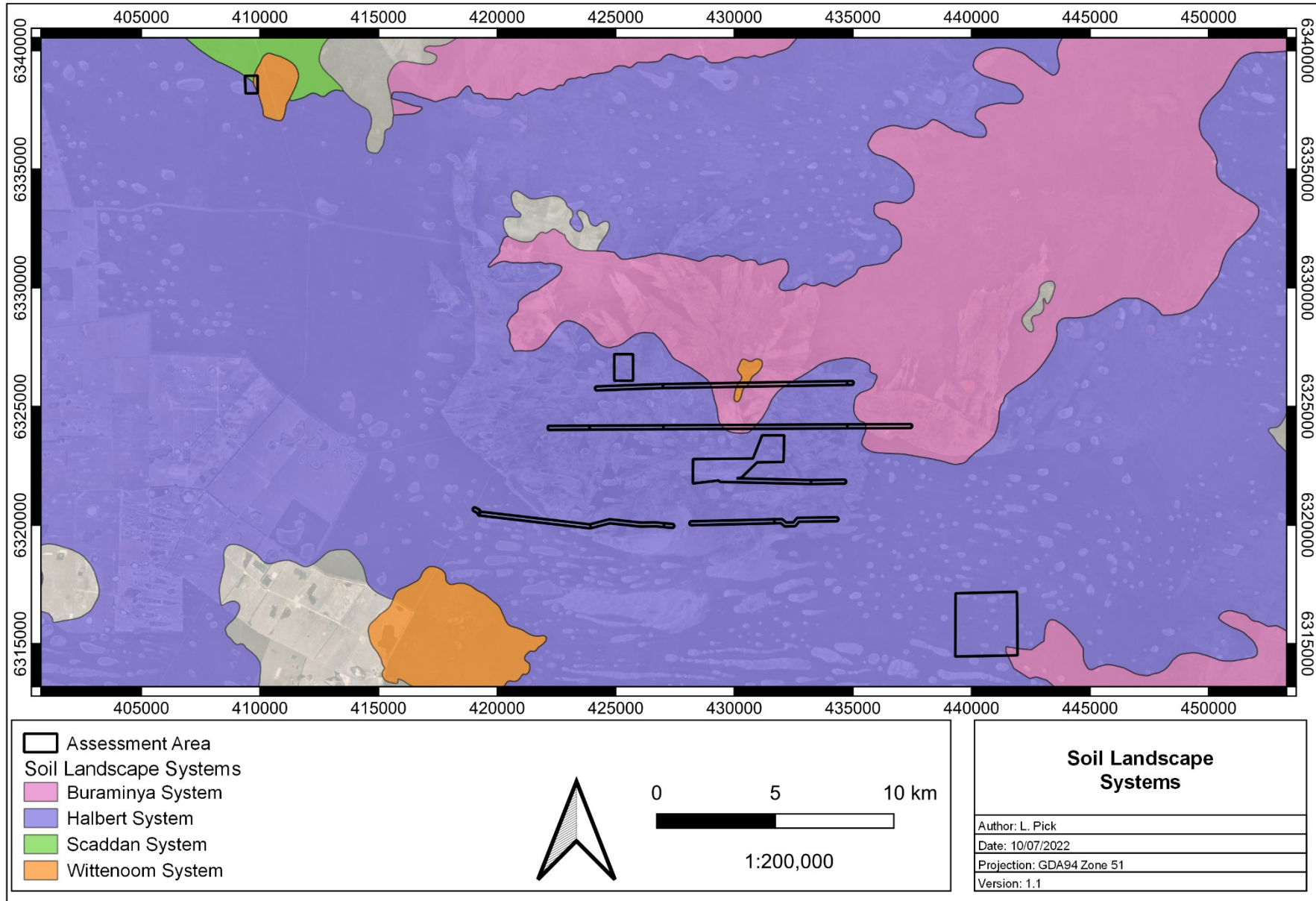


Figure 2-2: Soil landscape systems within the assessment area

2.2 Hydrology

According to the Geoscience Australia database (2015), there are no ephemeral or perennial drainage lines within the assessment area. The assessment area has been designed to avoid clearing within multiple un-named playas and Lake Halbert (Figure 2-3).

Groundwater Dependent Ecosystems (GDE) includes biological assemblages of species such as wetlands or woodlands that use groundwater either opportunistically or as their primary water source. For the purposes of this report, a GDE is defined as any vegetation community that derives part of its water budget from groundwater and must be assumed to have some degree of groundwater dependency. According to the BoM *Atlas of Groundwater Dependent Ecosystems* database (BoM, 2022), there are no known or potential aquatic GDEs located within the assessment area. Four potential terrestrial GDEs intersect the assessment area as described in Table 2-2 and shown in Figure 2-3.

Table 2-2: Potential Groundwater Dependent Ecosystems within the assessment area (BoM, 2022)

Ecosystem Description	GDE Potential (BoM, 2022)	Extent within Assessment Area
Bare areas; salt lakes	High potential GDE	37 ha (1.9%)
Medium woodland; merrit & red mallee	Low potential GDE	390 ha (20.1%)
Shrublands; mallee scrub, <i>Eucalyptus eremophila</i>	Low potential GDE	809 ha (41.6%)
Shrublands; mallee scrub, <i>Eucalyptus eremophila</i> & red mallee	Low potential GDE	700 ha (36.0%)

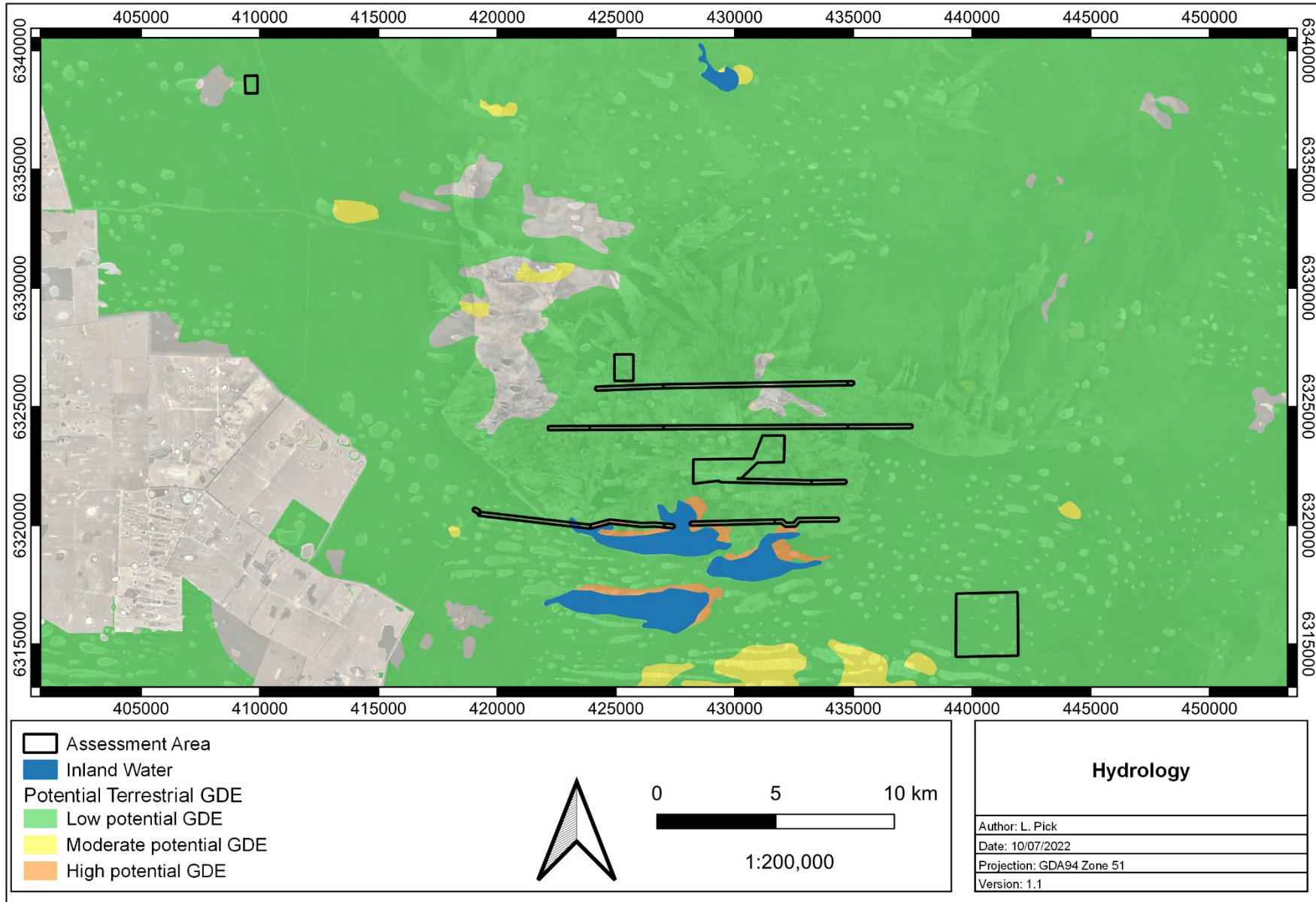


Figure 2-3: Hydrology of the assessment area

2.3 Conservation Areas

No Threatened Ecological Communities (TEC) listed under the Commonwealth EPBC Act or the Western Australian BC Act are known to occur within the assessment area. No Priority Ecological Communities (PEC) as listed by DBCA are known to occur within the assessment area. The assessment area is located approximately 4.5km north of the *Proteaceae dominated kwongan shrublands of the southeast coastal floristic province of Western Australia* which is listed under the Commonwealth EPBC Act as Endangered and a Priority 3 Ecological Community by DBCA. This community is not listed as a TEC under the Western Australian BC Act.

There are no Ramsar wetlands or wetlands of national importance (ANCA Wetlands) within the assessment area (Figure 2-4). The assessment area is not located within any gazetted conservation reserves or DBCA lands of interest. A map showing conservation areas in relation to the assessment area is provided in Figure 2-4.

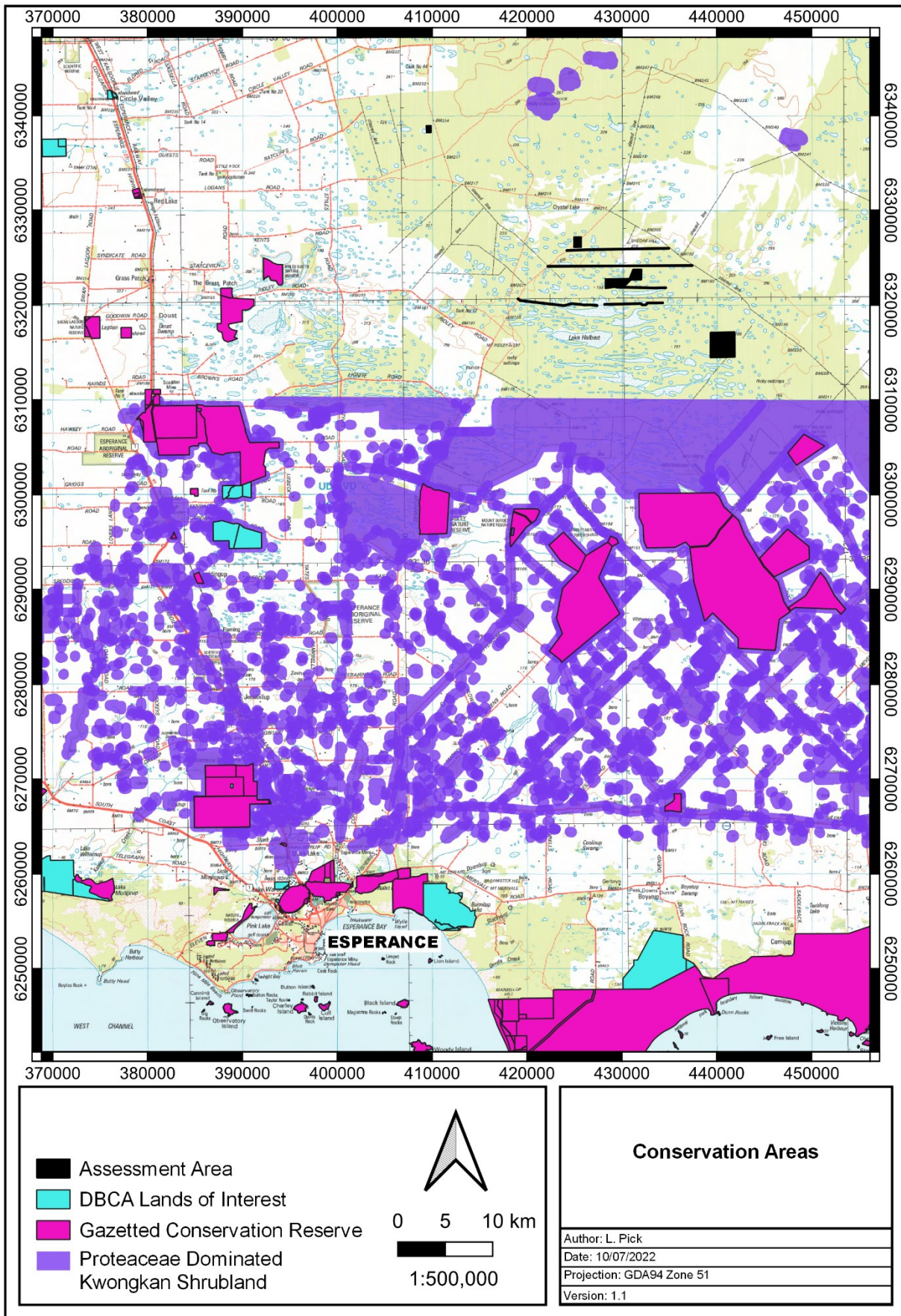


Figure 2-4: Conservation areas in relation to the assessment area

2.4 Flora

According to the results of the NatureMap search (DBCA, 2021a), a total of 1,102 flora taxa have been recorded within a 40 km radius of the assessment area. Dominant genera include *Acacia*, *Eucalyptus* and *Melaleuca*.

The results of the literature review, combined search of the DBCA's Flora of Conservation Significance databases (DBCA, 2021b) and DAWE protected matters search (DAWE, 2021) recorded eight Threatened Flora and 124 Priority Flora as occurring within a 40km radius of the assessment area (Table 2-3). Significant Flora records obtained from DBCA are shown spatially in Figure 2-5.

Table 2-3: Conservation Significant Flora within 40km of the assessment area

Taxon	BC Act	EPBC Act	DBCA Priority Rating	Habitat Description (DBCA, 2021a; DBCA 2021b)
<i>Acacia amyctica</i>			P2	Plain. Yellow-brown loam, clay.
<i>Acacia bartlei</i>			P3	Growing in grey brown clay loam. Light covering of grey sand.
<i>Acacia diaphana</i>			P1	Closed drainage depression/foci in a sandplain. Yellow-brown, shallow sandy duplex soil.
<i>Acacia diaphana</i>			P1	Closed drainage depression/foci in a sandplain. Yellow-brown, shallow sandy duplex soil.
<i>Acacia euthyphylla</i>			P3	Narrow road reserve (N and S side) (10m wide). Brown loam over clay.
<i>Acacia glaucissima</i>			P3	Sand or clay. Flats, low-lying areas.
<i>Acacia improcera</i>			P3	Sand, loamy clay, clay. Undulating plains, flats.
<i>Acacia</i> sp. Esperance (M.A. Burgman 1833b)			P1	Reddish sand and clay. Depression near clay pan.
<i>Adenanthos ileticus</i>			P4	Low sand dune. White sand.
<i>Alyogyne</i> sp. Great Victoria Desert (D.J. Edinger 6212)			P3	Black soil fresh water swamp.
<i>Angianthus</i> sp. Salmon Gums (G.F. Craig 3074)			P1	Flat granite. UCL. Brown/red loam.
<i>Anigozanthos bicolor</i> subsp. <i>minor</i>	VU	EN		Sand. Well-watered sites.
<i>Aotus lanea</i>			P1	On edge of salt lake.
<i>Aotus</i> sp. Dundas (M.A. Burgman 2835)			P2	Plain, road verge. Grey loam. Next to limestone extraction area.
<i>Astroloma</i> sp. Grass Patch (A.J.G. Wilson 110)			P2	Intermittent salt creek, deep sand on edges, sand on clay in creek bed.
<i>Astus duomilia</i>			P1	Topography: Gentle SW slope of lake dune. Soil: Deep orange sand.
<i>Baeckea</i> sp. Gibson (K.R. Newbey 11084)			P1	Variable drained, shallow granitic loamy sand. Moderately exposed, rounded granite hill.
<i>Beyeria physaphylla</i>			P1	Plain, sloping, grey and brown dry sand.
<i>Bossiaea flexuosa</i>			P3	White sand on hill top.
<i>Bossiaea spinosa</i>			P3	Gravelly, sandy soils. Undulating plains.
<i>Cyanothamnus baeckeaceus</i> subsp. <i>patulus</i>			P1	No description available
<i>Brachyloma mogin</i>			P3	Rise above salt lake. Brown loam.
<i>Chamelaucium</i> sp. Mt Heywood (K. Newbey 7954)			P1	Well drained, deep white sand. Moderately exposed, almost flat plain.
<i>Comesperma calcicola</i>			P3	Salt lake. Wet, pale grey sand over clay.
<i>Comesperma griffinii</i>			P2	Plain. Grey sand. Burnt 2010.
<i>Commersonia rotundifolia</i>			P3	No description available
<i>Conostephium marchantiorum</i>			P3	In grey-brown clay loam, shallow covering of grey white sand.
<i>Conostephium uncinatum</i>			P2	Reddish sand and clay depression near claypan.
<i>Cyanothamnus baeckeaceus</i> subsp. <i>patulus</i>			P1	Fine sand/clay loam.

Taxon	BC Act	EPBC Act	DBCA Priority Rating	Habitat Description (DBCA, 2021a; DBCA 2021b)
<i>Cyathostemon</i> sp. Dowak (J.M. Fox 86/271)			P1	Saline depression. On loam.
<i>Cyathostemon</i> sp. Esperance (A. Fairall 2431)			P1	Dom sp: Melaleuca aff. uncinata. Open mixed heath. Littoral zone of salt lake.
<i>Cyathostemon</i> sp. Salmon Gums (B. Archer 769)			P3	Littoral zone of salt lake. Dry bare, white, sand over clay.
<i>Dampiera sericantha</i>			P3	Sand rise, plain. Grey sand.
<i>Dampiera triloba</i>			P3	Dry grey soil.
<i>Darwinia luehmannii</i>			P2	Yellow loamy sand.
<i>Darwinia polycephala</i>			P4	Sand, clay. Flats, near salt lakes.
<i>Darwinia</i> sp. Gibson (R.D. Royce 3569)			P1	Open depression. Moist, grey sandy loam.
<i>Darwinia</i> sp. Mt Burdett (N.G. Marchant 80/42)			P4	In gutter of road verge, on sand plain with yellow sand and ironstone gravel.
<i>Darwinia</i> sp. Mt Heywood (R. Davis 11066)	VU			Flat sandplain. Grey-brown or orange-brown sand.
<i>Darwinia</i> sp. Mt Ney (M.A. Burgman & S. McNee 1274)			P1	Fine white sand over yellowish sandy clay. Slight slope with E aspect.
<i>Darwinia</i> sp. Mt Ridley (W.R. Archer 510914)			P1	In a fine sand/silt loam.
<i>Daviesia pauciflora</i>			P3	White sand.
<i>Desmocladius biformis</i>			P3	Topography: flat area of lower slope. Soil: sand over pale clay at 5 cm.
<i>Dicrastylis archeri</i>			P1	Lower slope of valley. Dry grey loamy sand over clay.
<i>Dicrastylis capitellata</i>			P1	Yellow loamy sand near salt lake (with water) on S side of track.
<i>Eremophila chamaephila</i>			P3	White sand, clay. Sandplains, disturbed road verges.
<i>Eremophila compressa</i>			P3	Fine loam over limestone.
<i>Eremophila glabra</i> subsp. Scaddan (C. Turley s.n. 10/11/2005)	CR			Near saline watercourse. Brown clayey sand.
<i>Eremophila lactea</i>	CR	EN		Plain, dry open, white-yellow clay.
<i>Eremophila serpens</i>			P4	In fine white/grey sandy soil.
<i>Eucalyptus creta</i>			P3	Sandy clay or loam. Calcareous plains.
<i>Eucalyptus dolichorhyncha</i>			P4	Sandy clay loam with gravel over heavy clay.
<i>Eucalyptus foliosa</i>			P3	Flat terrain bordering a swamp. Sandy clay soil.
<i>Eucalyptus histophylla</i>			P3	Sandy loam on granite or laterite. Granite outcrops.
<i>Eucalyptus luculenta</i>			P2	Flat, light brown loamy sand.
<i>Eucalyptus merrickiae</i>	VU	VU		Plants occur on road verge. Adjacent salt lake system.
<i>Eucalyptus misella</i>			P1	White, yellow or grey sand. Low-lying sandplains.
<i>Eucalyptus preissiana</i> subsp. lobata			P4	Coastal sand dunes.
<i>Eucalyptus semiglobosa</i>			P3	Hillside. Gravel reserve. White-grey shallow sandy duplex soil (sand over gravel over clay). Burnt > 20 years.
<i>Eucalyptus</i> sp. Esperance (M.E. French 1579)			P1	Reddish brown loam soil.
<i>Eucalyptus sweedmaniana</i>			P2	Level topography of gravelly sand.
<i>Fabronia hampeana</i>			P2	On sheltered wet trunk of <i>Macrozamia dyeri</i> in shrub layer. Hill, with bare brown sand with 5% outcropping of granite. HVD = 1-20 m.
<i>Frankenia brachyphylla</i>			P2	Salt lake margins.
<i>Gonocarpus pycnostachyus</i>			P3	In a sand/clay loam over granite around a seasonally water filled rock depression.
<i>Goodenia exigua</i>			P2	Plain. Grey clay. Collection site: reserve.
<i>Goodenia laevis</i> subsp. laevis			P3	On laterite.
<i>Goodenia turleyae</i>			P1	Slightly undulating (S aspect) close to lake edge. Light brown sand over grey clay.



Taxon	BC Act	EPBC Act	DBCA Priority Rating	Habitat Description (DBCA, 2021a; DBCA 2021b)
<i>Grammosolen archeri</i>			P1	In sandy soil on island.
<i>Grammosolen</i> sp. Mt Ridley (W.R. Archer 1210911)			P1	Sand. Dry or seasonally damp habitats along streams.
<i>Grevillea aneura</i>			P4	Dune in salt lake. Sand over clay.
<i>Grevillea baxteri</i>			P4	In light sand.
<i>Gyrostemon ditrigynus</i>			P4	Intersection, in open cleared area. Yellow sand and clay.
<i>Haegiela tatei</i>			P4	clay claypan
<i>Halgania</i> sp. Peak Eleanora (M.A. Burgman 3547 B)			P2	Gently undulating sandplain. Chained firebreak (not burnt) through Crown land. Lower, E-facing slope adjacent to salt lake.
<i>Hibbertia turleyana</i>			P2	Hillside. Reserve. Grey sand.
<i>Hopkinsia adscendens</i>			P3	Sand. Dry or seasonally damp habitats along streams.
<i>Hydrocotyle asterocarpa</i>			P2	Raised embankment along the eastern margin of the salt lake.
<i>Hydrocotyle decorata</i>			P2	Edge of salt lake, cream fine clayey sand, salt scalds in some spots.
<i>Hydrocotyle tuberculata</i>			P2	Along creek edges, black loam, burnt ca 8 months ago.
<i>Isopogon alpicornis</i>			P3	Sandy soil.
<i>Kennedia glabrata</i>	VU	VU		Soil pockets, sandy soils. Granite outcrops.
<i>Kunzea salina</i>			P3	Growing at the edge of a salt lake in an area of accumulating sand.
<i>Lambertia echinata</i> subsp. <i>echinata</i>	CR	EN		Gravelly sandy loam, brown sandy loam, white-grey sand, granite, laterite. Below & between rock outcrops, slopes, hill crests.
<i>Lasiopetalum parvuliflorum</i>			P3	Sandy clay and emergent granite rock.
<i>Lepidium fasciculatum</i>			P3	No description available
<i>Leucopogon corymbiformis</i>			P2	No description available
<i>Leucopogon florulentus</i>			P3	White/grey or yellow sand, sandy clay, gravelly lateritic soils. Sandplains, gentle slopes.
<i>Leucopogon remotus</i>			P1	Plain. Near salt lake. Grey brown loam over limestone.
<i>Styphelia rotundifolia</i>			P3	No description available
<i>Logania archeri</i>			P1	Growing in good quality fine sandy loam.
<i>Melaleuca dempta</i>			P3	Clay.
<i>Melaleuca eximia</i>			P2	Flat. Orange clay.
<i>Melaleuca fissurata</i>			P4	Flat, calcareous, salt lake.
<i>Melaleuca viminea</i> subsp. <i>appressa</i>			P2	Shallow sand over clay. Near creeks or wet depressions.
<i>Micromyrtus elobata</i> subsp. <i>scopula</i>			P3	Aeolian dune. Grey sand.
<i>Microseris walteri</i>			P3	At edge of salt lake.
<i>Microtis quadrata</i>			P4	Brown clay over laterite, slight slope to scraped areas. Area has been burnt.
<i>Myoporum turbinatum</i>			P4	Salt lake. White loam.
<i>Myriophyllum petraeum</i>			P4	Ephemeral pools in roadside flat granites in disturbed site. Pool 30 m x 5 m, <20 cm deep. Many pools at site.
<i>Olearia laciniifolia</i>			P2	White sand. Around playa lakes.
<i>Paracaleana parvula</i>			P2	In sandy open ground. Light cover of pine needles.
<i>Patersonia inaequalis</i>			P2	Sandy clay, lateritic or granitic sand.
<i>Persoonia cymbifolia</i>			P3	In grey-brown clay loam. Shallow covering of grey-white sand.
<i>Persoonia scabra</i>			P3	Plain. Grey sand.
<i>Persoonia spathulata</i>			P2	Deep sandy soils with other Proteaceae species.
<i>Pimelea halophila</i>			P2	Lake edge and slightly elevated ridges on lake bed.
<i>Pimelea pelinos</i>			P1	Salt lake.

Taxon	BC Act	EPBC Act	DBCA Priority Rating	Habitat Description (DBCA, 2021a; DBCA 2021b)
<i>Pityrodia chrysocalyx</i>			P3	White sand.
<i>Pterostylis faceta</i>			P3	In sandy loam.
<i>Pterostylis zebrina</i>			P2	Huge granite complex.
<i>Pultenaea adunca</i>			P3	Tight silty clay soils along roadside.
<i>Pultenaea brachyphylla</i>			P2	Topography: Flat area of midslope. Soil: Cream sand over pale clay at 20 cm.
<i>Ricinocarpos trichophorus</i>	VU	EN		Red coarse sandy clay loam on broken, stony small shallow gully on NW & NE slopes.
<i>Scaevola archeriana</i>			P1	Graded road gutter. Bare areas.
<i>Schoenus</i> sp. Grey Rhizome (K.L. Wilson 2922)			P1	Topography: Upland flat. Soil: Grey sand over gravel at 30 cm.
<i>Spyridium mucronatum</i> subsp. <i>multiflorum</i>			P2	Gravelly loam.
<i>Stachystemon vinosus</i>			P4	Topography: Flat area of lower slope. Soil: Sand over pale clay at 5 cm.
<i>Styphelia rotundifolia</i>			P3	Lower slopes of hill. Dry littered, yellow, gravelly sand over laterite.
<i>Tecticornia indefessa</i>			P2	White to brown-grey sand. Near the edges of salt lakes.
<i>Thysanotus brachyantherus</i>			P2	Clay over limestone, loam.
<i>Thysanotus parviflorus</i>			P4	Shallow sand.
<i>Trachymene anisocarpa</i> var. <i>trichocarpa</i>			P3	Loam.
<i>Goodenia exigua</i>			P2	No description available



Notes: Green shaded cells indicates DBCA record/ previous flora survey record within the assessment area



Previous flora and vegetation surveys have been conducted within the assessment area (Terratree, 2015a; Terratree 2015b and Botanica Consulting, 2022), with copies of these reports provided in Appendix A. Results of these surveys identified one Threatened Flora taxon and five Priority Flora taxon within the assessment area as listed in Table 2-4 and shown spatially in Figure 2-6.

Table 2-4: Conservation Significant Flora previously recorded within the assessment area

Taxon	BC Act	EPBC Act	DBCA Priority Rating	Records ¹	Image
<i>Acacia euthyphylla</i>			P3	72 records within 40km radius of the assessment area; approximate total of 1,311 plants. 29 plants recorded within the assessment area	
<i>Acacia glaucissima</i>			P3	147 records within 40km radius of the assessment area; approximate total of 320 plants. 82 plants recorded within the assessment area	

¹ Combination of DBCA database records (DBCA, 2021b) and previous flora survey records (Terratree, 2015a; Terratree 2015b & Botanica Consulting, 2022). For those records where no abundance data available, record has been considered a single plant

Taxon	BC Act	EPBC Act	DBCA Priority Rating	Records ¹	Image
<i>Adenanthos ileticos</i>			P4	56 records within 40km radius of the assessment area; approximate total of 11,119 plants. 18 plants recorded within the assessment area	 <p><i>Adenanthos ileticos</i></p> <p>Photos: R. Butler & G. Craig</p>
<i>Darwinia polycephala</i>			P4	85 records within 40km radius of the assessment area; approximate total of 2,296 plants. 30 plants recorded within the assessment area	 <p><i>Darwinia polycephala</i></p> <p>Photos: R. Davis</p>

Taxon	BC Act	EPBC Act	DBCAs Priority Rating	Records ¹	Image
<i>Eucalyptus merrickiae</i>	VU	VU		884 records from 58 populations within 40km radius of the assessment area; approximate total of 18,130 plants. 789 plants recorded within the assessment area	 <p><i>Eucalyptus merrickiae</i> Photos: S.D. Hopper, L. Sweedman</p>
<i>Persoonia cymbifolia</i>			P3	59 records within 40km radius of the assessment area; approximate total of 637 plants. 11 plants recorded within the assessment area	 <p><i>Persoonia cymbifolia</i> Photos: J.A. Cochrane</p>

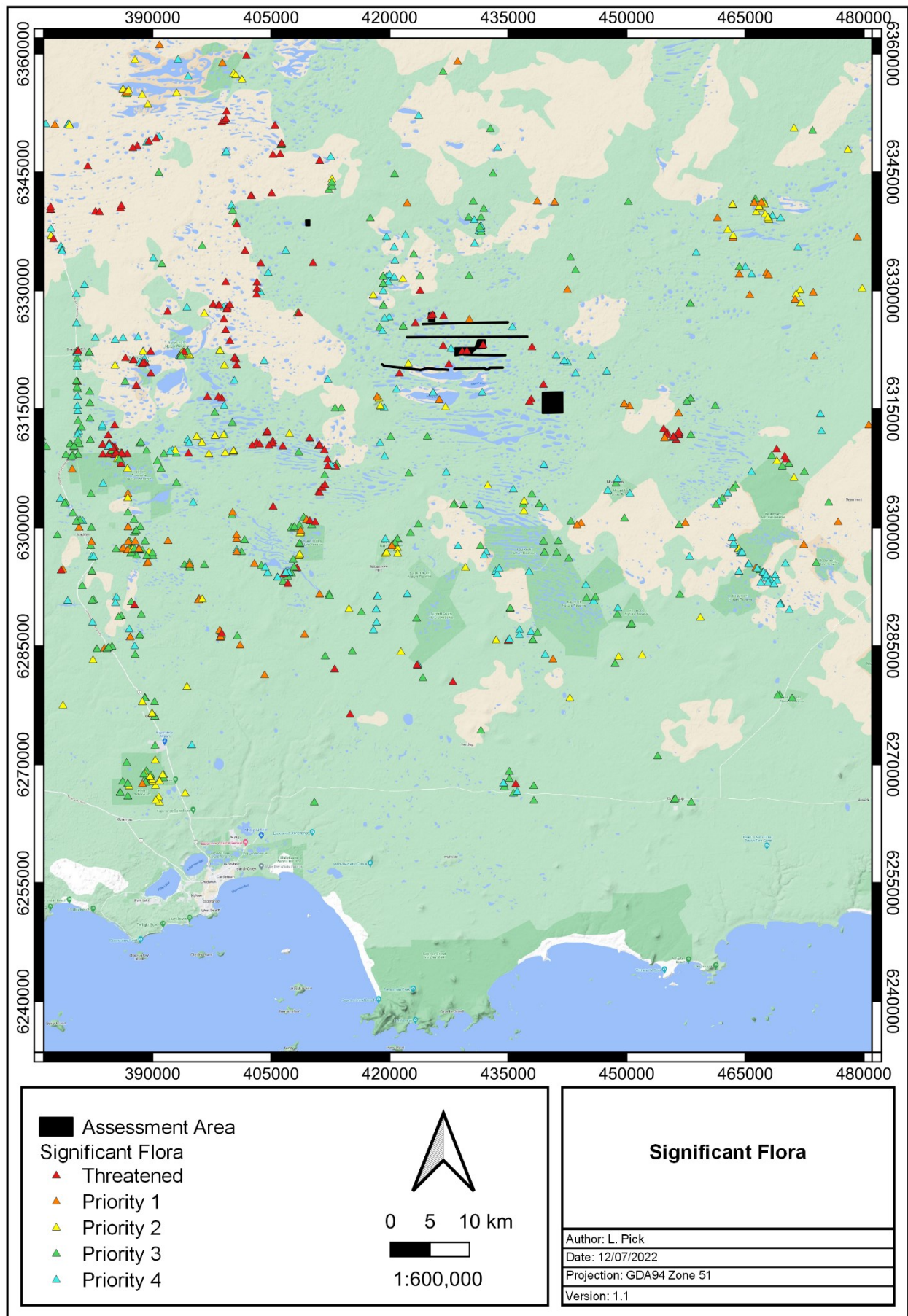


Figure 2-5: DBCA significant flora records in relation to the assessment area

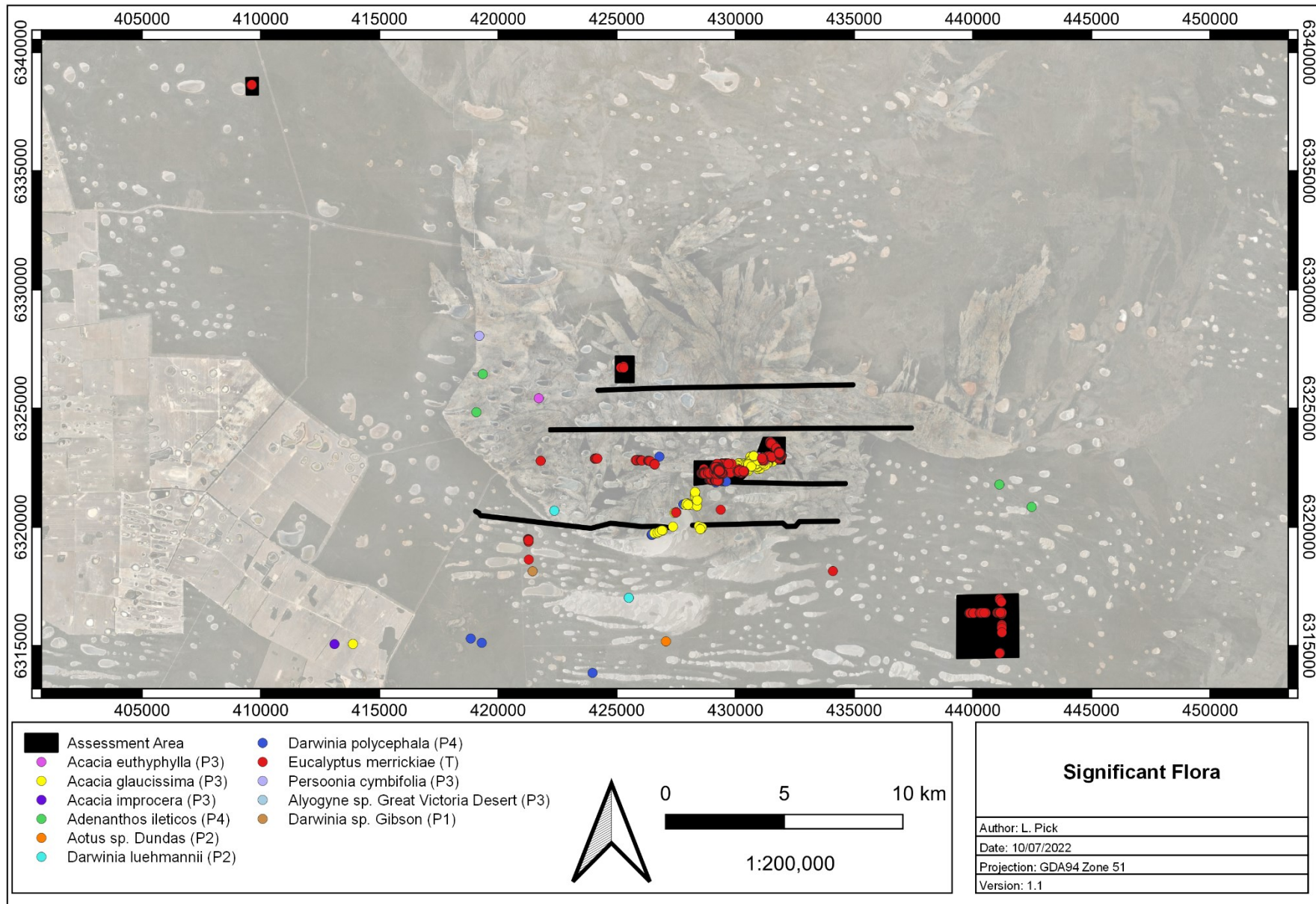


Figure 2-6: Significant flora recorded during field surveys in relation to the assessment area

2.5 Vegetation

The Department of Primary Industries and Regional Development (DPIRD) GIS file (2018) indicates that the assessment area is located within Pre-European Beard vegetation associations of the Ridley System (Figure 4-2). The extent of these vegetation associations, as specified in the 2018 Statewide Vegetation Statistics (DBCA, 2018) is provided in Table 2-5.

Areas retaining less than 30% of their pre-European vegetation extent generally experience exponentially accelerated species loss, while areas with less than 10% are considered “endangered” (EPA, 2000). Clearing within the assessment area will not significantly reduce the extent of pre-European vegetation.

As shown in Appendix B, vegetation within the northern region of the assessment area has been subject to recent fires (2019-2020).

Table 2-5: Pre-European Vegetation Associations within the assessment area

Pre-European Vegetation	Description	Pre-European Extent Remaining (%)	Current Extent Reserved for Conservation (%)	Extent within Assessment Area
Ridley 125	Bare areas; salt lakes	61.40	3.62	37 ha (1.9%)
Ridley 482	Medium woodland; merrit & red mallee	61.29	0	396 ha (20.4%)
Ridley 519	Shrublands; mallee scrub, <i>Eucalyptus eremophila</i>	85.84	0.39	810 ha (41.7%)
Ridley 924	Shrublands; mallee scrub, <i>Eucalyptus eremophila</i> & red mallee	48.77	1.04	700 ha (36.0%)

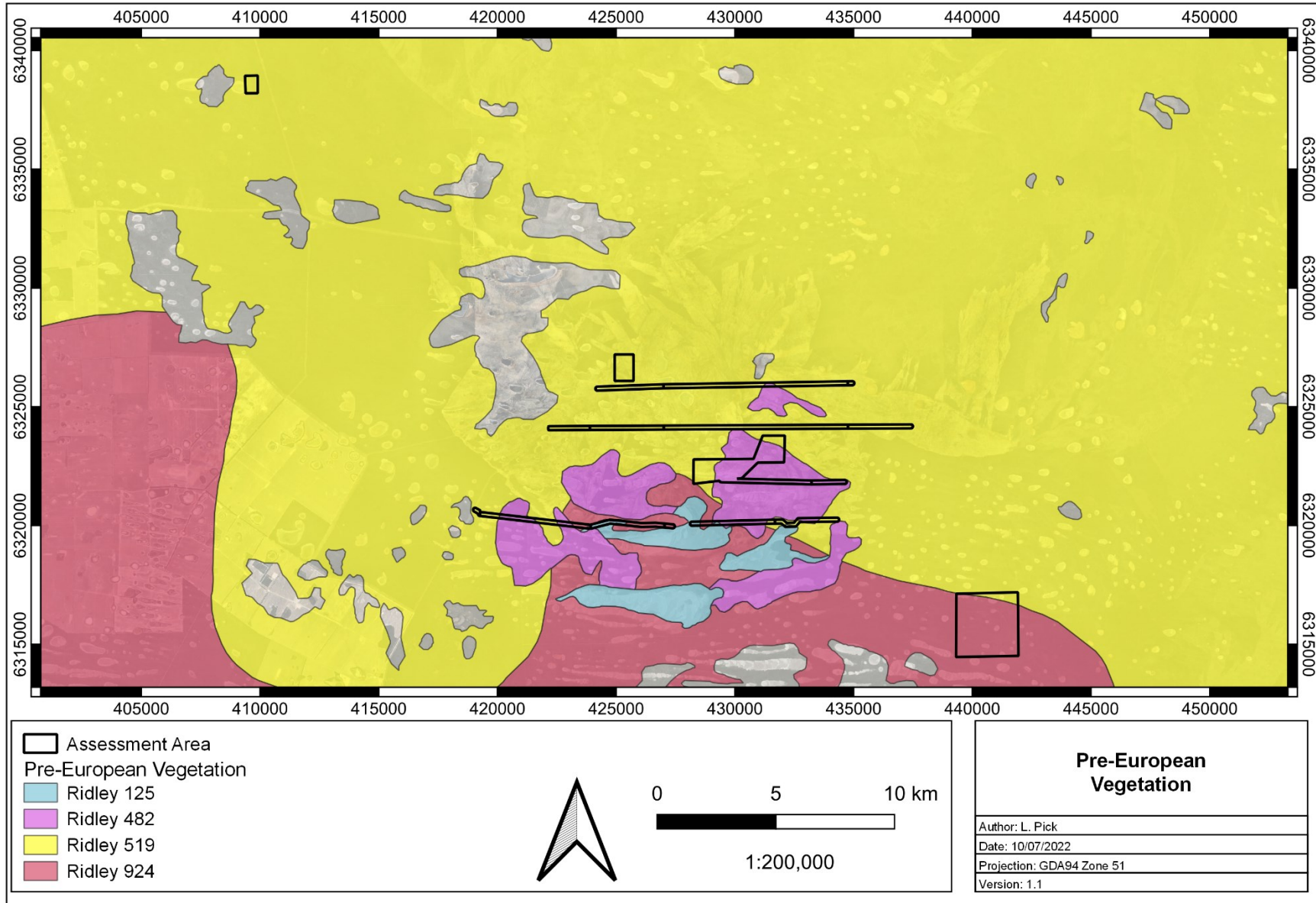


Figure 2-7: Pre-European Vegetation within the assessment area

2.6 Fauna

According to the results of the NatureMap search (DBCA, 2021), a total of 271 vertebrate fauna taxa have been recorded within a 40 km radius of the assessment area. The results of the literature review recorded nine Threatened Fauna and one Priority Fauna as occurring within a 40km radius of the assessment area as listed in Table 2-6.

Table 2-6: Conservation Significant Fauna within 40km of the assessment area

Taxon	Common Name	EPBC Act	BC Act	DBCA Listing	Habitat Description
Birds					
<i>Botaurus poiciloptilus</i>	Australasian bittern	EN	EN	-	The Australasian Bittern's preferred habitat is comprised of wetlands with tall dense vegetation, where it forages in still, shallow water up to 0.3 m deep, often at the edges of pools or waterways, or from platforms or mats of vegetation over deep water. It favours permanent and seasonal freshwater habitats, particularly those dominated by sedges, rushes and reeds or cutting grass (<i>Gahnia</i>) growing over a muddy or peaty substrate (DAWE, 2022).
<i>Calidris ferruginea</i>	Curlew Sandpiper	CR	CR	-	Curlew Sandpipers mainly occur on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms. They are also recorded inland, though less often, including around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand. They occur in both fresh and brackish waters. Occasionally they are recorded around floodwaters (DAWE, 2022).
<i>Calyptorhynchus latirostris</i>	Carnaby's cockatoo	EN	EN	-	Carnaby's Cockatoo is highly mobile and displays a seasonal migratory pattern linked to breeding. Breeding mainly occurring in the Wheatbelt but has also been recorded on the Swan Coastal Plain (DPAW 2013). Breeding is primarily within smooth barked eucalypts such as Salmon Gum and Wandoo but has been reported in tree species such as Jarrah and Tuart. There are some resident populations of the species that do not show breeding migration however none of these are known from the Greenbushes region (DPAW 2013).
<i>Cereopsis novaehollandiae grisea</i>	Cape Barren Goose (south-western)	VU	VU	-	The Cape Barren Goose is concentrated on islands and rocks in the Archipelago of the Recherche, off the coast of southern Western Australia. On two occasions in the early 2000s, it has also been recorded west of Bremer Bay, at Albany and there are historical records of its sporadic (and accidental) occurrence at other mainland sites far from the Recherche including Busselton, Lake Grace and the Nullarbor Plain (DAWE, 2022)
<i>Falco hypoleucos</i>	Grey Falcon	VU	-	-	This species frequents timbered lowland plains, particularly acacia shrublands that are crossed by tree-lined water courses. The species has been observed hunting in treeless areas and frequents tussock grassland and open woodland, especially in winter (DAWE, 2022).
<i>Leipoa ocellata</i>	Malleefowl	VU	VU	-	Scrublands and woodlands dominated by mallee and wattle species (DAWE, 2022).

Taxon	Common Name	EPBC Act	BC Act	DBCAL Listing	Habitat Description
<i>Numenius madagascariensis</i>	Eastern Curlew	CR	CR	-	During the non-breeding season in Australia, the eastern curlew is most commonly associated with sheltered coasts, especially estuaries, bays, harbours, inlets and coastal lagoons, with large intertidal mudflats or sandflats, often with beds of seagrass (Zosteraceae). Occasionally, the species occurs on ocean beaches (often near estuaries), and coral reefs, rock platforms, or rocky islets. The birds are often recorded among saltmarsh and on mudflats fringed by mangroves, and sometimes within the mangroves. The birds are also found in coastal saltworks and sewage farms (DAWE, 2022).
<i>Thinornis rubricollis</i>	Hooded Plover	-	-	P4	The Hooded Plover occurs on sandy beaches between Jervis Bay, New South Wales and the Eyre Peninsula, South Australia, as well as in Tasmania and between Esperance and Perth in south-west Western Australia (Birdlife Australia, 2022).
Mammals					
<i>Dasyurus geoffroii</i>	Chuditch, western quoll	VU	VU	-	Chuditch use a range of habitats including forest, mallee shrublands, woodland and desert. The densest populations have been found in riparian Jarrah Forest (DEC 2012).
<i>Parantechinus apicalis</i>	Dibbler	EN	EN		Dibblers have been recorded over an extensive area and it is likely that they can occupy a diverse range of habitats. Dibblers seem to prefer vegetation with a dense canopy greater than 1 m high which has been unburnt for at least 10 years or more. In some locations, the presence of Proteaceous and Myrtaceous flowering shrubs may also be important. It is currently restricted to the Western Australian coastline near Jurien on three small offshore islands (Boullanger, Whitlock and Escape Islands), and a small number of widely scattered mainland sites (DAWE, 2022).

3 EXPLORATION ACTIVITIES


Exploration activities proposed to be undertaken by MRD (and its contractors) fall into two categories of increased intensity as follows:

1. **LV Assisted Regional Exploration** - this type of work involves light vehicle assisted activities where no vegetation clearing is required. This includes geological mapping, surface sampling using a vehicle mounted auger or hand auger and regional geophysical studies.

2. **Regional Exploration and Prospect Identification** – widely spaced tracks (ranging from 2 km to 200 m spacing based on prospect confirmation) with no or very low levels of clearing required. This type of work is typically undertaken light vehicles and may include air core (AC) or rotary air blast (RAB) rigs. AC and RAB rigs are small, manoeuvrable and have 4WD capabilities.

Table 3-1: Exploration Activities Description

Activity Type	Description	Typical Area of disturbance
<p>Track Mounted Drilling</p> 	<p>Use of track mounted drill rig. The drill rig is supported by a land cruiser/ light truck. All water is contained and recycled by using solid removal equipment. This equipment is mounted on a light truck which follows the drill rig. A small water truck will also access the site to replenish water that has been lost to drilling.</p>	<p>Disturbance is low with no physical clearing required and no sumps required. The vehicles drive around or over vegetation where necessary.</p>
<p>Auger sampling</p> 	<p>Auger sampling uses a helical screw which is driven into the ground with rotation; the earth is lifted up the borehole by the blade of the screw. Small augers can be mounted on the back of a light vehicle. It is a cheap and fast method of drilling.</p>	<p>Disturbance is generally low with no pads or sumps required. Provided vegetation is not dense no clearing for access tracks is required. For areas of dense vegetation raised blade/bucket touch clearing may be required for access tracks. Tracks are typically 3-4m wide. Existing tracks are utilised where possible. Drilling occurs on tracks.</p>
<p>Rotary Air Blast (RAB)</p> 	<p>RAB drilling uses a pneumatic reciprocating piston-driven 'hammer' to energetically drive a heavy drill bit into the rock. Air or a combination of air and foam are used to lift the cuttings. The cuttings are blown up the outside of the rods and collected at surface.</p>	<p>Disturbance is generally low level with raised blade clearing for access tracks and pads. In dense vegetation bucket touch clearing may be required. Tracks are typically 3-4m wide. Existing tracks are utilised where possible. Pads are typically 5m width by 10m length (length of the pad aligned along length of the access track). Where required, in pad sumps will be constructed (one sump per pad; 3m X 3m).</p>

Activity Type	Description	Typical Area of disturbance
<p>Air Core (AC)</p> 	<p>Air core drilling uses hardened steel or tungsten blades to bore a hole into unconsolidated ground. The drill cuttings are removed by injection of compressed air. The cuttings are then blown back to surface. AC rigs usually have 4WD capabilities and are relatively maneuverable. Where possible, air core drilling is preferred over RAB drilling as it provides a more representative sample.</p>	<p>Disturbance is generally low level with raised blade clearing for access tracks and pads. In dense vegetation bucket touch clearing may be required. Tracks are typically 3-4m wide. Existing tracks are utilised where possible. Pads are typically 5m width by 10m length (length of the pad aligned along length of the access track). Where required, in pad sumps will be constructed (one sump per pad; 3m X 3m).</p>

4 ENVIRONMENTAL RISK ASSESSMENT

The potential environmental risks associated with the exploration activities are summarised below. Activities that may impact the natural environment include:

- Clearing native vegetation; and
- Inappropriate hydrocarbon and waste disposal including sample bags, damaged equipment, food and beverage containers.

Potential impacts from these activities include:

- Vegetation disturbance from drilling/clearing activities;
- Damage to flora and fauna of conservation significance from drilling/clearing activities;
- Fauna habitat disturbance or destruction from drilling/clearing activities;
- Rutting and degradation of existing road access from vehicle and machinery movement;
- Compacting soils from vehicles;
- Spreading weed or dieback from unwashed vehicles;
- Potential to increase fire risk from vehicles or inappropriate disposal of waste such as cigarette butts or glass containers;
- Inappropriate waste disposal attracting feral animals or causing local pollution;
- Minor hydrocarbon spills from vehicles, refuelling and drill rig use; and
- Fauna injury or death from falling into sumps or drill holes.

A risk assessment conducted for the potential impacts of exploration activities on the surrounding environment is provided in Table 4-1. These risks were assessed using the matrix provided below. More detailed information on the management measures that will be implemented to manage the potential impacts associated with exploration activities are provided in Section 5.

LIKELIHOOD		RISK ASSESSMENT				
		CONSEQUENCE				
		INSIGNIFICANT	MINOR	MODERATE	MAJOR	CATASTROPHIC
		1	2	3	4	5
ALMOST CERTAIN	A	Medium	High	High	High	High
LIKELY	B	Medium	Medium	High	High	High
POSSIBLE	C	Low	Medium	Medium	High	High
UNLIKELY	D	Low	Low	Medium	Medium	High
RARE	E	Low	Low	Low	Medium	Medium

The basic principle of environmental management for exploration is to minimise disturbance and to return the disturbed areas to near original condition or to a condition which will allow rehabilitation to continue naturally. This can be achieved by incorporating the following measures:

- Maximising the use of non-intrusive exploration techniques.
- Minimising intrusive exploration by:
 - minimising or avoiding, where possible, the clearing of vegetation;
 - retaining and restoring the original ground contours, where appropriate; and
 - preparing the ground for rehabilitation.
- Preventing contamination of soil, surface and groundwater and plants and animals.
- Protecting animals from human-made obstacles such as drill holes.
- Having an awareness of the threats to plants and animals from accidental introduction of exotic diseases and feral species.

