WESTERN AREAS LTD

Forrestania Nickel Operation

CPS 2271/4 AMENDMENT APPLICATION – SUPPORTING DOCUMENT

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Document Date: 10/11/2021

DOCUMENT DETAILS

Title	CPS 2271/4 Amendment Application – Supporting Document
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Document Type	Native Vegetation Clearing Permit Amendment Application
Reference Number	CPS 2271/4
Document Date	24/10/2021
Applicable Tenure and Holder(s)	Western Areas Ltd - M77/545, M77/582, M77/911
Purpose	The purpose of this document is to support an application to amend CPS 2271/3 to increase the authorised area of clearing from 15 ha to 21.02 ha. Western Areas Ltd (WSA) intend to construct and operate an additional borrow pit on M77/545 to support paste fill plant operations for underground stoping (Flying Fox and Spotted Quoll) and other mining infrastructure projects. Therefore, additional clearing of native vegetation is required.
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Approver	Bryan Williams

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1. INTRODUCTION

1.1 Background

Western Areas Ltd (WSA) operates the Forrestania Nickel Operations (FNO), targeting Ni-Cu deposits located within the Shire of Kondinin, approximately 400 km east of Perth in the Forrestania Greenstone Belt (Figure 1).

WSA previously obtained approval for a native vegetation clearing permit (NVCP) in 2014 for CPS 2217/3 to clear 15 ha of native vegetation within a 262.5 ha permit area (within mining tenements M77/545, M77/582 and M77/911). The purpose of the NVCP was to allow for mining operations including mining of borrow material to supply paste plant operations. Since 2008, WSA have cleared approximately 15 ha of native vegetation under the NVCP and have reported annually to the Department of Mines, Industry Regulation and Safety (DMIRS). Between 2018 and 2020, WSA conducted surface extraction of the Lounge Lizard East sand borrow pit, however, the depth of the sand resource was less than anticipated. A large proportion of the exhausted borrow pit was rehabilitated in June of 2020.

1.2 Proposed amendments

WSA are proposing to increase the allowable clearing area on CPS 2217/3 for the purpose of developing additional borrow pits to support paste fill plant operations and other mining infrastructure projects. WSA is seeking an additional clearing allowance of 6.02 ha which would result in the total allowable clearing under CPS 2217/4 to become 21.02 ha.

WSA have delineated a “sand resource target area” where additional borrow pits would supply a maximum of 25,000 m^3 of sand (Figure 2). The “sand resource target area” represents an indicative area where future sand pits will be located based on resource definition sampling. As development progresses, spatial and depth variation in the sand resource is likely which will dictate the final disturbance footprint.

WSA will undertake the following management measures both prior to and during ground disturbing activities including:

- Implementation of WSA’s Ground Disturbance Procedure;
- Avoidance of all conservation significant flora and fauna species;
- Implementation of WSA’s Vehicle Hygiene Management Procedure;
- Clearing areas progressively as needed rather than in one campaign to avoid unnecessary removal of vegetation; and
- As per tenement conditions for M77/545, WSA will progressively rehabilitate borrow pits within a year of sand extraction being completed so that the disturbance area for borrow pits does not exceed 6.5 ha at any point in time.

Given the period of time since Botanica conducted their last survey of the area, WSA contracted Botanica to undertake further surveys to inform the assessment of conservation significant vegetation, floral species and faunal species. Surveys were conducted over the entire permit envelope (262.5 ha) however a more targeted survey was undertaken within the “sand resource target area” (6.02 ha). A reconnaissance flora survey was undertaken as defined in the Environmental Protection Authority (EPA) (2016a) guide *Technical Guidance - Flora and Vegetation Surveys for Environmental Impact Assessment*. A Level 1 fauna survey was also undertaken in accordance with the requirements of a reconnaissance terrestrial fauna survey as defined in *Technical Guidance – Terrestrial Fauna Surveys for Environmental Impact Assessment* (EPA 2016a). Outcomes from Botanica’s survey “Flora/Vegetation and Fauna Assessment Lounge Lizard Sand Pits Prepared for Western Areas Limited 2021” are presented within this document and attached in **Error! Reference source not found.**.

1.3 Purpose of this document

The purpose of this document is to support an application to amend CPS 2217/3 to increase the authorised area of clearing from 15 ha to 21.02 ha. WSA intend to develop additional borrow pits on M77/545 to support paste fill plant operations for underground stoping (Flying Fox and Spotted Quoll) and other mining infrastructure projects. Therefore, additional clearing of native vegetation is required.

Figure 1: FNO location

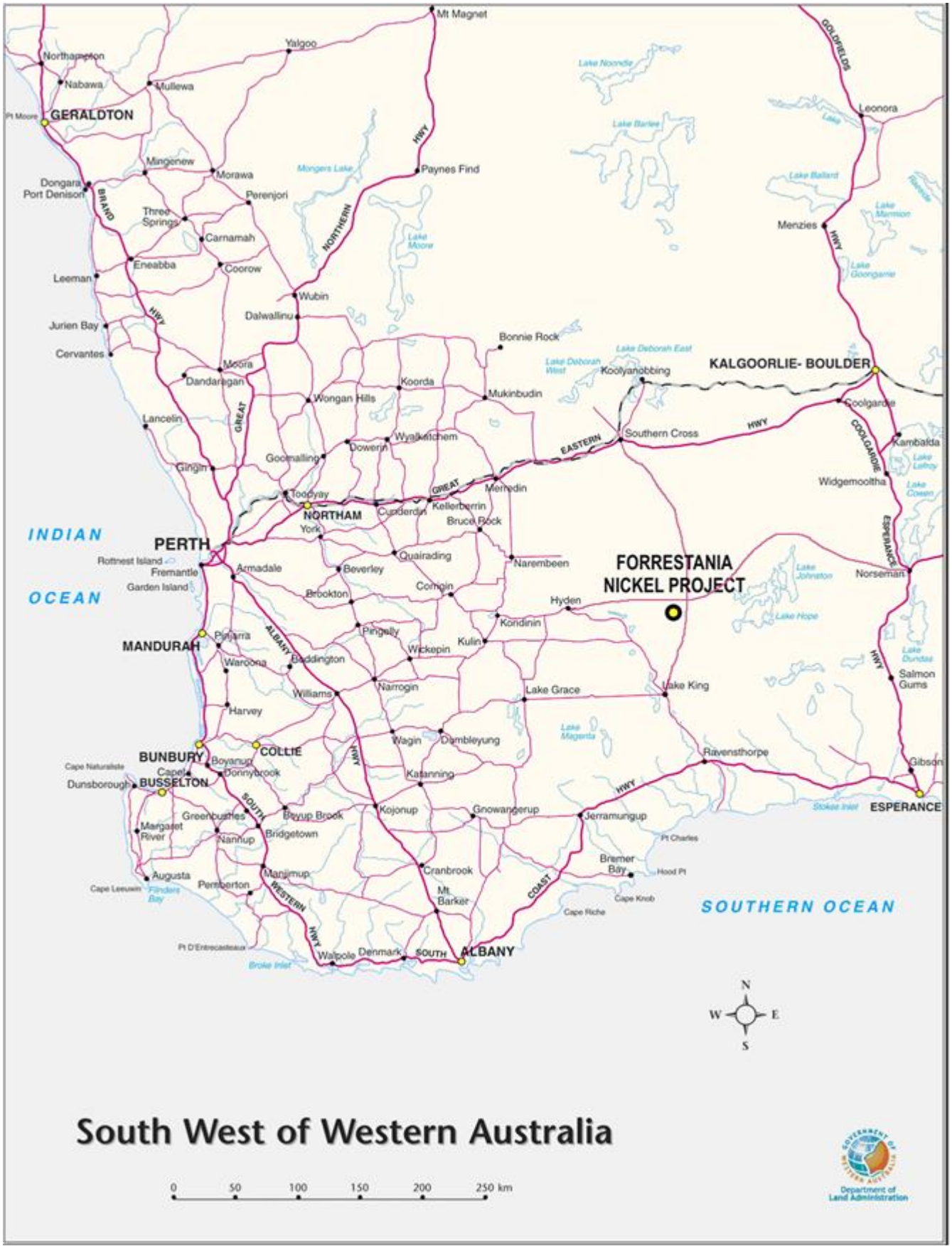
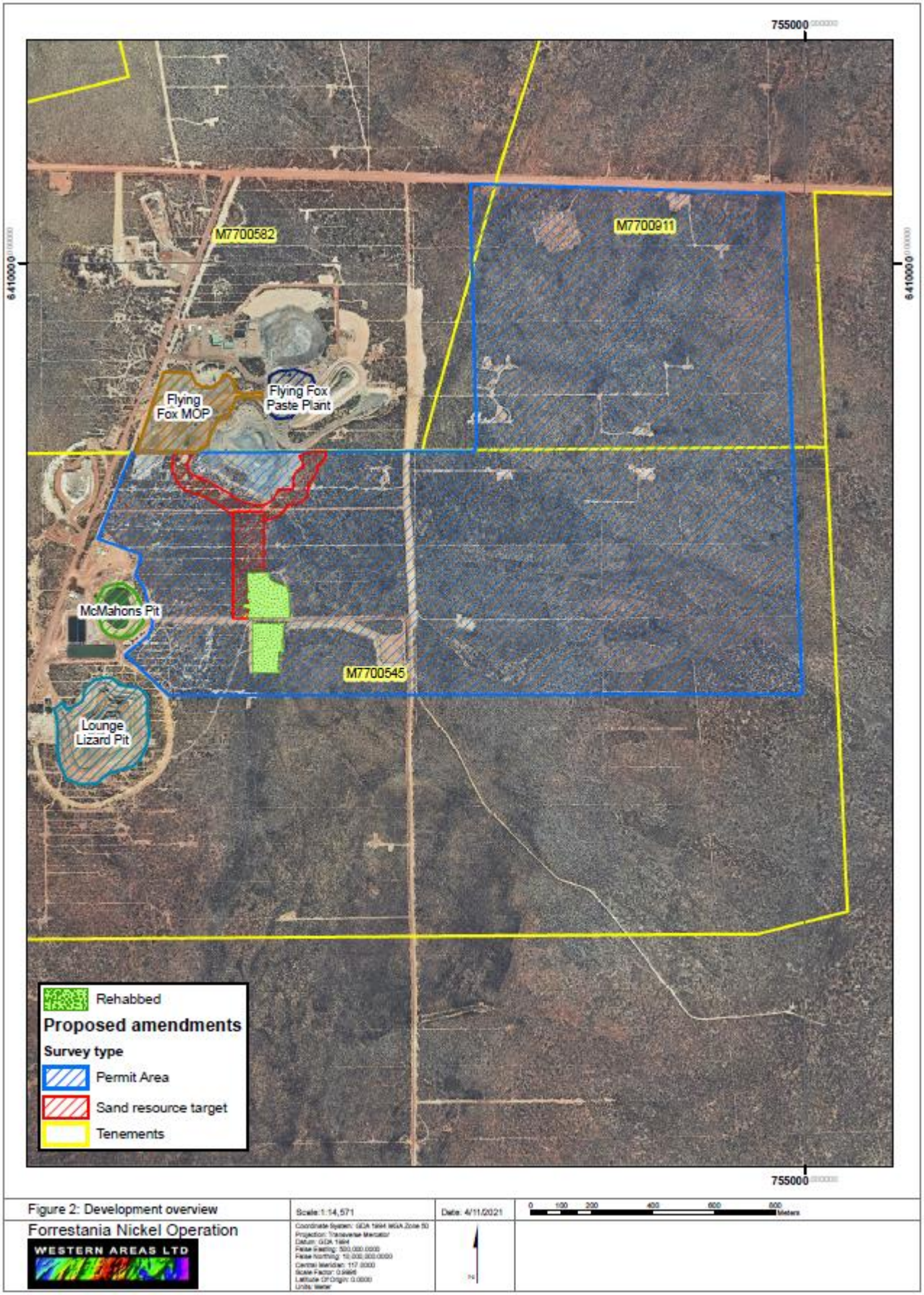


Figure 2: CPS 2217/4 Permit Area and sand resource target area.



2. PHYSICAL ENVIRONMENT

2.1 Biogeographic and regional setting

The permit area lies on the border between the Southern Cross subregion of the Coolgardie Bioregion and the Western Mallee subregion of the Mallee Bioregion, as classified by IBRA (Interim Biogeographic Regionalisation for Australia).

These bioregions also lie within the South-West and Interzone Province of Western Australia. The Mallee Bioregion also lies within a region known as the Roe Botanical District. The Mallee Bioregion is located in the south-eastern part of the Yilgarn Craton which is gently undulating, with partially occluded drainage. The Western Mallee subregion has more relief than its eastern counterpart. Its main surface types comprise clays and silts underlain by kankar, exposed granite, sandplains, isolated uplands of laterite pavements and salt lake systems on a granite basement (Botanica 2021). The Coolgardie Bioregion also lies within a region known as the Coolgardie Botanical District. The Coolgardie Bioregion is located within the Yilgarn Craton which is characterised by a granite basement and includes Archaean Greenstone intrusions in parallel belts. Drainage is occluded. The Southern Cross subregion comprises gently undulating uplands on granite strata and broad valleys with bands of low greenstone hills (Botanica 2021).

Vegetation within the Mallee subregion is comprised of mallee communities that occur on a variety of surfaces and Eucalypt woodlands, that occur with scrub-heath mainly on fine-textured sand and laterite (Beecham and Danks 2001).

Vegetation within the Southern Cross Bioregion is predominantly Eucalypt woodlands, Mallees, Acacia thickets and scrubheaths on sandplains. Diverse Eucalyptus woodlands occur around salt lakes; on the low greenstone hills; valley alluvials and broad plains of calcareous earths.

2.2 Geology, landform and soils

The permit area is mapped as soil landscape zone 250 – South Eastern Zone of Ancient Drainage of the Avon Province (Tille et al 2004). The geology is described as gently undulating terrain, dominated by salt lake chains and areas of prominent granite outcrops, on deeply weathered mantle and alluvium over granite rocks of the Yilgarn Craton. Soil is comprised of sandy duplexes that are often alkaline with ironstone gravelly soils and loamy earths that are often calcareous and some loamy duplexes, sandy earths, deep sands, and saline wet soils (Tille et al 2004).

2.3 Hydrology

2.3.1 Surface water

The permit area is located within the Swan Avon-Lockhart catchment of the Avon River Basin. The broader natural drainage of the region is characterised by chains of salt lakes coinciding with relics of old river systems (paleodrainages). The salt lakes act as surface water sinks except after heavy rainfall events when floodwaters move along those paleodrainage systems.

According to the Geoscience Australia database (2015), there are no perennial or ephemeral inland waters or drainage lines within the survey area (Botanica 2021). There are no permanent natural surface water features within the permit area or wider FNO although short term flows may occur in association with a high rainfall event. The closest water bodies of significance to the permit area are Lake Cronin (approximately 9.8 km ENE) and Lake Ned (approximately 8.1 km SE).

The region in which the survey area is found, is described as having a dry warm Mediterranean climate, with winter precipitation and an annual rainfall between 300 to 500 mm (Beard 1990).

2.3.2 Groundwater

Groundwater at the FNO is hypersaline in nature, occurs within weathered and fractured bedrock aquifers and generally moves from higher in the landscape from greenstone belts to salt lakes, generally overlying palaeochannel systems. Groundwater levels in the Flying Fox area were originally in the range 345 to 377 m AHD (about 50 to 70 m bgl), and are now in the range 264 to 374 m AHD due to dewatering operations (Rockwater, 2020).

Groundwater Dependent Ecosystems (GDE) include biological assemblages of species such as wetlands or woodlands that use groundwater either opportunistically or as their primary water source. For the purposes of this report, a GDE is defined as any vegetation community that derives part of its water budget from groundwater and must be assumed to have some degree of groundwater dependency. According to the BoM Atlas of Groundwater Dependent Ecosystems (BoM, 2020) database, there are no known or potential aquatic GDEs located within the survey area (Botanica 2021). Although this database suggests the permit area has a moderate potential to contain a terrestrial GDE, given proposed development within the permit area relates to sand pit activities which will not impact the groundwater table, impacts to potential GDE vegetation are unlikely to occur. For this reason, GDE communities are not discussed further in this assessment.

3. BIOLOGICAL ENVIRONMENT

3.1 Flora and Vegetation

Numerous flora and vegetation surveys have been conducted in the past across the clearing permit envelope. These surveys are cited by Botanica in their October 2021 survey. This survey provides the data basis for this supporting document. Botanica (2021) undertook flora and vegetation surveys in accordance with the Environmental Protection Authority (EPA) guide *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA 2016a).

WSA engaged Botanica to undertake this further survey work to better inform the assessment on the presence or absence of conservation significant flora and vegetation.

3.1.1 Flora

Botanica (2021) identified a total of 179 taxa from 30 families and 75 genera within the permit area. For the purposes of this application the species list has not been sub-categorised for the permit area. A species list for the survey is presented in Appendix 4 of Botanica (2021) [Appendix B of this supporting document].

3.1.1.1 Threatened and Priority Flora

Botanica (2021) did not identify any Threatened flora species listed under section 178 of the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) or pursuant to Part 2 of the *Biodiversity Conservation Act 2018* (BC Act) and as listed by DBCA.

Three Priority flora taxa were recorded by Botanica (2021) during their surveys, however, these were outside the “sand resource target area”. The species in the survey area associated with CPS 2271/4 were identified as *Rinzia triplex* (P3) and *Microcorys* sp. Forrestania (V. English 2004) (P4) and another species *Eutaxia hirsuta* (P2), was located in an adjacent clearing application survey area. Locations of Priority flora recorded within the Permit area are shown in Figure 3. A map showing regional Threatened and Priority Flora records in relation to the permit area is also provided in Botanica (2021) [Appendix B of this supporting document].

3.1.1.2 Introduced Species

No introduced (weed) species were recorded within the permit by Botanica (2021).

3.1.2 Vegetation

3.1.2.1 Vegetation assessment

The Department of Primary Industries and Regional Development (DPIRD) Vegetation Association GIS file (2018) indicates that the permit area is located within the Beard’s and Hopkins’ Vegetation Association (BHVA), Forrestania 511 of the Southern Cross subregion and Forrestania 2048 of the Western Mallee subregion. The extent of these BHVA, as specified in the 2018 State wide Vegetation Statistics (DBCA, 2019) is provided in

Table 1.

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). As per

Table 1 the proposed additional clearing of 6.02 ha will not significantly reduce the extent of pre-European vegetation.

Table 1: Pre-European Vegetation Association within the permit area

Region	Pre-European extent (ha)	Current pre-European extent (%)	Proposed additional clearing (ha) (% of current extent)
Forrestania 511: Medium woodland; salmon gum & morrel			
Southern Cross Subregion	153,641.65	99.58	3.72 (0.002%)
Western Australian	163,919.47	99.59	3.72 (0.002%)
Forrestania 2048: Shrublands; scrub-heath in the Mallee Region			
Western Mallee Subregion	5,735.92	97.56	2.3 (0.04%)
Western Australian	7,829.67	97.92	2.3 (0.03%)

Botanica (2021) described and mapped vegetation types for the permit area. Vegetation types recorded, and the extents of each within the permit area are summarised in Table 2 and shown in Figure 3.

Table 2: Vegetation associations within permit area (Botanica 2021)

Major Vegetation Group	Vegetation association code and description	Vegetation code	Approximate extent within permit area – ha (%)
Heathland (MVG 18)	Mid heathland of *Allocasuarina campestris* / *Allocasuarina corniculata*, *Acacia eremophila* / *Acacia fragilis* and *Melaleuca cordata* / *Melaleuca hamata* on sandplain.	SP-H1	135.3 ha (51.5%)
Mallee Woodland and Shrubland (MVG 14)	Open mallee shrubland of *Eucalyptus tenera/ E. pileata* over low heathland of *Melaleuca adnata, M. calyptroides, M. lateriflora* and low open shrubland of *Acacia deficiens/ A. intricata* on sand-loam plain.	SLP-MWS1	98.5 ha (37.5%)
Eucalypt Woodland (MVG 5)	Low woodland of *Eucalyptus salmonophloia* over low open heathland of *Melaleuca adnata*, *M. calyptroides*, *M. eleuterostachya* on clay-loam plain.	CLP-EW1	7.68 (2.9%)
	Cleared	NA	20.95 (7.98%)
		Total	**262.5 (100%)**

3.1.2.2 Vegetation condition

Vegetation within the permit area was predominantly classed as being in 'Very Good' condition based on the vegetation condition rating scale adapted from Keighery, 1994 and Trudgen, 1988 (Botanica 2021; Appendix 4). 'Very Good' condition depicts vegetation structure altered by obvious signs of disturbance, for example by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing. Disturbance within the survey area was a result of existing mining infrastructure and exploration gridlines.

3.1.2.3 Threatened and Priority Ecological Community

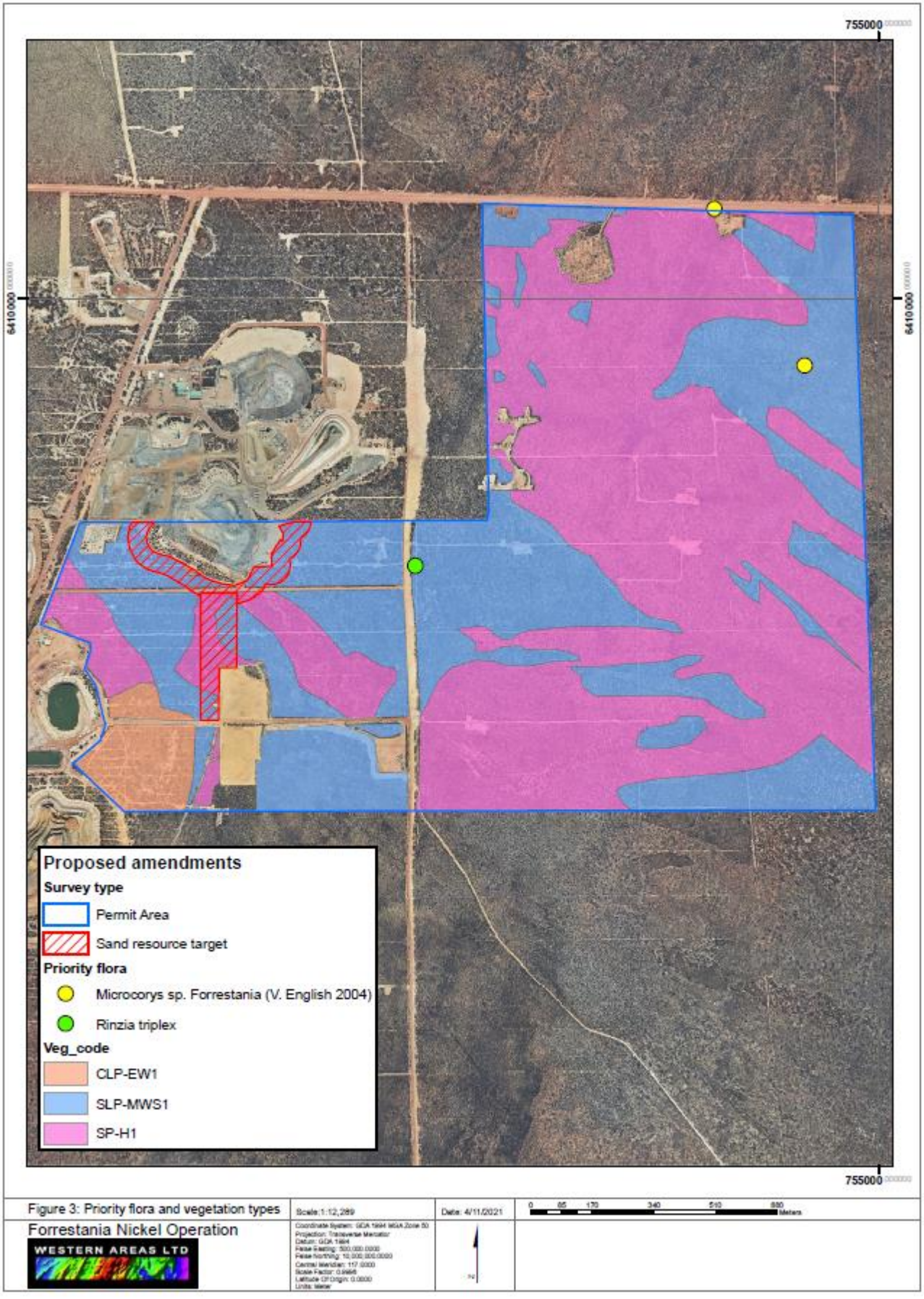
None of the vegetation associations were considered analogous with any Threatened Ecological Communities (TECs) or Priority Ecological Communities (PECs) listed under the EPBC Act or BC Act (Botanica 2021). The permit area lies within the buffer of the Lake Cronin Environmentally Sensitive Area (ESA).

The permit area is located adjacent to the spatially mapped 500 m buffer of the Ironcap Hills Vegetation Complexes (North Ironcap) obtained from the DBCA communities database. This Priority Ecological Community is managed by the DBCA as a Priority 3 Ecological Community. No banded ironstone was identified within the permit area and the vegetation complex described above was not represented within the permit area (Botanica 2021).

According to the DPIRD (2018) Vegetation Association GIS file, the BIF complex within the Greater North Ironcap area is classified by pre-European vegetation association Forrestania 1413; Shrublands; Acacia,

Casuarina & Melaleuca thicket which is represented in both the Southern Cross and Western Mallee subregion. This vegetation association does not occur within the permit area (Botanica 2021).

Figure 3: Vegetation types and Priority flora



3.2 Terrestrial Fauna

WSA engaged Botanica (2021) to undertake a fauna survey across the permit area including a targeted survey across the "sand resource target area" to better inform the assessment on the presence or absence of conservation significant fauna.

3.2.1 Terrestrial fauna species

Botanica (2021) undertook a likelihood assessment of fauna species present based on habitat assessment and database searches and determined that a total of 230 fauna species were likely to be present across the survey area (Table 4-6 of Appendix B). This survey area also included an area to the west referred to as Lounge Lizard West which is subject to a separate application. For the purposes of this application the number of species has not been sub-categorised for the permit area.

3.2.1.1 Threatened and priority fauna

No conservation significant fauna or evidence of their presence was recorded within the permit area.

