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Reconnaissance flora and vegetation survey for the Kalgoorlie Operations Project

Prepared for Northern Star Resources Ltd

February 2022

Final



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Prepared for Northern Star Resources Ltd

Version history

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EXECUTIVE SUMMARY

In July 2022, Phoenix Environmental Sciences Pty Ltd (Phoenix) was commissioned to undertake a reconnaissance flora and vegetation survey for part of the Black Flag Pastoral Lease.

The survey area is located in the Eastern Goldfields and Eastern Murchison subregions of the Coolgardie and Murchison bioregions respectively and is located in both the Eremaean and South-West Interzone Botanical Provinces and Climatic Regions.

The purpose of the survey was to identify further survey requirements for potential future developments, and to support the submission of necessary regulatory approvals. The survey comprised a desktop assessment followed by a field survey.

A desktop assessment was conducted in September 2022 prior to the field survey conducted from 19-22 September 2022. The desktop assessment determined:

- the presence of *Eremophila praecox* (P2) in the study area and high likelihood of further populations
- potential presence of a further of 46 significant flora species comprising one Threatened flora, 44 Priority flora and one novel species
- the study area was unlikely to contain any listed Threatened or Priority Ecological Communities (TEC or PEC)

The field survey determined:

- the presence of further populations of *Eremophila praecox*
- a population of *Allocasuarina eriochlamys* subsp. *grossa* (P3) and a population of a species considered to exhibit novel features indicating an undescribed species *Streptoglossa* aff *cylindriceps*
- the presence of a Declared Pest **Echium plantagineum* and a Weed of National Significance **Lycium ferocissimum*
- 15 species may possibly occur as there was suitable habitat in the study area, 29 were unlikely to occur due to a lack of suitable habitat and likelihood of one species could not be determined due to a lack of information on habitat (determined via a likelihood of occurrence assessment for significant species identified in the desktop review
- no vegetation represented a TEC or PEC
- eight vegetation types may be considered locally significant as habitat for significant flora

The key botanical value of the study area is the presence of Priority flora and potential for further Priority flora to occur. Subsequently, future survey requirements are likely to require targeted searches for these significant species in areas proposed for development.

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1 INTRODUCTION

In July 2022, Phoenix Environmental Sciences Pty Ltd (Phoenix) was commissioned Northern Star Resources Ltd (Northern Star) to undertake a reconnaissance flora and vegetation survey for a portion of the Black Flag Pastoral Lease (Figure 1-1).

The survey area is located in the Eastern Goldfields and Eastern Murchison subregions of the Coolgardie and Murchison bioregions respectively, and is located in both the Eremaean and South-West Interzone Botanical Provinces and Climatic Regions, as defined by EPA (2016b) and EPA (2020).

The purpose of the survey was to identify further survey requirements for potential future developments, and to support the submission of necessary regulatory approvals.

1.1 SCOPE OF WORK

The scope of work for the flora and vegetation survey from the Request for Quotation (RFQ) was as follows:

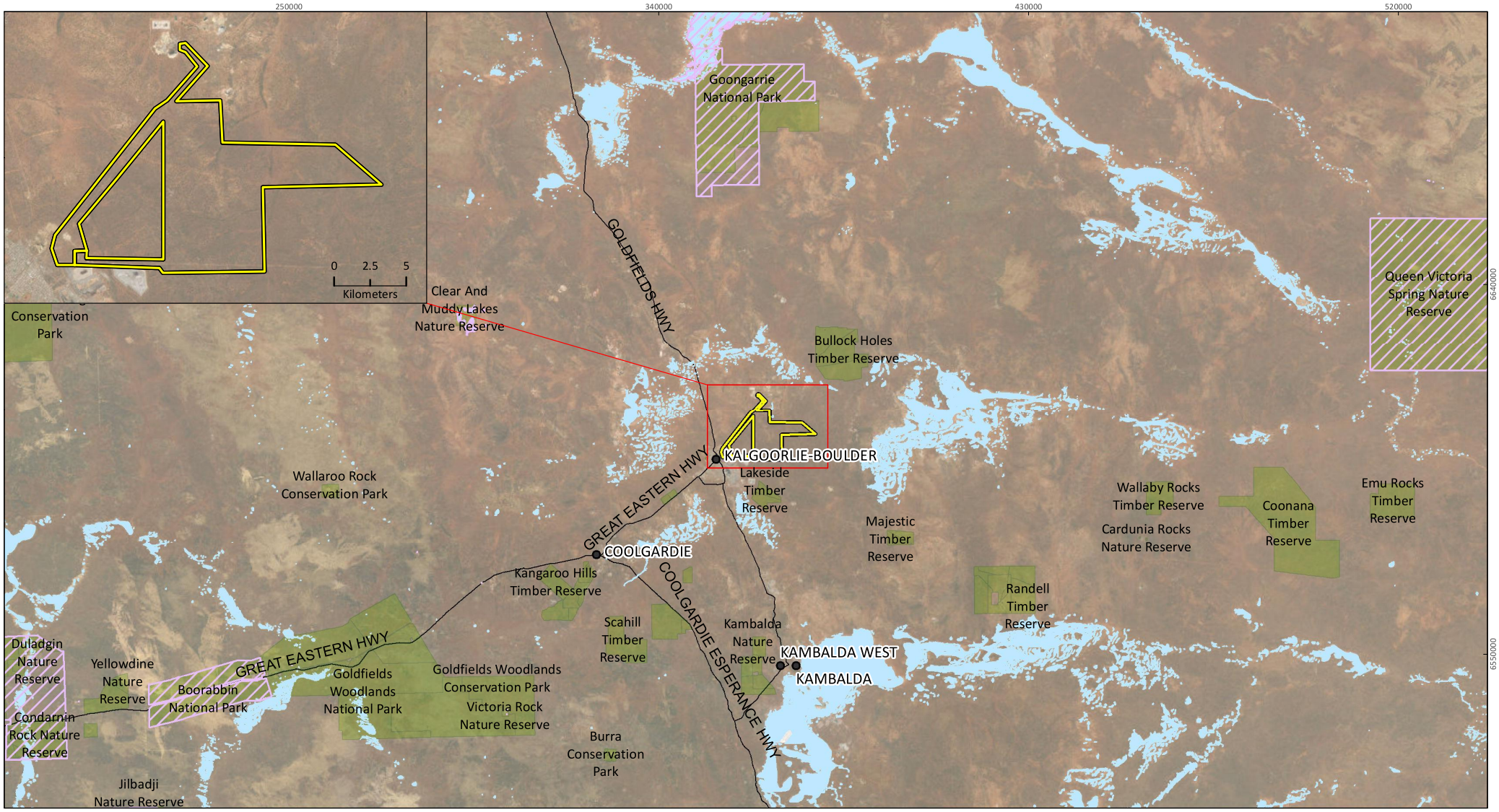
- Conduct a reconnaissance/Level 1 flora and vegetation survey (as per EPA guidelines) in Spring, with targeted searches for any threatened species that are known or likely to occur in the area

Accordingly, Phoenix proposed the following scope of work for the flora and vegetation survey:

- desktop study – to gather contextual information on the study area
- reconnaissance survey – to gather broad information about the flora and vegetation present, including
    - low intensity sampling to describe the general flora vegetation characteristics and condition
    - assess potential for study area to support any significant flora or vegetation
- targeted survey – significant flora identified in the desktop study, particularly *Eremophila praecox*

1.2 STUDY AREA

The study area for the survey is 11,413.3 ha and comprises linear corridors along existing roadways, a large project area, and a corridor which links the Kanowna Belle Gold Mine to Kalgoorlie (Figure 1-1).





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Map author	BQ

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Kilometers

1:1,250,200 (at A4) GDA 1994 MGA Zone 51

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- Study area
- Environmentally sensitive areas
- Lake
- DBCA managed land

Figure 1-1

Project location and study area

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2 LEGISLATIVE CONTEXT

The protection of flora and fauna in WA is principally governed by three acts:

- Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
- State *Biodiversity Conservation Act 2016* (BC Act)
- State *Environmental Protection Act 1986* (EP Act).

The BC Act came into full effect on 1 January 2019 and replaced the functions of the *Wildlife Conservation Act 1950* (WC Act).

2.1 COMMONWEALTH

The EPBC Act is administered by the Federal Department of Climate Change, Energy, the Environment and Water (DCCEEW). The EPBC Act provides for the listing of Threatened flora and Threatened Ecological Communities (TECs) as matters of National Environmental Significance (NES). Under the EPBC Act, actions that have, or are likely to have, a significant impact on a matter of NES, require approval from the Australian Government Minister for the Environment through a formal referral process.

Conservation categories applicable to Threatened flora species under the EPBC Act are as follows:

- Extinct (EX)[1] – there is no reasonable doubt that the last individual has died
- Extinct in the Wild (EW) – taxa known to survive only in captivity
- Critically Endangered (CR) – taxa facing an extremely high risk of extinction in the wild in the immediate future
- Endangered (EN) – taxa facing a very high risk of extinction in the wild in the near future
- Vulnerable (VU) – taxa facing a high risk of extinction in the wild in the medium-term
- Conservation Dependent (CD)[1] – taxa whose survival depends upon ongoing conservation measures; without these measures, a conservation dependent taxon would be classified as Vulnerable, Endangered or Critically Endangered.

Ecological communities are defined as 'naturally occurring biological assemblages that occur in a particular type of habitat' (English & Blyth 1997). There are three categories under which ecological communities can be listed as TECs under the EPBC Act: Critically Endangered, Endangered and Vulnerable.

2.2 STATE

2.2.1 Threatened and Priority species

In WA, the BC Act provides for the listing of Threatened flora species (Government of Western Australia 2018a, b)[2] in the following categories:

[1] Species listed as Extinct and Conservation Dependent are not matters of NES and therefore do not trigger the EPBC Act.

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

- Critically Endangered (CR) – species facing an extremely high risk of extinction in the wild in the immediate future[3]
- Endangered (EN) – species facing a very high risk of extinction in the wild in the near future[3]
- Vulnerable (VU) – species facing a high risk of extinction in the wild in the medium term future[3].

The Department of Biodiversity, Conservation and Attractions (DBCA) administers the BC Act and also maintains a non-statutory list of Priority flora. Priority species are still considered to be of conservation significance – that is they may be Threatened – but cannot be considered for listing under the BC Act until there is adequate understanding of threat levels imposed on them. Species on the Priority flora list are assigned to one of four Priority (P) categories, P1 (highest) – P4 (lowest), based on level of knowledge/concern.

2.2.2 Critical habitat

Under the BC Act, habitat is eligible for listing as critical habitat if it is critical to the survival of a Threatened species or a TEC and its listing is otherwise in accordance with the ministerial guidelines.

2.2.3 Threatened and Priority Ecological Communities

The BC Act provides for the listing of TECs in the following categories:

- Critically Endangered – facing an extremely high risk of becoming eligible for listing as a collapsed ecological community in the immediate future[3]
- Endangered – facing a very high risk of becoming eligible for listing as a collapsed ecological community in the near future[3]
- Vulnerable – facing a high risk of becoming eligible for listing as a collapsed ecological community in the medium term future[3].

An ecological community may be listed as a collapsed ecological community under the BC Act if there is no reasonable doubt that the last occurrence of the ecological community has collapsed or the ecological community has been so extensively modified throughout its range that no occurrence of it is likely to recover its species composition and/or structure.

The DBCA also maintains a non-statutory list of Priority Ecological Communities (PECs), which may become TECs in the future; however, do not currently meet survey criteria or that are not adequately defined. PECs are assigned to one of five categories depending on their priority for survey or definition, with Priority 1 of highest concern and Priority 5 of lowest concern.

2.2.4 Other significant flora and vegetation

Under the EPA's environmental factor guidelines, flora and vegetation may be considered significant for a range of reasons other than listing as a Threatened or Priority species or ecological community.

In addition to listing as Threatened or Priority, EPA (2016a) identifies the following:

- flora may be significant for
    - local endemism or association with a restricted habitat type (e.g. surface water or groundwater dependent ecosystems)
    - new species or anomalous features that indicate a potential new species
    - representing the range of a species (particularly at the extremes of range, recently discovered range extensions, or isolated outliers of the main range)

[3] As determined in accordance with criteria set out in the ministerial guidelines.

  - being unusual species, including restricted subspecies, varieties or naturally occurring hybrids
  - having relictual status, being representative of taxonomic groups that no longer occur widely in the broader landscape
- vegetation may be significant for:
  - having restricted distribution
  - subject to a degree of historical impact from threatening processes
  - having a role as a refuge
  - providing an important function required to maintain ecological integrity of a significant ecosystem.

Provided in the guide for assessment of applications to clear native vegetation (DER 2014) is a scale for assessing the bioregional conservation status of ecological vegetation classes (Table 2-1).

Table 2-1 Bioregional conservation status of ecological vegetation classes

Conservation status	Description
Presumed extinct	Probably no longer present in the bioregion
Endangered*	Less than 10% of pre-European extent remains
Vulnerable*	10-30% of pre-European extent exists
Depleted*	More than 30% and up to 50% pre-European extent exists
Least concern	More than 50% of pre-European extent exists and subject to little or no degradation over a majority of this area

*or a combination of depletion, loss of quality, current threats and rarity gives a comparable status.

2.2.5 Environmentally Sensitive Areas

Under section 51B of the EP Act the Minister for Environment may declare by notice either a specified area of the State or a class of areas of the State to be Environmentally Sensitive Areas (ESAs). ESAs are declared in the *Environmental Protection (Environmentally Sensitive Areas) Notice 2005*, which was gazetted on 8 April 2005 (Government of Western Australia 2005).

ESAs are areas where the vegetation has high conservation value. Several types of areas are declared ESAs including:

- the area covered by vegetation within 50 metres (m) of Threatened flora, to the extent to which the vegetation is continuous with the vegetation in which the Threatened flora is located
- the area covered by a TEC
- a defined wetland (Ramsar wetlands, conservation category wetlands and nationally important wetlands) and the area within 50 m of the wetland
- Bush Forever sites.

2.2.6 Introduced flora

Introduced flora (weeds) pose threats to biodiversity and natural values by successfully out-competing native species for available nutrients, water, space and sunlight; reducing the natural structural and biological diversity by smothering native plants or preventing them from growing back after clearing, fire or other disturbance; replacing the native plants that animals use for shelter, food and nesting; and altering fire regimes, often making fires hotter and more destructive (Australian Weeds Committee 2007).

Management of some weed species is required under Commonwealth or State frameworks. Key classifications for significant introduced flora that are relevant to this report are:

- Declared Pest – the Biosecurity and Agriculture Management Act 2007 (BAM Act), Section 22 makes provision for a plant taxon to be listed as a Declared Pest organism in parts of, or the entire State. Under the Biosecurity and Agriculture Management Regulations 2013 Declared Pests are assigned to one of three control categories that dictate the level of management required (DPIRD 2019).
- Weed of National Significance (WoNS) – high impact, established introduced flora causing major economic, environmental, social and/or cultural impacts in a number of states/territories, and which have strong potential for further spread (Australian Weeds Committee 2012). Management is required in accordance with Department of Primary Industries and Regional Development (DPIRD) guidelines for particular WoNS.

Throughout this report, introduced flora species are indicated with an asterisk (*).

3 EXISTING ENVIRONMENT

3.1 INTERIM BIOGEOGRAPHIC REGIONALISATION OF AUSTRALIA

The Interim Biogeographic Regionalisation of Australia (IBRA) classifies Australia's landscapes into large 'bioregions' and 'subregions' based on climate, geology, landform, native vegetation and species information (DoEE 2016). The study area lies on both the East Murchison subregion (MUR1) of the Murchison bioregion, and the Eastern Goldfield subregion (COO3) of the Coolgardie bioregion (Figure 3-1).

The East Murchison subregion is characterised by (Cowan 2001b):

- internal drainage, and extensive areas of elevated red desert sandplains with minimal dune development
- salt lake systems associated with the occluded Paleodrainage system
- broad plains of red-brown soils and breakaway complexes as well as red sandplains
- vegetation is dominated by Mulga Woodlands often rich ephemerals; hummock grasslands, saltbush shrublands and *Halosacia* (i.e., *Tecticornia*) shrublands
- land use dominated by grazing, followed by Crown Reserves with considerable mining interests.

The Eastern Goldfields subregion is characterised by (Cowan 2001a):

- subdued relief comprised of undulating plains interrupted by low hills and ridges in the west and a horst in the east
- playa lakes associated with the remnants of an ancient major drainage line
- calcareous earths that cover much of the plains and greenstone areas
- vegetation dominated by Mallees, *Acacia* thickets, shrubland heaths, *Eucalyptus* woodlands and dwarf samphire shrublands
- land use dominated by Unallocated Crown Land, Crown Reserves and grazing.

3.2 LAND SYSTEMS AND SURFACE GEOLOGY

DPIRD undertakes land system mapping for WA using a nesting soil-landscape mapping hierarchy (Schoknecht & Payne 2011). While the primary purpose of the mapping is to inform pastoral and agricultural land capability, it is also useful for informing biological assessments. Under this hierarchy, land systems are defined as areas with recurring patterns of landforms, soils, vegetation and drainage (Payne & Leighton 2004).

The study area intersects nine land systems (Table 3-1; Figure 3-2).

According to the Surface Geology of Australia 1:1,000,000 scale, Western Australia database (Stewart et al. 2008), the study area intersects eight geological formations (Table 3-2; Figure 3-2).

Table 3-1 Land systems and extent in study area

Land system	Description	Area (ha)	% of study area
BB5	Rocky ranges and hills of greenstones-basic igneous rocks.	94.4	0.83
Bunyip System	Gilgaied drainage tract, draining greenstone hills supporting mixed halophytic shrublands occasionally with a black oak overstorey.	242.1	2.12
Graves System	Basalt and greenstone rises and low hills supporting eucalypt woodlands with prominent saltbush and bluebush understoreys.	1,200.5	10.52
Gumland System	Extensive pedeplains supporting eucalypt woodlands with halophytic and non-halophytic shrub understoreys.	4,209.3	36.88
Helag System	Hardpan plains and central drainage tracts with mulga shrublands and minor chenopod shrublands.	221.9	1.94
Kanowna System	Level to gently inclined pedeplains, gently undulating stony plains and prominent drainage foci supporting eucalypt woodlands with saltbush low shrubs.	11.8	0.1
Moriarty System	Low greenstone rises and stony plains supporting chenopod shrublands with patchy eucalypt overstoreys.	619.2	5.43
Mx43	Gently undulating valley plains and pediments; some outcrop of basic rock.	3,672.7	32.18
Zed System	Low hills, rises and gently undulating stony plains based on metasedimentary rocks supporting acacia shrublands.	1,141.5	10
	Total	**11,413.3**	**100**

Table 3-2 Surface geology of the study area, extent by deposit type

Surface geology	Abbreviation	Description	Area (ha)	% of study area
alluvium 38485	Qa	Channel and flood plain alluvium; gravel, sand, silt, clay, locally calcreted.	1,644.9	14.41
colluvium 38491	Qrc	Colluvium, sheetwash, talus; gravel piedmonts and aprons over and around bedrock; clay-silt-sand with sheet and nodular kankar; alluvial and aeolian sand-silt-gravel in depressions and broad valleys in Canning Basin; local calcrete, reworked laterite.	3,974.7	34.82
felsic volcanic and volcaniclastic rocks 74288	Afe	Quartz-feldspar (meta-) porphyry, porphyritic microgranite; rhyolite, dacite, rhyodacite, andesite; agglomerate, breccia tuff; felsic schist; felsic volcanic and volcaniclastic rocks; dacite and rhyodacite tuff; dacite porphyry.	525.0	4.6
ferruginous duricrust 38498	Czl	Pisolitic, nodular or vuggy ferruginous laterite; some lateritic soils; ferricrete; magnesite; ferruginous and siliceous duricrusts and reworked products, calcrete, kaolinised rock, gossan; residual ferruginous saprolite.	667.2	5.85
mafic intrusive rocks 74263	Ade	Mafic intrusive rocks, medium to coarse-grained; layered mafic to ultramafic intrusions - dolerite, gabbro, olivine gabbro, peridotite, pyroxenite, leucogabbro, quartz dolerite, quartz gabbro, gabbronorite.	270.0	2.37
sedimentary rocks 74322	Ase	Phyllitic schist, siltstone, sandstone, greywacke, pelite, conglomerate, quartzite, phyllite, shale, slate, claystone, chert, minor felsic volcanic and volcaniclastic rocks; arkose, para- and orthoamphibolites; rare banded iron formation.	3,876.3	33.96
ultramafic and minor mafic rocks 74475	Aue	Tremolite-chlorite-talc amphibolite, metapyroxenite, pyroxenite, peridotite, serpentinite, ultramafic schists, komatiite, high-Mg basalt; also chalcedony, silica, jasper, silcrete, silica cap rock on ultramafic rocks.	322.0	2.82
undivided sedimentary and volcanic rocks 74481	Awe	Undivided sedimentary (non-volcanic) and felsic volcanic rocks.	133.3	1.17
		Total	**11,413.3**	**100**





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Map author	BQ

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Study area

Region, subregion

Coolgardie, Eastern Goldfield

Murchison, Eastern Murchison

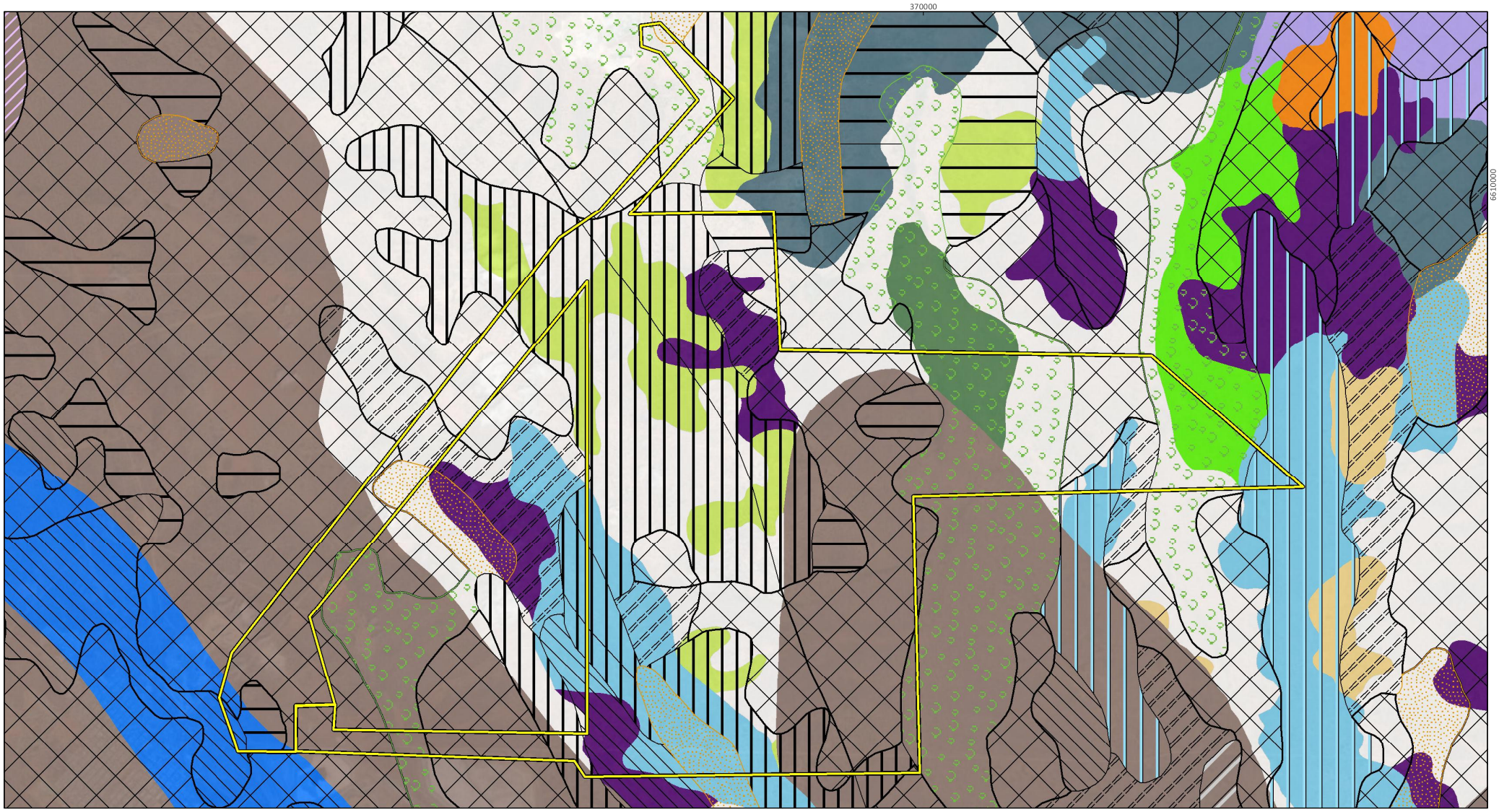
Figure 3-1

Study area in relation to IBRA bioregion and subregions

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Kilometers

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Study area

Land system

- BB5
- Bevon System
- Bunyip System
- Campsite System
- Graves System
- Gumland System
- Gundockerta System
- Helag System
- Kanowna System
- Moriarty System
- Mx43
- Zed System

Surface geology

- Abe
- Ade
- Afe
- Ase
- Aue
- Awe
- Czl
- Qa
- Qdlu
- Qrc

Figure 3-2

Land systems and surface geology in the study area

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3.3 CLIMATE AND WEATHER

The climate of the East Murchison subregion is described as arid with mostly winter rainfall (Cowan 2001b). The climate of the Eastern Goldfields subregion is characterised by arid to semi-arid with 200-300 mm of rainfall annually, sometimes falling in Summer but usually winter (Cowan 2001a).

