

GERALDTON-MT MAGNET ROAD / YALGOO- NINGHAN ROAD

INTERSECTION UPGRADE



NATIVE VEGETATION CLEARING PERMIT APPLICATION

SUPPORTING DOCUMENT

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Revision 0

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Executive Summary

Mount Gibson Mining Limited (MGM) owns and operates the Shine Iron Ore Project located south of Yalgoo, with ore proposed to be hauled to Geraldton on the Geraldton-Mt Magnet Road (via Yalgoo and Mullewa).

Consultation with Main Roads WA has identified a requirement to upgrade the intersection of Yalgoo-Ninghan Road (east of Yalgoo) with Geraldton-Mt Magnet Road.

A Native Vegetation Clearing Permit (NVCP) is required to enable clearing of up to 1.1 ha of native vegetation within a 3.5 ha permit area, as part of construction activities for the intersection upgrade.

A summary of the proposed clearing of native vegetation within the permit area is provided in Table E1.

Table E1: Native vegetation clearing summary

Permit Area (ha)	Cleared Land (ha)	Total native vegetation (ha)	Remnant Vegetation (ha)	Area to be cleared (ha)
3.5	1.7	1.8	1.7	1.1

The works required to upgrade the Yalgoo-Ninghan Road intersection will occur across various properties for which Main Roads Western Australia (MRWA) has responsibility. Landowner authorisation for MGM to undertake clearing activities on these properties has been obtained from MRWA.

The permit area comprises 1.7 ha of cleared land, associated with Geraldton-Mt Magnet Road and Yalgoo-Ninghan Road, as well as 1.8 ha of native vegetation. The 1.8 ha of native vegetation comprises 1.7 ha of remnant vegetation and 0.1 ha of cleared/degraded vegetation (no vegetation type assigned).

In 2020 MGM commissioned Jenny Borger Botanical Consultancy to undertake a targeted flora and vegetation survey of the permit area and its immediate surrounds (the survey area):

- No Threatened or priority listed flora species were recorded within either the permit area or the broader survey area.
- No Threatened Ecological Communities (TECs) were found to exist during the field surveys nor after desktop assessment in the Project Area.
- The boundary of the buffer of Priority Ecological Community (PEC) Midwest No. 14: Yalgoo (Gnows Nest/Wolla Wolla and Woolgah-Wadgingarra) vegetation assemblages (banded ironstone formation) (P1) occurs at the eastern end of the permit area.
- PEC Midwest No. 60 Wagga Wagga and Yalgoo Calcrete groundwater assemblage types on Yalgoo and Moore palaeodrainage on Wagga Wagga and Bunnawarra Stations occurs beneath the permit area.

Habitat for conservation significant fauna species within the permit area is considered unsuitable due to:

- proximity to Geraldton-Mt Magnet Road and the Yalgoo townsite
- extent of degraded condition of native vegetation and presence of weeds
- small extent of remnant native vegetation.

The proposed clearing of native vegetation within the permit area was assessed against the ten Clearing Principles, with reference to DWER's (2014) *A Guide to the Assessment of Applications to*

Clear Native Vegetation. The assessment concluded that the proposed clearing of up to 1.1 ha of native vegetation within the permit area is not at variance with any of the clearing principles.

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1 Introduction

Mount Gibson Mining Limited (MGM) is a wholly owned subsidiary of Mount Gibson Iron Limited (ACN 008 670 817) and the owner/operator of the Shine Iron Ore Project (the Project), located approximately 60 km by road south of Yalgoo, via Geraldton-Mt Magnet Road and Yalgoo-Ninghan Road.

Haulage of ore to Geraldton via Geraldton-Mt Magnet Road requires upgrading the intersection of this road with Yalgoo-Ninghan Road (hereafter referred to as the intersection), the aim being to not compromise public safety as a result of the increased frequency of road trains on this route.

The intersection upgrade primarily comprises widening of Geraldton-Mt Magnet Road / Yalgoo-Ninghan Road (east of Yalgoo). The location of the intersection is shown in Figure 1, with further detail provided in Section 2.

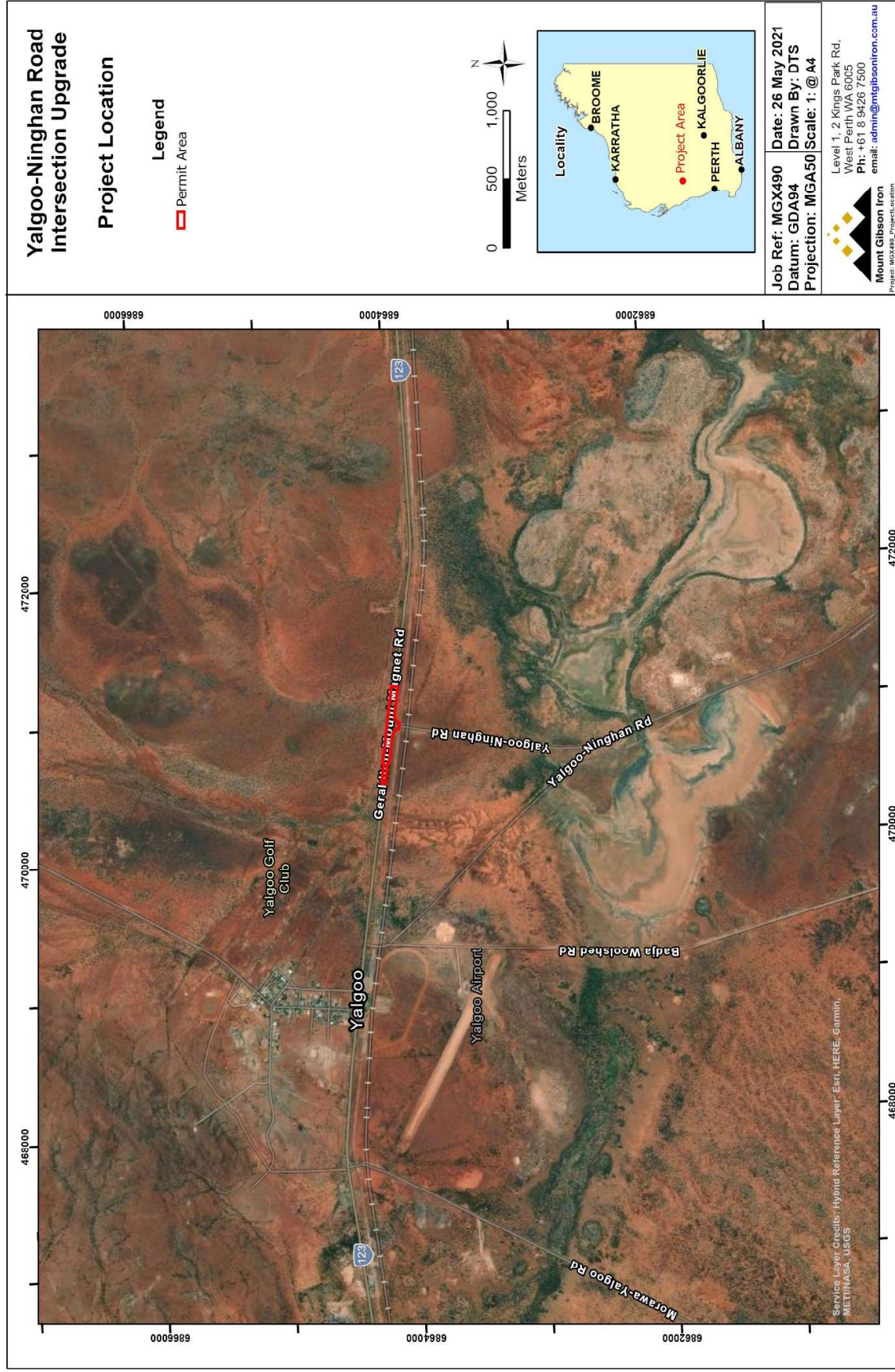


Figure 1: Project location

2 Project Description

2.1 Survey Area and Permit Area

The survey area referred to in this application is the area surveyed for the targeted flora and vegetation survey undertaken in 2020 by Jenny Borger Botanical Consultancy.

The permit area is the area within which up to 1.0 ha of native vegetation will be cleared. The permit area has a total extent of 3.5 ha. The boundary of the survey area relative to the permit area is shown on Figure 2.

2.2 Tenure and land access

The permit area is coincident with various properties for which Main Roads Western Australia (MRWA) is the responsible agency. These properties are listed in Table 1 and are shown on Figure 3.

Table 1: Land ownership

Property	Polygon Identification No. (PIN)	Certificate of Title	Type	Ownership
Lot 322 on DP 43529	11911449	LR3164/714	Road (YN Road)	State of WA (MRWA)
Lot 322 on DP43529	11911450	LR3164/714	Road (GMM Road)	State of WA (MRWA)
Lot 323 on DP43529	11911451	LR3164/715	Road (YN Road)	State of WA (MRWA)
Lot 355 on DP 433536	11943744	LR3167/694	Road (GMM Road)	State of WA (MRWA)
Road Reserve	11743800	N/a	Road (GMM Road)	MRWA
Road Reserve	11663841	N/a	Road (GMM Road)	MRWA

Refer to Attachment 2 for copies of Certificates of Title and the authority granted to MGM by MRWA to undertaken clearing of native vegetation on the identified properties.

2.3 Site description

The Geraldton Mt-Magnet Road length relative to the proposed widening is approximately 0.63 km. The road is only slightly built up from the natural ground surface, with minimal sloping from the middle of the road for water run-off management. The intersection and road are position on flat, low-lying ground.

The horizontal and vertical alignments of the existing road will not be changed, as the upgrade involves only widening of the road to the required width to accommodate a basic right turn. Tie-ins with the existing road are not applicable as the proposal is to widen the road, although earthworks will be required at each end where pavement batters and open drains will need to be blended to the existing arrangement.

There are no culverts on this stretch of either Geraldton-Mt Magnet Road or Yalgoo-Ninghan Road. Drainage is generally in an easterly direction parallel to Geraldton Mt-Magnet Road and is accommodated in an open drain to the north of Geraldton-Mt Magnet Road.

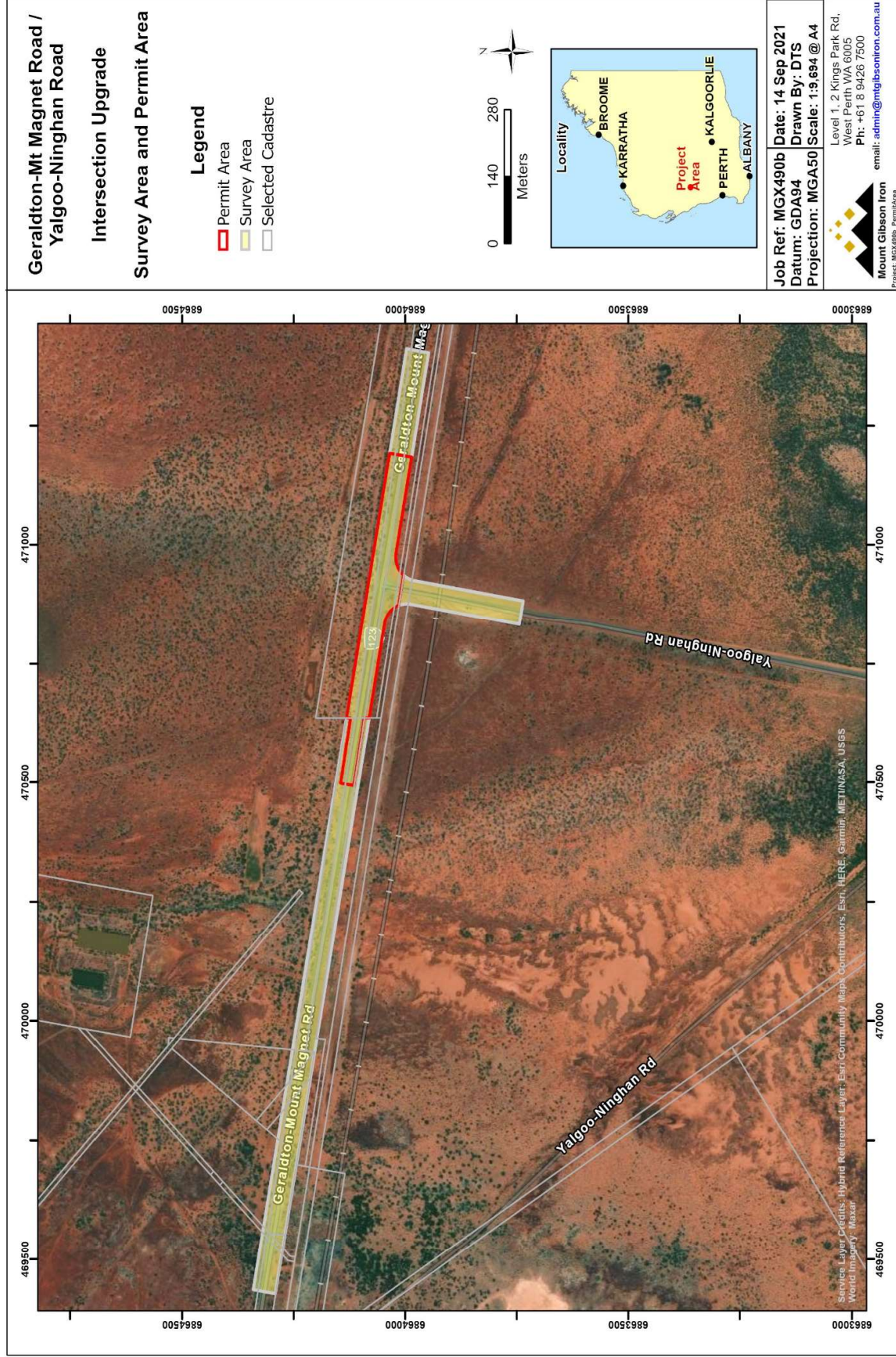


Figure 2: Survey Area and Permit Area

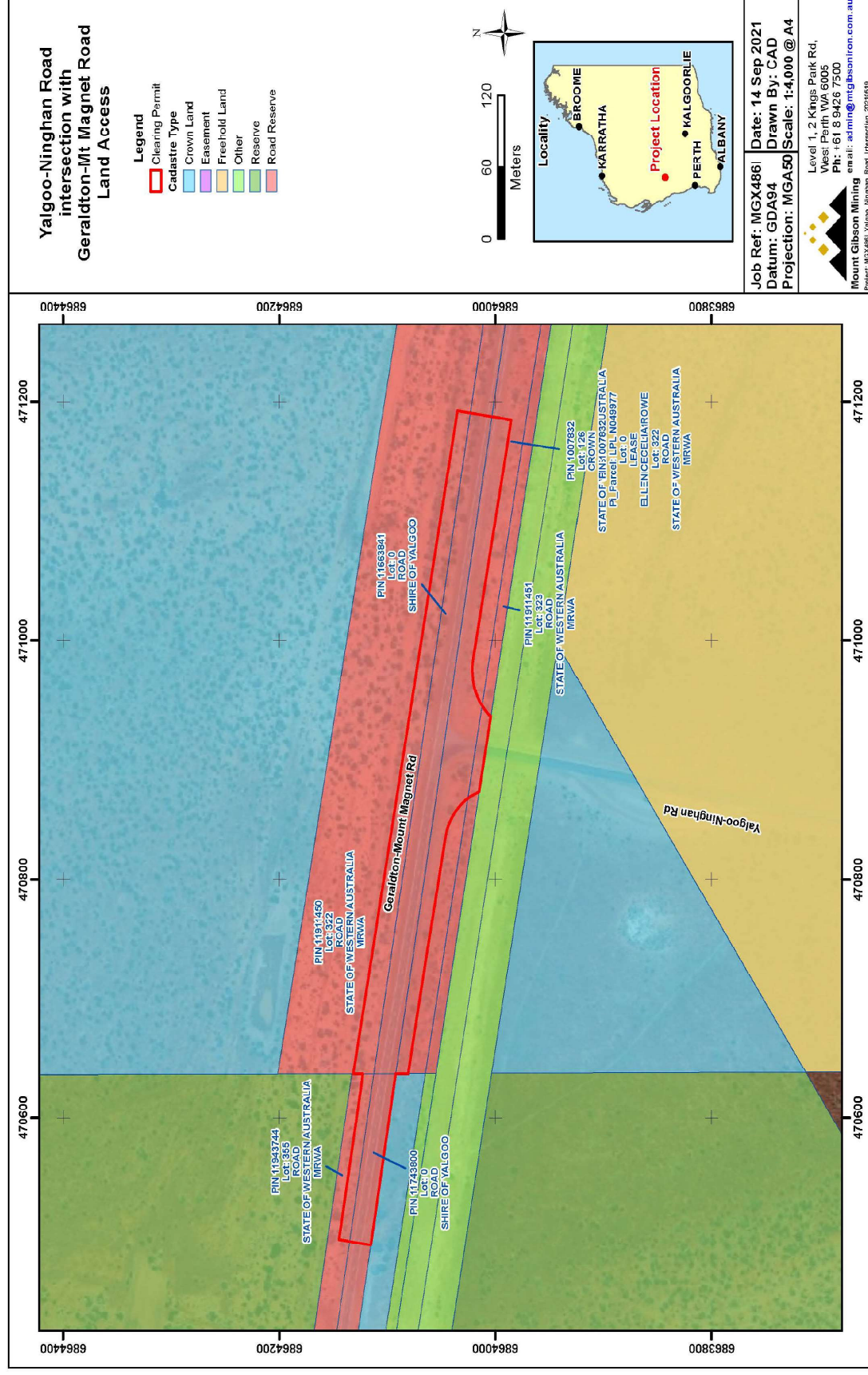


Figure 3: Land tenure and ownership

3 Environmental Setting

3.1 Climate

Yalgoo is located within the interzone between the wetter southwest province and the semi-arid Eremaean province. The nearest long-term weather station is located at Gabyon, about 30 km west-northwest of Yalgoo. Rainfall data for Gabyon is presented in Figure 3.

The mean annual rainfall received is 255.7 mm at Gabyon. Rainfall received during the period January to October 2020 (to time of survey) was below average with 155.4 mm recorded at Yalgoo (mean 239.4 mm). Gabyon received average or below rainfall except in August and October 2020, with an extended dry period from March to June.

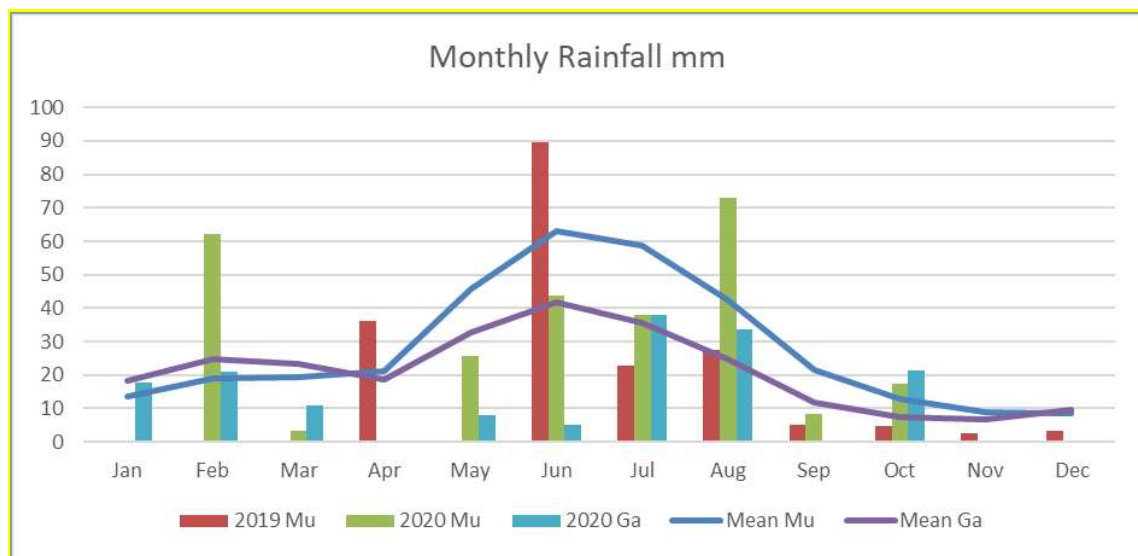


Figure 4: Monthly and long term monthly mean rainfall (Gabyon)

3.2 Land systems and regional vegetation

The Yalgoo-Ninghan Road intersection is situated on an alluvial plain at the base of the greenstone Woolgah-Wadgingarra Hills within the Yalgoo Bioregion and Talling subregion (Yal02).

Land systems and Pre-European Vegetation (PEV) mapping of the Yalgoo survey areas are shown in Figure 4 and Figure 5, and summarised in Table 1.



