

Vivien Project

Reconnaissance Flora/ Vegetation & Basic Fauna Assessment

**Prepared for Ramelius Resources Limited
July 2022**



Prepared by



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Cover Photo: View of Mulga woodland within the survey area, typical of the Murchison IBRA Region. Taken 2nd June 2022.

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EXECUTIVE SUMMARY

Botanica Consulting Pty Ltd (Botanica) was commissioned by Ramelius Resources Limited to undertake a reconnaissance flora/ vegetation and basic fauna survey of the Vivien Project. The survey area encompasses an area of approximately 86 ha and is located approximately 15 km west of Leinster, Western Australia (Figure 1-1).

The survey area lies within the Murchison Bioregion, as defined by the Interim Biogeographic Regionalisation of Australia (IBRA) within the Shire of Leonora.

Botanica conducted a reconnaissance flora/ vegetation and basic fauna survey of the survey area on the 2nd June 2022. The area was traversed with a four-wheel drive and on foot by Jennifer Jackson (Senior Botanist, BSc (Honours) Environmental Management).

Prior to the field assessment, a desktop review was undertaken to identify any potential significant flora, vegetation and fauna that may occur within the survey area. The desktop review consisted of a literature review of previous flora and fauna assessments conducted within the local region, NatureMap Database search (DBCA, 2022a) and the *Environmental Protection and Biodiversity Conservation (EPBC) Act 1999* Protected Matters search tool (DAWE, 2022a). Database search requests were also submitted to the Department of Biodiversity, Conservation and Attractions (DBCA) for records of significant flora (Ref: 52_0522FL), significant fauna (Ref: 7123) and Ecological Communities (Ref: 24_0422EC) occurring within 40 km of the survey area.

Two vegetation types were identified within the survey area. These vegetation types were identified within two landform types and comprised of one major vegetation group, which were represented by a total of 19 families, 30 genera and 42 taxa. No Threatened Flora listed under the Western Australian *Biodiversity Conservation Act 2016* (BC Act) or Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) was identified in the survey area. No Threatened Ecological Communities as listed under the Western Australian BC Act or Commonwealth EPBC Act were identified within the survey area.

Based on the vegetation condition rating scale specified in the Environmental Protection Authority (EPA) *Technical Guidance - Flora and Vegetation Surveys for Environmental Impact Assessment – December 2016* (EPA, 2016a), vegetation was rated as 'good'. Disturbances within the survey area include historical mining and exploration and current mining. Evidence of cattle grazing was seen throughout the area, and two non-aggressive weed species were present. Neither of these weeds are listed as a Declared Pest or Weed of National Significance.

No Priority Flora taxa as listed on the Department of Biodiversity, Conservation and Attractions (DBCA) database had previously been recorded within the survey area. No Priority flora was identified within the survey area during the field survey. No Priority Ecological Communities (as listed by DBCA) were identified within the survey area.

One fauna habitat was identified within the survey area during the field survey. Results of the desktop assessment identified 139 bird, 5 mammal, 31 reptile and 7 amphibian taxa as having been previously recorded in the general area, some of which have the potential to occur within the survey area.

No significant fauna were observed within the survey area. A desktop and on ground assessment concluded that the survey area had low potential for significant fauna habitat, and that it was unlikely that any threatened or conservation significant fauna would occupy the area.

There are no wetlands of international importance (Ramsar Wetlands) or national importance (Australian Nature Conservation Agency Wetlands) within the survey area nor proposed or gazetted conservation reserves.

Based on the outcomes from the survey undertaken, Botanica assessed the results of the desktop and field survey with regards to the native vegetation clearing principles listed under Schedule 5 of the *Environmental Protection (EP Act) 1986*. The assessment found that any proposed vegetation clearing activities are unlikely to be at variance with any clearing principles.

1 INTRODUCTION

Botanica Consulting Pty Ltd (Botanica) was commissioned by Ramelius Resources Limited to undertake a reconnaissance flora/ vegetation and basic fauna survey of their Vivien Project. The survey area encompasses an area of approximately 86 ha and is located approximately 15 km west of Leinster, Western Australia (Figure 1-1).

1.1 Objectives

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

- gather background information on flora and vegetation in the target area (literature review, database and map-based searches);
- identify significant flora, vegetation and ecological communities and assess the potential sensitivity to impact;
- conduct a field survey to verify / ground truth the desktop assessment findings;
- undertake floristic community mapping to a scale appropriate for the bioregion and described according to the National Vegetation Information System (NVIS) structure and floristics;
- undertake vegetation condition mapping;
- assess the project area's plant species diversity, density, composition, structure and weed cover, using NVIS classification system for vegetation description;
- assess Matters of National Environmental Significance (MNES) and indicate whether potential impacts on MNES as protected under the *Environment Protection and Biodiversity Conservation (EPBC) Act 1999* are likely to require referral of the project to the Commonwealth Department of Agriculture, Water and the Environment (DAWE); and
- determine the State legislative context of environmental aspects required for the assessment.

The fauna assessment was conducted in accordance with the requirements of a basic terrestrial fauna survey as defined in *Technical Guidance - Terrestrial Fauna Surveys for Environmental Impact Assessment – June 2020* (EPA, 2020). The objectives of the assessment were to:

- Undertake a literature review, including map-based information searches of all current and relevant literature sources and databases relating to the survey area;
- Undertake a desktop investigation to identify any previously recorded occurrences of or potentially occurring Threatened and Priority listed fauna within the survey area;
- Undertake searches on available databases for details relating to any Threatened and Priority listed fauna previously identified as occurring or potentially occurring within the survey area;
- Conduct fauna habitat mapping and identify habitat types which are suitable for each significant fauna considered likely or possible to occur, or fauna recorded in the survey area;
- Compile an inventory of fauna species occurrences within the survey area;
- Undertake opportunistic, low intensity sampling of fauna; and
- Report on the conservation status of species present using the Western Australian Museum and EPBC Act databases for presence of Threatened and Priority listed fauna species within the survey area.

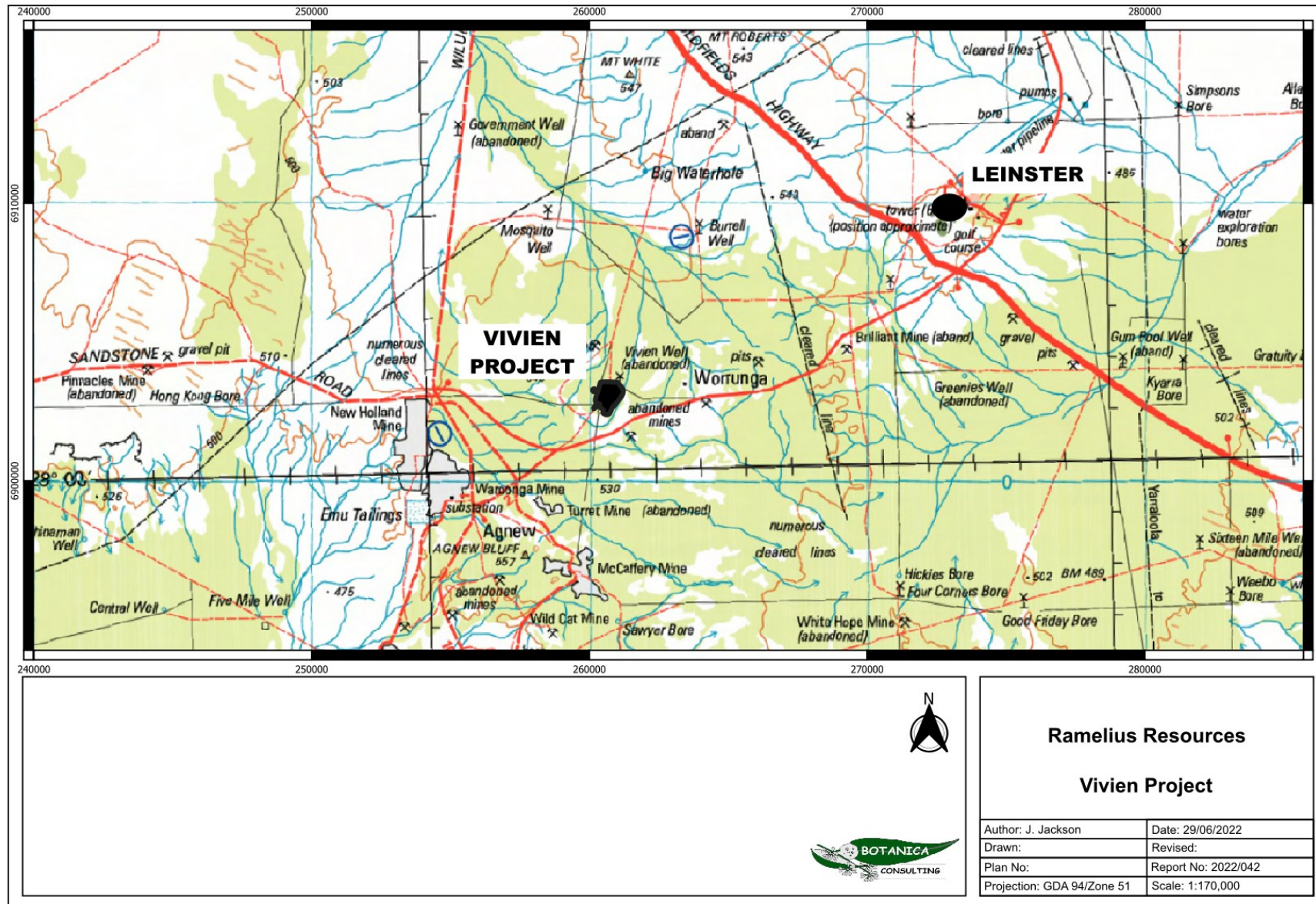


Figure 1-1: Regional location of the Vivien Project

2 BIOPHYSICAL ENVIRONMENT

2.1 Regional Environment

The survey area lies within the Eremaean Province of Western Australia (WA). Based on the Interim Biogeographic Regionalisation of Australia (IBRA, Version 7) (DotEE, 2012) the survey area lies across the Murchison Bioregion. The bioregions are further divided into subregions with the survey area located within the Eastern Murchison (MUR1) subregion (Figure 2-1).

The landscape of the Murchison Bioregion comprises low hills, mesas of duricrust separated by flat colluvium and alluvial plain. It is dominated by the Archaean (over 2500 million years ago) granite greenstone terrain of the Yilgarn Craton (McKenzie, May and McKenna, 2002). Alluvial soils and sands mantle the granitic and greenstone units of the Yilgarn Craton. These soils are shallow, sandy and infertile. Underlying the soils in low areas is a red-brown siliceous hard pan (Curry et al. 1994). The soils in the eastern half of the bioregion are typically red sands, calcareous red earth soil, duplex soil and clays. There are 41 vegetation associations (hummock grasslands, succulent steppe or low woodlands) that have at least 85 per cent of their total area in the bioregion. The bioregion is rich and diverse in both its flora and fauna but most species are wide ranging and usually occur in adjoining regions (McKenzie, May and McKenna, 2002).

The Eastern Murchison subregion comprises the northern parts of the craton's Southern Cross and Eastern Goldfields Terrains and is characterised by internal drainage and extensive areas of elevated red desert sandplains with minimal dune development. Salt Lake systems are associated with the occluded paleodrainage system. Broad plains of red-brown soils and breakaways complexes as well as red sandplains are widespread. Vegetation is dominated by Mulga woodlands and is often rich in ephemerals, hummock grasslands, saltbush shrublands and Samphire shrublands (McKenzie, May and McKenna, 2002). The Eastern Murchison subregion comprises diverse mulga woodlands, which occur on low greenstone belts. The sand plains have red loamy earths and red deep sands which are found on the sandy banks (Cowan, 2001).

2.2 Land Use

The dominant land uses of the Eastern Murchison subregion include grazing native pastures (85.47%), unallocated crown reserves (11.34%), conservation (1.4%) and mining (1.79%) (Cowan, 2001).

The Vivien Project is located within the Shire of Leonora and intersects the Vivien Townsite Crown Reserve (R 10513).

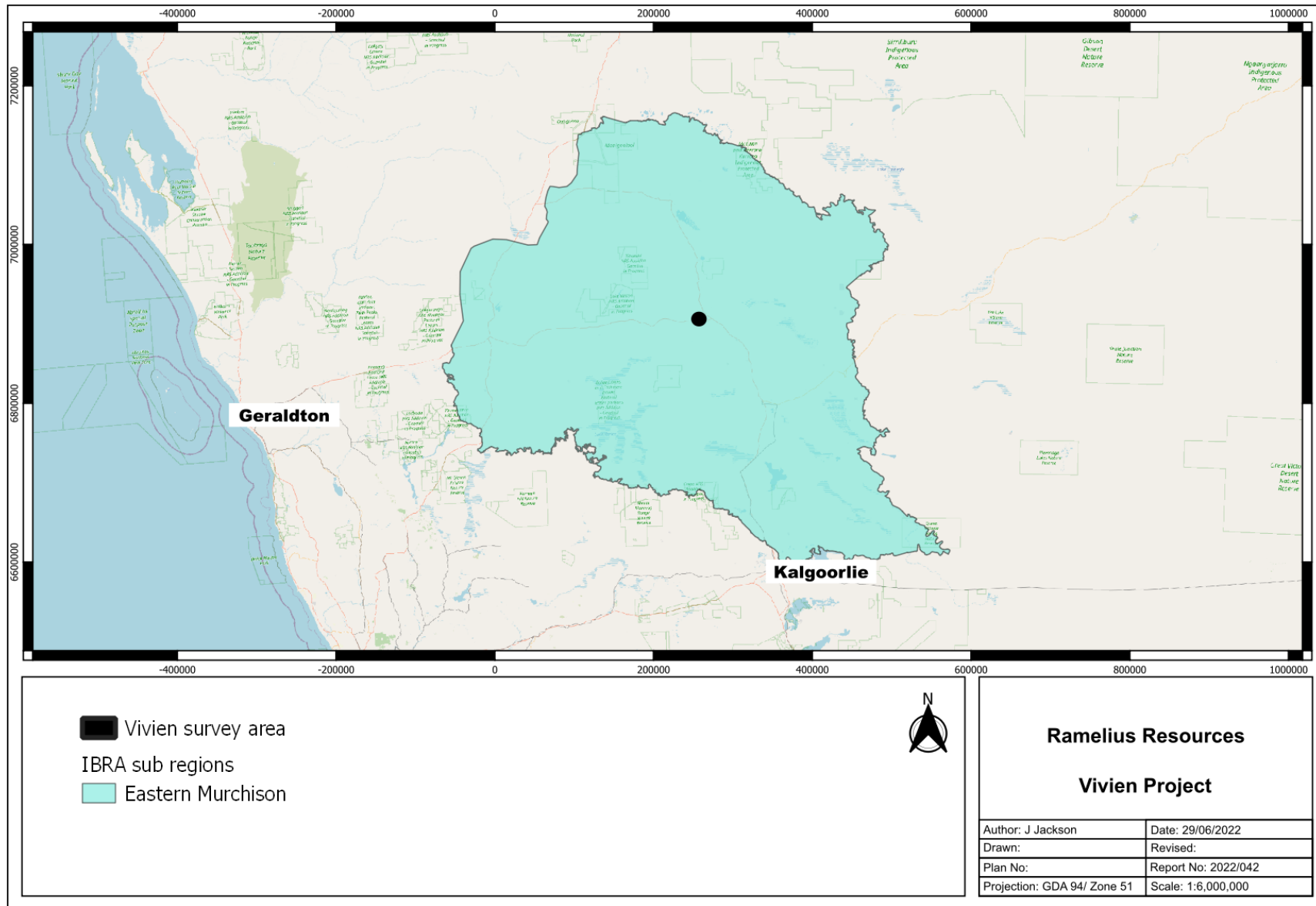


Figure 2-1: Map of the survey area in relation to the Eastern Murchison IBRA subregion

2.3 Soil Landscape Systems

The survey area lies within the Murchison Province soil-landscape of the Western Region. The Murchison Province consists of hardpan wash plains and sandplains (with some stony plains, hills, mesas and salt lakes) on the granitic rocks and greenstone of the Yilgarn Craton. This Province is located in the inland Mid-west and northern Goldfields between Three Springs, the Gascoyne River, Wiluna, Cosmo Newberry and Menzies (Tille, 2006). This Province is further divided into soil-landscape zones, with the survey area located within the Salinaland Plains Zone (279).

