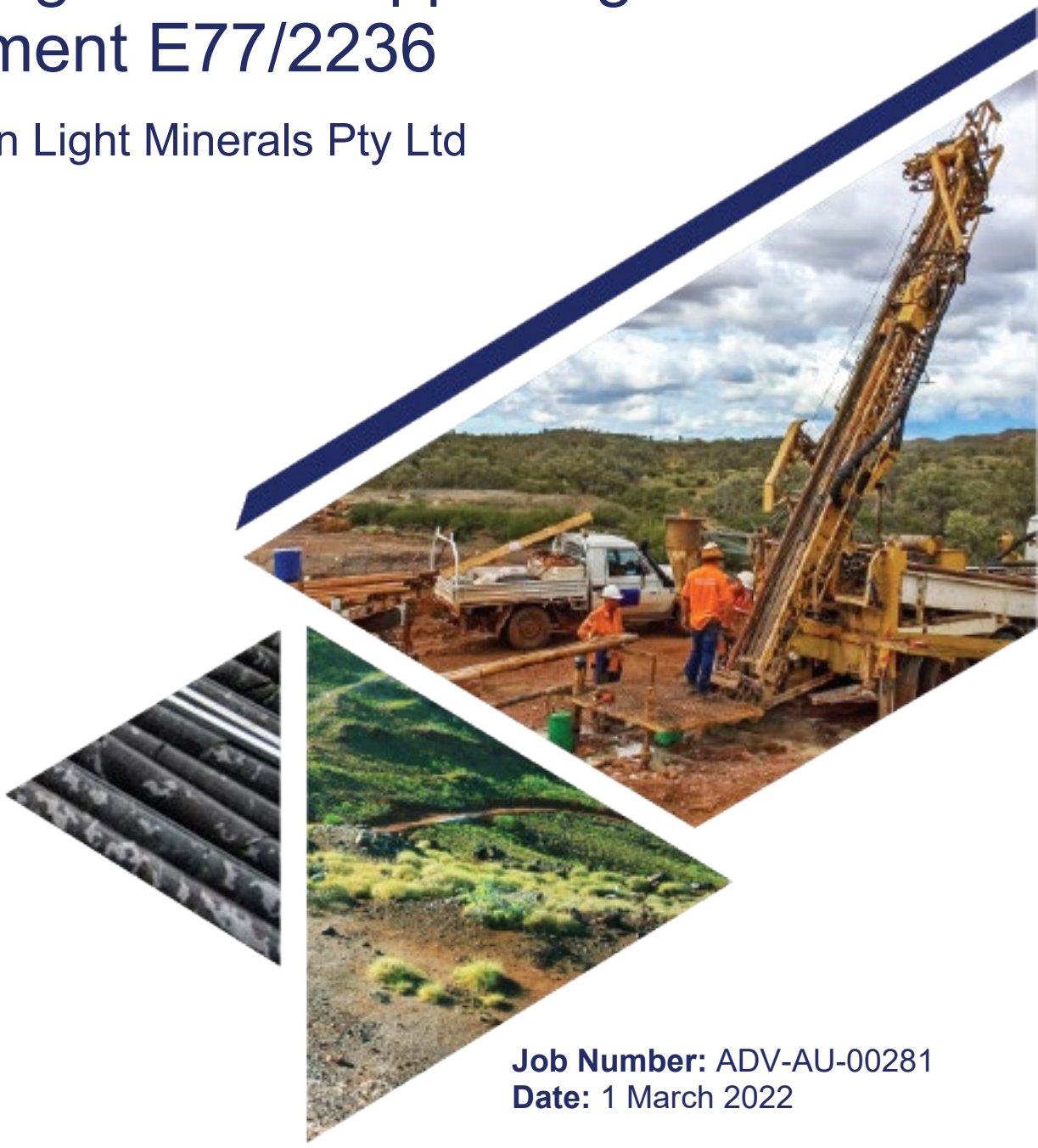
RPMGLOBAL

Clearing Permit Supporting Document E77/2236

Australian Light Minerals Pty Ltd



Job Number: ADV-AU-00281
Date: 1 March 2022

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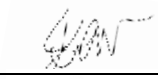
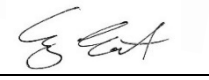
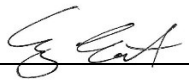
Prepared By:	J Woodhouse	Senior Environmental Advisor		10 February 2022
Reviewed By	C Roberts	Director – Consulting		10 February 2022
Approved By	C Roberts	Director – Consulting		10 February 2022

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Executive Summary

RPM Advisory Services Pty Ltd ("RPM") has been engaged by Australian Light Minerals Pty Ltd ("ALM" or the "Client") to complete a Clearing Permit Supporting Document E77/2236 (hereafter referred to as the "Report") to support the Clearing Permit application on exploration licence E77/2236.

ALM proposes to explore for lithium on E77/2236. Exploration will comprise Reverse Circulation (RC) drilling and/or Rotary Air Blast (RAB) drilling and take approximately two to three weeks.

Approximately 4.4083 ha of clearing is proposed as part of exploration activities for access tracks and drill pads, within a 110.7 ha purpose permit area.

A flora survey of the proposed exploration area identified six Priority flora species listed below which will be avoided wherever possible. An impact assessment was completed on the disturbance footprint, against the regional flora database to provide a maximum potential impact for the following priority species:

- *Acacia asepala* - Priority 2.
- *Chamelaucium* sp. Parker Range (B.H. Smith 1255) - Priority 1.
- *Grevillea marriottii* - Priority 1.
- *Grevillea neodissecta* - Priority 4.
- *Microcorys elatoides* - Priority 1.
- *Verticordia gracilis* - Priority 3.

Regional impacts were less than 2% for all species. The full impact assessment is provided in Section 2.4.3.

A targeted fauna survey of the area identified one active Malleefowl Mound adjacent to an access track. To reduce potential impacts a 20 km/hr speed limit enforced within 1 km of the mound.

Assessment of the proposal against the ten Clearing Principles is provided in Section 4.

A series of Environmental Management Measures are provided in Section 5.

Due to the location of the tenement within the Jilbadji Nature Reserve a Conservation Management Plan is also required to be approved by the Department of Biodiversity, Conservation and Attractions prior to exploration commencing.

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1. Introduction

RPM Advisory Services Pty Ltd ("RPM") has been engaged by Australian Light Minerals Pty Ltd ("ALM" or the "Client") to complete a Clearing Permit Supporting Document E77/2236 (hereafter referred to as the "Report").

1.1 Background

ALM proposes to explore for lithium on E77/2236. Exploration will comprise Reverse Circulation (RC) drilling and/or Rotary Air Blast (RAB) drilling.

Approximately 4.4083 ha of clearing is proposed as part of exploration activities within a 110.7 ha purpose permit area.

A Conservation Management Plan (CMP) has been developed and submitted to the Department of Biodiversity, Conservation and Attractions (DBCA) and the Department of Mines, Industry Regulation and Safety (DMIRS).

A Programme of Work (PoW) will also be submitted to DMIRS for approval prior to undertaking the exploration programme.

1.2 Proponent

The Proponent is ALM, a wholly owned subsidiary of Wesfarmers Chemicals, Energy & Fertilisers Pty Ltd (WesCEF).

The holder of exploration license E77/2236 is Western Areas Limited.

All compliance and regulatory requirements should be forwarded by email or post to the following addresses:

Proponent

Australian Light Minerals Pty Limited
Address: 161 Campus Drive, Murdoch, WA, 6150
Contact: Corinne Lemon, Tenement Specialist
Telephone: 0417 643 314
Email: tenements@wescef.com.au, clemon@wescef.com.au

Environmental Consultant

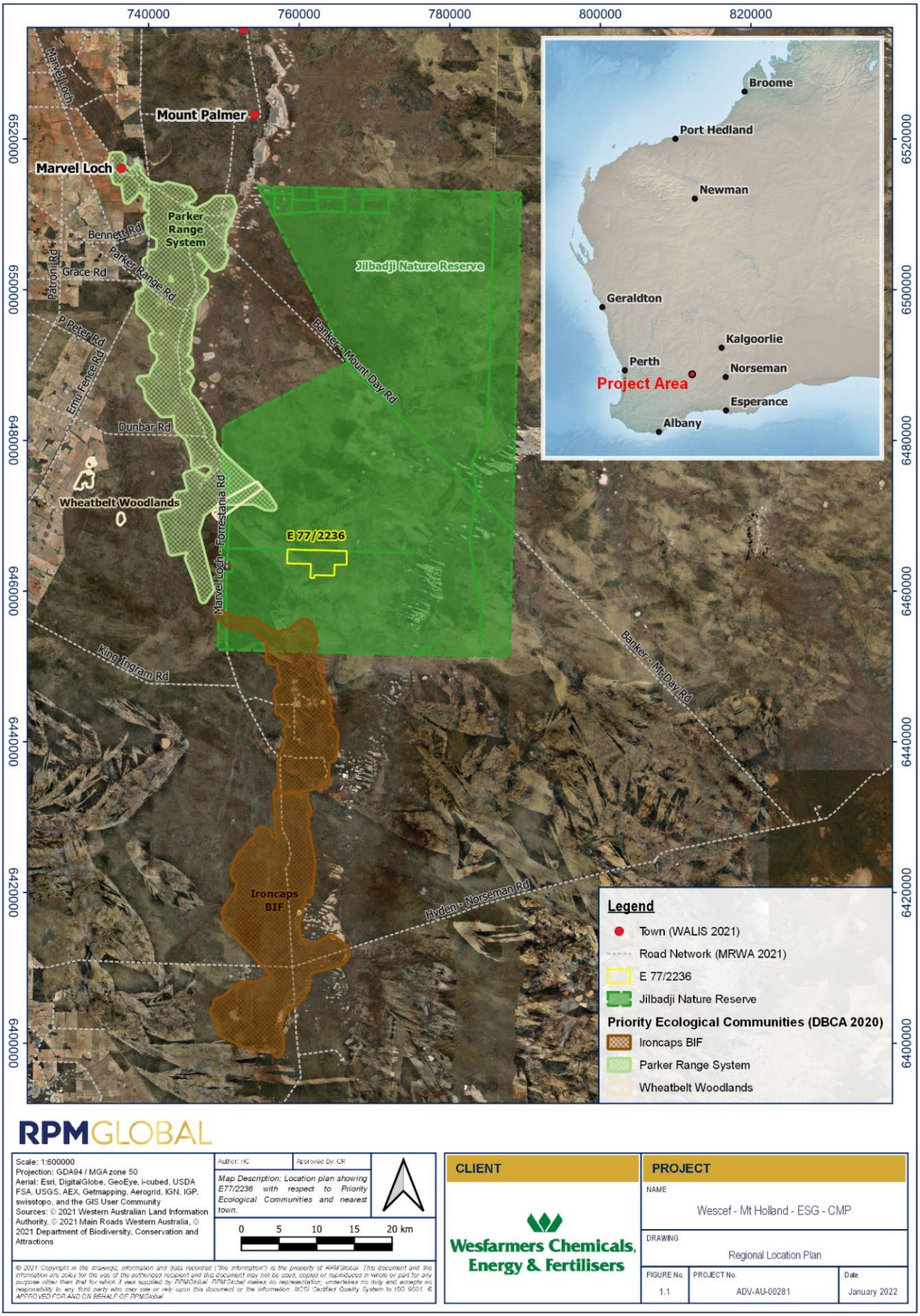
RPM Global
Address: Level 2/131 St Georges Terrace, Perth WA 6000
Contact: Siobhan Pelliccia, RPM Global Manager ESG – West
Telephone: 0403 942 546
Email: spelliccia@rpmglobal.com

1.3 Location, Access and Tenure

Exploration tenement E77/2236 is located approximately 365 km east of Perth and 75 km south-southeast of Southern Cross, in the Shire of Yilgarn as shown on **Figure 1-1**. The tenement is 1,935.58 ha, with access from local tracks accessed from the Marvel Loch – Forrestania Road (**Figure 1-1**).

E77/2236 is located within the Jilbadji Nature Reserve (R24049) which is listed as a Class C Nature Reserve under the *Conservation and Land Management Act 1984* (WA) and is managed by DBCA. It is also listed as an Environmentally Sensitive Area (ESA) under the *Environmental Protection Act 1986* (WA) (EP Act). The tenement's location within the reserve is shown on **Figure 1-1**.

Figure 1-1 Regional Location Plan



2. Environmental Setting

2.1 Regional Setting

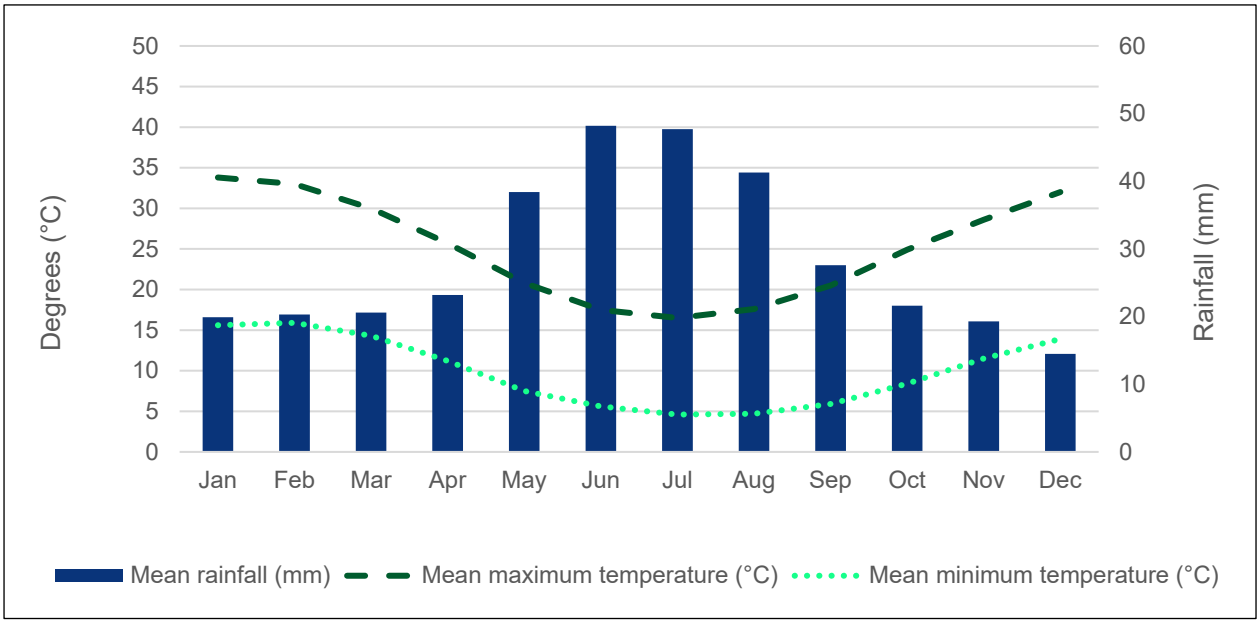
The regional setting of E77/2236 includes:

- Great Western Woodlands (GWW) – a 16-million-hectare area extending from the wheatbelt to the edge of the deserts and is the largest intact area of Mediterranean Woodland on earth (DEC 2010), it includes open eucalypt woodlands (63%), mallee eucalypt woodlands, shrublands and grasslands (Fox et al. 2016). Less common habitats in the GWW include granite outcrops, banded ironstone formations, salt lakes and freshwater wetlands (Fox *et al.* 2016).
- Jilbadji Nature Reserve - a large reserve of over 200,000 ha within the GWW.
- Southern Cross Subregion of the Coolgardie Bioregion of the Interim Biogeographic Regionalism for Australia (IBRA) classification system (DEWHA 2004) - dominant land-uses in this bioregion are Crown Reserves and Unallocated Crown Land (66.7%), grazing on native pastures (17%), conservation (11.5%) and dryland agriculture (2.3%) (Cowan *et al*., 2001).

2.2 Climate

The survey area has a semi-arid climate which is an intermediate between desert and humid climates with hot and dry (sometimes exceptionally hot) summers, and cold winters. Precipitation rates are generally lower than the potential evapotranspiration rates. Rainfall occurs sporadically throughout the year, often as small events, with higher rainfall occurring in winter months from May to August. The nearest Bureau of Meteorology (BoM) weather station is Hyden (Station ID 010568), located 75 km west of the survey area. Mean annual rainfall at Hyden is 342 mm (BoM, 2020). Rainfall patterns show a decline in seven months of the year. Data from Hyden weather station show that mean monthly minimum temperatures ranged from 4.3°C in July to 15.2°C in February and mean monthly maximum temperatures range from 16.5°C in July to 33.8°C in January (BOM 2020). Climate statistics are provided as **Figure 2-1**.

Figure 2-1 Climate Statistics for Hyden



2.3 Geology, Soils and Landforms

AECOM (2021b) states E77/2236 lies within the Coolgardie IBRA region and the Southern Cross IBRA subregion. CALM (2002, in AECOM, 2021b) identify the Coolgardie bioregion is within the Yilgarn Craton with a granite basement including Archaean Greenstone intrusions in parallel belts Low greenstone hills support diverse woodlands rich in endemic Eucalypts on alluvial soils on the valley floors, around saline playas of the occluded drainage system and on broad plains of calcareous earths. Granite basement outcrops support granite grass, wattles and York Gum. Playa lakes support Samphire shrubs.

The Southern Cross subregion, described by Cowan *et. al* (2001, in AECOM, 2021b) is characterised by valleys, low greenstone hills, salt lakes, granite basement outcrops, and uplands of yellow sandplains, gravelly sandplains and laterite breakaways. Rare features of the area include the arid woodlands with rare plants and rare vertebrates.

One soil landscape system has been mapped within the survey area:

- 261Ya28 – sandy plain with some clay pans and some salt lakes, dunes and lunettes.

2.4 Flora and Vegetation

A desktop and field survey of E77/2236 for flora and vegetation was completed by AECOM (2021a, 2021b). A report summarising the findings is provided as Appendix A.

2.4.1 Vegetation Communities

Flora and vegetation survey of the area (AECOM 2021b) identified three vegetation communities, which are described in further detail in **Table 2-1.**

Table 2-1 Vegetation Communities of the Survey Area

Code	Name	Extent	Dominant Species	Photograph
AeSy	Mixed Shrubland	23.92 ha	*Acacia enervia* subsp. *explicata*, *Thryptomene kochii* and *Grevillea didymobotrya* subsp. *didymobotrya* tall shrubland over *Stylidium yilgarnense*, *Dampier angulata* subsp. *Peak Charles (K.R. newbey 5402)* and *Drosera macrantha* low isolated herbs. Dense to open shrubland with high diversity of sclerophyllous shrubs. Includes areas dominated by Priority flora including *Grevillea marriottii* (P1), *Chamelaucium* sp. *Parker Range (B.H. Smith 1255)* (P1), *Grevillea neodissecta* (P4) and *Verticordia gracilis* (P3).	
EsMpDa	Eucalypt Woodland	79.08 ha	*Eucalyptus salmonophloia*, *Eucalyptus longicornis* and *Eucalyptus flocktoniae* subsp. *flocktoniae* tall open woodland over *Melaleuca pauperiflora* and *Melaleuca johnsonii* low woodland over *Daviesia argillacea*, *Acacia deficiens* and *Westringia cephalantha* low open shrubland. Lacks groundcover. Mostly on clay loam red soils. Includes large variation of Melaleuca and Eucalyptus species in overstorey.	

MlOm	Melaleuca Woodland	7.80 ha	*Melaleuca lateriflora*, *Melaleuca sheathiana* and *Eucalyptus comitae-vallis*, low woodland over *Olearia muelleri*, *Grevillea huegelii* and *Alyxia buxifolia*.	

2.4.2 Threatened and Priority Ecological Communities

No Threatened or Priority Ecological Communities (TECs or PECs) are known to occur within the survey area (AECOM 2021a).

2.4.3 Conservation Significant Flora

The desktop assessment identified 33 conservation significant flora species that are known to occur within 20 km of the survey area. Database search results are provided in Appendix A.

The targeted flora field survey did not record any species listed as threatened under the *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth) (EPBC Act) or *Biodiversity Conservation Act 2016* (WA) (BC Act).

The targeted flora field survey recorded six Priority flora species within the survey area, these are summarised in **Table 2-2** with locations shown on **Figure 2-2** to **Figure 2-6**.

An impact assessment is provided in Section 3.4.

Table 2-2 Priority Flora Recorded on E77/2236 During Targeted Field Survey

Species	Conservation status	Total in disturbance envelope	Recorded on E77/2236 (AECOM 2021)
Acacia asepala	Priority 2	1	71
Chamelaucium sp. Parker Range (B.H. Smith 1255)	Priority 1	0	468
Grevillea marriottii	Priority 1	35	611
Grevillea neodissecta	Priority 4	45	1035
Microcorys elatoides	Priority 1	0	2
Verticordia gracilis	Priority 3	1	203

2.4.4 Weeds

No weeds were recorded in the survey area (AECOM 2021b).

2.4.5 Dieback

Dieback (*Phytophthora* sp.) is a soil borne water mould that continually spreads by root-to-root growth amongst host plants and through zoospores which are motile in water and moist soil. The fungus also has two resting structures, chlamydospores and oospores, that are resistant to desiccation and can survive in dry conditions for a period before developing into active zoospores when wet conditions return. Soil movement is also a significant means of dieback spread, by vehicles, human activity, and terrestrial mammals.

The “vulnerable zone” to dieback is considered to be the area of south-west Australia, west and south of the 400 mm rainfall isohyet, although several incidences have been recorded in wet conditions to the east of the isohyet including the Forrestania area (DBCA 2020).

Figure 2-2 Locations of Conservation Significant Flora and Fauna (Malleefowl Mound) (West)

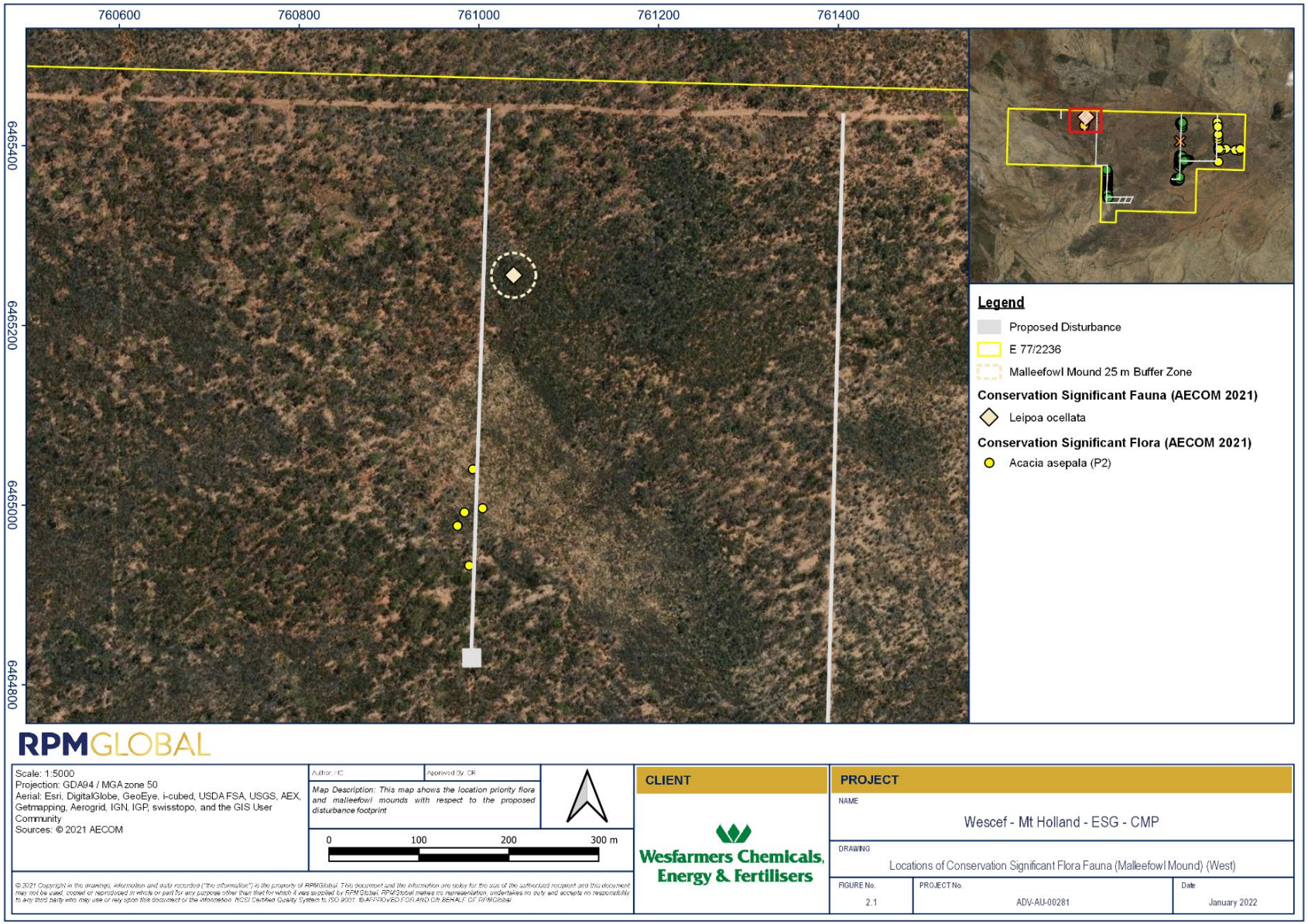


Figure 2-3 Locations of Conservation Significant Flora (Central)