Geraldton-Mt Magnet Rd/Yalgoo-Ninghan Road – Intersection Upgrade

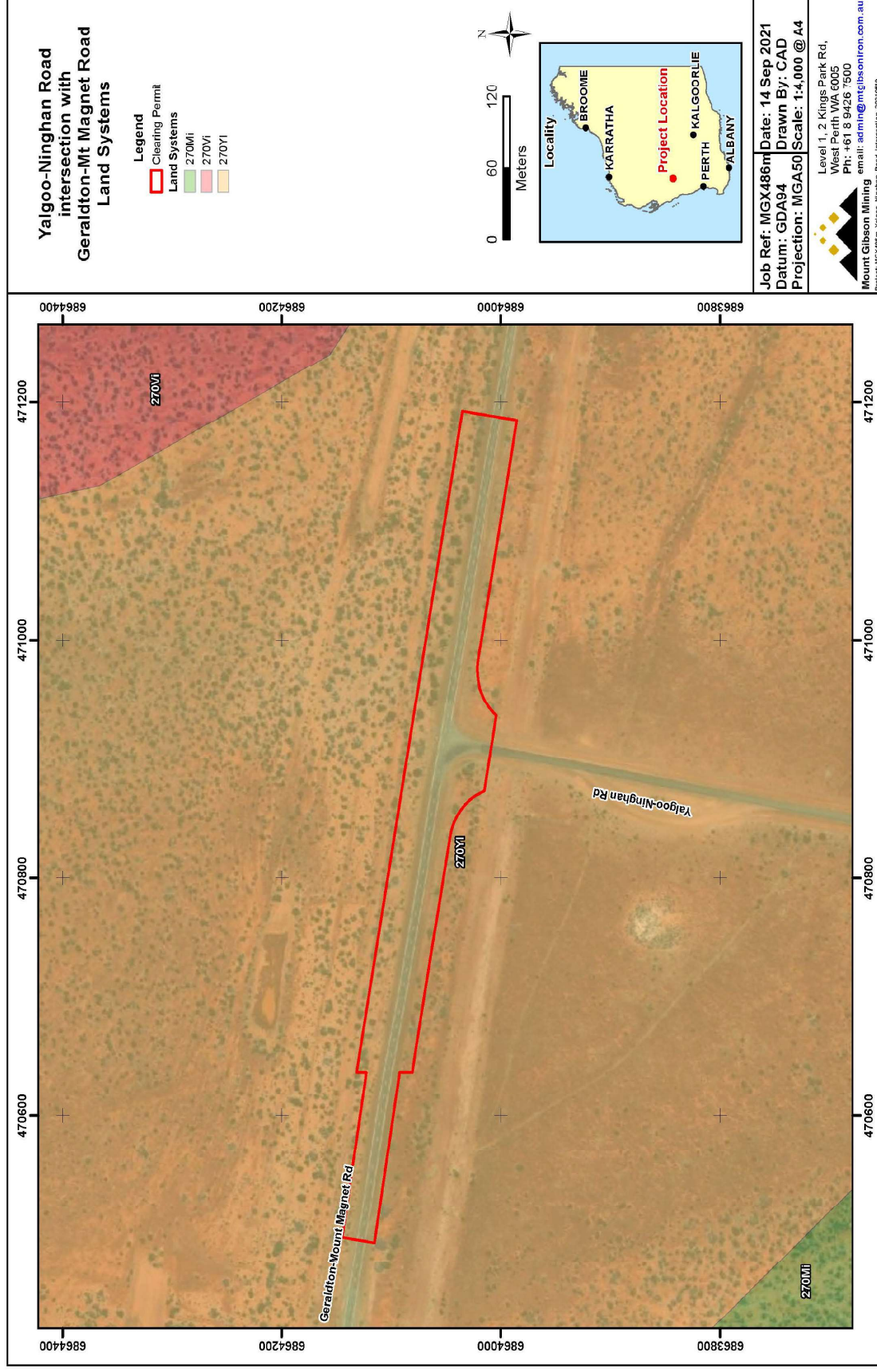


Figure 5: Land systems

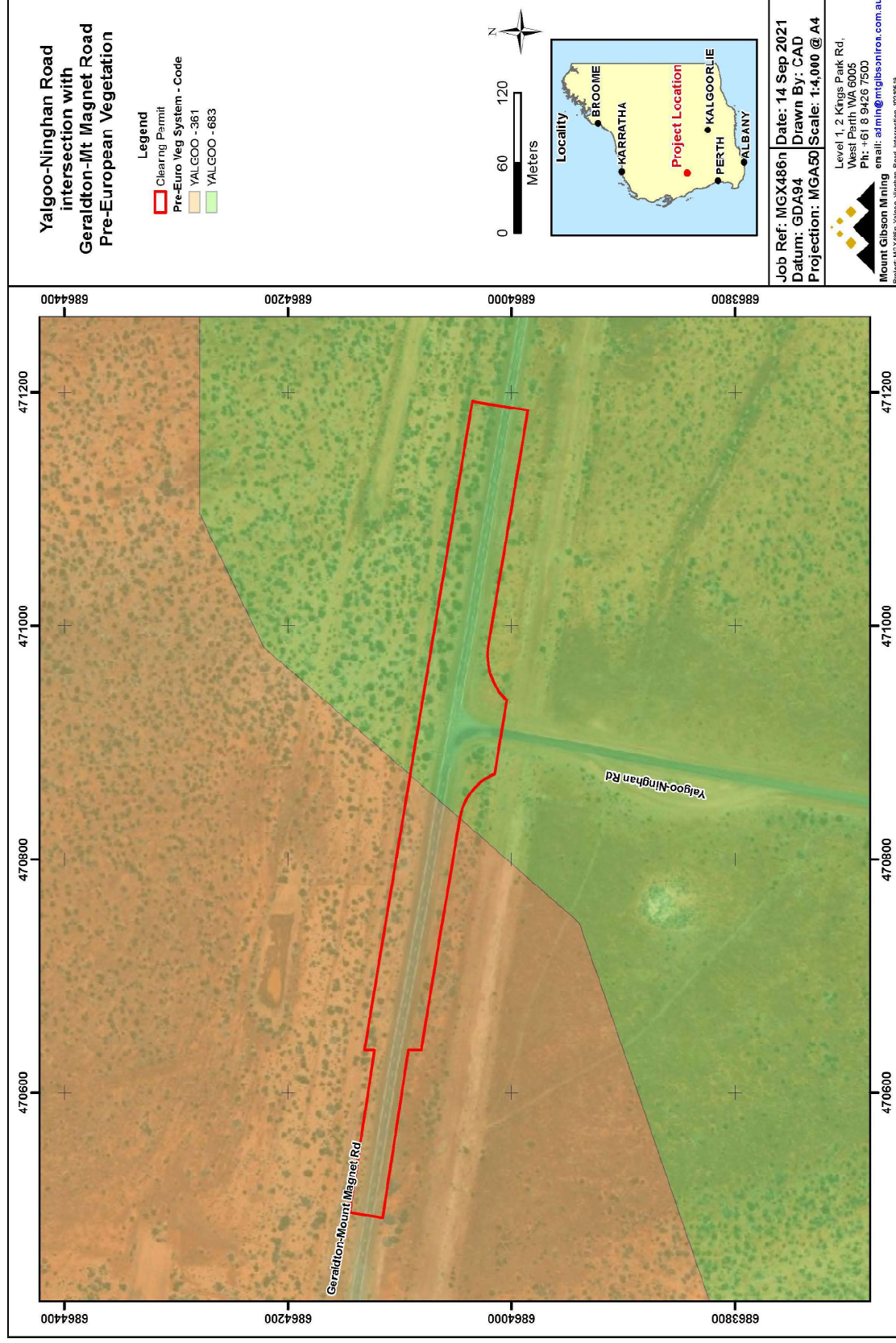


Figure 6: Pre-European vegetation

Table 2: Land systems and Pre-European Vegetation

Land System	Description	Area (ha)
Yalluwin	Hardpan plains and drainage tracts carrying concentrated flow, supporting mulga, curara and other acacia shrublands.	10.67
Violet	Gently undulating gravelly plains on greenstone, laterite and hardpan, with low stony rises and minor saline plains; supporting groved mulga and bowgada shrublands and occasionally chenopod shrublands.	0.95
PEV – Yalgoo 683	Succulent steppe with open scrub; scattered <i>Acacia sclerosperma</i> & snakewood over samphire	4.4
PEV – Yalgoo 361	Wattle with York gum, casuarina, mulga <i>Acacia</i> spp. with <i>Eucalyptus loxophleba</i> , <i>Allocasuarina</i> spp. <i>Acacia aneura</i> .	7.21

3.3 Flora and vegetation

A desktop assessment and targeted flora and vegetation survey of the survey area was undertaken in October 2020 by Jenny Borger Botanical Consultancy (Appendix 2). The objectives of the survey were to:

- undertake a desktop review of available information to determine the flora and vegetation values of the survey area
- provide a list of flora present within the survey area boundaries
- record locations of conservation significant flora
- map the vegetation associations within the survey area
- record the condition of the vegetation, including threats.

3.3.1 Desktop assessment

The desktop assessment identified the potential occurrence of three Priority Ecological Communities across the survey area:

- Midwest No. 2: Gullewa vegetation assemblages (banded ironstone formation) (P1). Includes Buddadoo Range, Edamura Range, Mugga Mugga Hill and Murdaburia Hill.
- Midwest No. 14: Yalgoo (Gnows Nest/Wolla Wolla and Woolgah-Wadgingarra) vegetation assemblages (banded ironstone formation) (P1). Includes Gnows Nest Range, Wolla Wolla and Woolgah-Wadgingarra Hills.
- Midwest No. 60: Wagga Wagga and Yalgoo Calcrete groundwater assemblage types on Yalgoo and Moore palaeodrainage on Wagga Wagga and Bunnawarra Stations.

The Midwest No. 2 PEC has been recorded in the Yalgoo region, with surveys carried out on Mugga Mugga Hill, Buddadoo Range, Edamura Range and Murdaburia Hill and is located south-west of Yalgoo.

The Midwest No. 14 PEC has been recorded from areas adjacent to Yalgoo, with a small portion of the buffer area of this PEC situated at the eastern end of the survey area.

The Midwest No. 60 PEC underlies Yalgoo and includes the entire survey area. The PEC refers to assemblages of invertebrates in groundwater.

The desktop assessment identified a total of 12 conservation significant flora taxa recorded in the Yalgoo region. Of these 12 taxa, two are *likely* to occur within the survey area, based on similar habitat and nearby occurrence, and three taxa possibly occur (these are lacking habitat description

but have been recorded in the local area, or from a broad range of habitats) (Table 2). The remaining taxa are unlikely to occur as there is no suitable habitat within the study areas.

Table 3: Conservation significant flora - likelihood of occurrence (LOC)

Taxon	Code	Habitat	LOC
<i>Grevillea globosa</i>	P3	Red loam, yellow sand; more often on lower slopes and plains; in tall <i>Acacia</i> shrublands	L
<i>Persoonia pentasticha</i>	P3	Range of habitats; slopes of granite or BIF hills, reddish brown clay loam on plains	L
<i>Eremophila viscida</i>	T	Granitic soils, sandy loam. Stony gullies, sandplains	P
<i>Goodenia neogoodenia</i>	P4	Red loam or clay, near water	P
<i>Triglochin protuberans</i>	P3	Winter-wet sites, claypans, near salt lakes, margins of pools	P

3.3.2 Field survey

Within the survey area, a total of 71 vascular taxa were recorded including 70 native species, one introduced species (*Mesembryanthemum nodiflorum*), and 1 planted species (*Eucalyptus loxophleba*).

Four vegetation types were identified and described within the survey area, although high levels of disturbance on the south side of Geraldton-Mt Magnet Road affected the description/mapping of vegetation:

- VT1 occurs predominantly on the northern side of the survey area, east of the intersection with Yalgoo-Ninghan Rd. It is distinguished from VT2 by the presence of Acacias within the mulga (*A. aneura*) complex.
- VT2 has patches in good condition interspersed with bare or degraded areas with isolated plants. *Acacia eremaea* and *Eremophila longifolia* are present and/or dominant in areas of least disturbance.
- VT3 is located at the western end of the survey area, north of Geraldton-Mt Magnet Rd within a drainage line/depression – the vegetation is denser in this area.
- VT4 occurs over a very small extent on the southwestern edge of the survey area. It is within the Yalgoo townsite and comprised planted Eucalyptus trees over a shrubland dominated by chenopod species.

Vegetation types and condition within the survey area and permit area are shown in Figure 6 and Figure 7.

No threatened or priority species, or vegetation representative of conservation significant ecological communities, occur within the survey areas.

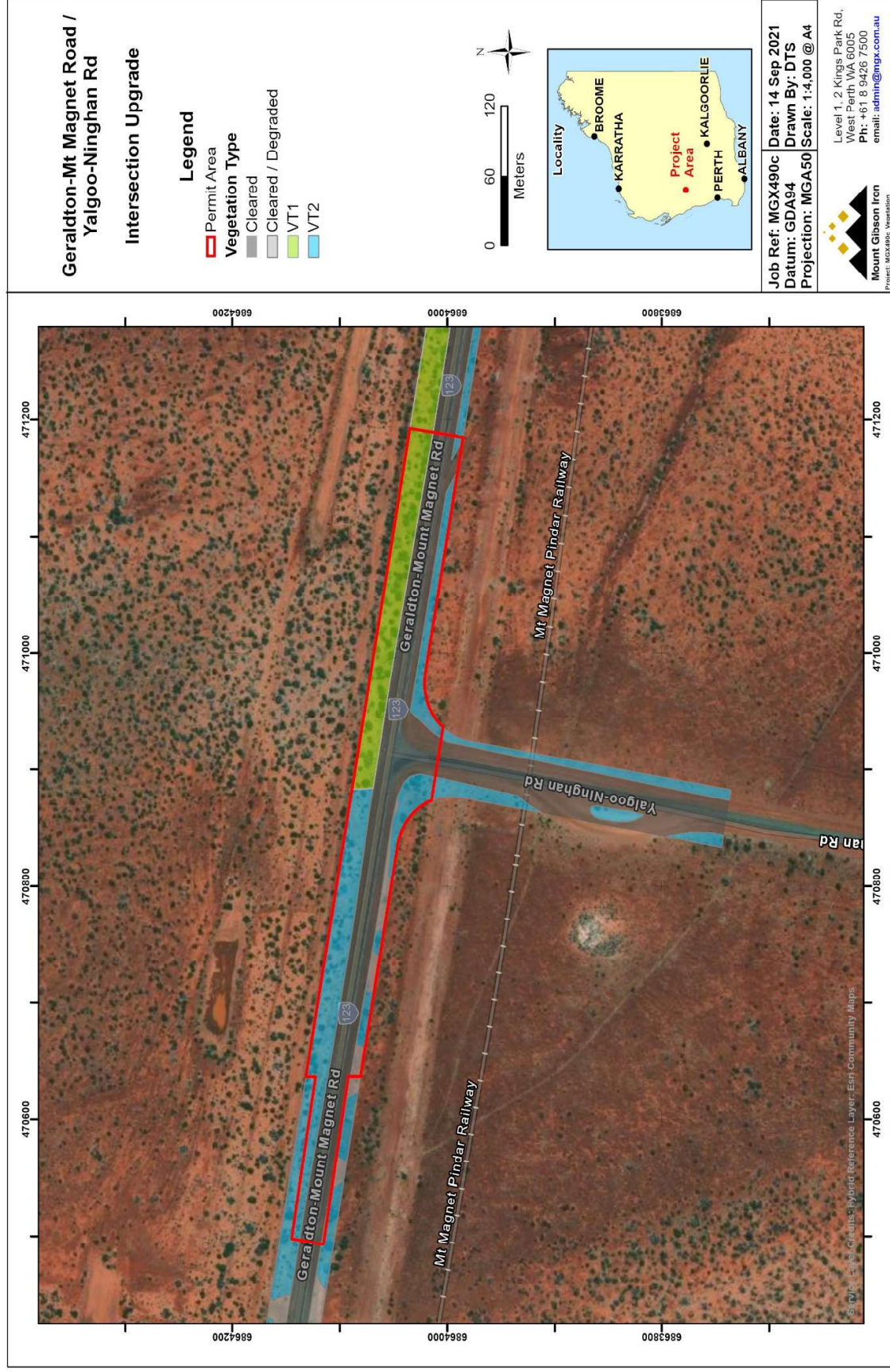


Figure 7: Vegetation types

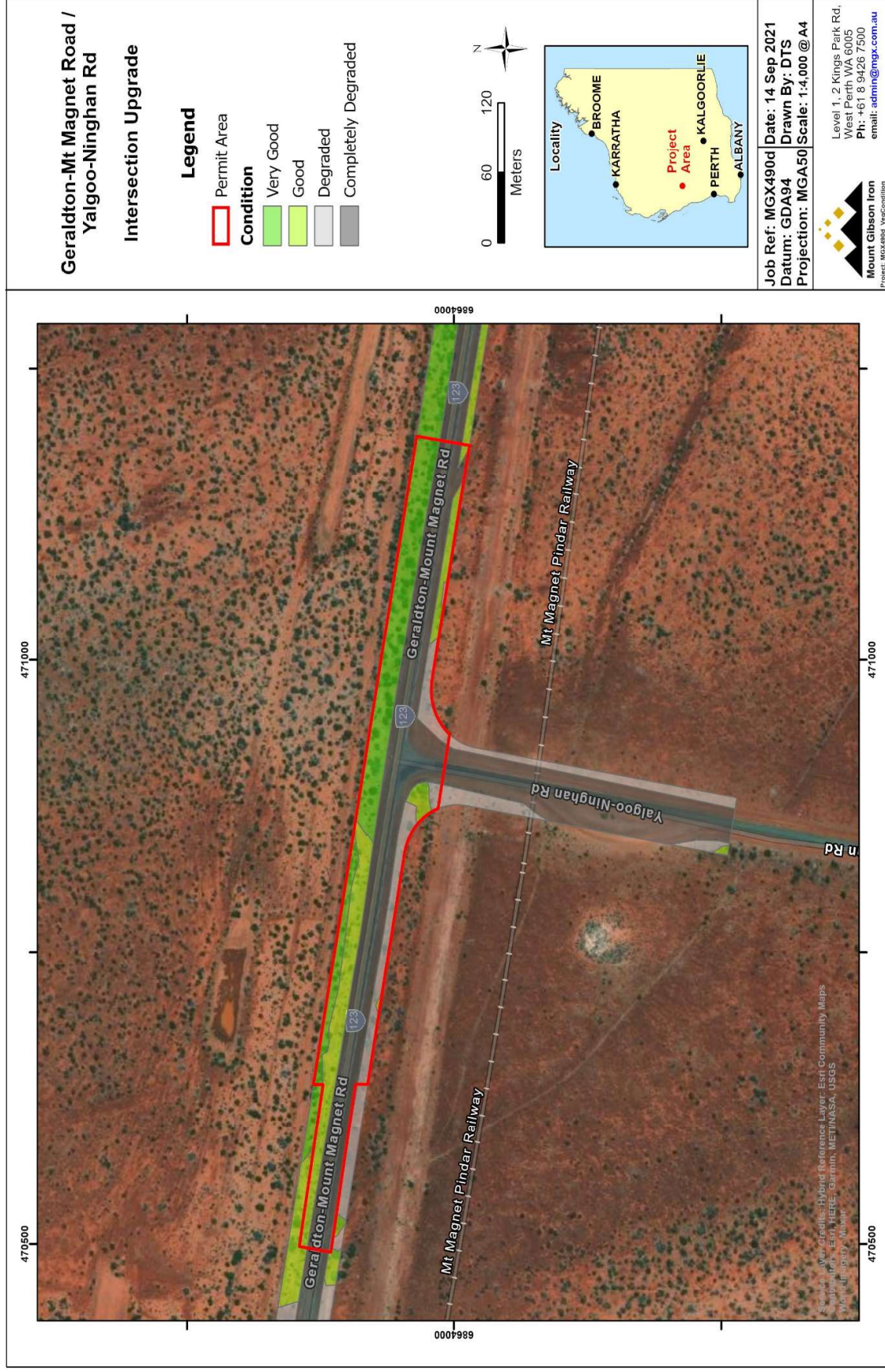


Figure 8: Vegetation condition

3.4 Fauna and habitat

A desktop fauna assessment of the survey area was undertaken based on searches of fauna records within DBCA's NatureMap database (using a 20 km radius from Yalgoo). Refer to Appendix 3 for a copy of the NatureMap report.

Based on the desktop fauna assessment, and the potential lack of significant fauna values, a survey of fauna habitats and values was not considered necessary.

3.4.1 Yalgoo survey area

The NatureMap search for the Yalgoo area identified records of 178 fauna species including 173 non-conservation taxa, two Threatened fauna taxa, one Priority-listed fauna taxa, one fauna species protected under international agreement and one fauna species that is specially protected. The conservation significant species are:

- Western Spiny-tailed Skink (*Egernia stokesii* subsp. *badia*) (T)
- Malleefowl (*Leipoa ocellata*) (T)
- Fork-tailed Swift (*Apus pacificus*) (IA)
- Peregrine Falcon (*Falco peregrinus*)(S)
- Western Grasswren (*Amytornis textilis* subsp. *textilis*) (P4)

A description of each of these species and their likelihood of occurrence within the survey area is provided in Table 3.