The Salinaland Plains Zone comprises of sandplains (with hardpan wash plains and some mesas, stony plains and salt lakes) on granitic rocks (and some greenstone) of the Yilgarn Craton. Soils include red sandy earths, red deep sands, red shallow loams and red loamy earths with some red-brown hardpan shallow loams, salt lake soils and red shallow sandy duplexes. Vegetation is dominated by mulga shrublands with spinifex grasslands (and some halophytic shrublands and eucalypt woodlands). This zone is located in the northern Goldfields from Lake Barlee and Lake Ballard to Wiluna and Laverton (Tille, 2006).

The Salinaland Plains Zone is further divided into soil landscape systems, with the survey area located across three soil landscape systems, as listed in Table 2-1 shown in Figure 2-2.

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

Soil Landscape System	Description	Extent within Survey Area
Bevon System	Irregular low ironstone hills with stony lower slopes supporting mulga shrublands.	30.3 ha (35.2%)
Jundee System	Hardpan plains with variable gravelly mantles and minor sandy banks supporting weakly groved mulga shrublands.	12.3 ha (14.3%)
Violet System	Gently undulating gravelly plains on greenstone, laterite and hardpan, with low stony rises and minor saline plains; supporting groved mulga and bowgada shrublands and occasionally chenopod shrublands.	43.4 ha (50.5%)

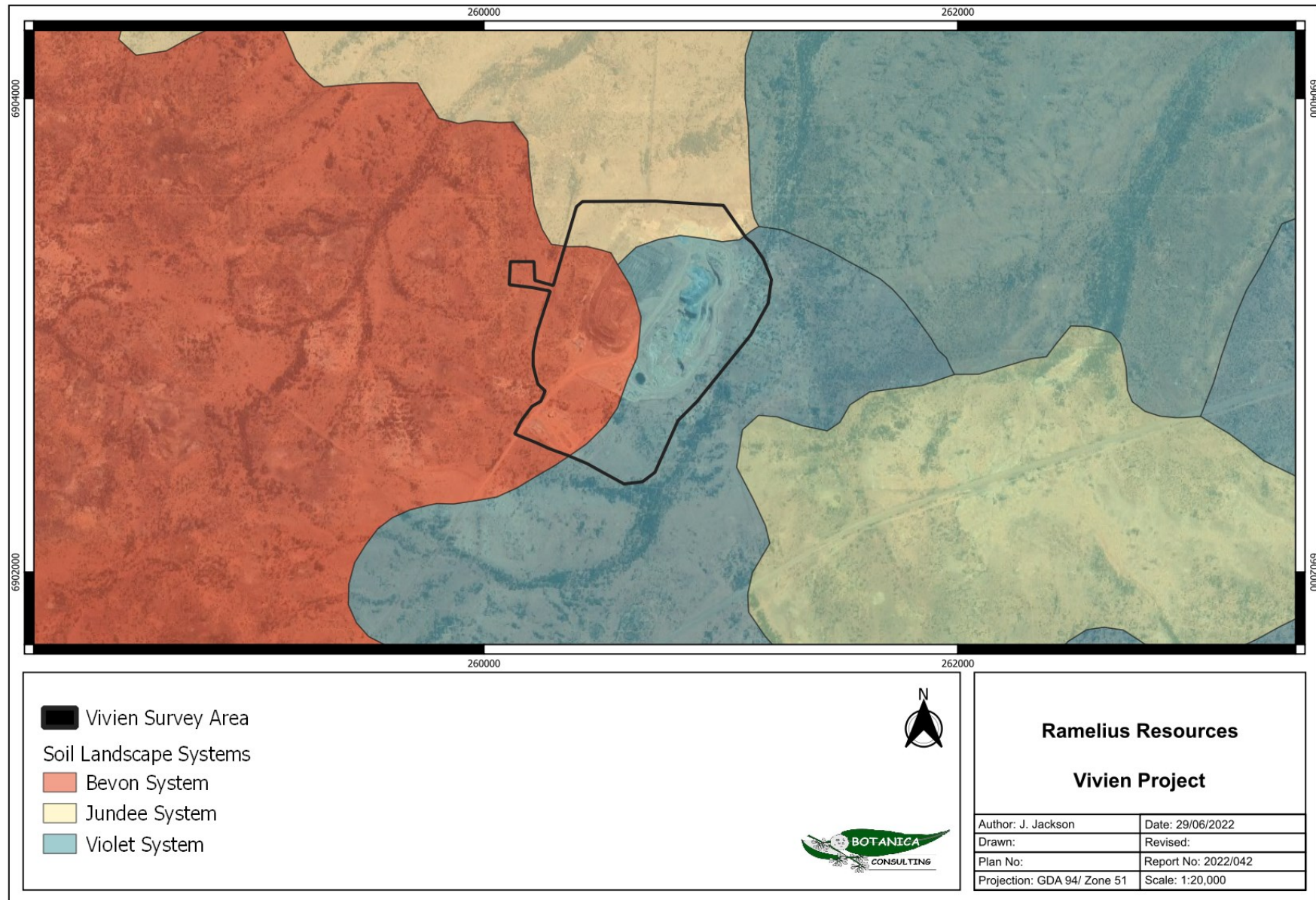


Figure 2-2: Map of soil landscape systems within the survey area

2.4 Pre-European Vegetation

Vegetation of the Murchison Bioregion in the Austin Botanical District is predominantly Mulga low woodlands on plains, often rich in ephemerals, which reduce to scrub on hills. It is also characterised by hummock grasslands, Saltbush shrublands and Samphire shrublands (Beard, 1990; Cowan, 2001a).

The Department of Primary Industries and Regional Development GIS file (DPIRD, 2020) indicates that the survey area is located within pre-European Beard vegetation association Wiluna 18 in the Eastern Murchison subregion. The extent of this vegetation association as specified in the 2018 *Statewide Vegetation Statistics* (Government of Western Australia, 2019) is provided in Table 2-2.

Areas retaining less than 30% of their pre-European vegetation extent generally experience exponentially accelerated species loss, while areas with less than 10% are considered “endangered” (EPA, 2000).

Table 2-2: Pre-European Vegetation Associations within the Project area

Pre-European Vegetation	Description	Pre-European Extent Remaining (%)	Current Extent Reserved for Conservation (%)	Extent within Survey Area
Wiluna 18	Low woodland, open low woodland or sparse woodland of Mulga (<i>Acacia aneura</i>) and associated species.	99.59	1.05	100%

2.5 Climate

The climate of the Eastern Murchison subregion is characterised as an arid climate with summer and winter rainfall of approximately 200 mm annually (Beard, 1990). Rainfall data for the Leinster weather station (#12314) located approximately 15km east of the survey area, is shown in Figure 2-3 (BoM, 2022a). Leinster generally receives a mean annual rainfall of 251.6 mm. Rainfall for the four months preceding the survey was below average.

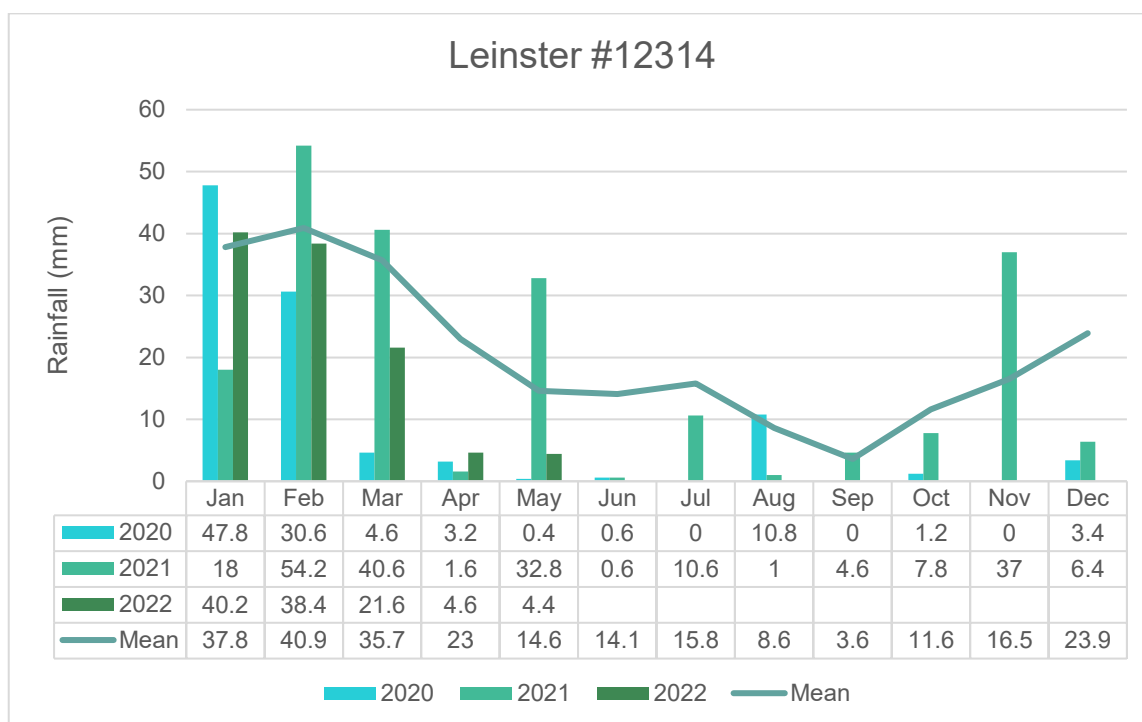


Figure 2-3: Climate data for Leinster (#12314) (BoM, 2022a)

2.6 Conservation Values

No Threatened Ecological Communities (TEC) listed under the Commonwealth EPBC Act or the Western Australian BC Act are known to occur within the survey area or within 40 km of the survey area. The TEC ‘Depot Springs Stygofauna Community’ is located approximately 45 km west of the survey area. Four Priority 1 Ecological Communities (PEC) as listed by DBCA occur within 40 km of the survey area:

1. Lake Miranda west calcrete groundwater assemblage types on Carey paleodrainage on Yakabindie Station. Located approximately 25 km north of the survey area;
2. Lake Miranda east calcrete groundwater assemblage types on Carey paleodrainage on Yakabindie Station. Located approximately 35 km north of the survey area;
3. Yakabindie calcrete groundwater assemblage type on Carey paleodrainage on Yakabindie Station. Located approximately 38 km north of the survey area; and
4. Violet Range (Perseverance Greenstone Belt) vegetation complexes (banded ironstone formation). Located approximately 38 km north of the survey area.

There are no Ramsar wetlands or wetlands of national importance (ANCA Wetlands) within the survey area or within 40 km of the survey area. The nearest Environmentally Sensitive Area (ESA) as listed under the EP Act is the TEC ‘Depot Springs Stygofauna Community’ which is located approximately 45 km west of the survey area.

There are no proposed nor gazetted conservation reserves within the survey area or within 40 km of the survey area. The closest gazetted conservation reserve is the Wanjarri Nature Reserve which is located approximately 55 km north of the survey area.

A map showing conservation values in relation to the assessment area is provided in Figure 2-4.

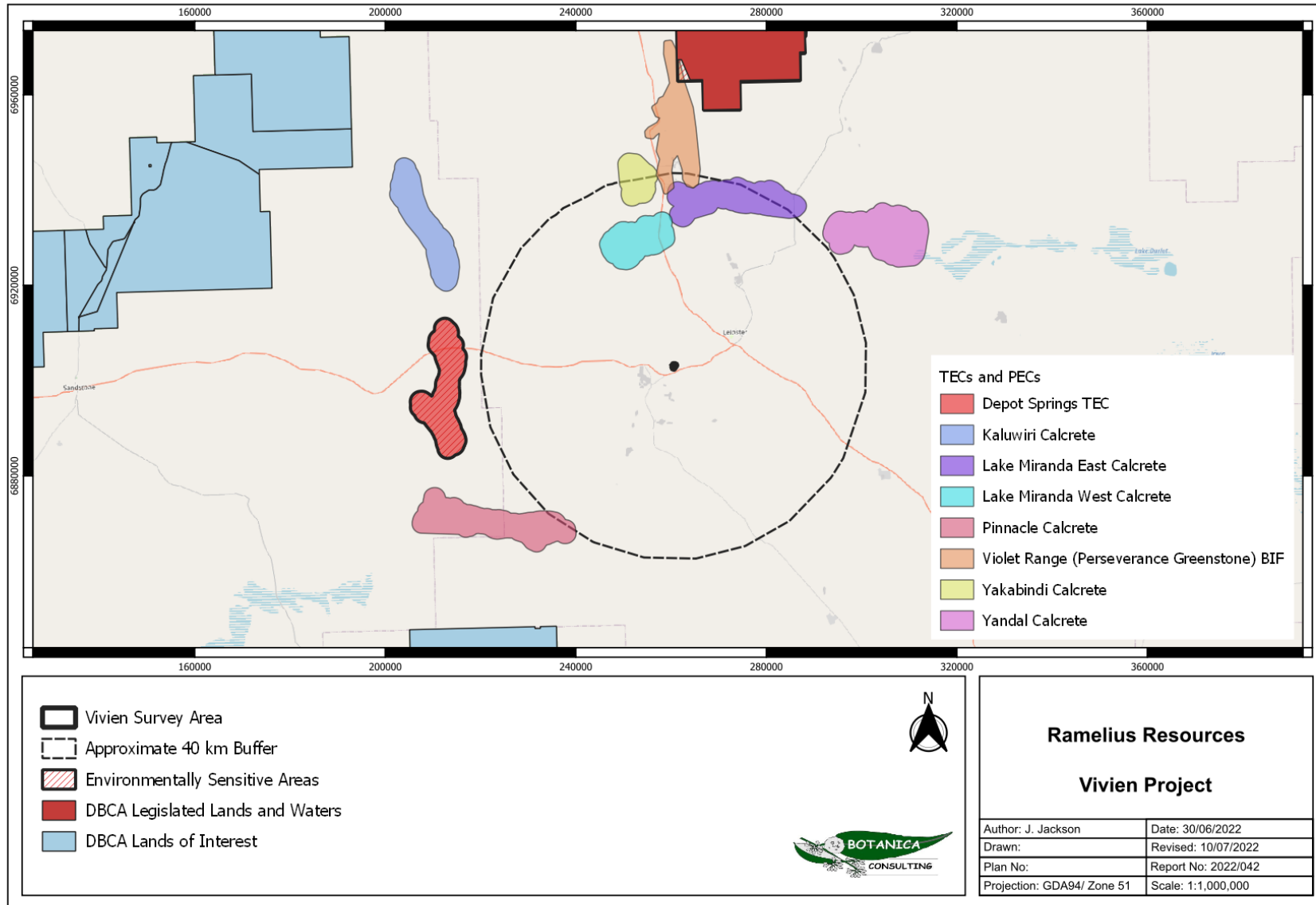


Figure 2-4: Conservation values in relation to the survey area

2.7 Hydrology

According to the Geoscience Australia database (2015), there are no permanent/ perennial inland waters or drainage lines within the survey area. There is one minor ephemeral drainage line that runs along the eastern boundary of the survey area (Figure 2-5).

