



Carnegie Gold Pty Ltd

A subsidiary of OraBanda Mining Limited
ABN 14 117 116 097

Davyhurst Gold Operations
Application for Amendment #3 to CPS 7318/2
Davyhurst Hub Support Infrastructure Expansion
M30/255

August 2025



Document Title:	Davyhurst Gold Operations – Application for Amendment #3 for CPS 7318/2– M30/255		
Document No:	OBM-DAVY-PPA#3-0825	PROJECT J00084 S0231724	
Type: (Tick Box)	Controlled ☐ Uncontrolled ☒	Issue A Revision 1.3	
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COMMODITY	Gold	
PROJECT DESCRIPTION	The Davyhurst Gold Operations (DGO) is the processing hub that supports the satellite underground mine operations for the Ora Banda Mining (OBM) operations located 120 km northwest of Kalgoorlie and 52km southwest of Menzies, Western Australia, within the Ularring District of the North Coolgardie Mineral Field. The Davyhurst tenure includes a number of historic open cut, underground, and processing operations and is situated within the Davyhurst Town Common, which has been extensively disturbed by a combination of pastoral and mining activities for over 100 years. The Davyhurst Operation comprises a carbon in leach processing plant with a production capacity of 1.2Mtpa. The operation is supported by gas and diesel power generation, low and high salinity borefields, workshops, wastewater lagoon system, SBT - fuelling facility, administration offices and a 180-person accommodation village. Haul roads, some with partial access restrictions, and service tracks are maintained within the tenements. A Western Power Supply easement connects Davyhurst to the Kalgoorlie Gas Power Grid. The Davyhurst paddock style tailing storage facility (TSF) with two cells is located adjacent to the processing facility, and since 2021 has been undergoing consolidation and remains inactive. Tailings from the processing plant is currently directed to the active Golden Eagle InPit TSF. Clearing Permit CPS 7318/1, was initially granted on the 31 December 2016, amended on the 23 December 2021 and authorizes clearing of 50ha on M30/255. This Application, located entirely on M30/255, seeks to amend CPS 7318/2 to cover the expansion of support infrastructure located within the processing and administration hub, including the expansion of the Corefarm, Administration Buildings and Davyhurst Village and the Plant facilities.	
THIS CLEARING PERMIT (PURPOSE) APPLICATION	This Amendment Application #3 for Purpose Permit CPS 7318/2 is submitted for the proposed additional clearing of up to 40ha on M30/255, covering infrastructure expansion. Clearing for this Amendment Application will use mechanical methods and will commence following receipt of the CPS Amendment approval. Native vegetation removed to facilitate construction activities will be stockpiled for area rehabilitation at closure.	
RELEVANT TENEMENTS	Davyhurst Processing Hub – M30/255	
DISTRIBUTION	Department of Mines, Petroleum and Energy (DMPE) Native Vegetation Assessment Branch – Perth Digital Copy and Ora Banda Mining Ltd – Perth Corporate Library	
AUTHORIZED FOR SUBMISSION	Andrew Czerw  Chief Development Officer Date: 22.08.2025	

CONTENTS

1.	INTRODUCTION	1
1.1	Background to Project	1
2.	THIS PROPOSAL	5
2.1	Location and Ownership	5
2.2	Project Description	5
3.	EXISTING ENVIRONMENT	6
3.1	Climate	6
3.2	Landforms and Soils	6
3.3	Water Resources	7
3.3.1	Groundwater	7
3.3.2	Surface Drainage	7
3.4	Flora and Fauna	8
3.5	Fauna	11
3.6	Conservation Significance	12
4.	MEASURES TO AVOID AND MITIGATE CLEARING IMPACTS	13
5.	SENSITIVE ENVIRONMENTAL RECEPTORS	16
5.1	Heritage, Community and Consultation	16
5.2	Weed Management	17
5.3	Land Discharge	17
5.4	Closure and Rehabilitation Management	17
5.5	Rehabilitation Concepts	17
6.	REFERENCES, DEFINITIONS & ACRONYMS	19
7.	DEFINITIONS	21
8.	ACRONYMS	22

LIST OF FIGURES

Figure 1: Davyhurst Gold Operations: Location and Regional Infrastructure	2
Figure 2: Davyhurst Gold Operations showing Approved CPS 7318-2, Proposed Disturbances within approved footprint	3
Figure 3: Davyhurst Gold Operations Clearing Permit Investigation Area - Vegetation Overview	10

LIST OF TABLES

Table 1: Summary of Project Permitting and Approvals	4
Table 2: Summary of Findings against the 10 Clearing Principles	14

ATTACHMENTS

Appendix A: Davyhurst Gold Project - Vegetation and flora survey of proposed clearing areas: Core shed and support infrastructure expansion Process Plant expansion Camp expansion - M30-255 (JBBC, 2025)	23
Appendix B: Vegetation Clearing – Fauna Assessment – Davyhurst, Callion, Waihi, Siberia, Riverina Clearance Areas – (BIOSTAT, 2020)	24
Appendix C: Clearing Permit CPS 7318-2	25
Appendix D: Clearing Permit Amendment Application	26

1. INTRODUCTION

1.1 Background to Project

The Davyhurst Gold Operations (**DGO**) forms part of the broader Ora Banda Mining Limited (**OBM, Company**) Mining Operations and is the Processing and Administration hub for the current satellite underground operations. Davyhurst is located 120 km northwest of Kalgoorlie and 52 km southwest of Menzies with the North Coolgardie Mineral Field (Figure 1).

The Davyhurst Project includes a number of historic and more recent open cuts, underground mines and processing operations. The Processing and Administration hub for the Project is located with the historic Davyhurst Town Common (R12202) and comprises the Davyhurst Village, Processing Plant, Administration Offices, Power Station and Inpit and Paddock Style TSF (inactive). The completed Open Pits and underground mines are currently on Care and Maintenance.

There have been numerous owners of the Davyhurst Project tenements during the currency of the current *Mining Act (1978)*. Carnegie Gold Pty Ltd (formally Swan Gold Mining Pty Ltd) acquired the Project in 2010 from the Monarch Gold Mining Company after which it remained on Care and Maintenance until 2017. In 2017 the operation underwent a name change to Eastern Goldfields Limited and in November 2018 was placed into voluntary administration from which It emerged in May 2019 and changed its name to Ora Banda Mining Limited.

Ore treatment recommenced at the Project in 2020 following refurbishment of the Processing Plant and additional approvals were obtained to shift tailings deposition from the paddock style TSF to the Golden Eagle In-Pit TSF in December 2022 (MP Reg Id 113667). The current life of mine (LOM) is defined as 5 years, although the area is considered highly prospective and further exploration is likely to identify additional resources.

Current Status

The Davyhurst Project is currently undergoing a period of expansion, with two operational satellite underground mines and positive exploration results likely supporting further underground and open pit opportunities in the near future, requiring an expansion of the existing support facilities within the Davyhurst Processing Hub. Clearing of native vegetation for processing and infrastructure development has been undertaken in accordance with CPS 7318/2, however this Clearing Permit is nearing the area allocation of 50ha and therefore additional area is required to increase elements of the infrastructure footprint to support the expansion of the Project. Approved and proposed new application clearing areas are shown on Figure 2 and the inforce Permit is referenced in Attachment C.

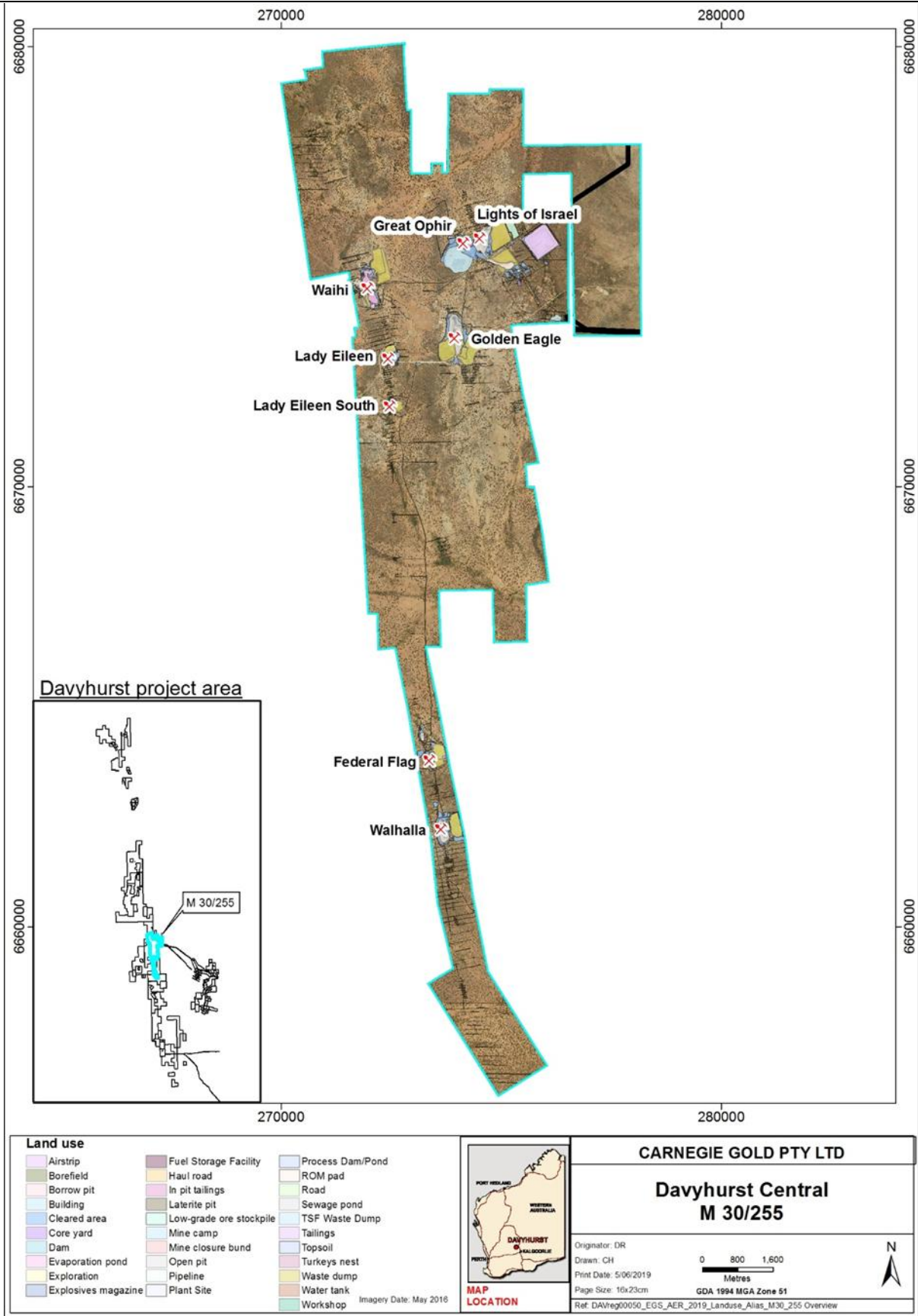


Figure 1: Davyhurst Gold Operations: Location and Regional Infrastructure



Figure 2: Davyhurst Gold Operations showing Approved CPS 7318-2, Proposed Disturbances within approved footprint

Table 1: Summary of Project Permitting and Approvals

Approval Required	By Whom	Current Status
Mining Leases	DMPE	Tenement Conditions associated with M30/255. Tenement is owned by Carnegie Gold Pty Ltd, a wholly owned subsidiary of Ora Banda Mining Ltd, and is in good standing.
Development Approvals	DMPE	NOI 2321 (1996) in force, Small Mining Operations MP Amendment – in Preparation
Impact on Threatened Flora, Fauna and Ecological Communities	DBCA	No threatened flora or ecological communities reported in past or recent mine site surveys - Borger (2017, 2019, 2025), G&G Environmental (2007), BSD (1997) and targeted survey identified no threatened fauna at risk – Biostat (2019)
Heritage	DPLH	No Aboriginal or European registered heritage sites are recorded on the respective ACHIS or Inherit Databases for the Project Area on M30/255, recent heritage surveys undertaken by Marlinyu Ghoorlie did not identify any heritage sites that require management.
Clearing Permits and Authorizations	DMPE	Mine sites and surrounds are extensively disturbed and degraded. Purpose Permit 7318-2 authorised for clearing of 50ha. This Amendment #3 application seeks a further 40ha vegetation clearing on M30/255, to support infrastructure expansion
Groundwater Well Licences	DWER	5C Licence GWL 180490(3) and 66199(8) in force for dust suppression, mining and Mineral Ore Processing use and camp water supply.
Local Authority Approvals	SOM	Building licences and effluent disposal (septic).

Decision Making Authority (DMA) Code:

SOM – Shire of Menzies, DPLH – Department of Planning Lands and Heritage

DWER-Department of Water and Environmental Regulation

DMPE – Department of Mines, Petroleum and Energy

2. THIS PROPOSAL

This application is the third amendment to Clearing Permit (Purpose) 7318-2 within M30/255 which seeks approval for the removal by mechanical means of vegetation covering up to 40ha from the 223.73ha existing Clearing Permit Envelope on Figure 2. The addition of 40ha will allow for the expansion of the Processing and Administration Hub support infrastructure including the Davyhurst Corefarm, Village, Plant and Office complex.

This programme will result in clearing of native vegetation by mechanical means, with recovered vegetation tracked rolled and stockpiled in secure locations for later rehabilitation use. Topsoil and rootstock will be recovered and managed in accordance with OBM's Management Procedures, which are outlined in Section 4. Clearing, if approved, is scheduled to commence in Q2 of FY2026, with staged clearing commencing following receipt of approval. A mine life of 5 years is anticipated, although this is likely to be extended due to the high prospectivity of the tenure.

2.1 Location and Ownership

The proposed clearing is located on M30/255 within the Shire of Menzies Local Government area within the Davyhurst Town Common (R12202). The mining tenure is owned by Carnegie Gold Pty Ltd, a wholly owned subsidiary of Ora Banda Mining Limited. Carnegie Gold Pty Ltd is the proponent for this Amendment #3 Clearing Permit Application.

2.2 Project Description

The Davyhurst Gold Operations recommenced processing in 2020 after a period of care and maintenance. Tailings are deposited in the nearby Golden Eagle InPit TSF under MP Reg Id 113667. Processing, Geology Services, Mine administration, Stores and Accommodation are located within the Davyhurst Processing Hub as it is central to the satellite operations. As a result of production increases from the satellite underground mines and expansion of the exploration program there is a requirement to expand the Davyhurst Corefarm, Village, Plant and Administration footprint.

The Davyhurst hub and the proposed clearing is not located wholly or partially in a gazetted occupied Township, DBCA managed areas, Environmentally Sensitive Area (ESA), Schedule 1 Area, Threatened Ecological Community (TEC) or on a Pre-1978 State Agreement Act Area, Pre-1899 Crown Grant Areas, Biodiversity Reserve, World Heritage Property, Soil Reference Site, Red Book Area, Bush Forever Site; or registered Heritage Site. This site does not contain or potentially impact on significant lakes or wetlands, Water Supply Catchment area, Water Reserve or Groundwater Protection Areas (WRC 2001).

Site layout, clearing permit boundary and existing mining infrastructure and tenure is shown in Figure 2.

3. EXISTING ENVIRONMENT

The Davyhurst district is dominated by granite-greenstone terrains of the Yilgarn Craton, which consists of a series of low ranges separated by flat plains derived from colluvium and alluvium deposition. According to the Interim Biogeographic Regionalisation of Australia (IBRA), the DGO is located north of the boundary between the Murchison Bioregion (Eastern Murchison sub-region) and the Coolgardie Bioregion (Eastern Goldfields sub-region). The Davyhurst site geology comprises a package of metamorphosed mafic and ultramafic rocks, which lies between the Ida and Ballard faults (Siraz, 2008). There are low isolated greenstone stony rises present within the central and western area of the Project.

3.1 Climate

The climate is typical of the south Murchison Area and is characterised by a Semi-desert Mediterranean climate. Dry weather occurs for 9 to 11 months of the year, summers are hot and dry, and winters are mild and wet with unpredictable rainfall. With the prevailing winds ranging east-south easterly, the air has a lengthy passage overland and therefore produces little rain. The presence of summer low pressure systems over the interior, commonly referred to as heat lows, produces intense hot, dry conditions (Payne et. al 1998).

Rainfall

Rainfall is both irregular and highly variable across the district. The mean annual rainfall over a 86-year period (1939 – 2025) for Kalgoorlie Boulder Aero (BOM Station 12038) is 264.7mm, with the wettest months, January to July. Rainfall is also received from degenerating tropical lows during the summer months.

Temperature

Temperatures are generally hot in summer with the Mean daily maximum temperature for Kalgoorlie recorded as 32.6°C during the period of December through to February, and cool in the winter with the mean for June to August ranging from 5.1°C to 18.8°C. (BOM, 2025).

3.2 Landforms and Soils

The landscapes in the Davyhurst district are generally north - south trending, undulating low stony rises, with foot slopes of low relief and characterised by internal draining into saline drainages and various sized playa lakes between erosional highs. The relief of outcrop areas is closely related to underlying geology, with granitoids forming eroded pavements and domes, and basalts and metasedimentary rocks forming elongated, rounded hills and strike ridges (JBBC 2016, 2019, 2025). Landforms, soils and vegetation in the mine area are described utilizing the Land System approach first reported by Pringle et. al. (1994) in the Department of Agriculture Technical Bulletin 87 covering the Northeastern Goldfields.

In general terms the landscape is characterised by incised low hills to the west and broad valleys and washout areas alongside broad ephemeral drainage lines in the east

Moriarty Land System

This Land System is common in the Eastern Goldfields and within the Davyhurst Processing Hub study area. It is described as low stony rises to 20m relief, gently undulating lower plains with pebble ironstone mantels and level to very gently inclined alluvial plains with poorly defined, sparse drainage patterns. The Golden Eagle mine site is located on the upper slope of a low stony rise merging into an alluvial plain to the east, which contains the saline, internally draining to Lake Wangine. Vegetation sparse areas are common and often contain a mantle of quartz or ironstone pebbles, with pedogenic

calcrete clasts. These areas, when framework shrub layers are removed are subject to sheet flow erosion. (Pringle et. al. 1994).

Soils

The predominant soil-landform associations in the Davyhurst district, is described as Unit 265 in the WA Department of Agriculture rangelands classification system (P Tille, 2006). Calcareous loamy earths and red brown loamy earths predominate in the mine environments with salt lakes soils and some red-brown hardpan, shallow loams and red sandy duplexes located to the east.

3.3 Water Resources

Water resources in the Davyhurst District can be described in terms of ephemeral surface waters on playa surfaces and deeper groundwaters (>50m) located in fractured rock aquifers of varying quality and salinity. Permanent natural water storages are not present in the Davyhurst District and surface water cannot be considered as a locally exploitable water resource.

3.3.1 Groundwater

The Project area lies within the Kalgoorlie Hydrogeological Series (SH51-9) 1:250,000 scale map sheet. The major aquifers in the region are present in (a) palaeodrainage channels, and (b) within low yielding fractured rock aquifers present in deeper structural positions. Regional groundwaters are typically saline to hypersaline and the absence of pastoral bores in the Davyhurst Hub attests to the very limited presence of significant groundwater as a beneficial resource. Water levels in bores around Davyhurst – that are recorded in the WIR database – were reduced to m AHD using topographic contours and are contoured in Fig. 4 of Rockwater (2022).

Water Quality

Mine site sampling during operations and a recent review by Rockwater (2022) described the groundwaters associated with mines and borefields in the Davyhurst hub as predominantly hypersaline (>20,000 mg/L TDS), ranging between about 30,000 and 65,000 mg/L TDS. Salinity generally increases towards the drainage sinks such as Wangine Lake. The groundwater is alkaline and of high salinity. It is a sodium chloride type with elevated sulphate and nitrate concentrations. Metals are at low concentrations and are commonly below the reporting levels. Geochemical characterization studies and monitoring at other tailings storage facilities associated with the Davyhurst Plant output over 30 years have demonstrated the tailings are unlikely to become acidic.

3.3.2 Surface Drainage

The Davyhurst Project Hub lies on a catchment divide with no significant permanent streams developed. To the north, ephemeral drainage is to the northeast via the Papertalk Brook broad drainage line which then directs surface flows into a series of small bottomland salinas. South of Davyhurst, drainage is directed eastward towards Wangine Lake (Rockwater, 2022). The area carries stony plains supporting chenopod shrub lands with patchy eucalypt upper-storeys and acacia dominated woodlands on low stony rises west of the mine. The Project area has in part been degraded by historic grazing, exploration, timber cutting, mining activities and proximity to the abandoned township of Davyhurst. Stream flow occurs only for short periods after heavy storms, or after persistent low intensity rainfall. Ponding is temporary and no permanent natural water bodies are present.

Potential Impacts

Land management assessment for the Moriarty Land System highlight that Narrow Drainage Tracts and Alluvial Plain terrain units are susceptible to water erosion where perennial shrub cover is substantially reduced (Pringle et. al. 1994), or the soil mantle surface is extensively disturbed. While both of these activities will occur as part of the expansion of support infrastructure, management

practices can substantially reduce the risks of environmental harm and can remediate impacts to drainage that have occurred as a part of past activities.

The primary objective is to minimise soil erosion and dust generation and the export of material into ephemeral drainage lines and onto verge vegetation. The following strategies will be implemented to achieve the clearing and rehabilitation objectives:

- Identify areas of major erosion hazard and avoid disturbance of these areas wherever possible;
- Provide environmental supervision and co-ordination of work teams during clearing and topsoil recovery;
- Minimise ground disturbance and restrict clearing to designated areas;
- Reinstate any drainage line disturbance at the completion of any earthworks programme
- Schedule any ephemeral creek-crossing construction activities to coincide with no creek flow periods, where practicable;
- Return stripped topsoil and rootstock to the original horizon to promote rapid revegetation and surface stabilisation;
- Keep topsoil stockpiles out of inappropriate areas such as watercourses and areas subject to wetting by poorer quality waters;
- Control access and prevent vehicular movements over topsoil stockpiles;
- Rehabilitate progressively where required and re-spread cleared vegetation selectively to create habitats;
- Reform access roads to similar pre-construction surface conditions, and
- Install erosion control structures along roads and areas of high erosion risk.

The following strategies will be implemented to achieve dust minimisation:

- Minimise clearing and avoid unnecessary machinery movements,
- Rehabilitate and/or stabilise disturbed surfaces as soon as possible, and
- Damp down with water of suitable quality from water trucks as necessary.

Historical evidence from pastoral, exploration and mining activities in the Davyhurst area from the 1960's to the present day, suggests that impacts to offsite drainage systems or water quality have probably occurred to varying degrees. Proposed management control arrangements during clearing will keep impacts to an acceptable level.

3.4 Flora and Fauna

Recent flora surveys have been completed in the Davyhurst Hub environs (JBBC 2016, 2019, 2025) which cover the same vegetation communities as present within the proposed Davyhurst Processing and administration expansion Projects. Shepherdson Environmental Services completed a flora and vegetation survey of the Golden Eagle Project in 2000 for Croesus Mining and reported the results in *Notice of Intent Reg Id 3584*. Surveys report that vegetation in and around the survey area is highly disturbed, with much of the natural vegetation, particularly the mid storey shrubs, having been removed.

The Davyhurst Project Tenements lie within the Austin Botanical District of the Eremaean Botanical Province (Beard 1976) and in the Murchison IBRA bioregion in the Eastern Murchison (MUR01) IBRA sub-region (Thackway and Creswell 1995). This IBRA sub region comprises the northern parts of the Yilgarn Craton and is characterized by extensive areas of elevated red sandplains with internal drainage, Salt Lake systems and broad plains of red-brown soils and breakaways. Minor areas of granite/ gneiss/ greenstone rock outcrop in the survey area. Vegetation is dominated by mulga (*Acacia aneura* complex) woodlands and is often rich in ephemerals, hummock grasslands (*Triodia* spp.), saltbush shrublands and *Halosarcia* (*Tecticornia*) shrublands. The support infrastructure expansion footprint is located within the existing Davyhurst Clearing Permit 7318/2 Purpose Permit footprint. Flora and fauna field surveys (JBBC 2016, 2019, 2025; Biostat 2020, Ecotec 2021) were

commissioned to assist in identifying conservation significant species and communities within the Project region, to develop plans for managing clearing and assisting in closure and rehabilitation planning.

Flora

Jenny Borger Botanical Consulting (JBBC) completed flora and vegetation surveys of the Davyhurst Processing and Administration Hub in 2016, 2019 and 2025. The ESA and vegetation mapping is shown on Figure 3 for the recent 2025 survey. The study area reported a total of 62 native taxa from 20 families and 34 genera. The majority of taxa were recorded within Fabaceae (11), Cheopodiaceae (10 taxa) Scrophulariaceae (6 taxa), Myrtaceae (6 taxa) and families (JBBC, 2025). Seven vegetation communities were described and mapped. Five of the VTs are *Eucalyptus* woodlands, one is a Mulga woodland and one chenopod shrubland occurring on secondary saline sites within the processing expansion area.

No vegetation representative of priority or threatened ecological communities was described for the Davyhurst Environmental Survey Area (ESA). Sixteen registered species – *Santalum spicatum* (Sandalwood) were recorded in the eastern part of the CPS 7318/2 permit area adjacent to the Davyhurst Village. No Priority or weed species were recorded in the survey area.

The condition of the vegetation varied from degraded to very good with the majority of the surveyed vegetation rating good to very good. Multiple impacts were observed, and include historic and current mining impacts, and evidence of feral animal grazing impacts (JBBC, 2025).

No Threatened Ecological Communities as defined by the DBCA and the *EPBC Act (1999)* were recorded within the survey area. No Priority Ecological Community as listed by the DBCA was recorded within survey area and current desktop and field survey evidence, suggests no floral habitat of regional significance will be permanently impacted by the proposed clearing activities.

Recommendations in respect to the management of weed spread, minimisation of disturbance to natural runoff flow patterns, and confirmation of taxa suitable for use in minesite rehabilitation trials, were identified in the recent field work and these will be incorporated into the Site Environmental Management Plan. Further flora and vegetation information is referenced in *Davyhurst Gold Project - Vegetation and flora survey of proposed clearing areas: Core shed and support infrastructure expansion Process Plant expansion Camp expansion - M30-255*, (JBBC, 2025) in Attachment A.

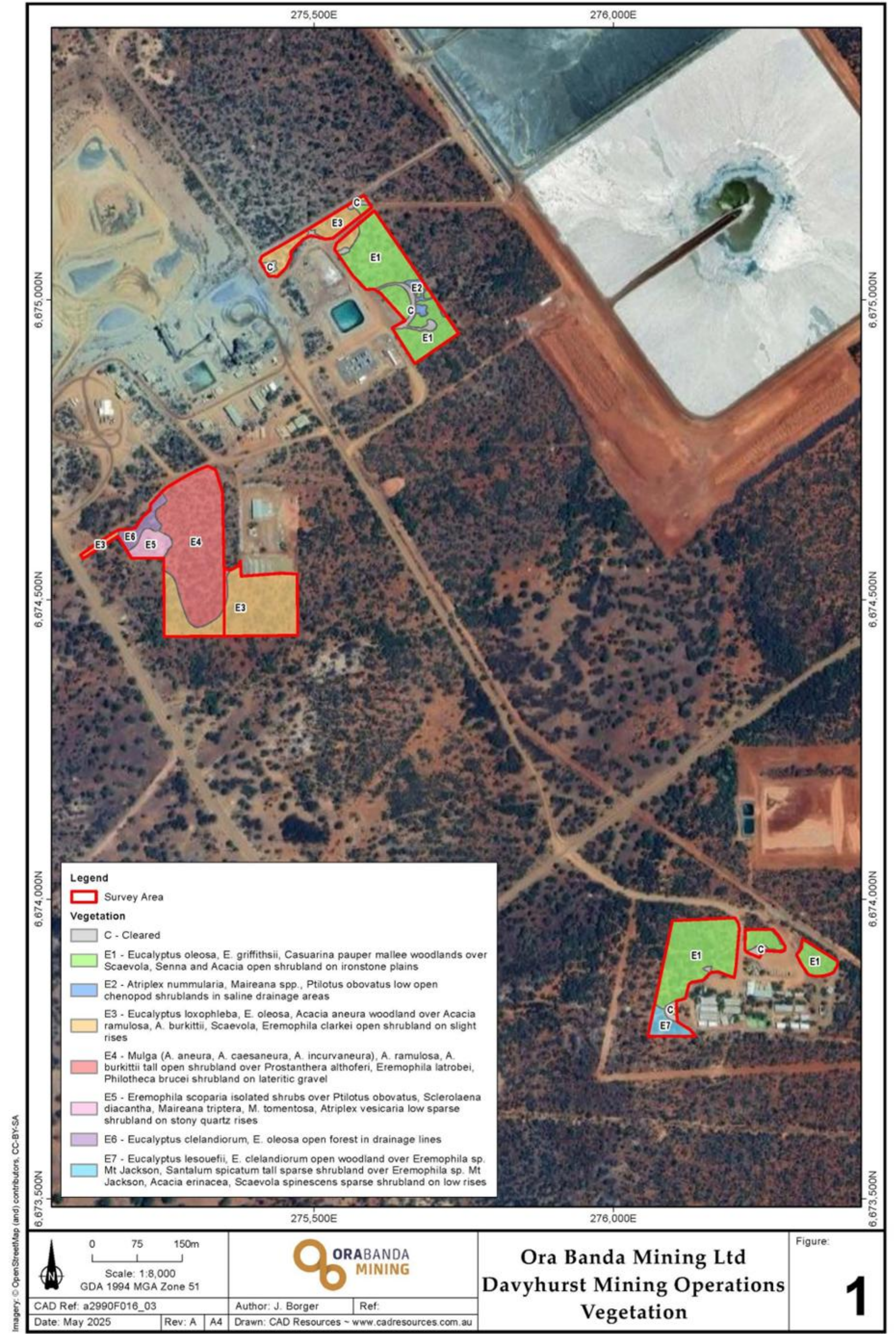


Figure 3: Davyhurst Gold Operations Clearing Permit Investigation Area - Vegetation Overview

3.5 Fauna

Shepherdson Environmental Services was commissioned in 2000 by Croesus Mining to undertake a desktop and field study of the Davyhurst Project area in accordance with the requirements documented in *EPA Guidance Statement No 56 and Position Statement No. 3*. More recently, OBM commissioned BioStat Pty Ltd to undertake desktop and field assessments to support clearing applications in the Davyhurst, Callion, Waihi, Siberia and Riverina mine areas (Biostat 2020).

The focus of this study was to investigate the likelihood of malleefowl (*Leipoa ocellata*) occurring in the planned disturbance envelopes and the habit value of the vegetation delineated for clearing at the respective minesites. In addition, the investigations also required an assessment of residual habitats and their value to other gazetted threatened fauna such as the (Curlew Sandpiper- *Calidris ferruginea*), Night Parrot (*Pezoporus occidentalis*), Princess Parrot (*Polytelis alexandrae*), the Chuditch (*Dasyurus geoffroyi*) and the likelihood of occurrence of other conservationally significance species such in general.

The Biostat assessment found that the remnant vegetation within the areas surveyed was mostly in a fair to degraded condition, with the main vegetation type being described as Eucalypt Woodland tending to Open Woodland in the highly disturbed areas. Due to the high level of mining and pastoral disturbances evident throughout the Project areas, resulting in presence of limited shrub species, factors such as the lack of cover, limitation on food sources and nesting sites will likely place limits on the range of native fauna that could be potentially inhabit the areas.

Malleefowl (*Leipoa ocellata*) is listed as Vulnerable under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and Schedule 3 of the *Western Australian Biodiversity Conservation Act 2016* (BC Act). No malleefowl mounds have been observed in the Davyhurst Processing Hub environs.

Curlew Sandpiper- (*Calidris ferruginea*). Status - Critically Endangered. The Curlew Sandpiper is associated with coastal mudflat areas but can sometimes be observed at inland ephemeral lakes (fresh or saline). No suitable habitat for this species was encountered during the survey.

Night Parrot (*Pezoporus occidentalis*). Status - Endangered. The night parrot has only recently been “rediscovered” in its historical distribution. It prefers areas of large spinifex hummocks in long unburnt grassland habitats – habitats not recorded in the Golden Eagle area. The likelihood of this nomadic species being present in the Davyhurst Hub environs is ranked as low.

Princess Parrot (*Polytelis alexandrae*). Status – Vunerable. This species is restricted to the central arid interior of South Australia, Northern Territory and Western Australia. It is unlikely to be recorded in the development area.

Chuditch (*Dasyurus geoffroyi*). Status – Vunerable. Historical records exist from the eastern portion of the Greater Western Woodlands and Goldfields region. Much of the habitats that supported these species in the past has been highly modified or cleared. If they have persisted, the species is likely to be found in very low densities.

Arid Bronze Azure Butterfly (*Ogyris subterrastris petrina*). Status – Critically Endangered. The Arid Bronze Azure Butterfly (*Ogyris subterrastris petrina*) has an obligate association with the light brown variety of Sugar Ant (*Camponotus sp.nr terebans*). DBCA recently released Survey Guidelines for the critical habitat features to determine potential occupancy of the ABAB. These features include: - (a) vegetation communities of mature Smooth Barked Eucalypts (*Eucalyptus salmonophloia*, *E. salubris*) mixed woodland over an open understorey, (b) presence of large underground colonies of the host ant, (c) other SBE’s to be examined for large basal ant colonies include - *E. loxophleba subsp.*

lissophloia, *E. sheathiana*, and *E. capillosa* subsp. *Wandoo*, and (d) the presence of red brown loamy soils.

Very isolated target tree species (SBE's) are present in the Davyhurst Processing Hub Development Envelope; however, the majority of these trees are immature with a diameter of less than 10cm. No signs of host ants were found at the base of the trunk. Another species which occasionally had mostly smooth bark, sometimes with a short layer of rough bark at the base, was *E. loxophleba* subsp. *lissophloia*, a mallee with most stems less than 10 cm diameter. No host ants were recorded. With the documented extensive historic and current mining and pastoral activity, and the absence of habitat specifically suitable for the host sugar ant, the likelihood of the ABAB being present in the area is considered low.

Guidance information for surveying for IHB was based on the WA Museum Records (Eastwood et. al. (2023). No DBCA Guidance material was found. *Senna artemisioides* subsp. *filifolia*, *Acacia tetragonophylla*, *Eremophila* spp., *Scaevola spinescens* and *Maireana* spp. are present within the survey areas; however, the structure of the vegetation does not closely resemble that described by Eastwood et. al. (2023). No signs of the associated ants, *Froggattella kirbii* were observed.

Introduced Animals

A total of seven introduced mammals could potentially occur in the habitats of the Davyhurst Project Area; of most concern within the Murchison bioregion are the introduced herbivores; the European rabbit, feral goat, donkey and camel which have the most widespread impact on fauna habitats through grazing and trampling. Feral cats and foxes are present, and these represent a threat to small ground dwelling fauna.

A series of recommendations were provided in the Biostat (2020) and Ecotec (2021) reports that will assist in minimising the impact on the habitats of a range of animals during clearing and mining associated operations.

3.6 Conservation Significance

The significance of the biota of the Davyhurst area was assessed in three contexts – State, regional and local levels. As no Conservation Significant Flora or fauna taxa or Threatened Ecological Communities have been recorded during past and current field surveys, the proposed extension of the Davyhurst support infrastructure has no significance at a State level. Of the fauna which potentially occur in the area, Biostat (2020) and Ecotec (2021) identified species of conservation significance that have the potential to occur in the Davyhurst area. The Mallee fowl (*Leipoa ocellata*), Curlew Sandpiper (*Calidris ferruginea*), Night Parrot (*Pezoporus occidentalis*), Princess Parrot (*Polytelis alexandrae*), Arid Bronze Azure Butterfly (*Ogyris subterrestris petrina*) Inland Hairstreak (*Jalmenus aridus*) and Chuditch (*Dasyurus geoffroii*) are Scheduled species under the Western Australian *Biodiversity Conservation Act* (2016) and Regulations (2018)

Of the Scheduled species identified in the desktop study, all are in urgent need of conservation attention and Action Plans, involving a range of conservation activities in conjunction with predator eradication are being managed by the DBCA with some success.

The presence of Schedule 1 terrestrial fauna in the Davyhurst mine area is considered highly unlikely, due to the lack of suitable habitat, a long history of land disturbance from grazing, timber cutting, mining and processing, permanent night light exposure, continuous 24/7 noise and equipment movements. While inactive, old Malleefowl mounds are recorded east of the Hub, their presence has not been recorded during recent botanical and fauna surveys (JBBC 2016, 2019, 2025) associated with near mines.