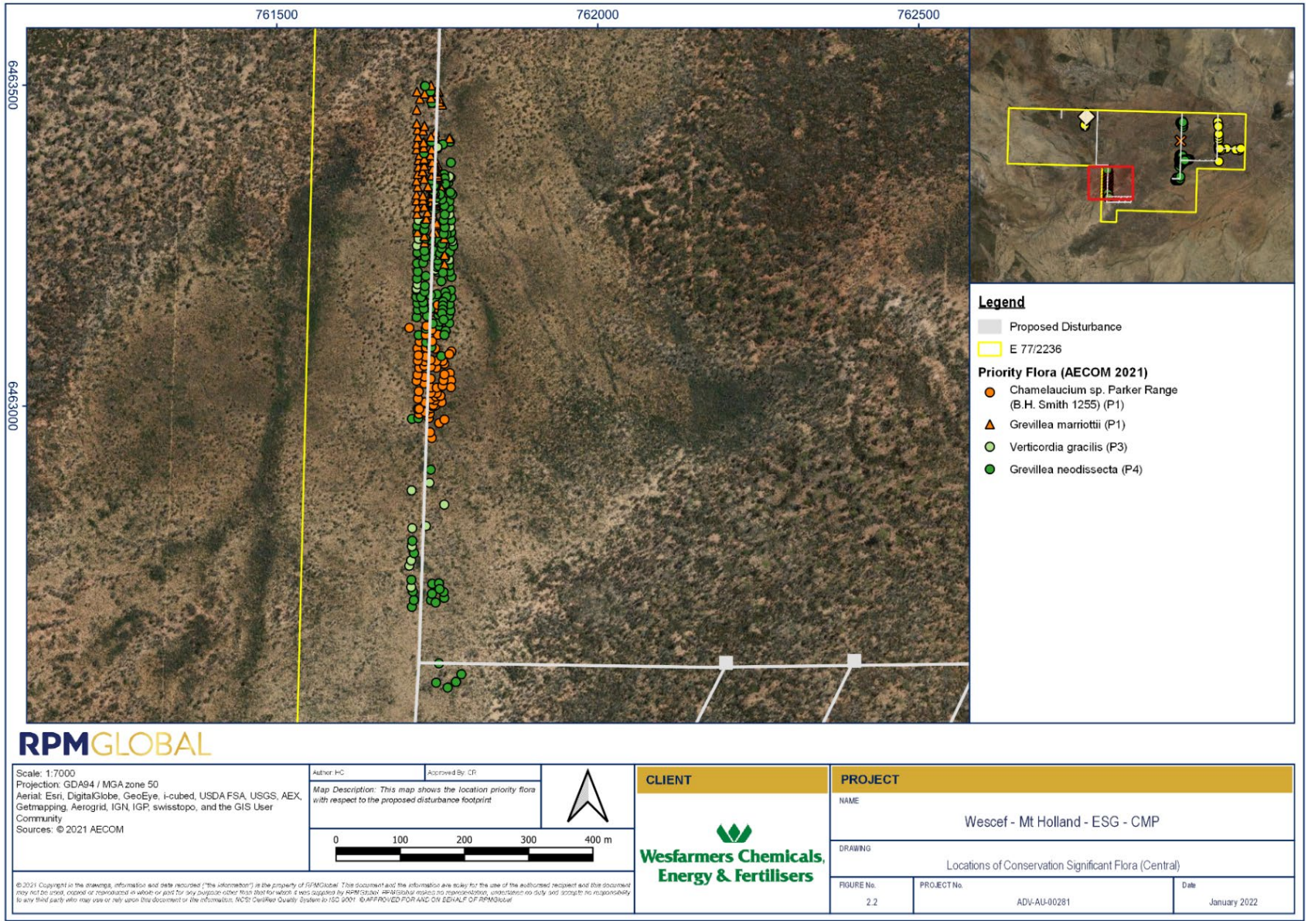


Figure 2-4 Locations of Conservation Significant Flora (East)

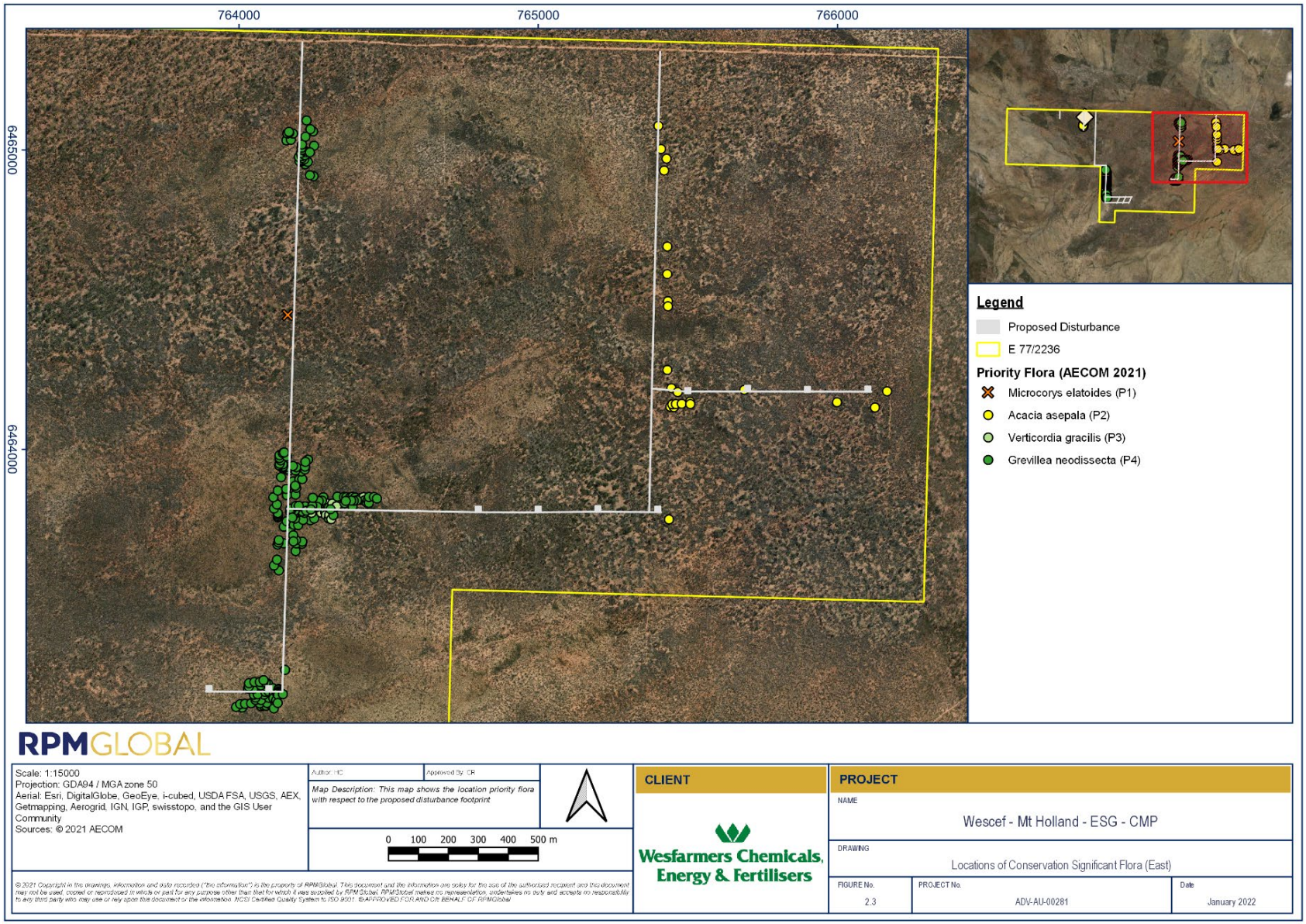


Figure 2-5 Vegetation Mapping

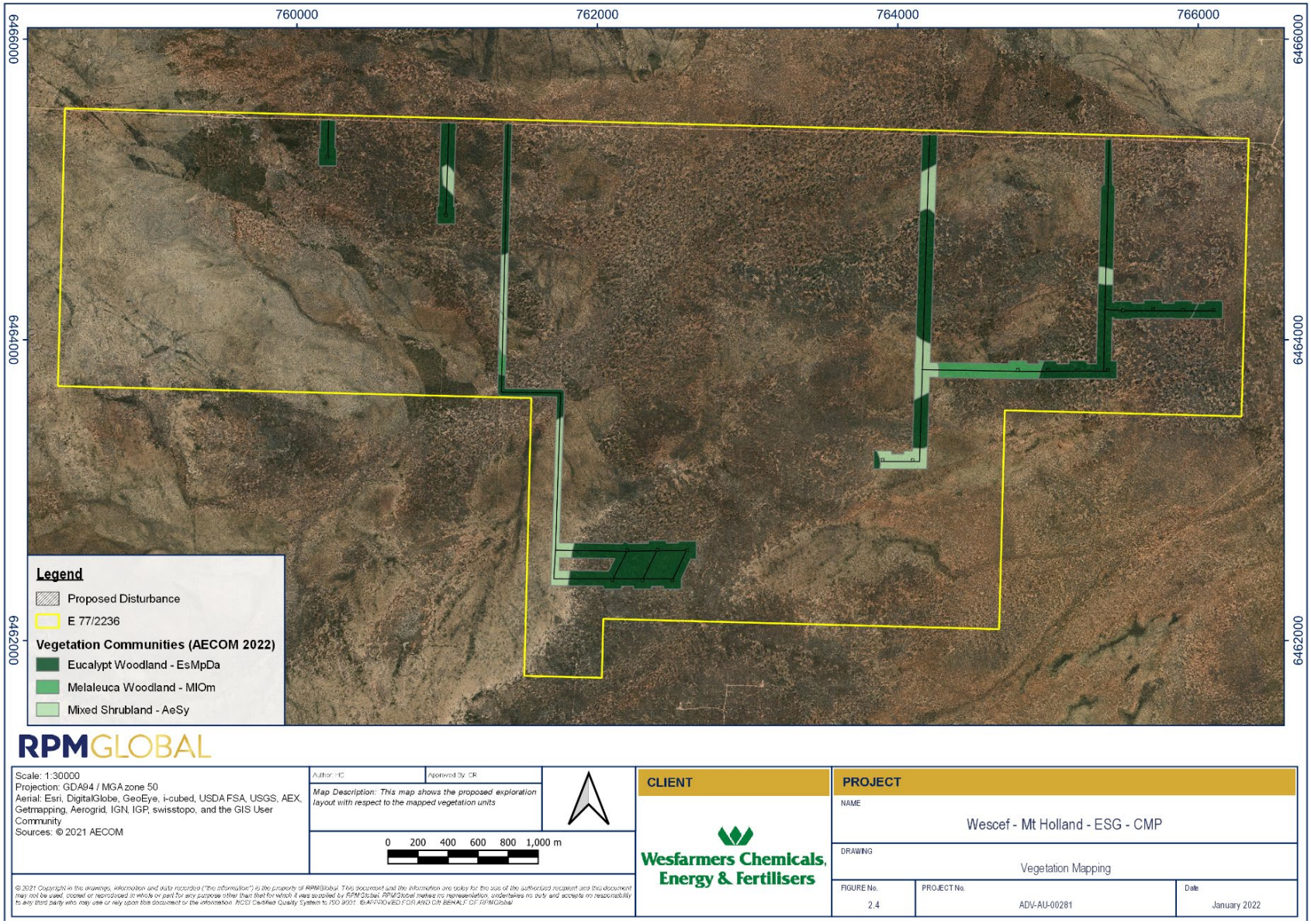
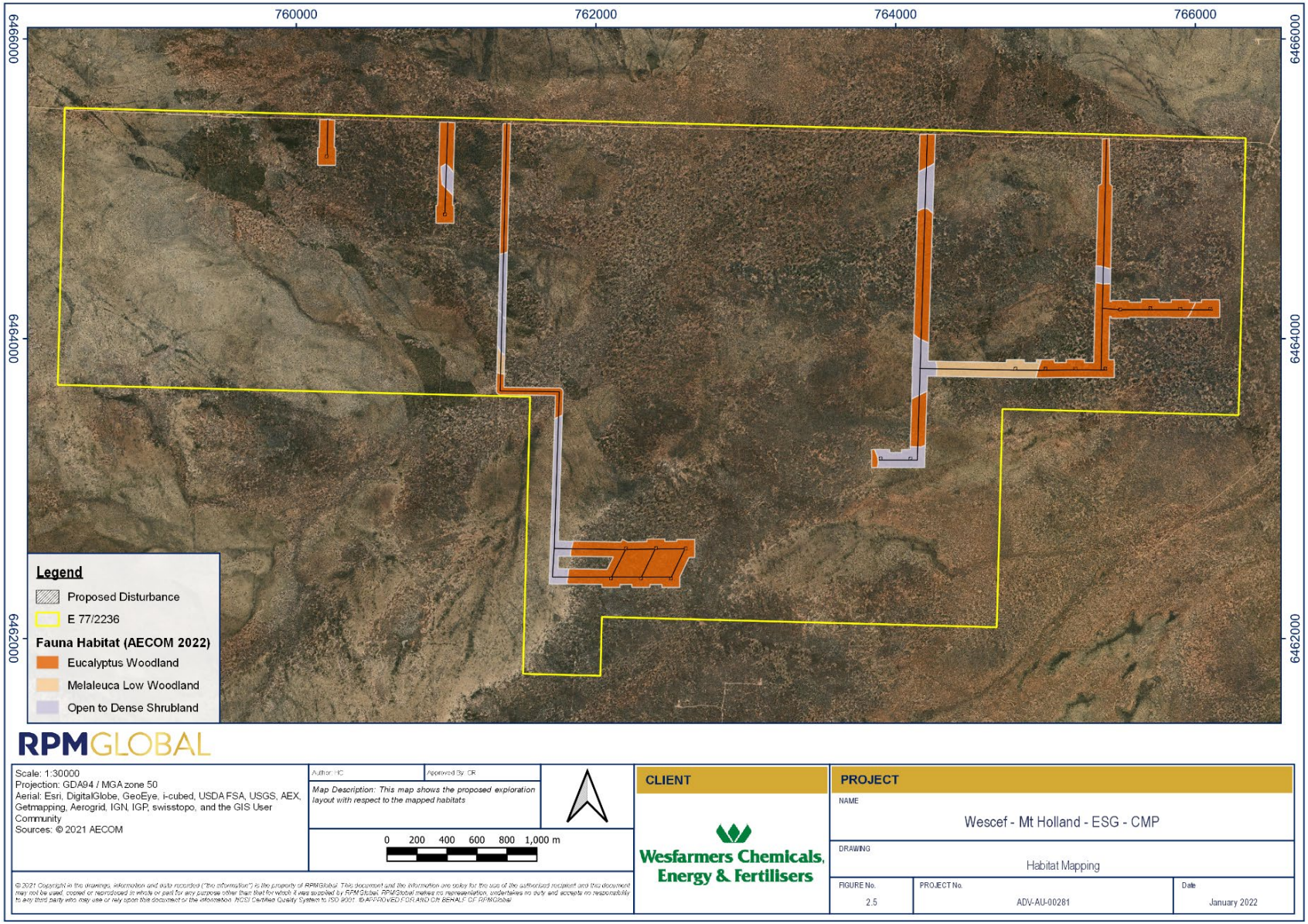


Figure 2-6 Habitat Mapping



2.5 Fauna and Habitat

A desktop and field survey of E77/2236 for fauna and habitat was completed by AECOM (2021a; 2021b). A report summarising the findings is provided as Appendix A.

2.5.1 Conservation Significant Fauna

Desktop assessment identified eight conservation significant fauna species including three species listed as Vulnerable under the EPBC Act, one species listed as Other Specially Protected Fauna under the BC Act and four Priority species listed by DBCA. Based on desktop assessment of historical records and preferred habitat, five fauna species of conservation significance were considered likely to utilise the survey area (AECOM, 2021a):

- Chuditch (Vulnerable EPBC Act and BC Act).
- Malleefowl (Vulnerable EPBC Act and BC Act).
- Peregrine Falcon (Other Specially Protected Fauna, BC Act).
- Western Brush Wallaby (Priority 4, DBCA).
- Western Rosella (Priority 4, DBCA).

Targeted fauna survey, comprising transects spaced at 10 m, identified one active Malleefowl Mound. Its location is shown on **Figure 2-2.**

2.6 Surface Water

E77/2236 is located fully within the Outer Avon Management surface water area and Yilgarn surface water sub-area.

Review of aerial photography and catchment divides indicates there are no major rivers or creek lines in the vicinity of E77/2236.

There are no proclaimed surface water areas, irrigation districts or rivers under the *Rights in Water and Irrigation Act 1914* (WA) (RIWI Act) in the vicinity of E77/2236.

2.7 Groundwater

E77/2236 is located within the proclaimed Goldfields Groundwater area and the proclaimed Westonia groundwater area of the Southern Cross Province under the RIWI Act. The tenement spans two groundwater provinces: in the east the Deborah subarea of the Goldfields province, and in the west the Westonia subarea of the Westonia province. Regionally the main groundwater sources in the Southern Cross Province are derived from the following sources:

- Regional catchment-controlled flow systems in fresh and weathered fractured rock.
- Tertiary palaeochannel sands.
- Calcrete units that commonly overlie palaeochannel deposits.
- Shallow alluvium.

Palaeochannel, calcrete and shallow alluvial deposits can form significant aquifer types in the Southern Cross region, although the groundwater quality varies considerably, with salinity tending to increase downstream along the drainage lines.

The deep weathering profile of the ultramafic and basaltic sequences, characteristic of the Southern Cross region, result in a thick siliceous caprock. Modest supplies of groundwater can be derived from this weathered zone. Fractured basement aquifers are characterised by secondary porosity and permeability, resulting in complex fracturing enhanced by chemical dissolution. The storage capacity and hydraulic conductivity of these aquifers is largely related to the degree of fracture intensity. Small quantities of potable water are known to occur in fractures within granite outcrops in the Southern Cross Province.

2.8 Cultural Heritage

2.8.1 Aboriginal Heritage

Tenement E77/2236 is subject to a registered Native Title Claim from Marlinyu Ghoorlie (MG) WC2017/007 (WAD647/201). WesCEF's subsidiaries MH Gold Pty Ltd and Montague Resources Australia Pty Ltd have a regional heritage agreement for exploration activities with the MG dated 21 October 2020. Under the agreement, WesCEF will provide the MG with a heritage notice which details the planned activities and any relevant information. Following receipt of the notice, a heritage survey is typically organised.

Under the Due Diligence guidelines (DAA 2013) the proposed drilling programme is considered 'Moderate Disturbance' and the previous land use is considered 'Unaltered Environment', so the activity is deemed to be 'High Risk'. High risk activities require consultation with the relevant Traditional Owners and the Department of Planning, Lands. Risk mitigation measures include:

- A search of the Department of Planning, Lands and Heritage's (DPLH) Aboriginal Heritage Inquiry System was undertaken on 15 December 2021 which found no registered aboriginal sites within E77/2236 (DPLH 2021).
- Consultation with the relevant Traditional Owners and DPLH.
- Heritage survey.
- Personnel involved in the drilling program will complete a site induction which incorporates aboriginal heritage awareness.

2.8.2 European Heritage

A search of the Heritage Council State Heritage Office inHerit database was undertaken on 15 December 2021 (State Heritage Office 2021). No places of European heritage were recorded on E77/2236, with the closest site being 'Holland's Track', located in the south-east corner of Jilbadji Nature Reserve.

2.9 Recreational and Other Values

The south-eastern corner of Jilbadji Nature Reserve is transected by the Holland Track, a four-wheel drive track between Broomehill and Coolgardie used for recreational purposes. Other tracks in the reserve may be used for four-wheel driving. Informal bush camping is known to occur at Sandalwood Rocks, located at the south-eastern corner of the reserve, a few hundred metres off the Holland Track.

3. Proposed Land Clearing

3.1 Program of Works

The exploration program will comprise up to 18 drill holes located on 20 m x 20 m drill pads. The location of all drill pads is shown on **Figure 3-1.**

3.2 Access

Access to the tenement will be via tracks accessed from the Marvel Loch – Forrestania Road. Where there are no existing tracks, new tracks will be cleared to a maximum width of 3 m. Track routes have been chosen to avoid known locations of Priority flora where practicable, however a small percentage of Priority flora will be impacted by access tracks (refer to Section 2.5.1). All tracks are shown on **Figure 3-1.**

3.3 Areas of Disturbance

A total of 4.4083 hectares of land clearing is proposed to complete the exploration program. Estimated vegetation disturbance is presented in **Table 3-1**. These estimates are considered to be an overestimation of the actual area of disturbance because they do not consider the presence of existing historic tracks and exploration drill lines. Any vegetation disturbance, including both vegetation removal and other forms of disturbance, will be subject to a Clearing Permit being obtained.

Table 3-1 Vegetation Disturbance Estimate

Purpose	Description	Area of Disturbance (ha)	Notes
Mineral exploration	Up to 18 Drill holes	0	Located on drill pads
	Up to 18 Drill pads, 20 m x 20m	0.72	
	Tracks 12.2943 km	3.6883	
Total Clearing	**-**	**4.4083**	**-**

The proposed exploration layout and purpose permit boundary is shown in **Figure 3-1**. A GIS shapefile is provided for the clearing permit application areas in MGA94 Zone 51.

3.4 Impact Assessments

An impact assessment was completed for Priority flora at a local and regional scale with the results presented in **Table 3-2** and **Table 3-3.** The local impact assessment shows a percent impact against all records from the tenement. The regional impact assessment shows percentage impact against a regional flora records database for the Mt Holland Project maintained by ALM.

Table 3-2 Priority Flora – Local Impact Assessment

Species	Conservation status	Total in disturbance envelope	Recorded on E77/2236 (AECOM 2021)	% Impact – E77/2236
Acacia asepala	Priority 2	1	71	1.4
Chamelaucium sp. Parker Range (B.H. Smith 1255)	Priority 1	0	468	0.0
Grevillea marriottii	Priority 1	35	611	5.7
Grevillea neodissecta	Priority 4	45	1035	4.3
Microcorys elatoides	Priority 1	0	2	0.0
Verticordia gracilis	Priority 3	1	203	0.5

Table 3-3 Priority Flora – Regional Impact Assessment

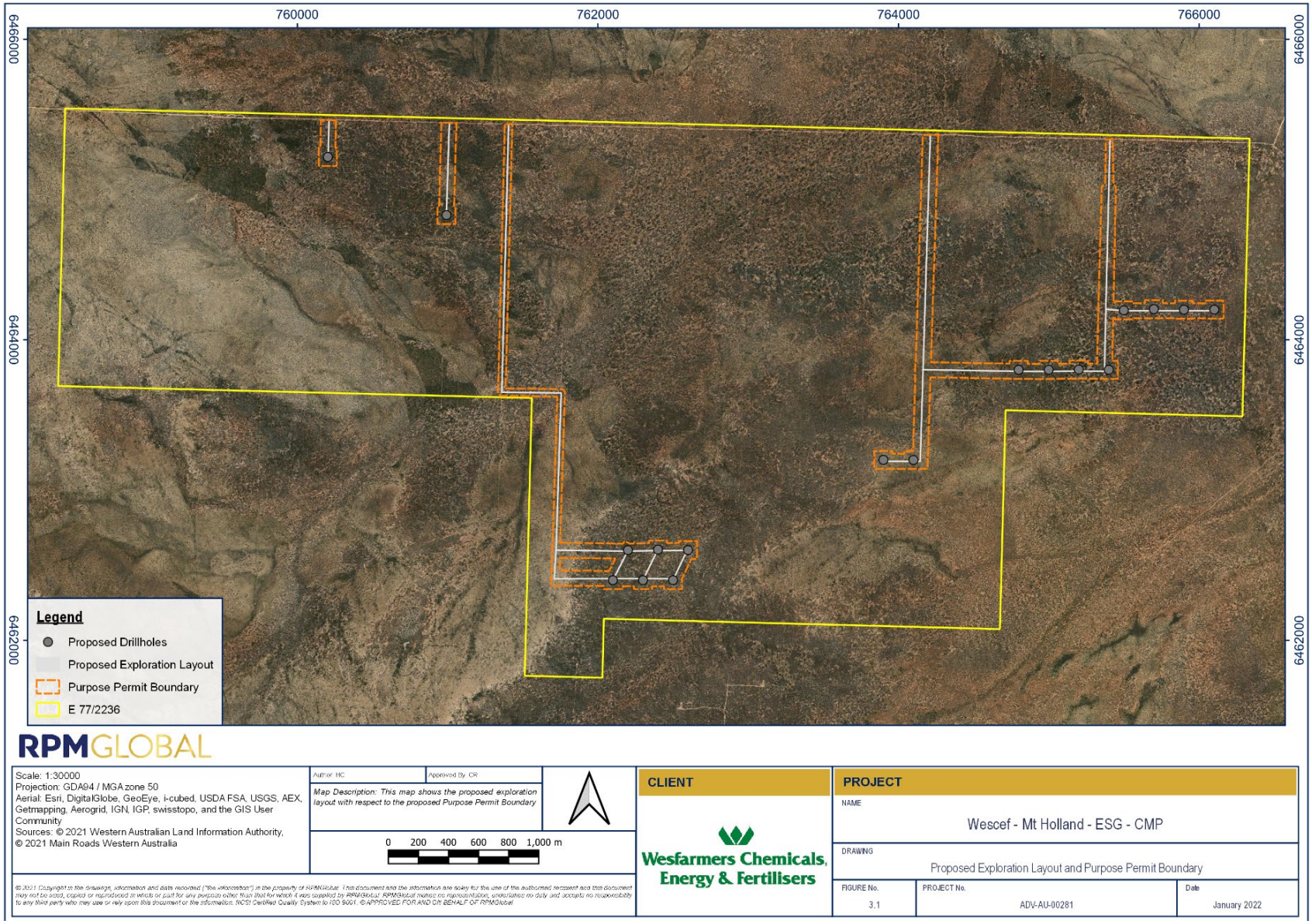
Species	Conservation status	Total in disturbance envelope	Total in Regional Flora Dataset	% Impact – Regional
Acacia asepala	Priority 2	1	72	1.4
Chamelaucium sp. Parker Range (B.H. Smith 1255)	Priority 1	0	1,809	0.0
Grevillea marriottii	Priority 1	35	4,831	0.7
Grevillea neodissecta	Priority 4	45	3,016	1.5
Microcorys elatoides	Priority 1	0	87,561	0.0
Verticordia gracilis	Priority 3	1	11,319	0.0

An impact assessment for vegetation and fauna habitat is presented in **Table 3-4** with proposed clearing against the area mapped in this survey.