Groundwater Dependent Ecosystems (GDE) includes biological assemblages of species such as wetlands or vegetation 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, 2022b), there are no known or potential aquatic or terrestrial GDEs located within the survey area (Figure 2-5).

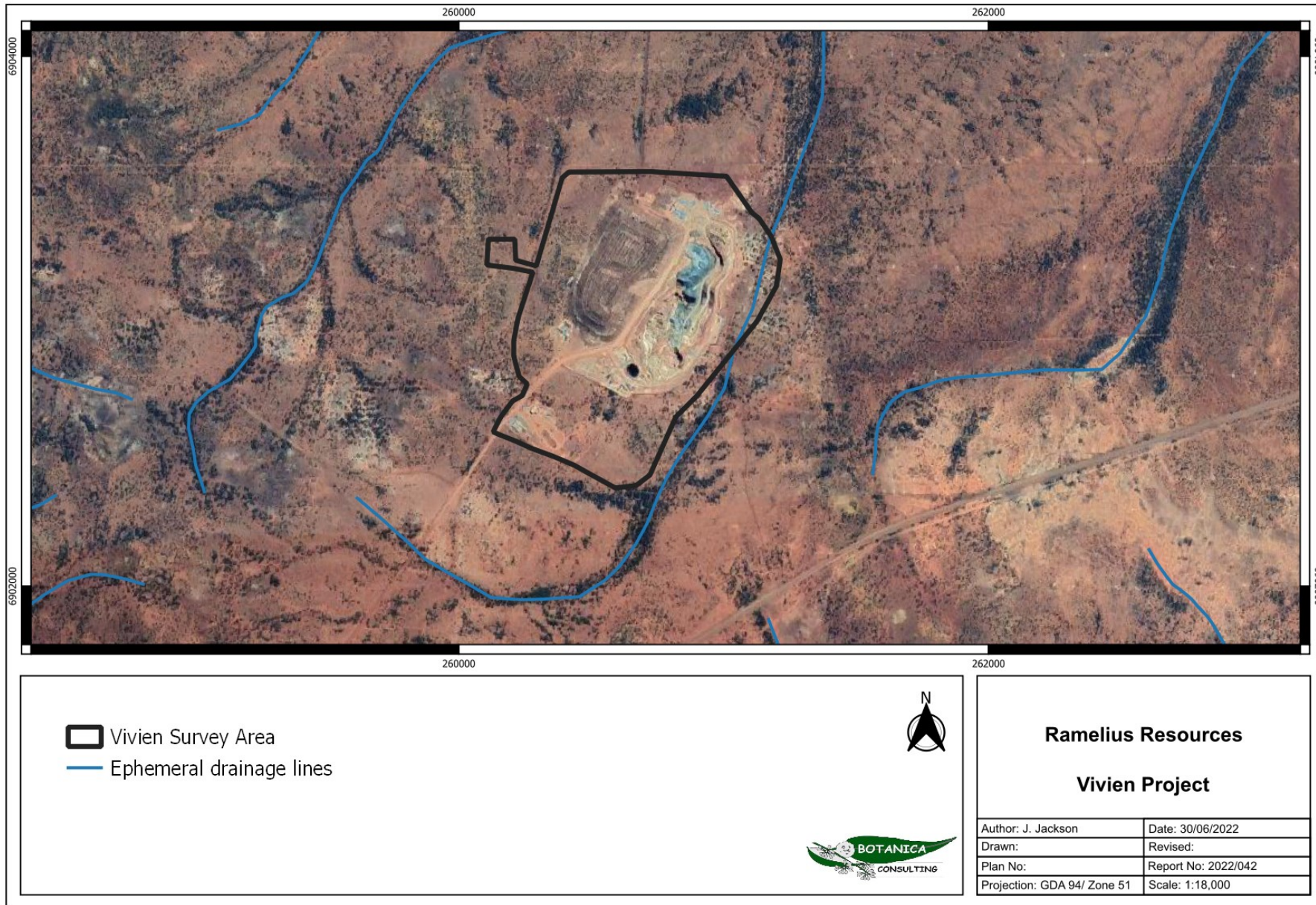


Figure 2-5: Regional hydrology of the survey area

3 SURVEY METHODOLOGY

3.1 Desktop Assessment

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

- Botanica. (2021). Detailed flora/vegetation survey and basic fauna survey of the Redcliffe Gold Project. Unpublished report prepared for Dacian Gold Ltd., October 2021.
- Botanica (2021). Reconnaissance Flora and Basic Fauna Survey of the proposed Bronzewing to Thunderbox Haul Road (L36/246). Unpublished report prepared for Northern Star Resources Ltd., October 2021.
- Botanica (2022). Reconnaissance Flora/Vegetation and Basic Fauna Survey of the Bundarra Project. Unpublished report prepared for Northern Star Resources Ltd., June 2022.
- Botanica (2019). Reconnaissance Flora/Vegetation & Level 1 Fauna Survey Kathleen Valley Lithium Project. Prepared for Liontown Resources Ltd, March 2019.
- Botanica (2021). Targeted Flora/Vegetation survey -Kathleen Valley Project. Unpublished memorandum prepared for MBS Environmental. July 2021.
- Hall, N.J., Newbey, K.R., McKenzie, N.L., Keighery, G.J., Rolfe, J.K & Youngson, W. K., (1993). The Biological survey of the Eastern Goldfields of Western Australia Part 7: Sandstone-Sir Samuel. Laverton-Leonora study area, West. Aust. Mus. Suppl. 47.
- Meissner, R., and Wright, J. (2010). Flora and vegetation of banded iron formations of the Yilgarn Craton: Perseverance Greenstone Belt. Conservation Science W. Aust. 7 (3): 593–604 (2010)
- Pringle, H.J.R., Van Vreeswyk, A.M.E. and Gilligan, S.A. (1994) An inventory and condition survey in the North-Eastern Goldfields, Western Australia. Western Australian Department of Agriculture, Technical Bulletin No. 87
- Western Botanical (2017). Flora and Vegetation Assessment of the Mt Keith Satellite Proposal Study Area. October 2017. Report prepared for BHP Billiton, Nickel West Pty Ltd. Report Ref: WB867.

Database search requests were submitted to the DBCA for records of significant flora (Ref: 52-0522FL) (DBCA, 2022a), significant fauna (ref: 7123) (DBCA, 2022b) and ecological communities (Ref: 24-0422EC) (DBCA, 2022c), with a centre-point located at coordinates: 25° 39' 13" S, 120° 32' 26" E and with a 40 km buffer applied. A DBCA Naturemap search was also obtained (DBCA, 2022d).

The Environment Protection and Biodiversity Conservation (EPBC) Act 1999 protects environmental matters at a federal level. In addition to the literature review and DBCA database search requests, a search of the EPBC Protected Matters search tool was also undertaken (using the same centre-point and 40 km buffer as stated above) to aid in the compilation of a list of potential federally listed significant flora, fauna and communities within the survey area (DAWE, 2022).

Significant flora species identified by the desktop review were assessed with regards to their population extent and distribution and preferred habitat to determine their likelihood of occurrence within the survey area. The assessment categorised flora species as follows:

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

Significant fauna species identified by the desktop review were assessed with regards to their distribution and preferred habitat to determine their likelihood of occurrence within the survey area. The assessment categorised fauna species as follows:

- **Would Not Occur:** There is no suitable habitat for the species in the survey area and/or there is no documented record of the species in the general area since records have been kept and/or the species is generally accepted as being locally/regionally extinct (supported by a lack of recent records).
- **Unlikely to Occur:** The survey area is outside of the currently documented distribution for the species in question, or no suitable habitat (type, quality and extent) was identified as being present during the field assessment. Individuals of some species may occur occasionally as vagrants/transients especially if suitable habitat is located nearby but the site itself would not support a population or part population of the species.
- **Possibly Occurs:** Survey area is within the known distribution of the species in question and habitat of at least marginal quality was identified as likely to be present during the field survey and literature review, supported in some cases by recent records being documented in literature from within or near the survey area. In some cases, while a species may be classified as possibly being present at times, habitat may be marginal (e.g. poor quality, fragmented, limited in extent) and therefore the frequency of occurrence and/or population levels may be low.
- **Known to Occur:** The species in question has been positively identified as being present (for sedentary species) or as using the survey area as habitat for some other purpose (for non-sedentary/mobile species) during field surveys within or near the survey area. This information may have been obtained by direct observation of individuals or by way of secondary evidence (e.g. tracks, foraging debris, scats). In some cases, while a species may be classified as known to occur, habitat may be marginal (e.g. poor quality, fragmented, limited in extent) and therefore the frequency of occurrence and/or population levels may be low.

It should be noted that these lists are based on observations from a broader area than the assessment area (40 km radius) and therefore may include taxa not present. The databases also often include very old records that may be incorrect or in some cases the taxa in question have become locally or regionally extinct. Information from these sources should therefore be taken as indicative only and local knowledge and information also needs to be taken into consideration when determining what actual species may be present within the specific area being investigated.

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

- *Environment Protection and Biodiversity Conservation (EPBC) Act 1999*. Administered by the Australian Government (DAWE);
- *Biodiversity Conservation (BC) Act 2016*. Administered by the WA Government (DBCA);
- Red List produced by the Species Survival Commission (SSC) of the World Conservation Union (also known as the IUCN Red List – the acronym derived from its former name of the International Union for Conservation of Nature and Natural Resources). The Red List has no legislative power in Australia but is used as a framework for State and Commonwealth categories and criteria; and
- Priority Flora/ Fauna list. A non-legislative list maintained by DBCA for management purposes (fauna list released 10th April 2019; flora list released 5th December 2018).

The EPBC Act also requires the compilation of a list of migratory species that are recognised under international treaties including the:

- Japan Australia Migratory Bird Agreement 1981 (JAMBA)¹;
- China Australia Migratory Bird Agreement 1998 (CAMBA);
- Republic of Korea-Australia Migratory Bird Agreement 2007 (ROKAMBA); and
- Bonn Convention 1979 (The Convention on the Conservation of Migratory Species of Wild Animals).

Most but not all migratory bird species listed in the annexes to these bilateral agreements are protected in Australia as Matters of National Environmental Significance (MNES) under the EPBC Act. Descriptions of conservation significant species and communities are provided in Appendix A.

3.2 Flora and Vegetation Field Assessment

Botanica conducted a reconnaissance flora/ vegetation and basic fauna survey of the Vivien Project area on the 2nd June 2022. The area was traversed using a 4WD vehicle and on foot by Jennifer Jackson (Senior Botanist, BSc (Honours) Environmental Management). The GPS track log of the survey effort is shown in Figure 3-1. Given the degree of existing disturbance within the survey area (existing mining, exploration and some pastoral land use), the survey area is not located in a fragmented landscape, high biodiversity region or a conservation reserve and the desktop assessment identified low potential for significant habitats (i.e. widespread/ common habitats), a reconnaissance survey was conducted.

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

The survey was conducted using a series of survey sites (relevés) as shown in Figure 3-1. At each relevé site, the area was walked on foot to observe and record all flora species. The distance surveyed at each relevé varied dependent on the diversity/ variability of species and landforms/ vegetation types.

¹ Most but not all species listed under JAMBA are also specially protected under Specially Protected Species of the BC Act.

At each relevé, the following information was recorded:

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

Unknown specimens collected during the survey were identified with the aid of samples housed at the Botanica Herbarium and Western Australian Herbarium. Vouchering of the specimens with the Western Australian Herbarium was not required as none of the specimens were of significance (i.e. conservation flora, novel taxa, range extensions etc.). A complete species list was generated from the relevé data for each of the vegetation types identified within the survey area (Appendix B). Structural vegetation classification was used to characterise the different vegetation types. Vegetation types were described in accordance with NVIS classifications-Vegetation Types (Level V).

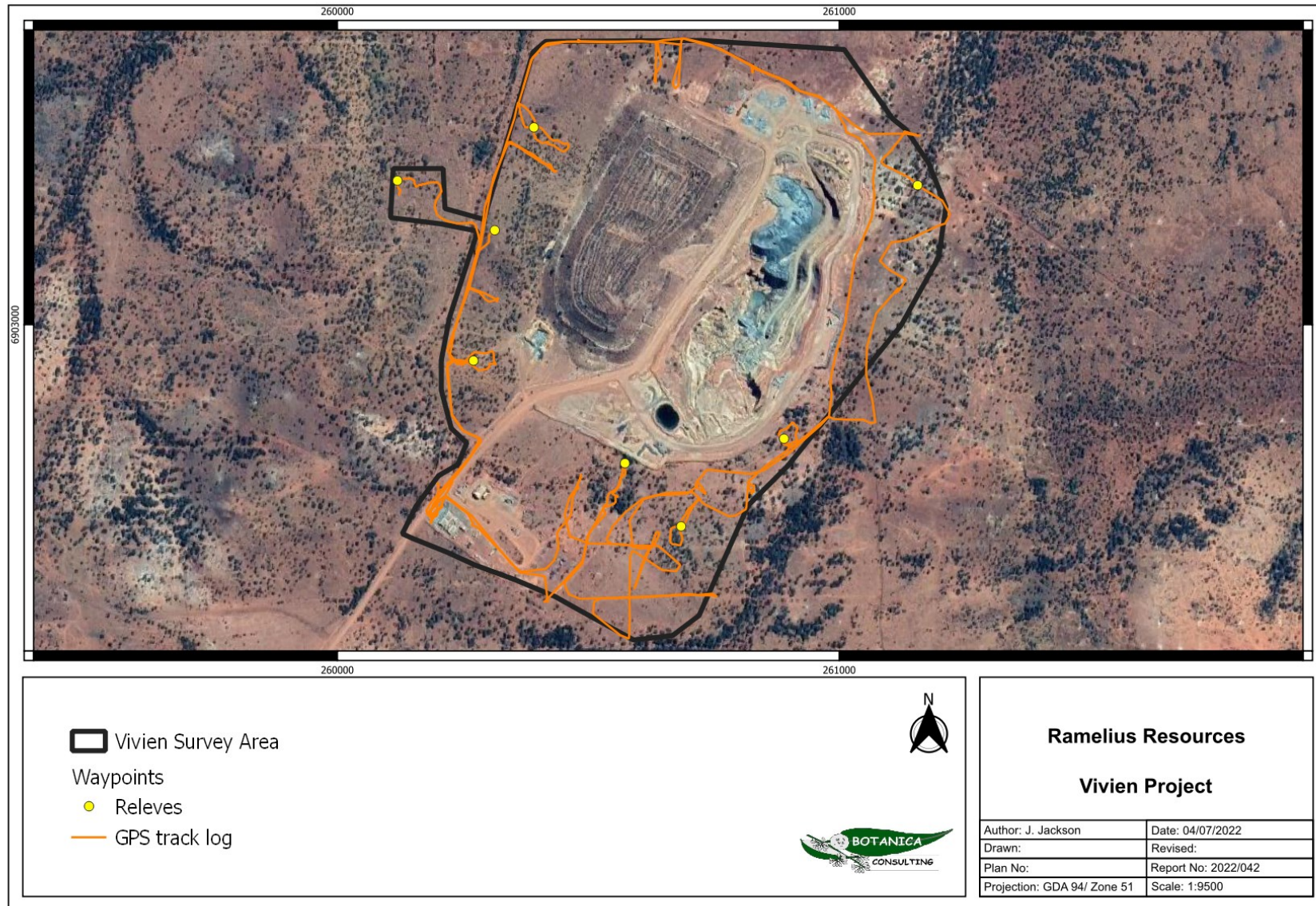


Figure 3-1: GPS track log of the survey effort and locations of relevés

3.3 Data Analysis Tools

Following field assessments, vegetation types and condition were mapped using the GIS program QGIS, and the hectare area/ percentage area of each vegetation type and condition within the survey area was calculated. Spatial maps illustrating the location of vegetation types and any significant flora/ vegetation and fauna were generated using QGIS.