Table 4-1: Assessment of potential impacts from exploration activities and management measures to reduce the level of risk from potential impacts

Event	Impact	Likelihood	Consequence	Risk Ranking	Management Strategy	Residual Risk
Driving on access tracks	Damage to tracks from erosion/ sediment run off	Likely	Minor	Medium	<ul style="list-style-type: none"> Implementation of dirt-road driving procedures Driving in wet areas and conditions prohibited 	Low
	Spread of weeds	Possible	Minor	Medium	<ul style="list-style-type: none"> Induction and training of all staff and contractors on appropriate weed management strategies Strict wash down procedures implemented whilst working in the area Vehicle travel restricted to cleared tracks and drill lines Adherence to weed management measures 	Low
	Spread of dieback	Unlikely	Minor	Medium	<ul style="list-style-type: none"> Induction and training of all staff and contractors on appropriate dieback management strategies Strict wash down procedures implemented whilst working in the area Vehicle travel restricted to cleared tracks and drill lines Adherence to dieback management plan 	Low
Hydrocarbon Spills	Soil Contamination	Possible	Minor	Medium	<ul style="list-style-type: none"> Induction and training of all staff and contractors on appropriate hydrocarbon management strategies Use of absorbent matting and drip trays Servicing of equipment to be done outside of exploration area Contaminated soil to be removed from the exploration area for remediation 	Low
	Water Contamination	Unlikely	Insignificant	Low	<ul style="list-style-type: none"> Induction and training of all staff and contractors on appropriate hydrocarbon management strategies Use of absorbent matting and drip trays Servicing of equipment to be done outside of exploration area Contaminated soil to be removed from the exploration area for remediation 	Low
Fire	Damage to vegetation/ fauna habitat	Rare	Major	Medium	<ul style="list-style-type: none"> Mobile fire suppression on drilling equipment on site Fire extinguishers on all mechanised equipment No open fires in exploration area No work during fire ban periods 	Low

Event	Impact	Likelihood	Consequence	Risk Ranking	Management Strategy	Residual Risk
Saline water spill	Damage to vegetation	Possible	Minor	Medium	<ul style="list-style-type: none"> Any water encountered during drilling operations to be stored in unlined sump 	Low
	Contamination of waterways	Possible	Minor	Medium	<ul style="list-style-type: none"> No drilling to occur within perennial waterways Any water encountered during drilling operations to be contained in sump 	Low
Dust	Damage to vegetation	Possible	Minor	Medium	<ul style="list-style-type: none"> Dust Suppression systems on drill rigs Maintenance of access tracks 	Low
Clearing of tracks and drill sites	Damage to flora/vegetation of conservation significance	Possible	Major	High	<ul style="list-style-type: none"> Induction and training on presence of significant flora/vegetation to staff and contractors Preferential use of cleared tracks and gridlines where possible Alignment of proposed drill lines to avoid conservation significant flora where possible Use of track mounted drill rigs where possible to minimise disturbance Clearing to be supervised by qualified botanist to record and establish exclusion zones surrounding conservation significant flora Avoidance of clearing within a 10m radius of Priority Flora populations where possible. Consultation with DBCA should Priority Flora not be able to be avoided. Avoidance of clearing within a 50m radius of Threatened Flora where possible. Compliance with Threatened Flora Authorisation approval under the BC Act. 	Medium
	Damage to fauna habitats and displacement of fauna from habitats	Possible	Minor	Low	<ul style="list-style-type: none"> Induction and training on presence of threatened and priority fauna species (including malleefowl mounds) Clearing to be supervised by suitably qualified personnel to record and establish exclusion zones surrounding any malleefowl mounds or trees with significant hollows Preferential use of cleared tracks and gridlines where possible Avoidance of clearing mature trees Avoidance of clearing within a 200m radius of active Malleefowl mounds and 50m radius of inactive Malleefowl mounds Recording/reporting of significant fauna sightings/mortality to Project Manager and DBCA 	Low

Event	Impact	Likelihood	Consequence	Risk Ranking	Management Strategy	Residual Risk
	Erosion of cleared areas	Possible	Insignificant	Low	<ul style="list-style-type: none"> Clearing will be kept to a minimum as per procedures Rapid rehabilitation after completion of drilling program (within 6 months of drilling unless approved for extension by DMIRS) 	Low
Disposal of rubbish/human waste	Pollution of environment including water ways	Likely	Minor	Medium	<ul style="list-style-type: none"> All rubbish transported off site to appropriate facilities Rapid rehabilitation of drill sites to remove all plastic bags and old consumable products (within 6 months of drilling) No camping outside of designated exploration camp. 	Low
Un-rehabilitated drill sites	Fauna trapped in and sumps or drill holes	Likely	Moderate	High	<ul style="list-style-type: none"> All drill holes either capped or covered immediately after drilling Rehabilitation of any historic uncapped holes as encountered Sumps unlined and angled to allow for fauna escape (1 in 3 incline) 	Medium

5 ENVIRONMENTAL MANAGEMENT MEASURES

The following section outlines the management measures to be implemented during the exploration activities in order to provide adequate protection to the environment and comply with legal obligations.

5.1 Environmental Training

A site-specific induction must be undertaken as a condition of site entry and these are provided to all employees and contractors prior to commencing work. As part of this process, all employees are made aware of and directed to this EMP. The Threatened Flora locations will be highlighted in the induction and the importance of the exclusion zones communicated. Environmental induction training of the workforce includes:

- Overview of the legislation and responsibilities;
- Overview of environmental issues and management procedures including:
 - Inspections;
 - Incident Reporting;
 - Flora;
 - Fauna;
 - Vegetation Clearance;
 - Access Tracks and Drilling Operations;
 - Post Drilling Site Clean-up;
 - Rehabilitation;
 - Vehicle and Equipment Servicing; and
 - Hydrocarbon and Chemical Spills.

5.2 Vegetation Clearing

The following points outline the minimum measures that will be undertaken to manage vegetation clearing and habitat disturbance:

- Existing tracks will be used wherever possible in preference to creating new ones and to minimise the potential for soil erosion, soil compaction and fire.
- Where tracks are to be re-opened, threatened species inspections will be undertaken prior to clearing.
- Large trees will be avoided where possible and pruning considered before total removal.
- Clearing of riparian vegetation (vegetation fringing the playas) to be avoided.
- Vegetation clearing will be conducted where possible using a raised blade technique. Bucket touch clearing may be required for thicker vegetated areas.
- Vegetation clearing required for drill pads and sumps (where required) will be conducted in accordance with approvals.
- Drill sites will be kept to the minimum size possible, without compromising the safety of the worksite.
- Washing of vehicles is to be done prior to entry to the project area and inspected to ensure they are free of any soil and plant material by the Project Geologist.

5.2.1 Constructing Access Tracks/Drill pads/ Sumps

The objective is to plan and conduct drilling activities so that environmental impacts are minimised, and current best practice is adopted. The following procedures will be implemented:

- Access to a drill site should be via existing access tracks, wherever possible, and then via the path of least resistance.
- The clearing of vegetation to gain access to a drill site location should be avoided, wherever possible, as should the clearing of trees at a drill site. If necessary, vegetation should be rolled or cleared by a bulldozer with the blade above the ground so as to minimise soil disturbance and avoid the loss of vegetative root stock.
- Where clearing is required, ground disturbance should be minimised and the area of disturbance should only be big enough to allow for the safe and efficient operation of the drill.
- Overhanging branches may be removed via chainsaw or brush saw to ensure safety to traversing vehicles.
- Drill pads should be constructed to minimise disturbance to drainage patterns.
- Topsoil and any cleared vegetative material should be stockpiled for future rehabilitation.
- Drill sites should be positioned to create minimal disturbance to landform and vegetation and should be located on flat ground, wherever possible.
- Where water is encountered, in-pad sump to be constructed at the drill site to contain runoff and spillage. The sumps should be located away from trees so as to avoid contamination or damage of tree roots.
- Drilling mud and slurries should be contained as much as possible to avoid contamination of the site.
- Waste oils, drilling fluids and rubbish should be disposed into appropriate containers and disposed of at an approved site.
- Sample bags should only be used to contain wet samples (use polyweave type) or in resource definition drilling.
- Any spillage of oils or fuels should be contained. Any significant spillage of drilling fluid should be cleaned up and any contaminated soil disposed of in an approved manner.

The following procedure will be undertaken for ground clearing. A written approval notice for the PoW consenting to ground clearing and drill holes must be returned before any clearing can be undertaken.

Ground Clearing Phase 1

Last minute confirmation includes checking off that:

- the PoW has been approved.
- Supervising Botanist available for pre-clearing inspections.
- All hand-held UHF radios are fully charged and working.

Ground Clearing Phase 2

1. All visitors must undergo a site induction and safety meeting before work is to begin.
2. All personal are to wear PPE including steel cap boots, safety glasses, and high visibility vests.
3. The Project Geologist or senior field technician must carry a hand-held UHF radio, Channel for communication with the loader operator.

Ground Clearing Phase 3

1. The Project Geologist and supervising Botanist will proceed along the proposed track 100m to 200m in front of the loader. The scrub rake acts as a large comb scraping along the surface and collecting all vegetation in its path minimising ground disturbance to the track. All vegetation is suitably placed into an opening permitting retrieval for later rehabilitation.
2. Call up the loader to start clearing towards your location and let him know your location.
3. Once the loader is visible and is approximately 50m of your location instruct the loader operator to stop.
4. Commence walking the next 150m of the proposed track and call up the loader operator to recommence track clearing.
5. This process is to be repeated until the entire track has been cleared.
6. The Project Geologist or senior field technician are responsible for the safety of all personal on site while the clearing is in progress, while the loader is clearing all personal are to stay in a group.

5.3 Drilling

The actions of the drilling company (drillers and offsidiers) are the responsibility of the Project Geologist supervising the drill rig. The EMP should be considered by each Geologist when entering the drill site on a daily basis. Issues found should be discussed with the Driller (or Drilling Supervisor) and a solution found on the spot to correct the issues. Issues that cannot be corrected immediately should be discussed with the Senior Geologist to assist with a resolution. All hazards or incidents (resolved or unresolved) will be reported as per standard operating procedures.

5.3.1 Traversing Access Tracks

- Keep to established tracks.
 - Vegetation should not be unnecessarily disturbed.
 - Overhanging branches may be removed via chainsaw or brush saw to ensure safety to traversing vehicles.
 - When exiting a drill site, reverse out, or do a three-point turn.
 - Geologist should be observing the surrounding vegetation to ensure that no unnecessary clearing/ trafficking is occurring.
- During inclement weather work shall cease to minimise ground disturbance along the tracks.

5.4 Flora and Fauna Management

- Induction and training on the presence of significant flora/vegetation and fauna potentially in the area to staff and contractors;
- Clearing to be supervised by qualified Botanist to record and establish exclusion zones surrounding conservation significant flora (50m radius for Threatened Flora and 10m radius for Priority Flora) and fauna (200m radius of active Malleefowl mounds, 50m radius of inactive Malleefowl mounds, 10m radius of trees with significant hollows);

- Recording/reporting of fauna sightings/mortality to Project Manager and DBCA;
- Exploration personnel and contractors will not feed foxes, dogs, or feral cats and will be informed of this requirement through education/induction; and
- Exploration personnel are not permitted to take dogs or any other fauna species into the area and will be informed of this requirement through education/induction.

5.5 Weed and Dieback Management

- Induction and training on weed and dieback management requirements to staff and contractors;
- Compliance with the Dieback Management Plan provided in Appendix C.
- All equipment and vehicles will be 'Clean on Entry' (cleaned and free of soil and vegetation material offsite) prior to travelling to the site;
- MRD Supervisors will conduct random checks of equipment coming to site prior to commencing work to ensure they are clean; and
- Vehicles must stay on designated tracks to minimise disturbance.

5.6 Dust Management

- Activities will be planned to prevent the generation of dust wherever possible;
- Speed limits (maximum of 60km/hr on ungazetted roads) for all vehicles are enforced and unnecessary movement of vehicles is minimised;
- Maintenance and repair of roads will occur when required to minimise bull dust pits; and
- Consideration of restricting exploration activities under extremely windy conditions when dust could affect neighbouring properties or significant flora species.

5.7 Waste Management

- To reduce the risk of increased local populations of feral animals such as dogs, foxes and cats, putrescible wastes will be placed in secure containers before being removed from the site;
- All rubbish and rubbish receptacles will be removed from site; and
- Rubbish will be appropriately disposed of in a designated off-site facility.

5.8 Hydrocarbon Management

- Induction and training of all staff and contractors on appropriate hydrocarbon management strategies prior to commencing activities;
- Fuels and oils are to be stored in suitably located and bunded areas that minimise the risks of fire and spills or leaks. When necessary, hydrocarbons should be stored on temporary portable bunds;
- Rig wastes, such as engine oil, grease, and fluids are to be removed and disposed of appropriately.
- Leaks from equipment, such as hydraulic lines, must be repaired as soon as they are detected;
- Geologist to inspect under drill rigs/ support trucks / booster trucks on a regular basis (daily) to ensure that there are no oil spills;

- All drill crew personnel involved in the programme must be aware of the three C's of spill management (Control, Contain and Clean-up);
- Drillers are to regularly maintain drilling equipment and fill in regular rig checks to prevent hydrocarbon leaks All rigs must have a large black plastic mat positioned under the drill rig to capture any oil spills;
- The contractor will also have spill response equipment available, including (but not limited to) oil booms or matts, and products such as Enretech-1; and
- MRD will ensure that contaminated material and soils are removed from the site as soon as practicable.

5.9 Fire Management

- Weather will be monitored on a daily basis, particularly during bushfire risk months and adhere to warnings and fire danger ratings;
- MRD personnel, including contractors, will comply with local fire bans, the requirements of the Fire and Emergency Services Authority WA and the District Manager DBCA;
- To reduce the risk of vehicle induced bushfires all vehicles will be fitted with fire extinguishers and site personnel trained in their use;
- Where practicable, drill rigs to be fitted with a fire suppression deluge system; and
- Should any evidence of fire be observed whilst conducting onsite exploration activities, Emergency services will be notified and all personnel will immediately leave the area.

5.10 Rehabilitation

Rehabilitation will be undertaken in accordance with DMIRS Exploration Rehabilitation Guidelines (2007). It should be noted that auger sampling does not require vegetation clearing and therefore no rehabilitation is required for auger drilling. The auger sampling holes will be backfilled through a combination of the hole naturally collapsing following the removal of the auger bit and excess material being returned to the hole.

In the case of AC drilling, the drill hole will be backfilled using spoil piles to above ground level and vegetation will be re-spread to promote germination. All rubbish will be removed from site and track entrances will be blocked to prevent third party access. Plastic plugs will be used to prevent animals from getting trapped in the drill holes while they are still active.


Where disturbed areas and drill holes are not required for ongoing exploration programmes, completion of rehabilitation will occur within 6 months of the end of the drilling program. If MRD require the area to remain open (un-rehabilitated) for future developments an extension application will be made to the DMIRS within 3 months of drilling completion. Rehabilitation will be conducted using the sequence and methods outlined in Table 5-1.

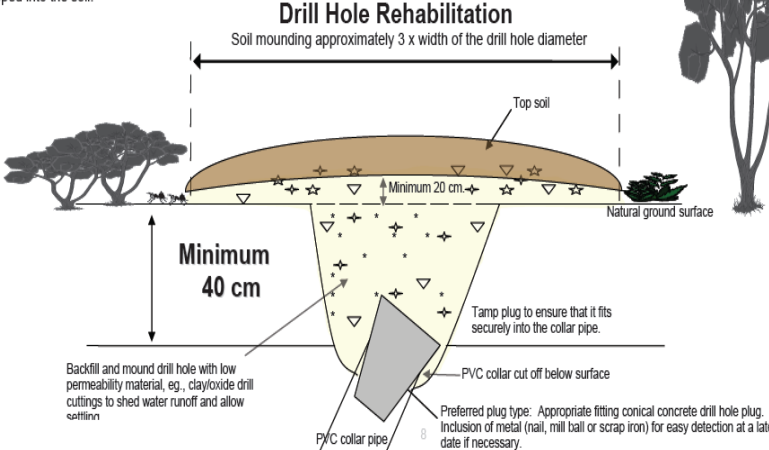

At the completion of exploration, the rehabilitation will involve disguising track entrances (excluding existing access tracks) by placing branches/debris/rocks over the entrance and/or brushing over vehicle tracks to prevent/discourage tourists detouring from the main access routes.

Prior to the preparation of a works completion report, as required by the POW approval process, MRD will conduct a completion inspection to ensure all rehabilitation requirements have been implemented. In conducting the inspection, the following completion criteria will be considered:

- Only pre-existing access tracks remain (unless agreed upon with DMIRS);
- All tracks no longer required for the exploration activity have been appropriately disguised, closed, rehabilitated (where required) so they are no longer obvious or apparent;
- All drill pads and sumps have been appropriately covered and ripped where required;
- All auger sampling and drill holes have been backfilled and/or capped and covered;
- No permanent markers (flagging tape, posts, drill collars etc.) are apparent (unless agreed upon with DMIRS to remain till end of PoW);
- All drill spoil has been buried or blended into soil surface;
- All rubbish has been removed;
- No hydrocarbon contaminated soil occurs at drill sites; and
- No declared weed growth observed along tracks or within the rehabilitated areas.

Table 5-1: Typical Rehabilitation Approach

Time Period	Procedure
<p>Immediately after drilling</p>	<p>Cap the drill hole below surface immediately after drilling has been completed to prevent animals from entering or becoming trapped in the holes. Use black cap (smaller diameter) for RAB and aircore holes. Use orange cap for larger diameter drill holes.</p> 
	<p>Remove rubbish, wastes and equipment</p>
	<p>Remove/remediate any hydrocarbon spills</p>
<p>One Month after drilling</p>	<p>Remove non-permanent markers (excluding those agreed to remain)</p>
<p>Six Months after drilling</p>	<p>Remove spoil piles by either disposing down the hole.</p>
	<p>Dig down approximately 400mm from the surface of the collar, exposing the top section of the collar pipe.</p>
	<p>Cut the top 400mm section of the collar pipe off with a collar cutter. If smaller PVC pipe has been left in the hole after geophysical surveys, this will also need to be cut.</p> <p>Seat the plug firmly into the top of the casing. Backfill the drill hole to the surface with low permeability material (e.g., clay/oxide drill cuttings).</p>

Time Period	Procedure
	<p>Mound over the backfilled hole to facilitate water shedding away from the hole with low permeability material (approximately 200mm by 800mm wide) and cover with topsoil.</p> <p style="text-align: center;">Drill Hole Rehabilitation</p>  <p>The diagram illustrates the process of rehabilitating a drill hole. It shows a cross-section of the ground with a hole that has been backfilled. The hole is filled with a material (represented by stars) and a PVC collar pipe is inserted. A tamper is used to ensure the plug fits securely. The hole is then mounded with soil, and a layer of topsoil is added on top. The mounding is approximately 3 times the width of the drill hole diameter. The backfill material is specified as low permeability material, such as clay/oxide drill cuttings, to shed water runoff and allow settling. The PVC collar pipe is cut off below the surface. A preferred plug type is an appropriate fitting conical concrete drill hole plug, which includes metal (nail, mill ball or scrap iron) for easy detection at a later date if necessary. The natural ground surface is shown to the right of the hole, and the topsoil layer is at least 20 cm thick. The backfill material is at least 40 cm deep.</p>
	<p>Backfill sumps once dry with removed subsoil</p>
	<p>Windrows higher than 100mm should be back bladed onto the adjacent area prior to ripping.</p>
	<p>Scarify tracks (excluding existing tracks) and drill pads along the contour, respread vegetation to promote germination and plant growth and block track entrances to prevent third party access. Rehabilitation should be planned to take best advantage of seasons. This may include completion of rehabilitation works in time for the rains.</p>
	 <p>The photograph shows a dirt road with deep tire tracks in a natural setting. The soil is a reddish-brown color, and there are several trees and bushes along the road. The road appears to be in a rural or mining area.</p>

5.10.1 Rehabilitation Tracking

Rehabilitation of drilling programmes will be tracked by the Project Geologist or Company Environmental Representative. The tracking will ensure that MRD is consistently rehabbing explored areas according to the requirements stated in the PoW and this EMP, and that the disturbed area is correctly captured for end of year reporting.

5.10.2 Regular Auditing

The Field Supervisor or the Project Geologist will audit active drill sites at one and six month intervals. Any non-conformances will be entered into the database for tracking purposes. Weekly checks of all rigs will be undertaken by the Field Supervisor.

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Appendix A: Flora and Vegetation Surveys

**Threatened (Declared Rare) Taxon *Eucalyptus merrickiae*:
Results of Targeted Survey and Impact Assessment**

Prepared for Mt Ridley Mines Limited

Ref: T15013



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Document Control

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A handwritten signature in black ink, appearing to read "Joe Grehan".

Joseph Grehan
Principal Ecologist

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Terratree Pty Ltd

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Executive Summary

Mt Ridley Mines Limited (Mt Ridley) proposes to undertake infill exploration drilling within one of its high priority target areas, Target 19, on Unallocated Crown Land within tenements E63/1547 and E63/1564, approximately 70km NNE of Esperance. The existing drilling program has been carried out under Program of Works approval Registration ID: 55683.

To meet regulatory requirements for future exploration and mining, Mt Ridley commissioned Terratree Pty Ltd (Terratree) to conduct a Level 2 (EPA 2004) Flora and Vegetation and a Targeted Threatened Species survey in spring 2015 within exploration target areas which totaled 409 ha.

While conducting the survey in September 2015, Terratree Principal Ecologist Joseph Grehan collected a pant specimen which turned out to be the Threatened (Declared Rare) taxon *Eucalyptus merrickiae* within exploration Target 19. After it was confirmed that the species was *E. merrickiae* by taxonomist Chris Hancock Terratree was again commissioned by Mt Ridley to undertake a targeted survey for *E. merrickiae* both locally and regionally.

Eucalyptus merrickiae, commonly known as Goblet Mallee, is a Mallee to 2-4(-6) m high with rough, flaky bark and has pink/cream-white flowers between August-November. This mallee is found around ephemeral salt lakes on sandy clay or grey sand, near Mount Ridley in the Eastern Mallee IBRA sub-region within the Shire of Esperance, Western Australia

E. merrickiae is listed as Threatened (Declared Rare) under the *Wildlife Conservation Act 1950* (WA) (*Wildlife Conservation [Rare Flora] Notice 2006 [2]*) and Threatened (Vulnerable) under the *Environment Protection and Biodiversity and Conservation Act 1999* (CPBR, 2006).

The targeted field survey was undertaken by Terratree Principal Ecologist Joseph Grehan and Botanist Kelby Jennings from September 29 to October 4, 2015. At the time of the survey most trees were in bud, but fruits from the previous season were found on some specimens. The survey focussed on areas of suitable habitat surrounding ephemeral salt lakes within and around the exploration target areas to a distance of 10km where access was feasible. Known occurrences from earlier surveys were also visited. Proposed exploration drill lines within target areas were searched along a 50m wide linear survey corridor.

Populations of *E. merrickiae* were way-pointed using hand-held GPS units with an accuracy of <10m. Multiple individuals were recorded using one waypoint where there was more than one individual within a 5m radius of the waypoint being recorded. Geo-tagged photos of each new population were also recorded.

The last two days of the survey were spent searching regionally for new populations in addition to visiting known populations to confirm that *E. merrickiae* was present. All three existing populations visited were re-surveyed and actual counts of individuals present recorded.

Seven potentially new populations of *E. merrickiae* were identified during the survey, with four of the populations located within 1-5km and the other three located are 5-10 km of the Level 2 study areas. Declared Rare Flora (DRF) report forms and maps for all seven potentially new *E. merrickiae* populations have been submitted to DPaW's Species and Communities Branch and a specimen has been vouchered with the WA Herbarium for formal identification.

If the identification of *E. merrickiae* is confirmed by the WA Herbarium then the targeted survey for this species will result in an increase in known populations from 34 to 41. The number of individuals will also increase significantly from 5,087 to 9,716 which represent a 41.9% increase in the overall population.

Mt. Ridley proposes to undertake infill drilling in an area where a new population of *E. merrickiae* has been identified and recorded. The new population is comprised of 705 individuals comprised of nine sub-populations.

The 'permit to take DRF' application has applied to impact up to 294 individuals within the exploration area. This impact represents a 5.78% impact to the current known population. If the specimen lodged with the WA Herbarium is confirmed to be *E. merrickiae* and the results of the targeted survey accepted by DPaW then the potential impact to the overall population will decrease to 3.3%. In addition only one population out of 41 will be impacted by the proposed ground disturbing activities.

Impacts to individuals will be avoided in first instance and, if unavoidable, will be minimised and mitigated through implementation of the following management measures:

- A botanist who participated in the targeted survey and is very familiar with this species will be on the ground to guide the exploration team during ground disturbing activities;
- All exploration personnel will be made aware of the characteristics and conservation status of *E. merrickiae*;
- All *E. merrickiae* individuals within the exploration disturbance area will be flagged with fluorescent tape prior to the commencement of clearing;
- Every effort will be made not to disturb or damage lignotubers of *E. merrickiae* to enable the plants to re-shoot after disturbance. This can be achieved by cutting each plant to the base and leaving the lignotuber undisturbed in the ground.

1 Introduction

1.1 Background

Mt Ridley Mines Limited (Mt Ridley) proposes to undertake infill exploration drilling within one of its high priority target areas, Target 19, on Unallocated Crown Land within tenements E63/1547 and E63/1564. The existing drilling program has been carried out under Program of Works approval Registration ID: 55683.

To meet regulatory requirements for future exploration and mining, Mt Ridley commissioned Terratree Pty Ltd (Terratree) to conduct a Level 2 (EPA 2004) Flora and Vegetation and Targeted Threatened (Declared Rare) Flora survey in spring 2015 within exploration target areas over an area of 409 ha.

While conducting the survey in September 2015, Terratree Principal Ecologist Joseph Grehan collected a pant specimen which turned out to be the Threatened (Declared Rare) species *Eucalyptus merrickiae* within exploration Target 19. After it was confirmed as *E. merrickiae* by taxonomist Chris Hancock Terratree was again commissioned by Mt Ridley to undertake a targeted survey for *E. merrickiae* both locally and regionally.

1.2 Project Location

Tenements E63/1547 and E63/1564 are located on the edge of Fraser Range approximately 34km north-east of Wittenoom Hill and 70km north of Esperance within the Shire of Esperance. The Level 2 flora and vegetation survey was undertaken within the exploration target areas. The targeted survey for *E. merrickiae* was undertaken in areas of suitable habitat for the species both within and surrounding tenements E63/1547 and E63/1564 (**Error! Reference source not found.**).

1.3 Survey Objective and Scope of Work

The objective of the survey was to better define the distribution and abundance of *Eucalyptus merrickiae* locally and regionally. The targeted survey was conducted within exploration target areas and more broadly in areas of suitable habitat within and surrounding tenements E63/1547 and E63/1564.

The scope of work for the targeted survey included the following:

- Undertake a targeted survey for Threatened (Declared Rare) taxon *Eucalyptus merrickiae* within local areas of suitable habitat within Mt Ridley exploration targets recording the number of individuals present;
- Undertake a regional survey for Threatened (Declared Rare) taxon *E. merrickiae* in an areas within 10km of exploration targets the number of individuals present;
- Prepare a report and appropriate figures detailing results of survey; and
- Undertake an impact assessment of the proposed in-fill exploration on *E. merrickiae*.

2 Eucalyptus merrickiae

2.1.1 Description

Eucalyptus merrickiae, commonly known as Goblet Mallee, is a Mallee to 2-4(-6) m high with rough, flaky bark and produces pink/cream-white flowers between August and November. Smaller plants have dense foliage often growing to ground level, while larger, older plants grow into erect mallees around 6m tall. The species re-sprouts from its lignotuber after fire. The bark is rough, fissured, flaky and pale grey on stems greater than approximately 8 cm diameter, and smooth pale-grey on smaller stems. Buds occur in the axils of the leaves in clusters of three and are shortly cylindrical, around 7–12 mm long and 5–6 mm wide. The flowers are creamy white and the fruit are cylindrical, 6–8 mm wide. Crown leaves are stiff, erect, shortly stalked, narrow (0.4–0.8 cm wide), 5–8.5 cm long, dull, and grey-green weathering with age to slightly glossy green. Juvenile leaves occur opposite each other for the first few pairs then alternate on the stems. They are narrow, linear, shortly stalked and grey green to green (**Photos 1-6**) (CPBR, 2006).

Beard (1990) identified *E. merrickiae* as one of the mallee species present during his survey of the Mallee region in the Roe Botanical District.

2.1.2 Conservation Status

E. merrickiae is listed as Threatened (Declared Rare) under the *Wildlife Conservation Act 1950* (WA) (*Wildlife Conservation [Rare Flora] Notice 2006 [2]*) and Threatened (Vulnerable) under the *Environment Protection and Biodiversity and Conservation Act 1999* (CPBR, 2006).

2.1.3 Distribution and Habitat

While there are 12 known populations of *E. merrickiae* in WA (Kelly *et. al.*, 1995), database search results from the DPaW identified four populations (**Table 2**) within a 40 km radius of the following centroid points within the exploration target areas:

- E 421626.056 N 6316996.656 ZN 51
- E 430892.126 N 6323534.580 ZN 51
- E 407728.181 N 6309482.526 ZN 51

E. merrickiae is typically found around ephemeral salt lakes on sandy clay or grey sand, near Mount Ridley in the Eastern Mallee IBRA sub-region within the Shire of Esperance, Western Australia. More specifically *E. merrickiae* is found on flat to slightly rising sites predominantly on the north-eastern edges of salt lakes where Aeolian deposits of sand, sandy-loam or sandy-clay are better drained than on the southern sides. Usually a halophytic zone dominated by *Tecticornia* species is found between the mallees and the edge of the salt lake (Department of the Environment, Water, Heritage and the Arts, 2008).

Table 1: Combined (Threatened (Declared Rare) and Priority Flora database, Threatened and Priority Flora List and Western Australian Herbarium Database) database search results for Threatened (Declared Rare) taxon *E. merrickiae*

Taxon	Cons Status	WA Rank	Pop Number	Location	District	Date	Method	Live Total	Flower
<i>Eucalyptus merrickiae</i>	T	VU	5	16.7km N of Scadden Rd on Dempster Rd. 7.5km N of Norwood Rd	ESPERANCE	25/09/1992	ESTMT	1	N
<i>Eucalyptus merrickiae</i>	T	VU	11	1.43km W of Dempster Rd on south side of Lignite Rd near to lake; land to south of this site is Location No. 1999 - VCL. Population may be on both private property & road verge.	ESPERANCE	28/11/1995	ESTMT	30	N
<i>Eucalyptus merrickiae</i>	T	VU	13	2.35km W of Dempster Rd on south side of Lignite Rd; land to the south of this site is probably VCL.	ESPERANCE	28/11/1995	ESTMT	30	N
<i>Eucalyptus merrickiae</i>	T	VU	14	4.5km E of Styles Rd on both the north & south sides of Lignite Rd; Location No. 1999 on south side, Location No.	ESPERANCE	28/11/1995	ESTMT	30	N

Taxon	Cons Status	WA Rank	Pop Number	Location	District	Date	Method	Live Total	Flower
				1647/1646 on north side.					

2.1.4 Threats

The main threats to *E. merrickiae* include land clearing, fire, weeds, pathogens and mineral exploration. The majority of the known populations are located outside reserves on roadsides and Unallocated Crown Land (Department of the Environment, Water, Heritage and the Arts, 2008).

3 Regulatory Context

Legislation relevant to the protection of biodiversity in Western Australia includes, but is not limited to, the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), the State *Wildlife Conservation Act 1950* (WC Act) and *Environmental Protection Act 1986* (EP Act).

The Commonwealth EPBC Act was developed to provide protection for matters of National Environmental Significance (matters of NES). It includes provisions to protect threatened species and communities and the conservation of migratory species.

The State WC Act was developed to provide for the protection of wildlife in Western Australia. Under section 14 of this act, all native flora and fauna are protected in Western Australia. In addition, the Minister has published a list of species in need of special protection because they are considered rare, likely to become extinct, or are presumed extinct. The current listing was published in Western Australian Government Gazette on 6 November 2012.

The State EP Act was developed to ensure that impacts on native flora and fauna are considered in the assessment of development proposals. While the assessment of specific proposals is not within the scope of this report, the surveys undertaken conform to the requirements of the Environmental Protection Authority's (EPA's) Position Statement No. 3: *Terrestrial Biological Surveys as an Element of Biodiversity Protection* (EPA, 2002a) and Guidance Statement No. 51: *Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia* (EPA, 2004).

Under the relevant legislation, certain species of flora and ecological communities are awarded protection in the interest of their conservation.

3.1 Threatened and Priority Flora

3.1.1 *Environment Protection and Biodiversity Conservation Act, 1999 (Commonwealth of Australia)*

At a Commonwealth level, Threatened flora are protected under the EPBC Act, which lists species that are considered Critically Endangered, Endangered, Conservation Dependant, Extinct, or Extinct in the Wild (**Appendix B**).

3.1.2 *Wildlife Conservation Act (1950) (Western Australia)*

Taxa which have been adequately searched for and are deemed to either rare, in danger of extinction, or otherwise in need of special protection in the wild, are gazetted as Threatened Flora (Schedule 1, WC Act 1950). Threatened Flora (Schedule 1, December 2010) taxa are further categorised by the Department according to their level of threat using IUCN Red List criteria:

- CR: Critically Endangered – considered to be facing an extremely high risk of extinction in the wild;
- EN: Endangered – considered to be facing a very high risk of extinction in the wild; and
- VU: Vulnerable – considered to be facing a high risk of extinction in the wild.

These taxa are legally protected and their removal or impact to their surroundings cannot be conducted without Ministerial approval, obtained specifically on each occasion for each population (refer to Appendix A for conservation category definitions).

3.1.3 *Priority Flora*

The Department of Parks and Wildlife (DPaW) maintains a list of Priority Flora taxa, which are considered poorly known, uncommon or under threat but for which there is insufficient justification, based on known distribution and population sizes, for inclusion in Schedule 1 of the WC Act. A Priority taxon is assigned to one of five priority categories (**Appendix A**).

3.1.4 Local and Regionally Significant Flora

In addition to plant taxa being recognised as significant through their Declared Rare or Priority Flora status, they can also be significant for a number of other reasons. The Environmental Protection Authority (EPA) in Guidance Statement No. 51 – *Terrestrial flora and vegetation surveys for environmental impact assessment in Western Australia* (EPA 2004) states that "significant flora" may include taxa that have:

- "a keystone role in a particular habitat for threatened species, or supporting large populations representing a significant proportion of the local regional population of a species;
- relic status;
- anomalous features that indicate a potential new discovery;
- being representative of the range of a species (particularly, at the extremes of range, recently discovered range extensions, or isolated outliers of the main range);
- the presence of restricted subspecies, varieties or naturally occurring hybrids;
- local endemism/a restricted distribution; or
- being poorly reserved. "

Similarly, plant communities or vegetation may be considered "significant vegetation" for reasons other than a listing as a TEC. The EPA (2004) states that these reasons include:

- "scarcity;
- unusual species;
- novel combinations of species;
- a role as a refuge;
- a role as a key habitat for threatened species or large populations representing a significant proportion of the local to regional total population of a species;
- being representative of the range of a unit (particularly, a good local and/or regional example of a unit in 'prime' habitat, at the extremes of range, recently discovered range extensions, or isolated outliers of the main range); or
- a restricted distribution. "

3.2 Environmentally Sensitive Areas

Under section 51B of the *Environmental Protection Act* the Minister can, by notice, declare an area of the State specified in the notice or an area of the State to be an Environmentally Sensitive Area (ESA). ESAs are protected under the *Environmental Protection (Clearing of Native Vegetation) Regulation 2004* and are selected for their environmental values at state or national levels. Some of the reasons for assigning this status include:

- Protection of rare or threatened species of native plants;
- Protection of wetlands and water courses;
- Protection of sites that have other high conservation, scientific or aesthetic values; and
- Protection of Aboriginal or European cultural sites.

3.3 Government Policy and Guidelines

The following State Policies, EPA Position & Guidance Statements, and relevant environmental guidelines and codes of practice are considered relevant to the environmental impact assessment of the proposed project:

- EPA Position Statement No. 2 Environmental Protection of Native Vegetation (EPA, 2000);
- EPA Position Statement No. 3 Terrestrial Biological Surveys (EPA, 2002a);

- EPA Position Statement No. 7 Principles of Environmental Protection (EPA, 2002b);
- EPA Guidance Statement No. 51 Terrestrial Flora and Vegetation Surveys (EPA, 2004);

4 Methods

After the level 2 flora and vegetation survey was completed in September one of the Eucalypt specimens collected was confirmed to be the Threatened (Declared Rare) taxon *Eucalyptus merrickiae* by Taxonomist Chris Hancock. Once confirmed, Mt. Ridley commissioned Terratree to undertake a targeted survey with the objective of better defining the distribution and abundance of this Threatened species locally within and adjacent to exploration target areas and regionally (within a 10km radius).

4.1 Desktop Review

Prior to the field survey known locations retrieved from DPaW's database search were plotted onto aerial imagery to create field maps. In addition taxonomic and habitat descriptions and photographs of *E. merrickiae* were compiled from Florabase and available literature in order to produce a 'field guide' to assist all botanists with identification of the target species during the survey.

4.2 Field survey

The targeted field survey was undertaken over six days by Terratree Principal Ecologist Joseph Grehan and Senior Botanist Kelby Jennings from September 29 to October 4, 2015. The survey focussed on areas of suitable habitat surrounding ephemeral salt lakes both within and adjacent to exploration target areas and regionally (<10km from local area) around accessible salt lakes and known locations. Proposed exploration drill lines within target areas were also searched along a 50m wide linear survey corridor.

Prior to commencing the survey, the location where the *E. merrickiae* specimen was collected during the Level 2 flora and vegetation survey undertaken three weeks before was visited for re-familiarisation to see what reproductive stage *E. merrickiae* was at (i.e. fruiting and/or flowering). Fortunately *E. merrickiae* was still laden with the distinctive red buds which make it easily distinguishable in areas of suitable habitat. While none of the plants present had commenced flowering we were to record some flowering individuals at a later stage in the survey.

After re-familiarisation, the targeted survey commenced by undertaking searches of areas where *E. merrickiae* was recorded during the Level 2 flora and vegetation survey to accurately define the populations and record the number of individuals present. Following this, searches were undertaken of areas of suitable habitat, mainly around salt lakes, within and adjacent exploration target areas and then around other salt lakes in the local area.

Populations of *E. merrickiae* were recorded using hand-held GPS units to log waypoints with an accuracy of <10m. Multiple individuals were recorded using one waypoint where there was more than one individual within a 5m radius of the waypoint being recorded. In addition to waypoints, geo-tagged photos of each new population were also taken.

The last two days of the survey were spent searching regionally for new populations in addition to visiting known populations to confirm that *E. merrickiae* was present. All three existing populations visited were re-surveyed and trees counted.

5 Results

Table 6 presents the results of the targeted survey for *E. merrickiae*. In total seven new populations were recorded with a total number of 4,629 individuals. The largest new population had 2,369 individuals. Three existing populations (2, 11A & B, 13A & B were also surveyed) resulting in an additional 130 individuals.

E. merrickiae was found at three of the four known populations visited during the survey (**Figures 4 & 8**). A new population was located along Lignite Road approximately 1-2 km north-west of two known populations.

Table 2: Details of new and existing *E. merrickiae* populations and corresponding figures

Population Name	Number of Waypoints	Number of Individuals	Figure Number
T19 West	322	705	2
T19 East	250	522	3
New Population 1		61	4
Existing Population 11A & 11B		99	4
Existing Population 13A & 13B	88 (includes New Population 1 and Existing Populations 11A & 11B)	14	4
New Population 5	255	619	5
New Population 3	124	2396	6
New Population 4	980	301	7
Existing Population 2	15	17	8
New Population 6	4	25	9
Total	2038	4,759	

6 Discussion

The targeted survey for *E. merrickiae* was undertaken when the species was in bud or beginning to flower. The bright red buds aided identification in the field. This taxon can be confused with *Eucalyptus halophila* as they have similar buds, leaves and fruit. However *E. halophila* flowers between January and May whereas *E. merrickiae* flowers from August to November which is consistent with what was observed during the field survey in late September and early October. The following characteristics helped taxonomist Chris Hancock to confirm that the specimen was *E. merrickiae*:

1. **Seeds:** both species have pitted and similarly shaped seeds, but the seeds from the Hadley specimens look much more like the *E. merrickiae* seeds in the photo provided in Euclid. They have raised cream-yellow ridges surrounding the pits

2. **Pedicels:** both species have very short pedicels - *E. merrickiae* is 0-1mm and *E. halophila* is 2-4mm. The specimens were always 0-1mm.

3. **Pith oil glands:** the specimens were largely devoid of pith oil glands but some very small ones were seen. The description for *E. merrickiae* is that it has pith oil glands but they are 'obscure'. By contrast *E. halophila* has no pith oil glands (C, Hancock. pers. correspondence 22/10/15).

Seven potentially new populations of *E. merrickiae* were identified during the survey, with four of the populations located within 1-5km and the other three located are 5-10 km from of the level 2 study areas (**Figure 1**). DRF report forms and maps for all seven potentially new *E. merrickiae* populations have been submitted to DPaW's Species and Communities Branch and a specimen has been vouchered with the WA Herbarium for formal identification.

If the identification of *E. merrickiae* is confirmed by the WA Herbarium then the targeted survey for this species will result in an increase in known populations from 34 to 41. The number of individuals will also increase from 5,087 to 9,716 which represent a 41.9% increase in the overall population.

6.1 Impact Assessment

Mt. Ridley proposes to undertake infill drilling in an area where a new population of *E. merrickiae* has been identified and recorded, Target 19 West. The new population is comprised of 705 individuals comprised of nine sub-populations (**Figure 2**).

The 'permit to take DRF' application (**Appendix B**) has applied to impact up to 294 individuals within the exploration area. This impact represents 41.7% of the Target 19 West population and 5.78% of all known *E. merrickiae* trees. If the specimen lodged with the WA Herbarium is confirmed to be *E. merrickiae* and the results of the targeted survey accepted by DPaW then the potential impact to the overall population will decrease to 3.3%. In addition one population out of 41 will be impacted by the proposed ground disturbing activities.

6.2 Survey Limitations

The potential limitations of the survey, as outlined in the EPA Guidance Statement No. 51 (EPA, 2004) are presented in **Error! Reference source not found.**

Table 3: Potential limitations and discussion of their relevance to the study area

Potential Limitation	Discussion
Sources of information and availability of contextual information (i.e. pre-existing background vs. new material)	Existing information was available including Florabase www.florabase.dpaw.wa.gov.au and Approved Conservation advice for <i>Eucalyptus merrickiae</i> (Goblet Mallee) prepared by the Department of the Environment, Water, Heritage and the Arts, 2008.
Scope (e.g. what habitats, etc., were surveyed)	There were no inappropriate limitations on the scope. The survey assessed and exploration target areas and suitable habitat locally and regionally.
Completeness and further work which might be needed (e.g. was the relevant area fully surveyed)	Targeted flora surveys were undertaken along proposed drill and within areas determined to be suitable habitat for <i>Eucalyptus merrickiae</i> that were reasonably accessible via tracks both locally and regionally (within a 20km radius). The survey was constrained by time and more new populations may have been located with additional time.
Taxonomic certainty	There were no significant limitations on taxonomic certainty. Species profiles, descriptions and photographs were compiled from specimens and information available on Florabase and resources in the WA Herbarium. These were used for field identification of any species with potential to be a threatened or priority species.
Timing, weather, season, cycle	Timing of the survey in September 2015 was preceded by above average rainfall received in July 2015, with approximately 24.8mm recorded. Additionally, two out of the three months preceding the survey, (i.e. June and August) did not receive any rainfall. However, timing was considered acceptable as <i>E. merrickiae</i> was in bud during the Level 2 survey and beginning to flower during the targeted survey.
Intensity (in retrospect, was the intensity adequate)	The intensity of the targeted survey was adequate with all populations accurately defined in terms of extent and abundance.
Resources	The field survey, plant identification and reporting were all adequately resourced.
Experience levels (e.g. degree of expertise in plant identification to taxon level).	The field survey was carried out by suitably qualified and experienced personnel. Plant identification was primarily undertaken by Dr. Chris Hancock, whom has over ten years of experience in taxonomic identification and has extensive experience identifying flora from the Mallee region.

7 Conclusions and Recommendations

The permit to take DRF application being submitted by Mt Ridley could result in 294 *E. merrickiae* individuals being destroyed or damaged by exploration activities, representing a 5.78% impact to the current known population and 3.3% impact if the results of the targeted survey are accepted by DPaW. The exploration will be impacting two sub-populations within one new population.

Impacts to individuals will be avoided in first instance and, if unavoidable; impacts will be minimised and mitigated through implementation of the following management measures:

- A botanist who participated in the targeted survey and is very familiar with this species will be on the ground to guide the exploration team during ground disturbing activities.
- All exploration personnel will be made aware of morphological characteristic and conservation of *E. merrickiae*.
- All *E. merrickiae* individual within the exploration disturbance area will be flagged with fluorescent tape prior to the commencement of clearing;
- Every effort will be made not to disturb or damage lignotubers of *E. merrickiae* to enable the plants to re-shoot after disturbance. This can be achieved by cutting each plant to the base and leaving the lignotuber in the ground.

Terratree make the following recommendations:

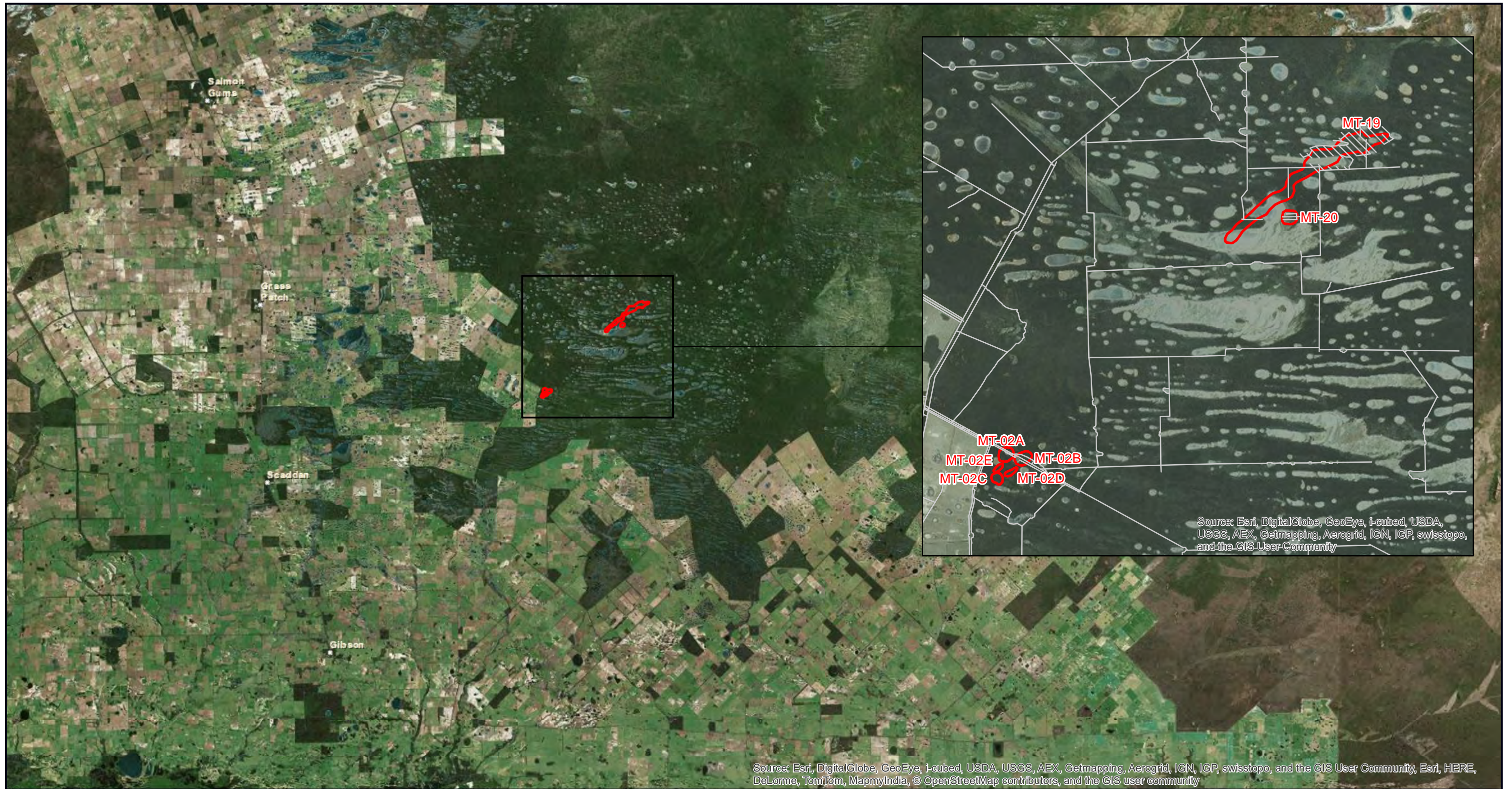
- The recovery of *E. merrickiae* individuals that have been impacted be monitored to determine if these individuals are regenerating.
- If the results to the survey are accepted by DPaW that a submission is prepared for the Threatened Species Scientific Committee to reassess the conservation status of this taxon to determine whether it should remained listed as Threatened (Declared Rare).