Based on likelihood assessments conducted by Botanica (2021), the following species of conservation significance were regarded as possibly utilising the permit area for some purposes at times. These included:

- Lake Cronin Snake - *Paroplocephalus atriceps* (DBCA – Priority 3);
- Carnaby's Black Cockatoo - *Calyptorhynchus latirostris* (BC Act and EPBC Act – Endangered);
- Western Rosella (inland ssp) - *Platycercus icterotis xanthogenys* (DBCA - Priority 4);
- Malleefowl – *Leipoa ocellata* (BC Act and EPBC Act Vulnerable);
- Peregrine Falcon – *Falco peregrinus* (BC Act – Other Specially Protected);
- Western Brush Wallaby – *Notamacropus Irma* (DBCA – Priority 4);
- Chuditch - *Dasyurus geoffroii* (BC Act and EPBC Act - Vulnerable);
- Central Long-eared Bat - *Nyctophilus major tor* (DBCA - Priority 4); and
- Rainbow bee-eater, Merops ornatus (EPBC Act - Marine)

It should be noted that while habitats onsite for one or more of the species listed above are considered possibly suitable, some or all may be marginal in extent/quality and therefore the fauna species considered as possibly occurring may in fact only visit the area for short periods as infrequent vagrants.

3.2.2 Terrestrial fauna habitat

Habitat types were described and mapped for the permit area by Botanica (2021). Botanica (2021) recorded two habitat types referred to as 'Sand-Loam Plain – Heathland/Mallee Shrubland' and "Clay-Loam Plain – Eucalypt Woodland". The Sand-Loam Plain habitat type comprises dense Acacia/ Allocasuarina/ Banksia/ Melaleuca heathland and mallee shrubland over mixed low shrubs and is considered very well suited to a variety of burrowing small mammals and reptiles. The habitat was also described by Botanica (2021) as having a less diverse vegetation strata supporting a less diverse avifauna assemblage. This habitat type is considered well represented across the Mallee region and not unique to the permit area. The Clay-Loam Plain habitat type comprises Salmon Gum woodland over Melaleuca spp. and mixed low shrubs. The habitat type is suitable for a variety of passerine and non-passerine birds and due to the relatively dense shrubs the habitat provides suitable cover for small fauna. This particular habitat is not generally suitable for burrowing fauna.

4. ASSESSMENT AGAINST THE TEN CLEARING PRINCIPALS

An assessment of the proposed vegetation clearing against the ten native vegetation Clearing Principles contained in Schedule 5 of the Environmental Protection Act 1976 (EP Act) is provided in Sections 4.1 to 4.10. Table 2 contains a summary of the assessment.

The proposed clearing is not considered to be at variance with any of the Principles.

Table 3: Summary of assessment against ten clearing principals

Clearing Principal	Is not at variance	May be at variance
a) Native vegetation should not be cleared if it comprises a high level of biological diversity	☒	☐
b) Native vegetation should not be cleared if it comprises the whole, or part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia	☒	☐
c) Native vegetation should not be cleared if it includes, or is necessary for the continued existence of Rare flora	☒	☐
d) Native vegetation should not be cleared if it comprises the whole, or part of, or is necessary for the maintenance of a threatened ecological community (TEC)	☒	☐
e) Native vegetation should not be cleared if it is significant as remnant vegetation in an area that has been extensively cleared	☒	☐
f) Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland	☒	☐
g) Native vegetation should not be cleared if the clearing of vegetation is likely to cause appreciable land degradation	☒	☐
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	☒	☐
i) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water	☒	☐
j) Native vegetation should not be cleared if the clearing of vegetation is likely to cause, or exacerbate, the incidence of flooding	☒	☐

4.1 Comprises high level of biological diversity

Principle (a): Native vegetation should not be cleared if it comprises a high level of biological diversity.

With the exception of granite outcrops, vegetation of the Western Mallee and Southern Cross subregions are not considered to comprise of a high level of biodiversity, however, they do contain a high number of endemic species (Beecham & Danks, 2001). Vegetation identified within the permit area is not considered to be of high biological diversity, and is well represented outside of the permit area (Botanica 2021).

The permit area has been well surveyed by Botanica (2021) with total flora species identified in **Error! Reference source not found.**. No state or federally listed TECs or PECs have been recorded within the application area.

As the proposed clearing does not comprise a high level of biological diversity, the proposed clearing is not considered to be at variance with this Principle.

4.2 Potential impact to any significant habitat for fauna indigenous to Western Australia

Principle (b): Native vegetation should not be cleared if it comprises the whole, or part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.

No conservation significant fauna or evidence of their presence was recorded within the permit area by Botanica (2021). In addition, the survey area comprises of broad fauna habitats that are typical of those in the wider region. No unique fauna habitats (hollow bearing trees, malleefowl mounds, caves, rocky outcrops/ pools etc.) occur within the permit area. No water bodies (perennial or intermittent) occur within the permit area.

Specifically, to Carnaby's Black-Cockatoo *Calyptorhynchus latirostris,* it is listed as a potential species as it has infrequently been recorded in the general area. They are expected to only occur very occasionally in small transient groups. The survey area contains no potential breeding habitat for this species. No impact on this species conservation status is anticipated.

As the native vegetation in the application area is not considered significant habitat for fauna indigenous to Western Australia, the proposed clearing is not considered to be at variance with this Principle.

4.3 Potential impact to any rare flora

Principle (c): Native vegetation should not be cleared if it 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 (Botanica 2021).

Two Priority flora taxa were recorded by Botanica (2021) *Microcorys sp. Forrestania (V. English 2004) (P4) and Rinzia triplex (P3).* Locations of Priority flora recorded within the Permit area are shown in Figure 3. A map showing regional Threatened and Priority Flora records in relation to the permit area is also provided in Botanica (2021); Appendix B. Priority Flora are not within the sand resource target, however, if Priority Flora are discovered a 10 m exclusion zone will be enforced.

The proposed clearing is not considered to be at variance with this Principle.

4.4 Potential of any threatened ecological communities

Principle (d): Native vegetation should not be cleared if it comprises the whole, or part of, or is necessary for the maintenance of a threatened ecological community (TEC).

No state or federally listed TECs or PEC's have been recorded within the permit area (Botanica 2021). A map showing the total extent of PEC's in relation to the survey area is provided within the Botanica (2021) assessment.

The proposed clearing is not considered to be at variance with this Principle.

4.5 Significance as a remnant of native vegetation in the area that has been extensively cleared

Principle (e): Native vegetation should not be cleared if it is significant as remnant vegetation in an area that has been extensively cleared.

The permit area is located within BHVA Forrestania 511 of the Southern Cross subregion and Forrestania 2048 of the Western Mallee subregion. The current extent of these vegetation associations, as specified in the 2018 State wide Vegetation Statistics (DBCA, 2019) is >97% of the pre-European extent and as such, a significant representation of this vegetation association remains. The proposed clearing in the permit area is 6.02 ha, therefore, the clearing is <1% of the current extent of these vegetation associations. This is still well above the target of 30% or more pre-clearing extent, outlined in national objectives.

Additionally, the vegetation types in the permit area were described by Botanica (2021). The majority of the vegetation occurring in the proposed clearing area is vegetation type SLP-MWS1 (open mallee shrubland or *Eucalyptus tenera*/*E. pileata* over low heathland of *Melaleuca adnata*, *M. calyptroides*, *M. lateriflora* and low open shrubland of *Acacia deficiens*/*A. intricata* on sand-loam plain. The remaining vegetation consists of vegetation type SP-H1 (mid heathland of *Allocasuarina campestris* / *Allocasuarina corniculata*, *Acacia eremophila* / *Acacia fragilis* and *Melaleuca cordata* / *Melaleuca hamata* on sandplain.). While there are 233.8 ha of these vegetation types in the permit area only 6.02 ha are proposed clearing area. These vegetation types haven not been extensively cleared; and they form large intact areas contiguous with other vegetation types. The small amount of clearing proposed will have limited impact on any ecosystem services provided by these vegetation types.

Furthermore, the vegetation condition is considered “Very Good” due to the obvious signs of disturbance from mining infrastructure and exploration gridlines, however, would likely regenerate naturally.

The proposed clearing is considered unlikely to be at variance with this Principle.

4.6 Impact on any watercourses and/or wetlands

Principle (f): Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.

There have been no perennial or ephemeral watercourses or wetlands mapped by Geoscience Australia (2015) in the permit area. The vegetation surveyed within the permit area is not consistent with the typical plant assemblages that occur near watercourses or wetlands.

The proposed clearing is considered unlikely to be at variance with this Principle.

4.7 Potential to cause appreciable land degradation

Principle (g): Native vegetation should not be cleared if the clearing of vegetation is likely to cause appreciable land degradation.

The permit area occurs within Soil Landscape System Ms8 (gently undulating plains with broad shallow drainage depressions) and the climate is characterised as arid to semi-arid Mediterranean with an annual rainfall of 200 – 300 mm (Botanica 2021). Based on the landscape type and climate, erosion is unlikely. During sand extraction from previous borrow pits, erosion (water or wind) has not been evident (neither has salinity or acidification) and this is likely due to the gently sloping nature of this landscape, the improbability of high intensity rainfall events and the careful planning and construction of the borrow pits. Furthermore, within the proposed clearing area only small areas are excavated at a time and these are subsequently rehabilitated (topsoil and vegetation replaced) as excavations progress.

The proposed clearing is considered unlikely to be at variance with this Principle.

4.8 Potential to impact on the environmental values of adjacent or nearby conservation areas

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.

According to Botanica’s (2021) survey, the permit area is not located within a gazetted conservation area. Furthermore, according to the EPA (2009) Advice on Conservation Values and Review of Nature Reserve Proposals in the Lake Cronin Region, the permit area occurs within a 56,750 ha area within the mineralised

greenstone belt in the Lake Cronin Region which is proposed to be managed under Section 33(2) of the *Conservation and Land Management Act 1984* (CALM Act) but not formally reserved. Given the small size of the proposed clearing area (19 ha) in relation to this proposed management area, significant impact to this land is unlikely.

The proposed clearing is considered unlikely to be at variance with this Principle.

4.9 Potential deterioration in the quality of surface or underground water

Principle (i): Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.

There are no inland waters (lakes/playas) or any perennial/ephemeral drainage lines within the permit area. Most rainfall is lost to evaporation. Only a small portion infiltrates the soil and recharges the groundwater.

The proposed clearing is considered unlikely to be at variance with this Principle.

4.10 Potential of clearing to cause, or exacerbate, the incidence of flooding

Principle (j): Native vegetation should not be cleared if the clearing of vegetation is likely to cause, or exacerbate, the incidence of flooding.

Rainfall is highly variable with an average annual rainfall between 200 – 300 mm and an evaporation rate of 2000 mm (Botanica 2021). The region is not prone to flooding and according to Botanica (2021) the permit area does not contain riparian vegetation.

The proposed clearing is considered unlikely to be at variance with this Principle.

5. REPORTING AND AUDITING

Disturbance as a result of the proposed vegetation clearing will be reported yearly under the FNO Annual Environmental Report (AER), Clearing Permit Report and Mine Rehabilitation Fund (MRF) reporting.

Upon approval of this Clearing Permit, subsequent environmental approvals will be sought to excavate and utilise the sand borrow pit. These approvals will include additional conditions and commitments relating to progressive clearing dependant on demand and depth of sand resource, rehabilitation design specifications and reporting.

6. CONCLUSION

The vegetation and habitats present within the proposed Clearing Permit Area are well represented on a regional scale. It is considered unlikely that there will be any impact on the conservation status of relevant flora and fauna species and there are likely to be only minor local impacts from loss of vegetation.

The proposed clearing will not impact significantly upon the ten clearing principles and a range of environmental management procedures are in place to ensure that clearing will be managed to minimise any potential adverse impacts. Rehabilitation will minimise exposed areas and the long-term loss of vegetation cover.

7. REFERENCES

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APPENDIX A – CPS 2271/3

GOVERNMENT OF
WESTERN AUSTRALIA

CLEARING PERMIT

Granted under section 51E of the Environmental Protection Act 1986

Purpose Permit number:	2271/3
Duration of Permit:	From 17 May 2008 to 30 June 2023
Permit Holder:	Western Areas Limited

The Permit Holder is authorised to clear native vegetation subject to the following conditions of this Permit.

PART I - CLEARING AUTHORISED

1. **Land on which clearing is to be done**
   Mining Lease 77/545
   Mining Lease 77/582
   Mining Lease 77/911

2. **Purpose for which clearing may be done**
   Clearing for the purposes of mineral exploration and mine infrastructure.

3. **Area of Clearing**
   The Permit Holder must not clear more than 15 hectares of native vegetation. All clearing must be within the area cross-hatched yellow on attached Plan 2271/3.

4. **Type of Clearing Authorised**
   The Permit Holder shall not clear native vegetation unless the purpose for which the clearing is authorised is enacted within three months of the authorised clearing being undertaken.

5. **Application**
   This Permit allows the Permit Holder to authorise persons, including employees, contractors and agents of the Permit Holder, to clear native vegetation for the purposes of this Permit subject to compliance with the conditions of this Permit and approval from the Permit Holder.

PART II – MANAGEMENT CONDITIONS

6. **Weed Control**
   When undertaking any clearing or other activity authorised under this Permit, the Permit Holder must take the following steps to minimise the risk of the introduction and spread of *weeds*:

   (i) clean earth-moving machinery of soil and vegetation prior to entering and leaving the area to be cleared;
   (ii) ensure that no *weed*-affected soil, *mulch*, *fill* or other material is brought into the area to be cleared; and
   (iii) restrict the movement of machines and other vehicles to the limits of the areas to be cleared.

7. **Flora Management**
   The Permit Holder shall not clear within 50 metres of any population of the flora species *Microcorys* sp. *Forrestania.*

PART III - RECORD KEEPING AND REPORTING

8. Records to be kept

The Permit Holder must maintain the following records for activities done pursuant to this Permit:

In relation to the clearing of native vegetation authorised under this Permit,

(i) the location where the clearing occurred, recorded using a Global Positioning System (GPS) unit set to Geocentric Datum Australia 1994 (GDA94), expressing the geographical coordinates in Eastings and Northings or decimal degrees;
(ii) the date that the area was cleared;
(iii) the size of the area cleared (in hectares); and
(iv) purpose for which clearing was undertaken.

9. Reporting

(a) The Permit Holder shall provide a report to the Director Operations, Environment, Department of Mines and Petroleum by 31 July each year for the life of this permit, demonstrating adherence to all conditions of this permit, and setting out the records required under Condition 8 of this permit in relation to clearing carried out between 1 July and 30 June of the previous financial year.

(b) Prior to 30 June 2023, the Permit Holder must provide to the Director Operations, Environment, Department of Mines and Petroleum a written report of records required under Condition 8 of this Permit where these records have not already been provided under Condition 9(a) of this Permit.

DEFINITIONS

The following meanings are given to terms used in this Permit:

fill means material used to increase the ground level, or fill a hollow;

mulch means the use of organic matter, wood chips or rocks to slow the movement of water across the soil surface and to reduce evaporation;

weed/s means any plant -

(a) that is declared under section 22 of the *Biosecurity and Agriculture Management Act 2007*; or
(b) published in a Department of Parks and Wildlife Regional Weed Rankings Summary, regardless of ranking; or
(c) not indigenous to the area concerned.

Steve Tantala
DIRECTOR OPERATIONS
ENVIRONMENT
DEPARTMENT OF MINES AND PETROLEUM

Officer with delegated authority under Section 20
of the Environmental Protection Act 1986

12 June 2014

PLAN 2271/3

LEGEND

- Mining Tenements Clearing Instruments
- Areas Approved to Clear

Holland 2833 Mar 2011 Mosaic

N

0 ~500 m

Scale 1:20000
(Approximate when reproduced at A4)

Geocentric Datum Australia 1994

Note: the data in this map have not been projected. This may result in geometric distortion or measurement inaccuracies.

..... Date 12/6/14

STEVE TANTALA

Officer with delegated authority under Section 20 of the Environmental Protection Act 1986

Information derived from this map should be confirmed with the data custodian acknowleged by the agency acronym in the legend.

APPENDIX B – FLORA, VEGETATION AND FAUNA ASSESSMENT (BOTANICA 2021)

Flora/ Vegetation and Fauna Assessment
Lounge Lizard Sand Pits
Prepared For
Western Areas Limited

October 2021
Version 1

Prepared by:
Botanica Consulting Pty Ltd
33 Brewer Street
Perth WA 6000

Disclaimer

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Document Job Number: 2021/105

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Appendices

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Glossary

Acronym	Description
ANCA	Australian Nature Conservation Agency.
BA	Birdlife Australia.
BAM Act	*Biosecurity and Agriculture Management Act 2007*, WA Government.
BC Act	*Biodiversity Conservation Act 2016*, WA Government.
Botanica	Botanica Consulting Pty Ltd.
BoM	Bureau of Meteorology.
CAMBA	China Australia Migratory Bird Agreement 1998.
DAFWA	Department of Agriculture and Food (now DPIRD), WA Government.
DAWE	Department of Agriculture, Water and the Environment (formerly DotEE), Australian Government.
DBCA	Department of Biodiversity, Conservation and Attractions (formerly DPaW), WA Government.
DMIRS	Department of Mines, Industry Regulation and Safety (formerly DMP), WA Government
DotEE	Department of the Environment and Energy (now DAWE), Australian Government.
DPIRD	Department of Primary Industries and Regional Development, WA Government
DWER	Department of Water and Environmental Regulation (formerly EPA, DER and DoW), WA Government
EP Act	Environmental Protection Act 1986, WA Government.
EP Regulations	Environmental Protection (Clearing of Native Vegetation) Regulations 2004, WA Government.
EPA	Environmental Protection Authority, WA Government.
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*, Australian Government.
ESA	Environmentally Sensitive Area.
Ha	Hectare (10,000 square meters).
IBRA	Interim Biogeographic Regionalisation for Australia.
IUCN	International Union for the Conservation of Nature and Natural Resources – commonly known as the World Conservation Union.
JAMBA	*Japan Australia Migratory Bird Agreement 1981.*
Km	Kilometer (1,000 meters).
MVG	Major Vegetation Groups.
NVIS	National Vegetation Information System.
PEC	Priority Ecological Community.
ROKAMBA	Republic of Korea-Australia Migratory Bird Agreement 2007.
SRE	Short Range Endemic.
SSC	Species Survival Commission, International.
TEC	Threatened Ecological Community.
WA	Western Australia.
WAHERB	Western Australian Herbarium.
WAM	Western Australian Museum, WA Government.

Executive Summary

Botanica Consulting Pty Ltd (Botanica) was commissioned by Western Areas Limited to undertake a reconnaissance flora/ vegetation survey, basic fauna survey and targeted flora/ fauna survey of proposed new borrow pit developments within tenements M77/545 and M77/911 (referred to as the 'survey area'). The survey area is located at Lounge Lizard, an area adjacent and to the south of the Flying Fox mine site, owned and operated by Western Areas Limited, located approximately 78km east of Hyden, Western Australia. The survey was conducted on the 21st and 22nd September 2021. The total survey area encompassed an approximate area of 383 ha. The target survey area encompassed an approximate area of 25.7 ha

Four vegetation types were identified within the survey area. These vegetation types were located within three landform types and comprised of three major vegetation groups, which were represented by a total of 30 Families, 75 Genera and 179 Taxa. No introduced flora were identified within the survey area. Based on the vegetation condition rating scale adapted from Keighery, 1994 and Trudgen, 1988 vegetation was rated as 'very good'.

The broad scale terrestrial fauna habitats within the survey area have been identified as comprising a mosaic of clay-loam plain and sand-loam plain. Results of the literature review identified 32 mammals (including 9 bat species), 121 birds, 65 reptiles and 22 frog species that have previously been recorded in the general area, some of which have the potential to occur, subject to the identified habitats being suitable.

No Threatened flora or Threatened Ecological Communities (TEC) as listed under the Western Australian *Biodiversity Conservation (BC) Act 2016* or Commonwealth *Environment Protection and Biodiversity Conservation (EPBC) Act 1999* were identified within the survey area. The survey area is located adjacent to the spatially mapped 500m buffer of the *Ironcap Hills Vegetation Complexes* (North Ironcap) obtained from the Department of Biodiversity, Conservation and Attractions (DBCA) communities database search. This Priority Ecological Community is listed by the DBCA as a Priority 3 Ecological Community. No banded ironstone was identified within the survey area and no vegetation representative of this Priority Ecological Community was identified within the survey area. Three Priority flora taxa were identified within the survey area; *Eutaxia hirsuta* (P2), *Microcorys* sp. Forrestania (V. English 2004) (P4) and *Rinzia triplex* (P3).

A review of the EPBC Act Threatened fauna list, DBCA's Threatened Fauna Database and Priority List, unpublished reports and scientific publications identified a number of specially protected, migratory or priority fauna species as having been previously recorded or as being potentially present in the general vicinity of the survey area. However, no fauna of conservation significance is likely to be significantly impacted on by the proposed development. This conclusion is primarily based on the lack of suitable habitats, the known local extinction of some species, the relatively small size of the impact footprint and the extensive habitat connectivity with adjoining areas. Impacts on fauna and fauna habitat are therefore anticipated to be localised, small/negligible and as a consequence manageable.

The survey area does not contain any world or national heritage places and does not occur within a Bush Forever site. There are no wetlands of international importance (Ramsar Wetlands), national importance (Australian Nature Conservation Agency (ANCA) Wetlands) or conservation category wetlands within the survey area.

The survey area is located within an Environmentally Sensitive Area (ESA) as listed under the *Environmental Protection (EP) Act 1986.* This ESA is associated with Lake Cronin which is located approximately 4.5km north-east of the survey area.

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

Botanica have undertaken an assessment against the ten native vegetation Clearing Principles contained in Schedule 5 of the EP Act. Based on the information provided in this report, this assessment considered that the proposed sand pit works in the survey area is unlikely to be at variance with these ten Clearing Principles.

1 Introduction

1.1 Project Description

Botanica Consulting Pty Ltd (Botanica) was commissioned by Western Areas Limited to undertake a reconnaissance flora/ vegetation survey, basic fauna survey and targeted flora/ fauna survey of proposed new borrow pit developments within tenements M77/545 and M77/911 (referred to as the 'survey area') . The survey area is located within the Flying Fox mine site, owned and operated by Western Areas Limited, located approximately 78km east of Hyden, Western Australia (Figure 1-2). The survey was conducted on the 21st and 22nd September 2021. The total survey area encompassed and approximate area of 383 ha. The target survey area encompassed an approximate area of 25.7 ha (Figure 1-1).

1.2 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/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 EPBC Act are likely to require referral of the project to the Commonwealth 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 Vertebrate Fauna Surveys for Environmental Impact Assessment – June 2020* (EPA, 2020). The objectives of the assessment were to:

- Gather background information on fauna in the survey area (literature review, database and map-based searches);
- Delineate and characterise the faunal assemblages and fauna habitats present in the survey area;
- Document and map locations of any Threatened or Priority listed fauna species located; and
- Assess the regional and local conservation status of fauna species and fauna habitats within the survey area.