3.4 Terrestrial Fauna Field Assessment

Botanica conducted a basic fauna survey of the survey area in conjunction with the reconnaissance flora/ vegetation survey.

Fauna habitat types were identified across the survey area based on broad major vegetation groups and associated landform. A handheld GPS unit was used to record the coordinates of the boundaries between fauna habitats and each habitat was photographed.

The main aim of the fauna habitat assessment was to determine the likelihood of a species of conservation significance utilising habitat within the survey area. The habitat information obtained was also used to aid in finalising the overall potential fauna list.

Available information on the habitat requirements of the species of conservation significance listed as possibly occurring in the area (determined from the desktop assessment) was researched. During the field survey, the habitats within the survey area were assessed and specific elements identified, if present, to determine the likelihood of listed Threatened and Priority species utilising habitat within the survey area.

Opportunistic observations of fauna species were made during all field survey work.

3.5 Scientific Licences

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

Licensed Staff	Permit Number	Date of Expiry
Jennifer Jackson	FB62000309 (Licence to take flora for scientific purposes)	11/01/2024

3.6 Survey Limitations and Constraints

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

The conclusions presented in this report are based upon field data and environmental assessments and/or testing carried out over a limited period of time and are therefore merely indicative of the environmental condition of the site at the time of the field assessments. Also, it should be recognised that site conditions can change with time. Information not available at the time of this assessment which may subsequently become available may alter the conclusions presented.

Some species are reported as potentially occurring based on there being suitable habitat (quality and extent) within the survey area or immediately adjacent. The habitat requirements and ecology of many of the species known to occur in the wider area are however often not well understood or documented. It can therefore be difficult to exclude species from the potential list based on a lack of a specific habitats or microhabitats within the survey area. As a consequence of this limitation, the potential species list produced is most likely an overestimation of those species that actually utilise the survey area for some purpose.

In recognition of survey limitations, a precautionary approach has been adopted for this assessment. Any flora species that would possibly occur within the survey area (or immediately adjacent), as identified through ecological databases, publications, discussions with local experts/residents and the habitat knowledge of the author, has been listed as having the potential to occur.

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

Variable	Potential Impact on Survey	Details
Access problems	Not a constraint	The survey was conducted via 4WD and on foot. Numerous access tracks were present within the survey area providing ease of access and good coverage of vegetation types.
Competency/ Experience	Not a constraint	The Botanica personnel that conducted the survey were regarded as suitably qualified and experienced. Coordinating Staff: Jennifer Jackson (Senior Botanist / BSc, Environmental Management, Hons) Data Interpretation: Jennifer Jackson.
Timing of survey, weather & season	Minor constraint	Fieldwork was undertaken in June during the EPA's recommended primary survey time period for the Eremaean Province (i.e., 6-8 post wet season March-June), however rainfall for four months preceding the survey was below average.
Area disturbance	Not a constraint	The area has been disturbed from mining operations, cattle grazing and other human impacts; however, vegetation was mostly intact and comprised of native vegetation.
Survey Effort/ Extent	Not a constraint	Survey intensity was appropriate for the size/significance of the area with a reconnaissance flora/ vegetation survey and basic fauna survey completed to identify vegetation types/ fauna habitats.
Availability of contextual information at a regional and local scale	Not a constraint	Conservation significant flora database searches provided by the DBCA were used to identify any potential locations of Threatened/Priority flora species. BoM, DWER, DPIRD, DBCA and DAWE databases were reviewed to obtain appropriate regional desktop information on the biophysical environment of the local region. Botanica has conducted numerous surveys within the Murchison bioregion and was also able to obtain information about the area from previous research conducted within the area. Results of previous assessments in the local area were reviewed to provide context on the local environment.
Completeness	Not a constraint	In the opinion of Botanica, the survey area was covered sufficiently in order to identify vegetation assemblages. Survey work was conducted within EPAs recommended approximate timing (6-8 weeks post wet season), however rainfall for four months preceding the survey was below average. Some taxa were flowering and most taxa were able to be identified to species level. The vegetation associations for this study were based on visual descriptions of locations in the field. The distribution of these vegetation associations outside the study area is not known, however vegetation associations identified were categorised via comparison to vegetation distributions throughout WA given on NVIS (DotEE, 2017).

4 RESULTS

4.1 Desktop Assessment

4.1.1 Flora

The NatureMap database search (DBCA, 2022d) identified 273 vascular flora species as occurring within 40 km of the survey area. The full list of vascular flora identified by the desktop search is contained in Appendix D.

4.1.1.1 Introduced Flora

The desktop review identified seven introduced flora (weed) species as potentially occurring in the vicinity of the survey area. None of these are listed as a Declared Pest on the Western Australian Organism List (WAOL) under the *Biosecurity and Agriculture Management (BAM) Act 2007* or as a Weed of National Significance (Table 4-1).

Table 4-1: introduced flora potentially occurring within 40 km of the survey area

Taxon	Common Name	Declared Pest	WONS
<i>Asphodelus fistulosus</i>	Onion weed	No	No
<i>Digitaria ciliaris</i>	Summer grass	No	No
<i>Lysimachia arvensis</i>	Pimpernel	No	No
<i>Portulaca oleracea</i>	Purslane	No	No
<i>Rumex hypogaeus</i>	Doublegee	No	No
<i>Solanum nigrum</i>	Black Berry Nightshade	No	No
<i>Tribulus terrestris</i>	Caltrop	No	No

4.1.1.2 Significant Flora

Assessment of the DBCA's Threatened and Priority Flora database records (Ref: 52-0522FL) (DBCA, 2022a), EPBC Protected Matters (DAWE, 2022a) and NatureMap database (DBCA, 2022d) and previous relevant literature identified 12 Priority Flora as occurring within a 40 km radius of the survey area.

The threatened flora species *Seringia exastia* was listed as occurring within 40 km of the survey area. DBCA note the following for the Threatened taxa:

“A recently completed taxonomic study that assessed genomic and morphological characters in several *Seringia* taxa (Binks & al. 2020) has concluded that *Seringia exastia* and *S. elliptica* are the same species. The taxonomy of the genus has been revised to synonymise *S. exastia* and *S. elliptica* under the oldest valid name of *S. exastia*. As *S. elliptica* is common and widespread throughout the Pilbara region, central WA and the Northern Territory and extends into South Australia, following the taxonomic revision *S. exastia* is now considered common and widespread.

A nomination to delist the species due to no plausible significant threats to the species has been prepared and considered by the WA Threatened Species Scientific Committee (TSSC). DBCA anticipate that at the next TSSC meeting recommendations will be made to the Minister to delist. However, until changes are officially made to the threatened species list, *S. exastia* is still legally listed as threatened flora, and authorisation to take under section 40 of the *Biodiversity Conservation Act 2016* is still required. Although some loss of plants is likely to have occurred and will continue to occur during mining and road works in some parts of the species' distribution, this is not expected to be significant in the context of the entire population. Therefore, there should be no impediments to

granting authorisation, following the standard process of application made to DBCA's Species and Communities Program (DBCA, 2022a)'.

The DBCA database records identified no Priority Flora taxon as known to occur within the survey area. The 12 Priority taxa that were identified to occur within 40 km of the survey area were assessed for distribution and known habitat to determine their likelihood of occurrence within the survey area (Table 4-2). The locations of DBCA database records for Significant Flora (DBCA, 2022a) in relation to the survey area is shown in Figure 4-1.

Table 4-2: Significant flora potentially occurring within the survey area

Taxon	Rank			Habitat Description	Assessment	Likelihood
	EPBC	BC Act	DBCA			
<i>Baeckea</i> sp. Sandstone (C.A. Gardner s.n. 26 Oct. 1963)	-	-	P3	Orange sand. Flats.	No orange sand plains in the survey area.	Unlikely
<i>Eremophila pungens</i>	-	-	P4	Sandy loam, clayey sand over laterite. Plains, ridges, breakaways.	Recorded approximately 20 km northeast of the survey area. Suitable habitat unlikely to be present.	Unlikely
<i>Goodenia modesta</i>	-	-	P3	Playa formation in paleodrainage channel.	No paleodrainage channels known in the survey area.	Unlikely
<i>Grevillea inconspicua</i>	-	-	P4	Loam, gravel. Along drainage lines on rocky outcrops, creeklines.	Recorded approximately 20 km northeast of the survey area. Suitable habitat unlikely to be present.	Unlikely
<i>Hemigenia exilis</i>	-	-	P4	Laterite. Breakaways, slopes.	No breakaways in the survey area.	Unlikely
<i>Korthalsella leucothrix</i>	-	-	P1	Growing on <i>Acacia acuminata</i> and <i>A. craspedocarpa</i> on red sandy clay.	Recorded approximately 30 km east of the survey area. Little is known about habitat preferences.	Unlikely
<i>Lysiandra baeckeoides</i>	-	-	P3	Gentle slope, gravelly ironstone soils.	Recorded approximately 20 km northeast of the survey area. Suitable habitat unlikely to be present.	Unlikely
<i>Sauropus</i> sp. Woolgorong (M. Officer s.n. 10/8/94)	-	-	P3	Flat. Rocky, red-brown clay-loam hardpan plain over laterite.	Recorded approximately 20 km northeast of the survey area. Suitable habitat may be present.	Possible
<i>Seringia exastia</i>	CR	CR	-	Pindan (red soil) plain/ heathland.	Usually found on sand plains, unlikely to be any present in the survey area.	Unlikely
<i>Thryptomene nealensis</i>	-	-	P3	Growing on top of a duricrust breakaway, skeletal soils.	No breakaways in the survey area.	Unlikely
<i>Thryptomene</i> sp. Leinster (B.J. Lepschi & L.A. Craven 4362)	-	-	P3	Edge of low breakaway/ flat top of breakaway. Rocky brown sandy clay loam.	Recorded approximately 14 km east of the survey area. Suitable habitat unlikely to be present.	Unlikely
<i>Verticordia jamiesonii</i>	-	-	P3	Plateau of duricrust breakaway.	No breakaways in the survey area.	Unlikely

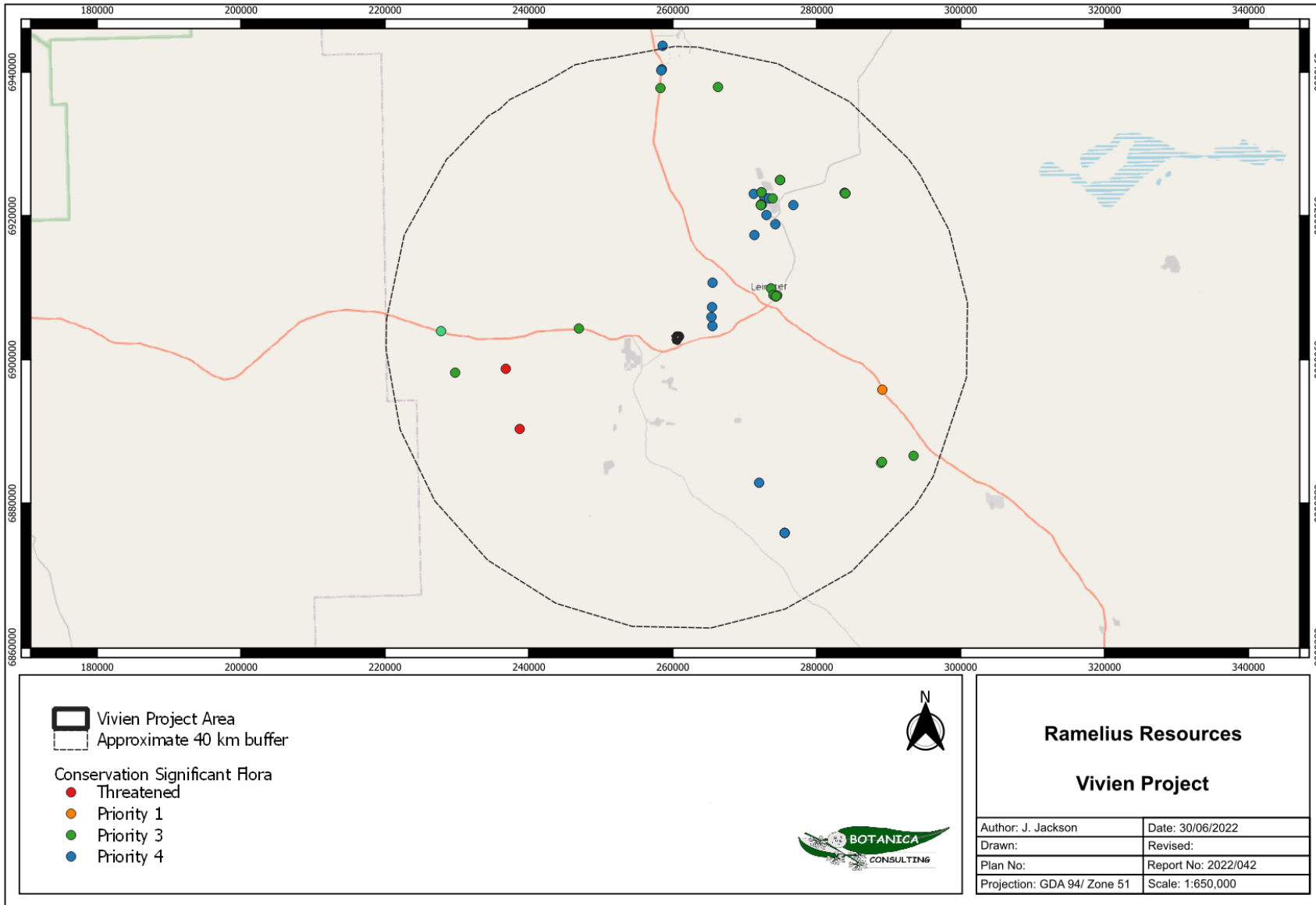


Figure 4-1: Significant flora records in relation to the survey area

4.1.2 Fauna

The NatureMap database search (DBCA, 2022d) identified a total of 139 terrestrial vertebrate fauna taxa within 40 km of the survey area, consisting of 96 bird, 5 mammal, 31 reptile and 7 amphibian taxa. The full list of vertebrate fauna identified by the desktop search is contained in Appendix D.

4.1.2.1 Conservation Significant Fauna

The desktop review identified 13 terrestrial vertebrate fauna species of conservation significance as previously being recorded within 40 km of the survey area (DBCA, 2022b), or the species or species habitat that may occur within 40 km of the survey area (DAWE, 2022a). Of those 13, five are Threatened species, seven are migratory species and one is an otherwise specially protected species. Habitat and distribution data was used to determine the likelihood of occurrence within the survey area (Table 4-3). The locations of DBCA database records for Significant Fauna (DBCA, 2022b) in relation to the survey area is shown in Figure 4-2.