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Figures 1-9



Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community, Esri, HERE, DeLorme, TomTom, MapmyIndia, © OpenStreetMap contributors, and the GIS user community

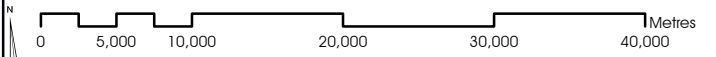
LEGEND

 Study Areas

LOCALITY



LOCALITY
Mt Ridley Mines

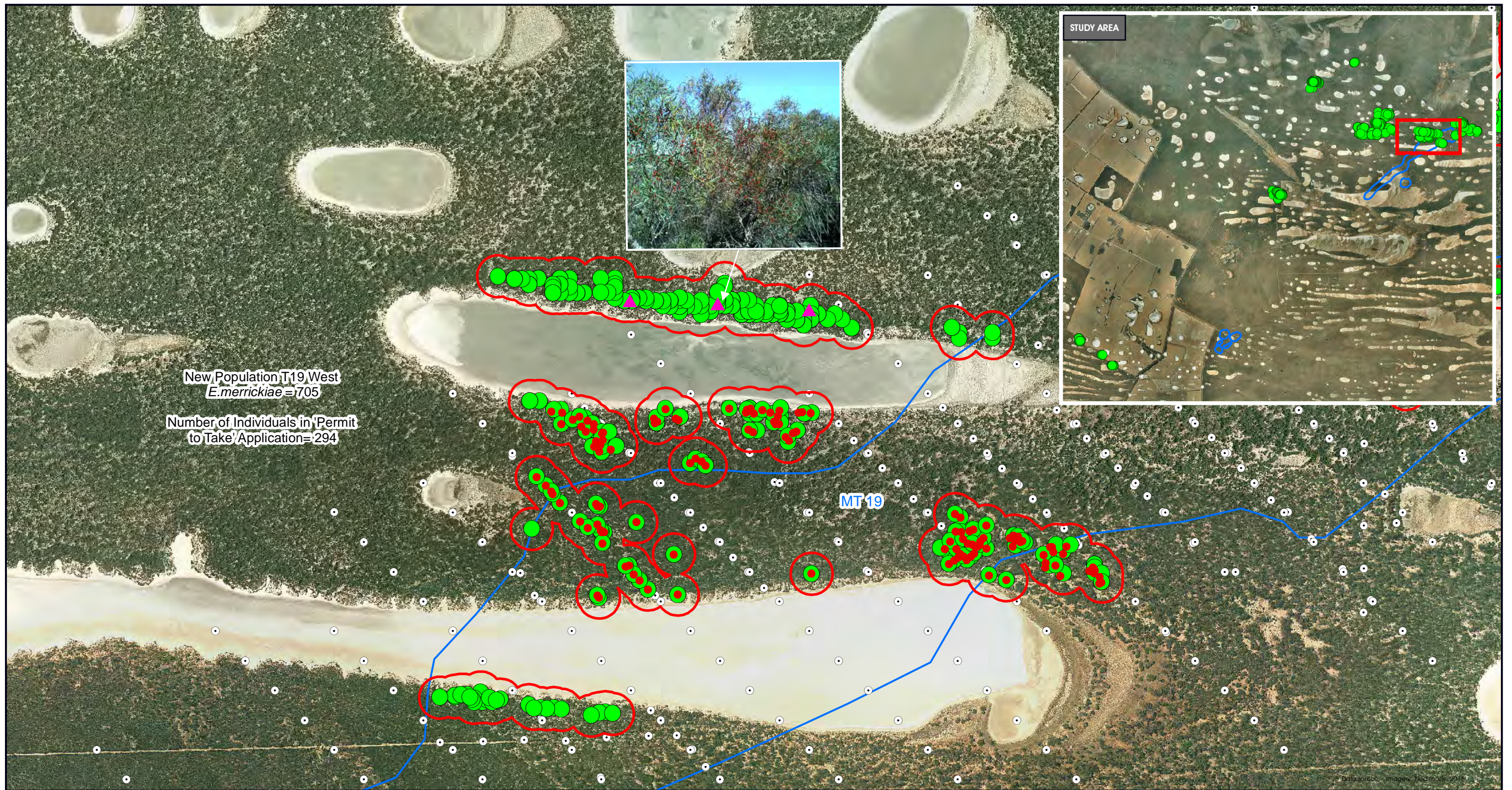


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Prepared:	N King	Figure 01	
Checked:	R Low		
Reviewed:	G Martinez		

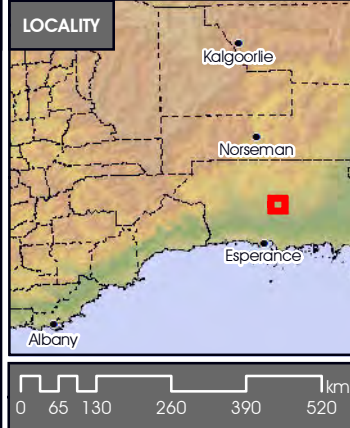


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LEGEND

- *E.merrickiae* Records in 'Permit to Take' Application
- *E.merrickiae* Location Points
- ▲ Geotagged Photo Locations
- ⊙ Proposed Drill Holes
- Study Areas
- 50 Metre Exclusion Buffers



Threatened (Declared Rare) Species *Eucalyptus merrickiae*
 Results of targeted survey-species abundance and distribution
 New Population Target 19 West

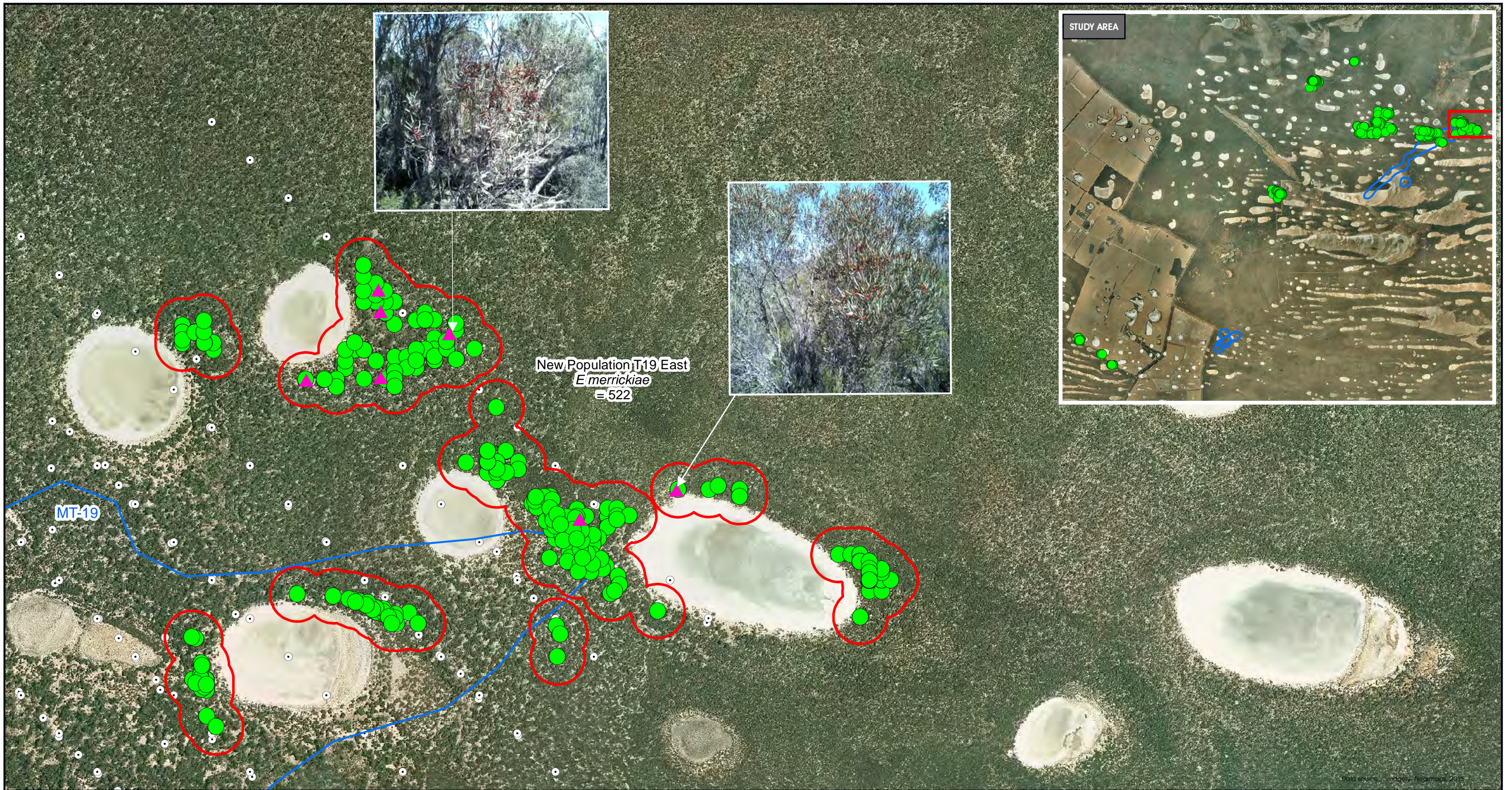


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Prepared:	R Low	Figure 02	Terratree
Checked:	N King		
Reviewed:	J Grehan		



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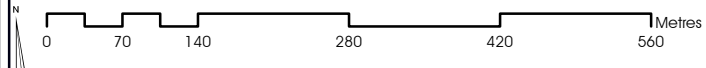


LEGEND

- *E. merrickiae* Location Points
- ▲ Geotagged Photo Locations
- Proposed Drill Holes
- Study Areas
- 50 Metre Exclusion Buffers



Threatened (Declared Rare) Species *Eucalyptus merrickiae*
Results of targeted survey-species abundance and distribution
New Population Target 19 East

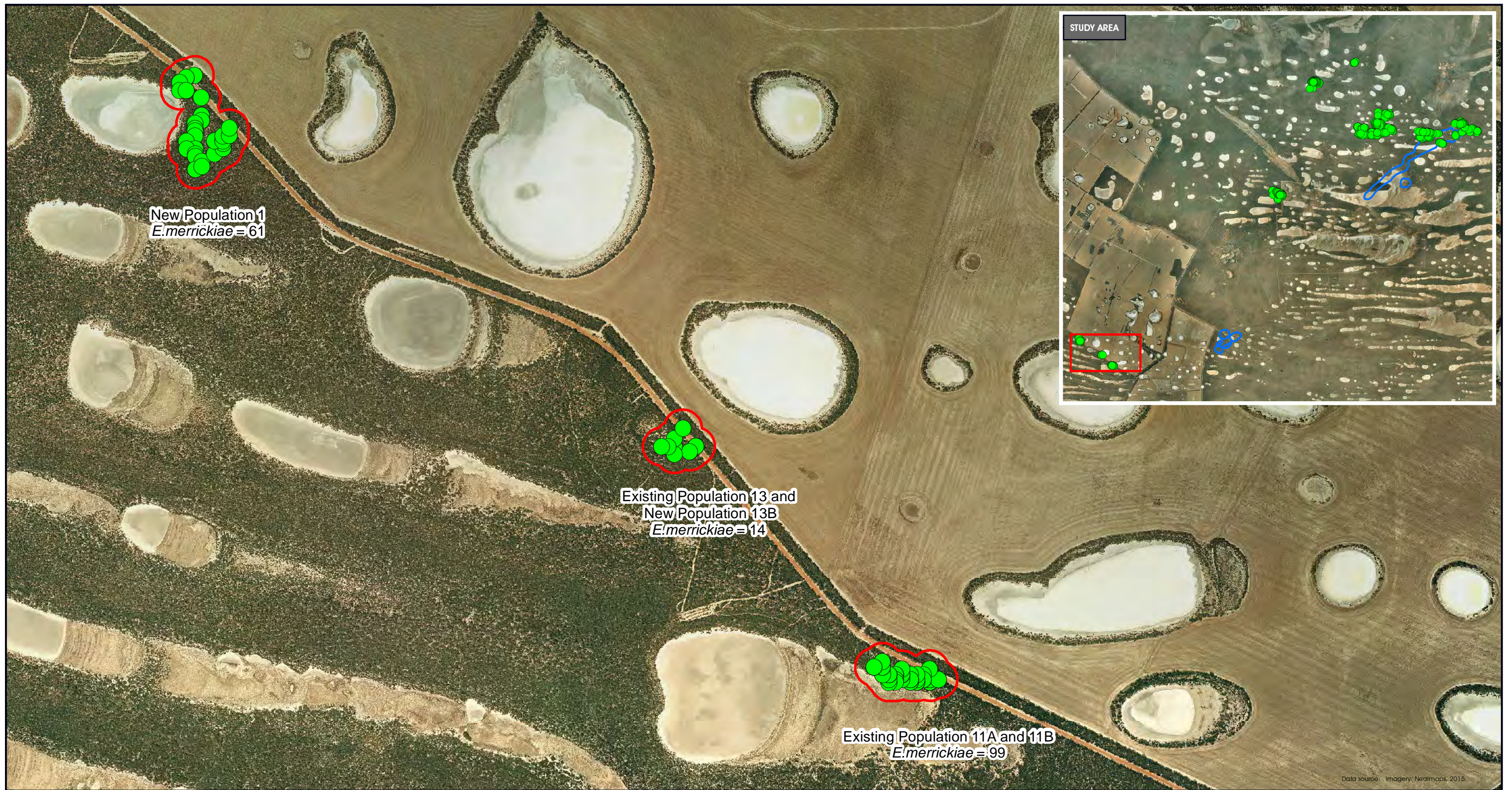


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Prepared:	R Low	Figure 03	
Checked:	N King		
Reviewed:	J Grehan		



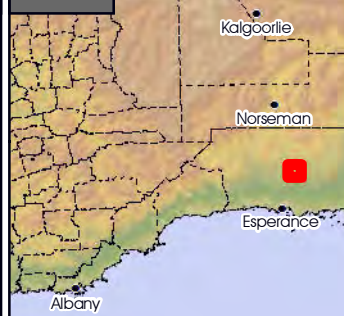
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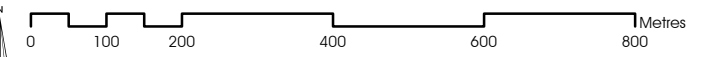
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- *E.merrickiae* Location Points
- 50 Metre Exclusion Buffer

LOCALITY



Threatened (Declared Rare) Species *Eucalyptus merrickiae*
 Results of targeted survey-species abundance and distribution
 New and Existing Populations

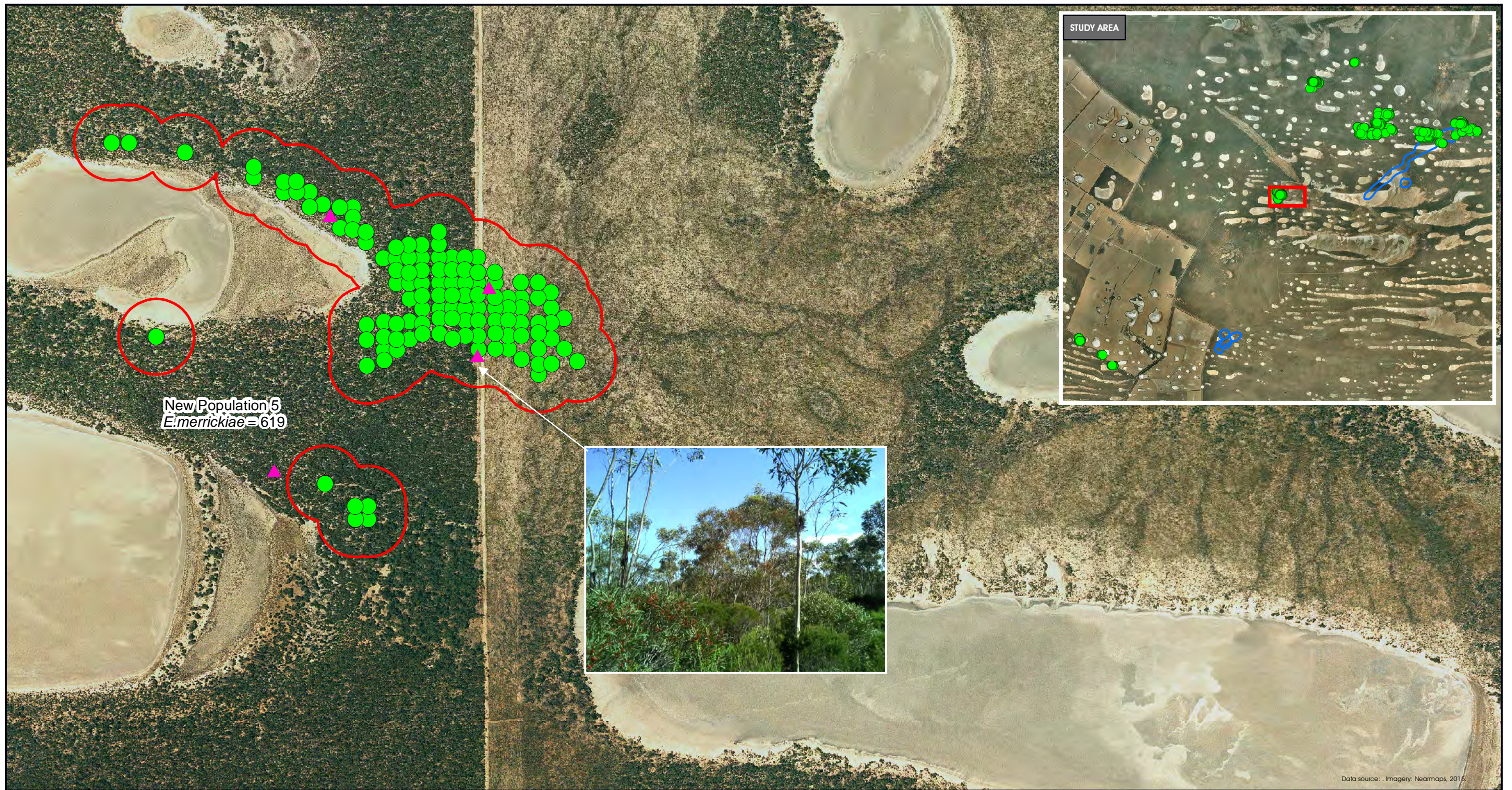


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Prepared:	R Low	Figure 04	
Checked:	N King		
Reviewed:	J Grehan		



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New Population 5
E.merrickiae = 619

STUDY AREA

Data source: Imagery: Nearmaps, 2015

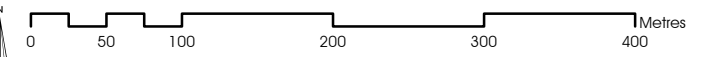
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- *E.merrickiae* Location Points
- ▲ Geotagged Photo Location
- 50 Metre Exclusion Buffers

LOCALITY



Threatened (Declared Rare) Species *Eucalyptus merrickiae*
 Results of targeted survey-species abundance and distribution
 New Population 5

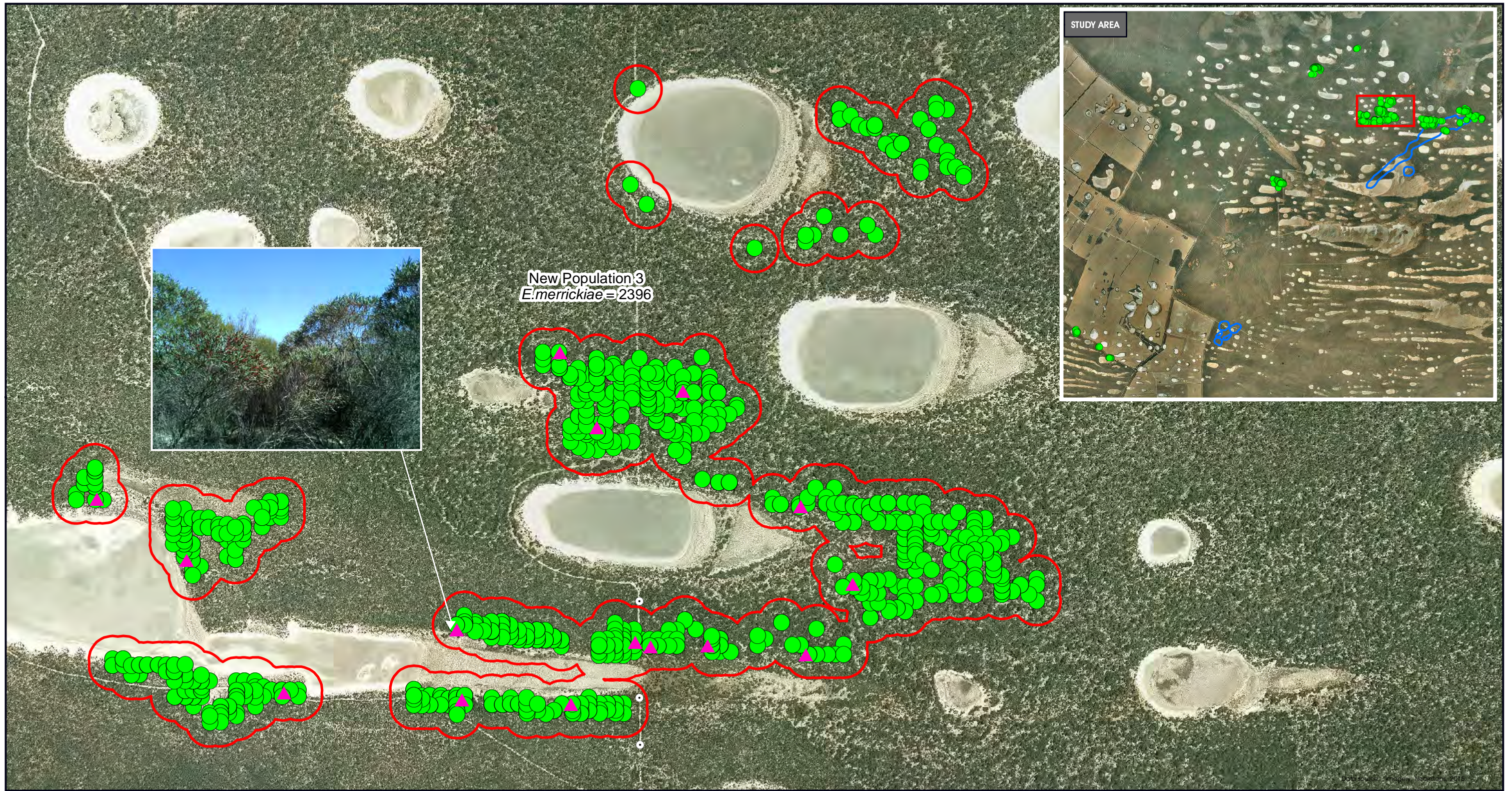


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Prepared:	R Low	Figure 05	
Checked:	N King		
Reviewed:	J Grehan		



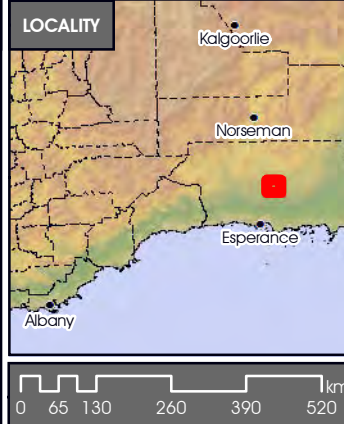
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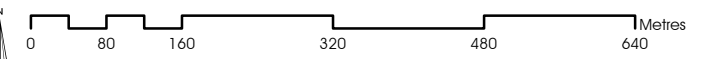
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- *E. merrickiae* Location Points
- ▲ Geotagged Photo Location
- ⊙ Proposed Drill Holes
- 50 Metre Exclusion Buffers

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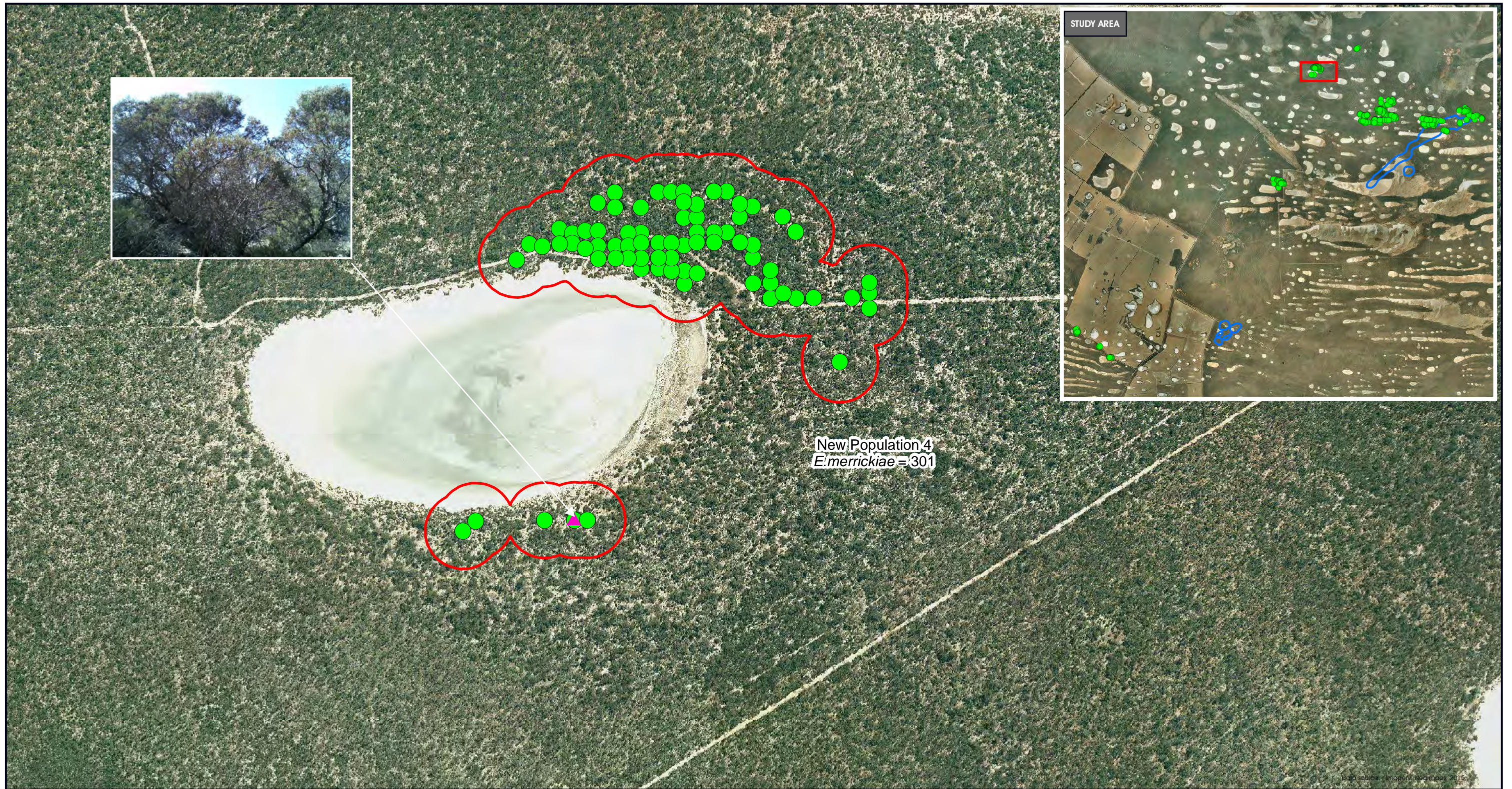


Threatened (Declared Rare) Species *Eucalyptus merrickiae*
 Results of targeted survey-species abundance and distribution
 New Population 3



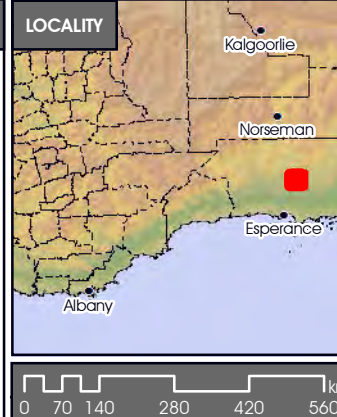
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Prepared:	R Low	Figure 06	Terratree
Checked:	N King		
Reviewed:	J Grehan		



LEGEND

- *E. merrickiae* Location Points
- ▲ Geotagged Photo Location
- 50 Metre Exclusion Buffers



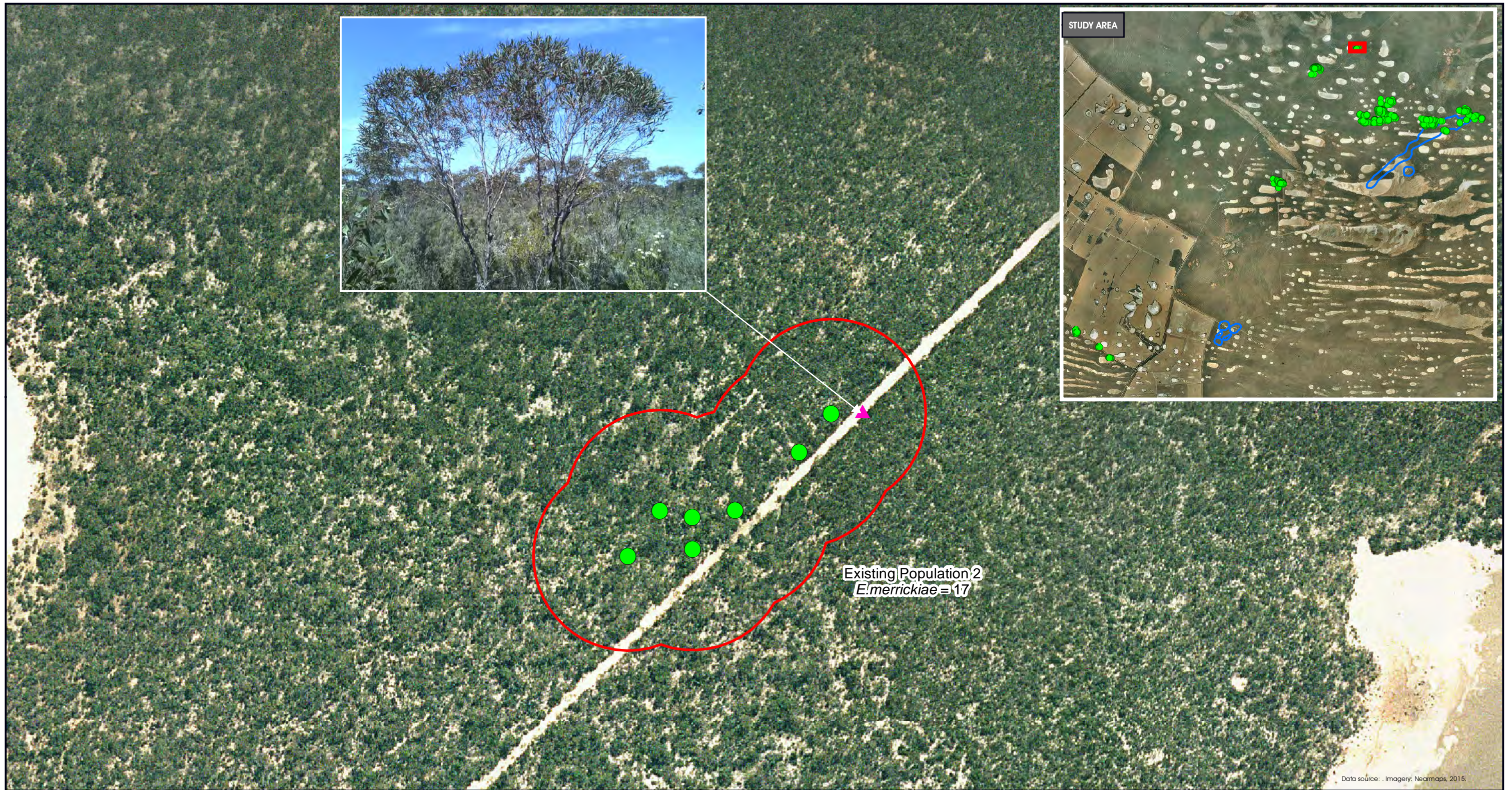
Threatened (Declared Rare) Species *Eucalyptus merrickiae*
 Results of targeted survey-species abundance and distribution
 New Population 4

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Coordinate System: GDA 1994 MGA Zone 51, Projection: Transverse Mercator, Datum: GDA 1994

Date:	27/10/2015	Revision:	Rev A
Scale @ A3:	1:5,000	Project No:	TS15008-05
Prepared:	R Low	Figure 07	
Checked:	N King		
Reviewed:	J Grehan		

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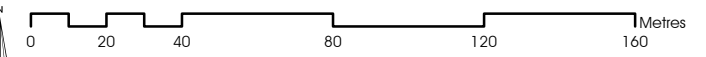


LEGEND

- *E.merrickiae* Location Points
- ▲ Geotagged Photo Location
- 50 Metre Exclusion Buffers



Threatened (Declared Rare) Species *Eucalyptus merrickiae*
Results of targeted survey-species abundance and distribution
Existing Population 2

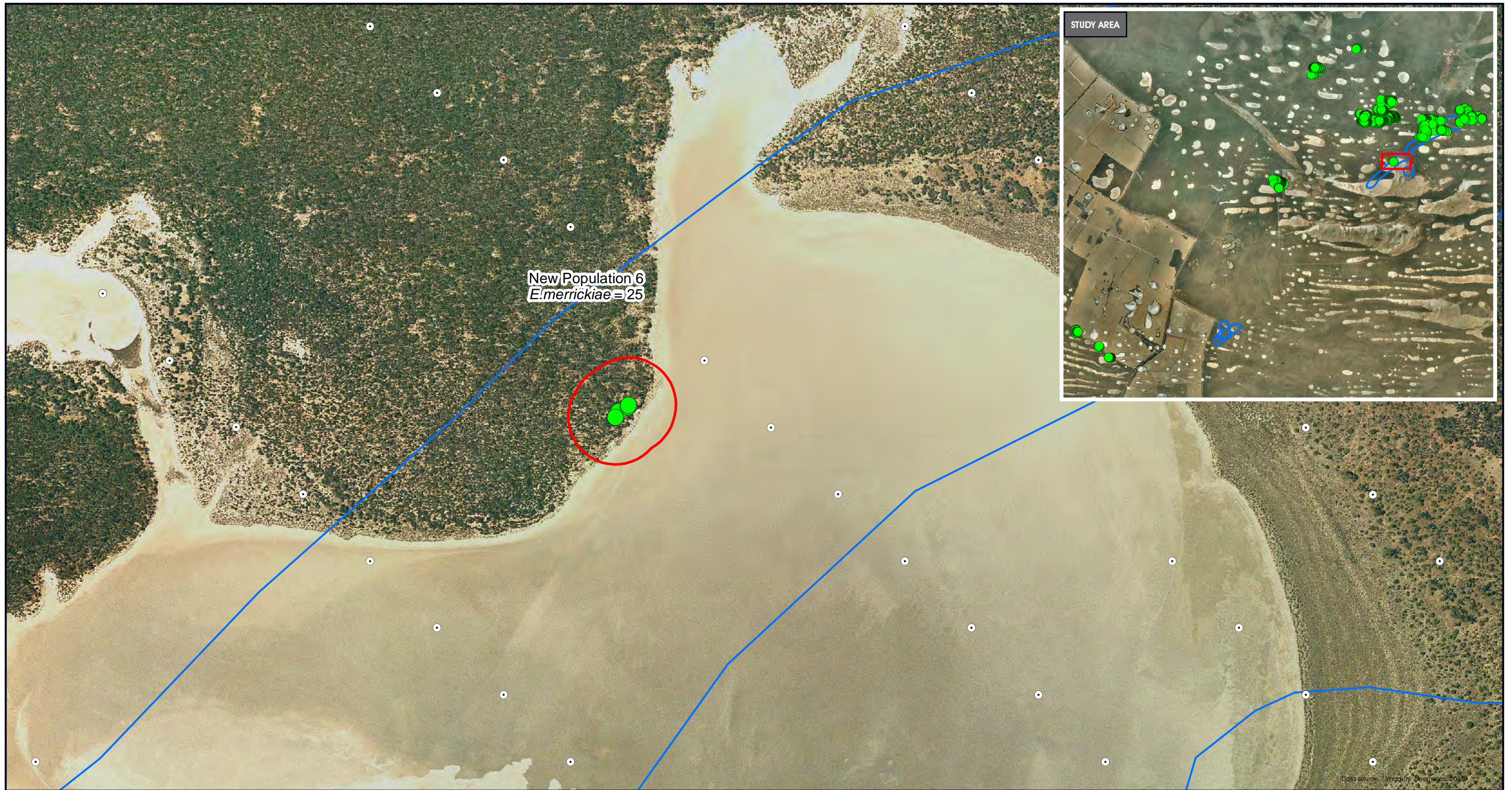


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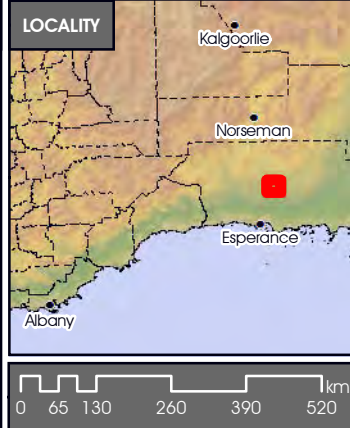


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LEGEND

- *E.merrickiae* Location Points
- ⊙ Proposed Drill Holes
- Study Areas
- 50 Metre Exclusion Buffers



Threatened (Declared Rare) Species *Eucalyptus merrickiae*
 Results of targeted survey-species abundance and distribution
 New Population 6

Coordinate System: GDA 1994 MGA Zone 51, Projection: Transverse Mercator, Datum: GDA 1994

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Prepared:	R Low	Figure 09	
Checked:	N King		
Reviewed:	J Grehan		



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Photos



Photo 1: *Eucalyptus merrickiae* bark



Photo 2: *Eucalyptus merrickiae* fruiting



Photo 3: Close-up of *E. merrickiae* fruit and leaves



Photo 4: *E. merrickiae* in flower



Photo 5: Close-up of *E. merrickiae* fruit



Photo 6: Close-up of *E. merrickiae* flower

Appendices

Appendix A: Definition of Threatened and Priority Species under the *Wildlife Conservation Act 1950* (DPaW 2013)

Appendix A: Definition of Threatened and Priority Species under the *Wildlife Conservation Act 1950* (DPaW 2013)

Conservation Code	Category
T	<p>Threatened Flora and Fauna (Extant) Taxa which have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such. Threatened Flora are further ranked by the Department according to their level of threat using IUCN Red List criteria:</p> <ul style="list-style-type: none"> • CR: Critically endangered – considered to be facing an extremely high risk of extinction in the wild; • EN: Endangered – considered to be facing a very high risk of extinction in the wild; • VU: Vulnerable – considered to be facing a high risk of extinction in the wild.
X	<p>Threatened – Presumed Extinct Taxa Taxa which have been adequately searched for and there is no reasonable doubt that the last individual has died, and have been gazetted as such. Species that have not yet been adequately surveyed to be listed under Schedule 1 or 2 are added to the Priority Flora List under Priorities 1, 2 or 3.</p>
P1	<p>Priority One – Poorly Known Taxa Taxa which are known from one or a few (generally <5) populations which are under threat, either due to small population size, or being on lands under immediate threat e.g. road verges, urban areas, farmland, active mineral leases etc., or the plants are under threat, e.g. from disease, grazing by feral animals etc. May include taxa with threatened populations on protected lands. Such taxa are under consideration for declaration as ‘rare flora’, but are in urgent need of further survey.</p>
P2	<p>Priority Two – Poorly Known Taxa Taxa which are known from one or a few (generally <5) populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as ‘rare flora’, but urgently need further survey.</p>
P3	<p>Priority Three – Poorly Known Taxa Taxa which are known from several populations, and the taxa are not believed to be under immediate threat (i.e. not currently endangered), either due to the number of known populations (generally >5), or known populations being large, and either widespread or protected. Such taxa are under consideration for declaration as ‘rare flora’ but need further surveying.</p>
P4	<p>Priority Four – Rare, Near Threatened and other taxa in need of monitoring</p> <ul style="list-style-type: none"> • Rare. Taxa 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 taxa are usually represented on conservation lands. • Near Threatened. Taxa that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable. • Taxa that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.
P5	<p>Priority Five – Conservation Dependent Species Species that are not threatened but are subject to a specific conservation program, the cessation of which would result in the species becoming threatened within five years.</p>

Appendix B: Threatened & Priority report form for new *Eucalyptus merrickiae* population located at Target 19 West



Threatened and Priority Flora Report Form

Please complete as much of the form as possible.

For information on how to complete the form please refer to the Threatened & Priority Flora Report Form (TPRF) manual on the DPaW website at <http://www.dpaw.wa.gov.au/>

TAXON: <u>Eucalyptus merrickiae</u>		TPFL Pop. No.: _____	
OBSERVATION DATE: <u>01/10/2015</u>		CONSERVATION STATUS: <u>DRF</u> New population <input checked="" type="checkbox"/>	
OBSERVER/S: <u>Joseph Grehan and Kelby Jennings</u>		PHONE: <u>(08)9250 1163</u> <u>0400003688</u>	
ROLE: <u>Principal Ecologist and Botanist</u>		ORGANISATION: <u>Terratree Pty Ltd</u>	

DESCRIPTION OF LOCATION (Provide at least nearest town/named locality, and the distance and direction to that place):
 Population located approximately 9.2 km east of Dempster Road, (not easily assessable by tracks) and 62km north-east of Gibson Soak and and 75.5km north of Esperance on the Shire of Esperance .

Reserve No.: _____

DISTRICT: <u>South Coast</u>	LGA: <u>Esperance</u>	Land manager present: <input type="checkbox"/>	
DATUM:	COORDINATES: (If UTM coords provided, Zone is also required)	METHOD USED:	
GDA94 / MGA94 <input checked="" type="checkbox"/>	DecDegrees <input type="checkbox"/> DegMinSec <input type="checkbox"/> UTM <input checked="" type="checkbox"/>	GPS <input checked="" type="checkbox"/>	Differential GPS <input type="checkbox"/> Map <input type="checkbox"/>
AGD84 / AMG84 <input type="checkbox"/>	Lat / Northing: <u>6322290</u>	No. satellites: <u>5</u>	Map used: _____
WGS84 <input type="checkbox"/>	Long / Easting: <u>429786</u>	Boundary polygon captured: <input type="checkbox"/>	Map scale: _____
Unknown <input type="checkbox"/>	Zone: <u>51</u>		

LAND TENURE:

Nature reserve <input type="checkbox"/>	Timber reserve <input type="checkbox"/>	Private property <input type="checkbox"/>	Rail reserve <input type="checkbox"/>	Shire road reserve <input type="checkbox"/>
National park <input type="checkbox"/>	State forest <input type="checkbox"/>	Pastoral lease <input type="checkbox"/>	MRWA road reserve <input type="checkbox"/>	Other Crown reserve <input type="checkbox"/>
Conservation park <input type="checkbox"/>	Water reserve <input type="checkbox"/>	UCL <input checked="" type="checkbox"/>	SLK/Pole _____ to _____	Specify other: _____

AREA ASSESSMENT: Edge survey Partial survey Full survey Area observed (m²): _____

EFFORT: Time spent surveying (minutes): 960 No. of minutes spent / 100 m²: 10

POP'N COUNT ACCURACY: Actual Extrapolation Estimate

Count method: (Refer to field manual for list) Actual count

WHAT COUNTED: Plants Clumps Clonal stems

TOTAL POP'N STRUCTURE:	Mature:	Juveniles:	Seedlings:	Totals:	Area of pop (m ²): _____ Note: Pls record count as numbers (not percentages) for database.
Alive	<u>705</u>	<u>?</u>		<u>705</u>	
Dead	<u>0</u>			<u>0</u>	

QUADRATS PRESENT: No. _____ Size _____ Data attached Total area of quadrats (m²): _____

Summary Quad. Totals: Alive				
------------------------------------	--	--	--	--

REPRODUCTIVE STATE:

Clonal <input type="checkbox"/>	Vegetative <input type="checkbox"/>	Flowerbud <input type="checkbox"/>	Flower <input checked="" type="checkbox"/>
Immature fruit <input type="checkbox"/>	Fruit <input checked="" type="checkbox"/>	Dehisced fruit <input type="checkbox"/>	Percentage in flower: <u>0</u> %

CONDITION OF PLANTS: Healthy Moderate Poor Senescent

COMMENT: All plants except a few individuals were healthy

THREATS - type, agent and supporting information: <small>E.g. clearing, too frequent fire, weed, disease. Refer to field manual for list of threats & agents. Specify agent where relevant.</small>	Current impact (N-E)	Potential Impact (L-E)	Potential Threat Onset (S-L)
• Exploration	<u>N</u>	<u>L</u>	<u>S</u>
• Drought	<u>L</u>	<u>M</u>	<u>L</u>

Please return completed form to **Species And Communities Branch DPaW**,
 Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983

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



Threatened and Priority Flora Report Form

•			
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HABITAT INFORMATION: (Check more than one box for combinations or where necessary)

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

Specific Landform Element: (Refer to field manual for additional values)

Upland of seasonally inundated salt lakes

CONDITION OF SOIL:

Dry Moist Waterlogged Inundated Cracked Saline Other:

VEGETATION CLASSIFICATION:*

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

1. Eucalyptus merrickiae (T) and Eucalyptus uncinata Low Open Woodland
2. Melaleuca pulchella, Phymatocarpus maxwellii and Melaleuca thyoides Tall Open Shrubland
3. Darwinia polycephala (P4), Calytrix duplistipulata and Conostephium drummondii Low Shrubland
- 4.

ASSOCIATED SPECIES:

Other (non-dominant) spp

Cryptandra recurva
 Adenanthos ileticos (P4)
 Cyathostemon tenuifolius
 Dodonaea amblyophylla

* 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: Some disturbance from tracks

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.)

This is a significant new population in an area that is not easily accessible. Please note that the coordinates provided are a centroid for the population. Waypoints of all E. merrickiae records will be provided to DPaW's Species and Communities Branch. See attached Figure 2

Please return completed form to **Species And Communities Branch** DPaW,

Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983

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

Record entered by: _____ Sheet No.: _____ Record Accepted in Database



Threatened and Priority Flora Report Form

DRF PERMIT/ LICENCE No:

Note if only observing plants (i.e. no specimens or plant material is taken) then no permit/licence is required. For further information on permit and licencing requirements see the Threatened Flora and Wildlife Licensing pages on DPaW's website. Any actions carried out under licence/permit should be recorded above in the OTHER COMMENTS section.

SPECIMEN: Collectors No: WA Herb. Regional Herb. District Herb. Other:

ATTACHED: Map Mudmap Photo GIS data Field notes Other:

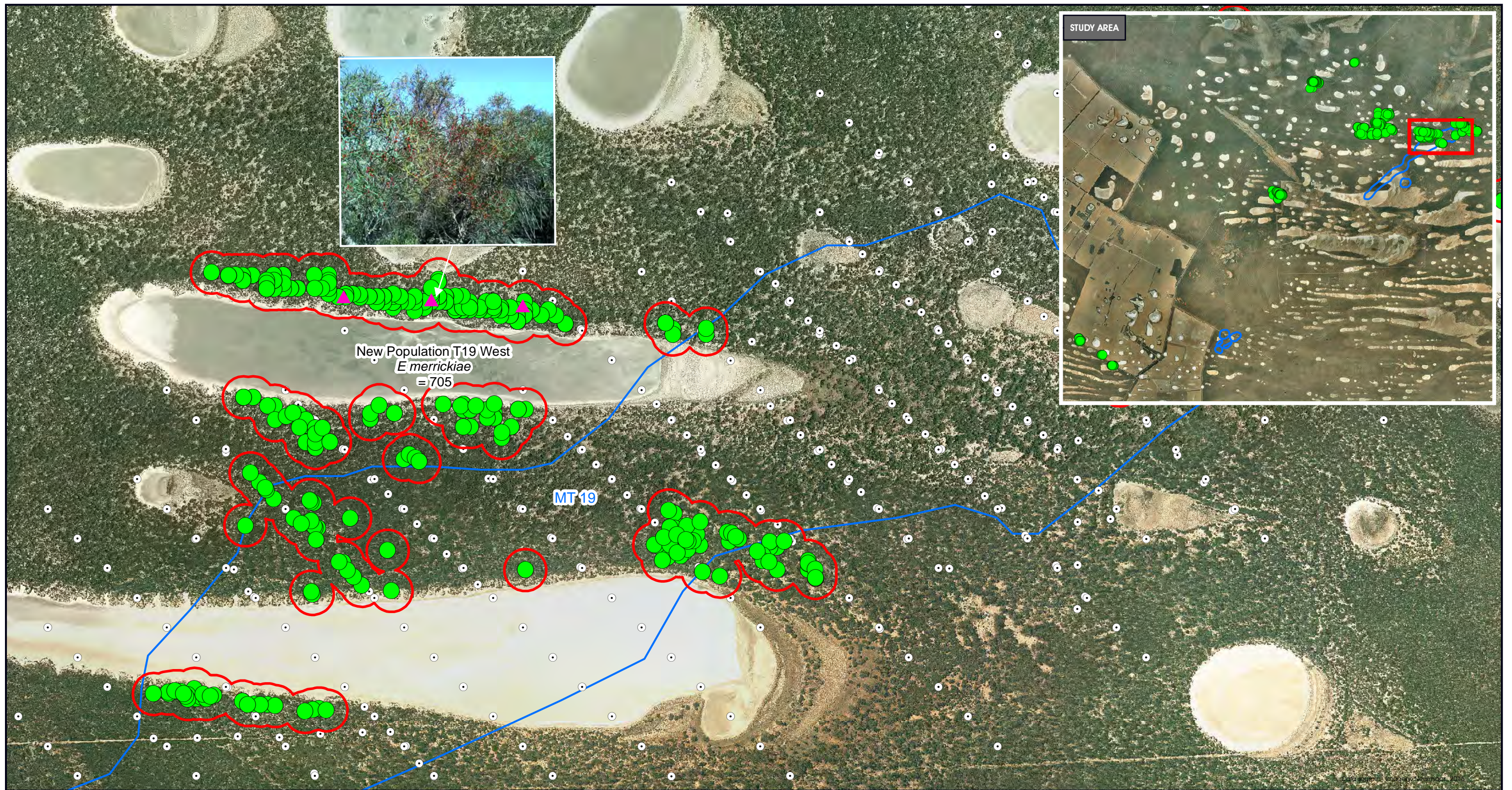
COPY SENT TO: Regional Office District Office Other:

Submitter of record: Joseph Grehan **Role:** Principal Ecologist

Signature:  **Date submitted:** 4/11/2015

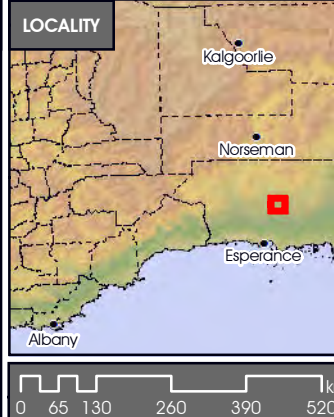
Please return completed form to **Species And Communities Branch** DPaW,
Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983

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



LEGEND

- *E.merrickiae* Location Points
- ▲ Geotagged Photo Locations
- ⊙ Proposed Drill Holes
- Study Areas
- 50 Metre Exclusion Buffers



Threatened (Declared Rare) Species *Eucalyptus merrickiae*
 Results of targeted survey-species abundance and distribution
 New Population Target 19 West



Coordinate System: GDA 1994 MGA Zone 51, Projection: Transverse Mercator, Datum: GDA 1994

Date:	27/10/2015	Revision:	Rev B
Scale @ A3:	1:9,000	Project No:	TS15008-05
Prepared:	R Low	Figure 02	
Checked:	N King		
Reviewed:	J Grehan		

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**Level 2 Flora and Vegetation and Targeted Survey for Threatened
and Priority Flora**

Prepared for Mt Ridley Mines Limited

Ref: T15013



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Document Control

Revision	Details	Date	Author	Reviewer
Rev A	Draft for Internal Review	28/08/2015	G. Martinez and K. Jennings	J. Grehan and C. Hancock
Rev B	Draft for Client Review	23/11/2015	K. Jennings	J. Grehan and C. Hancock

A handwritten signature in black ink, appearing to read "Joe Grehan".

Joseph Grehan
Director and Principal Ecologist

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Terratree Pty Ltd

Executive Summary

To meet regulatory requirements for future exploration and mining activities, Mt Ridley commissioned Terratree Pty Ltd to conduct a Level 2 Flora and Vegetation and Targeted Threatened and Priority Flora Survey in spring 2015 within target areas MT-02A, MT-02B, MT-02C, MT-02D, MT-02E, MT-19 and MT-20 within tenements E63/1547 and E63/1564. The flora and vegetation field assessment was conducted in accordance with EPA Guidance Statement No.51, *Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia* for a Level 2 Flora and Vegetation assessment (EPA, 2004).

The desktop assessment identified 114 flora species of conservation significance and one Priority Ecological Community, the Proteaceae-Dominated Kwongan Shrublands of the Southeast Coastal Floristic Province of Western Australia Ecological Community (DPaW, 2015), as occurring in the vicinity of the study area.

A total of 50 quadrats were sampled within the study, with information recorded in each quadrat including GPS location, species present, height and foliage cover, landscape features and vegetation community and condition description. The field survey identified 218 vascular flora species within the study area; representing 120 genera from 52 families, including ten (4%) introduced (weed) or non-endemic species.

Ten flora species of conservation significance were identified within the study area, including the Threatened (Declared Rare) species *Eucalyptus merrickiae*. Other significant flora identified within the survey area include *Boronia baeckeacea* ssp. *patula* (P1), *Acacia euthyphylla* (P3), *Acacia glaucissima* (P3), *Gonocarpus pycnostachyus* (P3), *Micromyrtus elobata* ssp. *scopula* (P3), *Persoonia cymbifolia* (P3), *Adenanthos ileticos* (P4), *Darwinia polycephala* (P4) and *Melaleuca fissurata* (P4). Two species, *Eucalyptus ? ceratocorys* and *Phebalium obovatum*, were found to be occurring outside their previously recorded ranges (range extensions).

Eleven vegetation communities were described and mapped within the study area (**Figures 1-5**). No Threatened or Priority Ecological Community were identified as occurring within the study area, and vegetation communities within the survey area did not resemble known TEC/PEC's. Vegetation community descriptions were not consistent with the Proteaceae-Dominated Kwongan Shrubland TEC.

Vegetation condition over the study area ranged from Very Good to Excellent, with disturbance restricted to exploration tracks and drilling pads. Nine introduced (exotic) flora species were observed during the field survey. No Declared Pest species were identified as occurring in the study area.

Management of the Threatened (Declared Rare) species *Eucalyptus merrickiae* is the highest environmental management priority for exploration activities within the study area. An impact assessment has been undertaken and management recommendations developed as part of the Permit to Take DRF application submitted to the Species and Communities Branch of DPaW. Terratree will continue to work closely with Mt Ridley to implement best-practise environmental management procedures during exploration. This will include provision of information and training in regard to environmental matters within the study area, and identifying management options for minimising disturbance to vegetation.

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1 Introduction

1.1 Background

Mt Ridley Mines Limited (Mt Ridley) proposes to undertake mineral exploration drilling within seven target areas currently identified as 'high priority' for exploration, namely MT-02A, MT-02B, MT-02C, MT-02D, MT-02E, MT-19 and MT-20, which comprise a total of 409ha (herein referred to as 'the study area'). To meet regulatory requirements for future exploration, Mt Ridley commissioned Terratree Pty Ltd (Terratree) to conduct a Level 2 Flora and Vegetation and Targeted (Threatened and Priority Flora) survey throughout the study area. This report presents the findings of the surveys, which were conducted during September 2015.

1.2 Project Location

The study area is located approximately 34km north-east of Wittenoom Hill and 70km north of Esperance within tenements E63/1547 and E63/1564 on the edge of the Fraser Range. The study area is situated within the Shire of Esperance and comprises a total of 409ha (**Table 1**).

Table 1: Names, tenement numbers, and figure numbers for study areas

Area Name	Tenement Number	Size (ha)	Figure
MT-02A	E63/1547	23.0	Figure 5
MT-02B	E63/1547	23.0	Figure 5
MT-02C	E63/1547	13.0	Figure 5
MT-02D	E63/1547	7.0	Figure 5
MT-02E	E63/1547	5.0	Figure 5
MT-19	E63/1547 & E63/1564	315.0	Figures 1-4
MT-20	E63/1547	23.0	Figure 3

1.3 Scope of Work

The scope of work for the study included the following tasks:

- Conduct an initial desktop assessment to determine the broad environmental values of the study area
- Undertake a 'single' (Phase 1) Level 2 Flora and Vegetation survey;
- Produce an inventory of flora and vegetation communities present;
- Produce figures showing the extent of various vegetation communities recorded;
- Produce figures showing the extent of the varying vegetation condition.
- Determine the presence of any TECs, PECs, Threatened and Declared Rare Flora (DRF), Priority Flora species and provide a map showing locations of these;
- Determine the native vegetation representation compared with the Pre-European extent of the complexes within the study area;
- Undertake Targeted Threatened Flora surveys within areas determined to be suitable habitat for flora or vegetation of conservation significance;
- Recommend best practice management techniques to avoid impacts to significant conservation values and if unavoidable to minimise and mitigate impacts; and
- Prepare a report detailing results of study (including desktop and field results).

2 Regulatory Context

Legislation relevant to the protection of biodiversity in Western Australia includes, but is not limited to, the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), the State *Wildlife Conservation Act 1950* (WC Act) and *Environmental Protection Act 1986* (EP Act).

The Commonwealth EPBC Act was developed to provide protection for matters of National Environmental Significance (matters of NES). It includes provisions to protect threatened species and communities and the conservation of migratory species.

The State WC Act was developed to provide for the protection of wildlife in Western Australia. Under section 14 of this act, all flora and fauna are protected in Western Australia. In addition, the Minister has published a list of species in need of special protection because they are considered rare, likely to become extinct, or are presumed extinct. The current listing was published in Western Australian Government Gazette on 6 November 2012.

The State EP Act was developed to ensure that impacts on native flora and fauna are considered in the assessment of development proposals. While the assessment of specific proposals is not within the scope of this report, the surveys undertaken conform to the requirements of the Environmental Protection Authority's (EPA's) Position Statement No. 3: *Terrestrial Biological Surveys as an Element of Biodiversity Protection* (EPA, 2002a) and Guidance Statement No. 51: *Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia* (EPA, 2004).

Under the relevant legislation, certain species of flora and ecological communities are awarded protection in the interest of their conservation.

2.1 Threatened and Priority Flora

2.1.1 Environment Protection and Biodiversity Conservation Act (1999) (Commonwealth of Australia)

At a Commonwealth level, Threatened flora are protected under the EPBC Act, which lists species that are considered Critically Endangered, Endangered, Conservation Dependant, Extinct, or Extinct in the Wild (**Appendix A**).

2.1.2 Wildlife Conservation Act (1950) (Western Australia)

Taxa which have been adequately searched for and are deemed to either rare, in danger of extinction, or otherwise in need of special protection in the wild, are gazetted as Threatened Flora (Schedule 1, WC Act 1950). Threatened Flora (Schedule 1, December 2010) taxa are further categorised by the Department according to their level of threat using IUCN Red List criteria:

- CR: Critically Endangered – considered to be facing an extremely high risk of extinction in the wild;
- EN: Endangered – considered to be facing a very high risk of extinction in the wild; and
- VU: Vulnerable – considered to be facing a high risk of extinction in the wild.

These taxa are legally protected and their removal or impact to their surroundings cannot be conducted without Ministerial approval, obtained specifically on each occasion for each population (refer to Appendix A for conservation category definitions).

2.1.3 Priority Flora

The Department of Parks and Wildlife (DPaW) maintains a list of Priority Flora taxa, which are considered poorly known, uncommon or under threat but for which there is insufficient justification, based on known distribution and population sizes, for inclusion in Schedule 1 of the WC Act. A Priority taxon is assigned to one of five priority categories (**Appendix A**).

2.2 Threatened and Priority Ecological Communities

Ecological communities are naturally occurring biological assemblages located in a particular type of habitat. At a national level, Threatened Ecological Communities (TECs) are protected under the EPBC Act. TECs are listed under this Act as either 'Critically Endangered', 'Endangered' or 'Vulnerable'

The DPaW also maintains a list of TECs endorsed by the Minister of Environment (DEC, 2015) that are classified as being either 'Presumed Totally Destroyed', 'Critically Endangered', 'Endangered' or 'Vulnerable'.

The DPaW maintains an additional list of Priority Ecological Communities (PECs), for communities that could potentially be classified as TECs, but are not currently adequately defined or surveyed. Communities are placed into one of five Priority (1-5) this category while consideration can be given to their declaration as a TEC.

Definitions of these conservation codes are provided in **Appendix A**.