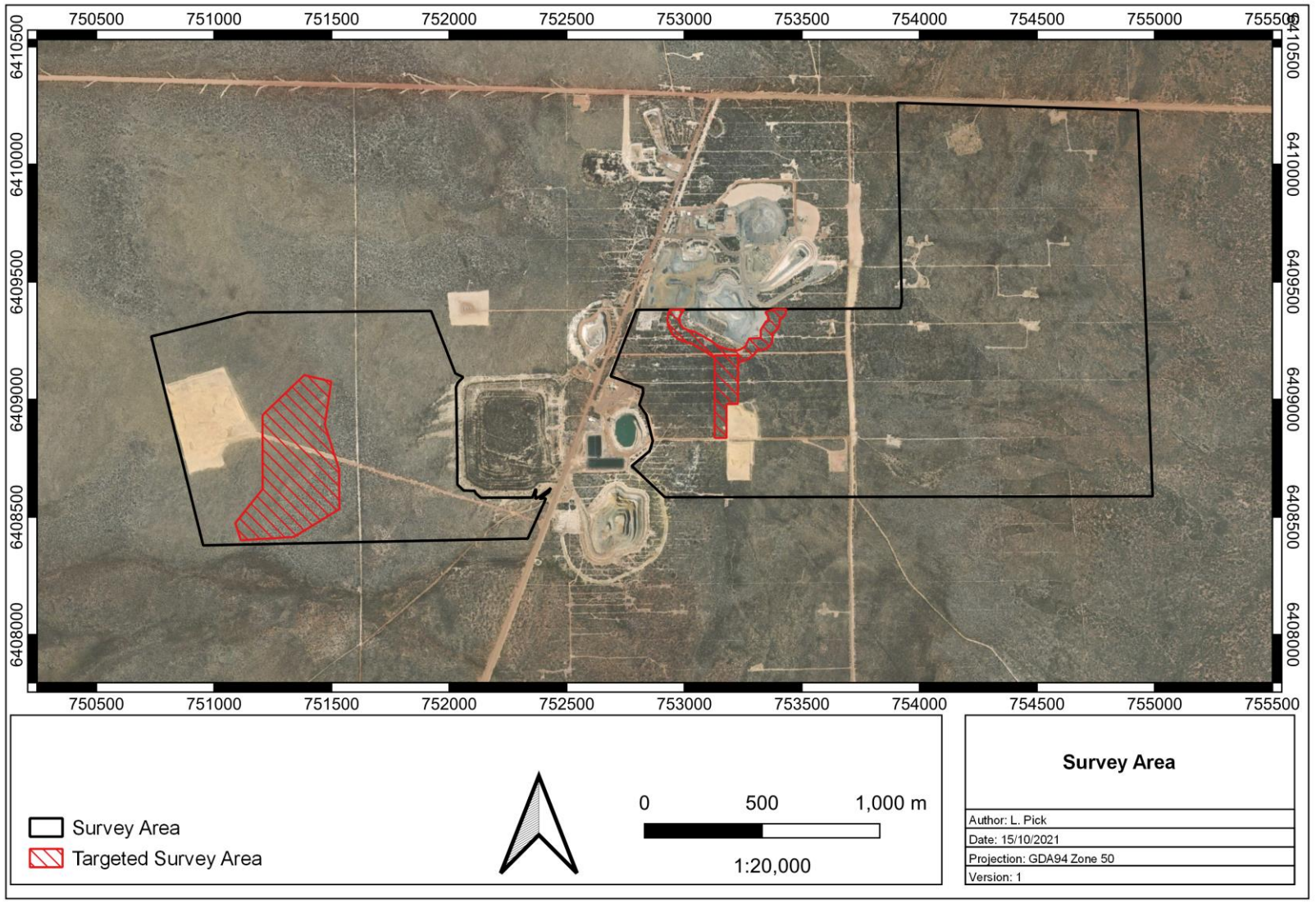


Figure 1-1: Flying Fox sand pit survey area

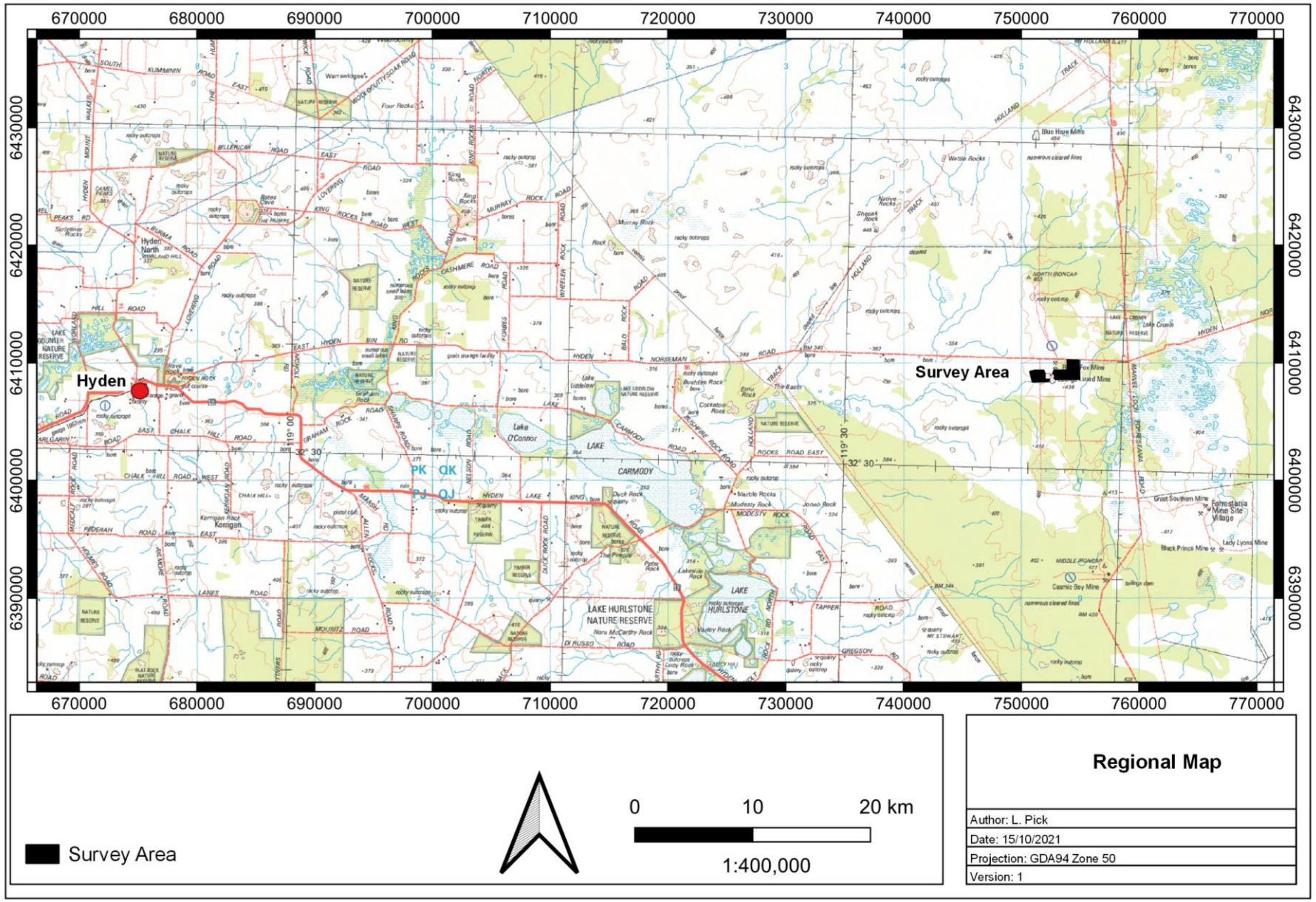


Figure 1-2: Regional map of the survey area

2 Regional Biophysical Environment

2.1 Regional Environment

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

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

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

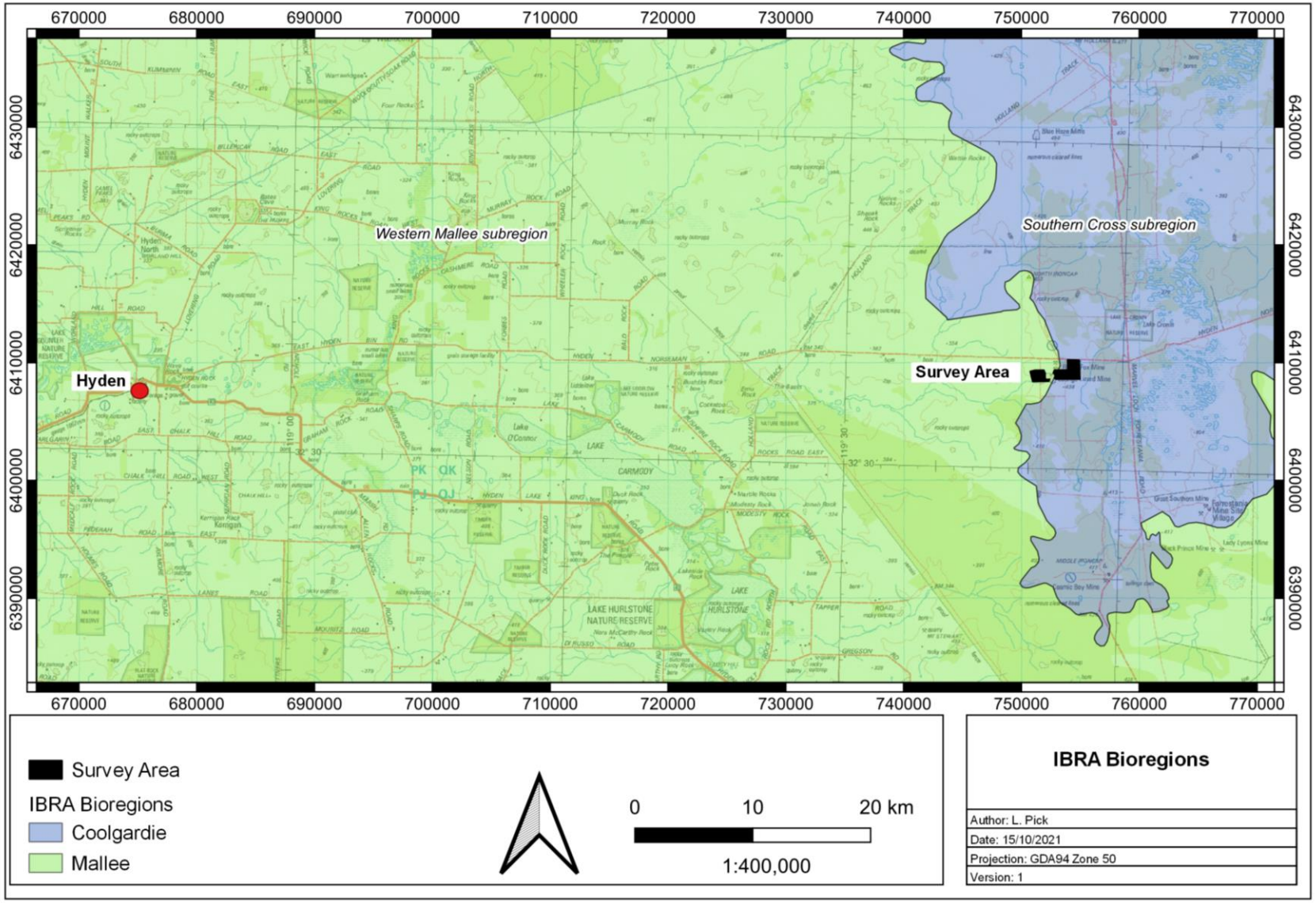


Figure 2-1: Map of IBRA Bioregions in relation to the survey area

2.2 Soils and Landscape Systems

Based on geographic information provided by the Department of Agriculture and Food Western Australia (DAFWA, 2014), the survey area is located within the South-eastern Zone of Ancient Drainage (250) of the Avon Province (25).

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

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

These South-western Zone of Ancient Drainage is further divided into soil landscape systems, with the survey area located within the soil landscape system described in Table 2-1 and Figure 2-2 below.

Table 2-1: Soil Landscape System within the survey area

Soil Landscape System	Description
Ms8	Gently undulating plains with broad shallow drainage depressions

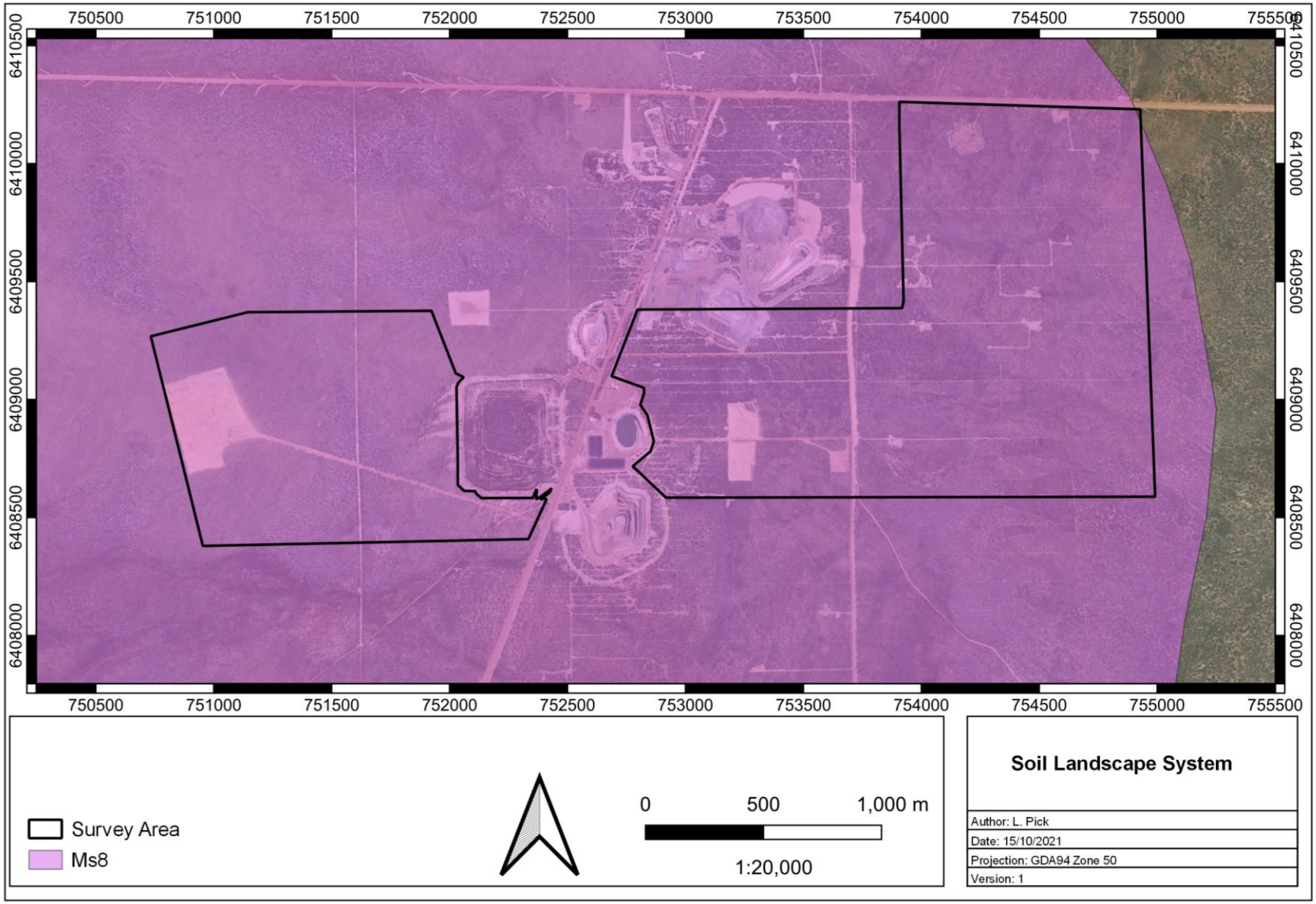


Figure 2-2: Map of Soil Landscape Systems within the survey area

2.3 Remnant Vegetation

The Department of Primary Industries and Regional Development (DPIRD) Vegetation Association GIS file (2018) indicates that the survey area is located within Pre-European Beard vegetation association Forrestania 511 of the Southern Cross subregion and Forrestania 2048 of the Western Mallee subregion. The extent of these vegetation associations, as specified in the 2018 Statewide Vegetation Statistics (DBCA, 2019) are provided in Table 2-2 and Figure 2-3.

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

Table 2-2: Pre-European Vegetation Association within the survey area

Region	Pre-European Extent (ha)	Pre-European extent remaining (%)	% of Current extent within DBCA managed lands	Extent within the survey area (ha)
Forrestania 511: Medium woodland; salmon gum & morrel				
Southern Cross Subregion	153,641.65	99.58	9.68	50
Western Australia	163,919.47	99.59	9.07	
Forrestania 2048: Shrublands; scrub-heath in the Mallee Region				
Western Mallee Subregion	5,735.92	97.56	0	4
Western Australia	7,829.67	97.92	0.64	

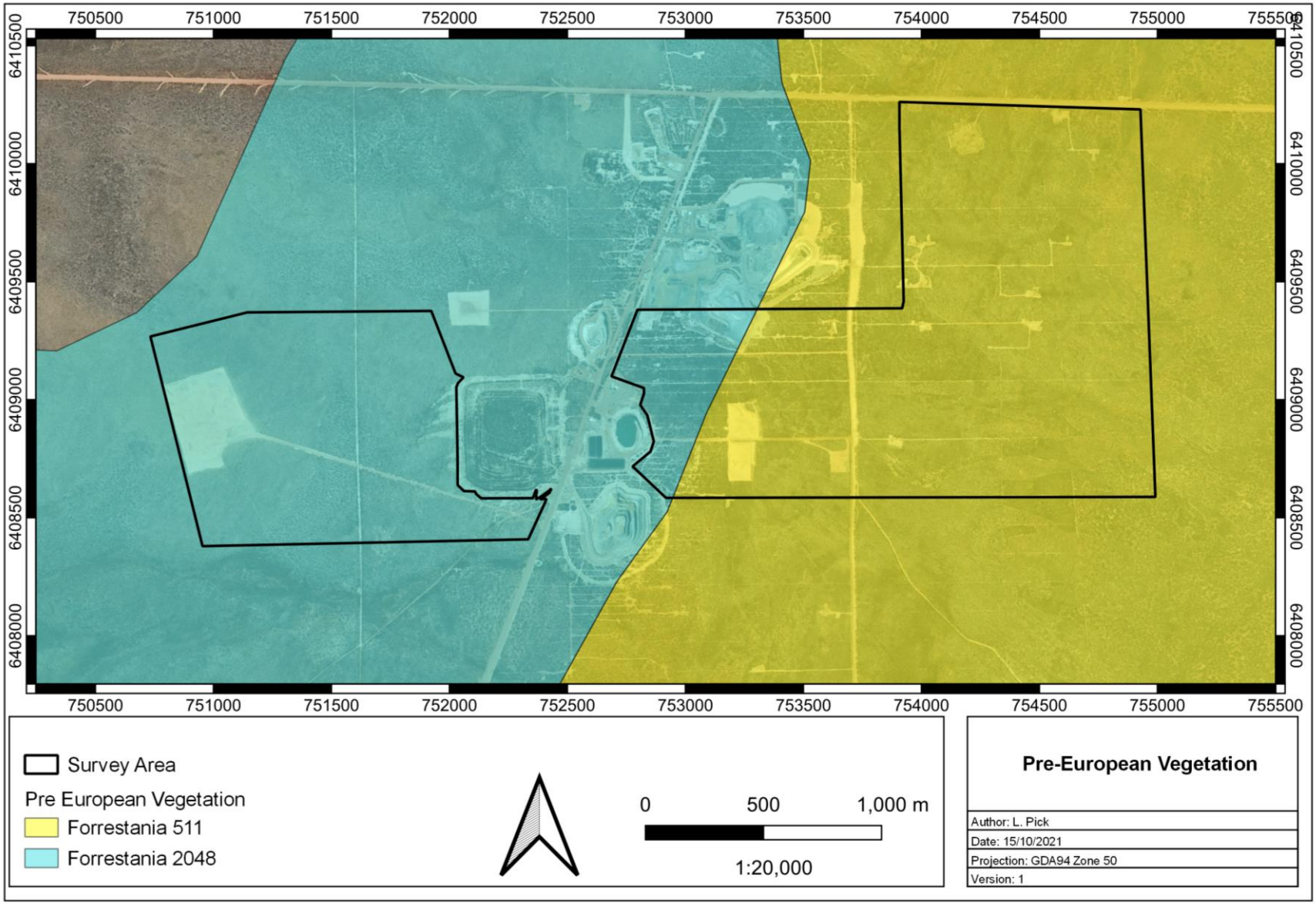
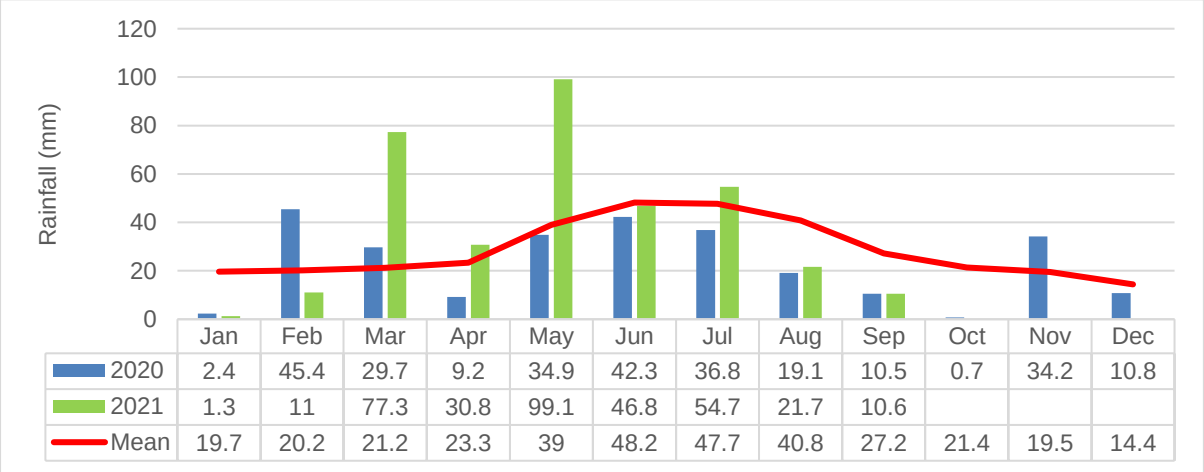


Figure 2-3: Pre-European Vegetation Associations within the survey area

2.4 Climate

The climate of the Southern Cross subregion is characterised as arid to semi-arid Mediterranean with an annual rainfall of 200-300mm (Beard, 1990; Cowan, 2001). The climate of the Western Mallee subregion is characterised as dry warm Mediterranean with an annual rainfall of 300-500mm (Beard, 1990; Beecham & Danks, 2001). Rainfall data for the Hyden weather station (#10568) located approximately 78km west of the survey area is shown in Figure 2-4 (BoM, 2021). Mean monthly rainfall ranges from 48.2 mm in June to 14.4 mm in December, whilst the mean annual rainfall is 339.6 mm. Annual rainfall received in 2020 was below average. Survey work was undertaken in September 2021 within the EPA recommended timing for primary surveys of the South-West and Interzone Province (i.e. Spring) (EPA, 2016).



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2020	2.4	45.4	29.7	9.2	34.9	42.3	36.8	19.1	10.5	0.7	34.2	10.8
2021	1.3	11	77.3	30.8	99.1	46.8	54.7	21.7	10.6			
Mean	19.7	20.2	21.2	23.3	39	48.2	47.7	40.8	27.2	21.4	19.5	14.4

Figure 2-4: Monthly rainfall and mean monthly rainfall (January 2020 to September 2021) for the Hyden weather station #10568 (BoM, 2021)

2.5 Hydrology

According to the Geoscience Australia database (2015), there are no perennial or ephemeral inland waters or drainage lines within the survey area (Figure 2-5).

Groundwater Dependent Ecosystems (GDE) includes biological assemblages of species such as wetlands or woodlands that use groundwater either opportunistically or as their primary water source. For the purposes of this report, a GDE is defined as any vegetation community that derives part of its water budget from groundwater and must be assumed to have some degree of groundwater dependency. According to the BoM *Atlas of Groundwater Dependent Ecosystems* (BoM, 2019) database, there are no known or potential aquatic GDEs located within the survey area (Figure 2-5). The survey area has moderate potential to contain the following terrestrial GDE listed in Table 2-3 and shown spatially in Figure 2-5 (BoM, 2020). As the proposed developments within the survey relate to sand pit activities and will not impact the groundwater table, impacts to potential GDE vegetation are unlikely to occur.

Table 2-3: Potential Terrestrial Groundwater Dependent Ecosystems (BoM, 2020)

GDE Description	Potential GDE according to BoM (2019b)
Undulating plains with some sandplains, ferruginous breakaways; ridges of metamorphic rocks and granitic hills and rises; calcretes, large salt lakes and dunes along valleys.	Moderate potential GDE

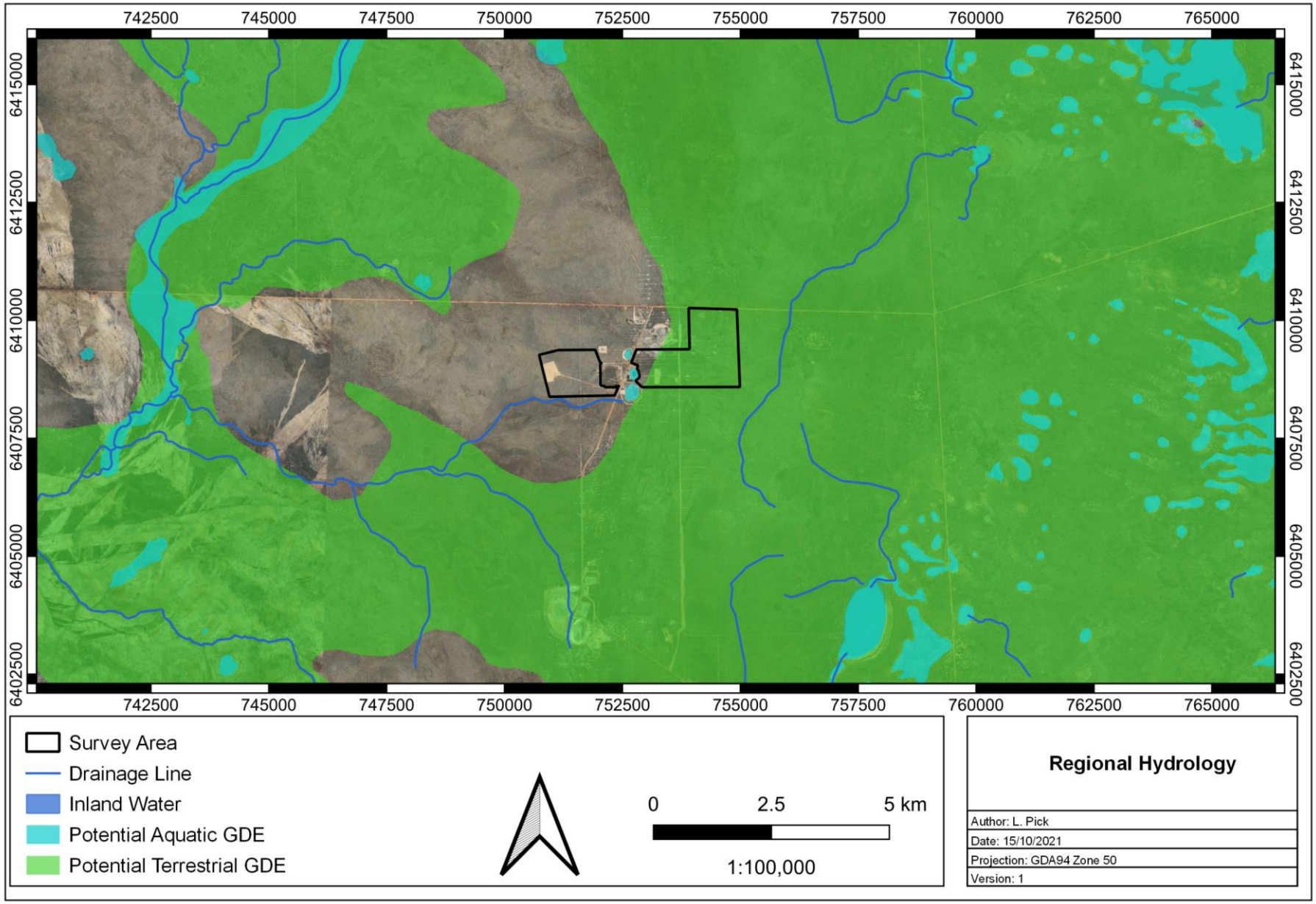


Figure 2-5: Surface Hydrology of the survey area

2.6 Land Use

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

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

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

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

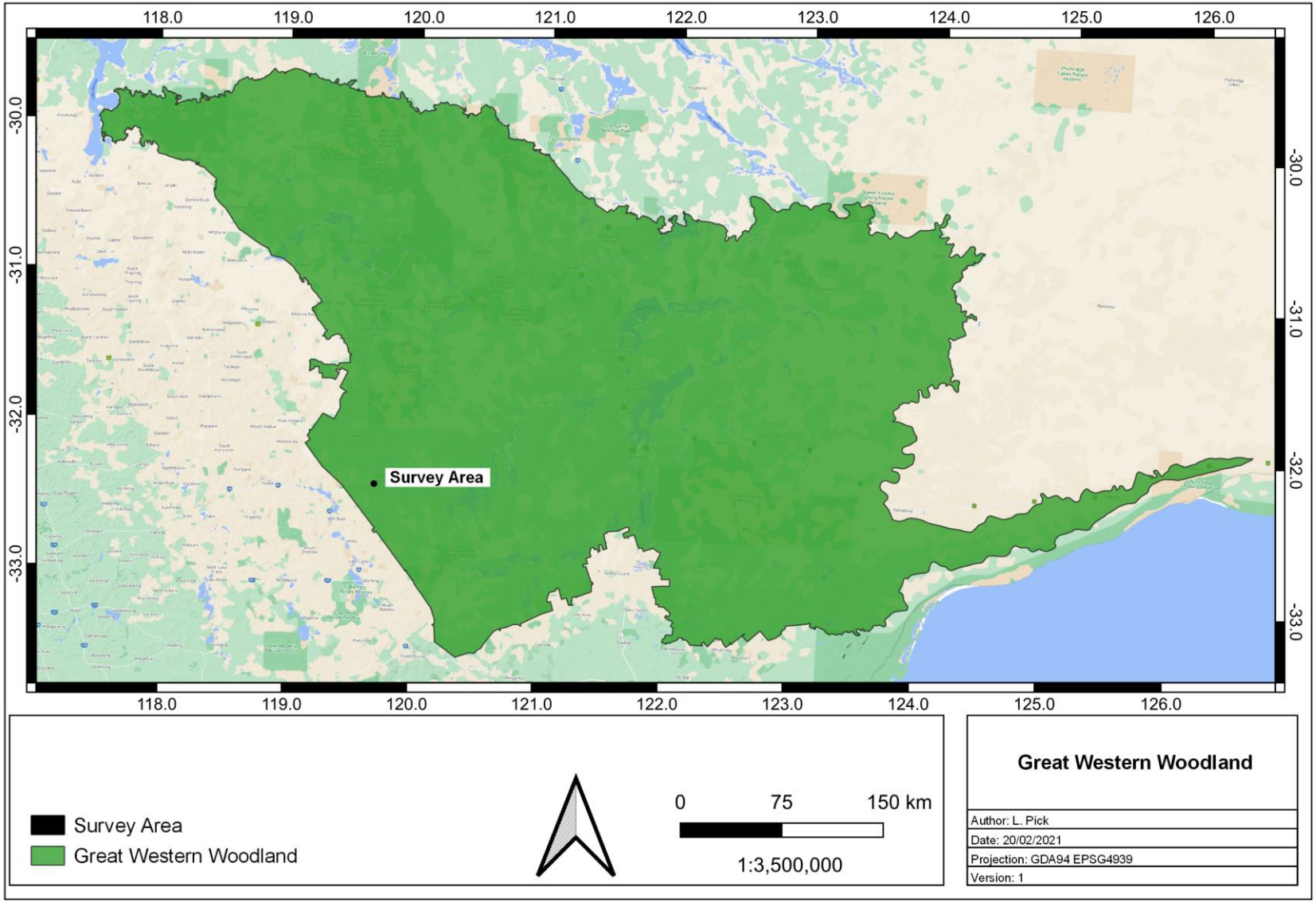


Figure 2-6: Location of survey area within the Great Western Woodlands

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:

- How, R. A Newbey, K.R Dell, J. Muir, B.G & Hnatiuk, R.J, (1988), *The Biological survey of the Eastern Goldfields of Western Australia: Lake Johnston-Hyden.* Western Australian Muesum Supplement No. 30.
- Gibson (2004) Flora and vegetation of the Eastern Goldfields Ranges: Part 7. Middle and South Ironcap, Digger Rock and Hatter Hill. Science Division, Department of Conservation and Land Management.
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- Biota (2007a). Forrestania Monitoring Survey, Flying Fox Phases I, II, III and IV. Unpublished report for Western Areas NL.
- Botanica (2007a), Vegetation Survey of a Proposed Extension to the Current Clearing Permit Number 691/1 at the Flying Fox mine site prepared for Western Areas Limited, Botanica Consulting.
- Botanica (2007b), Flora and Vegetation Survey within the Greater Flying Fox mine site prepared for Western Areas Limited, Botanica Consulting.
- Botanica (2009), Flora and Vegetation Survey within the lounge Lizard/Flying Fox area, Proposed Gravel Pit, prepared for Western Areas Limited, Botanica Consulting.
- Biota (2010). Spotted Quoll Haul Road Single Phase Fauna Survey. Unpublished report for Western Areas N.L. May 2010.
- Botanica (2013), Flora and Vegetation survey of the greater Flying Fox area, prepared for Western Areas Limited, Botanica Consulting.
- Astron (2014). Forrestania Nickel Operations Lounge Lizard Vegetation, Flora and Fauna Biological Assessment, prepared for Western Areas Limited, Astron Environmental Services.
- Biota (2018), New Morning Level 1 and Targeted Terrestrial fauna Survey, prepared for Western Areas Limited, Biota Environmental Sciences.
- Botanica (2021a), Detailed Flora and Vegetation Survey and Targeted Flora survey of the New Morning Project, prepared for Western Areas Limited, Botanica Consulting.
- Botanica (2021b), Reconnaissance Flora/ Vegetation Survey & Basic Fauna Survey Lounge Lizard East Sand Pit Extension, prepared for Western Areas Limited, Botanica Consulting.

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

- DBCA Priority/ Threatened Flora Database Search (DBCA, 2018a)
- DBCA Priority/ Threatened Ecological Communities Database Search (DBCA, 2018b)
- DBCA NatureMap Database (DBCA, 2021);
- DAWE Protected Matters search tool (DAWE, 2021).

The DBCA Priority/ Threatened Flora Database Search and Priority/ Threatened Ecological Communities Database Search were conducted within a 50km radius of the survey area (DBCA, 2018a; DBCA, 2018b).

The NatureMap and Protected Matters Search were conducted for an area encompassing a 40km radius of the centre coordinates -32.4322S 119.6932E. It should be noted that these lists are based on observations from a broader area than the assessment area (40km 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 and Conservation* (EPBC) *Act 1999*. Administered by the Australian Government (DAWE);
- *Biodiversity Conservation* (BC) *Act 2016*. Administered by the WA Government (DBCA);
- Red List produced by the Species Survival Commission (SSC) of the World Conservation Union (also known as the IUCN Red List – the acronym derived from its former name of the International Union for Conservation of Nature and Natural Resources). The Red List has no legislative power in Australia but is used as a framework for State and Commonwealth categories and criteria; and
- Priority Flora/ Fauna list. A non-legislative list maintained by DBCA for management purposes (fauna list released April 2019; flora list released 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 1.

3.2 Field Assessment

Botanica conducted a reconnaissance flora/ vegetation survey, basic fauna survey and targeted flora/ fauna survey on the 21st and 22nd September 2021. The total survey area encompassed an approximate area of 383 ha. The target survey area encompassed an approximate area of 25.7 ha. The survey area was traversed on foot and 4WD by two personnel; Jim Williams and Michelle Luinstra. GPS tracks of the area traversed within the survey area is shown spatially in Figure 3-1.

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

3.2.1 Reconnaissance Flora Survey

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

At each sample point (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 WAHERB. Vegetation was classified in accordance with NVIS classifications.

3.2.2 Targeted Flora Survey

A targeted search for Threatened and Priority flora was conducted within the target survey area, encompassing an approximate area of 25.7 ha. The survey area was systematically searched on foot by two Botanica staff members to identify and record the locations of Threatened and Priority flora. Any locations of Threatened and Priority flora were recorded using a hand-held GPS. For any Threatened and Priority Flora identified, a simple plant count (not differentiated between juvenile/mature plants, flowering or non-flowering plants) was conducted for each record.

3.2.3 Basic Fauna Survey

Vegetation and landform units identified during the flora assessment have been used to define broad fauna habitat types across the site. This information has been supplemented with observations made during the fauna assessment.

The main aim of the fauna habitat assessment was to determine if it was likely that any species of conservation significance would be utilising the areas that maybe impacted on as a consequence of development at the site. The habitat information obtained was also used to aid in finalising the overall potential fauna list.

As part of the desktop literature review, available information on the habitat requirements of the species of conservation significance listed as possibly occurring in the area was researched. During the field survey, the habitats within the study area were assessed and specific elements identified, if present, to determine the likelihood of listed threatened species utilising the area and its significance to them.

Opportunistic observations of fauna species were made during all field survey work which involved a series of transects across the study area during the day including observations of bird species with binoculars. Secondary evidence of a species presence such as tracks, scats, skeletal remains, foraging evidence or calls were also noted if observed/heard.

3.2.4 Targeted Fauna Survey

A targeted search for Malleefowl was conducted within the target survey area. The footprint was systematically searched on foot by two personnel to identify and record the locations of any Malleefowl activity (i.e. mounds, footprints and feathers). Any locations/ observations of Malleefowl activity were recorded using a hand-held GPS.

3.2.5 Personnel involved

Jim Williams - Environmental Consultant/ Director (Diploma of Horticulture)
Michelle Luinstra - Environmental Consultant (Bachelor of Science-Biology)
Greg Harewood - Zoologist (Bachelor of Science-Zoology)
Lauren Pick - Environmental Consultant (Bachelor of Science-Zoology/Conservation Biology)

3.2.6 Scientific licences

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

Licensed staff	Permit Number	Valid Until
Jim Williams	FB62000108 (Licence to take flora for scientific purposes)	27/05/2019-27/05/2022

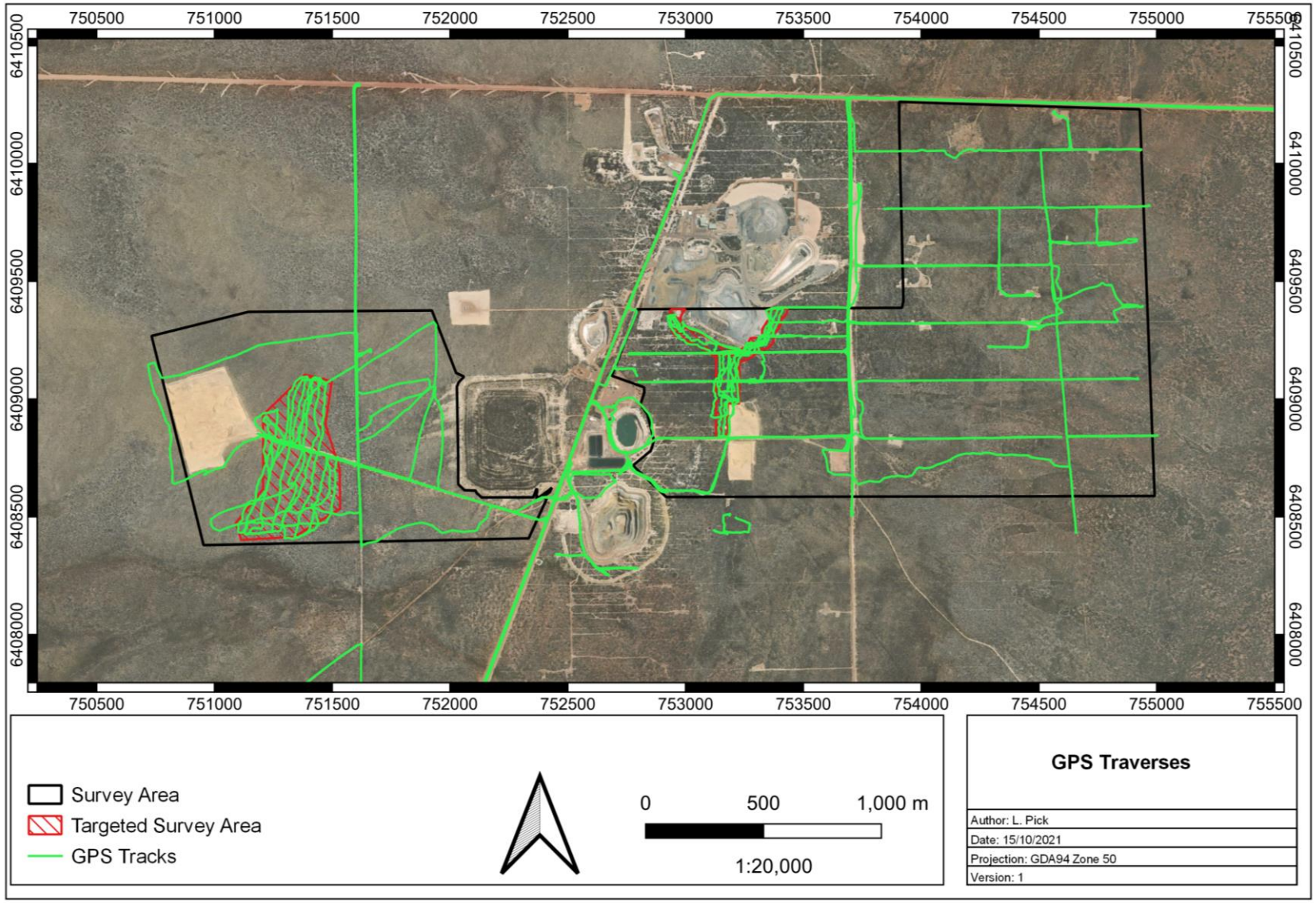


Figure 3-1: GPS Tracks recorded within the survey area

3.3 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 and fauna 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 survey

Variable	Potential Impact on Survey	Details
Access problems	Not a constraint	The survey was conducted via 4WD and on foot. Numerous tracks were located within the survey area, providing ease of access.
Competency/ Experience	Not a constraint	The BC personnel that conducted the survey were regarded as suitably qualified and experienced. **Coordinating Botanist/ Zoologist:** Jim Williams **Field Survey:** Jim Williams and Michelle Luinstra **Data Interpretation:** Jim Williams, Greg Harewood and Lauren Pick
Timing of survey, weather & season	Minor constraint	Fieldwork was completed within the EPA's recommended primary survey time period (i.e. Spring) for the South-West and Interzone Province. The survey area has been previously surveyed by Botanica and other consultants over multiple years (2005, 2006-2008, 2012, 2014 and 2021) and multiple seasons.
Area disturbance	Not a constraint	The area has been disturbed from exploration and mining; 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 survey and basic fauna completed to identify vegetation types/fauna habitats and

Variable	Potential Impact on Survey	Details
		conservation significant species/communities over the survey area. Targeted flora and fauna surveys were also conducted.
Availability of contextual information at a regional and local scale	Not a constraint	Threatened flora database searches provided by the DBCA were used to identify any potential locations of Threatened/Priority taxa. BoM, DWER, DPIRD, DBCA and DAWE databases were reviewed to obtain appropriate regional desktop information on the biophysical environment of the local region. Previous Flora/ Fauna surveys within the local area have been assessed for pertinent information and environmental context of the regional area.
Completeness	Minor constraint	In the opinion of Botanica, the survey area was covered sufficiently in order to identify vegetation assemblages. Few annual species were present during the current survey, however Botanica have previously conducted flora surveys within the survey area over multiple years (2006-2008, 2012 and 2021) and multiple seasons. All observed flora individuals were able to be identified to species level. The vegetation types for this study were based on visual descriptions of locations in the field. The distribution of these vegetation communities/ fauna habitats outside the study area is not known, however vegetation types identified were categorised via comparison to vegetation distributions throughout WA specified in the NVIS Major Vegetation Groups (DotEE, 2017b).

4 Results

4.1 Desktop Assessment

4.1.1 Flora/Vegetation

According to the results of the NatureMap search (DBCA, 2021), a total of 1,300 flora taxa have been recorded within a 40 km radius of the survey area. Dominant genera include *Acacia, Eucalyptus* and *Melaleuca.* Combined results of database searches (DBCA, 2021 and DAWE, 2021) identified 49 introduced taxa as potentially occurring within 40km of the survey area (Table 4-1). According to the Department of Primary Industries and Regional Development Western Australian Organism List (DPIRD, 2020), two taxa are listed as a Declared Pest under the *Biosecurity and Agriculture Management* (BAM) *Act 2007.* Three taxa are listed as a Weed of National Significance (WoNS).

Table 4-1: Introduced flora within 40km of the survey area

Taxon	Common Name	Declared Pest	WoNS
Aira caryophyllea	Silvery Hairgrass		
Alyssum linifolium	Flax-leaf Alyssum		
Arctotheca calendula	Cape Weed, African Marigold		
Asparagus asparagoides	Bridal Creeper	Y	Y
Avellinia michelii			
Brassica tournefortii	Mediterranean Turnip		
Brassica x napus			
Bromus catharticus	Prairie Grass		
Bromus rubens	Red Brome		
Bupleurum semicompositum			
Carrichtera annua	Wards Weed		
Centaurea melitensis	Maltese Cockspur, Malta Thistle		
Centaurium erythraea	Common Centaury		
Centaurium tenuiflorum			
Cotula bipinnata	Ferny Cotula		
Crassula natans			
Crassula natans var. *minus*			
Ehrharta longiflora	Annual Veldt Grass		
Erodium cicutarium	Common Storksbill		
Hordeum leporinum	Barley Grass		
Hornungia procumbens			
Hypochaeris glabra	Smooth Catsear		
Juncus bufonius	Toad Rush		
Lepidium africanum	Rubble Peppercress		
Lolium rigidum	Wimmera Ryegrass		
Lycium ferocissimum	African Boxthorn		Y
Lysimachia arvensis	Pimpernel		
Medicago sativa	Alfalfa		
Mesembryanthemum crystallinum	Iceplant		
Mesembryanthemum nodiflorum	Slender Iceplant		

Taxon	Common Name	Declared Pest	WoNS
Parapholis incurva	Coast Barbgrass		
Parentucellia latifolia	Common Bartsia		
Pentameris airoides subsp. *airoides*			
Plantago coronopus	Buckshorn Plantain		
Rostraria cristata			
Rostraria pumila			
Schismus barbatus	Kelch Grass		
Sonchus oleraceus	Common Sowthistle		
Spergularia diandra	Lesser Sand Spurry		
Spergularia rubra	Sand Spurry		
Stellaria pallida			
Tamarix aphylla	Athel Pine	Y	Y
Trifolium arvense var. *arvense*			
Trifolium campestre	Hop Clover		
Trifolium tomentosum var. *tomentosum*			
Ursinia anthemoides	Ursinia		
Vulpia bromoides	Squirrel Tail Fescue		
Vulpia myuros forma megalura			
Vulpia myuros forma myuros			

The results of the literature review, combined search of the DBCA's Flora of Conservation Significance databases (DBCA, 2018a), NatureMap (DBCA, 2021) and DAWE protected matters search (DAWE, 2021) recorded no Threatened Flora or Priority Flora within the survey area. Thirteen Threatened Flora and 97 Priority Flora taxa were listed on the databases as occurring within a 40km radius of the survey area (Appendix 5). A map of flora locations is provided in Appendix 2. These taxa were assessed and ranked for their likelihood of occurrence[2] within the survey area. The rankings and criteria used were:

- Unlikely: Area is outside of the currently documented distribution for the species/no suitable habitat (type, quality and extent) was identified as being present during the field/desktop assessment.

- Possible: Area is within the known distribution of the species in question and habitat of at least marginal quality was identified as being present during the field/desktop assessment, supported in some cases by recent records being documented from within or near the area.

- Known to Occur: The species in question was positively identified as being present during current or previous field surveys.

[2] Based on habitat descriptions provided by the WA Herbarium (Florabase), habitat descriptions provided in previous records listed on the DBCA Threatened Flora Database (DBCA, 2018a) and DAWE Species Profile and Threats Database (DAWE, 2020b)

Of the 110 species listed as potentially occurring within 40km of the survey area (Appendix 5), 57 were considered 'possible' to occur within the survey area[3] (Table 4-2). Five taxa were 'known to occur' within the survey area based on previous records by Botanica (2013), Astron (2014) and DBCA (2018a).

Table 4-2: Flora of Conservation Significance identified as possible or known to occur within the survey area

Taxon	Conservation Code			Description (WAHERB, 2021)	Likelihood of Occurrence
	EPBC Act	BC Act	Priority Listing		
Acacia sp. Mt Holland (B. Ellery BE 1147)			P1	No description available	Possible
Anticoryne melanosperma			P3	No description available	Possible
Austrostipa sp. Carlingup Road (S. Kern & R. Jasper LCH 18459)			P1	No description available	Possible
Austrostipa sp. Mt Holland (W.A. Thompson & J. Allen 948)			P1	No description available	Possible
Baeckea sp. Blue Haze Mine (P. Armstrong 06/910)			P1	No description available	Possible
Baeckea sp. Crossroads (B.L. Rye & M.E. Trudgen 241186)			P1	No description available	Possible
Baeckea sp. Forrestania (K.R. Newbey 1105)			P1	No description available	Possible
Baeckea sp. Hatter Hill (K.R. Newbey 3284)			P3	Narrow, open, upright shrub, to 1.3 m high. Fl. pink, Jun to Oct. Yellow-orange coarse sandy loam with laterite gravel, red-brown sandy loam with quartz pebbles. Undulating plains.	Possible
Baeckea sp. Koonadgin (B.L. Rye & M.E. Trudgen BLR 241137)			P3	No description available	Possible
Baeckea sp. Lake Cronin (K.R. Newbey 9191)			P1	Upright, spreading, moderately open shrub. Fl. white/pink, Oct. Well-drained gravelly sands. Moderately exposed, gently undulating plain.	Possible
Baeckea sp. North Ironcap (R.J. Cranfield 10580)			P1	Erect, open shrub, to 0.4 m high. Fl. white/pink, Oct. Red clay. Gently undulating sandplains.	Possible
Banksia rufa subsp. *flavescens*			P3	Prostrate, ?lignotuberous shrub, to 0.45 m high. Fl. cream-yellow, Jul to Aug. Sandy loam or sand with gravel.	Possible
Banksia viscida			P3	Densely branched, non-lignotuberous shrub, 0.4-1 m high. Fl. yellow-orange, Jul to Oct. Gravelly soils. Lateritic rises.	Possible
Boronia westringioides			P2	Erect shrub, 0.2-0.75 m high. Fl. pink, Jul to Sep. Loamy sand. Plains.	Possible

[3] Includes 27 taxa where habitat description are not available. In the absence of habitat description have been tentatively considered as 'possible' to occur

Taxon	Conservation Code			Description (WAHERB, 2021)	Likelihood of Occurrence
	EPBC Act	BC Act	Priority Listing		
Brachyloma nguba			P1	Erect, compact to spreading, mid-dense shrub, to 0.8 m high, leaves discolorous, usually 2-3 mm long; style 0.2-0.25 mm long; disc truncate. Fl. red, Apr to May. White to brown sandy clay, shallow sandy loam. Open mallee woodland, mallee scrub, flat plains.	Possible
Brachyloma stenolobum			P1	No description available	Possible
Calamphoreus inflatus			P4	Erect, spreading shrub, 0.4-1.6 m high, to 2 m wide. Fl. blue-purple/green, Oct to Dec or Feb to Mar. Clay loam with ironstone gravel. Flats, disturbed sites.	Possible
Calytrix nematoclada			P3	Shrub, 0.15-0.5(-1) m high. Fl. purple-pink, Sep or Nov to Dec or Jan. Yellow or grey sand. Sandplains.	Possible
Chorizema circinale			P3	Prostrate, scrambling, wiry shrub, to 0.4 m high. Fl. yellow & orange & red, Sep to Dec. Yellow sand, sandy clay with gravel. Flats, margin of gravel pit.	Possible
Cryptandra polyclada subsp. *polyclada*			P3	Mat-forming or upright shrub, 0.1-0.7 m high. Fl. white/cream, Jan to May or Aug or Oct. Sand. Sandplains.	Possible
Dampiera orchardii			P2	Erect perennial, herb, 0.2-0.4 m high. Sand.	Possible
Dampiera scaevolina			P1	Erect to ascending perennial, herb or shrub, 0.2-0.5 m high. Fl. blue/white, Sep to Nov. Sandy & gravelly soils.	Possible
Daviesia elongata subsp. *implexa*			P3	Spreading or sprawling shrub, 0.4-1 m high. Fl. yellow/orange & red, Sep. Sand & laterite.	Possible
Daviesia implexa			P3	No description available	Possible
Dicrastylis capitellata			P1	Low spreading shrub, 0.2-0.25 m high. Fl. blue-purple, May. Loamy sand, sandy loam.	Possible
Eremophila racemosa			P4	Erect shrub, 0.5-1.7 m high. Fl. purple-pink-red/white, Mar or Aug to Dec. Sandy or stony loam, clay loam. Undulating plains, roadsides.	Possible
Eucalyptus cerasiformis			P4	Mallee, 2-3.5 m high, bark smooth, grey to brown. Fl. yellow, Dec or Jan to Mar. Red loamy soils.	Possible
Eucalyptus deflexa			P4	(Mallee), 1-3 m high, bark smooth. Fl. pink/cream-white, Mar or May to Oct. Clay loam, sandy loam, white or yellow sand, often with gravel. Flat areas & slight rises.	Possible
Eucalyptus exigua			P3	Mallee, 2-5 m high, bark smooth. Fl. white-cream, Mar. Sandy loam, white sand. Sandplains.	Possible
Eucalyptus retusa			P1	No description available	Possible
Eutaxia hirsuta			P2	Erect, shrub, spindly shrub (broom-like). *Stems* terete, glabrous; pustules or glands absent.	Known to occur[3]
Eutaxia sp. North Ironcap (P. Armstrong PA 06/898)			P1	No description available	Possible

Taxon	Conservation Code			Description (WAHERB, 2021)	Likelihood of Occurrence
	EPBC Act	BC Act	Priority Listing		
Grevillea aneura			P4	Dense, prickly shrub, 0.5-2.8 m high. Fl. red, Jun or Aug to Dec or Jan. Sand, sandy clay, gravel.	Possible
Grevillea neodissecta			P4	No description available	Possible
Grevillea prostrata			P4	Loose, prostrate shrub, 0.04-0.1 m high, 0.8-1.2 m wide. Fl. cream-white/pink-red, Aug to Dec or Jan. White, grey or yellow sand, gravel. Sandplains.	Possible
Guichenotia anota			P1	Shrubs, 1 m high; branchlets hairy, not glaucous. Leaves alternate, 10-25 mm long	Possible
Guichenotia asteriskos			P2	Erect, compact shrub, ca 0.35 m high. Fl. white, Sep to Oct. Sandy clay or loam with gravel.	Possible
Hemigenia sp. Newdegate (E. Bishop 75)			P1	Spindly, erect to spreading shrub, 0.2-0.45 m high, to 0.5 m wide. Fl. blue/purple, Sep to Oct. Clay loam. Disturbed sites.	Possible
Hibbertia carinata			P1	Shrub, to 0.4 m high. Fl. yellow, Aug to Sep. Well-drained gravelly sand, yellow sand with gravel.	Possible
Hibbertia pachyphylla			P3	Shrub, to 0.5 m high. Fl. yellow, Sep to Nov. White to yellow sand, brown sandy gravel, gravelly loam, laterite, granite, quartz. Undulating plains, low rises, valley floors.	Possible
Hydrocotyle eichleri			P3	No description available	Possible
Hysterobaeckea pterocera			P1	No description available	Possible
Labichea rossii			P1	No description available	Possible
Melaleuca ochroma			P3	No description available	Possible
Microcorys sp. Forrestania (V. English 2004)			P4	Prostrate or erect shrub, 0.35-0.4 m high. Fl. white/purple, Jan or Apr. Yellow sandy clay or red-brown clay. Open woodland or cleared areas.	Known to occur[2]
Microcorys sp. Mt Holland (D. Angus DA 2397)			P1	No description available	Possible
Microseris walteri			P3	No description available	Possible
Mirbelia taxifolia			P1	Shrub, 0.6-0.9 m high. Fl. orange-yellow, Sep. Red or yellow sand.	Possible
Notisia intonsa			P3	No description available	Possible
Orianthera exilis			P2	No description available	Possible
Oxymyrrhine plicata			P3	No description available	Possible
Pityrodia scabra subsp. *dendrotricha*			P3	No description available	Possible
Pityrodia sp. Yilgarn (A.P. Brown 2679)			P3	No description available	Possible
Pterostylis echinulata			P3	No description available	Possible
Rinzia torquata			P3	No description available	Known to occur[1]
Rinzia triplex			P3	No description available	Known to occur[1,2]
Seringia adenogyna			P3	No description available	Possible

Taxon	Conservation Code			Description (WAHERB, 2021)	Likelihood of Occurrence
	EPBC Act	BC Act	Priority Listing		
Stylidium thylax			P2	Creeping perennial, herb, 0.04-0.08 m high, Leaves adpressed to stem, ovate to lanceolate, 0.1-0.4 cm long, 0.6-1.5 mm wide, apex mucronate, margin hyaline, glabrous. Inflorescence uni-flowered, pedicels glandular. Fl. white, Oct. Sand. Gentle slopes and plains. Heath, mallee shrubland.	Possible
Thysanotus lavanduliflorus			P1	Caespitose perennial, herb (with tuberous roots), to 0.25 m high. Fl. purple, Nov to Dec. Sand, sandy loam.	Possible
Thysanotus sp. Yellowdine (A.S. George 6040)			P2	No description available	Possible
Verticordia gracilis			P3	Low, slender shrub, 0.15-0.6 m high. Fl. pink, Oct to Nov. Yellow sand, gravelly sand, sandy loam.	Known to occur[1]
Verticordia stenopetala			P3	Shrub, 0.2-0.6(-1.3) m high. Fl. pink/pink-purple-red, Oct to Dec or Jan. Yellow sand, sometimes with gravel. Undulating plains.	Possible

[1] DBCA record (2018a); [2] Botanica record (2013); [3] Astron record (2014)

4.1.2 Fauna

According to the results of the NatureMap search (DBCA, 2021), a total of 243 vertebrate fauna taxa have been recorded within a 40 km radius of the survey area, including 10 amphibians, 145 bird, 25 mammals and 63 reptiles. Combined results of database searches (DBCA, 2021 and DAWE, 2021) identified eight introduced taxa as potentially occurring within the survey area, these being:

1. *Camelus dromedarius* (Camel)
2. *Canis lupus familiaris* (Dog)
3. *Capra hircus* (Goat)
4. *Felis catus* (Cat)
5. *Mus musculus* (House Mouse)
6. *Oryctolagus cuniculus* (Rabbit)
7. *Sus scrofa* (Pig)
8. *Vulpes vulpes* (Red Fox)

Vertebrate fauna of conservation significance identified during the literature review as previously being recorded in the general area were assessed and ranked for their likelihood of occurrence within the survey area itself (Table 4-3). The rankings and criteria used were:

- 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).
    - Locally Extinct: Populations no longer occur within a small part of the species natural range, in this case within 10 or 20km of the survey area. Populations do however persist outside of this area.