Table 4: Conservation significant fauna – Yalgoo survey area

Taxon	Conservation status	Distribution and habitat	Likelihood of occurrence
Western Spiny-tailed Skink (<i>Egernia stokesii</i> subsp. <i>badia</i>) (T)	Threatened	Occurs in open eucalypt woodlands and <i>Acacia</i> -dominated shrublands in semi-arid to arid areas of southwestern WA (Geraldton Sandplains and Yalgoo bioregions) and, depending on taxonomic clarification, around Shark Bay. It was widely distributed up until the 1960s; however clearing for agriculture has removed most of its potential habitat and the species has declined as a result of isolation through fragmentation (Pearson, 2012). It tends to shelter in logs, in cavities in the trunks and branches of shrubs, as well as in houses and ruins, especially in accumulations of old corrugated iron (Pearson, 2012).	Possible
Malleefowl (<i>Leipoa ocellata</i>) (T)	Threatened	Occurs in semi-arid to arid shrublands and low woodlands, especially those dominated by mallee and/or acacias. A sandy substrate and abundance of leaf litter are required for breeding.	Possible
Fork-tailed Swift (<i>Apus pacificus</i>)	Agreement	This migratory species has a very large range, wintering in southern Indonesia, Melanesia and Australia where it is found in arid areas as well as coastal areas. It is mainly an aerial species.	Possible
Peregrine Falcon (<i>Falco peregrinus</i>)	Specially protected	The Peregrine Falcon is wide-ranging, mobile and aerial in nature. It prefers areas with deep gorges or large cliff faces with riparian or plain habitat surrounding. It nests primarily on	Unlikely

Taxon	Conservation status	Distribution and habitat	Likelihood of occurrence
		ledges of cliffs, shallow tree hollows and ledges of building in cities (Morcombe, 2004).	
Western Grasswren (<i>Amytornis textilis</i> subsp. <i>textilis</i>)	Priority 4	Once occurred over much of southern WA but is now restricted to the Shark Bay region, where it inhabits acacia-dominated shrublands that feature chenopod plant species and recumbent shrubs where the foliage extends to the ground (DEC, 2000)	Unlikely

3.5 Surface water

The survey area is situated within the Northern Zone of Ancient Drainage hydrological zone within the South West drainage division. This hydrological zone is described as:

- Northern Zone of Ancient Drainage – An ancient plain of low relief and lateritic uplands on weathered granite. Ranges and stony plains in the northeast. No connected drainage, remnant salt lake chains occur in ancient drainage systems which now only function in very wet years.

Within the Northern Zone of Ancient Drainage, the survey area is situated within the Yarra Monger catchment. The Yarra Monger catchment comprises an extensive chain of ephemeral salt lakes, playas and samphire-covered claypans that stretch for about 300 km and cover an area of 250,000 ha. The major lakes in the system include Nullewa Lake, Weelhamby Lake, Mongers Lake, Lake DeCourey, Lake Hillman and Yarra Yarra Lake, which is the terminal point of the system (Fordyce, 2005).

In most years surface water does not flow through the Yarra Monger system, instead ponding in waterlogged depressions or poorly defined drainage lines and ultimately infiltrating to the groundwater (DEC, 2009). The drainage lines of the Yarra Monger system, together with the broad valley floors that host them, are becoming progressively saltier as saline groundwater nears the surface (DEC, 2009). Across much of the subregion, groundwater is within 1-2 m of the surface (Fordyce, 2005).

Drainage within the survey area occurs generally from north to south, perpendicular to Geraldton-Mt Magnet Road, towards a chain of playas that 'flow' in an easterly direction to the south of Yalgoo township. Drainage within the survey area is broadly associated with VT2, VT3 (in particular) and VT4.

At the western end of the survey area there is a drainage line/depression on the northern side of Geraldton-Mt Magnet Road associated with VT3 (the vegetation is denser in this area). VT4 is mapped as occurring with the Violet land system and supports groved *Acacia* tall shrublands within a drainage line. It is located at the western end of the survey area south of Geraldton-Mt Magnet Road.

3.6 Groundwater

The Yalgoo townsite is situated on a greenstone belt of Archaean age within the Yilgarn Craton. Groundwater is found within weathered and fresh fractured rock, generally 13-21 metres below ground level (DoW, 2010).

Yalgoo's drinking water comes from the Yalgoo borefield, located approximately 4.5 km northeast of the town. The borefield is situated within the Proclaimed Yalgoo Water Reserve, the southern boundary of which abuts Geraldton-Mt Magnet Road. This southern boundary was proposed to be moved northwards to exclude townsite areas and follow cadastral boundaries for ease of planning (DoW, 2010).

The Yalgoo borefield draws water from an unconfined, fractured rock aquifer that is thought to be recharged from direct infiltration of rainfall. The unconfined nature of the aquifer makes it vulnerable to contamination from surrounding uses (DoW, 2010).

There is a large southwest trending drainage line about 8 km northwest of the Yalgoo borefield, which carries water to the west of Yalgoo townsite and into a salt lake system associated with the Yarra Monger catchment. Groundwater is inferred to flow to the southwest with salinity ranging from 750 mg/L to over 1,000 mg/L TDS (DoW, 2010).

3.7 Land and soils

The land and soils of the permit area, including land degradation risk, are described here as per van Gool et al's (2005) assessment of land qualities and land capability in south-western Australia. The boundaries of the various soil zones, systems, subsystems and phases are shown in Figure 10 (Yalgoo).

The permit area is situated within the Karrara Hills, Plains and Lakes soil-landscape zone (270), comprising hills and ranges, sandy plains, hardpan wash plains, stony plains and salt lakes on greenstone and granitic rocks of the Yilgarn Craton with Red Shallow loams, Red loamy earths, Red deep sands and Salt lake soils.

Within the Karrara Hills, Plains and Lakes Zone, the permit area is wholly within the Yalluwin System (270YI), described as hardplan plans and drainage tracts carrying concentrated flow, supporting mulga, curara and other acacia shrublands.

3.8 Land degradation

Land degradation occurs as a result of a variety of processes including soil erosion, salinity, nutrient export, acidification, waterlogging and flooding.

Land degradation risk within the permit area is assessed in Table 5, based on land quality attribution associated with soil-landscape mapping at the subsystem/phase level (van Gool et al, 2005). The risk ratings are based on the criteria outlined in Table 6.

Note that there is no assessment information available in relation to erosion, waterlogging and flood risk within the survey area.

Table 5: Land degradation risk

Map unit	Name	Land degradation process				
		Acidity	Salinity	Erosion	Waterlogging	Flood
270YI	Yalluwin	L1	L1	N/a	N/a	N/a
270Vi	Violet	L1	L1	N/a	N/a	N/a

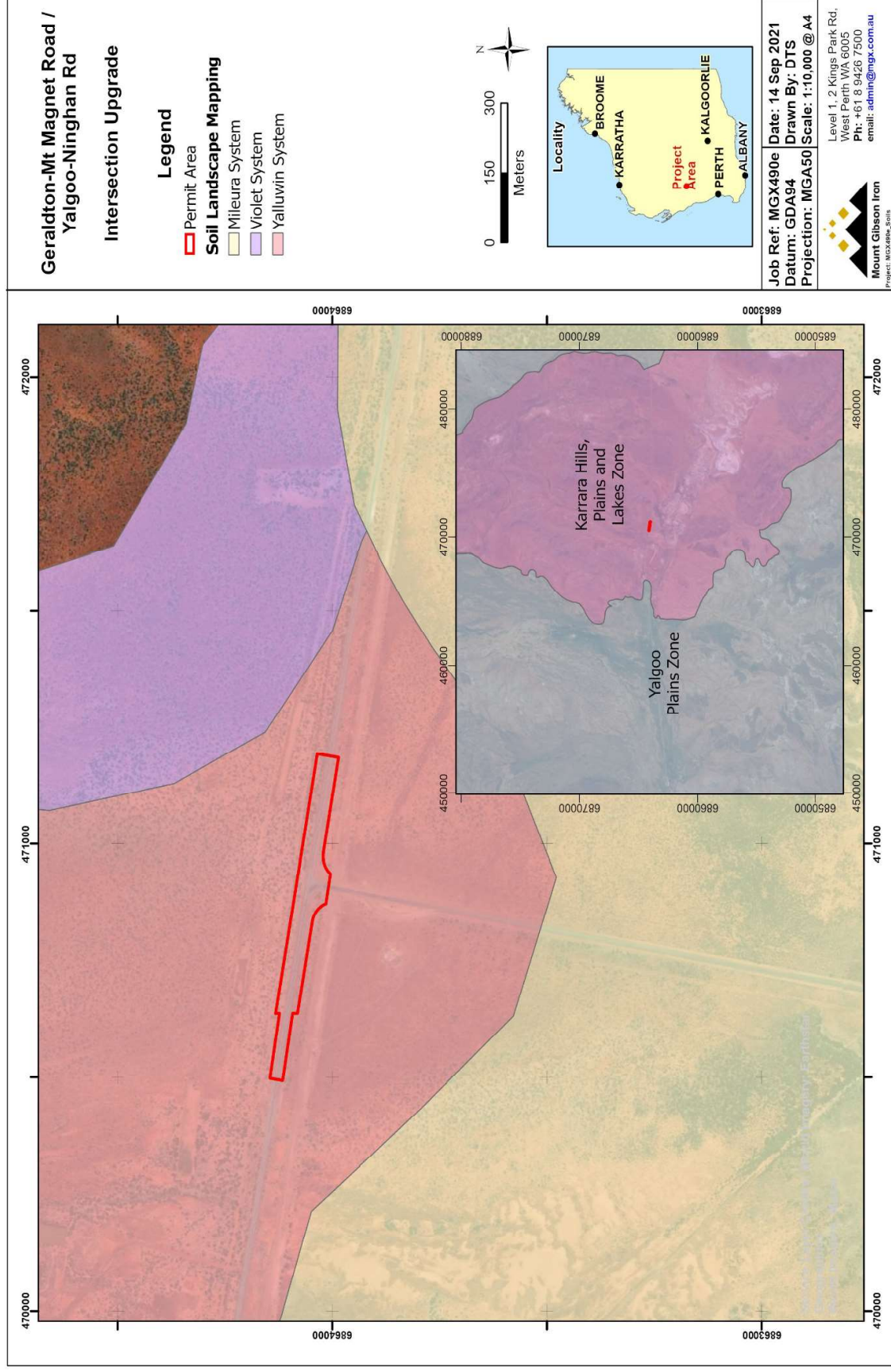


Figure 9: Soils landscape zones and units

Table 6: Land degradation risk rating key

Risk Rating	Description				
	Acidity	Salinity	Erosion	Waterlogging	Flood
L1	< 3% of map unit has pHCa <4.5	< 3% of map unit has moderate to high salinity risk or is presently saline	<3% of map unit has a high to extreme water erosion risk	<3% of map unit has a moderate to very high waterlogging risk	<3% of map unit has a moderate to high flood risk
L2	-	3-10% of map unit has a moderate to high salinity risk or is presently saline	3-10% of map unit has a high to extreme water erosion risk	-	3-10% of the map unit has a moderate to high flood risk
H1	-	50-70% of map unit has a moderate to high salinity risk or is presently saline	-	-	-
H2	-	>70% of map unit has a moderate to high salinity risk or is presently saline	-	>70% of map unit has a moderate to very high waterlogging risk	-
N/a	-	-	Not assessed		

4 Environmental Management

MGM has an Environmental Management System (EMS) for the Shine Iron Ore Project, inclusive of plans, procedures and forms to minimise the routine environmental effects of activities such as:

- unauthorised clearing (clearing outside of approved areas)
- importing materials and vehicles/machinery contaminated with weeds
- spillage of hydrocarbons
- surface water drainage
- dust

A list of the plans and procedures for the Project is provided in Table 7. These are considered sufficient to manage the potential environmental effects of the proposed clearing of native vegetation.

Table 7: Shine Iron Ore Project EMS documents

Document Number	Document Name
MGM-HSEC-SH-PLN-899 EMP-REV1	SIOP Environmental Management Plan
MGM-HSEC-SH-SWI-801	Ground Disturbance
MGM-HSEC-SH-SWI-802	Storage, Use and Disposal of Hazardous Substances
MGM-HSEC-SH-SWI-803	Surface Water Management
MGM-HSEC-SH-SWI-804	Waste Management
MGM-HSEC-SH-SWI-805	Dust Management
MGM-HSEC-SH-SWI-806	Vegetation Health Monitoring
MGM-HSEC-SH-SWI-807	Flora Management
MGM-HSEC-SH-SWI-808	Weed and Hygiene Management
MGM-HSEC-SH-SWI-809	Fauna Management
MGM-HSEC-SH-SWI-810	Heritage Management
MGM-HSEC-SH-SWI-811	Topsoil, Subsoil and Cleared Vegetation Management
MGM-HSEC-SH-FRM-801 FM01	Ground Disturbance Request Form
MGM-HSEC-SH-FRM-801 FM02	Ground Disturbance Assessment Form
MGM-HSEC-SH-FRM-801 FM03	Ground Disturbance Authorisation Form
MGM-HSEC-SH-FRM-801 FM04	Ground Disturbance Release Form
MGM-HSEC-SH-FRM-802 FM02	Hazardous Substances Inspection Form
MGM-HSEC-SH-FRM-803 FM01	Erosion Inspection Form
MGM-HSEC-SH-FRM-804 FM01	Landfill Inspection Form
MGM-HSEC-SH-FRM-804 FM02	Site Landfilling Conditions of Use Form
MGM-HSEC-SH-FRM-805 FM01	Dust Inspection Form
MGM-HSEC-SH-FRM-811 FM01	Topsoil Inspection Form

5 Assessment against the Clearing Principles

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

Native vegetation (Yalgoo 361 and Yalgoo 683 vegetation associations) within the permit area is widespread both locally and regionally, and substantial areas of these vegetation associations occur in lands managed for conservation.

The broader survey area contains 70 native flora species and four vegetation types. Within the permit area, there are two vegetation types (VT1, VT2) overlying a single soil type (Yalluwin System). VT2 comprises 2.1 ha of the total extent (3.0 ha) of native vegetation in this section of the permit area, of which 1.4 ha is in good-very good condition.

The permit area is underlain by the Midwest PEC No. 60 Wagga Wagga and Yalgoo Calcrete groundwater assemblage types.

No threatened or priority flora species or vegetation representative of conservation significant ecological communities were recorded in the permit area, or the broader survey area. The native vegetation within the permit area is not representative of an area of high biodiversity, nor does it support the whole, or a part of, a significant population of priority flora.

The proposed clearing of native vegetation within the permit area is therefore not at variance with this principle.

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

The desktop fauna assessment identified the following conservation significant fauna species as possibly occurring within the permit area, based on previous records of these species within a 20 km radius of the Yalgoo townsites:

- Western Spiny-tailed Skink (*Egernia stokesii* subsp. *badia*) (T)
- Malleefowl (*Leipoa ocellata*) (T)
- Fork-tailed Swift (*Apus pacificus*) (IA)

None of the above conservation significant species were considered *likely* to occur within the permit area, based on the lack of suitable habitat, the overall condition of native vegetation as habitat for these species, and the proximity to Yalgoo townsites as well as Geraldton-Mt Magnet Road.

The proposed clearing of native vegetation within the permit area is therefore not at variance with this principle.

Principle (c): Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora.

No rare (threatened) flora were recorded within the survey area. The vegetation that is proposed to be cleared does not include, nor is it necessary for the continued existence of rare flora.

The proposed clearing of native vegetation within the permit area is therefore not at variance with this principle.

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

There are no threatened ecological communities within the survey area. The native vegetation proposed to be cleared does not comprise the whole or a part of, nor is it necessary for the maintenance of, a threatened ecological community.

The proposed clearing of native vegetation within the permit area is therefore not at variance with this principle.

Principle (e): Native vegetation should be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.

The permit area has a total extent of 3.5 ha, of which 1.7 ha (49 %) has been cleared for Geraldton-Mt Magnet Road and the associated intersection with Yalgoo-Ninghan Road, leaving 1.8 ha of native vegetation. Of the remaining native vegetation:

- 1.7 ha is remnant vegetation, mapped as VT1 (0.6) and VT2 (1.1 ha).
- 0.1 ha is mapped as 'Cleared/degraded' i.e. no vegetation type able to be identified

A comparison of the remnant vegetation against Beard's vegetation association mapping for the survey area is provided in Table 8.

The Yalgoo 361 and Yalgoo 683 vegetation associations each have more than 99% of their Pre-European extent remaining. These broad vegetation associations have therefore not been extensively cleared.

Table 8: Vegetation extents

Association	PE Extent (ha)	Current Extent (ha)	% remaining	PE extent DBCA managed land (ha)	Current extent DBCA managed land (ha)	% current extent DBCA managed land
Yalgoo 361	76,381	76,354	99.97	20,831	20,831	27.27
Yalgoo 683	50,075	49,732	99.32	17,695	17,366	34.92

The proposed clearing of native vegetation within the permit area is therefore not at variance to this principle.

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.

Native vegetation within the permit is not growing in, or in association with, an environment associated with a watercourse or wetland.

The proposed clearing of native vegetation within the permit area is therefore not at variance with this Principle.

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

There is a low risk of acidity within the permit area and a low risk of salinity within the permit area.

Whilst there is no erosion, waterlogging and flood risk information for the permit area; it is not likely that this area is subject to these risks, based on soil types and topography.

The proposed clearing of native vegetation within the permit area is therefore not at variance with this principle.

Principle (h): Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.

The nearest conservation area to the permit area is a parcel of Unallocated Crown Land about 20km to the east of the survey area. This land is of interest to DBCA as former leasehold land proposed for conservation – ex Barnong Station.

Ex Barnong Station comprises four priority 1 ecological communities, nine threatened and priority plant species and four threatened and priority animal species. It features numerous saline waterholes and wetlands as well as lignum-dominated swamps (Dougless et al., 2019).

The proposed clearing of vegetation within the permit area is not likely to have an impact on the environmental values of nearby conservation areas, or proposed conservation areas, based on the small extent of clearing of native vegetation (up to 1.1 ha) and the considerable distance to these conservation areas.

The proposed clearing of native vegetation within the permit area is therefore not at variance with this principle.

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 permanent surface water features within or adjacent to the permit area.

The permit area is situated immediately south of the Yalgoo Proclaimed Water Reserve, where the depth to water is at least 8 m below ground surface. The absence of any secondary salinity or evidence of waterlogging in the permit area indicates that groundwater is not in proximity to the surface and that the removal of small extent of native vegetation is not likely to cause deterioration in the quality of groundwater.

The proposed clearing of native vegetation within the permit area is therefore not at variance with this principle.

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

The area of native vegetation within the permit area is less than 10 ha. Clearing of up to 1.1 ha of this vegetation is not expected to result in waterlogging (localised flooding), nor exacerbate the occurrence of waterlogging in the vicinity of Yalgoo-Ninghan Road. Waterlogging has been considered in further detail under principle (g).

The proposed clearing of native vegetation within the permit boundary is therefore not at variance with this principle.

6 References

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APPENDICES

Appendix 1:

Landowner Authority and Ownership



Enquiries: [REDACTED]

Our Ref: 20/7407

28/09/2021

Department of Water and Environmental Regulation
Prime House
8 Davidson Terrace
JOONDALUP WA 6027

Dear Sir / Madam

**LETTER OF AUTHORITY TO CLEAR NATIVE VEGETATION IN
MAIN ROADS ROAD RESERVE – GERALDTON MT MAGNET ROAD**

I refer to Mount Gibson Mining Limited's application to clear native vegetation for the upgrade of the intersection between Geraldton Mt Magnet Road and Yalgoo-Ninghan Road, located east of Yalgoo townsite. The proposed clearing of native vegetation will occur on the following properties for which Main Roads Western Australia (Main Roads) is the responsible agency:

Property	Title Reference	Polygon Identification No. (PIN)	Type	Ownership
Lot 322 on DP43529	LR3164/714	11911450	Road (GMM Road)	State of WA (MRWA)
		11911449	Road (YN Road)	State of WA (MRWA)
Lot 323 on DP43529	LR3164/715	11911451	Road (YN Road)	State of WA (MRWA)
Lot 355 on DP433536	LR3167/694	11943744	Road (GMM Road)	State of WA (MRWA)
Road Reserve	N/a	11743800	Road (GMM Road)	MRWA
Road Reserve	N/a	11663841	Road (GMM Road)	MRWA

Main Roads understands that widening of the intersection is required to accommodate a higher frequency of road trains on this route and maintain public safety.

Main Roads notes that MGM intends to undertake the clearing in accordance with a Native Vegetation Clearing Permit. As the responsible agency for the above properties, Main Roads advises DWER that MGM is authorised to clear native vegetation on its behalf for the purpose of the intersection upgrade.



mainroads
WESTERN AUSTRALIA

Should you require further information, please contact [REDACTED] Environment Officer
Mid-West Gascoyne or [REDACTED] or via email to [REDACTED]

Yours sincerely

Hamson

[REDACTED]
[REDACTED]

Mid West-Gascoyne Region

WESTERN



AUSTRALIA

REGISTER NUMBER

322/DP43529DUPLICATE
EDITION
N/ADATE DUPLICATE ISSUED
N/AVOLUME
LR3164FOLIO
714

**RECORD OF CERTIFICATE
OF
CROWN LAND TITLE
UNDER THE TRANSFER OF LAND ACT 1893
AND THE LAND ADMINISTRATION ACT 1997
NO DUPLICATE CREATED**

The undermentioned land is Crown land in the name of the STATE OF WESTERN AUSTRALIA, subject to the interests and Status Orders shown in the first schedule which are in turn subject to the limitations, interests, encumbrances and notifications shown in the second schedule.