Table 3-4 Vegetation and Fauna Habitat Impact Assessment

Vegetation Unit – Code – Fauna Habitat	Impacted Area (ha)	Total Area Mapped (ha)	Impact %
Eucalypt Woodland – EsMpDa – Eucalyptus Woodland	3.0572	79.012	3.9%
Melaleuca Woodland – MlOm - Melaleuca Low Woodland	0.2823	7.7948	3.6%
Mixed Shrubland – AeSy - Open to Dense Shrubland	1.0687	23.9011	4.5%

Figure 3-1 Proposed Exploration Layout and Purpose Permit Boundary



4. Assessment of Clearing Principles

Clearing applications are assessed against 10 principles as outlined in Schedule 5 of the EP Act. These principles aim to ensure that all potential impacts resulting from the removal of native vegetation can be assessed in an integrated way and applied to all lands throughout Western Australia. The principles address the four main environmental areas of biodiversity significance, land degradation, conservation estate and ground and surface water quality. Information regarding the potential impact of clearing for mining activities on each of these principles for the Project area is provided in **Table 4-1.**

Table 4-1 Native Vegetation Clearing Principles

<table>
<tr><th>Clearing Principle</th><th>Assessment</th></tr>
<tr><td colspan="2">Biodiversity Significance</td></tr>
<tr><td>a) Native vegetation should not be cleared if it comprises a high level of biological diversity.</td><td>▪ The vegetation to be cleared is not considered to support a high level of biological diversity.
▪ Vegetation communities and fauna habitats of the Project are considered common and widespread in the subregion and unlikely to function as refugia.
▪ No conservation significant flora protected under State or Federal legislation have been identified in the Project area.
▪ Fauna habitat is discussed in Section b.
▪ Priority flora are discussed in Section c.
▪ Communities are discussed in Section d.</td></tr>
<tr><td>b) Native vegetation should not be cleared if it comprises the whole or part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.</td><td>▪ There are no restricted vegetation units that have been identified in the Project area that are considered significant for the maintenance of native fauna.
▪ Three fauna habitats were identified in the clearing area.
▪ One Malleefowl Mound was recorded in the exploration area. Environmental management measures to protect this include:
– The active mound will be avoided.
– A 25 m buffer around the mound will be demarcated with flagging and signage.
– A 20 km/hr speed limit will be implemented on the access track within 1 km of the mound.
The proposed clearing is not anticipated to compromise any of the fauna species identified in the survey due to:
▪ The small size of the proposed clearing (4.4083 ha).
▪ The short-term nature of the exploration activities (two to three weeks of exploration and rehabilitation within six months).
▪ The implementation of the Conservation Management Plan.</td></tr>
<tr><td>c) Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora.</td><td>▪ No flora protected under state or federal legislation were recorded during flora surveys.
▪ Six Priority flora species listed by DBCA were recorded during flora surveys.
▪ An impact assessment was completed in Section 2.4.3, with the results summarised below.
<table>
<tr><th>Priority flora species</th><th>% Impact E77/2236</th><th>% Impact Regional</th></tr>
<tr><td>Acacia asepala</td><td>1.4</td><td>1.4</td></tr>
<tr><td>Chamelaucium sp. Parker Range (B.H. Smith 1255)</td><td>0.0</td><td>0.0</td></tr>
<tr><td>Grevillea marriottii</td><td>5.7</td><td>0.7</td></tr>
<tr><td>Grevillea neodissecta</td><td>4.3</td><td>1.5</td></tr>
<tr><td>Microcorys elatoides</td><td>0.0</td><td>0.0</td></tr>
<tr><td>Verticordia gracilis</td><td>0.5</td><td>0.0</td></tr>
</table>
▪ Priority flora identified within the proposed exploration areas will be located and flagged prior to clearing commencing and avoided wherever possible.</td></tr>
</table>

d) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of a TEC.	▪ No TECs were recorded in the exploration area. ▪ No PECs were recorded in the exploration area.
e) Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.	▪ Vegetation of the area is not considered to be remnant, with limited clearing in a vastly uncleared environment
f) Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.	▪ All drainages in the immediate vicinity of the Project are ephemeral and remain dry for most of the year. ▪ No vegetation groups are classed as riparian in the survey area.
Land Degradation	
g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.	▪ The proposed area of clearing for exploration is considered minimal at 4.4083 ha. ▪ All disturbed areas will be rehabilitated at the completion of exploration (Section 6). ▪ The proposed vegetation clearing, and exploration activity is not expected to cause any appreciable land degradation: – **Waterlogging**: The small-scale of the exploration, and containment of any intercepted groundwater in sumps, makes waterlogging unlikely. – **Acidification**: The small-scale of the exploration, short timeframe and limited amount of exposed soil and water makes acidification unlikely. – **Salinization**: The small extent of the clearing and rapid rehabilitation makes salinization unlikely. Any potentially saline groundwater will be contained in sumps and allowed to infiltrate or evaporate before sumps are infilled, preventing impact to the wider environment. – **Deep subsoil compaction**: The short timeframe, limited number of vehicles and the small scale of the exploration makes compaction unlikely. Rehabilitation will include shallow ripping to relieve compaction. – **Erosion**: The short timeframe, rehabilitation within six months, the small scale of the exploration and gently sloping terrain make erosion unlikely. There are no surface water features in the proposed clearing areas. – **Dieback**: Dieback is unlikely to spread due to the low rainfall of the area (<400 mm). Vehicle hygiene practices will be implemented (Section 5) to prevent introduction and spread of dieback. – **Weeds**: No weeds were recorded in the flora survey. Vehicle hygiene practices will be implemented to prevent introduction and spread of weeds (Section 5).
Conservation Estate	
h) Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.	▪ The tenement is located within the Jilbadji Nature Reserve (number 24049) protected under the *Conservation and Land Management Act 1984* (WA) and managed by the DBCA. It is listed as an Environmentally Sensitive Area (ESA) under the EP Act and is listed on the Register of the National Estate. ▪ The exploration is unlikely to have an impact on the environmental values of the conservation area as: – The extent of the clearing is small at 4.4083 ha. – The duration of the program is limited, estimated at two to three weeks.

	– The area has experienced previous disturbance through historical exploration. – Operations will be completed in accordance with strict environmental management procedures outlined in Section 5 and a Conservation Management Plan approved by DBCA. Rehabilitation will be completed within six months in compliance with tenement conditions.
Ground and Surface Water Quality	
i) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.	▪ Surface Water: – There are no surface water receptors that may be impacted by the proposal. ▪ Groundwater: – Clearing of vegetation is unlikely to have an impact on the quality of groundwater. – Groundwater may be intersected during exploration for a short duration, with water pumped to sumps to infiltrate or evaporate. – There are no groundwater dependent vegetation units within the exploration area.
j) Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence of flooding.	▪ The proposed clearing is unlikely to cause or exacerbate the incidence of flooding in the area due to: – The small scale of the clearing (4.4083 ha) which is spread out over the greater purpose permit area of 110.7 ha (**Figure 3-1**). – The existing native vegetation of the surrounding area. – No alterations will be made to the surface water drainage system of the area. The short timeframe the clearing will be open, with exploration taking two to three weeks and rehabilitation required to be completed within six months of completion.

5. Environmental Management Measures

Environmental management commitments that will be undertaken during and after the completion of the project are summarised in **Table 5-1**.

Table 5-1 Environmental Management Measures

Aspect	Commitment No.	Commitment
Clearing and Topsoil Disturbance	Commitment 1	All activities undertaken in a manner that minimises vegetation clearing and ground disturbance.
	Commitment 2	Designated access routes, drill lines and drill sites will be clearly pegged or flagged and delineated in the field. At the completion of the exploration stage these markings will be removed.
	Commitment 3	When choosing the final alignment of access routes and survey lines in the field, the path of least resistance through the vegetation will be chosen and trees and large shrubs avoided as far as possible to minimise disturbance.
	Commitment 4	In areas of low growing non-woody vegetation, vegetation will not be cleared ahead of access, but travel will occur on the vegetated surface. This will minimise ground and vegetation disturbance.
	Commitment 5	In areas where taller shrubs and other woody vegetation cannot be avoided, and the risk of tyre punctures is higher, the vegetation will be cleared ahead of access with a small front-end loader using a raised bucket method, which leaves the soil surface and roots largely undisturbed. The cleared vegetation will be placed in windrows along the access route or drill line, to be respread during rehabilitation.
	Commitment 6	Cutting of branches will be favoured over removing entire trees.
	Commitment 7	The width of disturbance for any access route and drill line will be confined to 3 m.
	Commitment 8	Vehicles and other equipment will always remain on the designed access routes, drill lines and drill pads.
Surface Water	Commitment 9	Access routes, drill lines and drill pads will avoid existing drainage lines where practicable.
	Commitment 10	Prior to backfilling of sumps, any water will be allowed to completely evaporate.
Groundwater	Commitment 11	Any groundwater intersected during drilling will be contained in a sump.
	Commitment 12	As far as practicable, sumps will be located away from the drip line of significant vegetation to minimise disturbance to roots and prevent contact with potentially hostile substances (e.g. saline water).
Flora and Fauna	Commitment 13	The Malleefowl mound will be avoided, with a 25 m buffer flagged and signed around the Malleefowl mound and a speed limit of 20 km/hr implemented for 1 km around the mound.
	Commitment 14	Priority flora identified within the proposed exploration areas will be flagged prior to operations commencing and avoided wherever possible.
	Commitment 15	All drill holes will be plugged immediately following completion of the hole.
	Commitment 16	Costeans and sumps will be no more than 2 m deep and have at least one side ramped (approximately 10º) to allow for fauna egress.
	Commitment 17	Exploration activities will only be conducted in daylight hours thus avoiding the need for night-time lighting and reducing the risk of vehicle collisions.
	Commitment 18	No pets will be allowed on site.
	Commitment 19	Exploration personnel will not feed or otherwise interact with any fauna.
	Commitment 20	Vehicles will travel at speeds no greater than 40 km/h within the tenement areas to protect fauna, reduce dust and noise.

Aspect	Commitment No.	Commitment
	Commitment 21	All vehicles and other equipment arriving on site should be free of weed seeds and soil; they will have wheels and undercarriage washed down thoroughly prior to being mobilised to the exploration area.
	Commitment 22	If weeds are identified within the Project area and weed control deemed necessary, the proponent will contact the District Nature Conservation Officer, DBCA, Merredin on (08) 9041 6000 to discuss the appropriate protocols and approval process to conduct weed control on conservation estate.
Air Quality and Noise	Commitment 23	All vehicles and machinery will be regularly maintained to ensure they are operating optimally and not producing excessive noise.
	Commitment 24	Where necessary, at the start of a drill hole, the drill rig can use water to consolidate the drill hole collar and limit dust generation from dry surface material.
Waste	Commitment 25	All waste generated from exploration to be removed from site and recycled or disposed of to an approved and fenced landfill facility.
	Commitment 26	Wooden or other biodegradable markers will be used.
	Commitment 27	PVC/steel drill collars that are removed or cut off during rehabilitation will be taken off site and disposed of appropriately.
	Commitment 28	Sample bags will be removed and suitably disposed of within six months of completion of drilling programs.
	Commitment 29	Non-hazardous drill samples (excluding plastic sample bags) may be disposed of into sumps prior to backfilling.
Hydrocarbons	Commitment 30	Hydrocarbons or other chemicals will not be stored within 100 m of a drainage line.
	Commitment 31	Spill response kits will be available in all vehicles and in the diesel tanker trailer. The spill response kits will be of appropriate type and size and stock levels will be maintained.
	Commitment 32	All exploration personnel will be trained in spill response.
	Commitment 33	All vehicles and other equipment will be regularly maintained to minimise the chance of leaks and breakdown related spills.
	Commitment 34	Liners and drip trays will be placed under tank filler points on equipment and vehicles during onsite refuelling to contain potential overfill, tank blow back and minor spills.
	Commitment 35	Liners and drip trays will be used under drill rigs to contain any leaks.
	Commitment 36	Hydrocarbon and chemical waste will be transported off site for disposal to an approved waste facility.
	Commitment 37	Any contaminated material (e.g., hydrocarbon contaminated soil) will be removed and disposed of at licensed facilities.
	Commitment 38	As required, any spills defined under Section 72 of the EP Act and *Environmental Protection (Unauthorised Discharges) Regulations 2004* will be reported to DBCA, DWER and DMIRS.
Fire	Commitment 39	During the induction process all exploration personnel working in the area will be made aware of the risk of bushfires and the precautions necessary to minimise this hazard including knowledge of escape routes and correct disposal of cigarettes. All personnel will be trained in the use of available firefighting equipment and advised on the plan of action in case of a fire.
	Commitment 40	All vehicles and the fuel trailer will carry portable fire extinguishers. Larger machinery such as loaders and drill rigs will be required, if practicable, to be fitted with a fire suppression deluge system.

Aspect	Commitment No.	Commitment
	Commitment 41	All hot work (such as welding/cutting/grinding) that needs to be undertaken in the routine process of drilling activities will be undertaken by qualified personnel on cleared ground (drill pad) with dosing water on standby.
	Commitment 42	No hot works will be undertaken on Total Fire Ban days as declared by the Department of Fire and Emergency Services (DFES).
	Commitment 43	Any drill rigs, or associated plant working in the nature reserve will always maintain a Fire Evacuation Plan including emergency contact details and have it displayed and available to all personnel.
	Commitment 44	DBCA will be notified of the timing and location of all exploration activities. A designated person will oversee checking fire warnings daily. During restricted or prohibited fire periods, contact will be made with DBCA to clarify any potential work restrictions. Any such restrictions will be complied with at all times.
	Commitment 45	There will be no deliberate burning of any vegetation.
	Commitment 46	No cigarette butts will be thrown on the ground but rather placed into sealable containers carried with the crew and later disposed of with general waste.
	Commitment 47	ALM will adhere to the requirements of the Bush Fires Act 1954 (WA) and adhere to Shire/Rural machinery movement bans that are placed periodically where required. Specific fire management measures to be adopted will include: ▪ Regular contact with local shires regarding bushfires, harvest bans and vehicle movement bans. ▪ Listening to local ABC radio for updates on fire in the area. ▪ Contact the DBCA Merredin office regarding prescribed burns in the area (Tel: (08) 9041 6000) and visit the website: http://www.dpaw.wa.gov.au/management/fire/prescribed-burning/burns. ▪ Contacting the Department's Merredin office when onsite (Tel: (08) 9041 6000). ▪ Daily consult of the DFES and DBCA websites for alerts and warnings https://www.emergency.wa.gov.au. ▪ Consultation of relevant websites (e.g. sentinel hotspots https://hotspots.dea.ga.gov.au/) for possible fire activity in the area.
	Commitment 48	The Fire Evacuation Plan will be clearly displayed and distributed to all personnel and will include: ▪ Emergency telephone numbers. ▪ Details on a minimum of two exit points in opposite directions (where possible) to get out of the area safely. ▪ Establishment of a safe muster point in case of fire. ▪ Communication through satellite telephone if no mobile coverage. ▪ Daily scheduled phone calls to base.
	Commitment 49	An observer will trail machinery during vegetation clearing for early detection of fires.
	Commitment 50	At least 400 L of water will be available during clearing and exploration activities for rapid and effective firefighting.
Camping	Commitment 51	No exploration camp will be required, ALM will utilise the existing accommodation facilities at their Mt Holland operation.
Heritage	Commitment 52	Prior to ground disturbance occurring, a heritage survey will be undertaken covering the proposed exploration areas (unless the Marlinyu Ghoorlie People advise a survey is not required).

Aspect	Commitment No.	Commitment
	Commitment 53	If a heritage site is identified prior to, or during the exploration program, the provisions of the *Aboriginal Heritage Act 1972* (WA) and *Aboriginal Cultural Heritage Act 2021* (WA) (once enacted) will be followed. Activities in the vicinity of the site will cease immediately and the discovery will be reported to the DPLH.
Workforce and Training	Commitment 54	All personnel to complete an Environmental Induction which outlines strategies to protect the environment including flagging of “no-go” areas and bushfire prevention.
Incidents	Commitment 55	All environmental incidents and corrective actions will be reported to the DBCA District Nature Conservation Officer, Merredin.

6. Rehabilitation

Rehabilitation is the return of disturbed land to a safe, stable, productive, non-polluting, and self-sustaining condition in consideration of beneficial uses of the land. Appropriate rehabilitation will ensure that the long-term impacts of exploration in the area are minimised.

Rehabilitation will be in accordance with the DBCA Wheatbelt Region's standard set of principles and methods to ensure that rehabilitation following exploration within areas of conservation estate is to a consistent standard, and ALM will comply with all tenement conditions regarding rehabilitation.

Key rehabilitation measures to be implemented are:

- Access routes, drill lines, drill pads, drill holes and sumps will be rehabilitated within six months of completion of each exploration program. However, if access routes are likely to be used in the near future to support further exploration, then ALM will approach DBCA and DMIRS to discuss the need for retention and will apply to defer the requirements to rehabilitate these areas after an extended period (e.g., 6-12 months).
- Drill holes:
  - Will be securely capped or plugged immediately at the completion of each drill hole (preferably with appropriate conical plastic plug).
  - If an exemption is approved to leave the drill hole un-rehabilitated for future geophysical surveys the drill hole will be capped temporarily.
  - For permanent closure of the drill holes the following procedures will be employed:
    - The drill collars are removed or cut a minimum of 40 cm below the surface.
    - A permanent plug is inserted into the hole or cut collar. This will be secured in the drill hole collar or hole.
    - The depression where the hole occurs will be backfilled to create a mound to facilitate water shedding away from the drill hole.
- ALM will liaise with DBCA to determine if access tracks installed as part of exploration works within the Project area should be left un-rehabilitated for fire management purposes.
- All rubbish (including plastic bags, grid pegs, artificial debris, and waste), hydrocarbon material and chemicals will be removed from site and disposed of appropriately (and at a licensed facility if required).
- Tracks and drill pads will be shallow ripped on the original contour where possible (300 mm) to relieve any compacted soil. Drill spoil will be emptied into sumps or removed from site and disposed of at the Mt Holland Project landfill.
- Drill sumps (when dry) will be backfilled with the stockpiled subsoil and topsoil, lightly scarified and rehabilitated.
- All trenches and holes directly resulting from the drilling Project will be filled in.
- Compacted areas will be ripped along the original contour.
- Stockpiled topsoil will be respread and cleared vegetation where possible will be dragged onto the tracks and drill sites to restrict third party access, minimise soil erosion and encourage regrowth.
- Access to rehabilitated areas will be minimised.
- Rehabilitation will comply with all requirements in the tenement conditions.
- Rehabilitation/revegetation will be completed to a standard that is safe, stable, and non-polluting.
- Direct seeding will be considered using an appropriate mix of local provenance seeds treated to break germination (e.g., via scarification or smoke treatment) where:
  - Drill sites or access tracks that have been open longer than 24 months; or
  - The viability of the topsoil may be suspect for any reason.
- Following completion of rehabilitation activities, ALM will obtain agreement with DBCA that the rehabilitation has been completed to the agreed completion criteria.

- ALM will undertake a monitoring session one year after the revegetation/rehabilitation with a DBCA Wheatbelt representative, where available, to determine success i.e., successful onsite seed germination.

The following Completion Criteria will be adhered to:

- Native flora and fauna:
  - No individuals of conservation significant flora species (declared under the EPBC Act or BC Act) are taken as a result of exploration activity unless authorised by a Ministerial Condition, Threatened Flora Authorisation or similar.
- Revegetation/rehabilitation success:
  - Emerging new vegetation by the end of the first winter following rehabilitation activities (visual inspection). To be inspected in spring and photographically recorded.
  - Disturbed areas have been rehabilitated to a standard similar to the surrounding undisturbed areas. This should be sufficient to support the development of a self-sustaining community of local native flora and fauna (visual inspection).
- Stable landform:
  - Upslope runoff and excessive water flow diverted away from the rehabilitated area (visual inspection).
  - Rehabilitation area is stabilised without ongoing erosion, deposition or ponding of water (visual inspection).
  - Evidence of soil erosion, or development of rills/gullies (visual inspection).
- Waste:
  - All waste, including hydrocarbon spills, has been removed offsite (visual inspection).
- Weeds:
  - No new introductions of weed species, or no increased percentage cover of those previously present (visual inspection or use of quadrats for quantitative criteria).
- Reporting:
  - All reporting commitments have been met to the required standard, within required timeframes (e.g. non-compliance reports).

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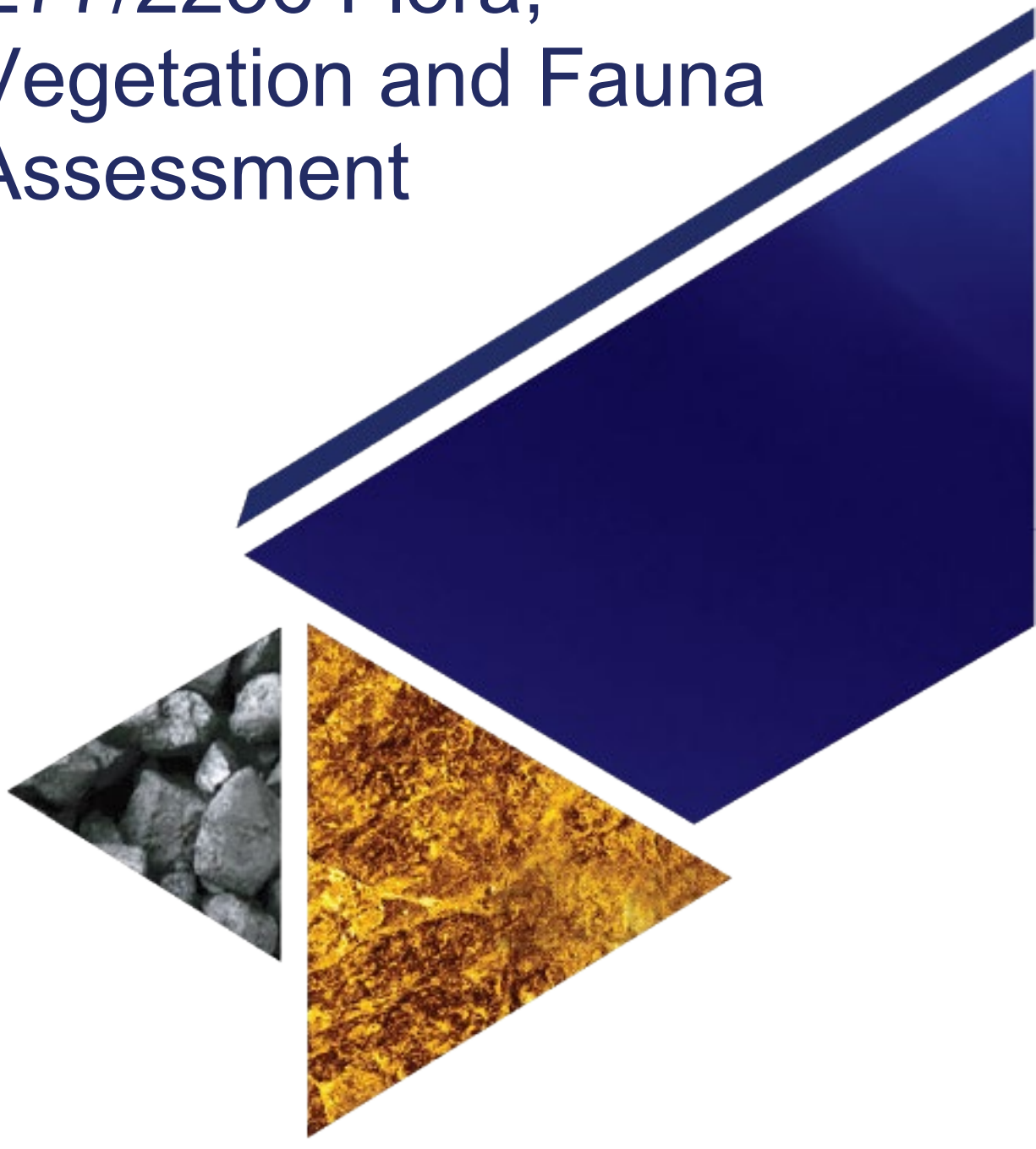
Appendix A. E77/2236 Flora, Vegetation and Fauna Assessment



Prepared for
Wesfarmers Chemicals, Energy & Fertilisers
ABN: 48 008 797 402

AECOM

E77/2236 Flora, Vegetation and Fauna Assessment

09-Feb-2022

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E77/2236 Flora, Vegetation and Fauna Assessment

Client: Wesfarmers Chemicals, Energy & Fertilisers

ABN: 48 008 797 402

Prepared by

AECOM Australia Pty Ltd
Level 3, 181 Adelaide Terrace, Perth WA 6004, GPO Box B59, Perth WA 6849, Australia
T +61 8 6230 5600 www.aecom.com
ABN 20 093 846 925

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Quality Information

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Reviewed by Linda Kirchner

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Rev	Revision Date	Details	Authorised	
			Name/Position	Signature
B	19-Jan-2022	Draft for Review	Linda Kirchner Technical Director - Environment	
0	09-Feb-2022	Final Submission	Linda Kirchner Technical Director - Environment	

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Executive Summary

AECOM Australia Pty Ltd (AECOM) was engaged by Wesfarmers Chemicals, Energy and Fertilisers (WesCEF) to conduct ecological surveys for a defined survey area within mining tenement E77/2236. A detailed flora and vegetation assessment and basic fauna assessment was conducted to record and describe the environmental values of the survey area.

The flora and vegetation assessment included collecting floristic data from seven 20x20m quadrats and two relevés and walking linear traverses 10 m apart to conduct targeted flora surveys. A summary of results is presented below:

- No Threatened or Priority Ecological Communities were anticipated to occur and none were recorded.
- Three vegetation communities were defined and mapped including two woodlands and one shrubland. All communities were in excellent condition with historical drill tracks and recent fires noted.
- Seven Priority flora and two potential Priorities waiting for formal identification were recorded including:
  - *Acacia asepala* (P2) – 71 individuals
  - *Chamelaucium* sp. Parker Range (B.H. Smith 1255) (P1) – 468 individuals
  - *Eucalyptus exigua*(P3) – 2-5 individuals
  - *Grevillea marriottii* (P1) – 611 individuals
  - *Grevillea neodissecta* (P4) – 1035 individuals
  - *Microcorys elatoides* (P1) – 2 individuals
  - *Verticordia gracilis* (P3) – 203 individuals
- Three fauna habitats were recorded, all of which provide suitable habitat for five conservation significant fauna species including
  - 110.8 ha for Chuditch *Dasyurus geoffroii* (EPBC & WA Vulnerable), Malleefowl *Leipoa ocellata* (EPBC & WA Vulnerable), and Western Brush Wallaby *Notamacropus irma* (WA P4)
  - 79.08 ha of suitable habitat was mapped for the Peregrine Falcon *Falco peregrinus* (WA Other Specially Protected Species) and the Western Rosella *Platycercus icterotis* (WA P4)
- Twelve fauna species were recorded in the survey area including one species listed as Vulnerable under the EPBC Act or BC Act (Malleefowl *Leipoa ocellata*), which was recorded due to the presence of one active malleefowl mound within the survey area.

The flora, vegetation and fauna assessment was successfully completed with no significant limitations identified that may influence the outcome of the survey.

1.0 Introduction

1.1 Background

Wesfarmers Chemicals, Energy and Fertilisers (WesCEF) intends to conduct regional mineral exploration in a series of exploration licences near Mt Holland in the Shire of Yilgarn, Western Australia. WesCEF engaged AECOM to conduct ecological assessments for the exploration licences of interest to support planning of exploration activities and inform environmental approvals documentation.

1.2 Location

Exploration licence E77/2236 is located approximately 365 km east of Perth and 85 km southeast of Southern Cross, in the Shire of Yilgarn (Figure 1). The survey area is 110.80 ha and lies entirely within Jilbadji Nature Reserve.