  - Regionally Extinct: Populations no longer occur in a large part of the species natural range, in this case within the Southern Cross/ Western Mallee Bioregions. Populations do however persist outside of this area.

- 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.

Table 4-3: Likelihood of Occurrence – Fauna Species of Conservation Significance

Species	Conservation Status			Habitat Description	Likelihood of Occurrence
	EPBC Act	BC Act	DBCA Priority		
Carnaby's Black Cockatoo *Calyptorhynchus latirostris*	EN	EN	-	Carnaby's cockatoo is endemic to the south-west of WA, ranging from the Kalbarri in the north to Esperance in the south-east, and inland to Coorow, Kellerberrin and Lake Cronin. They are most common in semi-arid parts of the south-west. Carnaby's cockatoo occur in uncleared and remnant areas of woodland, shrubland and kwongan heath dominated by Proteaceous species. They breed in the semiarid and subhumid interior eucalypt woodlands, principally dominated by Salmon Gum Eucalyptus salmonophloia or Wandoo Eucalyptus wandoo. The Avon Wheatbelt bioregion is an important breeding area for the species. After breeding, flocks tend to migrate coastward in search of food, with the Swan Coastal Plain recognised as an important foraging area.	Unlikely to occur. This species is only recorded very infrequently this far north east of its main documented range. The survey area contains no hollow bearing trees suitable for this species to use for breeding purposes. Potential impacts anticipated to be non-existent/negligible
Grey Falcon *Falco hypoleucos*	VU	VU	-	Occurs in arid and semi-arid Australia. The species is mainly found where annual rainfall is less than 500 mm, except when wet years are followed by drought, when the species might become marginally more widespread, although it is essentially confined to the arid and semi-arid zones at all times. The species frequents timbered lowland plains, particularly acacia shrublands that are crossed by tree-lined water courses.	Unlikely to occur. This species is only recorded very infrequently in this general area. The survey area contains no suitable breeding habitat. No impact on this species conservation status will occur.
Malleefowl *Leipoa ocellata*	VU	VU	-	Occurs in unburned mallee and woodland with abundant litter and low scrub.	Possibly occurs however habitat appears very marginal/or unsuitable for breeding supported by lack of observations during survey. Occasional transients only. Potential impacts anticipated to be non-existent/negligible
Night Parrot *Pezoporus occidentalis*	EN	CR	-	Broad habitat requirements include areas of old-growth spinifex (*Triodia*) 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).	Would not occur. Preferred habitat absent. No records in southern goldfields/ mallee region. No impact on this species conservation status will occur.
Fork-tailed Swift *Apus pacificus*	MI	MI	-	Low to very high airspace over varied habitat from rainforest to semi desert.	Possibly Occurs aerially over survey area on very rare occasions. No impact on this species conservation status will occur.
Peregrine Falcon *Falco peregrinus*	-	OS	-	Diverse from rainforest to arid shrublands, from coastal heath to alpine Mainly about cliffs along coasts, rivers and ranges and about wooded watercourses and lakes. The species utilises the ledges, cliff faces and large hollows/broken spouts of trees for nesting. It will also occasionally use the abandoned nests of other birds of prey.	Possibly Occurs aerially over survey area on very rare occasions. No suitable breeding habitat. Potential impacts anticipated to be non-existent/negligible

Species	Conservation Status			Habitat Description	Likelihood of Occurrence
	EPBC Act	BC Act	DBCA Priority		
Western Rosella (inland) *Platycercus icterotis* subsp. *xanthogenys*	-	-	P4	Western Rosellas are found in open eucalypt forest and timbered areas, including cultivated land and orchards. The inland species occurs in drier woodland, with a heath understorey.	Possibly Occurs however habitat appears marginal/or unsuitable for breeding. No impact on this species conservation status will occur.
Migratory shorebirds (various species)	MI	MI	P4	Migratory shorebirds generally prefer 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.	Would not occur. No suitable habitat. No impact on this species conservation status will occur.
Chuditch *Dasyurus geoffroii*	VU	VU	-	Previously occurred throughout arid and semi-arid Australia, but is now restricted to south-west Western Australia. It now currently inhabits a wide range of wooded habitats, including wet and dry sclerophyll, eucalyptus forest (especially Jarrah, Eucalyptus marginata) dry woodlands and mallee remnants.	Possibly occurs as occasional transient individuals only. Large expanses of similar habitat in surrounding areas. Potential impacts anticipated to be non-existent/negligible.
Western Brush Wallaby *Notamacropus irma*	-	-	P4	Dry sclerophyll forest and woodland, including mallee areas with grassy understorey and thickets of shrubs.	Possibly occurs as occasional transient individuals only. Large expanses of similar habitat in surrounding areas. Potential impacts anticipated to be non-existent/negligible.
Heath Mouse *Pseudomys shortridgei*	EN	VU	-	Heath mouse frequently inhabits species-rich dry heathland, and open woodland and forest habitats with a heath understorey. In both the western and eastern subpopulations there appears to be a preference for a structurally complex heath. In Western Australia, the heath mouse has been trapped mostly in species-rich heath but also in mixed scrub and mallee. The species has not been located in vegetation less than 10 years post-fire and it has been known to attain high densities in heath 30 years post-fire.	Unlikely to occur. This species has not been recorded in the general area during several detailed fauna surveys over many years. Large expanses of similar habitat in surrounding areas No impact on this species conservation status will occur
Western Mouse *Pseudomys occidentalis*			P4	The western mouse shows a preference for long unburnt habitat (between 30 and 50 yrs) on sandy clay loam or sandy loam. Vegetation in suitable habitats is variable and includes sparse low shrubland, tall dense shrubland, sparse to dense shrub mallee and mid-dense woodland. All sites where the western mouse has been collected have had patches of extremely dense vegetation. On some sites, populations occur in dense vegetation surrounded by granite rocks, which may afford them protection from fire. Quandong (Santalum acuminatum) and sedge species are thought to be important habitat requirements in the northern part of the western mouse's range. Populations are fragmented and restricted to this type of (fragmented) habitat.	Unlikely to occur. This species has not been recorded in the general area during several detailed fauna surveys over many years. Large expanses of similar habitat in surrounding areas No impact on this species conservation status will occur

Species	Conservation Status			Habitat Description	Likelihood of Occurrence
	EPBC Act	BC Act	DBCA Priority		
Red-tailed Phascogale *Phascogale calura*	VU	CD	-	The red-tailed phascogale occurs in remnant vegetation in the southern wheatbelt of Western Australia, where annual mean rainfall is 400−500 mm. Most of the records are concentrated in an area about 150 km long in a north-south direction from Brookton to Katanning. The red-tailed phascogale is largely confined to woodlands with old-growth hollow-producing eucalypts, particularly Wandoo (*Eucalyptus wandoo*) and York gum (*E. loxophleba*), often with associated rock sheoak (*Allocasuarina huegeliana*), but has also been recorded in shrublands and various mosaics of woodland, shrubland and scrub-heath. It avoids relatively open areas and rocky ridges which are devoid of vegetation. The species prefers long unburnt (more than 50 years) patches.	Unlikely to occur. Habitat appears to be unsuitable. In addition this species has not been recorded in the general area during several detailed fauna surveys over many years. Large expanses of similar habitat in surrounding areas No impact on this species conservation status will occur.
Lake Cronin Snake *Paroplocephalus atriceps*	-	-	P3	Eucalyptus woodlands and granite outcrops.	Possibly occurs, however as the area of impact is small and there are large expanses of similar habitat in surrounding areas potential impacts are anticipated to be non-existent/negligible
Central Long-eared Bat *Nyctophilus major tor*	-	-	P4	Appears to prefer heavy eucalypt woodlands and tall woodlands with a tall shrub understorey. Less common in open woodlands.	Possibly occurs while foraging though no nearby records. No suitable refuge habitat. Large expanses of similar habitat in surrounding areas No impact on this species conservation status will occur.

4.2 Field Assessment

4.2.1 Vegetation Types

Four vegetation types were identified within the survey area. These vegetation types were identified within three landform types and comprised of three major vegetation groups according to the NVIS, Major Vegetation Group (MVG) definition (Table 4-4). These vegetation types were represented by a total of 30 Families, 75 Genera and 179 Taxa as listed in Appendix 3. A map showing the vegetation types present in the survey area is provided in Figure 4-1.

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

Major Vegetation Group	Vegetation Type	Vegetation Code	Extent within survey area	Image
Eucalypt Woodland (MVG 5)	Low woodland of *Eucalyptus salmonophloia* over low open heathland of *Melaleuca adnata, M. calyptroides, M. eleuterostachya* on clay-loam plain	CLP-EW1	8 ha (2.0%)	
Mallee Woodland and Shrubland (MVG 14)	Open mallee shrubland of *Eucalyptus tenera/ E. pileata* over low heathland of *Melaleuca adnata, M. calyptroides, M. lateriflora* and low open shrubland of *Acacia deficiens/ A. intricata* on sand-loam plain	SLP-MWS1	136 ha (35.5%)	

Major Vegetation Group	Vegetation Type	Vegetation Code	Extent within survey area	Image
Heathland (MVG 18)	Mid heathland of *Allocasuarina campestris/ Allocasuarina corniculata, Acacia eremophila/ Acacia fragilis* and *Melaleuca cordata/ Melaleuca hamata* on sandplain	SP-H1	135 ha (35.3%)	
Heathland (MVG 18)	Low heathland of *Banksia sessilis/ Hakea platysperma* and *Verticordia chrysantha, Verticordia roei* and *Grevillea incrassata* on sandplain	SP-H2	69 ha (18.1%)	
N/A	Cleared Vegetation (excluding exploration)	CV	35 ha (9.1%)	No image available
Total			**383 ha**	

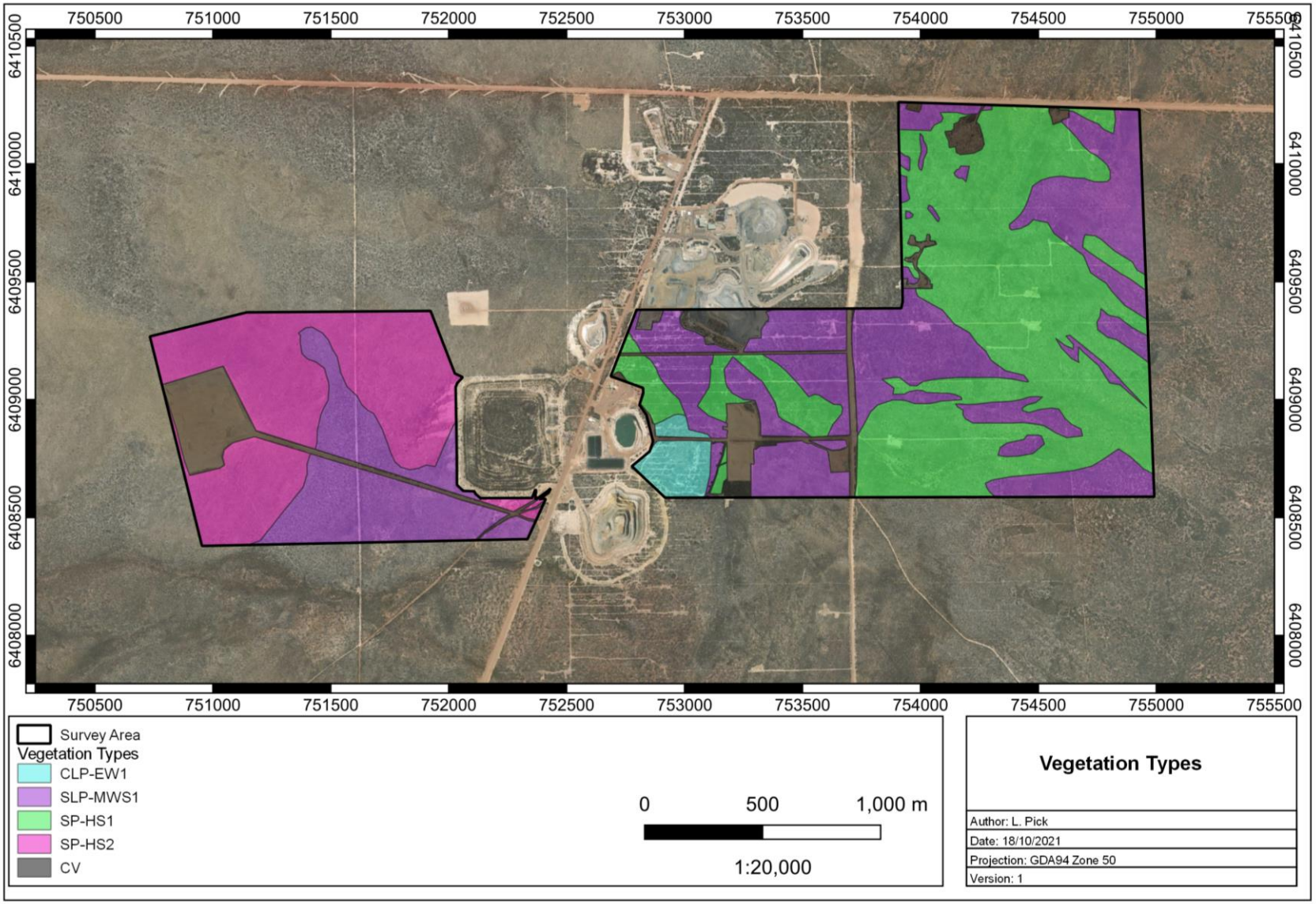


Figure 4-1: Vegetation types within the survey area

4.2.2 Vegetation Condition

Based on the vegetation condition rating scale adapted from Keighery, 1994 and Trudgen, 1988 (Appendix 4), vegetation was rated as 'Very Good' (Figure 4-2). 'Very Good' condition depicts vegetation structure altered by obvious signs of disturbance, for example by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing. Disturbance within the survey area was a result of existing mining infrastructure and exploration gridlines.

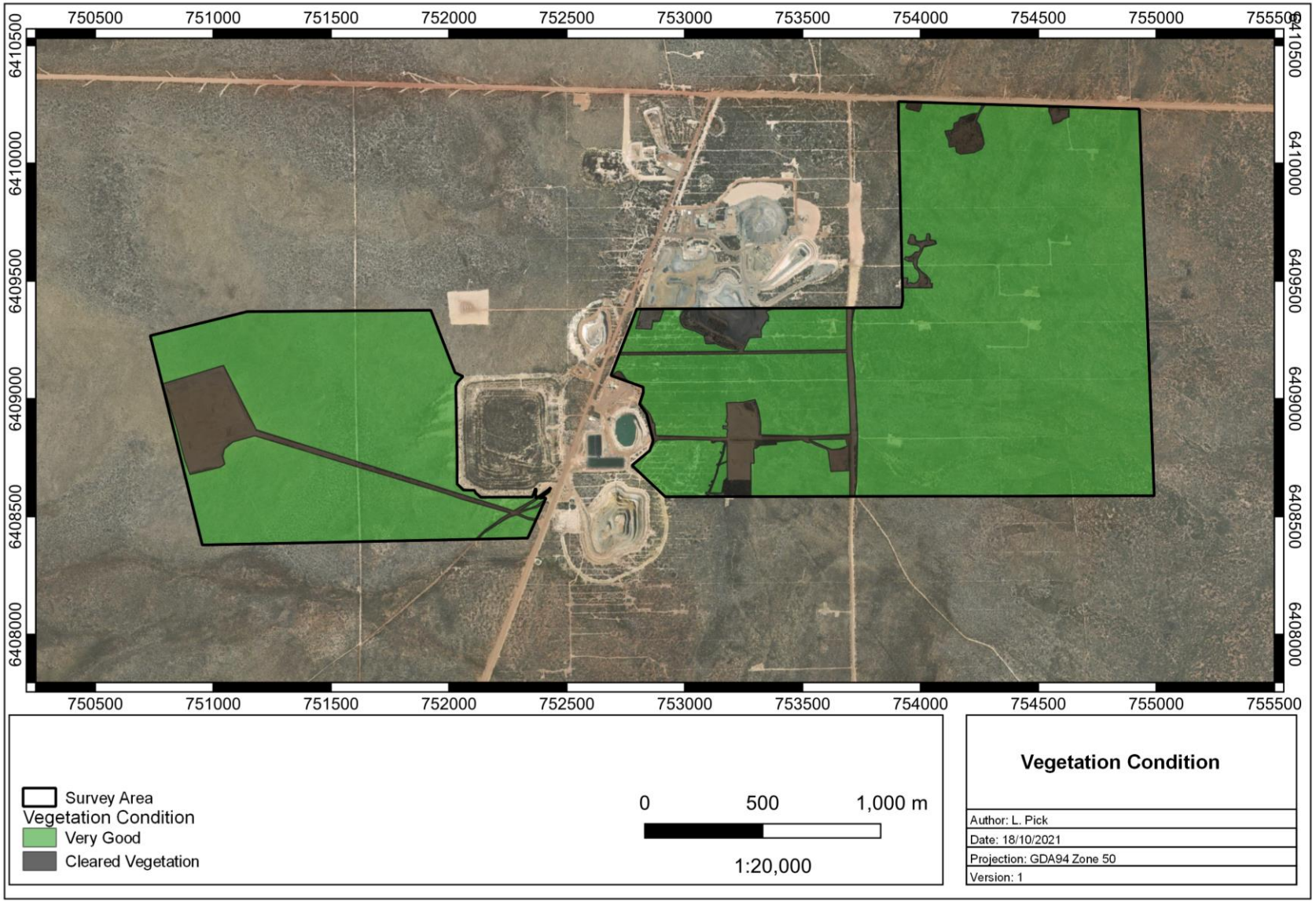
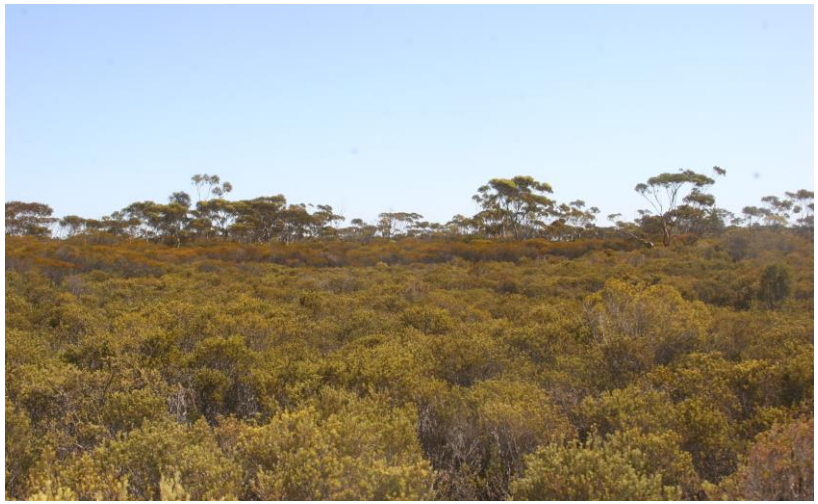


Figure 4-2: Vegetation condition within the survey area

4.2.3 Fauna Habitat

The broad scale terrestrial fauna habitats within the survey area presented below are based on vegetation and associated landforms identified during the flora and vegetation assessment. The extent of the identified fauna habitats and a summary description of each are provided in Table 4-5 below.

Table 4-5: Main Terrestrial Fauna Habitats within the survey area

Fauna Habitat	Description	Representative Fauna Attributes	Example Image
<u>Clay-Loam Plain</u> Eucalypt Woodland approximate area = 8 ha; 2.0%	Clay-loam plain comprising Salmon Gum woodland over *Melaleuca* spp. and mixed low shrubs.	• Range of vegetation strata suitable to a variety of passerine and nonpasserine birds. • Moderate to high leaf litter due to the presence of mature Eucalypt trees. • Relatively dense shrubs providing cover for small fauna. • Ground not especially suited to burrowing species	
<u>Sand-Loam Plain</u> Heathland/ Mallee Shrubland approximate area = 341 ha; 88.8%	Sand-loam plain comprising of dense Acacia/ Allocasuarina/ Banksia/ Melaleuca heathland and mallee shrubland over mixed low shrubs.	• Substrate very well suited to a variety of burrowing small mammals and reptiles. • Less diverse vegetation strata supporting a less diverse avifauna assemblage.	

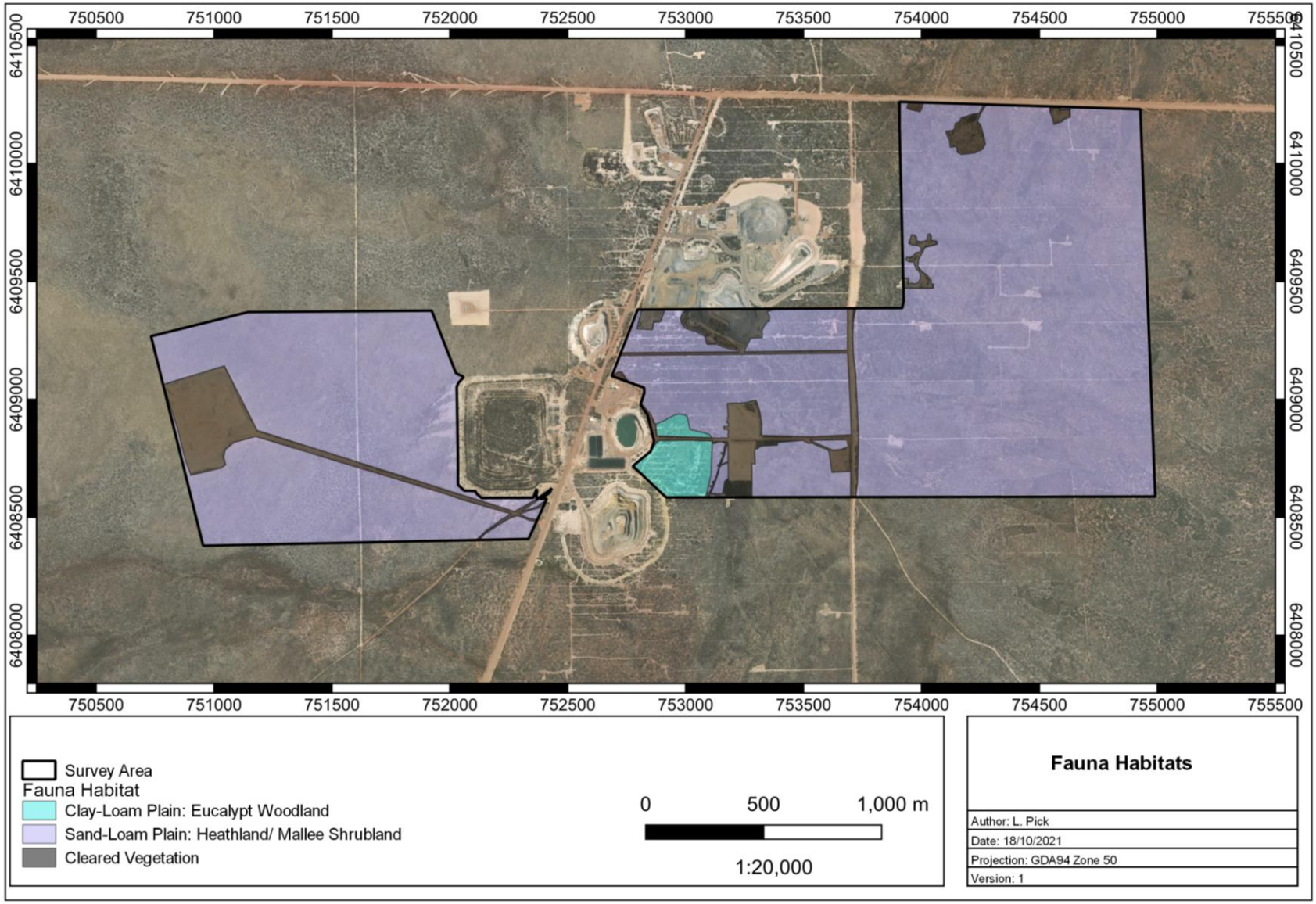


Figure 4-3: Main Terrestrial Fauna Habitats within the survey area

Based on the habitats present within the survey area, a list of expected vertebrate fauna species likely to occur in the survey area was compiled from information obtained during the literature review and is presented in Appendix 6. The results of some previous fauna surveys carried out in the general area are also summarised in this species listing as are the DBCA NatureMap database search results.