BGRoberts
REGISTRAR OF TITLES



LAND DESCRIPTION:

LOT 322 ON DEPOSITED PLAN 43529

**STATUS ORDER AND PRIMARY INTEREST HOLDER:
(FIRST SCHEDULE)**

STATUS ORDER/INTEREST: ROAD

PRIMARY INTEREST HOLDER: STATE OF WESTERN AUSTRALIA

**LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)**

1. L910297 TAKING ORDER. THE DESIGNATED PURPOSE OF ROAD (GERALDTON - MT MAGNET ROAD).
REGISTERED 17/4/2012.
2. M569128 DEDICATED ROAD REGISTERED 6/3/2014.

Warning: A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required.
Lot as described in the land description may be a lot or location.

-----END OF CERTIFICATE OF CROWN LAND TITLE-----

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND: DP43529
PREVIOUS TITLE: LR3071-927, LR3074-607
PROPERTY STREET ADDRESS: NO STREET ADDRESS INFORMATION AVAILABLE.
LOCAL GOVERNMENT AUTHORITY: SHIRE OF YALGOO
RESPONSIBLE AGENCY: MAIN ROADS WESTERN AUSTRALIA (ROAD)

NOTE 1: M569128 CORRESPONDENCE FILE 00087-2013-01RO

WESTERN



AUSTRALIA

REGISTER NUMBER

323/DP43529DUPLICATE
EDITION
N/ADATE DUPLICATE ISSUED
N/AVOLUME
LR3164FOLIO
715

**RECORD OF CERTIFICATE
OF
CROWN LAND TITLE
UNDER THE TRANSFER OF LAND ACT 1893
AND THE LAND ADMINISTRATION ACT 1997
NO DUPLICATE CREATED**

The undermentioned land is Crown land in the name of the STATE OF WESTERN AUSTRALIA, subject to the interests and Status Orders shown in the first schedule which are in turn subject to the limitations, interests, encumbrances and notifications shown in the second schedule.

BGRoberts
REGISTRAR OF TITLES

**LAND DESCRIPTION:**

LOT 323 ON DEPOSITED PLAN 43529

**STATUS ORDER AND PRIMARY INTEREST HOLDER:
(FIRST SCHEDULE)**

STATUS ORDER/INTEREST: ROAD**PRIMARY INTEREST HOLDER:** STATE OF WESTERN AUSTRALIA

**LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)**

1. M569128 DEDICATED ROAD REGISTERED 6/3/2014.

Warning: A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required.
Lot as described in the land description may be a lot or location.

-----END OF CERTIFICATE OF CROWN LAND TITLE-----

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND: DP43529
PREVIOUS TITLE: LR3164-715
PROPERTY STREET ADDRESS: NO STREET ADDRESS INFORMATION AVAILABLE.
LOCAL GOVERNMENT AUTHORITY: SHIRE OF YALGOO
RESPONSIBLE AGENCY: MAIN ROADS WESTERN AUSTRALIA (ROAD)

NOTE 1: M569128 CORRESPONDENCE FILE 00087-2013-01RO

WESTERN



AUSTRALIA

REGISTER NUMBER

355/DP43536DUPLICATE
EDITION
N/ADATE DUPLICATE ISSUED
N/AVOLUME
LR3167FOLIO
694

**RECORD OF CERTIFICATE
OF
CROWN LAND TITLE
UNDER THE TRANSFER OF LAND ACT 1893
AND THE LAND ADMINISTRATION ACT 1997
NO DUPLICATE CREATED**

The undermentioned land is Crown land in the name of the STATE OF WESTERN AUSTRALIA, subject to the interests and Status Orders shown in the first schedule which are in turn subject to the limitations, interests, encumbrances and notifications shown in the second schedule.

BGRoberts
REGISTRAR OF TITLES

**LAND DESCRIPTION:**

LOT 355 ON DEPOSITED PLAN 43536

**STATUS ORDER AND PRIMARY INTEREST HOLDER:
(FIRST SCHEDULE)**

STATUS ORDER/INTEREST: ROAD**PRIMARY INTEREST HOLDER:** STATE OF WESTERN AUSTRALIA

**LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)**

1. N514511 DEDICATED ROAD REGISTERED 20/12/2016.

Warning: A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required.
Lot as described in the land description may be a lot or location.

-----END OF CERTIFICATE OF CROWN LAND TITLE-----

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND:	DP43536
PREVIOUS TITLE:	LR3122-726
PROPERTY STREET ADDRESS:	NO STREET ADDRESS INFORMATION AVAILABLE.
LOCAL GOVERNMENT AUTHORITY:	SHIRE OF YALGOO
RESPONSIBLE AGENCY:	MAIN ROADS WESTERN AUSTRALIA (ROAD)

NOTE 1: N514504 CORRESPONDENCE FILE 02055-1998-01RO

Appendix 2:

Targeted Flora and Vegetation Survey (Borger, 2021)

Targeted vegetation and flora survey – Geraldton Mt Magnet Road:

Mullewa – Mingenew and Messina Road Intersections MGX420a

Yalgoo – Ninghan Intersections MGX420

Mt Gibson Mining Ltd

March 2021



Jenny Borger Botanical Consulting

[REDACTED]

E: [REDACTED]

Mobile: [REDACTED]

ABN 29 082 526 297

Executive Summary

Mount Gibson Mining (MGM) is the owner/operator of the Shine Iron Ore Project (Shine) located 68 km south-east of Yalgoo Western Australia's Midwest Region. MGM also owns the Ruvidini rail siding situated 2 km west of Mullewa. Haulage of ore from Shine to Ruvidini rail siding is proposed to occur via Yalgoo-Ninghan Road and Geraldton-Mt Magnet Road, the latter of which is managed by Main Roads Western Australia (MRWA). Several intersections along the Geraldton-Mt Magnet Road will require upgrading to comply with MRWA safety guidelines. The intersection upgrades will involve clearing of native vegetation within the road reserve.

A targeted flora and vegetation survey of two areas was undertaken in October 2020 – one located east of Yalgoo (11.6 ha), and one located west of Mullewa (11.2 ha). The survey targeted conservation significant flora (CSF) and vegetation assemblages representative of threatened or priority ecological communities (PEC/ TEC).

No CSF or vegetation representative of PECs/ TECs was recorded in either the Yalgoo or Mullewa survey areas. The Yalgoo survey area is underlain by the Wagga Wagga and Yalgoo Calcrete groundwater assemblage types on Yalgoo and Moore palaeodrainage on Wagga Wagga and Bunnawarra Stations (assemblages of invertebrates in groundwater).

Both the Yalgoo and Mullewa survey areas had moderate to high levels of disturbance that has impacted vegetation structure and possibly species presence/ absence.

A total of 71 vascular taxa were recorded in the Yalgoo survey area which included 70 native species and 1 introduced species. Native flora were recorded from 16 families and 32 genera, with the best represented families being Fabaceae (19 taxa – 10 *Acacia* and 9 *Senna*); Chenopodiaceae (7 genera and 13 spp.); Amaranthaceae (8 spp. from 1 genus - *Ptilotus*); and Scrophulariaceae (7 spp. from 1 genus – *Eremophila*). Four vegetation types (VT) were described from species present.

A total of 65 vascular taxa were recorded in the Mullewa survey area, including 49 native taxa (5 planted) and 16 weeds. Native flora were recorded from 19 families and 32 genera, with the best represented families being Chenopodiaceae (11 spp. from 7 genera); Fabaceae (9 spp. from 2 genera) and Poaceae (6 spp. from 5 genera).

No vegetation types described for the survey areas are representative of restricted vegetation types. Flora recorded at both sites are expected flora. No range extensions were recorded.

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1. Introduction

1.1 Background

Mount Gibson Mining (MGM) is the owner/operator of the Shine Iron Ore Project (Shine) located 68 km south-east of Yalgoo Western Australia's Midwest Region. MGM also owns the Ruvidini rail siding situated 2 km west of Mullewa. Haulage of ore from Shine to Ruvidini rail siding is proposed to occur via Yalgoo-Ninghan Road and Geraldton-Mt Magnet Road, the latter of which is managed by Main Roads Western Australia (MRWA). Several intersections along the Geraldton-Mt Magnet Road will require upgrading to comply with MRWA safety guidelines. The intersection upgrades will involve clearing of native vegetation within the road reserve.

MGM requested Jenny Borger Botanical Consultancy (JBBC) undertake a targeted vegetation and flora survey within the MRWA road reserves. There are two survey sites – 1) MGX420 Shine Iron Ore Project Intersection Eastern Upgrade located on the western side of Yalgoo at the intersection of the Yalgoo-Ninghan Rd and Geraldton Mt Magnet Rd (Figure 1) – 11.6 ha, and 2) MGX420a Shine Iron Ore Project Intersection Western Upgrade located west of Mullewa and includes two intersections – 2a) Mingenew-Mullewa Rd and Geraldton Mt Magnet Rd, and 2b) Messina Rd access to Ruvidini Rail Siding and Geraldton Mt Magnet Rd (Figure 2) – 11.2 ha.

The surveys were undertaken on the 29th October 2020. Both survey areas are located within highly disturbed road reserves and adjacent areas.

The objectives of the survey were to:

- Desktop review of available information to determine the flora and vegetation values of the areas
- Undertake a targeted flora and vegetation survey as described in the Environmental Protection Authority (2018) Technical Guidance for Flora and Vegetation Surveys for Environmental Impact Assessment including:
 - Provide a list of flora present within the survey boundaries supplied by MGM
 - Record locations of conservation significant flora
 - Undertake and provide mapping of the vegetation associations within the survey areas
 - Record the condition of the vegetation including threats

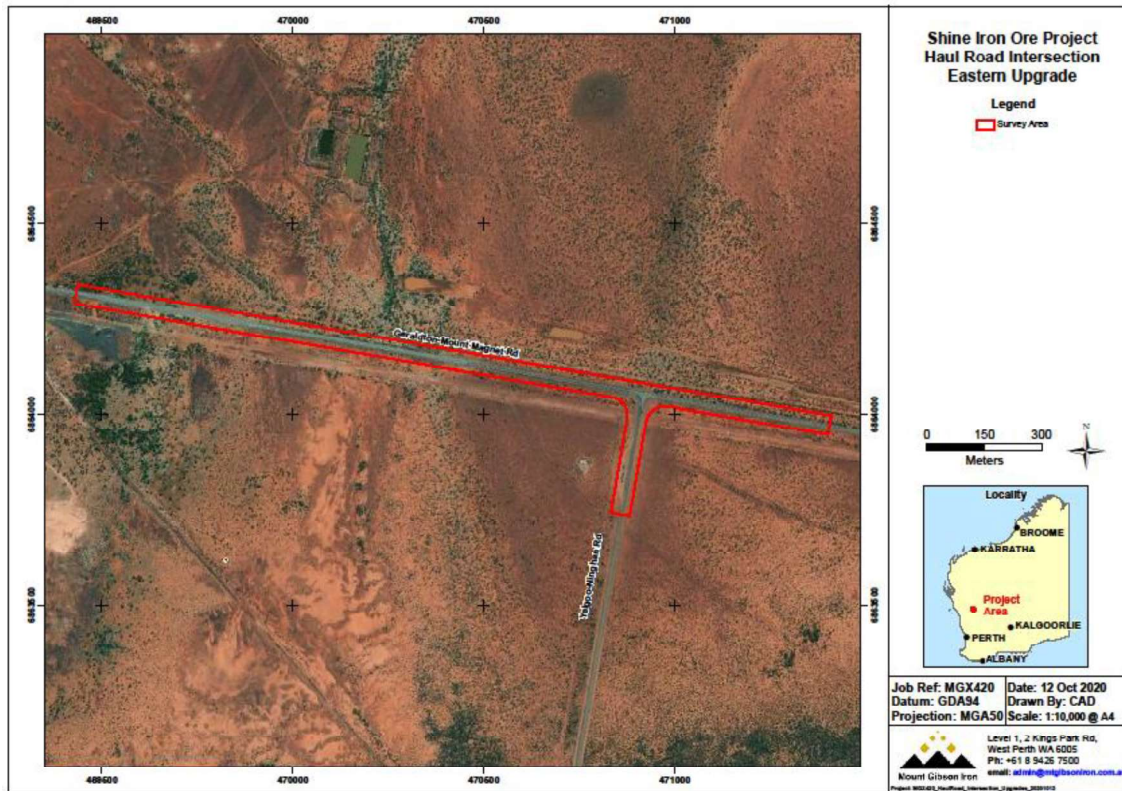


Figure 1: MGX420: Yalgoo-Ninghan Road – Geraldton-Mt Magnet Road Intersection survey area

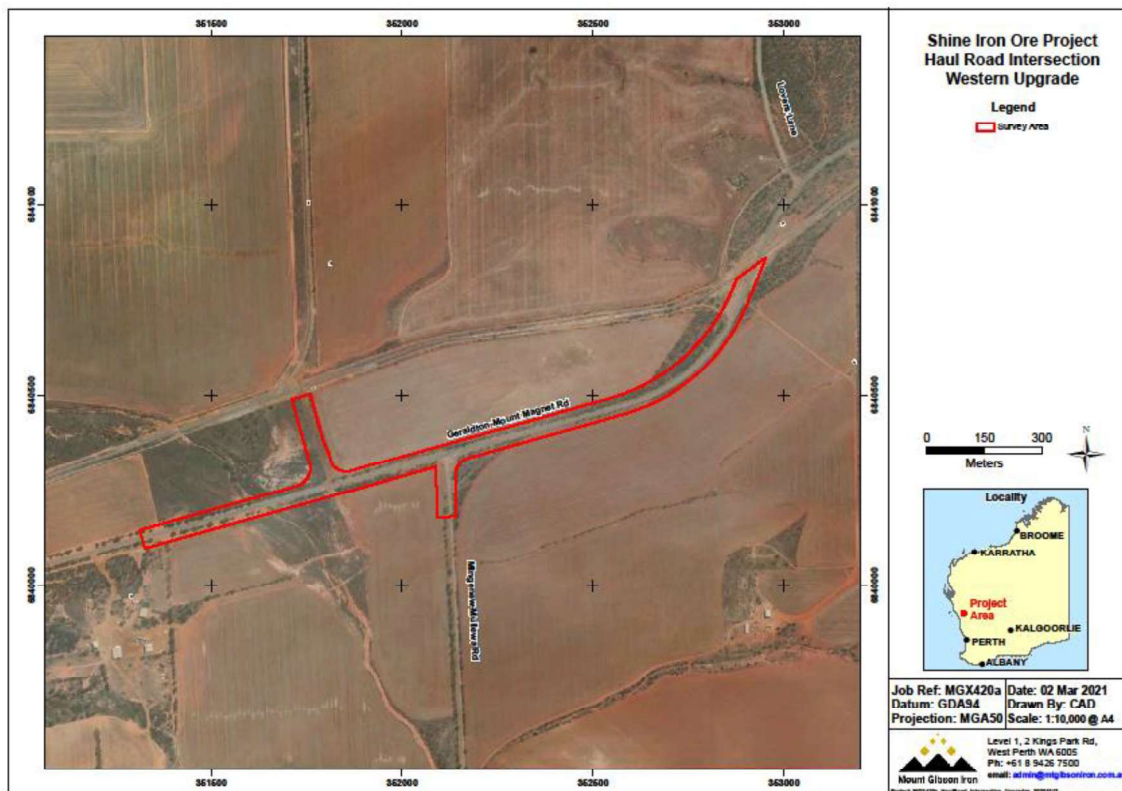


Figure 2: MGX420a: Intersection upgrade west of Mullewa survey area

1.2 Environmental Setting

1.2.1 Climate

MGX420 (Yalgoo) is located within the interzone between the wetter south west province and the semi-arid Eremaean province. The nearest long-term Bureau of Meteorology (BOM) recording station is located at Gabyon (BOM Station 7027, 1888 – 2020). MGX420a (Mullewa) is located at the eastern edge of the south west province which experiences a Mediterranean climate with cool moist winters and hot, dry summers. The closest BOM station is located at Mullewa (BOM Station 8095, 1896 – 2020). Rainfall data are presented in Table 1 and Figure 3.

Table 1: Monthly rainfall statistics for Mullewa (Mu) and Gabyon (Ga)

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean Mu	13.6	19	19.3	21.3	45.7	63	58.8	42.4	21.4	12.7	8.8	8.5	332.3
Mean Ga	18.4	24.7	23.4	18.7	32.8	41.8	35.6	24.9	11.7	7.4	6.7	9.7	255.7
2019 Mu	0	0.3	0.5	36.2	0.3	89.7	22.8	27.4	5.1	4.8	2.4	3.4	192.9
2020 Mu	0	62.1	3.1	0.4	25.8	43.8	38.1	73	8.3	17.4			
2020 Ga	17.7	21	10.7	0	8	5	38	33.5	0	21.5			

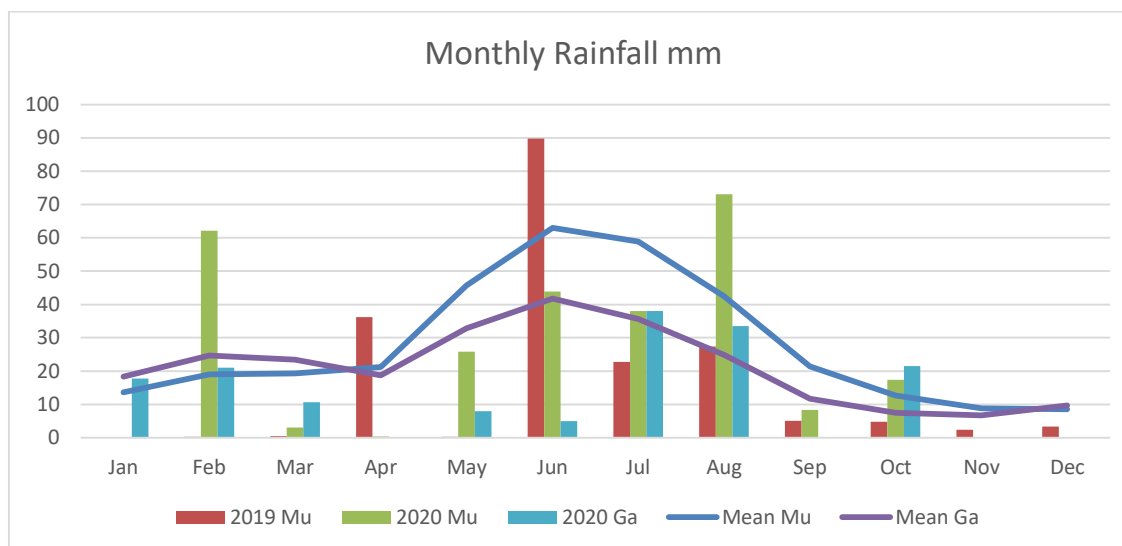


Figure 3: Monthly rainfall and long term monthly means recorded at Mullewa (Mu) and Gabyon (Ga)

The mean annual rainfall received at Mullewa is 332.3 mm and 255.7 mm at Gabyon, 30 km WNW of Yalgoo. Rainfall received during the period January to October 2020 (to time of survey) was below average for both sites, with 272 mm recorded at Mullewa (mean 317.2 mm) and 155.4 mm recorded at Yalgoo (mean 239.4 mm). Mullewa received well above average falls in February and August following a long dry spell from September 2019 to January 2020, and Gabyon received average or below rainfall except in August and October 2020, with an extended dry period from March to June. The drier than average conditions were expected to have some impact on vegetation health, presence of annuals and reproductive structures (flowers and fruit).