Table 4-3: Potentially occurring significant fauna

Species	Conservation Status			Habitat Description	Assessment	Likelihood
	EPBC Act	BC Act	DBCA Priority			
Chuditch <i>Dasyurus geoffroii</i>	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).	No known records on the DBCA database within 130km of the survey area. Considered to be locally extinct. Suitable habitat unlikely to be present.	Unlikely to Occur
Grey Falcon <i>Falco hypoleucos</i>	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, 2022b).	No known records on the DBCA database within 130km of the survey area. Potential for individuals to occur aerially over the survey area however generally uncommon and suitable breeding habitat unlikely to be present.	Unlikely to Occur
Peregrine Falcon <i>Falco peregrinus</i>	-	OS	-	The Peregrine Falcon is found in most habitats, from rainforests to the arid zone, and at most altitudes, from the coast to alpine areas. It requires abundant prey and secure nest sites and prefers coastal and inland cliffs or open woodlands near water, and may even be found nesting on high city buildings (Birdlife Australia, 2022).	Previously recorded approximately 30km south of the survey area (recorded in 1974). Potential for individuals to occur aerially over the survey area however suitable breeding habitat unlikely to be present.	Unlikely to Occur
Malleefowl <i>Leipoa ocellata</i>	VU	VU	-	Scrublands and woodlands dominated by mallee and wattle species (DAWE, 2022b).	Known to occur in low density within 100km of the survey area, however suitable habitat is unlikely to be present.	Unlikely to Occur
Night Parrot <i>Pezoporus occidentalis</i>	EN	CR	-	Broad habitat requirements include areas of old-growth spinifex (<i>Triodia</i>) for roosting and nesting, together with foraging habitats that are likely to include various native grasses and herbs, and may or may not contain shrubs or low trees. (DPaW, 2017).	No known records on the DBCA database within 130km of the survey area. Considered to be locally extinct. Suitable habitat unlikely to be present.	Unlikely to Occur
Princess Parrot <i>Polytelis alexandrae</i>	VU	-	P4	Inhabits sand dunes and sand flats in the arid zone of western and central Australia. It occurs in open savanna woodlands and shrublands that usually consist of scattered stands of <i>Eucalyptus</i> (including <i>E. gongylocarpa</i> , <i>E. chippendalei</i> and mallee species), <i>Casuarina</i> or <i>Allocasuarina</i> trees; an understorey of shrubs such as <i>Acacia</i> (especially <i>A. aneura</i>), <i>Cassia</i> , <i>Eremophila</i> , <i>Grevillea</i> , <i>Hakea</i> and <i>Senna</i> ; and a ground cover dominated by <i>Triodia</i> species (DAWE, 2020)	Unlikely that suitable habitat would be present in the survey area.	Unlikely to Occur
Yellow Wagtail <i>Motacilla flava</i>	MI	IA	-	Occurs in a variety of damp or wet habitats with low vegetation, from rushy pastures, meadows, hay fields and marshes to damp steppe and grassy tundra (Morecombe 2004).	No sightings from inland WA. Unlikely that suitable habitat would be present in the survey area.	Unlikely to Occur
Grey Wagtail <i>Motacilla cinerea</i>	MI	IA	-	Running water in disused quarries, sandy, rocky streams in escarpments and rainforest, sewerage ponds, ploughed fields and airfields (Morecombe 2004).	No sightings from inland WA. Unlikely that suitable habitat would be present in the survey area.	Unlikely to Occur

Species	Conservation Status			Habitat Description	Assessment	Likelihood
	EPBC Act	BC Act	DBCA Priority			
Migratory Shorebirds (various species)	MI	MI	-	Prefers muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation. This includes lagoons, swamps, lakes and pools near the coast, and dams, waterholes, soaks, bore drains and bore swamps, saltpans and hypersaline salt lakes inland (DAWE, 2022b).	Suitable habitat (wetlands) is not present within the survey area.	Unlikely to Occur

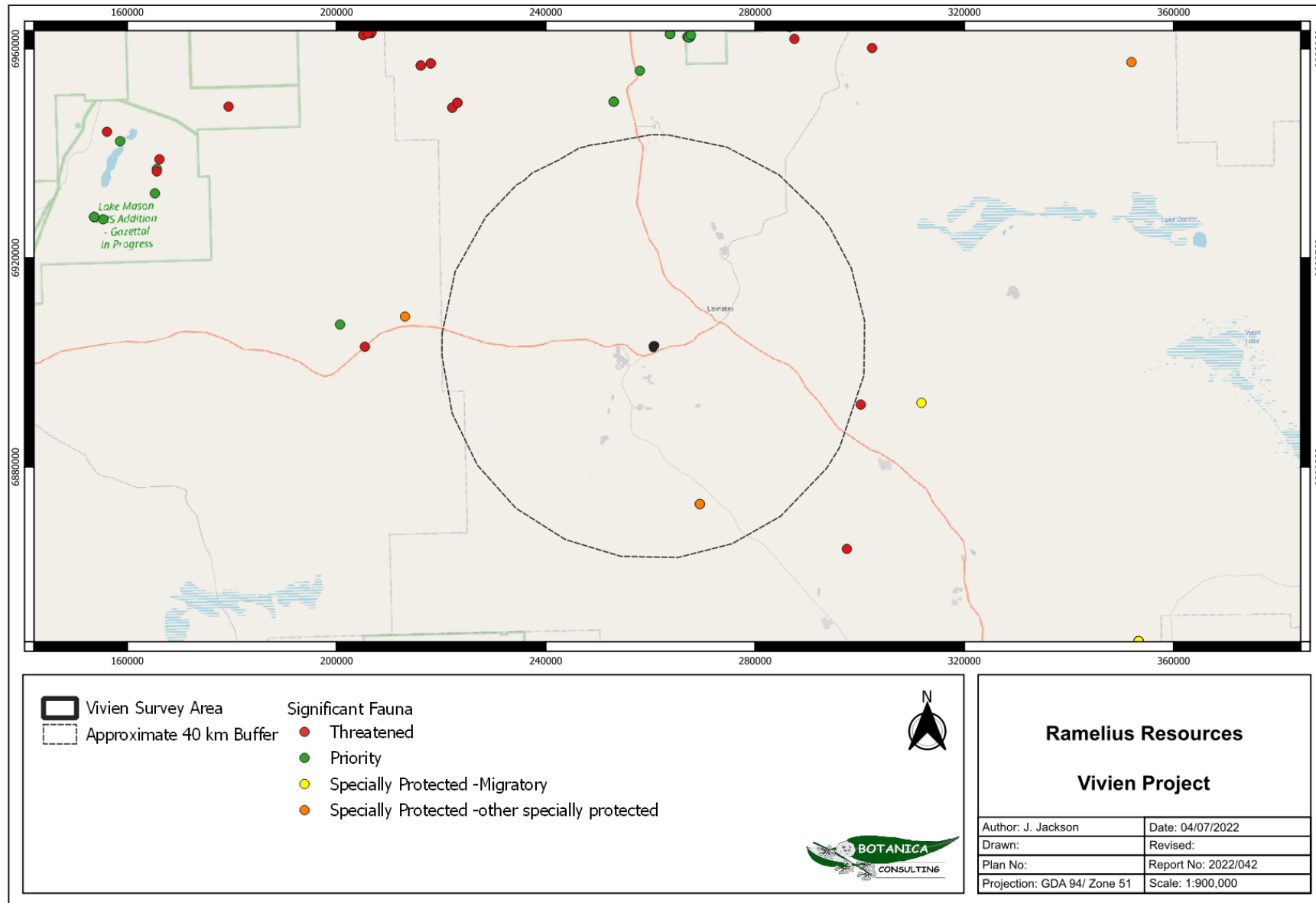


Figure 4-2: Significant fauna records in relation to the survey area

4.2 Field Assessment

4.2.1 Flora

The field survey identified 42 vascular flora taxa within the survey area. These taxa represented 30 genera across 19 families, with the most diverse families being Fabaceae and Scrophulariaceae. Dominant genera include *Acacia* and *Eremophila*. The full field species inventory is listed in Appendix B.

4.2.1.1 Introduced Flora

A total of two species of introduced flora were recorded within the survey area (Table 4-4 and Figure 4-3). Neither of these species are listed as a Weed of National Significance or a Declared Pest in Western Australia.

Table 4-4: Introduced flora species within the survey area

Family	Taxon	Common Name
Cucurbitaceae	<i>Cucumis myriocarpus</i>	Paddy Melon
Polygonaceae	<i>Rumex vesicarius</i>	Ruby Dock

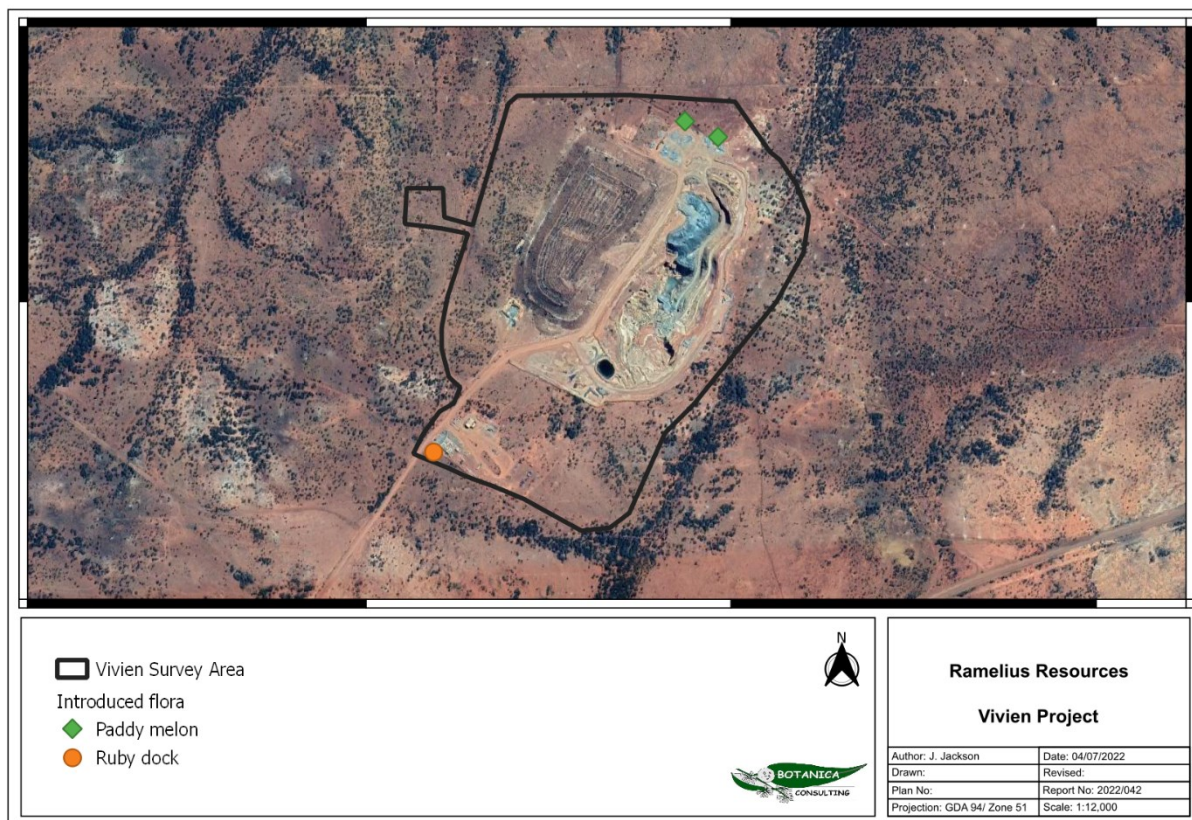


Figure 4-3: Introduced flora recorded within the survey area

4.2.1.2 Significant Flora

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



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


No Threatened Flora or Priority Flora taxa was recorded within the survey area. No otherwise significant flora (as described above) were recorded within the survey area.

4.2.1.3 Vegetation Communities

A total of two broad-scale vegetation communities were identified within the survey area. Vegetation community descriptions and extent are listed below in Table 4-5 and illustrated spatially in Figure 4-4. Vegetation community descriptions and extents were determined from field survey results, aerial imagery interpretation and extrapolation of the communities.

Table 4-5: Summary of vegetation types within the survey area

Landform	NVIS Vegetation Group	Veg Code	Vegetation Type	Area (ha)	Area (%)	Image
Rocky slope	Acacia Forest and Woodlands (MVG 6)	RS-AW1	Low woodland of <i>Acacia incurvaneura</i> over mid open shrubland of <i>Eremophila conglomerata</i> and low shrubland of <i>Ptilotus obovatus</i> on rocky slopes	5.2	6.05	
Plain	Acacia Forest and Woodlands (MVG 6)	CLP-AW1	Low woodland of <i>Acacia incurvaneura</i> over low open shrubland of <i>Eremophila forrestii</i> subsp. <i>forrestii</i> on clay loam plain	37.2	43.25	

Landform	NVIS Vegetation Group	Veg Code	Vegetation Type	Area (ha)	Area (%)	Image
NA		CV	Cleared vegetation	43.6	50.7	

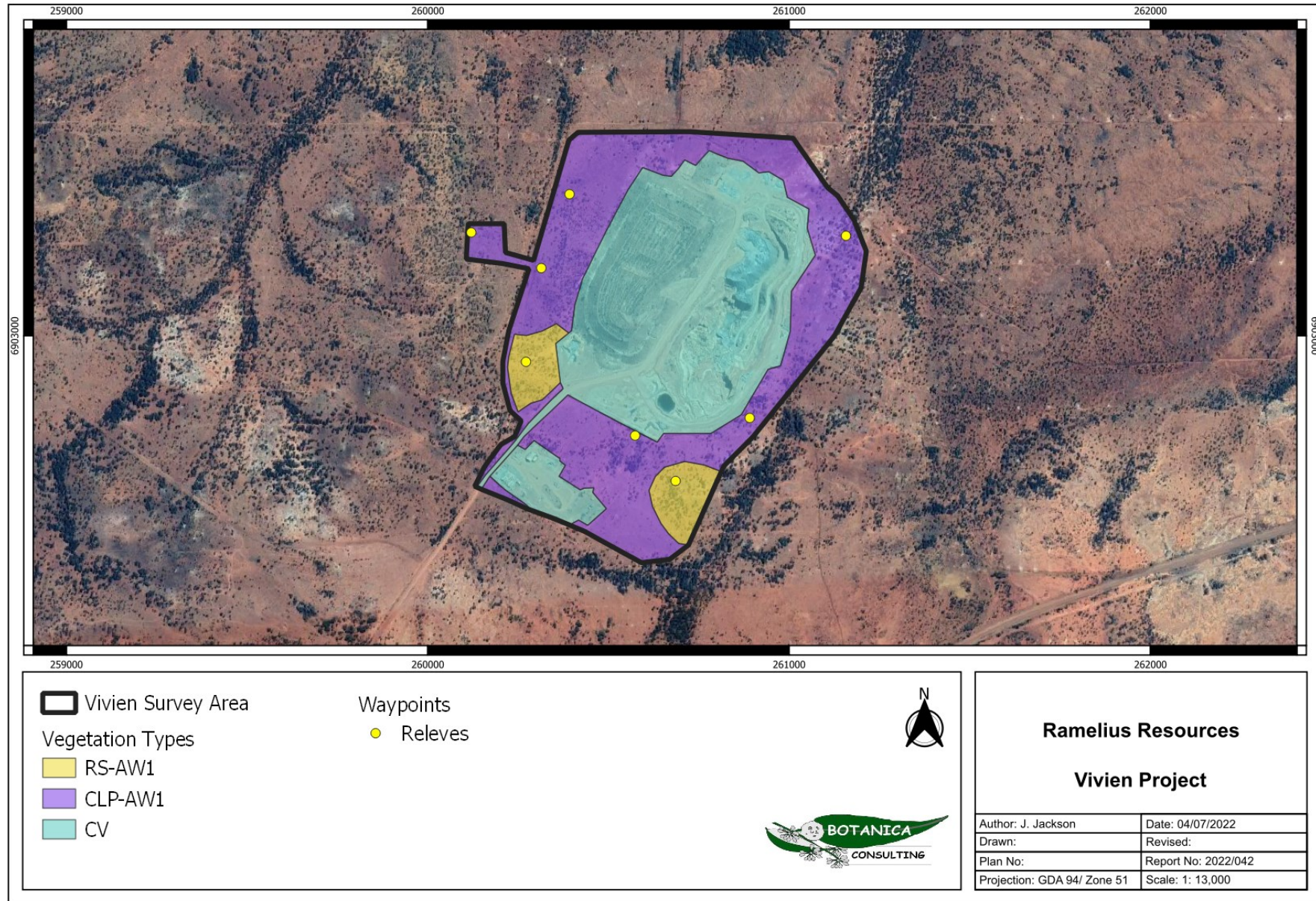


Figure 4-4: Vegetation types within the survey area

4.2.1.4 Vegetation Condition

Based on the vegetation condition rating scale adapted from Keighery (1994) and Trudgen, (1988), native vegetation within the survey area was rated as ‘good’. (Table 4-6 & Figure 4-5). Vegetation condition rating descriptions are listed in Appendix C. Disturbances within the survey area include historical mining and exploration and current mining. Evidence of cattle grazing was seen throughout the area, and two non-aggressive weed species were present.