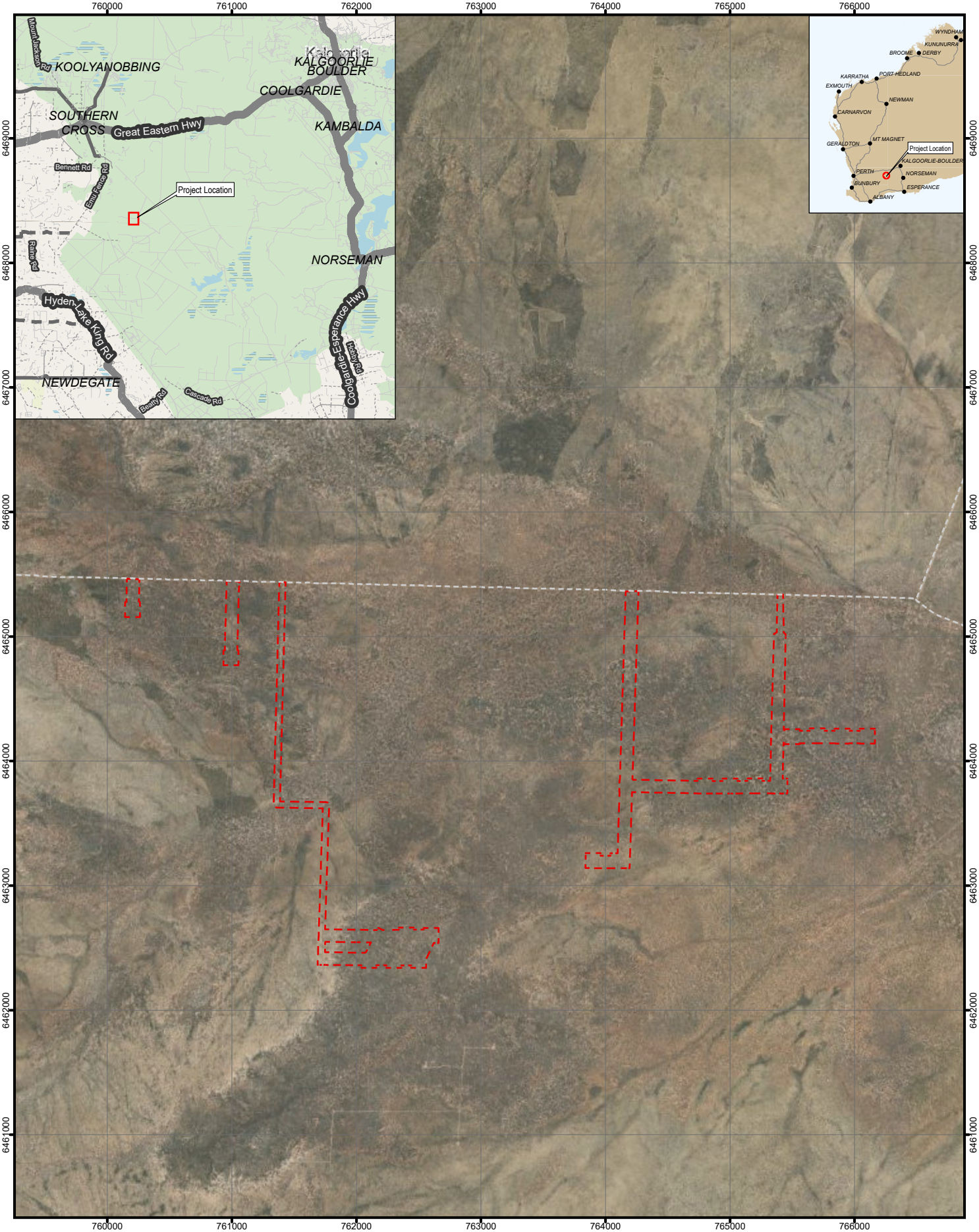
1.3 Purpose and Scope

The objective of the survey was to identify and describe flora, vegetation and fauna present in accordance with relevant industry guidelines. This included a desktop assessment and field survey to collect information on flora, vegetation, and fauna habitats that characterise E77/2236.

The scope of works for the assessment included:

- undertake a comprehensive desktop assessment to define the existing environment and potential matters of conservation significance present in the survey area
- conduct a detailed flora and vegetation survey in accordance with the Flora Survey Technical Guide (EPA, 2016)
- undertake targeted flora surveys using systematic methods to quantify and map all threatened and priority flora locations
- conduct a fauna survey in accordance with the Fauna Survey Technical Guide (EPA, 2020) to define fauna habitats present and identify threatened fauna that may utilise the survey area.

This report presents the methods, results and discussion of the ecological assessments.



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APPROVED BY	F. DE WIT
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Datum: GDA 1994 MGA Zone 50

0 150 300 450 600
metres

Data sources:

Base Data: (c) Based on information provided by and with the permission of the Western Australian Land Information Authority trading as Landgate (2010).Geoscience Australia, Streetpro

LEGEND

E77/2236 Survey Area

Survey Area
E77/2236

WESFARMERS CHEMICALS ENERGY AND FERTILISER (WESCEF)

E77/2236 FLORA, VEGETATION AND FAUNA ASSESSMENT

Figure
1

2.0 Existing Environment

2.1 Climate

The survey area has a semi-arid climate. Semi-arid climates are characterised by areas that receive precipitation below the potential evapotranspiration rates. The climate is an intermediate between desert and humid climates and is characterised by hot and dry (sometimes exceptionally hot) summers, with cold winters. This climate tends to receive small amounts rain throughout the year, with higher more reliable rainfall occurring in winter months from May to August.

The nearest Bureau of Meteorology (BoM) weather station is Hyden weather station (Station 10568), located approximately 50 km west of the survey area. Mean annual rainfall at Hyden between 1928-2021 is 343 mm (BoM, 2021) Rainfall in the 12 months preceding the field survey in September was 399 mm, attributed to significant rainfall events in March and May (Figure 2).

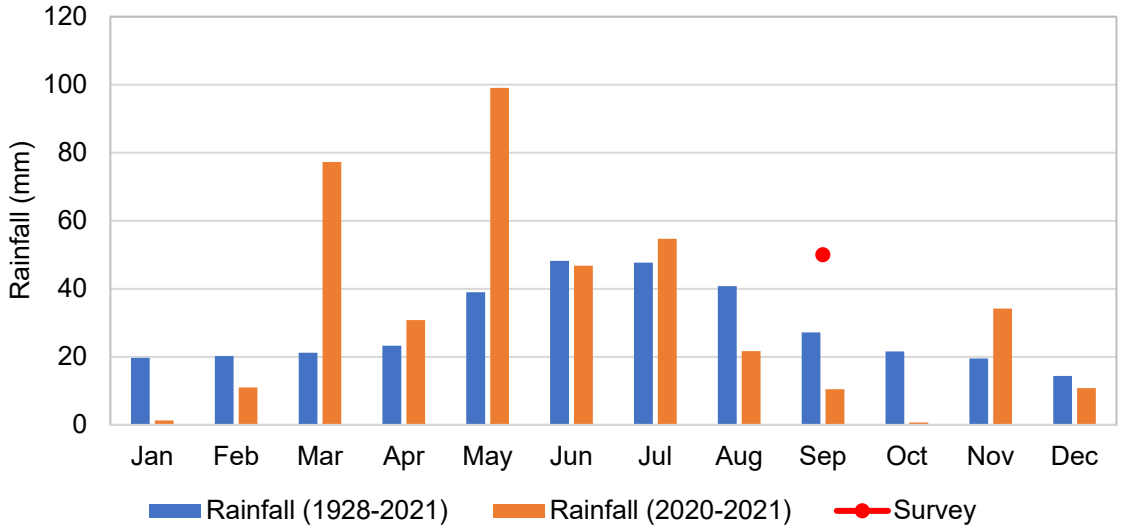


Figure 2 Rainfall data (average and 12 months preceding survey) from Hyden weather station (BoM, 2021)

2.2 BRA Regions

The largest regional vegetation classification scheme recognised by EPA is the Interim Biogeographical Region of Australia (IBRA). The IBRA7 (2012) regions provide the planning framework for the systematic development of a comprehensive, adequate and representative (CAR) national reserve system. There are 89 recognised IBRA regions across Australia that have been defined based on climate, geology, landforms and characteristic vegetation and fauna (CALM, 2002).

The survey area lies within the Coolgardie IBRA region and the Southern Cross IBRA subregion. The Coolgardie bioregion, according to CALM (2002) is within the Yilgarn Craton with a granite basement including Archaean Greenstone intrusions in parallel belts. Low greenstone hills support diverse woodlands rich in endemic Eucalypts on alluvial soils on the valley floors, around saline playas of the occluded drainage system and on broad plains of calcareous earths. Granite basement outcrops support granite grass, wattles and York Gum. Playa lakes support Samphire shrubs. The Southern Cross subregion, described by Cowan et. al (2001) is characterised by valleys, low greenstone hills, salt lakes, granite basement outcrops, and uplands of yellow sandplains, gravelly sandplains and laterite breakaways. Rare features of the area include the arid woodlands with rare plants and rare vertebrates. One soil landscape system has been mapped within the survey area: 261Ya28 – sandy plain with some clay pans and some salt lakes, dunes and lunettes.

The survey area also lies within the Great Western Woodlands, an area of over 16 million hectares of area recognised as the largest remaining area of intact Mediterranean-climate woodland (DBCA, 2020). The Great Western Woodlands is considered to have significant value due to its high biological richness. The area is also important economically because it is used for mining, pastoralism, recreation and tourism.

2.3 Vegetation

Four pre-European vegetation associations (Beard, 1972) have been mapped in the survey area:

- 1413 –shrublands and Acacia, Casuarina and Melaleuca thicket
- 511 – Medium woodland; Salmon Gum & Morrel
- 519 – Shrublands; mallee scrub, Eucalyptus eremophila
- 128 – bare areas rock outcrop.

3.0 Methodology

3.1 Desktop Study

A desktop study was undertaken to identify significant environmental values that are likely to be present in the survey area including flora, fauna and vegetation communities. Desktop database searches were requested from the following government databases (including a 20 km buffer from survey area boundary):

- DBCA Threatened and Priority flora, fauna and communities
- NatureMap
- EPBC Act Protected Matters database
- E77/1582 flora and vegetation assessment (AECOM, 2020)
- Environmental Review Document – Earl Grey Lithium Project (Kidman, 2017).

All conservation significant matters including flora, fauna and communities were reviewed and a likelihood of occurrence was completed based on the designated categories (Table 1).

Table 1 Categories of likelihood of occurrence for species and communities

Likelihood Category	Flora	Fauna	Communities
Likely to occur	Habitat is present in the Survey area and the species has been recorded in close proximity to the survey area.	Survey area is within the known distribution of the species, habitat is present in the survey area and the species has been recorded in close proximity to the survey area.	Known occurrences of the community in close proximity to the Survey area. Vegetation looks the same within the known occurrence and survey area based on aerial imagery. Geographic location is similar to the survey area.
May occur	Habitat may be present and/or the species has been recorded in close proximity to the survey area.	Survey area is within the known distribution of the species, marginal habitat may be present and/or the species has been recorded in close proximity to the survey area.	Known occurrence of the community in the local area, and/or vegetation looks the same within known occurrence and survey area based on aerial imagery. Geographic location is similar to the survey area.
Unlikely to occur	No suitable habitat is present and the species has not been recorded in close proximity to the survey area.	Survey area is outside the known distribution for the species, or no suitable habitat is present and the species has not been recorded in close proximity to the survey area.	Known occurrence of the community in close proximity to the Survey area however geographic location does not occur in survey area.

3.2 Flora and Vegetation

A detailed flora and vegetation assessment was undertaken utilising methods outlined in the EPA (2016) Flora Survey Technical Guide. Quadrat sampling was undertaken by Floora de Wit (flora collection permit FB62000137). The field survey was undertaken between 8 and 10 September 2021.

Floristic data was collected from seven 20 x 20 m non-permanent quadrats and two relevés, delineated by a measuring tape. Data collected from quadrats included the presence of plant species, their cover abundance, structural composition of vegetation, physical environment, and presence/absence of disturbance. Each site was given a unique site number, and the following parameters recorded:

- date
- location using hand-held GPS (accuracy of 5 m)
- sample site type (quadrat/relevé and size)
- photograph (northwest corner)
- soil details (type, colour, moisture)
- landform
- vegetation condition
- fire history
- comprehensive species list
    - estimated height
    - estimated percentage cover (for trees both percentage within quadrat and within community was recorded to enable better description of vegetation community).

Vegetation communities were described and mapped based on changes in dominant species composition and landform. Vegetation community descriptions were based on the National Vegetation Information System (NVIS) framework (DEE, 2017). Delineation of vegetation communities was supported by analysing floristic data collected within quadrats. Vegetation condition was determined using the scale developed by M.E. Trudgen (1988) as recommended in the Technical Guide (EPA, 2016) (Table 2).

Table 2 Bushland condition ratings (Trudgen, 1988)

Category	Description
Excellent	Pristine or nearly so, no obvious signs of 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	Most 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.

3.2.1 Targeted Flora Searches

Targeted flora searches were conducted by Floora de Wit, Cassandra House and Paul Brandon. Linear traverses 10 m apart were walked across the entire survey area.

A field guide for Threatened and Priority flora species identified in desktop studies and previous surveys was developed by Mattiske Consulting (Mattiske, 2021). This guide presents photographs, habitat, morphology and other unique identifying characteristics of 92 conservation significant flora species.

The field guide was consulted at the start of each day, with particular emphasis on plant taxa that were considered likely to occur in E77/2236. Where potential conservation significant flora were identified in the field, the guide was consulted to compare morphological features to support the identification of the species.

Conservation significant flora were recorded at 10 m intervals along the 10 m traverses. This effectively demonstrates the extent and size of the populations.

Survey effort is shown in Figure 3.

3.3 Fauna Survey

A basic fauna assessment was undertaken in accordance with methods outlined in EPA (2020) Technical Guidance for Terrestrial Fauna Surveys. This included collecting data from sample point locations in areas considered representative of the vegetation types and fauna habitat types present. Various habitat features were assessed and used to inform the fauna habitat map and be used to determine suitability of habitat to conservation significant fauna species, including consideration of structural diversity and refuge opportunities for fauna.

The fauna habitats of the survey area were assessed and mapped in conjunction with the vegetation mapping. Seven detailed habitat assessments were completed during the field survey. Fauna habitats were assessed for specific habitat components in order to determine the potential for these habitats to support conservation significant species.

Information collected included:

- location
- general habitat description
- habitat condition and disturbance types
- dominant / characteristic flora species and vegetation layers
- presences and abundance of hollows, fallen logs, leaf litter, bare ground, grass, stones and boulders, rock crevices, soil cracks, cryptogramic crust, vines, mistletoe, dense shrubs, water bodies etc.
- presence of animal signs (e.g. scats, digging, tracks, burrows, egg shell, bones, feathers etc.)
- fauna observations
- connectivity and potential significance of habitat.

3.3.1 Targeted Malleefowl Searches

Targeted Malleefowl searches were undertaken during the targeted flora searches, i.e. walking linear traverses 10 m apart. Evidence of Malleefowl (i.e. nesting mounds) were recorded using a hand held GPS. Information collected included mound size, location and evidence of use. All mounds were photographed.

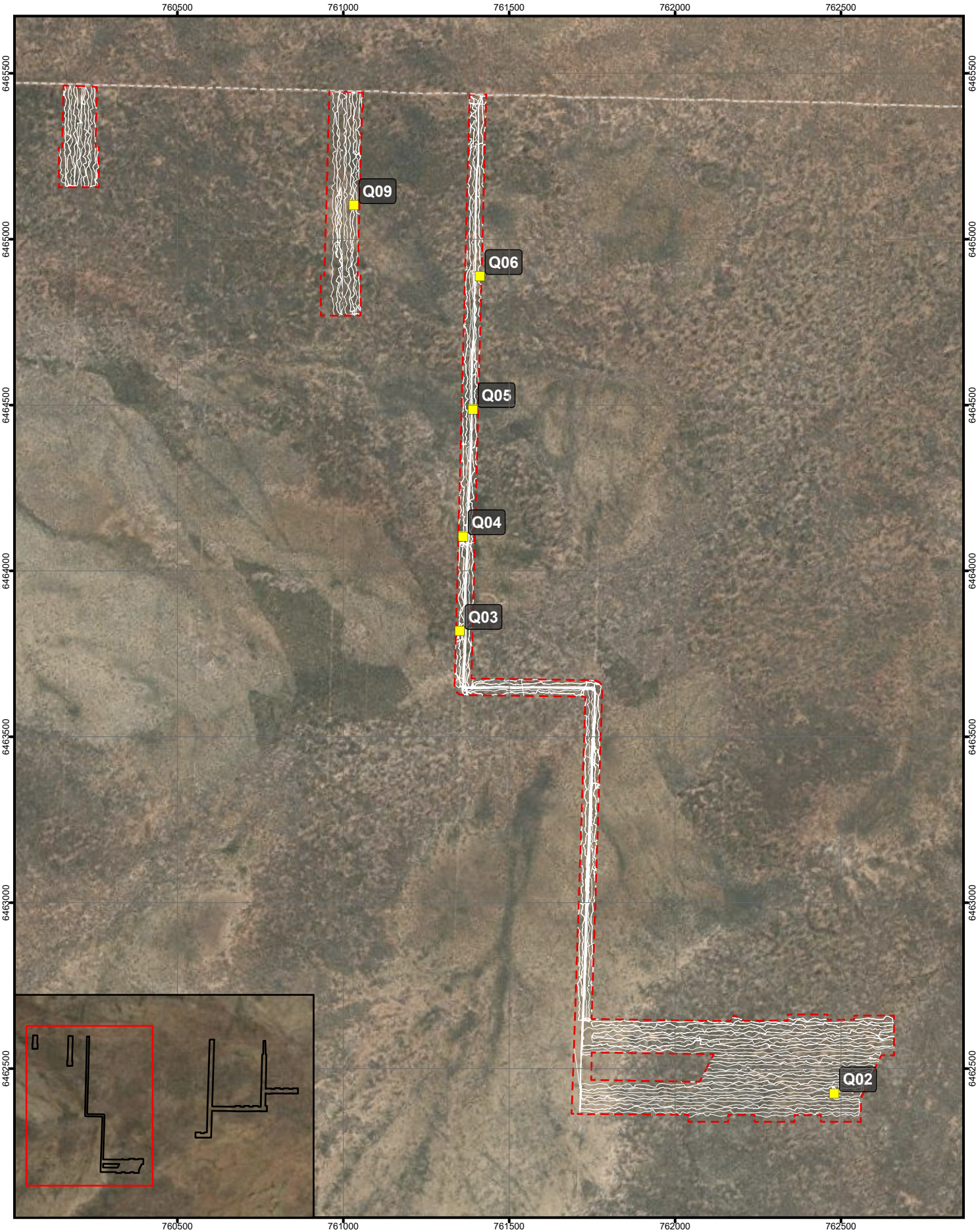
3.4 Limitations

Limitations of the survey are discussed in Table 3.

Table 3 Limitations of the Ecological Surveys

Limitation	Flora and vegetation survey	Fauna survey
Availability of contextual information on the region	**Nil** Contextual resources used to inform the survey include state-wide public datasets and a number of reports and surveys completed by Mattiske and AECOM for the Mt Holland Project.	**Nil** Contextual resources used to inform the survey include NatureMap, DBCA database search results, and previous Projects undertaken by AECOM for WesCEF in the vicinity (AECOM, 2020).
Competency/experience of consultant conducting survey	**Nil** The flora and vegetation surveys were led by Floora de Wit who has more than 14 years' experience conducting surveys of similar scope including three years at Mt Holland.	**Nil** The fauna survey was led by Cassandra House, an ecologist with 5 years of experience conducting surveys of a similar scope.
Proportion of flora/fauna identified, recorded and/or collected (based on sampling, timing and intensity)	**Moderate** The survey was undertaken during the ideal survey season. The area is represented by seven quadrats and two relevés and numerous observation points. Due to diversity of flora, it is likely that with additional sampling more flora species would be identified. The survey emphasised targeting conservation significant flora species for which survey effort was considered suitable.	**Nil** The survey was undertaken during the ideal survey season. Jilbadji Nature Reserve is known for its diversity of fauna species. Additional survey effort would likely identify more fauna species than in this report. A species inventory was not the objective of the survey therefore this is not considered a limitation. The survey emphasised targeting the conservation significant Malleefowl species, for which survey effort was considered suitable.
Completion (is further work needed)	**Moderate** As above. Furthermore, despite the ongoing botanical surveys for the Mt Holland Project, it is possible that more survey effort would identify additional conservation significant flora species, and flora species at the limit or beyond their current known range.	**Nil** The survey objectives were met.

Limitation	Flora and vegetation survey	Fauna survey
Remoteness and/or access issues	**Nil** All areas of the field survey were able to be accessed on foot and/or by vehicle.	**Nil** All areas of the field survey were able to be accessed on foot and/or by vehicle.
Timing, weather, season, cycle	**Nil** The field survey was undertaken within the typical 'ideal survey season' in accordance with EPA (2016) Technical Guidance: Flora and Vegetation Surveys for Environmental Impact Assessment. Weather was predominately sunny during the field survey.	**Nil** The field survey was undertaken within the typical 'ideal survey season' in accordance with EPA (2020) Technical Guidance: Terrestrial vertebrate fauna surveys for environmental impact assessment. Weather was predominately sunny during the field survey.
Disturbances (e.g. fire, flood, accidental human intervention) which affected results of the survey	**Nil** No disturbances were recorded that would impact on the results of the survey.	**Nil** No disturbances were recorded that would impact on the results of the survey.



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LEGEND

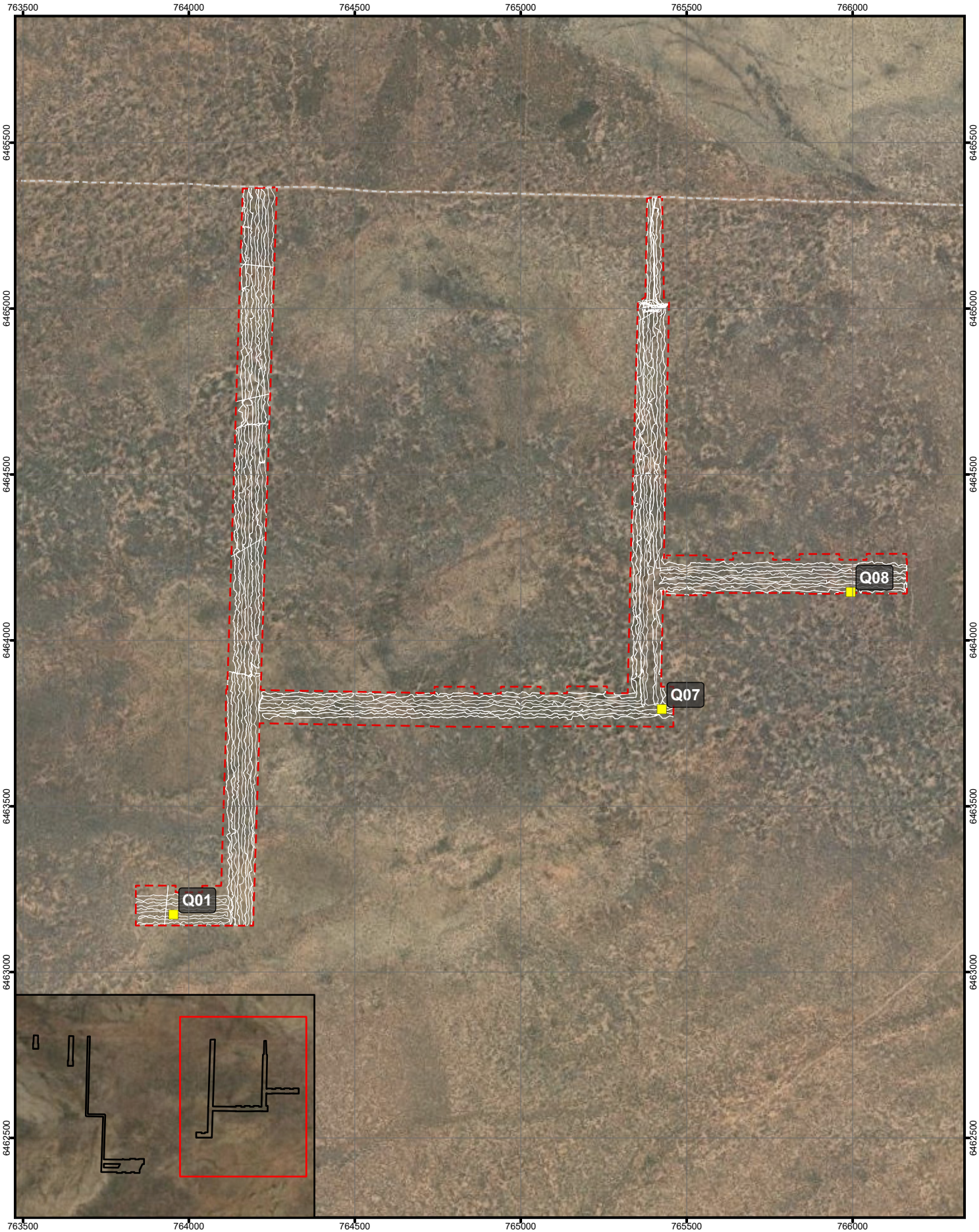
- E77/2236 Survey Area
- Sample Sites
- Tracklog

Survey Effort E77/2236

WESFARMERS CHEMICALS ENERGY AND FERTILISER (WESCEF)

E77/2236 FLORA, VEGETATION AND FAUNA ASSESSMENT

Figure 3.1



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Survey Effort E77/2236

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Figure 3.2

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4.0 Desktop Study Results

4.1 Threatened and Priority Ecological Communities

The database searches identified one Threatened Ecological Community (TEC) and three Priority Ecological Communities (PEC) (Figure 4), none of which are considered likely to occur.

Eucalypt Woodlands of the WA Wheatbelt EPBC TEC Critically Endangered WA PEC P3

Restricted to Wheatbelt region. The survey area lies within the Coolgardie district, also known as The Great Western Woodlands. According to the TEC Conservation Advice (DoE, 2015a) this area is excluded from consideration as the TEC, with the exception of the westernmost fringes.

Plant assemblages of Parker Range System WA PEC P3

Hakea pendula Tall Shrubland is of particular significance. *Eucalyptus sheathiana* with *E. transcontinentalis* and/or *E. eremophila* woodland on sandy soils at the base of ridges and low rises; *E. longicornis* with *E. corrugata* and *E. salubris* or *E. myriadena* woodland on broad flats; *E. salmonophloia* and E. salubris woodland on broad flats; *Allocasuarina acutivalvis* and *A. corniculata* on deeper sandy soils of lateritic ridges; *E. capillosa* subsp. *polyclada* and/or *E. loxophleba* over *Hakea pendens* thicket on skeletal soils on ridges (laterites, breakaways and massive gossanous caps); and *Callitris glaucophylla* low open woodland on massive greenstone ridges.

This PEC is restricted to the Parker range west of Forrestania Road and is therefore considered unlikely to occur.