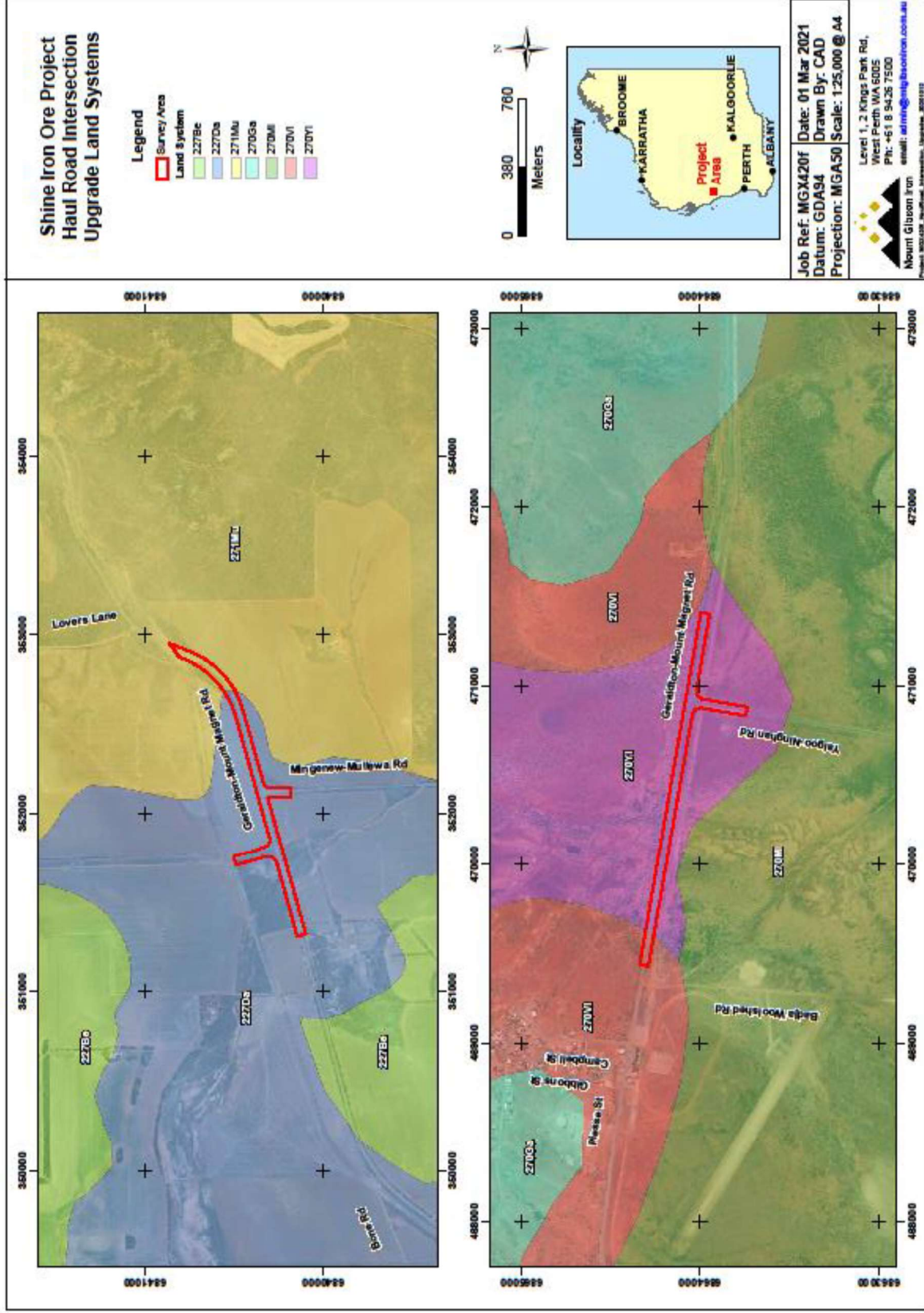


Figure 4: Land System mapping for the survey areas

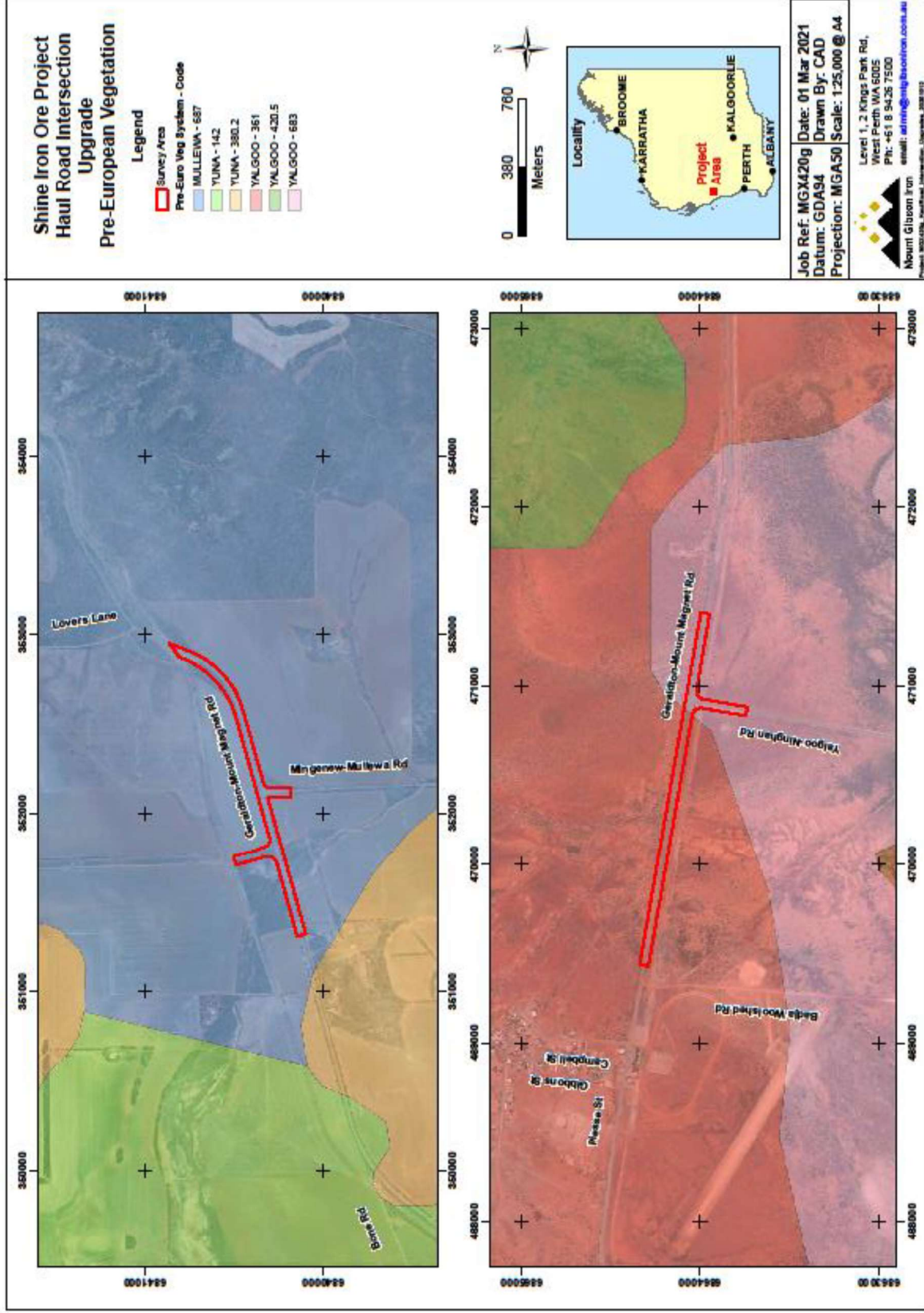


Figure 5: Pre-European vegetation mapping based on Beard's surveys

1.2.2 Landform and regional vegetation

The Interim Biogeographic Regionalisation for Australia (IBRA) is a biogeographic regionalisation of Australia (Thackway & Cresswell 2017). IBRA subregions are a landscape based approach to classifying the land surface, including attributes of climate, geomorphology, landform, lithology, flora and fauna.

The Yalgoo survey area is located on an alluvial plain at the base of the greenstone Woolgah-Wadgingarra Hills within the Yalgoo Bioregion and Talling IBRA subregion (Yal02). The survey area is located adjacent to the road and includes areas which have been subjected to historical and current impacts from the pastoral and mining industries and infrastructure maintenance.

The Mullewa survey area is located on the western slope of a low granitic hill grading to sandplain to the west. It is near the junction of the Avon Wheatbelt, Geraldton Sandplain and Yalgoo Bioregions, and Avon Wheatbelt 01, Geraldton Hills, Talling (Yal02) IBRA subregions. The survey area is located mainly within road reserves and adjacent cleared farmland. Small areas of remnant vegetation are present, with significant areas on the western side planted to trees.

Land systems (Payne et al) and Pre-European Vegetation mapping (DAFWA 2018) of the survey areas have been summarised in Table 2. Mapping is presented in Appendices 1 and 2.

Table 2: Land systems and Pre-European vegetation (PEV) mapped for the survey areas

Yalgoo	Description	Area (ha)
Yalluwin Land System	Hardpan plains and drainage tracts carrying concentrated flow, supporting mulga, curara and other acacia shrublands.	10.67
Violet Land System	Gently undulating gravelly plains on greenstone, laterite and hardpan, with low stony rises and minor saline plains; supporting groved mulga and bowgada shrublands and occasionally chenopod shrublands.	0.95
PEV Yalgoo 683	Succulent steppe with open scrub; scattered <i>Acacia sclerosperma</i> & snakewood over samphire	4.4
PEV Yalgoo 361	Wattle with York gum, casuarina, mulga <i>Acacia</i> spp. with <i>Eucalyptus loxophleba</i> , <i>Allocasuarina</i> spp. <i>Acacia aneura</i> .	7.21
Mullewa	Description	Area (ha)
271 Mullewa Land System	Dissected undulating terrain with rocky hill crests, gentle slopes and numerous drainage lines.	2.105
227 Dartmoor Land System	Undulating plain with crests, slopes, dunes and drainage lines. Weathered Permian sediments. Red-brown hardpan shallow loam and red earths, loams, sands and duplexes.	9.1
PEV Mullewa 687	Shrublands; bowgada & jam scrub with scattered <i>Allocasuarina huegeliana</i> & York gum	11.205

1.2.3 Conservation significant flora and ecological communities

A desktop survey was undertaken prior to the field survey on 29th October 2020 to determine threatened and priority flora (Table 3) and ecological communities (Table 4) that may be present within the survey areas including database searches of NatureMap (DBCA 2020a) and FloraBase (DBCA 1998-), and personal communication with the Rare Flora Officer at DBCA for the Midwest in Geraldton. The botanist, Jenny Borger, has undertaken several surveys in the region over the last 15

years which were also referred to (Table 5), and recently compiled a field guide (draft) of threatened and priority flora of Karara Regional Park area so is familiar with many of the conservation significant taxa in the Yalgoo area particularly.

Likelihood of occurrence of conservation significant flora descriptions (Table 3) are:

- Likely (L) – similar habitat, nearby occurrences
- Possible (P) – lacking habitat description but recorded in local area; or occurs on a broad range of habitats
- Unlikely (U) – Unsuitable habitat

Table 3: Conservation significant flora recorded in the region (Mullewa (Mu), Yalgoo (Yg); Likelihood of occurring (LOC)

Scientific Name	Code ¹	Mu	Yg	Habitat	LOC
<i>Eremophila viscida</i>	T	*	*	Granitic soils, sandy loam. Stony gullies, sandplains	P
<i>Eucalyptus beardiana</i>	T	*		Sand dunes and ridges	U
<i>Eucalyptus synandra</i>	T	*		Sandy and lateritic soils	P
<i>Stylidium scintillans</i>	T		*	Low rises & breakaways with weathered granitic rock with weathered or colluvial ironstone rock.	U
<i>Acacia ampliata</i>	P1	*		Sand, loam; sandplains and hillsides	L
<i>Acacia lineolata subsp. multilineata</i>	P1	*		Yellow sand, rocky clay. Sandplains.	L
<i>Chamelaucium</i> sp. Yalgoo (Y Chadwick 1816)	P1		*	Granite outcrops	U
<i>Enekbatus dualis</i>	P1		*	Silty sand, brown clayey sand, granite. Low hills, rock outcrops.	U
<i>Frankenia bracteata</i>	P1	*		Often saline habitats, margins of salt lakes	L
<i>Leptospermum exsertum</i>	P1	*		Sandplains	L
<i>Pterostylis macrocalymma</i>	P1	*		Rocky red clay-loam. Flats	U
<i>Caladenia pluvialis</i>	P2	*		Red or yellow sand in tall shrubland	P
<i>Calandrinia</i> sp. Warriedar (F. Obbens 04/09)	P2			Exposed rocky sites on granite or outcropping duricrust	U
<i>Chthonocephalus muellerianus</i>	P2	*	*	Red sand	U
<i>Acacia scalena</i>	P3	*		Yellow or yellow gravelly sand, loam	P
<i>Acacia subsessilis</i>	P3		*	Shallow red sand and stony gravel over ironstone	U
<i>Anthotroche myoporoides</i>	P3	*		Yellow or red sand. Sandplains.	P
<i>Cryptandra nola</i>	P3	*		Sandy soils over granite, laterite	P
<i>Darwinia</i> sp. Morawa (C.A. Gardner 2662)	P3			Clay over granite, yellow/brown clayey sand; flats, low hills	P
<i>Gastrolobium propinquum</i>	P3	*		Variable	P
<i>Grevillea candicans</i>	P3	*		Deep yellow sand. Sandplains.	P
<i>Grevillea globosa</i>	P3	*	*	Red loam, yellow sand; more often on lower slopes and plains; in tall <i>Acacia</i> shrublands	L
<i>Malleostemon nephroideus</i>	P3	*		Yellowish, orange sand in swales between dunes	U
<i>Persoonia pentasticha</i>	P3	*	*	Range of habitats; slopes of granite or BIF hills, reddish brown clay loam on plains	L
<i>Psammomoya implexa</i>	P3	*		Stony rises, plains	P
<i>Scaevola globosa</i>	P3	*		Sandy soils	P
<i>Thryptomene hubbardii</i>	P3	*		Yellow sand or sandy soils	P
<i>Thryptomene orbiculata</i>	P3	*		Often in yellow sand	P

Scientific Name	Code ¹	Mu	Yg	Habitat	LOC
<i>Triglochin protuberans</i>	P3	*	*	Winter-wet sites, claypans, near salt lakes, margins of pools	P
<i>Verticordia chrysostachys</i> var. <i>pallida</i>	P3	*		Yellow sand. Sandplains, sand dunes	P
<i>Acacia speckii</i>	P4		*	Rocky soils over granite, basalt or dolerite on rocky hills or rises	U
<i>Banksia benthamiana</i>	P4	*		Sandy loam, clay-loam, yellow sand, gravel.	L
<i>Dodoniae amplisemina</i>	P4		*	Red-brown sandy clay on basalt, gabbro and banded ironstone or on dolerite and quartzite. Rocky hills.	U
<i>Goodenia neogoodenia</i>	P4		*	Red loam or clay, near water	P
<i>Verticordia capillaris</i>	P4	*		Yellow sand, sandy loam, sandy clay. Sandplains.	P
<i>Verticordia penicillaris</i>	P4	*		Shallow gritty soils. Granite outcrops.	U

1. A description of conservation codes is presented in Appendix 4.

The Priority Ecological Community (PEC) Midwest No. 14: Yalgoo (Gnows Nest/Wolla Wolla and Woolgah-Wadgingarra) vegetation assemblages (banded ironstone formation) is recorded as occurring in the areas adjacent to Yalgoo on the Gnows Nest Range, Wolla Wolla and Woolgah-Wadgingarra Hills ((Markey and Dillon 2011). The locations of the Yalgoo PEC are mapped in Figure 6. A minor area of polygon 2591 (Woolgah-Wadgingarra Hills) is located at the far eastern end of the Yalgoo survey area. The proposed disturbance area is located on the plain and any disturbance in this area is not likely to impact the PEC area.

Midwest 2: Wolla Wolla (Gullewa) vegetation complexes on banded ironstone formation (P1) (DBCA 2020b) is recorded as occurring in the Yalgoo region, with surveys carried out on Mugga Mugga Hill, Buddudoo Range, Edamurta Range and Murdaburia Hill and is located south west of Yalgoo.

Midwest No. 60: Wagga Wagga and Yalgoo Calcrete groundwater assemblage types on Yalgoo and Moore palaeodrainage on Wagga Wagga and Bunnawarra Stations underlies Yalgoo and includes the entire Yalgoo survey area. The PEC refers to assemblages of invertebrates in groundwater. Potential impacts on this PEC are primarily related to changes to the level of groundwater as a result of water abstraction or alteration of hydrological flows.

One PEC is recorded in the Mullewa region – Midwest No. 75: Eucalypt woodlands of the Western Australian Wheatbelt. The Eucalypt woodlands PEC “occurs in the IBRA Avon Wheatbelt 1 and 2 and Western Mallee subregions. It also includes outlying patches in the eastern parts of JAF01 Northern Jarrah Forests and JAF02 Jarrah Forests adjacent to the Avon Wheatbelt, that are off the Darling Range, and receive less than 600 mm mean annual rainfall. The structure of the ecological community is a woodland in which the minimum crown cover of the tree canopy in a mature woodland is 10%. The key dominant or co-dominant species of the tree canopy are species of *Eucalyptus* trees that typically have a single trunk. Native understorey is present but is of variable composition, being a combination of grasses, other herbs and shrubs (DBCA 2020b).” The minimum area of woodland is 2 ha, and no woodland areas of that size (or larger) occur in or near the survey area at Mullewa. As most of the survey area is located on sandplains it is highly unlikely that remnant vegetation within this PEC’s parameters would occur near the site.

Table 4: Priority ecological communities in the Mullewa (Mu) and Yalgoo (Yg) regions (DBCA 2020b). PEC polygons refer to Figure 6.

Community	Code	Mu	Yg
Midwest No. 2: Gullewa vegetation assemblages (banded ironstone formation) Includes Buddadoo Range, Edamura Range, Mugga Mugga Hill and Murdaburia Hill. Threats: clearing for mining; south west of Yalgoo	P1		*
Midwest No. 14: Yalgoo (Gnows Nest/Wolla Wolla and Woolgah-Wadgingarra) vegetation assemblages (banded ironstone formation) Includes Gnows Nest Range, Wolla Wolla and Woolgah-Wadgingarra Hills. Polygons: 2590, 2591 Threats: clearing for mining; the Yalgoo survey area is within the buffer zone (eastern end)	P1		*
Midwest No. 60: Wagga Wagga and Yalgoo Calcrete groundwater assemblage types on Yalgoo and Moore palaeodrainage on Wagga Wagga and Bunnawarra Stations Unique assemblages of invertebrates have been identified in the groundwater calcretes. Polygon: 3387 Threats: hydrological changes associated with mining; the Yalgoo survey area is within the mapped extent of the PEC	P1		*
Midwest No. 75: Eucalypt woodlands of the Western Australian Wheatbelt (synonymous with the Eucalypt woodlands of the Western Australian Wheatbelt EPBC-listed TEC) – Mullewa region	P3	*	

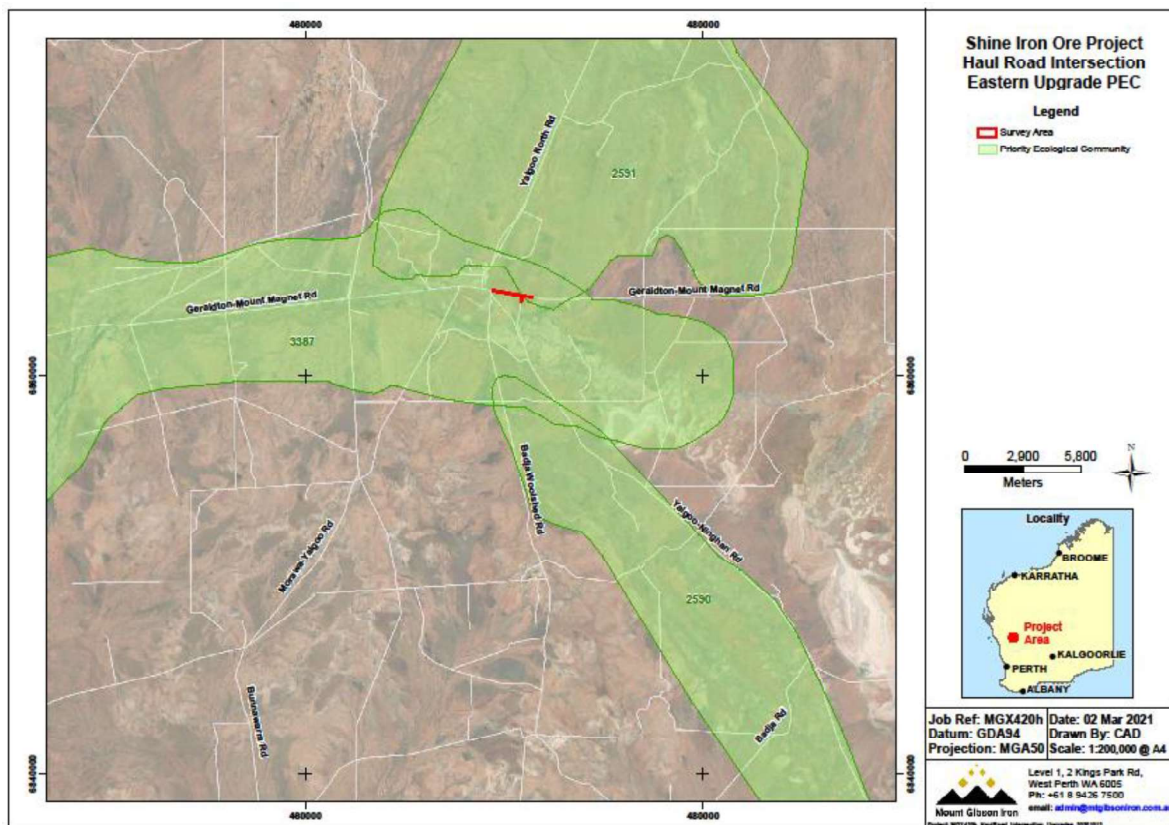


Figure 6: Location of priority ecological communities in the Yalgoo area (DBCA 2020a)

Table 5: Other vegetation and flora surveys/ reports near the Mullewa and Yalgoo survey areas

Author	Title/ Description	Area
Borger J (Draft)	A Field Guide to Conservation Significant Flora - Blue Hills Range, Minjar Gnows Nest Range, Warriedar Hill – Pinyalling Range and surrounding areas	Yalgoo
Borger J (2013)	Vegetation and Flora survey at the Rocksteady Mine Site for Mutiny Gold – Tenements M 59/ 294, M 59/391, M 59/336 and M59/335	Yalgoo
CALM/ NACC (2006)	Hidden Treasures 2006 Annual Report Surveys of remnant bushland of potential high value in the Northern Agricultural Region which included some remnants in the Mullewa area. Surveyed by the author and CALM staff.	Mullewa
DEC/ NACC (2008)	Hidden Treasures of the Northern Agricultural Region – Last Stands – 2008 Field Survey Report. Surveys of restricted vegetation associations mapped by J S Beard to provide baseline information for further management. Surveyed by the author and DEC staff.	Mullewa
GHD (2019)	FI Joint Venture Pty Ltd – Yogi Magnetite Project Flora and Vegetation Assessment	Yalgoo
Markey AS & Dillon SJ (2011)	Flora and vegetation of the banded iron formations of the Yilgarn Craton: Yalgoo.	Yalgoo
Markey AS & Dillon SJ (2010)	Flora and vegetation of the Banded Iron Formations of the Yilgarn Craton: Gullewa.	Yalgoo
Payne et al (1998)	An inventory and condition survey of the Sandstone-Yalgoo-Paynes Find area, Western Australia.	Yalgoo

CALM – Department of Conservation and Land Management; NACC – Northern Agricultural Catchment Council; DEC – Department of Environment and Conservation

1.2.4 Disturbance History

The survey areas are located within the Avon wheatbelt (Mullewa) and Yalgoo Bioregions which have a disturbance history going back to at least the 1880's. The Mullewa site was broadly cleared for agriculture up to the fencelines bordering the road reserve, except for a small area closer to Mullewa at the eastern end of the site. The central to western area was dominated by tree plantings within the road reserves and adjacent farmland. A broad area of samphire wetland was present at the intersection of Messina Rd and the Geraldton-Mt Magnet Road, which is likely the result of changes to the hydrological conditions associated with a rise in regional water tables causing dryland salinity. Many of these areas developed in the 1960's.