The nearest Bureau of Meteorology (BoM) weather station with comprehensive data collection and recent historic climate data is Kalgoorlie-Boulder Airport (no. 012038), Latitude: 30.78°S Longitude 121.45°E), located 6 km southwest of the study area.

Kalgoorlie-Boulder Airport records the highest mean maximum monthly temperature (33.7°C) in January (lowest in July, 16.9°C) and the lowest minimum mean monthly temperature (5.1°C) in July (highest in January, 18.5°C) (BoM 2022) (Figure 3-3). Median annual rainfall is 254 mm with July, June and May recording the highest monthly median (20.0, 18.6 and 18.6 mm respectively; Figure 3-3).

Daily mean temperatures at Kalgoorlie-Boulder Airport preceding the surveys were relatively consistent with long term average (Figure 3-3). Temperatures were slightly above long-term averages (>1 degree) in July, February, and December, and slightly cooler than long term averages in September, April, November and October (Figure 3-3).

Records from Kalgoorlie-Boulder Airport show above average rainfall in the weeks preceding the survey in August and September (Figure 3-3).

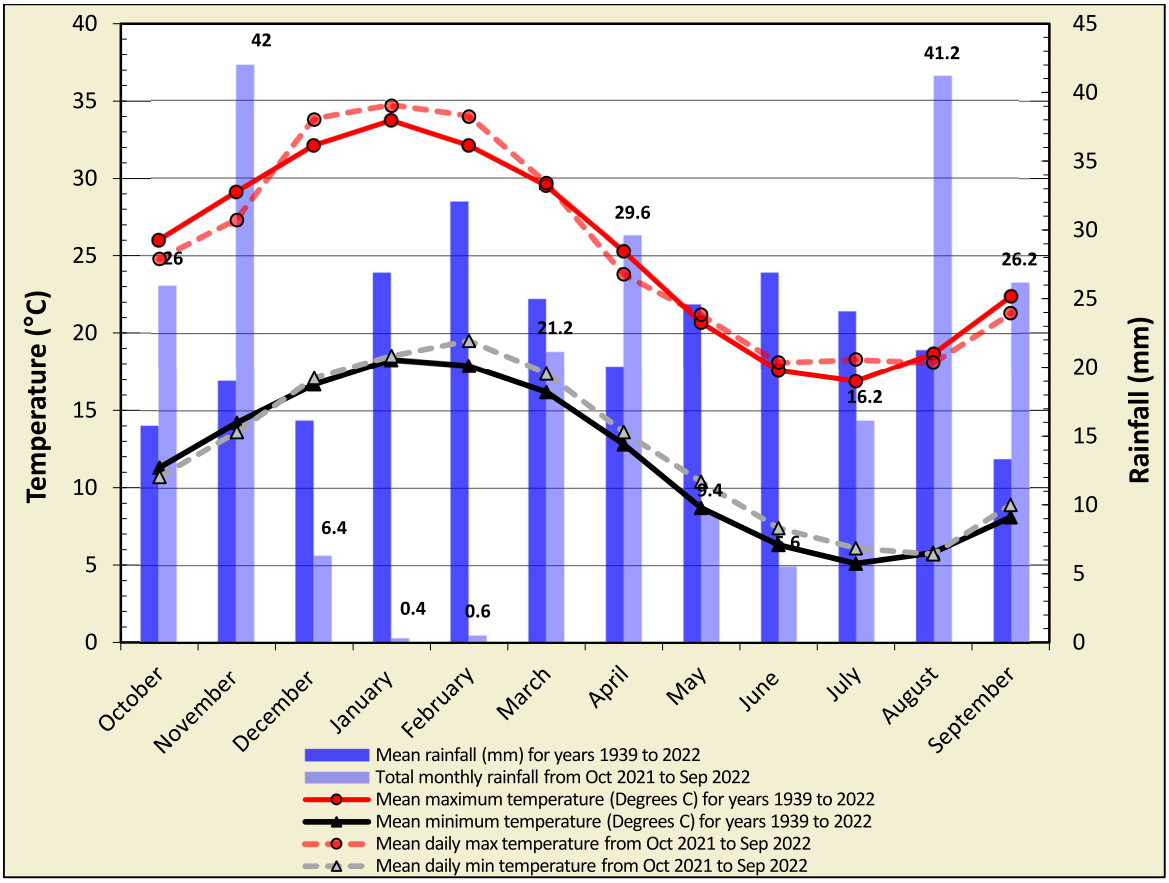


Figure 3-3 **Annual climate and weather data for Kalgoorlie-Boulder Airport (no. 012038) and mean monthly data for the 12 months preceding the survey (BoM 2022)**

LAND USE

The study area occurs within the Eastern Goldfields and Eastern Murchison subregion. The dominant land use within the Eastern Goldfields subregion is Unallocated Crown Land and Crown reserves. This accounts for the vast majority of the land use in the subregion with grazing on native pastures, freehold, conservation and mining making up the remainder (Cowan 2001a). The dominant land use within the Eastern Murchison subregion is grazing on native pastures, with Unallocated Crown Land, Crown reserves, mining and conservation making up the remainder (Cowan 2001b).

The dominant land use of the study area is grazing on native pastures. The study area encompasses pastoral lease N049574 and N049574.

CONSERVATION RESERVES AND ESAS

The study area does not intersect any current or proposed conservation reserves; however, Kalgoorlie Arboretum is located 3.6 km east of the study area and Lakeside Timber Reserve is located 5.3 km south of the study area. The closest Environmentally Sensitive Area is located approximately 49.8 km north of the study area (Figure 1-1).

4 METHODS

The reconnaissance survey was conducted in accordance with relevant survey guidelines and guidance, including:

- *EPA Environmental Factor Guideline: Flora and vegetation* (EPA 2016a)
- *EPA Technical Guidance: Flora and vegetation surveys for Environmental Impact Assessment* (EPA 2016b)

4.1 DESKTOP REVIEW

Searches of several biological databases were undertaken to identify and prepare lists of significant flora and vegetation that may occur within the study area (Table 4-1). The DBCA recommended Threatened and Priority Flora Database search was for a 50 km buffer for this area.

Table 4-1 Database searches conducted for the desktop review

Database	Target group/s	Search coordinates and extent
Protected Matters Search Tool (DCCEEW 2022)	EPBC Act Threatened flora, and ecological communities	Approximate centre point of study area with 40 km buffer
DBCA Threatened and Priority Flora Database (DBCA 2022a)	Threatened and Priority flora	Study area plus a 50 km buffer
DBCA Threatened and Priority Ecological Communities Database (DBCA 2022b)	TECs and PECs	Study area plus a 40 km buffer

A total of 12 reports were reviewed in the desktop assessment previously undertaken (Phoenix 2019a) that covers the current study area (Table 4-2). The results from Phoenix (2019a) were utilised to inform the current survey/report information from targeted searches for *Eremophila praecox* (P2) (Phoenix 2020b) have been included.

Table 4-2 Reports reviewed for the desktop assessment (Phoenix 2019a)

Report author	Survey type	Project and client
McKenzie & Hall (1992)	Level 2 flora and fauna surveys	Eastern Goldfields Biological Survey
Botanica (2009, 2010b, 2011b, 2012a, 2013, 2014a)	Vegetation monitoring 2009–2014	Fimiston I and II Tailings Storage Facilities (KCGM)
Botanica (2010a, 2011a, 2012b, 2014b)	Vegetation monitoring 2010–2014	Fimiston I and II. Kaltails and Gidji Tailings Storage Facilities (KCGM)
Jim's Seeds, Weeds & Trees (2004)	Flora and vegetation survey	Fimiston III (KCGM)
Jim's Seeds, Weeds & Trees (2006)	Flora and vegetation survey	KCGM rehabilitation sites
Botanica (2014c)	Desktop flora assessment	Tailings Storage Facility Expansion (KCGM)
Botanica (2015b)	Level 2 flora and vegetation survey	Tailings Storage Facility Expansion (KCGM)
Botanica (2015a)	Level 1 flora and vegetation survey	Fimiston Waste Rock Dump Extension (KCGM)
Phoenix (2016)	Level 2 aquatic and riparian flora and fauna survey	Hannan Lake (KCGM)
Phoenix (2017)	Level 2 aquatic and riparian flora and fauna survey	Hannan Lake (KCGM)
Phoenix (2018b)	Level 2 flora and vegetation and Level 1 terrestrial fauna	Gidji Operations (KCGM)
Phoenix (2018a)	Level 2 flora and vegetation and Level 1 terrestrial fauna	Crossroads Tenement (KCGM)
Phoenix (2019a)	Detailed flora and vegetation and Level 1 terrestrial fauna	Fimiston operations (KCGM)
Phoenix (2020b)	Targeted searches for *Eremophila praecox*	Fimiston operations (KCGM)

4.2 FIELD SURVEY

4.2.1 Survey timing

The field survey was conducted from 19 to 22 September 2022 by Dr Grace Wells and Dr Grant Wells.

4.2.2 Field methods

Field methods for the flora and vegetation survey included:

- surveying of relevés (see 4.2.2.1)
- targeted flora searches (4.2.2.2)
- vegetation type and condition mapping (4.2.2.3, 4.2.2.4)

Prior to the commencement of the field survey, data including satellite imagery, survey boundary, and pre-selected relevés were loaded onto electronic field devices. The field survey involved assessing and mapping vegetation boundaries, conducting relevé sampling and collecting opportunistic flora

specimens. GPS locations of vegetation and condition boundaries, survey sites and flora specimen data were recorded digitally.

4.2.2.1 Relevés

Relevés locations were selected to ensure that an accurate representation of the major vegetation types within the study area were sampled adequately. Two methods were used for the selection of relevé placement within the study area. Preliminary relevé locations were pre-selected using aerial photography, with selection based on apparent changes in the vegetation visible in the aerial imagery. Final relevé placement was determined in the field while ground-truthing the study area on foot. Some preliminary relevés were moved to locations which better represented vegetation types.

In total, 52 relevés were surveyed across the study area (Figure 4-1).

The following information was recorded for each relevé (Appendix 1):

- location – a single geographic coordinate was recorded central to the area surveyed
- description of vegetation – a broad description utilising the structural formation and height classes based on National Vegetation Information System (ESCAVI 2003) and in accordance with EPA (2016b) (Appendix 2)
- habitat – a brief description of landform and habitat
- geology – a broad description of surface soil type and rock type
- disturbance history – a description of any observed disturbance including an estimate of time since last fire, weed invasions, soil disturbance, human activity and fauna activity
- vegetation condition – using the condition scale in EPA (2016b) for the Eremaean and South-West Interzone Botanical Province
- height and percentage foliage cover (PFC) – a visual estimate of cover of total vegetation cover, cover of shrubs and trees >2 m tall, cover of shrubs <2 m, total grass cover and total herb cover
- photograph – a colour photograph of the vegetation within each quadrat in a south-easterly direction from the north-west corner of the quadrat
- flora species list –list of all prominent flora species.

To ensure accurate taxonomic identification of flora species present within the study area, collections were made of each specimen at least once and each collection was pressed and documented for identification using the WA Herbarium resources.

For each species identified, records on FloraBase and the Australasian Virtual Herbarium were consulted to provide information on known ranges to determine whether the survey area represented a range extension for the species.

4.2.2.2 Targeted flora searches

Targeted searches were undertaken for significant flora (Threatened and Priority), Declared Pests and WoNS. Remnant vegetation was traversed by foot in meandering transects with the searches focused on habitats considered likely to support significant flora, in addition to previously recorded locations of significant plants or populations in the study area.

If a flora species was considered to potentially be a significant species (i.e. similar floristic characteristics and occurring within suitable habitat) the following information was collected:

- GPS coordinates, including population boundary where applicable
- description of the habitat and floristic community in which the potential significant species was located

- population size estimate (i.e. estimated number of individual plants) where applicable
- specimen collection for taxonomic identification and lodgement at the WA Herbarium
- photograph of live plant in situ and description of important details, such as flower colour, height of individual or average height of population.

Following the field survey, the likelihood of occurrence for each significant flora species identified in the desktop review was assessed and assigned to one of three ratings:

- recorded – species recorded within the study area by previous or current survey
- possible – study area within known range of species; potential habitat within the study area, records within 5 km of study area and may not have been detectible during survey (e.g. survey conducted outside flowering period, annual plant survey conducted outside likely period of occurrence, small herbaceous plant in dense vegetation), or entire area of habitat not thoroughly searched
- unlikely – study area outside known range of species and/or no suitable habitat present in study area and/or suitable/potential habitat present but study area considered adequately searched for the species.

4.2.2.3 Vegetation type mapping

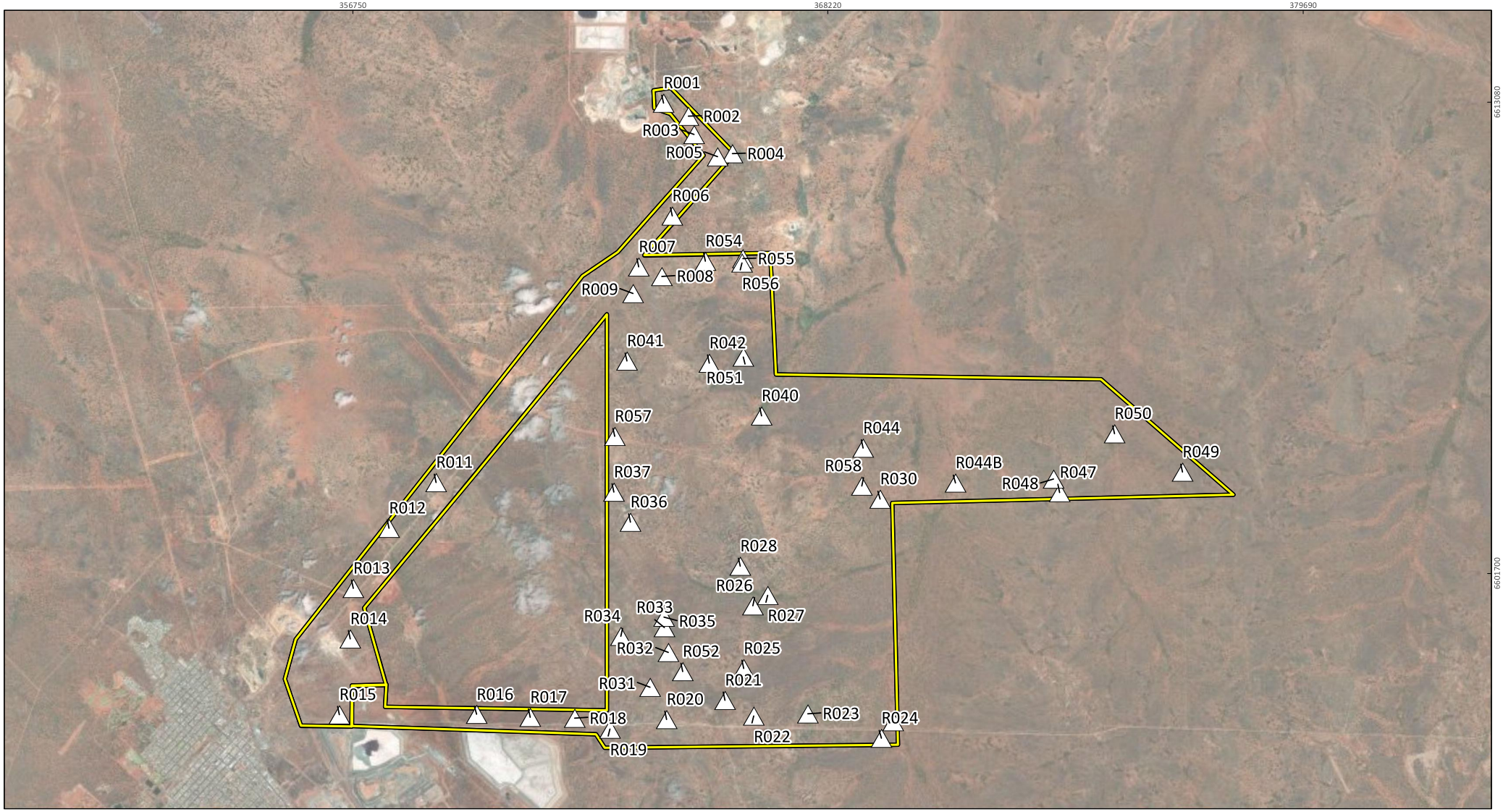
Vegetation mapping was undertaken at a scale of 1:10,000 using the National Vegetation Information System (NVIS) sub-formation level (L4) for structural descriptions (ESCAVI 2003). The vegetation descriptions from relevés from the survey were grouped according to similarity of community structure (i.e. canopy levels), species composition and combination of species and the prevalent community structure (i.e. woodland, shrubland, etc.). The vegetation boundaries were mapped utilising ArcGIS ESRI imagery.

4.2.2.4 Vegetation condition mapping

The condition of vegetation was mapped across the study area based on the condition scale for the Eremaean and South-West Interzone Botanical Province (Trudgen 1988 in EPA 2016b) (Table 4-3). The vegetation condition ratings relate to vegetation structure, the level of disturbance and weed cover at each structural layer and the ability of the vegetation unit to regenerate. Vegetation condition ranges from Excellent being the highest rating to Completely Degraded as the lowest.

Table 4-3 Vegetation condition rating scale (EPA 2016b)

Condition rating	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	More obvious signs of damage caused by human activity since European settlement, including some obvious impact on the vegetation structure such as that caused by low levels of grazing or slightly aggressive weeds.
Poor	Still retains basic vegetation structure or ability to regenerate it after very obvious impacts of human activities since European settlement, such as grazing, partial clearing, frequent fires or aggressive weeds.
Degraded	Severely impacted by grazing, very frequent fires, clearing or a combination of these activities. Scope for some regeneration but not to a state approaching good condition without intensive management. Usually with a number of weed species present including very aggressive species.
Completely Degraded	Areas that are completely or almost completely without native species in the structure of their vegetation; i.e. areas that are cleared or 'parkland cleared' with their flora comprising weed or crop species with isolated native trees or shrubs.





Northern Star
Kalgoorlie Operations

Project No	1530
Date	12/15/2022
Drawn by	FK
Map author	BQ

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Kilometers

1:124,300 (at A4) GDA 1994 MGA Zone 51

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Study area
Site

Figure 4-1

Flora and vegetation survey sites

PHOENIX ENVIRONMENTAL SCIENCES

4.2.3 Survey personnel

The personnel involved in the surveys are listed in Table 4-4. All survey work was carried out under relevant licences issued by DBCA under the BC Act (Table 4-4).

Table 4-4 Survey personnel

Name	Permit	Qualifications	Role/s
Dr Grant Wells	FB2000227	PhD Botany	Field survey, taxonomy, reporting
Dr Grace Wells	NA	PhD Botany	Field survey, mapping, report review
Dr Andrew Perkins	NA	PhD Botany	Taxonomy
Calum Woods	NA	Ma (Biol. Sci.), BSc (Env. Sci. & Cons. Biol	Data management
Naomi Lee	NA	Dip. Business Admin	Logistics and administration
Brigitte Kovar		BSc (Ex. Sci.)	GIS, cartography, spatial data management

5 RESULTS

5.1 DESKTOP REVIEW

5.1.1 Flora and vegetation

5.1.1.1 Flora assemblage

The desktop review identified records of a total of 248 flora taxa have been recorded in the vicinity of the study area, representing 39 families and 98 genera of which 234 have been identified to species level. This included 223 native and 25 introduced flora. The most prominent families were the Chenopodiaceae (51 taxa), Fabaceae (35 taxa), Scrophulariaceae (28 taxa), Myrtaceae (26 taxa) and Asteraceae (21 taxa).

5.1.1.2 Significant flora

Records of 46 significant flora species were identified within the desktop search extent, comprising one Threatened flora, 44 Priority flora and one novel species (Table 5-1).

A record of *Eremophila praecox* (P2) occurred in the study area (Figure 5-1), no other records of significant flora occurred in the study area.