Not all species listed in existing databases and publications as potentially occurring within the region (i.e. *EPBC Act* Threatened Fauna and Migratory species lists, DBCA NatureMap Fauna Database and various publications) are considered likely to be present within the survey area. The list of potential fauna takes into consideration that firstly the species in question is not known to be locally/regionally extinct and secondly that suitable habitat for each species, as identified during the habitat assessment, is present within the survey area, though compiling an accurate list has limitations (see **Section 3.3 Survey limitations and constraints**).

Table 4-6 summarises the numbers of potential species based on vertebrate class considered likely to be present in the general vicinity of the survey area based on the complete list held Appendix 6. This list has been developed based on the complete list provided in Appendix 6 and using a precautionary approach adopted for the assessment. At any one time, only a subset of the listed potential species is likely to be present within the bounds of the survey area.

Table 4-6: Summary of Potential Vertebrate Fauna Species

Group	Total number of potential species	Potential number of specially protected species	Potential number of migratory species	Potential number of priority species
Amphibians	12	0	0	0
Reptiles	65	0	0	1
Birds	121	3	0	1
Non-Volant Mammals	23[6]	1	0	1
Volant Mammals (Bats)	9	0	0	1
Total	**230[6]**	**4**	**0**	**4**

Superscript = number of introduced species included in the total. Note: Where a species state and federal conservation status is different, the highest category is used.

4.2.4 Introduced Species

No introduced flora or fauna species were recorded during the survey.

4.2.5 Significant Flora

According to the EPA *Environmental Factor Guideline for Flora and Vegetation* (EPA, 2016a) 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 were identified within the survey area. Three Priority flora taxa were identified within the survey area, each of which have been previously recorded by Botanica (2013) and Astron (2014); *Eutaxia hirsuta* (P2), *Microcorys* sp. Forrestania (V. English 2004) (P4) and *Rinzia triplex* (P3). Two additional Priority Flora are listed on the DBCA database as occurring within the survey area; *Rinzia torquata* (P3) and *Verticordia gracilis* (P3) however to date neither record has been able to be confirmed. These records were obtained during previous flora surveys conducted by Frost O'Connor and Associates in 2004/ 2005 and have not been identified despite numerous searches. GPS coordinates of taxa recorded within the survey area is provided in Table 4-7 and shown in Figure 4-4.

No other significant flora (as described above) was identified within the survey area. A map showing regional Threatened and Priority Flora records in relation to the survey area is provided in Appendix 2.

Table 4-7: Significant Flora recorded within the survey area

Taxon	Coordinates	Image
Eutaxia hirsuta (P2)	50H 751662 6409206[3] 50H 751274 6408561 50H 751276 6408603 50H 751276 6408606 50H 751277 6408606 50H 751277 6408605 50H 751279 6408604 50H 751281 6408623 50H 751425 6408949	
Microcorys sp. Forrestania (V. English 2004) (P4)	50H 754547 6410246[2] 50H 754796 6409814[2]	

Taxon	Coordinates	Image
Rinzia triplex (P3)	50H 753722 6409262[1,2]	

[1] DBCA record (2018a); [2] Botanica record (2013); [3] Astron record (2014)

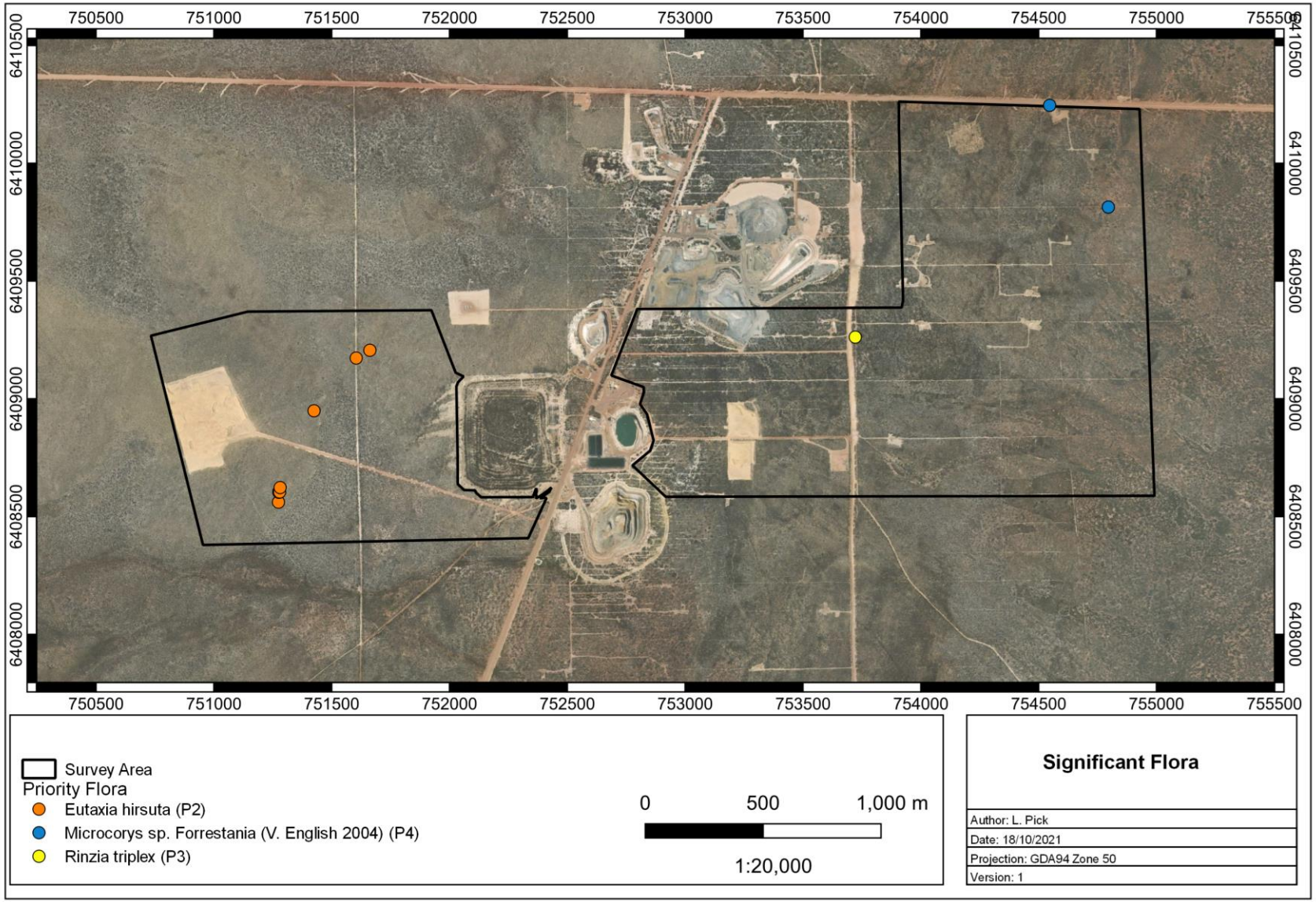


Figure 4-4: Significant flora recorded within the survey area

4.2.6 Significant Vegetation

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

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

The survey area is located adjacent to the spatially mapped 500m buffer of the *Ironcap Hills Vegetation Complexes* (North Ironcap) obtained from the DBCA communities database. This Priority Ecological Community is managed by the DBCA as a Priority 3 Ecological Community. This vegetation community was first described by Newbey and Hnatiuk (1988) during the biological survey of the Lake Johnston-Hyden area as a BIF complex and was considered one of seven unique vegetation communities to the Lake Johnston-Hyden area. The description of the North Ironcap BIF complex is provided below:

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

No banded ironstone was identified within the survey area and the vegetation complex described above was not represented within the survey area.

According to the DPIRD (2018) Vegetation Association GIS file, the BIF complex within the Greater North Ironcap area is classified by pre-European vegetation association Forrestania 1413; Shrublands; *Acacia, Casuarina & Melaleuca* thicket which is represented in both the Southern Cross and Western Mallee subregion. This vegetation association does not occur within the survey area (see **Section 2.3**).

No other significant vegetation (as described above) was identified within the survey area. A map showing the total extent of Priority Ecological Communities in relation to the survey area is provided in Appendix 2.

4.2.7 Significant Fauna

According to the EPA *Environmental Factor Guideline for Terrestrial Fauna* (EPA, 2016d) 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 significant fauna were observed during the survey. The current status of some species on site and/or in the general area is difficult to determine, however, based on the habitats present and, in some cases, direct observations or recent nearby records, the following species of conservation significance can be regarded as possibly utilising the survey area for some purpose at times, these being:

- **Lake Cronin Snake *Paroplocephalus atriceps* - P4 (DBCA Priority Species)**
  Status of this species in the survey area is difficult to determine but it has been listed as potentially present as the survey area falls within/near the species documented range. The species does however appear to be very uncommon given the paucity of documented records in the immediate vicinity. Given the small size of the survey area and the presence of large expanses of similar habitat in surrounding areas, potential impacts are anticipated to be non-existent/negligible.

- **Carnaby's Black-Cockatoo *Calyptorhynchus latirostris* - Endangered (EPBC Act and BC Act)**
  Listed as a potential species as it has infrequently been recorded in the general area. Expected to only occur very occasionally in small transient groups. The survey area contains no potential breeding habitat for this species. No impact on this species conservation status is anticipated.

- **Western Rosella (inland ssp) *Platycercus icterotis* subsp*. xanthogenys* - P4 (DBCA Priority Species)**
  Listed as a potential species as it has infrequently been recorded in the general area. Expected to only occur very occasionally in small transient groups. The survey area contains no potential breeding habitat for this species. No impact on this species conservation status is anticipated.

- **Malleefowl *Leipoa ocellata* – Vulnerable (EPBC Act and BC Act)**
  Listed as a potential species as it has previously been recorded in the general area. No evidence of recent malleefowl activity (active mounds, tracks, feathers or bird observations etc.) was however observed within the survey area and therefore it is expected only to occur occasionally as transient individuals. No impact on this species conservation status is anticipated.

- **Peregrine Falcon *Falco peregrinus* – Other Specially Protected (BC Act)**
  This species potentially utilises some sections of the survey area as part of a much larger home range, though records in this area are uncommon. It would not breed within the survey area. No impact on this species conservation status will occur.

- **Western Brush Wallaby *Notamacropus irma* - P4 (DBCA Priority Species**
  Listed as a potential species as it has infrequently been recorded in the general area. Expected to only occur very occasionally as individuals/pairs if at all. Given the small size of the survey area and the presence of large expanses of similar habitat in surrounding areas, potential impacts anticipated to be non-existent/negligible.

- **Chuditch *Dasyurus geoffroii* - Vulnerable (EPBC Act and BC Act)**
  Listed as a potential species as it has previously been recorded in the general area. Possibly occurs as occasional transient individuals only. Given the small size of the survey area and the presence of large expanses of similar habitat in surrounding areas, potential impacts anticipated to be non-existent/negligible.

- **Central Long-eared Bat *Nyctophilus major tor* – P4 (DBCA Priority Species)**
  Listed as a potential species as the survey area falls within the species documented range. The species does however appear to be uncommon in the general area given the lack of documented records in the immediate vicinity. The survey area represents potential foraging habitat but lacks refuge habitat (hollow bearing trees). No impact on this species conservation status is anticipated.

It should be noted that while habitats onsite for one or more of the species listed above are considered possibly suitable, some or all may be marginal in extent/quality and therefore the fauna species considered as possibly occurring may in fact only visit the area for short periods as infrequent vagrants.

A number of other species of conservation significance, while possibly present in the general area and/or the local region are not listed as potential species due to the survey area being outside of their currently recognised range, a lack of suitable habitat or known/very likely local or regional extinction (and no subsequent recruitment from adjoining areas).

4.3 Matters of National Environmental Significance

4.3.1 *Environment Protection and Biodiversity Conservation Act 1999*

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

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

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

4.4 Relevant State Legislation

4.4.1 Environmental Protection Act WA 1986

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

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

No evidence of the survey area containing any TEC or Threatened Flora or Fauna was identified during the survey. Approximately 375 ha of the survey area is located within an ESA

which encompasses an approximate 10km radius of Lake Cronin as listed under the *Environmental Protection Act 1986* (EP Act).

4.4.2 Biodiversity Conservation Act 2016

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

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

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

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

4.4.3 Conservation Reserves

The survey area is not located within a vested Conservation Reserve. The closest vested Conservation Reserve is the Lake Cronin Nature Reserve, located approximately 4.5km north-east of the survey area which is managed by DBCA as a Class A Reserve.

According to the EPA (2009) *Advice on Conservation Values and Review of Nature Reserve Proposals in the Lake Cronin Region*, the survey area occurs within a 56,750ha area within the mineralised greenstone belt in the Lake Cronin Region which is proposed to be managed under Section 33(2) of the *Conservation and Land Management Act 1984* (CALM Act) but not formally reserved. A map showing conservation areas in relation to the survey area is provided in Appendix 2.

4.5 Native Vegetation Clearing Principles

Based on the outcomes from the survey undertaken, as presented in this report, Botanica provides the following comments regarding the native vegetation clearing principles listed under Schedule 5 of the EP Act (Table 4-8).

Table 4-8: Assessment of development within the survey area 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.	Woodlands of the Southern Cross subregion have a very high diversity of Eucalypts with as many as 170 species occurring within the subregion. The subregion also has a high diversity of Acacia species however most species (excluding Threatened and Priority Flora species) are wide ranging and usually occur in at least one, and often several, adjoining subregions (Cowan, 2001). With the exception of granite outcrops vegetation of the Western Mallee subregion is not considered to comprise of a high level of biodiversity however it does contain a high number of endemic species (Beecham & Danks, 2001). 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 to this principle
(b)	comprises the whole or part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to WA.	No significant fauna were observed within the survey area. No evidence of Malleefowl activity was identified during the targeted survey. The survey area comprises of broad fauna habitats that are typical of those in the wider region. No unique fauna habitats (caves, rocky outcrops/ pools etc.) occur within the survey area. No water bodies (both perennial/ non-perennial) occur within the survey area.	Clearing is unlikely to be at variance to 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 to 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 to this principle
(e)	is significant as a remnant of native vegetation in an area that has been extensively cleared	The survey area occurs within the pre-European Beard vegetation association Forrestania 511 of the Southern Cross subregion and Forrestania 2048 Western Mallee subregion which retain >97% of their original pre-European vegetation extent.	Clearing is unlikely to be at variance to this principle
(f)	is growing, in, or in association with, an environment associated with a watercourse or wetland	There are no inland waters (lakes/ playas) or any perennial/ ephemeral drainage lines within the survey area.	Clearing is unlikely to be at variance to 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 occurs within the pre-European Beard vegetation association Forrestania 511 of the Southern Cross subregion and Forrestania 2048 Western Mallee subregion which retain >97% of their original pre-European vegetation extent. Clearing within these vegetation associations	Clearing is unlikely to be at variance to this principle

Letter	Principle Native vegetation should not be cleared if it:	Assessment	Outcome
		is not likely to lead to land degradation issues such as salinity, water logging or acidic soils.	
(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 survey area is not located within a gazetted conservation area. According to the EPA (2009) Advice on Conservation Values and Review of Nature Reserve Proposals in the Lake Cronin Region, the survey area occurs within a 56,750ha area within the mineralised greenstone belt in the Lake Cronin Region which is proposed to be managed under Section 33(2) of the CALM Act 1984 but not formally reserved. Given the small size of the survey area (54 ha) in relation to this proposed management area (56,750ha) significant impact to this land is unlikely.	Clearing is unlikely to be at variance to this principle
(i)	Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.	There are no inland waters (lakes/ playas) or any perennial/ ephemeral drainage lines within the survey area. Most rainfall is lost by evaporation or surface runoff. Only a small portion infiltrates the soil and recharges the groundwater.	Clearing is unlikely to be at variance to this principle
(j)	Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence of flooding	Rainfall is highly variable with an average annual rainfall of 339.6 mm and an evaporation rate of 2000 mm. The region is not prone to flooding and does not contain riparian vegetation.	Clearing is unlikely to be at variance to this principle

5 Recommendations

- Clearing Permit approval under the EP Act is required prior to any clearing within the survey area as the survey area is located within an ESA listed under the EP Act.
- Disturbance to Priority Flora taxa should be avoided where possible, including maintaining a 10m exclusion zone surrounding Priority Flora. Should avoidance not be possible, consultation with the DBCA Species and Communities Program is recommended prior to clearing of Priority Flora.

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Appendix 1: Conservation Ratings BC Act and EPBC Act

Definitions of Conservation Significant Species

Code	Category
State categories of threatened and priority species	
Threatened Species (T) Listed by order of the Minister as Threatened in the category of critically endangered, endangered or vulnerable under section 19(1), or is a rediscovered species to be regarded as threatened species under section 26(2) of the Biodiversity Conservation Act 2016 (BC Act).	
CR	**Critically Endangered** Threatened species considered to be "facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines". Listed as critically endangered under section 19(1)(a) of the BC Act in accordance with the criteria set out in section 20 and the ministerial guidelines. Published under schedule 1 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for critically endangered fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for critically endangered flora.
EN	**Endangered** Threatened species considered to be "facing a very high risk of extinction in the wild in the near future, as determined in accordance with criteria set out in the ministerial guidelines". Listed as endangered under section 19(1)(b) of the BC Act in accordance with the criteria set out in section 21 and the ministerial guidelines. Published under schedule 2 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for endangered fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for endangered flora.
VU	**Vulnerable** Threatened species considered to be "facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines". Listed as vulnerable under section 19(1)(c) of the BC Act in accordance with the criteria set out in section 22 and the ministerial guidelines. Published under schedule 3 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for vulnerable fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for vulnerable flora.
Extinct species Listed by order of the Minister as extinct under section 23(1) of the BC Act as extinct or extinct in the wild.	
EX	**Extinct** Species where "*there is no reasonable doubt that the last member of the species has died*", and listing is otherwise in accordance with the ministerial guidelines (section 24 of the BC Act). Published as presumed extinct under schedule 4 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for extinct fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for extinct flora.
EW	**Extinct in the Wild** Species that *"is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form*", and listing is otherwise in accordance with the ministerial guidelines (section 25 of the BC Act). Currently there are no threatened fauna or threatened flora species listed as extinct in the wild. If listing of a species as extinct in the wild occurs, then a schedule will be added to the applicable notice.
Specially protected species Listed by order of the Minister as specially protected under section 13(1) of the BC Act. Meeting one or more of the following categories: species of special conservation interest; migratory species; cetaceans; species subject to international agreement; or species otherwise in need of special protection. Species that are listed as threatened species (critically endangered, endangered or vulnerable) or extinct species under the BC Act cannot also be listed as Specially Protected species.	
IA	**International Agreement/ Migratory** Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth; and listing is otherwise in accordance with the ministerial guidelines (section 15 of the BC Act). Includes birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and fauna subject to the *Convention on the Conservation of Migratory Species of Wild Animals* (Bonn Convention), an environmental treaty under the United Nations Environment Program. Migratory species listed under the BC Act are a subset of the migratory animals, that are known to visit Western Australia, protected under the international agreements or treaties, excluding species that are listed as Threatened species. Published as migratory birds protected under an international agreement under schedule 5 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

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

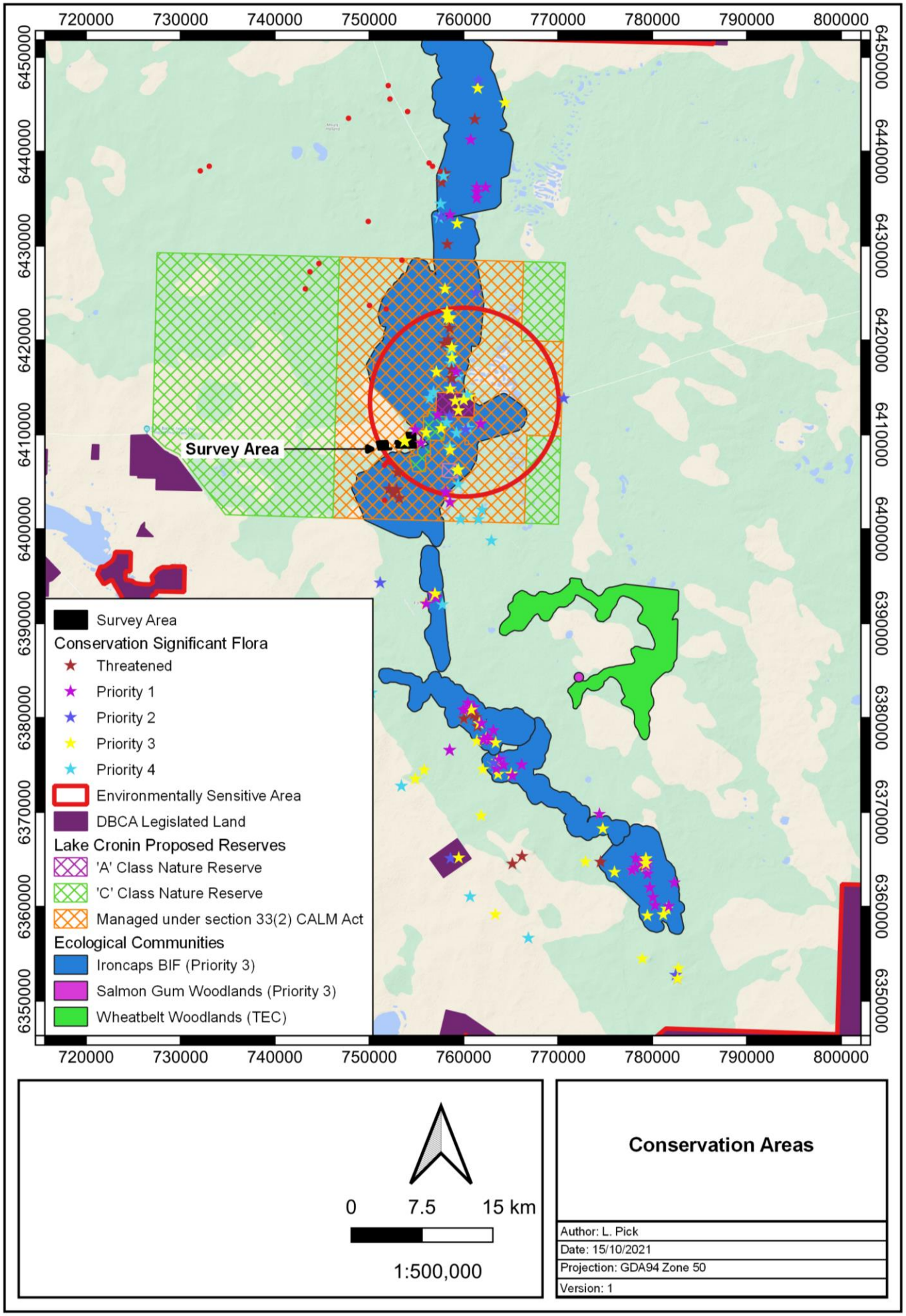
Code	Category
VU	**Vulnerable** Taxa which are not critically endangered or endangered and is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
CD	**Conservation Dependent** Taxa which are the focus of a specific conservation program the cessation of which would result in the species becoming vulnerable, endangered or critically endangered; or (b) the following subparagraphs are satisfied: (i) the species is a species of fish; (ii) the species is the focus of a plan of management that provides for actions necessary to stop the decline of, and support the recovery of, the species so that its chances of long term survival in nature are maximised; (iii) the plan of management is in force under a law of the Commonwealth or of a State or Territory; (iv) cessation of the plan of management would adversely affect the conservation status of the species.