The Yalgoo site is located on the northern edge of an alluvial plain which is currently used for pastoral activities. Stock were present in the site during the survey. The Yalgoo area has been mined since the late 1800's and historic infrastructure is present in the area. The township of Yalgoo is located at the western end of the survey area and there are multiple impacts from road maintenance, tracks and other infrastructure.

2. Methodology

2.1 Survey scope

The scope of the surveys was to record flora, describe vegetation and condition and threats within the defined areas provided by MGM. JBBC was provided with maps and GPX files of both sites which are located on narrow bands either side of the carriageways. The Yalgoo site was surveyed first as it was furthest from base (Mullewa) and aerial imagery showed that there was more intact vegetation present which would take longer to survey. The botanist was accompanied by [REDACTED] [REDACTED] The areas were walked, and all flora recorded (native and introduced). The condition of the sites was ranked (Table 6) (EPA 2018). Changes in vegetation type were recorded by GPS. Any significant flora (or flora which was unable to be identified in the field) were recorded by GPS. Permission was requested and granted from MRD.

No quadrats were established as most of the areas were not wide enough, the levels of impact to the vegetation were moderate to high, and the aim of the survey was to record species of conservation significance.

Table 6: Vegetation condition scale (EPA 2018)

Vegetation condition	South West and Interzone 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.
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.
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.
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.
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.

2.2 Survey limitations and constraints

Survey limitations and constraints as identified by the EPA (2018) are addressed in Table 7.

Table 7: Limitations and constraints associated with the survey

Limitation	Constraint	Comment
Availability of contextual information at a regional and local scale	No	Adequate information is available for the survey areas, including: <ul style="list-style-type: none"> Broad scale mapping (1:250,000) by J S Beard digitised by Shepherd et al (2002) with extent presented in 2018 Statewide Vegetation Statistics (DBCA 2019) Regional biogeography (Payne et al 1998; Desmond and Chant 2001) Previous surveys (Markey & Dillon 2011, GDH 2019, Borger 2013)
Competency/experience of the team carrying out the survey	No	The personnel who undertook the survey were practitioners suitably qualified in their respective fields with relevant experience as specified by: <ul style="list-style-type: none"> EPA Technical Guidance: Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment (EPA 2016). The personnel were as follows: <ul style="list-style-type: none"> Jenny Borger (Principal Botanist) [REDACTED] [REDACTED]
Proportion of flora recorded and/or collected, any identification issues	Minor	All flora present was recorded. Some species had floral structures present. Sterile <i>Acacia</i> spp. were identified/ verified using phyllode characteristics in interactive keys. The presence of forbs was low in some areas due to either pastoral or climatic conditions and some had dried off; however enough plants were present in the broader area with reproductive structures present for identification. One planted <i>Eucalyptus</i> tree near the edge (outside) of the Yalgoo survey was hard to verify due to lack of buds/ fruit within access of the surveyor.
Was the appropriate area fully surveyed (effort and extent)	No	All areas of survey sites were surveyed. Both areas were under 12 ha and adjacent to roads.
Access restrictions within the survey area	No	The survey area was accessible and traversed by vehicle and foot.
Survey timing, rainfall, season of survey	Minor	Climatic conditions at both sites have been drier than average which may have impacted the diversity of annuals and grasses present.
Disturbance that may have affected the results of survey such as fire, flood or clearing	Yes	Both sites were heavily impacted by historic and current activities including road construction and maintenance which has resulted in changes to vegetation structure and floristics. Cattle were present at the Yalgoo site. The Mullewa site had high levels of weed invasion, clearing and revegetation (assumed to address secondary salinity).

3. Results

Most of the species were familiar to the botanist. *Acacia* species were checked against taxonomic descriptions (Maslin & Reid 2012; Maslin 2018), *Eremophila* were verified using Brown & Buirchell (2011) and *Senna* and other taxa with descriptions available in Grieve (1998), on FloraBase or against specimens at the WA Herbarium. The results are discussed in sections 3.1 and 3.2. Vegetation and condition mapping are presented in Figures 7 – 10.



3.1 MGX420 – Yalgoo survey area



A total of 71 vascular taxa were recorded in the survey area which included 70 native species and 1 introduced species – *Mesembryanthemum nodiflorum** (iceplant) (Appendix 1) and 1 planted species – *Eucalyptus loxophleba* at the edge of the survey area. Native flora were recorded from 16 families and 32 genera, with the best represented families being Fabaceae (19 taxa – 10 *Acacia* and 9 *Senna*); Chenopodiaceae (7 genera and 13 spp.); Amaranthaceae (8 spp. from 1 genus - *Ptilotus*); and Scrophulariaceae (7 spp. from 1 genus – *Eremophila*). Four vegetation types (VT) were described from species present (Table 8); however, there were high levels of disturbance on the south side of the Geraldton-Mt Magnet Rd which did affect the description/ mapping of vegetation. VT2 had patches in good condition interspersed with bare or degraded areas with isolated plants. VT1 was mainly located on the north side of the site, eastwards from the intersection with the Yalgoo – Paynes Find Road. VT1 was distinguished from VT2 by the presence of *Acacias* within the mulga (*A. aneura*) complex. *Acacia eremaea* and *Eremophila longifolia* were present and/or dominant in areas of least disturbance in VT2. VT3 was located at the western end of the site, north of the Geraldton-Mt Magnet Road within a drainage line/ depression. The vegetation was denser in this area. A very small area of VT 4 was present within the site on the south western edge. The area is within the townsite and comprised planted *Eucalyptus* trees over a shrubland dominated by chenopod species.

3.2 MGX420a – Mullewa survey area

A total of 65 vascular taxa were recorded in the survey area which includes 49 native taxa (5 planted) (Appendix 2) and 16 weeds (Appendix 3). 49 native flora were recorded from 19 families and 32 genera, with the best represented families being Chenopodiaceae (11 spp. from 7 genera); Fabaceae (9 spp. from 2 genera) and Poaceae (6 spp. from 5 genera). Four *Eucalyptus* spp. were recorded; however, most of these had been planted. One *E. loxophleba* subsp. *loxophleba* is likely to be a natural occurrence. Three remnant vegetation types (VT) (Table 9) were mapped for the site with two *Acacia acuminata* dominated types – 1. *A. acuminata*, *A. sclerosperma* subsp. *sclerosperma* tall shrubland mostly present on the northern eastern road verge, and 2. Isolated low trees or small stands of *A. acuminata*, *Bursaria occidentalis* or *A. sclerosperma* subsp. *sclerosperma* over dense weeds which was present mostly on the southern road verge at the eastern end, and north verge towards the intersection with Messina Road. The third remnant VT is the *Tecticornia* dominant low chenopod shrubland on the valley floor at the intersection with Messina Road, north of the intersection with Mingenew Mullewa Rd. The vegetation is most likely a native adapted replacement for original woodland vegetation which would have been cleared for farming or killed by secondary salinity over several decades. The remaining areas have been planted to *Eucalyptus* (slight rises) and *Casuarina obesa* (valley floor) with recruitment of native shrubs in the understorey. Weed invasion is moderate to high in these areas.

Table 8: Vegetation type (VT) descriptions for the Yalgoo Survey Area

VT	Yalgoo Landform and condition	Associated species	Image
VT1	<p>Sites: R1 – R4, R7</p> <p>Landform: Plain</p> <p>Land surface: Yellowish red clay loam over red hardpan; surface rock (ironstone gravel) < 5%; litter 5 – 10%; fallen timber < 1%</p> <p>Condition: Mostly very good; vegetation structure slightly to moderately disturbed; historic disturbances – clearing, old rail embankment to north; changes in drainage to north; main road to south</p> <p>Land System Yalluwuin 270YI</p> <p>PEV Yalgoo 683</p> <p>Area: 1.73 ha</p>	<p>Assoc spp: <i>Acacia assimilis</i> subsp. <i>assimilis</i>, <i>A. grasbyi</i>, <i>Amyema nestor</i>, <i>Angianthus tomentosus</i>, <i>Calandrinia primuliflora</i>, <i>Cephalopterum drummondii</i>, <i>Cymbopogon ambiguus</i>, <i>Eremophila longifolia</i>, <i>E. miniata</i>, <i>Exocarpos aphyllus</i>, <i>Lepidium oxytrichum</i>, <i>Lysiana casuarinae</i>, <i>Maireana pyramidata</i>, <i>M. triptera</i>, <i>Ptilotus aevoides</i>, <i>Ptilotus polystachyus</i>, <i>Rhagodia drummondii</i>, <i>Salsola australis</i>, <i>Scaevola spinescens</i>, <i>S. artemisioides</i> subsp. <i>petiolaris</i>, <i>Solanum lasiophyllum</i>, <i>Waitzia acuminata</i></p> <p>No. taxa: 39</p>	
VT2	<p>Sites: 5, 6, 8, 9, 10, 11, 12, 13</p> <p>Landform: Plain; drainage line</p> <p>Land surface: highly disturbed areas of reddish yellow clay loam, washed sand, gravel and hardpan</p> <p>Condition: Mostly degraded to good on the southern side; good to very good on the northern side; modified drainage from north</p> <p>Weed: <i>Mesembryanthemum nodiflorum</i>*</p> <p>Land system Yalluwuin 270YI</p> <p>PEV Yalgoo 361</p> <p>Area: 8.11</p>	<p>Assoc spp: <i>Acacia grasbyi</i>, <i>Acacia tetragonophylla</i>, <i>Amyema nestor</i>, <i>Androcalva luteiflora</i>, <i>Atriplex semilunaris</i>, <i>Cephalopterum drummondii</i>, <i>Cratystylis subspinescens</i>, <i>Dysphania glomulifera</i> subsp. <i>eremaea</i>, <i>Eremophila forrestii</i> subsp. <i>forrestii</i>, <i>E. miniata</i>, <i>Maireana carnosae</i>, <i>Ptilotus divaricatus</i>, <i>P. exaltatus</i>, <i>P. obovatus</i>, <i>Rhagodia drummondii</i>, <i>Salsola australis</i>, <i>Sclerolaena diacantha</i>, <i>Senna artemisioides</i> subsp. <i>filifolia</i>, <i>S. artemisioides</i> subsp. <i>helmsii</i>, <i>S. sp.</i> <i>Meekatharra</i>, <i>Sida</i> sp., <i>Stenopetalum filifolium</i>, <i>Waitzia acuminata</i></p> <p>No. taxa: 40</p>	
<p>Vegetation: <i>Acacia sclerosperma</i> subsp. <i>sclerosperma</i>, <i>A. tetragonophylla</i>, <i>A. burkittii</i>, <i>A. caesaneura</i>, <i>A. caesaneura</i> tall open shrubland over <i>Senna artemisioides</i> subsp. <i>helmsii</i>, <i>Eremophila forrestii</i> subsp. <i>forrestii</i>, <i>Senna</i> sp. <i>Meekatharra</i>, <i>S. charlesiana</i>, <i>Eremophila galeata</i> open shrubland over <i>Sclerolaena diacantha</i>, <i>Ptilotus obovatus</i>, <i>Enchylaena tomentosa</i>, <i>Ptilotus exaltatus</i>, <i>Austrostipa trichophylla</i> low sparse shrubland</p>			
<p>Vegetation: <i>Acacia burkittii</i>, <i>Eremophila longifolia</i>, <i>Exocarpos aphyllus</i> tall sparse shrubland to isolated tall shrubs over <i>Acacia eremaea</i>, <i>A. sclerosperma</i> subsp. <i>sclerosperma</i>, <i>A. synchronia</i>, <i>Senna glutinosa</i> subsp. <i>chatelainiana</i>, <i>S. sp.</i> <i>Austin</i>, <i>Eremophila compacta</i> open shrubland over <i>Maireana triptera</i>, <i>M. trichoptera</i>, <i>Senna</i> sp. <i>Austin</i>, <i>Atriplex vesicaria</i>, <i>Maireana pyramidata</i> low open shrubland over <i>Ptilotus aevoides</i>, <i>Ptilotus eremita</i>, <i>Aristida contorta</i>, <i>Solanum lasiophyllum</i> low sparse forbland</p>			

VT	Yalgoo Landform and condition	Associated species	Image
VT3	<p>Site: R15 Landform: Drainage line/ depression Condition: Very good; structure mostly intact although there is possible mature regrowth following historic clearing Land system Violet 270VI PEV Yalgoo 361 Area: 0.32 ha</p>	<p>No. taxa: 12 (identifiable)</p>	
VT4	<p>Vegetation: <i>Acacia burkittii</i>, <i>A. tetragonophylla</i>, <i>A. synchronicia</i>, <i>Eremophila longifolia</i> tall shrubland over <i>Senna artemisioides</i> subsp. <i>filifolia</i>, <i>Ptilotus obovatus</i>, <i>Solanum lasiophyllum</i>, <i>Sida</i> sp. Golden calyces open shrubland over <i>Pimelea microcephala</i>, <i>Ptilotus polystachyus</i>, <i>P. aervoides</i>, dried grasses low open forbland</p> <p>Site: R14 Landform: Modified plain/ broad drainage line Condition: Degraded; high level of historic disturbances; some tree planting in area; areas are in town reserve and road reserve; most of the vegetation is outside the survey area PEV Yalgoo 361 Area: < 0.1 ha</p>	<p>Assoc spp: <i>Cephalopterum drummondii</i>, <i>Eucalyptus camaldulensis</i> (outside; tentative; planted), <i>E. kochii</i> (outside; planted), <i>Ptilotus obovatus</i>, <i>Aristida contorta</i>, <i>Austrostipa</i> sp.</p> <p>No. species: 14; 3 of which are planted</p>	
	<p>Vegetation: <i>Eucalyptus loxophleba</i> subsp. <i>supralaevis</i> isolated trees (planted) over <i>Atriplex vesicaria</i>, <i>Maireana brevifolia</i>, <i>M. pyramidata</i> chenopod open shrubland over <i>Ptilotus polystachyus</i>, <i>P. exaltatus</i>, <i>P. aervoides</i>, <i>Sclerolaena diacantha</i> low sparse forbland</p>		

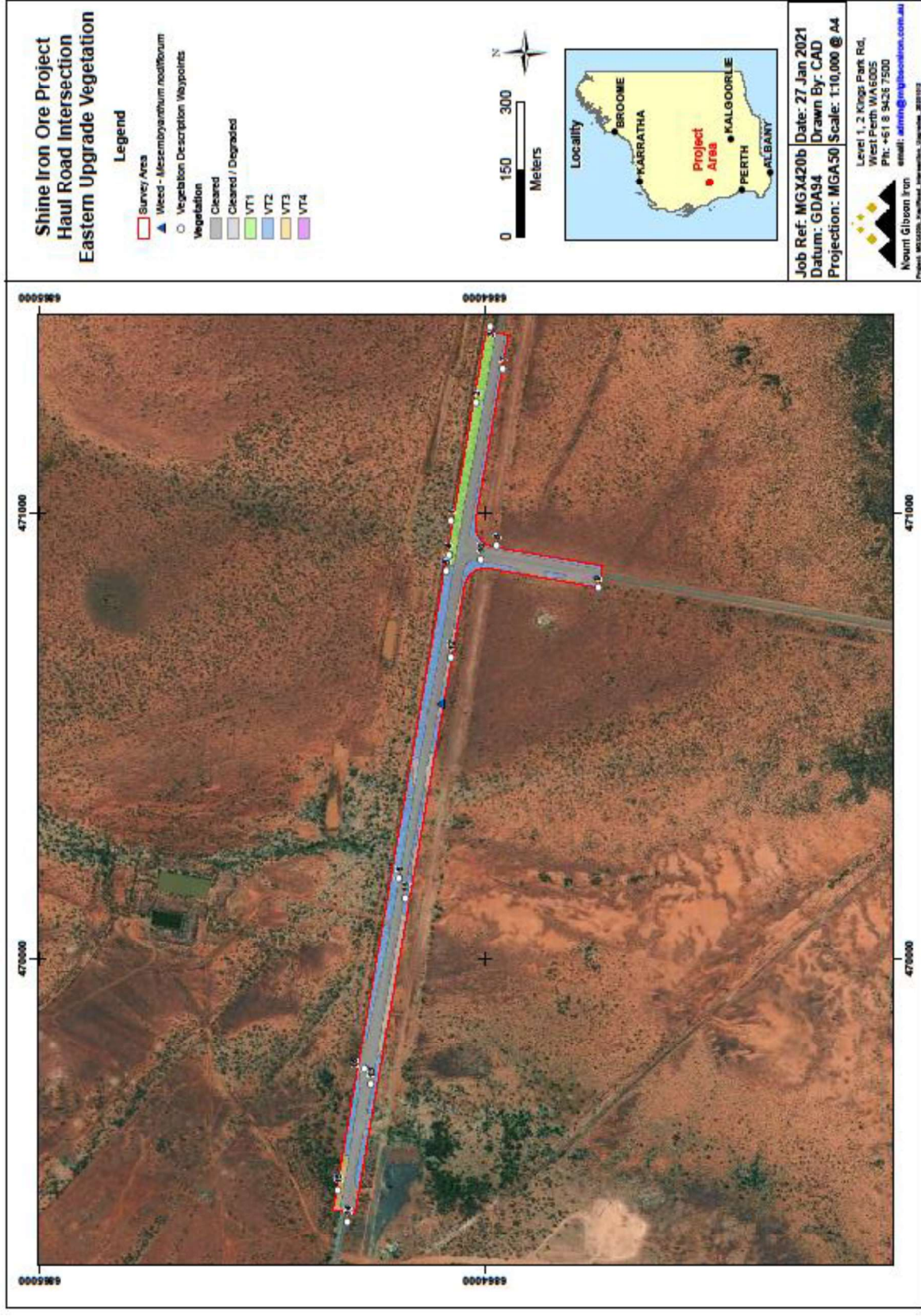


Figure 7: Vegetation mapping for the Yalgoo survey area with the location of the weed *Mesembryanthemum nodiflorum**

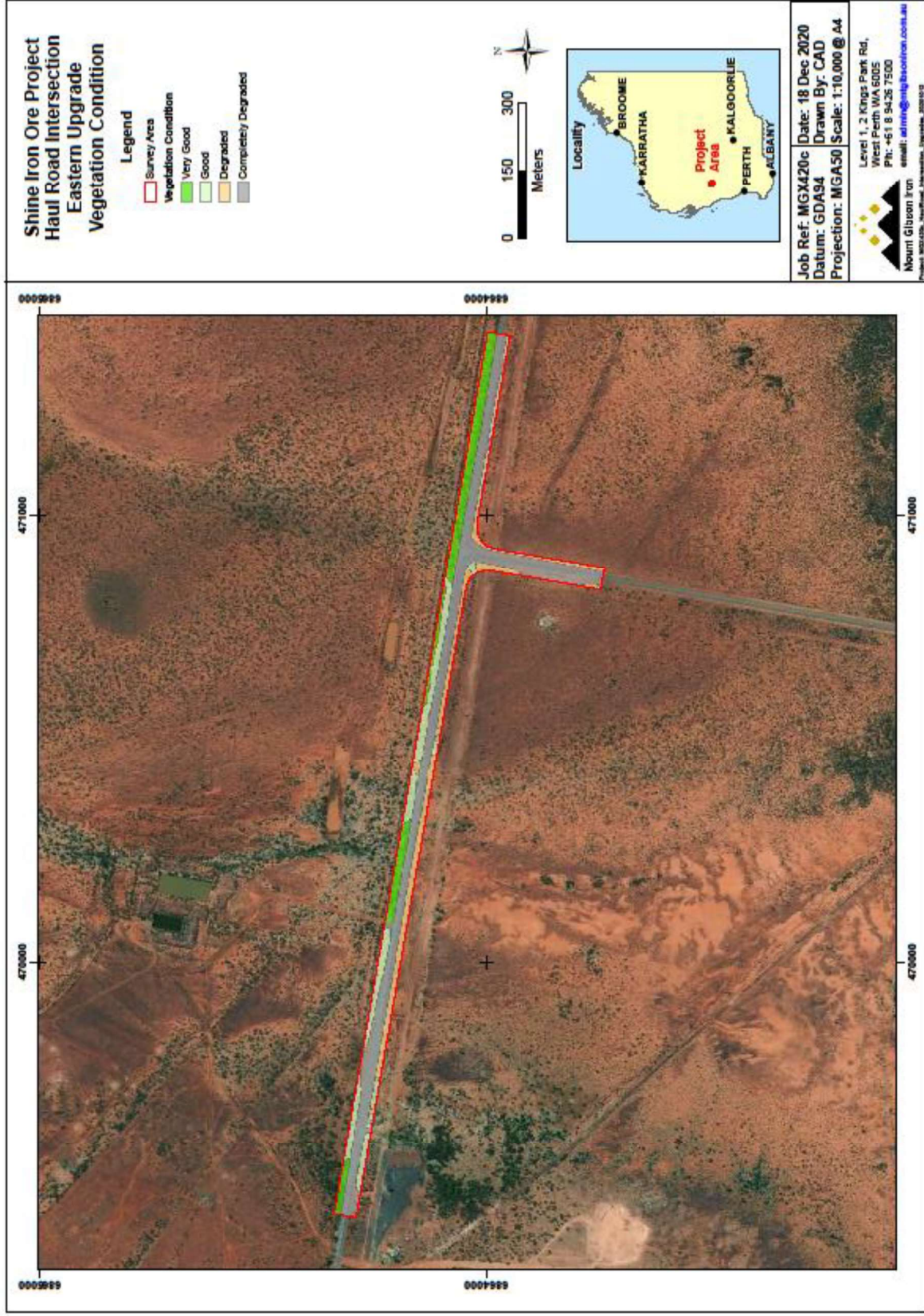






Figure 8: Vegetation condition mapping for the Yalgoo survey area. Condition was better on the northern side of the road.