The LOM is of short duration (approximately 5 years) and the impact of the clearing on small, regional fauna is expected to be minimal, with the return of many terrestrial species back into disturbed areas after site decommissioning and rehabilitation. Threatening processes identified in the CALM Biodiversity Audit in 2002, include vegetation clearing and fragmentation, grazing pressure, feral animals (goats, foxes and cats), changed fire regimes, weed spread, salinity, mining and poaching bird species. Management Plans to mitigate and manage those processes relevant to mining, have been developed and are being implemented as part of the of current mining activities.

A significant part of the proposed Davyhurst infrastructure development is located within extensively disturbed areas and is part of a larger area degraded as a result of extensive past mining and processing activities and encompasses Land Systems and vegetation associations that are relatively widespread in the region (Pringle et al.1994). There is no evidence that floral or faunal habitat of regional significance will be significantly impacted by the proposed clearing for Project expansion.

4. MEASURES TO AVOID AND MITIGATE CLEARING IMPACTS

The Davyhurst Project Area is located within the Davyhurst Town Common, which is heavily impacted by over a century of mining use. The current proposal to extend the Davyhurst infrastructure and Administration footprint including the expansion of the corefarm, administration building, plant infrastructure and village will result in a short-term increase to site emissions and the disturbance footprint at the site. Measures to avoid and mitigate impacts arising from clearing of native vegetation as part of the continued development of the Davyhurst Gold Operations can be divided into Planning Controls and Operational Controls.

Planning Controls

Mitigation measure already adopted as part of the current mining operations include: (a) utilisation of existing cleared areas, (b) where feasible, placement of infrastructure in historically degraded mining/pastoral areas, (c) adopt progressive clearing practices as required for Project development stages.

Operational Controls

Operational impacts can be managed through:

- a) minimisation of disturbance and clearing,
- b) avoiding changes to drainage patterns and sheet flow zones,
- c) controlling weed spread,
- d) reducing impacts to soils and verges by using best quality ground water during dust suppression,
- e) controlling the clearing process by clearing in a direction towards vegetated areas, and only clearing areas that will be utilized within 6 months, and;
- f) progressive rehabilitation of disturbed areas during operations.

Mitigation measure already adopted include:

- a) utilisation of existing cleared areas,
- b) where feasible, placement of infrastructure in historically degraded mining areas, progressive clearing as required for project development stages, and
- c) recovery and stockpiling of vegetation trash for habitat establishment and progressive rehabilitation of mining disturbed areas.

Table 2: Summary of Findings against the 10 Clearing Principles

No.	Principle / Assessment
1	Clearing Principle Native vegetation should not be cleared if it comprises a high level of biological diversity. Assessment: Proposal is unlikely to be at variance with this Principle The application area (Davyhurst ESA) does not contain any conservation significant flora or Priority Ecological Communities (PECs) The species diversity would not be considered high with a total of 62 native taxa from 20 families and 84 genera. Comparing results with other regional surveys there is a deficit of grasses and annual species which is largely a result of pastoral and mining impacts over > 100 years as well as a drier, warmer climate through much of 2024/25. No threatened or priority flora species were recorded.
2	Clearing Principle 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. Assessment: Proposal is unlikely to be at variance with this Principle Vegetation communities within the Davyhurst (ESA) Project area are well represented within the broader region. Any fauna habitat occurring within the survey area is therefore well represented within the wider region. Described habitat for the IHB is not present although some of the associated shrub species are present in limited numbers. The main two flora species associated with IHB – <i>Senna artemisioides</i> subsp. <i>filifolia</i> and <i>Acacia tetragonophylla</i> are present; however the populations are sparse, and many of the <i>Acacia</i> have been heavily grazed and are present as low shrubs. In respect to ABAB, only one <i>Eucalyptus salubris</i> was recorded in the survey area and it was a semi mature tree with a narrow diameter and not likely to be a suitable size to support large sugar ant (<i>Camponotus</i> sp. nr. <i>terebrans</i>) colonies or leaf hoppers. Other conservation significant fauna species include <i>Leipoa ocellata</i> (Malleefowl) listed as Vulnerable - <u>Fauna that is rare or is likely to become extinct</u> under Section 19(1) c of the Biodiversity Conservation Act 2016. <i>Leipoa ocellata</i> is found in semi-arid and arid, mallee and acacia shrublands (Benshemesh 2007) and inactive mounds have been identified in the broader Davyhurst area (Biostat 2020) and could be present in the proposed ESA development areas. Loss and fragmentation of habitat are listed as major threats to this species. Although the proposed clearing areas comprise some of the described habitat types, pedestrian searches did not identify any evidence of Malleefowl presence. All fauna habitat in the ESA surveyed area has been subject to some degree of mining, township or pastoral disturbance. Clearing of native vegetation within the Davyhurst Project area is therefore not considered to pose a significant threat to the survival of any threatened fauna species
3	Clearing Principle Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, threatened flora. Assessment: Proposal is not at variance with this Principle No threatened flora has been recorded within the Davyhurst ESA.
4	Clearing Principle Native vegetation should not be cleared if it comprises the whole or part of, or is necessary for the maintenance of a threatened ecological community. Assessment: Proposal is not at variance with this Principle There were no Threatened or Priority Ecological Communities identified within or adjacent to the Davyhurst expansion areas.
5	Clearing Principle Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.

No.	Principle / Assessment
	Assessment: Proposal is not at variance with this Principle The application area falls with the Murchison Biogeographic Regionalisation of Australia (IBRA) bioregion in which approximately 100% of the pre-European vegetation remains (GWA 2018), although this does not take into account passive clearing through pastoral grazing. The area to be cleared is not considered to be significant as a remnant of native vegetation and the surrounding area has not been extensively cleared although pastoral impacts are present. The area to be cleared is not considered to be significant as a remnant of native vegetation as the surrounding area has not been extensively cleared and the vegetation association is well represented outside the Project area.
6	Clearing Principle Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland. Assessment: Proposal is not at variance with this Principle No permanent watercourses or wetlands occur within the proposed ESA development area. The proposed development area does not occur adjacent to or nearby to any major permanent watercourse or wetland. The drainage lines in or near the ESA are ephemeral and do not support riparian vegetation.
7	Clearing Principle 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. Assessment: Proposal is not at variance with this Principle Two former Pastoral stations in the district are UCL and are being managed for future inclusion in the Conservation estate: - Ex Goongarrie Station 50km to the east and Ex-Credo Station are being managed as Conservation Parks. The latter contains the Clear and Muddy Lakes Nature Reserve (R7634) and Rowles Lagoon Conservation Park (R4274), approximately 47 km south of the Davyhurst Hub development in an adjoining catchment. The proposed clearing is unlikely to impact on the environmental values of any adjacent or nearby conservation areas.
8	Clearing Principle Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation. Assessment: Proposal is not at variance with this Principle The Davyhurst Hub area has a high level of recent mining, historic township and pastoral disturbance which has occurred over many decades. The ESA is located in the Davyhurst Town Common. The current proposed clearing is to support existing infrastructure and activities and covers an area of 15 ha. Included are terrain units which have already been historically disturbed and are not likely to contribute to appreciable new land degradation. Clearing impacts can be managed by staged clearing, retaining vegetation buffers where practical and adopting progressive rehabilitation practices. Much of the area is flat to undulating and will pose a low erosion risk. Opportunities to enhance environmental biodiversity values through rehabilitation will be adopted.
9	Clearing Principle Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface and underground water. Assessment: Proposal is not at variance with this Principle Drainage in the area is ephemeral with surface water present for limited times during the year following major storm events. There are no permanent water courses, wetlands or Public Drinking Water Sources Areas in the Application Areas. Limited yield fractured rock aquifers do occur in the Davyhurst Hub environment within rocks primarily where tectonic action and weathering has created zones of secondary permeability. Groundwater in the Davyhurst environs is typically saline to hypersaline (>40,000 mg/L TDS), and have limited beneficial uses.

No.	Principle / Assessment
10	Clearing Principle Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding. Assessment: Proposal is not at variance with this Principle Rainfall is typically greatest in winter months within the Eastern Goldfields and surface sheet flow only occurs for short periods after heavy storms or after persistent low intensity rainfall. The Davyhurst Hub project areas are elevated. There are no permanent major watercourses or other surface water features in the Davyhurst Hub area with the potential for flooding, and due to the limited size of the proposed disturbance areas, and the presence of built infrastructure, the incidence or intensity of increased flooding is limited. The proposed clearing is unlikely to exacerbate the incidence or intensity of flooding.

5. SENSITIVE ENVIRONMENTAL RECEPTORS

This section provides details of any sensitive (environmental or social) receptors potentially impacted by the proposed expansion of support infrastructure at the Davyhurst.

The Davyhurst Hub is located within the historical Davyhurst Town Common that is managed by the Shire of Menzies through the Department of Planning, Lands and Heritage and is situated 2km north east of the historic Davyhurst township that is part of the Golden Quest Discovery Trail. The Davyhurst tenure hosts a number of active exploration, prospecting and mining operations with the closest sensitive receptor being located 50km south within the Credo Homestead campground.

5.1 *Heritage, Community and Consultation*

Searches of the Shire of Menzies-Local Heritage Survey and Listing (2022) and the Department of Planning, Land and Heritage online Aboriginal Cultural Heritage Inquiry System (ACHIS) - Site Register for the relevant tenure - M30/255 within the Shire of Menzies boundary, have identified no registered heritage sites within the proposed Davyhurst Infrastructure expansion.

Aboriginal Cultural Heritage

The Davyhurst Project is situated within the Marlinyu Ghoorlie Native Title Claimant Group area in which OBM have a Heritage Agreement. As per Section 21 of the Agreement, OBM issued a Heritage Notice 2025/1 to the Claimant Group outlining the proposed expansion activities for the DGO and a portion of the area has had surveys completed (Terra Rosa, July 2025) with no heritage sites identified during the recent survey. For new mine development areas within the Davyhurst Project, archaeological surveys were undertaken in 2020 (Brad Goode and Associates Pty Ltd 2020) and in 2021 by Wayne Glendenning (Indigenous Matters Pty Ltd 2021).

European Cultural Heritage

There are no anticipated impacts on areas of significance to European cultural heritage within the Davyhurst Infrastructure expansion Project. The proposed disturbances are within the existing CPS Boundary 7318/2 and external to the historic Davyhurst Town Boundary.

OBM continue to undertake a range of community and regulatory consultation programmes. These include correspondence and presentations to the Department of Biodiversity, Conservation and Attractions, Department of Mines, Petroleum and Energy and the Department of Water and Environmental Regulation. Discussions have also been held with Local government – Shire of Menzies and Local Pastoralists in respect to Shire Road use around the Davyhurst Processing Hub.

5.2 Weed Management

Several well-known weed species have shown themselves to be well adapted to colonisation of disturbed ground in the Eastern Goldfields. No noxious weed species were identified during the recent site inspection of the proposed extensions to the Project Development Areas (JBBC 2016, 2019, 2025). Operational management strategies adopted to stop weed spread include:

- Materials (i.e. soil) should not be removed from sites for reuse where weed infestations are evident without prior spraying;
- Require as a Site condition that all earthmoving equipment and vehicles are washed down prior to the initial transport to site and are soil free;
- Existing infestations in the general Project area and stockpiles will be brought to the attention of the Mine Management for action;
- Undertake progressive rehabilitation of disturbed areas, (where feasible) to assist in reducing weed spread by promoting competition from local native species, and;
- Mine personnel are made aware of weed issues through the Site Induction Programme.

5.3 Land Discharge

Mineral Ore processing is undertaken within the Davyhurst Hub with tailings discharged into the nearby Golden Eagle InPit TSF. There is a minimal risk for liquid waste such as hydrocarbons to enter the environment during land clearing and stockpiling operations. Servicing of earth moving equipment will only be permitted in designated areas. Saline water from the Project borefields is stored in lined dams and utilized for processing and dust suppression.

5.4 Closure and Rehabilitation Management

The Australian and New Zealand Minerals and Energy Council and the Minerals Council of Australia have jointly produced a high-level framework for the development of Closure Plans. The Davyhurst Project Mine Closure Plan was approved by DMIRS in 2015, and Activity Specific Mine Closure Plans for the Golden Eagle TSF was approved in 2022. Aspects arising from the proposed expansion project will be discussed in the Small Operations Mining Proposal expected to be lodged in August 2025.

The MCP guidelines recommend that final mine rehabilitation and decommissioning should ensure:

- That Stakeholders have their interests considered during the mine closure process and that the process of closure occurs in an orderly cost effective and timely manner;
- That the cost of closure is adequately represented in company accounts and the community is not left with a liability;
- There is clear transparent accountability and adequate resources for the implementation of the Closure Plan.
- The establishment of a set of indicators (i.e. completion criteria) that will demonstrate the successful completion of the closure process be developed prior to plan implementation, and
- That all statutory requirements are met.

5.5 Rehabilitation Concepts

Rehabilitation is defined as the implementation of procedures resulting in the return of an area to a sustainable biological condition such that it does not require ongoing maintenance.

The primary objectives for the closure and rehabilitation of the Davyhurst Processing site and infrastructure are outlined below. These are:

- Ensure risks to public safety are minimised and that the community do not inherit any road closure liabilities.
- The site is returned to a condition that will support current land uses.
- Stable topographic conditions are established that will support, a self-sustaining indigenous vegetation community consistent with the Land System and final land use objectives.
- Minimise off site impacts by removing deleterious materials, controlling infiltration, erosion, sedimentation and the degradation of existing drainages.
- Employ rehabilitation methods that are technically effective and cost efficient, rely on standard and proven engineering practices that do not require ongoing maintenance to ensure performance.
- Ensure the protection and conservation during rehabilitation works of any identified elements of the cultural and conservation estate within the mining leases.

Temporary Care and Maintenance

In the event of a Temporary Mine Closure, the transition from operations to Care and Maintenance status will be an orderly and managed process in accordance with the provisions of the approved C & M Plan.

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7. DEFINITIONS

Application Area	Area of proposed project native vegetation clearing including buffer zones as listed in the application form.
Care and maintenance	All mining operations suspended, site being maintained and monitored. Resident caretaker – considered Managed Care and Maintenance.
Disturbed	Area where vegetation has been cleared and/or topsoil (surface cover) removed.
Disturbance type	A feature created during mining or exploration activity, e.g. waste dumps, haul roads, access roads, ROM, plant site, TSF, borrow pits, drill pads, stockpiles, office blocks, accommodation village, etc
Investigation Area.	Area of survey surrounding proposed development for baseline studies also called Environmental Survey Area - ESA.
Life of mine	Expected duration of mining and processing operations.
Orthophotography	Use of aerial photography to measure areas of disturbance.
Pits	All open excavations including active mineral rock, gravel, sand, clay, bauxite and salt-pan extraction areas.
Project	The total integrated mining operations in which a number of sites contribute to the overall operation to supply ore, processing facilities and disposal of waste products.
Preliminary earthworks	Reshaping, capping, water/wind erosion control, rock armouring.
Rehabilitated	Areas are safe, have demonstrated stability under representative climatic conditions, non-polluting and support a functioning, self-sustaining ecosystem comprising local native species.
Relinquished	Agreed closure criteria met, government “sign-off” achieved, all obligations under the Mining Act removed and bonds retired.
Reporting period	Twelve-month period from reporting month as specified in tenement conditions e.g. if reporting month is June, reporting period would be June – May.
Revegetation	Establishment of self-sustaining vegetation cover after earthworks have been completed.
Tenement	Land tenure granted under the <i>Mining Act 1978</i> e.g. Mining Lease Exploration Licence, Prospecting Licence, Miscellaneous Licence, General Purpose Lease.
Waste landforms	Includes all mullock and waste rock disposal areas.

8. ACRONYMS

AER	Annual Environmental Report
AMD	Acid Mine Drainage
BOM	Bureau of Meteorology
CGPL	Carnegie Gold Pty Ltd
CIL	Carbon in Leach
CP	Clearing Permit
DBCA	Department of Biodiversity Conservations and Attractions
DWER	Department of Water and Environmental Regulation
DMIRS	Department of Mines Industry Regulation and Safety
DOW	Department of Water now incorporated in DWER
DSR	Drill Site Rehabilitation
Ec	Electrical Conductivity
EPA	Environmental Protection Authority
ESA	Environmental Survey Area
GLOS	Groundwater Licence Operating Strategy
GWL	5C Groundwater Well Licence
LG	Low Grade
LJE	Leanne James Environmental
M	Mining Lease
mAHD	Metres above the Australian Height Datum
MCM	Managed Care and Maintenance
MOU	Memorandum of Understanding between EPA and DMP
OBM	Ora Banda Mining Ltd
OEPA	Office of Environmental Protection Authority
PEC	Plant Ecology Consulting
PWS	Parks and Wildlife Service
PAF	Potential Acid Forming
RGO	Davyhurst Gold Operations
ROM	Run of Mine
SOM	Shire of Menzies
TDS	Total Dissolved Solids
TEC	Threatened Ecological Community
TSF	Tailings Storage Facility
WA	Western Australia
WCPL	Woolard Consulting Pty Ltd
WRL	Waste Rock Landform
ROA	Riverina Operations Area

Units of Measurement

A	per annum
dS/m	deci Siemens per meter
g/t	grams per tonne
ha	hectare
kL	kilolitre
kt	kilotonnes
m	metre
mg/L	milligrams per litre
Mt	million tonnes



Appendix A: Davyhurst Gold Project - Vegetation and flora survey of proposed clearing areas: Core shed and support infrastructure expansion Process Plant expansion Camp expansion - M30-255 (JBBC, 2025)

Davyhurst Gold Project - Vegetation and flora survey of proposed clearing areas:
Core shed and support infrastructure expansion
Process Plant expansion
Camp expansion - M30-255

Ora Banda Mining Ltd



July 2025

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Contents

Executive Summary	1
1. Introduction	2
1.1 Background	2
1.2 Environmental Setting.....	4
1.2.1 Climate.....	4
1.2.2 Landforms, hydrology and geology	4
1.2.3 Regional Vegetation	6
1.2.4 Conservation Significant Flora (CSF)	8
1.2.5 Threatened and Priority Ecological Communities (PEC/TEC)	11
1.2.6 Arid Bronze Azure Butterfly and Inland Hairstreak Butterfly (ABAB, IHB)	11
1.2.6 Land managed for Conservation	12
1.2.7 Disturbance History	12
2. Methodology.....	13
2.1 Desktop Survey.....	13
2.2 Field Survey.....	13
2.2.1 Vegetation and flora.....	13
2.2.2 Critical habitat for ABAB and IHB butterflies	13
3. Results	15
3.1 Flora.....	15
3.2 Vegetation	15
3.3 Vegetation condition	15
3.4 Arid Bronze Azure Butterfly and Inland Hairstreak Butterfly habitat	15
4. Discussion.....	20
4.1 Flora and vegetation.....	20
4.2 Fauna - Arid Bronze Azure Butterfly and Inland Hairstreak Butterfly habitat	22
4.3 Conclusions	22
5. References	26

Table 1: Description of Land Systems	6
Table 2: Vegetation associations mapped in 2016.....	6
Table 3: Greenstone range vegetation communities (VC) described by Meissner & Coppen (2013)	8
Table 4: Conservation significant flora recorded within 20 km. Likelihood of occurrence (LOC) – No (N), low (L), moderate (M), high (H) – in proposed disturbance areas.....	10
Table 5: Vegetation Condition – Eremaean and Northern Botanical Provinces (adapted from Keighery 1994 and Trudgen 1988; EPA 2016)	13
Table 6: Survey limitations	14
Table 7: Vegetation type (VT) descriptions	17
Table 8: Comparison of 2016 and 2025 mapping	20
Table 9: Comparison of species diversity with other survey results from the Davyhurst area.....	21
Table 10: Assessment of the Davyhurst Support Infrastructure expansion within CPS 7318/2 Boundary against DWER 10 Clearing Principles (EPA 1986)	23
Figure 1: Location of proposed clearing areas	3
Figure 2: Monthly rainfall recorded at Kalgoorlie Boulder (KB) and Credo WA (Cr) with long term means	4
Figure 3: Land systems – the clearing areas are located within the Moriarty and Marmion LS.....	5
Figure 4: Pre-European Vegetation mapping.....	7
Figure 5: DBCA CSF records for the area. (<i>Austrostipa blackii</i> has been recently delisted).....	9
Figure 6: DBCA <i>E. crucis</i> location was checked in May 2025. The habitat is highly unlikely to support the species.	10
Figure 7: Vegetation mapping	16
Appendix 1: Species list (P – Processing; C – Core Yard; V – Village).....	28
Appendix 2: Survey sites and Sandalwood (<i>Santalum spicatum</i>) locations	30
Appendix 3: GPS locations of <i>Santalum spicatum</i>	31
Appendix 4: Vegetation condition	32
Appendix 5: Davyhurst Expansion areas site descriptions 28 th April 2025	33

Executive Summary

OraBanda Mining Limited (OBM) propose to expand existing operations in three areas on M30/255 each covering approximately 5 hectares (total of 15 ha) within the Davyhurst Gold Project Hub located near the historic townsite of Davyhurst in the northern Goldfields region of Western Australia. The areas are located adjacent to existing mining infrastructure including the Process Plant, Geology Core Yard and Service Shed, and the Davyhurst Accommodation Village. Project mining operation are expanding, and extra space is required to clear these areas to accommodate additional people and materials. A Reconnaissance Survey was undertaken on the 28th April 2025 by botanist, Jenny Borger (Jenny Borger Botanical Consulting (JBBC)) and Leanne James, Environmental Consultant (LJ Environmental). The three areas occur within areas previously surveyed for Eastern Goldfields Ltd (EGL) in 2016 (JBBC 2016).

The aims of the survey were to update vegetation mapping, condition and location of any conservation significant flora (CSF), record impacts and identify potential threats. The vegetation mapping completed in 2016 was described at a broader scale than the current survey, with three communities described: #2 - *Eucalyptus griffithsii*, *E. oleosa* open mallee woodland to mallee woodland; #4 - *Eucalyptus salubris* and *E. griffithsii* woodland; and #5 - *Eucalyptus griffithsii*, *E. clelandiorum*, *Casuarina pauper* low mallee woodland.

Two land systems are mapped as occurring within the survey area – Moriarty (265Mo) and Marmion (266Ma); however, all vegetation is representative of the Moriarty LS (Low greenstone rises and stony plains supporting chenopod shrubland with patchy eucalypt overstoreys). Pre European vegetation mapping places the survey areas in Vegetation Association (VA) 538 Barlee - *Acacia brachystachya** (Turpentine mulga) scrub; and shrublands; (may refer to other mulga alliances such as *A. fuscaneura* or *A. caesaneura*) and 468 Kununulling - Medium woodland; salmon gum (*Eucalyptus salmonophloia*) and goldfields blackbutt (*E. lesouefii*). Vegetation representative of VA 538 is present within parts of the core yard and processing areas. No Salmon Gum or Goldfields Blackbutt woodlands are present.

Survey results

- No priority or threatened flora taxa were recorded. Sixteen (16) *Santalum spicatum* (sandalwood) were recorded.
- One smooth bark eucalyptus species was recorded in the survey areas, all with stems of less than 100mm. There was no evidence of *Camponotus* sp. nr. *terebrans* ant nests colonies within the survey area and therefore no preferred critical habitat as described in (DBCA ABAB Guidance 2020a) necessary to support the Arid Bronze Azure Butterfly (*Ogyris subterrestris petrina*) was considered to be present in the survey area.
- *Senna artemisioides* subsp. *filifolia*, *Acacia tetragonophylla*, *Eremophila* spp., *Scaevola spinescens* and *Maireana* spp. are present within the survey areas; however, the structure of the vegetation does not closely resemble that described by Eastwood et. al. (2023). No presence of the required associated ant species, *Froggattella kirbii*, were observed.
- A total of 62 taxa from 20 families and 34 genera were recorded from the three survey areas with 40 taxa recorded at the Core Yard, 37 adjacent to the Processing Plant and 28 in the Village area. The best represented families were:
 - Fabaceae 11, 2 genera (*Acacia* 10)
 - Chenopodiaceae 10, 5 genera (*Maireana* 5)
 - Myrtaceae 6, 1 genus (*Eucalyptus* 6)
 - Scrophulariaceae 6, 1 genus (*Eremophila* 6)

- Seven vegetation types (VT) are described. Five of the VTs are *Eucalyptus* woodlands, one is a Mulga woodland and one chenopod shrubland occurring on secondary saline sites within the processing expansion area.

The condition of the vegetation was mostly good to very good.

1. Introduction

1.1 Background

OraBanda Mining Limited (OBM) propose to expand three areas within the Davyhurst Gold Project located on within the historic Davyhurst townsite Common in the northern Goldfields region of Western Australia. The areas are located adjacent to existing mining infrastructure including Process plant, Geology Administration (core shed and core yard), and the Davyhurst Accommodation village (Figure 1). The mining operation is expanding, and clearing for additional infrastructure is required to be located adjacent to existing services.

The three areas each cover approximately 5 ha (total 15 ha) and occur within areas previously surveyed for Eastern Goldfields Ltd (EGL) in 2016 (Jenny Borger Botanical Consulting (JBBC) 2016). To support the Inforce CPS amendment application, DEMIRS requested OBM to update the vegetation mapping. A reconnaissance survey was undertaken on the 28th April 2025 by botanist, Jenny Borger (JBBC) and Leanne James, Environmental Consultant (LJ Environmental).

A reconnaissance survey is undertaken to provide context and gather broad information about a survey area and is required where flora and vegetation values are well defined, the area is not likely to support significant flora or vegetation and the scale and nature of potential impacts are not likely to be significant (EPA 2016).

The aims of the reconnaissance vegetation and flora survey were to:

- Update and describe vegetation mapping and condition for three sites,
- Record impacts and potential threats, and
- Record conservation significant flora .

As part of ongoing changes to clearing submissions, the vegetation was also assessed for critical habitat for the two rare butterfly species – the Arid Bronze Azure Butterfly (ABAB) (*Ogyris subterrestris petrina*) and Inland Hairstreak Butterfly (IHB) (*Jalmenus aridus*) and the presence of Malleefowl mounds.

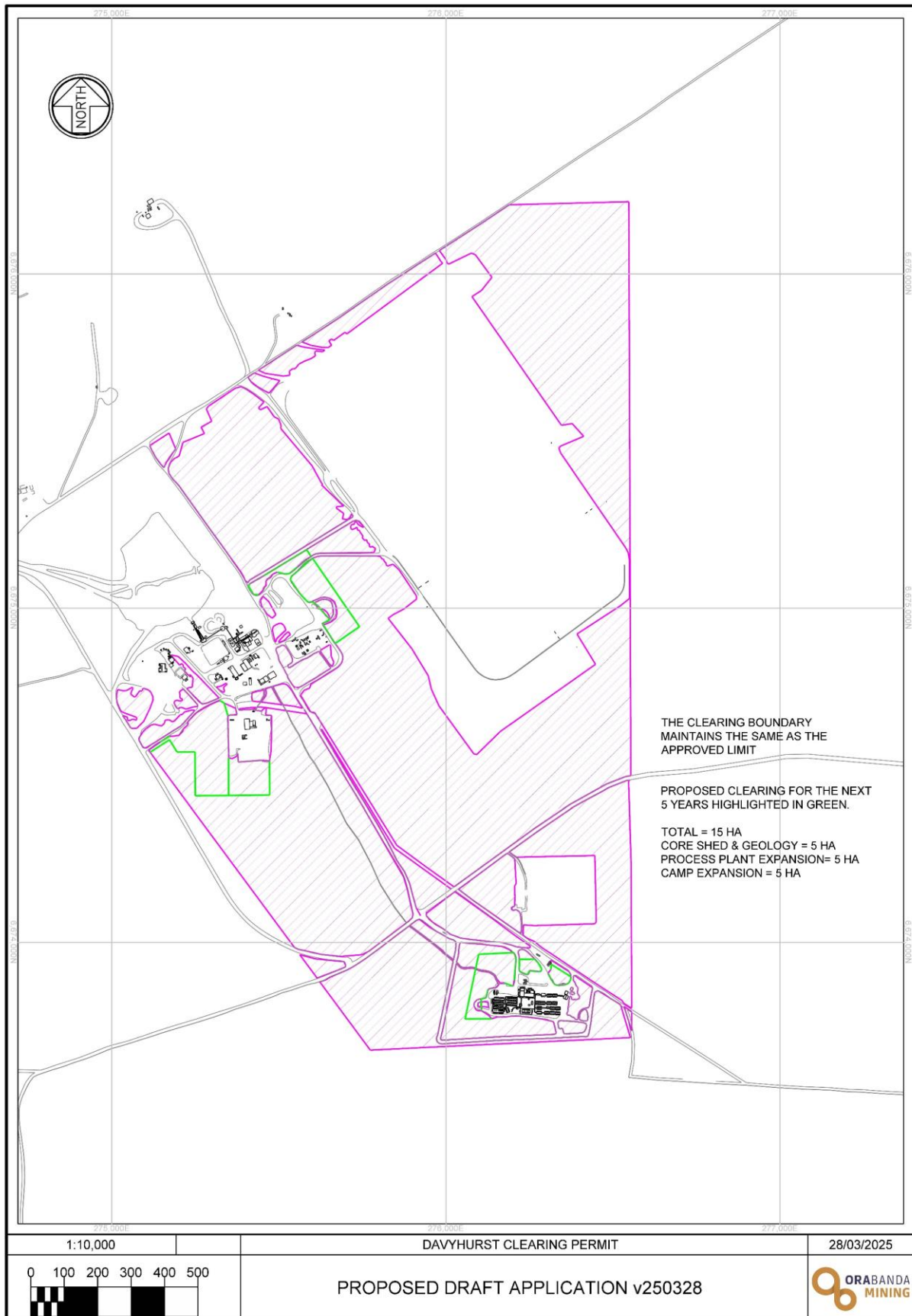


Figure 1: Location of proposed clearing areas within M30/255

1.2 Environmental Setting

1.2.1 Climate

The Davyhurst area experiences an arid climate with average annual rainfall recorded at Credo WA (Bureau of Meteorology (BoM) Station 12259, opened 2011) at 277.1 mm and 264 mm at Kalgoorlie Boulder (BoM Station 12038, opened 1939). Rainfall records are inconsistent at Credo for 2024. Mean monthly averages are shown with the 12-month records prior to the survey in Figure 2. Rainfall can be unreliable and extensive dry periods of around 4 – 6 months can be expected. Both Stations record a bimodal pattern with higher falls in the summer period and a slight increase in winter. Precipitation in the three months prior to the survey were above average at Kalgoorlie, and well below average January and February, no data is available for March and above average is recorded in April 2025 at Credo. The foliage of most plants was green with a few species in flower at the time of survey. Healthy ferns were also present within the Core Yard survey area. Annuals were mostly absent in all areas.

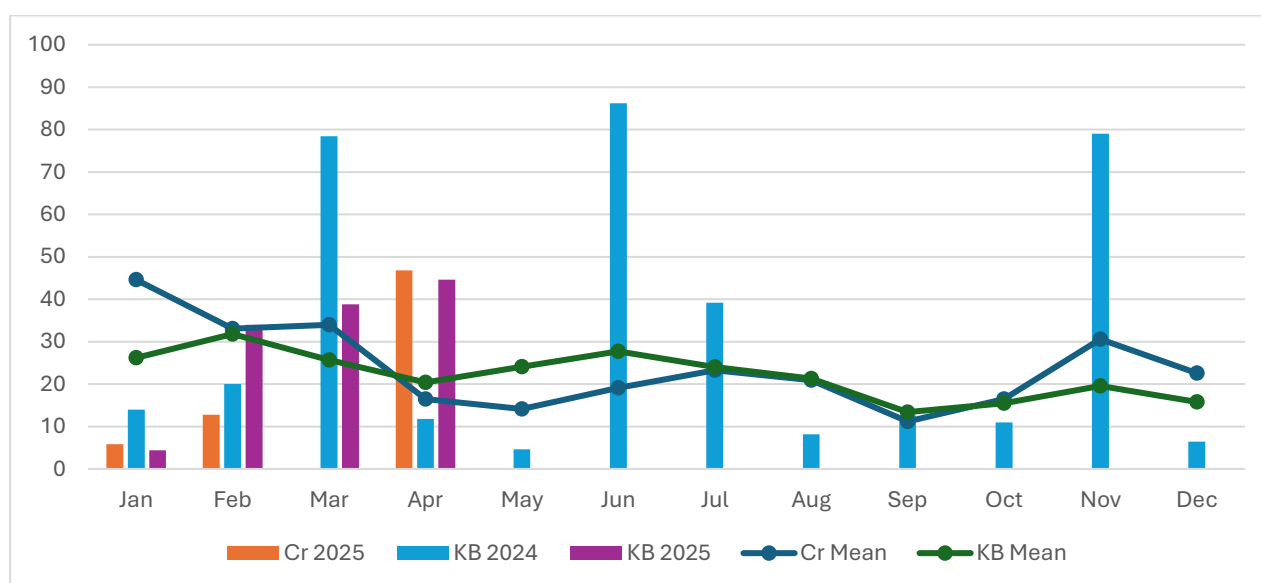


Figure 2: Monthly rainfall recorded at Kalgoorlie Boulder (KB) and Credo WA (Cr) with long term means

1.2.2 Landforms, hydrology and geology

Mapping of the Interim Biogeographic Regionalisation for Australia (IBRA) places the sites within the Murchison IBRA bioregion and within the Eastern Murchison (MUR1) IBRA sub-region very close to the eastern boundary of the Coolgardie IBRA bioregion and Eastern Goldfield IBRA sub-region (COO3) (Thackway and Creswell 2017). MUR1 comprises the northern parts of the Yilgarn Craton and is characterized by extensive areas of elevated red desert sandplains with internal drainage, Salt Lake systems and broad plains of red-brown soils and breakaways. Minor areas of granite/ gneiss/ greenstone rock outcrop in the survey area. Drainage within the survey area is to the east, with minor unincised drainage lines present. Landforms include hardpan plains with fine ironstone gravel for much of the area with low gravelly rises with patchy quartz on the western side which are present within the Core Yard and Village areas.

Land system (LS) mapping for the north-eastern Goldfields was undertaken by the Department of Agriculture Western Australia (Pringle et al. 1994). Two land systems are mapped as occurring within the survey area – Moriarty (265Mo) and Marmion (266Ma) (Figure 3, Table 1).