Ironcap Hills vegetation assemblages (Mt Holland, Middle, North and South Ironcap Hills, Digger Rock and Hatter Hill (greenstone ranges) WA PEC P3

No information is readily available for this PEC. The PEC is restricted to the BIF hills south of the survey area and is therefore unlikely to occur. This is further supported by statistical analysis undertaken by Mattiske Consulting Pty Ltd (2018) where all the Earl Grey Lithium project data was analysed to determine similarity to the Ironcap Hills vegetation. The Early Grey Lithium data was obtained from an area closer to the Ironcap Hills PEC and was found to be dissimilar to the PEC data.

4.2 Conservation Significant Flora

A total of 33 Threatened and Priority flora species were identified in the desktop assessment that are known to occur within 20 km of the survey area. Of these, 17 species are considered likely to occur, eight may occur, and eight species are considered unlikely to occur.

Species considered likely to occur are presented in Table 4.

Results of database searches are provided in Appendix C. The spatial location of desktop assessment results are shown in Figure 4.

Table 4 Threatened and Priority flora considered likely to occur in the survey area

Species	Cons. Code		Habitat (WAH, 1998)
	EPBC	WA	
Acacia lachnocarpa		P1	Recorded on open sandplains under low mallee woodland. Sparse understorey.
Acacia sp. Forrestania (D. Angus DA 3001)		P1	At Mt Holland this taxon appears restricted to one vegetation type as S4mapped by Mattiske (2018), described as Eucalyptus sp. Southern Wheatbelt (D. Nicolle & M. French DN 5507), *Allocasuarina spinosissima, Allocasuarina, acutivalvis* low open mallee woodland over *Hakea invaginata, Melaleuca cordata, Micromyrtus erichsenii* mid sparse shrubland on light orange gravelly clay on upper-mid slopes).
Acacia undosa		P3	Sandy clay loam, clayey sand or loam in open shrub mallee. Undulating plains, low-lying areas.
Baeckea sp. Forrestania (K.R. Newbey 1105)		P1	Sand. Plains.
Banksia shanklandiorum		P4	White/yellow sand with lateritic gravel.
Banksia sphaerocarpa var. *dolichostyla* (Ironcap Banksia)	VU	VU	Lateritic gravel, grey sand.
Brachyloma stenolobum		P1	Associated with yellow sand plains.
Dampiera orchardii		P2	Sand
Drummondita wilsonii		P1	Sand with gravel & pebbles.
Eremophila caerulea subsp. *merrallii*		P4	Sand, clay or loam. Undulating plains.
Eucalyptus exigua		P3	Sandy loam, white sand. Sandplains.
Microcorys elatoides		P1	Grows in a variety of habitats. Appears to prefer disturbed areas.
Microcorys sp. Forrestania (V. English 2004)		P4	Yellow sandy clay or red-brown clay. Open woodland or cleared areas.
Microcybe sp. Windy Hill (G.F. Craig 6583)		P3	Known from Jilbadji Nature Reserve from brown clay-loam flats in mixed Eucalypt woodland.
Rinzia medifila (Parker Range Rinzia)		P1	Yellowish or reddish sandy soils, sometime with laterite or greenstone, in Eucalyptus woodlands, often with Melaleuca.
Verticordia gracilis		P3	Yellow sand, gravelly sand, sandy loam.
Verticordia stenopetala		P3	Yellow sand, sometimes with gravel. Undulating plains.

EPBC Act Commonwealth Environment Protection and Biodiversity Conservation Act, 1999: VU Vulnerable

WA Western Australia Biodiversity Conservation Act 2016: VU Vulnerable P Priority 1, P2, P3, P4

4.3 Conservation Significant Fauna

Eight conservation significant fauna species were identified during the desktop assessment including three species listed as Vulnerable under the EPBC Act, and four species listed as Priority, and one species listed as Other Specially Protected Fauna.

Based on the review of historical records and preferred habitat, it has been determined that five fauna species of conservation significance are likely to utilise the survey area. Two species may occur, and one species is considered unlikely to occur. Species likely to occur are listed in Table 4, with the comprehensive search results presented in Appendix C.

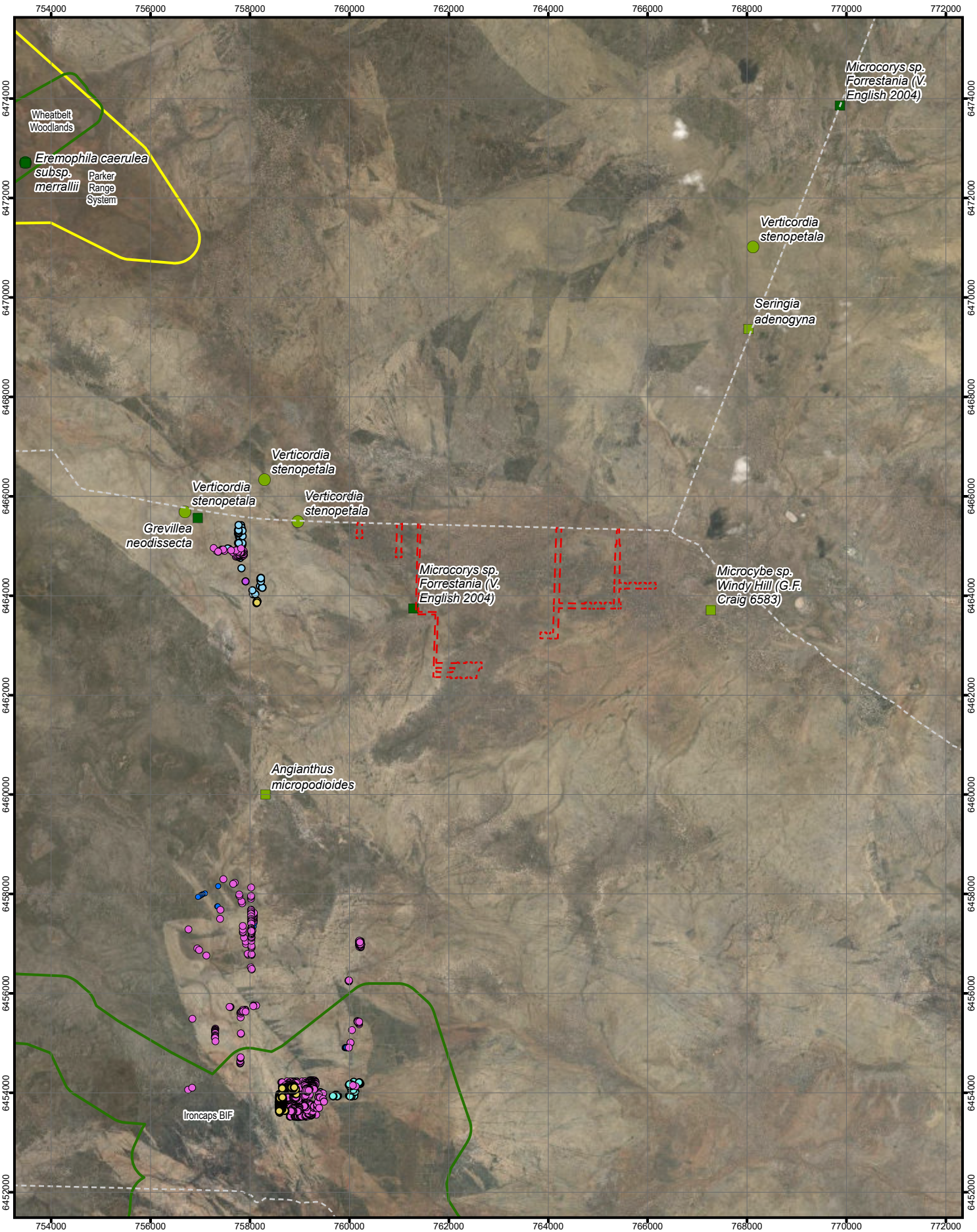
Conservation significant fauna species locations are shown in Figure 4.

Table 5 Threatened and Priority fauna considered likely to utilise the survey area

Scientific Name	Common Name	EPBC Act	WA	Ecology
Dasyurus geoffroii	Chuditch	VU	VU	It currently only occurs in areas dominated by sclerophyll forest or drier woodland, heath and mallee shrubland (Van Dyck & Strahan, 2008). The Chuditch requires adequate numbers of suitable den and refuge sites (horizontal hollow logs or earth burrows) and sufficient prey biomass (large invertebrates, reptiles and small mammals) to survive.
Leipoa ocellata	Malleefowl	VU	VU	The Malleefowl is found principally in the semi-arid to arid zone in shrublands and low woodlands dominated by mallee and associated habitats such as such as Broombush (*Melaleuca uncinata*) and Scrub Pine (*Callitris verrucosa*). In WA Malleefowl distribution was associated with landscapes that had lower rainfall, greater amounts of mallee and shrubland that occur as large remnants, and lighter soil surface textures (Benshemesh, 2007). At a finer scale, malleefowl occurrence was associated with mallee/shrubland and thicket vegetation with woodland representing poor habitat for the species (Parsons, 2008).
Falco peregrinus	Peregrine Falcon		OS	The Peregrine Falcon is a medium-sized raptor (length 35-55cm; wingspan 80-105cm) with slate-grey back, a striking charcoal black head and face which contrast with a pale cream bib on the neck and breast (Birdlife Australia, 2018). A well-known falcon, the Peregrine inhabits a vast array of environs in Australia. Usually uncommon and migratory (Pizzey & Knight, 2007). This species lays its eggs in recesses of cliff faces, tree hollows or large abandoned nests (Bamford, 2009)
Notamacropus irma	Western Brush Wallaby		P4	The Western Brush-wallaby occurs in the south-west of Western Australia. Its preferred habitat consists of open sclerophyll forest or woodland and favours open flats over scrub thickets. However, it doesn't seem to venture into open pasture areas adjacent it's bushland refuges. It is also found in larger areas of mallee and heathland in the wheat belt and is uncommon in wet sclerophyll forest (Van Dyck & Strahan, 2008).
Platycercus icterotis	Western Rosella		P4	Prefer wooded habitat with *Allocasuarina*, *Eucalyptus salmonophloia* and *wandoo*. Also observed in cleared areas with crops in the wheatbelt and adjoining vegetation.

EPBC VU Vulnerable

WA VU Vulnerable, OS Other Specially Protected, P Priority 1, P2, P3, P4



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LEGEND

- E77/2236 Survey Area
- *Acacia lachnocarpa*
- *Acacia undosa*
- *Calamphoreus inflatus*
- *Grevillea neodissecta*
- *Malleefowl*
- *Microcorys aff. obovata*
- *Microcorys elatoides*
- *Verticordia stenopetala*

WA Herbarium database (WAHERB)
- P3
- P4

Threatened and Priority Flora database (TPFL)
- P3
- P4

TEC / PEC
- Vulnerable
- Priority 3

Desktop Study Results E77/2236

WESFARMERS CHEMICALS ENERGY AND FERTILISER (WESCEF)

E77/2236 FLORA, VEGETATION AND FAUNA ASSESSMENT

Figure 4

5.0 Field Survey Results

5.1 Vegetation

5.1.1 Threatened and Priority Ecological Communities

No TECs were recorded and none were anticipated to occur. Similarly, no PECs were recorded. PECs in the region are restricted to specific land systems, none of which occur in the survey area.

5.1.2 Vegetation Communities

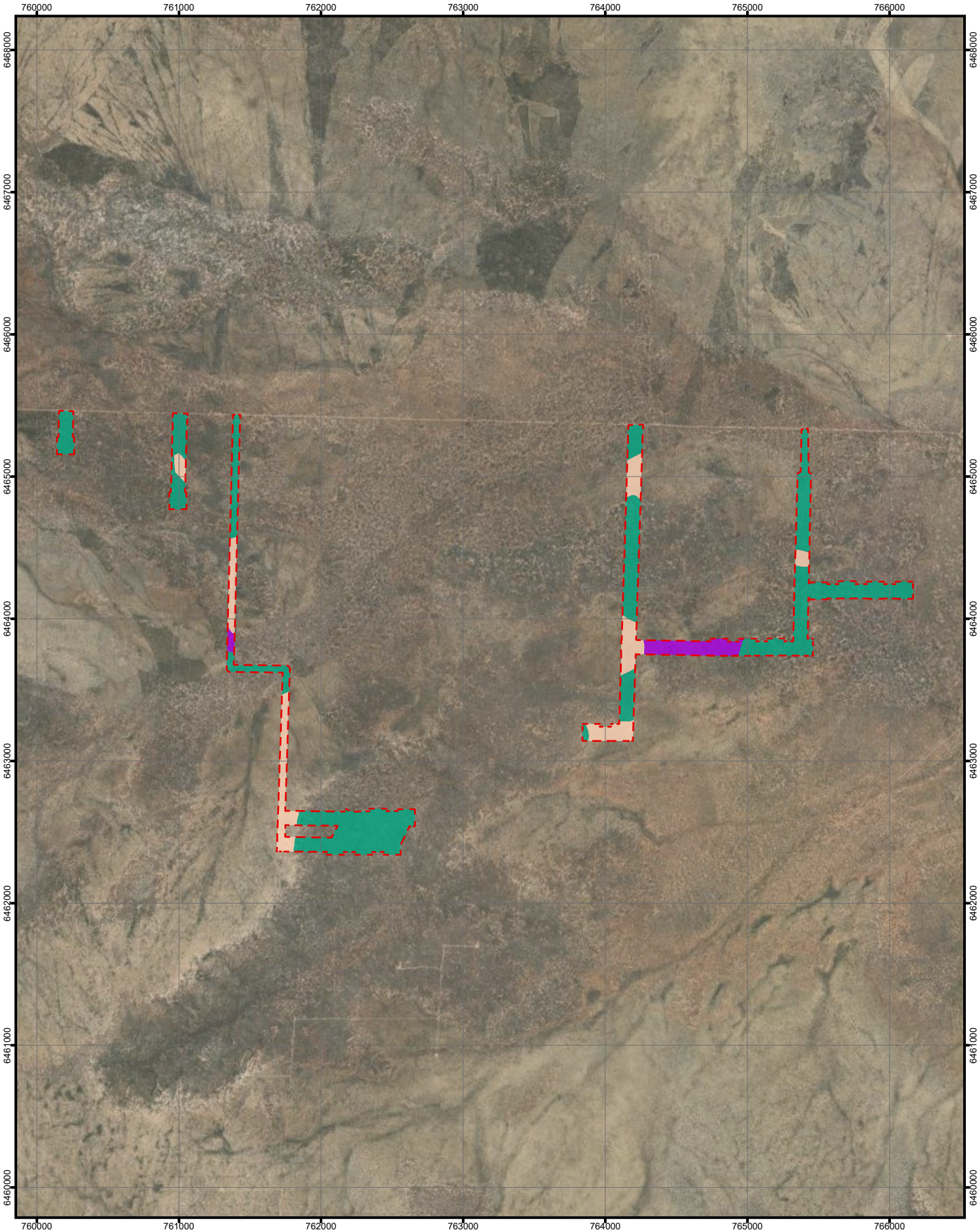
Three native vegetation communities were defined and mapped including one shrubland and two woodlands, described in Table 6 and mapped in Figure 5.

Delineation of vegetation communities was supported by analysing the similarity of floristics across the nine sites. The outcome of the analysis was inconclusive, likely attributed to the diverse range of Eucalypts and Melaleuca species present.

Table 6 Vegetation community details

Description	Additional Detail	Photograph
AeSy Mixed Shrubland *Acacia enervia* subsp. *explicata, Thryptomene kochii* and *Grevillea didymobotrya* subsp. *didymobotrya* tall shrubland over *Stylidium yilgarnense, Dampier angulata* subsp. Peak Charles (K.R. newbey 5402) and *Drosera macrantha* low isolated herbs. Dense to open shrubland with high diversity of sclerophyllous shrubs. Includes areas dominated by Priority flora including *Grevillea marriottii* (P1), *Chamelaucium* sp. Parker Range (B.H. Smith 1255) (P1), *Grevillea neodissecta* (P4) and *Verticordia gracilis* (P3).	Survey effort: 1, 4, 5, 9 Species richness: 45 native species Extent:23.92 ha	
EsMpDa Eucalypt Woodland *Eucalyptus salmonophloia, Eucalyptus longicornis* and *Eucalyptus flocktoniae* subsp. *flocktoniae* tall open woodland over *Melaleuca pauperiflora* and *Melaleuca johnsonii* low woodland over *Daviesia argillacea, Acacia deficiens* and *Westringia cephalantha* low open shrubland. Lacks groundcover. Mostly on clay loam red soils. Includes large variation of *Melaleuca* and *Eucalyptus* species in overstorey.	Survey effort: 2, 6, 7, 8 Species richness: 44 native species Extent: 79.08 ha	

Description	Additional Detail	Photograph
MlOm Melaleuca Woodland *Melaleuca lateriflora, Melaleuca sheathiana* and *Eucalyptus comitae-vallis*, low woodland over *Olearia muelleri, Grevillea huegelii* and *Alyxia buxifolia*.	Survey effort: 3 Species richness: 11 native species Extent: 7.80 ha	



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LEGEND
- E77/2236 Survey Area
- Eucalypt Woodland - EsMpDa
- Melaleuca Woodland - MlOm
- Mixed Shrubland - AeSy

Vegetation Communities E77/2236

WESFARMERS CHEMICALS ENERGY AND FERTILISER (WESCEF)

E77/2236 FLORA, VEGETATION AND FAUNA ASSESSMENT

Figure 5

5.2 Flora

5.2.1 Species Inventory

A total of 88 native flora species were recorded during the field survey representing 43 genera and 22 families. The best represented families were Myrtaceae (25 species), Fabaceae (17 species) and Proteaceae (11 species).

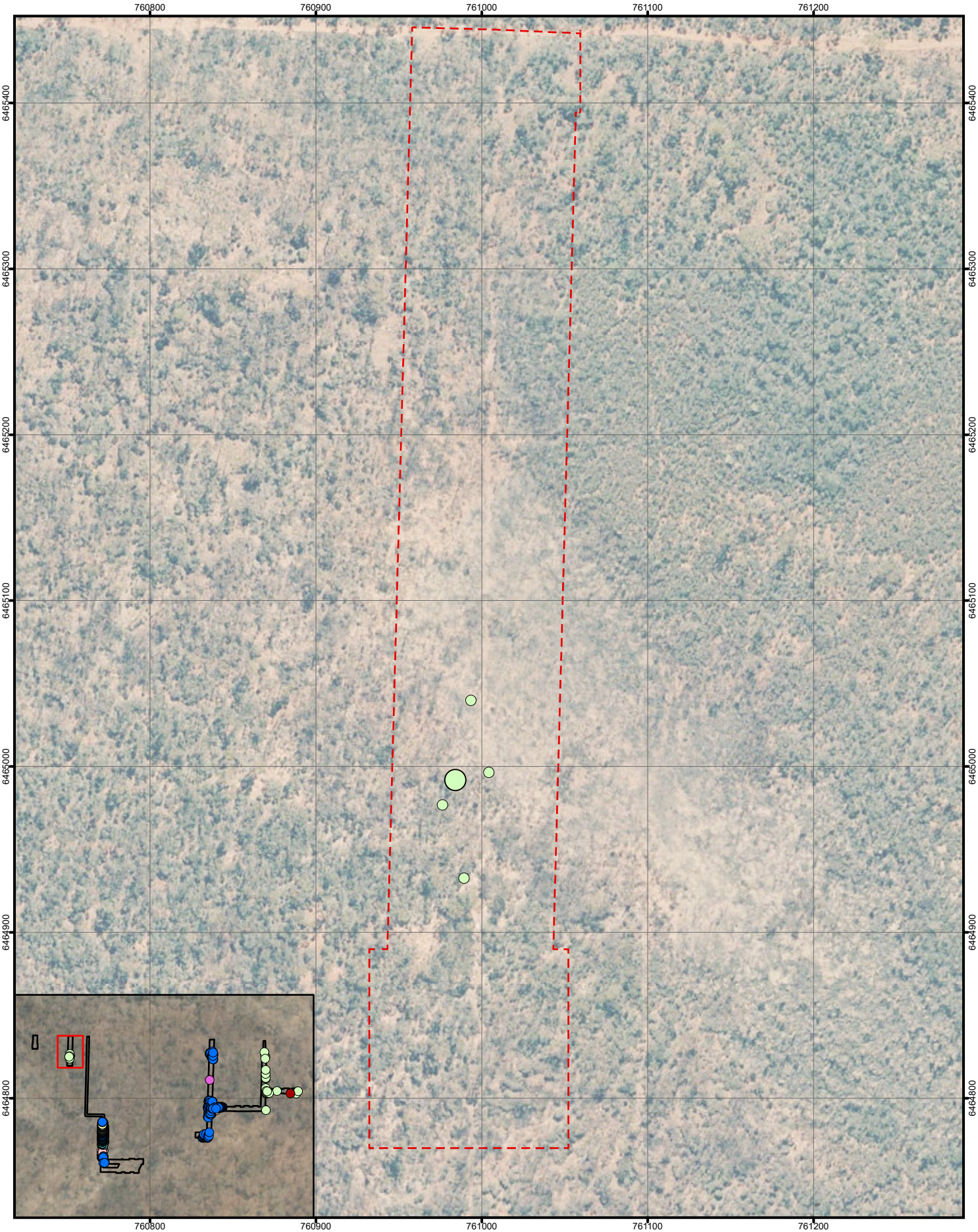
A species by family matrix is presented in Appendix D and quadrat data is presented in Appendix E.

5.2.2 Conservation Significant Flora

No species listed as threatened under the EPBC Act or BC Act were recorded. Seven Priority flora species were recorded within the survey area, summarised in Table 7 and mapped in Figure 6.

Table 7 Summary of Priority flora recorded in the survey area

Species	Individuals
Acacia asepala (P2) In flower at the time of survey. Very similar to *Acacia nyssophylla*. Sampled and confirmed by Mike Hislop (ACC/9130/E). Recorded at the eastern extent of the survey area across numerous locations in low numbers.	71
Chamelaucium sp. Parker Range (B.H. Smith 1255) (P1) Sterile, familiarised at a known population with Mattiske at start of survey. Sample identified by Mike Hislop (ACC/9130/E). Recorded at one distinct sandplain heath community.	468
Eucalyptus exigua (P3) Not recognised as Priority species during survey. Sample identified by Mike Hislop (ACC/9364/E). Foliage cover of 2% indicates more than 1 individual.	2-5
Grevillea marriottii (P1) In flower at the time of survey. Easily distinguished from unique characteristics. Recorded at one distinct sandplain heath community. This species has not been recorded within 20 km of the survey area.	611
Grevillea neodissecta (P4) Recorded numerous times at Mt Holland previously. Easily distinguished from unique characteristics. This species was recorded at four distinct patches where it was locally common. At some locations the majority of individuals were dead or mostly dead.	1035
Microcorys elatoides (P1) Recorded numerous times at Mt Holland previously. Easily distinguished from unique characteristics. Only recorded at one location.	2
Verticordia gracilis (P3) Sterile at the time of the survey. Collected and confirmed by Mike Hislop (ACC/3190/E). Recorded at three distinct locations on sandplains associated with heath shrubland.	203



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LEGEND

- E77/2236 Survey Area
- *Grevillea marriottii* P1
- *Microcorys elatoides* P1
- *Acacia asepala* P2
- *Chamelaucium* sp. Parker Range (B.H. Smith 1255) P3
- *Eucalyptus exigua* P3
- *Verticordia gracilis* P3
- *Grevillea neodissecta* P4

Abundance

- 1 - 5
- 6 - 25
- > 25

Conservation Significant Flora E77/2236

WESFARMERS CHEMICALS ENERGY AND FERTILISER (WESCEF)

E77/2236 FLORA, VEGETATION AND FAUNA ASSESSMENT

Figure 6.1

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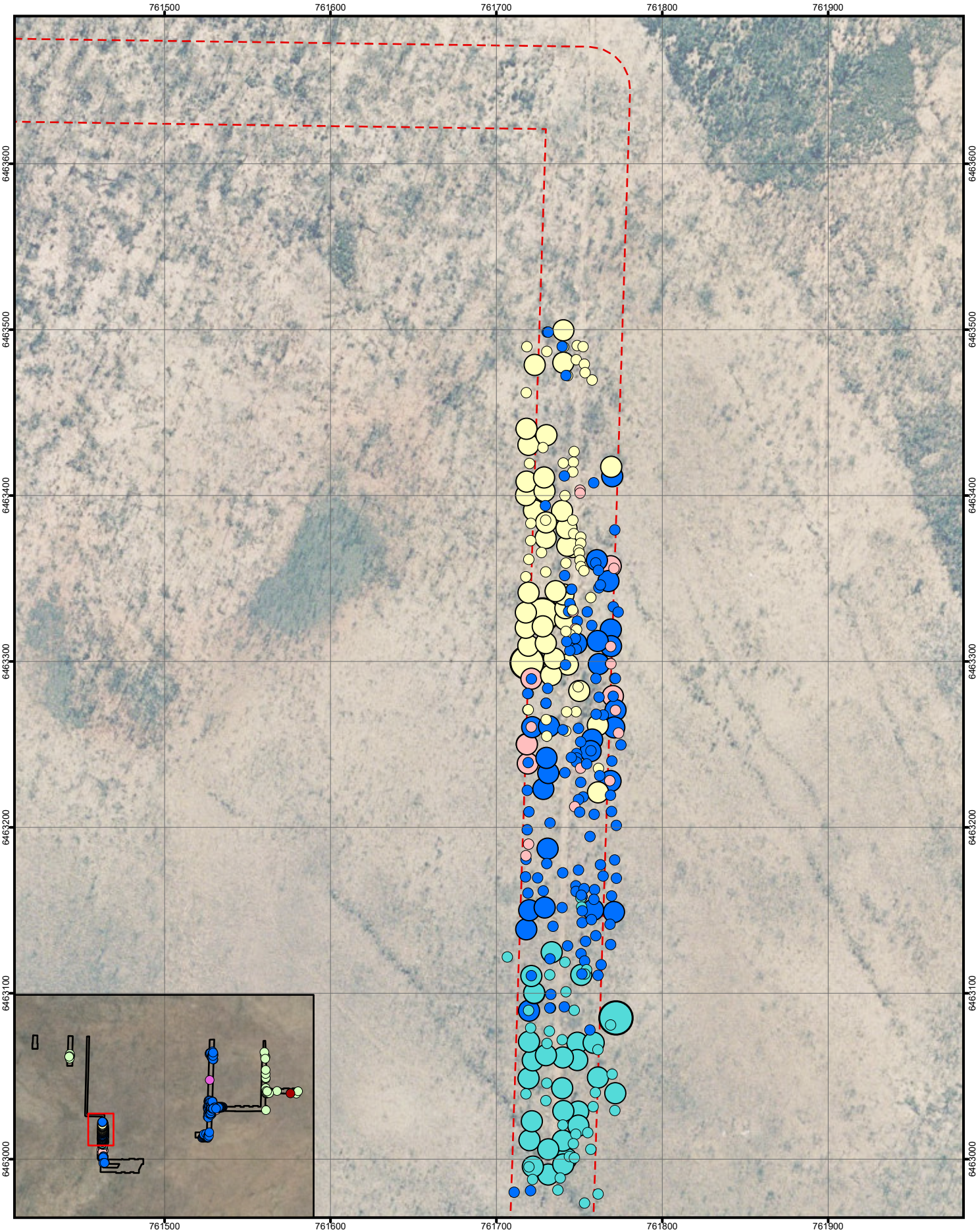