Table 9: Vegetation type (VT) descriptions for the Mullewa Survey Area

VT	Mullewa Landform and condition	Associated species	Image
Acacia acuminata tall shrubland	<p>Sites: 2, 3, 4, 6 Landform: Low hill; lower to midslopes Condition: Good; some areas have some structure (ground/ mid and upper strata); however, most areas have a high weed presence in the understorey. Historic clearing, road construction and maintenance; rail maintenance</p> <p>Land System 271 Mullewa PEV Mullewa 687 Area: 1.55 ha</p>	<p>Assoc spp: <i>Amphipogon caricinus</i>, <i>Amyema Aristida contorta</i>, <i>Atriplex vesicaria</i>, <i>Austrostipa elegantissima</i>, <i>Chenopodium gaudichaudianum</i>, <i>Crassula colorata</i> var. <i>acuminata</i>, <i>Dianella revoluta</i>, <i>Enchylaena tomentosa</i>, <i>Goodenia berardiana</i>, <i>Maireana thesioides</i>, <i>Pimelea microcephala</i>, <i>Podolepis lessonii</i>, <i>Ptilotus eremita</i>, <i>P. obovatus</i>, <i>Sclerolaena eurotioides</i>, <i>Solanum lasiophyllum</i>, <i>Waitzia acuminata</i></p>	
Acacia sparse shrubland	<p>Sites: 1, 5 Landform: Low hill; lower to midslope Condition: Degraded – dense understorey of several weed species</p> <p>Land system 227 Dartmoor PEV Mullewa 687 Area: 1.06 ha</p>	<p>Assoc spp: <i>Acacia hemiteles</i>, <i>Senna artemisioides</i> subsp. <i>filifolia</i></p>	
Vegetation: Isolated low trees or small stands of <i>Acacia acuminata</i> , <i>Bursaria occidentalis</i> or <i>A. sclerosperma</i> subsp. <i>sclerosperma</i> over dense grassland of <i>Avena fatua</i> * with isolated <i>Ptilotus polystachyus</i> , <i>Maireana brevifolia</i> , <i>M. georgei</i> , <i>M. thesioides</i> low shrubs			

VT	Mullewa Landform and condition	Associated species	Image
Tecticornia low shrubland	<p>Site: 9 – Messina Rd, Geraldton-Mt Magnet Rd intersection</p> <p>Landform: Gently sloping valley; drainage to NW</p> <p>Condition: Degraded to good; chenopod shrubland developed on secondary salinity; several weeds present; trees planted around the edges</p> <p>Land system 227 Dartmoor PEV Mullewa 687 Area: 0.76 ha</p>	<p><i>Alyogyne pinoniana</i> (edge of road on slightly raised areas), <i>Paspalum vaginatum</i>, <i>Salsola australis</i>, <i>Senna pleurocarpa</i> var. <i>angustifolia</i>, <i>Solanum lasiophyllum</i></p>	
Vegetation: <i>Tecticornia indica</i> subsp. <i>bidens</i> , <i>Maireana brevifolia</i> , <i>Atriplex codonocarpa</i> low chenopod shrubland			
<i>Eucalyptus loxophleba</i>	<p>Site: 7 – Mingenew-Mullewa Rd</p> <p>Landform: Plain</p> <p>Condition: Degraded to good – narrow strips of remnant vegetation (<i>Eucalyptus loxophleba</i> at rear of vehicle is within the survey area) with areas of tree planting and native shrub regrowth forming an understorey. The planted trees in the foreground are at the edge of the impact area. Weeds are sparse on the eastern side of the road, but denser on the western side.</p> <p>Land system 227 Dartmoor PEV Mullewa 687 Area: < 0.1 ha</p>	<p><i>Eucalyptus camaldulensis</i> (planted), <i>E. salomonophloia</i> (planted), <i>Acacia tetragonophylla</i>, <i>Atriplex vesicaria</i>, <i>Comesperma integerrimum</i>, <i>Cryptandra myriantha</i>, <i>Maireana brevifolia</i>, <i>M. georgei</i>, <i>Pimelea microcephala</i>, <i>Senna charlesiana</i></p>	
<i>Eucalyptus loxophleba</i> subsp. <i>loxophleba</i> isolated tree over <i>Acacia acuminata</i> isolated shrubs over <i>Acacia andrewsii</i> , <i>A. acuminata</i> , <i>Enchylaena tomentosa</i> low open shrubland over <i>Ptilotus eremita</i> , <i>Chenopodium gaudichaudianum</i> , <i>Waitzia acuminata</i> low sparse forbland			

4. Discussion

No conservation significant flora or assemblages representative of priority ecological communities were present in either the Yalgoo or Mullewa survey areas. Both survey areas had moderate to high levels of disturbances, both historic and current which has had an impact on the structure and floristics of the vegetation. Road verges are wider in the Yalgoo survey area and support vegetation more structurally intact than the Mullewa survey area. The vegetation on the northern verge (Yalgoo) was in better condition than the southern side which is adjacent to a pastoral lease. The road verges in the Mullewa survey area are narrow and are mostly adjacent to cleared land. Significant areas of the Mullewa verges in the western half of the survey area have been cleared and currently support planted vegetation. A comparison of the remnant vegetation against Beard's vegetation association mapping for both survey areas (Figure 5) is described below. The pre-European and current extents of the vegetation associations, and land managed for conservation (DBCA managed lands) are presented in Table 10. Neither Yalgoo association has been extensively cleared. 27.4 % of Mullewa vegetation association 687 remains, with 26.88 % of the current extent in DBCA managed lands.

Table 10: Pre-European (PE) vegetation pre-clearing and current extents, and current extent in DBCA managed land (DBCA 2019)

Association	PE Extent (ha)	Current Extent (ha)	% remaining	PE extent DBCA managed land (ha)	Current extent DBCA managed land (ha)	% current extent DBCA managed land
Yalgoo 361	76,381	76,354	99.97	20,831	20,831	27.27
Yalgoo 683	50,075	49,732	99.32	17,695	17,366	34.92
Mullewa 687	37,336	10,229	27.40	2844	2750	26.88

The similarity of the Yalgoo vegetation against pre-European vegetation (PEV) mapping is broadly comparable; however, the occurrences of the *Acacia aneura* (mulga) alliances (*A. caesaneura*, *A. fuscaneura*) (VT1) are located at the eastern end of the survey area which is mapped as Yalgoo 683 - Succulent steppe with open scrub; scattered *Acacia sclerosperma* & snakewood (*Acacia xiphophylla*) over samphire. VT2 is closer in structure and floristics to Yalgoo 683. VT1 is more representative of the Violet Land System (270Vi) - Gently undulating gravelly plains on greenstone, laterite and hardpan, with low stony rises and minor saline plains, supporting groved mulga and bowgada shrublands and occasionally chenopod shrublands which is mapped as occurring NE of the area. VT4 is mapped as occurring with the Violet LS and supports groved *Acacia* tall shrublands within a drainage line. The majority of the site is mapped as the Yalluwin Land System - Hardpan plains and drainage tracts carrying concentrated flow, supporting mulga, curara (*Acacia tetragonophylla*) and other *Acacia* shrublands which is representative of the vegetation present.

The Mullewa survey area is mapped as PEV Mullewa 687 - Shrublands; bowgada (*Acacia ramulosa*) & jam (*Acacia acuminata*) scrub with scattered *Allocasuarina huegeliana* & York gum (*Eucalyptus loxophleba*). Remnant vegetation (with the exception of the samphire (*Tecticornia*) shrubland) is representative of the PEV mapping. The samphire shrubland has likely developed after the valley area has been impacted from secondary salinity through extensive clearing on the adjacent farmland. Land system mapping places most of the area in 227 Dartmoor LS (Undulating plain with

crests, slopes, dunes and drainage lines. The eastern end (VT1) is mapped as 271 Mullewa (Dissected undulating terrain with rocky hill crests, gentle slopes and numerous drainage lines). VT1 is located on the lower to midslope of a granitic low hill. One drainage line was present on the northern side of the road with flow confined through culverts at the road.

The roadside vegetation at Mullewa includes areas of revegetation (mostly trees; Figure 11) which do have some importance as a corridor connecting other areas of remnant vegetation with the larger area surrounding the Mullewa townsite, although most of the tree planting is only one tree wide and less than 10 m total width. The trees also have a role in intercepting groundwater flow and reducing the area/ level of waterlogging and salinity in the valley.

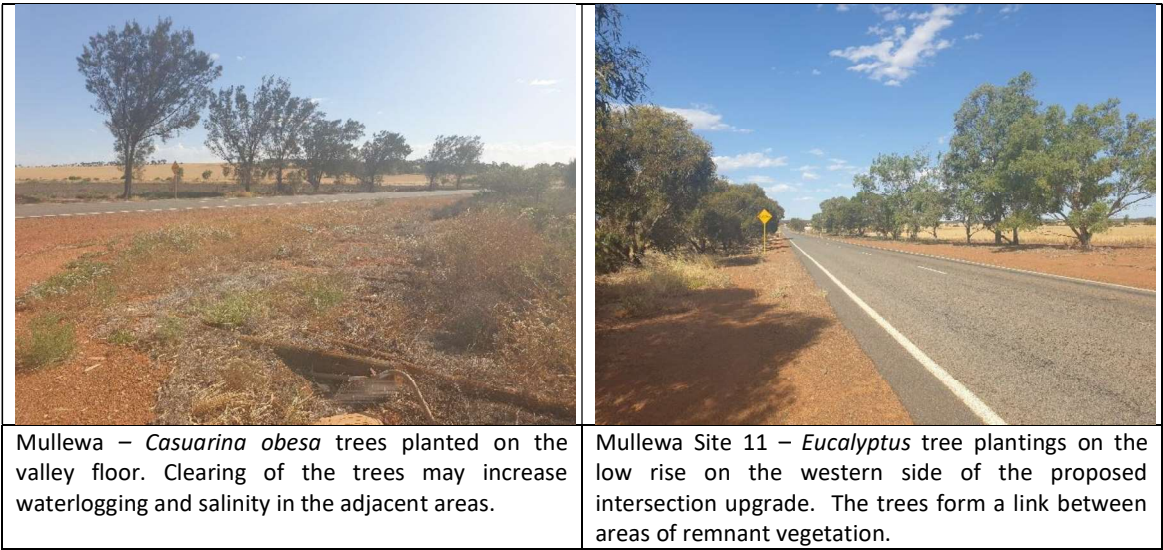


Figure 11: Tree planting areas at the Mullewa site

5. Conclusions

The targeted vegetation and flora survey was undertaken following the guidelines described by the EPA (2018) to determine if conservation significant flora or vegetation are present in the survey areas.

No threatened or priority species or vegetation representative of conservation significant ecological communities are present in either the Yalgoo or Mullewa survey areas.

The Yalgoo survey area is underlain by the Midwest PEC No. 60 (Wagga Wagga and Yalgoo Calcrete groundwater assemblage types on Yalgoo and Moore palaeodrainage on Wagga Wagga and Bunnawarra Stations) where unique assemblages of invertebrates have been identified in the groundwater calcretes.

The regional vegetation mapping for the Yalgoo survey area indicates that the remnant vegetation present in the area is widespread in the region and substantial areas are present in lands managed for conservation. Native vegetation is present adjacent to the survey area and erosion resulting from land clearing is likely to be minimal as the site is located on a gently sloping plain.

A total of 27.4 % (10,229 ha) of the Mullewa vegetation association 687 remains, with 26.88 % (2750 ha) occurring in lands managed for conservation. The condition of the remnant vegetation (3.35 ha) in the Mullewa survey area is mostly degraded to good with a dense groundcover of weeds.

The spread of weeds will need to be taken into consideration in the Mullewa survey area with any soil disturbance. Weed control would be advised prior to disturbance although the weed seed bank is likely to be high. Weed control would need to be undertaken in autumn after sufficient rainfall for germination has occurred.

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Appendix 1: List of vascular flora recorded within MGX420 – Yalgoo survey area

Family	Scientific Name	Code
Aizoaceae	<i>Mesembryanthemum nodiflorum</i> *	Alien
Amaranthaceae	<i>Ptilotus aervoides</i>	
Amaranthaceae	<i>Ptilotus divaricatus</i>	
Amaranthaceae	<i>Ptilotus eremita</i>	
Amaranthaceae	<i>Ptilotus exaltatus</i>	
Amaranthaceae	<i>Ptilotus helipteroides</i>	
Amaranthaceae	<i>Ptilotus obovatus</i>	
Amaranthaceae	<i>Ptilotus polystachyus</i>	
Amaranthaceae	<i>Ptilotus spathulatus</i>	
Asteraceae	<i>Angianthus tomentosus</i>	
Asteraceae	<i>Cephalopterum drummondii</i>	
Asteraceae	<i>Cratystylis subspinescens</i>	
Asteraceae	<i>Isoetopsis graminifolia</i>	
Asteraceae	<i>Podolepis capillaris</i>	
Asteraceae	<i>Podolepis lessonii</i>	
Brassicaceae	<i>Lepidium oxytrichum</i>	
Brassicaceae	<i>Stenopetalum filifolium</i>	
Chenopodiaceae	<i>Atriplex amnicola</i>	
Chenopodiaceae	<i>Atriplex codonocarpa</i>	
Chenopodiaceae	<i>Dysphania glomulifera</i> subsp. <i>eremaea</i>	
Chenopodiaceae	<i>Enchylaena tomentosa</i>	
Chenopodiaceae	<i>Maireana carnosae</i>	
Chenopodiaceae	<i>Maireana pyramidata</i>	
Chenopodiaceae	<i>Maireana tomentosa</i>	
Chenopodiaceae	<i>Maireana trichoptera</i>	
Chenopodiaceae	<i>Maireana triptera</i>	
Chenopodiaceae	<i>Rhagodia drummondii</i>	
Chenopodiaceae	<i>Salsola australis</i>	
Chenopodiaceae	<i>Sclerolaena diacantha</i>	
Chenopodiaceae	<i>Sclerolaena fusiformis</i>	
Fabaceae	<i>Acacia assimilis</i> subsp. <i>assimilis</i>	
Fabaceae	<i>Acacia burkittii</i>	
Fabaceae	<i>Acacia caesaneura</i>	
Fabaceae	<i>Acacia eremaea</i>	
Fabaceae	<i>Acacia fuscaneura</i>	
Fabaceae	<i>Acacia grasbyi</i>	
Fabaceae	<i>Acacia masliniana</i>	
Fabaceae	<i>Acacia sclerosperma</i> subsp. <i>sclerosperma</i>	
Fabaceae	<i>Acacia synchronica</i>	
Fabaceae	<i>Acacia tetragonophylla</i>	
Fabaceae	<i>Senna artemisioides</i> subsp. <i>x artemisioides</i>	
Fabaceae	<i>Senna artemisioides</i> subsp. <i>filifolia</i>	

Family	Scientific Name	Code
Fabaceae	<i>Senna artemisioides</i> subsp. <i>helmsii</i>	
Fabaceae	<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	
Fabaceae	<i>Senna artemisioides</i> subsp. x <i>sturtii</i>	
Fabaceae	<i>Senna charlesiana</i>	
Fabaceae	<i>Senna glutinosa</i> subsp. <i>chatelainiana</i>	
Fabaceae	<i>Senna</i> sp. Austin (A. Strid 20210)	
Fabaceae	<i>Senna</i> sp. Meekatharra (E. Bailey 1-26)	
Goodeniaceae	<i>Scaevola spinescens</i>	
Loranthaceae	<i>Amyema nestor</i>	
Loranthaceae	<i>Lysiana casuarinae</i>	
Malvaceae	<i>Androcalva luteiflora</i>	
Malvaceae	<i>Sida</i> sp. Golden calyces glabrous (H. N. Foote 32)	
Montiaceae	<i>Calandrinia primuliflora</i>	
Myrtaceae	<i>Eucalyptus camaldulensis</i> (tentative)	Planted; outside
Myrtaceae	<i>Eucalyptus kochii</i>	Planted; outside
Myrtaceae	<i>Eucalyptus loxophleba</i>	planted
Poaceae	<i>Amphipogon caricinus</i> var. <i>caricinus</i>	
Poaceae	<i>Austrostipa trichophylla</i>	
Poaceae	<i>Cymbopogon ambiguus</i>	
Poaceae	<i>Aristida contorta</i>	
Proteaceae	<i>Hakea recurva</i> subsp. <i>recurva</i>	
Santalaceae	<i>Exocarpos aphyllus</i>	
Scrophulariaceae	<i>Eremophila compacta</i> subsp. <i>compacta</i>	
Scrophulariaceae	<i>Eremophila forrestii</i> subsp. <i>forrestii</i>	
Scrophulariaceae	<i>Eremophila fraseri</i> subsp. <i>fraseri</i>	
Scrophulariaceae	<i>Eremophila galeata</i>	
Scrophulariaceae	<i>Eremophila longifolia</i>	
Scrophulariaceae	<i>Eremophila miniata</i>	
Scrophulariaceae	<i>Eremophila platycalyx</i> subsp. Yalgoo (A. Markey & S. Dillon 3337)	
Solanaceae	<i>Solanum lasiophyllum</i>	
Thymelaeaceae	<i>Pimelea microcephala</i>	

Appendix 2: Native vascular flora recorded within MGX420a – Mullewa survey area

Family	Scientific Name	Notes
Amaranthaceae	<i>Ptilotus eremita</i>	
Amaranthaceae	<i>Ptilotus obovatus</i>	
Amaranthaceae	<i>Ptilotus polystachyus</i>	
Asteraceae	<i>Waitzia acuminata</i>	
Asteraceae	<i>Podolepis lessonii</i>	
Casuarinaceae	<i>Casuarina obesa</i>	Planted
Chenopodiaceae	<i>Atriplex codonocarpa</i>	
Chenopodiaceae	<i>Chenopodium gaudichaudianum</i>	
Chenopodiaceae	<i>Enchylaena tomentosa</i>	
Chenopodiaceae	<i>Maireana brevifolia</i>	
Chenopodiaceae	<i>Maireana georgei</i>	
Chenopodiaceae	<i>Maireana thesioides</i>	
Chenopodiaceae	<i>Maireana tomentosa</i>	
Chenopodiaceae	<i>Maireana trichoptera</i>	
Chenopodiaceae	<i>Salsola australis</i>	
Chenopodiaceae	<i>Sclerolaena eurotioides</i>	
Chenopodiaceae	<i>Tecticornia indica</i> subsp. <i>bidens</i>	
Crassulaceae	<i>Crassula colorata</i> var. <i>acuminata</i>	
Fabaceae	<i>Acacia acuminata</i>	
Fabaceae	<i>Acacia andrewsii</i>	
Fabaceae	<i>Acacia hemiteles</i>	
Fabaceae	<i>Acacia ligulata</i>	
Fabaceae	<i>Acacia microbotrya</i>	
Fabaceae	<i>Acacia tetragonophylla</i>	
Fabaceae	<i>Senna artemisioides</i> subsp. <i>filifolia</i>	
Fabaceae	<i>Senna charlesiana</i>	
Fabaceae	<i>Senna pleurocarpa</i> var. <i>angustifolia</i>	
Goodeniaceae	<i>Goodenia berardiana</i>	
Hemerocallidaceae	<i>Dianella revoluta</i> var. <i>divaricata</i>	
Loranthaceae	<i>Amyema preissii</i>	
Malvaceae	<i>Alyogyne pinoniana</i>	
Malvaceae	<i>Seringia hermanniifolia</i>	
Myrtaceae	<i>Eucalyptus camaldulensis</i>	Planted
Myrtaceae	<i>Eucalyptus leptopoda</i> subsp. <i>arctata</i>	Planted
Myrtaceae	<i>Eucalyptus loxophleba</i> subsp. <i>loxophleba</i>	Planted/ remnant
Myrtaceae	<i>Eucalyptus salmonophloia</i>	Planted
Pittosporaceae	<i>Bursaria occidentalis</i>	
Poaceae	<i>Amphipogon caricinus</i> var. <i>caricinus</i>	
Poaceae	<i>Aristida contorta</i>	
Poaceae	<i>Austrostipa elegantissima</i>	
Poaceae	<i>Austrostipa variabilis</i>	