2.3 Introduced Flora

2.3.1 Weeds of National Significance (WONS)

At a national level there are twenty weed species listed as Weeds of National Significance (WONS). *The Commonwealth National Weeds Strategy: A Strategic Approach to Weed Problems of National Significance* (2012) describes broad goals and objectives to manage these species.

2.3.2 Declared Plants

The *Biosecurity and Agriculture Management Act 2007* (BAM Act, DAFWA, 2007) seeks to prevent serious animal and plant pests and diseases from entering the State and becoming established, and to minimise the spread and impact of any that are already present. The BAM Act (and associated regulations) replaces the *Agriculture and Related Resources Protection Act 1976* (and associated regulations). The BAM regulations were enacted on 1 May 2013, placing organisms into four categories:

- Permitted organism (listed under Section 11) – permitted in Western Australia subject to regulations;
- Prohibited organism (listed under Section 12) – prohibited in Western Australia subject to regulations (i.e. is a Declared Pest for the whole of State);
- Permitted organism: permit required (under regulation 73) – must not be imported unless in accordance with an import permit ; and
- Permitted organism: Declared Pests (under Section 22) – can apply to part of or the whole of the State.

The current Western Australian Organism List (WAOL) was published on 1 May 2013 (DAFWA, 2013) and lists organisms in each of these categories. Unlisted organisms must not be imported (unless in accordance with an import permit and regulations). The BAM Act further categorises Declared Pests in one of three control categories (**Table 2**):

- C1 – Exclusion;
- C2 – Eradication; or
- C3 – Management.

Table 2: Control categories for Declared Pests

Declared Plant Category	Description
C1 - Exclusion	Pests assigned to this category are not established in Western Australia and control measures are to be taken, including border checks, in order to prevent them entering and establishing in the State.
C2 - Eradication	Pests assigned to this category are present in Western Australia in low enough numbers or in sufficiently limited areas that their eradication is still a possibility.
C3 - Management	Pests assigned to this category are established in Western Australia but it is feasible, or desirable, to manage them in order to limit their damage. Control measures can prevent a C3 pest from increasing in population size or density or moving from an area in which it is established into an area which currently is free of that pest.

*Source: BAM Act 2007 and WAOL (DAFWA, 2015).

2.3.3 Environmental Weeds

A second and much more extensive categorisation of weeds has been developed by the DPaW (formerly the Department of Conservation) in the Environmental Weed Strategy (Department of Conservation and Land Management, 1999). Species considered to adversely affect the communities they invade are evaluated based on the following criteria:

- Invasiveness; ability to invade bushland in good to excellent condition or ability to invade waterways (scored as yes or no);
- Distribution; wide current or potential distribution including consideration of known history of widespread distribution elsewhere in the world (scored as yes or no);
- Environmental impacts; ability to change the structure, composition and function of ecosystems. In particular an ability to form a monoculture in a vegetation community (scored as yes or no).

Weeds listed as Environmental Weeds are ranked into four categories using the above criteria and the scoring system:

- High; a species which scores yes to all three of the above criteria. A rating of high indicates a species that should be prioritised for control and/or research;
- Moderate; a species which scores yes for two of the above criteria. A rating of moderate indicates a species which should be monitored. Control or research should be directed to it if funds are available;
- Mild; a species which scores yes to one of the criteria. A mild rating indicates monitoring or control if appropriate; and
- Low; a species which does not score yes for any of the criteria. A low rating indicates a low requirement for monitoring.

2.4 Environmentally Sensitive Areas

Under section 51B of the *Environmental Protection Act* the Minister can, by notice, declare an area of the State specified in the notice or an area of the State to be an Environmentally Sensitive Area (ESA). ESAs are protected under the *Environmental Protection (Clearing of Native Vegetation) Regulation 2004* and are selected for their environmental values at state or national levels. Some of the reasons for assigning this status include:

- Protection of rare or threatened species of native plants;
- Protection of wetlands and water courses;
- Protection of sites that have other high conservation, scientific or aesthetic values; and
- Protection of Aboriginal or European cultural sites.

2.5 Conservation Estate

The National Reserve System (NRS) is a network of protected areas managed for conservation under international guidelines. The objective of placing areas of bushland into the Conservation Estate is to achieve and maintain a comprehensive, adequate and representative reserve system for Western Australia. Areas vested in the Conservation Estate are managed by the Conservation Commission.

2.6 Government Policy and Guidelines

The following State Policies, EPA Position & Guidance Statements, and relevant environmental guidelines and codes of practice are considered relevant to the environmental impact assessment of the proposed project:

- EPA Position Statement No. 2 Environmental Protection of Native Vegetation (EPA, 2000);
- EPA Position Statement No. 3 Terrestrial Biological Surveys (EPA, 2002a);
- EPA Position Statement No. 7 Principles of Environmental Protection (EPA, 2002b);
- EPA Guidance Statement No. 51 Terrestrial Flora and Vegetation Surveys (EPA, 2004);

3 Existing Environment

3.1 Biogeography

There are 89 recognised Interim Biogeographical Regionalisation Areas (IBRA) Regions across Australia that have been defined based on climate, geology, landforms and characteristic vegetation and fauna. The study area lies within the Mallee Biogeographic Region of IBRA (DotE, 2015b).

The Mallee IBRA Region comprises of two Biogeographical subregions, namely the Mallee 1 (MAL 1 Eastern mallee subregion) and the Mallee 2 (MAL 2 Western Mallee subregion). The study areas is located within the Mallee 1 (MAL 1) subregion, which encompasses approximately 46,000 sq km from Norseman to Esperance north/south and Ravensthorpe to Cocklebiddy (Great Australian Bight) east/west. Landscapes are described as containing calcareous clays and loams as duplex soils that often with sheet and modular kankar, outcrops of metamorphosed sandstone, white and yellow sandplains, and loamy plains with numerous salt pans (pan fields). The vegetation is a mosaic: mallee grows on sandplains, samphire is common around small salt lakes, mallee and patches of woodland are found on clay, scrub-heath is present on sandstone, while mallee with boree (*Melaleuca pauperiflora*) grow on calcareous clay and loam' (McKenzie & Comer *et al.*, 2002).

The climate is described as 'Mediterranean to semi-arid, with winter rainfall of between 250 and 500mm'. Land use within the subregion includes 'grazing of improved pastures and dryland farming, with lesser areas of conservation, unallocated Crown land and Crown reserves, roads and other easements, and forestry plantation' (Comer *et al.*, 2002). According to McKenzie and Commer *et al.*, (2002) rare features include:

- Granite outcrops: Four reptile species, uncommon terrestrial and aquatic invertebrates, and hundreds of plant species are restricted to granite outcrops. Individual outcrops have up to 200 species, including many endemics, making them the most diverse in the south west of Western Australia. These also provide seasonal resources and temporary refuge for fauna of surrounding habitats such as the black-flanked rock wallaby;
- Gypsum dunes such as Lake Tay are rich in rare and endemic plants (*Anigozanthos bicolor* subsp. *minor*, *Eremophila lactea*, *Myoporum turbinatum*, *Ricinocarpos trichophorus*, etc);
- The mixed thicket complex peculiar to the Russell Range includes dominants *Eucalyptus doratoxylon*, *Adenanthos oreophilus*, *Dampiera parvifolia*, *Monotoca oligarrhenoides*, declared rare flora *Kennedia becxiana*, and Priority taxa *Leucopogon apiculatus* and *Chorizema nervosa*;
- There are numerous endemic plant species belonging to the genera *Grevillea*, *Hakea*, *Eucalyptus*, *Acacia*, *Banksia* as well as Asteraceae;
- Rare vertebrates including the western whipbird, western ground parrot, malleefowl, Cape Barren goose, slender-billed thornbill and chuditch;
- Freshwater wetlands are important refugia. Examples, such as Lake Bryde, East Lake Bryde and Lake Cronin, are becoming increasingly important as surrounding areas are salinised; and
- Salt lake systems, the Russell Ranges and the region's eucalypt woodlands have high species- and ecosystem-diversity.

3.2 Soils and Landforms

The study area lies within the Stirling Province (24) of the Western Region (2) of the Soil Landscapes of WA (Tille 2006). The Stirling Province is described as 'Undulating plains and laterised plateau (dissected at fringes and with some emergent quartzite ranges) on deeply weathered mantle and Bremer Basin sediments over granitic rocks of the Yilgarn Craton and Albany-Fraser Orogen (with some metasediments and greenstone). Grey shallow sandy duplexes (mostly alkaline), calcareous loamy earths, grey deep sandy duplexes and pale deep sands (with some salt lakes soils and alkaline grey shallow loamy duplexes). Mallee scrub with mallee heath and eucalypt woodlands (and some scrub-heath)' (Tille 2006).

In accordance with Tille (2006) the study area is located within the Salmon Gums Mallee Zone (246) of the Stirling Province. It comprises flat to undulating plains (with some salt lakes) on deeply weathered mantle and alluvium over Bremer Basin sediments on granite and gneiss of the Yilgarn Craton and Albany-Fraser Orogen. Calcareous loamy earths and Alkaline grey shallow sandy duplexes with Salt lake soils and some Alkaline grey shallow loamy duplexes and Pale deep sands. Merrit-coral Gum, Salmon Gum, Red Mallee woodlands with Mallee scrub and some Mallee heath located in the South Coast district between Pyramid Lake, Scaddan, Norseman and Mt Ragged.

In accordance with Surface Geology of Australia, 1:1,000,000 maps published by Stewart *et al.*, (2008) five of the study areas (MT-2A, MT-2B, MT-2C, MT-2D and MT-2E) are located within the Scaddan Soil System whilst the other two areas (MT-19 and MT-20) fall entirely within the Halbert Soil System. The two geological mapping units identified by Stewart *et al.*, (2008) as occurring within the study area as follows:

Scz – comprises of sand or gravel plains; quartz sand sheets commonly with ferruginous pisoliths or pebbles, minor clay; local calcrete, laterite, silcrete, silt, clay, alluvium, colluvium, aeolian sand. It has level to gently undulating plains with numerous clay pans and salt lakes, and small areas of undulating rises. The geology comprises Tertiary sediments overlying Proterozoic granites with some minor Pleistocene sand sheets.

Qrc – comprises of colluvium, sheetwash, talus; gravel piedmonts and aprons over and around bedrock; clay-silt-sand with sheet and nodular kankar; alluvial and aeolian sand-silt-gravel in depressions and broad valleys in Canning Basin; local calcrete, reworked laterite. It has level to gently undulating plain with numerous salt lakes within a paleo valley on Tertiary marine sediments (Plantagenet and Werrilup formations). Soils are alkaline grey shallow sandy duplex soils and salt lake soils.

3.3 Regional Vegetation

The study area is located in the northern portion of the Mallee Region of the Southwest Province (Beard, 1990). This region supports a mallee of *Eucalyptus*, with *Eremophila* being the most consistently present genus. Patches of *Eucalypt* woodland occur on lower ground, with scrub heath and *Casuarina* thickets on residual plateau soils (Beard 1990).

Beard (1973) 1: 250 000 vegetation mapping for the Esperance and Malcolm region identifies four broad terrestrial vegetation types occurring within the study area as described below in Table 3 (Beard, 1972 & Beeston *et al.*, 2002).

Table 3: Extent of Regional Vegetation Associations within the Study Area (Beard, 1973 & Beeston., *et al*, 2002)

Vegetation Association	Beard Code	Current Extent (ha)	Pre-European Extent (ha)	Remaining (%)	Description
125	sl	3,237,158	3,578,590	90.46	Bare areas; salt lakes
482	e11,22Mi	1,615,442	1,639,415	98.54	Medium woodland; merrit & red mallee
519	e15Si	1,119,196	2,021,134	55.37	Shrublands; mallee scrub, <i>Eucalyptus eremophila</i>
924	e15,22Si	33,430	82,770	40.39	Shrublands; Mallee scrub, <i>Eucalyptus Eremophila</i> & red Mallee

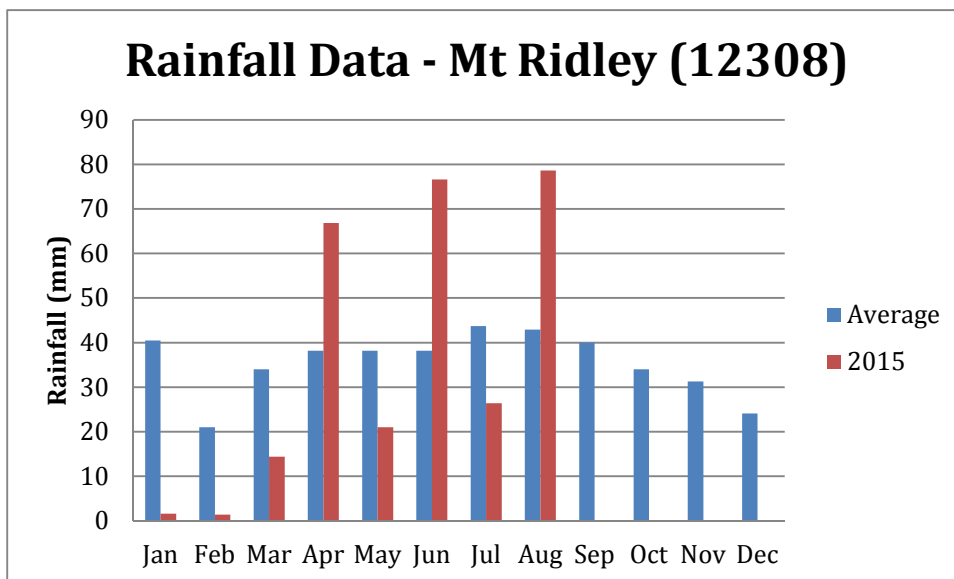
The vegetation types and extent in Technical Report 250 were identified and assessed using aerial photography and satellite imagery and therefore the figures above are indicative only (Beeston, *et al.*, 2002).

3.4 Climate

The climate in the Mallee Region is dry warm Mediterranean, with winter rain (300 – 500 mm annually) and seven to eight dry months (Beard 1990). The nearest available monitoring climatic data for the study area, Mt Ridley Weather Station (Site No. 12308), is located approximately 5km south-west of the study area. Mean annual rainfall for Mt Ridley is 425.7mm (**Graph 1**).

During 2015, rainfall has fallen erratically, with April, June and August receiving substantially higher rainfall than the historical average. Conversely, March, May and June recorded substantially reduced rainfall. Cumulative rainfall to September 2015 is 286.8mm, slightly below the cumulative average of 296.7mm.

Graph 1: Rainfall data at Mt Ridley Station (Site No: 12308) (BoM, 2015)



4 Desktop Review

4.1 Previous Studies

As part of the desktop assessment and field preparations, results of previous surveys conducted within the study area and general surrounds were reviewed.

Terratree was previously commissioned by Mt Ridley in December 2014 to undertake a comprehensive desktop review of environmental opportunities and constraints within tenements E63/1547, E63/1564, E63/1617 and E63/1719 comprising a total of approximately 102,300ha (Terratree, 2015_A). Additional studies have been undertaken within or in close proximity to the study area since 2001 (**Table 4**).

Table 4: Previous environmental surveys within or in close proximity to the study area

Author	Study Area	Year	Reference	Distance from study area
Department of Conservation and Land Management (CALM)	Esperance District	2001	Declared Rare and Poorly Known Flora in the Esperance District	overlapping
Frost O'Connor & Associates	E63/816 and E63/817	2003	Endangered Flora Survey Exploration Tenements E63/816 and E63/817 Grass Patch Project	46km north-west of study area
Terratree	E63/1547, E63/1564, E63/1617 and E63/1719	2015	Desktop Assessment of Environmental Constraints and opportunities within Exploration Tenements E63/1547, E63/1564, E63/1617 and E63/1719	overlapping
Department of the Environment		2015a	Great Western Woodlands of Western Australia, Coolgardie Esperance Hwy, Norseman, WA, Australia.	overlapping

4.2 Desktop Assessment

Prior to the field assessment, a search of DPaW's Threatened and Priority Flora and Priority Ecological Communities database was undertaken in order to identify flora of conservation significance that have previously been recorded within the study area and surrounds. The following databases were interrogated:

- DPaW's Threatened and Priority Flora Database;
- Western Australian Herbarium records;
- DPaW's Threatened Ecological Communities (TEC) and Priority Ecological Community (PEC) databases; and
- The Commonwealth (EPBC Act) Protected Matters Search (for values of flora and vegetation of conservation significance).

The Threatened and Priority Flora databases search was conducted using a 40km buffer (reference number 10-0915FL), whilst the Threatened and Priority Ecological Communities database encompassed a 20km buffer radius around points as listed below which represent tenement centroids, located in close proximity to Lake Herbert within the Shire of Esperance:

- E 421626.056 N 6316996.656 ZN 51
- E 430892.126 N 6323534.580 ZN 51
- E 407728.181 N 6309482.526 ZN 51

The database search identified 105 flora species of conservation significance, composed of eight Threatened, 26 Priority 1, 21 Priority 2, 38 Priority 3 and 12 Priority 4.

The Commonwealth (EPBC Act) Protected Matters Search Tool (DotE 2015) returned nine additional Endangered and Vulnerable plant species from within a 60km radius of the following coordinates: - E 421626.056 N 6316996.656 ZN 51.

Threatened and Priority flora identified from the database search results are listed in **Appendix B**.

The database search identified one Priority Ecological Community as occurring within 20km of the study area: the Proteaceae-Dominated Kwongkan Shrublands of the Southeast Coastal Floristic Province of Western Australia Ecological Community. This Ecological Community is classified as Priority 3 under the WC Act, and as Threatened (EN) under the EPBC Act, and is afforded legal protection under the EPBC Act. Community structure is described as scrub heath on deep sand, with *Banksia speciosa* and *Lambertia inermis* dominant in the vegetation.

5 Methods

The Level 2 Flora and vegetation Assessment and Targeted Threatened and Priority Flora survey was conducted between 9-20 September 2015 by Principal Ecologist Joseph Grehan, Senior Botanist Gabriela Martinez, and Botanist, Kelby Jennings of Terratree.

5.1 Flora and Vegetation

The flora and vegetation field assessment was conducted in accordance with the methodologies described in EPA Guidance Statement No.51, *Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia* for a Level 2 Flora and Vegetation assessment (EPA, 2004). Specifically, the assessment included:

- desktop studies;
- reconnaissance field survey, encompassing:
- verification of desktop studies;
- delineation and characterisation of flora and vegetation units;
- identification of potential impacts; and
- a detailed flora and vegetation field survey.

In accordance with the methodologies described in EPA Guidance Statement 51 (EPA 2004), the survey was conducted by sampling within non-permanent 100sqm quadrats where vegetation was in good or better condition, supplemented by a series of non-permanent spot sampling points where vegetation was in poorer condition in order to gain a representative sample of the flora and environmental values of the site.

The study area was traversed by foot and vehicle to verify and further define vegetation communities within the study area. Detailed recordings were undertaken at several locations, selected on the basis of local variation in vegetation structure and floristic composition.

Flora species unidentifiable in the field, including introduced flora, were collected, labelled, pressed, dried and frozen in accordance with the requirements of the West Australian Herbarium. The plant species were identified via comparison with pressed specimens housed at the herbarium and using taxonomic keys and other references. The majority of flora identifications were carried out by experienced taxonomist Dr. Chris Hancock and Senior Botanist Gabriela Martinez of Terratree. Nomenclature of the species recorded follows protocols of the West Australian Herbarium (DEC, 2011).

5.2 Quadrats

A total of 50 quadrats were sampled within the study area and these are presented spatially in **Figures 1-5**. Quadrat locations were selected using aerial photography, topographic features and field observations to represent the diversity of vegetation present. All quadrats sampled were 100 sqm in size. Usual quadrat dimensions were 10m x 10m; however, this was occasionally altered to 20m x 5m where necessitated by vegetation and/or landscape constraints. Standardised data collection sheets were used to ensure consistent data records for the following features were recorded at each quadrat:

- Observer
- Date
- Location/site
- GPS Location (GDA 94)
- Species observed;
- Height of all species recorded
- Percentage foliage cover (to determine dominance)
- Soil type and colour
- Topography
- Degree and nature of disturbance
- Tears since fire (if any)

- **Vegetation community and condition**

Descriptions of communities were based on the nomenclature of the National Vegetation Information System (NVIS) (ESCAVI, 2003) at level 5 which will enable conclusions regarding the TEC and PEC status of each of the recorded vegetation types.

Vegetation mapping was conducted by delineating plant communities based on distinctive characteristics such as vegetation structure, dominant species and species composition. A combination of aerial photography, and ground-truthing was used to interpret the vegetation patterns of the study area.

Vegetation condition was determined in relation to the (perceived) ability of the bushland to maintain itself (Keighery, 1994). This was assessed by determining the ratio of introduced to native species in terms of both species richness and cover. Disturbance (e.g. grazing, erosion), degree of alteration to the community in terms of structure and ecological function are also considered.

5.3 Threatened and Priority Flora

Prior to the survey, the locations of all Threatened or Priority flora retrieved from DPaW's database search were plotted over aerial imagery of the study area. Furthermore, descriptions and photographs of Threatened and Priority Flora identified in database searches or previously recorded in the area, were compiled from FloraBase and available literature in order to produce a 'field guide' to assist all botanists with identification of target species during the survey.

Where Priority flora species formed a major component of the vegetation over extensive areas and recording individual plants was impractical, the locations of the edges of the species' distribution were recorded where they intersected with survey transects. The point locations thus recorded were later interpolated into polygonal areas during data analysis.

In these areas, plant numbers were quantified by the use of 'density transects', in which individuals of the target species were counted in transects of appropriate length (usually 10 x 50 m) to determine the density/m² in that area. Density transects were repeated in different areas to determine average densities for each species. All flora and vegetation communities of potential significance were photographed.

5.4 Introduced Flora

A search of DAFWA's website for Declared Plants was consulted to determine if any of the recorded species are listed as Declared Plants pursuant to the BAM Act.

5.5 Vegetation Condition

Vegetation condition within the survey area was assessed using the Keighery Scale (**Table 5**).

Table 5: Keighery Vegetation Condition Scale (Keighery, 1994)

Scale		Condition
1	Pristine	Pristine or nearly so, no obvious signs of disturbance.
2	Excellent	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species.
3	Very Good	Vegetation structure altered, obvious signs of disturbance. For example, disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.
4	Good	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. For example, disturbance to vegetation structure caused by very frequent fires, the presence of some very aggressive weeds at high density, partial clearing, dieback and grazing.
5	Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. For example, disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.
6	Completely Degraded	The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as "parkland cleared" with the flora comprising weed or crop species with isolated native trees or shrubs.

5.6 Range Extensions

Taxa recorded during the current survey that were outside of their known distribution were identified as range extensions. Range extensions have been subdivided into three categories:

- Bioregional Extension, indicates the taxon has not been previously recorded in the IBRA Bioregion in which the impact area is located;
- Range Extension, indicates the records in the study are at least 100 km from the boundary of the known distribution based on herbarium lodged records; and
- Bridging Record, indicates records between known populations, but at least 100 km from the nearest population.

6 Results

6.1 Flora

A total of 218 species, representing 120 genera from 52 families, were recorded within the study area. The total includes 208 (96%) native species and 10 (4%) introduced (weed) or non-endemic species. The full list of vascular flora species recorded is presented in **Appendix C**. Qualitative data recorded from individual quadrats are presented in **Appendix E**.

Families with the highest representation were Myrtaceae (Myrtle family – 42 taxa; 42 native), Asteraceae (Daisy family – 25 taxa; 22 native, 3 introduced) and Chenopodiaceae (Saltbush family – 14 taxa; 14 native).

One Threatened (Declared Rare) species, *Eucalyptus merrickiae*, pursuant to the WC Act and listed as Threatened under the EPBC Act was recorded within the study area. Nine Priority Flora species were also recorded within the study area, comprised of one Priority 1 (P1) - *Boronia baeckeacea* ssp. *patula* (P1), five Priority 3 (P3) – *Acacia euthyphylla* (P3), *Acacia glaucissima* (P3), *Gonocarpus pycnostachyus* (P3), *Micromyrtus elobata* ssp. *scopula* (P3) and *Persoonia cymbifolia* (P3) and three Priority 4 (P4) – *Adenanthos ileticos* (P4), *Darwinia polycephala* (P4) and *Melaleuca fissurata* (P4). Threatened and Priority Flora recorded within the study area are described in further detail below. All Threatened and Priority species were identified in the DPaW database search results.

Two species, *Eucalyptus ? ceratocorys* and *Phebalium obovatum*, were found to be occurring outside their previously recorded ranges (range extensions), as documented by the West Australian Herbarium (DPaW, 2015b).

The locations of quadrats and conservation significant flora recorded within the study area have been mapped spatially in **Figures 1-5**.

6.2 Introduced Flora (Weeds)

Ten species of introduced flora from five families were recorded within the study area (**Table 6**). The most common species was **Pentameris airoides* ssp. *airoides*, recorded in eight quadrats, followed by **Schismus barbatus*, **Parapholis incurva* and **Carpobrotus aequilaterus*, each represented in six quadrats.

Table 6: Introduced Flora recorded within the study area

Family	Species
Aizoaceae	<i>*Carpobrotus aequilaterus</i>
Asteraceae	<i>*Arctotheca calendula</i>
	<i>*Carduus pycnocephalus</i>
	<i>*Hypochaeris glabra</i>
	<i>*Ursinia anthemoides</i>
Brassicaceae	<i>*Hornungia procumbens</i>
Poaceae	? <i>*Parapholis incurva</i>
	<i>*Pentameris airoides</i> ssp. <i>airoides</i>
	<i>*Schismus barbatus</i>
Primulaceae	<i>*Lysimachia arvensis</i>

No Declared Pest species were recorded within the study area. The extent, dominance and impact of weeds upon vegetation condition are discussed in **Section 6.4**.

6.3 Vegetation

Classification of plant communities was carried out based on a species by site matrix with singletons removed and foliage projective cover values converted to the six point Braun-Blanquet scale. From the options available in the multivariate analysis package PC-ORD (MJM Software Design), Ward's method of hierarchical grouping was chosen using relative Euclidian distance (Ward, 1963). This is one of three methods recommended by McCune and Grace (2002) as a way of avoiding space distortion and chaining among samples.

These results were then analysed for similarity and accuracy by comparing quadrat positions within the landscape and comparison with quadrat photos.

This combined method identified 11 vegetation communities as occurring within the study area. The vegetation communities within the study area are presented spatially in **Figures 1-5** and are described below in **Table 7**. Vegetation acronyms are derived from the dominant flora species for each strata level.

Table 7: Vegetation Communities of the study area

Vegetation Community	Vegetation Description	Quadrat No.
A (EfMuAg)	<i>Eucalyptus fraseri</i> ssp <i>fraseri</i> , <i>Eucalyptus flocktoniae</i> ssp <i>flocktoniae</i> and <i>Eucalyptus kessellii</i> Low Open Woodland over <i>Melaleuca uncinata</i> , <i>Melaleuca linguiformis</i> and <i>Melaleuca acuminata</i> ssp. <i>acuminata</i> Tall Shrubland over <i>Acacia glaucissima</i> (P3), <i>Exocarpos aphyllus</i> and <i>Hibbertia pungens</i> Low Open Shrubland. Sandy soils, gently undulating plains.	Q36, Q37, Q38, Q39, Q40, Q43
B (MtBuDK)	<i>Melaleuca tuberculata</i> var. <i>macrophylla</i> , <i>Melaleuca subularis</i> and <i>Santalum acuminatum</i> Shrubland over <i>Baeckea uncinella</i> and <i>Cyathostemon tenuifolius</i> Sparse Shrubland over <i>Darwinia</i> sp. Karonie (K.Newbey 8503), <i>Gahnia</i> sp. L (K.R. Newbey 7888) and <i>Darwinia polycephala</i> (P4) Low Sparse Shrubland. Located on the margins of salt lakes/pans.	Q28, Q29
C (EeMfLr)	<i>Eucalyptus eremophila</i> ssp <i>eremophila</i> and <i>Eucalyptus fraseri</i> ssp <i>fraseri</i> Woodland over <i>Melaleuca fissurata</i> (P4), <i>Melaleuca rigidifolia</i> and <i>Melaleuca thyoides</i> Tall Shrubland over <i>Lissanthe rubicunda</i> , <i>Acacia glaucissima</i> (P3) and <i>Cyathostemon tenuifolius</i> Low Sparse Shrubland. White clay soils.	Q18, Q21, Q22, Q24, Q30, Q31, Q41, Q42, Q48, Q49
D (EmMpDp)	<i>Eucalyptus merrickiae</i> (T) and <i>Eucalyptus uncinata</i> Low Open Woodland over <i>Melaleuca pulchella</i> , <i>Phymatocarpus maxwellii</i> and <i>Melaleuca thyoides</i> Tall Open Shrubland over <i>Darwinia polycephala</i> (P4), <i>Calytrix duplistipulata</i> and <i>Conostephium drummondii</i> Low Shrubland. On white sand/clay soils adjacent to salt lakes/pans.	Q26, Q27, Q50
E (EkBmPm)	<i>Eucalyptus kessellii</i> , <i>Eucalyptus uncinata</i> and <i>Eucalyptus leptocalyx</i> Low Open Woodland over <i>Banksia media</i> and <i>Callitris roei</i> Tall Sparse Shrubland over <i>Phymatocarpus maxwellii</i> , <i>Melaleuca rigidifolia</i> and <i>Melaleuca uncinata</i> Shrubland over <i>Baeckea crispiflora</i> var. <i>icosandra</i> , <i>Darwinia polycephala</i> (P4) and <i>Cyathostemon tenuifolius</i> Low Sparse Shrubland. Gentle slopes in association with salt lakes.	Q2, Q9, Q11, Q13
F (EcMpCt)	<i>Eucalyptus congoblata</i> ssp. <i>perata</i> , <i>Eucalyptus leptocalyx</i> and <i>Eucalyptus kessellii</i> Low Woodland over <i>Melaleuca podiocalyx</i> , <i>Melaleuca bromelioides</i> and <i>Melaleuca rigidifolia</i> Tall Shrubland over <i>Cyathostemon tenuifolius</i> , <i>Daviesia benthamii</i> ssp. <i>acanthoclona</i> and <i>Boronia inornata</i> ssp. <i>leptophylla</i> Low Sparse Shrubland. White clay or sand, gently undulating plains.	Q3, Q4, Q5, Q6 Q7, Q10, Q47
G (AvTs)	<i>Atriplex vesicaria</i> , <i>Tecticornia syncarpa</i> and <i>Tecticornia halocnemoides</i> Low Heathland. On low-lying areas adjacent to salt lakes/pans.	Q14, Q15, Q16, Q19, Q32, Q34, Q46
H (MsAg)	<i>Melaleuca subularis</i> , <i>Melaleuca thyoides</i> and <i>Melaleuca fissurata</i> (P4) Tall Open Shrubland over <i>Acacia glaucissima</i> (P3), <i>Enchylaena tomentosa</i> var. <i>tomentosa</i> and <i>Gahnia</i> sp. L (K.R. Newbey 7888) Low Open Shrubland over Mixed Herbland. Low-lying areas subject to seasonal inundation with white	Q17, Q20

Vegetation Community	Vegetation Description	Quadrat No.
	clay soils.	
I (EbMfCt)	<i>Eucalyptus brachycalyx</i> Low Woodland over <i>Melaleuca fissurata</i> (P4), <i>Melaleuca linguiformis</i> and <i>Cyathostemon blackettii</i> Tall Shrubland over <i>Calytrix tetragona</i> , <i>Exocarpos aphyllus</i> and <i>Eremophila decipiens</i> ssp. <i>decipiens</i> Low Sparse Shrubland. Adjacent to salt lakes/pans.	Q23, Q25
J (EgHpRc)	<i>Eucalyptus gracilis</i> Low Sparse Woodland over <i>Hakea preissii</i> , <i>Geijera linearifolia</i> and <i>Alyxia buxifolia</i> Open Shrubland over <i>Rhagodia crassifolia</i> , <i>Atriplex vesicaria</i> and <i>Gunniopsis quadrifida</i> Low Open Shrubland. Located on red clays in low-lying areas subject to seasonal inundation.	Q33, Q35, Q44 & Q45
K (EeMtBu)	<i>Eucalyptus eremophila</i> ssp. <i>eremophila</i> Low Open Woodland over <i>Melaleuca teuthidoides</i> , <i>Melaleuca thyoides</i> and <i>Melaleuca uncinata</i> Tall Sparse Shrubland over <i>Baeckea uncinella</i> and <i>Tecticornia lylei</i> Low Open Shrubland. Margins of salt lakes.	Q1, Q8, Q12

Quadrats 17 (Community H) and 46 (Community G) were the most floristically diverse, containing 39 species each. Quadrats 8 (Community K) and 31 (Community C) were the least diverse, with eight and nine species respectively.

Community C had the highest floristic diversity, with 78 species recorded, followed by Communities G and F, with 72 and 67 species respectively. Community B had the lowest species richness (23 species), followed by Community K (28 species) and Community J (39 species).

Photographic plates of each community are displayed in **Appendix D**.

6.4 Vegetation Condition

Vegetation condition throughout the area was rated as Very Good to Excellent, in accordance with the Keighery Condition Scale (Keighery, 1994). Impacts to vegetation were largely restricted to the presence of exploration tracks and drilling pads. Several weed species, including **Arctotheca calendula*, **Hornungia procumbens* and **Lysimachia arvensis*, were associated with these disturbed areas, whereas species such as **Ursinia anthemoides*, **Carpobrotus aequilaterus* and **Pentameris airoides* ssp. *airoides* were widely distributed throughout both the study area and Western Australia as a whole, indicating that these species have established within the study area independent of human interference.

Weed extent and dominance was largely localised and restricted within the survey area. Weeds were not observed to be causing significant impacts to native vegetation at current levels.

6.5 Environmentally Sensitive Areas

Environmentally Sensitive Areas (ESA's) can be applicable to a range of environmental, heritage and vegetation values. ESA's that are potentially applicable within the study area include:

- a Defined Wetland and the area within 50 metres of the wetland;
- the area covered by vegetation within 50 metres of rare flora, to the extent to which the vegetation is continuous with the vegetation in which the rare flora is located; and
- the area covered by a threatened ecological community.

A search of the interactive WA Atlas on Landgate's Shared Land Information Platform (SLIP) website confirmed that there are no Defined Wetlands within the study area. This includes wetlands of international significance protected under the Ramsar Treaty and also South Coast Significant Wetlands (DPaW 2014).

The field survey identified several populations of the Threatened flora species *Eucalyptus merrickiae*. All areas within 50m of individuals of this species are considered ESA's in accordance with the EP Act (1986).

The field survey did not identify the Proteaceae-dominated Kwongan shrubland TEC (under EPBC Act), as occurring within the study area.

7 Discussion

7.1 Threatened and Priority Flora

7.1.1 *Eucalyptus merrickiae* (T)

Eucalyptus merrickiae is listed as Threatened (VU) under the federal EPBC Act (Threatened Species Scientific Committee, 2008ed) and Threatened (Declared Rare-Extant) under the State WC Act.

E. merrickiae grows in both mallee and non-mallee form, from 2-4 (occasionally 6) meters high, with a rough, flaky grey bark. Flowering period is from August to November, exhibiting a pink/cream-white inflorescence. Prior to opening, flower buds possess a distinctive red cap. It inhabits grey sand/sandy clay soils near salt lakes. Populations can be found in the Esperance Plains and Mallee IBRA bioregions (Florabase, 2015).

The WA Herbarium has 43 records of this species. This high number is likely due to numerous submissions of specimens as a result of its conservation status. Records range from isolated individuals to populations of over 50. The plant can be locally dominant in suitable habitat.

The field survey results confirmed these observations, especially in regard to soil and landscape habitats. The majority of observed individuals occurred within 20-50 meters of salt lakes and were often locally dominant in these areas (Community D). Significant numbers and populations were also located in low-lying areas outside the optimal habitat zone however, in areas dominated by *Eucalyptus eremophila* ssp. *eremophila* and mixed *Melaleuca* spp. (Community C).

Subsequent to the positive identification of this species within the study area, a supplementary Targeted search has been conducted both locally (within and adjacent to the study areas) and regionally (10 km radius from the study areas (Terratree, 2015B). The purpose of the targeted survey for was to better define the distribution and abundance of *E. merrickiae* both locally and regionally to inform an environmental impact assessment being prepared as part of a Permit to Take DRF application.



Plate 1: *Eucalyptus merrickiae* (Joe Grehan, 2015)

7.1.2 *Boronia baeckeacea* ssp. *patula* (P1)

Boronia baeckeacea ssp. *patula* is a slender, straggling shrub, from 0.2-1 meter high. Leaves are simple or trifoliate, more or less spreading, broadly elliptic to obovate, 4-7 mm long. Flowers are pink and white, emerging March-September or November-December. It inhabits clay loam soil in open mallee woodland, and is often associated with disturbed sites (clearing or fire) (Florabase, 2015).

The WA Herbarium contains five records, all within the Eastern Mallee IBRA subregion.

This species was identified as occurring in three quadrats during the field survey (Quadrats 7, 17 and 41), within a variety of vegetation communities.



7.1.3 *Acacia euthyphylla* (P3)

Acacia euthyphylla is an erect shrub, 0.7-2 meters high. The flowering period is August-September, exhibiting a yellow inflorescence. It inhabits areas of grey/white sand and clay loam on the margins of salt lakes and in seasonal swamps (Florabase, 2015).

A. euthyphylla was recorded in three quadrats within the study area (Q29, Q33 and Q40). These represent a variety of vegetation communities, but are all located in close proximity to the numerous salt lake located in the region. Its presence in Quadrat 40 is unusual, as this is located upon a limestone ridge, but is likely an outlying individual occurring outside of its optimal habitat.



Plate 2: *Acacia euthyphylla* (worldwidewattle.com, 2015)

7.1.4 *Acacia glaucissima* (P3)

Acacia glaucissima is a dense, bushy shrub from 0.3-1.5 meters high, with yellow flowers. It inhabits sand or clay soils in flat, low-lying areas (Florabase, 2015)

The WA Herbarium has 22 records, all but one located within the Shire of Esperance LGA, within the Mallee bioregion. The outlying record isolated within the Shire of Lake Grace, approximately 200km west of the main distribution.

A. glaucissima was relatively widespread and common within the study area, inhabiting a variety of habitats. Extensive, high density populations were mostly located in flat or gently rolling *Eucalyptus* woodland, especially in disturbed areas.



Plate 3: *Acacia glaucissima* (Kelby Jennings, 2015)

7.1.5 *Gonocarpus pycnostachyus* (P3)

An erect annual herb, 0.1-0.15 meters high, with green-red flowers. Occurs wet depressions in sand or clay soils within the Eastern Mallee and Recherche IBRA Subregions (Florabase, 2015).

The WA Herbarium has 8 records of this species. It is often found in association with open shrubby heath, and appears to be a disturbance opportunist (clearing or fire).

G. pycnostachyus was observed once during the field survey, close to Q13 within Community E.



7.1.6 *Micromyrtus elobata* ssp. *scopula* (P3)

Micromyrtus elobata ssp. *scopula* is an erect shrub, 0.1-0.4 (occasionally 1) meter high. Occurs on grey or white sand and white sandy clays on undulating plains, dunes and hill crests (Florabase, 2015).

The WA Herbarium contains 11 records, located within the Eastern Mallee subregion. Individuals are often found in association with Open *Eucalyptus* Woodland with a Tall *Melaleuca* shrubland mid-story.

This assessment of *M. elobata* ssp. *scopula* is supported by the field survey results, which identified this species as occurring in six quadrats within Communities C and D.



7.1.7 *Persoonia cymbifolia* (P3)

An erect, spreading shrub, from 0.2-0.6 (occasionally 1) meter high. Occurs in sandy soils on flats or in rock crevices. Flowers are yellow, emerging in December /January, and is present across the Eastern Mallee, Recherche, Southern Cross and Western Mallee subregions (Florabase, 2015).

The WA Herbarium has 30 records of this species, collected from a wide area spanning over 450km from near Hyden in the NW to Israelite Bay in the SE.

The field survey identified *P. cymbifolia* as occurring as scattered individuals or small groups throughout Community C.



Plate 4: *Persoonia cymbifolia* (Kelby Jennings, 2015)

7.1.8 *Adenanthos ileticos* (P4)

Adenanthos ileticos is a diffuse, lignotuberous shrub, 0.7-2 (occasionally 3) meters high. It produces pink & cream/yellow flowers from March/July to October/December. It occurs on white, yellow or brown sand within the Eastern Mallee subregion. The WA Herbarium contains 18 records for this species (Florabase, 2015).

Within the study area, *A. ileticos* was restricted to a small area within Community D, along the north edge of a major salt lake dissecting Target 19 (Figure 2).



Plate 5: *Adenanthos ileticos* (Kelby Jennings, 2015)

7.1.9 *Darwinia polycephala* (P4)

Darwinia polycephala is a low, diffuse shrub, from 0.1-0.5 meters high. Flowering period is from March/May to July/September, with distinctive red/purple flowers. Habitat is in sand or clay soils on flats and in proximity to salt lakes. Known populations occur within the Eastern Mallee IBRA subregion (Florabase, 2015).

D. polycephala was widely distributed within the study area, being recorded in 13 quadrats. It occurred in a variety of vegetation communities, but highest population counts and densities were associated with areas adjacent to salt lakes, including Communities B and D.



Plate 6: *Darwinia polycephala* (Florabase, 2015)

7.1.10 *Melaleuca fissurata* (P4)

Melaleuca fissurata is an erect shrub from 0.5-2 (occasionally 4) meters high, producing white/yellow flowers from July to August. White/grey sand, sandy loam. Occurs on samphire flats and salt pans (Florabase, 2015).

WA Herbarium records for this species are all located within the Mallee bioregion.

M. fissurata was widely distributed throughout the project area, being recorded in 14 quadrats, making this species the most widely distributed flora of conservation significance within the study area. It is associated with Community 3, which is itself the most extensive community within the study area. It was not noted on flats and salt pans adjacent to lakes, but was more associated with undulating plains among *Eucalyptus* woodland. These results suggest that this species inhabits a wider range of habitats than is currently recorded.



Plate 7: *Melaleuca fissurata* (Florabase, 2015)

7.2 Range Extensions

7.2.1 *Eucalyptus ? ceratocorys*

Eucalyptus ceratocorys is a mallee, 2-10 meters high, with a rough, flaky bark. Preferred habitat is red sands (Florabase, 2015).

Current WA Herbarium records indicate a distribution over the Avon Wheatbelt, Coolgardie, Great Victoria Desert and Murchison bioregions, which places this individual substantially outside its known range, approximately 250km from the closest Herbarium record. No red sands were observed within the study area.

This specimen represents a bioregional extension, as it has not previously been recorded in the Mallee bioregion. Identifying material will be submitted to the WA Herbarium for taxonomic confirmation and to increase current scientific knowledge regarding this species and its range within Western Australia.



7.2.2 *Phebalium obovatum*

Phebalium obovatum is an upright, spreading shrub, 0.2-1 meters high, producing white/cream flowers from July to September. Occurs in sandy and gravelly soils on undulating plains in the Coolgardie, Esperance Plains and Mallee bioregions (Florabase, 2015).

The nearest WA Herbarium records of this species are approximately 100 km west of the project area.

This specimen will be submitted to the WA Herbarium to increase current scientific knowledge regarding this species and its range within Western Australia.



7.3 Vegetation

Eleven vegetation communities were identified as occurring within the study area. **Table 8** lists the species richness between vegetation communities and their extent within the study area. A number of communities, including B, E and G, contain a high percentage of the surveys area diversity within a relatively small area. These areas are associated with the margins of salt lakes/pans, indicating the importance of these landscape features and vegetation communities to overall local diversity.

No Threatened or Priority Ecological Community were identified as occurring within the study area, and vegetation communities within the survey area did not resemble known TEC/PEC's. Vegetation community descriptions were not consistent with the Proteaceae-Dominated Kwongan Shrubland TEC .

Table 8: Community Species Richness and Area

Vegetation Community	# of species	% of total species	Area (ha)	% of study area
A	49	22.48	67.11	29.28
B	23	10.55	1.24	0.54
C	78	35.78	12.06	5.26
D	53	24.31	10.75	4.69
E	65	29.82	3.29	1.44
F	67	30.73	62.27	27.17
G	72	33.03	22.02	9.61
H	46	21.10	16.93	7.39
I	46	21.10	6.56	2.86
J	39	17.89	21.15	13.04
K	28	12.84	5.83	2.54

7.4 Survey Limitations

The potential limitations of the survey, as outline in the EPA Guidance Statement No. 51 (EPA, 2004) are outlined in **Table 5**.

Table 9: Potential limitations and discussion of their relevance to the study area

Potential Limitation	Discussion
Sources of information and availability of contextual information (i.e. pre-existing background vs. new material)	Existing information was available, including the Terratree (2014) Desktop Assessment.
Scope (e.g. what life forms, etc., were sampled)	There were no limitations on the scope. The survey assessed vegetation types and targeted threatened and priority vascular plant species within the study area.
Proportion of flora collected and identified (based on sampling, timing and intensity)	Quadrat density was considered sufficient for the area and variety of vegetation communities within the study area. A minimum of two quadrats were installed per vegetation community.
Completeness and further work which might be needed (e.g. was the relevant area fully surveyed)	Targeted Flora surveys were undertaken within areas determined to be suitable habitat for conservation significant species. The Level 2 Flora and Vegetation Survey was complete in mapping the vegetation types of the areas surveyed.
Taxonomic certainty	There were no significant limitations on taxonomic certainty. Species profiles, descriptions and photographs were compiled from specimens and information available on Florabase and resources in the WA Herbarium. These were used for field identification of any species with potential to be a threatened or priority species. Specimens were collected for all potential threatened and priority species and all unidentified plants (as encountered), for identification by a taxonomic expert in the WA Herbarium.
Mapping reliability	The vegetation mapping has been based on a Level 2 Flora and Vegetation survey, using quadrat data. For planning and mapping purposes, detailed aerial imagery was provided by the Client.
Timing, weather, season, cycle	The survey was undertaken in spring between 9-20 September 2015. Prior to survey, rainfall was recorded at above average, ensuring growth and flowering was not limited major limiting factor. Numerous ephemeral species were evident during the time of the field survey.
Disturbances (fire, flood, accidental human intervention etc.)	Some areas of the study area had been previously disturbed by access tracks used for exploration activities. Disturbance within the study area was mainly evident in areas surrounding or adjacent to cleared tracks.
Intensity (in retrospect, was the intensity adequate)	The intensity of the Level 2 Flora and Vegetation and Targeted Threatened and Priority Flora Searches, were considered adequate for the purpose of the survey. By the end of the survey no new vegetation types and few new plant species were being encountered.
Resources	The field survey, plant identification and reporting were all adequately resourced.
Experience levels (e.g. degree of expertise in plant identification to taxon level).	The field survey was carried out by suitably qualified and experienced personnel. Plant identification was primarily undertaken by Dr. Chris Hancock, whom has over ten years of experience in taxonomic identification and has extensive experience identifying flora from the Mallee region.

8 Conclusions and Recommendations

Management of the Threatened (Declared Rare) species *Eucalyptus merrickiae* is the highest environmental management priority for exploration activities within the study area. An impact assessment has been undertaken and management recommendations developed as part of the Permit to Take DRF application submitted to the Species and Communities Branch of DPaW. The key results of the impact assessment and management recommendations are as follows:

- A Targeted Survey (Terratree, 2015_B) was conducted from 29 September to 4 October for *E. merrickiae* to determine the distribution and abundance of the species locally (within and adjacent to the study area) and regionally (within 10km of the study area). The survey identified seven new populations comprising 4,629 individuals, increasing the known overall population by 41.9% from 5,087 individuals to 9,716.
- A Permit to Take DRF application has been lodged for 294 *E. merrickiae* individuals, representing 3.3% of the overall population. This number has been proposed to allow for flexibility in planning and operations; measures will be employed to minimise actual disturbance to individuals and populations.
- A botanist who participated in the targeted survey and is very familiar with this species will be on the ground to guide the exploration team during ground disturbing activities.
- All exploration personnel will be made aware of morphological characteristic and conservation status of *E. merrickiae*.
- All *E. merrickiae* individual within the exploration disturbance area will be flagged with fluorescent tape prior to the commencement of clearing;
- Every effort will be made not to disturb or damage lignotubers of *E. merrickiae* to enable the plants to re-shoot after disturbance. This can be achieved by cutting each plant to the base and leaving the lignotuber in the ground.
- Any impacts to individuals will be recorded for auditing and compliance purposes.

Terratree make the following recommendations:

- The recovery of *E. merrickiae* individuals that have been impacted be monitored to determine if these individuals are regenerating.
- If the results to the survey are accepted by DPaW, a submission will be made to the Threatened Species Scientific Committee to reassess the conservation status of this taxon to determine whether it should remained listed as Threatened (Declared Rare).

Terratree will continue to work closely with Mt Ridley to implement best-practise environmental management procedures during exploration. This will include provision of information and training in regard to environmental matters within the study area, and identifying management options for minimising disturbance to vegetation (disturbance footprint), including:

- Avoid clearing of large, mature trees and shrubs where practical;
- Minimize impacts to species of conservation significance;
- Avoid unnecessary disturbance to vegetation;
- Minimise disturbance to wetlands and associated riparian vegetation;
- Ensure machinery entering site, especially earth-moving equipment, is clean of soil and vegetative materials to prevent the introduction of weeds and pathogens; and
- Restrict driving to established tracks.