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Data sources:

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LEGEND

- E77/2236 Survey Area
- *Grevillea marriottii* P1
- *Microcorys elatoides* P1
- *Acacia asepala* P2
- *Chamelaucium* sp. Parker Range (B.H. Smith 1255) P3
- *Eucalyptus exigua* P3
- *Verticordia gracilis* P3
- *Grevillea neodissecta* P4

Abundance

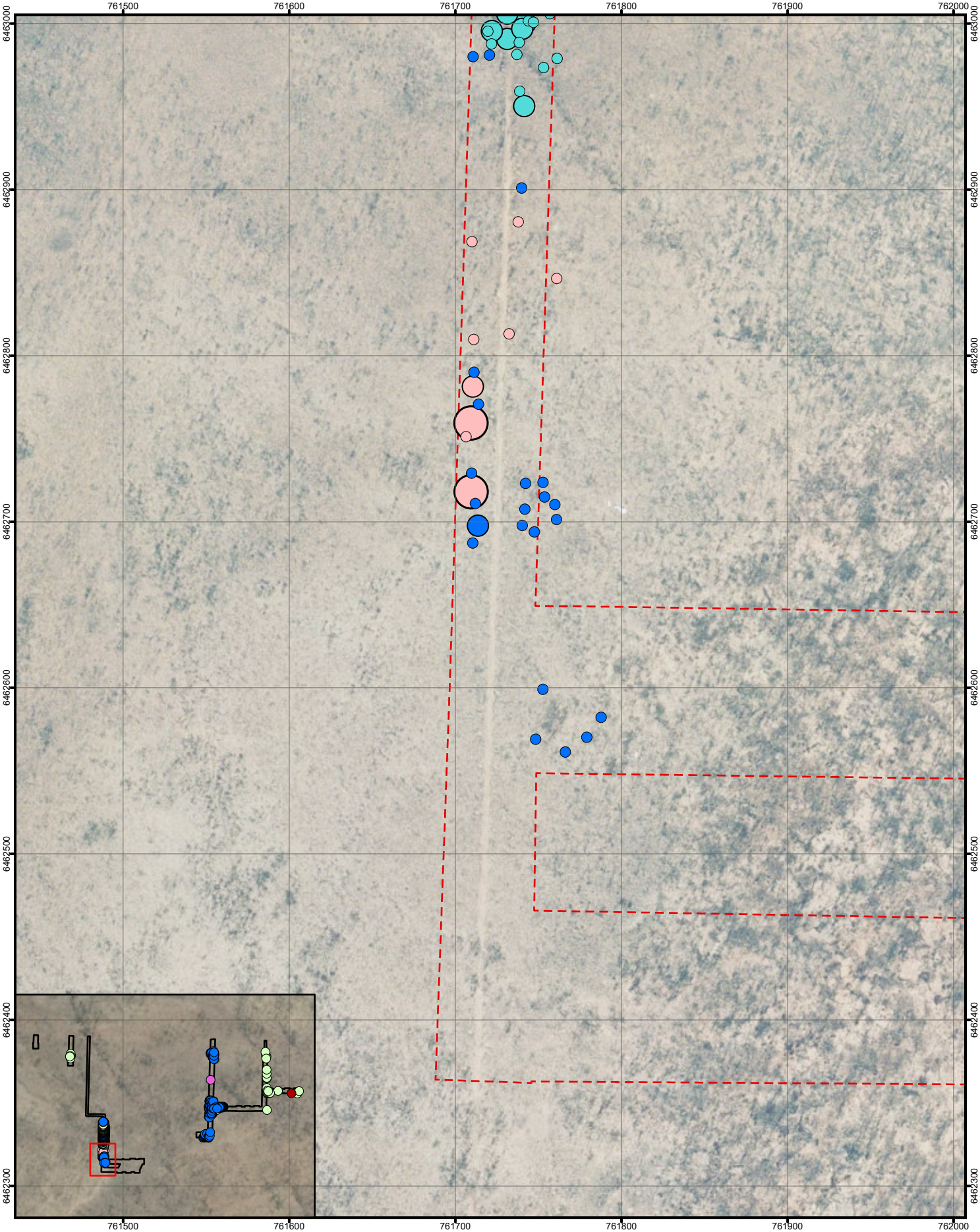
- 1 - 5
- 6 - 25
- > 25

Conservation Significant Flora E77/2236

WESFARMERS CHEMICALS ENERGY AND FERTILISER (WESCEF)

E77/2236 FLORA, VEGETATION AND FAUNA ASSESSMENT

Figure 6.2



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LEGEND

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- *Microcorys elatoides* P1
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- *Eucalyptus exigua* P3
- *Verticordia gracilis* P3
- *Grevillea neodissecta* P4

Abundance
1 - 5
6 - 25
> 25

Conservation Significant Flora E77/2236

WESFARMERS CHEMICALS ENERGY AND FERTILISER (WESCEF)

E77/2236 FLORA, VEGETATION AND FAUNA ASSESSMENT

Figure 6.3

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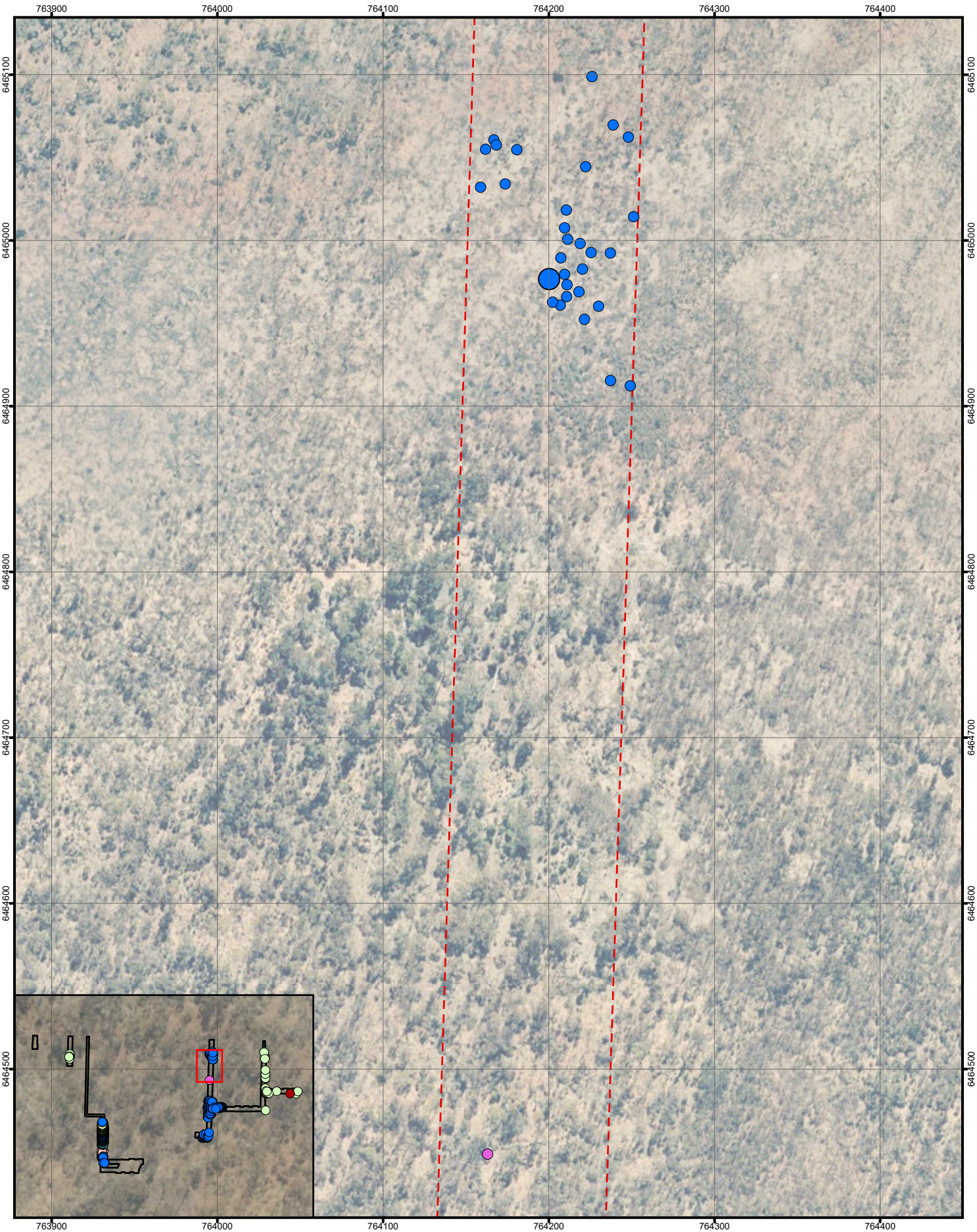

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LEGEND

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- *Microcorys elatoides* P1
- *Acacia asepala* P2
- *Chamelaucium* sp. Parker Range (B.H. Smith 1255) P3
- *Eucalyptus exigua* P3
- *Verticordia gracilis* P3
- *Grevillea neodissecta* P4

Abundance

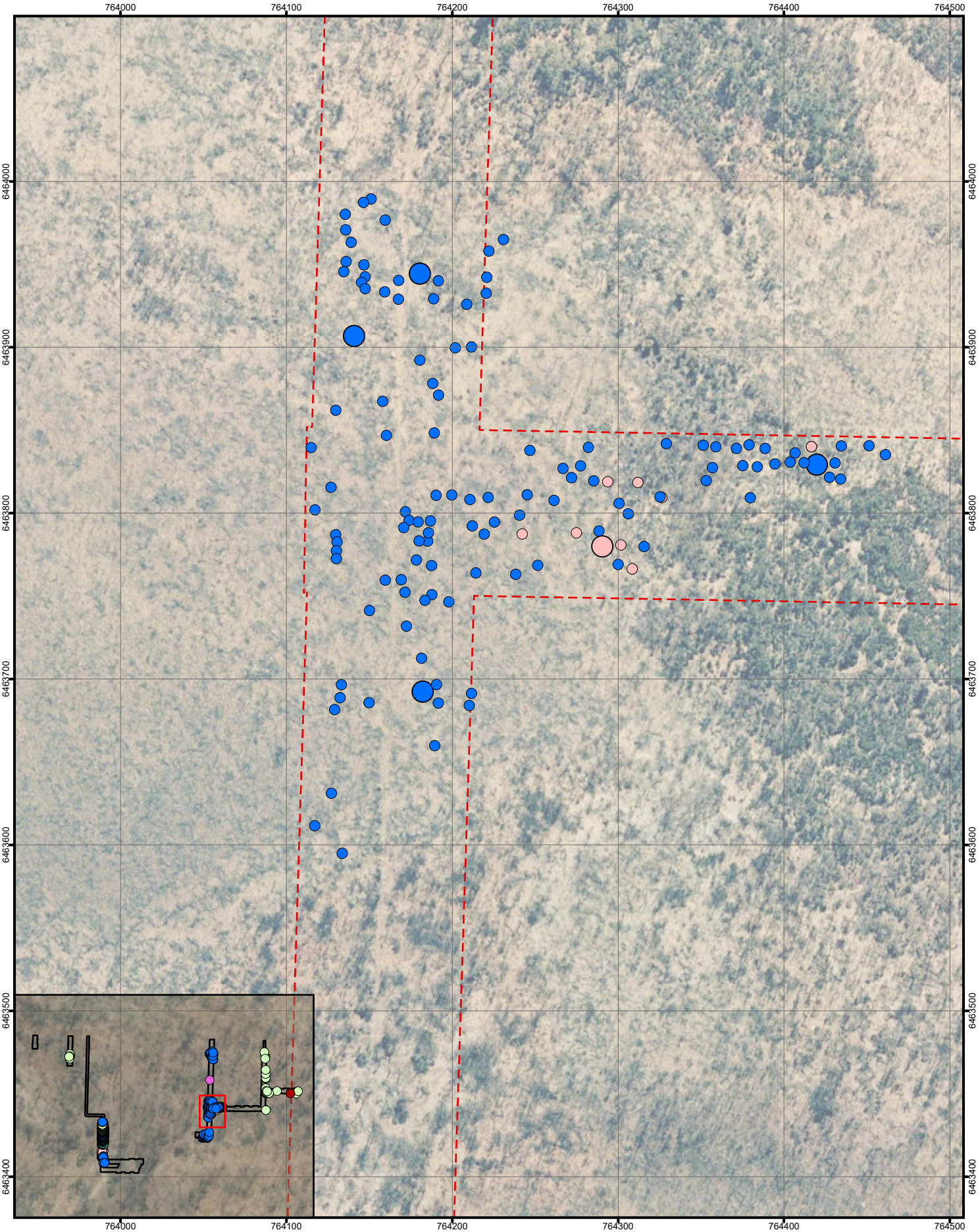
- 1 - 5
- 6 - 25
- > 25

Conservation Significant Flora E77/2236

WESFARMERS CHEMICALS ENERGY AND FERTILISER (WESCEF)

E77/2236 FLORA, VEGETATION AND FAUNA ASSESSMENT

Figure 6.4



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LEGEND

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- *Microcorys elatoides* P1
- *Acacia asepala* P2
- *Chamelaucium* sp. Parker Range (B.H. Smith 1255) P3
- *Eucalyptus exigua* P3
- *Verticordia gracilis* P3
- *Grevillea neodissecta* P4

Abundance

- 1 - 5
- 6 - 25
- > 25

Conservation Significant Flora E77/2236

WESFARMERS CHEMICALS ENERGY AND FERTILISER (WESCEF)

E77/2236 FLORA, VEGETATION AND FAUNA ASSESSMENT

Figure 6.5

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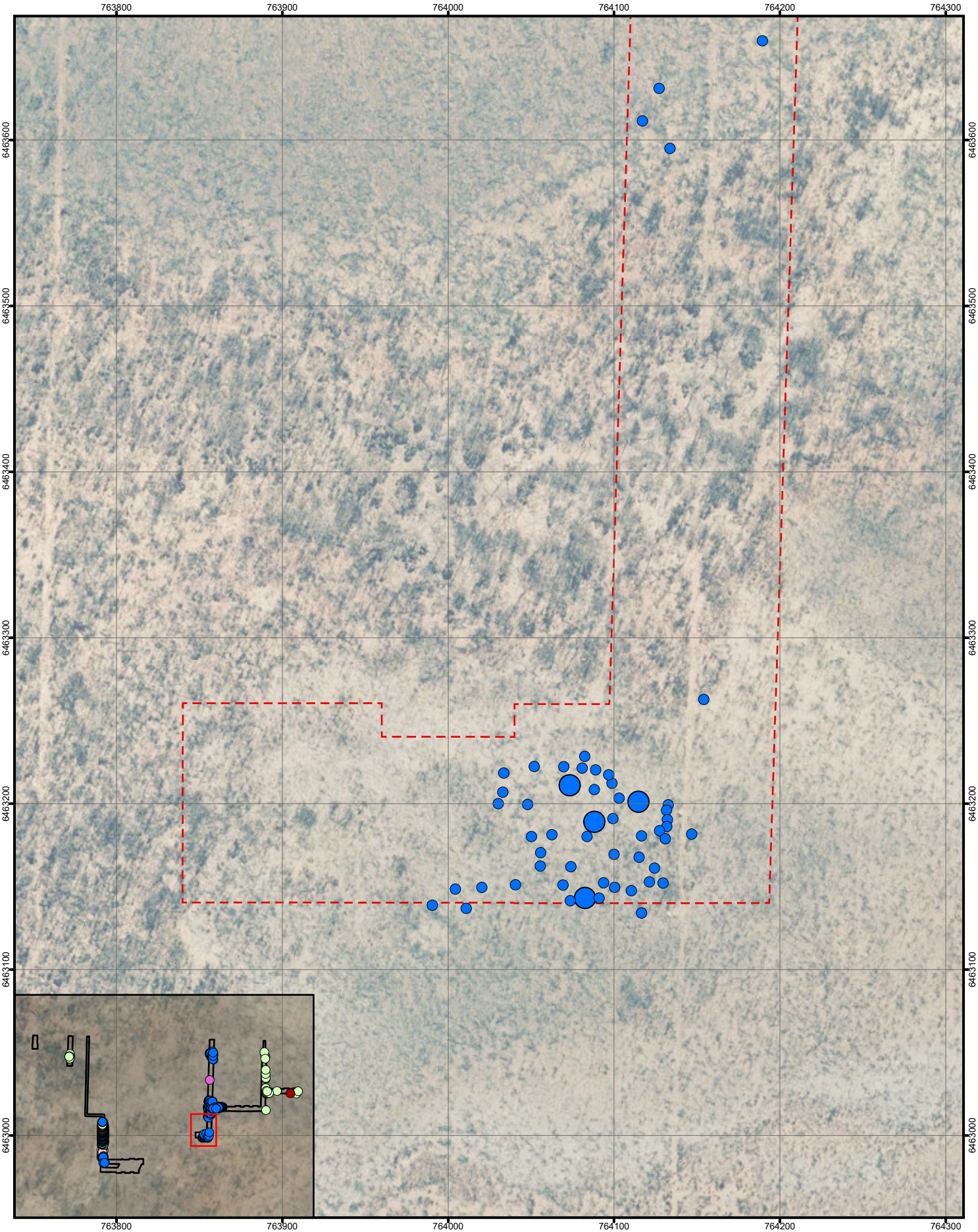

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Data sources:

Base Data: (c) Based on information provided by and with the permission of the Western Australian Land Information Authority trading as Landgate (2010).Geoscience Australia, Streetpro

LEGEND

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- *Grevillea marriottii* P1
- *Microcorys elatoides* P1
- *Acacia asepala* P2
- *Chamelaucium* sp. Parker Range (B.H. Smith 1255) P3
- *Eucalyptus exigua* P3
- *Verticordia gracilis* P3
- *Grevillea neodissecta* P4

Abundance

- 1 - 5
- 6 - 25
- > 25

Conservation Significant Flora E77/2236

WESFARMERS CHEMICALS ENERGY AND FERTILISER (WESCEF)

E77/2236 FLORA, VEGETATION AND FAUNA ASSESSMENT

Figure 6.6

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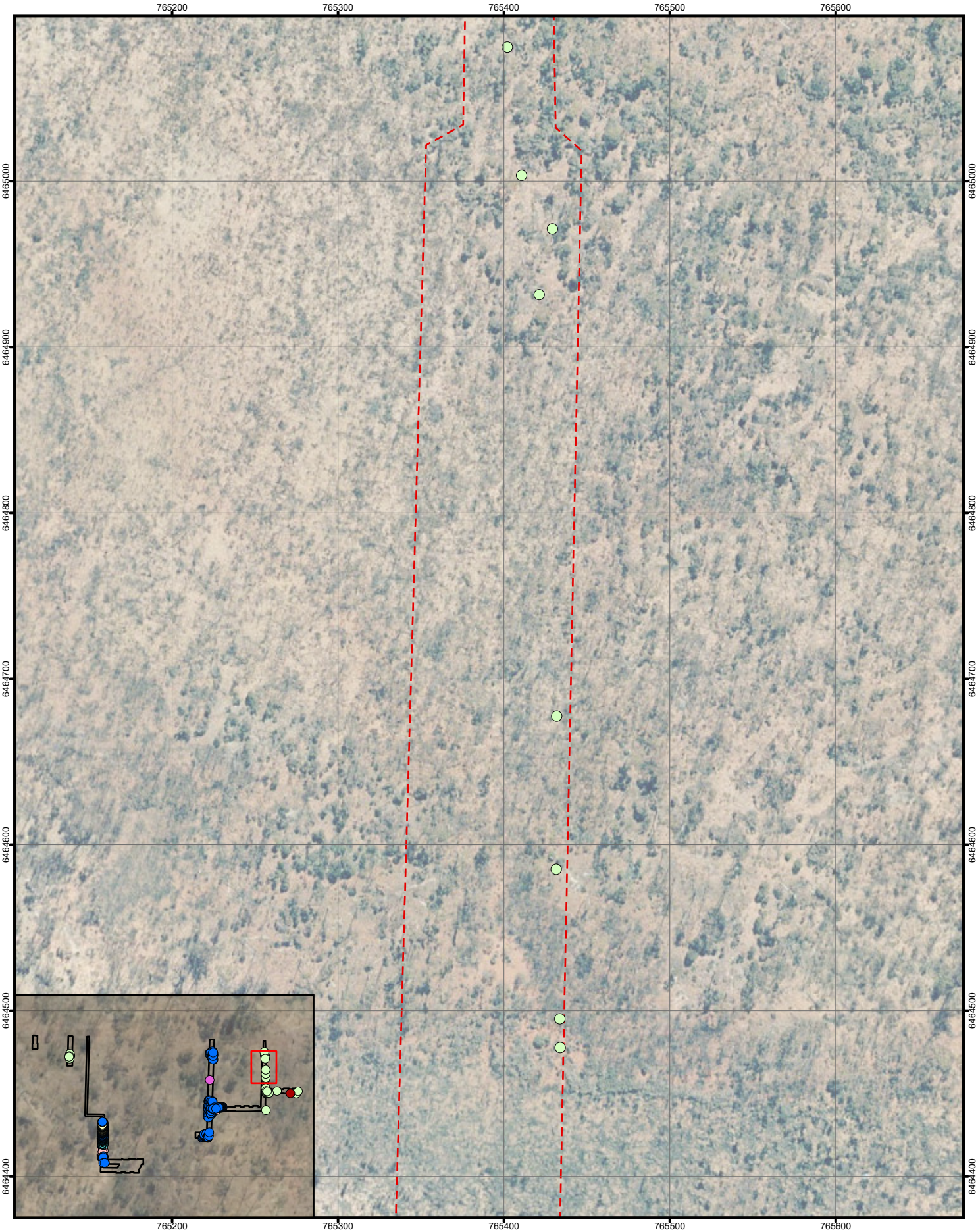

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LEGEND
- E77/2236 Survey Area
- *Grevillea marriottii* P1
- *Microcorys elatoides* P1
- *Acacia asepala* P2
- *Chamelaucium* sp. Parker Range (B.H. Smith 1255) P3
- *Eucalyptus exigua* P3
- *Verticordia gracilis* P3
- *Grevillea neodissecta* P4

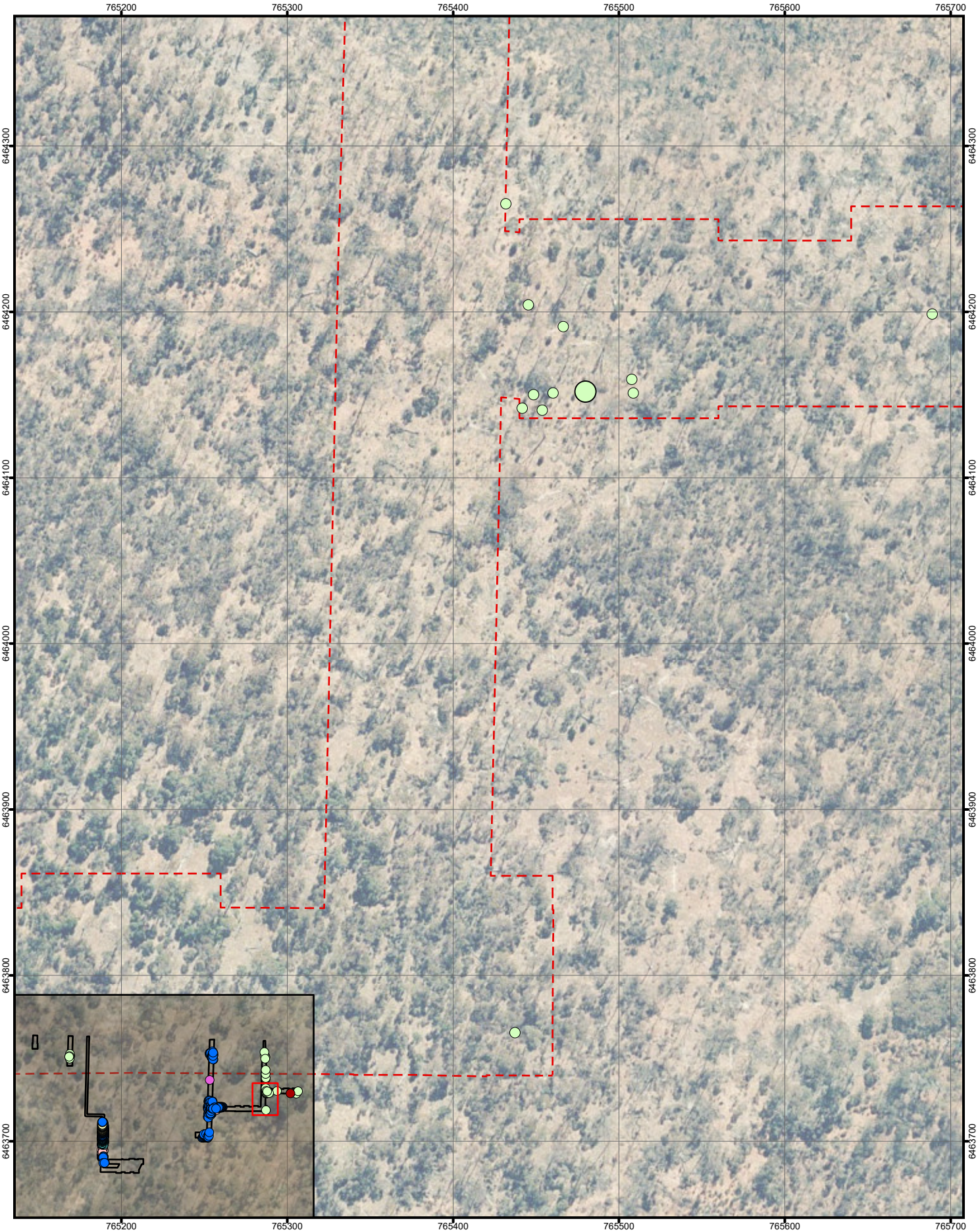
Abundance
- 1 - 5
- 6 - 25
- > 25

Conservation Significant Flora E77/2236

WESFARMERS CHEMICALS ENERGY AND FERTILISER (WESCEF)

E77/2236 FLORA, VEGETATION AND FAUNA ASSESSMENT

Figure 6.7



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LEGEND

- E77/2236 Survey Area
- *Grevillea marriottii* P1
- *Microcorys elatoides* P1
- *Acacia asepala* P2
- *Chamelaucium* sp. Parker Range (B.H. Smith 1255) P3
- *Eucalyptus exigua* P3
- *Verticordia gracilis* P3
- *Grevillea neodissecta* P4