Definitions of Conservation Significant Communities

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

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

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



Appendix 3: List of species identified within each vegetation type

Red text-Priority species (WAHERB, 2021)

Family	Genus	Taxon	CLP-EW1	SLP-MWS1	SP-H1	SP-H2
Apiaceae	*Platysace*	*deflexa*			*	
Apiaceae	*Platysace*	*maxwellii*		*		
Asparagaceae	*Lomandra*	*effusa*			*	
Asparagaceae	*Lomandra*	*mucronata*	*		*	
Asteraceae	*Olearia*	*dampieri* subsp. *eremicola*			*	
Asteraceae	*Olearia*	*lanuginosa*		*		
Asteraceae	*Olearia*	*muelleri*			*	
Boraginaceae	*Halgania*	*andromedifolia*			*	
Boraginaceae	*Halgania*	*lavandulacea*	*			
Boryaceae	*Borya*	*constricta*			*	
Casuarinaceae	*Allocasuarina*	*acutivalvis*	*	*	*	
Casuarinaceae	*Allocasuarina*	*campestris*			*	
Casuarinaceae	*Allocasuarina*	*corniculata*			*	*
Casuarinaceae	*Allocasuarina*	*decussata*	*	*	*	
Casuarinaceae	*Allocasuarina*	*humilis*			*	
Casuarinaceae	*Allocasuarina*	*microstachya*				*
Celastraceae	*Psammomoya*	*choretroides*			*	
Chenopodiaceae	*Atriplex*	*vesicaria*	*			
Chenopodiaceae	*Chenopodium*	*curvispicatum*	*			
Chenopodiaceae	*Maireana*	*pyramidata*			*	
Chenopodiaceae	*Rhagodia*	*preissii* subsp. *preissii*			*	
Chenopodiaceae	*Sclerolaena*	*diacantha*	*			
Chenopodiaceae	*Sclerolaena*	*uniflora*	*			
Convolvulaceae	*Wilsonia*	*humilis*		*		
Cupressaceae	*Callitris*	*canescens*		*		
Cupressaceae	*Callitris*	*preissii*	*	*	*	*
Cyperaceae	*Gahnia*	*ancistrophylla*		*	*	
Cyperaceae	*Lepidosperma*	*drummondii*	*	*	*	
Cyperaceae	*Lepidosperma*	sanguinolentum				
Cyperaceae	*Schoenus*	*brevisetis*				
Dasypogonaceae	*Calectasia*	*valida*	*			
Dilleniaceae	*Hibbertia*	*ancistrophylla*			*	
Dilleniaceae	*Hibbertia*	*gracilipes*			*	*
Ericaceae	*Leucopogon*	sp. Coujinup (Burgman 1085)			*	
Ericaceae	*Leucopogon*	sp. Wheatbelt (S. Murray 257)	*			
Ericaceae	*Lysinema*	*ciliatum*	*		*	*
Ericaceae	*Styphelia*	*epacridis*			*	
Ericaceae	*Styphelia*	*serratifolia*	*		*	
Ericaceae	*Styphelia*	*conostephioides*	*			
Ericaceae	*Styphelia*	*dielsianus*			*	
Ericaceae	*Styphelia*	*lissanthoides*			*	
Euphorbiaceae	*Bertya*	*dimerostigma*			*	
Fabaceae	*Acacia*	*assimilis* subsp. *atroviridis*	*			
Fabaceae	*Acacia*	*binata*		*		
Fabaceae	*Acacia*	*brachyclada*			*	
Fabaceae	*Acacia*	*deficiens*		*	*	
Fabaceae	*Acacia*	*densiflora*			*	
Fabaceae	*Acacia*	*eremophila* var. *eremophila*			*	

Family	Genus	Taxon	CLP-EW1	SLP-MWS1	SP-H1	SP-H2
Fabaceae	*Acacia*	*erinacea*	*	*	*	
Fabaceae	*Acacia*	*fragilis*		*	*	
Fabaceae	*Acacia*	*hemiteles*		*	*	
Fabaceae	*Acacia*	*heteroneura* var. *jutsonii*			*	
Fabaceae	*Acacia*	*intricata*		*		
Fabaceae	*Acacia*	*leptopetala*		*	*	
Fabaceae	*Acacia*	*neurophylla* subsp. *erugata*			*	
Fabaceae	*Acacia*	*sulcata* var. *platyphylla*		*		
Fabaceae	*Aotus*	sp. Tortile (G.J. Keighery 3767)		*		
Fabaceae	*Aotus*	*tietkensii*		*		
Fabaceae	*Chorizema*	*aciculare* subsp. *aciculare*				*
Fabaceae	*Daviesia*	*benthamii*	*	*	*	
Fabaceae	*Daviesia*	*brachyphylla*	*			
Fabaceae	*Daviesia*	*lancifolia*	*		*	
Fabaceae	*Daviesia*	*nematophylla*			*	
Fabaceae	*Daviesia*	*pachyloma*			*	
Fabaceae	*Dillwynia*	*divaricata*		*		
Fabaceae	*Dillwynia*	*uncinata*			*	
Fabaceae	*Eutaxia*	*hirsuta* (P2)				*
Fabaceae	*Gastrolobium*	*melanocarpum*			*	
Fabaceae	*Gastrolobium*	*spinosum*	*		*	
Fabaceae	*Gastrolobium*	*trilobum*			*	*
Fabaceae	*Gompholobium*	*gompholobioides*	*			
Fabaceae	*Jacksonia*	*nematoclada*		*		
Fabaceae	*Senna*	*artemisioides* subsp. *filifolia*			*	
Fabaceae	*Templetonia*	*egena*			*	
Fabaceae	*Templetonia*	*sulcata*	*			
Goodeniaceae	*Coopernookia*	*strophiolata*		*	*	
Goodeniaceae	*Dampiera*	*angulata*			*	
Goodeniaceae	*Dampiera*	*eriocephala*			*	
Goodeniaceae	*Goodenia*	*pinifolia*	*		*	
Goodeniaceae	*Scaevola*	*spinescens*	*			
Haloragaceae	*Glischrocaryon*	*roei*	*			
Hemerocallidaceae	*Dianella*	*revoluta*			*	
Lamiaceae	*Dasymalla*	*terminalis*		*		
Lamiaceae	*Hemiphora*	*lanata*		*		
Lamiaceae	*Microcorys*	sp. Forrestania (V. English 2004) (P4)		*	*	
Lamiaceae	*Westringia*	*cephalantha*		*	*	
Lamiaceae	*Westringia*	*rigida*		*		
Lauraceae	*Cassytha*	*glabella*			*	
Lauraceae	*Cassytha*	*melantha*		*	*	
Myrtaceae	*Balaustion*	*pulcherrimum*	*		*	
Myrtaceae	*Beaufortia*	*interstans*	*		*	
Myrtaceae	*Beaufortia*	*schaueri*	*		*	
Myrtaceae	*Calytrix*	*breviseta* subsp. *stipulosa*			*	
Myrtaceae	*Calytrix*	*duplistipulata*			*	
Myrtaceae	*Calytrix*	*violacea*			*	
Myrtaceae	*Cyathostemon*	*ambiguus*		*	*	
Myrtaceae	*Cyathostemon*	*tenuifolius*			*	
Myrtaceae	*Darwinia*	*inconspicua*	*	*	*	*
Myrtaceae	*Eucalyptus*	*calycogona*		*		

Family	Genus	Taxon	CLP-EW1	SLP-MWS1	SP-H1	SP-H2
Myrtaceae	*Eucalyptus*	*celastroides* subsp. *celastroides*	*			
Myrtaceae	*Eucalyptus*	*cylindriflora*		*		
Myrtaceae	*Eucalyptus*	*cylindrocarpa*			*	
Myrtaceae	*Eucalyptus*	*horistes*	*			*
Myrtaceae	*Eucalyptus*	*pileata*		*	*	
Myrtaceae	*Eucalyptus*	*platycorys*	*		*	
Myrtaceae	*Eucalyptus*	*polita*			*	
Myrtaceae	*Eucalyptus*	*rigidula*			*	*
Myrtaceae	*Eucalyptus*	*salmonophloia*		*		
Myrtaceae	*Eucalyptus*	*tenera*		*	*	*
Myrtaceae	*Eucalyptus*	*transcontinentalis*		*		
Myrtaceae	*Leptospermum*	*erubescens*	*	*	*	
Myrtaceae	*Leptospermum*	*roei*			*	*
Myrtaceae	*Leptospermum*	*spinescens*			*	
Myrtaceae	*Melaleuca*	*acuminata*		*		
Myrtaceae	*Melaleuca*	*adnata*		*	*	
Myrtaceae	*Melaleuca*	*calyptroides*	*	*	*	
Myrtaceae	*Melaleuca*	*cordata*	*	*	*	
Myrtaceae	*Melaleuca*	*cucullata*		*	*	
Myrtaceae	*Melaleuca*	*eleuterostachya*		*		
Myrtaceae	*Melaleuca*	*elliptica*		*	*	
Myrtaceae	*Melaleuca*	*hamata*	*	*	*	
Myrtaceae	*Melaleuca*	*lateriflora*		*		
Myrtaceae	*Melaleuca*	*laxiflora*			*	
Myrtaceae	*Melaleuca*	*pauperiflora* subsp. *fastigiata*	*			
Myrtaceae	*Melaleuca*	*pauperiflora* subsp. *pauperiflora*		*		
Myrtaceae	*Melaleuca*	*radula*		*		
Myrtaceae	*Melaleuca*	*teuthidoides*		*		
Myrtaceae	*Melaleuca*	*thyoides*		*		
Myrtaceae	*Melaleuca*	*uncinata*		*	*	
Myrtaceae	*Micromyrtus*	*obovata*			*	
Myrtaceae	*Rinzia*	*triplex* (P3)		*		
Myrtaceae	*Thryptomene*	*kochii*		*	*	
Myrtaceae	*Verticordia*	*chrysantha*		*	*	*
Myrtaceae	*Verticordia*	*roei*			*	*
Olacaceae	*Olax*	*benthamiana*			*	
Pittosporaceae	*Marianthus*	*bicolor*		*		
Proteaceae	*Banksia*	*cirsioides*	*		*	*
Proteaceae	*Banksia*	*elderiana*		*		*
Proteaceae	*Banksia*	*erythrocephala*		*	*	*
Proteaceae	*Banksia*	*laevigata* subsp. *laevigata*			*	*
Proteaceae	*Banksia*	*sessilis*			*	*
Proteaceae	*Grevillea*	*acuaria*	*			
Proteaceae	*Grevillea*	*cagiana*	*		*	*
Proteaceae	*Grevillea*	*eriostachya*		*	*	
Proteaceae	*Grevillea*	*eryngioides*		*		*
Proteaceae	*Grevillea*	*huegelii*		*		
Proteaceae	*Grevillea*	*incrassata*				*
Proteaceae	*Grevillea*	*obliquistigma*		*		
Proteaceae	*Grevillea*	*oncogyne*	*			
Proteaceae	*Grevillea*	*pterosperma*		*		

Family	Genus	Taxon	CLP-EW1	SLP-MWS1	SP-H1	SP-H2
Proteaceae	*Grevillea*	*shuttleworthiana* subsp. *obovata*	*			*
Proteaceae	*Hakea*	*corymbosa*	*			*
Proteaceae	*Hakea*	*cygna* subsp. *cygna*			*	
Proteaceae	*Hakea*	*incrassata*	*			
Proteaceae	*Hakea*	*multilineata*		*	*	
Proteaceae	*Hakea*	*newbeyana*			*	
Proteaceae	*Hakea*	*platysperma*				*
Proteaceae	*Hakea*	*scoparia*	*	*	*	*
Proteaceae	*Isopogon*	*scabriusculus*				*
Proteaceae	*Persoonia*	*coriacea*		*	*	
Proteaceae	*Persoonia*	*helix*	*	*	*	
Proteaceae	*Petrophile*	*circinata*				*
Proteaceae	*Petrophile*	*stricta*			*	
Proteaceae	*Petrophile*	*teretifolia*			*	
Rutaceae	*Boronia*	*inornata*		*		
Rutaceae	*Drummondita*	*hassellii*			*	
Rutaceae	*Microcybe*	*albiflora*			*	
Rutaceae	*Microcybe*	*ambigua*			*	
Rutaceae	*Microcybe*	*multiflora*	*			
Rutaceae	*Phebalium*	*filifolium*	*			
Santalaceae	*Exocarpos*	*aphyllus*	*			
Santalaceae	*Exocarpos*	*sparteus*		*	*	*
Santalaceae	*Leptomeria*	*preissiana*			*	
Santalaceae	*Santalum*	*acuminatum*	*	*	*	*
Sapindaceae	*Dodonaea*	*bursariifolia*		*		
Scrophulariaceae	*Eremophila*	*densiflora*	*			
Scrophulariaceae	*Eremophila*	*dichroantha*		*		
Scrophulariaceae	*Eremophila*	*drummondii*		*	*	
Thymelaeaceae	*Pimelea*	*aeruginosa*			*	

Appendix 4: Vegetation Condition Rating

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

Appendix 5: Conservation Significant Flora within 40km of the survey area

Taxon	Conservation Code			Description (WAHERB, 2021)	Likelihood of Occurrence
	EPBC Act	BC Act	Priority Listing		
Acacia asepala			P2	Diffuse, much-branched shrub, 0.5-1.5 m high. Fl. yellow, Aug. Red-brown sandy loam. Undulating plains, along drainage lines.	Unlikely
Acacia kerryana			P2	Low, spreading, domed shrub, 0.3-1 m high. Fl. yellow, Oct to Dec or Jan to Feb. Granitic loamy sand, stony clayey loam or clayey sand. Low stony ridges, undulating plains.	Unlikely
Acacia lanuginophylla	EN	VU		Dense shrub, 0.5-1.2 m high. Fl. yellow, Jul to Oct. White/grey sand, clayey sand, gravelly soils. Flats, along drainage lines.	Unlikely
Acacia repanda			P3	Rounded to obconic, single-stemmed or much-branched shrub, 0.5-2 m high, bark 'minni-ritchi'. Fl. yellow, Jun to Aug. Loam, sandy or gravelly loam. Near granite outcrops.	Unlikely
Acacia sp. Mt Holland (B. Ellery BE 1147)			P1	No description available	Possible
Anticoryne melanosperma			P3	No description available	Possible
Austrostipa sp. Carlingup Road (S. Kern & R. Jasper LCH 18459)			P1	No description available	Possible
Austrostipa sp. Mt Holland (W.A. Thompson & J. Allen 948)			P1	No description available	Possible
Baeckea sp. Blue Haze Mine (P. Armstrong 06/910)			P1	No description available	Possible
Baeckea sp. Crossroads (B.L. Rye & M.E. Trudgen 241186)			P1	No description available	Possible
Baeckea sp. Forrestania (K.R. Newbey 1105)			P1	No description available	Possible
Baeckea sp. Hatter Hill (K.R. Newbey 3284)			P3	Narrow, open, upright shrub, to 1.3 m high. Fl. pink, Jun to Oct. Yellow-orange coarse sandy loam with laterite gravel, red-brown sandy loam with quartz pebbles. Undulating plains.	Possible
Baeckea sp. Koonadgin (B.L. Rye & M.E. Trudgen BLR 241137)			P3	No description available	Possible
Baeckea sp. Lake Cronin (K.R. Newbey 9191)			P1	Upright, spreading, moderately open shrub. Fl. white/pink, Oct. Well-drained gravelly sands. Moderately exposed, gently undulating plain.	Possible
Baeckea sp. North Ironcap (R.J. Cranfield 10580)			P1	Erect, open shrub, to 0.4 m high. Fl. white/pink, Oct. Red clay. Gently undulating sandplains.	Possible
Baeckea sp. Sheoaks Rocks (M.E. Trudgen MET5452)			P1	Open shrub, to 0.3 m high. Fl. white/pink, Nov. Yellow-brown silty sand. Mid-upper gentle slopes.	Unlikely
Banksia rufa subsp. *flavescens*			P3	Prostrate, ?lignotuberous shrub, to 0.45 m high. Fl. cream-yellow, Jul to Aug. Sandy loam or sand with gravel.	Possible
Banksia sphaerocarpa var. *dolichostyla*	VU	VU		Lignotuberous shrub, 1-3 m high. Fl. yellow-orange, Mar to May. Lateritic gravel, grey sand.	Unlikely
Banksia viscida			P3	Densely branched, non-lignotuberous shrub, 0.4-1 m high. Fl. yellow-orange, Jul to Oct. Gravelly soils. Lateritic rises.	Possible

Taxon	Conservation Code			Description (WAHERB, 2021)	Likelihood of Occurrence
	EPBC Act	BC Act	Priority Listing		
Boronia revoluta	EN	VU		Shrub, 0.4-0.8 m high. Fl. pink, Jul to Aug. Stony sandy loam or sand. Plains, hillsides & summits.	Unlikely
Boronia westringioides			P2	Erect shrub, 0.2-0.75 m high. Fl. pink, Jul to Sep. Loamy sand. Plains.	Possible
Brachyloma nguba			P1	Erect, compact to spreading, mid-dense shrub, to 0.8 m high, leaves discolorous, usually 2-3 mm long; style 0.2-0.25 mm long; disc truncate. Fl. red, Apr to May. White to brown sandy clay, shallow sandy loam. Open mallee woodland, mallee scrub, flat plains.	Possible
Brachyloma stenolobum			P1	No description available	Possible
Caladenia graniticola		EN		Tuberous, perennial, herb, to 0.21 m high, plant usually single flowered. Fl. green-yellow, Oct. Gritty sandy clay, granite. Near low exposed rock outcrops.	Unlikely
Caladenia hoffmanii	EN	EN		Tuberous, perennial, herb, 0.13-0.3 m high. Fl. green & yellow & red, Aug to Oct. Clay, loam, laterite, granite. Rocky outcrops and hillsides, ridges, swamps and gullies.	Unlikely
Calamphoreus inflatus			P4	Erect, spreading shrub, 0.4-1.6 m high, to 2 m wide. Fl. blue-purple/green, Oct to Dec or Feb to Mar. Clay loam with ironstone gravel. Flats, disturbed sites.	Possible
Calectasia pignattiana	VU	VU		Rhizomatous, prickly herb, to 0.5 m high. Fl. blue-purple, Aug to Oct. Sand to sandy clay over granite or laterite, gravel. Plains and gentle slopes.	Unlikely
Calytrix nematoclada			P3	Shrub, 0.15-0.5(-1) m high. Fl. purple-pink, Sep or Nov to Dec or Jan. Yellow or grey sand. Sandplains.	Possible
Chorizema circinale			P3	Prostrate, scrambling, wiry shrub, to 0.4 m high. Fl. yellow & orange & red, Sep to Dec. Yellow sand, sandy clay with gravel. Flats, margin of gravel pit.	Possible
Comesperma calcicola			P3	Soft perennial, herb, to 0.3 m high. Fl. pink, Oct to Dec or Jan. Calcareous or semi-saline clay loams, limestone. Areas around saline water.	Unlikely
Conospermum sigmoideum			P2	Erect shrub, 0.2-0.5 m high. Fl. blue, Aug to Sep. Yellow sand.	Unlikely
Cryptandra polyclada subsp. *polyclada*			P3	Mat-forming or upright shrub, 0.1-0.7 m high. Fl. white/cream, Jan to May or Aug or Oct. Sand. Sandplains.	Possible
Dampiera orchardii			P2	Erect perennial, herb, 0.2-0.4 m high. Sand.	Possible
Dampiera scaevolina			P1	Erect to ascending perennial, herb or shrub, 0.2-0.5 m high. Fl. blue/white, Sep to Nov. Sandy & gravelly soils.	Possible
Daviesia elongata subsp. *implexa*			P3	Spreading or sprawling shrub, 0.4-1 m high. Fl. yellow/orange & red, Sep. Sand & laterite.	Possible
Daviesia implexa			P3	No description available	Possible
Dicrastylis capitellata			P1	Low spreading shrub, 0.2-0.25 m high. Fl. blue-purple, May. Loamy sand, sandy loam.	Possible

Taxon	Conservation Code			Description (WAHERB, 2021)	Likelihood of Occurrence
	EPBC Act	BC Act	Priority Listing		
Elatine macrocalyx			P3	Prostrate, glabrous, mat-forming annual, herb, sepals 2-3mm long, fruit indehiscent. Fl. white, May to Oct (probably opportunistic). Shallow sands over clay. Margins of playa lakes and clay pans.	Unlikely
Eremophila biserrata			P4	Prostrate shrub, to 3 m wide. Fl. green/yellow-green, Sep to Nov or Mar. Sandy or sandy clay soils. Alluvial flats, salt flats & lakes.	Unlikely
Eremophila racemosa			P4	Erect shrub, 0.5-1.7 m high. Fl. purple-pink-red/white, Mar or Aug to Dec. Sandy or stony loam, clay loam. Undulating plains, roadsides.	Possible
Eremophila verticillata	EN	CR		Low spreading shrub, up to 0.8 m high, to 1 m wide. Fl. purple-violet, Nov to Dec. Clay loam, loam over limestone.	Unlikely
Eucalyptus cerasiformis			P4	Mallee, 2-3.5 m high, bark smooth, grey to brown. Fl. yellow, Dec or Jan to Mar. Red loamy soils.	Possible
Eucalyptus deflexa			P4	(Mallee), 1-3 m high, bark smooth. Fl. pink/cream-white, Mar or May to Oct. Clay loam, sandy loam, white or yellow sand, often with gravel. Flat areas & slight rises.	Possible
Eucalyptus exigua			P3	Mallee, 2-5 m high, bark smooth. Fl. white-cream, Mar. Sandy loam, white sand. Sandplains.	Possible
Eucalyptus georgei subsp. *fulgida*			P4	Tree, 4-20 m high, bark smooth, often hanging in ribbons. Fl. cream-white. Sandy loam, clayey sand. Slight depressions.	Unlikely
Eucalyptus myriadena subsp. *parviflora*			P1	Mallee or tree, 3-10 m high, bark rough, coarse & flaky on trunk, smooth above. Loam. Swamps, plains.	Unlikely
Eucalyptus recta	EN	VU		Tree, to 15 m high, bark smooth. Sandy laterite.	Unlikely
Eucalyptus retusa			P1	No description available	Possible
Eucalyptus steedmanii	VU	VU		Tree, 2-8(-12) m high, bark smooth. Fl. white, Jan to Mar. Gravelly loam over ironstone, sand. Low hills, undulating plains.	Unlikely
Eutaxia acanthoclada			P3	Compact, mat-forming, prostrate shrub, to 0.3 m high. Fl. yellow/orange/red, Oct to Nov. Light brown sandy clay, shallow sandy loam, red clay over banded ironstone, gravel. Gently undulating plains.	Unlikely
Eutaxia hirsuta			P2	Erect, shrub, spindly shrub (broom-like). *Stems* terete, glabrous; pustules or glands absent.	Known to occur[3]
Eutaxia lasiocalyx			P2	Low, spreading, multi-stemmed shrub, to 0.15 m high. Fl. yellow, Nov. Red sandy loam, laterite and quartz gravel. Gentle lower slopes.	Unlikely
Eutaxia nanophylla			P3	Straggly, rounded shrub, to 0.35 m high. Fl. Yellow & orange & red, Oct to Nov. Clayey sand, red clay, stoney clayey loam. Low-lying areas, damp flats, slopes, undulating plains, low stony ridges.	Unlikely

Taxon	Conservation Code			Description (WAHERB, 2021)	Likelihood of Occurrence
	EPBC Act	BC Act	Priority Listing		
Eutaxia rubricarina			P3	Straggling shrub, to 0.5 m high. Fl. Orange & yellow & brown, Aug or Oct. Gravelly sand, grey to pinkish-white sandy clay, red loam. Flats, slopes, valley floors, road verges.	Unlikely
Eutaxia sp. North Ironcap (P. Armstrong PA 06/898)			P1	No description available	Possible
Frankenia drummondii			P3	Prostrate shrub. Fl. white. Sand. Lake edges.	Unlikely
Gastrolobium tenue			P1	Low, bushy shrub, to 0.6 m high. Fl. Orange & red & purple, Sep to Oct. Yellow sand or sandy clay. Undulating dunes, stony outcrops.	Unlikely
Grevillea aneura			P4	Dense, prickly shrub, 0.5-2.8 m high. Fl. red, Jun or Aug to Dec or Jan. Sand, sandy clay, gravel.	Possible
Grevillea neodissecta			P4	No description available	Possible
Grevillea insignis subsp. *elliotii*			P3	Erect, bushy, non-lignotuberous shrub, 1-2 m high. Fl. red/pink & cream & white, Oct. Gravelly sand or loam over ironstone. Hilltops or rises.	Unlikely
Grevillea pilosa subsp. *redacta*			P3	Spreading to prostrate, non-lignotuberous shrub, 0.4-1.2 m high. Fl. red, Feb or Oct or Dec. Sand, laterite.	Unlikely
Grevillea prostrata			P4	Loose, prostrate shrub, 0.04-0.1 m high, 0.8-1.2 m wide. Fl. cream-white/pink-red, Aug to Dec or Jan. White, grey or yellow sand, gravel. Sandplains.	Possible
Guichenotia anota			P1	Shrubs, 1 m high; branchlets hairy, not glaucous. Leaves alternate, 10-25 mm long	Possible
Guichenotia asteriskos			P2	Erect, compact shrub, ca 0.35 m high. Fl. white, Sep to Oct. Sandy clay or loam with gravel.	Possible
Gyrostemon ditrigynus			P4	Shrub, 0.4-1.5 m high. Sand, sandy clay, loam. Plains, low ironstone ridges.	Unlikely
Haegiela tatei			P4	Ascending to erect annual, herb, 0.02-0.08(-0.2) m high. Fl. white-yellow, Aug to Nov. Clay, sandy loam, gypsum. Saline habitats.	Unlikely
Hemigenia sp. Newdegate (E. Bishop 75)			P1	Spindly, erect to spreading shrub, 0.2-0.45 m high, to 0.5 m wide. Fl. blue/purple, Sep to Oct. Clay loam. Disturbed sites.	Possible
Hibbertia axillibarba			P1	Shrub, to 0.7 m high. Fl. yellow, Sep to Oct. Lateritic soil. Ranges.	Unlikely
Hibbertia carinata			P1	Shrub, to 0.4 m high. Fl. yellow, Aug to Sep. Well-drained gravelly sand, yellow sand with gravel.	Possible
Hibbertia pachyphylla			P3	Shrub, to 0.5 m high. Fl. yellow, Sep to Nov. White to yellow sand, brown sandy gravel, gravelly loam, laterite, granite, quartz. Undulating plains, low rises, valley floors.	Possible
Hydrocotyle eichleri			P3	No description available	Possible
Hysterobaeckea pterocera			P1	No description available	Possible
Isolepis australiensis			P3	Annual, grass-like or herb (sedge), 0.03-0.055 m high, glumes 0.8-1.2 mm long; stamens 1(-2); style branches 3; nut with abaxial angle acute. Fl. Jun or Sep. Silty sand, sandy clay. Lake margins, pools.	Unlikely
Labichea rossii			P1	No description available	Possible

Taxon	Conservation Code			Description (WAHERB, 2021)	Likelihood of Occurrence
	EPBC Act	BC Act	Priority Listing		
Lepidosperma amantiferrum			P1	Tufted rhizomatous, herb (sedge), leaves 0.15-0.42 m high, culms and leaves distichous. Yellow sandy loam with banded ironstone gravel and rocks. Gentle lower slopes.	Unlikely
Lepidosperma ferriculmen			P1	Tufted rhizomatous, perennial, herb (sedge), leaves 0.16-0.38 m high, culms and leaves distichous. Well-drained orange-red sandy loam with banded ironstone gravel and rocks. Stony slopes.	Unlikely
Lepidosperma lyonsii			P4	Tufted rhizomatous, perennial, herb (sedge), leaves 0.31-0.53 m high, culms and leaves distichous. Pale orange skeletal sandy loam with banded ironstone gravel & rock, well-drained shallow stony loamy with quartz. Gentle hill slopes, upper slopes of large hill.	Unlikely
Melaleuca macronychia subsp. *trygonoides*			P3	Multi-stemmed, spreading shrub, 1-4 m high, leaves broadly elliptic. Fl. red, Feb or Jul to Aug or Oct. Sandy soils. Granite outcrops.	Unlikely
Melaleuca ochroma			P3	No description available	Possible
Microcorys sp. Forrestania (V. English 2004)			P4	Prostrate or erect shrub, 0.35-0.4 m high. Fl. white/purple, Jan or Apr. Yellow sandy clay or red-brown clay. Open woodland or cleared areas.	Known to occur[2]
Microcorys sp. Mt Holland (D. Angus DA 2397)			P1	No description available	Possible
Microseris walteri			P3	No description available	Possible
Mirbelia densiflora			P3	Erect or straggling shrub, 0.2-1 m high. Fl. yellow-orange, Oct or Jan. Stony loam, loamy sand. Small ridges, breakaways, undulating plains.	Unlikely
Mirbelia taxifolia			P1	Shrub, 0.6-0.9 m high. Fl. orange-yellow, Sep. Red or yellow sand.	Possible
Notisia intonsa			P3	No description available	Possible
Olearia laciniifolia			P2	Erect, few-stemmed shrub, 0.6-1.2 m high. Fl. blue/purple & white/yellow, May to Sep. White sand. Around playa lakes.	Unlikely
Orianthera exilis			P2	No description available	Possible
Oxymyrrhine plicata			P3	No description available	Possible
Paragoodia crenulata	CE	VU		The flower spike has 1–3 flowers that are brown and yellow in colour. The flowering period is from July to August. This species is thought to require disturbance (DEC, 2010)	Unlikely
Pityrodia scabra subsp. *dendrotricha*			P3	No description available	Possible
Pityrodia sp. Yilgarn (A.P. Brown 2679)			P3	No description available	Possible
Pterostylis echinulata			P3	No description available	Possible
Pultenaea daena			P3	Dense, prostrate, domed shrub, to 0.07 m high. Fl. yellow, Mar. White to yellow sand or sandy loam, sandy or loamy clay, gravel, limestone, dolomite, laterite. Gently undulating plains, adjacent to salt lakes, in disturbed areas.	Unlikely
Rinzia torquata			P3	No description available	Known to occur[1]
Rinzia triplex			P3	No description available	Known to occur[1,2]