Table 4-6: Vegetation condition rating within the survey area

Condition rating	Description	Area (ha)	Area (%)
Good	More obvious signs of damage caused by human activity since European settlement, including some obvious impact on the vegetation structure such as that caused by low levels of grazing or slightly aggressive weeds.	42.4	49.3
Cleared vegetation	Cleared vegetation	43.6	50.7

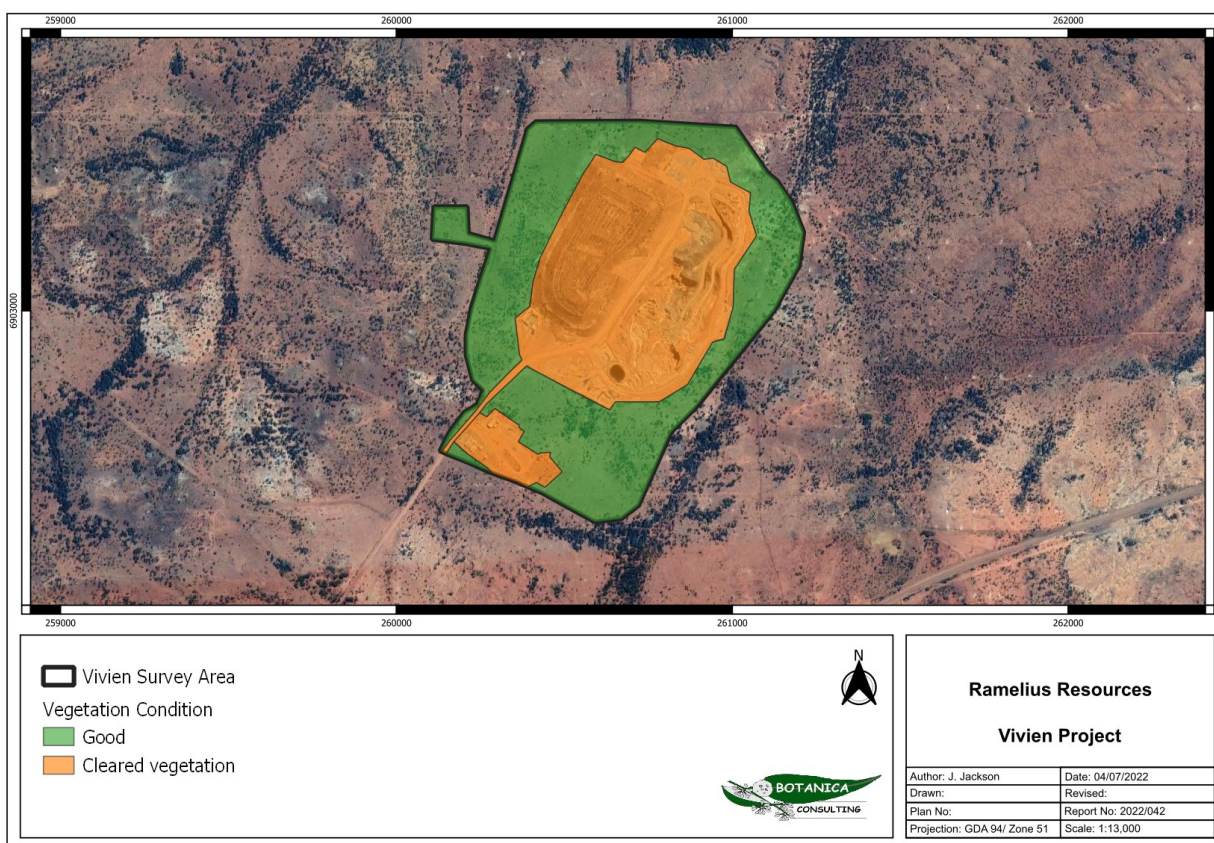


Figure 4-5: Vegetation condition within the survey area

4.2.1.5 Significant Vegetation

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

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

No TECs or PECs as listed under State or Commonwealth legislation were identified within the survey area. No otherwise significant vegetation (as described above) was recorded within the survey area.


4.2.2 Fauna

4.2.2.1 Fauna Habitat

Based on vegetation and associated landforms identified during the flora and vegetation assessment, one broad scale terrestrial fauna habitat was identified as occurring within the survey area. Table 4-7 provides the area and a visual representation of fauna habitat types, and the extent of fauna habitats is shown spatially in Figure 4-6.

No fauna was observed during the field survey.

Table 4-7: Main terrestrial fauna habitats within the survey area

Fauna Habitat	Description	Representative Fauna Attributes	Example Image
Plains, Mulga Woodlands Area= 42.4 ha (49.3%)	Mulga/ Acacia Woodland over mixed Eremophila shrubland on rocky or clay loam plain	<ul style="list-style-type: none"> • Ground has low suitability to burrowing species • Low diversity vegetation strata • Low vegetation density and leaf litter • Some grasses are present but no hummock grasses, therefore a very low refuge potential. 	

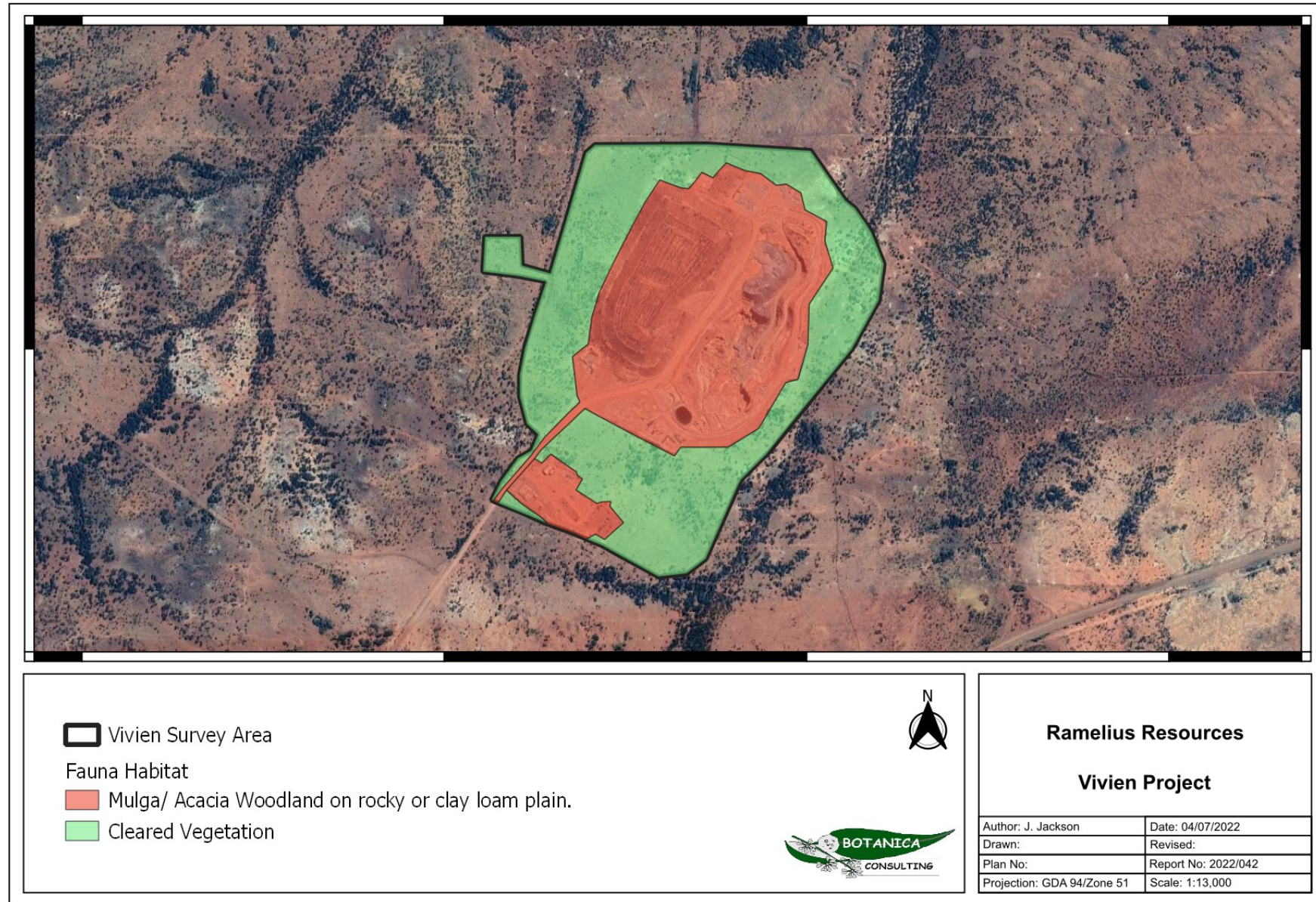


Figure 4-6: Fauna habitats within the survey area

4.2.2.2 Significant Fauna

According to the EPA *Environmental Factor Guideline for Terrestrial Fauna* (EPA, 2016c) significant fauna includes:

- Fauna being identified as a Threatened or Priority species;
- Fauna species with restricted distribution;
- Fauna subject to a high degree of historical impact from threatening processes; and
- Fauna providing an important function required to maintain the ecological integrity of a significant ecosystem.

No fauna species of conservation significance were identified from the desktop review to possibly occur in the Project area. Based on field observations the survey area had low potential for significant fauna habitat. This is based on the following:

- The ground has low suitability to burrowing species,
- Low diversity of vegetation strata,
- Overall low vegetation density and leaf litter,
- No large Eucalypt trees with hollows for nesting birds, and
- Some grasses are present but no hummock grasses, therefore there is a very low refuge potential.

4.3 Matters of National Environmental Significance

4.3.1 Environment Protection and Biodiversity Conservation Act 1999

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

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

No Matters of National Environmental Significance were identified within the survey area.

4.4 Matters of State Environmental Significance

4.4.1 Environmental Protection Act 1986 (WA)

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

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

No Environmentally Sensitive Areas were identified within the survey area.

4.4.2 Biodiversity Conservation Act 2016

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

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

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

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

No Threatened flora were recorded within the survey area.

4.5 Other Areas of Conservation Significance

The DBCA lists ‘Priority’ species and communities which are under consideration for declaration as ‘Threatened’ under the BC Act. These Priority species/ communities have no formal legal protection until they are endorsed by the Minister as being Threatened. No PECs were identified within the survey area.

No Priority species or communities were found to occur within the survey area.

There are no wetlands of international importance (Ramsar Wetlands) or national importance (Australian Nature Conservation Agency Wetlands) within the survey area.

There are no proposed nor gazetted conservation reserves within the survey area. The closest gazetted conservation reserve is the Wanjarri Nature Reserve which is located approximately 55 km north of the survey area.

4.6 Native Vegetation Clearing Principles

Based on the outcomes from the survey undertaken, Botanica assessed the results of the desktop and field survey with regards to the native vegetation clearing principles listed under Schedule 5 of the EP Act (Table 4-8). The assessment found that the proposed vegetation clearing activities are unlikely to be at variance with any clearing principles.

Table 4-8: Assessment against native vegetation clearing principles

Letter	Principle	Assessment	Outcome
	Native vegetation should not be cleared if it:		
(a)	comprises a high level of biological diversity.	Vegetation identified within the survey area is not considered to be of high biological diversity and is well represented outside of the survey area.	Clearing is unlikely to be at variance with this principle
(b)	comprises the whole or part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to WA.	A desktop and on ground assessment concluded that it was unlikely that any threatened or conservation significant fauna would occupy the area.	Clearing is unlikely to be at variance with this principle
(c)	includes, or is necessary for the continued existence of rare flora.	No Threatened Flora taxa, pursuant to the BC Act and the EPBC Act were identified within the survey area.	Clearing is not at variance with this principle
(d)	comprises the whole or part of or is necessary for the maintenance of a threatened ecological community (TEC).	No TEC listed under the EPBC Act or by the BC Act occur within the survey area.	Clearing is not at variance with this principle
(e)	is significant as a remnant of native vegetation in an area that has been extensively cleared	Vegetation associations within the survey area retain >99% of their pre-European extent, and development within the survey area will not significantly reduce the current extent of these vegetation associations.	Clearing is not at variance with this principle
(f)	is growing, in, or in association with, an environment associated with a watercourse or wetland	There are no permanent/ perennial inland waters or drainage lines within the survey area. There was one minor ephemeral drainage lines occurring in the east of the survey area. Proposed development of the Vivien Project is unlikely to impact this minor drainage line.	Clearing is unlikely to be at variance with this principle
(g)	Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.	The survey area has been previously cleared for mining activities. Further clearing within the survey area is unlikely to lead to land degradation issues such as salinity, water logging or acidic soils.	Clearing is unlikely to be at variance with this principle
(h)	Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.	The nearest conservation area is the Wanjarri Nature Reserve, located approximately 55 km north of the survey area. Disturbances within the survey area are unlikely to impact this Reserve.	Clearing is unlikely to be at variance with this principle
(i)	Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the	Previous and existing clearing for mining activities have to date not impacted any surface or underground waters. It is unlikely that further clearing would impact surface or underground waters.	Clearing is unlikely to be at variance with this principle

Letter	Principle	Assessment	Outcome
	Native vegetation should not be cleared if it:		
	quality of surface or underground water.		
(j)	Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence of flooding.	Rainfall in the Eastern Murchison subregion has an average rainfall of 200mm. Rainfall events are unlikely to result in localised flooding. Clearing within the survey area is not likely to increase the incidence or intensity of flooding within the survey area or surrounds.	Clearing is unlikely to be at variance with this principle

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APPENDIX A: CONSERVATION RATINGS BC ACT AND EPBC ACT

Definitions of Conservation Significant Species

Code	Category
State categories of Threatened and Priority species	
Threatened Species (T) Listed by order of the Minister as Threatened in the category of critically endangered, endangered or vulnerable under section 19(1), or is a rediscovered species to be regarded as Threatened species under section 26(2) of the Biodiversity Conservation Act 2016 (BC Act).	
CR	<p>Critically Endangered</p> <p>Threatened species considered to be “facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines”.</p> <p>Listed as critically endangered under section 19(1)(a) of the BC Act in accordance with the criteria set out in section 20 and the ministerial guidelines. Published under schedule 1 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for critically endangered fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for critically endangered flora.</p>
EN	<p>Endangered</p> <p>Threatened species considered to be “facing a very high risk of extinction in the wild in the near future, as determined in accordance with criteria set out in the ministerial guidelines”.</p> <p>Listed as endangered under section 19(1)(b) of the BC Act in accordance with the criteria set out in section 21 and the ministerial guidelines. Published under schedule 2 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for endangered fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for endangered flora.</p>
VU	<p>Vulnerable</p> <p>Threatened species considered to be “facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines”.</p> <p>Listed as vulnerable under section 19(1)(c) of the BC Act in accordance with the criteria set out in section 22 and the ministerial guidelines. Published under schedule 3 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for vulnerable fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for vulnerable flora.</p>
Extinct species Listed by order of the Minister as extinct under section 23(1) of the BC Act as extinct or extinct in the wild.	
EX	<p>Extinct</p> <p>Species where “<i>there is no reasonable doubt that the last member of the species has died</i>”, and listing is otherwise in accordance with the ministerial guidelines (section 24 of the BC Act).</p> <p>Published as presumed extinct under schedule 4 of the <i>Wildlife Conservation (Specially Protected Fauna) Notice 2018</i> for extinct fauna or the <i>Wildlife Conservation (Rare Flora) Notice 2018</i> for extinct flora.</p>
EW	<p>Extinct in the Wild</p> <p>Species that “<i>is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form</i>”, and listing is otherwise in accordance with the ministerial guidelines (section 25 of the BC Act).</p> <p>Currently there are no Threatened fauna or Threatened flora species listed as extinct in the wild. If listing of a species as extinct in the wild occurs, then a schedule will be added to the applicable notice.</p>
Specially protected species Listed by order of the Minister as specially protected under section 13(1) of the BC Act. Meeting one or more of the following categories: species of special conservation interest; migratory species; cetaceans; species subject to international agreement; or species otherwise in need of special protection. Species that are listed as Threatened species (critically endangered, endangered or vulnerable) or extinct species under the BC Act cannot also be listed as Specially Protected species.	
IA	<p>International Agreement/ Migratory</p> <p>Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth; and listing is otherwise in accordance with the ministerial guidelines (section 15 of the BC Act).</p> <p>Includes birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and fauna subject to the <i>Convention on the Conservation of Migratory Species of Wild Animals</i> (Bonn Convention), an environmental treaty under the United Nations Environment</p>