Abundance

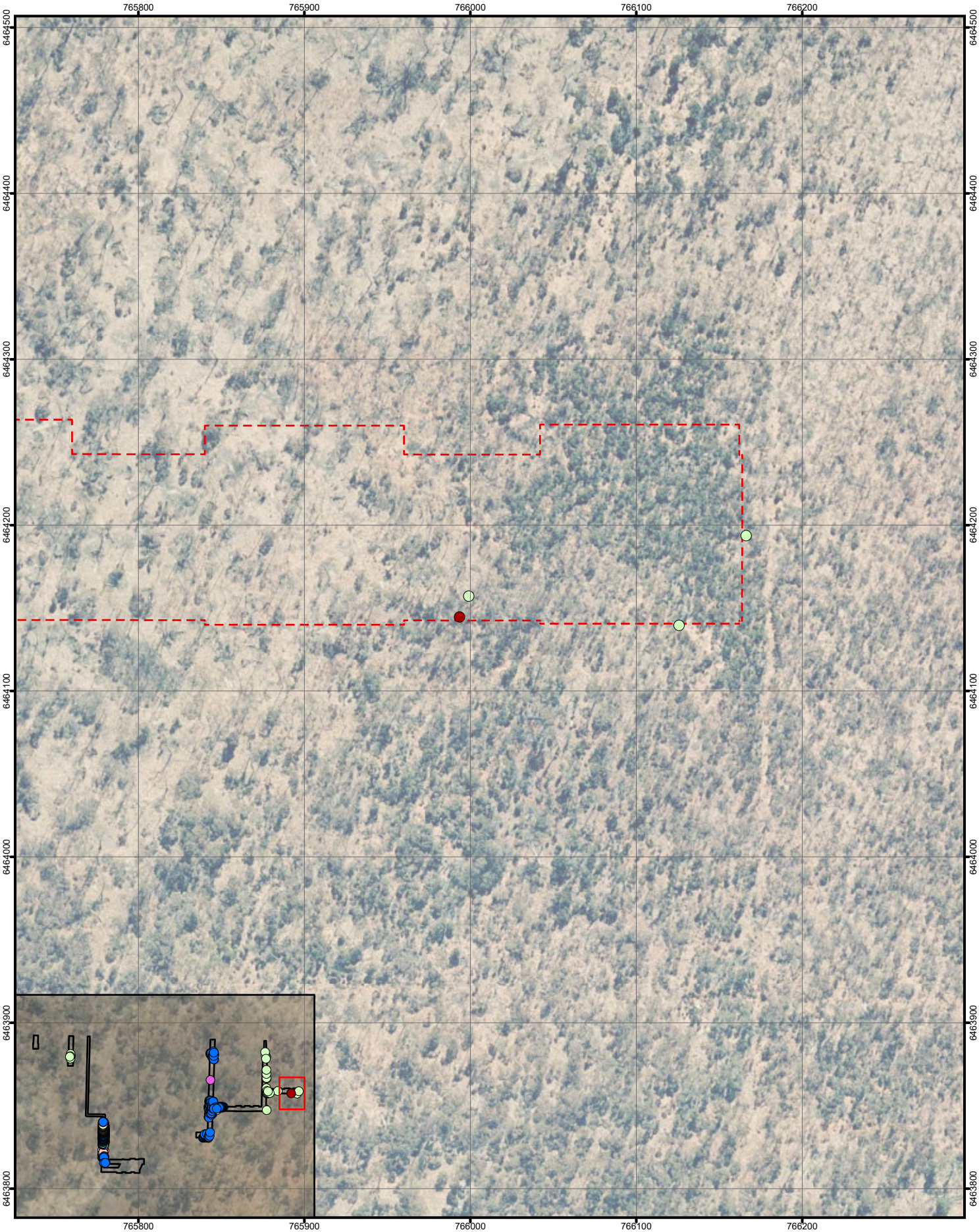
- 1 - 5
- 6 - 25
- > 25

Conservation Significant Flora E77/2236

WESFARMERS CHEMICALS ENERGY AND FERTILISER (WESCEF)

E77/2236 FLORA, VEGETATION AND FAUNA ASSESSMENT

Figure 6.8



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Data sources:

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LEGEND

- E77/2236 Survey Area
- *Grevillea marriottii* P1
- *Microcorys elatoides* P1
- *Acacia asepala* P2
- *Chamelaucium* sp. Parker Range (B.H. Smith 1255) P3
- *Eucalyptus exigua* P3
- *Verticordia gracilis* P3
- *Grevillea neodissecta* P4

Abundance

- 1 - 5
- 6 - 25
- > 25

Conservation Significant Flora E77/2236

WESFARMERS CHEMICALS ENERGY AND FERTILISER (WESCEF)

E77/2236 FLORA, VEGETATION AND FAUNA ASSESSMENT

Figure 6.9

5.3 Fauna Species

No fauna species listed as Priority by DBCA were recorded. No introduced species were recorded. Twelve fauna species were recorded over the field survey including two mammal, one reptile and nine bird species:

- Dingo - *Canis familiaris dingo*
- Western Grey Kangaroo - *Macropus fuliginosus*
- Gould's Monitor – *Varanus gouldii gouldii*
- Emu - *Dromaius novae-hollandiae*
- Inland Thornbill - *Acanthiza apicalis*
- Malleefowl - *Leipoa ocellata* – listed as Vulnerable under the EPBC Act and BC Act
- Red Wattlebird - *Anthochaera carunculata*
- Splendid Fairy Wren - *Malurus splendens*
- Weebill - *Smicrornis brevirostris*
- Wedge-tailed Eagle - *Aquila audax*
- White-browed Scrubwren – *Sericornis frontalis*
- Willie Wagtail - *Rhipidura leucophrys.*

5.4 Fauna Habitat

The survey area supports three fauna habitats, including Melaleuca Low Woodland, Open to Dense Shrubland and Eucalyptus Woodland. These habitats are described in Table 8 and mapped in Figure 7.

The survey area supports habitat that may be utilised by the five conservation significant fauna species identified as likely to occur in the desktop assessment, including:

- Chuditch *Dasyurus geoffroii* (EPBC & WA Vulnerable) – 110.8 ha
- Western Brush Wallaby *Notamacropus irma* (WA P4) – 110.8 ha
- Peregrine Falcon *Falco peregrinus* (WA Other Specially Protected Species) – 79.08 ha
- Malleefowl *Leipoa ocellata* (EPBC & WA Vulnerable) – 110.8 ha
- Western Rosella *Platycercus icterotis* (WA P4)– 79.08 ha.

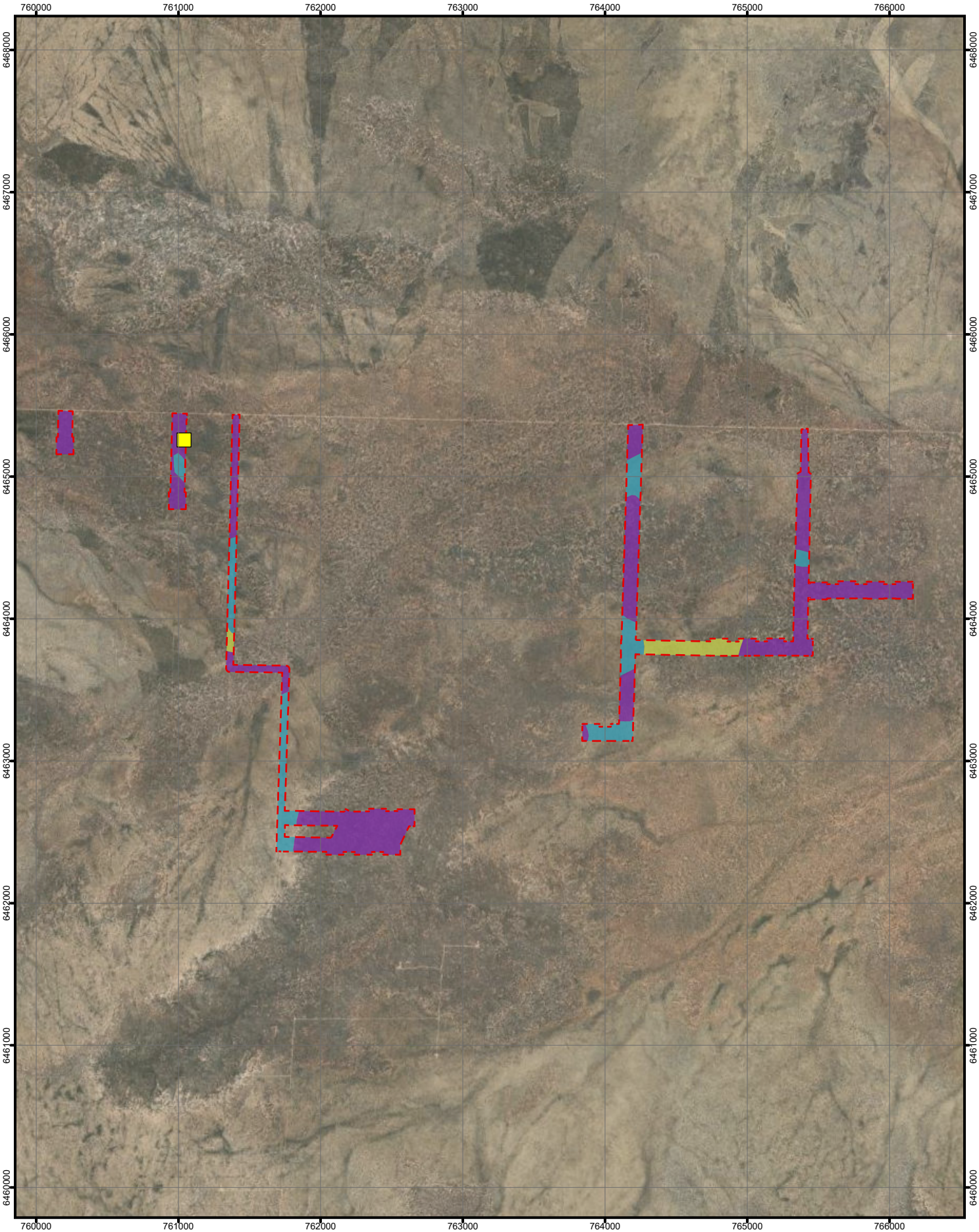
One active Malleefowl mound was recorded in the survey area (Plate 1 and Figure 7). Evidence to suggest the mound was active or recently used includes the height of the walls of the mound, recently disturbed dirt around the edges of the mound and the presence of a large amount of organic matter within the mound. These factors indicate that the mound has likely been maintained in the previous breeding season and may have been being prepared for the upcoming breeding season. Egg laying for this species generally begins in September and continues through the summer months (NMRT, 2022).

Plate 1 Active Malleefowl Mound

Table 8 Fauna habitats within the survey area

Description	Photos
Open to Dense Shrubland Shrubland that varies in both density and height with some areas very low and open and others dense and tall. Ample fine leaf litter is present throughout. No hollows or large logs observed. Logs <10cm are common, Coarse and fine litter are both abundant. Loamy clay soil with some gravel on surface. Area: 23.92 ha Fauna species that may utilise this habitat include: • Chuditch *Dasyurus geoffroii* • Western Brush Wallaby *Notamacropus Irma* • Malleefowl *Leipoa ocellata.*	
Eucalyptus Woodland Eucalyptus woodland varying in understory from denser areas of Melaleuca thickets to open Acacia shrubland. The habitat type generally contains an understorey of lower shrubs scattered throughout areas of bare clay loam soils, scattered with fallen timber and small to large logs. Provides moderate to high structural complexity. Area: 79.08 ha Fauna species that may utilise this habitat include: • Chuditch *Dasyurus geoffroii* • Western Brush Wallaby *Notamacropus irma* • Malleefowl *Leipoa ocellata* • Western Rosella *Platycercus icterotis* • Peregrine Falcon *Falco peregrinus.*	

Description	Photos
Melaleuca Woodland Dense Melaleuca woodland with emergent Eucalyptus and an understory of small shrubs on white to orange clay loam. Some fallen timber and fine to medium leaf litter is present. Small logs are more common, with sporadic large logs. Area: 7.80 ha Fauna species that may utilise this habitat include: • Chuditch *Dasyurus geoffroii* • Western Brush Wallaby *Notamacropus Irma* • Malleefowl *Leipoa ocellata*	



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Base Data: (c) Based on information provided by and with the permission of the Western Australian Land Information Authority trading as Landgate (2010).Geoscience Australia, Streetpro

LEGEND
- Active Malleefowl Mound, No Individual Sighted
- E77/2236 Survey Area
- Eucalyptus Woodland
- Melaleuca Low Woodland
- Open to Dense Shrubland

Fauna Habitats
E77/2236

WESFARMERS CHEMICALS ENERGY AND FERTILISER (WESCEF)

E77/2236 FLORA, VEGETATION AND FAUNA ASSESSMENT

Figure

7

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6.0 Conclusions

Ecological assessments were completed for a defined survey area in E77/2236 within Jilbadji Nature Reserve. The assessment included a detailed flora and vegetation assessment, basic fauna assessment, and comprehensive targeted flora searches.

The field surveys were undertaken between 8 and 10 September 2021 led by experienced botanist Floora de Wit with ecologist Cassandra House, assisted by Paul Brandon. The entire survey area was traversed on foot walking linear traverses 10 m apart to conduct targeted searches. Simultaneously, 20x20 m quadrats were completed in areas considered representative of the vegetation community present.

A summary of results is presented below:

- No TECs or PECs were recorded.
- Three vegetation communities were described and mapped, all in excellent condition with minor old drill tracks and recent fire observed.
- Seven Priority flora species were recorded including:
  - *Acacia asepala* (P2) – 71 individuals
  - *Chamelaucium* sp. Parker Range (B.H. Smith 1255) (P1) – 468 individuals
  - *Eucalyptus exigua* (P3) – 2-5 individuals
  - *Grevillea marriottii* (P1) – 611 individuals
  - *Grevillea neodissecta* (P4) – 1035 individuals
  - *Microcorys elatoides* (P1) – 2 individuals
  - *Verticordia gracilis* (P3) – 203 individuals.
- One active Malleefowl *Leipoa ocellata* mound was recorded in the survey area.
- Three fauna habitats were mapped within the survey area and may provide suitable habitat for the following conservation significant fauna species:
  - Chuditch *Dasyurus geoffroii* (EPBC & WA Vulnerable)
  - Western Brush Wallaby *Notamacropus irma* (WA P4)
  - Peregrine Falcon *Falco peregrinus* (WA Other Specially Protected Species)
  - Malleefowl *Leipoa ocellata* (EPBC & WA Vulnerable)
  - Western Rosella *Platycercus icterotis* (WA P4).

Jilbadji Nature Reserve is considered a significant area for fauna, flora and vegetation communities due to its rich diversity and substantial size, which acts as an important refuge for many fauna species (DAWE, 2022). It is therefore expected that additional survey effort throughout this area would result in the identification of a larger number of fauna and flora species.

7.0 References

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Appendix A

Conservation Code Categories

Appendix A Conservation Codes

1.0 Legislative Framework

1.1 Federal Legislation – EPBC Act

1.1.1 Matters of National Significance

The EPBC Act is the main piece of Federal legislation protecting biodiversity in Australia. All Matters of National Environmental Significance (MNES) are listed under the EPBC Act. These include:

- listed threatened species and ecological communities
- migratory species protected under international agreements
- Ramsar wetlands of international importance
- the Commonwealth marine environment
- world Heritage properties
- national Heritage places
- Great Barrier Reef Marine Park
- a water resource, in relation to coal seam gas development and large coal mining development
- nuclear actions.

If an action is likely to have a significant impact on a MNES this action must be referred to the Minister for the Environment for a decision on whether assessment and approval is required under the EPBC Act.

1.1.2 Flora and Fauna

Species at risk of extinction are recognised at a Commonwealth level and are categorised in one of six categories as outlined in Table 1.

Table 1 Categories of Species Listed under Schedule 179 of the EPBC Act

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

Conservation	Code Category
CD	**Conservation Dependent** Taxa which at a particular time if, at that time: the species is the focus of a specific conservation program the cessation of which would result in the species becoming vulnerable, endangered or critically endangered the following subparagraphs are satisfied: - the species is a species of fish - the species is the focus of a plan of management that provides for management actions necessary to stop the decline of, and support the recovery of, the species so that its chances of long term survival in nature are maximised the plan of management is in force under a law of the Commonwealth or of a State or Territory cessation of the plan of management would adversely affect the conservation status of the species.
Migratory	The EPBC Act also requires the compilation of a list of migratory species that are recognised under international treaties including the: - Japan Australia Migratory Bird Agreement 1981 (JAMBA) - China Australia Migratory Bird Agreement 1998 (CAMBA) - Republic of Korea-Australia Migratory Bird Agreement 2007 (ROKAMBA) - Bonn Convention 1979 (The Convention on the Conservation of Migratory Species of Wild Animals). All migratory bird species listed in the annexes to these bilateral agreements are protected in Australia as a MNES under the EPBC Act.
Marine	Species established under s248 of the EPBC Act.

1.1.3 Vegetation Communities

Vegetation communities can be classified as Threatened Ecological Communities (TECs) under the EPBC Act. The EPBC Act protects Australia's ecological communities by providing for:

- identification and listing of ecological communities as threatened
- development of conservation advice and recovery plans for listed ecological communities
- recognition of key threatening processes
- reduction of the impact of these processes through threat abatement plans.

Categories of federally listed TECs are described in Table 2.

Table 2 Categories of TECs that are listed under the EPBC Act

Code	Category
CE	Critically Endangered If, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future.
E	Endangered If, at that time, it is not critically endangered and is facing a very high risk of extinction in the wild in the near future.
V	Vulnerable If, at that time, it is not critically endangered or endangered, and is facing a high risk of extinction in the wild in the medium-term future.

1.2 Western Australian Legislation

1.2.1 Flora and Fauna

Threatened, Extinct and Specially Protected fauna and flora are species that have been adequately searched for and are deemed to be, in the wild, threatened, extinct or in need of special protection. These species are protected under Part 2 of the *Biodiversity Conservation Act 2016*. Categories of Threatened, Extinct and Specially Protected fauna and flora are defined in Table 3.

Species considered Threatened, Extinct and Specially Protected are listed under section 19(1) of the BC Act and published under Schedule 1 to 4 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 (for listed fauna) or the Wildlife Conservation (Rare Flora) Notice 2018 (for listed flora).

Species that have not yet been adequately surveyed to warrant being listed under the BC Act, or are otherwise data deficient, are added to a Priority Lists under Priorities 1, 2 or 3 by the State Minister for Environment. Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. Categories and definitions of Priority Flora and Fauna species are provided in Table 4.

Table 3 Conservation Codes for WA Flora and Fauna Listed under the *Biodiversity Conservation Act 2016*

Code	Category
CR	**Critically Endangered** Threatened species considered to be "facing an extremely high risk of extinction in the wild in the immediate future".
EN	**Endangered species** Threatened species considered to be "facing a very high risk of extinction in the wild in the near future".
VU	**Vulnerable species** Threatened species considered to be "facing a high risk of extinction in the wild in the medium term future"
EX	**Extinct species** Species where "there is no reasonable doubt that the last member of the species has died",
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".
Specially Protected Species	
MI	**Migratory birds** 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. Includes agreements between Govt. of Australia and governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention), relating to the protection of migratory birds.
CD	**Special conservation** Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened.
OS	**Other specially protected species** Special protection for reasons other than those already mentioned.

1.2.2 Vegetation Communities

Threatened Ecological Communities (TECs) are naturally occurring biological assemblages that occur in a particular type of habitat and that may be subject to processes that threaten to destroy or significantly modify the assemblage across its range. TECs are listed by both state and commonwealth legislation.

Vegetation communities in Western Australia are listed as TECs under Section 45 of the BC Act if they have been endorsed by the Western Australian Minister for Environment following recommendations made by the Threatened Species Scientific Committee. Categories of TECs are defined in Table 5.

Department of Biodiversity, Conservation and Attractions (DBCA) maintains a database of state listed PECs which is available for online searches via their website. Possible TECs that do not meet survey criteria or are not adequately defined are listed as Priority Ecological Communities (PECs) under Priorities 1, 2 and 3. Ecological communities that are adequately known and are rare but not threatened, or meet criteria for Near Threatened, or that have been recently removed from the threatened list, are placed in Priority 4. PECs are endorsed by the Minister for Environment and are described in Table 6.

DBCA requires that all Priority and Threatened ecological communities are considered during environmental impact assessments and clearing permit applications.

Table 4 Conservation Codes for WA Flora and Fauna as listed by DBCA

Code	Category
P1	**Priority One – Poorly Known Species** Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes.
P2	**Priority Two – Poorly Known Species** Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes.
P3	**Priority Three – Poorly Known Species** Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them.
P4	**Priority Four – Rare, Near Threatened and other species in need of monitoring** a. Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection but could be if present circumstances change. These species are usually represented on conservation lands. b. Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for vulnerable but are not listed as Conservation Dependent. c. Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

Table 5 Conservation Codes for Threatened Ecological Communities

Code	Category
PD	Presumed Totally Destroyed
CR	Critically Endangered
EN	Endangered
VU	Vulnerable

Table 6 Categories for Priority Ecological Communities

Code	Category
P1	Priority One: poorly-known ecological communities
P2	Priority Two: poorly-known ecological communities
P3	Priority Three: poorly known ecological communities
P4	Priority Four: ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list.

1.2.3 Communities of Local, Regional and National Significance

Significant flora and vegetation units need to take into account a number of other features other than statutory listings in accordance with the Flora and Vegetation Environmental Factor Guideline (EPA, 2016c). These include the following:

- Restricted distribution
- Degree of historical impact from threatening processes
- A role as a refuge
- Providing an important function required to maintain ecological integrity of a significant ecosystem.

Appendix B

Desktop Flora Results

Appendix B Flora Desktop Results

Species	EPBC	WA	Habitat (DAWE, 2021; WAHerb 1998-)	Likelihood and Justification	Record Date (most recent)	NatureMap	PMST	DBCA	WA Herb
Acacia undosa		P3	Sandy clay loam, clayey sand or loam in open shrub mallee. Undulating plains, low-lying areas.	Likely, known records nearby. Suitable habitat present.	7/09/1994	X		X	X
Acacia sp. Forrestania (D. Angus DA 3001)		P1	Within the EGLP, this taxon is restricted to the S4 vegetation mapping unit (Eucalyptus sp. Southern Wheatbelt (D. Nicolle & M. French DN 5507), Allocasuarina spinosissima, Allocasuarina, acutivalvis low open mallee woodland over Hakea invaginata, Melaleuca cordata, Micromyrtus erichsenii mid sparse shrubland over Acacia sp. Forrestania (D. Angus DA 3001) (P1), Hibbertia spp. low sparse shrubland on light orange gravelly clay on upper-mid slopes).	Likely, known records nearby. Suitable habitat present.	13/09/2017				X
Acacia lachnocarpa		P1	Recorded on open sandplains under low mallee woodland. Sparse understorey.	Likely, known records nearby. Suitable habitat present.	9/09/2017				X
Angianthus micropodioides		P3	Saline sandy soils. River edges, saline depressions, claypans.	Unlikely, no suitable habitat present.	7/10/1981	X			X
Baeckea sp. Forrestania (K.R. Newbey 1105)		P1	Sand. Plains.	Likely, suitable habitat present.	10/10/2018	X			X
Banksia shanklandiorum		P4	White/yellow sand with lateritic gravel.	Likely, suitable habitat present.	31/08/1990	X		X	X
Banksia sphaerocarpa var. *dolichostyla* (Ironcap Banksia)	VU	VU	Lateritic gravel, grey sand.	Likely, suitable habitat present.	11/05/2011	X	X	X	X
Brachyloma stenolobum		P1	Associated with yellow sand plains.	Likely, suitable habitat present.	24/05/2013	X		X	X
Chorizema circinale		P3	Yellow sand, sandy clay with gravel. Flats, margin of gravel pit.	May, suitable habitat may be present.	30/09/2009	X			X
Dampiera orchardii		P2	Sand	Likely, suitable habitat present.	1/11/2004	X		X	X
Daviesia newbeyi		P3	Sand or sandy clay over granite. Rocky slopes.	Unlikely, no suitable habitat present.	21/10/2006	X		X	
Dicrastylis capitellata		P1	Loamy sand, sandy loam.	May, suitable habitat may be present.	23/11/2004			X	X
Drummondita wilsonii		P1	Sand with gravel & pebbles.	Likely, suitable habitat present.	18/03/2004	X		X	X
Eremophila caerulea subsp. *merrallii*		P4	Sand, clay or loam. Undulating plains.	Likely, suitable habitat present.	11/12/1995	X		X	X
Eremophila verticillata	EN	CR	Clay loam, loam over limestone.	Unlikely, no suitable habitat present.	11/09/2017				X
Eucalyptus exigua		P3	Sandy loam, white sand. Sandplains.	Likely, suitable habitat present.	17/04/2003	X		X	X
Eutaxia lasiocalyx		P2	Red sandy loam, laterite and quartz gravel. Gentle lower slopes.	May, suitable habitat may be present.	21/10/2006	X		X	X
Grevillea lissopleura		P1	Stony loam on banded ironstone. On ridges.	Unlikely, no suitable habitat present.	23/08/1979	X			X
Grevillea marriottii		P1	Yellow or white sand over laterite. On rises or on tops of lateritic cappings.	Unlikely, no suitable habitat present.	19/08/2008			X	X
Grevillea neodissecta		P4	Grows in low mallee scrub or heath in sand over laterite or in heavy laterised brown loam.	May, suitable habitat may be present.	6/12/2011	X			X
Grevillea pilosa subsp. redacta		P3	Sand, laterite. Grows in gravelly rises in brown loam in dense shrubland.	May, suitable habitat may be present.	8/12/2007			X	X
Hakea pendens		P3	Stony loam. Ironstone ridges.	Unlikely, no suitable habitat present.	8/09/2000	X		X	X
Logania nanophylla		P2	White sand, pebbly calcareous sandy clay. Sand dunes.	Unlikely, no suitable habitat present.	10/10/2018	X			X
Melaleuca ochroma		P3	Brown clay, whitish sandy clay, brown clay loam and sandy loam.	May, suitable habitat may be present. No recent records.	13/11/1989	X			X
Microcorys sp. Forrestania (V. English 2004)		P4	Yellow sandy clay or red-brown clay. Open woodland or cleared areas.	Likely, suitable habitat present.	6/12/2011	X		X	X
Microcorys elatoides		P1	Grows in a variety of habitats. Appears to prefer disturbed areas.	Likely, suitable habitat present.	10/10/2018	X			X
Microcybe sp. Windy Hill (G.F. Craig 6583)		P3	Known from Jilbadji Nature Reserve from brown clay-loam flats in mixed Eucalypt woodland.	Likely, suitable habitat present.	15/05/2017	X			X
Myriophyllum petraeum (Granite Myriophyllum)		P4	Strictly confined to ephemeral rock pools on granite outcrops.	Unlikely, no suitable habitat present.	22/09/2008	X		X	X

Species	EPBC	WA	Habitat (DAWE, 2021; WAHerb 1998-)	Likelihood and Justification	Record Date (most recent)	NatureMap	PMST	DBCA	WA Herb
Rinzia medifila (Parker Range Rinzia)		P1	Yellowish or reddish sandy soils, sometime with laterite or greenstone, in Eucalyptus woodlands, often with Melaleuca.	Likely, suitable habitat present.	12/10/1994	X		X	X
Seringia adenogyna (Skinny-leaved fire-bush)		P3	Scattered mallee trees with tall shrubland, or in mallee heath, in gravell, yellowish-brown sand, or in grey sandy clay or loam. Sometimes in damp low lying areas.	May, suitable habitat may be present.	5/11/2004	X		X	X
Stenanthemum bremerense		P4	Orange-brown sandy loam, orange-red gravelly loam, skeletal red loam, laterite, ironstone. Top or sides of outcrops and breakaways.	May, suitable habitat may be present.	28/07/2006			X	X
Verticordia gracilis		P3	Yellow sand, gravelly sand, sandy loam.	Likely, suitable habitat present.	5/05/2004	X		X	X
Verticordia stenopetala		P3	Yellow sand, sometimes with gravel. Undulating plains.	Likely, suitable habitat present.	2/11/2011	X		X	X

Appendix C

Desktop Fauna Results

Appendix C Fauna Desktop Results

Scientific Name	Common Name	EPBC	WA	Last Record	Total Records	Ecology	Likelihood and Justification
Dasyurus geoffroii	Chuditch	VU	VU	11/02/2017	148	It currently only occurs in areas dominated by sclerophyll forest or drier woodland, heath and mallee shrubland (Van Dyck & Strahan, 2008). The Chuditch requires adequate numbers of suitable den and refuge sites (horizontal hollow logs or earth burrows) and sufficient prey biomass (large invertebrates, reptiles and small mammals) to survive.	Likely, suitable habitat and known records.
Leipoa ocellata	Malleefowl	VU	VU	20/09/2018	141	The Malleefowl is found principally in the semi-arid to arid zone in shrublands and low woodlands dominated by mallee and associated habitats such as such as Broombush (*Melaleuca uncinata*) and Scrub Pine (*Callitris verrucosa*). In WA Malleefowl distribution was associated with landscapes that had lower rainfall, greater amounts of mallee and shrubland that occur as large remnants, and lighter soil surface textures (Benshemesh, 2007). At a finer scale, malleefowl occurrence was associated with mallee/shrubland and thicket vegetation with woodland representing poor habitat for the species (Parsons, 2008).	Likely, suitable habitat and known records.
Macrotis lagotis	Bilby	VU	VU	1/01/1904	1	The Bilby occupies arid to semi-arid woodlands and hummock grasslands in the north of Australia. The Bilby formerly occupied much of the Australian mainland however has experienced a vast contraction in its range (Van Dyck & Strahan, 2008).	Unlikely, no suitable habitat. One old record.
Aganippe castellum	Tree-stem Trapdoor Spider		P4	12/06/2017	4	The Tree-stem Trapdoor Spider occurs on the mid to lower slopes of rocky hills in the Koolyanobbing area (Bamford, 2009). It has been recorded 10 km north of Morowa and 30 km north of the Project Area	May, suitable habitat may be present.
Falco peregrinus	Peregrine Falcon		OS	17/09/2017	98	The Peregrine Falcon is a medium-sized raptor (length 35-55cm; wingspan 80-105cm) with slate-grey back, a striking charcoal black head and face which contrast with a pale cream bib on the neck and breast (Birdlife Australia, 2018). A well-known falcon, the Peregrine inhabits a vast array of environs in Australia. Usually uncommon and migratory (Pizzey & Knight, 2007). This species lays its eggs in recesses of cliff faces, tree hollows or large abandoned nests (Bamford, 2009)	Likely, suitable habitat and known records.