Taxon	Conservation Code			Description (WAHERB, 2021)	Likelihood of Occurrence
	EPBC Act	BC Act	Priority Listing		
Roycea pycnophylloides	EN	VU		Perennial, herb, forming densely branched, silvery mats to 1 m wide. Fl. Sep. Sandy soils, clay. Saline flats.	Unlikely
Scaevola tortuosa			P1	Ascending perennial, herb, 0.1-0.2 m high. Fl. blue-purple/pink, Oct. Sandy clay. Margins of salt lakes.	Unlikely
Seringia adenogyna			P3	No description available	Possible
Stenanthemum liberum			P1	Dwarf shrub, ca 0.5 m high. Yellow sandy loam over laterite.	Unlikely
Stylidium sejunctum			P3	Caespitose perennial, herb, 0.25-0.45 m high, Leaves tufted, linear to narrowly oblanceolate, 10-30 cm long, 0.8-4 mm wide, apex acute to mucronate, margin involute, glabrous to scabrous. Membraneous scale leaves present at base of mature leaves. Scape glandular throughout. Inflorescence paniculate. Fl. white/pink-purple, Sep to Nov. Clayey sand or loam, laterite. Outcrops, upper slopes, breakaways. Mallee and Allocasuarina shrubland.	Unlikely
Stylidium thylax			P2	Creeping perennial, herb, 0.04-0.08 m high, Leaves adpressed to stem, ovate to lanceolate, 0.1-0.4 cm long, 0.6-1.5 mm wide, apex mucronate, margin hyaline, glabrous. Inflorescence uni-flowered, pedicels glandular. Fl. white, Oct. Sand. Gentle slopes and plains. Heath, mallee shrubland.	Possible
Stylidium validum			P1	Caespitose perennial, herb, 0.06-0.3 m high, Leaves tufted, oblanceolate, 1.5-10 cm long, 2.2-6 mm wide, apex acute to acuminate, margin entire, glabrous, glaucous. Scape glabrous. Inflorescence paniculate. Fl. white/pink, Sep to Oct. Clayey sand or loam, ironstone, greenstone gravel. Hillslopes and hilltops. Eucalypt woodland, mallee shrubland.	Unlikely
Teucrium diabolicum			P3	Compact, dwarf shrub, 0.1 m high, to 0.1 m wide. Fl. white, Apr. Hills, road verges.	Unlikely
Tetratheca aphylla subsp. *megacarpa*	VU	VU		Shrub, to 0.35 m high. Yellow sand, brown sandy loam, yellow-brown clay loam, gravel, laterite. Rises and ridges.	Unlikely
Thysanotus lavanduliflorus			P1	Caespitose perennial, herb (with tuberous roots), to 0.25 m high. Fl. purple, Nov to Dec. Sand, sandy loam.	Possible
Thysanotus sp. Yellowdine (A.S. George 6040)			P2	No description available	Possible
Tribonanthes purpurea	VU	VU		Tuberous, perennial, herb, 0.03-0.04 m high. Fl. pink-purple, Aug. Seasonally wet soils in moss swards & herbfields among granite rocks.	Unlikely
Verticordia gracilis			P3	Low, slender shrub, 0.15-0.6 m high. Fl. pink, Oct to Nov. Yellow sand, gravelly sand, sandy loam.	Known to occur[1]
Verticordia multiflora subsp. *solox*			P2	Erect to spreading shrub, 0.2-0.6 m high. Fl. yellow, Oct to Dec or Jan. Yellow sand over gravel, sand over granite.	Unlikely

Taxon	Conservation Code			Description (WAHERB, 2021)	Likelihood of Occurrence
	EPBC Act	BC Act	Priority Listing		
Verticordia staminosa var. *cylindracea*	EN	VU		Spreading shrub, 0.3-0.8 m high. Fl. green-yellow/yellow-brown, Jul to Oct. Soil pockets. Granite outcrops.	Unlikely
Verticordia stenopetala			P3	Shrub, 0.2-0.6(-1.3) m high. Fl. pink/pink-purple-red, Oct to Dec or Jan. Yellow sand, sometimes with gravel. Undulating plains.	Possible

Appendix 6: Potential Fauna Species List

Listing of Fauna Potentially Present in/near Survey Area

Lounge Lizard Sand Pits

Approximate centroid 119° 41' 36" E, 32° 25' 46" S

Compiled by Greg Harewood - February 2021

Recorded (Captured/Sighted/Heard/Signs) = X

A = How, R.A. et al. (1988). The biological survey of the eastern goldfields of Western Australia. Part 4. Lake Johnston-Hyden Study Area. Records of the WAM, supplement No. 30. (Lake Cronin)

B = Biota (2006a/2007a). Forrestania Monitoring Survey, Flying Fox Phases I, II, III and IV. Unpublished report for Western Areas NL.
Biota (2006b). Forrestania Water Disposal Pipeline Survey – Fauna and Faunal Assemblages Report. Unpublished report for Western Areas NL.
Biota (2007b). Diggers South Fauna Survey – Phase I. Unpublished report for Western Areas NL.
Biota (2010). Spotted Quoll Haul Road Single Phase Fauna Survey. Unpublished report for Western Areas N.L. May 2010.
Biota (2018). New Morning Level 1 and Targeted Terrestrial Fauna Survey Unpublished report for Western Areas N.L. Nov 2018.

C = KLA (2010). Cazaly Resources Ltd. Parker Range Iron Ore Project. Fauna Assessment. Unpublished report for Cazaly Resources Limited. August 2011.

D = DBCA (2021). NatureMap Database search. “By Circle”119° 41' 36" E, 32° 25' 56" S – Survey Area (plus 40 km buffer). 20 February 2021.

Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D
Amphibia						
Myobatrachidae Ground or Burrowing Frogs						
Crinia pseudinsignifera	Bleating Froglet	LC		X		X
Heleioporus albopunctatus	Western Spotted Frog	LC	X	X		X
Limnodynastes dorsalis	Western Banjo Frog	LC	X			X
Myobatrachus gouldii	Turtle Frog	LC				
Neobatrachus albipes	White-footed Trilling Frog	LC				X
Neobatrachus centralis	Trilling Frog	LC	X			

BC Act Status - S1 to S7, EPBC Act Status - CR = Critically Endangered, EN = Endangered, VU = Vulnerable, EX = Extinct, DPaW Priority Status - P1 to P4, Int. Agmts - CA = CAMBA, JA = JAMBA, RK = ROKAMBA, IUCN Red List Category Definitions LC = Least Concern - see Appendix A andhttps://www.iucnredlist.org/resources/categories-and-criteria for others.

Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D
Neobatrachus kunapalari	Kunapalari Frog	LC				X
Neobatrachus pelobatoides	Humming Frog	LC	X			X
Neobatrachus sp.	Unidentified Burrowing Frog	LC				
Neobatrachus sutor	Shoemaker Frog	LC	X			X
Pseudophryne guentheri	Crawling Toadlet	LC				X
Pseudophryne occidentalis	Western Toadlet	LC	X	X		X

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D
Reptilia						
Diplodactylidae Geckoes						
Crenadactylus ocellatus	Clawless Gecko	LC	X	X		X
Diplodactylus granariensis granariensis	Wheatbelt Stone Gecko	LC	X	X	X	
Diplodactylus pulcher	Western Saddled Ground Gecko	LC		X	X	X
Lucasium maini	Main's Ground Gecko	LC	X	X	X	X
Oedura reticulata	Reticulated Velvet Gecko	LC	X	X	X	
Strophurus intermedius	Southern Spiny-tailed Gecko	LC				
Strophurus spinigerus inornatus	Orange-eyed Southwestern Spiny-tailed Gecko	LC	X	X		
Gekkonidae Geckoes						
Christinus marmoratus	Marbled Gecko	LC			X	
Gehyra variegata	Variegated Dtella	LC	X	X		X
Heteronotia binoei	Bynoe's Gecko	LC	X			
Underwoodisaurus milii	Barking Gecko	LC	X	X		X

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D
Pygopodidae Legless Lizards						
Delma australis	Marble-faced Delma	LC		X		X
Delma butleri	Unbanded Delma	LC				
Delma fraseri	Fraser's Legless Lizard	LC	X	X		X
Lialis burtonis	Burton's Legless Lizard	LC	X	X		X
Pygopus lepidopodus	Common Scaly Foot	LC		X		X

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D
Agamidae Dragon Lizards						
Ctenophorus cristatus	Crested Bicycle Dragon	LC	X	X	X	X
Ctenophorus isolepis	Goldfields Military Sand Dragon	LC				
Ctenophorus maculatus	Spotted Military Dragon	LC	X	X		X
Ctenophorus ornatus	Ornate Crevice Dragon	LC				X
Ctenophorus salinarum	Salt Pan Dragon	LC	X			X
Moloch horridus	Thorny Devil	LC	X	X		X
Pogona minor minor	Western Bearded Dragon	LC	X	X	X	
Rankinia adelaidensis chapmani	Eastern Heath Dragon	LC	X	X		
Varanidae Monitor's or Goanna's						
Varanus gouldii	Gould's Sand Monitor	LC	X	X		X
Varanus rosenbergi	Heath Monitor	LC		X		X
Varanus tristis	Black-headed Monitor	LC				

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D
Scincidae Skinks						
Cryptoblepharus buchananii	Buchanan's Snake-eyed Skink	LC	X	X	X	X
Ctenotus atlas	Southern Malle Ctenotus	LC	X			X
Ctenotus impar	Odd-striped Ctenotus	LC	X	X		X
Ctenotus schomburgkii	Barred Wedge-snout Ctenotus	LC	X	X		X
Ctenotus xenopleura	Wide-striped Sandplain Ctenotus	LC				
Cyclodomorphus melanops elongatus	Eastern Slender Blue-tongue	LC	X			
Egernia formosa	Goldfields Crevise Skink	LC				X
Egernia inornata	Desert Skink	LC			X	
Egernia richardi	Woodland Crevice Skink	LC	X	X	X	X
Eremiascincus richardsonii	Broad-banded Sand Swimmer	LC				
Hemiergis initialis initialis	Sth Five-toed Mulch Skink	LC		X		
Hemiergis peronii peronii	Four-toed Earless Skink	LC				

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D
Lerista distinguenda	SW Four-toed Lerista	LC	X	X		X
Lerista dorsalis	Southern Four-toed Lerista	LC		X		
Lerista kingi	King's Three-toed Slider	LC				
Lerista picturata	Goldfields Robust Lerista	LC		X		X
Lerista timida	Dwarf Three-toed Slider	LC				
Liopholis multiscutata	Bull Skink	LC	X	X	X	X
Menetia greyii	Dwarf Skink	LC	X	X	X	X
Morethia butleri	Woodland Dark-flecked Morethia	LC	X		X	X
Morethia obscura	Shrubland Pale-flecked Morethia	LC	X	X		X
Tiliqua occipitalis	Western Bluetongue	LC	X	X		X
Tiliqua rugosa	Bobtail	LC		X		X

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D
Typhlopidae Blind Snakes						
Ramphotyphlops australis	Southern Blind Snake	LC	X	X	X	
Ramphotyphlops bicolor	Dark-spined Blind Snake	LC				
Ramphotyphlops bituberculatus	Prong-snouted Blind Snake	LC				
Ramphotyphlops hamatus	Northern Hook-snouted Blind Snake	LC				
Boidae Pythons, Boas						
Morelia imbricata	Southern Carpet Python	LC				

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D
Elapidae Elapid Snakes						
Brachyurophis semifasciata	Southern Shovel-nosed Snake	LC				
Echiopsis curta	Bardick	LC		X		X
Neelaps bimaculatus	Black-naped Snake	LC	X			X
Parasuta gouldii	Gould's Hooded Snake	LC	X	X		X
Parasuta nigriceps	Black-backed Snake	LC		X		X
Paroplocephalus atriceps	Lake Cronin Snake	P3	X	X		X
Pseudechis australis	Mulga Snake	LC	X			X
Pseudonaja affinis	Dugite	LC	X	X		X
Pseudonaja modesta	Ringed Brown Snake	LC			X	
Simoselaps bertholdi	Jan's Banded Snake	LC		X		X

Aves

Casuariidae Emus, Cassowarries						
Dromaius novaehollandiae	Emu	LC	X	X		X

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D
Megapodiidae Moundbuilders						
Leipoa ocellata	Malleefowl	S3 VU VU	X	X	X	X
Phasianidae Quails, Pheasants						
Coturnix pectoralis	Stubble Quail	LC				
Accipitridae Kites, Goshawks, Eagles, Harriers						
Accipiter cirrocephalus	Collared Sparrowhawk	LC	X	X		X
Accipiter fasciatus	Brown Goshawk	LC				X
Aquila audax	Wedge-tailed Eagle	LC		X	X	X
Aquila morphnoides	Little Eagle	LC	X	X		
Circus assimilis	Spotted Harrier	LC				X
Elanus caeruleus	Black-shouldered Kite	LC				
Haliastur sphenurus	Whistling Kite	LC				X
Hamirostra isura	Square-tailed Kite	LC	X	X		

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D
Falconidae Falcons						
Falco berigora	Brown Falcon	LC	X	X	X	X
Falco cenchroides	Australian Kestrel	LC	X	X		X
Falco longipennis	Australian Hobby	LC	X			X
Falco peregrinus	Peregrine Falcon	S7 LC		X		X
Otididae Bustards						
Ardeotis australis	Australian Bustard	LC	X			X
Turnicidae Button-quails						
Turnix velox	Little Button-quail	LC		X		X
Charadriidae Lapwings, Plovers, Dotterels						
Vanellus tricolor	Banded Lapwing	LC				

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D
Columbidae Pigeons, Doves						
Ocyphaps lophotes	Crested Pigeon	LC				X
Phaps chalcoptera	Common Bronzewing	LC	X	X	X	X
Phaps elegans	Brush Bronzewing	LC		X		X

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D
Psittacidae Parrots						
Cacatua roseicapilla	Galah	LC	X	X	X	X
Calyptorhynchus latirostris	Carnaby's Black-Cockatoo	S2 EN EN	X	X		X
Glossopsitta porphyrocephala	Purple-crowned Lorikeet	LC	X	X	X	
Melopsittacus undulatus	Budgerigar	LC				X
Neophema elegans	Elegant Parrot	LC	X	X	X	X
Nymphicus hollandicus	Cockatiel	LC				X
Platycercus icterotis xanthogenys	Western Rosella (inland ssp)	P4	X	X	X	
Platycercus varius	Mulga Parrot	LC		X		X
Platycercus zonarius	Australian Ringneck	LC	X	X	X	X
Polytelis anthopeplus	Regent Parrot	LC	X	X	X	X

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D
Cuculidae Parasitic Cuckoos						
Cacomantis flabelliformis	Fan-tailed Cuckoo	LC	X	X		X
Chrysococcyx basalis	Horsfield's Bronze Cuckoo	LC	X		X	X
Chrysococcyx lucidus	Shining Bronze Cuckoo	LC		X		
Chrysococcyx osculans	Black-eared Cuckoo	LC				
Cuculus pallidus	Pallid Cuckoo	LC	X	X		
Strigidae Hawk Owls						
Ninox novaeseelandiae	Boobook Owl	LC	X		X	
Tytonidae Barn Owls						
Tyto alba	Barn Owl	LC				
Podargidae Frogmouths						
Podargus strigoides	Tawny Frogmouth	LC	X	X	X	X

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D
Caprimulgidae Nightjars						
Eurostopodus argus	Spotted Nightjar	LC	X	X	X	X
Aegothelidae Owlet-nightjars						
Aegotheles cristatus	Australian Owlet-nightjar	LC	X	X		X
Halcyonidae Tree Kingfishers						
Todiramphus pyrrhopygia	Red-backed Kingfisher	LC				
Todiramphus sanctus	Sacred Kingfisher	LC				X
Meropidae Bee-eaters						
Merops ornatus	Rainbow Bee-eater	JA LC	X	X	X	X
Climacteridae Treecreepers						
Climacteris rufa	Rufous Treecreeper	LC	X	X		

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D
Maluridae Fairy Wrens, GrassWrens						
Malurus lamberti	Variegated Fairy-wren	LC				
Malurus leucopterus	White-winged Fairy-wren	LC				X
Malurus pulcherrimus	Blue-breasted Fairy-wren	LC	X	X	X	X
Malurus splendens	Splendid Fairy-wren	LC				X
Stipiturus malachurus	Southern Emu-wren	LC		X		X

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D
Acanthizidae Thornbills, Geryones, Fieldwrens & Whitefaces						
Acanthiza apicalis	Broad-tailed Thornbill	LC	X	X	X	X
Acanthiza chrysorrhoa	Yellow-rumped Thornbill	LC	X	X		X
Acanthiza uropygialis	Chestnut-rumped Thornbill	LC	X	X		X
Aphelocephala leucopsis	Southern Whiteface	LC				
Calamanthus campestris	Rufous Fieldwren	LC	X	X		X
Gerygone fusca	Western Gerygone	LC	X	X		X
Hylacola cauta whitlocki	Shy Heath-wren (western)	LC	X	X		
Pyrrholaemus brunneus	Redthroat	LC	X	X	X	X
Sericornis frontalis	White-browed Scrubwren	LC	X			X
Smicrornis brevirostris	Weebill	LC	X	X	X	X

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D
Pardalotidae Pardalotes						
Pardalotus punctatus	Spotted Pardalote	LC	X	X	X	X
Pardalotus striatus	Striated Pardalote	LC	X	X	X	X

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D
Meliphagidae Honeyeaters, Chats						
Acanthagenys rufogularis	Spiny-cheeked Honeyeater	LC		X		X
Anthochaera carunculata	Red Wattlebird	LC	X	X	X	X
Certhionyx niger	Black Honeyeater	LC			X	
Certhionyx variegatus	Pied Honeyeater	LC				X
Epthianura albifrons	White-fronted Chat	LC	X			X
Epthianura tricolor	Crimson Chat	LC				
Lichenostomus cratitius	Purple-gaped Honeyeater	LC	X	X		X
Lichenostomus leucotis	White-eared Honeyeater	LC	X	X	X	X
Lichenostomus ornatus	Yellow-plumed Honeyeater	LC	X	X	X	
Lichenostomus plumulus	Grey-fronted Honeyeater	LC		X		
Lichenostomus virescens	Singing Honeyeater	LC		X	X	
Lichmera indistincta	Brown Honeyeater	LC	X	X	X	X

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D
Manorina flavigula	Yellow-throated Miner	LC	X	X	X	X
Melithreptus brevirostris	Brown-headed Honeyeater	LC	X	X	X	X
Phylidonyris albifrons	White-fronted Honeyeater	LC	X	X	X	
Phylidonyris melanops	Tawny-crowned Honeyeater	LC	X	X		
Phylidonyris nigra	White-cheeked Honeyeater	LC		X		
Phylidonyris novaehollandiae	New Holland Honeyeater	LC		X		X
Petroicidae Australian Robins						
Drymodes brunneopygia	Southern Scrub-robin	LC	X	X	X	X
Eopsaltria griseogularis	Western Yellow Robin	LC	X	X	X	
Microeca fascinans	Jacky Winter	LC	X	X		X
Petroica cucullata	Hooded Robin	LC	X	X		
Petroica goodenovii	Red-capped Robin	LC	X	X	X	X

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D
Pomatostomidae Babblers						
Pomatostomus superciliosus	White-browed Babbler	LC	X	X		X
Cinclosomatidae Whipbirds, Wedgebills, Quail Thrushes						
Cinclosoma castanotus	Chestnut Quail-thrush	LC	X	X		
Neosittidae Sitellas						
Daphoenositta chrysoptera	Varied Sittella	LC	X	X	X	X
Pachycephalidae Crested Shrike-tit, Crested Bellbird, Shrike Thrushes, Whistlers						
Colluricincla harmonica	Grey Shrike-thrush	LC	X	X	X	X
Falcunculus frontatus	Crested Shrike-tit	LC				X
Oreoica gutturalis	Crested Bellbird	LC	X	X	X	X
Pachycephala inornata	Gilbert's Whistler	LC				X
Pachycephala pectoralis	Golden Whistler	LC	X	X	X	
Pachycephala rufiventris	Rufous Whistler	LC		X	X	X

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D
Dicruridae Monarchs, Magpie Lark, Flycatchers, Fantails, Drongo						
Grallina cyanoleuca	Magpie-lark	LC		X		X
Myiagra inquieta	Restless Flycatcher	LC				X
Rhipidura fuliginosa	Grey Fantail	LC	X	X	X	
Rhipidura leucophrys	Willie Wagtail	LC	X	X		X
Campephagidae Cuckoo-shrikes, Trillers						
Coracina novaehollandiae	Black-faced Cuckoo-shrike	LC	X	X	X	X
Lalage tricolor	White-winged Triller	LC	X	X		X
Artamidae Woodswallows, Butcherbirds, Currawongs						
Artamus cinereus	Black-faced Woodswallow	LC	X	X		X
Artamus cyanopterus	Dusky Woodswallow	LC	X	X		X
Artamus personatus	Masked Woodswallow	LC				X
Artamus superciliosus	White-browed Woodswallow	LC				

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Cracticidae Currawongs, Magpies & Butcherbirds						
Cracticus nigrogularis	Pied Butcherbird	LC		X	X	X
Cracticus tibicen	Australian Magpie	LC		X		X
Cracticus torquatus	Grey Butcherbird	LC	X	X		X
Strepera versicolor	Grey Currawong	LC		X	X	X
Corvidae Ravens, Crows						
Corvus bennetti	Little Crow	LC				X
Corvus coronoides	Australian Raven	LC		X	X	X
Corvus sp.	Unidentified corvid	LC				
Motacillidae Old World Pipits, Wagtails						
Anthus australis	Australian Pipit	LC	X	X		X
Estrilidae Grass Finches & Mannikins						
Taeniopygia guttata	Zebra Finch	LC				X

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Dicaeidae Flowerpeckers						
Dicaeum hirundinaceum	Mistletoebird	LC	X			X
Hirundinidae Swallows, Martins						
Cheramoeca leucosternus	White-backed Swallow	LC				
Hirundo ariel	Fairy Martin	LC				
Hirundo neoxena	Welcome Swallow	LC				X
Hirundo nigricans	Tree Martin	LC	X	X		
Sylviidae Old World Warblers						
Cincloramphus cruralis	Brown Songlark	LC				
Cincloramphus mathewsi	Rufous Songlark	LC				
Zosteropidae White-eyes						
Zosterops lateralis	Silvereye	LC	X	X		X

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Mammalia						
Tachyglossidae Echidnas						
Tachyglossus aculeatus	Echidna	LC	X	X		X
Dasyuridae Carnivorous Marsupials						
Antechinomys laniger	Kultarr	LC				
Dasyurus geoffroii	Chuditch	S3 VU VU		X		X
Ningaui yvonneae	Southern Ningaui	LC	X			X
Sminthopsis crassicaudata	Fat-tailed Dunnart	LC		X		X
Sminthopsis dolichura	Little long-tailed Dunnart	LC			X	X
Sminthopsis gilberti	Gilbert's Dunnart	LC	X	X		X
Sminthopsis granulipes	White-tailed Dunnart	LC	X	X		X
Sminthopsis griseoventer	Grey-bellied Dunnart	LC		X		
Sminthopsis ooldea	Ooldea Dunnart	LC				X

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Class **Family** *Species*	Common Name	Conservation Status	A	B	C	D
Burramyidae Pygmy Possums						
Cercartetus concinnus	Western Pygmy-possum	LC	X	X	X	X
Tarsipedidae Honey Possum						
Tarsipes rostratus	Honey Possum	LC		X		
Macropodidae Kangaroos, Wallabies						
Macropus fuliginosus	Western Grey Kangaroo	LC	X	X		X
Macropus irma	Western Brush Wallaby	P4 LC		X		
Macropus robustus	Euro	LC	X			
Molossidae Freetail Bats						
Ozimops kitcheneri	Western Freetail-bat	LC	X	X	X	
Tadarida australis	White-striped Freetail-bat	LC	X	X	X	

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Vespertilionidae Ordinary Bats						
Chalinolobus gouldii	Gould's Wattled Bat	LC	X	X	X	X
Chalinolobus morio	Chocolate Wattled Bat	LC		X	X	X
Nyctophilus geoffroyi	Lesser Long-eared Bat	LC	X	X	X	X
Nyctophilus major tor	Central Long-eared Bat	P4				
Scotorepens balstoni	Inland Broad-nosed Bat	LC			X	X
Vespadelus baverstocki	Inland Forest Bat	LC				X
Vespadelus regulus	Southern Forest Bat	LC	X	X	X	X
Muridae Rats, Mice						
Mus musculus	House Mouse	Introduced	X	X	X	X
Notomys mitchellii	Mitchell's Hopping-mouse	LC	X	X	X	X
Pseudomys albocinereus	Ash-grey Mouse	LC	X	X		X
Pseudomys bolami	Bolam's Mouse	LC	X			

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Canidae Dogs, Foxes						
Canis lupus	Dingo/Dog	LC/Introduced	X	X		
Vulpes vulpes	Red Fox	Introduced	X	X		X
Felidae Cats						
Felis catus	Cat	Introduced		X	X	X
Camelidae Camels						
Camelus dromedarius	Camel	Introduced				
Leporidae Rabbits, Hares						
Oryctolagus cuniculus	Rabbit	Introduced	X	X		X

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