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Figures

Figure 1: Project Location

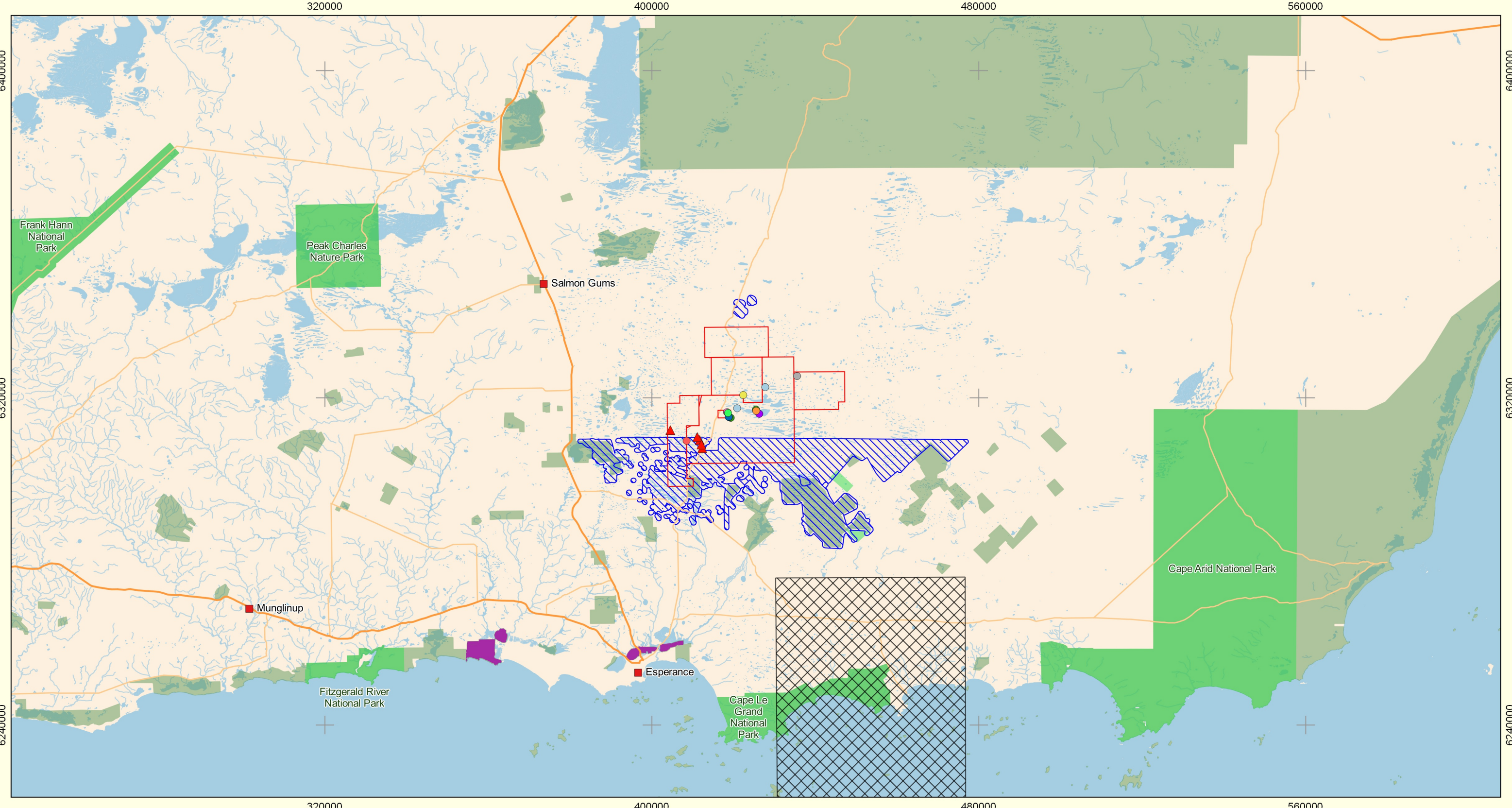
Figure 2: Vegetation Communities and Threatened and Priority Flora Locations: Target M19, Section 1

Figure 3: Vegetation Communities and Threatened and Priority Flora Locations: Target M19, Section 2

Figure 4: Vegetation Communities and Threatened and Priority Flora Locations: Targets M19 and M20, Section 3

Figure 5: Vegetation Communities and Threatened and Priority Flora Locations: Target M19, Section 4

Figure 6: Vegetation Communities and Threatened and Priority Flora Locations: Target Mt 02A-02E



Legend

Study Area
 Study Area

Topography
 Towns
 Principal Road
 Secondary Road
 Waterbodies
 Drainage Line

EPBC Protected Matters
 National Heritage Places
 State Reserve
 Protected Areas
 Wetlands of International Importance (Ramsar)

Threatened Flora Record (DPAw Database)
 ▲ *Eucalyptus merrickiae* (T)

Conservation Significant Flora Record (DPAw Database)
 ● *Acacia euthyphylla* (P3)
 ● *Adenanthos ileticos* (P4)
 ● *Darwinia luehmannii* (P2)
 ● *Darwinia polycephala* (P4)
 ● *Eucalyptus* sp. Esperance (M.E. French 1579) (P1)
 ● *Grammosolen* sp. Mt Ridley (W.R. Archer 1210911) (P1)
 ● *Grevillea aneura* (P4)
 ● *Gyrostemon ditrigynus* (P4)
 ● *Hydrocotyle* sp. Decipiens (G.J. Keighery 463) (P2)
 ● *Pterostylis* sp. striped sepal greenhood (G. Brockman GBB355) (P2)

Priority Ecological Community (DPAw Database)
 Proteaceae Dominated Kwongkan Shrubland (P3)



Regional Map and Conservation Values
 Mt Ridley Mines Desktop Study

Datum: GDA 1994
 Projection: MGA Zone 51

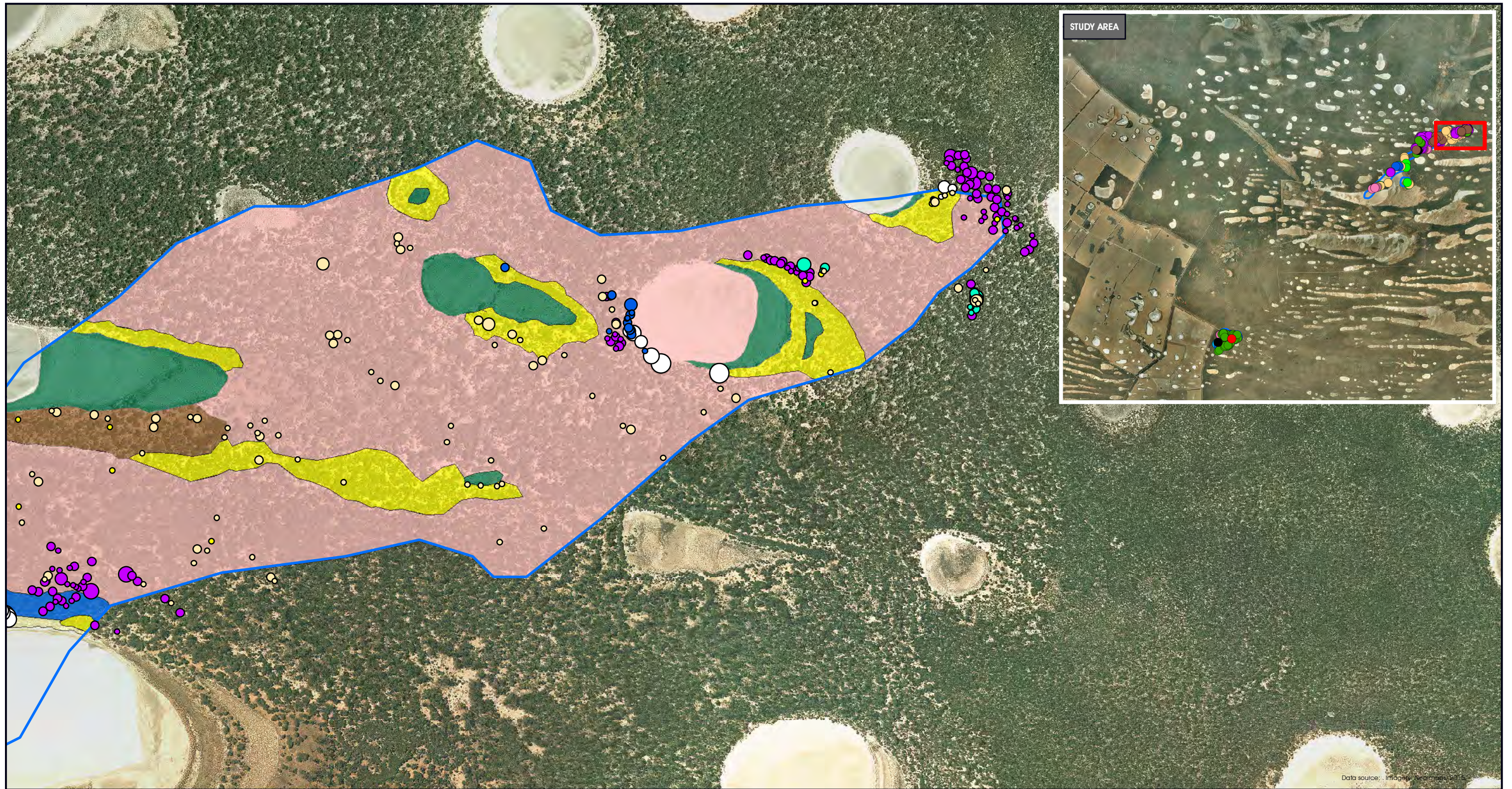
Scale: 1:900,000
 Date: 15/12/2014

Prepared: L Trotter
 Checked: L Trotter
 Review: J. Grehan
 Revision: Rev A

Project No: T14016

Figure 1

Terratree



LEGEND

Threatened and Priority Flora

- *Acacia glaucissima* (P3)
- *Boronia baeckeacea* ssp. *patula* (P1)
- *Acacia euthyphylla* (P3)
- *Persoonia cymbifolia* (P3)
- *Melaleuca fissurata* (P4)
- *Eucalyptus merrickiae* (T)
- *Darwinia polycephala* (P4)

Vegetation Community

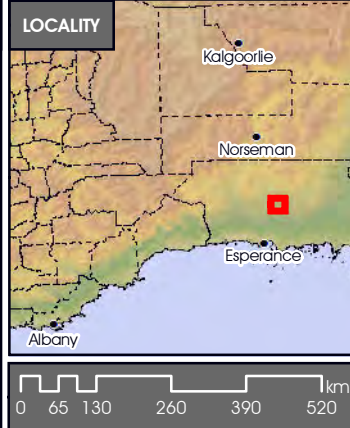
- (MsAg)
- (EeMfLr)
- (EmMpDp)
- (AvTs)
- (EbMfCt)
- (EeMtBu)

Study Area

Flora Observations Indicator

- 1
- 2 - 5
- 6 - 10
- 11 - 25
- 26 - 50
- 51 - 100
- 101+

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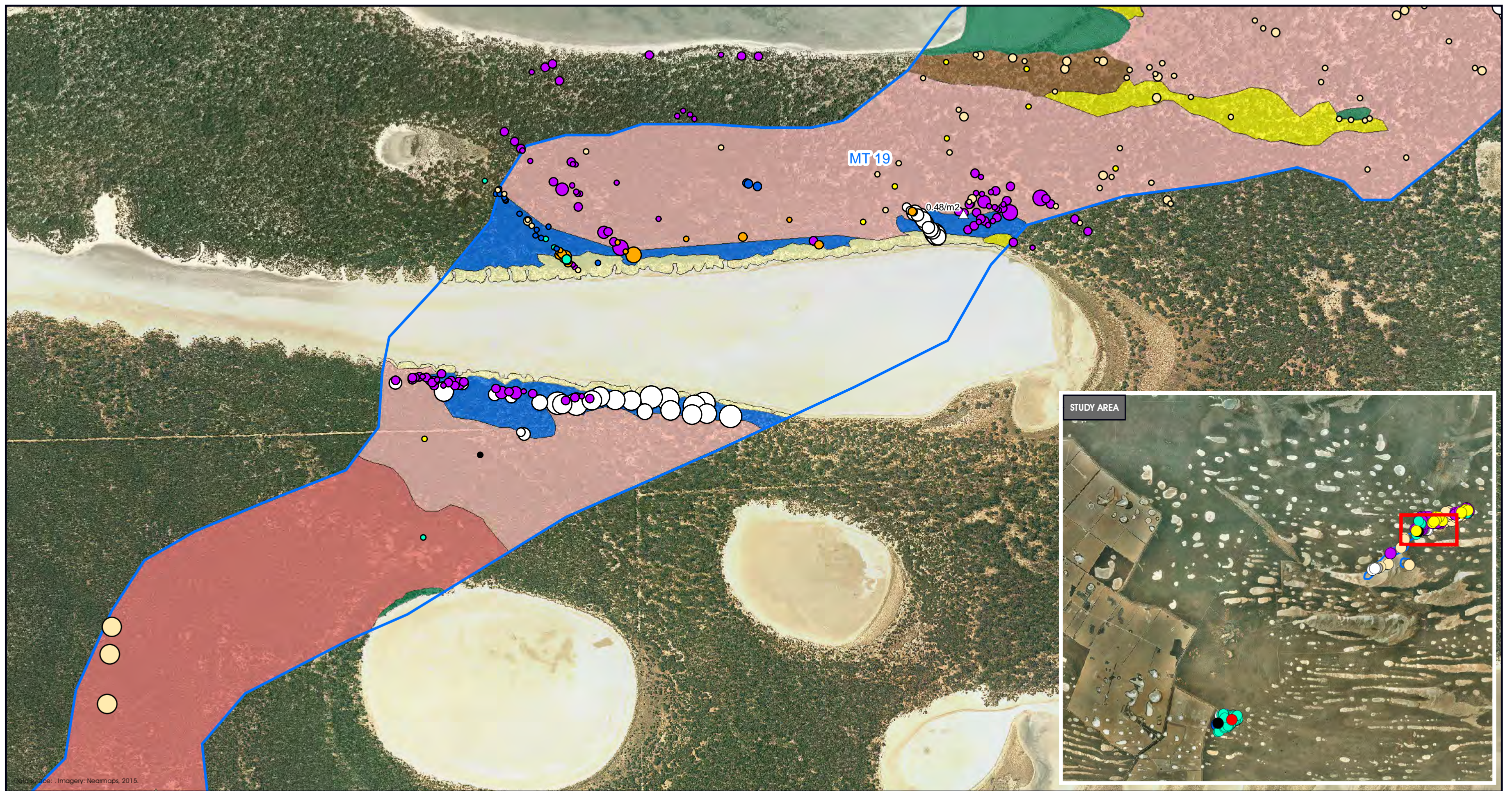
Mt Ridley Level 2 Flora and Vegetation Survey
Vegetation Communities and Threatened and Priority Flora Locations
Target M19 Section 1

0 62.5 125 250 375 500 Metres

Coordinate System: GDA 1994 MGA Zone 51, Projection: Transverse Mercator, Datum: GDA 1994

Date:	11/11/2015	Revision:	Rev A
Scale @ A3:	1:7,000	Project No:	TS15008-06
Prepared:	R Low	Figure 01	
Checked:	N King		
Reviewed:	K Jennings		





LEGEND

Threatened and Priority Flora

- △ *Darwinia polycephala* (P4) (Density Transect)
- ▲ *Acacia glaucissima* (P3) (Density Transect)
- *Acacia glaucissima* (P3)
- *Boronia baeckeacea* ssp. *patula* (P1)
- *Acacia euthyphylla* (P3)
- *Persoonia cymbifolia* (P3)

- *Adenanthos ileticos* (P4)
- *Melaleuca fissurata* (P4)
- *Eucalyptus merrickiae* (T)
- *Darwinia polycephala* (P4)

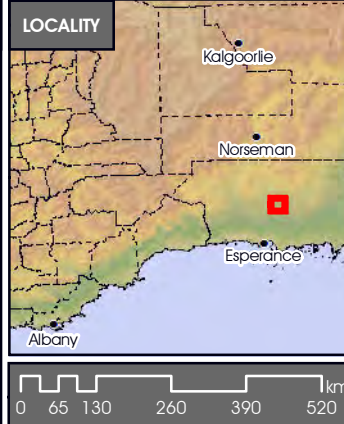
Vegetation Community

- (MsAg)
- (EfMuAg)
- (MtBuDK)
- (EeMfLr)
- (EmMpDp)
- (AVTs)
- (EbMfCt)
- (EeMtBu)
- Study Area

Flora Observations Indicator

- | | | | |
|---|---------|---|----------|
| ○ | 1 | ○ | 26 - 50 |
| ○ | 2 - 5 | ○ | 51 - 100 |
| ○ | 6 - 10 | ○ | 101+ |
| ○ | 11 - 25 | | |



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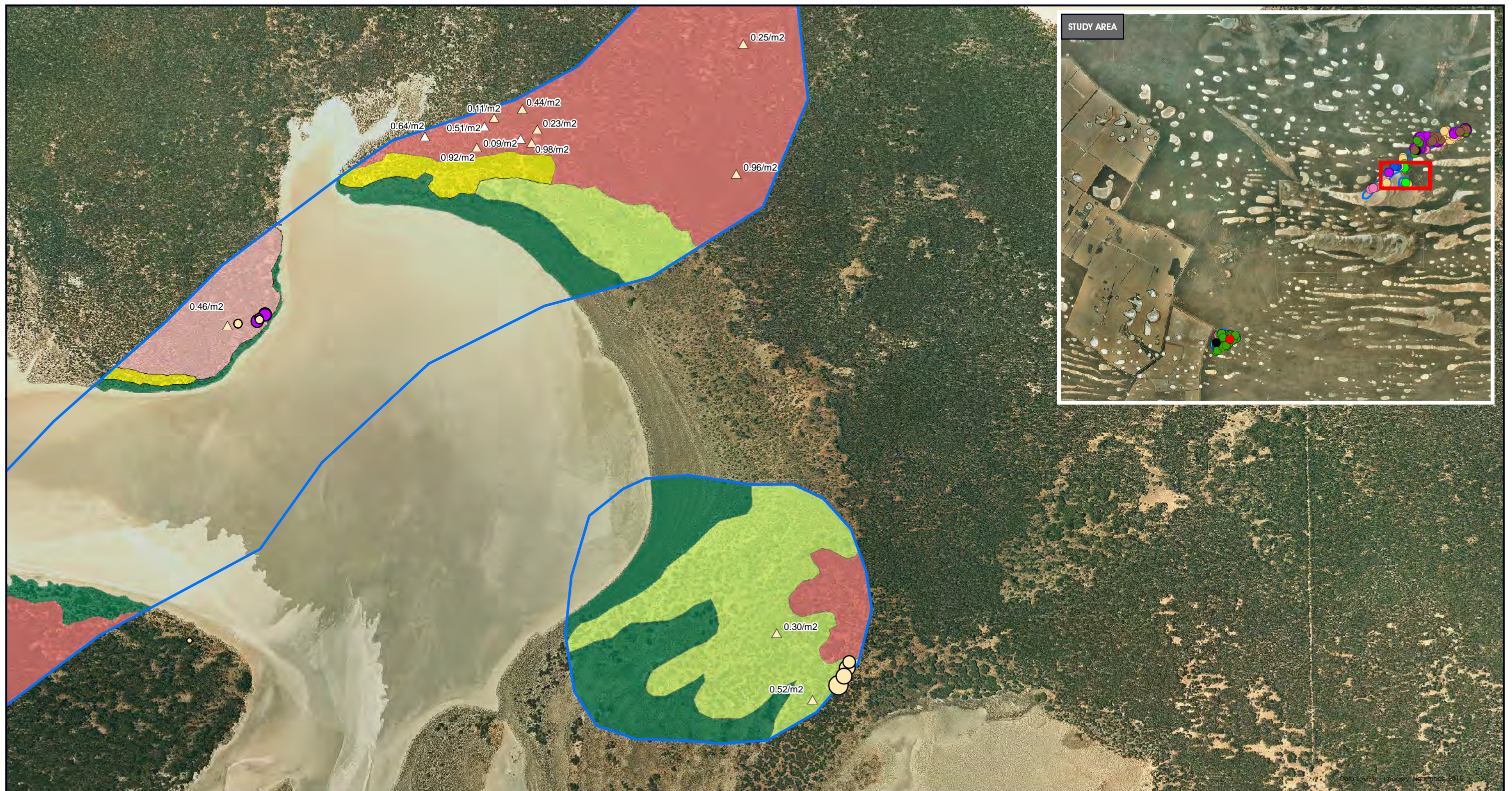


Mt Ridley Level 2 Flora and Vegetation Survey
Vegetation Communities and Threatened and Priority Flora Locations
Target M19 Section 2

Coordinate System: GDA 1994 MGA Zone 51, Projection: Transverse Mercator, Datum: GDA 1994

Date:	11/11/2015	Revision:	Rev A
Scale @ A3:	1:8,000	Project No:	TS15008-06
Prepared:	R Low	Figure 02	
Checked:	N King		
Reviewed:	K Jennings		



LEGEND

Threatened and Priority Flora

- △ *Darwinia polycephala* (P4) (Density Transect) (EfMuAg)
- △ *Acacia glaucissima* (P3) (Density Transect) (EeMfLr)
- *Acacia glaucissima* (P3) (AvTs)
- *Eucalyptus merrickiae* (T) (EgHpRc)

Vegetation Community

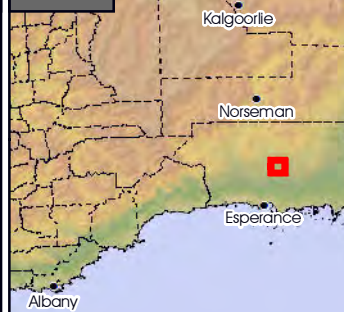
- (MsAg)

- (EfMuAg)
- (EeMfLr)
- (AvTs)
- (EgHpRc)
- Study Area

Flora Observations Indicator

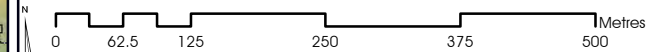
- 1
- 2 - 5
- 6 - 10
- 11 - 25
- 26 - 50
- 51 - 100
- 101+

LOCALITY



Mt Ridley Level 2 Flora and Vegetation Survey

Vegetation Communities and Threatened and Priority Flora Locations
Targets M19 and M20 Section 3

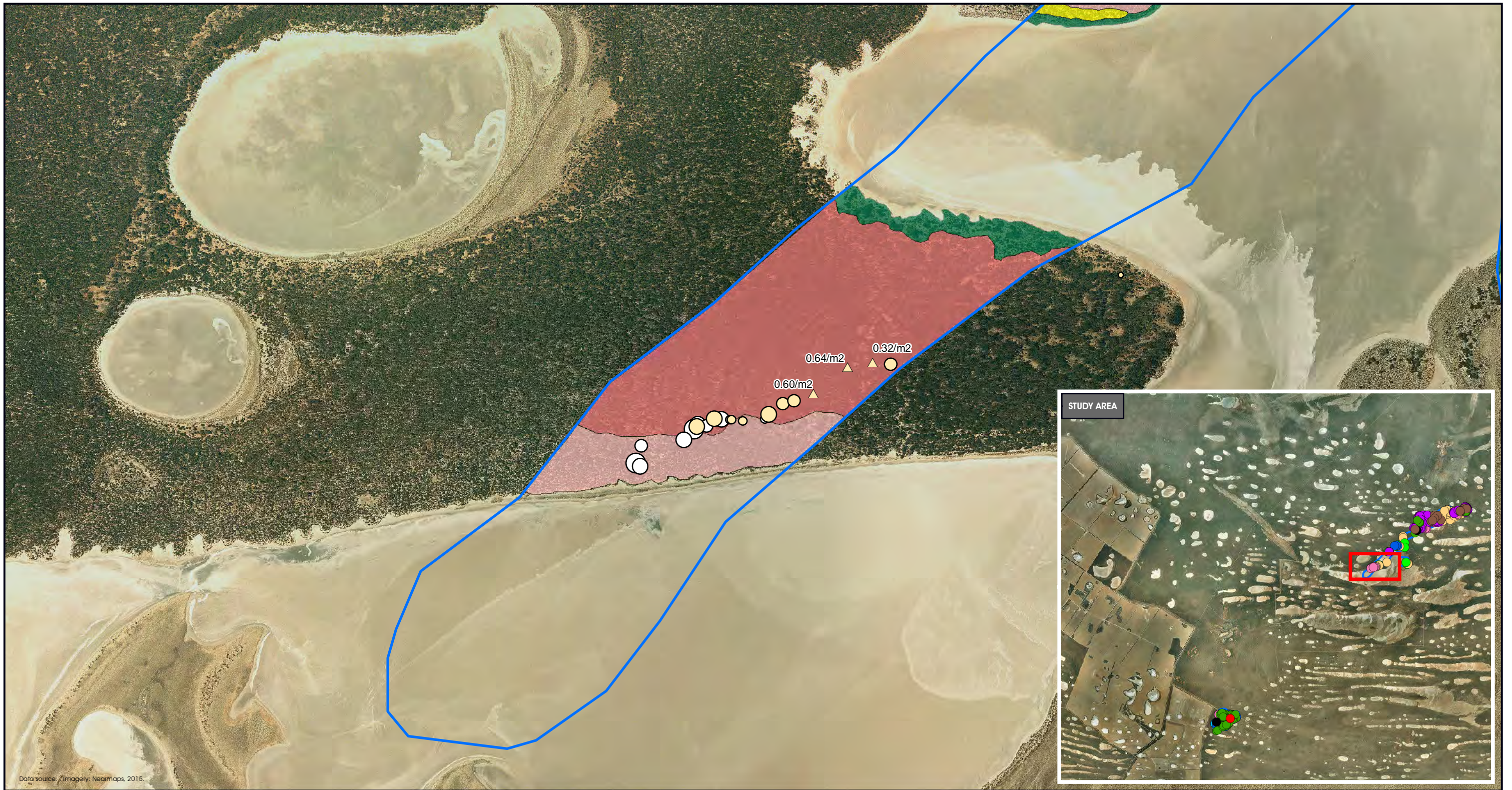


Coordinate System: GDA 1994 MGA Zone 51, Projection: Transverse Mercator, Datum: GDA 1994

Date:	11/11/2015	Revision:	Rev A
Scale @ A3:	1:7,000	Project No:	TS15008-06
Prepared:	R Low	Figure 03	
Checked:	N King		
Reviewed:	K Jennings		



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Data source: Imagery: Nearmaps, 2015.

LEGEND

Threatened and Priority Flora

- ▲ *Acacia glaucissima* (P3) (Density Transect)
- *Acacia glaucissima* (P3)
- *Darwinia polycephala* (P4)

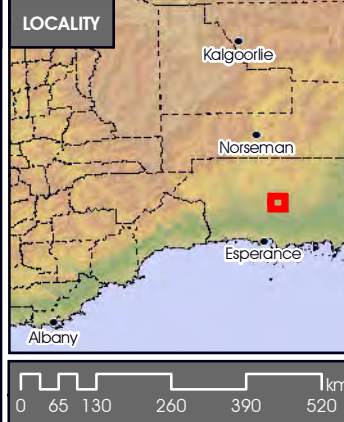
Vegetation Community

- (MsAg)
- (EfMuAg)

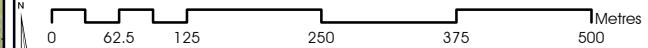
- (EeMfLr)
- (AVTs)
- (EgHpRc)
- Study Area

Flora Observations Indicator

- | | | | |
|---|---------|---|----------|
| ○ | 1 | ○ | 26 - 50 |
| ○ | 2 - 5 | ○ | 51 - 100 |
| ○ | 6 - 10 | ○ | 101+ |
| ○ | 11 - 25 | | |



Mt Ridley Level 2 Flora and Vegetation Survey
Vegetation Communities and Threatened and Priority Flora Locations
Target M19 Section 4



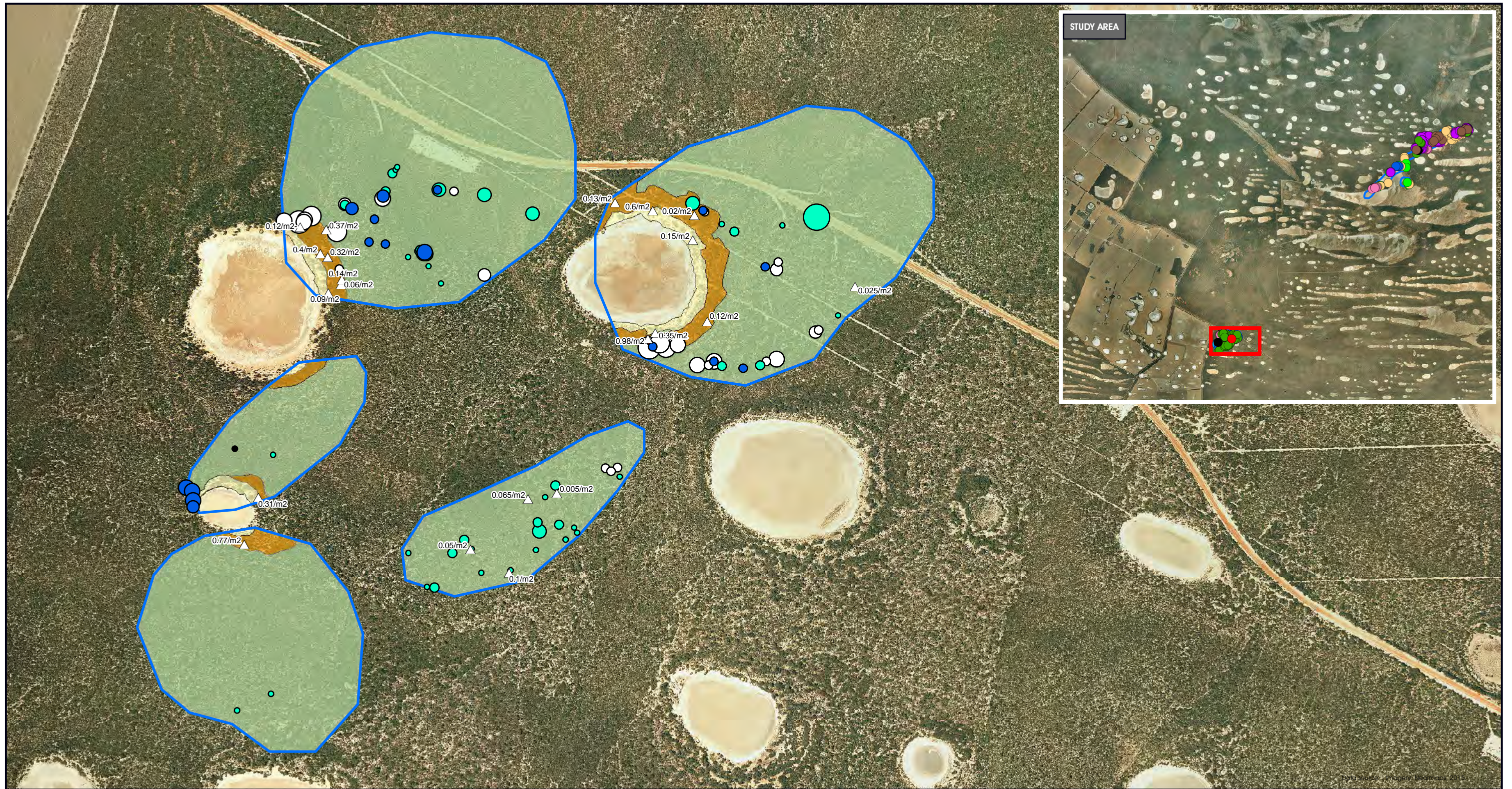
Coordinate System: GDA 1994 MGA Zone 51, Projection: Transverse Mercator, Datum: GDA 1994

Date:	11/11/2015	Revision:	Rev A
Scale @ A3:	1:7,000	Project No:	TS15008-06
Prepared:	R Low		
Checked:	N King		
Reviewed:	K Jennings		

Figure 04



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LEGEND

Threatened and Priority Flora

- △ *Darwinia polycephala* (P4) (Density Transect)
- *Boronia baeckeacea* ssp. *patula* (P1)
- *Acacia euthyphylla* (P3)
- *Persoonia cymbifolia* (P3)
- *Gonocarpus pycnostachyus* (P3)
- *Darwinia polycephala* (P4)

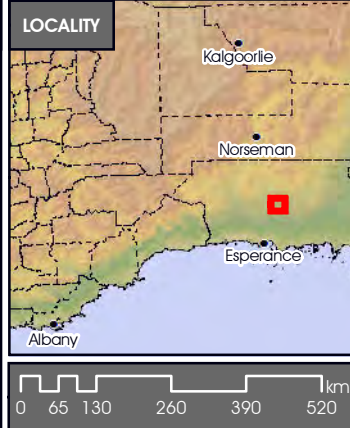
Vegetation Community

- (EkBmPm)
- (EcMpCt)
- (EeMtBu)
- Study Area

Flora Observations Indicator

- 1
- 2 - 5
- 6 - 10
- 11 - 25
- 26 - 50
- 51 - 100
- 101+

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Mt Ridley Level 2 Flora and Vegetation Survey

Vegetation Communities and Threatened and Priority Flora Locations
Targets MT 02A - 02E

Coordinate System: GDA 1994 MGA Zone 51, Projection: Transverse Mercator, Datum: GDA 1994

Date:	11/11/2015	Revision:	Rev A
Scale @ A3:	1:7,000	Project No:	TS15008-06
Prepared:	R Low	Figure 05	
Checked:	N King		
Reviewed:	K Jennings		



Appendices

Appendix A: Conservation Codes for Threatened and Priority Flora and Ecological Communities

Table A.1 – Definition of codes for Threatened and Priority Flora (DPaW)

Code	Definition
T	Threatened Flora – (Declared Rare Flora – Extant) Taxa which have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection and have been gazetted as such (Schedule 1 under the <i>Wildlife Conservation Act 1950</i>).
X	Presumed Extinct Flora (Declared Rare Flora - Extinct) Taxa which have been adequately searched for and there is no reasonable doubt that the last individual has died, and have been gazetted as such Schedule 2 under the <i>Wildlife Conservation Act 1950</i>).
P1	Priority One – Poorly Known Species Species that are known from one or a few collections or sight records (generally less than five), all on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, Shire, Westrail and Main Roads WA road, gravel and soil reserves, and active mineral leases and under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes.
P2	Priority Two – Poorly Known Species Species that are known from one or a few collections or sight records, some of which are on lands not under imminent threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, vacant Crown land, water reserves, etc. Species may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes.
P3	Priority Three – Poorly Known Species Species that are known from collections or sight records from several localities not under imminent threat, or from few but widespread localities with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and known threatening processes exist that could affect them.
P4	Priority Four – 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 do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable. (c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.
P5	Priority Five - Conservation Dependent species Species that are not threatened but are subject to a specific conservation program, the cessation of which would result in the species becoming threatened within five years.

Table A.2 – Definition of codes for Commonwealth Listed Threatened Flora

Code	Definition
Ex	Extinct Taxa which at a particular time if, at that time, there is no reasonable doubt that the last member of the species has died.
ExW	Extinct in the Wild Taxa which is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
CE	Critically Endangered Taxa which at a particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
E	Endangered Taxa which is not critically endangered and it is facing a very high risk of extinction in the wild in the immediate or near future, as determined in accordance with the prescribed criteria.
V	Vulnerable Taxa which is not critically endangered or endangered and is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
CD	Conservation Dependent Taxa which at a particular time if, at that time, the species is the focus of a specific conservation programme, the cessation of which would result in the species becoming vulnerable, endangered or critically endangered within a period of 5 years.

Table A.3 – Definition of codes for Threatened Ecological Communities

Code	Definition
PD: Presumed Totally Destroyed	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. An ecological community will be listed as presumed totally destroyed if there are no recent records of the community being extant
CR: Critically Endangered	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. An ecological community will be listed as Critically Endangered when it has been adequately surveyed and is found to be facing an extremely high risk of total destruction in the immediate future.
EN: Endangered	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. An ecological community will be listed as Endangered when it has been adequately surveyed and is not Critically Endangered but is facing a very high risk of total destruction in the near future.
VU: Vulnerable	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. An ecological community will be listed as Vulnerable when it has been adequately surveyed and is not Critically Endangered or Endangered but is facing a high risk of total destruction or significant modification in the medium to long-term future.

Table A.4 – Definition of codes for Priority Ecological Communities

Code	Definition
P1: Priority One	Ecological communities with apparently few, small occurrences, all or most not actively managed for conservation (e.g. within agricultural or Pastoral lands, urban areas, active mineral leases) and for which current threats exist. Communities may be included if they are comparatively well-known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under immediate threat from known threatening processes across their range.
P2: Priority Two	Communities that are known from few small occurrences, all or most of which are actively managed for conservation (e.g. within national parks, conservation parks, nature reserves, State forest, unallocated Crown land, water reserves, etc.) and not under imminent threat of destruction or degradation. Communities may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under threat from known threatening processes.
P3: Priority Three	<p>(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:</p> <p>(ii) Communities known from a few widespread occurrences, which are either large or within significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat, or;</p> <p>(iii) Communities made up of large, and/or widespread occurrences that may or not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, and inappropriate fire regimes.</p> <p>Communities may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and/or are not well defined, and known threatening processes exist that could affect them.</p>
P4: Priority Four	<p>Ecological communities that are adequately known, Rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. These communities require regular monitoring.</p> <p>(a) Rare. Ecological communities known from few occurrences 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 communities are usually represented on conservation lands.</p> <p>(b) Near Threatened. Ecological communities that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable.</p> <p>(c) Ecological communities that have been removed from the list of threatened communities during the past five years.</p> <p>P5: Priority Five Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.</p>
P5: Priority Five	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 B: DPaW and EPBC Database Search

Taxon name and conservation status	Databases ¹⁾	
	DPaW	EPBC
THREATENED		
<i>Acacia imitans</i>	✓	
<i>Adenanthos eyrie</i>		✓
<i>Anigozanthus bicolor ssp minor</i>		✓
<i>Caladenia huegelii</i>		✓
<i>Conostylis lepidospermoides</i>		✓
<i>Darwinia masonii</i>	✓	
<i>Eremophila denticulata subsp. trisulcata</i>	✓	✓
<i>Eremophila lacta</i>	✓	✓
<i>Eremophila subteretifolia</i>		✓
<i>Eucalyptus insularis</i>		✓
<i>Eucalyptus merrickiae</i>	✓	✓
<i>Kennedia glabrata</i>		✓
<i>Lambertia echinata ssp echinata</i>		✓
<i>Lepidium catapycnon</i>	✓	
<i>Lepidosperma gibsonii</i>	✓	
<i>Myoporum turbinatum</i>	✓	✓
<i>Ricinocarpos trichophorus</i>		✓
PRIORITY 1		
<i>Acacia cerastes</i>	✓	
<i>Acacia diaphana</i>	✓	
<i>Acacia diminuta</i>	✓	
<i>Acacia karina</i>	✓	
<i>Astus duomilius</i>	✓	
<i>Baeckea sp. Gibson (K.R. Newbey 11084)</i>	✓	
<i>Beyeria physaphylla</i>	✓	
<i>Boronia baeckeacea subsp. patula</i>	✓	
<i>Calotis squamigera</i>	✓	
<i>Coleanthera coelophylla</i>	✓	
<i>Darwinia sp. Gibson (R.D. Royce 3569)</i>	✓	
<i>Eremophila glabra subsp. Scaddan (C. Turley s.n. 10/11/2005)</i>	✓	
<i>Eucalyptus misella</i>	✓	
<i>Eucalyptus sp. Esperance (M.E. French 1579)</i>	✓	
<i>Gastrolobium involutum</i>	✓	
<i>Goodenia turleyae</i>	✓	
<i>Grammosolen sp. Mt Ridley (W.R. Archer 1210911)</i>	✓	
<i>Grevillea scabrada</i>	✓	
<i>Hydrocotyle sp. Truslove (M.A. Burgman 4419)</i>	✓	
<i>Hydrocotyle sp. Vigintimilia (P.G. Wilson 7940)</i>	✓	
<i>Leucopogon rugulosus</i>	✓	
<i>Maireana sp. Patience (C.P. Campbell 1052)</i>	✓	
<i>Mitrasacme katjarranka</i>	✓	
<i>Philothea eremicola</i>	✓	
<i>Pimelea pelinos</i>	✓	
<i>Scaevola archeriana</i>	✓	
PRIORITY 2		

Taxon name and conservation status	Databases ¹⁾	
	DPaW	EPBC
<i>Aotus sp. Dundas (M.A. Burgman 2835)</i>	✓	
<i>Astroloma sp. Grass Patch (A.J.G. Wilson 110)</i>	✓	
<i>Conostephium uncinatum</i>	✓	
<i>Darwinia luehmannii</i>	✓	
<i>Darwinia sp. Mt Ragged (S. Barrett 663)</i>	✓	
<i>Daviesia newbeyi</i>	✓	
<i>Dicladantha glabra</i>	✓	
<i>Drosera salina</i>	✓	
<i>Eremophila sp. Young Range (Desert Dreaming Expedition 93)</i>	✓	
<i>Gompholobium karjini</i>	✓	
<i>Goodenia virgata</i>	✓	
<i>Halgania sp. Peak Eleanora (M.A. Burgman 3547 B)</i>	✓	
<i>Hydrocotyle sp. Decipiens (G.J. Keighery 463)</i>	✓	
<i>Melaleuca eximia</i>	✓	
<i>Melaleuca viminea subsp. appressa</i>	✓	
<i>Olearia laciniifolia</i>	✓	
<i>Persoonia spathulata</i>	✓	
<i>Pterostylis sp. striped sepal greenhood (G. Brockman GBB355)</i>	✓	
<i>Pultenaea brachyphylla</i>	✓	
<i>Tecticornia indefessa</i>	✓	
<i>Thysanotus sp. Desert East of Newman (R.P. Hart 964)</i>	✓	
PRIORITY 3		
<i>Acacia bartlei</i>	✓	
<i>Acacia euthyphylla</i>	✓	
<i>Acacia glaucissima</i>	✓	
<i>Acacia improcera</i>	✓	
<i>Bossiaea flexuosa</i>	✓	
<i>Brachyloma mogin</i>	✓	
<i>Calytrix plumulosa</i>	✓	
<i>Comesperma calcicola</i>	✓	
<i>Commersonia rotundifolia</i>	✓	
<i>Conostephium marchantiorum</i>	✓	
<i>Dampiera atriplicina</i>	✓	
<i>Daviesia pauciflora</i>	✓	
<i>Eragrostis lanicaulis</i>	✓	
<i>Eremophila chamaephila</i>	✓	
<i>Eremophila compressa</i>	✓	
<i>Eucalyptus creta</i>	✓	
<i>Eucalyptus famelica</i>	✓	
<i>Eucalyptus foliosa</i>	✓	
<i>Eucalyptus semiglobosa</i>	✓	
<i>Goodenia laevis subsp. laevis</i>	✓	
<i>Goodenia modesta</i>	✓	
<i>Goodenia perryi</i>	✓	
<i>Grevillea subtiliflora</i>	✓	
<i>Hibbertia sp. Mt Gibson (R.D. Hoogland 12002)</i>	✓	

Taxon name and conservation status	Databases ¹⁾	
	DPaW	EPBC
<i>Isopogon alpicornis</i>	✓	
<i>Korthalsella leucothrix</i>	✓	
<i>Kunzea salina</i>	✓	
<i>Leucopogon rotundifolius</i>	✓	
<i>Melaleuca dempta</i>	✓	
<i>Micromyrtus elobata</i> subsp. <i>scopula</i>	✓	
<i>Microseris scapigera</i>	✓	
<i>Persoonia cymbifolia</i>	✓	
<i>Persoonia scabra</i>	✓	
<i>Pityrodia chrysocalyx</i>	✓	
<i>Pododthea uniseta</i>	✓	
<i>Rhodanthe collina</i>	✓	
<i>Trachymene anisocarpa</i> var. <i>trichocarpa</i>	✓	
<i>Verticordia venusta</i>	✓	
PRIORITY 4		
<i>Adenanthos ileticos</i>	✓	
<i>Darwinia polycephala</i>	✓	
<i>Darwinia</i> sp. Mt Burdett (N.G. Marchant 80/42)	✓	
<i>Eremophila magnifica</i> subsp. <i>magnifica</i>	✓	
<i>Eremophila serpens</i>	✓	
<i>Eucalyptus dolichorhyncha</i>	✓	
<i>Grevillea aneura</i>	✓	
<i>Grevillea baxteri</i>	✓	
<i>Gyrostemon ditrigynus</i>	✓	
<i>Haegiela tatei</i>	✓	
<i>Melaleuca fissurata</i>	✓	
<i>Stachystemon vinosus</i>	✓	

DPaW: Combined DPaW databases include Threatened (Declared Rare) and Priority Flora database, Threatened and Priority Flora List and Western Australian Herbarium Database; EPBC: EPBC Act Protected Matters Search Report (2015c).

Appendix C: Vascular Flora Species within Study Area

FAMILY	SPECIES	STATUS
Aizoaceae	*Carpobrotus aequilaterus	Introduced
Apiaceae	<i>Platysace trachymenioides</i>	
Apocynaceae	<i>Alyxia buxifolia</i>	
Araliaceae	<i>Trachymene cyanopetala</i>	
	<i>Trachymene</i> sp. (sterile)	
Asparagaceae	<i>Lomandra effusa</i>	
	<i>Lomandra micrantha</i> ssp. <i>teretifolia</i>	
	<i>Thysanotus patersonii</i>	
Asphodelaceae	<i>Bulbine semibarbata</i>	
Asteraceae	*Arctotheca calendula	Introduced
	<i>Argentipallium tephrodes</i>	
	<i>Blennospora drummondii</i>	
	<i>Brachyscome ciliaris</i>	
	<i>Brachyscome lineariloba</i>	
	*Carduus pycnocephalus	Introduced
	<i>Ceratogyne obionoides</i>	
	<i>Cotula cotuloides</i>	
	<i>Helichrysum leucopsidium</i>	
	<i>Hyalochlamys globifera</i>	
	<i>Hydrocotyle medicaginoides</i>	
	*Hypochaeris glabra	Introduced
	<i>Millotia major</i>	
	<i>Millotia tenuifolia</i> var. <i>tenuifolia</i>	
	<i>Olearia muelleri</i>	
	<i>Podolepis capillaris</i>	
	<i>Pogonolepis stricta</i>	
	<i>Rhodanthe laevis</i>	
	<i>Senecio glossanthus</i>	
	<i>Senecio pinnatifolius</i> var. <i>pinnatifolius</i>	
<i>Senecio spanomerus</i>		
<i>Siloxerus multiflorus</i>		
<i>Siloxerus pygmaeus</i>		
*Ursinia anthemoides	Introduced	
<i>Waitzia acuminata</i> var. <i>acuminata</i>		
Boraginaceae	<i>Halgania andromedifolia</i>	
Brassicaceae	*Hornungia procumbens	Introduced
Campanulaceae	<i>Wahlenbergia gracilentia</i>	
Casuarinaceae	<i>Allocasuarina campestris</i>	
Celastraceae	<i>Stackhousia monogyna</i>	
Centrolepidaceae	<i>Centrolepis polygyna</i>	
Chenopodiaceae	<i>Atriplex spongiosa</i>	
	<i>Atriplex vesicaria</i>	
	<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	
	<i>Maireana amoena</i>	
	<i>Maireana erioclada</i>	
	<i>Maireana oppositifolia</i>	
	<i>Rhagodia crassifolia</i>	

FAMILY	SPECIES	STATUS
	<i>Sarcocornia blackiana</i>	
	<i>Sclerolaena diacantha</i>	
	<i>Sclerolaena uniflora</i>	
	<i>Tecticornia halocnemoides</i>	
	<i>Tecticornia lorae</i>	
	<i>Tecticornia lylei</i>	
	<i>Tecticornia syncarpa</i>	
Colchicaceae	<i>Wurmbea sinora</i>	
Crassulaceae	<i>Crassula colligata</i> ssp. <i>lamprosperma</i>	
	<i>Crassula colorata</i> var. <i>acuminata</i>	
	<i>Crassula exserta</i>	
Cupressaceae	<i>Callitris roei</i>	
Cyperaceae	<i>Cyathochaeta equitans</i>	
	<i>Gahnia</i> sp. L (K.R. Newbey 7888)	
	<i>Lepidosperma brunonianum</i>	
	<i>Lepidosperma</i> ? <i>drummondii</i>	
	<i>Lepidosperma</i> sp. Bandalup Scabrid (N. Eveleigh 10798)	
	<i>Schoenus</i> sp. G Broad Sheath (K.L. Wilson 2633)	
Dilleniaceae	<i>Hibbertia gracilipes</i>	
	<i>Hibbertia psilocarpa</i>	
	<i>Hibbertia pungens</i>	
	<i>Hibbertia rostellata</i>	
Droseraceae	<i>Drosera macrantha</i> ssp. <i>macrantha</i>	
Ericaceae	<i>Conostephium drummondii</i>	
	<i>Leucopogon brevicuspis</i>	
	<i>Leucopogon canaliculatus</i>	
	<i>Leucopogon fimbriatus</i>	
	<i>Leucopogon</i> sp. Kau Rock (M.A. Burgman 1126)	
	<i>Leucopogon</i> sp. Mount Heywood (M.A. Burgman 1211)	
	<i>Lissanthe rubicunda</i>	
	<i>Lysinema pentapetalum</i>	
Euphorbiaceae	<i>Monotaxis paxii</i>	
Fabaceae	<i>Acacia ancistrophylla</i> var. <i>ancistrophylla</i>	
	<i>Acacia bracteolata</i>	
	<i>Acacia euthyphylla</i>	
	<i>Acacia fragilis</i>	
	<i>Acacia glaucissima</i>	Priority 3 (P3)
	<i>Acacia mutabilis</i> ssp. <i>mutabilis</i>	
	<i>Acacia patagiata</i>	
	<i>Acacia pritzeliana</i>	
	<i>Acacia sulcata</i> var. <i>platyphylla</i>	
	<i>Acacia triptycha</i>	
	<i>Acrotriche</i> sp. Israelite Bay (M. Hislop & F. Hort MH2630)	
	<i>Aotus</i> sp. Esperance (P.G. Wilson 7904)	
	<i>Bossiaea barbarae</i>	
	<i>Bossiaea leptacantha</i>	
<i>Daviesia benthamii</i> ssp. <i>acanthoclona</i>		

FAMILY	SPECIES	STATUS
	<i>Dillwynia acerosa</i>	
	<i>Gastrolobium discolor</i>	
Frankeniaceae	<i>Frankenia sessilis</i>	
	<i>Frankenia tetrapetala</i>	
Goodeniaceae	<i>Scaevola myrtifolia</i>	
	<i>Scaevola spinescens</i>	
Haloragaceae	<i>Glischrocaryon aureum</i>	
	Gonocarpus pycnostachyus	Priority 3 (P3)
	<i>Gunniopsis quadrifida</i>	
	<i>Gunniopsis septifraga</i>	
Hemerocallidaceae	<i>Dianella brevicaulis</i>	
	<i>Dianella revoluta</i>	
Juncaginaceae	<i>Triglochin isingiana</i>	
	<i>Triglochin mucronata</i>	
Lamiaceae	<i>Teucrium eremaeum</i>	
	<i>Westringia rigida</i>	
Lauraceae	<i>Cassytha melantha</i>	
Loganiaceae	<i>Logania stenophylla</i>	
Malvaceae	<i>Lawrenzia squamata</i>	
Myrtaceae	<i>Baeckea crispiflora</i> var. <i>icosandra</i>	
	<i>Baeckea uncinella</i>	
	<i>Calytrix duplistipulata</i>	
	<i>Calytrix tetragona</i>	
	<i>Cyathostemon blackettii</i>	
	<i>Cyathostemon tenuifolius</i>	
	<i>Darwinia polycephala</i> (P4)	
	<i>Darwinia</i> sp. Karonie (K.Newbey 8503)	
	<i>Eucalyptus brachycalyx</i>	
	<i>Eucalyptus ?ceratocorys</i>	Range Extension
	<i>Eucalyptus congoblata</i> ssp. <i>perata</i>	
	<i>Eucalyptus eremophila</i> ssp. <i>eremophila</i>	
	<i>Eucalyptus flocktoniae</i> ssp. <i>flocktoniae</i>	
	<i>Eucalyptus forrestiana</i>	
	<i>Eucalyptus fraseri</i> ssp. <i>fraseri</i>	
	<i>Eucalyptus gracilis</i>	
	<i>Eucalyptus kessellii</i>	
	<i>Eucalyptus leptocalyx</i>	
	<i>Eucalyptus merrickiae</i>	Threatened (T)
	<i>Eucalyptus ?oleosa</i> ssp. <i>oleosa</i>	
	<i>Eucalyptus platycorys</i>	
	<i>Eucalyptus tumida</i>	
	<i>Eucalyptus uncinata</i>	
	<i>Melaleuca acuminata</i> ssp. <i>acuminata</i>	
	<i>Melaleuca brevifolia</i>	
	<i>Melaleuca bromelioides</i>	
<i>Melaleuca fissurata</i>	Priority 4 (P4)	
<i>Melaleuca glaberrima</i>		

FAMILY	SPECIES	STATUS
	<i>Melaleuca linguiformis</i>	
	<i>Melaleuca podiocarpa</i>	
	<i>Melaleuca pulchella</i>	
	<i>Melaleuca quadrifaria</i>	
	<i>Melaleuca rigidifolia</i>	
	<i>Melaleuca sapientes</i>	
	<i>Melaleuca subularis</i>	
	<i>Melaleuca teuthidoides</i>	
	<i>Melaleuca thyoides</i>	
	<i>Melaleuca tuberculata</i> var. <i>macrophylla</i>	
	<i>Melaleuca uncinata</i>	
	<i>Micromyrtus elobata</i> ssp. <i>scopula</i>	Priority 3 (P3)
	<i>Phymatocarpus maxwellii</i>	
	<i>Rinzia communis</i>	
Orchidaceae	<i>Caladenia attingens</i> ssp. <i>gracillima</i>	
	<i>Caladenia brevisura</i>	
	<i>Caladenia reptans</i>	
	<i>Calandrinia eremaea</i>	
	? <i>Prasophyllum</i> sp. (in bud)	
	<i>Pterostylis sargentii</i>	
	<i>Pterostylis</i> sp.	
Oxalidaceae	<i>Oxalis perennans</i>	
Phyllanthaceae	<i>Boronia baeckeacea</i> ssp. <i>baeckeacea</i>	
	<i>Boronia baeckeacea</i> ssp. <i>patula</i>	Priority 1 (P1)
	<i>Boronia crassifolia</i>	
	<i>Boronia inornata</i> ssp. <i>leptophylla</i>	
	<i>Poranthera microphylla</i>	
Pittosporaceae	<i>Billardiera coriacea</i>	
Plantaginaceae	<i>Plantago debilis</i>	
Poaceae	<i>Austrostipa hemipogon</i>	
	<i>Austrostipa juncifolia</i>	
	<i>Austrostipa</i> sp. (sterile)	
	<i>Austrostipa trichophylla</i>	
	<i>Neurachne alopecuroidea</i>	
	?*<i>Parapholis incurva</i>	Introduced
	* <i>Pentameris airoides</i> ssp. <i>airoides</i>	
	<i>Rytidosperma setaceum</i>	
	*<i>Schismus barbatus</i>	Introduced
<i>Comesperma integerrimum</i>		
Polygalaceae	? <i>Potamogeton</i> sp. (poor material)	
Potamogetonaceae	*<i>Lysimachia arvensis</i>	Introduced
Primulaceae	<i>Adenanthos ileticos</i>	Priority 4 (P4)
Proteaceae	<i>Banksia media</i>	
	<i>Grevillea huegelii</i>	
	<i>Grevillea oligantha</i>	
	<i>Grevillea plurijuga</i> ssp. <i>superba</i>	
	<i>Hakea adnata</i>	

FAMILY	SPECIES	STATUS
	<i>Hakea cinerea</i>	
	<i>Hakea laurina</i>	
	<i>Hakea lissocarpha</i>	
	<i>Hakea pandanicaarpa ssp pandanicaarpa</i>	
	<i>Hakea preissii</i>	
	<i>Persoonia cymbifolia</i>	Priority 3 (P3)
	<i>Persoonia teretifolia</i>	
Restionaceae	<i>Hypolaena humilis</i>	
Rhamnaceae	<i>Cryptandra minutifolia</i>	
	<i>Cryptandra recurva</i>	
	<i>Pomaderris rotundifolia</i>	
Rutaceae	<i>Geijera linearifolia</i>	
	<i>Microcybe multiflora ssp. multiflora</i>	
	<i>Phebalium lepidotum</i>	
	<i>Phebalium obovatum</i>	Range Extension
	<i>Philothea fitzgeraldii</i>	
	<i>Exocarpos aphyllus</i>	
	<i>Exocarpos sparteus</i>	
Santalaceae	<i>Leptomeria pachyclada</i>	
	<i>Satanlum acuminatum</i>	
Sapindaceae	<i>Dodonaea amblyophylla</i>	
	<i>Dodonaea stenozyga</i>	
	<i>Dodonaea viscosa ssp. angustissima</i>	
Scrophulariaceae	<i>Eremophila decipiens ssp. decipiens</i>	
	<i>Eremophila deserti</i>	
	<i>Eremophila dichroantha</i>	
	<i>Eremophila psilocalyx</i>	
Solanaceae	<i>Solanum symonii</i>	
Thymelaeaceae	<i>Pimelea</i> sp. (sterile)	
Zygophyllaceae	<i>Zygophyllum glaucum</i>	

Appendix D: Vegetation Communities (Plates)