Table 5-1 Significant flora identified in the desktop review

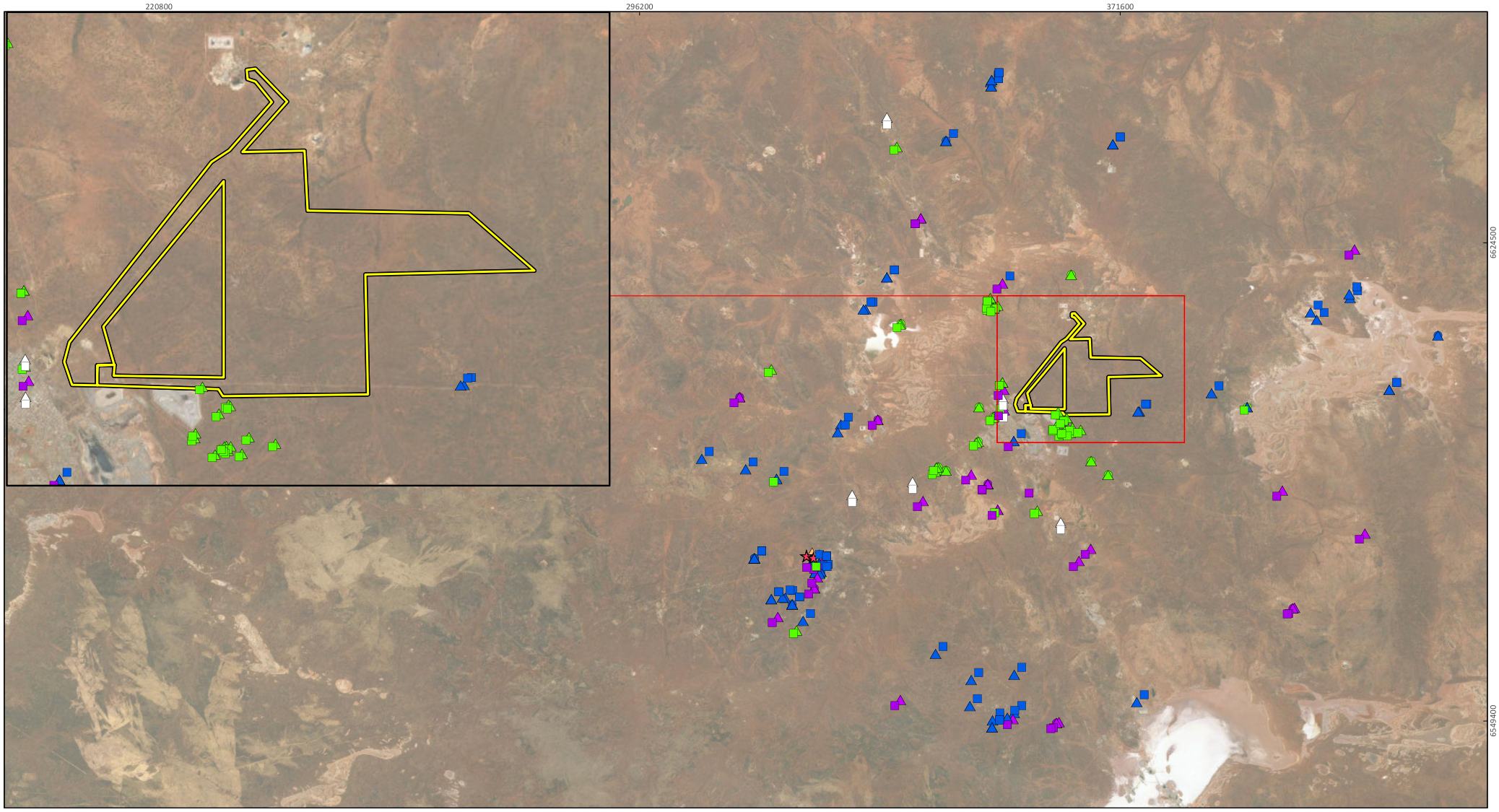
Species	Status	Proximity to study area	Habitat
Gastrolobium graniticum	T	39.2 km WSW	Associated with the margins of granite outcrops, especially along drainage lines, on sandy soils in open woodland in association with *Allocasuarina huegeliana*, *Acacia lariocalyx* and *Eucalyptus eremophila* (DEWHA 2008). Flowers August to October (DEWHA 2008; WA Herbarium 1998).
Acacia coatesii	1	48.6 km WSW	Open woodland dominated by *Eucalyptus clelandii* and *E. lesouefii* over open shrubland that includes *Acacia erinacea*, *A. hemiteles*, *Atriplex nummularia*, *Eremophila scoparia*, *Dodonaea stenozyga* and *Olearia muelleri*. Grows in shallow, red, sandy clay on flat or gently sloping ground towards the base of a low greenstone ridge (greenstones are variably metamorphosed mafic to ultramafic volcanic sequences with associated sedimentary rocks. Flowering in August to October. (Maslin 2014)
Acacia epedunculata	1	33.6 km NW	*Eucalyptus* mallee woodland, *Callitris*, *Banksia* and shrubland over *Triodia* grasses on yellow sand plain. Flowers July to August (WA Herbarium 1998).
Acacia websteri	1	39.2 km WSW	*Acacia* spp. woodlands and shrublands on sandplain in orange sand, plains and drainage foci in red clay, drainage lines in yellow clay loam and flat with rad/brown sand. Recorded flowering in January and June (WA Herbarium 1998).
Calandrinia lefroyensis	1	27.5 km W	Occurs on salt-lake flats among samphire communities, soils are brown silty loams or brown-grey sandy clays, favour the outer edges of samphire

Species	Status	Proximity to study area	Habitat
			communities including within the ecotone of adjacent communities where there are open assemblages of taller species such as *Casuarina obesa* and *Eucalyptus* spp. Flowers October to November (Obbens 2018).
Chamelaucium sp. Parker Range (B.H. Smith 1255)	1	49.9 km W	Open mallee woodlands with mixed shrublands and mixed heath with *Grevillea*, *Melaleuca*, *Beaufortia* and *Persoonia* in yellow or orange sand on plains and rises. Recorded flowering in November and December (WA Herbarium 1998).
Dampiera plumosa	1	47.0 km SW	*Eucalyptus* woodland with *Acacia* shrubs and *Triodia* grassland in red sandy soil and in *Eucalyptus* woodland and heathlands in yellow sand plains. Flowers September to October (WA Herbarium 1998).
Eremophila xantholaemus	1	4.5 km E	Growing in stony, brown loam soils in *Eucalyptus-Casuarina* woodland on the upper slopes of low rocky hills. Associated species include *Casuarina pauper*, *Eremophila glabra* subsp. *glabra*, *E. parvifolia* subsp. *auricampa*, *E. pustulata*, *Senna artemisioides* subsp. *filifolia* and *Westringia rigida*. Flowers from September to October (Brown & Davis 2019).
Phebalium appressum	1	39.2 km WSW	Open mallee woodlands over mixed shrublands and *Triodia* grassland in yellow sand, Mixed shrublands with *Triodia* grassland in yellow sand on plains. Recorded flowering in July and September (WA Herbarium 1998)
Pterostylis xerampelina	1	42.7 km SSW	Occurs in sand and gravel over granite amongst shrublands and thickets or bare rocky areas. Flowers September to October (WA Herbarium 1998).
Ptilotus procumbens	1	4.6 km S	Open *Acacia* shrubland over mixed forbland in red clay, in deep red clay and in mulga scrub on plain with lateritic gravel. Recorded flowering September to November (WA Herbarium 1998).
Ptilotus rigidus	1	25.5 km ENE	Associated with salt lakes, occurs in red loam/clay, orange sand on salt lake edges, quartz rises, rocky outcrops in *Tecticornia* shrublands, kopi dune vegetation and *Melaleuca* shrublands. Flowers September to November (Lally 2009; WA Herbarium 1998)
Ptilotus sp. Kalgoorlie (J. Jackson & B. Moyle 260)	1	27.8 km NW	Quartz hills and outcrop in *Tecticornia* dominated shrublands. Recorded in flower bud in September (WA Herbarium 1998).
Rhodanthe uniflora	1	13.5 km NW	Open *Eucalyptus* woodland in brown soil and mid sparse shrubland dominated by *Maireana pyramidata* over low sparse chenopod shrubland of mixed species including *Maireana georgei*, *Sclerolaena diacantha* and *Sclerolaena patenticuspis* on a stony plain in red clay. Recorded flowering in September (WA Herbarium 1998).

Species	Status	Proximity to study area	Habitat
Ricinocarpos digynus	1	37.9 km NNW	Grows in sandy loam on rocky hillsides in association with *Casuarina pauper*, *Acacia kalgoorliensis*, *Ptilotus obovatus* and *Triodia scariosa*. Flowering November to March (Hislop & Wege 2020).
Thryptomene planiflora	1	39.9 km WSW	Recorded on plains, with yellow or brown to red sandy soils, in shrublands that are often dominated by *Acacia*. Flowers June to October (Rye 2020).
Thryptomene sp. Coolgardie (E. Kelso s.n. 1902)	1	39.2 km WSW	No habitat description available.
Austrostipa frankliniae	2	48.8 km SW	Open salmon gum and mallee woodland over grasses on plain in red sand/loam and in *Acacia* and *Dodonaea* shrubland and *Eucalyptus torquata* open woodland over *Dodonaea* and *Trymalium* shrubland on slopes of basalt hills. Recorded flowering in October and November (WA Herbarium 1998).
Elachanthus pusillus	2	1.9 km W	Sparse *Eucalyptus* spp. woodland over open mixed shrubland over open mixed herbs or Chenopod shrubland in bare lateritic gravel – red loamy clay soils or red loam over limestone on low plain. Flowers August to October (WA Herbarium 1998).
Eremophila praecox	2	Within study area	Red/brown sandy loam. Undulating plains. Hill slope. Red-brown clay loam over ferrous ironstone. Low *Eucalyptus* woodland over dwarf scrubland in red-brown sandy loam on undulating plains. Flowers October to December (WA Herbarium 1998).
Goodenia salina	2	15.7 km SSW	Found in low gypseous dunes near salt pans in well-drained, saline, grey or brown loamy clay with scattered *Callitris preissii* subsp. *verrucosa*, *Tecticornia* spp. and *Austrostipa juncifolia*. Flowers September to October (Sage & Shepherd 2007).
Hakea rigida	2	39.2 km WSW	Open mallee woodlands over mixed heath/shrublands with *Allocasuarina*, *Grevillea* and *Hakea* spp. in plains and on kopi dunes in yellow sand. Flowers September to October (WA Herbarium 1998).
Lepidium merrallii	2	39.2 km WSW	Open mulga scrub over scattered saltbush in yellow brown sandy clay and in well drained red crumbly clay loam. No record of flowering period (WA Herbarium 1998).
Tecticornia flabelliformis	2	14.3 km ESE	Flat areas near shoreline and on playa of salt lakes in orange sand, brown clay, red-brown sandy clay in low samphire shrubland. Collected with fertile material in March, April and December (WA Herbarium 1998).
Alyogyne sp. Great Victoria Desert (D.J. Edinger 6212)	3	43.5 km SW	*Eucalyptus* woodlands over mixed shrublands and *Triodia* grasslands in red/orange and yellow sands on plains. Recorded flowering in May, August and November (WA Herbarium 1998).
Alyxia tetanifolia	3	12.3 km SW	*Casuarina* pauper woodland or Chenopod shrubland in sandy clay, loam, concretionary gravel or granite on drainage lines near lakes or lateritic low rises and

Species	Status	Proximity to study area	Habitat
			breakaways. Recorded flowering May to June and November (WA Herbarium 1998).
Angianthus prostratus	3	11.9 km WNW	*Tecticornia* low heath over open herbs or dense low grass in red clay or loamy soils in saline depressions on beach edge of salt lake. Flowers July to September (WA Herbarium 1998).
Austrostipa turbinata	3	21.1 km S	*Eucalyptus* woodlands on hillslopes and claypan with crabholes in sandy loam to cracking clay soils. Flowers September to October (WA Herbarium 1998; Williams 2022)
Chrysocephalum apiculatum subsp. *norsemanense*	3	38.6 km WSW	Open *Eucalyptus* woodlands, shrublands in various soil types including yellow or red sand, yellow sandy clay, and calcareous soil (Wilson 2016) on sandplains, undulating plains, valley floors and hill slopes. Recorded flowering in August to October (WA Herbarium 1998)
Cyathostemon verrucosus	3	2.4 km WNW	Found on yellow sand plains, recorded in shrublands, sometimes dominated by mallees or *Banksia* (Trudgen & Rye 2014). Flowers mainly from late September to early December, also recorded in early March (Trudgen & Rye 2014).
Eremophila acutifolia	3	48.9 km SSW	In *Eucalyptus* spp. woodland with mixed shrublands on flat/undulating plains and broad valley floors in red/brown clay loams and gravelly clay loams. Recorded flowering from November to December and in May (WA Herbarium 1998).
Eremophila arachnoides subsp. *tenera*	3	26.2 km SE	Shrublands frequently dominated by *Maireana sedifolia*, *Cratystylis subspinescens* and *Atriplex* spp. with open *Eucalyptus* woodland overstorey on plains in calcareous sandy loam. Recorded flowering from September to January (WA Herbarium 1998).
Eremophila veronica	3	40.8 km SW	Growing in stony, brown loam soils in *Eucalyptus-Casuarina* woodland on the upper slopes of low rocky hills (Brown & Davis 2019). Drainage area, brown clay with gravel and plains in red loam. Recorded flowering from October to December and in March (WA Herbarium 1998).
Gompholobium cinereum	3	43.2 km W	Open mallee woodlands and shrublands in yellow sand, yellow/brown clayey sand on flat plains. Recorded flowering from August to November (WA Herbarium 1998).
Grevillea georgeana	3	42.2 km SW	In open *Eucalyptus* woodlands and shrublands occasionally with *Triodia* grassland on banded ironstone formations, lateritic hills and plateaus and flat plains in red loamy soils, brown/red ironstone gravel and red/brown clay. Recorded flowering January, March and September to November (WA Herbarium 1998).
Isolepis australiensis	3	15.7 km SSW	*Melaleuca* open shrubland or *Casuarina/Eucalyptus* open woodland in silty sand, sandy clay and red clay on lake margins, pools or granite outcrop. Recorded

Species	Status	Proximity to study area	Habitat
			flowering in June and September (WA Herbarium 1998).
Lepidium fasciculatum	3	1.9 km WSW	Open *Acacia* or *Maireana* shrubland in brown cracking clay on plain or red loam on dry lakebed. Recorded in fruit in September (WA Herbarium 1998).
Melaleuca coccinea	3	4.6 km S	*Acacia* or *Melaleuca* shrubland in sandy loam over granite on granite outcrops, sandplain and river valleys. Recorded flowering from September to November and in January (WA Herbarium 1998).
Notisia intonsa	3	20.4 km SW	*Eucalyptus* woodlands over shrubland in red-orange clayey sand with ironstone and quartz gravel on plains, floodplains and shallow depressions. Recorded flowering September to November (WA Herbarium 1998).
Phlegmatospermum eremaeum	3	39.9 km WSW	In *Eucalyptus* woodlands and chenopod shrublands in red loam and clay soils on hill slopes, plains and edges of salt lakes. Recorded flowering in June and August to October (WA Herbarium 1998).
Styphelia rectiloba	3	46.5 km S	Restricted to rocky, skeletal soils, on and in close proximity to, decomposed granitic breakaways. The associated vegetation is very open woodland or heath with *Eucalyptus stricklandii*, *Melaleuca leiocarpa*, *Alyxia buxifolia* and *Ptilotus helichrysoides* among the more frequently encountered species. Flowering specimens have been collected between December and June, March to May is likely the peak flowering season (Hislop 2019).
Eremophila caerulea subsp. *merrallii*	4	29.6 km WSW	Open *Eucalyptus* woodland over shrubland in sand, clay or loam with ironstone/quartz pebbles on undulating plains. Recorded flowering from October to December (WA Herbarium 1998).
Eucalyptus jutsonii subsp. *jutsonii*	4	20.5 km WSW	Open *Eucalyptus* mallee woodland with spinifex grassland in red, yellow or orange deep sands on sandplain, undulating areas and on dunes. Recorded flowering April to March and November (WA Herbarium 1998).
Eucalyptus x *brachyphylla*	4	2.5 km WSW	Sandy loam. Granite outcrops. Red loam over granite, on slope. *Eucalyptus* mallee woodland over shrubland in sandy loam or clay loam on granite outcrops. Recorded flowering in December with buds recorded in January (WA Herbarium 1998).
Frankenia glomerata	4	1.9 km W	Associated primarily with waterways and saline areas in particular salt lake/pan edges in shrublands including samphire shrublands in sandy to clay loam soils. Recorded flowering August to December (WA Herbarium 1998).
Streptoglossa aff *cylindriceps*	sp. nov.	1.9 km S	Along drainage lines and on undulating depressions (crabhole gilgai) in red clay/loam soils (Phoenix 2021a, b, c, 2022)





Northern Star
Kalgoorlie Operations

Project No	1530
Date	22/12/2022
Drawn by	FK
Map author	BQ

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1:805,800 (at A4) GDA 1994 MGA Zone 51

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Study area

Phoenix Records

- EN/VU (EPBC Act; BC Act)
- P1 (DBCA list)
- P2 (DBCA list)
- P3 (DBCA list)
- P4 (DBCA list)

TPFL

- P1
- P2
- P3

WA Herbarium

- P1
- P2
- P3
- P4
- PT

Figure 5-1

Desktop records of significant flora and vegetation

PHOENIX ENVIRONMENTAL SCIENCES

5.1.1.3 Introduced flora

The desktop review identified records for 75 weed species within 40 km of the study area (Appendix 4). Under current listings (DAFWA 2016; Department of the Environment 2014), eight of the species are declared pests and seven are WoNS (Table 5-2).

Previous surveys also reported **Carthamus lanatus*, **Marrubium vulgare* and **Rumex hypogaeus* as declared pests but these but these are no longer listed as declared on the Western Australian Organism List (DAFWA 2016).

Table 5-2 Significant weed species identified by the desktop review

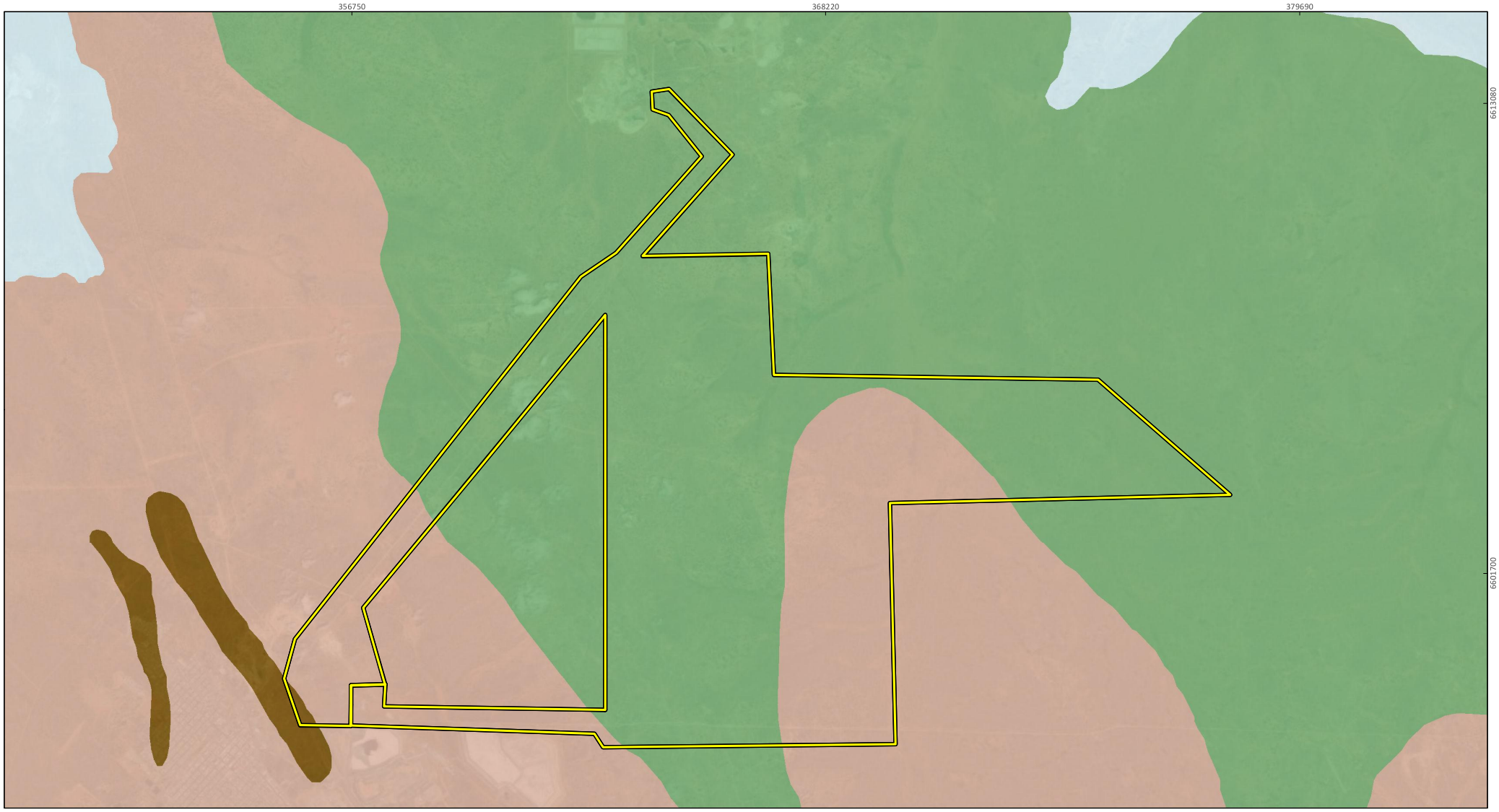
Family	Name	Declared Pest/WoNS
Boraginaceae	**Echium plantagineum* (Paterson's Curse)	Declared pest, S22(2) (C3)
Cactaceae	**Cylindropuntia fulgida* var. *mamillata* (Boxing Glove Cactus)	Declared pest, S22(2) (C3); WoNS
Cactaceae	**Cylindropuntia imbricata* (Devil's Rope)	Declared pest, S22(2) (C3); WoNS
Cactaceae	**Cylindropuntia kleiniae* (Candle Cholla)	Declared pest, S22(2) (C3); WoNS
Cactaceae	**Opuntia elata* (Riverina Pear)	Declared pest, S22(2) (C3); WoNS
Cactaceae	**Opuntia ficus-indica* (Prickly Pear)	Declared pest, S22(2) (C3); WoNS
Fabaceae	**Alhagi maurorum* (Camelthorn)	Declared pest, S22(2) (C3)
Solanaceae	**Lycium ferocissimum* (African boxthorn)	WoNS
Tamariaceae	**Tamarix aphylla* (Athel Pine)	Declared pest, S22(2) (C3); WoNS

5.1.1.4 Vegetation associations

Regional scale pre-European vegetation mapping for Western Australia (Beard *et al.* 2013; DPIRD 2018) identifies mapped 3 vegetation associations in the study area (Table 5-3; Figure 5-2). The remaining extent of all vegetation associations at the Statewide scale exceeds 95% and they are therefore considered of Least Concern (Table 5-3). Each of the associations have over 95% remaining at the both the bioregional and subregional scales (DBCA 2018a).

Table 5-3 Statewide extent of Pre-European vegetation associations present in the study area (DBCA 2018a).

Vegetation association	Pre-European extent (ha)	Current extent (ha)	Remaining (%)	Current extent in DBCA lands (%)	% of study area
20, Low woodland; mulga mixed with *Allocasuarina cristata* & *Eucalyptus* sp.	1,295,103.39	1,292,474.58	99.8	19.42	67.15
468, Medium woodland; salmon gum & goldfields blackbutt	592,022.32	583,902.76	98.63	23.15	32.6
1294, Medium woodland; coral gum	6,295.55	6,047.45	96.06	1.9	0.26





Northern Star
Kalgoorlie Operations

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Map author	BQ

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Study area

Vegetaion association, description

- 20, Low woodland; mulga mixed with Allocasuarina cristata & Eucalyptus sp.
- 125, Bare areas; salt lakes
- 468, Medium woodland; salmon gum & goldfields blackbutt
- 540, Succulent steppe with open low woodland; sheoak over saltbush
- 1294, Medium woodland; coral gum

Figure 5-2

Vegetation associations of the study area

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5.1.1.5 Significant vegetation

No Commonwealth or State listed TECs or DBCA listed PECs intersect the study area (Figure 5-1).

Phoenix (2022) identified fourteen vegetation types that may be considered locally significant as habitat for the Priority flora *Eremophila praecox* but also noted that the species was recorded in disturbed areas and in rehabilitation.

5.2 FIELD SURVEY

5.2.1 Flora and vegetation

5.2.1.1 Flora assemblage

A total of 136 flora taxa representing 33 families and 70 genera identified to species level were recorded in the study area during the field surveys (Appendix 4). Species richness ranged from 7 – 24 species between relevés (Appendix 1). The assemblage included 126 native species and 10 introduced species, including 103 perennial species, and 33 annual or short-lived species. The most prominent families recorded were Chenopodiaceae (19 spp.), Scrophulariaceae (18 spp.), Fabaceae (15 spp.), Myrtaceae (13 spp.) and Asteraceae (13 spp.).

5.2.1.2 Significant flora

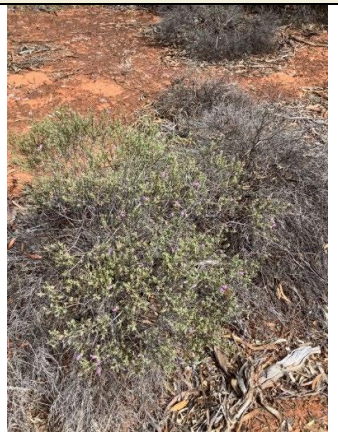
No Threatened flora were recorded during the field survey. 2 Priority flora were recorded, *Eremophila praecox* (P2) and *Allocasuarina eriochlamys* subsp. *grossa* (P3) (Table 5-4; Figure 5-3). The record for *Allocasuarina eriochlamys* subsp. *grossa* represents a slight northern extension of the recorded distribution (WA Herbarium 1998) of the species.

One species was collected that exhibited anomalous features, *Streptoglossa* aff *cylindriceps.* The specimen differs from *Streptoglossa cylindriceps* by having achenes with an indumentum of dense hairs that are approximately double the width of *S. cylindriceps*. This potentially represents a new species and is subsequently considered a locally significant species.