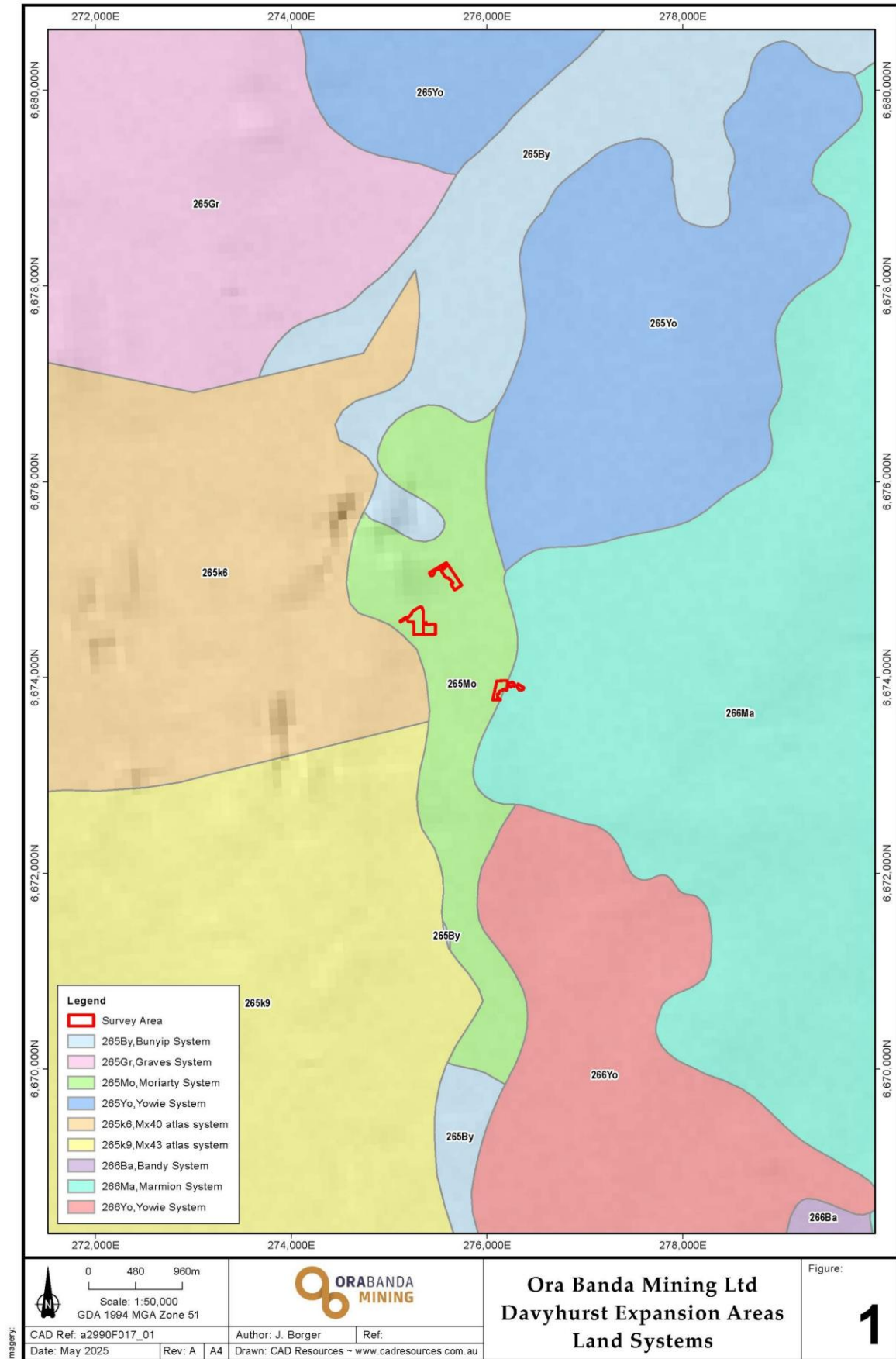


Figure 3: Land systems – the clearing areas are located within the Moriarty and Marmion LS

Table 1: Description of Land Systems

Code	Description	Location
265Mo	Moriarty – Low greenstone rises and stony plains supporting chenopod shrubland with patchy eucalypt overstoreys	Process plant Core Yard Village
266Ma	Marmion – Gently undulating sandplains with mixed tall shrublands and hummock grassland	Village

Vegetation and landform representative of the Marmion LS does not occur within the surveyed areas, and all vegetation is representative of the Moriarty LS.

1.2.3 Regional Vegetation

Pre-European mapping undertaken by Beard (1990) included the Davyhurst area in the northern part of the Coolgardie Botanical District characterized by dry eucalypt woodlands bordering the Austin Botanical District supporting mulga communities. Pre-European mapping for the area is presented in Figure 4. Davyhurst is mapped as Vegetation Association (VA) 538 Barlee - *Acacia brachystachya** (Turpentine mulga) scrub; and shrublands; (may refer to other mulga alliances such as *A. fuscaneura* or *A. caesaneura*) and 468 Kununulling - Medium woodland; salmon gum (*Eucalyptus salmonophloia*) and goldfields blackbutt (*E. lesouefii*). Vegetation representative of VA 468 is present within parts of core yard and processing areas. No Salmon Gum or Goldfields Blackbutt woodlands are present.

Vegetation association mapping of the Davyhurst area including the survey areas was undertaken in 2016 (JBBC 2016). Three VA were mapped for the current areas and are described in Table 2.

Table 2: Vegetation associations mapped in 2016

Code	Description	Site
2	<i>Eucalyptus griffithsii</i> , <i>E. oleosa</i> open mallee woodland to mallee woodland over <i>Acacia fuscaneura</i> , <i>A. aptaneura</i> , <i>Grevillea juncifolia</i> , <i>Eremophila decipiens</i> subsp. <i>decipiens</i> tall open shrubland over <i>Acacia tetragonophylla</i> , <i>A. ramulosa</i> var. <i>ramulosa</i> , <i>A. burkittii</i> , <i>Eremophila interstans</i> , <i>E. eriocalyx</i> , <i>Dodonaea lobulata</i> open shrubland over <i>Prostanthera althoferi</i> subsp. <i>althoferi</i> , <i>Dodonaea lobulata</i> , <i>Senna artemisioides</i> subsp. <i>filifolia</i> low sparse shrubland Plain; reddish yellow sandy clay loam to clay loam; cryptogam cover 30 – 50 %; condition good to excellent	Village Processing
4	<i>Eucalyptus salubris</i> and <i>E. griffithsii</i> woodland over <i>Acacia tetragonophylla</i> , <i>Senna artemisioides</i> subsp. <i>filifolia</i> , <i>Scaevola spinescens</i> , <i>Acacia burkittii</i> , <i>A. prainii</i> , and <i>Leichhardtia australis</i> (vines) open shrubland to shrubland over <i>Ptilotus obovatus</i> and <i>Maireana triptera</i> low sparse shrubland Reddish brown clay loam; gently sloping plain; condition mostly very good to excellent	Core Yard
5	<i>Eucalyptus griffithsii</i> , <i>E. clelandiorum</i> , <i>Casuarina pauper</i> low mallee woodland over <i>Acacia burkittii</i> , <i>A. tetragonophylla</i> , <i>Senna artemisioides</i> subsp. <i>filifolia</i> , <i>Santalum spicatum</i> open shrubland over <i>Dodonaea lobulata</i> , <i>D. viscosa</i> subsp. <i>angustissima</i> , <i>Acacia tetragonophylla</i> , <i>A. burkittii</i> shrubland over <i>Scaevola spinescens</i> , <i>Olearia muelleri</i> , <i>Ptilotus obovatus</i> , <i>Enchylaena tomentosa</i> , <i>Maireana trichoptera</i> low open shrubland over <i>Cheilanthes sieberi</i> subsp. <i>sieberi</i> isolated ferns to sparse fernland Low rises	Village

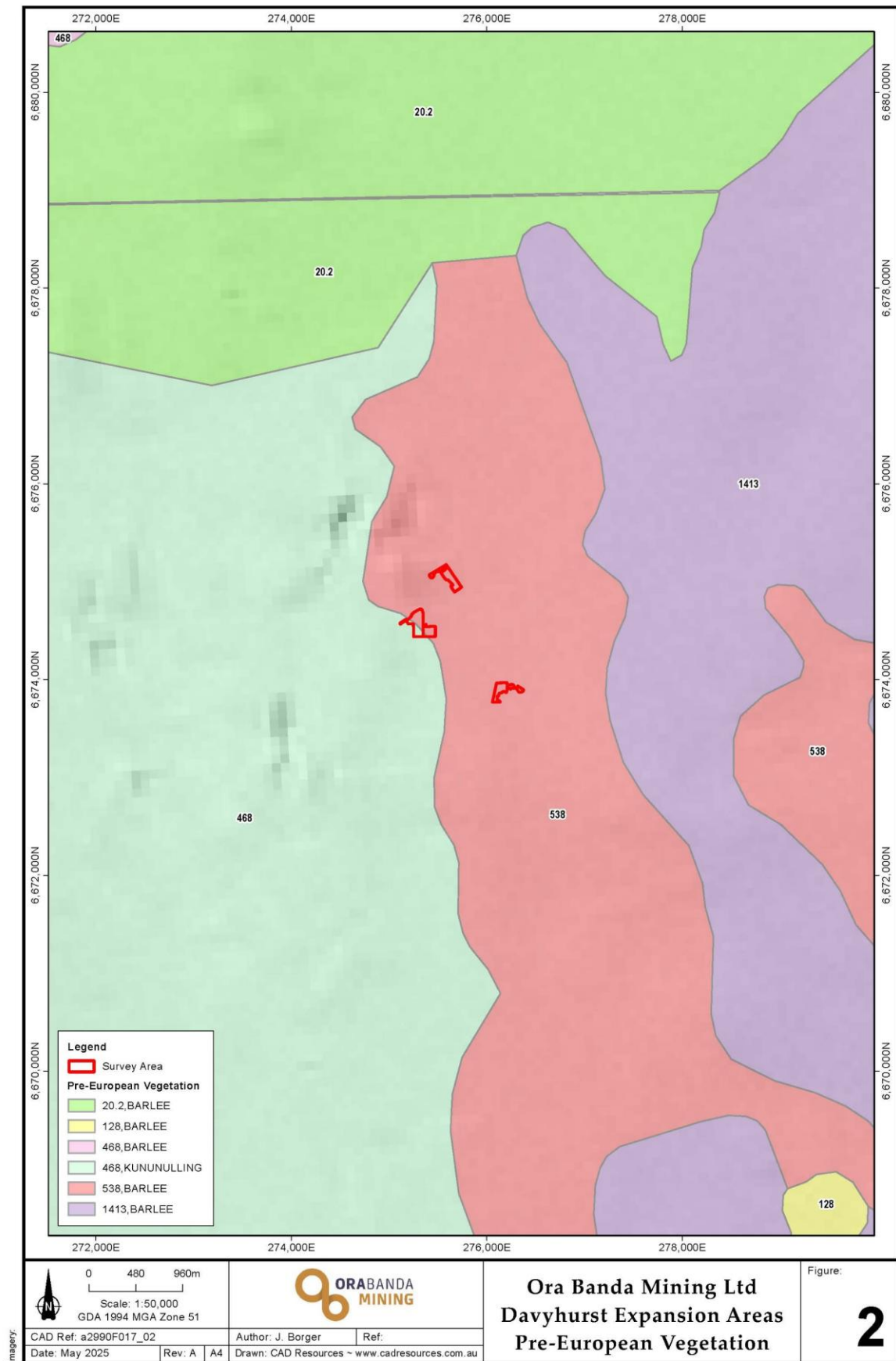


Figure 4: Pre-European Vegetation mapping

Meissner and Coppen (2013) (Department of Parks and Wildlife) undertook a survey of the flora and vegetation of the greenstone ranges occurring on Credo Station in 2011 from which six community groups were described (Table 3). Communities 1 – 4 occurred on basalt geology, and 5 and 6 occurred on laterised or ironstone geology. *Senna artemisioides* subsp. *filifolia*, *Austrostipa nitida* and *Eriochiton sclerolaenoides* were all indicator species for communities 1 – 4. Species names have been updated.

Table 3: Greenstone range vegetation communities (VC) described by Meissner & Coppen (2013)

VC	Description
1	Open woodlands to open forest of <i>Eucalyptus oleosa</i> subsp. <i>oleosa</i> , <i>E. clelandiorum</i> or <i>E. dundasii</i> over open to sparse shrublands of <i>Eremophila</i> sp. Mt Jackson and <i>Senna artemisioides</i> subsp. <i>filifolia</i> over low sparse shrubland of <i>Ptilotus obovatus</i> , <i>Acacia erinacea</i> and <i>Olearia muelleri</i> or isolated <i>Roepera ovata</i> . Gentle or lower slopes of basalt hills. IS* = 0
2	Open woodlands of either <i>Eucalyptus griffithsii</i> or <i>E. celastroides</i> over sparse shrubland of <i>Eremophila</i> sp. Mt Jackson and other <i>Eremophila</i> spp. (<i>E. interstans</i> subsp. <i>interstans</i> or <i>E. scoparia</i>), over low sparse shrubland of <i>Olearia muelleri</i> . Gentle slopes of basalt. IS = 0
3	Open to sparse woodlands of <i>Casuarina pauper</i> or <i>Eucalyptus griffithsii</i> over shrubland to open shrubland of <i>Dodonaea lobulata</i> , <i>Eremophila oldfieldii</i> subsp. <i>angustifolia</i> , <i>Senna artemisioides</i> subsp. <i>filifolia</i> and <i>Scaevola spinescens</i> over open to sparse low shrublands of <i>Ptilotus obovatus</i> . Crests and slopes of basalt hills. IS: <i>Enchylaena tomentosa</i>
4	Open forests to open woodlands of <i>Eucalyptus</i> spp. (<i>E. clelandiorum</i> , <i>E. celastroides</i> , <i>E. griffithsii</i>) and occasional <i>Casuarina pauper</i> , over shrublands to sparse shrublands of <i>Eremophila</i> spp. (<i>E. oldfieldii</i> , <i>E. interstans</i> and <i>E. scoparia</i>), <i>Senna artemisioides</i> subsp. <i>filifolia</i> and <i>Dodonaea lobulata</i> over open to sparse low shrublands of <i>Acacia erinacea</i> , <i>Olearia muelleri</i> and <i>Ptilotus obovatus</i> and isolated <i>Roepera ovata</i> forbs. Slopes and crests of the basalt hills. IS = 0
5	Open forest to open woodland of several dominant taxa (<i>Acacia burkittii</i> , <i>Allocasuarina eriochlamys</i> , <i>Grevillea oligomera</i> , <i>Eucalyptus oleosa</i>) over shrublands of to open shrublands of <i>Philotheca brucei</i> subsp. <i>brucei</i> , <i>Prostanthera grylloana</i> and <i>Dodonaea microzyga</i> subsp. <i>acrolobata</i> . Laterised basalt within the greenstone hills. IS = <i>Eremophila clarkei</i> , <i>Grevillea oligomera</i> , <i>Prostanthera grylloana</i> , <i>Allocasuarina eriochlamys</i> and <i>Dodonaea microzyga</i> ; <i>Philotheca brucei</i> subsp. <i>brucei</i> and <i>Acacia burkittii</i> (Com. 5 & 6)
6	Either open tall shrubland or woodland of <i>Acacia burkittii</i> or <i>Allocasuarina dielsiana</i> over open to sparse shrublands of <i>Philotheca brucei</i> subsp. <i>brucei</i> , <i>Prostanthera althoferi</i> subsp. <i>althoferi</i> over sparse to isolated forland or grassland of <i>Ptilotus helipteroides</i> and <i>Aristida contorta</i> . Ironstone geology. IS = <i>Cheilanthes sieberi</i> subsp. <i>sieberi</i> ; <i>Philotheca brucei</i> subsp. <i>brucei</i> and <i>Acacia burkittii</i> (Com. 5 & 6)

IS = Indicator species; no IS were confined to communities 1, 2 and 4.

1.2.4 Conservation Significant Flora (CSF)

A desktop survey of databases of threatened and priority taxa was undertaken in FloraBase (WA Herbarium 1998-), Meissner & Coppen (2013), DBCA database search (04-0121FL (2021) Figure 5) and other survey reports to determine the likelihood of conservation significant flora (CSF) occurring within the proposal areas. Taxa recorded within 20 km are listed in Table 4. One threatened species – *Eucalyptus crucis* subsp. *crucis* – has been recorded within 10 km which will be discussed further. A description of conservation codes is presented in Appendix 6.

Table 4: Conservation significant flora recorded within 20 km. Likelihood of occurrence (LOC) – No (N), low (L), moderate (M), high (H) – in proposed disturbance areas

Code	Scientific Name	Described Habitat	LOC
T	<i>Eucalyptus crucis</i> subsp. <i>crucis</i>	Mallee to 15 m high; minniritchie bark, always associated with granite.	N
P1	<i>Pterostylis elegantissima</i>	Elegant Rufous Greenhood; orchid; granite outcrops	N
P1	<i>Ptilotus procumbens</i>	Herb, gravelly plain; broad flats; Red clay/ gravelly sandy loam; flowers Sept – Nov	M
P2	<i>Eucalyptus educta</i>	Straggly mallee to 4 m high. Shallow soils on granite outcrops	N
P3	<i>Calytrix hislopilii</i>	Erect open low shrub with yellow flowers. Lateritic ridge; top of breakaway, granite	N
P3	<i>Grevillea georgeana</i>	Shrub; flowering recorded Jan, Mar, Sept – Nov; probably opportunistic; ironstone hilltops and slopes	L
P3	<i>Homalocalyx grandiflorus</i>	Shrub, yellow sand; sandplains Flowers Oct – Dec	N
P3	<i>Hysterobaecka ochropetala</i> subsp. <i>cometes</i>	Erect shrub, yellow or red sandy soils	N
P3	<i>Menkea draboides</i>	Prostrate spreading herb; wide distribution; flowers Aug – Sept; variety of habitats	L
P3	<i>Notisia intonsa</i>	Herb; variety of habitats including red clay loams associated with greenstone; Flowers Sep – Oct	L
P3	<i>Pterostylis virens</i>	Green Spoon-lipped Rufous Greenhood; herb, granite outcrops	N
P4	<i>Goodenia berringbinensis</i>	Herb; south end of wide distribution; along watercourses, clay pans; sometimes with aquatic leaves	N
P4	<i>Wurmbea murchisoniana</i>	Cormous perennial herb; flowers Jul – Sep; distribution from east of Esperance to north of Geraldton; rock pools; seasonally inundated clay hollows	N

The DBCA record for *Eucalyptus crucis* subsp. *crucis* T was recorded in April 1929 (pre-GPS) from sandy lake country 50 miles (80 km) west of Ora Banda. The latitude and longitude are very vague/ broad with the point mapped in Figure 1-5 being 50 km NW of Ora Banda within 100 m of the Coolgardie North Road.



This site was visited recently with the vegetation described as *Eucalyptus clelandiorum* woodland on greenstone hills with lateritic gravel (Figure 6). No salt lakes or granite are located near the site. 80 km (50 miles) west of Ora Banda places the location adjacent to salt lakes 45 km west of Coolgardie North Road.

Figure 6: DBCA *E. crucis* location was checked in May 2025. The habitat is highly unlikely to support the species.

1.2.5 Threatened and Priority Ecological Communities (PEC/TEC)

No Threatened Ecological Communities (TEC) are located in the Davyhurst area. The Helena and Aurora Range vegetation complexes (banded ironstone formation (BIF) Priority Ecological Community (PEC) is located approximately 65 km west of the survey area. Vegetation complexes recorded in the Helena and Aurora Ranges are unlikely to occur within the survey area as there is no outcropping BIF within the site.

1.2.6 Arid Bronze Azure Butterfly and Inland Hairstreak Butterfly (ABAB, IHB)

1.2.6.1 Arid Bronze Azure Butterfly - *Ogyris subterrestris petrina*

The Arid Bronze Azure Butterfly (ABAB) is associated with large colonies of the ant *Camponotus sp. nr. terebrans*, which is a pale form of the honey ant *C. terebrans* (The Western Australian Biodiversity Science Institute 2022). It is found associated with mallee vegetation on sandy soil, often near flood plains, and the ant typically digs its subterranean nest at the base of eucalypts (Threatened Species Scientific Committee 2014). *Camponotus terebrans* is typically only found in areas with smooth bark Eucalypts including Gimlet (*Eucalyptus salubris*), Lake Grace Gum (*Eucalyptus loxophleba ssp. gratiae*), York Gum (*Eucalyptus loxophleba subsp. lissophloia*), but also Wheatbelt Wandoo (*E. capillosa subsp. wandoo*) and Salmon Gum (*E. salmonophloia*). The butterfly has been recorded at the Barbalin Nature Reserve (BNR) (north of Merredin), a site about 100 km from the BNR, and two subpopulations within 75 km of Kalgoorlie. At Lake Douglas (12 km SW of Kalgoorlie), the host tree was *Eucalyptus concinna*. This population is now extinct. There are some more recently discovered populations ~50km north of Kalgoorlie and ~20km north of Kalgoorlie. *Camponotus sp. nr. terebrans*' association with smooth-barked eucalypts may be linked to their mutualistic association with the Pogonoscopus leafhoppers that feed on the tree sap. Of these eucalypts, *E. salubris* is present in the Davyhurst survey area. The individual species were checked for basal sugar ant colonies with no *Camponotus sp. nr. terebrans* identified.

1.2.6.2 Inland Hairstreak Butterfly (IHB) – *Jalmenus aridus*

The larvae of the Inland Hairstreak are typically found in stands of mixed young and mature *Senna artemisioides* subsp. *filifolia* shrubs in open woodland on sandy-loam, clay-loam with or without ironstone pebbles, or even a rocky substrate, often with a variety of flowering shrubs such as *Eremophila*, *Scaevola* and *Maireana*, which are used as nectar sources for adult butterflies. Small IHB larvae are attended by a few *Froggattella kirbii* ants (1–2), but 10 or more ants may attend final instar larvae, and these ants are found around the base of the *S. artemisioides* subsp. *filifolia* and *A. tetragonophila* (Eastwood et. al. 2023).

Based on surveys by Eastwood et. al. of *J. aridus* breeding sites within 100 km of Kalgoorlie, the preferred habitat for *J. aridus* larvae is feeding on *S. artemisioides* subsp. *filifolia* consists of the following components (in order of apparency):

1. Open woodland.
2. A stand of mixed young and mature *Senna* shrubs in an area of 2000 m² or more. *Senna* shrubs grow to 2.5-3.0 m in height and the older plants often have gnarled or twisted multi-stemmed branching trunks.
3. A variety of flowering shrubs such as *Eremophila*, *Grevillea*, *Scaevola*, and *Maireana*, which are used as nectar sources for adult butterflies.
4. Some scattered taller vegetation (e.g. *Allocasuarina*, *Santalum*), which creates wind breaks and sheltered microhabitats where adult butterflies congregate.
5. Open areas of exposed ground as well as corridors around the shrubs that *J. aridus* use for thermoregulation and mate location.

6. Good drainage, especially around the older *Senna* shrubs.
7. Substrate and soil suitable for the *Senna* host plants include sandy-loam, clay-loam with or without ironstone pebbles, or even a rocky substrate. Most breeding sites have been found on clay loam on relatively flat ground or adjoining seasonal floodplains (n = 7). Two sites were on rocky ridges with a hard packed rocky substrate and the remaining site was somewhat in between.
8. *Senna* shrubs with loose bark and/or debris accumulated in forks or on the ground surrounding the trunk or around adjoining shrubs.
9. Presence of *F. kirbii* ants at the base of the *Senna* shrub.

Due to the lack of critical host plants for *J. aridus* it is believed that the likely presence of this butterfly is low.

1.2.6 Land managed for Conservation

Davyhurst is located on UCL within the Davyhurst Township Common. This Reserve is surrounded by Credo Conservation Park, an ex-pastoral station which is currently being managed for conservation purposes by DBCA. Clear and Muddy Lakes Nature Reserve and Rowles Lagoon Conservation Park are located within southern part of Credo, 43 km south of the current survey area and within an adjoining catchment. No drainage from the Davyhurst site enters that system.

1.2.7 Disturbance History

The survey areas are located within the Davyhurst Town Common on ex Credo Station, which was run as a pastoral lease from 1906/ 07 to 2007 when it was acquired by the Department of Environment and Conservation. It is currently Unallocated Crown Land (UCL) proposed for conservation. Most stock have been removed but cattle and donkeys are still in some areas. Other feral grazers including, camels and rabbits are present in the region. The main impacts to the vegetation have been timber cutting, minor areas of clearing for construction of dwellings, dams and tracks, grazing impact on grasses and other palatable plants and mining and exploration. Species of plants can have variable responses to grazing pressure which were assigned different species indicator values by Pringle et al (1994). These are 'decreaser' (sensitive to grazing), 'increaser' (less palatable), 'intermediate' and 'non-responsive' or 'no value'.

Gold mining commenced in the Coolgardie area in the 1890's and several historic mining sites and abandoned towns are located in the Davyhurst district. Clearing of timber to support the mining industry has occurred over several decades. Signs of this were noted in some areas within the survey area with stumps and coppiced trees present. More recent mining activities are present within the Davyhurst area and the sites are all located adjacent to existing clearings.

2. Methodology

2.1 Desktop Survey

A desktop survey was undertaken prior to the site visit to collect information on vegetation and flora, including threatened and priority flora and ecological communities which may occur in the area. Previous surveys in the local area included Flora and Vegetation of the greenstone ranges of the Yilgarn Craton: Credo Station (Meissner & Coppen 2013), a Bush Blitz survey of a broader range of habitats within Credo Station (Gibson & Langley 2013) and several vegetation and flora surveys on mining leases. The results of this are described in Section 1.2. Surveys have been conducted in the Davyhurst area for Eastern Goldfields Mining (previous name for OBM until 2019) and OraBanda Mining.

2.2 Field Survey

2.2.1 Vegetation and flora

OBM provided maps and shapefiles of the proposed development area. A reconnaissance flora survey was undertaken on the 28th April 2025 by an experienced arid land botanist, Jenny Borger (JBBC) and Leanne James (Environmental Consultant) both of whom have worked extensively in the Davyhurst area. The vegetation was described using the National Vegetation Information System (NVIS; NVIS Technical Working Group 2017) (Appendix 4) at relevés at various locations and vegetation change boundaries recorded to assist with mapping. Much of the Davyhurst area had been previously surveyed in 2017 (JBBC). The condition of the vegetation was based on the descriptions in Table 5 (EPA 2016).

2.2.2 Critical habitat for ABAB and IHB butterflies

The survey for critical habitat for the target butterfly species and host ants was undertaken by L. James with plant identification by J. Borger following published guidelines for ABAB (DBCA 2020a, b) and IHB habitat descriptions by Eastwood et. al. (2023).

Table 5: Vegetation Condition – Eremaean and Northern Botanical Provinces (adapted from Keighery 1994 and Trudgen 1988; EPA 2016)

Condition rating	Description
Excellent	Pristine or nearly so, no obvious signs of disturbance or damage caused by human activities since European settlement.
Very good	Some relatively slight signs of damage caused by human activities since European settlement. For example, some signs of damage to tree trunks caused by repeated fire, the presence of some relatively non-aggressive weeds, or occasional vehicle tracks.
Good	More obvious signs of damage caused by human activity since European settlement, including some obvious impact on the vegetation structure such as that caused by low levels of grazing or slightly aggressive weeds.
Poor	Still retains basic vegetation structure or ability to regenerate it after very obvious impacts of human activities since European settlement, such as grazing, partial clearing, frequent fires or aggressive weeds.
Degraded	Severely impacted by grazing, very frequent fires, clearing or a combination of these activities. Scope for some regeneration but not to a state approaching good condition without intensive management. Usually with a number of weed species present including very aggressive species.
Completely Degraded	Areas that are completely or almost completely without native species in the structure of their vegetation; i.e. areas that are cleared or ‘parkland cleared’ with their flora comprising weed or crop species with isolated native trees or shrubs.

Survey specific issues/ limitations have been addressed in Table 6.

Table 6: Survey limitations

Potential Limitation	Extent
Contextual information at a regional and local scale	Not limiting The results of surveys in or near the proposal area were available to study prior to the field survey and on similar landforms in the broader area. Land system mapping surveys broadly described the soils and landforms for the proposal area. Conservation significant species listed in Table 1-4 were researched prior to the survey. The botanist is familiar with most of the species.
Competency/ experience	Not limiting The survey team included a botanist (J Borger) and an Environmental Consultant (L James) with several years' experience in the region
Proportion of flora recorded and/ or collected, any identification issues	Not limiting The survey areas were small (5 ha) and with two personnel, the areas were well covered on foot. The survey was undertaken in late April and groundcover was very sparse and few herbs were present. New growth was present on the Mulga species, and old pods were present under the trees/ shrubs which aided in identification. One species in particular had been severely grazed and there were some issues in field identification which was later resolved.
Was the appropriate area fully surveyed	Not limiting The survey areas were small (5 ha) and with two personnel, the areas were well covered.
Access restrictions within the survey area	Not limiting. The sites are located within walking distance of roads or car park areas. Climatic conditions had not resulted in any access limitations. The sites were level to gently sloping.
Survey timing, rainfall, season	Partly limiting The surveys were undertaken at the end of summer, following a mostly below average rainfall in the 6 months to January 2025, with average or above rainfall in February and March. Annuals would not be expected to be present, or if present, not in flower.
Disturbance that may have affected the results such as fire, flood or clearing	Partly limiting The Davyhurst mine site is located within an area that has been subjected to historic mining activities for more than a century. It is also with ex-Credo Station which was run as a pastoral lease until recently. Feral cattle and donkeys are common in the area, and there is evidence of rabbits being present. None of the areas have been burnt in recent times. The village areas have higher impacts, with some of the sections being small and surrounded by roads or car parks. There are some historical impacts from saline water overflow from standpipes in the processing area, however bunding has been reinstated in this area.

3. Results

3.1 Flora

A total of 62 taxa from 20 families and 34 genera were recorded from the three survey areas with 40 taxa recorded at the Core Yard, 37 adjacent to Processing and 28 in the Village area (Appendix 1). The best represented families were:

- Fabaceae 11, 2 genera (Acacia 10)
- Chenopodiaceae 10, 5 genera (Maireana 5)
- Myrtaceae 6, 1 genus (Eucalyptus 6)
- Scrophulariaceae 6, 1 genus (Eremophila 6)

No threatened or priority species were recorded. 16 *Santalum spicatum* (Sandalwood), a registered species, was recorded and were present in all three areas with locations presented in Appendices 2 and 3. No range extensions were recorded.

3.2 Vegetation

Seven vegetation types (VT) are described for the survey areas (Figure 7) which are described in Table 7. The site locations and descriptions are presented in Appendices 2 and 5. Five of the VTs are *Eucalyptus* woodlands, one is a Mulga woodland and one chenopod shrubland occurring on secondary saline sites within the processing expansion area.

3.3 Vegetation condition

The vegetation was mostly rated (Table 5; Appendix 4) within the “good” range with disturbances from historic and recent mining activities, cattle and rabbits. VT2 – *Atriplex nummularia*, *Maireana* spp., *Ptilotus obovatus* low open shrubland – on secondary saline sites in the processing area was assessed as degraded to poor due to the loss of upper and mid canopy species from waterlogging and salinity impacts. There is evidence that the areas are improving with the recruitment of a number of species. The least impacted area is VT 4 – tall mulga shrublands – although there were signs of intense grazing pressure on a few species. Condition mapping is presented in Appendix 3. A long unused (extinct) mallee fowl mound was also recorded in this area. No recent signs of mallee fowl were noted. Weeds were absent most likely due to timing of the survey. Most weeds in the area are annual species which germinate in autumn/ winter or in summer after significant rainfall.

3.4 Arid Bronze Azure Butterfly and Inland Hairstreak Butterfly habitat

Eucalyptus salubris was the only smooth barked *Eucalyptus* present listed in the DBCA Guidance (2020a,b) ABAB advice. One tree was recorded in the Processing extension area; however, it was an immature tree with a diameter of < 10 cm. No signs of host ants were found at the base of the trunk. Another species which occasionally had mostly smooth bark, sometimes with a short layer of rough bark at the base, was *E. loxophleba* subsp. *lissophloia*, a mallee with most stems less than 10 cm diameter. No host ants were recorded.

Guidance information for surveying for IHB was based on the WA Museum Records (Eastwood et. al. (2023). *Senna artemisioides* subsp. *filifolia*, *Acacia tetragonophylla*, *Eremophila* spp., *Scaevola spinescens* and *Maireana* spp. are present within the survey areas; however, the structure of the vegetation does not closely resemble that described by Eastwood et. al. (2023). No signs of the associated ants, *Froggattella kirbii* were observed.

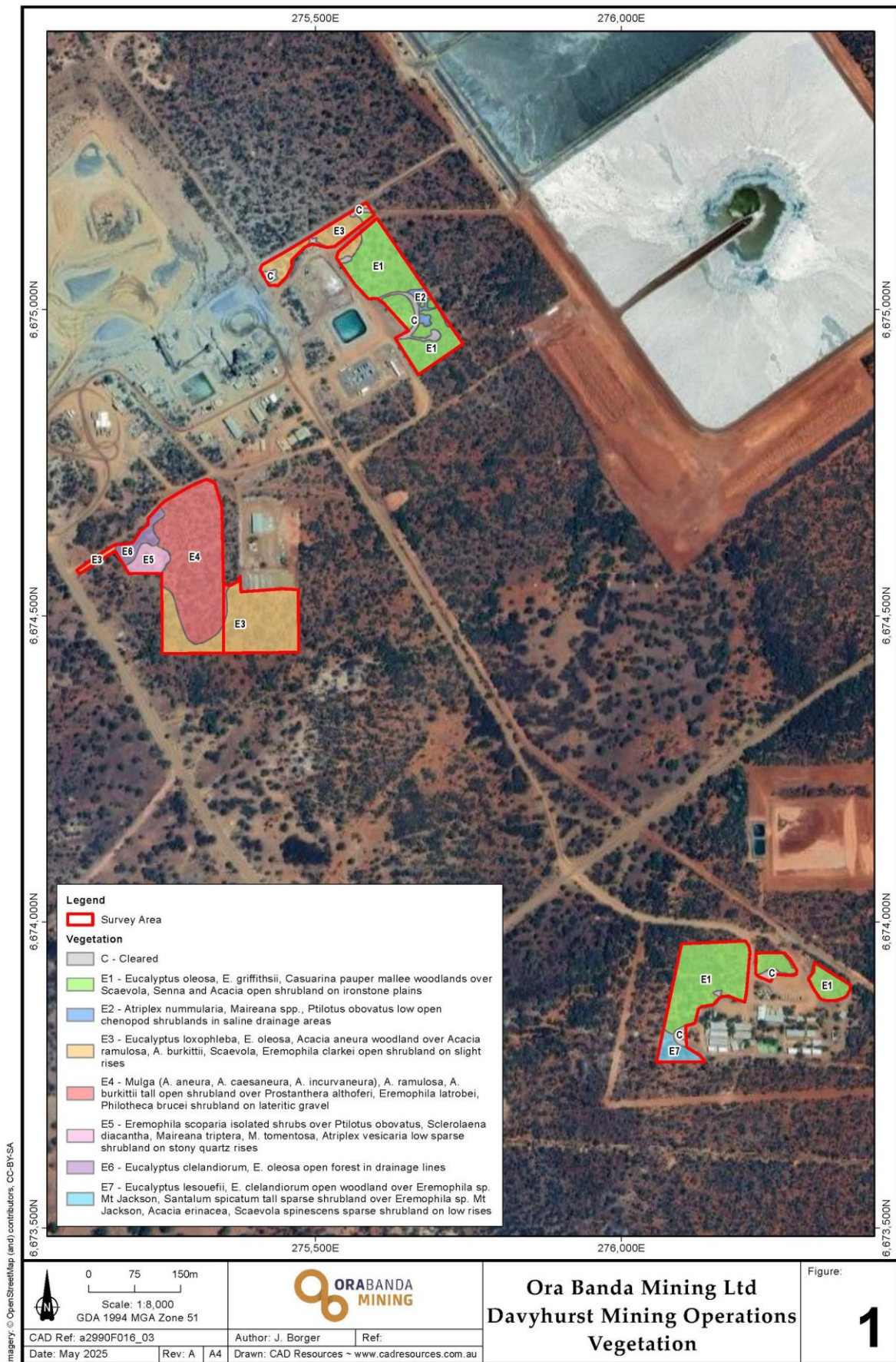


Figure 7: Vegetation mapping

Table 7: Vegetation type (VT) descriptions

VT	Landform	Vegetation	Image
E1 2016 VT2	Ironstone plain; fine ironstone gravel surface rock 30 – 60 % Condition: good to very good Processing, Village P1, P3, V1, V2, V3c	<i>Eucalyptus oleosa</i> subsp. <i>oleosa</i> , <i>Casuarina pauper</i> , <i>Eucalyptus griffithsii</i> tall mallee woodland over <i>Acacia burkittii</i> , <i>A. ramulosa</i> var. <i>ramulosa</i> tall sparse shrubland over <i>Scaevola spinescens</i> , <i>Senna artemisioides</i> subsp. <i>filifolia</i> , <i>Acacia ramulosa</i> var. <i>ramulosa</i> open shrubland over <i>Ptilotus obovatus</i> var. <i>obovatus</i> , <i>Dodonaea lobulata</i> , <i>Olearia muelleri</i> isolated low shrubs	
E2 2016 -	Plain; minor drainage lines/ depressions Condition: degraded to poor Saline overflow from standpipe; processing Sites P2a, 2b, P4a	<i>Atriplex nummularia</i> , <i>Ptilotus obovatus</i> var. <i>obovatus</i> , <i>Maireana pyramidata</i> , <i>M. triptera</i> , <i>M. georgei</i> , <i>Scaevola spinescens</i> , <i>Dodonaea lobulata</i> , <i>Atriplex vesicaria</i> , <i>Acacia burkittii</i> , <i>Maireana triptera</i> , <i>M. georgei</i> , <i>Leichhardtia australis</i> low open chenopod shrubland	

VT	Landform	Vegetation	Image
E3	Plain, slight rise Processing, core yard P5, C1, C2, C3, C3b, C5	<i>Eucalyptus loxophleba</i> subsp. <i>lissophloia</i>, <i>E. oleosa</i> subsp. <i>oleosa</i>, <i>E. griffithsii</i>, <i>Acacia aneura</i> woodland over <i>Acacia ramulosa</i>, <i>A. burkittii</i>, <i>Scaevola spinescens</i>, <i>Eremophila clarkei</i>, <i>Casuarina pauper</i>, <i>Eremophila latrobei</i> subsp. <i>latrobei</i> open shrubland over <i>Scaevola spinescens</i>, <i>Roepera aurantiaca</i> subsp. <i>aurantiaca</i>, <i>Solanum lasiophyllum</i> low open shrubland	
E4	Core Yard Low rise on lateritic gravel Condition: Good to very good C4, C6, C8, C9	<i>Mulga</i> (<i>A. aneura</i>, <i>A. caesaneura</i>, <i>A. incurvaneura</i>), <i>A. ramulosa</i> var. <i>ramulosa</i>, <i>A. burkittii</i> tall open shrubland over <i>Prostanthera althoferi</i> subsp. <i>althoferi</i>, <i>Eremophila latrobei</i> subsp. <i>latrobei</i>, <i>Philotheca brucei</i> subsp. <i>brucei</i> shrubland over <i>Solanum lasiophyllum</i>, <i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>, <i>Psyrax suaaveolens</i> low isolated shrubs	
E5	Crest of low rise Quartz rocky plain Condition: Mostly very good Core Yard C7	<i>Eucalyptus clelandiorum</i> isolated tree over <i>Eremophila scoparia</i> isolated shrubs over <i>Ptilotus obovatus</i>, <i>Sclerolaena diacantha</i>, <i>Maireana triptera</i>, <i>M. tomentosa</i>, <i>Atriplex vesicaria</i> low sparse shrubland	

VT	Landform	Vegetation	Image
E6	Drainage line/ depression Core Yard Condition: Very good; edge effects; very thick litter and fallen timber	<i>Image: Denser woodland area at back of photo of E5; Eucalyptus clelandiorum, E. oleosa open forest</i>	
E7	Low rise Condition: Poor Village V3a	<i>Eucalyptus lesouefii, E. clelandiorum open woodland over Eremophila sp. Mt Jackson, Santalum spicatum tall sparse shrubland over Eremophila sp. Mt Jackson, Acacia erinacea, Scaevola spinescens sparse shrubland on low rises</i>	

4. Discussion

4.1 Flora and vegetation

The flora and vegetation are representative of the Eastern Murchison/ northern Eastern Goldfields IBRA subregions and similar to results from other surveys in the Davyhurst area. No vegetation types are recorded as being restricted. Drainage from the site is to the east which will not impact flow into the Clear and Muddy Lakes NR or Rowles Lagoon Conservation Park.