Plate 8: Community A



Plate 9: Community B



Plate 10: Community C



Plate 11: Community D



Plate 12: Community E



Plate 13: Community F



Plate 14: Community G



Plate 15: Community H



Plate 16: Community I



Plate 17: Community J



Plate 18: Community K

Appendix E: Summary of Qualitative Quadrat Data within Study Area

Rec #	COLL NO	SPECIES	HEIGHT (m)	COVER (%)	Q
1	GM33	<i>Acacia patagiata</i>	0.4	4	Q01
2	GM27	<i>Allocasuarina campestris</i>	1.7	0.5	Q01
3	GM31	<i>Baeckea uncinella</i>	0.8	10	Q01
4	GM23	<i>Cyathostemon tenuifolius</i>	1.6	15	Q01
5	GM09	<i>Darwinia polycephala</i> (P4)	0.4	5	Q01
6	GM26	<i>Eucalyptus eremophila</i> ssp. <i>eremophila</i>	5	2	Q01
7	GM15	<i>Hibbertia pungens</i>	0.3	2	Q01
8	GM28	<i>Lepidosperma</i> sp. Bandalup Scabrid (N. Eveleigh 10798)	0.7	0.5	Q01
9	GM29	<i>Melaleuca thyoides</i>	0.5	4	Q01
10	GM30	<i>Melaleuca uncinata</i>	2.1	15	Q01
11	GM39	<i>Phebalium lepidotum</i>	0.6	1	Q01
12	GM84	<i>Gunniopsis septifraga</i>	ASSO	ASSO	Q01
13	GM36	<i>Melaleuca acuminata</i> ssp. <i>acuminata</i>	ASSO	ASSO	Q01
14	GM08	<i>Melaleuca teuthidoides</i>	ASSO	ASSO	Q01
15	GM37	<i>Neurachne alopecuroidea</i>	ASSO	ASSO	Q01
16	GM54	<i>Thysanotus patersonii</i>	ASSO	ASSO	Q01
17	GM02 & GM35	<i>Eucalyptus kessellii</i>	5	10	Q02
18	GM24	<i>Hakea laurina</i>	3.5	0.5	Q02
19	GM20	<i>Banksia media</i>	2.3	2	Q02
20	GM41	<i>Callitris roei</i>	2	0.5	Q02
21	GM13	<i>Acacia fragilis</i>	2	6	Q02
22	GM08	<i>Melaleuca teuthidoides</i>	1.6	10	Q02
23	GM38	<i>Grevillea plurijuga</i> ssp. <i>superba</i>	1.6	1	Q02
24	GM30	<i>Melaleuca uncinata</i>	1.5	5	Q02
25	GM43	<i>Melaleuca pulchella</i>	1.5	3	Q02
26	GM46	<i>Hakea pandanica</i> ssp. <i>pandanica</i>	1.5	2	Q02
27	GM14	<i>Phymatocarpus maxwellii</i>	1	30	Q02
28	GM21	<i>Hakea cinerea</i>	1	2	Q02
29	GM10	<i>Gastrolobium discolor</i>	1	5	Q02
30	GM42	<i>Dillwynia acerosa</i>	1	5	Q02
31	GM48	<i>Daviesia benthamii</i> ssp. <i>acanthoclona</i>	1	0.5	Q02
32	GM12	<i>Acacia patagiata</i>	0.7	2	Q02
33	GM44	<i>Lysinema pentapetalum</i>	0.5	0.5	Q02
34	GM15	<i>Hibbertia pungens</i>	0.5	0.5	Q02
35	GM47	<i>Acrotriche</i> sp. Israelite Bay (M. Hislop & F. Hort MH2630)	0.5	0.5	Q02
36	GM53	<i>Gahnia</i> sp. L (K.R. Newbey 7888)	0.4	0.5	Q02
37	GM09	<i>Darwinia polycephala</i> (P4)	0.3	2	Q02
38	GM23	<i>Cyathostemon tenuifolius</i>	0.3	1	Q02
39	GM11	<i>Cryptandra recurva</i>	0.3	0.5	Q02
40	GM16	<i>Baeckea crispiflora</i> var. <i>icosandra</i>	0.3	1	Q02
41	GM45	<i>Acacia mutabilis</i> ssp. <i>mutabilis</i>	ASSO	ASSO	Q02
42	GM49	<i>Leptomeria pachyclada</i>	ASSO	ASSO	Q02
43	GM50	<i>Conostephium drummondii</i>	ASSO	ASSO	Q02
44	GM51	<i>Lepidosperma</i> sp. Bandalup Scabrid (N. Eveleigh 10798)	ASSO	ASSO	Q02
45	GM56	<i>Grevillea huegelii</i>	ASSO	ASSO	Q02
46	GM57	<i>Pomaderris rotundifolia</i>	ASSO	ASSO	Q02
47	GM52	<i>Olearia muelleri</i>	ASSO	ASSO	Q02

Rec #	COLL NO	SPECIES	HEIGHT (m)	COVER (%)	Q
48	GM58	<i>Halgania andromedifolia</i>	ASSO	ASSO	Q02
49	GM59	<i>Persoonia teretifolia</i>	ASSO	ASSO	Q02
50	GM60	<i>Hibbertia rostellata</i>	ASSO	ASSO	Q02
51	GM61	<i>Exocarpos aphyllus</i>	ASSO	ASSO	Q02
52	GM62	<i>Pterostylis sargentii</i>	ASSO	ASSO	Q02
53	GM233	<i>Eremophila dichroantha</i>	ASSO	ASSO	Q02
54	GM22	<i>Eucalyptus tumida</i>	6	6	Q03
55	GM63	<i>Eucalyptus congoblata ssp perata</i>	4	10	Q03
56	GM64	<i>Eucalyptus leptocalyx</i>	3	4	Q03
57	GM04	<i>Melaleuca podiocarpa</i>	2.5	3	Q03
58	GM03	<i>Melaleuca bromelioides</i>	1.6	50	Q03
59	GM05	<i>Melaleuca rigidifolia</i>	1.6	30	Q03
60	GM61	<i>Exocarpos aphyllus</i>	1.6	3	Q03
61	GM30	<i>Melaleuca uncinata</i>	1.5	10	Q03
62	GM38	<i>Grevillea plurijuga ssp superba</i>	1.5	1.5	Q03
63	GM45	<i>Acacia mutabilis ssp mutabilis</i>	1	0.5	Q03
64	GM48	<i>Daviesia benthamii ssp acanthoclona</i>	0.6	2	Q03
65	GM69	<i>Leucopogon</i> sp. Kau Rock (M.A. Burgman 1126)	0.6	0.5	Q03
66	GM23	<i>Cyathostemon tenuifolius</i>	0.5	1	Q03
67	GM68	<i>Acacia sulcata</i> var. <i>platyphylla</i>	0.5	0.5	Q03
68	GM65	<i>Cryptandra minutifolia</i>	0.5	0.5	Q03
69	GM67	<i>Eremophila dichroantha</i>	0.5	0.5	Q03
70	GM19	<i>Boronia inornata ssp. leptophylla</i>	0.3	2	Q03
71	GM42	<i>Dillwynia acerosa</i>	0.3	0.5	Q03
72	GM15	<i>Hibbertia pungens</i>	0.3	0.5	Q03
73	GM66	<i>Acacia sulcata</i> var. <i>platyphylla</i>	0.2	0.5	Q03
74	GM60	<i>Hibbertia rostellata</i>	0.2	0.5	Q03
75	GM40	<i>Cassytha melantha</i>	C	0.5	Q03
76	GM58	<i>Halgania andromedifolia</i>	ASSO	ASSO	Q03
77	GM01	<i>Eucalyptus forrestiana</i>	ASSO	ASSO	Q03
78	GM21	<i>Hakea cinerea</i>	ASSO	ASSO	Q03
79	GM70	<i>Bulbine semibarbata</i>	ASSO	ASSO	Q03
80	GM71	<i>Rytidosperma setaceum</i>	ASSO	ASSO	Q03
81	GM72	<i>Scaevola myrtifolia</i>	ASSO	ASSO	Q03
82	GM73	<i>Acacia pritzeliana</i>	ASSO	ASSO	Q03
83		*Arctotheca calendula	ASSO	ASSO	Q03
84	GM40	<i>Cassytha melantha</i>	C	0.5	Q04
85	GM64	<i>Eucalyptus leptocalyx</i>	5	2	Q04
86	GM74	<i>Eucalyptus uncinata</i>	4	5	Q04
87	GM20	<i>Banksia media</i>	2.5	2	Q04
88	GM77	<i>Melaleuca rigidifolia</i>	1.6	10	Q04
89	GM75	<i>Melaleuca glaberrima</i>	1.5	50	Q04
90	GM14	<i>Phymatocarpus maxwellii</i>	1.5	10	Q04
91	GM21	<i>Hakea cinerea</i>	1.5	2	Q04
92	GM81	<i>Grevillea oligantha</i>	1.4	0.5	Q04
93	GM48	<i>Daviesia benthamii ssp. acanthoclona</i>	0.8	5	Q04
94	GM49	<i>Leptomeria pachyclada</i>	0.8	1	Q04
95	GM42	<i>Dillwynia acerosa</i>	0.8	0.5	Q04
96	GM78	<i>Leucopogon fimbriatus</i>	0.6	0.5	Q04
97	GM79	<i>Hibbertia gracilipes</i>	0.4	0.5	Q04

Rec #	COLL NO	SPECIES	HEIGHT (m)	COVER (%)	Q
98	GM76	<i>Leucopogon canaliculatus</i>	0.4	0.5	Q04
99	GM16	<i>Baeckea crispiflora</i> var. <i>icosandra</i>	0.3	0.5	Q04
100	GM80	<i>Gahnia</i> sp. L (K.R. Newbey 7888)	0.3	0.5	Q04
101	GM15	<i>Hibbertia pungens</i>	0.3	0.5	Q04
102	GM19	<i>Boronia inornata</i> ssp <i>leptophylla</i>	0.2	0.5	Q04
103	GM51	<i>Lepidosperma</i> sp. Bandalup Scabrid (N. Eveleigh 10798)	0.2	0.5	Q04
104	GM33	<i>Acacia patagiata</i>	ASSO	ASSO	Q04
105	GM01	<i>Eucalyptus forrestiana</i>	ASSO	ASSO	Q04
106	GM02	<i>Eucalyptus kessellii</i>	ASSO	ASSO	Q04
107	GM04	<i>Melaleuca podiocarpa</i>	ASSO	ASSO	Q04
108	GM120	<i>Acacia mutabilis</i> ssp <i>mutabilis</i>	ASSO	ASSO	Q04
109	GM122	<i>Boronia crassifolia</i>	ASSO	ASSO	Q04
110	GM123	<i>Acacia pritzeliana</i>	ASSO	ASSO	Q04
111	GM13	<i>Acacia fragilis</i>	ASSO	ASSO	Q04
112	GM15	<i>Hibbertia pungens</i>	ASSO	ASSO	Q04
113	GM16	<i>Baeckea crispiflora</i> var. <i>icosandra</i>	ASSO	ASSO	Q04
114	GM20	<i>Banksia media</i>	ASSO	ASSO	Q04
115	GM38	<i>Grevillea plurijuga</i> ssp. <i>superba</i>	ASSO	ASSO	Q04
116	GM59	<i>Persoonia teretifolia</i>	ASSO	ASSO	Q04
117	GM72	<i>Scaevola myrtifolia</i>	ASSO	ASSO	Q04
118	GM82	<i>Darwinia polycephala</i> (P4)	ASSO	ASSO	Q04
119	GM83	<i>Dianella brevicaulis</i>	ASSO	ASSO	Q04
120	KJ03	<i>Billardiera coriacea</i>	C	0.5	Q05
121	GM64	<i>Eucalyptus leptocalyx</i>	8	10	Q05
122	GM04	<i>Melaleuca podiocarpa</i>	2.5	20	Q05
123	GM05	<i>Melaleuca rigidifolia</i>	2	50	Q05
124	GM03	<i>Melaleuca bromelioides</i>	2	10	Q05
125	GM23	<i>Cyathostemon tenuifolius</i>	0.5	1	Q05
126	GM42	<i>Dillwynia acerosa</i>	0.5	0.5	Q05
127	GM48	<i>Daviesia benthamii</i> ssp. <i>acanthoclona</i>	0.4	1	Q05
128	KJ02	<i>Lissanthe rubicunda</i>	0.3	0.5	Q05
129	KJ04	<i>Acacia mutabilis</i> ssp <i>mutabilis</i>	0.2	0.5	Q05
130	KJ01	<i>Gahnia</i> sp. L (K.R. Newbey 7888)	0.2	0.5	Q05
131	GM02	<i>Eucalyptus kessellii</i>	3	5	Q06
132	GM07	<i>Melaleuca brevifolia</i>	1	3	Q06
133	GM09	<i>Darwinia polycephala</i> (P4)	0.15	1	Q06
134	GM14	<i>phymatocarpus maxwellii</i>	1.3	20	Q06
135	GM20	<i>Banksia media</i>	2.5	10	Q06
136	GM23	<i>Cyathostemon tenuifolius</i>	1	2	Q06
137	GM36	<i>Melaleuca acuminata</i> ssp. <i>acuminata</i>	1.2	1	Q06
138	GM40	<i>Cassytha melantha</i>	C	2	Q06
139	GM48	<i>Daviesia benthamii</i> ssp. <i>acanthoclona</i>	1	2	Q06
140	GM63	<i>Eucalyptus congoblata</i> ssp. <i>perata</i>	5	2	Q06
141	GM66	<i>Acacia sulcata</i> var. <i>platyphylla</i>	0.1	1	Q06
142	JG03	<i>Baeckea crispiflora</i> var. <i>icosandra</i>	0.5	5	Q06
143	JG05	<i>Gahnia</i> sp. L (K.R. Newbey 7888)	0.1	1	Q06
144	GM21	<i>Hakea cinerea</i>	ASSO	ASSO	Q06
145	GM05	<i>Melaleuca dominant</i>	ASSO	ASSO	Q06
146	GM47	<i>Acrotriche</i> sp. Israelite Bay (M. Hislop & F. Hort MH2630)	ASSO	ASSO	Q06

Rec #	COLL NO	SPECIES	HEIGHT (m)	COVER (%)	Q
147	GM59	<i>Persoonia teretifolia</i>	ASSO	ASSO	Q06
148	JG06	<i>Gahnia</i> sp. L (K.R. Newbey 7888)	ASSO	ASSO	Q06
149	JG07	<i>Hibbertia gracilipes</i>	ASSO	ASSO	Q06
150	GM40	<i>Cassythia melantha</i>	C	0.5	Q07
151	GM54	<i>Thysanotus patersonii</i>	C	0.5	Q07
152	GM91	<i>Eucalyptus gracilis</i>	4	10	Q07
153	GM63	<i>Eucalyptus congoblata</i> ssp. <i>perata</i>	4	8	Q07
154	GM74	<i>Eucalyptus uncinata</i>	3.5	3	Q07
155	GM01	<i>Eucalyptus forrestiana</i>	3	3	Q07
156	GM88	<i>Eucalyptus eremophila</i> ssp. <i>eremophila</i>	3	2	Q07
157	GM93	<i>Melaleuca teuthidoides</i>	1.6	15	Q07
158	GM77	<i>Melaleuca rigidifolia</i>	1.6	8	Q07
159	GM03	<i>Melaleuca bromelioides</i>	1.5	15	Q07
160	GM04	<i>Melaleuca podiocarpa</i>	1.5	10	Q07
161	GM38	<i>Grevillea plurijuga</i> ssp. <i>superba</i>	1.5	0.5	Q07
162	GM23	<i>Cyathostemon tenuifolius</i>	0.8	5	Q07
163	GM42	<i>Dillwynia acerosa</i>	0.7	0.5	Q07
164	GM60	<i>Hibbertia rostellata</i>	0.5	1	Q07
165	GM120	<i>Acacia mutabilis</i> ssp. <i>mutabilis</i>	0.5	0.5	Q07
166	KJ03	<i>Billardiera coriacea</i>	0.5	0.5	Q07
167	GM48	<i>Daviesia benthamii</i> ssp. <i>acanthoclona</i>	0.4	8	Q07
168	GM18	<i>Melaleuca thyoides</i>	0.4	1	Q07
169	GM87	<i>Microcybe multiflora</i> ssp. <i>multiflora</i>	0.4	1	Q07
170	GM89	<i>Boronia baeckeacea</i> ssp. <i>patula</i> (P1)	0.4	0.5	Q07
171	GM94	<i>Hibbertia psilocarpa</i>	0.4	0.5	Q07
172	GM15	<i>Hibbertia pungens</i>	0.3	0.5	Q07
173	KJ02	<i>Lissanthe rubicunda</i>	0.3	0.5	Q07
174	GM65	<i>Cryptandra minutifolia</i>	0.1	0.5	Q07
175	GM54	<i>Thysanotus patersonii</i>	C	0.5	Q08
176	GM101	<i>Melaleuca thyoides</i>	1.2	30	Q08
177	GM103	<i>Baekkea uncinella</i>	1.2	5	Q08
178	GM105 & GM 106	<i>Tecticornia lylei</i> Low Sparse Heathland	0.4	5	Q08
179	GM104	<i>Leucopogon</i> sp. Mount Heywood (M.A. Burgman 1211)	0.4	0.5	Q08
180	GM102	MISSING	0.3	0.5	Q08
181	GM107	<i>Eucalyptus eremophila</i> ssp. <i>eremophila</i>	ASSO	ASSO	Q08
182	GM108	<i>Darwinia</i> sp. Karonie (K.Newbey 8503)	ASSO	ASSO	Q08
183	GM40	<i>Cassythia melantha</i>	C	0.5	Q09
184	GM02	<i>Eucalyptus kessellii</i>	4	2	Q09
185	GM38	<i>Grevillea plurijuga</i> ssp. <i>superba</i>	3.2	2	Q09
186	GM77	<i>Melaleuca rigidifolia</i>	2	15	Q09
187	GM33	<i>Acacia patagiata</i>	2	5	Q09
188	GM30	<i>Melaleuca uncinata</i>	2	1	Q09
189	GM41	<i>Callitris roei</i>	1.8	10	Q09
190	GM14	<i>Phymatocarpus maxwellii</i>	1.7	50	Q09
191	GM49	<i>Leptomeria pachyclada</i>	1.5	1	Q09
192	GM112	<i>Melaleuca pulchella</i>	1.4	0.5	Q09
193	GM42	<i>Dillwynia acerosa</i>	0.8	4	Q09
194	GM81	<i>Grevillea oligantha</i>	0.8	1	Q09
195	GM15	<i>Hibbertia pungens</i>	0.6	2	Q09

Rec #	COLL NO	SPECIES	HEIGHT (m)	COVER (%)	Q
196	GM111	<i>Conostephium drummondii</i>	0.6	0.5	Q09
197	GM28	<i>Lepidosperma</i> sp. Bandalup Scabrid (N. Eveleigh 10798)	0.6	0.5	Q09
198	GM110	<i>Hibbertia gracilipes</i>	0.5	0.5	Q09
199	GM16	<i>Baekkea crispiflora</i> var. <i>icosandra</i>	0.4	2	Q09
200	GM82	<i>Darwinia polycephala</i> (P4)	0.3	2	Q09
201	GM113	<i>Platysace trachymenioides</i>	0.2	0.5	Q09
202	GM92	<i>Eucalyptus gracilis</i>	ASSO	ASSO	Q09
203	GM01	<i>Eucalyptus forrestiana</i>	ASSO	ASSO	Q09
204	GM13	<i>Acacia fragilis</i>	ASSO	ASSO	Q09
205	GM20	<i>Banksia media</i>	ASSO	ASSO	Q09
206	GM21	<i>Hakea cinerea</i>	ASSO	ASSO	Q09
207	GM02	<i>Eucalyptus kessellii</i>	5	2	Q010
208	GM114	<i>Eucalyptus leptocalyx</i>	4.5	3	Q010
209	GM92	<i>Eucalyptus gracilis</i>	4	2	Q010
210	GM01	<i>Eucalyptus forrestiana</i>	4	1	Q010
211	GM03	<i>Melaleuca bromelioides</i>	1.6	12	Q010
212	GM115	<i>Melaleuca rigidifolia</i>	1.6	10	Q010
213	GM04	<i>Melaleuca podiocarpa</i>	1.4	10	Q010
214	GM120	<i>Acacia mutabilis</i> ssp. <i>mutabilis</i>	1.2	1	Q010
215	GM112	<i>Melaleuca pulchella</i>	1.2	0.5	Q010
216	GM23	<i>Cyathostemon tenuifolius</i>	0.8	15	Q010
217	GM10	<i>Gastrolobium discolor</i>	0.8	2	Q010
218	GM48	<i>Daviesia benthamii</i> ssp. <i>acanthoclona</i>	0.6	12	Q010
219	GM76	<i>Leucopogon canaliculatus</i>	0.6	1	Q010
220	GM81	<i>Grevillea oligantha</i>	0.6	0.5	Q010
221	GM30	<i>Melaleuca uncinata</i>	0.6	0.5	Q010
222	GM116	<i>Hibbertia psilocarpa</i>	0.4	0.5	Q010
223	GM95	<i>Hibbertia rostellata</i>	0.4	0.5	Q010
224	GM118	<i>Logania stenophylla</i>	0.4	0.5	Q010
225	GM19	<i>Boronia inornata</i> ssp. <i>leptophylla</i>	0.3	0.5	Q010
226	GM117	<i>Cryptandra minutifolia</i>	0.2	0.5	Q010
227	GM119	? <i>Bossiaea barbarae</i>	ASSO	ASSO	Q010
228	GM120	<i>Acacia mutabilis</i> ssp. <i>mutabilis</i>	ASSO	ASSO	Q010
229	GM58	<i>Halgania andromedifolia</i>	ASSO	ASSO	Q010
230	GM61	<i>Exocarpos aphyllus</i>	ASSO	ASSO	Q010
231	GM40	<i>Cassyltha melantha</i>	C	1	Q011
232	GM02 & KJ10	<i>Eucalyptus kessellii</i>	4	13	Q011
233	GM22	<i>Eucalyptus tumida</i>	4	4	Q011
234	KJ13	<i>Eucalyptus uncinata</i>	4	2	Q011
235	GM41	<i>Callitris roei</i>	2.5	5	Q011
236	KJ09	<i>Melaleuca uncinata</i>	1.8	1	Q011
237	GM14	<i>Phymatocarpus maxwellii</i>	1.7	50	Q011
238	KJ06	<i>Hakea adnata</i>	1.6	2	Q011
239	KJ07	<i>Dodonaea amblyophylla</i>	1.6	0.5	Q011
240	KJ08	<i>Hakea lissocarpha</i>	1.5	10	Q011
241	GM33	<i>Acacia patagiata</i>	1.5	3	Q011
242	KJ14	<i>Acacia sulcata</i> var. <i>platyphylla</i>	1.5	0.5	Q011
243	KJ15	<i>Melaleuca glaberrima</i>	1	5	Q011
244	GM48	<i>Daviesia benthamii</i> ssp. <i>acanthoclona</i>	1	1	Q011
245	KJ12	<i>Leucopogon fimbriatus</i>	0.5	1	Q011

Rec #	COLL NO	SPECIES	HEIGHT (m)	COVER (%)	Q
246	GM16	<i>Baeckea crispiflora</i> var. <i>icosandra</i>	0.5	0.5	Q011
247	GM23	<i>Cyathostemon tenuifolius</i>	0.5	0.5	Q011
248	KJ17	<i>Phebalium lepidotum</i>	0.5	0.5	Q011
249	KJ11	<i>Rinzia communis</i>	0.5	0.5	Q011
250	KJ18	<i>Hibbertia gracilipes</i>	0.4	0.5	Q011
251	GM09	<i>Darwinia polycephala</i> (P4)	0.3	1	Q011
252	GM28	<i>Lepidosperma</i> sp. Bandalup Scabrid (N. Eveleigh 10798)	0.3	1	Q011
253	KJ16	<i>Melaleuca rigidifolia</i>	ASSO	ASSO	Q011
254	GM38	<i>Grevillea plurijuga</i> ssp. <i>superba</i>	ASSO	ASSO	Q011
255	KJ19	<i>Hibbertia pungens</i>	ASSO	ASSO	Q011
256	KJ20	<i>Microcybe multiflora</i> ssp. <i>multiflora</i>	ASSO	ASSO	Q011
257	GM126	<i>Eucalyptus eremophila</i> ssp. <i>eremophila</i>	4	3	Q012
258	GM93	<i>Melaleuca teuthidoides</i>	2	3	Q012
259	GM125	<i>Melaleuca brevifolia</i>	1.2	2	Q012
260	GM105	<i>Tecticornia lylei</i>	0.4	4	Q012
261		*<i>Arctotheca calendula</i>	0.1	0.5	Q012
262	GM124	<i>Eremophila psilocalyx</i>	ASSO	ASSO	Q012
263	GM101	<i>Melaleuca thyoides</i>	ASSO	ASSO	Q012
264	GM226	<i>Frankenia sessilis</i>	ASSO	ASSO	Q012
265	GM227	<i>Maireana erioclada</i>	ASSO	ASSO	Q012
266	GM28	<i>Lepidosperma</i> sp. Bandalup Scabrid (N. Eveleigh 10798)	ASSO	ASSO	Q012
267	GM83	<i>Dianella brevicaulis</i>	ASSO	ASSO	Q012
268	KJ121	<i>Stackhousia monogyna</i>	ASSO	ASSO	Q012
269	KJ122	<i>Hypolaena humilis</i>	ASSO	ASSO	Q012
270	KJ123	<i>Argentipallium tephrodes</i>	ASSO	ASSO	Q012
271	GM92	<i>Eucalyptus gracilis</i>	5	6	Q013
272	GM02	<i>Eucalyptus kessellii</i>	4.5	3	Q013
273	GM41	<i>Callitris roei</i>	3	10	Q013
274	GM129	<i>Acacia fragilis</i>	3	5	Q013
275	GM05	<i>Melaleuca rigidifolia</i>	2.5	30	Q013
276	GM03	<i>Melaleuca bromelioides</i>	2.5	1	Q013
277	GM33	<i>Acacia patagiata</i>	1.5	2	Q013
278	GM23	<i>Cyathostemon tenuifolius</i>	0.8	3	Q013
279	GM16	<i>Baeckea crispiflora</i> var. <i>icosandra</i>	0.6	1	Q013
280	GM15	<i>Hibbertia pungens</i>	0.6	1	Q013
281	GM130	<i>Lepidosperma</i> ? <i>drummondii</i>	0.5	6	Q013
282	GM127	<i>Platysace trachymenioides</i>	0.5	0.5	Q013
283	GM09	<i>Darwinia polycephala</i> (P4)	0.4	40	Q013
284	GM48	<i>Daviesia benthamii</i> ssp. <i>acanthoclona</i>	0.3	0.5	Q013
285	GM34	<i>Austrostipa</i> sp. (sterile)	ASSO	ASSO	Q013
286	GM126	<i>Eucalyptus eremophila</i> ssp. <i>eremophila</i>	ASSO	ASSO	Q013
287	GM131	<i>Caladenia brevisura</i>	ASSO	ASSO	Q013
288	GM132	<i>Gonocarpus pycnostachyus</i> (P3)	ASSO	ASSO	Q013
289	GM133	<i>Caladenia brevisura</i>	ASSO	ASSO	Q013
290	GM135	<i>Bossiaea leptacantha</i>	ASSO	ASSO	Q013
291	GM136	<i>Halgania andromedifolia</i>	ASSO	ASSO	Q013
292	GM137	<i>Pomaderris rotundifolia</i>	ASSO	ASSO	Q013
293	GM138	<i>Philothea fitzgeraldii</i>	ASSO	ASSO	Q013
294	GM19	<i>Boronia inornata</i> ssp. <i>leptophylla</i>	ASSO	ASSO	Q013

Rec #	COLL NO	SPECIES	HEIGHT (m)	COVER (%)	Q
295	GM38	<i>Grevillea plurijuga</i> ssp. <i>superba</i>	ASSO	ASSO	Q013
296	GM39	<i>Phebalium lepidotum</i>	ASSO	ASSO	Q013
297	GM83	<i>Dianella brevicaulis</i>	ASSO	ASSO	Q013
298	GM150	<i>Eremophila deserti</i>	0.7	0.5	Q014
299	GM145	<i>Atriplex vesicaria</i>	0.6	50	Q014
300	GM142 & GM143	<i>Tecticornia syncarpa</i>	0.5	22	Q014
301	GM148	<i>Senecio glossanthus</i>	0.4	0.5	Q014
302	GM146	<i>Tecticornia halocnemoides</i>	0.4	0.5	Q014
303	GM139	<i>Senecio pinnatifolius</i> var. <i>pinnatifolius</i>	0.3	20	Q014
304	GM254	* <i>Carduus pycnocephalus</i>	0.2	0.5	Q014
305	GM141	* <i>Schismus barbatus</i>	0.2	0.5	Q014
306	GM154	<i>Atriplex spongiosa</i>	0.2	0.5	Q014
307	GM149	<i>Sclerolaena uniflora</i>	0.2	0.5	Q014
308	GM144	<i>Tecticornia loriae</i>	0.2	0.5	Q014
309	GM140	<i>Gunniopsis quadrifida</i>	0.1	5	Q014
310	GM147	<i>Crassula colligata</i> ssp. <i>lamprosperma</i>	0.1	0.5	Q014
311	GM152	<i>Millotia major</i>	0.1	0.5	Q014
312	GM151	<i>Pogonolepis stricta</i>	0.1	0.5	Q014
313		* <i>Arctotheca calendula</i>	0.1	0.5	Q014
314	GM153	<i>Atriplex spongiosa</i>	ASSO	ASSO	Q014
315	GM155	<i>Pimelea</i> sp. (sterile)	ASSO	ASSO	Q014
316	GM156	<i>Austrostipa juncifolia</i>	ASSO	ASSO	Q014
317	GM157	<i>Exocarpos aphyllus</i>	ASSO	ASSO	Q014
318	GM158	<i>Gahnia</i> sp. L (K.R. Newbey 7888)	ASSO	ASSO	Q014
319	GM159	<i>Lawrenzia squamata</i>	ASSO	ASSO	Q014
320	GM160	<i>Eremophila decipiens</i> ssp. <i>decipiens</i>	ASSO	ASSO	Q014
321	GM161	* <i>Pentameris airoides</i> ssp. <i>airoides</i>	ASSO	ASSO	Q014
322	GM162	?* <i>Parapholis incurva</i>	ASSO	ASSO	Q014
323	KJ26	<i>Cyathochaeta equitans</i>	1.2	10	Q015
324	KJ25	<i>Gahnia</i> sp. L (K.R. Newbey 7888)	0.6	15	Q015
325	GM140	<i>Gunniopsis quadrifida</i>	0.5	1	Q015
326	GM147	<i>Crassula colligata</i> ssp. <i>lamprosperma</i>	0.5	0.5	Q015
327	GM152	<i>Millotia major</i>	0.5	0.5	Q015
328	KJ27	<i>Atriplex vesicaria</i>	0.4	7	Q015
329	KJ29	<i>Dianella brevicaulis</i>	0.3	0.5	Q015
330	KJ30	<i>Lawrenzia squamata</i>	0.2	0.5	Q015
331	KJ34	<i>Maireana amoena</i>	0.15	1	Q015
332	KJ31	<i>Frankenia tetrapetala</i>	0.1	3	Q015
333	KJ32	<i>Senecio spanomerus</i>	0.1	1	Q015
334	KJ28	<i>Eremophila decipiens</i> ssp. <i>decipiens</i>	ASSO	ASSO	Q015
335	GM168	* <i>Hypochaeris glabra</i>	P	0.5	Q016
336	GM162	?* <i>Parapholis incurva</i>	P	0.5	Q016
337	GM174	<i>Siloxerus multiflorus</i>	P	0.5	Q016
338	GM165	<i>Siloxerus pygmaeus</i>	P	0.5	Q016
339	KJ35	<i>Melaleuca subularis</i>	2	1	Q016
340	GM173	<i>Exocarpos aphyllus</i>	1.5	1	Q016
341	GM142 & GM143	<i>Tecticornia syncarpa</i>	0.6	12	Q016
342	GM156	<i>Austrostipa juncifolia</i>	0.6	4	Q016
343	GM141	* <i>Schismus barbatus</i>	0.3	0.5	Q016

Rec #	COLL NO	SPECIES	HEIGHT (m)	COVER (%)	Q
344	GM148	<i>Senecio glossanthus</i>	0.3	0.5	Q016
345	GM144	<i>Tecticornia loriae</i>	0.3	0.5	Q016
346		*<i>Ursinia anthemoides</i>	0.2	0.5	Q016
347	GM167	<i>Brachyscome ciliaris</i>	0.2	0.5	Q016
348	GM152	<i>Millotia major</i>	0.2	0.5	Q016
349	GM140	<i>Gunniopsis quadrifida</i>	0.2	0.1	Q016
350	KJ39	*<i>Carpobrotus aequilaterus</i>	0.1	0.5	Q016
351		*<i>Lysimachia arvensis</i>	0.1	0.5	Q016
352	GM176	? <i>Prasophyllum</i> sp. (in bud)	0.1	0.5	Q016
353	GM169	<i>Cotula cotuloides</i>	0.1	0.5	Q016
354	GM147	<i>Crassula colligata</i> ssp. <i>lamprosperma</i>	0.1	0.5	Q016
355	GM166	<i>Crassula exserta</i>	0.1	0.5	Q016
356	GM172	<i>Trachymene cyanopetala</i>	0.1	0.5	Q016
357	GM170	<i>Caladenia attingens</i> ssp. <i>gracillima</i>	ASSO	ASSO	Q016
358	GM123	<i>Acacia pritzeliana</i>	ASSO	ASSO	Q016
359	KJ46	<i>Waitzia acuminata</i> var. <i>acuminata</i>	ASSO	ASSO	Q016
360	KJ36	<i>Melaleuca thyoides</i>	4	20	Q017
361	KJ35	<i>Melaleuca subularis</i>	3	4	Q017
362	KJ37	<i>Melaleuca fissurata</i> (P4)	2.5	1	Q017
363	KJ38	<i>Exocarpos aphyllus</i>	1.7	2	Q017
364	KJ28	<i>Eremophila decipiens</i> ssp. <i>decipiens</i>	1.2	2	Q017
365	GM52	<i>Olearia muelleri</i>	1	2	Q017
366	GM163	<i>Acacia glaucissima</i> (P3)	0.7	1.5	Q017
367	KJ41	<i>Leucopogon</i> sp. Kau Rock (M.A. Burgman 1126)	0.5	1.5	Q017
368	GM161	*<i>Pentameris airoides</i> ssp. <i>airoides</i>	0.5	0.5	Q017
369	GM141	*<i>Schismus barbatus</i>	0.5	0.5	Q017
370	GM162	?*<i>Parapholis incurva</i>	0.5	0.5	Q017
371	GM147	<i>Crassula colligata</i> ssp. <i>lamprosperma</i>	0.5	0.5	Q017
372	GM152	<i>Millotia major</i>	0.5	0.5	Q017
373	KJ46	<i>Waitzia acuminata</i> var. <i>acuminata</i>	0.5	0.5	Q017
374	GM167	<i>Brachyscome ciliaris</i>	0.2	0.5	Q017
375	GM131	<i>Caladenia brevisura</i>	0.2	0.5	Q017
376	KJ44	<i>Maireana erioclada</i>	0.2	0.5	Q017
377	KJ45	<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	0.1	1	Q017
378	KJ39	*<i>Carpobrotus aequilaterus</i>	0.1	0.5	Q017
379	GM169	<i>Cotula cotuloides</i>	0.1	0.5	Q017
380	GM165	<i>Siloxerus pygmaeus</i>	0.1	0.5	Q017
381	GM140	<i>Gunniopsis quadrifida</i>	ASSO	ASSO	Q017
382	GM09	<i>Darwinia polycephala</i> (P4)	ASSO	ASSO	Q017
383	GM148	<i>Senecio glossanthus</i>	ASSO	ASSO	Q017
384	GM151	<i>Pogonolepis stricta</i>	ASSO	ASSO	Q017
385	GM166	<i>Crassula exserta</i>	ASSO	ASSO	Q017
386	GM172	<i>Trachymene cyanopetala</i>	ASSO	ASSO	Q017
387	GM23	<i>Cyathostemon tenuifolius</i>	ASSO	ASSO	Q017
388	GM42	<i>Dillwynia acerosa</i>	ASSO	ASSO	Q017
389	GM54	<i>Thysanotus patersonii</i>	ASSO	ASSO	Q017
390	KJ30	<i>Lawrenzia squamata</i>	ASSO	ASSO	Q017
391	KJ31	<i>Frankenia tetrapetala</i>	ASSO	ASSO	Q017
392	KJ40	<i>Eremophila psilocalyx</i>	ASSO	ASSO	Q017
393	KJ42	<i>Acacia ancistrophylla</i> var. <i>ancistrophylla</i>	ASSO	ASSO	Q017

Rec #	COLL NO	SPECIES	HEIGHT (m)	COVER (%)	Q
394	KJ47	<i>Plantago debilis</i>	ASSO	ASSO	Q017
395	KJ48	<i>Austrostipa</i> sp. (sterile)	ASSO	ASSO	Q017
396	KJ49	<i>Rhodanthe laevis</i>	ASSO	ASSO	Q017
397	KJ51	<i>Boronia baeckeacea</i> ssp. <i>patula</i> (P1)	ASSO	ASSO	Q017
398	KJ52	<i>Hibbertia psilocarpa</i>	ASSO	ASSO	Q017
399	JG35	<i>Eucalyptus leptocalyx</i>	5	10	Q018
400	JG28	<i>Melaleuca linguiformis</i>	5	5	Q018
401	JG26	<i>Eucalyptus merrickiae</i> (T)	4	5	Q018
402	GM05	<i>Melaleuca rigidifolia</i>	3	20	Q018
403	JG27	<i>Lissanthe rubicunda</i>	1.5	15	Q018
404	GM23	<i>Cyathostemon tenuifolius</i>	1.2	11	Q018
405	JG31	<i>Phebalium lepidotum</i>	1.2	3	Q018
406	GM163	<i>Acacia glaucissima</i> (P3)	1.1	2	Q018
407	JG32	<i>Leptomeria pachyclada</i>	1.1	2	Q018
408	JG29	<i>Cryptandra recurva</i>	1	10	Q018
409	GM19	<i>Boronia inornata</i> ssp. <i>leptophylla</i>	1	5	Q018
410	JG33	<i>Hibbertia psilocarpa</i>	0.5	1	Q018
411	JG30	<i>Micromyrtus elobata</i> ssp. <i>scopula</i> (P3)	0.2	1	Q018
412	GM59	<i>Persoonia teretifolia</i>	ASSO	ASSO	Q018
413	GM02	<i>Eucalyptus kessellii</i>	ASSO	ASSO	Q018
414	GM25	<i>Persoonia cymbifolia</i> (P3)	ASSO	ASSO	Q018
415		<i>Dianella revoluta</i>	ASSO	ASSO	Q018
416	GM178	<i>Hydrocotyle medicaginoidea</i>	P	0.5	Q019
417	GM142	<i>Tecticornia syncarpa</i>	0.5	10	Q019
418	GM177 & GM181	<i>Tecticornia halocnemoides</i>	0.4	62	Q019
419	GM180	*<i>Hornungia procumbens</i>	0.3	0.5	Q019
420	GM179	? <i>Potamogeton</i> sp. (poor material)	0.2	0.5	Q019
421	GM148	<i>Senecio glossanthus</i>	0.2	0.5	Q019
422	GM169	<i>Cotula cotuloides</i>	0.1	0.5	Q019
423	GM164	<i>Frankenia tetrapetala</i>	0.1	0.5	Q019
424	GM140	<i>Gunniopsis quadrifida</i>	ASSO	ASSO	Q019
425	GM09	<i>Darwinia polycephala</i> (P4)	ASSO	ASSO	Q019
426	GM101B	<i>Melaleuca thyoides</i>	ASSO	ASSO	Q019
427	GM11	<i>Cryptandra recurva</i>	ASSO	ASSO	Q019
428	GM141	*<i>Schismus barbatus</i>	ASSO	ASSO	Q019
429	GM147	<i>Crassula colligata</i> ssp. <i>lamprosperma</i>	ASSO	ASSO	Q019
430	GM152	<i>Millotia major</i>	ASSO	ASSO	Q019
431	GM164	<i>Frankenia tetrapetala</i>	ASSO	ASSO	Q019
432	GM166	<i>Crassula exserta</i>	ASSO	ASSO	Q019
433	GM182	<i>Frankenia sessilis</i>	ASSO	ASSO	Q019
434	GM183	<i>Hyalochlamys globifera</i>	ASSO	ASSO	Q019
435	GM184	<i>Millotia tenuifolia</i> var. <i>tenuifolia</i>	ASSO	ASSO	Q019
436	GM76	<i>Leucopogon canaliculatus</i>	ASSO	ASSO	Q019
437	KJ25	<i>Gahnia</i> sp. L (K.R. Newbey 7888)	ASSO	ASSO	Q019
438	KJ35	<i>Melaleuca subularis</i>	ASSO	ASSO	Q019
439	KJ46	<i>Waitzia acuminata</i> var. <i>acuminata</i>	ASSO	ASSO	Q019
440	KJ35	<i>Melaleuca subularis</i>	3	20	Q020
441	GM163	<i>Acacia glaucissima</i> (P3)	1	0.5	Q020
442	KJ25	<i>Gahnia</i> sp. L (K.R. Newbey 7888)	0.5	15	Q020
443	GM23	<i>Cyathostemon tenuifolius</i>	0.5	1	Q020

Rec #	COLL NO	SPECIES	HEIGHT (m)	COVER (%)	Q
444	KJ41	<i>Leucopogon</i> sp. Kau Rock (M.A. Burgman 1126)	0.5	1	Q020
445	KJ54	*<i>Pentameris airoides</i> ssp. <i>airoides</i>	0.5	0.5	Q020
446	GM140	<i>Gunniopsis quadrifida</i>	0.5	0.5	Q020
447	KJ53	<i>Millotia tenuifolia</i> var. <i>tenuifolia</i>	0.5	0.5	Q020
448	KJ57	<i>Bossiaea barbarae</i>	0.3	0.5	Q020
449	KJ55	<i>Trachymene cyanopetala</i>	0.3	0.5	Q020
450	KJ56	<i>Ceratogyne obionoides</i>	0.2	0.5	Q020
451	KJ45	<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	0.2	0.5	Q020
452	KJ39	*<i>Carpobrotus aequilaterus</i>	0.1	0.5	Q020
453	JG39	? <i>Prasophyllum</i> sp. (in bud)	0.1	0.5	Q020
454	GM148	<i>Senecio glossanthus</i>	0.1	0.5	Q020
455	GM165	<i>Siloxerus pygmaeus</i>	0.1	0.5	Q020
456	KJ46	<i>Waitzia acuminata</i> var. <i>acuminata</i>	0.1	0.5	Q020
457	GM151	<i>Pogonolepis stricta</i>	0.01	0.5	Q020
458	KJ55B	<i>Siloxerus pygmaeus</i>	0.01	0.5	Q020
459	KJ36	<i>Melaleuca thyoides</i>	ASSO	ASSO	Q020
460	GM166	<i>Crassula exserta</i>	ASSO	ASSO	Q020
461	GM167	<i>Brachyscome ciliaris</i>	ASSO	ASSO	Q020
462	JG46	<i>Eremophila decipiens</i> ssp. <i>decipiens</i>	ASSO	ASSO	Q020
463	KJ03	<i>Billardiera coriacea</i>	ASSO	ASSO	Q020
464	KJ33	<i>Rhagodia crassifolia</i>	ASSO	ASSO	Q020
465	KJ37	<i>Melaleuca fissurata</i> (P4)	ASSO	ASSO	Q020
466	KJ38	<i>Exocarpos aphyllus</i>	ASSO	ASSO	Q020
467	KJ43	<i>Rhagodia crassifolia</i>	ASSO	ASSO	Q020
468	KJ45	<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	ASSO	ASSO	Q020
469	KJ56	<i>Ceratogyne obionoides</i>	ASSO	ASSO	Q020
470	GM54	<i>Thysanotus patersonii</i>	C	0.5	Q021
471	JG36	<i>Eucalyptus fraseri</i> ssp. <i>fraseri</i>	15	10	Q021
472	JG37	<i>Eucalyptus eremophila</i> ssp. <i>eremophila</i>	10	20	Q021
473	GM36	<i>Melaleuca acuminata</i> ssp. <i>acuminata</i>	8	15	Q021
474	GM05	<i>Melaleuca rigidifolia</i>	3	3	Q021
475	JG38	<i>Melaleuca fissurata</i> (P4)	3	9	Q021
476	GM23	<i>Cyathostemon tenuifolius</i>	2	5	Q021
477	GM25	<i>Persoonia cymbifolia</i> (P3)	1.2	3	Q021
478	KJ50	<i>Lissanthe rubicunda</i>	1.2	20	Q021
479	GM16	<i>Baeckea crispiflora</i> var. <i>icosandra</i>	1	20	Q021
480	JG42	<i>Austrostipa hemipogon</i>	0.5	0.5	Q021
481	JG40	<i>Hibbertia gracilipes</i>	0.5	1	Q021
482	JG39	? <i>Prasophyllum</i> sp. (in bud)	0.2	0.5	Q021
483	JG30	<i>Micromyrtus elobata</i> ssp. <i>scopula</i> (P3)	0.2	0.5	Q021
484	GM163	<i>Acacia glaucissima</i> (P3)	0.1	0.5	Q021
485	JG46	<i>Eremophila decipiens</i> ssp. <i>decipiens</i>	0.1	0.5	Q021
486	JG43	<i>Eucalyptus uncinata</i>	ASSO	ASSO	Q021
487	GM18	<i>Melaleuca thyoides</i>	ASSO	ASSO	Q021
488	GM52	<i>Olearia muelleri</i>	ASSO	ASSO	Q021
489	JG19	<i>Eremophila psilocalyx</i>	ASSO	ASSO	Q021
490	JG37	<i>Eucalyptus eremophila</i> ssp. <i>eremophila</i>	ASSO	ASSO	Q021
491	JG44	<i>Exocarpos sparteus</i>	ASSO	ASSO	Q021
492		<i>Dianella revoluta</i>	ASSO	ASSO	Q021
493	GM185	<i>Thysanotus patersonii</i>	C	0.5	Q022

Rec #	COLL NO	SPECIES	HEIGHT (m)	COVER (%)	Q
494	JG36	<i>Eucalyptus fraseri</i> ssp. <i>fraseri</i>	12	6	Q022
495	JG37	<i>Eucalyptus eremophila</i> ssp. <i>eremophila</i>	8	4	Q022
496	KJ35	<i>Melaleuca subularis</i>	3	30	Q022
497	GM101	<i>Melaleuca thyoides</i>	3	10	Q022
498	GM203	<i>Melaleuca linguiformis</i>	3	4	Q022
499	JG38	<i>Melaleuca fissurata</i> (P4)	2	8	Q022
500	GM124	<i>Eremophila psilocalyx</i>	1.2	0.5	Q022
501	GM23	<i>Cyathostemon tenuifolius</i>	1	2	Q022
502	GM186	<i>Austrostipa</i> sp. (sterile)	0.4	0.5	Q022
503	GM176	? <i>Prasophyllum</i> sp. (in bud)	0.3	0.5	Q022
504	KJ46	<i>Waitzia acuminata</i> var. <i>acuminata</i>	ASSO	ASSO	Q022
505	GM169	<i>Cotula cotuloides</i>	ASSO	ASSO	Q022
506	GM173	<i>Exocarpos aphyllus</i>	ASSO	ASSO	Q022
507	GM184	<i>Millotia tenuifolia</i> var. <i>tenuifolia</i>	ASSO	ASSO	Q022
508	GM187 & GM188	<i>Podolepis capillaris</i>	ASSO	ASSO	Q022
509	GM189	<i>Lomandra effusa</i>	ASSO	ASSO	Q022
510	GM241	<i>Pterostylis sargentii</i>	ASSO	ASSO	Q022
511	GM83	<i>Dianella brevicaulis</i>	ASSO	ASSO	Q022
512	KJ46	<i>Waitzia acuminata</i> var. <i>acuminata</i>	ASSO	ASSO	Q022
513		<i>Dianella revoluta</i>	ASSO	ASSO	Q022
514	KJ36	<i>Melaleuca thyoides</i>	4	25	Q023
515	KJ59	<i>Eucalyptus brachycalyx</i>	3	3	Q023
516	KJ60	<i>Melaleuca fissurata</i> (P4)	2.5	1	Q023
517	KJ73	<i>Cyathostemon blackettii</i>	2	1	Q023
518	KJ69	<i>Alyxia buxifolia</i>	1.8	0.5	Q023
519	KJ65	<i>Dodonaea amblyophylla</i>	1.8	0.5	Q023
520	KJ50	<i>Lissanthe rubicunda</i>	1.7	3	Q023
521	GM23	<i>Cyathostemon tenuifolius</i>	1.5	10	Q023
522	KJ67	<i>Baeckea uncinella</i>	1.2	1	Q023
523	KJ57	<i>Bossiaea barbarae</i>	1	1	Q023
524	GM173	<i>Exocarpos aphyllus</i>	1	1	Q023
525	KJ66	<i>Calytrix tetragona</i>	0.7	4	Q023
526	KJ25	<i>Gahnia</i> sp. L (K.R. Newbey 7888)	0.5	0.5	Q023
527	KJ68	<i>Leucopogon brevicuspidis</i>	0.5	0.5	Q023
528	GM189	<i>Lomandra effusa</i>	0.4	0.5	Q023
529	GM131	<i>Caladenia brevisura</i>	0.2	0.5	Q023
530	GM188	<i>Podolepis capillaris</i>	0.1	0.5	Q023
531	KJ26	<i>Cyathochaeta equitans</i>	ASSO	ASSO	Q023
532	GM163	<i>Acacia glaucissima</i> (P3)	ASSO	ASSO	Q023
533	GM36	<i>Melaleuca acuminata</i> ssp. <i>acuminata</i>	ASSO	ASSO	Q023
534	JG19	<i>Eremophila psilocalyx</i>	ASSO	ASSO	Q023
535	JG51	<i>Leucopogon</i> sp. Kau Rock (M.A. Burgman 1126)	ASSO	ASSO	Q023
536	KJ35	<i>Melaleuca subularis</i>	ASSO	ASSO	Q023
537	KJ46	<i>Waitzia acuminata</i> var. <i>acuminata</i>	ASSO	ASSO	Q023
538	KJ58	<i>Darwinia</i> sp. Karonie (K.Newbey 8503)	ASSO	ASSO	Q023
539	KJ61	<i>Melaleuca linguiformis</i>	ASSO	ASSO	Q023
540	KJ62	<i>Leucopogon canaliculatus</i>	ASSO	ASSO	Q023
541	KJ63	<i>Teucrium eremaeum</i>	ASSO	ASSO	Q023
542	KJ64	<i>Caladenia reptans</i>	ASSO	ASSO	Q023

Rec #	COLL NO	SPECIES	HEIGHT (m)	COVER (%)	Q
543	KJ70	<i>Rytidosperma setaceum</i>	ASSO	ASSO	Q023
544	KJ71	<i>Comesperma integerrimum</i>	ASSO	ASSO	Q023
545	KJ72	<i>Hibbertia psilocarpa</i>	ASSO	ASSO	Q023
546	KJ75	<i>Lepidosperma brunonianum</i>	ASSO	ASSO	Q023
547	GM54	<i>Thysanotus patersonii</i>	C	0.5	Q024
548	JG36	<i>Eucalyptus fraseri ssp fraseri</i>	15	10	Q024
549	JG43	<i>Eucalyptus uncinata</i>	12	5	Q024
550	JG37 & GM26	<i>Eucalyptus eremophila ssp. eremophila</i>	10	40	Q024
551	GM05	<i>Melaleuca rigidifolia</i>	3	30	Q024
552	GM04	<i>Melaleuca podiocarpa</i>	3	15	Q024
553	GM18	<i>Melaleuca thyoides</i>	1.5	1	Q024
554	GM23	<i>Cyathostemon tenuifolius</i>	1	1	Q024
555	KJ50	<i>Lissanthe rubicunda</i>	0.8	5	Q024
556	JG42	<i>Austrostipa hemipogon</i>	0.5	0.5	Q024
557	GM83	<i>Dianella brevicaulis</i>	0.2	0.5	Q024
558	JG46	<i>Eremophila decipiens ssp decipiens</i>	ASSO	ASSO	Q024
559	GM02	<i>Eucalyptus kessellii</i>	ASSO	ASSO	Q024
560	GM163	<i>Acacia glaucissima</i> (P3)	ASSO	ASSO	Q024
561	GM52	<i>Olearia muelleri</i>	ASSO	ASSO	Q024
562	JG30	<i>Micromyrtus elobata ssp. scopula</i> (P3)	ASSO	ASSO	Q024
563	JG38	<i>Melaleuca fissurata</i> (P4)	ASSO	ASSO	Q024
564	JG47	<i>Lomandra effusa</i>	ASSO	ASSO	Q024
565	JG48	<i>Waitzia acuminata</i> var. <i>acuminata</i>	ASSO	ASSO	Q024
566	JG50	<i>Conostephium drummondii</i>	ASSO	ASSO	Q024
567	JG51	<i>Leucopogon</i> sp. Kau Rock (M.A. Burgman 1126)	ASSO	ASSO	Q024
568	GM203	<i>Melaleuca linguiformis</i>	5	30	Q025
569	JG38	<i>Melaleuca fissurata</i> (P4)	4	10	Q025
570	KJ59	<i>Eucalyptus brachycalyx</i>	3	20	Q025
571	KJ73	<i>Cyathostemon blackettii</i>	2.5	40	Q025
572	GM76	<i>Leucopogon canaliculatus</i>	1.2	10	Q025
573	GM124	<i>Eremophila psilocalyx</i>	1	2	Q025
574	KJ69	<i>Alyxia buxifolia</i>	1	1	Q025
575	GM189	<i>Lomandra effusa</i>	0.5	7	Q025
576	GM179	? <i>Potamogeton</i> sp. (poor material)	0.5	0.5	Q025
577	KJ63	<i>Teucrium eremaeum</i>	0.4	0.5	Q025
578	JG46	<i>Eremophila decipiens ssp. decipiens</i>	0.3	2	Q025
579	GM186	<i>Austrostipa</i> sp. (sterile)	0.3	0.5	Q025
580	GM173	<i>Exocarpos aphyllus</i>	0.3	0.5	Q025
581	GM191	<i>Helichrysum leucopsidium</i>	0.2	0.5	Q025
582	GM188	<i>Podolepis capillaris</i>	0.2	0.5	Q025
583	KJ39	*<i>Carpobrotus aequilaterus</i>	0.1	0.5	Q025
584	GM141	*<i>Schismus barbatus</i>	0.1	0.5	Q025
585	GM147	<i>Crassula colligata ssp. lamprosperma</i>	0.1	0.5	Q025
586	GM184	<i>Millotia tenuifolia</i> var. <i>tenuifolia</i>	0.1	0.5	Q025
587	GM171	<i>Plantago debilis</i>	0.1	0.5	Q025
588	GM172	<i>Trachymene cyanopetala</i>	0.1	0.5	Q025
589	GM192	<i>Oxalis perennans</i>	ASSO	ASSO	Q025
590	GM163	<i>Acacia glaucissima</i> (P3)	ASSO	ASSO	Q025
591	GM193	<i>Zygophyllum glaucum</i>	ASSO	ASSO	Q025
592	KJ25	<i>Gahnia</i> sp. L (K.R. Newbey 7888)	ASSO	ASSO	Q025