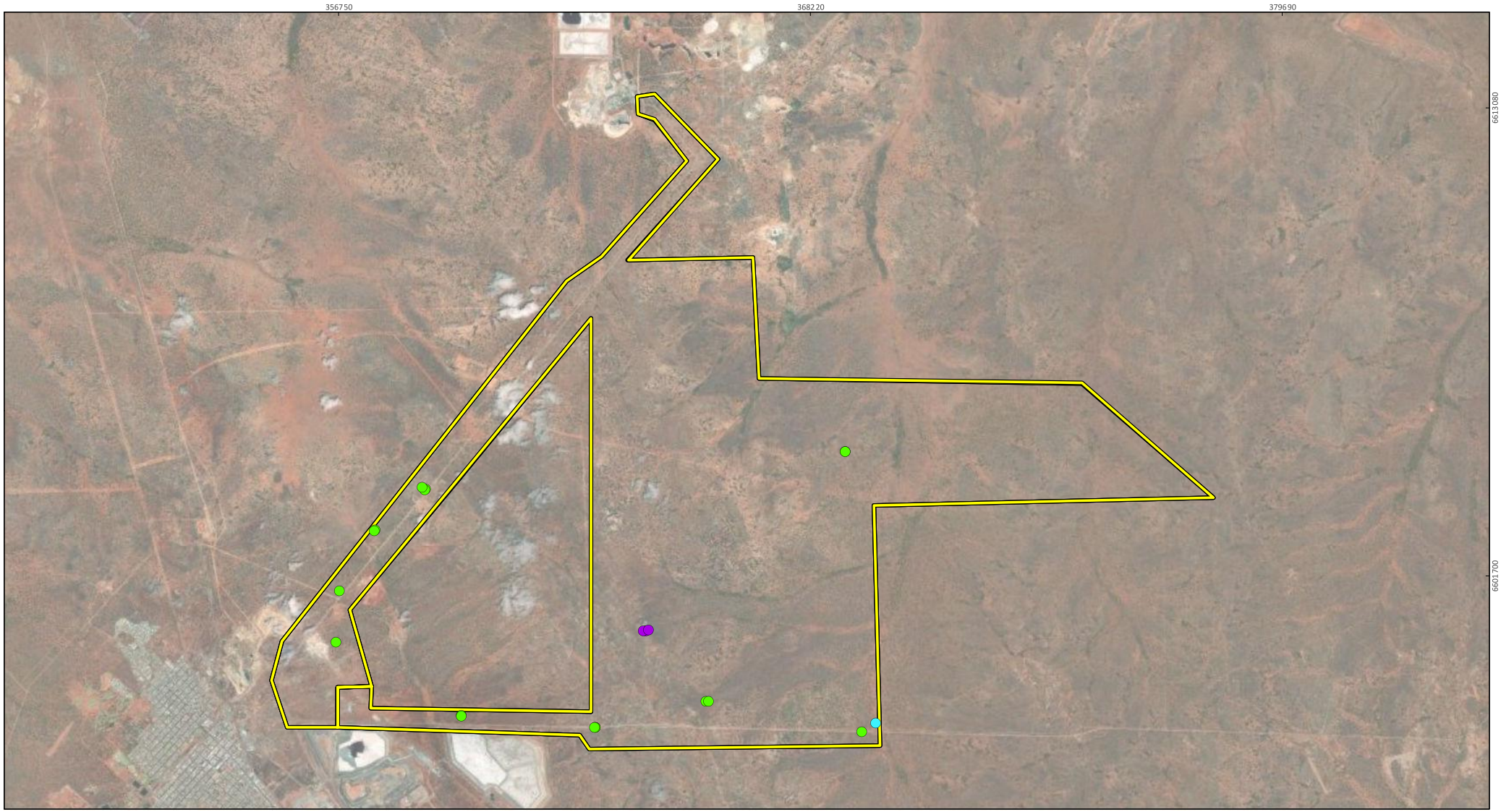
The likelihood of occurrence assessment for the remaining significant species identified in the desktop review determined 15 may possibly occur as there was suitable habitat in the study area, 29 were unlikely to occur due to a lack of suitable habitat and likelihood of one species could not be determined due to a lack of information on habitat (Table 5-5). The only Threatened species was considered unlikely to occur due to a lack of suitable habitat.

Allocasuarina eriochlamys subsp. *grossa* was recorded in the study area despite the closest record of the species being located more than 50 km from the study area. Subsequently Priority flora identified in the desktop assessment located at greater than 40 km from the study area were still considered to possibly occur in the study area if suitable habitat for the species was present in the study area.

Table 5-4 Details of significant flora recorded during the field survey

Species	Status	Distribution and ecology	Survey records	Photograph
Eremophila praecox	P2	Occurs in the Coolgardie, Murchison, and Nullarbor bioregions from 34 records (WA Herbarium 1998). Population sizes for the FloraBase WA Herbarium (1998) records range from one to few plants	The species was recorded at several locations in the study area in *Eucalyptus* and *Casuarina* woodlands over missed shrublands on flat plains in sandy loam soils. A total of 17 plants were recorded.	
Allocasuarina eriochlamys subsp. *grossa*	P3	Occurs in the Coolgardie, and Nullarbor bioregions from 28 records (WA Herbarium 1998). Population sizes for the FloraBase WA Herbarium (1998) records range from 100 to 1000's of plants to comments of locally frequent and common	The species was recorded at a single location in the study area on a hill slope in mid *Eucalyptus* mallee woodland over tall open *Acacia* shrubland.	

Species	Status	Distribution and ecology	Survey records	Photograph
Streptoglossa aff *cylindriceps*	sp. nov.	Recorded only in the Coolgardie bioregion at four locations (Phoenix 2021a, b, c, 2022). A total of four populations comprising 1290 plants were recorded by Phoenix (2021c).	The species was recorded at a single location in the study area in open *Eucalyptus* woodland over mid *Maireana* shrubland in riparian vegetation of a creek.	





Northern Star
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Study area

Significant flora

- *Allocasuarina eriochlamys subsp. grossa*, P3 (DBCA list)
- *Eremophila praecox*, P2 (DBCA list)
- *Streptoglossa aff. cylindriceps*, sp. nov.

Figure 5-3

Significant flora from the field survey

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Table 5-5 Likelihood of occurrence for significant flora identified in the desktop review

Species	Status	Likelihood of occurrence
Gastrolobium graniticum	T	Unlikely, lack of suitable habitat in study area.
Acacia coatesii	1	Possible there is suitable habitat in the study area
Acacia epedunculata	1	Unlikely, lack of suitable habitat in study area
Acacia websteri	1	Unlikely, lack of suitable habitat in study area and closest record is almost 40 km away
Calandrinia lefroyensis	1	Unlikely, lack of suitable habitat in study area.
Chamelaucium sp. Parker Range (B.H. Smith 1255)	1	Unlikely, lack of suitable habitat in study area.
Dampiera plumosa	1	Unlikely, lack of suitable habitat in study area and closest record is more than 40 km away
Eremophila xantholaemus	1	Possible, there is suitable habitat in the study area and there is a record for the species less than 5 km away
Phebalium appressum	1	Unlikely, lack of suitable habitat in study area and closest record is almost 40 km away
Pterostylis xerampelina	1	Unlikely, lack of suitable habitat in study area and closest record is more than 40 km away
Ptilotus procumbens	1	Possible, there is suitable habitat in the study area and there is a record for the species less than 5 km away
Ptilotus rigidus	1	Unlikely, lack of suitable habitat in study area.
Ptilotus sp. Kalgoorlie (J. Jackson & B. Moyle 260)	1	Unlikely, lack of suitable habitat in study area.
Rhodanthe uniflora	1	Possible, there is suitable habitat in the study area and the study area falls within the recorded distribution for the species
Ricinocarpos digynus	1	Possible, there is suitable habitat in the study area and the study area falls within the recorded distribution for the species
Thryptomene planiflora	1	Unlikely, lack of suitable habitat in study area and closest record is almost 40 km away
Thryptomene sp. Coolgardie (E. Kelso s.n. 1902)	1	Unable to determine as there is no information on habitat
Austrostipa frankliniae	2	Unlikely the study area is outside of the recorded distribution for the species and closest record is more than 40 km away
Elachanthus pusillus	2	Possible, there is suitable habitat in the study area and there is a record for the species less than 5 km away
Eremophila praecox	2	Recorded, desktop records occur in study area and new records for the species were record during the field survey
Goodenia salina	2	Unlikely, lack of suitable habitat in study area.
Hakea rigida	2	Unlikely, lack of suitable habitat in study area.
Lepidium merrallii	2	Unlikely, lack of suitable habitat in study area.
Tecticornia flabelliformis	2	Unlikely, lack of suitable habitat in study area.
Alyogyne sp. Great Victoria Desert (D.J. Edinger 6212)	3	Unlikely, lack of suitable habitat in study area.
Alyxia tetanifolia	3	Unlikely, lack of suitable habitat in study area.
Angianthus prostratus	3	Unlikely, lack of suitable habitat in study area.
Austrostipa turbinata	3	Possible there is suitable habitat in the study area

Species	Status	Likelihood of occurrence
Chrysocephalum apiculatum subsp. *norsemanense*	3	Possible there is suitable habitat in the study area
Cyathostemon verrucosus	3	Unlikely, lack of suitable habitat in study area.
Eremophila acutifolia	3	Possible there is suitable habitat in the study area
Eremophila arachnoides subsp. *tenera*	3	Possible there is suitable habitat in the study area
Eremophila veronica	3	Possible there is suitable habitat in the study area
Gompholobium cinereum	3	Unlikely, lack of suitable habitat in study area.
Grevillea georgeana	3	Possible there is suitable habitat in the study area
Isolepis australiensis	3	Unlikely, lack of suitable habitat in study area.
Lepidium fasciculatum	3	Unlikely, lack of suitable habitat in study area.
Melaleuca coccinea	3	Unlikely, lack of suitable habitat in study area.
Notisia intonsa	3	Possible there is suitable habitat in the study area
Phlegmatospermum eremaeum	3	Possible there is suitable habitat in the study area
Styphelia rectiloba	3	Unlikely, lack of suitable habitat in study area.
Eremophila caerulea subsp. *merrallii*	4	Possible there is suitable habitat in the study area
Eucalyptus jutsonii subsp. *jutsonii*	4	Unlikely, lack of suitable habitat in study area.
Eucalyptus x *brachyphylla*	4	Unlikely, lack of suitable habitat in study area.
Frankenia glomerata	4	Unlikely, lack of suitable habitat in study area.
Streptoglossa aff *cylindriceps*	sp. nov.	Recorded

5.2.1.3 Introduced flora

Ten introduced flora species were recorded during the survey, of which one is Declared Pest and one is a WoNS (Table 5-6).

Table 5-6 Introduced flora recorded in the field survey

Family	Species	Declared Pest	WoNS
Brassicaceae	**Carrichtera annua*		
Convolvulaceae	**Cuscuta epithymum*		
Boraginaceae	**Echium plantagineum*	Yes	
Solonaceae	**Lycium ferocissimum*		Yes
Primulaceae	**Lysimachia arvensis*		
Fabaceae	**Medicago laciniata*		
Fabaceae	**Medicago minima*		
Asteraceae	**Oligocarpus calendulaceus*		
Lamiaceae	**Salvia verbenaca*		
Asteraceae	**Sonchus oleraceus*		

5.2.1.4 Vegetation types

A total of 13 vegetation types defined for the study area comprised *Eucalyptus* and *Casuarina* woodlands, *Eucalyptus* mallee woodlands, a tall *Acacia* shrubland and two chenopod shrublands (Table 5-7; Figure 5-4). A small proportion (2.9%) of the study area was disturbed and mostly devoid of native vegetation, and included such infrastructure as roads and industrial estate.

The *Acacia* shrubland was the most restricted vegetation type comprising just 0.5% of the study area. The *Eucalyptus* woodlands were the most extensive, accounting for 62.4% of the study area followed by the *Casuarina* woodlands (27.5%) the chenopod shrublands (4%) and the *Eucalyptus* mallee woodlands (2.7%).

Table 5-7 Vegetation types, description and extent in the study area

Vegetation type	Site/s	Vegetation description	Extent in study area (ha) and % of study area	Representative photograph
AEP	R009, R020	Tall *Acacia* shrubland over mid open *Eremophila* shrubland over isolated low *Ptilotus* shrubs	57.5, 0.5%	
CDP	R007, R047, R057	Isolated low *Casuarina* trees over mid *Dodonaea* and *Senna* shrubland over isolated low *Ptilotus* shrubs	948.9, 8.3%	

Vegetation type	Site/s	Vegetation description	Extent in study area (ha) and % of study area	Representative photograph
CEP	R017, R032, R044, R048	Low *Casuarina* woodland over mid to tall *Eremophila* and *Senna* shrubland over isolated low *Ptilotus* shrubs	2191.3, 19.2%	
Disturbed		infrastructure mostly devoid of vegetation	335.4, 2.9%	NA
EA	R001, R008, R024, R030, R031, R058	Mid *Eucalyptus* woodland over mid open *Atriplex* and *Maireana* shrubland over isolated low shrubs	1204.0, 10.5%	

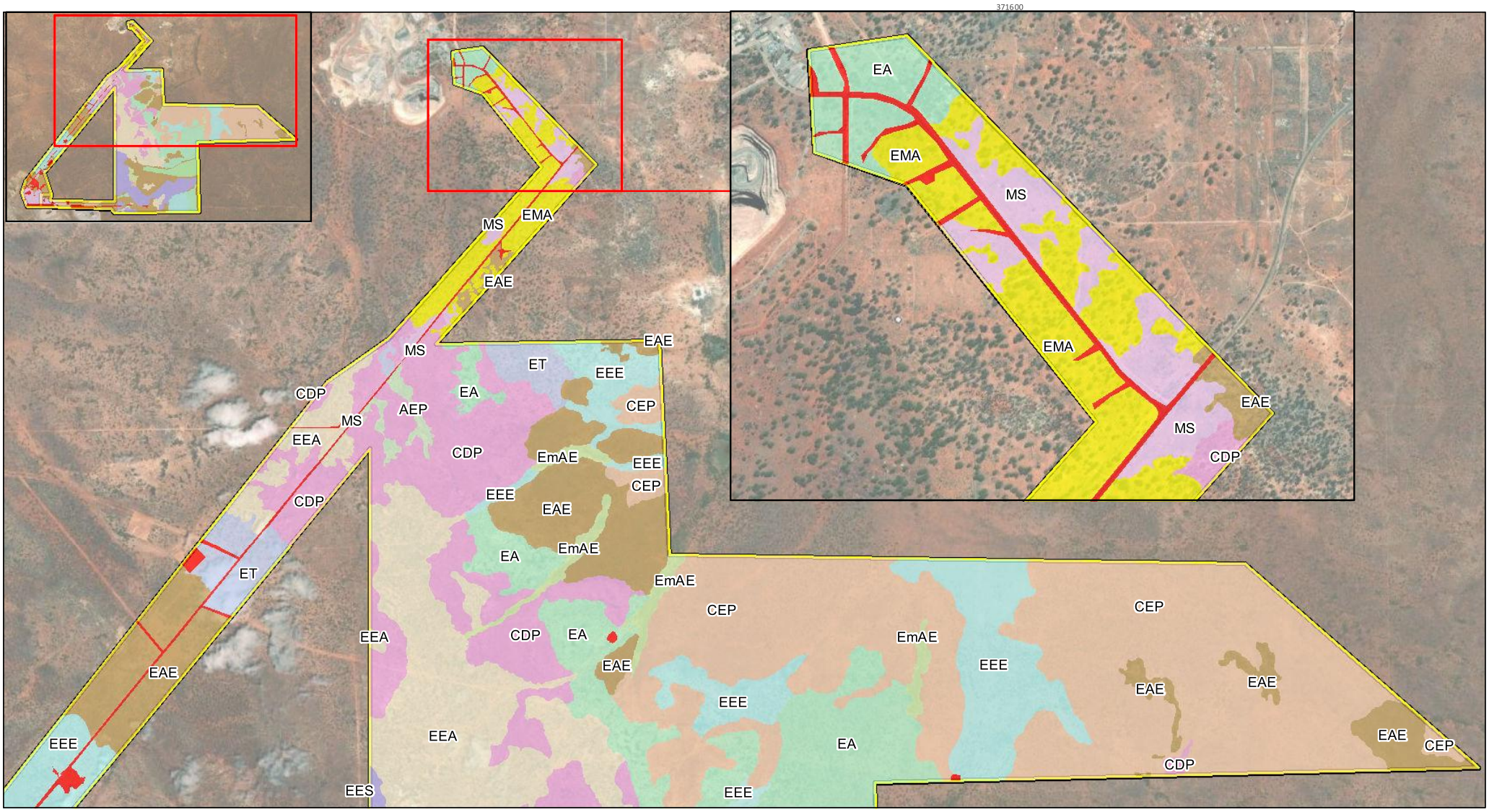
Vegetation type	Site/s	Vegetation description	Extent in study area (ha) and % of study area	Representative photograph
EAE	R004, R006, R014, R016, R018, R019, R025, R027, R042, R049, R050, R051, R053, R055	Mid *Eucalyptus* woodland over sparse tall *Acacia* shrubland over mid *Eremophila* and *Senna* shrubland	2083.2, 18.2%	
EEA	R022, R028, R036, R037, R041	Low open *Eucalyptus* woodland over mid open *Eremophila* shrubland over low sparse *Atriplex* shrubland	1317.3, 11.5%	

Vegetation type	Site/s	Vegetation description	Extent in study area (ha) and % of study area	Representative photograph
EEE	R011, R012, R013, R023, R044B, R056	Mid *Eucalyptus* woodland over mid sparse *Eremophila* and *Maireana* shrubland over isolated low *Eremophila* shrubs	1087.8, 9.5%	
EES	R021, R034, R052	Low open *Eucalyptus* woodland over mid open *Eremophila* shrubland over isolated low *Scaevola* shrubs	1087.2, 9.5%	

Vegetation type	Site/s	Vegetation description	Extent in study area (ha) and % of study area	Representative photograph
EM	R026	Mid *Eucalyptus* woodland over tall open *Melaleuca* shrubland isolated clumps of low forbs	340.2, 3.0%	
EMA	R003	Mid *Eucalyptus* mallee woodland over mid open *Maireana* shrubland over low *Atriplex* shrubland	158.1. 1.4%	

Vegetation type	Site/s	Vegetation description	Extent in study area (ha) and % of study area	Representative photograph
EmAE	R033, R035, R040	Mid *Eucalyptus* mallee woodland over tall *Acacia* shrubland over mid sparse *Eremophila* shrubland	149.9, 1.3%	
ET	R054	Isolated mid *Eucalyptus* trees over low open *Tecticornia* shrubland over isolated clumps of low forbs	168.9, 1.5%	

Vegetation type	Site/s	Vegetation description	Extent in study area (ha) and % of study area	Representative photograph
MS	R002, R005, R015	*Maireana* and *Atriplex* shrubland over isolated low *Sclerolaena* forbs	293.8, 2.5%	



Western Australia

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Northern Star
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Map author	GW

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Kilometers

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Study area

Vegetation type

- AEP
- CDP
- CEP
- EA
- EAE
- EEA
- EEE
- EES
- EM
- EMA
- ET
- EmAE
- MS
- Disturbed

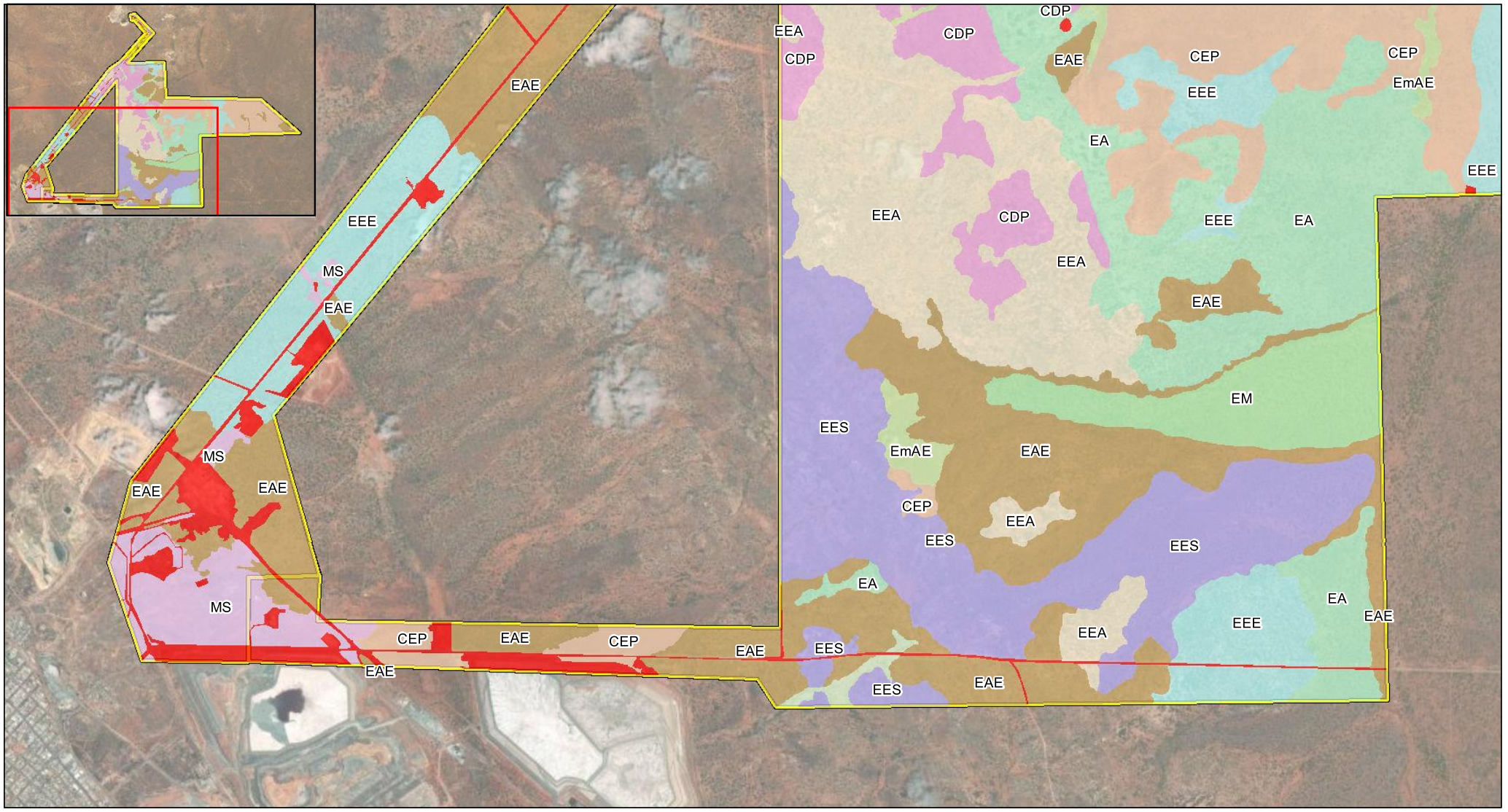
Figure 5-4a

Vegetation types recorded in the field survey

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Project No	1530
Date	16/02/2023
Drawn by	GW
Map author	GW

0 1.25 2.5
Kilometers

1:60,000 (at A4) GDA 1994 MGA Zone 51

Study area

Vegetation type

- AEP
- CDP
- CEP
- EA
- EAE
- EEA
- EEE
- EES
- EM
- EMA
- ET
- EmAE
- MS
- Disturbed

Figure 5-4b

Vegetation types recorded in the field survey

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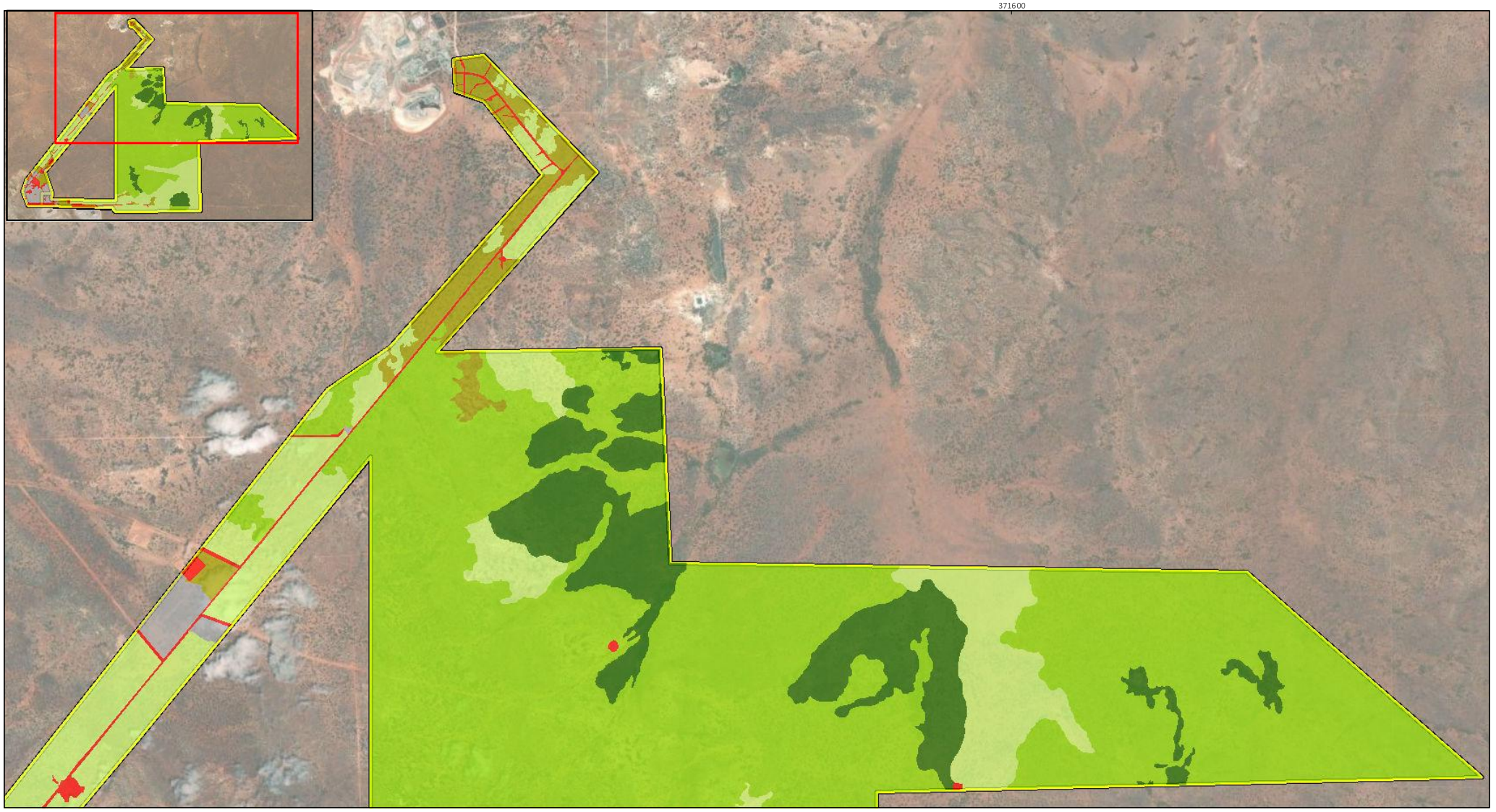
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5.2.1.5 Vegetation condition

The condition of remnant vegetation in the study area ranged from Excellent to Completely Degraded (Figure 5-5). The majority (55%) was in Very Good condition where disturbances were typically limited to evidence of historic clearing, vehicle tracks and the presence of a low number of weeds. 9% of the study area was deemed to be in Excellent condition despite some evidence of historic clearing as the vegetation structure was intact and there was no evidence of any recent disturbance. 36% of the area was recorded to be in Good to Completely Degraded condition with multiple impacts including clearing, roads, tracks, current operations, litter and the presence of weeds (Table 5-8).