Previous mapping of the area (JBBC 2016) mapped the areas as vegetation communities 2, 4 and 5 (Table 8). The 2016 survey was described at a broader scale. VC2 includes both E1 and E3 from the current survey. *Eucalyptus salubris* (VC4) did not extend into the Core Yard area but was present near the edges. *Eucalyptus griffithsii* was present in the Core Yard area, but not dominant. E4 (Mulga) has some similarities with VC2 but more representative of VC7 of the 2016 survey - *Acacia mulganeura*, *A. fuscaneura*, *A. ramulosa*, *Hakea preissii*, *Allocasuarina eriochlamys* subsp. *eriochlamys* shrubland over isolated *Cheilanthes sieberi* subsp. *sieberi* ferns – which was mapped east of the Processing area.

Table 8: Comparison of 2016 and 2025 mapping

2016	Description	Area	2025 VT
VC2	<i>Eucalyptus griffithsii</i> , <i>E. oleosa</i> open mallee woodland to mallee woodland over <i>Acacia fuscaneura</i> , <i>A. aptaneura</i> , <i>Grevillea juncifolia</i> , <i>Eremophila decipiens</i> subsp. <i>decipiens</i> tall open shrubland over <i>Acacia tetragonophylla</i> , <i>A. ramulosa</i> var. <i>ramulosa</i> , <i>A. burkittii</i> , <i>Eremophila interstans</i> , <i>E. ericalyx</i> , <i>Dodonaea lobulata</i> open shrubland over <i>Prostanthera althoferi</i> subsp. <i>althoferi</i> , <i>Dodonaea lobulata</i> , <i>Senna artemisioides</i> subsp. <i>filifolia</i> low sparse shrubland	Processing	E1, E2, E3
		Village	E1
VC4	<i>Eucalyptus salubris</i> and <i>E. griffithsii</i> woodland over <i>Acacia tetragonophylla</i> , <i>Senna artemisioides</i> subsp. <i>filifolia</i> , <i>Scaevola spinescens</i> , <i>Acacia burkittii</i> , <i>A. prainii</i> , and <i>Leichhardtia australis</i> (vines) open shrubland to shrubland over <i>Ptilotus obovatus</i> and <i>Maireana triptera</i> low sparse shrubland	Core Yard	E3, E4, E5, E6
VC5	<i>Eucalyptus griffithsii</i> , <i>E. clelandiorum</i> , <i>Casuarina pauper</i> low mallee woodland over <i>Acacia burkittii</i> , <i>A. tetragonophylla</i> , <i>Senna artemisioides</i> subsp. <i>filifolia</i> , <i>Santalum spicatum</i> open shrubland over <i>Dodonaea lobulata</i> , <i>D. viscosa</i> subsp. <i>angustissima</i> , <i>Acacia tetragonophylla</i> , <i>A. burkittii</i> shrubland over <i>Scaevola spinescens</i> , <i>Olearia muelleri</i> , <i>Ptilotus obovatus</i> , <i>Enchylaena tomentosa</i> , <i>Maireana trichoptera</i> low open shrubland over <i>Cheilanthes sieberi</i> subsp. <i>sieberi</i> isolated ferns to sparse fernland	Village	E7

A comparison of diversity between the current survey and other surveys at the site and broader region show similar results for family representation (Table 9). Chenopodiaceae, Fabaceae, Scrophulariaceae and Myrtaceae were the best represented families at all sites. Poaceae (grasses) and Asteraceae were more diverse in the Credo survey (DPAW Greenstone survey (Meissner & Coppen 2013), with much higher numbers of annuals also recorded. This would be due to timing of the survey and the diversity of landforms surveyed.

Table 9: Comparison of species diversity with other survey results from the Davyhurst area

Survey (North – south distance) or area (ha)	Surveyor	Total No. species	Families	Genera	Fabaceae	Chenopodiaceae	Scrophulariaceae	Myrtaceae	Poaceae	Asteraceae	Annuals	Weeds
Davyhurst Expansion Survey 2025 (15 ha)	JBBC	62	20	34	11	10	6	6	4	1	1	0
Mulwarrie 1 2025 (~90 ha)	GV	57	16	28	7	15	7	5	3	1	1	3
Mulwarrie 2 2025 (~ 120 ha)	GV	83	26	41	11	17	9	6	4	1	4	5
Riverina 2021 (563 ha)	JBBC	83	24	40	20	12	8	6	5	2	1	0
Riverina 2019 (3 km)	JBBC	95	26	41	18	14	14	8	4	2	6	2
Davyhurst Mine site* (2016) ~ 410 ha	JBBC	87	22	43	15	15	7	8	1	1	1	2
Credo 2013 (~80 km)	DPAW	186	42	96	20	15	15	11	13	15	62	3

* Part of larger survey JBBC 2016

No landforms could be described as greenstone ranges with landforms present in the survey area being plains or low rises underlain by greenstone. There are some similarities between the vegetation at Davyhurst with Meissner and Coppen (2013) greenstone range community 4 (Open forests to open woodlands of *Eucalyptus* spp. (*E. clelandiorum*, *E. celastroides*, *E. griffithsii* and occasional *Casuarina pauper*). The vegetation communities of the greenstone ranges are not considered to be restricted.

The likelihood of annual priority taxa being present at other times of the year are very low. Two species which may occur include *Menkea draboides* P3 which has been recorded in the Davyhurst region from basalt outcrops in open woodland of *Allocasuarina dielsiana* and *Acacia ramulosa* var. *ramulosa* over sparse shrubland of *Philotheca brucei* subsp. *brucei* and *Allocasuarina* sp. (not present in the survey area) or *Ptilotus procumbens* P1 which has been recorded from *Acacia burkittii* open shrubland on broad flats on red cracking clay. This habitat is also not present.

The three sites are present in areas with existing disturbances, and the clearing is unlikely to exacerbate environmental conditions in the OBM Davyhurst area. No vegetation representative of riparian or wetland habitat is present.

Impacts to the vegetation east of the Processing area (VT2) are being caused by overflow from the standpipes when filling water trucks (Sites 2a, 2b and 4b; Appendix 4). Mature woodland vegetation has died; however there has been some recent regeneration/ recruitment of small shrubs. Salt staining is present in some areas. OBM needs to address the water overflow situation with the construction of bunds or similar structures to control discharge into bushland areas.

4.2 Fauna - Arid Bronze Azure Butterfly and Inland Hairstreak Butterfly habitat

Described habitat for the IHB is not present although some of the species are. The main two flora species – *Senna artemisioides* subsp. *filifolia* and *Acacia tetragonophylla* are present; however the populations are sparse, and many of the *Acacia* have been heavily grazed and are present as low shrubs. Only one *Eucalyptus salubris* was recorded in the survey area as a semi mature tree with a narrow diameter trunk and not likely to be a suitable size to support large sugar ant (*Camponotus* sp. nr. *terebrans*) colonies or leaf hoppers populations.

4.3 Conclusions

The majority of the vegetation condition within the survey area was considered in the “good” range with disturbances from historic and recent mining activities, cattle and rabbits, with vegetation adjacent to the processing site considered degraded due to saline water overflows. No Threatened or Priority species were identified within the Environmental Study Area (ESA) and the critical habitat for the Inland Hairstreak and Arid Bronze Azure Butterflies was not observed within the survey area. Malleefowl have been observed in the Davyhurst Hub environs although no active mounds have been identified. Environmental impacts from the proposed clearings of the expansion areas are likely to be low.

An assessment of the Davyhurst expansion of support infrastructure within the existing Clearing Permit CPS 7318-2 boundary proposal against the Department of Water and Environmental Regulations 10 Clearing Principles (EPA 1986) is presented in Table 10.

Table 10: Assessment of the Davyhurst Support Infrastructure expansion within CPS 7318/2 Boundary against DWER 10 Clearing Principles (EPA 1986)

Clearing Principle		Assessment
1	Native vegetation should not be cleared if it comprises a high level of biological diversity.	Proposal is unlikely to be at variance with this principle The application area (Davyhurst ESA) does not contain any conservation significant flora or Priority Ecological Communities (PECs) The species diversity would not be considered high with a total of 62 native taxa from 20 families and 84 genera. Comparing results with other regional surveys there is a deficit of grasses and annual species which is largely a result of pastoral and mining impacts over > 100 years as well as a drier, warmer climate through much of 2024/25. No threatened or priority flora species were recorded.
2	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.	Proposal is unlikely to be at variance with this principle Vegetation communities within the Davyhurst (ESA) Project area are well represented within the broader region. Any fauna habitat occurring within the survey area is therefore well represented within the wider region. Described habitat for the IHB is not present although some of the associated shrub species are present in limited numbers. The main two flora species associated with IHB – <i>Senna artemisioides</i> subsp. <i>filifolia</i> and <i>Acacia tetragonophylla</i> are present; however the populations are sparse, and many of the <i>Acacia</i> have been heavily grazed and are present as low shrubs. In respect to ABAB, only one <i>Eucalyptus salubris</i> was recorded in the survey area and it was a semi mature tree with a narrow diameter and not likely to be a suitable size to support large sugar ant (<i>Camponotus</i> sp. nr. <i>terebrans</i>) colonies or leaf hoppers. Other conservation significant fauna species include <i>Leipoa ocellata</i> (Malleefowl) listed as Vulnerable - <u>Fauna that is rare or is likely to become extinct</u> under Section 19(1) c of the Biodiversity Conservation Act 2016. <i>Leipoa ocellata</i> is found in semi-arid and arid, mallee and acacia shrublands (Benshemesh 2007) and inactive mounds have been identified in the broader Davyhurst area (Biostat 2020) and could be present in the proposed ESA development areas. Loss and fragmentation of habitat are listed as major threats to this species. Although the proposed clearing areas comprise some of the described habitat types, pedestrian searches did not identify any evidence of Malleefowl presence. All fauna habitat in the ESA surveyed area has been subject to some degree of mining, township or pastoral disturbance. Clearing of native vegetation within the Davyhurst Project area is therefore not considered to pose a significant threat to the survival of any threatened fauna species.
3	Native vegetation should not be cleared if it includes, or is necessary, for the continued existence of rare flora	Proposal is not at variance with this principle No threatened flora has been recorded within the Davyhurst ESA.
4	Native vegetation should not be cleared if it compromises the whole or part of, or is necessary for the	Proposal is not at variance with this principle No threatened ecological communities are recorded in or near the proposed Davyhurst expansion areas.

	maintenance of a threatened ecological community	
5	Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.	Proposal is not at variance with this principle The broader region in which the proposal occurs has not been extensively cleared. The proposal is within Vegetation Association Barlee 538: Medium woodland – Salmon gum and Goldfields blackbutt, which has 98.63 % (575,360 ha) of its mapped original extent (583,360 ha) remaining. Within the IBRA subregion Coolgardie – Eastern Goldfields 47,4364 ha (98.34 %) of the pre-European extent (482,361 ha) remains. The area to be cleared is not considered to be significant as a remnant of native vegetation as the surrounding area has not been extensively cleared and the vegetation association is well represented outside the Project area.
6	Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.	Proposal is not at variance with this principle No permanent watercourses or wetlands occur within the proposed ESA development area. The proposed development area does not occur adjacent to or nearby to any major permanent watercourse or wetland.
7	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.	Proposal is not at variance with this principle Two former Pastoral stations in the district are UCL and are being managed for future inclusion in the Conservation estate: - Ex Goongarrie Station 50km to the east and Ex-Credo Station are being managed as Conservation Parks. The latter contains the Clear and Muddy Lakes Nature Reserve (R7634) and Rowles Lagoon Conservation Park (R4274), approximately 30 km south of the Davyhurst Hub development in an adjoining catchment. The proposed clearing is unlikely to impact on the environmental values of any adjacent or nearby conservation areas.
8	Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation	Proposal is not at variance with this principle The Davyhurst Hub area has a high level of recent mining, historic township and pastoral disturbance which has occurred over many decades. The ESA is located in the Davyhurst Town Common. The current proposed clearing is to support existing infrastructure and activities and covers an area of 15 ha. Included are terrain units which have already been historically disturbed and are not likely to contribute to appreciable new land degradation. Clearing impacts can be managed by staged clearing, retaining vegetation buffers where practical and adopting progressive rehabilitation practices. Much of the area is flat to undulating and will pose a low erosion risk. Opportunities to enhance environmental biodiversity values through rehabilitation will be adopted.
9	Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface and underground water	Proposal is not at variance with this principle Drainage in the area is ephemeral with surface water present for limited times during the year following major storm events. There are no permanent water courses, wetlands or Public Drinking Water Sources Areas in the Application Areas. Limited yield fractured rock aquifers do occur in the Davyhurst Hub environment within rocks primarily where tectonic action and weathering has created zones of secondary permeability. Groundwater in the Davyhurst environs are typically saline to hypersaline (>40,000 mg/L TDS), and have limited beneficial uses.

10	Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.	Proposal is not at variance with this principle Rainfall is typically greatest in winter months within the Eastern Goldfields and surface sheet flow only occurs for short periods after heavy storms or after persistent low intensity rainfall. The Davyhurst Hub project areas are elevated. There are no permanent major watercourses or other surface water features in the Davyhurst Hub area with the potential for flooding, and due to the limited size of the proposed disturbance areas, and the presence of built infrastructure, the incidence or intensity of increased flooding is limited. The proposed clearing is unlikely to exacerbate the incidence or intensity of flooding.
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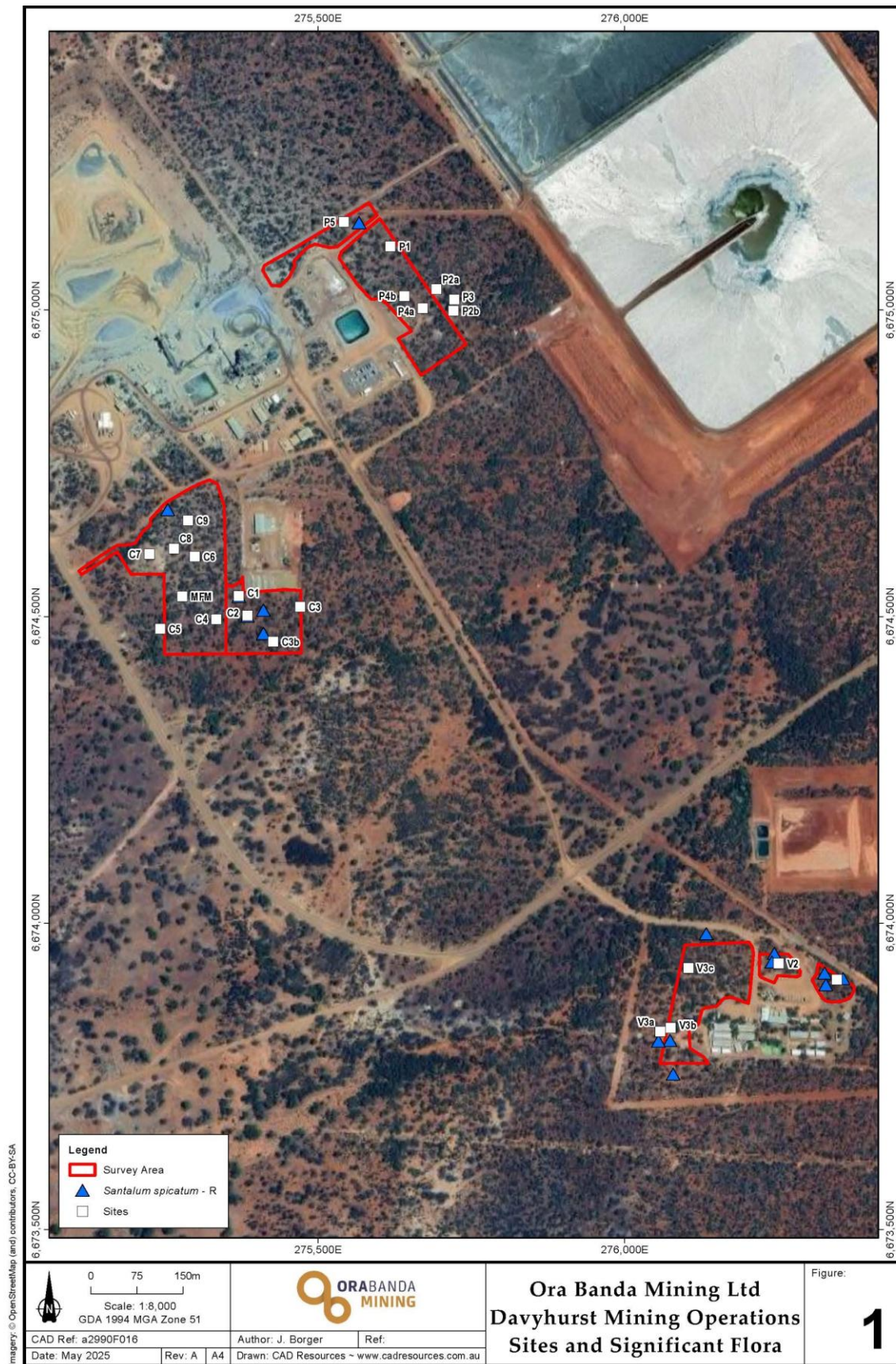
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Appendix 1: Species list (P – Processing; C – Core Yard; V – Village)

Family	Scientific Name	P	C	V
Amaranthaceae	<i>Ptilotus obovatus</i> var. <i>obovatus</i>	1	1	1
Apocynaceae	<i>Alyxia buxifolia</i>		1	1
	<i>Leichhardtia australis</i>	1		1
	<i>Vincetoxicum lineare</i>		1	
Asteraceae	<i>Olearia muelleri</i>	1		1
Casuarinaceae	<i>Allocasuarina dielsiana</i>		1	
	<i>Casuarina pauper</i>	1	1	1
Chenopodiaceae	<i>Atriplex nummularia</i>	1		
	<i>Atriplex vesicaria</i>	1	1	
	<i>Chenopodium curvispicatum</i>			1
	<i>Enchylaena lanata</i>	1		1
	<i>Maireana georgei</i>	1	1	
	<i>Maireana pyramidata</i>	1		
	<i>Maireana tomentosa</i>		1	
	<i>Maireana trichoptera</i>			1
	<i>Maireana triptera</i>	1	1	1
	<i>Sclerolaena diacantha</i>	1	1	1
Fabaceae	<i>Acacia aneura</i>	1	1	1
	<i>Acacia anthochaera</i>	1		
	<i>Acacia burkittii</i>	1	1	1
	<i>Acacia caesaneura</i>		1	
	<i>Acacia duriuscula</i>		1	
	<i>Acacia erinacea</i>			1
	<i>Acacia incurvaneura</i>		1	
	<i>Acacia murrayana</i>			1
	<i>Acacia ramulosa</i> var. <i>ramulosa</i>	1	1	1
	<i>Acacia tetragonophylla</i>	1	1	1
	<i>Senna artemisioides</i> subsp. <i>filifolia</i>	1	1	1
Goodeniaceae	<i>Scaevola spinescens</i>	1	1	1
Lamiaceae	<i>Prostanthera althoferi</i> subsp. <i>althoferi</i>		1	
	<i>Teucrium disjunctum</i>	1		
Loranthaceae	<i>Amyema gibberula</i> var. <i>gibberula</i>		1	
	<i>Amyema preissii</i>	1		
Malvaceae	<i>Brachychiton gregorii</i>		1	
	<i>Sida calyxhymenia</i>	1	1	
Myrtaceae	<i>Eucalyptus clelandiorum</i>		1	1
	<i>Eucalyptus griffithsii</i>	1	1	
	<i>Eucalyptus lesouefii</i>			1
	<i>Eucalyptus loxophleba</i> subsp. <i>lissophloia</i>	1	1	
	<i>Eucalyptus oleosa</i> subsp. <i>oleosa</i>	1	1	1
	<i>Eucalyptus salubris</i>	1		

Family	Scientific Name	P	C	V
Poaceae	<i>Austrostipa elegantissima</i>			1
	<i>Austrostipa</i> sp.	1	1	
	<i>Monachather paradoxus</i>	1		
	<i>Triodia ?scariosa</i>		1	
Proteaceae	<i>Grevillea nematophylla</i> subsp. <i>nematophylla</i>		1	1
Pteridaceae	<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>		1	
Rubiaceae	<i>Psyrdrax suaveolens</i>		1	
Rutaceae	<i>Philotheca brucei</i> subsp. <i>brucei</i>		1	
Santalaceae	<i>Exocarpos aphyllus</i>			1
	<i>Santalum acuminatum</i>	1		
	<i>Santalum spicatum</i>	1	1	1
Sapindaceae	<i>Dodonaea lobulata</i>	1	1	1
	<i>Dodonaea rigida</i>	1	1	1
Scrophulariaceae	<i>Eremophila clarkei</i>		1	
	<i>Eremophila decipiens</i> subsp. <i>decipiens</i>	1		
	<i>Eremophila latrobei</i> subsp. <i>latrobei</i>	1	1	
	<i>Eremophila oppositifolia</i> subsp. <i>alternifolia</i>	1		
	<i>Eremophila scoparia</i>		1	
	<i>Eremophila</i> sp. <i>Mt Jackson</i>	1		1
Solanaceae	<i>Solanum lasiophyllum</i>	1	1	
Zygophyllaceae	<i>Roepera aurantiaca</i> subsp. <i>aurantiaca</i>	1		
		37	40	28

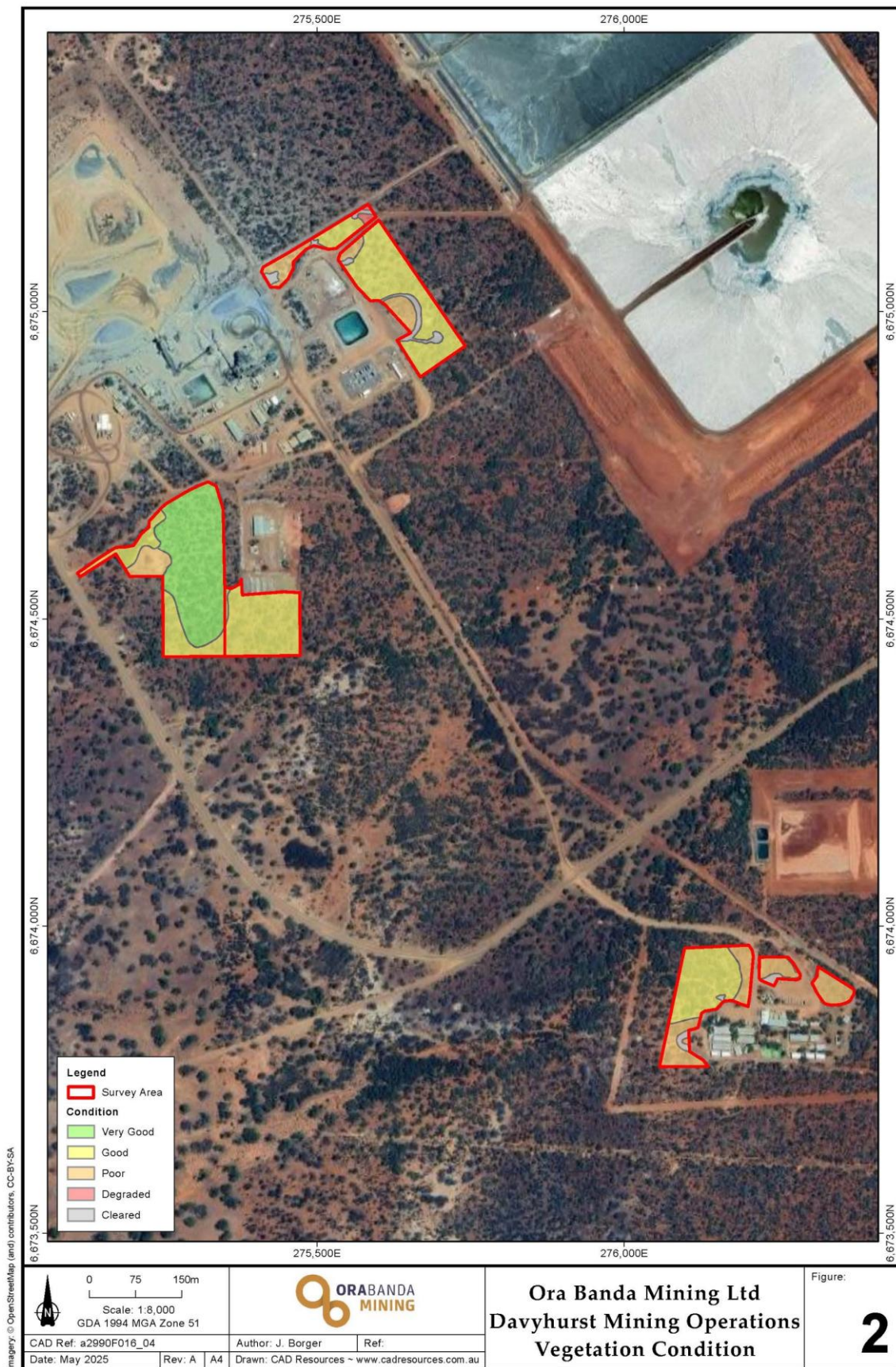
Appendix 2: Survey sites and Sandalwood (*Santalum spicatum*) locations



Appendix 3: GPS locations of *Santalum spicatum*

Scientific Name	Code	Date	Zone	Easting	Northing	No.	Site
<i>Santalum spicatum</i>	R	28/04/2025	51J	276356	6673911	1	Village
<i>Santalum spicatum</i>	R	28/04/2025	51J	276326	6673920	2	Village
<i>Santalum spicatum</i>	R	28/04/2025	51J	276328	6673901	1	Village
<i>Santalum spicatum</i>	R	28/04/2025	51J	276244	6673952	1	Village
<i>Santalum spicatum</i>	R	28/04/2025	51J	276240	6673938	1	Village
<i>Santalum spicatum</i>	R	28/04/2025	51J	276074	6673810	1	Village
<i>Santalum spicatum</i>	R	28/04/2025	51J	276055	6673809	1	Village
<i>Santalum spicatum</i>	R	28/04/2025	51J	276079	6673755	1	Village
<i>Santalum spicatum</i>	R	28/04/2025	51J	276133	6673984	1	Village
<i>Santalum spicatum</i>	R	28/04/2025	51J	275255	6674676	1	Core Farm
<i>Santalum spicatum</i>	R	28/04/2025	51J	275371	6674534	1	Core Farm
<i>Santalum spicatum</i>	R	28/04/2025	51J	275385	6674502	1	Core Farm
<i>Santalum spicatum</i>	R	28/04/2025	51J	275411	6674512	1	Core Farm
<i>Santalum spicatum</i>	R	28/04/2025	51J	275411	6674474	1	Core Farm
<i>Santalum spicatum</i>	R	28/04/2025	51J	275567	6675144	1	Processing
Total						16	

Appendix 4: Vegetation condition



NVIS foliage cover codes.

Cover Characteristics					
Foliage cover	70 – 100	30 – 70	10 – 30	< 10	~ 0 (<2)
Crown cover	>80	50 – 80	20 – 50	0.25 – 20	<0.25
% cover	>80	50 – 80	20 – 50	0.25 - <20	<0.25
Cover code	d	c	i	r	bi

Height classes defined for the NVIS.

Height		Growth Form				
Height Class	Height Range (m)	Tree	Shrub, chenopod shrub	Tree mallee, mallee shrub	Tussock grass	Bryophyte, lichen
8	>30	Tall	N/A	N/A	N/A	N/A
7	10 – 30	Mid	N/A	Tall	N/A	N/A
6	< 10	Low	N/A	Mid	N/A	N/A
5	<3	N/A	N/A	Low	N/A	N/A
4	>2	N/A	Tall	N/A	Tall	N/A
3	1 – 2	N/A	Mid	N/A	Tall	N/A
2	0.5 – 1	N/A	Low	N/A	Mid	Tall
1	< 0.5	N/A	Low	N/A	Low	Low

Summary of NVIS strata codes.

NVIS stratum code	NVIS sub-stratum	Description	Growth forms	Height classes
U	U1	Tallest stratum	Tree, tree mallees (mallee shrubs)	8, 7, 6, (5)
	U2	Sub-canopy layer, second tree layer		
	U3	Sub-canopy layer, third tree layer		
M	M1	Tallest shrub layer	Shrubs, low trees, mallee shrubs, low shrubs, vines	(6), 5, 4, 3
	M2	Next shrub layer		
	M3	Third shrub layer		
G	G1	Tallest ground species	Grasses, forbs, sedges, rushes, vines, lichens, low shrubs	(4, 3), 2, 1
	G2	Ground		

Growth Form Codes used in descriptions

T	Tree	U	Samphire shrub	F	Forb
M	Mallee	Z	Heath shrub	E	Fern
S	Shrub	G	Tussock grass	L	Vine
R	Rush	H	Hummock grass	B	Bryophyte (moss, liverwort)
C	Chenopod shrub	K	Epiphyte, mistletoe	N	Lichen

Process Plant Expansion

Site P1			
GPS: 275618 E/ 6675104 N Elevation: 468 m		Landform: Plain, very gentle slope; aspect ?east	
Land surface: Yellowish red/ red (5YR5/8)/ (2.5YR4/8) clay loam; surface rock (fine ironstone gravel 40 – 50 %; quartz, granite, ironstone 2 – 5 cm < 1 %) 40 – 50 %; litter 10 – 30 % ^ 10 cm under trees; fallen timber 5 – 10 %; cryptogams (lichen) 20 – 30 %; bare ground < 5 %; moist at depth			
Condition: Good; structure mostly intact			
Disturbance: Old disturbances – wheel tracks – filled (sediment), historic clearing; drought impacts – very sparse crowns on some plants; many deaths of lower shrubs; likely to have been feral grazing			
NVIS 6: U1+^ <i>Eucalyptus oleosa</i> subsp. <i>oleosa</i> , <i>Casuarina pauper</i> , <i>Eucalyptus griffithsii</i> \ <i>Eucalyptus</i> \ ^mallee, tree\7\i; M1^ <i>Acacia burkittii</i> , <i>A. ramulosa</i> var. <i>ramulosa</i> \Acacia\^shrub\4\r; M2^ <i>Scaevola spinescens</i> , <i>Senna artemisioides</i> subsp. <i>filifolia</i> , <i>Acacia ramulosa</i> var. <i>ramulosa</i> , <i>Santalum acuminatum</i> \Scaevola\^shrub\3\i; G1^ <i>Ptilotus obovatus</i> var. <i>obovatus</i> , <i>Dodonaea lobulata</i> , <i>Olearia muelleri</i> , <i>Acacia tetragonophylla</i> , <i>Maireana georgei</i> \Ptilotus\^shrub, chenopod shrub\2\bi; G2^ <i>Sclerolaena diacantha</i> , <i>Olearia muelleri</i> , <i>Sida calyxhymenia</i> \Sclerolaena\^forb, shrub\1\bi			
Vegetation: <i>Eucalyptus oleosa</i> subsp. <i>oleosa</i> , <i>Casuarina pauper</i> , <i>Eucalyptus griffithsii</i> tall mallee woodland over <i>Acacia burkittii</i> , <i>A. ramulosa</i> var. <i>ramulosa</i> tall sparse shrubland over <i>Scaevola spinescens</i> , <i>Senna artemisioides</i> subsp. <i>filifolia</i> , <i>Acacia ramulosa</i> var. <i>ramulosa</i> open shrubland over <i>Ptilotus obovatus</i> var. <i>obovatus</i> , <i>Dodonaea lobulata</i> , <i>Olearia muelleri</i> isolated low shrubs			
Height (m)	Crown cover %	Habit	Species
8 – 14	10 – 30	M, T	<i>Eucalyptus oleosa</i> subsp. <i>oleosa</i> , <i>Casuarina pauper</i> , <i>Eucalyptus griffithsii</i>
2 – 10	2 – 3	S	<i>Acacia burkittii</i> , <i>A. ramulosa</i> var. <i>ramulosa</i>
1 – 2	10 – 20	S	<i>Scaevola spinescens</i> , <i>Senna artemisioides</i> subsp. <i>filifolia</i> , <i>Acacia ramulosa</i> var. <i>ramulosa</i> , <i>Santalum acuminatum</i>
0.2 – 1	< 2	S, C	<i>Ptilotus obovatus</i> var. <i>obovatus</i> , <i>Dodonaea lobulata</i> , <i>Olearia muelleri</i> , <i>Acacia tetragonophylla</i> , <i>Maireana georgei</i> , <i>Santalum acuminatum</i>
< 0.2	< 2	F, S	<i>Sclerolaena diacantha</i> , <i>Olearia muelleri</i> , <i>Sida calyxhymenia</i>
<i>Acacia burkittii</i> <i>Acacia ramulosa</i> var. <i>ramulosa</i> <i>Acacia tetragonophylla</i> <i>Casuarina pauper</i> <i>Dodonaea lobulata</i> <i>Eucalyptus griffithsii</i> <i>Eucalyptus oleosa</i> subsp. <i>oleosa</i> <i>Maireana georgei</i> <i>Olearia muelleri</i> <i>Ptilotus obovatus</i> var. <i>obovatus</i> <i>Santalum acuminatum</i> <i>Scaevola spinescens</i> <i>Sclerolaena diacantha</i> <i>Senna artemisioides</i> subsp. <i>filifolia</i> <i>Sida calyxhymenia</i>			