Code	Category
	<p>Program. Migratory species listed under the BC Act are a subset of the migratory animals, that are known to visit Western Australia, protected under the international agreements or treaties, excluding species that are listed as Threatened species.</p> <p>Published as migratory birds protected under an international agreement under schedule 5 of the <i>Wildlife Conservation (Specially Protected Fauna) Notice 2018</i>.</p>
CD	<p>Species of special conservation interest</p> <p>Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as Threatened, and listing is otherwise in accordance with the ministerial guidelines (section 14 of the BC Act).</p> <p>Published as conservation dependent fauna under schedule 6 of the <i>Wildlife Conservation (Specially Protected Fauna) Notice 2018</i>.</p>
OS	<p>Other specially protected species</p> <p>Fauna otherwise in need of special protection to ensure their conservation, and listing is otherwise in accordance with the ministerial guidelines (section 18 of the BC Act).</p> <p>Published as other specially protected fauna under schedule 7 of the <i>Wildlife Conservation (Specially Protected Fauna) Notice 2018</i>.</p>
<p>Priority species</p> <p>Possibly Threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of Priority for survey and evaluation of conservation status so that consideration can be given to their declaration as Threatened Fauna or Flora.</p> <p>Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring.</p> <p>Assessment of Priority codes is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations.</p>	
P1	<p>Priority 1: Poorly-known species</p> <p>Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.</p>
P2	<p>Priority 2: Poorly-known species</p> <p>Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.</p>
P3	<p>Priority 3: Poorly-known species</p> <p>Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.</p>
P4	<p>Priority 4: Rare, Near Threatened and other species in need of monitoring</p> <p>(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.</p> <p>(b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for vulnerable but are not listed as Conservation Dependent.</p> <p>(c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.</p>
<p>Commonwealth categories of Threatened species</p>	
EX	<p>Extinct</p> <p>Taxa where there is no reasonable doubt that the last member of the species has died.</p>
EW	<p>Extinct in the Wild</p> <p>Taxa where it is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or it has not been recorded in its known and/or expected habitat,</p>

Code	Category
	at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
CR	Critically Endangered Taxa that are facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
EN	Endangered Taxa which are not critically endangered and is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.
VU	Vulnerable Taxa which are not critically endangered or endangered and is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
CD	Conservation Dependent Taxa which are the focus of a specific conservation program the cessation of which would result in the species becoming vulnerable, endangered or critically endangered; or (b) the following subparagraphs are satisfied: (i) the species is a species of fish; (ii) the species is the focus of a plan of management that provides for actions necessary to stop the decline of, and support the recovery of, the species so that its chances of long term survival in nature are maximised; (iii) the plan of management is in force under a law of the Commonwealth or of a State or Territory; (iv) cessation of the plan of management would adversely affect the conservation status of the species.

Definitions of Conservation Significant Communities

Category Code	Category
State categories of Threatened Ecological Communities (TEC)	
PD	Presumed Totally Destroyed
	An ecological community will be listed as Presumed Totally Destroyed if there are no recent records of the community being extant and either of the following applies:
	<ul style="list-style-type: none"> records within the last 50 years have not been confirmed despite thorough searches or known likely habitats or; all occurrences recorded within the last 50 years have since been destroyed.
CR	Critically Endangered
	An ecological community will be listed as Critically Endangered when it has been adequately surveyed and is found to be facing an extremely high risk of total destruction in the immediate future, meeting any one of the following criteria:
	The estimated geographic range and distribution has been reduced by at least 90% and is either continuing to decline with total destruction imminent, or is unlikely to be substantially rehabilitated in the immediate future due to modification;
	The current distribution is limited i.e. highly restricted, having very few small or isolated occurrences, or covering a small area;
EN	Endangered
EN	An ecological community will be listed as Endangered when it has been adequately surveyed and is not Critically Endangered but is facing a very high risk of total destruction in the near future. The ecological community must meet any one of the following criteria:
EN	The estimated geographic range and distribution has been reduced by at least 70% and is either continuing to decline with total destruction imminent in the short-term future, or is unlikely to be substantially rehabilitated in the short-term future due to modification;
EN	The current distribution is limited i.e. highly restricted, having very few small or isolated occurrences, or covering a small area;

Category Code	Category
	The ecological community is highly modified with potential of being rehabilitated in the short-term future.
VU	Vulnerable An ecological community will be listed as Vulnerable when it has been adequately surveyed and is not Critically Endangered or Endangered but is facing high risk of total destruction in the medium to long term future. The ecological community must meet any one of the following criteria:
	The ecological community exists largely as modified occurrences that are likely to be able to be substantially restored or rehabilitated;
	The ecological community may already be modified and would be vulnerable to threatening process, and restricted in range or distribution;
	The ecological community may be widespread but has potential to move to a higher threat category due to existing or impending threatening processes.
Commonwealth categories of Threatened Ecological Communities (TEC)	
CE	Critically Endangered If, at that time, an ecological community is facing an extremely high risk of extinction in the wild in the immediate future (indicative timeframe being the next 10 years).
EN	Endangered If, at that time, an ecological community is not critically endangered but is facing a very high risk of extinction in the wild in the near future (indicative timeframe being the next 20 years).
VU	Vulnerable If, at that time, an ecological community is not critically endangered or endangered, but is facing a high risk of extinction in the wild in the medium-term future (indicative timeframe being the next 50 years).
Priority Ecological Communities	
P1	Poorly-known ecological communities Ecological communities with apparently few, small occurrences, all or most not actively managed for conservation (e.g. within agricultural or pastoral lands, urban areas, active mineral leases) and for which current threats exist.
	Poorly-known ecological communities Communities that are known from few small occurrences, all or most of which are actively managed for conservation (e.g. within national parks, conservation parks, nature reserves, State forest, un-allocated Crown land, water reserves, etc.) and not under imminent threat of destruction or degradation.
P3	Poorly known ecological communities Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or:
	Communities known from a few widespread occurrences, which are either large or within significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat, or;
	Communities made up of large, and/or widespread occurrences, that may or not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing and inappropriate fire regimes.
P4	Ecological communities that are adequately known, rare but not threatened or meet criteria for near threatened, or that have been recently removed from the threatened list. These communities require regular monitoring.
P5	Conservation Dependent ecological communities Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.

APPENDIX B: LIST OF SPECIES IDENTIFIED WITHIN THE SURVEY AREA

(W) denotes introduced (weed) species.

Family	Genus	Taxon	CLP-AW1	RS-AW1
Amaranthaceae	<i>Ptilotus</i>	<i>obovatus</i>	*	*
Amaranthaceae	<i>Ptilotus</i>	<i>schwartzii</i>	*	*
Apocynaceae	<i>Leichhardtia</i>	<i>australis</i>	*	
Casuarinaceae	<i>Casuarina</i>	<i>obesa</i>		*
Chenopodiaceae	<i>Enchylaena</i>	<i>tomentosa</i>	*	
Chenopodiaceae	<i>Maireana</i>	<i>tomentosa</i>		*
Chenopodiaceae	<i>Maireana</i>	<i>triptera</i>	*	*
Chenopodiaceae	<i>Rhagodia</i>	<i>eremaea</i>	*	
Chenopodiaceae	<i>Sclerolaena</i>	<i>diacantha</i>		*
Cucurbitaceae	<i>Cucumis</i>	<i>myriocarpus (W)</i>	*	
Fabaceae	<i>Acacia</i>	<i>ramulosa</i> var. <i>linophylla</i>	*	
Fabaceae	<i>Acacia</i>	<i>incurvaneura</i>	*	*
Fabaceae	<i>Acacia</i>	<i>mulganeura</i>	*	
Fabaceae	<i>Acacia</i>	<i>quadrimarginea</i>	*	*
Fabaceae	<i>Acacia</i>	<i>tetragonophylla</i>	*	
Fabaceae	<i>Senna</i>	sp. Meekatharra (E. Bailey 1-26)		*
Goodeniaceae	<i>Scaevola</i>	<i>spinescens</i>	*	*
Lamiaceae	<i>Teucrium</i>	<i>teucriiflorum</i>	*	
Malvaceae	<i>Abutilon</i>	<i>cryptopetalum</i>	*	
Malvaceae	<i>Sida</i>	<i>calyxhymenia</i>	*	
Myrtaceae	<i>Eucalyptus</i>	<i>kingsmillii</i>	*	
Myrtaceae	<i>Thryptomene</i>	<i>decussata</i>		*
Poaceae	<i>Aristida</i>	<i>contorta</i>	*	*
Poaceae	<i>Cymbopogon</i>	<i>ambiguus</i>	*	
Poaceae	<i>Enneapogon</i>	<i>caerulescens</i>	*	
Poaceae	<i>Eragrostis</i>	<i>eriopoda</i>	*	*
Poaceae	<i>Eriachne</i>	<i>mucronata</i>	*	*
Polygonaceae	<i>Rumex</i>	<i>vesicarius (W)</i>	*	
Proteaceae	<i>Grevillea</i>	<i>berryana</i>		*
Proteaceae	<i>Hakea</i>	<i>preissii</i>	*	
Pteridaceae	<i>Cheilanthes</i>	<i>sieberi</i> subsp. <i>sieberi</i>	*	
Rubiaceae	<i>Psydrax</i>	<i>suaveolens</i>		*
Rutaceae	<i>Philothea</i>	<i>brucei</i> subsp. <i>brucei</i>		*
Santalaceae	<i>Santalum</i>	<i>spicatum</i>	*	
Santalaceae	<i>Santalum</i>	<i>lanceolatum</i>	*	*
Scrophulariaceae	<i>Eremophila</i>	<i>conglomerata</i>		*
Scrophulariaceae	<i>Eremophila</i>	<i>fraseri</i>	*	*
Scrophulariaceae	<i>Eremophila</i>	<i>forrestii</i> subsp. <i>forrestii</i>	*	
Scrophulariaceae	<i>Eremophila</i>	<i>latrobei</i> subsp. <i>latrobei</i>		*
Scrophulariaceae	<i>Eremophila</i>	<i>oldfieldii</i> subsp. <i>angustifolia</i>		*
Scrophulariaceae	<i>Eremophila</i>	<i>spectabilis</i> subsp. <i>brevis</i>	*	*
Solanaceae	<i>Solanum</i>	<i>lasiophyllum</i>	*	*

APPENDIX C: VEGETATION CONDITION RATING

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

APPENDIX D: NATUREMAP DESKTOP SEARCH (40KM)

Vascular Flora

DICOT
<i>Abutilon oxycarpum subsp. prostratum</i>
<i>Acacia aneura</i>
<i>Acacia aneura group</i>
<i>Acacia aneura hybrid</i>
<i>Acacia aptaneura</i>
<i>Acacia balsamea</i>
<i>Acacia burkittii</i>
<i>Acacia caesaneura</i>
<i>Acacia craspedocarpa</i>
<i>Acacia doreta</i>
<i>Acacia effusifolia</i>
<i>Acacia grasbyi</i>
<i>Acacia incurvaneura</i>
<i>Acacia jamesiana</i>
<i>Acacia minyura</i>
<i>Acacia mulganeura</i>
<i>Acacia murrayana</i>
<i>Acacia nyssophylla</i>
<i>Acacia oswaldii</i>
<i>Acacia quadrimarginea</i>
<i>Acacia ramulosa hybrid</i>
<i>Acacia ramulosa var. linophylla</i>
<i>Acacia sibina</i>
<i>Acacia tetragonophylla</i>
<i>Acacia thoma</i>
<i>Acacia victoriae</i>
<i>Actinobole oldfieldianum</i>
<i>Alyogyne pinoniana</i>
<i>Amyema microphylla</i>
<i>Androcalva loxophylla</i>
<i>Androcalva luteiflora</i>
<i>Anthotroche pannosa</i>
<i>Asteridea athrixoides</i>
<i>Atriplex bunburyana</i>
<i>Atriplex codonocarpa</i>
<i>Atriplex vesicaria</i>
<i>Baeckea sp. Sandstone (C.A. Gardner s.n. 26 Oct. 1963)</i>
<i>Bertya dimerostigma</i>
<i>Boerhavia repleta</i>
<i>Brachyscome ciliaris</i>
<i>Calandrinia aff. eremaea</i>
<i>Calandrinia aff. polyandra</i>
<i>Calandrinia eremaea</i>
<i>Calandrinia polyandra</i>

<i>Calocephalus francisii</i>
<i>Calocephalus knappii</i>
<i>Calocephalus multiflorus</i>
<i>Calotis hispidula</i>
<i>Calotis multicaulis</i>
<i>Calytrix erosipetala</i>
<i>Calytrix uncinata</i>
<i>Casuarina obesa</i>
<i>Casuarina pauper</i>
<i>Cephalopterum drummondii</i>
<i>Chthonocephalus viscosus</i>
<i>Convolvulus clementii</i>
<i>Crassula colorata</i> var. <i>acuminata</i>
<i>Cratystylis subspinescens</i>
<i>Cratystylis subspinescens</i>
<i>Dampiera dentata</i>
<i>Dampiera roycei</i>
<i>Dicrastylis brunnea</i>
<i>Dicrastylis sessilifolia</i>
<i>Dicrastylis</i> sp.
<i>Dissocarpus paradoxus</i>
<i>Dodonaea adenophora</i>
<i>Dodonaea petiolaris</i>
<i>Dodonaea rigida</i>
<i>Dodonaea viscosa</i> subsp. <i>angustissima</i>
<i>Dodonaea viscosa</i> subsp. <i>spatulata</i>
<i>Duperreya commixta</i>
<i>Dysphania cristata</i>
<i>Dysphania kalpari</i>
<i>Dysphania melanocarpa</i> forma <i>melanocarpa</i>
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>
<i>Enekbatus eremaeus</i>
<i>Eremophea spinosa</i>
<i>Eremophila alternifolia</i>
<i>Eremophila conglomerata</i>
<i>Eremophila exillifolia</i>
<i>Eremophila falcata</i>
<i>Eremophila foliosissima</i>
<i>Eremophila forrestii</i> subsp. <i>forrestii</i>
<i>Eremophila galeata</i>
<i>Eremophila granitica</i>
<i>Eremophila homoplastica</i>
<i>Eremophila hygrophana</i>
<i>Eremophila latrobei</i> subsp. <i>latrobei</i>
<i>Eremophila longifolia</i>
<i>Eremophila malacoides</i>
<i>Eremophila margarethae</i>
<i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i>
<i>Eremophila pantonii</i>