Table 5-8 Vegetation condition – extent of each condition rating in study area

Condition rating	Area (ha)	% of study area
Excellent	1030.2	9.0
Very Good	6275.4	55.0
Good	2873.7	25.2
Poor	446.6	3.9
Degraded	452.1	4.0
Completely Degraded	335.4	2.9



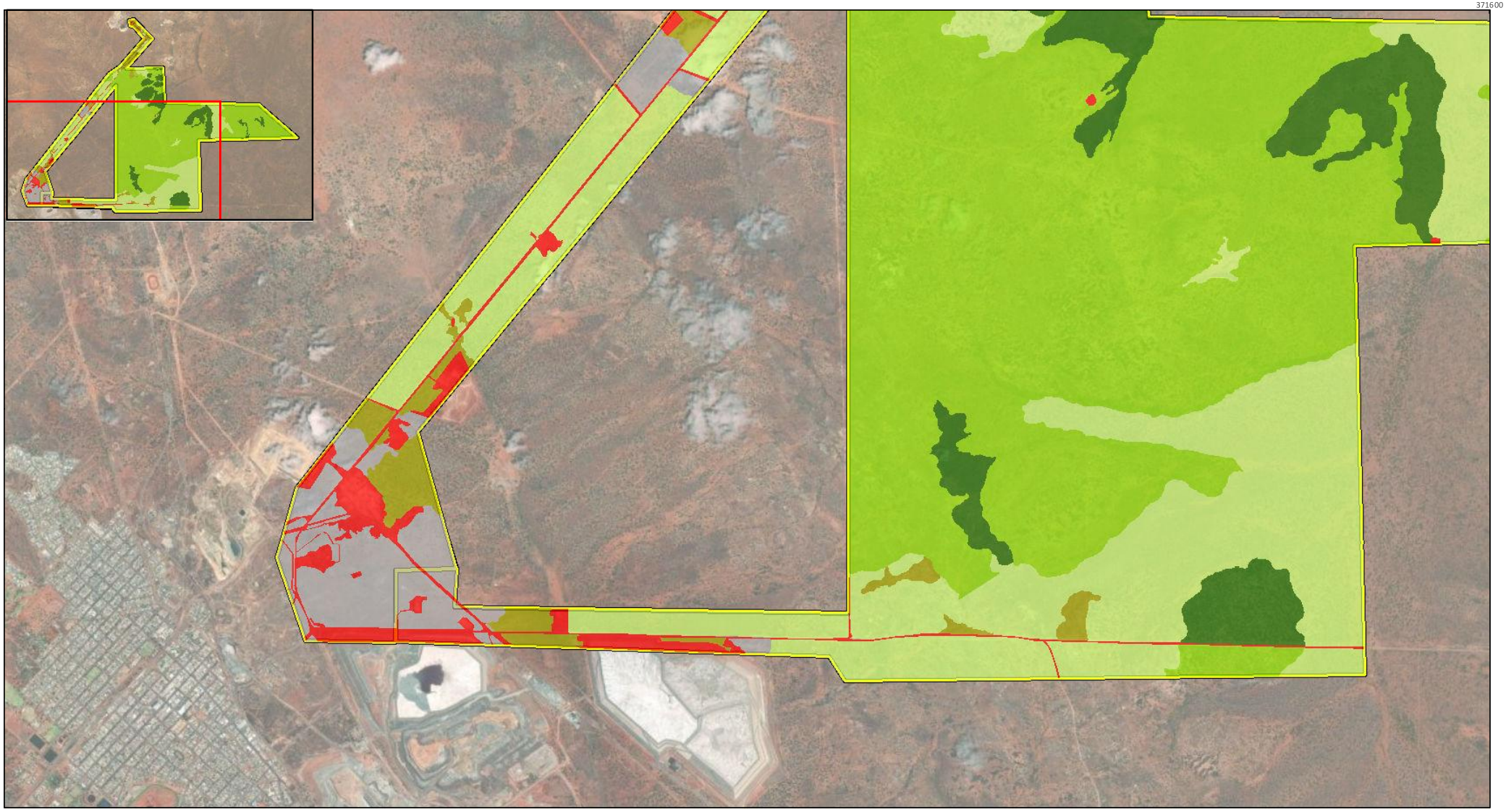
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Figure 5-5a

Vegetation condition in the study area

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Project No	1530
Date	16/02/2023
Drawn by	GW
Map author	GW

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Kilometers

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Study area

Vegetation condition

- Excellent
- Very good
- Good
- Poor
- Degraded
- Completely degraded

Figure 5-5b

Vegetation condition in the study area

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5.2.1.6 Significant vegetation

None of the vegetation types are considered regionally significant as they do not represent habitat for Federal or State listed Threatened Flora or are representative of vegetation with less than 30% Pre-European extent remaining.

The AEP vegetation type accounted for just 0.5% of the study area and may be considered locally significant due to restricted distribution.

The CEP, EA, EAE, EEA, EEE, EES and ET vegetation types may be considered locally significant due to their role as a refuge for the Priority flora *Eremophila praecox* (P2). The EAE vegetation type was also habitat for *Streptoglossa* aff *cylindriceps*. Similarly vegetation type EmAE may be considered locally significant due to the presence of the Priority flora *Allocasuarina eriochlamys* subsp. *grossa* (P3).

5.3 SURVEY LIMITATIONS

The limitations of the flora and vegetation survey have been considered in accordance with EPA (2016b, c) (Table 5-9).

Table 5-9 Consideration of potential survey limitations

Limitations	Comments
Availability of contextual information at a regional and local scale	There were numerous previous survey reports available and Phoenix have conducted several previous surveys from which a substantial amount of data was available.
Competency/experience of the team carrying out the survey	The survey team have a combined 35+ years experience in conducting flora and vegetation surveys in the Murchison and Coolgardie bioregions.
Scope and completeness	The scope of the survey was adequate to inform further survey requirements for the study area and the survey was satisfactorily completed.
Proportion of flora recorded and/or collected, any identification issues	All species collected were identified to species level, a satisfactory number of species to broadly describe the vegetation within the study area was collected.
Access within the study area	Access was sufficient for the purpose of the survey
Timing, rainfall, season	The survey was conducted following some above average rainfall at a time of year consistent with recommended survey periods for the bioregions.
Disturbance that may have affected the results of the survey	There were no disturbances that would have affected the results of the survey.

6 DISCUSSION

6.1 FLORA AND VEGETATION

The flora assemblage recorded for the current survey reflects that of previous surveys in the area with the five most prominent families Chenopodiaceae, Fabaceae, Scrophulariaceae, Myrtaceae and Asteraceae common to both. Fewer species were recorded in the current survey than for the previous surveys which is a simple reflection of the lower intensity of sampling conducted for the reconnaissance survey compared with the detailed survey.

6.1.1 Significant flora

Records of *Eremophila praecox* were previously recorded in the study area and further plants were located during the current survey. Plants were typically found singularly or in small groups spaced large distances apart. There are areas of suitable habitat for the species in the study area and it is highly likely further plants/populations would be present.

A recent survey for *Eremophila praecox* (Phoenix 2020b) established that the species has a greater distribution than that currently recorded on FloraBase (WA Herbarium 1998) or NatureMap (DBCA 2021). The species is most frequently recorded in clay loam soils in *Eucalyptus* and/or *Allocasuarina* woodland with a variable understorey, frequently with *Acacia* and *Eremophila* species. Phoenix (2020b) recorded a total of 340 *Eremophila praecox* plants noting that some records of the species were not visited during the survey as they were not accessible and subsequently the total population size of the species would exceed this figure. Further surveys and searches for the species have been conducted (Phoenix 2020a, 2021b, 2022) and the known population of the species exceeded 452 plants (Phoenix 2022) of which 125 plants have been recorded in nature reserves.

The 17 plants recorded in the current survey increases the known population to in excess of 469 individuals and represent 3.6% of the known total population.

A single population of *Allocasuarina eriochlamys* subsp. *grossa* (P3) was recorded in the study area, with a total of 3 individuals sighted, however, the actual population size and distribution is unknown as an intensive search of the area was not conducted. Several previous records for the species identified populations of thousands of individual plants (WA Herbarium 1998) and it is therefore possible that the population recorded in the current survey could cover a substantial area should an intensive survey of the population be conducted.

The record of *Streptoglossa.* aff. *cylindriceps* represent a potentially new, undescribed taxon. *Streptoglossa* aff. *cylindriceps* has been recorded at four further locations in recent surveys (Phoenix 2021a, b, c, 2022), approximately 180 km west-southwest, 68 km south, 160 km northwest and 1.9 km south of the study area. At all four locations the species typically occurs along drainage lines and on undulating depressions (crabhole gilgai). In the current survey the species was recorded in riparian vegetation of a small creek. A total of 3 populations comprising 1290 plants were recorded by Phoenix (2021c). Subsequently, the record within the current study area represents less than 1% of the known population of the taxon.

A further 15 Priority flora identified in the desktop assessment may possibly occur in the study area comprised of five Priority 1 species, one Priority 2 species, eight Priority 3 species and one Priority 4 species. For the majority of these species there is a considerable area of suitable habitat in the study area.

6.1.2 Introduced flora

**Echium plantagineum* is an Exempt Declared Pest, no management requirements are provided for the species (DPIRD 2023), but it is "an offence under the *Biosecurity and Agriculture Management Act 2007* to sell or transport hay or other materials containing declared plants" (DPIRD 2022). Subsequently measures should be taken to ensure development in the study areas does not result in the spread of either of the species.

**Lycium ferocissimum* is a WoNS, there are no management requirements for WoNS.

6.1.3 Vegetation

No vegetation in the study area is representative of a TEC or PEC.

The *Eucalyptus* and *Casuarina* woodland and mallee woodland vegetation types recorded in the study area are representative of the 20 and 468 vegetation associations mapped by Shepherd *et al.* (2002) for the study area, each of which have more than 95% of pre-European extent remaining and cover large areas (>500,000 ha) (DBCA 2018a).

The shrubland communities are dominated by common species with broad distributions and are likely to be well represented in the broader landscape. The shrubland communities were comprised of species that were in the understorey of the adjacent woodlands.

A total of eight vegetation types defined for the study area may be considered locally significant as role as a refuge for Priority flora, seven of which were habitat for *Eremophila praecox* (P2). *Eremophila praecox* has been found to have a broad distribution and is typically found in low densities in *Eucalyptus* and/or *Casuarina* woodlands over a varied shrub layer frequently *Acacia*, *Eremophila*, *Senna* and *Maireana* species on flat to undulating plains in red clay loam soils (Phoenix 2019b). These vegetation types are widespread in the study area and also in the surrounding landscape and indicate there is substantial habitat of *Eremophila praecox* in the surrounding area.

Allocasuarina eriochlamys subsp. *grossa* was recorded at a single site in the current survey and as the record represents the northern extent of the recorded distribution of the species it is considered that the vegetation type EmAE be considered locally significant as habitat for this Priority flora.

6.2 CONCLUSION

The key botanical value of the study area is the presence of Priority flora and potential for further Priority flora to occur. Subsequently, future survey requirements are likely to require targeted searches for these significant species in areas proposed for development.

REFERENCES

Australian Weeds Committee. 2007. *The Australian Weeds Strategy. A national strategy for weed management in Australia*. Natural Resource Management Ministerial Council, Australian Weeds Committee, Canberra, ACT. Available at: http://www.environment.gov.au/biodiversity/invasive/weeds/publications/strategies/pubs/weed-strategy.pdf

Australian Weeds Committee. 2012. *Weeds of National Significance 2012*. Department of Agriculture, Fisheries and Forestry, Canberra, ACT.

Beard, J. S., Beeston, G., Harvey, J., Hopkins, A. & Shepherd, D. 2013. *The vegetation of Western Australia at the 1:3,000,000 scale. Explanatory memoir. Second edition.* Department of Agriculture and Food Western Australia.

BoM. 2022. *Climate statistics for Australian locations*. Commonwealth of Australia, Bureau of Meterology. Available at: http://www.bom.gov.au/climate/data/

Botanica Consulting. 2009. *Fimiston I and II Tailings Storage Facilities. Land function analysis and vegetation monitoring report*. Botanica Consulting, Boulder, W.A. Unpublished report prepared for Kalgoorlie Consolidated Gold Mines Pty Ltd.

Botanica Consulting. 2010a. *Fimiston I and II and Gidji Tailings Storage Facilities. Photographic monitoring report. December 2010*. Botanica Consulting, Boulder, W.A. Unpublished report prepared for Kalgoorlie Consolidated Gold Mines Pty Ltd.

Botanica Consulting. 2010b. *Fimiston I andII Tailings Storage Facilites landscape function analysis and vegetation monitoring report*. Botanica Consulting, Boulder, W.A. Unpublished report prepared for Kalgoorlie Consolidated Gold Mines Pty Ltd.

Botanica Consulting. 2011a. *Fimiston I and II and Gidji Tailings Storage Facilities. Photographic monitoring report. December 2011*. Botanica Consulting, Boulder, W.A. Unpublished report prepared for Kalgoorlie Consolidated Gold Mines Pty Ltd.

Botanica Consulting. 2011b. *Fimiston I and II and Kaltails Tailings Storage Facilites. Landscape function analysis and vegetation monitoring report 2011. Draft 1*. Botanica Consulting, Boulder, W.A. Unpublished report prepared for Kalgoorlie Consolidated Gold Mines Pty Ltd.

Botanica Consulting. 2012a. *Fimiston I and II and Kaltails Tailings Storage Facilites. Landscape function analysis and vegetation monitoring report*. Botanica Consulting, Boulder, W.A. Unpublished report prepared for Kalgoorlie Consolidated Gold Mines Pty Ltd.

Botanica Consulting. 2012b. *Fimiston I and II, Kaltails and Gidji Tailings Storage Facilities. Photographic monitoring report. October 2012*. Botanica Consulting, Boulder, W.A. Unpublished report prepared for Kalgoorlie Consolidated Gold Mines Pty Ltd.

Botanica Consulting. 2013. *Fimiston I and II and Kaltails Tailings Storage Facilites. Landscape function analysis and vegetation monitoring report 2013*. Botanica Consulting, Boulder, W.A. Unpublished report prepared for Kalgoorlie Consolidated Gold Mines Pty Ltd.

Botanica Consulting. 2014a. *Fimiston I and II and Kaltails Tailings Storage Facilites. Landscape function analysis and vegetation monitoring report*. Botanica Consulting, Boulder, W.A. Unpublished report prepared for Kalgoorlie Consolidated Gold Mines Pty Ltd.

Botanica Consulting. 2014b. *Fimiston I and II, Kaltails and Gidji Tailings Storage Facilities. Photographic monitoring report. December 2014*. Botanica Consulting, Boulder, W.A. Unpublished report prepared for Kalgoorlie Consolidated Gold Mines Pty Ltd.

Botanica Consulting. 2014c. *Tailings Storage Facility Expansion desktop flora assessment*. Botanica Consulting Pty Ltd, Boulder, WA. Unpublished report prepared for Kalgoorlie Consolidated Gold Mines Pty Ltd.

Botanica Consulting. 2015a. *Level 1 flora and vegetation survey for the Fimiston Waste Rock Dump Extension. Draft 1*. Botanica Consulting, WA, Boulder, WA. Unpublished report prepared for Kalgoorlie Consolidated Gold Mines Pty Ltd.

Botanica Consulting. 2015b. *Tailings Storage Facility Expansion. Level 2 flora and vegetation report, spring 2014 and autumn 2015* Botanica Consulting Pty Ltd, Boulder, WA. Unpublished report prepared for Kalgoorlie Consoliated Gold Mines Pty Ltd.

Brown, A. & Davis, R. 2019. Eremophila oldfieldii subsp. papula, E. sericea and E. xantholaema (Scrophulariaceae), three new taxa from Western Australia. *Nuytsia* **30**: 25-31.

Cowan, M. 2001a. Coolgardie 3 (COO3—Eastern Goldfields subregion). *In:* May, J. E. & McKenzie, N. L. (eds) *A biodiversity audit of Western Australia's 53 biogeographical subregions in 2002.* Department of Conservation and Land Mangement, Perth, W.A., pp. 156–169.

Cowan, M. 2001b. Murchison 1 (MUR1—East Murchison subregion). *In:* May, J. E. & McKenzie, N. L. (eds) *A biodiversity audit of Western Australia's 53 biogeographical subregions in 2002.* Department of Conservation and Land Management, Perth, WA, pp. 466–479.

DAFWA. 2016. *Western Australian Organism List*. Department of Agriculutire and Food, Government of Western Australia, South Perth, WA. Available at: https://www.agric.wa.gov.au/organisms (accessed 11 March 2016).

DBCA. 2021. *NatureMap*. Department of Biodiversity, Conservation and Attractions. Available at: https://naturemap.dpaw.wa.gov.au/default.aspx

DBCA. 2022a. *Threatened and Priority flora database*. Department of Biodiversity, Conservation and Attractions, Kensington, WA.

DBCA. 2022b. *Threatened Flora, Fauna and Ecological Communities database*. Department of Biodiversity, Conservation and Attractions, Kensington, WA.

DCCEEW. 2022. *Protected Matters Search Tool*. Available at: pmst.awe.gov.au

Department of the Environment. 2014. *Weeds of National Significance*. Department of the Environment. Available at: http://www.environment.gov.au/biodiversity/invasive/weeds/weeds/lists/wons.html (accessed 17 February 2015).

DER. 2014. *A guide to the assessment of applications to clear native vegetation, under Part V Division 2 of the Environmental Protection Act 1986*. Department of Environment Regulation, Perth, WA.

DEWHA. 2008. *Approved conservation advice for Gastrolobium graniticum (Granite Poison)*. Department of the Environment,Water, Heritage and the Arts, Canberra,ACT.

DoEE. 2016. *Maps: Australia's bioregions (IBRA)*. Department of the Environment and Energy, Canberra, ACT. Available at: http://www.environment.gov.au/topics/land/national-reserve-system/science-maps-and-data/australias-bioregions-ibra

DPIRD. 2018. *Pre-European Vegetation – Western Australia (NVIS Compliant version 20110715) in* Department of Primary Industry and Regional Development, ed, Kensington, WA.

DPIRD. 2019. *Western Australian Organism List*. Department of Agriculture and Food, Government of Western Australia, South Perth, WA. Available at: https://www.agric.wa.gov.au/bam/western-australian-organism-list-waol (accessed 18 September 2019).

DPIRD. 2022. *Paterson's curse: What you should know*. Department of Primary Industries and Regional Development, Perth, WA. Available at: https://www.agric.wa.gov.au/biological-control/patersons-curse-what-you-should-know

DPIRD. 2023. *List of Declared Plants*. Department of Primary Industries and Regional Development, Perth, WA. Available at: https://www.agric.wa.gov.au/bam/western-australian-organism-list-waol

EPA. 2016a. *Environmental Factor Guideline: Flora and vegetation*. Environmental Protection Authority, Perth, WA. Available at: http://www.epa.wa.gov.au/sites/default/files/Policies_and_Guidance/Guideline-Flora-Vegetation-131216_4.pdf

EPA. 2016b. *Technical Guidance: Flora and vegetation surveys for Environmental Impact Assessment*. Environmental Protection Authority, Perth, WA. Available at:

http://www.epa.wa.gov.au/sites/default/files/Policies_and_Guidance/EPA%20Technical%20Guidance%20-%20Flora%20and%20Vegetation%20survey_Dec13.pdf

EPA. 2016c. *Technical Guidance: Terrestrial fauna surveys*. Environmental Protection Authority, Perth, WA. Available at: http://www.epa.wa.gov.au/sites/default/files/Policies_and_Guidance/Tech%20guidance-%20Terrestrial%20Fauna%20Surveys-Dec-2016.pdf

EPA. 2020. *Technical Guidance: Terrestrial vertebrate fauna surveys for environmental impact assessment*. Environmental Protection Authority, Perth, WA. Available at: https://epa.wa.gov.au/sites/default/files/Policies_and_Guidance/EPA-Technical-Guidance-Vertebrate-Fauna-Surveys.pdf

ESCAVI. 2003. *Australian Vegetation Attribute Manual: National Vegetation Information System (Version 6.0)*. Department of Environment and Heritage, Canberra.

Government of Western Australia. 2005. *Environmental Protection (Environmentally Sensitive Areas) Notice 2005*. Government of Western Australia, Perth, Western Australia.

Government of Western Australia. 2018a. *Wildlife Conservation Act 1950 Wildlife Conservation (Rare Flora) Notice 2018*. Government Gazette, WA. Government of Western Australia, Perth, WA.

Government of Western Australia. 2018b. *Wildlife Conservation Act 1950, Wildlife Conservation (Specially Protected Fauna) Notice 2018*. Government Gazette, WA, Perth, WA.

Hislop, M. 2019. *Styphelia quartzitica* and *S. rectiloba* (Ericaceae: Epacridoideae: Styphelieae), two new, morphologically anomalous species of restricted distribution. *Nuytsia* **30**: 229-235.

Hislop, M. & Wege, J. A. 2020. A new Wedding Bush from the eastern goldfields of Western Australia (*Ricinocarpos digynus*: Euphorbiaceae). *Nuytsia* **31**: 169-175.

Jims Seeds, W. T. 2004. *Flora survey. Fimiston III*. Jims Seeds, Weeds & Trees Pty Ltd, Boulder, WA. Unpublished report prepared for Kalgoorlie Consolidated Gold Mines Pty Ltd.

Jims Seeds, W. T. 2006. *Vegetation survey of three rehabilitated sites*. Jims Seeds, Weeds & Trees, Boulder, WA. Unpublished report prepared for Kalgoorlie Consolidated Gold Mines Pty Ltd.

Lally, T. R. 2009. New taxa of *Ptilotus* (Amaranthaceae) from Western Australia. *Nuytsia* **19**: 53-62.

Maslin, B. R. 2014. Miscellaneous new species of *Acacia* (Fabaceae: Mimosoideae) from south-west Western Australia. *Nuytsia* **24**: 139–159.