Site P2a			
GPS: 275693 E/ 6675034 N Elevation: 472 m		Landform: Plain, minor depression/ drainage line; very gentle slope; aspect east	
Land surface: Yellowish red clay loam with patches of cracked clay; surface rock 20 – 30 %; salt crusts present			
Condition: Degraded; old deaths of trees and shrubs, water ponding, wet			
Disturbance: Evidence of saline spillage from standpipe overflow were evident. Ongoing – happening for a fair while but some reduction over recent times with new recruitment occurring.			
NVIS 6: G1+^ <i>Ptilotus obovatus</i> var. <i>obovatus</i> , <i>Maireana pyramidata</i> , <i>Scaevola spinescens</i> , <i>Dodonaea lobulata</i> , <i>Atriplex nummularia</i> , <i>Acacia burkittii</i> \^shrub, chenopod shrub\2\r			
Vegetation: <i>Ptilotus obovatus</i> var. <i>obovatus</i> , <i>Maireana pyramidata</i> , <i>Scaevola spinescens</i> low sparse shrubland			
Height (m)	Crown cover %	Habit	Species
< 1	2 – 10	S, C, L	<i>Ptilotus obovatus</i> var. <i>obovatus</i> , <i>Maireana pyramidata</i> , <i>Scaevola spinescens</i> , <i>Dodonaea lobulata</i> , <i>Atriplex nummularia</i> , <i>Acacia burkittii</i> , <i>Maireana triptera</i> , <i>M. georgei</i> , <i>Leichhardtia australis</i>
<i>Acacia burkittii</i> <i>Atriplex nummularia</i> <i>Dodonaea lobulata</i> <i>Leichhardtia australis</i> <i>Maireana georgei</i> <i>Maireana pyramidata</i> <i>Maireana triptera</i> <i>Ptilotus obovatus</i> var. <i>obovatus</i> <i>Scaevola spinescens</i>			
P2b GPS: 275721 E/ 6674999 N Elevation: 471 m Spill area <i>Eucalyptus</i> sp. isolated shrubs over <i>Maireana pyramidata</i> , <i>M. triptera</i> , <i>Austrostipa</i> sp., <i>Atriplex vesicaria</i> low open chenopod shrubland <i>Other species: Dodonaea rigida</i> , <i>D. lobulata</i> , <i>Senna artemisioides</i> subsp. <i>filifolia</i>			
P2c Spill area GPS: 275706 E/ 6675005 N			

Site P3			
GPS: 275722 E/ 6675017 N Elevation: 470 m		Landform: Plain, very gentle slope; aspect east	
Land surface: Yellowish red clay loam; surface rock (fine ironstone gravel) 2 – 10 %; litter 70 – 80 % ^ 10 cm; fallen timber 2 – 3 %; bare ground (clay patches) < 2 %			
Condition: Very good			
Disturbance: Historic impacts; mostly intact; waterlogging patches on either side			
NVIS 6: U1+^ <i>Eucalyptus griffithsii</i> \Eucalyptus\^mallee\6\i; M1^ <i>Acacia burkittii</i> \Acacia\^shrub\4\i; M2^ <i>Acacia burkittii</i> , <i>Leichhardtia australis</i> , <i>Scaevola spinescens</i> , <i>Acacia tetragonophylla</i> \Acacia\^shrub, climber\3\i; G1^ <i>Dodonaea lobulata</i> , <i>Sida calyxhymenia</i> , <i>Santalum acuminatum</i> \Dodonaea\^shrub\2\i; G2^ <i>Maireana georgei</i> \Maireana\^chenopod shrub\1\bi			
Vegetation: <i>Eucalyptus griffithsii</i> mallee woodland over <i>Acacia burkittii</i> tall open shrubland over <i>Acacia burkittii</i> , <i>Leichhardtia australis</i> , <i>Scaevola spinescens</i> open shrubland over <i>Dodonaea lobulata</i> , <i>Sida calyxhymenia</i> , <i>Santalum acuminatum</i> low sparse shrubland			
Height (m)	Crown cover %	Habit	Species
6 – 8	20 – 30	M	<i>Eucalyptus griffithsii</i>
2 – 4	20 – 30	S	<i>Acacia burkittii</i>
1 – 2	20 – 30	S, L	<i>Acacia burkittii</i> , <i>Leichhardtia australis</i> , <i>Scaevola spinescens</i> , <i>Acacia tetragonophylla</i>
0.2 – 1	2 – 10	S	<i>Dodonaea lobulata</i> , <i>Sida calyxhymenia</i> , <i>Santalum acuminatum</i>
< 0.2	< 1	C	<i>Maireana georgei</i>
<i>Acacia burkittii</i> <i>Acacia tetragonophylla</i> <i>Dodonaea lobulata</i> <i>Eucalyptus griffithsii</i> <i>Leichhardtia australis</i> <i>Maireana georgei</i> <i>Santalum acuminatum</i> <i>Scaevola spinescens</i> <i>Sida calyxhymenia</i>			

Site P4a			
GPS: 275671 E/ 6675003 N Elevation: 471 m		Landform: Plain; gentle slope; aspect east Adjacent to Processing area; vehicle turnaround track	
Land surface: sodic; salt crusting			
Condition: Part degraded			
Disturbance: Clearing; vehicle track; regrowth; saline spill; erosion and sedimentation			
Vegetation: <i>Atriplex nummularia</i> , <i>A. vesicaria</i> , <i>Enchylaena lanata</i> chenopod shrubland over <i>Sclerolaena diacantha</i> open forbland			
<i>Atriplex nummularia</i> <i>Atriplex vesicaria</i> <i>Enchylaena lanata</i> <i>Sclerolaena diacantha</i>			
Site 4b			
GPS: 275641 E/ 6675023 N Elevation: 471 m		Landform: Plain; inside turn around area; east of standpipe * No ants supporting ABAB present	
Land surface: Red (2.5YR4/6) fine sandy clay loam			
Condition: Good; some regrowth; some drought deaths; black ants present near <i>E. salubris</i>			
Disturbance: Vehicle track clearing 3 sides; processing area clearing on west side			
Vegetation: <i>Eucalyptus griffithsii</i> , <i>E. salubris</i> mallee woodland			
Height (m)	Crown cover %	Habit	Species
5 – 6	10 – 20	M, T	<i>Eucalyptus griffithsii</i> , <i>E. salubris</i>
1 – 2	2 – 10	S	<i>Acacia burkittii</i> , <i>Eremophila decipiens</i> subsp. <i>decipiens</i> , <i>Dodonaea lobulata</i> , <i>Eremophila</i> sp. Mt Jackson
< 0.2	20 – 30	F, S, C	<i>Sclerolaena diacantha</i> , <i>Ptilotus obovatus</i> var. <i>obovatus</i> , <i>Atriplex nummularia</i> , <i>Acacia aneura</i>
Other species: (north of track) – <i>Acacia anthochaera</i> , <i>Enchylaena lanata</i> , <i>Eremophila oppositifolia</i> subsp. <i>alternifolia</i> , <i>E. latrobei</i> subsp. <i>latrobei</i>			

<i>Acacia aneura</i> <i>Acacia anthochaera</i> <i>Acacia burkittii</i> <i>Atriplex nummularia</i> <i>Dodonaea lobulata</i> <i>Enchylaena lanata</i> <i>Eremophila decipiens</i> subsp. <i>decipiens</i> <i>Eremophila latrobei</i> subsp. <i>latrobei</i> <i>Eremophila oppositifolia</i> subsp. <i>alternifolia</i> <i>Eremophila</i> sp. Mt Jackson <i>Eucalyptus griffithsii</i> <i>Eucalyptus salubris</i> <i>Ptilotus obovatus</i> var. <i>obovatus</i> <i>Sclerolaena diacantha</i>	
	
Clay patch with salt staining P2 area	Salt staining downslope from standpipe (P4b area)

Site P5			
GPS: 275542 E/ 6675144 N Elevation: 473 m		Landform: Plain; slight rise; aspect east SSE	
Land surface: Yellowish red clay loam			
Condition: Good to very good			
Disturbance: Historic mining and pastoral impacts; vehicle tracks, clearing			
NVIS 6: U1+^ <i>Acacia aneura</i> , <i>Eucalyptus oleosa</i> subsp. <i>oleosa</i> , <i>E. loxophleba</i> subsp. <i>lissophloia</i> \Acacia\^tree, mallee\ 7\i; M1^ <i>Eremophila oppositifolia</i> subsp. <i>alternifolia</i> , <i>Casuarina pauper</i> \Eremophila\^shrub, tree\4\bi; M2^ <i>Scaevola spinescens</i> , <i>Casuarina pauper</i> , <i>Leichhardtia australis</i> , <i>Eremophila latrobei</i> subsp. <i>latrobei</i> , <i>Amyema preissii</i> \Scaevola\^shrub, climber, mistletoe\3\i; G1^ <i>Solanum lasiophyllum</i> , <i>Olearia muelleri</i> , <i>Dodonaea rigida</i> , <i>Ptilotus obovatus</i> var. <i>obovatus</i> , <i>Sida calyxhymenia</i> \Solanum\^shrub\2\r; G2^ <i>Scaevola spinescens</i> , <i>Roepera aurantiaca</i> subsp. <i>aurantiaca</i> \Scaevola\^shrub, forb\1\i			
Vegetation: <i>Acacia aneura</i> , <i>Eucalyptus oleosa</i> subsp. <i>oleosa</i> , <i>E. loxophleba</i> subsp. <i>lissophloia</i> woodland over <i>Scaevola spinescens</i> , <i>Casuarina pauper</i> , <i>Eremophila latrobei</i> subsp. <i>latrobei</i> open shrubland over <i>Scaevola spinescens</i> , <i>Roepera aurantiaca</i> subsp. <i>aurantiaca</i> , <i>Solanum lasiophyllum</i> low open shrubland			
Height (m)	Crown cover %	Habit	Species
8 – 12	20 – 30	T, M	<i>Acacia aneura</i> , <i>Eucalyptus oleosa</i> subsp. <i>oleosa</i> , <i>E. loxophleba</i> subsp. <i>lissophloia</i>
2 – 4	< 2	S, T	<i>Eremophila oppositifolia</i> subsp. <i>alternifolia</i> , <i>Casuarina pauper</i>
1 – 2	10 – 20	S, L, K	<i>Scaevola spinescens</i> , <i>Casuarina pauper</i> , <i>Leichhardtia australis</i> , <i>Eremophila latrobei</i> subsp. <i>latrobei</i> , <i>Amyema preissii</i>
0.5 – 1	2 – 10	S, G	<i>Solanum lasiophyllum</i> , <i>Olearia muelleri</i> , <i>Dodonaea rigida</i> , <i>Ptilotus obovatus</i> var. <i>obovatus</i> , <i>Sida calyxhymenia</i> , <i>Monachather paradoxus</i>
< 0.5	10 – 20	S, F	<i>Scaevola spinescens</i> , <i>Roepera aurantiaca</i> subsp. <i>aurantiaca</i>
Other species: <i>Teucrium disjunctum</i> , <i>Acacia ramulosa</i> var. <i>ramulosa</i>			
<i>Acacia aneura</i> <i>Acacia ramulosa</i> var. <i>ramulosa</i> <i>Amyema preissii</i> <i>Casuarina pauper</i> <i>Dodonaea rigida</i> <i>Eremophila latrobei</i> subsp. <i>latrobei</i> <i>Eremophila oppositifolia</i> subsp. <i>alternifolia</i> <i>Eucalyptus loxophleba</i> subsp. <i>lissophloia</i> <i>Eucalyptus oleosa</i> subsp. <i>oleosa</i> <i>Leichhardtia australis</i> <i>Monachather paradoxus</i> <i>Olearia muelleri</i> <i>Ptilotus obovatus</i> var. <i>obovatus</i> <i>Roepera aurantiaca</i> subsp. <i>aurantiaca</i> <i>Scaevola spinescens</i> <i>Sida calyxhymenia</i> <i>Solanum lasiophyllum</i> <i>Teucrium disjunctum</i>			

Core Yard Expansion Area

Site C1			
GPS: 275371 E/ 6674534 N Elevation: 476 m		Landform: Low rise/ edge of plain; gentle slope; aspect SE	
Land surface: Red (2.5YR4/8) clay loam; surface rock 30 – 40 %; litter 30 – 35 %; fallen timber 5 %; cryptogams (lichen crust) 20 – 30 %; dry			
Condition: Very good			
Disturbance: Some edge effects from core yard clearing; historical pastoral impacts			
NVIS 6: U1+^ <i>Eucalyptus loxophleba</i> subsp. <i>lissophloia</i> \Eucalyptus\^mallee, tree\6\i; M1^ <i>Acacia ramulosa</i> var. <i>ramulosa</i> , <i>Dodonaea lobulata</i> , <i>Acacia tetragonophylla</i> , <i>Eremophila clarkei</i> \Acacia\^shrub\3\i; G1^ <i>Dodonaea lobulata</i> , <i>Ptilotus obovatus</i> var. <i>obovatus</i> , <i>Eremophila clarkei</i> , <i>Scaevola spinescens</i> , <i>Sida calyxhymenia</i> \Dodonaea\^shrub\2\r			
Vegetation: <i>Eucalyptus loxophleba</i> subsp. <i>lissophloia</i> mallee woodland over <i>Acacia ramulosa</i> var. <i>ramulosa</i> , <i>Dodonaea lobulata</i> , <i>Acacia tetragonophylla</i> open shrubland over <i>Dodonaea lobulata</i> , <i>Ptilotus obovatus</i> var. <i>obovatus</i> , <i>Eremophila clarkei</i> low sparse shrubland			
Height (m)	Crown cover %	Habit	Species
8 – 10	20 – 30	M, T	<i>Eucalyptus loxophleba</i> subsp. <i>lissophloia</i>
1 – 2	10 – 20	S	<i>Acacia ramulosa</i> var. <i>ramulosa</i> , <i>Dodonaea lobulata</i> , <i>Acacia tetragonophylla</i> , <i>Eremophila clarkei</i>
0.2 – 1	2 – 10	S	<i>Dodonaea lobulata</i> , <i>Ptilotus obovatus</i> var. <i>obovatus</i> , <i>Eremophila clarkei</i> , <i>Scaevola spinescens</i> , <i>Sida calyxhymenia</i> , <i>Dodonaea rigida</i>
Other species (edge): <i>Acacia aneura</i>			
<i>Acacia aneura</i> <i>Acacia ramulosa</i> var. <i>ramulosa</i> <i>Acacia tetragonophylla</i> <i>Dodonaea lobulata</i> <i>Dodonaea rigida</i> <i>Eremophila clarkei</i> <i>Eucalyptus loxophleba</i> subsp. <i>lissophloia</i> <i>Ptilotus obovatus</i> var. <i>obovatus</i> <i>Scaevola spinescens</i> <i>Sida calyxhymenia</i>			

Site C2			
GPS: 275385 E/ 6674502 N Elevation: 475 m		Landform: Low rise/ edge of plain; gentle slope; aspect SE	
Land surface: Red (2.5YR4/8) clay loam; surface rock (fine ironstone gravel 10 – 30; quartz, meta quartzite, chert 2 – 6 cm < 2 %) 10 – 30 % %; litter 60 – 70 %; fallen timber			
Condition: Very good; grasses (<i>Austrostipa</i>) < 1 %			
Disturbance: Grazing – cattle (historic and current pastoral impacts)			
NVIS 6: U1+^ <i>Eucalyptus oleosa</i> subsp. <i>oleosa</i> , <i>E. loxophleba</i> subsp. <i>lissophloia</i> , <i>Grevillea nematophylla</i> subsp. <i>nematophylla</i> , <i>Amyema gibberula</i> var. <i>gibberula</i> ^ <i>Eucalyptus</i> ^mallee, tree, mistletoe\6\i; M1^ <i>Acacia ramulosa</i> var. <i>ramulosa</i> , <i>A. burkittii</i> , <i>A. aneura</i> \Acacia\^shrub\4\i; M2 ^ <i>Scaevola spinescens</i> , ^ <i>Dodonaea lobulata</i> , <i>Senna artemisioides</i> subsp. <i>filifolia</i> , <i>Eremophila clarkei</i> \Scaevola, <i>Dodonaea</i> \^shrub\3\i; G1^ <i>Ptilotus obovatus</i> var. <i>obovatus</i> , <i>Eremophila clarkei</i> , <i>Vincetoxicum lineare</i> , <i>Sida calyxhymenia</i> , <i>Austrostipa</i> sp.\Ptilotus\^shrub, vine, tussock grass\2\r			
Vegetation: <i>Eucalyptus oleosa</i> subsp. <i>oleosa</i> , <i>E. loxophleba</i> subsp. <i>lissophloia</i> , <i>Grevillea nematophylla</i> subsp. <i>nematophylla</i> mallee woodland over <i>Acacia ramulosa</i> var. <i>ramulosa</i> , <i>A. burkittii</i> , <i>A. aneura</i> tall open shrubland over <i>Scaevola spinescens</i> , <i>Dodonaea lobulata</i> , <i>Senna artemisioides</i> subsp. <i>filifolia</i> open shrubland over <i>Ptilotus obovatus</i> var. <i>obovatus</i> , <i>Eremophila clarkei</i> , <i>Vincetoxicum lineare</i> low sparse shrubland			
Height (m)	Crown cover %	Habit	Species
6 – 11	20 – 30	M, T, K	<i>Eucalyptus oleosa</i> subsp. <i>oleosa</i> , <i>E. loxophleba</i> subsp. <i>lissophloia</i> , <i>Grevillea nematophylla</i> subsp. <i>nematophylla</i> (with <i>Amyema gibberula</i> var. <i>gibberula</i>)
2 – 5	10 – 20	S	<i>Acacia ramulosa</i> var. <i>ramulosa</i> , <i>A. burkittii</i> , <i>A. aneura</i>
1 – 2	10 – 15	S	<i>Scaevola spinescens</i> , <i>Dodonaea lobulata</i> , <i>Senna artemisioides</i> subsp. <i>filifolia</i> , <i>Eremophila clarkei</i>
0.3 – 1	2 – 10	S, L	<i>Ptilotus obovatus</i> var. <i>obovatus</i> , <i>Eremophila clarkei</i> , <i>Vincetoxicum lineare</i>
< 0.1	< 1	S, G	<i>Sida calyxhymenia</i> , <i>Austrostipa</i> sp. (grazed)
<i>Acacia aneura</i> <i>Acacia burkittii</i> <i>Acacia ramulosa</i> var. <i>ramulosa</i> <i>Amyema gibberula</i> var. <i>gibberula</i> <i>Austrostipa</i> sp. <i>Dodonaea lobulata</i> <i>Eremophila clarkei</i> <i>Eucalyptus loxophleba</i> subsp. <i>lissophloia</i> <i>Eucalyptus oleosa</i> subsp. <i>oleosa</i> <i>Grevillea nematophylla</i> subsp. <i>nematophylla</i> <i>Ptilotus obovatus</i> var. <i>obovatus</i> <i>Scaevola spinescens</i> <i>Senna artemisioides</i> subsp. <i>filifolia</i> <i>Sida calyxhymenia</i> <i>Vincetoxicum lineare</i>			

Site C3			
GPS: 275471 E/ 6674576 N Elevation: 474 m		Landform: Plain; gentle slope; aspect east	
Land surface: Red clay loam; surface rock < 10 %			
Condition: Very good; signs of cattle			
Vegetation: <i>Eucalyptus oleosa</i> subsp. <i>oleosa</i> , <i>E. loxophleba</i> subsp. <i>lissophloia</i> , <i>E. griffithsii</i> mallee woodland over <i>Senna artemisioides</i> subsp. <i>filifolia</i> , <i>Acacia tetragonophylla</i> open shrubland over <i>Ptilotus obovatus</i> var. <i>obovatus</i> , <i>Dodonaea rigida</i> , <i>Atriplex vesicaria</i> low sparse shrubland			
Height (m)	Crown cover %	Habit	Species
8 – 10	10 – 30	M, T	<i>Eucalyptus oleosa</i> subsp. <i>oleosa</i> , <i>E. loxophleba</i> subsp. <i>lissophloia</i> , <i>E. griffithsii</i>
1 – 2	10 – 30	S	<i>Senna artemisioides</i> subsp. <i>filifolia</i> , <i>Acacia tetragonophylla</i>
< 1	2 – 10	S, C	<i>Ptilotus obovatus</i> var. <i>obovatus</i> , <i>Dodonaea rigida</i> , <i>Atriplex vesicaria</i>
Site C3 <i>Acacia tetragonophylla</i> <i>Atriplex vesicaria</i> <i>Dodonaea rigida</i> <i>Eucalyptus griffithsii</i> <i>Eucalyptus loxophleba</i> subsp. <i>lissophloia</i> <i>Eucalyptus oleosa</i> subsp. <i>oleosa</i> <i>Ptilotus obovatus</i> var. <i>obovatus</i> <i>Senna artemisioides</i> subsp. <i>filifolia</i>			Opp 3b <i>Acacia duriuscula</i> <i>Cheilanthes sieberi</i> subsp. <i>sieberi</i> <i>Eucalyptus oleosa</i> subsp. <i>oleosa</i> <i>Ptilotus obovatus</i> var. <i>obovatus</i> <i>Scaevola spinescens</i>
Opp 3b GPS: 275427 E/ 6674459 N Elevation: 474 m <i>Eucalyptus oleosa</i> subsp. <i>oleosa</i> open woodland over <i>Acacia duriuscula</i> shrubland over <i>Scaevola spinescens</i> , <i>Ptilotus obovatus</i> var. <i>obovatus</i> low open shrubland over <i>Cheilanthes sieberi</i> subsp. <i>sieberi</i> low open fernland			

Site C4			
GPS: 275334 E/ 6674496 N Elevation: 477 m		Landform: Low rise; aspect south	
Land surface: Yellowish red (5YR4/6) clay loam; surface rock (fine ironstone gravel 20 – 30 %; small quartz rocks 2 – 3 cm < 2 %) 20 – 30 %; ; litter 20 – 30 %; fallen timber 30 – 40 %			
Condition: Very good			
Disturbance: Many fallen shrubs and trees – wind damage; donkeys and cattle in area; some drought deaths; old timber cutting			
NVIS 6: U1+^ Allocasuarina dielsiana, Casuarina pauper, Acacia aneura\Allocasuarina\^tree, shrub\6\i; M1^ Acacia aneura, A. tetragonophylla, A. ramulosa var. ramulosa\Acacia\^shrub, tree\4\i; M2^ Dodonaea lobulata, D. rigida, Eremophila clarkei, Scaevola spinescens, Alyxia buxifolia\Dodonaea\^shrub\3\i; G1^ Solanum lasiophyllum, Ptilotus obovatus var. obovatus, Vincetoxicum lineare, Sida calyxhymenia, Dodonaea rigida\Solanum\^shrub, vine\1\i			
Vegetation: Allocasuarina dielsiana, Casuarina pauper, Acacia aneura low woodland over Acacia aneura, A. tetragonophylla, A. ramulosa var. ramulosa tall sparse shrubland over Dodonaea lobulata, D. rigida, Eremophila clarkei open shrubland over Solanum lasiophyllum, Ptilotus obovatus var. obovatus, Vincetoxicum lineare low sparse shrubland			
Height (m)	Crown cover %	Habit	Species
6 – 10	20 – 30	T, S	Allocasuarina dielsiana, Casuarina pauper, Acacia aneura
2 – 4	2 – 10	S, T	Acacia aneura, A. tetragonophylla, A. ramulosa var. ramulosa
1 – 2	10 - 15	S	Dodonaea lobulata, D. rigida, Eremophila clarkei, Scaevola spinescens, Alyxia buxifolia
< 0.5	2 – 10	S, L, C	Solanum lasiophyllum, Ptilotus obovatus var. obovatus, Vincetoxicum lineare, Sida calyxhymenia, Dodonaea rigida, Maireana tomentosa
<i>Acacia aneura</i> <i>Acacia ramulosa</i> var. <i>ramulosa</i> <i>Acacia tetragonophylla</i> <i>Allocasuarina dielsiana</i> <i>Alyxia buxifolia</i> <i>Casuarina pauper</i> <i>Dodonaea lobulata</i> <i>Dodonaea rigida</i> <i>Eremophila clarkei</i> <i>Maireana tomentosa</i> <i>Ptilotus obovatus</i> var. <i>obovatus</i> <i>Scaevola spinescens</i> <i>Sida calyxhymenia</i> <i>Solanum lasiophyllum</i> <i>Vincetoxicum lineare</i>			

Site C5			
GPS: 275243 E/ 6674480 N Elevation: 474 m		Landform: Low rise; gentle slope; aspect south	
Land surface: Yellowish red clay loam; surface rock (fine ironstone gravel) 30 %, increasing calcrete and quartz; litter 10 – 30 %; fallen timber 15 – 30 %; cryptogams (lichen) 30 %; bare ground < 1 %			
Condition: Good			
Disturbance: Historic mining (tracks, clearing) and pastoral impacts; cattle present in area (fresh tracks); some erosion along track – mostly stable, debris dams filled with sediment			
NVIS 6: U1+^ <i>Eucalyptus oleosa</i> subsp. <i>oleosa</i> , <i>Brachychiton gregorii</i> , <i>Grevillea nematophylla</i> subsp. <i>nematophylla</i> \Eucalyptus\^tree, mallee\6\; M1^ <i>Acacia burkittii</i> , <i>A. ramulosa</i> var. <i>ramulosa</i> , <i>Grevillea nematophylla</i> subsp. <i>nematophylla</i> , <i>Acacia aneura</i> \Acacia\^shrub, tree\4\; M2^ <i>Dodonaea lobulata</i> , <i>Acacia ramulosa</i> var. <i>ramulosa</i> \Dodonaea\^shrub\3\; G1^ <i>Sida calyxhymenia</i> , <i>Acacia aneura</i> \Sida\ ^shrub\2\bi			
Vegetation: <i>Eucalyptus oleosa</i> subsp. <i>oleosa</i> , <i>Brachychiton gregorii</i> , <i>Grevillea nematophylla</i> subsp. <i>nematophylla</i> low open woodland over <i>Acacia burkittii</i> , <i>A. ramulosa</i> var. <i>ramulosa</i> , <i>Grevillea nematophylla</i> subsp. <i>nematophylla</i> tall open shrubland over <i>Dodonaea lobulata</i> , <i>Acacia ramulosa</i> var. <i>ramulosa</i> open shrubland over <i>Sida calyxhymenia</i> , <i>Acacia aneura</i> low isolated shrub			
Height (m)	Crown cover %	Habit	Species
7 – 10	5 – 10	T, M	<i>Eucalyptus oleosa</i> subsp. <i>oleosa</i> , <i>Brachychiton gregorii</i> , <i>Grevillea nematophylla</i> subsp. <i>nematophylla</i>
2 – 5	10 – 30	S, T	<i>Acacia burkittii</i> , <i>A. ramulosa</i> var. <i>ramulosa</i> , <i>Grevillea nematophylla</i> subsp. <i>nematophylla</i> , <i>Acacia aneura</i>
1 – 2	10 – 20	S	<i>Dodonaea lobulata</i> , <i>Acacia ramulosa</i> var. <i>ramulosa</i>
< 1	< 2	S	<i>Sida calyxhymenia</i> , <i>Acacia aneura</i>
Image > fallen tree with calcrete in root zone			
<i>Acacia aneura</i>			
<i>Acacia burkittii</i>			
<i>Acacia ramulosa</i> var. <i>ramulosa</i>			
<i>Brachychiton gregorii</i>			
<i>Dodonaea lobulata</i>			
<i>Eucalyptus oleosa</i> subsp. <i>oleosa</i>			
<i>Grevillea nematophylla</i> subsp. <i>nematophylla</i>			
<i>Sida calyxhymenia</i>			
Long unused (extinct) mallee fowl mound			
GPS: 275279 E/ 6674533 N			
Profile 6 – mound low and flat without peak or crater; width 4 m +; some spreading likely over time			
Slight depression (few centimetres) still evident in centre – mound material remaining mostly small quartz rocks. Small shrubs present on surface.			

Site C6			
GPS: 275299 E/ 6674598 N Elevation: 474 m		Landform: Low rise; lateritic gravel; aspect south	
Land surface: Yellowish red fine sandy clay loam; surface rock – lateritic gravel (30 – 40 %), small quartz rocks < 1 %; litter 15 – 20 %; fallen timber 8 – 10 %, slightly higher in some areas to 20 %; cryptogams (lichen) 30 – 40 %			
Condition: Very good			
Disturbance: Grazing impacts evident (donkeys, cattle) especially on <i>Psydrax suaeveolens</i> with many as sticks (up to 1.5 m) with small amount of new growth, and several recent germinations 1 – 2 cm high; historic mining impacts – old tracks, timber cutting			
NVIS 6: U1+^ <i>Acacia ramulosa</i> var. <i>ramulosa</i> , <i>A. caesaneura</i> , <i>A. burkittii</i> , <i>A. tetragonophylla</i> , <i>Brachychiton gregorii</i> \Acacia\^shrub, tree\4\i; M1^ <i>Prostanthera althoferi</i> subsp. <i>althoferi</i> , <i>Eremophila latrobei</i> subsp. <i>latrobei</i> , <i>Philotheca brucei</i> subsp. <i>brucei</i> , <i>Eremophila clarkei</i> , <i>Psydrax suaeveolens</i> \Prostanthera\^shrub\3\c; G1^ <i>Solanum lasiophyllum</i> , <i>Cheilanthes sieberi</i> subsp. <i>sieberi</i> , <i>Psydrax suaveolens</i> \Solanum\^shrub, fern\2\bi			
Vegetation: <i>Acacia ramulosa</i> var. <i>ramulosa</i> , <i>A. caesaneura</i> , <i>A. burkittii</i> tall open shrubland over <i>Prostanthera althoferi</i> subsp. <i>althoferi</i> , <i>Eremophila latrobei</i> subsp. <i>latrobei</i> , <i>Philotheca brucei</i> subsp. <i>brucei</i> shrubland over <i>Solanum lasiophyllum</i> , <i>Cheilanthes sieberi</i> subsp. <i>sieberi</i> , <i>Psydrax suaveolens</i> low isolated shrubs			
Height (m)	Crown cover %	Habit	Species
3 – 7	20 – 30	S, T	<i>Acacia ramulosa</i> var. <i>ramulosa</i> , <i>A. caesaneura</i> , <i>A. burkittii</i> , <i>A. tetragonophylla</i> , <i>Brachychiton gregorii</i>
1 – 2	30 – 40	S	<i>Prostanthera althoferi</i> subsp. <i>althoferi</i> , <i>Eremophila latrobei</i> subsp. <i>latrobei</i> , <i>Philotheca brucei</i> subsp. <i>brucei</i> , <i>Eremophila clarkei</i> , <i>Psydrax suaveolens</i>
< 1	< 2	S, E	<i>Solanum lasiophyllum</i> , <i>Cheilanthes sieberi</i> subsp. <i>sieberi</i> , <i>Psydrax suaveolens</i>
Other species: <i>Eucalyptus oleosa</i> subsp. <i>oleosa</i> , <i>Dodonaea lobulata</i> , <i>Scaevola spinescens</i>			
<i>Acacia burkittii</i> <i>Acacia caesaneura</i> <i>Acacia ramulosa</i> var. <i>ramulosa</i> <i>Acacia tetragonophylla</i> <i>Brachychiton gregorii</i> <i>Cheilanthes sieberi</i> subsp. <i>sieberi</i> <i>Dodonaea lobulata</i> <i>Eremophila clarkei</i> <i>Eremophila latrobei</i> subsp. <i>latrobei</i> <i>Eucalyptus oleosa</i> subsp. <i>oleosa</i> <i>Philotheca brucei</i> subsp. <i>brucei</i> <i>Prostanthera althoferi</i> subsp. <i>althoferi</i> <i>Psydrax suaveolens</i> <i>Scaevola spinescens</i> <i>Solanum lasiophyllum</i>			

Site C7			
GPS: 275225 E/ 6674602 N Elevation: 476 m		Landform: Low rise; crest; quartz field with isolated tree; drainage mostly west; very gentle slope	
Land surface: Reddish brown (5YR5/3) fine sandy clay loam; surface rock (quartz, granite) 30 – 40 %; litter < 10 %; fallen timber < 1 %; cryptogams (lichen) 20 – 30 %			
Condition: Poor to good – possible high historic impacts from mining; may be partly natural			
Disturbance: Historic mining activities – a number of old tracks in area, some ground disturbance; cattle in area recently			
NVIS 6: U1+^ <i>Eucalyptus clelandiorum</i> , <i>Allocasuarina dielsiana</i> \Eucalyptus\^tree\7\r; M1^ <i>Eremophila scoparia</i> \Eremophila\^shrub\3\bi; G1^ <i>Ptilotus obovatus</i> var. <i>obovatus</i> , <i>Sclerolaena diacantha</i> , <i>Maireana triptera</i> , <i>M. tomentosa</i> , <i>Atriplex vesicaria</i> \Ptilotus\^shrub, forb, chenopod shrub\1\r			
Vegetation: <i>Eucalyptus clelandiorum</i> , <i>Allocasuarina dielsiana</i> isolated trees over <i>Eremophila scoparia</i> isolated shrubs over <i>Ptilotus obovatus</i> var. <i>obovatus</i> , <i>Sclerolaena diacantha</i> , <i>Maireana triptera</i> , <i>M. tomentosa</i> , <i>Atriplex vesicaria</i> low sparse shrubland			
Height (m)	Crown cover %	Habit	Species
6 – 11 m	2 – 10	T	<i>Eucalyptus clelandiorum</i> , <i>Allocasuarina dielsiana</i>
1 – 2	< 2	S	<i>Eremophila scoparia</i>
< 0.6	2 – 10	S, F, C	<i>Ptilotus obovatus</i> var. <i>obovatus</i> , <i>Sclerolaena diacantha</i> , <i>Maireana triptera</i> , <i>M. tomentosa</i> , <i>Atriplex vesicaria</i>
<i>Allocasuarina dielsiana</i> <i>Atriplex vesicaria</i> <i>Eremophila scoparia</i> <i>Eucalyptus clelandiorum</i> <i>Maireana tomentosa</i> <i>Maireana triptera</i> <i>Ptilotus obovatus</i> var. <i>obovatus</i> <i>Sclerolaena diacantha</i>			

Site C8			
GPS: 275265 E/ 6674611 N Elevation: 476 m		Landform: Low rise; laterite; aspect south	
Land surface: Yellowish red fine sandy clay loam; surface rock (lateritic gravel and small quartz and greenstone rocks) 50 – 70 %; litter < 5 %; fallen timber < 2 %; cryptogams (lichen) < 10 %; bare ground < 10 %			
Condition: Good to very good; may be naturally sparse; some drought impacts; Triodia (spinifex ID tentative due to lack of flowering structures)			
Disturbance: Historic mining and pastoral activities; current impacts from cattle			
NVIS 6: U1^ Acacia caesaneura, A. aneura, A. ramulosa var. ramulosa, Eucalyptus oleosa subsp. oleosa\Acacia\^shrub, tree\4\; M1^ Philotheca brucei subsp. brucei, Eremophila latrobei subsp. latrobei, Acacia ramulosa var. ramulosa, Scaevola spinescens\Philotheca\^shrub\3\; G1^ Triodia ?scariosa, Cheilanthes sieberi subsp. sieberi, Prostanthera althoferi subsp. althoferi\Triodia\^hummock grass, fern, shrub\1\i			
Vegetation: Acacia caesaneura, A. aneura, A. ramulosa var. ramulosa tall sparse shrubland over Philotheca brucei subsp. brucei, Eremophila latrobei subsp. latrobei, Acacia ramulosa var. ramulosa open shrubland over Triodia ?scariosa, Cheilanthes sieberi subsp. sieberi, Prostanthera althoferi subsp. althoferi low open hummock grassland			
Height (m)	Crown cover %	Habit	Species
3 – 6	2 – 10	S, T	Acacia caesaneura, A. aneura, A. ramulosa var. ramulosa, Eucalyptus oleosa subsp. oleosa
1 – 2	10 – 30	S	Philotheca brucei subsp. brucei, Eremophila latrobei subsp. latrobei, Acacia ramulosa var. ramulosa, Scaevola spinescens
< 0.5	10 – 20	H, E, S	Triodia ?scariosa, Cheilanthes sieberi subsp. sieberi, Prostanthera althoferi subsp. althoferi
Acacia aneura Acacia caesaneura Acacia ramulosa var. ramulosa Cheilanthes sieberi subsp. sieberi Eremophila latrobei subsp. latrobei Eucalyptus oleosa subsp. oleosa Philotheca brucei subsp. brucei Prostanthera althoferi subsp. althoferi Scaevola spinescens Triodia ?scariosa			