<i>Eremophila platycalyx</i> subsp. <i>Granites</i> (D.J. Edinger & G. Marsh DJE 4782)
<i>Eremophila platycalyx</i> subsp. <i>Leonora</i> (J. Morrisey 252)
<i>Eremophila platythamnos</i> subsp. <i>platythamnos</i>
<i>Eremophila pungens</i>
<i>Eremophila pungens</i> x <i>spectabilis</i>
<i>Eremophila serrulata</i>
<i>Eremophila shonae</i> subsp. <i>shonae</i>
<i>Eremophila</i> sp.
<i>Eremophila spectabilis</i> subsp. <i>brevis</i>
<i>Eremophila spuria</i>
<i>Eremophila subfloccosa</i> subsp. <i>lanata</i>
<i>Eriochiton sclerolaenoides</i>
<i>Erodium crinitum</i>
<i>Erodium cygnorum</i>
<i>Eucalyptus camaldulensis</i> subsp. <i>obtusa</i>
<i>Eucalyptus carnei</i>
<i>Eucalyptus clelandiorum</i>
<i>Eucalyptus eremicola</i> subsp. <i>peeneri</i>
<i>Eucalyptus gongylocarpa</i>
<i>Eucalyptus gypsophila</i>
<i>Eucalyptus kingsmillii</i>
<i>Eucalyptus oldfieldii</i>
<i>Eucalyptus striaticalyx</i>
<i>Eucalyptus trivalva</i>
<i>Eucalyptus youngiana</i>
<i>Euphorbia drummondii</i>
<i>Euphorbia porcata</i>
<i>Exocarpos aphyllus</i>
<i>Gnephosis arachnoidea</i>
<i>Goodenia maideniana</i>
<i>Goodenia mimuloides</i>
<i>Goodenia mueckeana</i>
<i>Grevillea deflexa</i>
<i>Grevillea inconspicua</i>
<i>Grevillea sarissa</i> subsp. <i>bicolor</i>
<i>Gunniopsis rodwayi</i>
<i>Hakea leucoptera</i> subsp. <i>sericipes</i>
<i>Hakea minyma</i>
<i>Haloragis odontocarpa</i> forma <i>pterocarpa</i>
<i>Haloragis trigonocarpa</i>
<i>Heliotropium inexplicitum</i>
<i>Hemigenia exilis</i>
<i>Homalocalyx thryptomenoides</i>
<i>Hyalosperma glutinosum</i> subsp. <i>venustum</i>
<i>Hysterobaeckea occlusa</i>
<i>Indigofera georgei</i>
<i>Isoetopsis graminifolia</i>
<i>Jasminum calcareum</i>
<i>Kennedia prorepens</i>

<i>Korthalsella leucothrix</i>
<i>Lawrencia densiflora</i>
<i>Lawrencia helmsii</i>
<i>Lemooria burkittii</i>
<i>Lepidium oxytrichum</i>
<i>Lepidium phlebopetalum</i>
<i>Leptosema chambersii</i>
<i>Lycium australe</i>
<i>Lysiana murrayi</i>
<i>Maireana carnosae</i>
<i>Maireana convexa</i>
<i>Maireana georgei</i>
<i>Maireana pentatropis</i>
<i>Maireana pyramidata</i>
<i>Maireana thesioides</i>
<i>Maireana trichoptera</i>
<i>Maireana triptera</i>
<i>Maireana villosa</i>
<i>Marsdenia australis</i>
<i>Melaleuca interioris</i>
<i>Melaleuca xerophila</i>
<i>Menkea australis</i>
<i>Menkea sphaerocarpa</i>
<i>Minuria integerrima</i>
<i>Minuria leptophylla</i>
<i>Olearia stuartii</i>
<i>Phyllanthus baecckeoides</i>
<i>Pimelea microcephala</i>
<i>Pimelea microcephala</i> subsp. <i>microcephala</i>
<i>Pimelea subvillifera</i>
<i>Pittosporum angustifolium</i>
<i>Pluchea dentex</i>
<i>Podolepis aristata</i> subsp. <i>affinis</i>
<i>Podolepis capillaris</i>
<i>Pogonolepis stricta</i>
<i>Polygala isingii</i>
<i>Portulaca oleracea</i>
<i>Prostanthera althoferi</i> subsp. <i>althoferi</i>
<i>Psydrax rigidula</i>
<i>Ptilotus aevroides</i>
<i>Ptilotus chamaecladus</i>
<i>Ptilotus exaltatus</i>
<i>Ptilotus helipteroides</i>
<i>Ptilotus macrocephalus</i>
<i>Ptilotus obovatus</i>
<i>Ptilotus polystachyus</i>
<i>Ptilotus roei</i>
<i>Rhagodia drummondii</i>
<i>Rhagodia preissii</i>

<i>Rhodanthe charsleyae</i>
<i>Rhodanthe chlorocephala</i> subsp. <i>splendida</i>
<i>Rhodanthe humboldtiana</i>
<i>Rhodanthe polakii</i>
<i>Rhodanthe sterilecens</i>
<i>Roycea</i> sp.
<i>Salsola australis</i>
<i>Sauropus ramosissimus</i>
<i>Scaevola spinescens</i>
<i>Schoenia ayersii</i>
<i>Sclerolaena cuneata</i>
<i>Sclerolaena densiflora</i>
<i>Sclerolaena deserticola</i>
<i>Sclerolaena diacantha</i>
<i>Sclerolaena fimbriolata</i>
<i>Sclerolaena gardneri</i>
<i>Sclerolaena obliquicuspis</i>
<i>Senecio glossanthus</i>
<i>Senecio gregorii</i>
<i>Senecio magnificus</i>
<i>Senna artemisioides</i> subsp. <i>artemisioides</i>
<i>Senna charlesiana</i>
<i>Senna charlesiana</i> x <i>artemisioides</i> subsp. <i>filifolia</i>
<i>Senna manicula</i>
<i>Seringia elliptica</i>
<i>Seringia velutina</i>
<i>Sida</i> cf. <i>intricata</i>
<i>Sida</i> sp. dark green fruits (S. van Leeuwen 2260)
<i>Solanum chrysotrichum</i>
<i>Solanum lasiophyllum</i>
<i>Solanum nummularium</i>
<i>Stackhousia megaloptera</i>
<i>Stenopetalum filifolium</i>
<i>Swainsona beasleyana</i>
<i>Swainsona halophila</i>
<i>Swainsona incei</i>
<i>Swainsona kingii</i>
<i>Swainsona oroboides</i>
<i>Tecticornia indica</i> subsp. <i>bidens</i>
<i>Tecticornia</i> sp. Dennys Crossing (K.A. Shepherd & J. English KS 552)
<i>Tetragonia eremaea</i>
<i>Thryptomene nealensis</i>
<i>Thryptomene</i> sp. Leinster (B.J. Lepschi & L.A. Craven 4362)
<i>Trachymene cyanopetala</i>
<i>Tribulus astrocarpus</i>
<i>Tribulus</i> cf. <i>macrocarpus</i>
<i>Tribulus terrestris</i>
<i>Velleia cycnopotamica</i>
<i>Velleia glabrata</i>

<i>Zygophyllum aurantiacum</i>
<i>Zygophyllum compressum</i>
<i>Zygophyllum eichleri</i>
<i>Zygophyllum ovatum</i>
<i>Zygophyllum tetrapterum</i>
FERN
<i>Ophioglossum lusitanicum</i>
GYMNOSPERM
<i>Callitris columellaris</i>
MONOCOT
<i>Aristida contorta</i>
<i>Aristida obscura</i>
<i>Austrostipa eremophila</i>
<i>Austrostipa nitida</i>
<i>Dactyloctenium radulans</i>
<i>Digitaria ciliaris</i>
<i>Enneapogon caeruleus</i>
<i>Enneapogon polyphyllus</i>
<i>Eragrostis dielsii</i>
<i>Eragrostis eriopoda</i>
<i>Eragrostis parviflora</i>
<i>Eragrostis sp. Yeelirrie Calcrete (S. Regan LCH 26770)</i>
<i>Eriachne pulchella</i>
<i>Fimbristylis dichotoma</i>
<i>Monachather paradoxus</i>
<i>Panicum decompositum</i>
<i>Panicum effusum</i>
<i>Paractaenum novae-hollandiae</i>
<i>Paspalidium basicladum</i>
<i>Paspalidium constrictum</i>
<i>Perotis rara</i>
<i>Setaria verticillata</i>
<i>Stipa nitida</i>
<i>Themeda triandra</i>
<i>Thysanotus sp. Eremaean (S. van Leeuwen 1067)</i>
<i>Tragus australianus</i>

Terrestrial Vertebrate Fauna

AMPHIBIAN
<i>Neobatrachus aquilonius</i>
<i>Neobatrachus kunapalari</i>
<i>Neobatrachus sp.</i>
<i>Neobatrachus sutor</i>
<i>Neobatrachus wilsmorei</i>
<i>Platyplectrum spenceri</i>
<i>Pseudophryne occidentalis</i>
BIRD
<i>Acanthagenys rufogularis</i>
<i>Acanthiza apicalis</i>
<i>Acanthiza apicalis</i>
<i>Acanthiza chrysorrhoa</i>
<i>Acanthiza iredalei iredalei</i>
<i>Acanthiza robustirostris</i>
<i>Acanthiza uropygialis</i>
<i>Aegotheles cristatus</i>
<i>Aegotheles cristatus subsp. cristatus</i>
<i>Anas gracilis</i>
<i>Anthochaera carunculata</i>
<i>Aquila audax</i>
<i>Ardea pacifica</i>
<i>Artamus cinereus</i>
<i>Barnardius zonarius</i>
<i>Cacatua roseicapilla subsp. assimilis</i>
<i>Cacomantis pallidus</i>
<i>Calamanthus campestris</i>
<i>Charadrius ruficapillus</i>
<i>Chenonetta jubata</i>
<i>Cheramoeca leucosterna</i>
<i>Cincloramphus mathewsi</i>
<i>Cinclosoma castaneothorax</i>
<i>Cladorhynchus leucocephalus</i>
<i>Climacteris affinis</i>
<i>Climacteris affinis subsp. superciliosa</i>
<i>Colluricincla harmonica</i>
<i>Coracina maxima</i>
<i>Coracina novaehollandiae</i>
<i>Corvus bennetti</i>
<i>Corvus orru</i>
<i>Cracticus nigrogularis</i>
<i>Cracticus tibicen</i>
<i>Cracticus torquatus</i>
<i>Cygnus atratus</i>
<i>Daphoenositta chrysoptera subsp. pileata</i>
<i>Dromaius novaehollandiae</i>
<i>Elanus axillaris</i>

<i>Elseyornis melanops</i>
<i>Eolophus roseicapillus</i>
<i>Epthianura aurifrons</i>
<i>Epthianura tricolor</i>
<i>Erythrogonyx cinctus</i>
<i>Eurostopodus argus</i>
<i>Falco berigora</i>
<i>Falco berigora subsp. berigora</i>
<i>Falco cenchroides</i>
<i>Falco longipennis</i>
<i>Falco peregrinus</i>
<i>Gavicalis virescens</i>
<i>Gerygone fusca</i>
<i>Grallina cyanoleuca</i>
<i>Haliastur sphenurus</i>
<i>Hamirostra melanosternon</i>
<i>Himantopus himantopus</i>
<i>Hirundo neoxena</i>
<i>Lichenostomus penicillatus</i>
<i>Lichenostomus plumulus</i>
<i>Lichenostomus virescens</i>
<i>Lichmera indistincta</i>
<i>Malurus leucopterus</i>
<i>Malurus leucopterus leuconotus</i>
<i>Manorina flavigula</i>
<i>Melopsittacus undulatus</i>
<i>Mirafrja javanica</i>
<i>Neophema bourkii</i>
<i>Neopsephotus bourkii</i>
<i>Ninox novaeseelandiae subsp. boobook</i>
<i>Nymphicus hollandicus</i>
<i>Ocyphaps lophotes</i>
<i>Oreoica gutturalis</i>
<i>Pachycephala rufiventris</i>
<i>Pardalotus striatus</i>
<i>Pernis ptilorhynchus</i>
<i>Petrochelidon nigricans</i>
<i>Petroica cucullata</i>
<i>Petroica goodenovii</i>
<i>Phaps chalcoptera</i>
<i>Platycercus varius</i>
<i>Podargus strigoides</i>
<i>Poliocephalus poliocephalus</i>
<i>Pomatostomus superciliosus</i>
<i>Pomatostomus temporalis</i>
<i>Psophodes occidentalis</i>
<i>Ptilonorhynchus guttatus</i>
<i>Purnella albifrons</i>
<i>Pyrrholaemus brunneus</i>

<i>Recurvirostra novaehollandiae</i>
<i>Rhipidura leucophrys</i>
<i>Smicromis brevirostris</i>
<i>Strepera versicolor</i>
<i>Tadorna tadornoides</i>
<i>Taeniopygia guttata</i>
<i>Todiramphus pyrrhopygia</i>
<i>Tyto alba</i>
<i>Vanellus tricolor</i>
MAMMAL
<i>Antechinomys laniger</i>
<i>Macropus sp.</i>
<i>Mus musculus</i>
<i>Ningauai ridei</i>
<i>Pseudomys hermannsburgensis</i>
REPTILE
<i>Ctenophorus isolepis subsp. gularis</i>
<i>Ctenophorus salinarum</i>
<i>Ctenotus ariadnae</i>
<i>Ctenotus grandis subsp. grandis</i>
<i>Ctenotus helenae</i>
<i>Ctenotus sp.</i>
<i>Delma butleri</i>
<i>Diplodactylus granariensis subsp. rex</i>
<i>Furina ornata</i>
<i>Gehyra variegata</i>
<i>Heteronotia binoei</i>
<i>Lerista desertorum</i>
<i>Lerista timida</i>
<i>Liopholis inornata</i>
<i>Lucasium bungabinnia</i>
<i>Lucasium squarrosum</i>
<i>Menetia greyii</i>
<i>Moloch horridus</i>
<i>Nephrurus vertebralis</i>
<i>Parasuta monachus</i>
<i>Pygopus nigriceps</i>
<i>Ramphotyphlops bicolor</i>
<i>Simoselaps bertholdi</i>
<i>Strophurus assimilis</i>
<i>Strophurus strophurus</i>
<i>Suta fasciata</i>
<i>Tympanocryptis cephalus</i>
<i>Underwoodisaurus milii</i>
<i>Varanus caudolineatus</i>
<i>Varanus eremius</i>
<i>Varanus panoptes subsp. rubidus</i>

APPENDIX E: EPBC PROTECTED MATTERS SEARCH (40KM BUFFER)



Australian Government
Department of Agriculture,
Water and the Environment

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 25-May-2022

[Summary](#)

[Details](#)

[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

[Acknowledgements](#)

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance (Ramsar)	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	5
Listed Migratory Species:	7

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage>

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	9
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	None
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	2
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Listed Threatened Species [\[Resource Information \]](#)

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
 Number is the current name ID.

Scientific Name	Threatened Category	Presence Text
BIRD		
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat may occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Pezoporus occidentalis Night Parrot [59350]	Endangered	Species or species habitat may occur within area
Polytelis alexandrae Princess Parrot, Alexandra's Parrot [758]	Vulnerable	Species or species habitat may occur within area

MAMMAL

Dasyurus geoffroi Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat may occur within area
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Listed Migratory Species [\[Resource Information \]](#)

Scientific Name	Threatened Category	Presence Text
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
Scientific Name	Threatened Category	Presence Text
Bird		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
Chalcites osculans as Chrysococcyx osculans Black-eared Cuckoo [83425]		Species or species habitat likely to occur within area overfly marine area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area overfly marine area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area overfly marine area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area overfly marine area

Extra Information

EPBC Act Referrals			[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action			
Improving rabbit biocontrol: releasing another strain of RHDV, sthm two thirds of Australia	2015/7522	Not Controlled Action	Completed
Referral decision			
Northern Goldfields Interconnect Pipeline	2021/8900	Referral Decision	Referral Publication