McKenzie, N. L. & Hall, N. J. 1992. The biological survey of the Eastern Goldfields of Western Australia. Part 8: Kurnalpi - Kalgoorlie study area. *Records of the Western Australian Museum* **Supplement No. 41**.

Obbens, F. J. 2018. Three new perennial species of *Calandrinia* (Montiaceae) from southern Western Australia. *Nuytsia* **29**: 193-204.

Payne, A. L. & Leighton, K. A. 2004. Land systems. *In:* van Vreeswyk, A. M. E., Payne, A. L., Leighton, K. A. & Hennig, P. (eds) *Technical Bulletin 9. An inventory and condition survey of the Pilbara region, Western Australia*. Department of Agriculture, Government of Western Australia, South Perth, WA, pp. 175–384.

Phoenix. 2016. *Pilot flora and vegetation and aquatic biota survey of Hannan Lake*. Phoenix Environmental Sciences Pty Ltd, Balcatta, WA. Unpublished report prepared for Kalgoorlie Consolidated Gold Mines Pty Ltd.

Phoenix. 2017. *Aquatic biota survey of Hannan Lake*. Phoenix Environmental Sciences Pty Ltd, Balcatta, WA. Unpublished draft report prepared for Kalgoorlie Consolidated Gold Mines Pty Ltd.

Phoenix. 2018a. *Flora and vegetation and terrestrial fauna survey of the Crossroads Tenement*. Phoenix Environmental Sciences Pty Ltd, Balcatta, WA. Unpublished draft report prepared for Kalgoorlie Consolidated Gold Mines Pty Ltd.

Phoenix. 2018b. *Regional flora and vegetation and terrestrial fauna survey for the Gidji Operations*. Phoenix Environmental Sciences Pty Ltd, Balcatta, WA. Unpublished draft report prepared for Kalgoorlie Consolidated Gold Mines Pty Ltd.

Phoenix. 2019a. *Gap analysis, biological survey and consolidation report for the Fimiston Gold Mine Operations*. Phoenix Environmental Sciences Pty Ltd, Balcatta, WA. Unpublished report prepared for Kalgoorlie Consolidated Gold Mines Pty Ltd.

Phoenix. 2019b. *Regional survey for Eremophila praecox for the FIM IIE Project*. Phoenix Environmental Sciences, Balcatta, WA. Unpublished draft report prepared for Kalgoorlie Consolidated Gold Mines Pty Ltd.

Phoenix. 2020a. *Kambalda West regional flora and fauna survey for the St Ives Gold Mine*. Phoenix Environmental Sciences Pty Ltd, Osborne Park, WA. Unpublished report prepared for St Ives Gold Mining Company Pty Ltd.

Phoenix. 2020b. *Regional survey for Eremophila praecox for the FIM IIE Project*. Phoenix Environmental Sciences Pty Ltd, Osborne Park, W.A. Unpublished report prepared for Kalgoorlie Consolidated Mines Pty Ltd.

Phoenix. 2021a. *Baseline flora, vegetation and fauna surveys for the Parker Range Haul Road project - northern extension.* Phoenix Environmental Sciences Pty Ltd. Unpublished report prepared for Mineral Resources Ltd.

Phoenix. 2021b. *Detailed flora and vegetation and basic/detailed fauna surveys for the Larkinville and Eagles Nest Projects*. Phoenix Environmental Sciences Pty Ltd, Osborne Park, WA. Unpublished report prepared for Maximus Resources Ltd.

Phoenix. 2021c. *Targeted searches at Hunt Range*. Pheonix Environmental Sciences Pty Ltd, Osborne Park, WA. Unpublished report prepared for Mineral Resources Ltd.

Phoenix. 2022. *Flora and vegetation assessments for the Fimiston Gold Mine Operations*. Phoenix Environmental Sciences Pty Ltd, Osborne Park, WA.

Rye, B. L. 2020. Description of the rare Goldfields Laceflower, *Thryptomene planiflora* (Myrtaceae: Chamelaucieae). *Nuytsia* **31**.

Sage, L. W. & Shepherd, K. A. 2007. Five new conservation-listed *Goodenia* (Goodeniaceae) from south Western Australia. *Nuytsia* **17**: 331-346.

Schoknecht, N. R. & Payne, A. L. 2011. *Land systems of the Kimberley region, Western Australia*. Department of Agriculture and Food, Western Australia, Perth.

Shepherd, D. P., Beeston, G. R. & Hopkins, A. J. M. 2002. *Native vegetation in Western Australia. Extent, type and status.* Department of Agriculture, South Perth, WA. Resource Management Technical Report 249.

Trudgen, M. E. & Rye, B. L. 2014. An update to the taxonomy of some Western Australian genera of Myrtaceae tribe Chamelaucieae. 2. *Cyathostemon*. *Nuytsia* **24**.

WA Herbarium. 1998. *FloraBase - the Western Australian Flora*. Department of Biodiversity, Conservation and Attractions. Available at: http://florabase.dpaw.wa.gov.au/

Williams, A. R. 2022. *Austrostipa* (Poaceae) in Western Australia: new species, new records, keys, and character notes. *Nuytsia* **33**: 39-101.

Wilson, P. G. 2016. A taxonomic treatment of Chrysocephalum apiculatum and C. semipapposum (Asteraceae: Gnaphalieae). *Nuytsia* **27**: 33-73.

Site details			
Site	**R001**	**Position (WGS84)**	-30.607343, 121.583875
Slope	gentle	**Topography**	undulating plain
Soil colour	red-orange	**Soil texture**	sandy loam
Rock cover (%)	0	**Rock type**	ferrous - ironstone

Observation details - visit 1 (22 Sep 2022)			
Sample description	Mid *Eucalyptus salmonophloia* and *E. oleosa* woodland over mid open *Maireana sedifolia*, *Senna artemisioides* subsp. *filifolia* and *Eremophila glabra* subsp. *glabra* shrubland over isolated clumps of low *Scaevola spinescens*, *Lycium australe* and *Eremophila parvifolia* subsp. *auricampa* shrubs.		
Habitat	woodland		
Disturbance	current operations, evidence of feral animals, historic clearing, large-scale clearing, litter, revegetation		
Vegetation condition	Degraded	**Fire age**	not evident
Total veg. cover (%)	25	**Tree cover (%)**	12
Shrub cover (%)	15	**Grass cover (%**	0.1
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	22-Sep-2022	unbounded	Grant Wells

Species (9)	Status	Cover (%)	Height (m)
Maireana sedifolia		10	1.2
Eucalyptus oleosa subsp. *oleosa*		7	15
Eucalyptus salmonophloia		5	20
Senna artemisioides subsp. *filifolia*		1	1.2
Santalum acuminatum		0.1	1.9
Eremophila glabra subsp. *glabra*		0.1	1.2
Scaevola spinescens		0.1	0.8
Lycium australe		0.1	0.5
Eremophila parvifolia subsp. *auricampa*		0.1	0.25

Site details			
Site	**R002**	**Position (WGS84)**	-30.610259, 121.590077
Slope	gentle	**Topography**	undulating plain
Soil colour	red-orange, whitish	**Soil texture**	sandy clay, sandy loam
Rock cover (%)	0	**Rock type**	ferrous - ironstone, quartz

Observation details - visit 1 (22 Sep 2022)			
Sample description	Mid open *Maireana sedifolia*, *M. pyramidata* and *Lycium australe* shrubland over low open **Carichterra annua*, **Medicago laciniata* and **Salvia verbeneca* forbland.		
Habitat	shrubland		
Disturbance	erosion channels, evidence of feral animals, excavation, historic clearing, large-scale clearing, litter, revegetation, vehicle tracks, weed infestation		
Vegetation condition	Degraded	**Fire age**	not evident
Total veg. cover (%)	20	**Tree cover (%)**	0
Shrub cover (%)	15	**Grass cover (%**	0.1
Herb cover (%)	5		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	22-Sep-2022	unbounded	Grant Wells

Species (13)	Status	Cover (%)	Height (m)
Maireana sedifolia		13	1.2
**Carrichtera annua*	Weed	3	0.2
Maireana pyramidata		2	1.2
**Medicago laciniata*	Weed	2	0.05
Lycium australe		0.1	1.6
Austrostipa elegantissima		0.1	0.5
Maireana georgei		0.1	0.4
Solanum lasiophyllum		0.1	0.3
Ptilotus obovatus		0.1	0.2
Maireana triptera		0.1	0.2
**Salvia verbenaca*	Weed	0.1	0.15
Maireana trichoptera		0.1	0.1
Erodium cygnorum		0.1	0.05

Site details			
Site	**R003**	**Position (WGS84)**	-30.614211, 121.591454
Slope	negligible	**Topography**	plain
Soil colour	red-orange	**Soil texture**	sandy loam
Rock cover (%)	0	**Rock type**	ferrous - ironstone, quartz

Observation details - visit 1 (22 Sep 2022)			
Sample description	Isolated mid *Eucalyptus salmonophloia* and *E. salubris* trees over mid *Eucalyptus celastroides* subsp. *celastroides* mallee woodland over mid open *Maireana sedifolia*, *M. pyramidata* and *Eremophila scoparia* shrubland.		
Habitat	woodland		
Disturbance	evidence of feral animals, historic clearing, litter, vehicle tracks		
Vegetation condition	Good	**Fire age**	not evident
Total veg. cover (%)	20	**Tree cover (%)**	10
Shrub cover (%)	15	**Grass cover (%**	0.1
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	22-Sep-2022	unbounded	Grant Wells

Species (16)	Status	Cover (%)	Height (m)
Maireana sedifolia		14	1.2
Eucalyptus salmonophloia		1	20
Eucalyptus salubris		1	10
Eremophila dempsteri		0.1	2.5
Eremophila scoparia		0.1	1.3
Maireana pyramidata		0.1	1.2
Scaevola spinescens		0.1	0.5
Lycium australe		0.1	0.5
Atriplex vesicaria		0.1	0.4
Olearia muelleri		0.1	0.3
Ptilotus obovatus		0.1	0.3
Eremophila parvifolia subsp. *auricampa*		0.1	0.3
Maireana triptera		0.1	0.2
Maireana tomentosa		0.1	0.2
Atriplex codonocarpa		0.1	0.1
Eucalyptus celastroides subsp. *celastroides*			

Site details			
Site	**R004**	**Position (WGS84)**	-30.618552, 121.601043
Slope	gentle	**Topography**	hill top
Soil colour	brown, whitish	**Soil texture**	sandy loam
Rock cover (%)	0	**Rock type**	granite - outcropping, quartz

Observation details - visit 1 (22 Sep 2022)			
Sample description	Low *Eucalyptus griffithsii* and *Casuarina pauper* woodland over tall sparse *Acacia burkitii*, *Eremophila oldfieldii* and *E. dempsteri* shrubland over mid open *Maireana sedifolia*, *Acacia tetragonophylla* and *A. erinacea* shrubland.		
Habitat	woodland		
Disturbance	evidence of feral animals, excavation, exploration (drill pads and access tracks), historic clearing, large-scale clearing, litter, vehicle tracks		
Vegetation condition	Poor	**Fire age**	not evident
Total veg. cover (%)	25	**Tree cover (%)**	15
Shrub cover (%)	15	**Grass cover (%**	0.1
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	22-Sep-2022	unbounded	Grant Wells

Species (17)	Status	Cover (%)	Height (m)
Eucalyptus griffithsii		10	7
Acacia tetragonophylla		4	1.9
Maireana sedifolia		4	1.5
Eremophila oldfieldii subsp. *angustifolia*		3	2.5
Acacia erinacea		2	1.1
Eremophila dempsteri		1	4
Acacia burkittii		1	3
Dodonaea lobulata		0.5	1.1
Casuarina pauper		0.1	6
Acacia oswaldii		0.1	2.5
Roepera eremaea		0.1	0.5
Scaevola spinescens		0.1	0.5
Maireana georgei		0.1	0.4
Atriplex vesicaria		0.1	0.4
Westringia rigida		0.1	0.3
Solanum lasiophyllum		0.1	0.25
Maireana pentatropis		0.1	0.2

Site details			
Site	**R005**	**Position (WGS84)**	-30.619146, 121.59727
Slope	gentle	**Topography**	undulating plain
Soil colour	red-brown	**Soil texture**	sandy clay, sandy loam
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (22 Sep 2022)			
Sample description	Low open *Atriplex vesicaria*, *Ptilotus obovatus* and *Maireana pyramidata* shrubland over *Sclerolaena fusiformis*, **Carrichtera annua* and *Trichanthodium skirrophorum* forbland.		
Habitat	shrubland		
Disturbance	evidence of feral animals, grazing-high, historic clearing, large-scale clearing, litter, livestock tracks, vehicle tracks, weed infestation		
Vegetation condition	Degraded	**Fire age**	not evident
Total veg. cover (%)	75	**Tree cover (%)**	0
Shrub cover (%)	10	**Grass cover (%**	0.5
Herb cover (%)	65		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	22-Sep-2022	unbounded	Grant Wells

Species (12)	Status	Cover (%)	Height (m)
Sclerolaena patenticuspis		60	0.15
Atriplex vesicaria		5	0.7
Maireana pyramidata		2	1.1
**Carrichtera annua*	Weed	2	0.2
Ptilotus obovatus		1	0.6
Trichanthodium skirrophorum		1	0.1
Maireana turbinata		0.5	0.5
**Salvia verbenaca*	Weed	0.5	0.2
Maireana sedifolia		0.1	1
**Sonchus oleraceus*	Weed	0.1	0.3
Solanum lasiophyllum		0.1	0.3
**Oligocarpus calendulaceus*	Weed	0.1	0.2

Site details			
Site	**R006**	**Position (WGS84)**	-30.631928, 121.585747
Slope	negligible	**Topography**	plain
Soil colour	red-orange	**Soil texture**	sandy loam
Rock cover (%)	0	**Rock type**	ferrous - ironstone, quartz

Observation details - visit 1 (22 Sep 2022)			
Sample description	Mid open *Eucalyptus salmonophloia* and *E. lesouefii* woodland over tall sparse *Eremophila scoparia* shrubland over low open *Ptilotus obovatus*, *Maireana pyramidata* and *Atriplex vesicaria* shrubland.		
Habitat	open woodland		
Disturbance	evidence of feral animals, historic clearing, litter, vehicle tracks, weed infestation		
Vegetation condition	Good	**Fire age**	not evident
Total veg. cover (%)	35	**Tree cover (%)**	5
Shrub cover (%)	30	**Grass cover (%**	0.1
Herb cover (%)	0.2		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	22-Sep-2022	unbounded	Grant Wells

Species (23)	Status	Cover (%)	Height (m)
Eremophila scoparia		6	2.2
Ptilotus obovatus		5	0.6
Atriplex vesicaria		5	0.6
Maireana pyramidata		3	1.2
Eucalyptus salmonophloia		2	20
Eucalyptus lesouefii		2	12
**Salvia verbenaca*	Weed	0.2	0.2
**Carrichtera annua*	Weed	0.2	0.2
Eremophila longifolia		0.1	1.6
Senna artemisioides subsp. x*artemisioides*		0.1	1.2
Cratystylis subspinescens		0.1	1.2
Sida calyxhymenia		0.1	0.9
Eremophila glabra subsp. *glabra*		0.1	0.6
Ptilotus exaltatus		0.1	0.4
Maireana georgei		0.1	0.25
Eragrostis falcata		0.1	0.2
Solanum lasiophyllum		0.1	0.2
**Oligocarpus calendulaceus*	Weed	0.1	0.2
Sclerolaena diacantha		0.1	0.15
Maireana trichoptera		0.1	0.1
Erodium cygnorum		0.1	0.05
**Medicago laciniata*	Weed	0.1	0.05
Maireana sedifolia			1.5

Site details			
Site	**R007**	**Position (WGS84)**	-30.642901, 121.577119
Slope	gentle	**Topography**	hill slope
Soil colour	red-orange	**Soil texture**	sandy clay, sandy loam
Rock cover (%)	0	**Rock type**	quartz, siltstone / mudstone

Observation details - visit 1 (20 Sep 2022)			
Sample description	Isolated low *Casuarina pauper* trees over mid open *Dodonaea lobulata*, *Eremophila oldfieldii* and *Senna artemisioides* subsp *filifolia* shrubland over isolated low *Acacia kalgoorliensis*, *A. erinacea* and *Ptilotus obovatus* shrubs.		
Habitat	shrubland		
Disturbance	current operations, excavation, exploration (drill pads and access tracks)		
Vegetation condition	Very Good	**Fire age**	not evident
Total veg. cover (%)	30	**Tree cover (%)**	3
Shrub cover (%)	30	**Grass cover (%**	0.1
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	20-Sep-2022	unbounded	Grant Wells

Species (15)	Status	Cover (%)	Height (m)
Senna artemisioides subsp. *filifolia*		15	1.6
Dodonaea lobulata		4	1.6
Casuarina pauper		3	6
Eremophila oldfieldii subsp. *angustifolia*		3	1.5
Acacia erinacea		0.2	0.6
Acacia kalgoorliensis		0.2	0.5
Ptilotus obovatus		0.2	0.2
Santalum acuminatum		0.1	2.5
Scaevola spinescens		0.1	1
Maireana sedifolia		0.1	1
Olearia muelleri		0.1	0.25
Maireana georgei		0.1	0.2
Sclerolaena diacantha		0.1	0.1
Maireana trichoptera		0.1	0.1
Eriochiton sclerolaenoides		0.1	0.1

Site details			
Site	**R008**	**Position (WGS84)**	-30.645059, 121.582895
Slope	gentle	**Topography**	undulating plain
Soil colour	red-brown, whitish	**Soil texture**	sandy clay, sandy loam
Rock cover (%)	0	**Rock type**	quartz

Observation details - visit 1 (20 Sep 2022)			
Sample description	Low open *Eucalyptus ravida* woodland over low open *Atriplex vesicaria*, *A. nummularia* subsp. *spathulata* and *Maireana pyramidata* shrubland.		
Habitat	open woodland		
Disturbance	evidence of feral animals, historic clearing, large-scale clearing, litter, vehicle tracks, weed infestation		
Vegetation condition	Poor	**Fire age**	not evident
Total veg. cover (%)	15	**Tree cover (%)**	8
Shrub cover (%)	8	**Grass cover (%**	0.1
Herb cover (%)	1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	20-Sep-2022	unbounded	Grant Wells

Species (19)	Status	Cover (%)	Height (m)
Eucalyptus ravida		8	10
Atriplex vesicaria		6	0.5
Maireana pyramidata		0.2	0.8
**Oligocarpus calendulaceus*	Weed	0.2	0.2
**Carrichtera annua*	Weed	0.2	0.2
Lawrencella rosea		0.2	0.1
Plantago drummondii		0.1	5
Pittosporum angustifolium		0.1	2
Atriplex nummularia subsp. *spathulata*		0.1	1.5
Eremophila oppositifolia subsp. *angustifolia*		0.1	1.5
Eremophila scoparia		0.1	1
Solanum lasiophyllum		0.1	0.5
Maireana triptera		0.1	0.3
Sclerolaena diacantha		0.1	0.2
Brachyscome ciliaris		0.1	0.2
**Salvia verbenaca*	Weed	0.1	0.15
Bulbine semibarbata		0.1	0.1
Maireana trichoptera		0.1	0.1
Erodium cygnorum		0.1	0.08

Site details			
Site	**R009**	**Position (WGS84)**	-30.648675, 121.575564
Slope	gentle	**Topography**	drainage line
Soil colour	red-orange	**Soil texture**	sandy clay, sandy loam
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (20 Sep 2022)			
Sample description	Isolated mid *Casuarina obesa* trees over tall open *Acacia burkittii*, *A. tetragonophylla* and *Eremophila oldfieldii* shrubland over mid open *Eremophila granitica*, *E. alternifolia* and *Dodonaea latrobei* shrubland.		
Habitat	shrubland		
Disturbance	evidence of feral animals		
Vegetation condition	Very Good	**Fire age**	not evident
Total veg. cover (%)	60	**Tree cover (%)**	25
Shrub cover (%)	40	**Grass cover (%**	0.1
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	20-Sep-2022	unbounded	Grant Wells

Species (18)	Status	Cover (%)	Height (m)
Acacia burkittii		10	6
Eremophila granitica		10	1.5
Eremophila oldfieldii subsp. *angustifolia*		5	6
Casuarina pauper		2	12
Dodonaea lobulata		2	1.8
Eremophila alternifolia		2	1.6
Acacia tetragonophylla		1	4
Eremophila georgei		0.1	1.7
Senna artemisioides subsp. *filifolia*		0.1	1.5
Acacia kalgoorliensis		0.1	1.4
Senna artemisioides subsp. x*artemisioides*		0.1	1.2
Rhagodia drummondii		0.1	1
Scaevola spinescens		0.1	1
Ptilotus obovatus		0.1	0.6
Enchylaena tomentosa		0.1	0.3
Sclerolaena diacantha		0.1	0.2
Erodium crinitum		0.1	0.05
Calandrinia eremaea		0.1	0.05

Site details			
Site	**R011**	**Position (WGS84)**	-30.6893, 121.525413
Slope	gentle	**Topography**	undulating plain
Soil colour	red-orange	**Soil texture**	sandy clay, sandy loam
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (22 Sep 2022)			
Sample description	Low open *Eucalyptus salubris* and *E. lesouefii* woodland over mid open *Maireana sedifolia* and *Tecticornia* sp. shrubland.		
Habitat	open woodland		
Disturbance	evidence of feral animals, historic clearing, litter, vehicle tracks, weed infestation		
Vegetation condition	Good	**Fire age**	not evident
Total veg. cover (%)	20	**Tree cover (%)**	8
Shrub cover (%)	15	**Grass cover (%**	0.1
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	22-Sep-2022	unbounded	Grant Wells

Species (15)	Status	Cover (%)	Height (m)
Maireana sedifolia		15	1.2
Eucalyptus salubris		6	6
Eucalyptus lesouefii		2	10
Eremophila scoparia		0.1	2
Tecticornia disarticulata		0.1	1.4
Senna artemisioides subsp. *filifolia*		0.1	1
Nitraria billardierei		0.1	0.8
Eremophila glabra subsp. *glabra*		0.1	0.8
Atriplex nummularia subsp. *spathulata*		0.1	0.5
Lycium australe		0.1	0.4
Atriplex vesicaria		0.1	0.4
Solanum nummularium		0.1	0.3
Maireana triptera		0.1	0.2
Sclerolaena diacantha		0.1	0.15
Maireana trichoptera		0.1	0.15

Site details			
Site	**R012**	**Position (WGS84)**	-30.69916, 121.513337
Slope	negligible	**Topography**	plain
Soil colour	red-orange	**Soil texture**	sandy clay, sandy loam
Rock cover (%)	0	**Rock type**	ferrous - ironstone

Observation details - visit 1 (22 Sep 2022)			
Sample description	Low open *Eucalyptus salubris* and *Casuarina pauper* woodland over mid *Eremophila scoparia*, *Maireana sedifolia* and *Senna artemisioides* subsp. *filifolia* shrubland over isolated low *Lycium australe, Scaevola spinescens* and *Ntiraria billardierei* shrubs.		
Habitat	open woodland		
Disturbance	evidence of feral animals, historic clearing, litter, vehicle tracks		
Vegetation condition	Good	**Fire age**	not evident
Total veg. cover (%)	30	**Tree cover (%)**	4
Shrub cover (%)	30	**Grass cover (%**	0.1
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	22-Sep-2022	unbounded	Grant Wells

Species (14)	Status	Cover (%)	Height (m)
Eremophila scoparia		8	1.9
Maireana sedifolia		5	1.2
Casuarina pauper		3	5.5
Senna artemisioides subsp. *filifolia*		2	1.5
Scaevola spinescens		2	0.9
Eucalyptus salubris		1	6
Nitraria billardierei		1	0.8
Lycium australe		1	0.8
Acacia hemiteles		0.1	1.2
Eremophila praecox	P2 (DBCA list)	0.1	0.8
Minuria cunninghamii		0.1	0.4
Eremophila decipiens subsp. *decipiens*		0.1	0.4
Olearia muelleri		0.1	0.3
Eremophila parvifolia subsp. *auricampa*		0.1	0.3

Site details			
Site	**R013**	**Position (WGS84)**	-30.712118, 121.504182
Slope	negligible	**Topography**	plain
Soil colour	red-orange	**Soil texture**	sandy loam
Rock cover (%)	0	**Rock type**	ferrous - ironstone