Site C9			
GPS: 275288 E/ 6674657 N Elevation: 475 m		Landform: Low rise; midslope; aspect SE	
Land surface: Yellowish red fine sandy clay loam; surface rock (fine ironstone gravel and few small quartz rocks) 50 – 60 %; litter 10 – 15 %; fallen timber 10 – 20 %; cryptogams (lichen_ 10 – 20 %			
Condition: Good – very good; some drought impacts; new shoots present on mulga			
Disturbance: Cattle; historic mining and pastoral impacts			
NVIS 6: U1+^ <i>Acacia incurvaneura</i> , <i>A. ramulosa</i> var. <i>ramulosa</i> \Acacia\^tree, shrub\6\i; M1^ <i>Prostanthera althoferi</i> subsp. <i>althoferi</i> , <i>Eremophila latrobei</i> subsp. <i>latrobei</i> , <i>Brachychiton gregori</i> \Prostanthera\^shrub\3\i; G1^ <i>Prostanthera althoferi</i> subsp. <i>althoferi</i> \Prostanthera\2\i; G2^ <i>Cheilanthes sieberi</i> subsp. <i>sieberi</i> , <i>Maireana georgei</i> \Cheilanthes\^fern, chenopod shrub\1\bi			
Vegetation: <i>Acacia incurvaneura</i> , <i>A. ramulosa</i> var. <i>ramulosa</i> low open woodland over <i>Prostanthera althoferi</i> subsp. <i>althoferi</i> , <i>Eremophila latrobei</i> subsp. <i>latrobei</i> , <i>Brachychiton gregorii</i> open shrubland over <i>Prostanthera althoferi</i> subsp. <i>althoferi</i> low sparse shrubland over <i>Cheilanthes sieberi</i> subsp. <i>sieberi</i> , <i>Maireana georgei</i> low isolated ferns			
Height (m)	Crown cover %	Habit	Species
3 – 6	20 – 30	T, S	<i>Acacia incurvaneura</i> , <i>A. ramulosa</i> var. <i>ramulosa</i>
1 – 2	10 – 20	S	<i>Prostanthera althoferi</i> subsp. <i>althoferi</i> , <i>Eremophila latrobei</i> subsp. <i>latrobei</i> , <i>Brachychiton gregorii</i>
0.3 – 1	2 – 10	S	<i>Prostanthera althoferi</i> subsp. <i>althoferi</i>
< 0.3	< 2	E, C	<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i> , <i>Maireana georgei</i>
<i>Acacia incurvaneura</i> <i>Acacia ramulosa</i> var. <i>ramulosa</i> <i>Brachychiton gregorii</i> <i>Cheilanthes sieberi</i> subsp. <i>sieberi</i> <i>Eremophila latrobei</i> subsp. <i>latrobei</i> <i>Maireana georgei</i> <i>Prostanthera althoferi</i> subsp. <i>althoferi</i>			

OBM Village

Site V1			
GPS: 276346 E/ 6673908 N Elevation: 473 m		Landform: Plain; drainage changed – placement of dirt piles; sheet flow concentrated in parts; located north, east side of village car park	
Land surface: Yellowish red clay loam; surface rock (fine ironstone gravel) 30 – 40 %; ground disturbed			
Condition: Good; Disturbance: Changes to land surface through piles of dirt and other material been placed around edges; minor erosion; several minor tracks through area; rubbish; some drought deaths			
NVIS 6: U1+^ <i>Eucalyptus oleosa</i> subsp. <i>oleosa</i> , <i>Casuarina pauper</i> \ <i>Eucalyptus</i> \^mallee, tree\6\; M1^ <i>Acacia burkittii</i> , <i>A. tetragonophylla</i> , <i>Grevillea nematophylla</i> subsp. <i>nematophylla</i> , <i>Casuarina pauper</i> \ <i>Acacia</i> \^shrub, tree\4\; M2^ <i>Acacia burkittii</i> , <i>A. tetragonophylla</i> , <i>Santalum spicatum</i> , <i>Casuarina pauper</i> \ <i>Acacia</i> \^shrub\3\; G1^ <i>Scaevola spinescens</i> , <i>Ptilotus obovatus</i> var. <i>obovatus</i> , <i>Olearia muelleri</i> , <i>Leichhardtia australis</i> , <i>Enchylaena lanata</i> \ <i>Scaevola</i> \^shrub, vine, chenopod shrub\2\			
Vegetation: <i>Eucalyptus oleosa</i> subsp. <i>oleosa</i> , <i>Casuarina pauper</i> open mallee woodland over <i>Acacia burkittii</i> , <i>A. tetragonophylla</i> , <i>Grevillea nematophylla</i> subsp. <i>nematophylla</i> tall open shrubland over <i>Acacia burkittii</i> , <i>A. tetragonophylla</i> , <i>Santalum spicatum</i> sparse shrubland over <i>Scaevola spinescens</i> , <i>Ptilotus obovatus</i> var. <i>obovatus</i> , <i>Olearia muelleri</i> low sparse shrubland			
Height (m)	Crown cover %	Habit	Species
6 - 10	2 – 10	M, T	<i>Eucalyptus oleosa</i> subsp. <i>oleosa</i> , <i>Casuarina pauper</i>
2 – 4	10 – 30	S, T	<i>Acacia burkittii</i> , <i>A. tetragonophylla</i> , <i>Grevillea nematophylla</i> subsp. <i>nematophylla</i> , <i>Casuarina pauper</i>
1 – 2	5 – 10	S	<i>Acacia burkittii</i> , <i>A. tetragonophylla</i> , <i>Santalum spicatum</i> , <i>Casuarina pauper</i>
< 0.7	2 – 4	S, L, C	<i>Scaevola spinescens</i> , <i>Ptilotus obovatus</i> var. <i>obovatus</i> , <i>Olearia muelleri</i> , <i>Leichhardtia australis</i> , <i>Enchylaena lanata</i>
Other species: <i>Acacia murrayana</i> (edges), <i>Alyxia buxifolia</i> , <i>Eremophila</i> sp. Mt Jackson			
<i>Acacia burkittii</i> <i>Acacia murrayana</i> <i>Acacia tetragonophylla</i> <i>Alyxia buxifolia</i> <i>Casuarina pauper</i> <i>Enchylaena lanata</i> <i>Eremophila</i> sp. Mt Jackson <i>Eucalyptus oleosa</i> subsp. <i>oleosa</i> <i>Grevillea nematophylla</i> subsp. <i>nematophylla</i> <i>Leichhardtia australis</i> <i>Olearia muelleri</i> <i>Ptilotus obovatus</i> var. <i>obovatus</i> <i>Santalum spicatum</i> <i>Scaevola spinescens</i>			

Edge of clearing Mounds of soil and other material; rubbish			
<i>Chenopodium curvispicatum</i> , <i>Maireana trichoptera</i> , <i>Sclerolaena diacantha</i> low shrubs and forbs			
Site V2			
GPS: 276251 E/ 6673934 N Elevation: 473 m		Landform: North side of carpark; plain; located within access tracks	
Land surface: Yellowish red clay loam; surface rock (fine ironstone gravel) 70 – 80 % with scattered (< 2 %) small rocks; litter 10 – 15 %; fallen timber 2 – 10 % - mostly around edges of patch next to car park – less protection; cryptogams 2 – 5 %; bare ground < 1 %			
Condition: Poor; many old disturbances; changes to land surface; rubbish			
Vegetation: <i>Eucalyptus oleosa</i> subsp. <i>oleosa</i> , <i>Acacia aneura</i> low open woodland over <i>Acacia burkittii</i> , <i>Eucalyptus oleosa</i> subsp. <i>oleosa</i> , <i>Acacia ramulosa</i> var. <i>ramulosa</i> tall open shrubland over <i>Scaevola spinescens</i> , <i>Exocarpos aphyllus</i> , <i>Santalum spicatum</i> sparse shrubland over <i>Dodonaea rigida</i> , <i>Ptilotus obovatus</i> var. <i>obovatus</i> , <i>Maireana triptera</i> low isolated shrubs			
Height (m)	Crown cover %	Habit	Species
6 – 9	2 – 10	T	<i>Eucalyptus oleosa</i> subsp. <i>oleosa</i> , <i>Acacia aneura</i>
2 – 5	10 – 20	S, T	<i>Acacia burkittii</i> , <i>Eucalyptus oleosa</i> subsp. <i>oleosa</i> , <i>Acacia ramulosa</i> var. <i>ramulosa</i> , <i>Santalum spicatum</i>
1 – 2	2 – 10	S	<i>Scaevola spinescens</i> , <i>Exocarpos aphyllus</i> , <i>Santalum spicatum</i> , <i>Dodonaea rigida</i>
< 0.5	< 2	S, C	<i>Dodonaea rigida</i> , <i>Ptilotus obovatus</i> var. <i>obovatus</i> , <i>Maireana triptera</i>
<i>Acacia aneura</i> <i>Acacia burkittii</i> <i>Acacia ramulosa</i> var. <i>ramulosa</i> <i>Dodonaea rigida</i> <i>Eucalyptus oleosa</i> subsp. <i>oleosa</i> <i>Exocarpos aphyllus</i> <i>Maireana triptera</i> <i>Ptilotus obovatus</i> var. <i>obovatus</i> <i>Santalum spicatum</i> <i>Scaevola spinescens</i>			

Site V3a			
GPS: 276058 E/ 6673823 N Elevation: 476 m		Landform: Low rise; west side of camp; edge	
Land surface: Surface rock ~ 10 %; quartz, granite			
Condition: Good; basic structure present; species poor			
Disturbance: Multiple disturbances – access tracks, old clearing			
NVIS 6: U1+^ <i>Eucalyptus lesouefii</i> , <i>E. clelandiorum</i> \ <i>Eucalyptus</i> \^tree\7\i; M1^ <i>Eremophila</i> sp. Mt Jackson, <i>Santalum spicatum</i> \ <i>Eremophila</i> \^shrub\4\r; M2^ <i>Eremophila</i> sp. Mt Jackson, <i>Acacia erinacea</i> , <i>Scaevola spinescens</i> \ <i>Eremophila</i> \^shrub\3\r; G1^ <i>Sclerolaena diacantha</i> \ <i>Sclerolaena</i> \^forb\1\bi			
Vegetation: <i>Eucalyptus lesouefii</i> , <i>E. clelandiorum</i> open woodland over <i>Eremophila</i> sp. Mt Jackson, <i>Santalum spicatum</i> tall sparse shrubland over <i>Eremophila</i> sp. Mt Jackson, <i>Acacia erinacea</i> , <i>Scaevola spinescens</i> sparse shrubland over <i>Sclerolaena diacantha</i> low isolated forbs			
Height (m)	Crown cover %	Habit	Species
10 – 14	10 – 20	T	<i>Eucalyptus lesouefii</i> , <i>E. clelandiorum</i>
2 – 4	2 – 10	S, T	<i>Eremophila</i> sp. Mt Jackson, <i>Santalum spicatum</i>
1 – 2	2 – 10	S	<i>Eremophila</i> sp. Mt Jackson, <i>Acacia erinacea</i> , <i>Scaevola spinescens</i>
< 0.2	< 2	F	<i>Sclerolaena diacantha</i>
Acacia erinacea Eremophila sp. Mt Jackson Eucalyptus clelandiorum Eucalyptus lesouefii Santalum spicatum Scaevola spinescens Sclerolaena diacantha			

Site V3b			
GPS: 276075 E/ 6673829 N Elevation: 476 m		Landform: Change low rise to plain; very gentle slope; aspect north	
Land surface: Yellowish red (5YR4/6) clay loam; surface rock < 5 %; litter 30 – 40 %; fallen timber 2 – 5 %; cryptogams (lichen) 20 – 30 %			
Condition: Good to very good; structure mostly intact			
Disturbance: Drain and walking trail present to west; minor amounts of rubbish			
NVIS 6: U1+^ <i>Eucalyptus oleosa</i> subsp. <i>oleosa</i> \Eucalyptus\^mallee\6\i; M1^ <i>Eremophila</i> sp. Mt Jackson\Eremophila\^shrub\4\bi; M2^ <i>Eremophila</i> sp. Mt Jackson, <i>Acacia erinacea</i> , <i>Scaevola spinescens</i> , <i>Santalum spicatum</i> \Eremophila\^shrub\3\i; G1^ <i>Scaevola spinescens</i> , <i>Acacia erinacea</i> , <i>Olearia muelleri</i> , <i>Austrostipa elegantissima</i> , <i>Enchylaena lanata</i> , <i>Ptilotus obovatus</i> var. <i>obovatus</i> \Scaevola\^shrub, tussock grass\chenopod shrub\2\i			
Vegetation: <i>Eucalyptus oleosa</i> subsp. <i>oleosa</i> mallee woodland over <i>Eremophila</i> sp. Mt Jackson tall isolated shrubs over <i>Eremophila</i> sp. Mt Jackson, <i>Acacia erinacea</i> , <i>Scaevola spinescens</i> , <i>Santalum spicatum</i> open shrubland over <i>Scaevola spinescens</i> , <i>Acacia erinacea</i> , <i>Olearia muelleri</i> low open shrubland			
Height (m)	Crown cover %	Habit	Species
8 – 10	10 – 30	M	<i>Eucalyptus oleosa</i> subsp. <i>oleosa</i>
2 – 4	< 2	S	<i>Eremophila</i> sp. Mt Jackson
1 – 2	10 – 30	S	<i>Eremophila</i> sp. Mt Jackson, <i>Acacia erinacea</i> , <i>Scaevola spinescens</i> , <i>Santalum spicatum</i>
< 1	10 – 20	S, G, C	<i>Scaevola spinescens</i> , <i>Acacia erinacea</i> , <i>Olearia muelleri</i> , <i>Austrostipa elegantissima</i> , <i>Enchylaena lanata</i> , <i>Ptilotus obovatus</i> var. <i>obovatus</i>
Other species: <i>Senna artemisioides</i> subsp. <i>filifolia</i>			
<i>Acacia erinacea</i> <i>Austrostipa elegantissima</i> <i>Enchylaena lanata</i> <i>Eremophila</i> sp. Mt Jackson <i>Eucalyptus oleosa</i> subsp. <i>oleosa</i> <i>Olearia muelleri</i> <i>Ptilotus obovatus</i> var. <i>obovatus</i> <i>Santalum spicatum</i> <i>Scaevola spinescens</i> <i>Senna artemisioides</i> subsp. <i>filifolia</i>			

Site V3c			
GPS: 276104 E/ 6673927 N Elevation: 475 m		Landform: Alluvial plain; lower catchment; aspect north; very gentle slope	
Land surface: Yellowish red (5YR4/6) fine sandy clay loam; surface rock (fine ironstone gravel, granite) < 2 %; litter 30 – 40 %; fallen timber < 3 %; cryptogams (lichen, thick crust) 30 – 50 % increasing to 70 – 80 % in lower areas			
Condition: Very good; impacts lower than other areas; structure intact although ground cover very sparse; drought deaths; species poor			
Disturbance: Changes to drainage; historic pastoral impacts; maturing regrowth? Trees mostly small (trunk diameter)			
NVIS 6: U1+^ <i>Eucalyptus oleosa subsp. oleosa</i> \Eucalyptus\^mallee\6\i; M1^ <i>Senna artemisioides subsp. filifolia</i> , <i>Leichhardtia australis</i> \Senna\^shrub, vine\3\i; G1^ <i>Dodonaea lobulata</i> , <i>Leichhardtia australis</i> , <i>Ptilotus obovatus var. obovatus</i> \Dodonaea\^shrub, vine\2\bi			
Vegetation: <i>Eucalyptus oleosa subsp. oleosa</i> mallee woodland over <i>Senna artemisioides subsp. filifolia</i> , <i>Leichhardtia australis</i> open shrubland over <i>Dodonaea lobulata</i> , <i>Leichhardtia australis</i> , <i>Ptilotus obovatus var. obovatus</i> low isolated shrubs			
Height (m)	Crown cover %	Habit	Species
7 – 8	10 – 30	M	<i>Eucalyptus oleosa subsp. oleosa</i>
1 – 2	10 – 30	S, L	<i>Senna artemisioides subsp. filifolia</i> , <i>Leichhardtia australis</i>
< 0.7	< 2	S, L	<i>Dodonaea lobulata</i> , <i>Leichhardtia australis</i> , <i>Ptilotus obovatus var. obovatus</i>
Other species: <i>Acacia aneura</i>			
<i>Acacia aneura</i> <i>Dodonaea lobulata</i> <i>Eucalyptus oleosa subsp. oleosa</i> <i>Leichhardtia australis</i> <i>Ptilotus obovatus var. obovatus</i> <i>Senna artemisioides subsp. filifolia</i>			



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 26(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.

Extinct species

Listed by order of the Minister as extinct under section 23(1) of the BC Act as extinct or extinct in the wild.

EX Extinct species

Species where *"there is no reasonable doubt that the last member of the species has died"*, and listing is otherwise in accordance with the ministerial guidelines (section 24 of the BC Act).

Published as presumed extinct under schedule 4 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for extinct fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for extinct flora.

EW Extinct in the wild species

Species that *"is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form"*, and listing is otherwise in accordance with the ministerial guidelines (section 25 of the BC Act).

Currently there are no threatened fauna or threatened flora species listed as extinct in the wild. If listing of a species as extinct in the wild occurs, then a schedule will be added to the applicable notice.

Specially protected species

Listed by order of the Minister as specially protected under section 13(1) of the BC Act. Meeting one or more of the following categories: species of special conservation interest; migratory species; cetaceans; species subject to international agreement; or species otherwise in need of special protection.

Species that are listed as threatened species (critically endangered, endangered or vulnerable) or extinct species under the BC Act cannot also be listed as Specially Protected species.

MI Migratory species

Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth; and listing is otherwise in accordance with the ministerial guidelines (section 15 of the BC Act).

Includes birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and fauna subject to the *Convention on the Conservation of Migratory Species of Wild Animals* (Bonn Convention), an environmental treaty under the United Nations Environment Program. Migratory species listed under the BC Act are a subset of the migratory animals, that are known to visit Western Australia, protected under the international agreements or treaties, excluding species that are listed as Threatened species.

Published as migratory birds protected under an international agreement under schedule 5 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

CD Species of special conservation interest (conservation dependent fauna)

Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened, and listing is otherwise in accordance with the ministerial guidelines (section 14 of the BC Act).

Published as conservation dependent fauna under schedule 6 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

OS Other specially protected species

Fauna otherwise in need of special protection to ensure their conservation, and listing is otherwise in accordance with the ministerial guidelines (section 18 of the BC Act).

Published as other specially protected fauna under schedule 7 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

Extinct species

Listed by order of the Minister as extinct under section 23(1) of the BC Act as extinct or extinct in the wild.

EX Extinct species

Species where *"there is no reasonable doubt that the last member of the species has died"*, and listing is otherwise in accordance with the ministerial guidelines (section 24 of the BC Act).

Published as presumed extinct under schedule 4 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for extinct fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for extinct flora.

EW Extinct in the wild species

Species that *"is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form"*, and listing is otherwise in accordance with the ministerial guidelines (section 25 of the BC Act).

Currently there are no threatened fauna or threatened flora species listed as extinct in the wild. If listing of a species as extinct in the wild occurs, then a schedule will be added to the applicable notice.

Specially protected species

Listed by order of the Minister as specially protected under section 13(1) of the BC Act. Meeting one or more of the following categories: species of special conservation interest; migratory species; cetaceans; species subject to international agreement; or species otherwise in need of special protection.

Species that are listed as threatened species (critically endangered, endangered or vulnerable) or extinct species under the BC Act cannot also be listed as Specially Protected species.

MI Migratory species

Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth; and listing is otherwise in accordance with the ministerial guidelines (section 15 of the BC Act).

Includes birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and fauna subject to the *Convention on the Conservation of Migratory Species of Wild Animals* (Bonn Convention), an environmental treaty under the United Nations Environment Program. Migratory species listed under the BC Act are a subset of the migratory animals, that are known to visit Western Australia, protected under the international agreements or treaties, excluding species that are listed as Threatened species.

Published as migratory birds protected under an international agreement under schedule 5 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

CD Species of special conservation interest (conservation dependent fauna)

Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened, and listing is otherwise in accordance with the ministerial guidelines (section 14 of the BC Act).

Published as conservation dependent fauna under schedule 6 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

OS Other specially protected species

Fauna otherwise in need of special protection to ensure their conservation, and listing is otherwise in accordance with the ministerial guidelines (section 18 of the BC Act).

Published as other specially protected fauna under schedule 7 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.



**Appendix B: Vegetation Clearing – Fauna Assessment – Davyhurst, Callion, Waihi,
Siberia, Riverina Clearance Areas – (BIOSTAT, 2020)**



Vegetation Clearing - Fauna Assessment

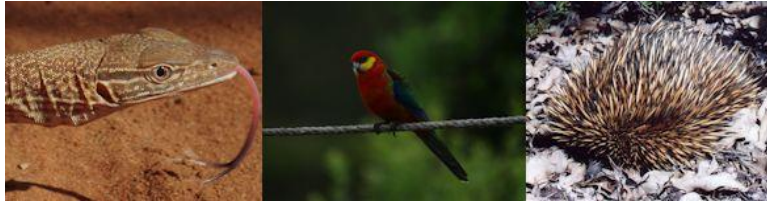
(Davyhurst, Callion, Waihi, Siberia, Riverina Clearance Areas)

Prepared for: Ora Banda Mining

By BIOSTAT Pty Ltd

March 2020





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This document has been prepared for Ora Banda Mining in relation to this project and should not be relied upon by other parties or used for any purpose without the specific permission of BIOSTAT Pty Ltd

REVISION SCHEDULE

Rev. No.	Date	Description	Prepared/Approved By
A	19/2/2020	Draft provided as starter for Leanne. Does not include Davyhurst or discussion.	EGC
1	6/3/2020	Final report	EGC
2		Includes changes to Riverina boundaries and review of comments	EGC

STATEMENT OF LIMITATIONS

This report and the associated services performed by BIOSTAT Pty Ltd were undertaken to satisfy the requirements of Ora Banda Mining (the 'Client') as set out in the scope of services defined in the contract agreed to between BIOSTAT Pty Ltd and the Client. That scope of services was defined by the Client's requests, by the time and budgetary constraints imposed by the Client, the availability of information and by the availability of access to the site defined by the Client.

BIOSTAT Pty Ltd derived the data in this report primarily from site observations, information provided by the Client and an examination of records in the public domain as described in the scope of services. The passage of time, manifestation of latent conditions, additional information or impacts of future events may require further consideration of the Project and its scope and may require further subsequent data analysis and re-evaluation of the findings, observations and conclusions expressed in this report.

BIOSTAT Pty Ltd has relied upon and presumed accurate certain information (or absence thereof) relative to the site provided by government officials and authorities, the Client and others identified herein, in the preparation of this report. BIOSTAT Pty Ltd has not attempted to verify the accuracy or completeness of any such information except where stated otherwise in this report.

No warranty or guarantee, whether express or implied, is made with respect to the data reported or to the findings, observations and conclusions expressed in this report. Further, such data findings, observations and conclusions are based solely upon site conditions and information provided by the Client at the time of the investigation.

This report has been prepared on behalf of and for the exclusive use of the Client and is subject to and issued in connection with the provision of the agreement between BIOSTAT Pty Ltd and the Client. BIOSTAT Pty Ltd accepts no liability or responsibility whatsoever for or in respect of any use of or reliance upon this report by any third party.

(The 'Project' is defined as the scope of services as set out in the contract and agreed to by BIOSTAT Pty Ltd and the Client.)

TABLE OF CONTENTS

1	INTRODUCTION.....	7
2	METHODS.....	7
3	NOMENCLATURE, TAXONOMY AND DISTRIBUTION PATTERNS.....	8
4	RESULTS AND DISCUSSION	15
4.1	FAUNA HABITAT CHARACTERISTICS	17
4.1.1	Riverina	17
4.1.2	Waihi	20
4.1.3	Callion.....	22
4.1.4	Davyhurst	26
4.1.5	Siberia	29
4.2	MNES SPECIES	31
4.2.1	<i>Leipoa ocellata</i> , malleefowl	31
4.2.2	<i>Calidris ferruginea</i> , curlew sandpiper	34
4.2.3	<i>Pezoporus occidentalis</i> , night parrot.....	34
4.2.4	<i>Polytelis alexandrae</i> , princess parrot.....	35
4.2.5	<i>Dasyurus geoffroii</i> , chuditch	35
5	GENERAL CONCLUSIONS AND RECOMMENDATIONS	36
6	REFERENCES	39
APPENDIX 1.	DATABASE SEARCHES RESULTS	41

TABLE OF FIGURES

Figure 1	Locations of vegetation clearing areas.	9
Figure 2	Riverina investigation area.	10
Figure 3	Davyhurst investigation area.	11
Figure 4	Waihi investigation area.....	12
Figure 5	Callion investigation area.	13
Figure 6	Siberia investigation area.	14
Figure 7	Fauna habitats and condition for Riverina.....	18
Figure 8	Degraded habitat showing lack of ground cover and sparse shrubs.....	19
Figure 9	A more structurally complex habitat present to the west of the Evanston-Menzies road.	19
Figure 10	Fauna habitats and condition for Waihi.	21
Figure 11	Fauna habitats and condition for Callion.....	23
Figure 12	Typical habitats located in Callion.....	24
Figure 13	One of several fox scats located at Callion.....	25

Figure 14	Fauna habitats and condition for Davyhurst.....	27
Figure 15	Typical habitats found within Davyhurst.	28
Figure 16	Fauna habitats and condition for Siberia.....	30
Figure 17	Old malleefowl mound located at Callion.....	32
Figure 18	Records of Malleefowl with dates of records.....	33

TABLE OF TABLES

Table 1	Likelihood assessment categories.	15
Table 2	Conservation status codes used in text.	16
Table 3	Fauna habitat areas identified at Riverina.....	17
Table 4	Fauna habitat areas identified at Waihi.....	20
Table 5	Fauna habitat areas identified at Callion.	22
Table 6	Fauna habitat areas identified at Davyhurst.....	26
Table 7	Fauna habitats identified in Siberia.....	29

1 INTRODUCTION

Biostat Pty Ltd (Biostat) was engaged to undertake a fauna habitat assessment as part of a vegetation clearing submission of five Ora Banda Mining Pty Ltd (OBM) leases located in the northern Goldfields, Western Australia approximately 110km north-west of Kalgoorlie (Figure); Riverina, Davyhurst, Waihi, Callion, Siberia (Figures 2 – 5, respectively). Each of these Investigation Areas (IA) contain historical mine workings, including 19th and early 20th century prospecting shafts and working, larger more modern mine voids and associated infrastructure and areas of native vegetation of varying quality. These areas are also within pastoral leases many of which are still operating. These IAs represent the area of interest for clearing but do not denote the total area proposed for clearing. Within each area, smaller areas (disturbance envelopes) will be identified for clearing and development. Overall, these 5 areas represent a total 1,482.8 ha, and includes areas already cleared, pasture lands, and existing mine voids.

The focus of this study was to investigate the likelihood of malleefowl (*Leipoa ocellata*) occurring in these areas and the value of the vegetation delineated for clearing to this species. However, the investigations also required an assessment of habitats and their value to fauna in general. Formally, the objectives for this study:

- Undertake a visual inspection of areas identified for vegetation clearing and determine quality of habitat for malleefowl.
- Assess the quality of habitat for any other threatened species that is likely to occur in the area.
- Report on the findings from the survey and produce likelihood of occurrence tables for threatened species.

The sites are located in the confluence between Coolgardie and Murchison bioregions (V7, Thackway & Cresswell 1995) with Siberia, Waihi and Callion in the former, and Davyhurst and Riverina in the latter. The Murchison region is regarded as being under-represented in conservation areas, i.e., less than 10% in protected (Cowan 2003).

2 METHODS

Database search from the DBCA NatureMap database and for threatened species records were undertaken using -30.03562°, 120.65771° (WGS84) as the centre point with a 39km radius buffer applied to give a search area of approximately 4,778 km². A search using the same coordinates and buffer zone was made of Matters of National Environmental Significance (MNES) (Appendix 1).

It should be noted that ecological processes and species distributions do not recognize artificial boundaries (i.e., administrative boundaries such as local government boundaries, development envelopes, etc.) and assessments are undertaken on a local and regional basis. This is an important aspect of determining the applicability of the information in relation to the landscapes being assessed.

Where available, survey reports relating to the assessment area were reviewed as background reference for this study. Other material relevant to this study were also included in the desktop assessment.

A reconnaissance of the sites was undertaken by an experienced zoologist from 9/12/2019 – 11/12/2019. The weather during the reconnaissance was generally warm although intermittent thunderstorm and rain featured on 11/12/2019.

3 NOMENCLATURE, TAXONOMY AND DISTRIBUTION PATTERNS

The following literature sources have been employed to discuss fauna distribution patterns and ecology in the preparation of this report:

Birds: Barrett et al. 2003; Johnstone & Storr 1998, 2004.

Mammals: Churchill 2008; Jackson & Groves 2015; eds Van Dyck, Gynther & Baker 2013; eds Van Dyck & Strahan 2008.

Amphibians: Tyler & Doughty 2009; Tyler & Knight 2011.

Reptiles: Wilson & Swan 2013.

The nomenclature in this report follows the references listed and more recent taxonomic revisions.

Species listed in this report will adhere to strict taxonomic order as outlined in the references above. The taxonomic order tends to reflect broad guild commonality between species. The more familiar alphabetical listing of species is ecologically irrelevant and hides much of this broader information.

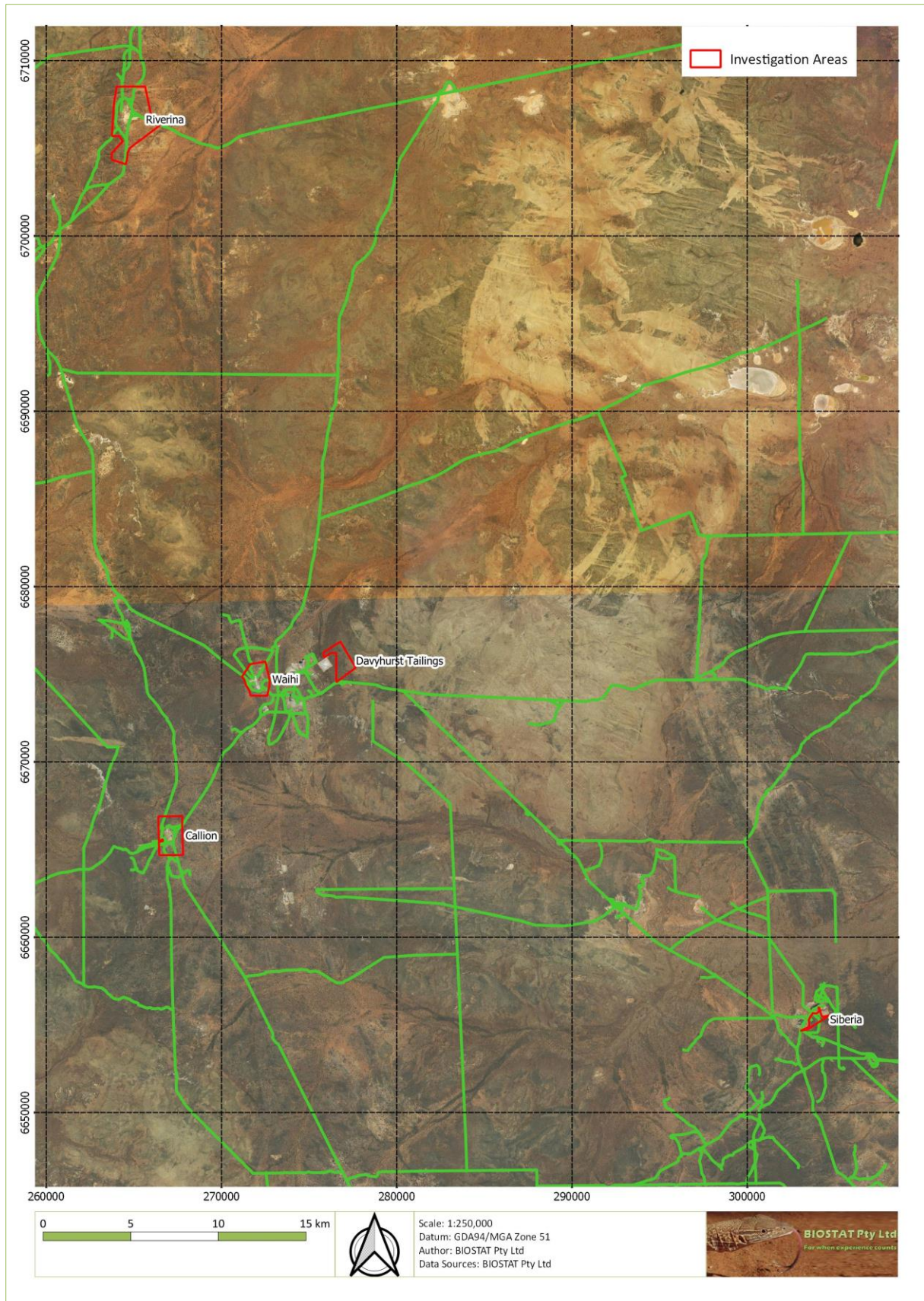


Figure 1 Locations of investigation areas.

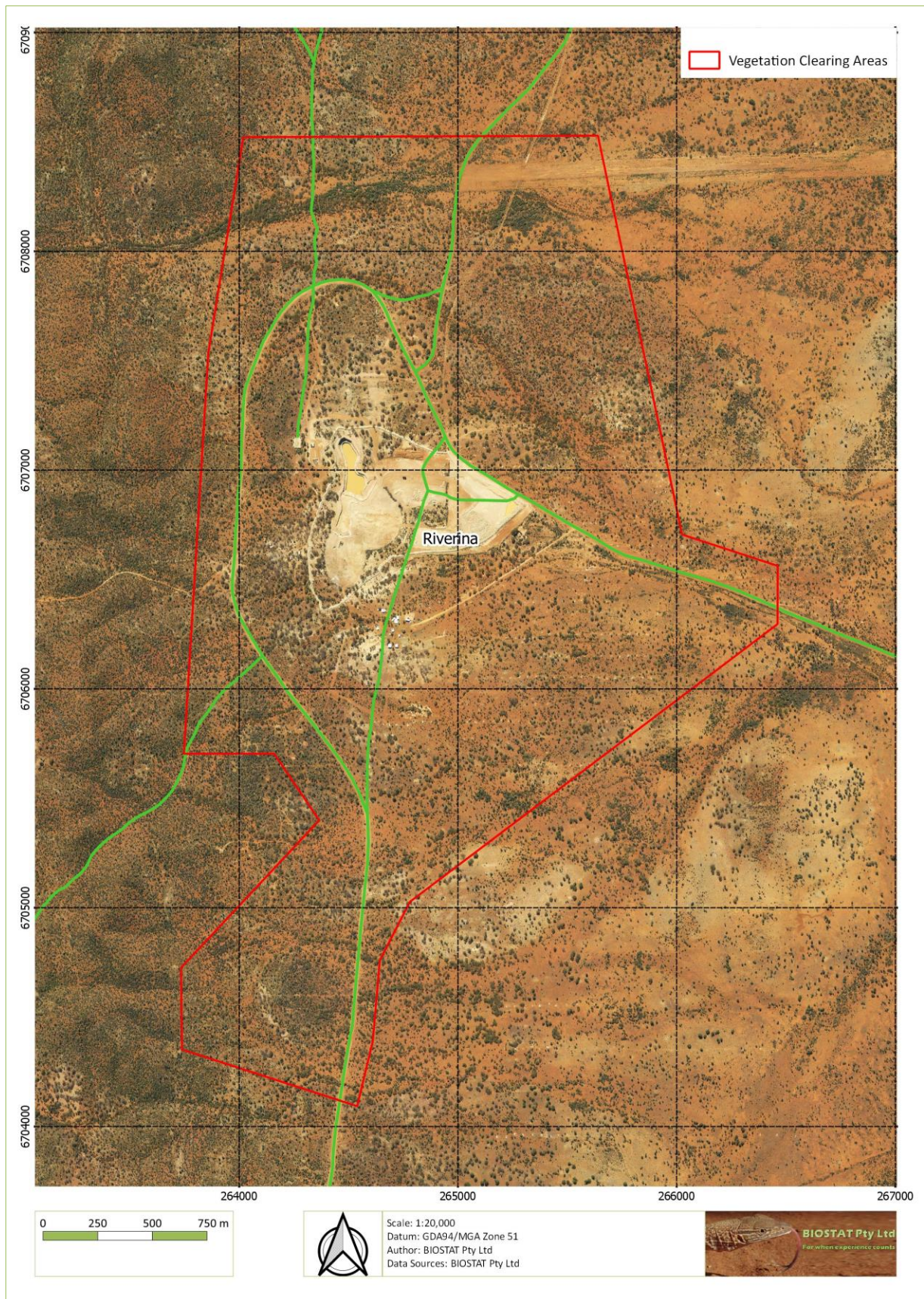


Figure 2 Riverina investigation area.