Family	Scientific Name	Notes
Poaceae	<i>Monachather paradoxus</i>	
Poaceae	<i>Paspalum vaginatum</i>	
Polygonaceae	<i>Comesperma integerrimum</i>	
Proteaceae	<i>Hakea recurva</i> subsp. <i>recurva</i>	
Rhamnaceae	<i>Cryptandra myriantha</i>	
Sapindaceae	<i>Dodonaea inaequifolia</i>	
Solanaceae	<i>Solanum lasiophyllum</i>	
Thymelaeaceae	<i>Pimelea microcephala</i> subsp. <i>microcephala</i>	

Appendix 3: Weeds recorded within the MGX420a – Mullewa survey area

Family	Scientific Name	Code	Common Name
Aizoaceae	<i>Cleretum papulosum</i> *	Alien	
Aizoaceae	<i>Mesembryanthemum nodiflorum</i> *	Alien	Iceplant
Asteraceae	<i>Carthamus lanatus</i> *	Alien	Saffron Thistle
Boraginaceae	<i>Echium plantagineum</i> *	Alien	Paterson's Curse
Brassicaceae	<i>Brassica tournefortii</i> *	Alien	Wild Radish
Brassicaceae	<i>Brassica x napus</i> *	Alien	Canola
Convolvulaceae	<i>Cuscuta epithymum</i> *	Alien	Lesser Dodder
Cucurbitaceae	<i>Citrullus amarus</i> *	Alien	Pie melon
Fabaceae	<i>Lupinus albus</i> *	Alien	White lupin
Malvaceae	<i>Malva parviflora</i> *	Alien	Marshmallow
Plumbaginaceae	<i>Limonium sinuatum</i> *	Alien	Sea Lavender
Poaceae	<i>Avena fatua</i> *	Alien	Wild Oats
Poaceae	<i>Bromus rubens</i> *	Alien	Brome grass
Poaceae	<i>Cenchrus setaceus</i> *	Alien	Fountain grass
Poaceae	<i>Eragrostis curvula</i> *	Alien	African Lovegrass
Poaceae	<i>Lolium rigidum</i> *	Alien	Wimmera ryegrass

Appendix 4: Conservation Codes for Western Australian Flora and Fauna



Department of Biodiversity,
Conservation and Attractions

CONSERVATION CODES For Western Australian Flora and Fauna

Threatened, Extinct and Specially Protected fauna or flora¹ are species² which have been adequately searched for and are deemed to be, in the wild, threatened, extinct or in need of special protection, and have been gazetted as such.

The *Wildlife Conservation (Specially Protected Fauna) Notice 2018* and the *Wildlife Conservation (Rare Flora) Notice 2018* have been transitioned under regulations 170, 171 and 172 of the *Biodiversity Conservation Regulations 2018* to be the lists of Threatened, Extinct and Specially Protected species under Part 2 of the *Biodiversity Conservation Act 2016*.

Categories of Threatened, Extinct and Specially Protected fauna and flora are:

T Threatened species

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 28(2) of the *Biodiversity Conservation Act 2016* (BC Act).

Threatened fauna is that subset of 'Specially Protected Fauna' listed under schedules 1 to 3 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for Threatened Fauna.

Threatened flora is that subset of 'Rare Flora' listed under schedules 1 to 3 of the *Wildlife Conservation (Rare Flora) Notice 2018* for Threatened Flora.

The assessment of the conservation status of these species is based on their national extent and ranked according to their level of threat using IUCN Red List categories and criteria as detailed below.

CR Critically endangered species

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 species

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 species

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.

P 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.

1 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.

2 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.

3 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.

4 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.

¹ The definition of flora includes algae, fungi and lichens

² Species includes all taxa (plural of taxon - a classificatory group of any taxonomic rank, e.g. a family, genus, species or any infraspecific category i.e. subspecies or variety, or a distinct population).

Appendix 3:
NatureMap Report – Yalgoo

NatureMap Species Report - Yalgoo Area

Created By Guest user on 02/03/2021

Kingdom	Animalia
Current Names Only	Yes
Core Datasets Only	Yes
Method	'By Circle'
Centre	116° 40' 53" E, 28° 20' 28" S
Buffer	20km
Group By	Conservation Status

Conservation Status	Species	Records
Non-conservation taxon	173	1206
Other specially protected fauna	1	1
Priority 4	1	1
Protected under international agreement	1	1
Rare or likely to become extinct	2	6
TOTAL	178	1215

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
Rare or likely to become extinct				
1.	25107 <i>Egernia stokesii</i> subsp. <i>badia</i> (Western Spiny-tailed Skink, Gidgee Skink)		T	
2.	24557 <i>Leipoa ocellata</i> (Malleefowl)		T	
Protected under international agreement				
3.	25554 <i>Apus pacificus</i> (Fork-tailed Swift, Pacific Swift)		IA	
Other specially protected fauna				
4.	25624 <i>Falco peregrinus</i> (Peregrine Falcon)		S	
Priority 4				
5.	24541 <i>Amytornis textilis</i> subsp. <i>textilis</i> (Western Grasswren, Thick-billed Grasswren (western))		P4	
Non-conservation taxon				
6.	24559 <i>Acanthagenys rufogularis</i> (Spiny-cheeked Honeyeater)			
7.	24260 <i>Acanthiza apicalis</i> (Broad-tailed Thornbill, Inland Thornbill)			
8.	24261 <i>Acanthiza chrysorrhoa</i> (Yellow-rumped Thornbill)			
9.	24264 <i>Acanthiza robustirostris</i> (Slaty-backed Thornbill)			
10.	24265 <i>Acanthiza uropygialis</i> (Chestnut-rumped Thornbill)			
11.	25535 <i>Accipiter cirrocephalus</i> (Collared Sparrowhawk)			
12.	25536 <i>Accipiter fasciatus</i> (Brown Goshawk)			
13.	24312 <i>Anas gracilis</i> (Grey Teal)			
14.	24316 <i>Anas superciliosa</i> (Pacific Black Duck)			
15.	<i>Anidiops villosus</i>			
16.	25528 <i>Aphelocephala leucopsis</i> (Southern Whiteface)			
17.	24266 <i>Aphelocephala leucopsis</i> subsp. <i>castaneiventris</i> (Southern Whiteface)			
18.	24285 <i>Aquila audax</i> (Wedge-tailed Eagle)			
19.	24341 <i>Ardea pacifica</i> (White-necked Heron)			
20.	24610 <i>Ardeotis australis</i> (Australian Bustard)			
21.	25566 <i>Artamus cinereus</i> (Black-faced Woodswallow)			
22.	24356 <i>Artamus personatus</i> (Masked Woodswallow)			
23.	<i>Asadipus phaleratus</i>			
24.	24318 <i>Aythya australis</i> (Hardhead)			
25.	<i>Barnardius zonarius</i>			
26.	24319 <i>Biziura lobata</i> (Musk Duck)			
27.	25331 <i>Brachyurophis approximans</i> (North-western Shovel-nosed Snake)			
28.	24359 <i>Burhinus grallarius</i> (Bush Stone-curlew)			
29.	42307 <i>Cacomantis pallidus</i> (Pallid Cuckoo)			
30.	25717 <i>Calyptorhynchus banksii</i> (Red-tailed Black-Cockatoo)			
31.	24732 <i>Calyptorhynchus banksii</i> subsp. <i>samueli</i> (Red-tailed Black-Cockatoo)			
32.	24564 <i>Certhionyx variegatus</i> (Pied Honeyeater)			
33.	24186 <i>Chalinolobus gouldii</i> (Gould's Wattleed Bat)			
34.	24187 <i>Chalinolobus morio</i> (Chocolate Wattleed Bat)			

	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
35.	24321	<i>Chenonetta jubata</i> (Australian Wood Duck, Wood Duck)			
36.	24431	<i>Chrysococcyx basalis</i> (Horsfield's Bronze Cuckoo)			
37.	24434	<i>Chrysococcyx osculans</i> (Black-eared Cuckoo)			
38.	25580	<i>Cinclosoma castaneothorax</i> (Chestnut-breasted Quail-thrush)			
39.	42311	<i>Cinclosoma marginatum</i> (Western Quail-thrush)			
40.	24393	<i>Climacteris affinis</i> subsp. <i>superciliosa</i> (White-browed Treecreeper)			
41.	25675	<i>Colluricincla harmonica</i> (Grey Shrike-thrush)			
42.	24361	<i>Coracina maxima</i> (Ground Cuckoo-shrike)			
43.	25568	<i>Coracina novaehollandiae</i> (Black-faced Cuckoo-shrike)			
44.	24362	<i>Coracina novaehollandiae</i> subsp. <i>novaehollandiae</i> (Black-faced Cuckoo-shrike)			
45.	24416	<i>Corvus bennetti</i> (Little Crow)			
46.	25592	<i>Corvus coronoides</i> (Australian Raven)			
47.	25593	<i>Corvus orru</i> (Torresian Crow)			
48.	24420	<i>Cracticus nigrogularis</i> (Pied Butcherbird)			
49.	25595	<i>Cracticus tibicen</i> (Australian Magpie)			
50.	25596	<i>Cracticus torquatus</i> (Grey Butcherbird)			
51.	24882	<i>Ctenophorus nuchalis</i> (Central Netted Dragon)			
52.	24886	<i>Ctenophorus reticulatus</i> (Western Netted Dragon)			
53.	24888	<i>Ctenophorus salinarum</i> (Salt Pan Dragon)			
54.	24889	<i>Ctenophorus scutulatus</i> (Lozenge-marked Dragon)			
55.	25052	<i>Ctenotus leonhardii</i>			
56.	25074	<i>Ctenotus schomburgkii</i>			
57.	25075	<i>Ctenotus severus</i>			
58.	25080	<i>Ctenotus uber</i> subsp. <i>uber</i> (Spotted Ctenotus)			
59.	25376	<i>Cyclorana platycephala</i> (Water-holding Frog)			
60.	24322	<i>Cygnus atratus</i> (Black Swan)			
61.	25673	<i>Daphoenositta chrysoptera</i> (Varied Sittella)			
62.	25004	<i>Delma tinca</i>			
63.	25296	<i>Demansia psammophis</i> subsp. <i>reticulata</i> (Yellow-faced Whipsnake)			
64.	25607	<i>Dicaeum hirundinaceum</i> (Mistletoebird)			
65.	24470	<i>Dromaius novaehollandiae</i> (Emu)			
66.	25092	<i>Egernia depressa</i> (Southern Pygmy Spiny-tailed Skink)			
67.	25094	<i>Egernia formosa</i>			
68.	25472	<i>Egernia stokesii</i> (Spiny-tailed Skink, Gidgee Skink)			
69.		<i>Egretta novaehollandiae</i>			
70.		<i>Elanus axillaris</i>			
71.	24290	<i>Elanus caeruleus</i> subsp. <i>axillaris</i> (Australian Black-shouldered Kite)			
72.	47937	<i>Elseyaornis melanops</i> (Black-fronted Dotterel)			
73.		<i>Eolophus roseicapillus</i>			
74.	24567	<i>Epthianura albifrons</i> (White-fronted Chat)			
75.	24570	<i>Epthianura tricolor</i> (Crimson Chat)			
76.	25109	<i>Eremiascincus richardsonii</i> (Broad-banded Sand Swimmer)			
77.	24379	<i>Erythronyx cinctus</i> (Red-kneed Dotterel)			
78.	24368	<i>Eurostopodus argus</i> (Spotted Nightjar)			
79.	25621	<i>Falco berigora</i> (Brown Falcon)			
80.	25622	<i>Falco cenchroides</i> (Australian Kestrel, Nankeen Kestrel)			
81.	24472	<i>Falco cenchroides</i> subsp. <i>cenchrus</i> (Australian Kestrel, Nankeen Kestrel)			
82.	25727	<i>Fulica atra</i> (Eurasian Coot)			
83.	25301	<i>Furina omata</i> (Moon Snake)			
84.	24958	<i>Gehyra punctata</i>			
85.	24959	<i>Gehyra variegata</i>			
86.	24401	<i>Geopelia cuneata</i> (Diamond Dove)			
87.	25530	<i>Gerygone fusca</i> (Western Gerygone)			
88.	24443	<i>Grallina cyanoleuca</i> (Magpie-lark)			
89.	24295	<i>Haliastur sphenurus</i> (Whistling Kite)			
90.	24961	<i>Heteronotia binoei</i> (Bynoe's Gecko)			
91.	24491	<i>Hirundo neoxena</i> (Welcome Swallow)			
92.		<i>Holconia nigrogularis</i>			
93.		<i>Idiomata blackwalli</i>			
94.		<i>Isometroides vescu</i>			
95.	24572	<i>Lacustroica whitei</i> (Grey Honeyeater)			
96.	24367	<i>Lalage tricolor</i> (White-winged Triller)			
97.	25157	<i>Lerista nicholli</i>			
98.	42411	<i>Lerista timida</i>			
99.	25661	<i>Lichmera indistincta</i> (Brown Honeyeater)			
100.	42415	<i>Lucasium squarrosum</i>			
101.	24135	<i>Macropus robustus</i> subsp. <i>erubescens</i> (Euro, Biggada)			
102.	24136	<i>Macropus rufus</i> (Red Kangaroo, Marlu)			
103.	24326	<i>Malacorhynchus membranaceus</i> (Pink-eared Duck)			
104.	25651	<i>Malurus lamberti</i> (Variegated Fairy-wren)			

	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
105.	24544	<i>Malurus lamberti</i> subsp. <i>assimilis</i> (Variegated Fairy-wren)			
106.	25652	<i>Malurus leucopterus</i> (White-winged Fairy-wren)			
107.	24549	<i>Malurus leucopterus</i> subsp. <i>leuconotus</i> (White-winged Fairy-wren)			
108.	25654	<i>Malurus splendens</i> (Splendid Fairy-wren)			
109.	24583	<i>Manorina flavigula</i> (Yellow-throated Miner)			
110.	47997	<i>Melanodryas cucullata</i> (Hooded Robin)			
111.	24736	<i>Melopsittacus undulatus</i> (Budgerigar)			
112.	25184	<i>Menetia greyii</i>			
113.	25240	<i>Morelia spilota</i> subsp. <i>imbricata</i> (Carpet Python)			
114.	25425	<i>Neobatrachus kunapalari</i> (Kunapalari Frog)			
115.	25426	<i>Neobatrachus pelobatoideus</i> (Humming Frog)			
116.	25427	<i>Neobatrachus sutor</i> (Shoemaker Frog)			
117.	25428	<i>Neobatrachus wilsmorei</i> (Plonking Frog)			
118.	24971	<i>Nephurus vertebralis</i>			
119.		<i>Nicodamus mainae</i>			
120.	24224	<i>Notomys alexis</i> (Spinifex Hopping-mouse)			
121.	24742	<i>Nymphicus hollandicus</i> (Cockatiel)			
122.	24407	<i>Ocyphaps lophotes</i> (Crested Pigeon)			
123.	24976	<i>Oedura marmorata</i> (Marbled Velvet Gecko)			
124.	24618	<i>Oreoica gutturalis</i> (Crested Bellbird)			
125.	25680	<i>Pachycephala rufiventris</i> (Rufous Whistler)			
126.	24624	<i>Pachycephala rufiventris</i> subsp. <i>rufiventris</i> (Rufous Whistler)			
127.	25254	<i>Parasuta monachus</i>			
128.	25682	<i>Pardalotus striatus</i> (Striated Pardalote)			
129.	24630	<i>Pardalotus striatus</i> subsp. <i>westraliensis</i> (Striated Pardalote)			
130.	48060	<i>Petrochelidon ariel</i> (Fairy Martin)			
131.	48061	<i>Petrochelidon nigricans</i> (Tree Martin)			
132.	24659	<i>Petroica goodenovii</i> (Red-capped Robin)			
133.	24409	<i>Phaps chalcoptera</i> (Common Bronzewing)			
134.	24748	<i>Platycercus varius</i> (Mulga Parrot)			
135.	42306	<i>Platyplectrum spenceri</i> (Centralian Burrowing Frog)			
136.	25704	<i>Podiceps cristatus</i> (Great Crested Grebe)			
137.	24681	<i>Poliocephalus poliocephalus</i> (Hoary-headed Grebe)			
138.	24683	<i>Pomatostomus superciliosus</i> (White-browed Babbler)			
139.	25706	<i>Pomatostomus temporalis</i> (Grey-crowned Babbler)			
140.	25262	<i>Pseudechis butleri</i> (Spotted Mulga Snake)			
141.	42416	<i>Pseudonaja mengdeni</i> (Western Brown Snake)			
142.	25263	<i>Pseudonaja modesta</i> (Ringed Brown Snake)			
143.	25434	<i>Pseudophryne occidentalis</i> (Western Toadlet)			
144.	24390	<i>Psophodes occidentalis</i> (Western Wedgebill, Chiming Wedgebill)			
145.	42344	<i>Pumella albifrons</i> (White-fronted Honeyeater)			
146.	25009	<i>Pygopus nigriceps</i>			
147.	24278	<i>Pyrholaemus brunneus</i> (Redthroat)			
148.	48096	<i>Rhipidura albiscapa</i> (Grey Fantail)			
149.	25614	<i>Rhipidura leucophrys</i> (Willie Wagtail)			
150.	24982	<i>Rhynchoedura ornata</i> (Western Beaked Gecko)			
151.		<i>Scolopendra laeta</i>			
152.		<i>Scolopendra morsitans</i>			
153.	25534	<i>Sericornis frontalis</i> (White-browed Scrubwren)			
154.	25266	<i>Simoselaps bertholdi</i> (Jan's Banded Snake)			
155.	30948	<i>Smicromis brevirostris</i> (Weebill)			
156.	24108	<i>Sminthopsis crassicaudata</i> (Fat-tailed Dunnart)			
157.	24109	<i>Sminthopsis dolichura</i> (Little long-tailed Dunnart)			
158.	25590	<i>Streptopelia senegalensis</i> (Laughing Turtle-Dove)	Y		
159.	24923	<i>Strophurus assimilis</i> (Goldfields Spiny-tailed Gecko)			
160.	24946	<i>Strophurus strophurus</i>			
161.	25705	<i>Tachybaptus novaehollandiae</i> (Australasian Grebe, Black-throated Grebe)			
162.	24331	<i>Tadorna tadornoides</i> (Australian Shelduck, Mountain Duck)			
163.	30870	<i>Taeniopygia guttata</i> (Zebra Finch)			
164.	24176	<i>Taphozous hilli</i> (Hill's Sheathtail-bat)			
165.		<i>Thereuopoda lesueurii</i>			
166.	24845	<i>Threskiornis spinicollis</i> (Straw-necked Ibis)			
167.	42351	<i>Todiramphus pyrrhopygius</i> (Red-backed Kingfisher)			
168.	48141	<i>Tribonyx ventralis</i> (Black-tailed Native-hen)			
169.	30814	<i>Tympanocryptis cephalus</i> (Pebble Dragon)			
170.		<i>Urodacus hoplurus</i>			
171.	24386	<i>Vanellus tricolor</i> (Banded Lapwing)			
172.	25211	<i>Varanus caudolineatus</i>			
173.	25216	<i>Varanus giganteus</i> (Perentie)			
174.	25218	<i>Varanus gouldii</i> (Bungarra or Sand Monitor)			

	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
175.	25524	<i>Varanus panoptes</i> (Yellow-spotted Monitor)			
176.	25223	<i>Varanus panoptes subsp. rubidus</i>			
177.	24205	<i>Vespadelus finlaysoni</i> (Finlayson's Cave Bat)			
178.	25765	<i>Zosterops lateralis</i> (Grey-breasted White-eye, Silveryeye)			

Conservation Codes

T - Rare or likely to become extinct
X - Presumed extinct
IA - Protected under international agreement
S - Other specially protected fauna
1 - Priority 1
2 - Priority 2
3 - Priority 3
4 - Priority 4
5 - Priority 5

¹ For NatureMap's purposes, species flagged as endemic are those whose records are wholly contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.