Observation details - visit 1 (22 Sep 2022)			
Sample description	Low *Eucalyptus lesouefii* woodland over mid open *Eremophila scoparia*, *Maireana sedifolia* and *Senna artemisioides* subsp. *filifolia* shrubland over low open *Eremophila parvifolia* subsp. *auricampa, Scaevola spinescens* and *Olearia muelleri* shrubland.		
Habitat	woodland		
Disturbance	erosion channels, evidence of feral animals, historic clearing, large-scale clearing, litter, vehicle tracks		
Vegetation condition	Good	**Fire age**	not evident
Total veg. cover (%)	35	**Tree cover (%)**	20
Shrub cover (%)	15	**Grass cover (%**	0.1
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	22-Sep-2022	unbounded	Grant Wells

Species (10)	Status	Cover (%)	Height (m)
Eucalyptus lesouefii		20	8
Eremophila scoparia		5	1.8
Senna artemisioides subsp. *filifolia*		2	1.5
Maireana sedifolia		2	1.2
Scaevola spinescens		1	0.6
Eremophila parvifolia subsp. *auricampa*		1	0.3
Olearia muelleri		0.5	0.4
Exocarpos aphyllus		0.1	1.3
Pimelea microcephala		0.1	0.7
Acacia nyssophylla		0.1	0.5

Site details			
Site	**R014**	**Position (WGS84)**	-30.723142, 121.50318
Slope	negligible	**Topography**	plain
Soil colour	red-orange	**Soil texture**	sandy loam
Rock cover (%)	0	**Rock type**	ferrous - ironstone

Observation details - visit 1 (22 Sep 2022)			
Sample description	Mid *Eucalyptus salmonophloia* and *E. lesouefii* woodland over isolated mid *Eremophila scoparia*, *Maireana sedifolia* and *Senna artemisioides* subsp. *filifolia* shrubs over isolated low *Eremophila parvifolia* subsp. *auricampa, E. glabra* subsp. *glabra* and *Scaevola spinescens* shrubs.		
Habitat			
Disturbance	evidence of feral animals, historic clearing, large-scale clearing, litter, vehicle tracks, weed infestation		
Vegetation condition	Poor	**Fire age**	not evident
Total veg. cover (%)	30	**Tree cover (%)**	25
Shrub cover (%)	10	**Grass cover (%**	0.1
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	22-Sep-2022	unbounded	Grant Wells

Species (14)	Status	Cover (%)	Height (m)
Eucalyptus lesouefii		15	15
Eucalyptus salmonophloia		10	20
Eremophila scoparia		3	1.8
Maireana sedifolia		2	1.6
Senna artemisioides subsp. *filifolia*		1	1.5
Scaevola spinescens		1	0.8
Eremophila parvifolia subsp. *auricampa*		1	0.5
Atriplex vesicaria		0.5	0.5
**Carrichtera annua*	Weed	0.2	0.2
Exocarpos aphyllus		0.1	2
Eremophila oblonga		0.1	1.2
Cratystylis microphylla		0.1	1
Eremophila glabra subsp. *glabra*		0.1	0.7
Maireana pentatropis		0.1	0.6

Site details			
Site	**R015**	**Position (WGS84)**	-30.739612, 121.500213
Slope	gentle	**Topography**	undulating plain
Soil colour	red-orange	**Soil texture**	sandy clay, sandy loam
Rock cover (%)	0	**Rock type**	ferrous - ironstone

Observation details - visit 1 (21 Sep 2022)			
Sample description	Isolated mid *Maireana pyramidata*, *Senna artemisioides* subsp. x *artemisioides* and *Atriplex vesicaria* shrubs over low open **Carrichtera annua* forbland.		
Habitat	shrubland		
Disturbance	evidence of feral animals, excavation, historic clearing, large-scale clearing, litter, weed infestation		
Vegetation condition	Degraded	**Fire age**	not evident
Total veg. cover (%)	30	**Tree cover (%)**	0
Shrub cover (%)	7	**Grass cover (%**	0.1
Herb cover (%)	25		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	21-Sep-2022	unbounded	Grant Wells

Species (8)	Status	Cover (%)	Height (m)
**Carrichtera annua*	Weed	25	0.25
Atriplex vesicaria		4	1.1
Maireana pyramidata		3	1.1
Senna artemisioides subsp. x*artemisioides*		1	1
**Lycium ferocissimum*	Weed (WoNS)	0.1	1.2
Ptilotus obovatus		0.1	0.5
Maireana georgei		0.1	0.3
Maireana trichoptera		0.1	0.1

Site details			
Site	**R016**	**Position (WGS84)**	-30.739969, 121.53476
Slope	negligible	**Topography**	plain
Soil colour	red-orange	**Soil texture**	sandy loam
Rock cover (%)	0	**Rock type**	ferrous - ironstone, quartz

Observation details - visit 1 (15 Sep 2022)			
Sample description	Mid *Eucalyptus salmonophloia* woodland over tall open *Eremophila scoparia*, *Exocarpus aphyllus* shrubland over mid open *Senna artemisioides* subsp. *filifolia*, *Scaevola spinescens* and *Acacia hemiteles* shrubland.		
Habitat	open woodland		
Disturbance	evidence of feral animals, historic clearing, litter, vehicle tracks		
Vegetation condition	Good	**Fire age**	not evident
Total veg. cover (%)	25	**Tree cover (%)**	15
Shrub cover (%)	15	**Grass cover (%**	0.1
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	15-Sep-2022	unbounded	Grant Wells

Species (13)	Status	Cover (%)	Height (m)
Eucalyptus salmonophloia		10	12
Eremophila scoparia		7	2.1
Senna artemisioides subsp. *filifolia*		5	1.9
Scaevola spinescens		5	1.5
Exocarpos aphyllus		3	3
Acacia hemiteles		2	1.8
Eremophila parvifolia subsp. *auricampa*		1	0.5
Maireana sedifolia		0.1	1.2
Acacia nyssophylla		0.1	0.5
Maireana trichoptera		0.1	0.15
Austrostipa scabra		0.1	0.15
Sclerolaena diacantha		0.1	0.1
Eremophila praecox	P2 (DBCA list)		

Site details			
Site	**R017**	**Position (WGS84)**	-30.74071, 121.548314
Slope	gentle	**Topography**	undulating plain
Soil colour	red-orange	**Soil texture**	sandy loam
Rock cover (%)	0	**Rock type**	ferrous - ironstone, quartz

Observation details - visit 1 (19 Sep 2022)			
Sample description	Low open *Casuarina pauper* woodland over isolated tall *Acacia tetragonophylla* shrubs mid open *Acacia hemiteles*, *Scaevola spinescens* and *Senna artemisioides* subsp. *filifolia* shrubland.		
Habitat	open woodland		
Disturbance	evidence of feral animals, historic clearing, vehicle tracks		
Vegetation condition	Good	**Fire age**	not evident
Total veg. cover (%)	20	**Tree cover (%)**	6
Shrub cover (%)	15	**Grass cover (%**	0.1
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	19-Sep-2022	unbounded	Grant Wells

Species (13)	Status	Cover (%)	Height (m)
Casuarina pauper		6	8
Acacia hemiteles		5	1.8
Senna artemisioides subsp. *filifolia*		3	1.6
Scaevola spinescens		2	1.4
Acacia tetragonophylla		1	2.2
Westringia rigida		0.2	0.4
Santalum spicatum		0.1	2.2
Eremophila oppositifolia subsp. *angustifolia*		0.1	1.8
Lysiana casuarinae		0.1	1
Ptilotus obovatus		0.1	0.4
Enchylaena tomentosa		0.1	0.2
Sclerolaena fusiformis		0.1	0.1
Sclerolaena diacantha		0.1	0.1

Site details			
Site	**R018**	**Position (WGS84)**	-30.741039, 121.559499
Slope	gentle	**Topography**	undulating plain
Soil colour	red-orange	**Soil texture**	sandy clay, sandy loam
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (19 Sep 2022)			
Sample description	Mid *Eucalyptus salmonophloia*, *E. salubris* and *E. lesouefii* woodland over mid sparse *Eremophila pustulata*, *E. scoparia* and *Senna artemisioides* subsp. *filifolia* shrubland over low sparse *Atriplex vesicaria*, *Maireana georgei* and *M. trichoptera* shrubland.		
Habitat	woodland		
Disturbance	evidence of feral animals, historic clearing, litter, vehicle tracks		
Vegetation condition	Good	**Fire age**	not evident
Total veg. cover (%)	25	**Tree cover (%)**	12
Shrub cover (%)	15	**Grass cover (%**	0.1
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	19-Sep-2022	unbounded	Grant Wells

Species (15)	Status	Cover (%)	Height (m)
Eucalyptus salmonophloia		8	15
Eremophila pustulata		4	1.8
Atriplex vesicaria		3	0.5
Eucalyptus lesouefii		2	10
Eucalyptus salubris		2	8
Maireana georgei		2	0.3
Eremophila scoparia		1	1.8
Senna artemisioides subsp. *filifolia*		1	1.5
Maireana trichoptera		1	0.2
Lycium australe		0.2	1.7
Ptilotus obovatus		0.2	0.25
Austrostipa elegantissima		0.1	0.5
Ptilotus exaltatus		0.1	0.3
Stenopetalum lineare		0.1	0.25
Sclerolaena fusiformis		0.1	0.1

Site details			
Site	**R019**	**Position (WGS84)**	-30.743582, 121.568417
Slope	moderate	**Topography**	hill slope
Soil colour	red-brown	**Soil texture**	sandy clay
Rock cover (%)	0	**Rock type**	granite - rocks

Observation details - visit 1 (19 Sep 2022)			
Sample description	Isolated low *Eucalyptus griffithsii* trees over tall sparse *Acacia burkitii* and *Senna artemisioides* subsp. *filifolia* shrubland over mid open *Dodonae lobulata*, *Scaevola spinescens* and *Eremophila oldfieldii* subsp. *angustifolia* shrubland.		
Habitat	shrubland		
Disturbance	evidence of feral animals, historic clearing, weed infestation		
Vegetation condition	Good	**Fire age**	not evident
Total veg. cover (%)	25	**Tree cover (%)**	2
Shrub cover (%)	25	**Grass cover (%**	0.1
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	19-Sep-2022	unbounded	Grant Wells

Species (15)	Status	Cover (%)	Height (m)
Dodonaea lobulata		5	1.8
Senna artemisioides subsp. *filifolia*		4	2.1
Eucalyptus griffithsii		2	8
Acacia burkittii		2	2.2
Eremophila oldfieldii subsp. *angustifolia*		2	1.9
Scaevola spinescens		0.5	1.2
Acacia tetragonophylla		0.1	1.4
Eremophila granitica		0.1	1.3
Ptilotus obovatus		0.1	0.3
**Carrichtera annua*	Weed	0.1	0.15
Sclerolaena diacantha		0.1	0.15
Enneapogon caerulescens		0.1	0.15
Goodenia sp. Midwest (K.A. Shepherd & C.F. Wilkins KS 1609)		0.1	0.1
Maireana trichoptera		0.1	0.1
Eriochiton sclerolaenoides		0.1	0.1

Site details			
Site	**R020**	**Position (WGS84)**	-30.741563, 121.582707
Slope	moderate	**Topography**	creek
Soil colour	red-brown	**Soil texture**	sandy clay, sandy loam
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (19 Sep 2022)			
Sample description	Tall *Acacia burkittii* and *Santalum acuminatum* shrubland over isolated mid *Atriplex nummularia*, *Senna artemisioides* subsp. x *artemisioides* and *Rhagodia drummondii* shrubs.		
Habitat	shrubland		
Disturbance	evidence of feral animals, historic clearing, weed infestation		
Vegetation condition	Poor	**Fire age**	not evident
Total veg. cover (%)	50	**Tree cover (%)**	50
Shrub cover (%)	2	**Grass cover (%**	0.1
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	19-Sep-2022	unbounded	Grant Wells

Species (15)	Status	Cover (%)	Height (m)
Acacia burkittii		45	3.5
Santalum acuminatum		5	3
Exocarpos aphyllus		0.1	1.5
Senna artemisioides subsp. x*artemisioides*		0.1	1.2
Atriplex nummularia subsp. *spathulata*		0.1	1.2
Rhagodia drummondii		0.1	1.1
Eremophila decipiens subsp. *decipiens*		0.1	0.5
Enchylaena tomentosa		0.1	0.5
Ptilotus obovatus		0.1	0.3
**Oligocarpus calendulaceus*	Weed	0.1	0.2
**Salvia verbenaca*	Weed	0.1	0.15
**Medicago minima*	Weed	0.1	0.15
Goodenia sp. Midwest (K.A. Shepherd & C.F. Wilkins KS 1609)		0.1	0.1
**Lysimachia arvensis*	Weed	0.1	0.1
Cephalipterum drummondii		0.1	0.1

Site details			
Site	**R021**	**Position (WGS84)**	-30.737553, 121.597446
Slope	negligible	**Topography**	plain
Soil colour	red-orange	**Soil texture**	sandy loam
Rock cover (%)	0	**Rock type**	ferrous - ironstone

Observation details - visit 1 (19 Sep 2022)			
Sample description	Mid *Eucalyptus transcontinentalis* woodland over isolated tall *Eremophila interstans* subsp. *interstans* and *Santalum acuminatum* shrubs over mid open *Senna artemisioides* subsp. *filifolia*, *Acacia hemiteles* and *Scaevola spinescens* shrubland.		
Habitat	woodland		
Disturbance	evidence of feral animals, historic clearing, litter, vehicle tracks		
Vegetation condition	Good	**Fire age**	not evident
Total veg. cover (%)	35	**Tree cover (%)**	15
Shrub cover (%)	25	**Grass cover (%**	0.1
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	19-Sep-2022	unbounded	Grant Wells

Species (14)	Status	Cover (%)	Height (m)
Eucalyptus transcontinentalis		15	12
Senna artemisioides subsp. *filifolia*		10	1.5
Scaevola spinescens		10	1.2
Acacia hemiteles		3	2
Santalum acuminatum		0.2	2.5
Eremophila interstans subsp. *interstans*		0.2	2.5
Acacia erinacea		0.2	1.2
Eremophila parvifolia subsp. *auricampa*		0.2	0.6
Eremophila oppositifolia subsp. *angustifolia*		0.1	2
Eremophila oldfieldii subsp. *angustifolia*		0.1	1.9
Eremophila praecox	P2 (DBCA list)	0.1	1
Atriplex nummularia subsp. *spathulata*		0.1	1
Atriplex vesicaria		0.1	0.5
Olearia muelleri		0.1	0.3

Site details			
Site	**R022**	**Position (WGS84)**	-30.74111, 121.604674
Slope	gentle	**Topography**	undulating plain
Soil colour	red-orange	**Soil texture**	sandy clay, sandy loam
Rock cover (%)	0	**Rock type**	ferrous - ironstone, quartz

Observation details - visit 1 (19 Sep 2022)			
Sample description	Low *Eucalyptus ravida* woodland over mid open *Eremophila dempsteri*, *E. scoparia* and *Santalum acuminatum* shrubland over low sparse *Atriplex vesicaria*, *Maireana tomentosa* and *M. trichoptera* shrubland.		
Habitat	woodland		
Disturbance	evidence of feral animals, historic clearing, litter, vehicle tracks		
Vegetation condition	Good	**Fire age**	not evident
Total veg. cover (%)	25	**Tree cover (%)**	12
Shrub cover (%)	15	**Grass cover (%**	0.1
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	19-Sep-2022	unbounded	Grant Wells

Species (13)	Status	Cover (%)	Height (m)
Eucalyptus ravida		10	7
Eremophila dempsteri		4	2
Santalum acuminatum		3	1.8
Eremophila scoparia		2	1.8
Atriplex vesicaria		2	0.5
Senna artemisioides subsp. *filifolia*		0.2	1.5
Eremophila glabra subsp. *glabra*		0.1	1.2
Stenopetalum lineare		0.1	0.2
Austrostipa scabra		0.1	0.15
Maireana trichoptera		0.1	0.1
Maireana tomentosa		0.1	0.08
Calandrinia eremaea		0.1	0.02
Menkea australis		0.1	0.01

Site details			
Site	**R023**	**Position (WGS84)**	-30.740722, 121.618321
Slope	gentle	**Topography**	undulating plain
Soil colour	red-orange, whitish	**Soil texture**	sandy clay, sandy loam
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (21 Sep 2022)			
Sample description	Mid *Eucalyptus salubris* woodland over isolated mid *Eremophila pustulata*, *Maireana sedifolia* and *Eremophila scoparia* shrubs over low sparse *Atriplex vesicaria*, *Eremophila parvifolia* subsp. *auricampa* and *Olearia muelleri* shrubland.		
Habitat	woodland		
Disturbance	evidence of feral animals		
Vegetation condition	Excellent	**Fire age**	not evident
Total veg. cover (%)	25	**Tree cover (%)**	15
Shrub cover (%)	15	**Grass cover (%**	0.1
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	21-Sep-2022	unbounded	Grant Wells

Species (13)	Status	Cover (%)	Height (m)
Eucalyptus salubris		15	12
Atriplex vesicaria		5	0.3
Eremophila pustulata		2	1.2
Maireana sedifolia		2	1.1
Eremophila parvifolia subsp. *auricampa*		2	0.3
Eremophila scoparia		0.2	1.5
Olearia muelleri		0.2	0.3
Atriplex nummularia subsp. *spathulata*		0.1	1.6
Eremophila glabra subsp. *glabra*		0.1	1
Maireana georgei		0.1	0.35
Maireana triptera		0.1	0.25
Maireana georgei		0.1	0.2
Maireana trichoptera		0.1	0.1

Site details			
Site	**R024**	**Position (WGS84)**	-30.746284, 121.636739
Slope	gentle	**Topography**	undulating plain
Soil colour	red-orange	**Soil texture**	sandy loam
Rock cover (%)	0	**Rock type**	ferrous - ironstone

Observation details - visit 1 (21 Sep 2022)			
Sample description	Mid *Eucalyptus salmonophloia* woodland over mid open *Atriplex nummularia* subsp. *spathulata*, *Eremophila scoparia* and *Eremophila interstans* subsp. *virgata* shrubland over isolated low *Maireana triptera, Olearia muelleri* and *Acacia erinacea* shrubs.		
Habitat	woodland		
Disturbance	evidence of feral animals, historic clearing, vehicle tracks		
Vegetation condition	Good	**Fire age**	not evident
Total veg. cover (%)	25	**Tree cover (%)**	15
Shrub cover (%)	20	**Grass cover (%**	0.1
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	21-Sep-2022	unbounded	Grant Wells

Species (16)	Status	Cover (%)	Height (m)
Eucalyptus salmonophloia		15	25
Eremophila scoparia		9	1.8
Eremophila interstans subsp. *virgata*		3	2.2
Atriplex nummularia subsp. *spathulata*		3	1.8
Maireana triptera		2	0.4
Pimelea microcephala		0.1	1.5
Templetonia ceracea		0.1	1.5
Exocarpos aphyllus		0.1	1.4
Maireana pyramidata		0.1	1.2
Maireana sedifolia		0.1	1
Eremophila maculata subsp. *brevifolia*		0.1	1
Lycium australe		0.1	1
Olearia muelleri		0.1	0.5
Acacia erinacea		0.1	0.4
Sclerolaena diacantha		0.1	0.2
Ptilotus holosericeus		0.1	0.02

Site details			
Site	**R025**	**Position (WGS84)**	-30.730669, 121.602308
Slope	gentle	**Topography**	undulating plain
Soil colour	red-brown	**Soil texture**	sandy clay, sandy loam
Rock cover (%)	0	**Rock type**	ferrous - ironstone, quartz, siltstone / mudstone

Observation details - visit 1 (19 Sep 2022)			
Sample description	Low open *Eucalyptus griffithsii* and *Casuarina pauper* woodland over tall open *Acacia kalgoorliensis*, *Senna artemisioides* subsp. *filifolia* and *Eremophila oppositifolia* shrubland over isolated low *Eremophila granitica*, *Scaevola spinescens* and *Lycium australe* shrubs.		
Habitat	open woodland		
Disturbance	evidence of feral animals, exploration (drill pads and access tracks)		
Vegetation condition	Very Good	**Fire age**	not evident
Total veg. cover (%)	30	**Tree cover (%)**	15
Shrub cover (%)	20	**Grass cover (%**	0.1
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	19-Sep-2022	unbounded	Grant Wells

Species (14)	Status	Cover (%)	Height (m)
Senna artemisioides subsp. *filifolia*		5	2
Acacia kalgoorliensis		5	2
Eucalyptus griffithsii		4	10
Casuarina pauper		2	8
Eremophila oppositifolia subsp. *angustifolia*		2	2.5
Scaevola spinescens		1	1
Eremophila granitica		1	0.8
Grevillea acuaria		0.1	1.2
Maireana sedifolia		0.1	1
Acacia hemiteles		0.1	1
Olearia muelleri		0.1	0.8
Lycium australe		0.1	0.5
Eremophila glabra subsp. *glabra*		0.1	0.5
Enchylaena tomentosa		0.1	0.3

Site details			
Site	**R026**	**Position (WGS84)**	-30.717054, 121.604807
Slope	negligible	**Topography**	plain
Soil colour	red-brown, whitish	**Soil texture**	sandy loam
Rock cover (%)	0	**Rock type**	ferrous - ironstone, quartz

Observation details - visit 1 (19 Sep 2022)			
Sample description	Mid *Eucalyptus lesouefii* woodland over tall open *Melaleuca sheathiana* and *Eremophila interstans* shrubland over isolated mid *Maireana sedifolia* and *Senna artemisioides* subsp. *filifolia* shrubs.		
Habitat	woodland		
Disturbance	historic clearing, litter, vehicle tracks		
Vegetation condition	Good	**Fire age**	not evident
Total veg. cover (%)	20	**Tree cover (%)**	18
Shrub cover (%)	4	**Grass cover (%**	0.1
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	19-Sep-2022	unbounded	Grant Wells

Species (7)	Status	Cover (%)	Height (m)
Eucalyptus lesouefii		10	12
Melaleuca sheathiana		10	4
Senna artemisioides subsp. *filifolia*		2	1.5
Maireana sedifolia		2	1.2
Eremophila interstans subsp. *interstans*		1	4
Exocarpos aphyllus		0.1	1.1
Olearia muelleri		0.1	0.3

Site details			
Site	**R027**	**Position (WGS84)**	-30.71483, 121.608588
Slope	negligible	**Topography**	plain
Soil colour	red-orange	**Soil texture**	sandy clay, sandy loam
Rock cover (%)	0	**Rock type**	ferrous - ironstone

Observation details - visit 1 (19 Sep 2022)			
Sample description	Mid *Eucalyptus salmonophloia* and *E. salubris* woodland over isolated tall *Acacia tetragonophylla* shrubs over mid open *Acacia hemiteles*, *Eremophila scoparia* and *Senna artemisioides* subsp. x *artemisioides* shrubland.		
Habitat	woodland		
Disturbance	historic clearing		
Vegetation condition	Very Good	**Fire age**	not evident
Total veg. cover (%)	45	**Tree cover (%)**	25
Shrub cover (%)	25	**Grass cover (%**	0.1
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	19-Sep-2022	unbounded	Grant Wells

Species (15)	Status	Cover (%)	Height (m)
Eucalyptus salmonophloia		15	20
Eucalyptus salubris		10	
Eremophila scoparia		8	1.5
Acacia hemiteles		5	1.5
Senna artemisioides subsp. x*artemisioides*		3	1.2
Acacia tetragonophylla		2	3
Eremophila ionantha		2	1.6
Ptilotus obovatus		0.2	0.5
Exocarpos aphyllus		0.1	2
Senna artemisioides subsp. *filifolia*		0.1	1
Scaevola spinescens		0.1	1
Maireana sedifolia		0.1	1
Maireana pyramidata		0.1	1
Eremophila decipiens subsp. *decipiens*		0.1	0.5
Enchylaena tomentosa		0.1	0.4

Site details			
Site	**R028**	**Position (WGS84)**	-30.708418, 121.601698
Slope	negligible	**Topography**	plain
Soil colour	red-orange, whitish	**Soil texture**	sandy clay
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (19 Sep 2022)			
Sample description	Low *Eucalyptus ravida* and *E. prolixa* woodland over mid *Eremophila pustulata* and *Maireana sedifolia* shrubland over isolated clumps of low *Atriplex vesicaria*, *Olearia muelleri* and *Maireana georgei* shrubs.		
Habitat	woodland		
Disturbance	evidence of feral animals, historic clearing		
Vegetation condition	Very Good	**Fire age**	not evident
Total veg. cover (%)	60	**Tree cover (%)**	30
Shrub cover (%)	40	**Grass cover (%**	0.1
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	19-Sep-2022	unbounded	Grant Wells