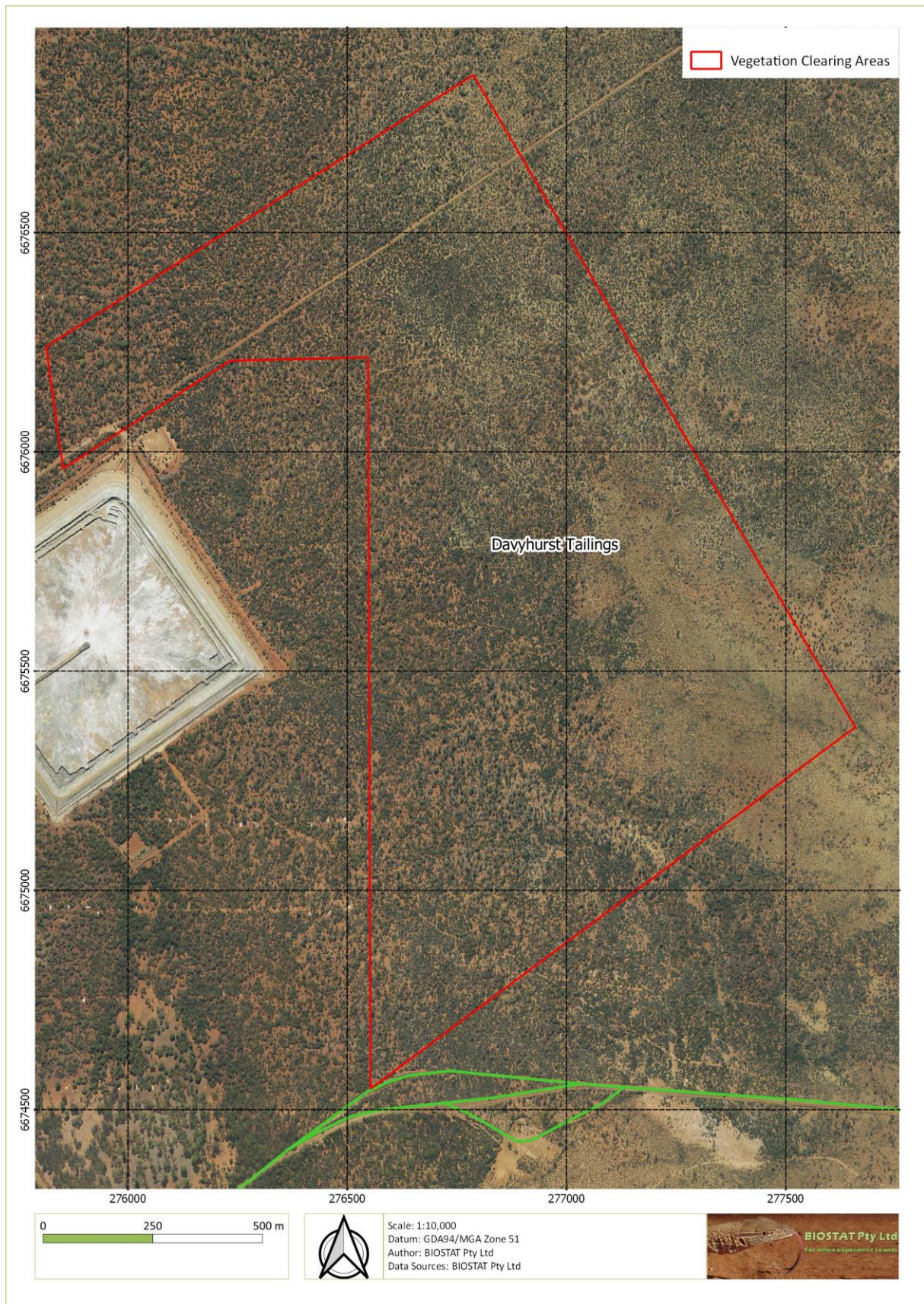


Figure 3 Davyhurst investigation area.

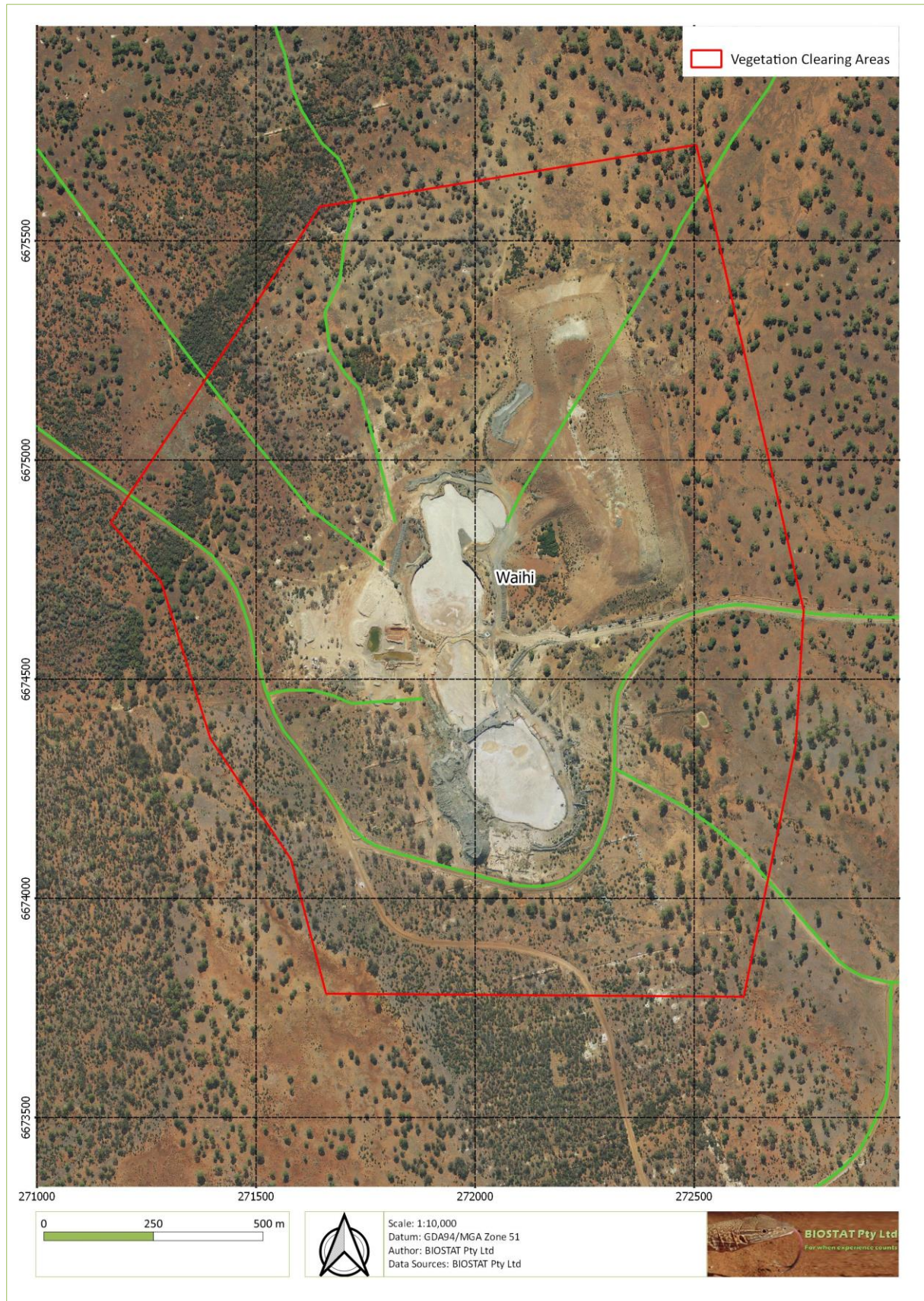


Figure 4 Waihi investigation area.

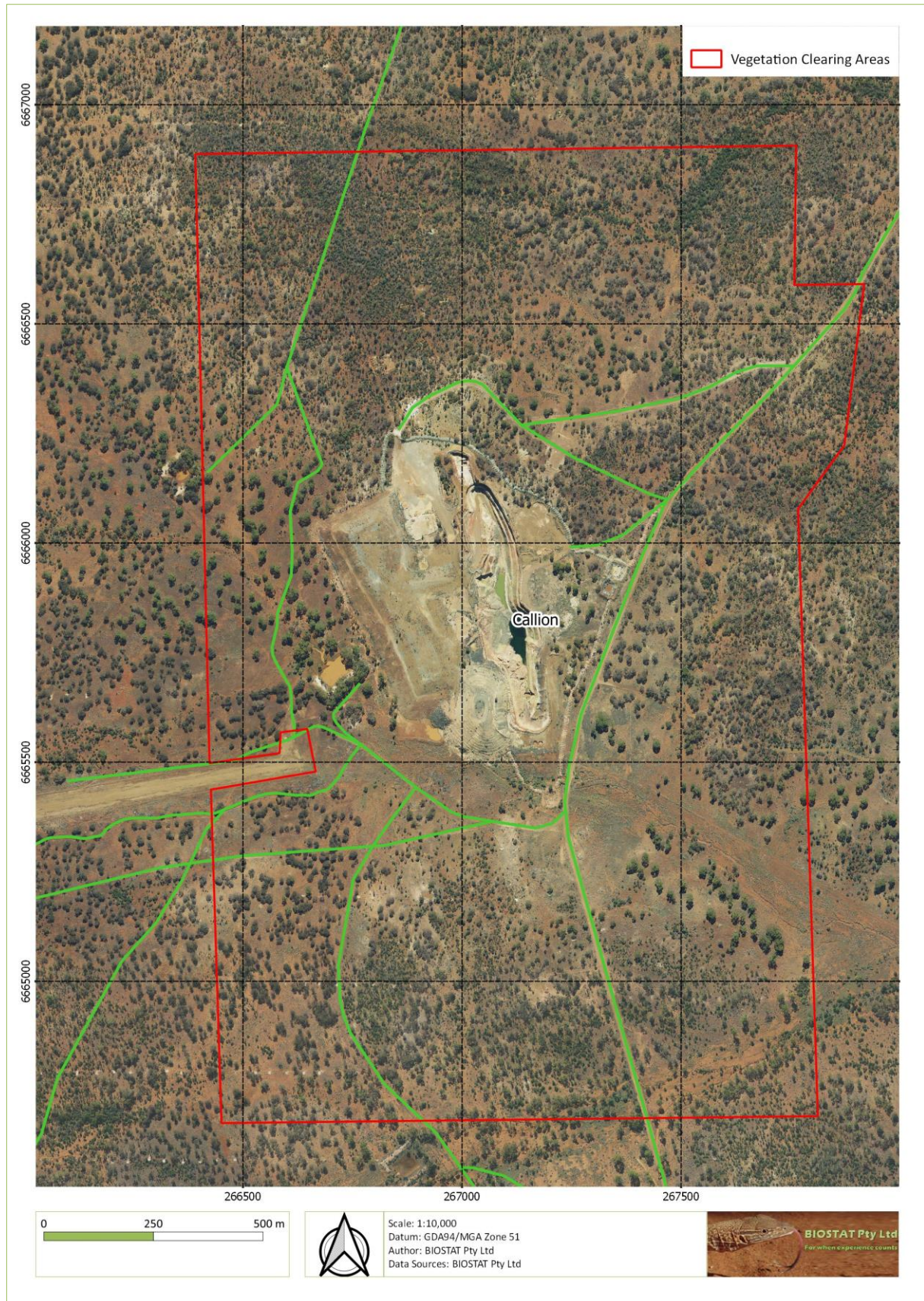


Figure 5 Callion investigation area.

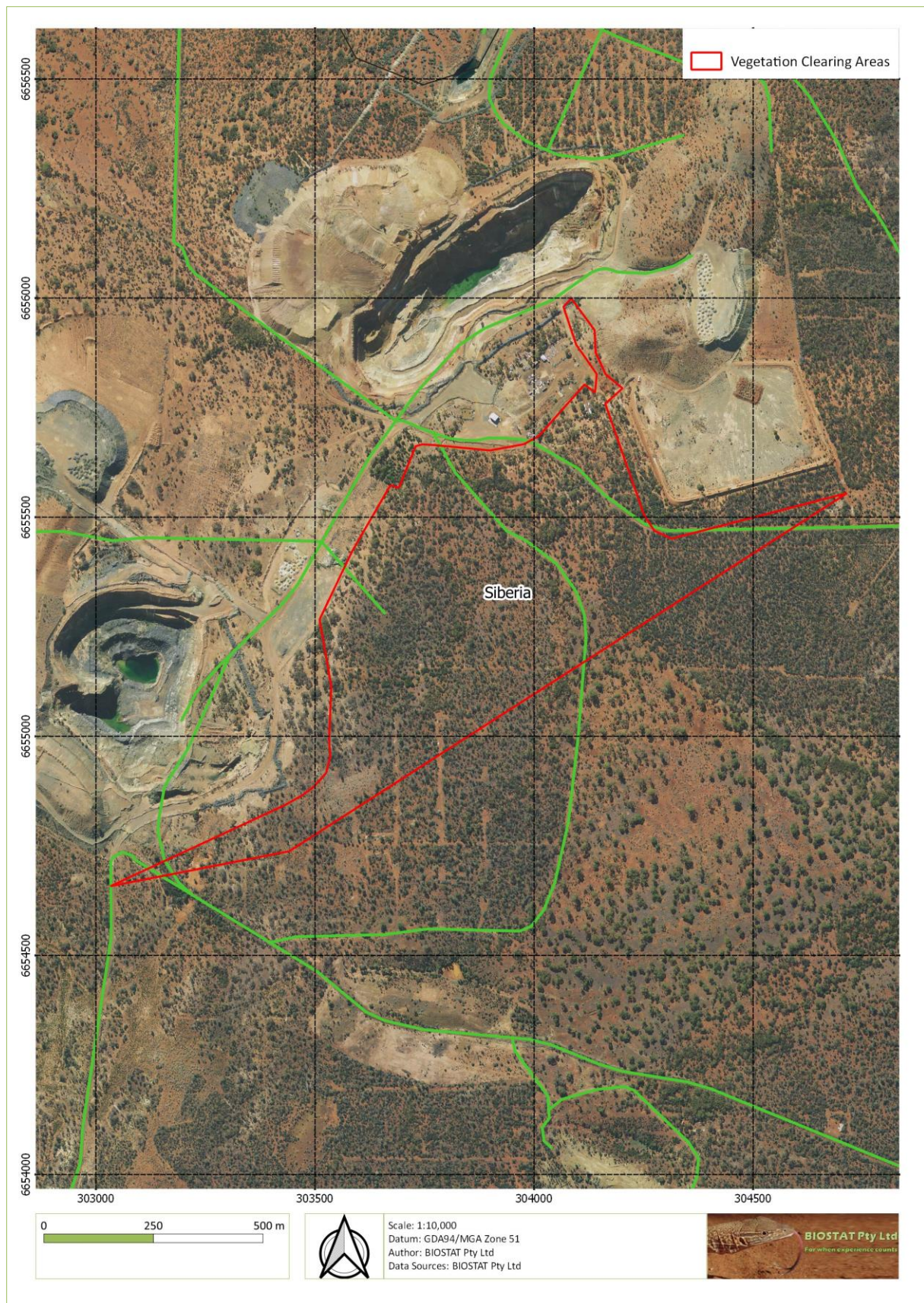


Figure 6 *Siberia investigation area.*

4 RESULTS AND DISCUSSION

The site reconnaissance provided an overview of the quality of habitats present in each of the areas of the project. The ecological value of habitats within areas and between areas varied from highly disturbed/poor to excellent/high. The confounding factor is the level of historical disturbance in many of these sites from mining and agricultural activities, and with the constant pressures from cattle, feral predators and herbivores.

The reconnaissance survey of Riverina and Siberia was hampered by weather events which restricted on-foot surveys due to lightning storms in the area. However, it was possible to use existing tracks in these areas to assess habitat values.

Background material was sourced from fauna surveys undertaken in surrounding areas including Goongarrie (BIOSTAT Pty Ltd 2000) and Credo Station Reserve (Credo Station Reserve WA 2015).

The likelihood of occurrence of species is a subjective assessment reliant on an understanding of available habitat, quality of habitat, and historical and current records (Table 1). The quantification of occurrence for most species would require longer term monitoring which, in many cases, has been carried out for much of the area being assessed. Although, due to changes in species distributions brought on by climatic and habitat changes there is future possibility of species, which currently may exist on the fringes of the areas, becoming more common. The high mobility of many species of fauna, particularly migratory and nomadic birds, may require a combination of two or more categories.

This following will describe the results in two sections. The first will discuss the fauna habitat characteristics of each of the areas within the project. It will provide a preliminary determination of the quality of those habitats.

The second, will discuss the attributes of each of the species of conservation significance listed under the Federal and State government acts (see Table 2 for status descriptions) and determine their likelihood of occurrence in each of the areas.

Table 1 *Likelihood assessment categories.*

Likelihood	Description
Extremely Unlikely	no suitable habitat appears to be present, the species is known to be locally extinct.
Unlikely	preferred habitat does not appear to be present, the species may be vagrant in the area.
Low	has not been recorded in the general area (i.e., within the regional search area) in the recent past but suitable viable ¹ habitats are present.
Moderate	has been recorded in the general area (i.e., within the regional search area) in the past and/or preferred viable habitat is present.
High	has been recorded near or in the project area in the recent past and preferred viable habitat is present.
Seasonally -high - moderate -low	a seasonal migrant or nomadic species that has a widespread distribution and few specific habitat requirements.
Recorded	Observed during the assessment or in other surveys.

¹ Viable habitat is defined as habitat with characteristics that would sustain a viable population of the species in the longer term (e.g., contiguous habitats vs fragmented habitats, undisturbed vs disturbed, etc.).

The database searches identified 5 MNES species; 4 bird and 1 mammal (Appendix 1). Each of these species will be considered in the following pages.

Table 2 **Conservation status codes used in text.**

Status – Australian Government (EPBC Act 1999)	
CR	Critically Endangered
EN	Endangered
VU	Vulnerable
MI	Migratory species
IA	JAMBA, CAMBA, ROKAMBA international agreements
Status – Western Australia (BC Act 2016 and DBCA Priority Listing)	
CR	Critically Endangered
EN	Endangered
VU	Vulnerable
EX	Extinct
MI	Migratory Species
CD	Conservation Dependent
OS	Other Specially Protected Fauna
XW	Extinct in the Wild
P1	Poorly-known species with few, poorly known populations on threatened lands
P2	Poorly-known species with few, poorly known populations on conservation lands
P3	Poorly-known species with several, poorly known populations, some on conservation lands
P4	Rare, Near Threatened and other species in need of monitoring

4.1 Fauna Habitat Characteristics

4.1.1 Riverina

The Riverina site is the largest of the areas investigated for this assessment at 614.7 ha (Figure 7). The landscape is characterised by incised low hills to the west and broad valleys and washout areas alongside broad drainage lines.

The areas bounded by the Evanston-Menzies road which include the open mine pit, station homestead and stock yards are degraded, lacking substantial understorey cover and sparse upper storey vegetation (Figure 8). Highly disturbed habitat also occurs around the airstrip at the north-eastern corner of the Riverina site. These degraded areas represent the lowest value to fauna.

Bordering the more highly disturbed habitats, and to the east of the Evanston-Menzies road, are areas of consisting of mosaics of Eucalyptus woodlands and acacia shrublands on incised drainage areas and washout slopes as well as some stony hills (Table 3). These areas are also within the field of disturbance resulting from livestock impacts and historical mining operations. However, they do represent habitats which are more structurally complex than the highly disturbed sites and, as such, are likely to provide some useful level of resource use for fauna. In total degraded areas make up approximately 76% of the land area within the clearance boundaries.

Better quality habitat exists to the west of the Evanston-Menzies road (Figure 9). It consists of a mosaic of Eucalyptus woodland on plains or stony rises, Acacia woodlands on stony rises and washouts, and shrublands on broad drainage lines. The varied topography of the area, including stony rises, incised drainage lines, washout valleys and larger drainage systems, provide the habitat variability that is likely to support a relatively higher fauna diversity. This area provides the relatively highest level of complexity in fauna habitats within the clearance envelope.

Table 3 Fauna habitat areas identified at Riverina.

Fauna Habitat Code	Description	Condition	Area (ha)
ACP	Acacia/Casuarina woodland on plains	Good	0.5
		Degraded	83.7
ACS	Acacia/Casuarina on slopes	Good	66.9
		Degraded	34.9
ECV	Eucalyptus/Casuarina woodlands in valleys	Good	13.5
		Degraded	33.1
EH	Eucalyptus woodlands on hills	Good	5.0
		Degraded	40.1
EP	Eucalyptus woodland on plains	Good	43.6
		Degraded	139.7
SD	Tall shrublands on drainage lines	Good	17.9
		Degraded	9.1
D	Degraded		126.7
Total Degraded Area			467.3
Total Area			614.7

The Riverina investigation area was increased by approximately 104 ha after the completion of the site investigation. This was to accommodate a mine camp and access walking track of approximately 3ha. Field assessments of vegetation communities and fauna habitats for this additional area are yet to be undertaken, although it is likely that they will contain fauna habitats common to the investigation area. A field vegetation and fauna assessment are recommended prior to any ground disturbance.

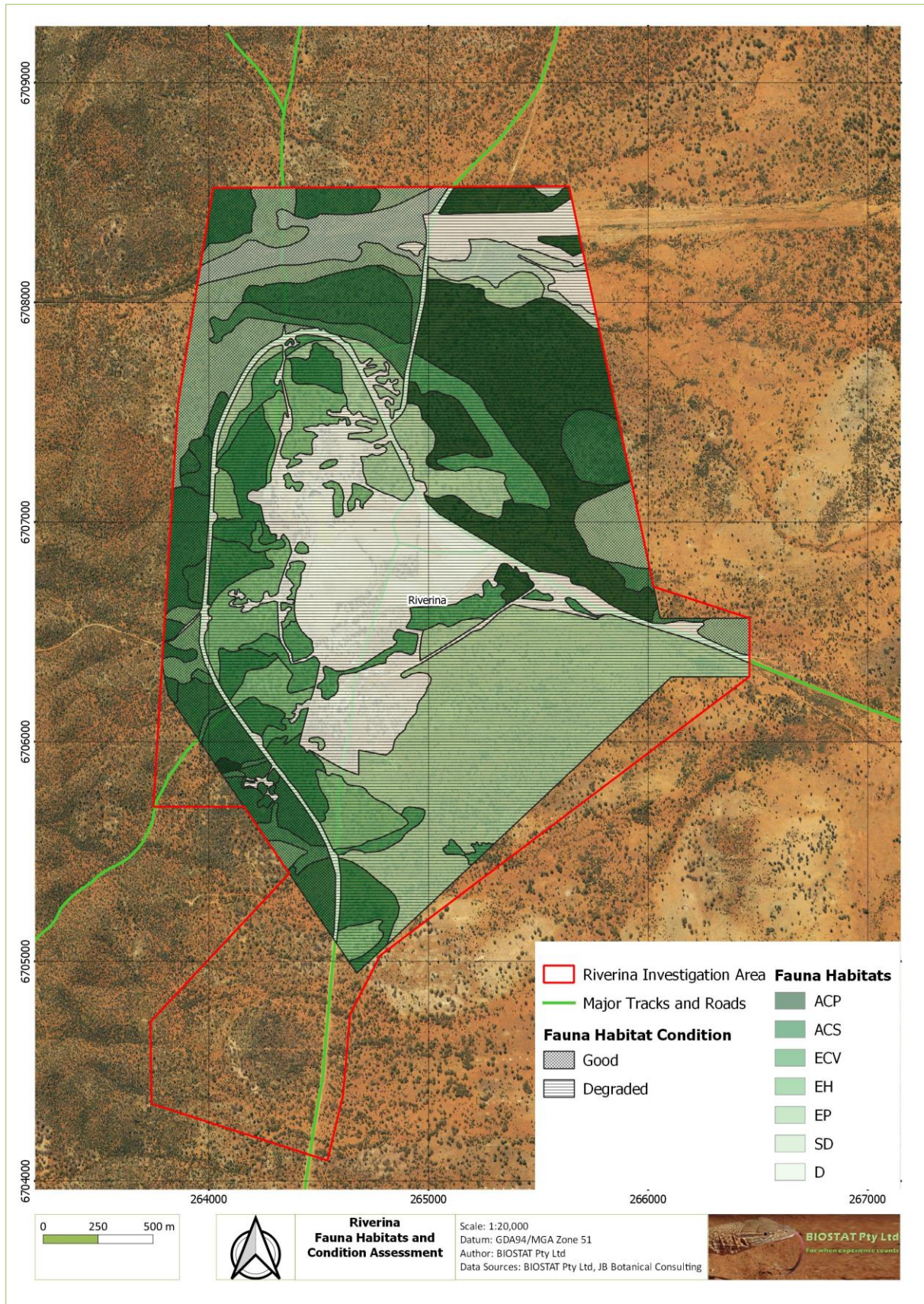


Figure 7 Fauna habitats and condition for Riverina.



Figure 8 *Degraded habitat showing lack of ground cover and sparse shrubs.*



Figure 9 *A more structurally complex habitat present to the west of the Evanston-Menzies road.*

4.1.2 Waihi

The Waihi is a highly degraded area with limited variation in fauna habitats (Table 4). Most of the site consists of lowland and washout areas of salmon gum (*Eucalyptus salmonophloia*) and gimlet (*E. salubris*) woodlands over chenopods although much of this area is considerably degraded. Impacts from mining activities, introduced grasses and weed, and the impact of cattle and other herbivores have reduced the vegetation to an open woodland system with extensive bare patches. A drainage line in the north-west corner of the IA boundary supports a variety of fauna habitats of relatively good quality although understory degradation was evident. Additional reasonably good fauna habitat exists to the west of the main access road. Waihi is overall of low-level fauna habitat quality with 88% of the area degraded to varying degrees.

The site is within a relatively degraded landscape suggesting long history of disturbance. Habitats within the greater area display similar levels of disturbance to much of Waihi clearance envelope. None of the habitats are critical to any of the listed threatened species that may occur in the local area. The loss of habitats from Waihi is likely to have minimal impact on fauna in the envelope and in surrounding areas.

Table 4 Fauna habitat areas identified at Waihi.

Fauna Habitat Code	Description	Fauna Habitat Condition	Area (ha)
ASH	Acacia shrubland	Good	6.8
ECW	Eucalyptus/chenopod woodland	Good	3.3
		Degraded	98.4
EW	Eucalyptus woodland	Good	17.4
		Degraded	28.0
D	Degraded		75.6
Total Degraded Area			202.0
Grand Total			229.5

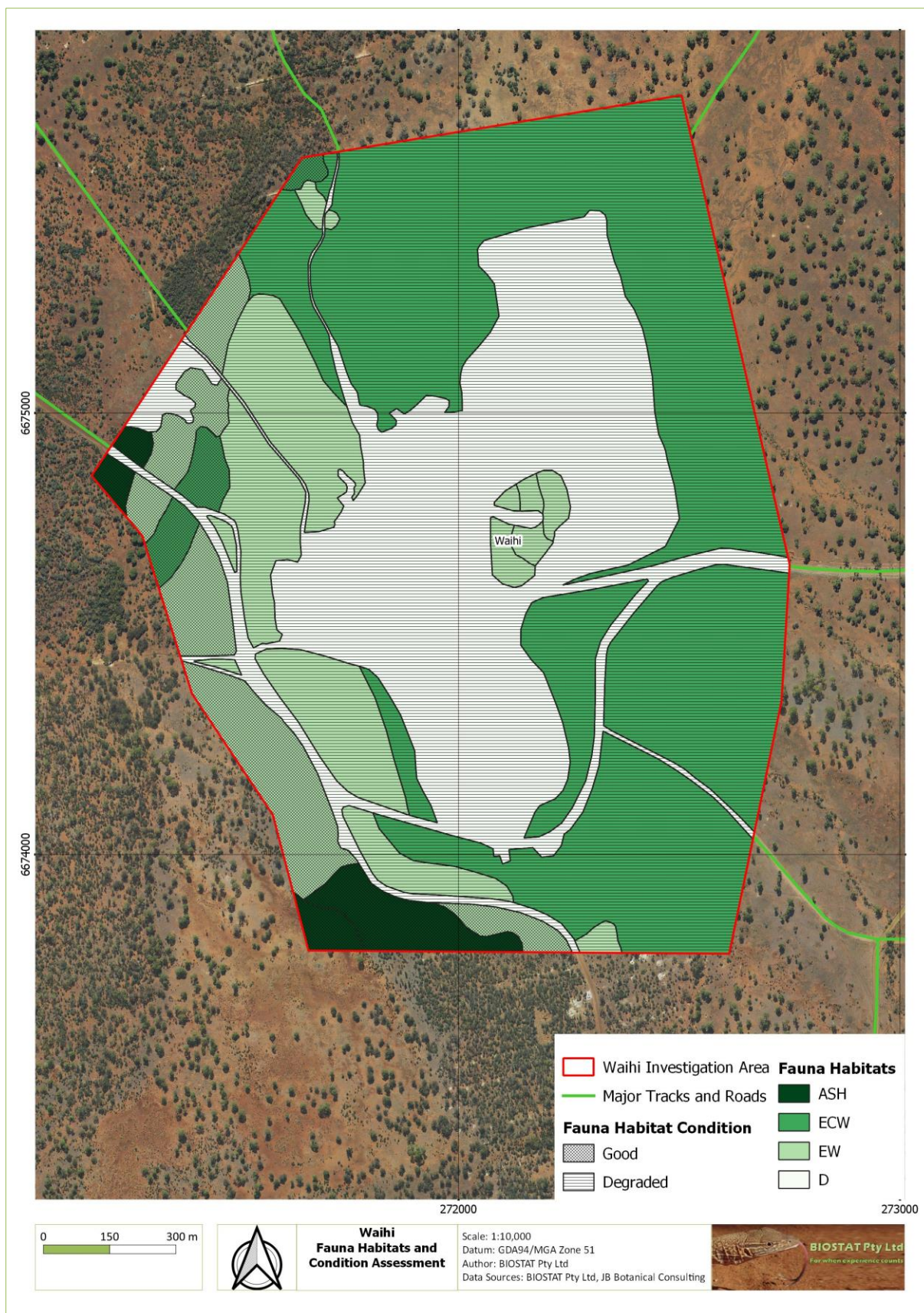


Figure 10 Fauna habitats and condition for Waihi.

4.1.3 Callion

As with Waihi, the Callion area is located on a drainage plain of sheetwash areas and drainage lines primarily of Eucalyptus woodlands over chenopods and saltbush (Figure 11). There are low rises within the landscape that support a drier habitat type of Acacia dominated shrubland or Eucalyptus dominated shrubland (Table 5). Remnant vegetation is mostly in fair condition (Figure 12). Although the vegetation is relatively dense and has an established lower storey and ground storey in patches, it was downgraded to fair due to the obvious signs of perturbations such as old mine workings and shafts as well as the persistent signs of cattle grazing impacts. The more recent mined area in the centre of the clearance envelope has changed surface water flows evident from the surface erosion to the south-east of the void.

The Eucalyptus woodlands and Acacia shrublands of the northern section do provide suitable habitat for native fauna but signs of fox were also identified during the reconnaissance. Two very old malleefowl mounds (>20 years) were located within this northern section indicating some level of suitability for nesting at some time.

Table 5 Fauna habitat areas identified at Callion.

Fauna Habitat Code	Description	Fauna Habitat Condition	Area (ha)
AS	Acacia shrubland	Fair	45.7
BR	Acacia shrubland on breakaways		1.8
EC	Eucalyptus woodland over chenopods and saltbush		117.6
ER	Eucalyptus drainage line		3.3
ES	Eucalyptus woodland with shrubland on slopes		22.6
D	Degraded		114.2
Grand Total			305.2

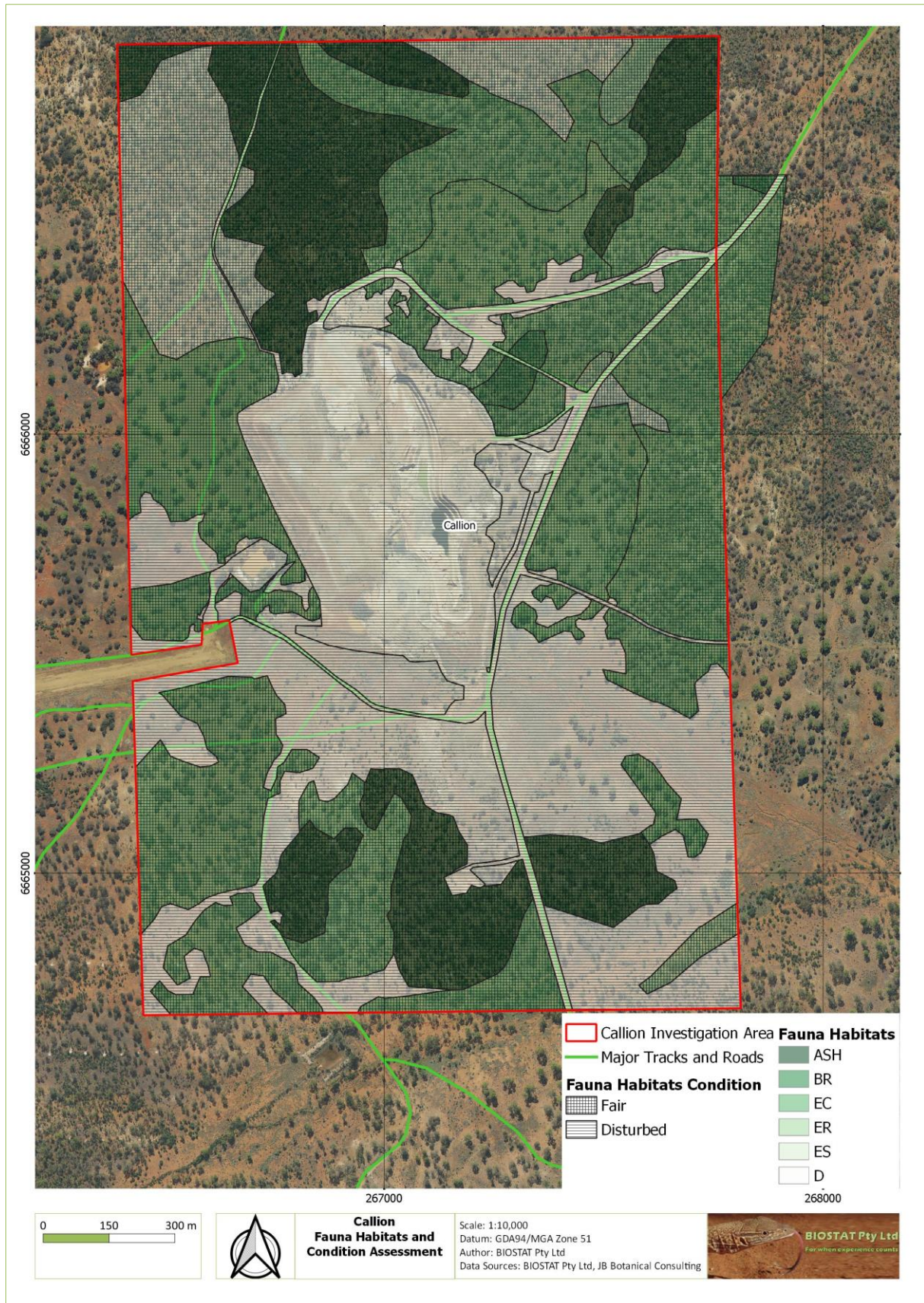


Figure 11 Fauna habitats and condition for Callion.



Figure 12 Typical habitats located in Callion.



Figure 13 One of several fox scats located at Callion.

4.1.4 Davyhurst

The Davyhurst site supports some of the higher quality habitat for any of the areas in this project (Figure 14). The habitats present in the area are all in very good condition with only very limited signs of the impact of grazing by introduced herbivores (including livestock).

The clearing area supports tall Eucalypt woodland over shrubland and tall Eucalypt mallee over spinifex or over shrubland with all forming a mosaic, transitioning from one habitat to the other (Figure 15). The Eucalypt habitat makes up 107.3 ha of the clearance area (Table 6). Certain *Eucalyptus* sp, such as *E. griffithsii* and *E. salmonophloia*, can support hollows used by birds, reptiles, and mammals. Spinifex hummock grasslands often support a very different ground-dwelling fauna assemblage in comparison to the open shrubland systems. It is likely this mosaic of systems supports a relatively high fauna biodiversity.