Scientific Name	Common Name	EPBC	WA	Last Record	Total Records	Ecology	Likelihood and Justification
Notamacropus irma	Western Brush Wallaby		P4	8/10/2017	28	The Western Brush-wallaby occurs in the south-west of Western Australia. Its preferred habitat consists of open sclerophyll forest or woodland and favours open flats over scrub thickets. However, it doesn't seem to venture into open pasture areas adjacent it's bushland refuges. It is also found in larger areas of mallee and heathland in the wheat belt and is uncommon in wet sclerophyll	Likely, suitable habitat and known records.
Paroplocephalus atriceps	Lake Cronin snake		P3	8/04/2007	3	Records limited to vicinity of Lake Cronin and Peak Eleanora.	Unlikely, no suitable habitat.
Platycercus icterotis	Western Rosella		P4	29/11/2017	33	Perefer wooded habitat with Allocasuarina, Eucalyptus salmonophloia and wandoo. Also observed in cleared areas with crops in the wheatbelt and adjoining vegetation.	Likely, suitable habitat and known records.

Appendix D

Flora Species List by Community

Appendix D Flora Species by Family, Site and Community

		AeSy					EsMpDa					MlOm
Family	**Taxon**	**1**	**4**	**5**	**9**	**Opp**	**2**	**6**	**7**	**8**	**Opp**	**3**
Amaranthaceae												
	Ptilotus holosericeus						x					
Apocynaceae												
	Alyxia buxifolia											x
Asteraceae												
	Asteridea athrixioides						x			x		
	Olearia muelleri									x		x
Boraginaceae												
	Halgania andromedifolia									x		
Casuarinaceae												
	Allocasuarina ?corniculata		x							x		
	Allocasuarina acutivalvis subsp. *acutivalvis*	x		x								
Chenopodiaceae												
	Sclerolaena diacantha						x		x			
Convolvulaceae												
	Wilsonia humilis						x					
Cupressaceae												
	Callitris preissii	x	x							x		
Droseraceae												
	Drosera macrantha			x	x							
Ericaceae												
	Leucopogon sp. outer wheatbelt (M. Hislop 30)		x	x								
Euphorbiaceae												
	Beyeria sulcata var. brevipes									x		
Fabaceae												
	Acacia asepala (P2)										x	
	Acacia assimilis subsp. *assimilis*		x	x								
	Acacia deficiens						x	x				
	Acacia enervia subsp. *explicata*	x	x	x	x							
	Acacia erinacea						x					
	Acacia hemiteles		x	x						x		
	Acacia merrallii						x		x	x		
	Acacia nyssophylla									x		
	Acacia steedmanii subsp. *steedmanii*			x								
	Acacia yorkrakinensis subsp. *acrita*			x				x				
	Daviesia argillacea						x	x	x	x		x
	Daviesia grahamii											
	Gastrolobium aculeatum		x									
	Gastrolobium floribundum			x								
	Gastrolobium melanocarpum			x								
	Jacksonia nematoclada	x	x									
	Senna artemisioides subsp. *filifolia*									x		
Goodeniaceae												
	Dampiera angulata subsp. Peak Charles (K.R. newbey 5402)	x										
	Goodenia pinifolia	x										
	Scaevola spinescens											x
Lamiaceae												
	Microcorys elatoides (P1)											
	Microcorys obovata							x				
	Westringia cephalantha	x	x					x		x		
	Westringia rigida									x		
Myoporaceae												
	Eremophila decipiens subsp. *decipiens*						x		x			
	Eremophila drummondii							x				
	Eremophila ionantha								x			

		AeSy					EsMpDa					MlOm
Family	**Taxon**	**1**	**4**	**5**	**9**	**Opp**	**2**	**6**	**7**	**8**	**Opp**	**3**
Myrtaceae												
	Baeckea elderiana			x	x							
	Chamelaucium sp. Parker Range (B.H. Smith 1255) (P1)					x						
	Eucalyptus ?longicornis								x			
	Eucalyptus comitae-vallis									x		x
	Eucalyptus eremophila	x						x				
	Eucalyptus exigua (P3)									x		
	Eucalyptus flocktoniae subsp. *flocktoniae*									x		
	Eucalyptus longicornis								x	x		
	Eucalyptus salmonophloia						x	x				
	Eucalyptus salubris											
	Euryomyrtus leptospermoides	x										
	Euryomyrtus maidenii	x	x									
	Leptospermum ?fastigiatum		x									
	Melaleuca cordata	x		x								
	Melaleuca hamata	x			x							
	Melaleuca johnsonii							x				x
	Melaleuca lanceolata						x					
	Melaleuca lateriflora											x
	Melaleuca pauperiflora						x		x	x		
	Melaleuca quadriflora								x			
	Melaleuca sheathiana											x
	Microcybe multiflora subsp. *multiflora*									x		
	Thryptomene kochii	x	x	x	x							
	Verticordia gracilis (P3)					x						
Poaceae												
	Amphipogon caricinus var. *caricinus*	x										
	Triodia ?scariosa									x		
Proteaceae												
	Grevillea acuaria							x		x		x
	Grevillea didymobotrya subsp. *didymobotrya*	x	x	x								
	Grevillea huegelii											x
	Grevillea marriottii (P1)											
	Grevillea neodissecta (P4)					x						
	Grevillea obliquistigma subsp. *obliquistigma*		x	x								
	Hakea erecta	x										
	Hakea francisiana	x	x		x							
	Persoonia coriacea	x		x								
	Persoonia inconspicua		x									
	Persoonia striata			x								
Rhamnaceae												
	Cryptandra wilsonii									x		
Rutaceae												
	Phebalium canaliculatum								x			
	Phebalium filifolium sens. lat.	x										
	Phebalium filifolium		x					x				
	Phebalium tuberculosum		x				x			x		
	Philotheca sp. (unusual specimen)				x					x		
	Philotheca rhomboidea	x										
Santalaceae												
	Exocarpos aphyllus		x				x	x		x		x
	Santalum acuminatum	x	x		x							
Stylidiaceae												
	Stylidium yilgarnense		x	x	x							

Opp referes to opportunistic collections

Appendix E

Floristic Site Data

Appendix E - Quadrat Data

Site No: 1	**Date**: 08/09/2021	**Longitude**: 119.792077	**Latitude**: -31.936726
Type: Quadrat		**Soil Types**: Sand yellow	
Topography: Flat		**Surface**: Bare	
Outcrops: None		**Litter**: 80% bare	
Vegetation Condition: Excellent		**Condition Notes**:	
Soil Condition: Dry		**Fire**: 10+	
Vegetation Type:			

Cons. Status	Taxon	Height (cm)	Foliage (%)	Comments
	Hakea francisiana	300	0.1	
	Santalum acuminatum	150	0.5	
	Thryptomene kochii	30	4	pink flower, mucro tip
	Melaleuca cordata	50	1	
	Euryomyrtus maidenii		3	
	Philotheca rhomboidea	30	0.1	FdW210908-3 Glabrous variant. Submit to WA Herb.
	Eucalyptus eremophila	250	1	FdW211008-4 patchy
	Phebalium drummondii	30	2	FdW211008-5
	Acacia enervia subsp. *explicata*	70	8	FdW211008-6
	Allocasuarina acutivalvis subsp. *acutivalvis*	40	0.5	

Cons. Status	Taxon	Height (cm)	Foliage (%)	Comments
	Callitris preissii	20	0.5	
	Persoonia coriacea	60	0.5	FdW211008-7
	Hakea erecta	60	0.1	FdW211008-8
	Jacksonia nematoclada	15	2	FdW211008-9
	Amphipogon caricinus var. *caricinus*	5	0.01	FdW211008-10
	Melaleuca hamata	100	2	
	Westringia cephalantha	40	0.1	
	Euryomyrtus leptospermoides	30	0.01	FdW211008-11
	Grevillea didymobotrya subsp. *didymobotrya*	30	0.01	FdW211008-12
	Dampiera angulata subsp. Peak Charles (K.R. newbey 5402)	10	0.5	FdW211008-13
	Goodenia pinifolia	50	0.01	FdW211008-14

Site No: 2	**Date**: 08/09/2021	**Longitude**: 119.776707	**Latitude**: -31.943817
Type: Quadrat		**Soil Types**: Clay, some loam	
Topography: Flat		**Surface**:	
Outcrops: None		**Litter**: 30% logs and branches	
Vegetation Condition: Excellent		**Condition Notes**: Random evidence of historical disturbance (soil piles)	
Soil Condition: Dry		**Fire**: 10+	
Vegetation Type:			

Conservation Status	Taxon	Height (cm)	Foliage (%)	Comments
	Eucalyptus salmonophloia	2500	15	FdW211008-15 mainly saplings, thin copper stems
	Exocarpos aphyllus	50	0.5	FdW211008-16
	Sclerolaena diacantha	5	0.01	FdW211008-17
	Acacia deficiens	30	2	FdW211008-18
	Phebalium tuberculosum	30	6	FdW211008-19
	Acacia merrallii	50	4	FdW211008-20
	Wilsonia humilis	10	3	
	Acacia erinacea	30	0.5	
	Melaleuca lanceolata	30	0.5	
	Melaleuca pauperiflora	100	1	
	Daviesia argillacea	50	1	
	Asteridea athrixioides	5	0.01	FdW211008-21

Conservation Status	Taxon	Height (cm)	Foliage (%)	Comments
	Ptilotus holosericeus	2	0.01	FdW211008-22
	Eremophila decipiens subsp. *decipiens*	20	0.1	FdW211008-23

Site No: 3	**Date**: 09/02/2021	**Longitude**: 119.764399	**Latitude**: -31.931517

Type: Releve
Soil Types: Loam clay
Topography: Flat
Surface: Bare
Outcrops: None
Litter: 50% logs and leaves
Vegetation Condition: Excellent
Condition Notes: Drill tracks
Soil Condition: Dry
Fire: 10+
Vegetation Type:

Cons. Status	Taxon	Height (cm)	Foliage (%)	Comments
	Melaleuca sheathiana	300	7	FdW211009-32
	Melaleuca lateriflora	300	7	
	Olearia muelleri	40	1	
	Alyxia buxifolia	150	0.1	
	Daviesia argillacea	50	0.01	
	Grevillea huegelii	200	0.1	FdW211009-33
	Scaevola spinescens	50	0.01	
	Grevillea acuaria	50	0.01	FdW211009-34
	Exocarpos aphyllus	200	0.1	
	Eucalyptus sp.	1500	15	FdW211009-35 M. Hislop ACC 9364
	Melaleuca johnsonii	300	7	

Site No: 4	**Date**: 09/02/2021	**Longitude**: 119.764426	**Latitude**: -31.928944
Type: Quadrat		**Soil Types**: Sandy loam	
Topography: Flat		**Surface**:	
Outcrops: None		**Litter**: 30% sticks and twigs	
Vegetation Condition: Excellent		**Condition Notes**: Evidence of fire	
Soil Condition: Dry		**Fire**: 10+	
Vegetation Type:			

Cons. Status	Taxon	Height (cm)	Foliage (%)	Comments
	Hakea francisiana	200	0.1	
	Exocarpos aphyllus	50	0.5	
	Euryomyrtus maidenii	50	6	
	Thryptomene kochii	50	15	
	Westringia cephalantha	80	0.5	
	Phebalium tuberculosum	50	1	
	Grevillea didymobotrya subsp. *didymobotrya*	100	4	FdW211009-46
	Phebalium filifolium	100	0.1	FdW211009-36
	Allocasuarina ?corniculata	100	1	FdW211009-37
	Acacia hemiteles	100	0.5	FdW211009-38
	Leucopogon sp. outer wheatbelt (M. Hislop 30)	50	0.1	FdW211009-

Cons. Status	Taxon	Height (cm)	Foliage (%)	Comments
				39
	Gastrolobium aculeatum	50	2	FdW211009-40
	Persoonia inconspicua	50	0.1	FdW211009-41
	Acacia assimilis subsp. *assimilis*	150	2	FdW211009-42
	Leptospermum ?fastigiatum	100	1	FdW211009-43
	Grevillea obliquistigma subsp. *obliquistigma*	300	3	FdW211009-44
	Acacia enervia subsp. *explicata*	100	10	
	Stylidium yilgarnense	2	0.01	FdW211009-26
	Jacksonia nematoclada	10	1	
	Santalum acuminatum	200	1	
	Callitris preissii	30	0.01	

Site No: 5	**Date**: 09/02/2021	**Longitude**: 119.764636	**Latitude**: -31.925489
Type: Quadrat		**Soil Types**: Loam clay sand	
Topography: Flat		**Surface**:	
Outcrops: Few calcrete laterite type		**Litter**: 20%	
Vegetation Condition: Excellent		**Condition Notes**:	
Soil Condition: Dry		**Fire**: 5-10	
Vegetation Type:			

Cons. Status	Taxon	Height (cm)	Foliage (%)	Comments
	Melaleuca cordata	50	10	
	Baeckea elderiana	200	3	
	Acacia enervia subsp. *explicata*	150	4	
	Drosera macrantha	20	0.1	
	Grevillea didymobotrya subsp. didymobotrya	50	15	
	Grevillea obliquistigma subsp. obliquistigma	200	0.5	
	Stylidium yilgarnense	2	0.5	
	Leucopogon sp. outer wheatbelt (M. Hislop 30)	50	0.01	
	Thryptomene kochii	50	3	
	Gastrolobium floribundum	50	1	FdW211009-47
	Persoonia striata	50	2	FdW211009-48
RE	*Gastrolobium melanocarpum*	80	0.1	FdW211009-49 Range extension

Cons. Status	Taxon	Height (cm)	Foliage (%)	Comments
	Acacia steedmanii subsp. *steedmanii*	180	0.1	FdW211009-50
	Acacia assimilis subsp. *assimilis*	180	1	
	Allocasuarina acutivalvis subsp. *acutivalvis*	300	12	Hard nuts with long appendages
	Persoonia coriacea	100	0.1	
	Acacia hemiteles	150	0.01	
	Acacia yorkrakinensis subsp. *acrita*	150	1	FdW211009-51

Site No: 6	**Date**: 09/02/2021	**Longitude**: 119.764756	**Latitude**: -31.921867
Type: Releve		**Soil Types**: Clay loam hard	
Topography: Flat		**Surface**: Some rocks	
Outcrops: None		**Litter**: 30% logs and twigs	
Vegetation Condition: Excellent		**Condition Notes**:	
Soil Condition: Dry		**Fire**: 10+	
Vegetation Type:			

Cons. Status	Taxon	Height (cm)	Foliage (%)	Comments
	Daviesia argillacea	50	10	FdW211009-55
	Eucalyptus eremophila	300	3	
	Eucalyptus salmonophloia	400	25	Dead, saplings
	Westringia cephalantha	50	3	
	Acacia deficiens	50	3	
	Exocarpos aphyllus	100	0.1	
	Acacia yorkrakinensis subsp. *acrita*	50	1	
	Phebalium filifolium	50	0.1	
	Eremophila drummondii	50	0.1	FdW211009-54
	Grevillea acuaria	30	0.1	
	Microcorys obovata	50	0.01	FdW211009-53
	Melaleuca johnsonii	400	3	

Site No: 7	**Date**: 10/02/2021	**Longitude**: 119.807456	**Latitude**: -31.930805
Type: Releve		**Soil Types**: Loam clay	
Topography: Flat		**Surface**:	
Outcrops: None		**Litter**: 30% leaves and twigs	
Vegetation Condition: Excellent		**Condition Notes**:	
Soil Condition: Dry		**Fire**: 10+	
Vegetation Type:			

Cons. Status	Taxon	Height (cm)	Foliage (%)	Comments
	Daviesia argillacea	100	1	
	Sclerolaena diacantha	5	0.01	
	Eremophila decipiens subsp. *decipiens*	30	0.5	FdW210909-57
	Phebalium canaliculatum	30	0.1	
	Melaleuca pauperiflora	400	10	
	Melaleuca quadriflora	100	4	
	Acacia merrallii	50	0.5	
	Eucalyptus longicornis	2000	20	FdW211009-58
	Eucalyptus ?longicornis	200	4	FdW211009-60
	Eremophila ionantha	100	0.1	FdW211009-59
	Melaleuca pauperiflora	100	0.1	FdW211009-61

Site No: 8	**Date**: 10/02/2021	**Longitude**: 119.813372	**Latitude**: -31.927489
Type: Releve		**Soil Types**: Loam clay	
Topography: Flat		**Surface**:	
Outcrops: None		**Litter**: 20% logs, branches and leaves	
Vegetation Condition: Excellent		**Condition Notes**:	
Soil Condition: Dry		**Fire**: 10+	
Vegetation Type:			

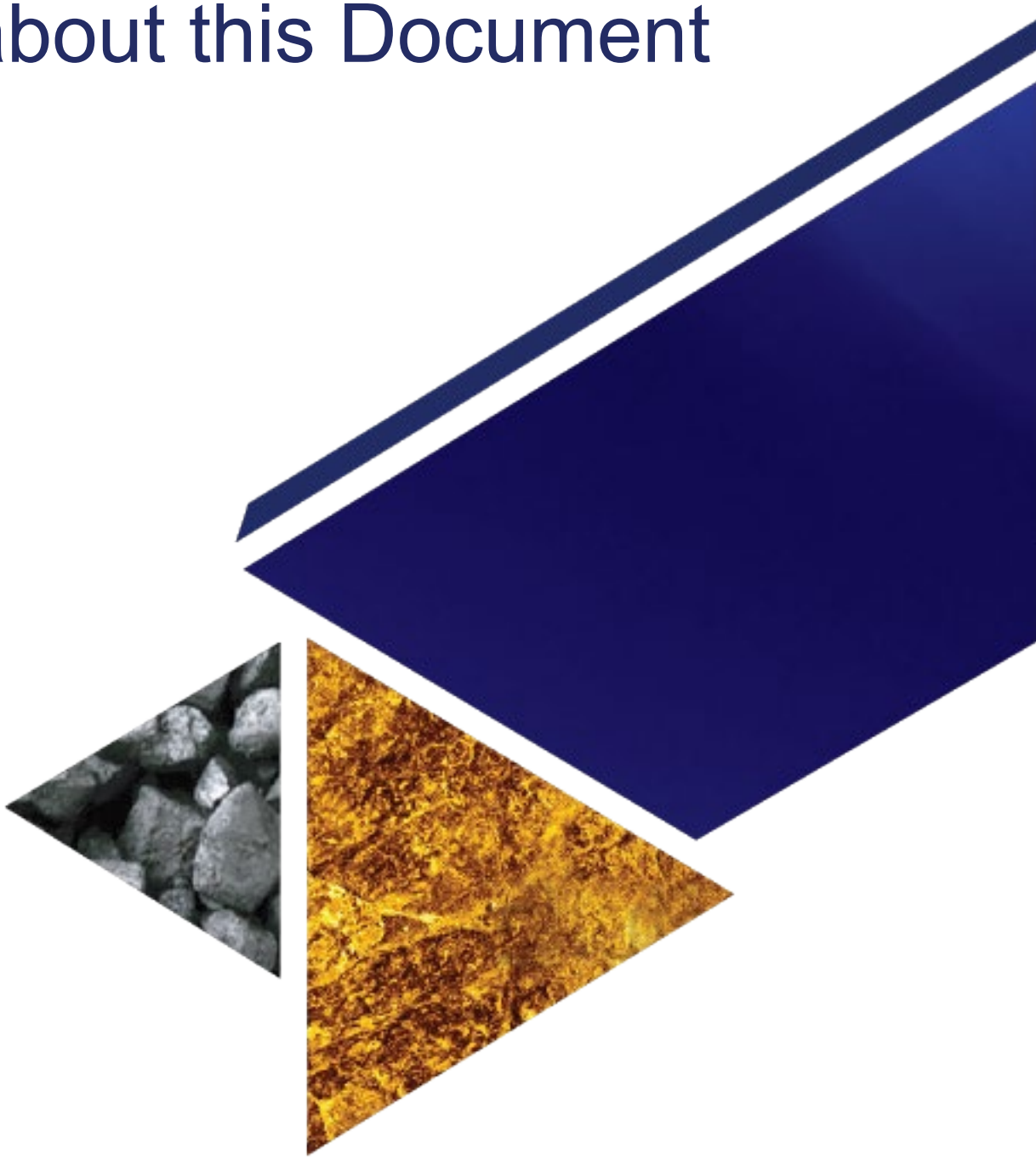
Cons. Status	Taxon	Height (cm)	Foliage (%)	Comments
	Daviesia argillacea	50	15	
	Halgania andromedifolia	50	3	FdW211010-62
P3	*Eucalyptus exigua*	400	2	FdW211010-63 M. Hislop ACC 9364
	Eucalyptus longicornis	2000	8	
	Exocarpos aphyllus	50	0.1	
	Callitris preissii	20	0.01	
	Phebalium tuberculosum	30	0.1	
	Westringia cephalantha	30	3	
	Allocasuarina ?corniculata	50	0.01	
	Grevillea acuaria	30	0.1	
	Melaleuca pauperiflora	300	8	
	Westringia rigida	30	0.1	
	Acacia nyssophylla	50	0.1	FdW211010-56 ID Mike Hislop

Cons. Status	Taxon	Height (cm)	Foliage (%)	Comments
	Senna artemisioides subsp. *filifolia*	80	0.01	
	Olearia muelleri	30	1	
	Philotheca sp.	30	0.5	FdW211010-64 M. Hislop ACC 9364
	Acacia merrallii	30	1	FdW211010-65
	Acacia hemiteles	80	0.1	FdW211010-66
	Asteridea athrixioides	5	0.1	FdW211010-67
	Microcybe multiflora subsp. *multiflora*	30	0.1	FdW211010-68
	Beyeria sulcata var. *brevipes*	80	0.1	FdW211010-69
	Cryptandra wilsonii	30	0.1	
	Triodia ?scariosa	20	0.01	
	Eucalyptus flocktoniae subsp. *flocktoniae*	1500	5	FdW211010-70
	Eucalyptus comitae-vallis	300	2	FdW211010-71

Site No: 9	**Date**: 10/02/2021	**Longitude**: 119.760679	**Latitude**: -31.920026
Type: Quadrat		**Soil Types**: Sand loam	
Topography: Flat		**Surface**:	
Outcrops: None		**Litter**: 5% twigs and leaves	
Vegetation Condition: Excellent		**Condition Notes**:	
Soil Condition: Dry		**Fire**: 10+	
Vegetation Type:			

Cons. Status	Taxon	Height (cm)	Foliage (%)	Comments
	Acacia enervia subsp. *explicata*	130	35	
	Thryptomene kochii	30	3	
	Melaleuca hamata	130	2	
	Hakea francisiana	300		Nearby
	Stylidium yilgarnense	2	0.01	
	Drosera macrantha	20	0.01	
	Philotheca sp.	30	0.1	
	Santalum acuminatum	200	0.1	
	Baeckea elderiana	50	0.5	FdW211010-73 M. Hislop ACC 9364

Appendix B. Important Information about this Document



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