Rec #	COLL NO	SPECIES	HEIGHT (m)	COVER (%)	Q
593	KJ66	<i>Calytrix tetragona</i>	ASSO	ASSO	Q025
594		*Ursinia anthemoides	ASSO	ASSO	Q025
595	KJ82	<i>Eucalyptus ? ceratocorys</i> (range ext)	6	2	Q026
596	GM194	<i>Eucalyptus merrickiae</i> (T)	3	6	Q026
597	GM195	<i>Melaleuca pulchella</i>	2.5	6	Q026
598	GM05	<i>Melaleuca rigidifolia</i>	2.5	4	Q026
599	KJ81	<i>Cryptandra recurva</i>	1.5	10	Q026
600	KJ79	<i>Conostephium drummondii</i>	1.5	3	Q026
601	GM200	<i>Acacia triptycha</i>	1.5	1	Q026
602	KJ76	<i>Calytrix duplistipulata</i>	1.2	15	Q026
603	KJ78	<i>Aotus</i> sp. Esperance (P.G. Wilson 7904)	1	9	Q026
604	GM23	<i>Cyathostemon tenuifolius</i>	1	2	Q026
605	KJ80	<i>Phebalium obovatum</i> (range ext)	0.8	0.5	Q026
606	GM09	<i>Darwinia polycephala</i> (P4)	0.4	20	Q026
607	GM186	<i>Austrostipa</i> sp. (sterile)	0.4	0.5	Q026
608	GM131	<i>Caladenia brevisura</i>	0.4	0.5	Q026
609	GM184	<i>Millotia tenuifolia</i> var. <i>tenuifolia</i>	0.2	0.5	Q026
610	GM161	*Pentameris airoides ssp. airoides	0.1	0.5	Q026
611	GM196	<i>Blennospora drummondii</i>	0.1	0.5	Q026
612	GM197	<i>Poranthera microphylla</i>	0.1	0.5	Q026
613	GM172	<i>Trachymene cyanopetala</i>	0.1	0.5	Q026
614	KJ46	<i>Waitzia acuminata</i> var. <i>acuminata</i>	0.1	0.5	Q026
615	GM02	<i>Eucalyptus kessellii</i>	ASSO	ASSO	Q026
616	GM19	<i>Boronia inornata</i> ssp. <i>leptophylla</i>	ASSO	ASSO	Q026
617	GM198	<i>Monotaxis paxii</i>	ASSO	ASSO	Q026
618	GM199	<i>Pterostylis</i> sp.	ASSO	ASSO	Q026
619	GM201	<i>Cassytha melantha</i>	ASSO	ASSO	Q026
620	JG43	<i>Eucalyptus uncinata</i>	ASSO	ASSO	Q026
621	KJ77	<i>Phebalium lepidotum</i>	ASSO	ASSO	Q026
622	KJ89	<i>Eucalyptus leptocalyx</i>	8	8	Q027
623	KJ90	<i>Eucalyptus uncinata</i>	8	4	Q027
624	GM195	<i>Melaleuca pulchella</i>	5	10	Q027
625	KJ37	<i>Melaleuca fissurata</i> (P4)	5	2	Q027
626	GM14	<i>Phymatocarpus maxwellii</i>	3	1	Q027
627	GM33	<i>Acacia patagiata</i>	1.8	10	Q027
628	GM23	<i>Cyathostemon tenuifolius</i>	1.8	5	Q027
629	KJ76	<i>Calytrix duplistipulata</i>	1.5	10	Q027
630	GM200	<i>Acacia triptycha</i>	1.4	1	Q027
631	KJ81 & KJ86	<i>Cryptandra recurva</i>	1.2	4	Q027
632	KJ78	<i>Aotus</i> sp. Esperance (P.G. Wilson 7904)	1.2	3	Q027
633	KJ83	<i>Micromyrtus elobata</i> ssp. <i>scopula</i> (P3)	0.8	1	Q027
634	GM09	<i>Darwinia polycephala</i> (P4)	0.5	2.5	Q027
635	KJ79	<i>Conostephium drummondii</i>	0.4	1	Q027
636	KJ87	<i>Austrostipa hemipogon</i>	0.3	0.5	Q027
637	GM76	<i>Leucopogon canaliculatus</i>	0.3	0.5	Q027
638	KJ88	<i>Neurachne alopecuroidea</i>	0.2	0.5	Q027
639	KJ46	<i>Waitzia acuminata</i> var. <i>acuminata</i>	0.1	0.5	Q027
640	KJ16	<i>Melaleuca rigidifolia</i>	ASSO	ASSO	Q027
641	GM38	<i>Grevillea plurijuga</i> ssp. <i>superba</i>	ASSO	ASSO	Q027
642	GM40	<i>Cassytha melantha</i>	ASSO	ASSO	Q027
643	GM41	<i>Callitris roei</i>	ASSO	ASSO	Q027

Rec #	COLL NO	SPECIES	HEIGHT (m)	COVER (%)	Q
644	JG41	Persoonia cymbifolia (P3)	ASSO	ASSO	Q027
645	KJ07	<i>Dodonaea amblyophylla</i>	ASSO	ASSO	Q027
646	KJ50	<i>Lissanthe rubicunda</i>	ASSO	ASSO	Q027
647	KJ84	<i>Glischrocaryon aureum</i>	ASSO	ASSO	Q027
648	KJ85	Adenanthos ileticos (P4)	ASSO	ASSO	Q027
649	KJ87	<i>Austrostipa hemipogon</i>	ASSO	ASSO	Q027
650	GM195	<i>Melaleuca pulchella</i>	4	3	Q028
651	KJ92	<i>Melaleuca tuberculata</i> var. <i>macrophylla</i>	2.5	7.5	Q028
652	KJ36	<i>Melaleuca thyoides</i>	2.5	1	Q028
653		<i>Satanlum acuminatum</i>	2	3	Q028
654	KJ95	<i>Melaleuca subularis</i>	1.7	2	Q028
655	KJ67	<i>Baeckea uncinella</i>	1.5	2	Q028
656	GM23	<i>Cyathostemon tenuifolius</i>	1.5	2	Q028
657	KJ58	<i>Darwinia</i> sp. Karonie (K.Newbey 8503)	1	1	Q028
658	GM76	<i>Leucopogon canaliculatus</i>	0.8	1	Q028
659	KJ25	<i>Gahnia</i> sp. L (K.R. Newbey 7888)	0.7	2	Q028
660	KJ79	<i>Conostephium drummondii</i>	0.6	0.5	Q028
661	KJ85	Adenanthos ileticos (P4)	0.5	0.5	Q028
662	KJ94	<i>Lomandra micrantha</i> ssp. <i>teretifolia</i>	0.4	0.5	Q028
663	GM09	Darwinia polycephala (P4)	0.3	5	Q028
664	KJ80	Phebalium obovatum (range ext)	0.3	0.5	Q028
665	JG61	<i>Caladenia brevisura</i>	0.2	0.5	Q028
666	GM194	Eucalyptus merrickiae (T)	ASSO	ASSO	Q028
667	GM40	<i>Cassytha melantha</i>	C	0.5	Q029
668	KJ92	<i>Melaleuca tuberculata</i> var. <i>macrophylla</i>	1.7	20	Q029
669	KJ95	<i>Melaleuca subularis</i>	1.2	35	Q029
670	GM39	<i>Phebalium lepidotum</i>	1.2	20	Q029
671	KJ73	<i>Cyathostemon blackettii</i>	0.8	0.5	Q029
672	KJ25	<i>Gahnia</i> sp. L (K.R. Newbey 7888)	0.6	3	Q029
673	KJ98	Acacia euthyphylla (P3)	0.6	0.5	Q029
674	GM23	<i>Cyathostemon tenuifolius</i>	0.5	0.5	Q029
675	KJ97	<i>Hakea preissii</i>	0.4	0.5	Q029
676	KJ96	<i>Leucopogon</i> sp. Mount Heywood (M.A. Burgman 1211)	0.3	0.5	Q029
677	GM54	<i>Thysanotus patersonii</i>	C	0.5	Q030
678	JG37	<i>Eucalyptus eremophila</i> ssp. <i>eremophila</i>	6	40	Q030
679	GM05	<i>Melaleuca rigidifolia</i>	4	1	Q030
680	GM203	<i>Melaleuca linguiformis</i>	3	25	Q030
681	JG38	Melaleuca fissurata (P4)	3	20	Q030
682	GM101B	<i>Melaleuca thyoides</i>	3	5	Q030
683	GM 204B	<i>Lissanthe rubicunda</i>	1.5	12	Q030
684	GM23	<i>Cyathostemon tenuifolius</i>	1.2	1	Q030
685	GM204	<i>Microcybe multiflora</i> ssp. <i>multiflora</i>	1.2	1	Q030
686	GM203	<i>Lepidosperma brunonianum</i>	0.4	0.5	Q030
687	KJ73	<i>Cyathostemon blackettii</i>	0.3	1	Q030
688	GM186	<i>Austrostipa</i> sp. (sterile)	0.2	0.5	Q030
689	GM124	<i>Eremophila psilocalyx</i>	ASSO	ASSO	Q030
690	GM157	<i>Exocarpos aphyllus</i>	ASSO	ASSO	Q030
691	GM184	<i>Millotia tenuifolia</i> var. <i>tenuifolia</i>	ASSO	ASSO	Q030
692	GM196	<i>Blennospora drummondii</i>	ASSO	ASSO	Q030
693	GM38	<i>Grevillea plurijuga</i> ssp. <i>superba</i>	ASSO	ASSO	Q030

Rec #	COLL NO	SPECIES	HEIGHT (m)	COVER (%)	Q
694	GM76	<i>Leucopogon canaliculatus</i>	ASSO	ASSO	Q030
695	JG33	<i>Hibbertia psilocarpa</i>	ASSO	ASSO	Q030
696	JG36	<i>Eucalyptus fraseri</i> ssp. <i>fraseri</i>	ASSO	ASSO	Q030
697	JG37	<i>Eucalyptus eremophila</i> ssp. <i>eremophila</i>	ASSO	ASSO	Q030
698	KJ46	<i>Waitzia acuminata</i> var. <i>acuminata</i>	ASSO	ASSO	Q030
699	KJ69	<i>Alyxia buxifolia</i>	ASSO	ASSO	Q030
700	KJ78	<i>Aotus</i> sp. Esperance (P.G. Wilson 7904)	ASSO	ASSO	Q030
701	JG36	<i>Eucalyptus fraseri</i> ssp. <i>fraseri</i>	8	2	Q031
702	JG37	<i>Eucalyptus eremophila</i> ssp. <i>eremophila</i>	5	5	Q031
703	JG38	<i>Melaleuca fissurata</i> (P4)	3	20	Q031
704	GM203	<i>Melaleuca linguiformis</i>	3	5	Q031
705	GM101	<i>Bossiaea leptacantha</i>	2.5	10	Q031
706	KJ73	<i>Cyathostemon blackettii</i>	1.5	0.5	Q031
707	GM205	<i>Lissanthe rubicunda</i>	0.8	5	Q031
708	GM23	<i>Cyathostemon tenuifolius</i>	0.6	2	Q031
709	GM204	<i>Microcybe multiflora</i> ssp. <i>multiflora</i>	0.4	3	Q031
710	GM145	<i>Atriplex vesicaria</i>	0.6	10	Q032
711	GM207	<i>Maireana oppositifolia</i>	0.4	60	Q032
712	GM142	<i>Tecticornia syncarpa</i>	0.4	5	Q032
713	GM179	? <i>Potamogeton</i> sp. (poor material)	0.2	0.5	Q032
714	GM209	<i>Brachyscome lineariloba</i>	0.2	0.5	Q032
715	GM184	<i>Millotia tenuifolia</i> var. <i>tenuifolia</i>	0.2	0.5	Q032
716	GM148	<i>Senecio glossanthus</i>	0.2	0.5	Q032
717	GM180	*<i>Hornungia procumbens</i>	0.1	0.5	Q032
718	GM208	<i>Cotula cotuloides</i>	0.1	0.5	Q032
719	GM147	<i>Crassula colligata</i> ssp. <i>lamprosperma</i>	0.1	0.5	Q032
720	GM140	<i>Gunniopsis quadrifida</i>	0.1	0.5	Q032
721	GM206	<i>Eremophila deserti</i>	ASSO	ASSO	Q032
722	GM164	<i>Frankenia tetrapetala</i>	ASSO	ASSO	Q032
723	GM210	<i>Wahlenbergia gracilentia</i>	ASSO	ASSO	Q032
724	GM211	<i>Senecio pinnatifolius</i> var. <i>pinnatifolius</i>	ASSO	ASSO	Q032
725	GM213	<i>Austrostipa juncifolia</i>	ASSO	ASSO	Q032
726	KJ35	<i>Melaleuca subularis</i>	ASSO	ASSO	Q032
727	KJ105	<i>Cassyltha melantha</i>	C	0.5	Q033
728	KJ97	<i>Hakea preissii</i>	3	15	Q033
729	KJ98	<i>Acacia euthyphylla</i> (P3)	2.5	2	Q033
730	KJ100	<i>Scaevola spinescens</i>	1.5	25	Q033
731	KJ99	<i>Geijera linearifolia</i>	1	2	Q033
732	KJ33	<i>Rhagodia crassifolia</i>	0.7	5	Q033
733	KJ103 & KJ104	<i>Crassula colorata</i> var. <i>acuminata</i>	0.5	1	Q033
734	KJ69	<i>Alyxia buxifolia</i>	0.5	0.5	Q033
735	KJ101	<i>Atriplex vesicaria</i>	0.3	2	Q033
736	KJ106	<i>Austrostipa trichophylla</i>	0.3	0.5	Q033
737	KJ29	<i>Dianella brevicaulis</i>	0.3	0.5	Q033
738	KJ102	<i>Austrostipa juncifolia</i>	0.2	0.5	Q033
739	GM167	<i>Brachyscome ciliaris</i>	0.2	0.5	Q033
740	KJ107	<i>Rytidosperma setaceum</i>	0.2	0.5	Q033
741	GM140	<i>Gunniopsis quadrifida</i>	0.1	1	Q033
742	KJ108	<i>Dodonaea viscosa</i> ssp. <i>angustissima</i>	ASSO	ASSO	Q033
743	GM206	<i>Eremophila deserti</i>	ASSO	ASSO	Q033
744	GM179	? <i>Potamogeton</i> sp. (poor material)	P	0.5	Q034

Rec #	COLL NO	SPECIES	HEIGHT (m)	COVER (%)	Q
745	GM207	<i>Maireana oppositifolia</i>	0.5	15	Q034
746	GM145	<i>Atriplex vesicaria</i>	0.4	8	Q034
747	GM164	<i>Frankenia tetrapetala</i>	0.4	5	Q034
748	GM211	<i>Senecio pinnatifolius</i> var. <i>pinnatifolius</i>	0.4	1	Q034
749	KJ25	<i>Gahnia</i> sp. L (K.R. Newbey 7888)	0.3	0.5	Q034
750	GM148	<i>Senecio glossanthus</i>	0.2	0.5	Q034
751	GM140	<i>Gunniopsis quadrifida</i>	0.1	4	Q034
752	GM141	*Schismus barbatus	0.1	0.5	Q034
753	GM147	<i>Crassula colligata</i> ssp. <i>lamprosperma</i>	0.1	0.5	Q034
754	GM171	<i>Plantago debilis</i>	0.1	0.5	Q034
755	GM142	<i>Tecticornia syncarpa</i>	ASSO	ASSO	Q034
756	GM161	*Pentameris airoides ssp. <i>airoides</i>	ASSO	ASSO	Q034
757	GM162	?*Parapholis incurva	ASSO	ASSO	Q034
758	GM167	<i>Brachyscome ciliaris</i>	ASSO	ASSO	Q034
759	GM169	<i>Cotula cotuloides</i>	ASSO	ASSO	Q034
760	GM208	<i>Cotula cotuloides</i>	ASSO	ASSO	Q034
761	GM210	<i>Wahlenbergia gracilentia</i>	ASSO	ASSO	Q034
762	GM214	<i>Eucalyptus platycorys</i>	ASSO	ASSO	Q034
763	GM61	<i>Exocarpos aphyllus</i>	ASSO	ASSO	Q034
764	KJ35	<i>Melaleuca subularis</i>	ASSO	ASSO	Q034
765	KJ97	<i>Hakea preissii</i>	3	10	Q035
766	KJ98B	<i>Exocarpos aphyllus</i>	2.5	5	Q035
767	KJ99	<i>Geijera linearifolia</i>	2.5	1	Q035
768	KJ107	<i>Rytidosperma setaceum</i>	0.5	0.5	Q035
769	KJ33	<i>Rhagodia crassifolia</i>	0.4	10	Q035
770	KJ101	<i>Atriplex vesicaria</i>	0.4	8	Q035
771	GM206	<i>Eremophila deserti</i>	0.3	0.5	Q035
772	KJ100	<i>Scaevola spinescens</i>	0.3	0.5	Q035
773	GM140	<i>Gunniopsis quadrifida</i>	0.1	1	Q035
774	KJ106	<i>Austrostipa trichophylla</i>	0.1	0.5	Q035
775	KJ109	<i>Oxalia perennans</i>	0.1	0.5	Q035
776	KJ110	<i>Eucalyptus?</i> <i>oleosa</i> ssp. <i>oleosa</i>	ASSO	ASSO	Q035
777	GM201	<i>Cassutha melantha</i>	C	0.5	Q036
778	KJ113	<i>Eucalyptus fraseri</i> ssp. <i>fraseri</i>	12	2	Q036
779	KJ114	<i>Eucalyptus flocktoniae</i> ssp. <i>flocktoniae</i>	8	10	Q036
780	GM215	<i>Melaleuca quadrifaria</i>	3	20	Q036
781	GM203	<i>Melaleuca linguiformis</i>	3	15	Q036
782	GM163	Acacia glaucissima (P3)	1.2	5	Q036
783	GM173	<i>Exocarpos aphyllus</i>	1.2	1	Q036
784	GM124	<i>Eremophila psilocalyx</i>	1	1	Q036
785	GM15	<i>Hibbertia pungens</i>	0.4	0.5	Q036
786	KJ80	Phebalium obovatum (range ext)	0.4	0.5	Q036
787	GM40	<i>Cassutha melantha</i>	C	0.5	Q037
788	KJ114	<i>Eucalyptus flocktoniae</i> ssp. <i>flocktoniae</i>	6	15	Q037
789	KJ113	<i>Eucalyptus fraseri</i> ssp. <i>fraseri</i>	6	15	Q037
790	GM203	<i>Melaleuca linguiformis</i>	5	1	Q037
791	GM67	<i>Eremophila dichroantha</i>	1.5	3	Q037
792	KJ98B	<i>Exocarpos aphyllus</i>	1.2	3	Q037
793	GM163	Acacia glaucissima (P3)	1	60	Q037
794	KJ115	<i>Melaleuca acuminata</i> ssp. <i>acuminata</i>	ASSO	ASSO	Q037
795	KJ116	<i>Solanum symonii</i>	ASSO	ASSO	Q037

Rec #	COLL NO	SPECIES	HEIGHT (m)	COVER (%)	Q
796	KJ117	<i>Bulbine semibarbata</i>	ASSO	ASSO	Q037
797	KJ118	<i>Dodonaea stenozyga</i>	ASSO	ASSO	Q037
798	GM201	<i>Cassytha melantha</i>	C	0.5	Q038
799	GM02	<i>Eucalyptus kessellii</i>	5	12	Q038
800	GM173	<i>Exocarpos aphyllus</i>	3	2	Q038
801	GM05	<i>Melaleuca rigidifolia</i>	3	0.5	Q038
802	KJ115	<i>Melaleuca acuminata</i> ssp. <i>acuminata</i>	1.2	2	Q038
803	KJ118	<i>Dodonaea stenozyga</i>	1	0.5	Q038
804	KJ73	<i>Cyathostemon blackettii</i>	0.8	2	Q038
805	GM15	<i>Hibbertia pungens</i>	0.8	1	Q038
806	GM217	<i>Halgania andromedifolia</i>	0.5	3	Q038
807	GM135	<i>Bossiaea leptacantha</i>	0.4	0.5	Q038
808	GM203	<i>Melaleuca linguiformis</i>	ASSO	ASSO	Q038
809	GM124	<i>Eremophila psilocalyx</i>	ASSO	ASSO	Q038
810	GM176	? <i>Prasophyllum</i> sp. (in bud)	ASSO	ASSO	Q038
811	GM217	<i>Halgania andromedifolia</i>	ASSO	ASSO	Q038
812	GM218	<i>Microcybe multiflora</i> ssp. <i>multiflora</i>	ASSO	ASSO	Q038
813	GM219	<i>Philothea fitzgeraldii</i>	ASSO	ASSO	Q038
814	GM220	<i>Westringia rigida</i>	ASSO	ASSO	Q038
815	GM38	<i>Grevillea plurijuga</i> ssp. <i>superba</i>	ASSO	ASSO	Q038
816	GM52	<i>Olearia muelleri</i>	ASSO	ASSO	Q038
817	GM76	<i>Leucopogon canaliculatus</i>	ASSO	ASSO	Q038
818	GM83	<i>Dianella brevicaulis</i>	ASSO	ASSO	Q038
819	JG37	<i>Eucalyptus eremophila</i> ssp. <i>eremophila</i>	ASSO	ASSO	Q038
820	KJ06	<i>Hakea adnata</i>	ASSO	ASSO	Q038
821	KJ114	<i>Eucalyptus flocktoniae</i> ssp. <i>flocktoniae</i>	ASSO	ASSO	Q038
822	KJ113	<i>Eucalyptus fraseri</i> ssp. <i>fraseri</i>	12	20	Q039
823	GM85	<i>Melaleuca subularis</i>	6	30	Q039
824	KJ115	<i>Melaleuca acuminata</i> ssp. <i>acuminata</i>	2	10	Q039
825	KJ73	<i>Cyathostemon blackettii</i>	1.6	0.5	Q039
826	GM163	<i>Acacia glaucissima</i> (P3)	1	2	Q039
827	KJ52	<i>Hibbertia psilocarpa</i>	0.5	1	Q039
828	GM16	<i>Hibbertia pungens</i>	0.4	0.5	Q039
829	GM38	<i>Grevillea plurijuga</i> ssp. <i>superba</i>	ASSO	ASSO	Q039
830	GM40	<i>Cassytha melantha</i>	ASSO	ASSO	Q039
831	GM67	<i>Eremophila dichroantha</i>	ASSO	ASSO	Q039
832	KJ114	<i>Eucalyptus flocktoniae</i> ssp. <i>flocktoniae</i>	ASSO	ASSO	Q039
833	KJ98B	<i>Exocarpos aphyllus</i>	ASSO	ASSO	Q039
834	GM02	<i>Eucalyptus kessellii</i>	5.5	30	Q040
835	GM36 & KJ115	<i>Melaleuca acuminata</i> ssp. <i>acuminata</i>	2	17	Q040
836	KJ98	<i>Acacia euthyphylla</i> (P3)	1.8	1	Q040
837	KJ18	<i>Hibbertia gracilipes</i>	1.7	30	Q040
838	GM05	<i>Melaleuca rigidifolia</i>	1.5	3	Q040
839	GM67	<i>Eremophila dichroantha</i>	1.5	1	Q040
840	GM38	<i>Grevillea plurijuga</i> ssp. <i>superba</i>	1.5	1	Q040
841	GM60	<i>Hibbertia rostellata</i>	0.4	1	Q040
842	KJ115	<i>Melaleuca acuminata</i> ssp. <i>acuminata</i>	ASSO	ASSO	Q040
843	GM155	<i>Pimelea</i> sp. (sterile)	ASSO	ASSO	Q040
844	GM216	<i>Acacia bracteolata</i>	ASSO	ASSO	Q040
845	GM40	<i>Cassytha melantha</i>	ASSO	ASSO	Q040
846	KJ29	<i>Dianella brevicaulis</i>	ASSO	ASSO	Q040

Rec #	COLL NO	SPECIES	HEIGHT (m)	COVER (%)	Q
847	KJ113	<i>Eucalyptus fraseri</i> ssp. <i>fraseri</i>	5	10	Q041
848	GM22	<i>Eucalyptus tumida</i>	4	25	Q041
849	GM203	<i>Melaleuca linguiformis</i>	1.8	2	Q041
850	GM217B	<i>Melaleuca sapientes</i>	1.7	60	Q041
851	GM05	<i>Melaleuca rigidifolia</i>	1.7	10	Q041
852	KJ38	<i>Exocarpos aphyllus</i>	1.7	1	Q041
853	GM221	<i>Grevillea oligantha</i>	1	0.5	Q041
854	JG38	<i>Melaleuca fissurata</i> (P4)	0.7	0.5	Q041
855	GM163	<i>Acacia glaucissima</i> (P3)	0.5	5	Q041
856	GM15	<i>Hibbertia pungens</i>	0.5	1	Q041
857	KJ78	<i>Aotus</i> sp. Esperance (P.G. Wilson 7904)	0.5	0.5	Q041
858	KJ72	<i>Hibbertia psilocarpa</i>	0.4	0.5	Q041
859	GM23	<i>Cyathostemon tenuifolius</i>	0.3	0.5	Q041
860	KJ29	<i>Dianella brevicaulis</i>	0.3	0.5	Q041
861	GM60	<i>Hibbertia rostellata</i>	0.3	0.5	Q041
862	KJ83	<i>Micromyrtus elobata</i> ssp. <i>scopula</i> (P3)	0.2	0.5	Q041
863	GM40	<i>Cassytha melantha</i>	0.1	0.5	Q041
864	GM119	? <i>Bossiaea barbarae</i>	ASSO	ASSO	Q041
865	GM128	<i>Cryptandra recurva</i>	ASSO	ASSO	Q041
866	GM16	<i>Baeckea crispiflora</i> var. <i>icosandra</i>	ASSO	ASSO	Q041
867	GM242	<i>Melaleuca tuberculata</i> var. <i>macrophylla</i>	ASSO	ASSO	Q041
868	JG60	<i>Daviesia benthamii</i> ssp. <i>acanthoclona</i>	ASSO	ASSO	Q041
869	KJ119	<i>Boronia baeckeacea</i> ssp. <i>patula</i> (P1)	ASSO	ASSO	Q041
870	JG37	<i>Eucalyptus eremophila</i> ssp. <i>eremophila</i>	4	40	Q042
871	GM101B	<i>Melaleuca thyoides</i>	3	4	Q042
872	GM203	<i>Melaleuca linguiformis</i>	2.5	5	Q042
873	GM38	<i>Grevillea plurijuga</i> ssp. <i>superba</i>	2.5	4	Q042
874	GM217B	<i>Melaleuca sapientes</i>	2	35	Q042
875	GM05	<i>Melaleuca rigidifolia</i>	2	2	Q042
876	GM218	<i>Microcybe multiflora</i> ssp. <i>multiflora</i>	1.2	1	Q042
877	KJ78	<i>Aotus</i> sp. Esperance (P.G. Wilson 7904)	1.2	0.5	Q042
878	GM163	<i>Acacia glaucissima</i> (P3)	1	5	Q042
879	GM204B	<i>Lissanthe rubicunda</i>	0.8	5.5	Q042
880	KJ73	<i>Cyathostemon blackettii</i>	0.8	5	Q042
881	GM221	<i>Grevillea oligantha</i>	0.8	0.5	Q042
882	GM173	<i>Exocarpos aphyllus</i>	0.7	0.5	Q042
883	GM128	<i>Cryptandra recurva</i>	0.6	0.5	Q042
884	JG38	<i>Melaleuca fissurata</i> (P4)	0.6	0.5	Q042
885	GM23	<i>Cyathostemon tenuifolius</i>	0.4	0.5	Q042
886	GM83	<i>Dianella brevicaulis</i>	0.4	0.5	Q042
887	KJ25	<i>Gahnia</i> sp. L (K.R. Newbey 7888)	0.4	0.5	Q042
888	GM116	<i>Hibbertia psilocarpa</i>	0.3	0.5	Q042
889	GM16	<i>Baeckea crispiflora</i> var. <i>icosandra</i>	ASSO	ASSO	Q042
890	GM222	<i>Hibbertia rostellata</i>	ASSO	ASSO	Q042
891	GM39	<i>Phebalium lepidotum</i>	ASSO	ASSO	Q042
892	KJ113	<i>Eucalyptus fraseri</i> ssp. <i>fraseri</i>	ASSO	ASSO	Q042
893	JG43	<i>Eucalyptus uncinata</i>	12	25	Q043
894	GM217B	<i>Melaleuca sapientes</i>	5	40	Q043
895	GM19	<i>Boronia inornata</i> ssp. <i>leptophylla</i>	1	1	Q043
896	GM76	<i>Leucopogon canaliculatus</i>	0.8	1	Q043
897	GM33	<i>Acacia patagiata</i>	ASSO	ASSO	Q043

Rec #	COLL NO	SPECIES	HEIGHT (m)	COVER (%)	Q
898	GM110	<i>Hibbertia gracilipes</i>	ASSO	ASSO	Q043
899	GM16	<i>Baeckea crispiflora</i> var. <i>icosandra</i>	ASSO	ASSO	Q043
900	GM222	<i>Hibbertia rostellata</i>	ASSO	ASSO	Q043
901	GM225	<i>Eucalyptus merrickiae</i> (T)	ASSO	ASSO	Q043
902	GM24	<i>Hakea laurina</i>	ASSO	ASSO	Q043
903	GM28	<i>Lepidosperma</i> sp. Bandalup Scabrid (N. Eveleigh 10798)	ASSO	ASSO	Q043
904	KJ119	<i>Boronia baeckeacea</i> ssp. <i>baeckeacea</i>	ASSO	ASSO	Q043
905	KJ57	<i>Bossiaea barbarae</i>	ASSO	ASSO	Q043
906	KJ79	<i>Conostephium drummondii</i>	ASSO	ASSO	Q043
907	KJ92	<i>Melaleuca tuberculata</i> var. <i>macrophylla</i>	ASSO	ASSO	Q043
908	GM162	?*<i>Parapholis incurva</i>	P	0.5	Q044
909	GM140	<i>Gunniopsis quadrifida</i>	C	2	Q044
910	KJ39	*<i>Carpobrotus aequilaterus</i>	C	0.5	Q044
911	GM230	<i>Eucalyptus gracilis</i>	7	4	Q044
912	KJ99	<i>Geijera linearifolia</i>	2	2	Q044
913	GM163	<i>Acacia glaucocissima</i> (P3)	1.5	6	Q044
914	GM81	<i>Grevillea oligantha</i>	1.2	1	Q044
915	KJ33	<i>Rhagodia crassifolia</i>	0.8	15	Q044
916	GM232	<i>Eremophila deserti</i>	0.8	0.5	Q044
917	GM160	<i>Eremophila decipiens</i> ssp. <i>decipiens</i>	0.6	8	Q044
918	GM186	<i>Austrostipa</i> sp. (sterile)	0.4	0.5	Q044
919	GM231	<i>Calandrinia eremaea</i>	0.1	0.5	Q044
920	GM147	<i>Crassula colligata</i> ssp. <i>lamprosperma</i>	0.1	0.5	Q044
921	GM229	<i>Sclerolaena diacantha</i>	0.1	0.5	Q044
922	GM165	<i>Siloxerus pygmaeus</i>	0	0.5	Q044
923	KJ113	<i>Eucalyptus fraseri</i> ssp. <i>fraseri</i>	ASSO	ASSO	Q044
924	GM173	<i>Exocarpos aphyllus</i>	ASSO	ASSO	Q044
925	GM190	<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	ASSO	ASSO	Q044
926	KJ124	<i>Alyxia buxifolia</i>	ASSO	ASSO	Q044
927	GM230	<i>Eucalyptus gracilis</i>	6	5	Q045
928	KJ99	<i>Geijera linearifolia</i>	2.5	10	Q045
929	KJ69 & KJ124	<i>Alyxia buxifolia</i>	1.8	1	Q045
930	GM148	<i>Senecio glossanthus</i>	0.5	0.5	Q045
931	KJ111	<i>Dodonaea viscosa</i> ssp. <i>angustissima</i>	0.4	0.5	Q045
932	KJ33	<i>Rhagodia crassifolia</i>	0.3	15	Q045
933	KJ101	<i>Atriplex vesicaria</i>	0.3	0.5	Q045
934	KJ103	<i>Crassula colorata</i> var. <i>acuminata</i>	0.3	0.5	Q045
935	KJ97	<i>Hakea preissii</i>	0.3	0.5	Q045
936	GM211	<i>Senecio pinnatifolius</i> var. <i>pinnatifolius</i>	0.3	0.5	Q045
937	KJ54	*<i>Pentameris airoides</i> ssp. <i>airoides</i>	0.2	0.5	Q045
938	JG46	<i>Eremophila decipiens</i> ssp. <i>decipiens</i>	0.2	0.5	Q045
939	KJ44	<i>Maireana erioclada</i>	0.2	0.5	Q045
940	KJ115	<i>Melaleuca acuminata</i> ssp. <i>acuminata</i>	0.2	0.5	Q045
941	KJ106	<i>Austrostipa trichophylla</i>	0.15	0.5	Q045
942	GM140	<i>Gunniopsis quadrifida</i>	0.1	2	Q045
943		<i>Enchylaena tomentosa</i>	0.1	0.5	Q045
944	KJ113	<i>Eucalyptus fraseri</i> ssp. <i>fraseri</i>	ASSO	ASSO	Q045
945	GM163	<i>Acacia glaucissima</i> (P3)	ASSO	ASSO	Q045
946	KJ25	<i>Gahnia</i> sp. L (K.R. Newbey 7888)	ASSO	ASSO	Q045
947		<i>Scaevola spinescens</i>	ASSO	ASSO	Q045

Rec #	COLL NO	SPECIES	HEIGHT (m)	COVER (%)	Q
948	GM162	?* <i>Parapholis incurva</i>	P	0.5	Q046
949	GM179	? <i>Potamogeton</i> sp. (poor material)	P	0.5	Q046
950	GM183	<i>Hyalochlamys globifera</i>	P	0.5	Q046
951	KJ26	<i>Cyathochaeta equitans</i>	0.6	25	Q046
952	GM143	<i>Tecticornia syncarpa</i>	0.4	15	Q046
953	GM207	<i>Maireana oppositifolia</i>	0.4	4	Q046
954	GM182	<i>Frankenia sessilis</i>	0.4	0.5	Q046
955	GM237	<i>Sarcocornia blackiana</i>	0.4	0.5	Q046
956	KJ39	* <i>Carpobrotus aequilaterus</i>	0.1	0.5	Q046
957	GM236	<i>Centrolepis polygyna</i>	0.1	0.5	Q046
958	GM169	<i>Cotula cotuloides</i>	0.1	0.5	Q046
959	GM147	<i>Crassula colligata</i> ssp. <i>lamprosperma</i>	0.1	0.5	Q046
960	GM164	<i>Frankenia tetrapetala</i>	0.1	0.5	Q046
961	GM140	<i>Gunniopsis quadrifida</i>	0.1	0.5	Q046
962	GM152	<i>Millotia major</i>	0.1	0.5	Q046
963	GM184	<i>Millotia tenuifolia</i> var. <i>tenuifolia</i>	0.1	0.5	Q046
964	GM106	<i>Tecticornia lylei</i>	0.1	0.5	Q046
965	GM234	<i>Triglochin mucronata</i>	0.1	0.5	Q046
966	GM235	<i>Wurmbea sinora</i>	0.1	0.5	Q046
967	KJ35	<i>Melaleuca subularis</i>	ASSO	ASSO	Q046
968	GM121	<i>Trachymene</i> sp. (sterile)	ASSO	ASSO	Q046
969	GM145	<i>Atriplex vesicaria</i>	ASSO	ASSO	Q046
970	GM149	<i>Sclerolaena uniflora</i>	ASSO	ASSO	Q046
971	GM161	* <i>Pentameris airoides</i> ssp. <i>airoides</i>	ASSO	ASSO	Q046
972	GM167	<i>Brachyscome ciliaris</i>	ASSO	ASSO	Q046
973	GM173	<i>Exocarpos aphyllus</i>	ASSO	ASSO	Q046
974	GM175	<i>Triglochin isingiana</i>	ASSO	ASSO	Q046
975	GM179	? <i>Potamogeton</i> sp. (poor material)	ASSO	ASSO	Q046
976	GM190	<i>Enchylaena tomentosa</i> var. <i>.tomentosa</i>	ASSO	ASSO	Q046
977	GM193	<i>Zygophyllum glaucum</i>	ASSO	ASSO	Q046
978	GM206	<i>Eremophila deserti</i>	ASSO	ASSO	Q046
979	GM208	<i>Cotula cotuloides</i>	ASSO	ASSO	Q046
980	GM211	<i>Senecio pinnatifolius</i> var. <i>pinnatifolius</i>	ASSO	ASSO	Q046
981	GM213	<i>Austrostipa juncifolia</i>	ASSO	ASSO	Q046
982	GM226	<i>Frankenia sessilis</i>	ASSO	ASSO	Q046
983	GM227	<i>Maireana erioclada</i>	ASSO	ASSO	Q046
984	GM233	<i>Eremophila dichroantha</i>	ASSO	ASSO	Q046
985	KJ124	<i>Alyxia buxifolia</i>	ASSO	ASSO	Q046
986	KJ99	<i>Geijera linearifolia</i>	ASSO	ASSO	Q046
987	GM63	<i>Eucalyptus congoblata</i> ssp. <i>perata</i>	7	10	Q047
988	GM107	<i>Eucalyptus eremophila</i> ssp. <i>eremophila</i>	6	5	Q047
989	GM20	<i>Banksia media</i>	4	2	Q047
990	GM04	<i>Melaleuca podiocarpa</i>	2	0.5	Q047
991	GM05	<i>Melaleuca rigidifolia</i>	1.8	75	Q047
992	GM03	<i>Melaleuca bromelioides</i>	1.8	1	Q047
993	GM45	<i>Acacia mutabilis</i> ssp. <i>mutabilis</i>	0.6	0.5	Q047
994	GM16	<i>Baeckea crispiflora</i> var. <i>icosandra</i>	0.5	0.5	Q047
995	GM42	<i>Dillwynia acerosa</i>	0.5	0.5	Q047
996	GM15	<i>Hibbertia pungens</i>	0.5	0.5	Q047
997	GM48	<i>Daviesia benthamii</i> ssp. <i>acanthoclona</i>	0.4	1	Q047
998	GM23	<i>Cyathostemon tenuifolius</i>	0.4	0.5	Q047

Rec #	COLL NO	SPECIES	HEIGHT (m)	COVER (%)	Q
999	GM51	<i>Lepidosperma</i> sp. Bandalup Scabrid (N. Eveleigh 10798)	0.4	0.5	Q047
1000	GM19	<i>Boronia inornata</i> ssp. <i>leptophylla</i>	0.3	0.5	Q047
1001	GM01	<i>Eucalyptus forrestiana</i>	0.3	0.5	Q047
1002	GM59	<i>Persoonia teretifolia</i>	ASSO	ASSO	Q047
1003	GM02	<i>Eucalyptus kessellii</i>	ASSO	ASSO	Q047
1004	GM38	<i>Grevillea plurijuga</i> ssp. <i>superba</i>	ASSO	ASSO	Q047
1005	JG43	<i>Eucalyptus uncinata</i>	4	6	Q048
1006	GM225	<i>Eucalyptus merrickiae</i> (T)	3.6	4	Q048
1007	GM05	<i>Melaleuca rigidifolia</i>	3	25	Q048
1008	GM242	<i>Melaleuca tuberculata</i> var. <i>macrophylla</i>	3	2	Q048
1009	GM217B	<i>Melaleuca sapientes</i>	2.5	0.5	Q048
1010	GM04	<i>Melaleuca podiocarpa</i>	2	4	Q048
1011	GM163	<i>Acacia glaucissima</i> (P3)	1.2	1	Q048
1012	GM23	<i>Cyathostemon tenuifolius</i>	1.2	0.5	Q048
1013	GM243	<i>Aotus</i> sp. Esperance (P.G. Wilson 7904)	0.8	0.5	Q048
1014	GM204	<i>Microcybe multiflora</i> ssp. <i>multiflora</i>	0.6	6	Q048
1015	GM128	<i>Cryptandra recurva</i>	0.6	1	Q048
1016	GM110	<i>Hibbertia gracilipes</i>	0.4	5	Q048
1017	GM244	<i>Acacia pritzeliana</i>	0.4	0.5	Q048
1018	GM95	<i>Hibbertia rostellata</i>	0.4	0.5	Q048
1019	GM16	<i>Baekkea crispiflora</i> var. <i>icosandra</i>	0.3	8	Q048
1020	KJ59	<i>Eucalyptus brachycalyx</i>	ASSO	ASSO	Q048
1021	GM101	<i>Bossiaea leptacantha</i>	ASSO	ASSO	Q048
1022	GM106	<i>Tecticornia lylei</i>	ASSO	ASSO	Q048
1023	GM81	<i>Grevillea oligantha</i>	ASSO	ASSO	Q048
1024	JG38	<i>Melaleuca fissurata</i> (P4)	ASSO	ASSO	Q048
1025	KJ120	<i>Dillwynia acerosa</i>	ASSO	ASSO	Q048
1026	KJ55	<i>Trachymene cyanopetala</i>	ASSO	ASSO	Q048
1027	KJ77	<i>Phebalium lepidotum</i>	ASSO	ASSO	Q048
1028	JG36	<i>Eucalyptus fraseri</i> ssp. <i>fraseri</i>	12	6	Q049
1029	JG43	<i>Eucalyptus uncinata</i>	12	2	Q049
1030	GM225	<i>Eucalyptus merrickiae</i> (T)	4	6	Q049
1031	JG38	<i>Melaleuca fissurata</i> (P4)	3	3	Q049
1032	GM204	<i>Microcybe multiflora</i> ssp. <i>multiflora</i>	1.5	10	Q049
1033	GM16	<i>Baekkea crispiflora</i> var. <i>icosandra</i>	0.6	1	Q049
1034	GM110	<i>Hibbertia gracilipes</i>	0.4	2	Q049
1035	GM128	<i>Cryptandra recurva</i>	0.4	1	Q049
1036	GM161	*<i>Pentameris airoides</i> ssp. <i>airoides</i>	ASSO	ASSO	Q049
1037	GM176	? <i>Prasophyllum</i> sp. (in bud)	ASSO	ASSO	Q049
1038	GM200	<i>Acacia triptycha</i>	ASSO	ASSO	Q049
1039	GM243	<i>Aotus</i> sp. Esperance (P.G. Wilson 7904)	ASSO	ASSO	Q049
1040	GM34	<i>Austrostipa</i> sp. (sterile)	ASSO	ASSO	Q049
1041	GM101	<i>Bossiaea leptacantha</i>	ASSO	ASSO	Q049
1042	GM131	<i>Caladenia brevisura</i>	ASSO	ASSO	Q049
1043	GM166	<i>Crassula exserta</i>	ASSO	ASSO	Q049
1044	KJ73	<i>Cyathostemon blackettii</i>	ASSO	ASSO	Q049
1045		<i>Dianella revoluta</i>	ASSO	ASSO	Q049
1046	GM81	<i>Grevillea oligantha</i>	ASSO	ASSO	Q049
1047	GM217	<i>Halgania andromedifolia</i>	ASSO	ASSO	Q049
1048	GM116	<i>Hibbertia psilocarpa</i>	ASSO	ASSO	Q049

Rec #	COLL NO	SPECIES	HEIGHT (m)	COVER (%)	Q
1049	GM43	<i>Melaleuca pulchella</i>	ASSO	ASSO	Q049
1050	KJ35	<i>Melaleuca subularis</i>	ASSO	ASSO	Q049
1051	GM184	<i>Millotia tenuifolia var tenuifolia</i>	ASSO	ASSO	Q049
1052	JG41	<i>Persoonia cymbifolia (P3)</i>	ASSO	ASSO	Q049
1053	GM39	<i>Phebalium lepidotum</i>	ASSO	ASSO	Q049
1054	GM224	<i>Schoenus</i> sp. G Broad Sheath (K.L. Wilson 2633)	ASSO	ASSO	Q049
1055	GM106	<i>Tecticornia lylei</i>	ASSO	ASSO	Q049
1056	GM54	<i>Thysanotus patersonii</i>	ASSO	ASSO	Q049
1057	GM172	<i>Trachymene cyanopetala</i>	ASSO	ASSO	Q049
1058		*<i>Ursinia anthemoides</i>	ASSO	ASSO	Q049
1059	KJ46	<i>Waitzia acuminata var acuminata</i>	ASSO	ASSO	Q049
1060	KJ105	<i>Cassytha melantha</i>	C	0.5	Q050
1061	GM248	<i>Drosera macrantha ssp macrantha</i>	C	0.5	Q050
1062	GM54	<i>Thysanotus patersonii</i>	C	0.5	Q050
1063	JG43	<i>Eucalyptus uncinata</i>	9	1	Q050
1064	GM101B	<i>Melaleuca thyoides</i>	4	2	Q050
1065	GM225	<i>Eucalyptus merrickiae (T)</i>	3	4	Q050
1066	GM14	<i>Phymatocarpus maxwellii</i>	2.5	2	Q050
1067	GM247	<i>Conostephium drummondii</i>	1.5	20	Q050
1068	KJ76	<i>Calytrix duplistipulata</i>	1.2	3	Q050
1069	GM80 & KJ25	<i>Gahnia</i> sp. L (K.R. Newbey 7888)	0.8	1.5	Q050
1070	GM19	<i>Boronia inornata ssp. leptophylla</i>	0.8	1	Q050
1071	GM23	<i>Cyathostemon tenuifolius</i>	0.8	0.5	Q050
1072	GM243	<i>Aotus</i> sp. Esperance (P.G. Wilson 7904)	0.6	30	Q050
1073	GM82	<i>Darwinia polycephala (P4)</i>	0.6	5	Q050
1074	GM204B & KJ50	<i>Lissanthe rubicunda</i>	0.6	2.5	Q050
1075	GM186	<i>Austrostipa</i> sp. (sterile)	0.4	0.5	Q050
1076	GM41	<i>Callitris roei</i>	0.4	0.5	Q050
1077	GM110	<i>Hibbertia gracilipes</i>	0.4	0.5	Q050
1078	GM250	<i>Lepidosperma brunonianum</i>	0.4	0.5	Q050
1079	GM246	<i>Micromyrtus elobata ssp. scopula (P3)</i>	0.4	0.5	Q050
1080	GM249	<i>Phebalium obovatum (range ext)</i>	0.3	0.5	Q050
1081	GM184	<i>Millotia tenuifolia var. tenuifolia</i>	0.1	0.5	Q050
1082	GM245	<i>Adenanthos ileticos (P4)</i>	ASSO	ASSO	Q050
1083	GM202	<i>Boronia crassifolia</i>	ASSO	ASSO	Q050
1084	GM217B	<i>Melaleuca sapientes</i>	ASSO	ASSO	Q050
1085	GM36	<i>Melaleuca acuminata ssp. acuminata</i>	ASSO	ASSO	Q050
1086	GM39	<i>Phebalium lepidotum</i>	ASSO	ASSO	Q050
1087	KJ35	<i>Melaleuca subularis</i>	ASSO	ASSO	Q050
1088	KJ73	<i>Cyathostemon blackettii</i>	ASSO	ASSO	Q050



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12th July 2022

Memorandum: Targeted Flora Survey-Mt Ridley North Exploration Program

Botanica Consulting Pty Ltd (Botanica) was commissioned by Mount Ridley Mines to conduct targeted flora surveys of the proposed Mt Ridley North exploration programs (referred to as the 'target survey area'). The surveys included assessment of approximately 170 km of proposed AC drill lines located along existing cleared access tracks within tenements E63/1547, E63/1564, E63/1617, E63/2111, E63/2112, E63/2113, E63/2114 and E63/2125 (Figure 1). Photographic records of the existing access tracks within the target survey area are provided in Attachment 1. The surveys were conducted by two Botanica staff members (Jim Williams and Jennifer Jackson) over the following dates:

- 20th and 21st October 2021
- 25th to 28th February 2022
- 10th to 14th March 2022
- 19th to 23rd April 2022
- 16th to 18th May 2022

The survey area was traversed on foot and four-wheel drive using a handheld GPS to record the locations of tracks traversed and locations of any conservation significant species (recorded in GDA 94 format) as shown in Figure 1.

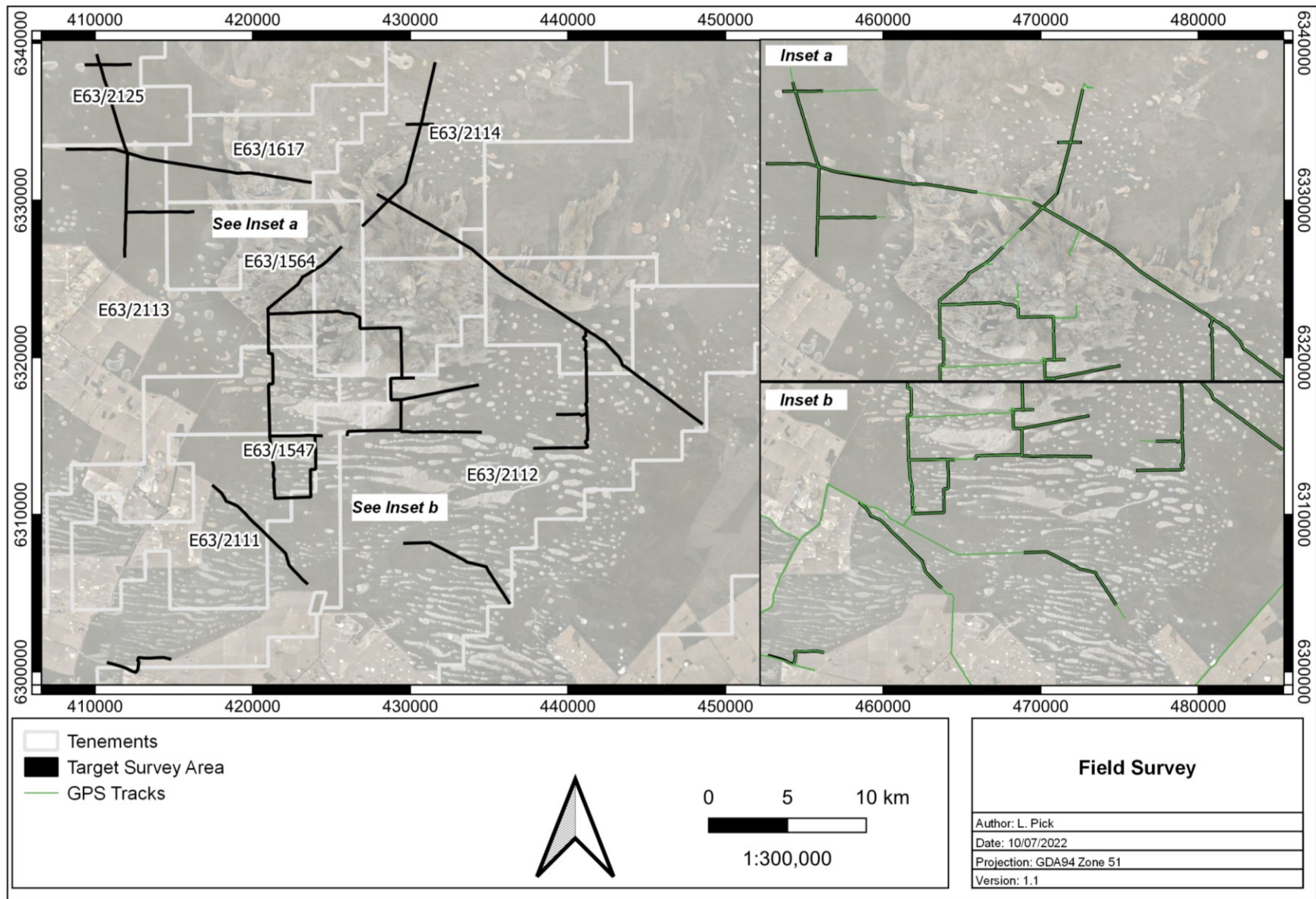


Figure 1: Mt Ridley North exploration program target survey area

1 Background Information

The results of a literature review, combined with a search of the DBCA Flora of Conservation Significance databases (DBCA, 2021a), NatureMap search (DBCA, 2021b) and Department of Agriculture, Water and Environment (DAWE) Protected Matters search (DAWE, 2021a) recorded eight Threatened Flora and 124 Priority Flora as occurring within a 40km radius of the survey area (Table 2 and Figure 2).

Table 1: Threatened/ Priority Flora within 40km of the target survey area

Taxon	BC Act	EPBC Act	DBCA Priority Rating	Habitat Description (DBCA, 2021a; DBCA 2021b)
<i>Acacia amyctica</i>			P2	Plain. Yellow-brown loam, clay.
<i>Acacia bartlei</i>			P3	Growing in grey brown clay loam. Light covering of grey sand.
<i>Acacia diaphana</i>			P1	Closed drainage depression/foci in a sandplain. Yellow-brown, shallow sandy duplex soil.
<i>Acacia diaphana</i>			P1	Closed drainage depression/foci in a sandplain. Yellow-brown, shallow sandy duplex soil.
<i>Acacia euthyphylla</i>			P3	Narrow road reserve (N and S side) (10m wide). Brown loam over clay.
<i>Acacia glaucissima</i>			P3	Sand or clay. Flats, low-lying areas.
<i>Acacia improcera</i>			P3	Sand, loamy clay, clay. Undulating plains, flats.
<i>Acacia</i> sp. Esperance (M.A. Burgman 1833b)			P1	Reddish sand and clay. Depression near clay pan.
<i>Adenanthos ileticos</i>			P4	Low sand dune. White sand.
<i>Alyogyne</i> sp. Great Victoria Desert (D.J. Edinger 6212)			P3	Black soil fresh water swamp.
<i>Angianthus</i> sp. Salmon Gums (G.F. Craig 3074)			P1	Flat granite. UCL. Brown/red loam.
<i>Anigozanthos bicolor</i> subsp. <i>minor</i>	VU	EN		Sand. Well-watered sites.
<i>Aotus lanea</i>			P1	On edge of salt lake.
<i>Aotus</i> sp. Dundas (M.A. Burgman 2835)			P2	Plain, road verge. Grey loam. Next to limestone extraction area.
<i>Astroloma</i> sp. Grass Patch (A.J.G. Wilson 110)			P2	Intermittent salt creek, deep sand on edges, sand on clay in creek bed.
<i>Astus duomilia</i>			P1	Topography: Gentle SW slope of lake dune. Soil: Deep orange sand.
<i>Baeckea</i> sp. Gibson (K.R. Newbey 11084)			P1	Variable drained, shallow granitic loamy sand. Moderately exposed, rounded granite hill.
<i>Beyeria physaphylla</i>			P1	Plain, sloping, grey and brown dry sand.
<i>Bossiaea flexuosa</i>			P3	White sand on hill top.
<i>Bossiaea spinosa</i>			P3	Gravelly, sandy soils. Undulating plains.
<i>Cyanothamnus baeckeaceus</i> subsp. <i>patulus</i>			P1	No description available
<i>Brachyloma mogin</i>			P3	Rise above salt lake. Brown loam.
<i>Chamelaucium</i> sp. Mt Heywood (K. Newbey 7954)			P1	Well drained, deep white sand. Moderately exposed, almost flat plain.
<i>Comesperma calcicola</i>			P3	Salt lake. Wet, pale grey sand over clay.
<i>Comesperma griffinii</i>			P2	Plain. Grey sand. Burnt 2010.
<i>Commersonia rotundifolia</i>			P3	No description available
<i>Conostephium marchantiorum</i>			P3	In grey-brown clay loam, shallow covering of grey white sand.
<i>Conostephium uncinatum</i>			P2	Reddish sand and clay depression near claypan.
<i>Cyanothamnus baeckeaceus</i> subsp. <i>patulus</i>			P1	Fine sand/clay loam.
<i>Cyathostemon</i> sp. Dowak (J.M. Fox 86/271)			P1	Saline depression. On loam.
<i>Cyathostemon</i> sp. Esperance (A. Fairall 2431)			P1	Dom sp: Melaleuca aff. uncinata. Open mixed heath. Littoral zone of salt lake.
<i>Cyathostemon</i> sp. Salmon Gums (B. Archer 769)			P3	Littoral zone of salt lake. Dry bare, white, sand over clay.