The complex structures created by the presence of taller trees and shrublands provide suitable nesting habitat for malleefowl. One individual was observed by an employee just outside the clearing area boundary during the reconnaissance survey and a further 5 old mounds identified within or just outside the clearance boundary.

Table 6 Fauna habitat areas identified at Davyhurst.

Fauna Habitat Code	Description	Fauna Habitat Condition	Area (ha)
CW	Casuarina woodland	Very Good	27.4
ML	<i>Eucalyptus</i> sp mallee over shrubland		20.2
MS	<i>Eucalyptus</i> sp mallee over spinifex		4.9
TE	Tall <i>Eucalyptus</i> sp woodland over shrubland		82.2
SH	Shrubland		34.3
Degraded			0
Grand Total			169.1

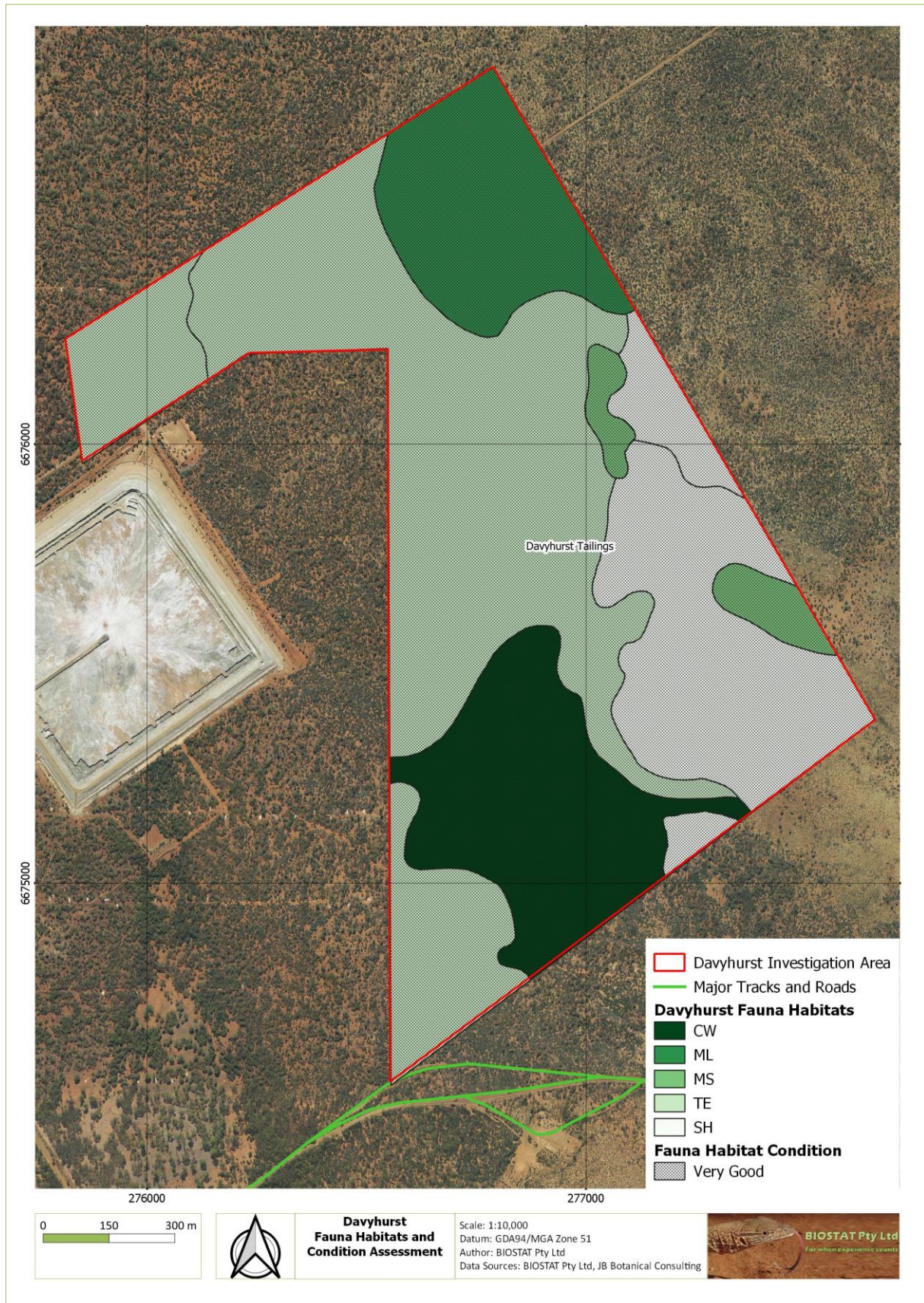


Figure 14 Fauna habitats and condition for Davyhurst.



Figure 15 Typical habitats found within Davyhurst.

4.1.5 Siberia

The Siberia area is located to the south of the other sites and is closer to settlement of Ora Banda. The area identified for clearing is approximately 52.1 ha in size consisting of four identifiable fauna habitats and highly degraded areas (Table 7).

The area is dominated by two topographical characteristics: Eucalyptus/mulga woodlands located on small stony rises and Eucalyptus woodlands on medium to heavy clay sheetwash plains. The stony rises support a different substrate which is likely to benefit a slightly different faunal assemblage to that found on the plains. For the most part, differences are likely to exist in ground dwelling fauna between the two topographic areas. Similarly, the taller trees are more likely to be found on the plains and these are more likely to support hollow nesting bird species. Generally, the fauna likely to be found in this area is not restricted to any specific habitat type and is likely to be found in most.

The area is highly disturbed across all habitat types. There is substantial fragmentation with haul roads and tracks throughout. There is substantial level of infrastructure still in place in the area and combined with the presence of tracks/roads, the area is likely to support the cat and fox including providing denning sites for these species. The quality of habitat in the Siberia area was judged overall as degraded and less likely to support a high degree of biodiversity, including MNES species.

Table 7 Fauna habitats identified in Siberia

Fauna Habitat Codes	Description	Fauna Habitat Condition	Area (ha)
EH	Eucalyptus woodland over shrubs on low stony/rocky hills	Degraded	12.3
EMH	Eucalyptus mallee over shrublands on low stony hills	Degraded	21.1
EP	Eucalyptus woodland over low shrubs on sheetwash plains	Degraded	13.3
MH	Mulga woodland on low stony hills	Degraded	0.7
D	Degraded/ cleared areas with some regrowth	Degraded	4.7
		Grand Total	52.1



Figure 16 Fauna habitats and condition for Siberia.

4.2 MNES Species

4.2.1 *Leipoa ocellata*, malleefowl

Status: VU, VU (EPBC and BC WA respectively)

Description: Malleefowl distributions have been generally restricted to the lower rainfall areas (<600mm isohyet) and predominantly absent from the higher rainfall areas (Saunders & Ingram 1995). Malleefowl have been impacted by loss of habitat and introduced predators, specifically fox, *Vulpes vulpes* (Bode & Brennan 2011; Priddel, Wheeler & Copley 2007). The loss of habitats, as with all fauna species under review here, is the major impact. Malleefowl also show a preference for long unburnt habitats with current agroforestry and fire protection practices impacting on the viability of habitats for this species (Parsons & Gosper 2011). It is likely that this species will utilise remnant vegetation corridors to allow them to move in highly modified landscapes such as agricultural areas. However, the persistence of this species in modified environments and in habitats not previously associated with their biology suggests a level of resilience.

The species will utilise broad habitats including shrublands, forests and woodland systems. It is a long-lived (~30 years) mobile species with a relatively large home range. However, there is a degree of fidelity to suitable nesting habitat and they may build several mounds as part of the breeding season but will only lay and tend one “chosen” as suitable by the breeding pair. Being a long-lived species, the study of this species requires long-term data collection to provide confidence in results. They are a relatively difficult species to observe and their presence is often only recorded by the location of nesting mounds. More intensive forms of surveying for malleefowl are available, for example, transect searches or lidar analysis. In all cases they are logistically complicated requiring large teams over long periods, are technically complex, and all are relatively costly. These methods are best employed where there is a need to identify and define populations within areas and are not appropriate for this level of assessment requested for this project.

The species is listed as Vulnerable under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and Schedule 3 of the Western Australian *Biodiversity Conservation Act 2016* (BC Act).

Sightings of malleefowl in the broader area were compiled from a search of the DBCA threatened species database and Atlas of Living Australia online database (Figure 18). The data resulting from the searches does not provide additional information relating to each record displayed on the map such as the type of observation (individual, mound or sign).

The searches of Davyhurst and Callion did locate nesting mounds (Figure 17) and an individual malleefowl was observed at Davyhurst by one of the mine personnel during the reconnaissance. All the mounds had not been used in the last 20 years and were showing signs of erosion and some were characteristic extinct mounds (i.e., >50 years of age) and had almost eroded completely. Foot searches of Riverina could not be undertaken due to safety concerns for personnel resulting from a persistent overhead lightning storm, however detailed foot searches by the Flora survey team, which included an Arid Ecologist with extensive malleefowl experience did not locate any evidence of their presence.

However, during the survey a feral cat was sighted crossing the track near the administration building at Davyhurst. Although feral cats are not considered predators of adult malleefowl, they are known to take chicks and smaller juveniles. The presence of cattle in all areas is likely to have impacted on nesting success with cattle often disturbing mounds as well as trampling vegetation.

Likely Habitat Use: Open woodland, open forests, mallee, tall shrublands, rocky vegetated hills.

Threatening Processes: Loss of habitat. Habitat fragmentation. Predation by fox, wild dog, cat.

Likelihood of Occurrence: Highly Likely across all areas. An individual has been recorded at Davyhurst. The recording of mounds would suggest they are also likely to utilise less disturbed habitats for breeding.

Data Adequacy: Limited but sufficient for assessing the likelihood of occurrence of this species on a broader scale.



Figure 17 *Old malleefowl mound located at Callion.*

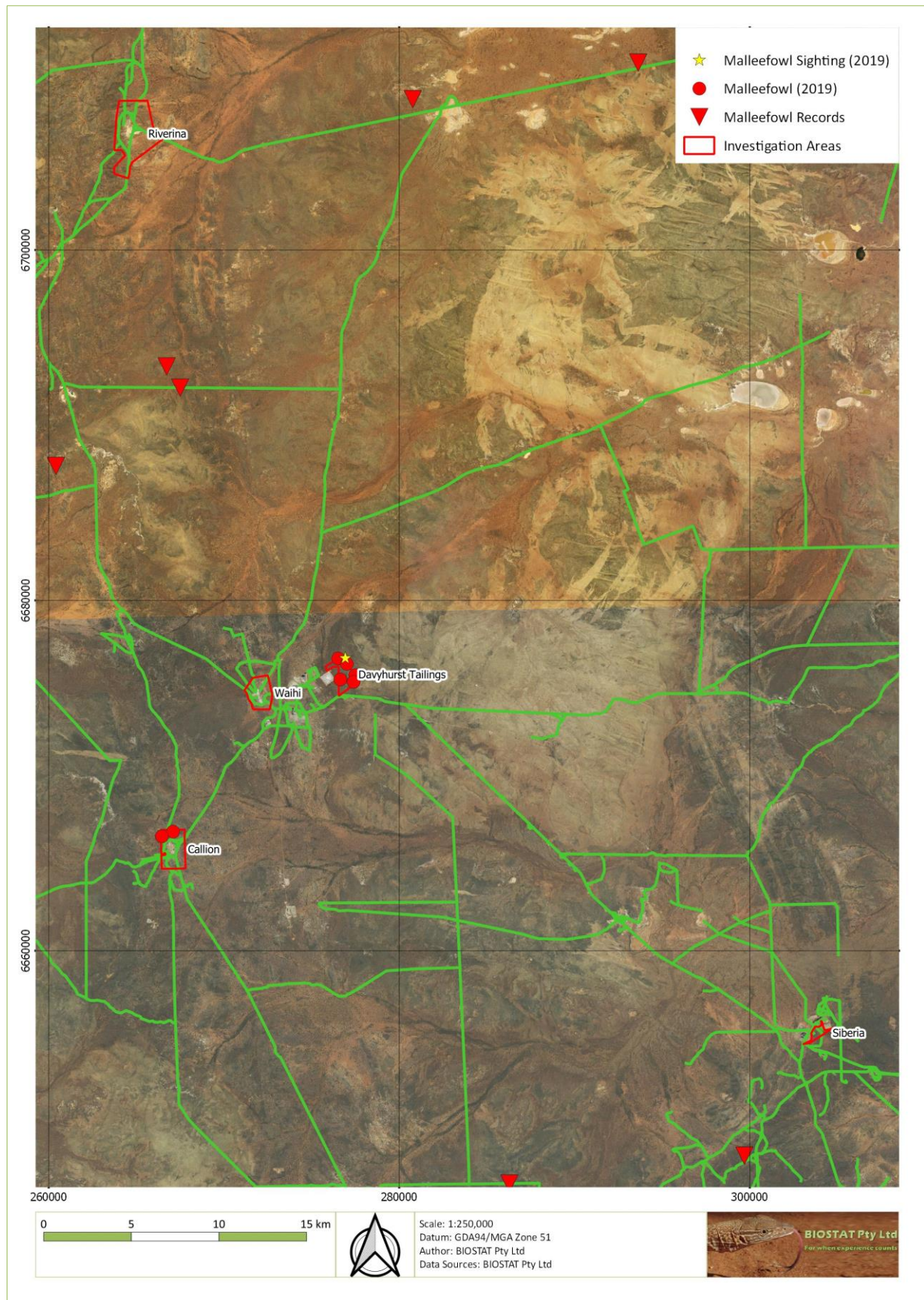


Figure 18 Records of Malleefowl with dates of records.

4.2.2 *Calidris ferruginea*, curlew sandpiper

Status: CR/MI, CR

Description: The curlew sandpiper is associated with coastal mudflat areas but can sometimes be observed at inland ephemeral lakes (fresh or saline).

The species are under threat resulting from impacts on their coastal inter-tidal habitats in both the southern and northern hemispheres. They are regarded as vagrant in the interior and will utilise water bodies as short-term roosting areas (Garnett, Szabo & Dutson 2011). However, these are transient species and unlikely to be resident and their potential use of the project area habitats would be regarded as opportunistic.

No suitable habitat for this species was encountered during the reconnaissance survey. It is likely to only ever be observed as a vagrant to each of the five sites investigated, possibly as a result of being blown off course by storms.

Likely Habitat Use: Large open water sources and riparian systems.

Threatening Processes: Loss of habitat. Habitat fragmentation. Predation by cat, fox, dog, rat.

Likelihood: Unlikely in all areas. Transient and opportunistic.

4.2.3 *Pezoporus occidentalis*, night parrot

Status: EN, CR

Description:

The night parrot has only recently been “rediscovered” through its historical distribution. It prefers areas of large spinifex hummocks in long unburnt grassland habitats. Recent sightings of this species suggest that they have a broader habitat preference including chenopod shrublands (Gailberger 2017; Hamilton et al. 2017; Murphy et al. 2017).

The night parrot is a cryptic species and nomadic associated with changes in availability in water and food resources (Garnett, Szabo & Dutson 2011). It is often encountered opportunistically. Due to its enigmatic nature, surveying for this species is difficult, relying on the use of audio-recording devices established in suitable habitats over a lengthy period (10-12 months).

Much of the spinifex grassland plains encountered in the assessment consisted of small clumping *Triodia* species rather than the large hummocks more commonly associated with Night Parrot habitat. The most likely habitat for this species occurs in the eastern portions of Davyhurst which is a mosaic of tall mallee over shrubs or spinifex with areas of low shrubland with spinifex. These areas provide cover but also a foraging source for this species. Other areas of suitable habitat exist at Riverina on the western and northern fringes of the clearance area. The vegetation complexes at Callion may prove suitable for foraging for this species.

Likely Habitat Use: Open woodlands with relatively dense hummock and tussock grasses understorey, chenopod shrublands, salt-lake fringes, spinifex shrublands. Long unburnt habitats.

Threatening Processes: Loss of habitat. Habitat fragmentation. Changes in fire regimes. Introduced herbivores (cattle and other feral herbivores). Predation by cat, fox, dog.

Likelihood: Low in all areas. Nomadic.

4.2.4 *Polytelis alexandrae*, princess parrot

Status: VU, P4

Description: Princes Parrots are considered as an eruptive species with population numbers increasing rapidly during favourable seasons (Pavey et al. 2014). Habitat preference is for open woodlands of marbled gum (*Eucalyptus congyclocarpa*), river red gum (*E. camaldulensis*) and desert oak (*Allocasuarina decaisneana*), and mallee over spinifex.

This species is restricted to the central arid interior of South Australia, Northern Territory and Western Australia. It is unlikely to be recorded in any of the project areas.

Likely Habitat Use: Open woodlands over spinifex and mallee over spinifex in the arid interior.

Threatening Processes: Changes in fire regimes, habitat clearing and fragmentation, introduced predators and herbivores.

Likelihood: Unlikely.

4.2.5 *Dasyurus geoffroii*, chuditch

Status: VU, VU

Description: This species had a much greater pre-European settlement distribution across Australia including the semi-arid and central regions (Woinarski, Burbidge & Harrison 2014). The chuditch suffered a sharp decline with the clearing of habitat and the introduction of herbivores and predators and is restricted to south-west Western Australia although it has been reintroduced into several sites across South Australia, New South Wales and Victoria. Translocations and reintroductions have also been undertaken in Western Australia with a focus to extend the current range of this species into semi-arid areas such as Lorna Glen in the Murchison district (Morris et al. 2015).

Historical records exist from the eastern portion of the Greater Western Woodlands and Goldfields region. There is also an unverified sighting of chuditch from the Goongarrie area from 2008 (NatureMap search 24/1/2020: source Record ID 15808). Much of the habitats that supported these species in the past has been highly modified or cleared. If they have persisted, the species is likely to be found in very low densities.

Likely Habitat Use: Woodland systems with well-established understory.

Threatening Processes: Habitat clearing and fragmentation, changed fire regimes, introduced predators and herbivores.

Likelihood: Unlikely.

5 GENERAL CONCLUSIONS AND RECOMMENDATIONS

The reconnaissance survey provided an overview of the fauna habitats present at each of the areas identified for clearing. It also provided a brief assessment of habitat values in relation to threatened fauna, especially malleefowl.

All the areas visited showed some degree of anthropogenic disturbances in the form of historical mine operations. Some of these mine workings were at least 90 years or older, with lower levels of associated impact. The more modern workings were on a larger scale and had more noticeable and extensive impacts.

With few exceptions the impact of livestock was also noticeable through the presence of individuals or signs such as footprints, scats and trampling of vegetation. The survey also located evidence of introduced predators including fox and feral cat. These existing factors will have impacted on the native fauna and on the habitats present within all sites.

The ecological value of habitats found within each of the sites are highly variable. The ecological values are a composite of the quality of habitats but also the complexity of the habitats. For example, the area chosen for clearing at Siberia is very much degraded and is of limited value for fauna. It is highly incised with tracks and earthworks highly fragmenting any remnant vegetation. In contrast, the Davyhurst area contains a variety of habitats with coherent structure and minimal fragmentation. This area was regarded as being in very good condition and likely to support a higher fauna biodiversity. Smaller section within the other areas also provide relatively good habitats for fauna. However, in all cases the area of degraded habitat comfortably exceeds any better-quality habitat.

All habitats have a value, even degraded habitats, as they provide varying levels of resources for different groups and species within fauna assemblages. The major impacts on habitats derive from:

- 1) total loss of habitats,

The total loss of habitats is the most immediate and severe impact. Total loss of habitat effectively ensures localised extirpation of fauna.

- 2) isolation of habitats,

The isolation of habitats would occur if areas are retained but surrounded by cleared landscape. These “islands”, if too small and too isolated, are likely to become less and less viable over time. It is likely this will occur in several of these projects as the areas will not be fully cleared and small stands may be retained.

- 3) fragmentation of habitats, and

Fragmentation of habitats occurs if areas, usually small, are randomly distributed in the landscape with some level of connectivity but not enough to provide contiguity. This impacts by reducing available viable habitat for fauna which, in turn, reduces survivability of populations.

- 4) secondary impacts on adjacent habitats.

Changes in habitats such as clearing will impact on surrounding habitats in a variety of ways. These are considered secondary impacts and include changes to surface hydrology, erosion, salination, silting, the creation of new edge effects, the introduction of weeds and the facilitation of access by introduced predators and herbivores.

The areas defined for clearing are likely to fall within categories 1 and 2 where the entire site is to be cleared (Siberia) or partially cleared (Riverina, Callion, Waihi and Davyhurst). It is, therefore, important the secondary impacts are avoided, mitigated or managed.

It is unlikely that clearing of Siberia will have any major secondary impacts as it supports a very low quality of habitat. Similarly, with most of Waihi also degraded, its value to native fauna is also considered low. However, it is important to consider the changes to surface hydrology at both sites as a result of clearing. This is especially important at Waihi due to the presence of the drainage line in the north-western corner of the clearing boundary. In addition, erosion and silting could be exacerbated due to the lack of vegetation cover and with changes in topography due to infrastructure.

Similarly, most of the area at Waihi has been highly disturbed and lack any coherent fauna habitat quality factors such as contiguity and structure. Areas to the north and west of the site, and adjacent areas outside the clearing envelope are of better fauna habitat quality. As with all clearing, the secondary and downstream impacts are of concern. However, in the case of the proposed clearing of Waihi, these impacts would be minimal.

Callion is in a landscape dominated by a sheetwash drainage plain with small areas of rises supporting open woodlands. The vegetation in the plains is relatively sparse but adapted to ephemeral flooding. Clearing the area is likely to impose surface hydrology impacts unless managed through the implementation of drainage mitigation measures (e.g., construction of channels, contour flow management). Other issues such as erosion and top-soil loss may also arise.

Riverina has sections of good quality habitat west and north of the Evanston-Menzies road. These are relatively intact vegetation communities on rises and along a drainage line. They are impacted by livestock and it is likely they also support introduced predators. The Evanston-Menzies road would act as a minor barrier to some of the smaller fauna (herpetofauna, small mammals, etc) but the lack of high-quality habitat to the east of the road would limit movement. The loss of the section to the west of the Evanston-Menzies road would impact on existing environment by creating a new edge-effect impact area. Furthermore, impacts on the drainage line to the north of the Evanston-Menzies road will potentially have downstream impacts outside the vegetation clearing boundaries.

The Davyhurst clearing envelope contains the largest area of very good quality habitat. The overall impact of the clearing is on adjacent habitats, mostly also of very good quality, through the creation of new edge effects, the facilitation of the movement of introduced predators (tracks), and changes in surface hydrology. These factors must be considered in the planning for the area to mitigate and manage downstream and secondary impacts.

None of the areas represent critical habitat for fauna, including malleefowl. Although an individual of this species was observed at Davyhurst, the available habitats outside the clearing areas are likely to be sufficient to support the local populations. This is especially relevant to areas such as Siberia where the habitats within the clearing envelope are degraded and unlikely to support nothing more than the occasional transient individual. The likelihood of other threatened species in the area is low. However, the cryptic and enigmatic night parrot may exist in the area, especially in the sheetwash plains of Callion and the low shrublands of Davyhurst. From available information on its biology, the habitats in these areas are not high value but mobile species can be found in many areas as transients. In summary, while most birds, larger mammals and reptiles will be able to avoid the impact of clearing, most small mammals, reptiles and burrowing frogs will be unavoidably killed by the large machinery used for vegetation removal and ground preparation. While the impact on individual animals is high, the clearing will have very little impact on the species overall.

In conclusion, none of the areas investigated are of sufficiently high quality and of importance to any of the listed threatened species for the area. In most cases, remnant habitats and areas are poor in quality and would not present a significant loss to the populations nor impact on local populations if they exist in the area. The greatest concern are secondary and downstream impacts resulting from the clearing of vegetation. It is recommended:

- The areas added to the project after the site reconnaissance should be assessed for fauna habitat and fauna quality prior to any ground disturbance.

- A search of areas to be cleared for malleefowl nests be conducted by an experienced zoologist prior to any activity.
- Avoidance of unnecessary clearing of vegetation beyond that strictly required.
- Windrows of topsoil, log debris and leaf litter formed during clearing should be retained, as they create extremely good microhabitat for a large range of fauna, particularly reptiles (see comment below).
- Rapid rehabilitation of cleared areas such as laydown sites and access tracks which are no longer required after construction.
- Rehabilitation should be structured to encourage the return of fauna by providing micro-relief and dense vegetation cover. This may be achieved, particularly in temporary laydown areas, by:
 - leaving patches or strips of vegetation;
 - placing equipment on flattened shrubbery rather than clearing;
 - retention of root stock in the ground by shallow scraping during essential clearing; and,
 - retaining stockpiled vegetation debris in windrows.
- Consideration is given to feral predator control (cat and fox) program.

Windrows and flattened vegetation provide substantial microhabitat and increased humidity for small vertebrates. They also provide a trap for windblown seed and protection for seedlings following germination. Placement of windrows across the prevailing wind direction may reduce erosion and facilitate rehabilitation success.

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Appendix 1. Database Searches Results



Appendix C: Clearing Permit CPS 7318-2



CLEARING PERMIT

Granted under section 51E of the Environmental Protection Act 1986

Purpose Permit number:	7318/2
Duration of Permit:	From 31 December 2016 to 31 December 2026
Permit Holder:	Carnegie Gold Pty Ltd

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

PART I - CLEARING AUTHORISED

1. Land on which clearing is to be done

Mining Lease 30/255

2. Clearing authorised (purpose)

The Permit Holder is authorised to clear native vegetation for the purposes of mineral production and associated infrastructure.

3. Area of Clearing

The Permit Holder must not clear more than 50 hectares of native vegetation within the areas cross-hatched yellow in Figure 1 of Schedule 1.

4. Type of Clearing Authorised

The Permit Holder shall not clear native vegetation unless the purpose for which the clearing is authorised is enacted within six months of the authorised clearing being undertaken.

PART II - MANAGEMENT CONDITIONS

5. Avoid, minimise and reduce the impacts and extent of clearing

In determining the amount of native vegetation to be cleared under this Permit, the Permit Holder must apply the following principles, set out in descending order of preference:

- (a) avoid the clearing of native vegetation;
- (b) minimise the amount of native vegetation to be cleared; and
- (c) reduce the impact of clearing on any environmental value.

6. Weed control

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

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

PART III - RECORD KEEPING AND REPORTING

7. Records to be kept

The Permit Holder must maintain records relating to the listed relevant matters in accordance with the specifications detailed in Table 1.

Table 1: Records that must be kept

No.	Relevant matter	Specifications
1.	In relation to the authorised clearing activities generally	(a) the location where the clearing occurred, recorded using a Global Positioning System (GPS) unit set to Geocentric Datum Australia 1994 (GDA94), expressing the geographical coordinates in Eastings and Northings; (b) the date that the area was cleared; (c) the size of the area cleared (in hectares); (d) actions taken to avoid, minimise, and reduce the impacts and extent of clearing in accordance with condition 5; and (e) actions taken to minimise the risk of the introduction and spread of weeds in accordance with condition 6.

8. Reporting

- (a) The Permit Holder shall provide a report to the *CEO* by 31 July each year for the life of this Permit, demonstrating adherence to all conditions of this Permit, and setting out the records required under condition 7 of this Permit in relation to clearing carried out between 1 July and 30 June of the previous financial year.
- (b) If no clearing authorised under this Permit was undertaken between 1 July and 30 June of the previous financial year, a written report confirming that no clearing under this permit has been carried out, must be provided to the *CEO* by 31 July of each year.
- (c) Prior to 31 December 2026, the Permit Holder must provide to the *CEO* a written report of records required under condition 7 of this Permit where these records have not already been provided under condition 8(a) or 8(b) of this Permit.

DEFINITIONS

In this Permit, the terms in Table 2 have the meanings defined.

Table 2: Definitions

Term	Definition
CEO	the Chief Executive Officer of the Department responsible for administering the clearing provisions contained within the <i>Environmental Protection Act 1986</i> or an Officer with delegated authority under Section 20 of the <i>Environmental Protection Act 1986</i> ;
clearing	has the meaning given under section 3(1) of the EP Act.
condition/s	a condition to which this clearing permit is subject under section 51H of the EP Act.
fill	means material used to increase the ground level, or to fill a depression.

Term	Definition
department	means the department established under section 35 of the <i>Public Sector Management Act 1994</i> (WA) and designated as responsible for the administration of the EP Act, which includes Part V Division 3.
EP Act	<i>Environmental Protection Act 1986</i> (WA)
mulch	means the use of organic matter, wood chips or rocks to slow the movement of water across the soil surface and to reduce evaporation.
native vegetation	has the meaning given under section 3(1) and section 51A of the EP Act.
weed/s	means any plant – (a) that is a declared pest under section 22 of the <i>Biosecurity and Agriculture Management Act 2007</i>; or (b) published in a Department of Biodiversity, Conservation and Attractions species-led ecological impact and invasiveness ranking summary, regardless of ranking; or (c) not indigenous to the area concerned.

END OF CONDITIONS



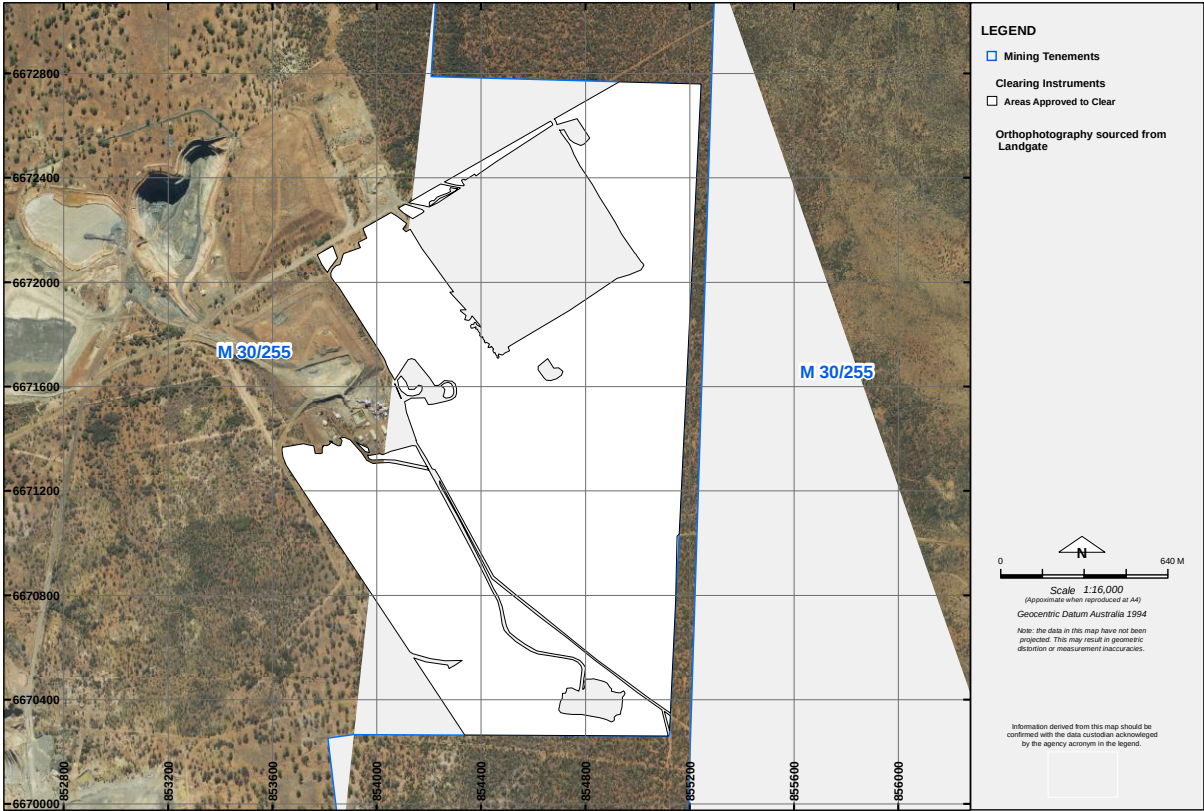
Dan Endacott
General Manager Environmental Compliance
Resource and Environmental Compliance Division
23 December 2021

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

SCHEDULE 1

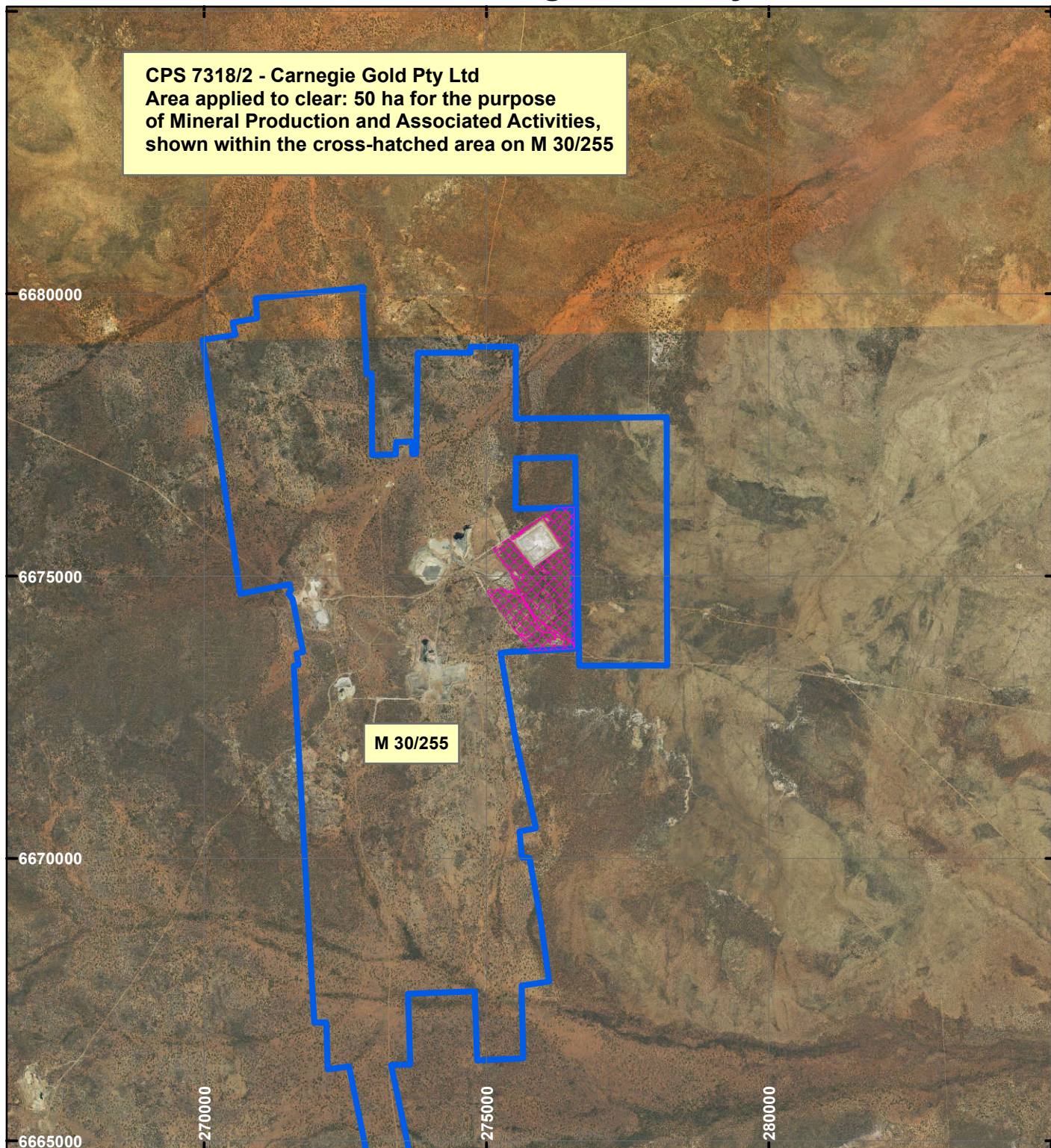
The boundary of the area authorised to be cleared is shown in the map below (Figure 1).

Figure 1: Map of the boundary of the area within which clearing may occur



CPS 7318/2 - Carnegie Gold Pty Ltd

CPS 7318/2 - Carnegie Gold Pty Ltd
Area applied to clear: 50 ha for the purpose
of Mineral Production and Associated Activities,
shown within the cross-hatched area on M 30/255



LEGEND



Clearing Instruments



Mining Tenements

Orthophotography sourced from Landgate



Scale 1:100,000

(Approximate when reproduced at A4)

Geocentric Datum Australia 1994

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

..... Date

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

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



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