Taxon	BC Act	EPBC Act	DBCA Priority Rating	Habitat Description (DBCA, 2021a; DBCA 2021b)
<i>Dampiera sericantha</i>			P3	Sand rise, plain. Grey sand.
<i>Dampiera triloba</i>			P3	Dry grey soil.
<i>Darwinia luehmannii</i>			P2	Yellow loamy sand.
<i>Darwinia polycephala</i>			P4	Sand, clay. Flats, near salt lakes.
<i>Darwinia</i> sp. Gibson (R.D. Royce 3569)			P1	Open depression. Moist, grey sandy loam.
<i>Darwinia</i> sp. Mt Burdett (N.G. Marchant 80/42)			P4	In gutter of road verge, on sand plain with yellow sand and ironstone gravel.
<i>Darwinia</i> sp. Mt Heywood (R. Davis 11066)	VU			Flat sandplain. Grey-brown or orange-brown sand.
<i>Darwinia</i> sp. Mt Ney (M.A. Burgman & S. McNee 1274)			P1	Fine white sand over yellowish sandy clay. Slight slope with E aspect.
<i>Darwinia</i> sp. Mt Ridley (W.R. Archer 510914)			P1	In a fine sand/silt loam.
<i>Daviesia pauciflora</i>			P3	White sand.
<i>Desmocladius biformis</i>			P3	Topography: flat area of lower slope. Soil: sand over pale clay at 5 cm.
<i>Dicrastylis archeri</i>			P1	Lower slope of valley. Dry grey loamy sand over clay.
<i>Dicrastylis capitellata</i>			P1	Yellow loamy sand near salt lake (with water) on S side of track.
<i>Eremophila chamaephila</i>			P3	White sand, clay. Sandplains, disturbed road verges.
<i>Eremophila compressa</i>			P3	Fine loam over limestone.
<i>Eremophila glabra</i> subsp. Scaddan (C. Turley s.n. 10/11/2005)	CR			Near saline watercourse. Brown clayey sand.
<i>Eremophila lactea</i>	CR	EN		Plain, dry open, white-yellow clay.
<i>Eremophila serpens</i>			P4	In fine white/grey sandy soil.
<i>Eucalyptus creta</i>			P3	Sandy clay or loam. Calcareous plains.
<i>Eucalyptus dolichorhyncha</i>			P4	Sandy clay loam with gravel over heavy clay.
<i>Eucalyptus foliosa</i>			P3	Flat terrain bordering a swamp. Sandy clay soil.
<i>Eucalyptus histophylla</i>			P3	Sandy loam on granite or laterite. Granite outcrops.
<i>Eucalyptus luculenta</i>			P2	Flat, light brown loamy sand.
<i>Eucalyptus merrickiae</i>	VU	VU		Plants occur on road verge. Adjacent salt lake system.
<i>Eucalyptus misella</i>			P1	White, yellow or grey sand. Low-lying sandplains.
<i>Eucalyptus preissiana</i> subsp. <i>lobata</i>			P4	Coastal sand dunes.
<i>Eucalyptus semiglobosa</i>			P3	Hillside. Gravel reserve. White-grey shallow sandy duplex soil (sand over gravel over clay). Burnt > 20 years.
<i>Eucalyptus</i> sp. Esperance (M.E. French 1579)			P1	Reddish brown loam soil.
<i>Eucalyptus sweedmaniana</i>			P2	Level topography of gravelly sand.
<i>Fabronia hampeana</i>			P2	On sheltered wet trunk of <i>Macrozamia dyeri</i> in shrub layer. Hill, with bare brown sand with 5% outcropping of granite. HVD = 1-20 m.
<i>Frankenia brachyphylla</i>			P2	Salt lake margins.
<i>Gonocarpus pycnostachyus</i>			P3	In a sand/clay loam over granite around a seasonally water filled rock depression.
<i>Goodenia exigua</i>			P2	Plain. Grey clay. Collection site: reserve.
<i>Goodenia laevis</i> subsp. <i>laevis</i>			P3	On laterite.
<i>Goodenia turleyae</i>			P1	Slightly undulating (S aspect) close to lake edge. Light brown sand over grey clay.
<i>Grammosolen archeri</i>			P1	In sandy soil on island.
<i>Grammosolen</i> sp. Mt Ridley (W.R. Archer 1210911)			P1	Sand. Dry or seasonally damp habitats along streams.
<i>Grevillea aneura</i>			P4	Dune in salt lake. Sand over clay.

Taxon	BC Act	EPBC Act	DBCA Priority Rating	Habitat Description (DBCA, 2021a; DBCA 2021b)
<i>Grevillea baxteri</i>			P4	In light sand.
<i>Gyrostemon ditrigynus</i>			P4	Intersection, in open cleared area. Yellow sand and clay.
<i>Haegiela tatei</i>			P4	clay claypan
<i>Halgania</i> sp. Peak Eleanora (M.A. Burgman 3547 B)			P2	Gently undulating sandplain. Chained firebreak (not burnt) through Crown land. Lower, E-facing slope adjacent to salt lake.
<i>Hibbertia turleyana</i>			P2	Hillside. Reserve. Grey sand.
<i>Hopkinsia adscendens</i>			P3	Sand. Dry or seasonally damp habitats along streams.
<i>Hydrocotyle asterocarpa</i>			P2	Raised embankment along the eastern margin of the salt lake.
<i>Hydrocotyle decorata</i>			P2	Edge of salt lake, cream fine clayey sand, salt scalds in some spots.
<i>Hydrocotyle tuberculata</i>			P2	Along creek edges, black loam, burnt ca 8 months ago.
<i>Isopogon alcicornis</i>			P3	Sandy soil.
<i>Kennedia glabrata</i>	VU	VU		Soil pockets, sandy soils. Granite outcrops.
<i>Kunzea salina</i>			P3	Growing at the edge of a salt lake in an area of accumulating sand.
<i>Lambertia echinata</i> subsp. <i>echinata</i>	CR	EN		Gravelly sandy loam, brown sandy loam, white-grey sand, granite, laterite. Below & between rock outcrops, slopes, hill crests.
<i>Lasiopetalum parvuliflorum</i>			P3	Sandy clay and emergent granite rock.
<i>Lepidium fasciculatum</i>			P3	No description available
<i>Leucopogon corymbiformis</i>			P2	No description available
<i>Leucopogon florulentus</i>			P3	White/grey or yellow sand, sandy clay, gravelly lateritic soils. Sandplains, gentle slopes.
<i>Leucopogon remotus</i>			P1	Plain. Near salt lake. Grey brown loam over limestone.
<i>Styphelia rotundifolia</i>			P3	No description available
<i>Logania archeri</i>			P1	Growing in good quality fine sandy loam.
<i>Melaleuca dempta</i>			P3	Clay.
<i>Melaleuca eximia</i>			P2	Flat. Orange clay.
<i>Melaleuca fissurata</i>			P4	Flat, calcareous, salt lake.
<i>Melaleuca viminea</i> subsp. <i>appressa</i>			P2	Shallow sand over clay. Near creeks or wet depressions.
<i>Micromyrtus elobata</i> subsp. <i>scopula</i>			P3	Aeolian dune. Grey sand.
<i>Microseris walteri</i>			P3	At edge of salt lake.
<i>Microtis quadrata</i>			P4	Brown clay over laterite, slight slope to scraped areas. Area has been burnt.
<i>Myoporum turbinatum</i>			P4	Salt lake. White loam.
<i>Myriophyllum petraeum</i>			P4	Ephemeral pools in roadside flat granites in disturbed site. Pool 30 m x 5 m, <20 cm deep. Many pools at site.
<i>Olearia laciniifolia</i>			P2	White sand. Around playa lakes.
<i>Paracaleana parvula</i>			P2	In sandy open ground. Light cover of pine needles.
<i>Patersonia inaequalis</i>			P2	Sandy clay, lateritic or granitic sand.
<i>Persoonia cymbifolia</i>			P3	In grey-brown clay loam. Shallow covering of grey-white sand.
<i>Persoonia scabra</i>			P3	Plain. Grey sand.
<i>Persoonia spathulata</i>			P2	Deep sandy soils with other Proteaceae species.
<i>Pimelea halophila</i>			P2	Lake edge and slightly elevated ridges on lake bed.
<i>Pimelea pelinos</i>			P1	Salt lake.
<i>Pityrodia chrysocalyx</i>			P3	White sand.
<i>Pterostylis faceta</i>			P3	In sandy loam.

Taxon	BC Act	EPBC Act	DBCA Priority Rating	Habitat Description (DBCA, 2021a; DBCA 2021b)
<i>Pterostylis zebrina</i>			P2	Huge granite complex.
<i>Pultenaea adunca</i>			P3	Tight silty clay soils along roadside.
<i>Pultenaea brachyphylla</i>			P2	Topography: Flat area of midslope. Soil: Cream sand over pale clay at 20 cm.
<i>Ricinocarpus trichophorus</i>	VU	EN		Red coarse sandy clay loam on broken, stony small shallow gully on NW & NE slopes.
<i>Scaevola archeriana</i>			P1	Graded road gutter. Bare areas.
<i>Schoenus</i> sp. Grey Rhizome (K.L. Wilson 2922)			P1	Topography: Upland flat. Soil: Grey sand over gravel at 30 cm.
<i>Spyridium mucronatum</i> subsp. <i>multiflorum</i>			P2	Gravelly loam.
<i>Stachystemon vinosus</i>			P4	Topography: Flat area of lower slope. Soil: Sand over pale clay at 5 cm.
<i>Styphelia rotundifolia</i>			P3	Lower slopes of hill. Dry littered, yellow, gravelly sand over laterite.
<i>Tecticornia indefessa</i>			P2	White to brown-grey sand. Near the edges of salt lakes.
<i>Thysanotus brachyantherus</i>			P2	Clay over limestone, loam.
<i>Thysanotus parviflorus</i>			P4	Shallow sand.
<i>Trachymene anisocarpa</i> var. <i>trichocarpa</i>			P3	Loam.
<i>Goodenia exigua</i>			P2	No description available

CR-Critically Endangered; EN-Endangered; VU-Vulnerable; P-Priority Listed

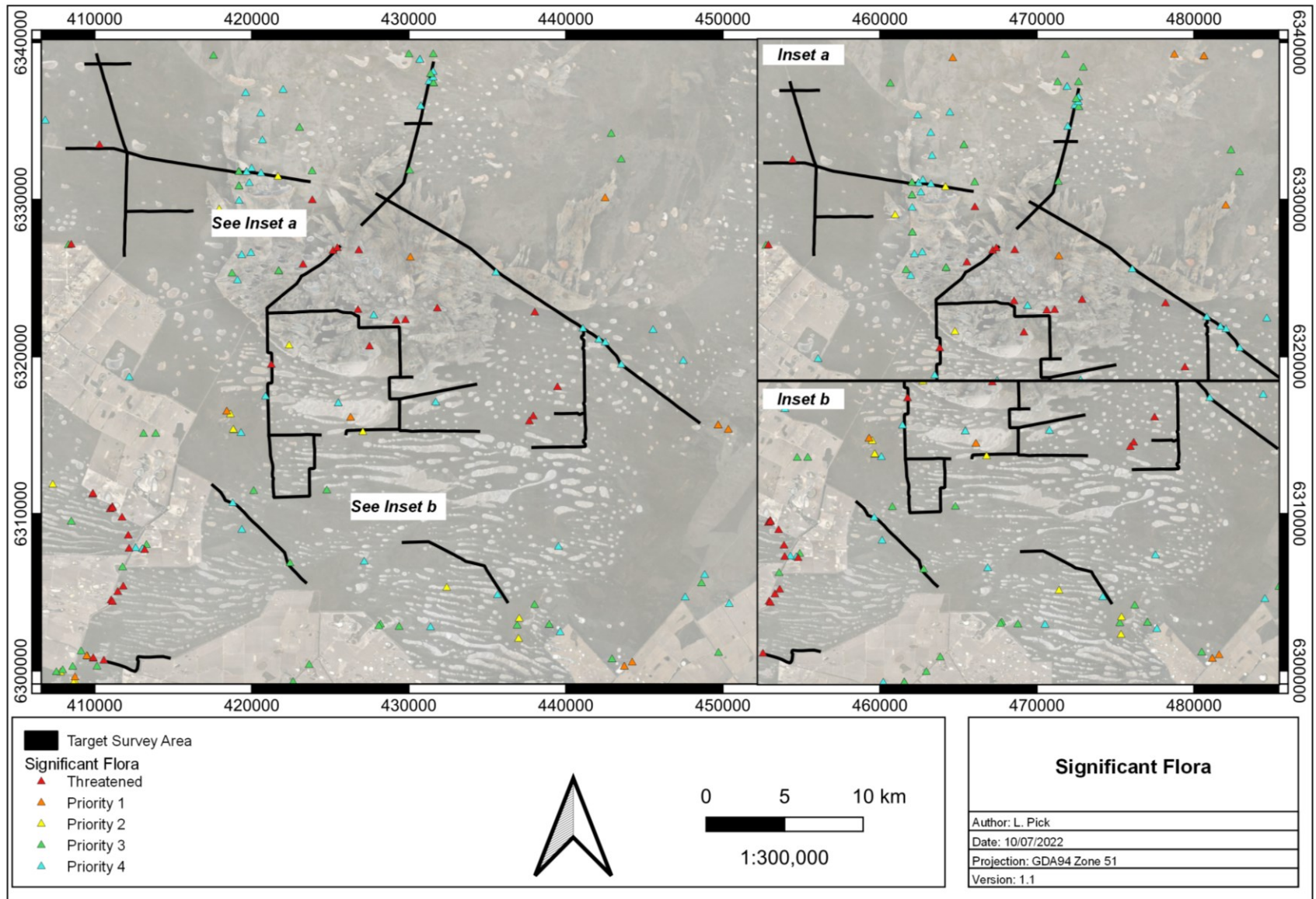



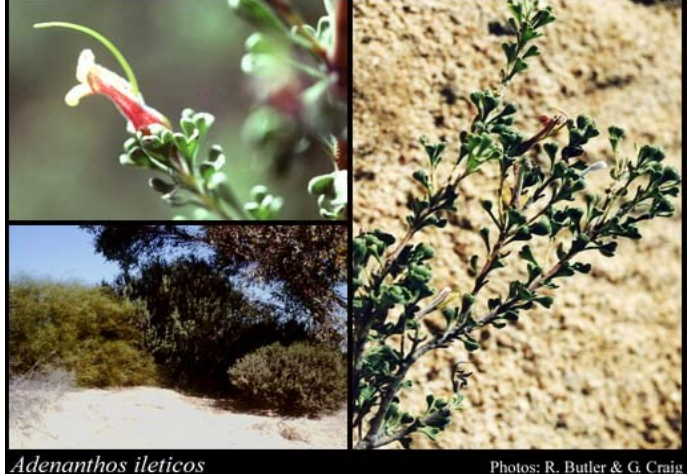

Figure 2: DBCA records of Threatened/ Priority Flora within 40km of the target survey area




2 Results

2.1 Flora

One Threatened Flora taxon listed as Vulnerable under the Western Australia *Biodiversity Conservation Act 2016* (BC Act) and the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) was recorded within the target survey area; *Eucalyptus merrickiae*. Five Priority Flora taxa were identified within the target survey area (Table 1 and Figure 3). GPS coordinates of Priority Flora recorded within the target survey area is provided in Attachment 2. Please note, GPS coordinates of Threatened Flora recorded within the target survey area have been excluded from the report due to the sensitive nature of Threatened Flora records.

Table 2: Significant Flora recorded within the target survey area

Taxon	Conservation Code	Description	Image
<i>Acacia euthyphylla</i>	Priority 3	Two records of this taxon recorded within the target survey area (two plants). Approximately 1,311 plants recorded in the local region (within 40km of the survey area).	
<i>Adenanthos ileticos</i>	Priority 4	Two records of this taxon recorded within the target survey area (two plants). Approximately 11,119 plants recorded in the local region (within 40km of the survey area).	
<i>Darwinia</i> sp. Gibson (R.D. Royce 3569)	Priority 1	Three records of this taxon recorded within the target survey area (3 plants). Approximately 2,133 plants recorded in the local region (within 40km of the survey area).	

Taxon	Conservation Code	Description	Image
<i>Darwinia polycephala</i>	Priority 4	Four records of this taxon recorded within the target survey area (43 plants). Approximately 2,296 plants recorded in the local region (within 40km of the survey area).	 <p><i>Darwinia polycephala</i> Photos: R. Davis</p>
<i>Eucalyptus merrickiae</i>	Vulnerable	97 records of this taxon recorded within the target survey area (97 plants). Approximately 18,130 plants recorded in the local region (within 40km of the survey area).	 <p><i>Eucalyptus merrickiae</i> Photos: S.D. Hopper, L. Sweedman</p>
<i>Persoonia cymbifolia</i>	Priority 3	Four records of this taxon recorded within the target survey area (4 plants). Approximately 637 plants recorded in the local region (within 40km of the survey area).	 <p><i>Persoonia cymbifolia</i> Photos: J.A. Cochrane</p>

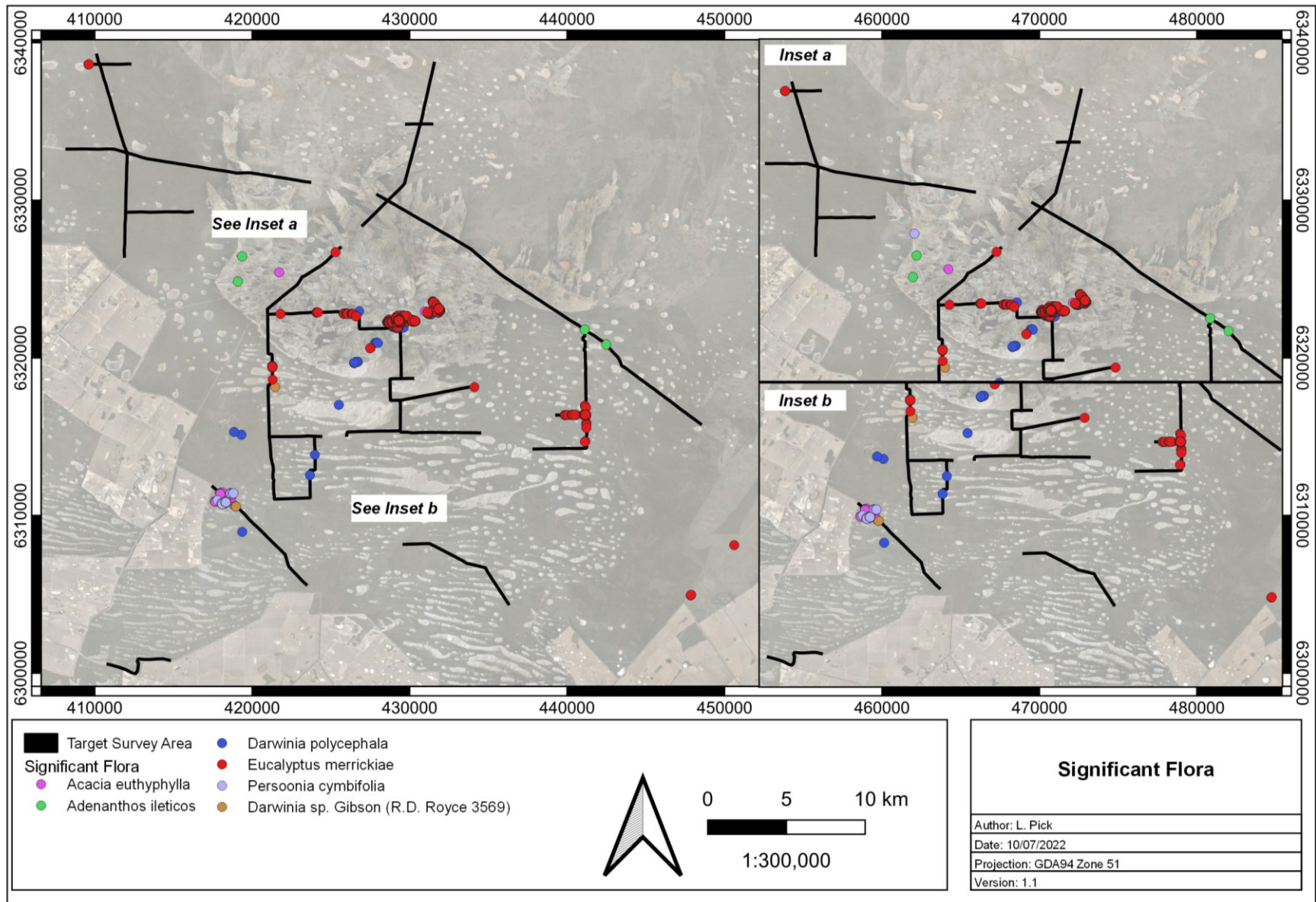


Figure 3: Significant Flora recorded within the target survey area

2.2 Conservation Areas

There are no wetlands of national importance (ANCA Wetlands) or conservation category wetlands within the target survey area. The target survey area does not contain any Environmentally Sensitive Areas as listed under the *Environmental Protection Act 1986* (EP Act). The target survey area is not located within any proposed or vested conservation reserves.

The southern extent of the target survey area is located within the *Proteaceae dominated kwongan shrublands of the southeast coastal floristic province of Western Australia* which is listed under the Commonwealth EPBC Act as an Endangered Threatened Ecological Community (TEC), however is not listed as a TEC under the Western Australian BC Act and is managed by DBCA as a Priority 3 Ecological Community (PEC).

The available description of this PEC provided by DBCA is as follows:

Consists of ≥30% Proteaceae species across all layers where shrubs occur or where two or more Proteaceae species are present that are likely to form a significant vegetative component when regenerated. It occurs on sandplains and marine plains, occupying lower and upper slopes and ridges, as well as uplands. It typically occurs on duplex soils and deep to shallow soils on the sandplains; and on sandy soils to clay loam, gravelly loam and loam on quartzite (e.g. The Barrens, Stirlings and Russell Range) and greenstone ranges (e.g. Ravensthorpe Range). The structure of the vegetation is that of a shrubland, ranging from low to high, and can form dense thickets or be relatively open due to variation in soils and landscape position, or due to disturbance history (e.g. fire). Mallee eucalypts may be present at varying densities, but providing the minimum Proteaceae cover is present, the ecological community is still recognised.

A map showing conservation areas in relation to the survey area is provided in Figure 6.

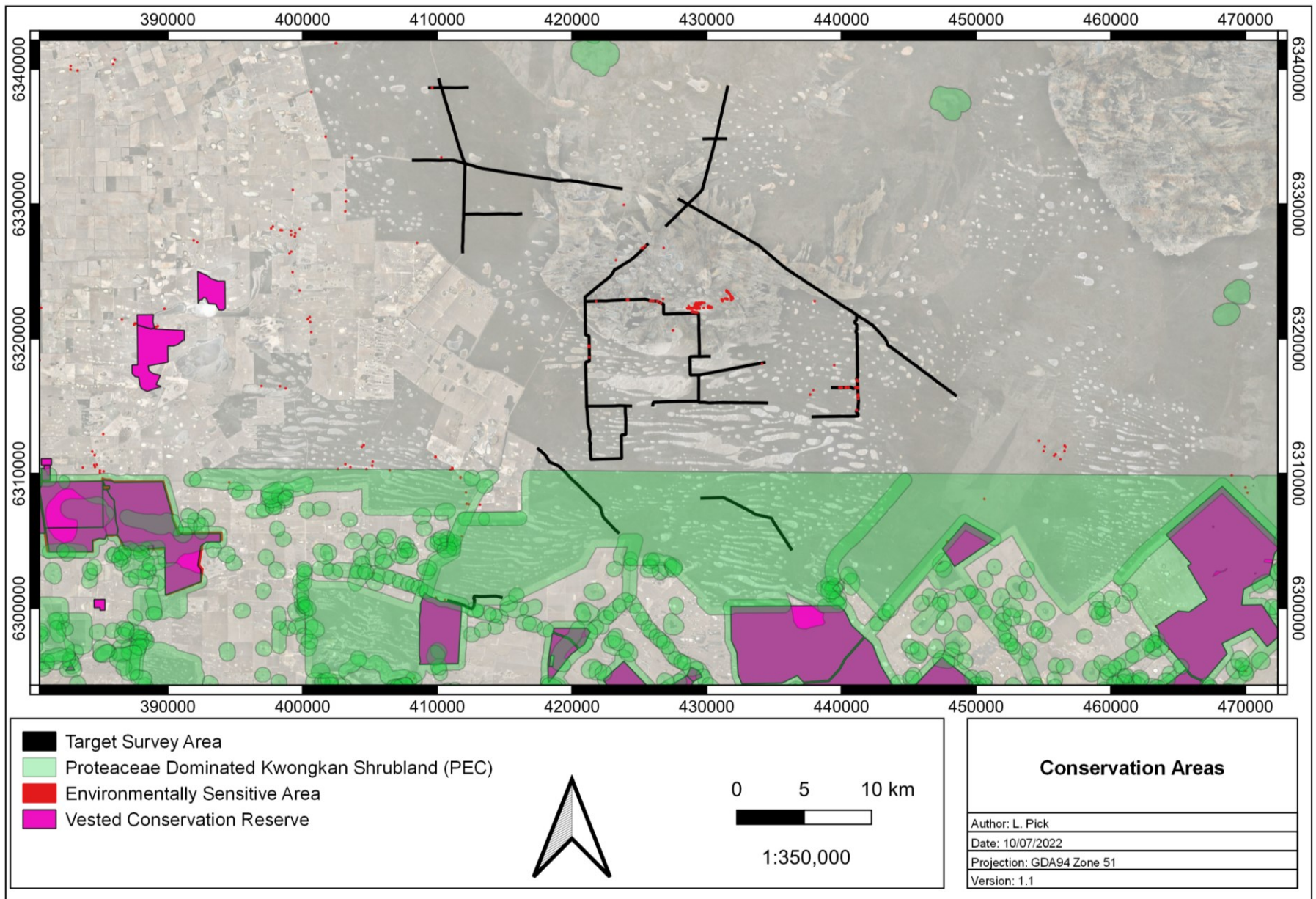


Figure 4: Conservation areas in relation to the target survey area

Attachment 1: Photographic records of proposed drill lines



51 H 409415 6300952



51 H 413582 6300900



51 H 417523 6311810



51 H 448788 6315575



51 H 439400 6322920



51 H 424738 6315081

Attachment 2: Priority Flora GPS Records within the target survey area (GDA94)

Taxon	Conservation Code	Zone	Easting	Northing	No. Plants
<i>Acacia euthyphylla</i>	P3	51 H	417986	6311402	1
<i>Acacia euthyphylla</i>	P3	51 H	417943	6311422	1
<i>Adenanthos ileticos</i>	P4	51 H	442484	6320847	1
<i>Adenanthos ileticos</i>	P4	51 H	441124	6321790	1
<i>Darwinia</i> sp. Gibson (R.D. Royce 3569)	P1	51 H	418823	6310664	1
<i>Darwinia</i> sp. Gibson (R.D. Royce 3569)	P1	51 H	418947	6310583	1
<i>Darwinia</i> sp. Gibson (R.D. Royce 3569)	P1	51 H	418967	6310571	1
<i>Darwinia polycephala</i>	P4	51 H	423979	6313853	12
<i>Darwinia polycephala</i>	P4	51 H	423662	6312555	31
<i>Darwinia polycephala</i>	P4	51 H	429168	6321883	1
<i>Darwinia polycephala</i>	P4	51 H	429172	6321881	1
<i>Persoonia cymbifolia</i>	P3	51 H	418299	6310887	1
<i>Persoonia cymbifolia</i>	P3	51 H	418325	6310837	1
<i>Persoonia cymbifolia</i>	P3	51 H	418354	6310831	1
<i>Persoonia cymbifolia</i>	P3	51 H	418358	6310822	1

Appendix B: Photographic records within the Assessment Area

Existing Access Tracks/ Drill Lines within the Assessment Area



51 H 409415 6300952



51 H 413582 6300900



51 H 417523 6311810



51 H 448788 6315575



51 H 439400 6322920



51 H 424738 6315081

Burnt vegetation-2019/ 2020



Mature Vegetation



Eucalyptus merrickiae



Regrowth



Mature

Appendix C: Dieback Management Plan



MOUNT RIDLEY PROJECT

Exploration Licences

E63/1547, E 63/1564, E 63/1617, E 63/2111, E 63/2112,

E 63/2113, E 63/2114, E 63/2117, E 63/2125

Dieback Management Plan

Updated 27/05/2022

Name of Project:	Mount Ridley
Tenements:	E63/1547, E 63/1564, E 63/1617, E 63/2111, E 63/2112, E 63/2113, E 63/2114, E 63/2117, E 63/2125
Name of Tenement Holder:	Mount Ridley Mines Ltd
Name of Tenement Operator	Mount Ridley Mines Ltd
Author:	Stuart Kerr
Approved:	David Crook
Title:	Technical Manager
Date:	27/05/2022

1.0 INTENT

To prevent the introduction of Phytophthora to protectable, potentially Dieback free vegetation within the project area.

It should be acknowledged that the project area has within it, excluded cleared farmland. It has potentially been compromised with respect to dieback introduction and spread by historical farming activities. This plan aims to prevent any further introduction or spread of Phytophthora across the project area.

2.0 ACCOUNTABILITY

Exploration Manager;

- Ensure compliance with the requirements of this procedure.
- Ensure employees and contractors are inducted in this procedure.
- Ensure vehicle inspections/washdowns are carried out.
- Ensure all inspections are carried out by suitably qualified staff or those who have undertaken Green Card training.

All employees and contractors;

- Ensure compliance with the requirements of this procedure.

3.0 LOCATION AND ACCESS

The Mt Ridley Project at the time of writing comprises nine granted exploration licenses: E63/1547, 1564, 1617, 2111, 2112, 2113, 2114, 2117, 2125. ("Project"). The Project is located approximately 70 km northeast of Esperance in the vicinity of Mt Ridley and Lake Halbert (Figure 1).

Access to the Project is via sealed roads and, within the Project, via good quality gravel roads and a combination of farm and exploration tracks.

The elevation difference across the tenement is minimal and in the general range between 180 and 200 m RL. The land is mainly flat-lying, except for small dune ridges and salt lakes are common throughout the project area. There are rare and isolated hills at least 50 meters above the drainage level occurring as erosional remnants.

These are typified by Mt Ridley (297 m) in the western part of the tenement and Sheoak Hill (210 m) in the northeast area.

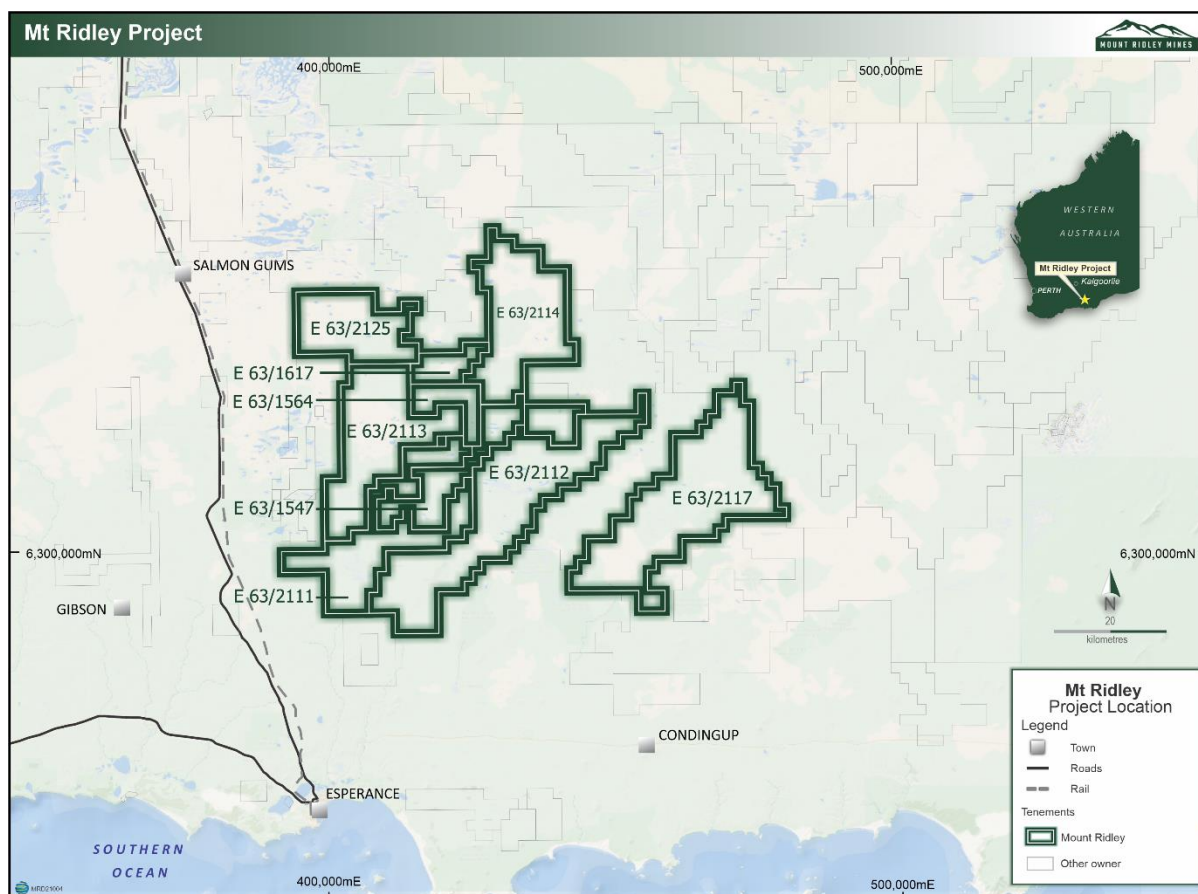


Figure 1: Mount Ridley Project Location.

4.0 DIEBACK OVERVIEW

Phytophthora dieback (dieback) is a plant disease of native ecosystems. The main species responsible, *Phytophthora cinnamomi*, is a microscopic and soil-borne organism that was introduced into Western Australia in the early 1900s. Over forty species of *Phytophthora* have been identified in Western Australia (DBCA, 2020).

The microscopic plant pathogens from the genus *Phytophthora* live in soil and infested plant material and can be spread by any mechanism in which infested soil, plant material or water is moved into uninfested areas. Although *Phytophthora* can be spread by native and feral animals, in surface and subsurface water or by root-to-root contact, human activities have the capacity to move it further and faster than any other means of spread. Consequently, vehicles and equipment need to remain free from infested plant material and soil when working on lands managed by the Department of Biodiversity, Conservation and Attractions (DBCA) in the south-west (DCBA, 2020).

Phytophthora cinnamomi depends on moist conditions as these favour survival, sporulation and dispersal. It may be transported in a number of ways (CALM, 2003):

- Mycelia may grow from plant to plant via root-to-root contact points;
- Mycelia can be carried in soil and host tissue;
- As zoospores that can actively swim very short distances towards new hosts and initiate new infections;
- Zoospores may be carried in moving water or in transported soil;

- Tough, long lived chlamydospores may be transported in soil or roots then germinate to cause a new infection when they encounter favourable conditions, producing mycelia and zoospores.
- Dieback is a symptom of a *Phytophthora cinnamomi*. Other, as yet unidentified species may also occur.

The pathogen has a wide distribution in areas of high annual rainfall with protectable areas situated in zones above 600 mm (DBCA, 2020).

As shown in Figure 2. The project area is located within the ‘Vulnerable Zone’ which is the geographic region in which conditions enable dieback to occur and persist. This zone includes all areas of the south-west land division, west and south of the 400mm rainfall isohyet (DBCA, 2020). The project is situated between Salmon Gums and Esperance Downs Research Stations with annual rainfall of approximately 355mm & 490mm respectively (<http://www.bom.gov.au/climate/averages/tables>).

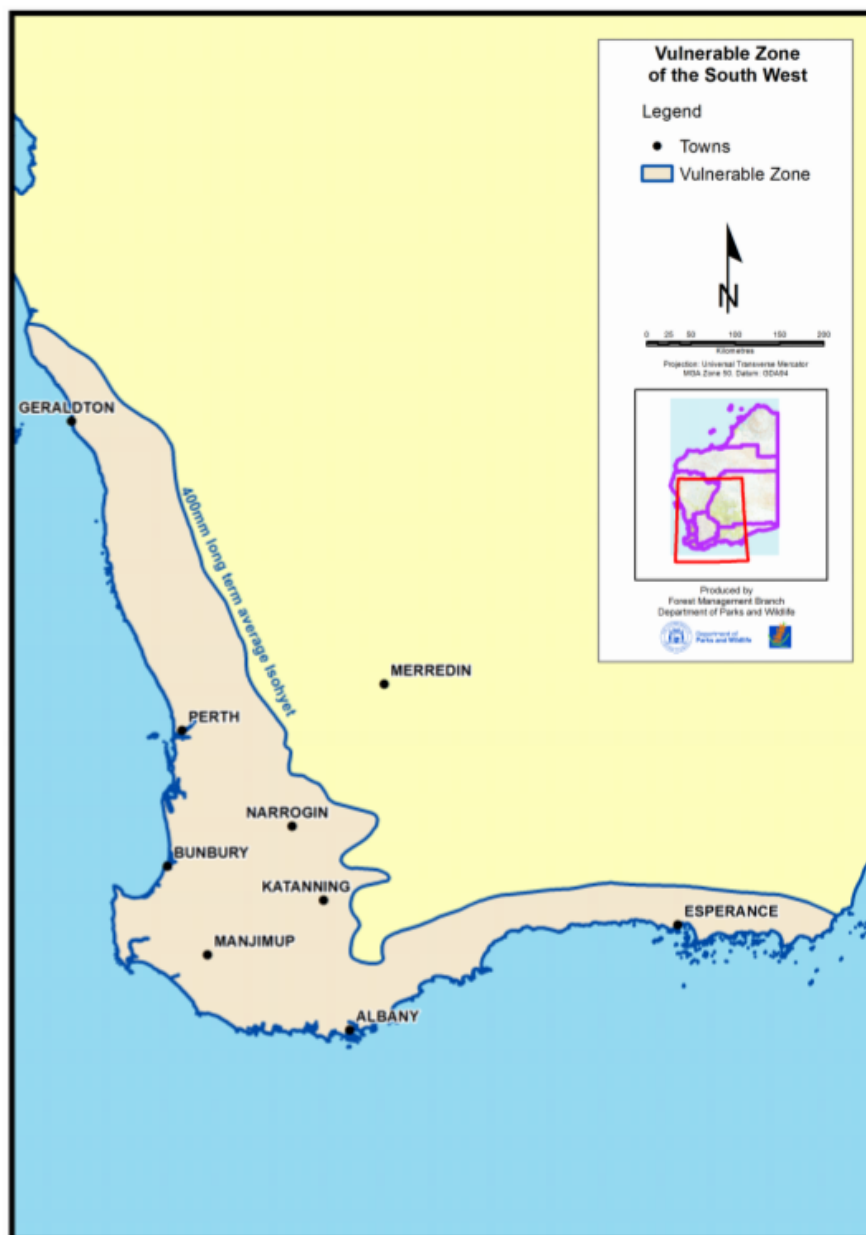


Figure 2: Dieback Vulnerable Zone of the South-West (DBCA, 2020).

5.0 MOUNT RIDLEY PROJECT AREA

The Project primarily lies within Vacant Crown Land, with parts overlapping Freehold Land used for agricultural farming of mainly wheat, barley, canola, lupins, peas and legumes. The total project area comprises 9 granted exploration licences for a total of approximately 3,396 square kilometres. Of the total project area only portions from 3 exploration licences (Table 1) are situated within the Dieback Risk Zone (Figure 3) that represent only 3.6% of the Project area. Main access into the Project area within the Dieback Risk Zone is via sealed roads and north of the Dieback Risk Zone is on gazetted gravel roads.

The area of remnant vegetation on Vacant Crown Land (VCL) is shown in Figure 4. These areas are all north of and outside of the Dieback Risk Zone. Project areas within the Dieback Risk Zone are either on Freehold Land or Nature Reserves.

Although areas of native vegetation are located outside the Dieback Risk Zone, they are considered to be at risk of Dieback due to the potential for localised impacts to vegetation in watercourses, winter-wet depressions and other low-lying areas.

Due to the extensive clearing and lack of appropriate remnant vegetation the farm areas are excluded with regards to the presence or absence of dieback. As a result, management practices have been put in place to minimise the risk of introducing dieback to the site from an external source or from cleared areas within the Project area to areas of remnant vegetation.

Table 1: Area of Tenements within Dieback Risk Zone (shown in Figure 3).

Tenement_ID	Area (ha)	Perimeter (m)
E63/2111	2974	23166
E63/2112	7513	39647
E63/2117	1732	16875

Although there is no exploration activity planned within the Dieback Risk Zone, **Tenement Condition 7 (plan of management to prevent the spread of dieback disease)** is relevant to the tenements within Table 1 when areas of Native Vegetation are accessed. Vehicles, machinery and equipment will adhere to section 6.0 *Management & Hygiene Requirements* as a precaution to prevent potential introduction of Phytophthora to protectable, potentially Dieback free vegetation within the project area.

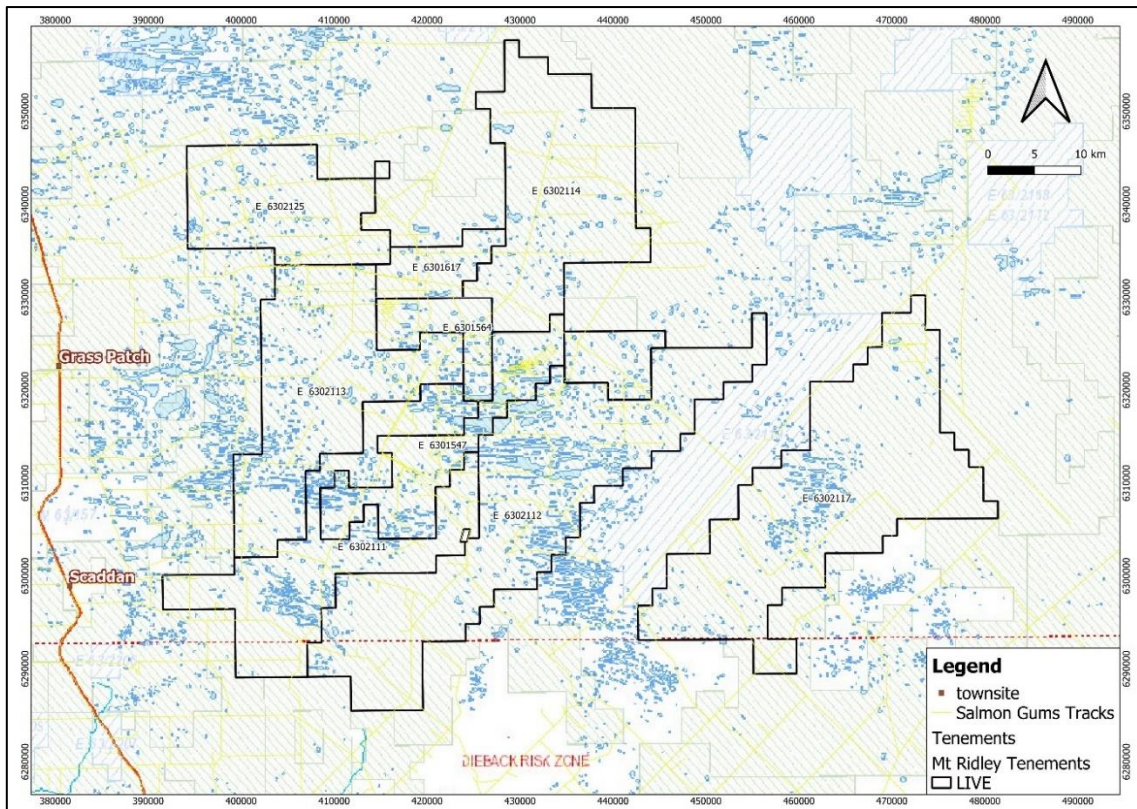


Figure 3: Mt Ridley Project Area relative to the Dieback Risk Zone labelled and south of the dashed red line (from DMIRS, Tengraph Online).

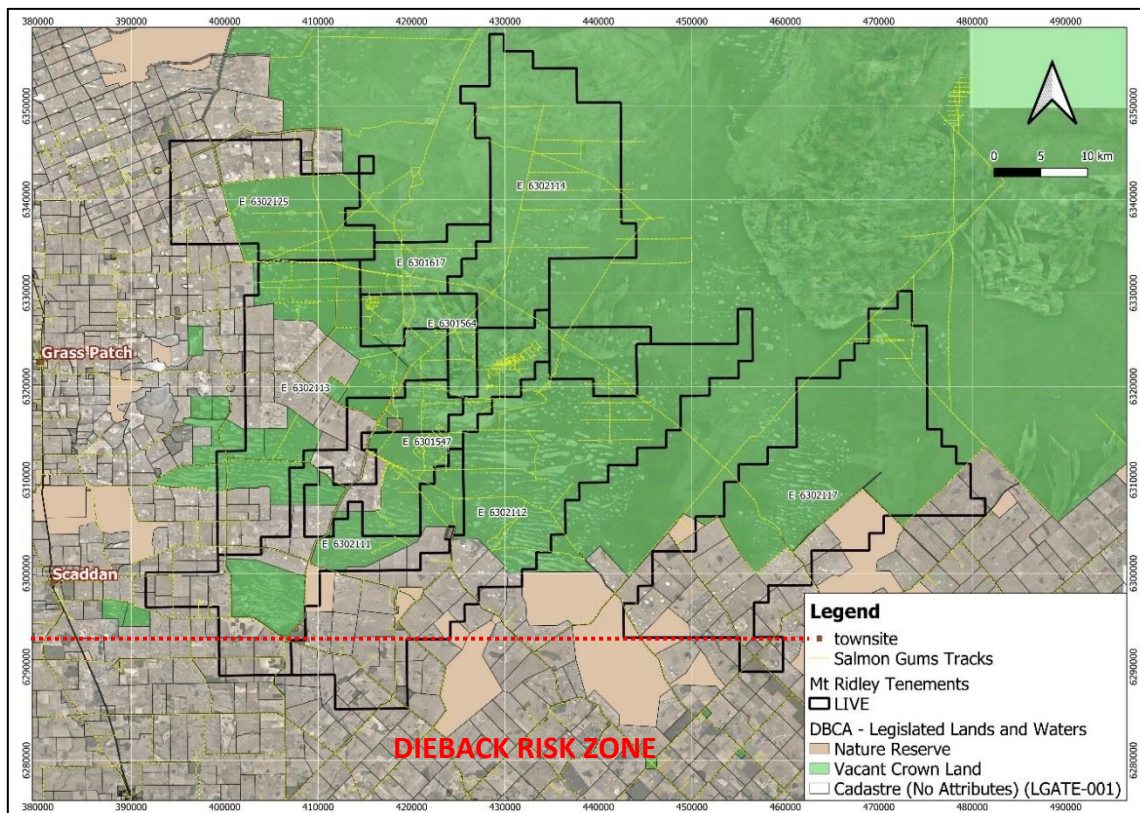


Figure 4: Mt Ridley Project Area – shows Vacant Crown Land (VCL/UCL) with remnant vegetation (green), Nature Reserves (tan) and Freehold Land utilised for agricultural use (no hatch). The Dieback Risk Zone is labelled and is the area south of the dashed red line (from DMIRS Tengraph Online).

6.0 MANAGEMENT & HYGIENE REQUIREMENTS

All employees and contractors to be familiar with this document and comply with management requirements and dieback hygiene strategy as outlined below;

- All equipment, machinery and vehicles will be 'Clean on Entry' (cleaned and free of soil and vegetation material offsite) prior to travelling to the Project area.
 1. Pressure washed – any vehicle or machinery that requires soil/mud removed at a designated wash down area.
 2. Brushed down – heavy or light vehicles, equipment and machinery particularly when it's dry.
 3. Airblown free of soil – drill rigs.
- Wash down locations (Figure 5).
 - Offsite - The Quick 'N' Clean Car Wash in the town of Esperance (or equivalent from site of mobilisation such as Perth or Kalgoorlie) prior to arriving at site providing proof of wash down and inspection.
 - Onsite - MRD Camp wash down bay prior to leaving site – the level of wash down (see 1-3 above) will be dictated by the inspection prior to leaving site. The wash-down bay is not located in the vicinity of a watercourse or other low-lying area, and run-off from washdowns will be contained in a sump pit to prevent spread into the wider environment.
- Inspections are carried out by qualified staff or those who have undertaken Green Card training.
- Entry and egress into areas of remnant native vegetation will only be along existing tracks. New tracks will only be established pursuant to a programme of work (POW) approved by DMIRS, and subject to this Dieback Management Plan.
- Any potentially ground disturbing activities within Dieback Risk Zones will be conducted during dry soil conditions as defined in the *Phytophthora Dieback Management Manual* (DBCA, 2020). In the event of rainfall, exploration activities will be suspended until dry soil conditions are restored.
- Exploration activity will be limited where possible to the Spring, Autumn and Summer Seasons to avoid crossing low lying damp areas and watercourses during Winter months within tenement areas outlined in Table 1.
- Access from the MRD camp and washdown site to external work areas will be from north of the Dieback Risk Zone where possible. Mobile washdown equipment carried on vehicles will be implemented where necessary with the level of washdown to be determined at the time and conditions. If a wet washdown is needed, this involves a 70:30 mix of methylated spirits and distilled/deionized water (or a specific chemical called Phytoclean).
- Induction and training relating to weed and dieback management to staff and contractors.
- Mount Ridley Mines Supervisors will conduct random checks of equipment coming to site prior to commencing work to ensure they are clean.

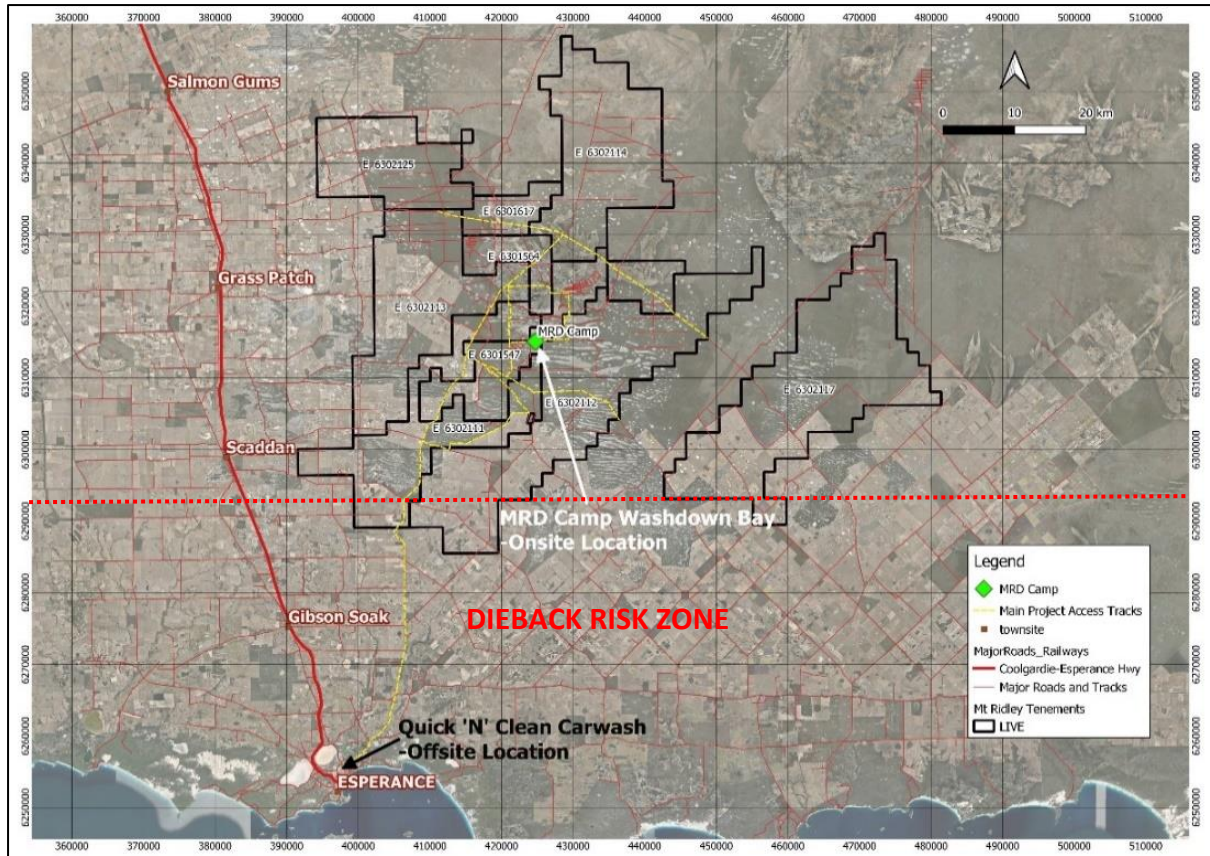


Figure 5: Mt Ridley Project Area – Washdown / Clean Down Sites for offsite and onsite. The Dieback Risk Zone is labelled and is the area south of the dashed red line (from DMIRS Tengraph Online).

7.0 REFERENCES

Australian Government, Bureau of Meteorology. Climate statistics for Australian locations;

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Government of Western Australia Department of Mines and Petroleum Environment. Management of Dieback Disease in Mineral Exploration, (December 2006).

7.0 APPENDICES

Machinery & Vehicle Hygiene Inspection Checklist



Machinery&Vehicle
Hygiene Inspection