Species (7)	Status	Cover (%)	Height (m)
Eremophila pustulata		30	1.2
Eucalyptus ravida		20	5
Eucalyptus prolixa		10	5
Maireana sedifolia		0.1	1
Atriplex vesicaria		0.1	0.5
Olearia muelleri		0.1	0.3
Maireana georgei		0.1	0.2

Site details			
Site	**R030**	**Position (WGS84)**	-30.694189, 121.637143
Slope	negligible	**Topography**	plain
Soil colour	red-orange	**Soil texture**	sandy loam
Rock cover (%)	0	**Rock type**	ferrous - ironstone, quartz

Observation details - visit 1 (20 Sep 2022)			
Sample description	Mid *Eucalyptus salmonophloia* and *E. salubris* woodland over mid open *Maireana sedifolia*, *Eremophila scoparia* and *E. ionantha* shrubland over isolated low *Ptilotus obovatus*, *Acacia hemiteles* and *Maireana triptera* shrubs.		
Habitat	open woodland		
Disturbance	evidence of feral animals, historic clearing, vehicle tracks		
Vegetation condition	Very Good	**Fire age**	not evident
Total veg. cover (%)	25	**Tree cover (%)**	7
Shrub cover (%)	20	**Grass cover (%**	0.1
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	20-Sep-2022	unbounded	Grant Wells

Species (18)	Status	Cover (%)	Height (m)
Maireana sedifolia		18	1.2
Eucalyptus salubris		5	10
Eucalyptus salmonophloia		2	20
Ptilotus obovatus		0.2	0.25
Maireana triptera		0.2	0.25
Eremophila interstans subsp. *interstans*		0.1	2.5
Eremophila scoparia		0.1	1.7
Eremophila ionantha		0.1	1.6
Senna artemisioides subsp. *filifolia*		0.1	1.5
Maireana pyramidata		0.1	1.1
Acacia hemiteles		0.1	1
Rhagodia drummondii		0.1	1
Scaevola spinescens		0.1	1
Lycium australe		0.1	1
Eremophila decipiens subsp. *decipiens*		0.1	0.5
Sclerolaena diacantha		0.1	0.15
Sclerolaena fusiformis		0.1	0.1
Menkea australis		0.1	0.01

Site details			
Site	**R031**	**Position (WGS84)**	-30.734575, 121.578657
Slope	gentle	**Topography**	undulating plain
Soil colour	red-orange	**Soil texture**	sandy loam
Rock cover (%)	0	**Rock type**	granite - rocks

Observation details - visit 1 (21 Sep 2022)			
Sample description	Mid open *Eucalyptus salmonophloia* woodland over mid sparse *Atriplex nummularia* subsp. *spathulata*, *Maireana sedifolia* and *Senna artemisioides* subsp. *filifolia* shrubland over low open *Atriplex vesicaria, Ptilotus obovatus* and *Maireana triptera* shrubland.		
Habitat	open woodland		
Disturbance	evidence of feral animals, excavation, historic clearing, large-scale clearing, litter, vehicle tracks, weed infestation		
Vegetation condition	Poor	**Fire age**	not evident
Total veg. cover (%)	20	**Tree cover (%)**	6
Shrub cover (%)	20	**Grass cover (%**	0.1
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	21-Sep-2022	unbounded	Grant Wells

Species (18)	Status	Cover (%)	Height (m)
Atriplex vesicaria		8	0.3
Eucalyptus salmonophloia		6	20
Atriplex nummularia subsp. *spathulata*		4	1.5
Maireana sedifolia		2	1.5
Ptilotus obovatus		2	0.3
Maireana triptera		2	0.2
**Salvia verbenaca*	Weed	0.5	0.15
**Cuscuta epithymum*	Weed	0.5	0.05
Scaevola spinescens		0.2	1.8
Senna artemisioides subsp. *filifolia*		0.2	1.2
Eremophila oldfieldii subsp. *angustifolia*		0.1	2
Solanum lasiophyllum		0.1	0.3
Maireana georgei		0.1	0.25
**Carrichtera annua*	Weed	0.1	0.2
Sclerolaena diacantha		0.1	0.15
Austrostipa nodosa		0.1	0.15
**Oligocarpus calendulaceus*	Weed	0.1	0.15
Maireana trichoptera		0.1	0.15

Site details			
Site	**R032**	**Position (WGS84)**	-30.726974, 121.583367
Slope	moderate	**Topography**	hill slope
Soil colour	red-orange, whitish	**Soil texture**	sandy clay, sandy loam
Rock cover (%)	0	**Rock type**	ferrous - ironstone, quartz

Observation details - visit 1 (21 Sep 2022)			
Sample description	Low *Casuarina pauper* woodland over tall open *Eremophila oldfieldii*, *Dodonaea lobulata* and *Acacia burkitii* shrubland over isolated mid *Senna artemisioides* subsp. *filifolia*, *Scaevola spinescens* and *Maireana sedifolia* shrubs.		
Habitat	woodland		
Disturbance	none evident		
Vegetation condition	Excellent	**Fire age**	not evident
Total veg. cover (%)	30	**Tree cover (%)**	25
Shrub cover (%)	5	**Grass cover (%**	0.1
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	21-Sep-2022	unbounded	Grant Wells

Species (15)	Status	Cover (%)	Height (m)
Casuarina pauper		10	5
Eremophila oldfieldii subsp. *angustifolia*		5	2.5
Dodonaea lobulata		3	2.1
Acacia burkittii		2	2.2
Acacia tetragonophylla		1	2.5
Santalum acuminatum		1	2
Alyxia buxifolia		1	2
Senna artemisioides subsp. *filifolia*		1	1.8
Scaevola spinescens		1	1.6
Westringia rigida		0.5	0.4
Maireana sedifolia		0.1	1.2
Grevillea acuaria		0.1	1
Acacia erinacea		0.1	0.6
Eremophila parvifolia subsp. *auricampa*		0.1	0.3
Ptilotus obovatus		0.1	0.2

Site details			
Site	**R033**	**Position (WGS84)**	-30.721607, 121.582462
Slope	gentle	**Topography**	hill slope
Soil colour	red-orange	**Soil texture**	sandy loam
Rock cover (%)	0	**Rock type**	ferrous - ironstone

Observation details - visit 1 (21 Sep 2022)			
Sample description	Mid *Eucalyptus oleosa* subsp. *oleosa* mallee woodland over tall open *Acacia burkitii*, *Melaleuca hamata* and *Allocasuarina eriochlamys* subsp. *grossa* shrubland over low sparse *Philotheca brucei, Scaevola spinescens* and *Eremophila granitica* shrubland.		
Habitat	mallee woodland		
Disturbance	none evident		
Vegetation condition	Excellent	**Fire age**	not evident
Total veg. cover (%)	35	**Tree cover (%)**	25
Shrub cover (%)	10	**Grass cover (%**	2
Herb cover (%)	0		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	21-Sep-2022	unbounded	Grant Wells

Species (11)	Status	Cover (%)	Height (m)
Acacia burkittii		15	2.3
Eucalyptus oleosa subsp. *oleosa*		10	4.5
Melaleuca hamata		2	2
Scaevola spinescens		2	1.2
Philotheca brucei subsp. *brucei*		2	1.2
Eremophila granitica		2	1.1
Triodia irritans		2	0.3
Allocasuarina eriochlamys subsp. *grossa*	P3 (DBCA list)	0.2	3
Prostanthera grylloana		0.2	1.1
Acacia tetragonophylla		0.1	1.6
Dodonaea lobulata		0.1	1

Site details			
Site	**R034**	**Position (WGS84)**	-30.723372, 121.571372
Slope	moderate	**Topography**	hill slope
Soil colour	red-brown	**Soil texture**	sandy loam
Rock cover (%)	0	**Rock type**	granite - rocks, quartz

Observation details - visit 1 (20 Sep 2022)			
Sample description	Low open *Eucalyptus stricklandii*, *E. celastroides* subsp. *celastroides* and *E. lesouefii* woodland over isolated mid *Eremophila oppositifolia* subsp. *angustifolia* and *E. oldfieldii* subsp. *angustifolia* shrubs over low open *Eremophila pustulata, E. parvifolia subsp. auricampa* and *Acacia erinacea* shrubland.		
Habitat	open woodland		
Disturbance	historic clearing, vehicle tracks		
Vegetation condition	Very Good	**Fire age**	not evident
Total veg. cover (%)	20	**Tree cover (%)**	8
Shrub cover (%)	15	**Grass cover (%**	0.1
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	20-Sep-2022	unbounded	Grant Wells

Species (19)	Status	Cover (%)	Height (m)
Eremophila pustulata		7	0.8
Eucalyptus stricklandii		5	7
Eremophila parvifolia subsp. *auricampa*		2	0.6
Eucalyptus lesouefii		1	8
Eremophila oppositifolia subsp. *angustifolia*		1	1.8
Eucalyptus celastroides subsp. *celastroides*		1	
Acacia erinacea		0.5	0.8
Eremophila oldfieldii subsp. *angustifolia*		0.2	1.8
Eremophila glabra subsp. *glabra*		0.1	1
Dodonaea lobulata		0.1	1
Grevillea acuaria		0.1	0.8
Senna artemisioides subsp. *filifolia*		0.1	0.8
Scaevola spinescens		0.1	0.5
Exocarpos aphyllus		0.1	0.5
Maireana georgei		0.1	0.25
Maireana sedifolia		0.1	0.2
Maireana triptera		0.1	0.2
Maireana trichoptera		0.1	0.1
Sclerolaena fusiformis		0.1	0.1

Site details			
Site	**R035**	**Position (WGS84)**	-30.719254, 121.582387
Slope	gentle	**Topography**	drainage line
Soil colour	red-orange	**Soil texture**	sandy clay, sandy loam
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (21 Sep 2022)			
Sample description	Tall *Eucalyptus oleosa* subsp. *oleosa* mallee woodland over tall *Acacia burkitii*, *A. tetragonophylla* and *Grevillea nematophylla* shrubland over isolated mid *Prostanthera grylloana*, *P. althoferi* subsp.*althoferi* and *Eremophila granitica* shrubs.		
Habitat	mallee woodland		
Disturbance	none evident		
Vegetation condition	Excellent	**Fire age**	not evident
Total veg. cover (%)	90	**Tree cover (%)**	85
Shrub cover (%)	5	**Grass cover (%**	0.1
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	21-Sep-2022	unbounded	Grant Wells

Species (17)	Status	Cover (%)	Height (m)
Acacia burkittii		70	3.5
Eucalyptus oleosa subsp. *oleosa*		12	10
Acacia tetragonophylla		5	3.5
Prostanthera grylloana		2	1.1
Grevillea nematophylla		1	4
Alyxia buxifolia		0.2	2.5
Prostanthera althoferi subsp. *althoferi*		0.2	1.2
Santalum acuminatum		0.1	3
Leichardtia australis		0.1	2.5
Dodonaea inaequifolia		0.1	2.5
Amyema gibberula var. *gibberula*		0.1	2
Austrostipa tuckeri		0.1	1.5
Senna artemisioides subsp. *filifolia*		0.1	1.4
Eremophila granitica		0.1	1.2
Scaevola spinescens		0.1	1
Eragrostis falcata		0.1	0.2
Monachather paradoxus		0.1	0.15

Site details			
Site	**R036**	**Position (WGS84)**	-30.698498, 121.574225
Slope	moderate	**Topography**	breakaway
Soil colour	red-orange	**Soil texture**	sandy clay, sandy loam
Rock cover (%)	0	**Rock type**	granite - rocks, quartz

Observation details - visit 1 (20 Sep 2022)			
Sample description	Low *Eucalyptus stricklandii*, *E. ravida* and *E. transcontinentalis* woodland over mid open *Acacia kalgoorliensis*, *Eremophila pustulata* and *Exocarpus aphyllus* shrubland over isolated low *Maireana triptera*, *Scaevola spinescens* and *M. georgei* shrubs.		
Habitat	woodland		
Disturbance	evidence of feral animals, exploration (drill pads and access tracks), historic clearing		
Vegetation condition	Very Good	**Fire age**	not evident
Total veg. cover (%)	20	**Tree cover (%)**	12
Shrub cover (%)	15	**Grass cover (%**	0.1
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	20-Sep-2022	unbounded	Grant Wells

Species (17)	Status	Cover (%)	Height (m)
Eremophila pustulata		7	1.3
Eucalyptus stricklandii		6	8
Eucalyptus transcontinentalis		3	9
Eucalyptus ravida		3	7
Acacia kalgoorliensis		3	1.2
Scaevola spinescens		1	0.6
Maireana georgei		0.5	0.25
Maireana triptera		0.5	0.25
Exocarpos aphyllus		0.2	1
Eucalyptus celastroides subsp. *celastroides*		0.1	4
Eremophila oppositifolia subsp. *angustifolia*		0.1	1.5
Alyxia buxifolia		0.1	1.2
Maireana pentatropis		0.1	0.4
Westringia rigida		0.1	0.2
Maireana trichoptera		0.1	0.1
Sclerolaena diacantha		0.1	0.1
Sclerolaena fusiformis		0.1	0.1

Site details			
Site	**R037**	**Position (WGS84)**	-30.691911, 121.570172
Slope	negligible	**Topography**	plain
Soil colour	red-brown	**Soil texture**	sandy loam
Rock cover (%)	0	**Rock type**	quartz

Observation details - visit 1 (20 Sep 2022)			
Sample description	Low *Eucalyptus ravida* woodland over isolated tall *Eremophila interstans* subsp. *interstans* and *Santalum acuminatum* shrubs over low open *Eremophila pustulata*, *E. scoparia* and *Atriplex vesicaria* shrubland.		
Habitat	woodland		
Disturbance	evidence of feral animals, exploration (drill pads and access tracks)		
Vegetation condition	Very Good	**Fire age**	not evident
Total veg. cover (%)	30	**Tree cover (%)**	20
Shrub cover (%)	20	**Grass cover (%**	0.1
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	20-Sep-2022	unbounded	Grant Wells

Species (22)	Status	Cover (%)	Height (m)
Eucalyptus ravida		20	8
Eremophila pustulata		8	1.2
Eremophila scoparia		5	1.2
Eremophila interstans subsp. *interstans*		1	2.2
Atriplex vesicaria		1	0.5
Santalum acuminatum		0.1	2
Eremophila glabra subsp. *glabra*		0.1	1.2
Maireana sedifolia		0.1	1.2
Eremophila oppositifolia subsp. *angustifolia*		0.1	1.2
Senna artemisioides subsp. *filifolia*		0.1	1
Atriplex nummularia subsp. *spathulata*		0.1	1
Scaevola spinescens		0.1	0.8
Enchylaena tomentosa		0.1	0.4
Ptilotus obovatus		0.1	0.3
Maireana pyramidata		0.1	0.3
Lycium australe		0.1	0.25
Maireana georgei		0.1	0.25
Sclerolaena diacantha		0.1	0.15
Austrostipa nodosa		0.1	0.15
Maireana trichoptera		0.1	0.1
Sclerolaena fusiformis		0.1	0.1
Erodium crinitum		0.1	0.02

Site details			
Site	**R040**	**Position (WGS84)**	-30.67573, 121.60756
Slope	gentle	**Topography**	drainage line
Soil colour	red-orange	**Soil texture**	sandy clay, sandy loam
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (20 Sep 2022)			
Sample description	Low *Eucalyptus griffithsii* and *E. yilgarnensis* woodland over tall *Acacia burkitii* shrubland over mid open *Eremophila granitica*, *E. decipeins* subsp. *decipiens* and *Senna artemisioides subsp. filifolia* shrubland.		
Habitat	woodland		
Disturbance	evidence of feral animals		
Vegetation condition	Excellent	**Fire age**	not evident
Total veg. cover (%)	45	**Tree cover (%)**	40
Shrub cover (%)	10	**Grass cover (%**	0.1
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	20-Sep-2022	unbounded	Grant Wells

Species (12)	Status	Cover (%)	Height (m)
Acacia burkittii		25	3
Eucalyptus griffithsii		17	10
Eucalyptus yilgarnensis		7	6
Eremophila granitica		5	1.8
Senna artemisioides subsp. *filifolia*		1	1.2
Eremophila decipiens subsp. *decipiens*		0.5	1.2
Rhagodia drummondii		0.5	1
Acacia hemiteles		0.1	1.5
Grevillea acuaria		0.1	1.2
Acacia tetragonophylla		0.1	1
Olearia pimeleoides		0.1	0.8
Ptilotus obovatus		0.1	0.3

Site details			
Site	**R041**	**Position (WGS84)**	-30.663434, 121.573872
Slope	gentle	**Topography**	undulating plain
Soil colour	red-orange	**Soil texture**	sandy clay, sandy loam
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (20 Sep 2022)			
Sample description	Low *Eucalyptus ravida* woodland over isolated mid Eremophila scoparia and *E. oppositifolia* subsp. *angustifolia* shrubs over low open *Eremophila pustulata*, *Maireana sedifolia* and *Atriplex vesicaria* shrubland.		
Habitat	woodland		
Disturbance	evidence of feral animals, historic clearing		
Vegetation condition	Very Good	**Fire age**	not evident
Total veg. cover (%)	30	**Tree cover (%)**	10
Shrub cover (%)	25	**Grass cover (%**	0.1
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	20-Sep-2022	unbounded	Grant Wells

Species (13)	Status	Cover (%)	Height (m)
Eucalyptus ravida		10	6
Maireana sedifolia		9	1
Eremophila pustulata		8	1
Eremophila scoparia		1	1.4
Atriplex vesicaria		1	0.3
Eremophila oppositifolia subsp. *angustifolia*		0.1	1.2
Scaevola spinescens		0.1	0.6
Templetonia ceracea		0.1	0.5
Exocarpos aphyllus		0.1	0.5
Maireana triptera		0.1	0.25
Maireana georgei		0.1	0.25
Sclerolaena diacantha		0.1	0.15
Maireana trichoptera		0.1	0.1

Site details			
Site	**R042**	**Position (WGS84)**	-30.664104, 121.594628
Slope	gentle	**Topography**	undulating plain
Soil colour	red-orange	**Soil texture**	sandy loam
Rock cover (%)	0	**Rock type**	ferrous - ironstone, quartz

Observation details - visit 1 (20 Sep 2022)			
Sample description	Low open *Eucalyptus griffithsii* and *Casuarina pauper* woodland over tall open *Acacia burkitii* and *Eremophila oldfieldii* subsp. *angustifolia* shrubland over mid open *Senna artemisioides* subsp. *filifolia* and *Dodonaea lobulata* shrubland.		
Habitat	open woodland		
Disturbance	evidence of feral animals		
Vegetation condition	Excellent	**Fire age**	not evident
Total veg. cover (%)	40	**Tree cover (%)**	15
Shrub cover (%)	30	**Grass cover (%**	0.1
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	20-Sep-2022	unbounded	Grant Wells

Species (12)	Status	Cover (%)	Height (m)
Acacia burkittii		8	3
Senna artemisioides subsp. *filifolia*		7	1.8
Eucalyptus griffithsii		6	9
Eremophila oldfieldii subsp. *angustifolia*		2	2.5
Dodonaea lobulata		2	1.5
Casuarina pauper		1	6
Scaevola spinescens		0.5	1
Eremophila granitica		0.1	1.2
Eremophila glabra subsp. *glabra*		0.1	1
Maireana pentatropis		0.1	0.8
Ptilotus obovatus		0.1	0.3
Maireana triptera		0.1	0.2

Site details			
Site	**R044**	**Position (WGS84)**	-30.683022, 121.633099
Slope	negligible	**Topography**	plain
Soil colour	red-orange	**Soil texture**	sandy loam
Rock cover (%)	0	**Rock type**	granite - rocks, quartz

Observation details - visit 1 (20 Sep 2022)			
Sample description	Low *Casuarina pauper* woodland over mid open *Acacia burkitii*, *Senna artemisioides* subsp. *filifolia* and *Exocarpus aphyllus* shrubland over isolated low *Scaevola spinescens*, *Eremophila granitica* and *E. parvifolia* subsp. *auricampa* shrubs.		
Habitat	woodland		
Disturbance	none evident		
Vegetation condition	Excellent	**Fire age**	not evident
Total veg. cover (%)	25	**Tree cover (%)**	10
Shrub cover (%)	20	**Grass cover (%**	0.1
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	20-Sep-2022	unbounded	Grant Wells

Species (13)	Status	Cover (%)	Height (m)
Casuarina pauper		10	6
Acacia burkittii		8	1.9
Senna artemisioides subsp. *filifolia*		7	1.5
Eremophila granitica		2	0.8
Scaevola spinescens		1	0.8
Maireana sedifolia		1	0.4
Dodonaea lobulata		0.2	1.8
Exocarpos aphyllus		0.1	1.5
Eremophila praecox	P2 (DBCA list)	0.1	0.5
Ptilotus obovatus		0.1	0.25
Maireana triptera		0.1	0.2
Maireana trichoptera		0.1	0.15
Maireana georgei		0.1	0.15

Site details			
Site	**R044B**	**Position (WGS84)**	-30.690883, 121.656186
Slope	negligible	**Topography**	plain
Soil colour	red-orange	**Soil texture**	sandy loam
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (22 Sep 2022)			
Sample description	Low *Eucalyptus salubris* woodland over mid sparse *Maireana sedifolia* and *Eremophila scoparia* shrubland over isolated low *Maireana pyramidata*, *Senna artemisioides* subsp. *filifolia* and *Lycium australe* shrubs.		
Habitat	woodland		
Disturbance	evidence of feral animals, excavation, historic clearing, large-scale clearing, litter, vehicle tracks		
Vegetation condition	Good	**Fire age**	not evident
Total veg. cover (%)	20	**Tree cover (%)**	15
Shrub cover (%)	7	**Grass cover (%**	0.1
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	22-Sep-2022	unbounded	Grant Wells

Species (17)	Status	Cover (%)	Height (m)
Eucalyptus salubris		15	8
Maireana sedifolia		4	1.2
Eremophila scoparia		2	1.8
Acacia colletioides		0.5	1.5
Leichardtia australis		0.1	1.8
Maireana pyramidata		0.1	1
Senna artemisioides subsp. *filifolia*		0.1	1
Lycium australe		0.1	1
Pimelea microcephala		0.1	0.8
Scaevola spinescens		0.1	0.6
Maireana georgei		0.1	0.5
Ptilotus obovatus		0.1	0.4
Enchylaena tomentosa		0.1	0.4
Eremophila parvifolia subsp. *auricampa*		0.1	0.35
Maireana georgei		0.1	0.25
Maireana triptera		0.1	0.2
Maireana trichoptera		0.1	0.1

Site details			
Site	**R047**	**Position (WGS84)**	-30.693199, 121.682478
Slope	moderate	**Topography**	hill top
Soil colour	red-orange, whitish	**Soil texture**	sandy clay, sandy loam
Rock cover (%)	0	**Rock type**	granite - rocks

Observation details - visit 1 (21 Sep 2022)			
Sample description	Isolated low *Casuarina pauper* trees over mid *Acacia tetragonophylla*, *Dodonaea lobulata* and *Senna artemisioides* subsp. *filifolia* shrubland.		
Habitat	shrubland		
Disturbance	none evident		
Vegetation condition	Excellent	**Fire age**	not evident
Total veg. cover (%)	30	**Tree cover (%)**	2
Shrub cover (%)	30	**Grass cover (%**	0.1
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	21-Sep-2022	unbounded	Grant Wells

Species (10)	Status	Cover (%)	Height (m)
Dodonaea lobulata		10	1.9
Acacia tetragonophylla		7	1.8
Senna artemisioides subsp. *filifolia*		7	1.5
Scaevola spinescens		2	1.1
Casuarina pauper		1	6
Santalum acuminatum		1	2.5
Eremophila oldfieldii subsp. *angustifolia*		0.2	3
Atriplex nummularia subsp. *spathulata*		0.1	1.8
Enchylaena tomentosa		0.1	0.3
Ptilotus obovatus		0.1	0.2

Site details			
Site	**R048**	**Position (WGS84)**	-30.690296, 121.680954
Slope	gentle	**Topography**	hill slope
Soil colour	red-orange, whitish	**Soil texture**	sandy clay, sandy loam
Rock cover (%)	0	**Rock type**	ferrous - ironstone

Observation details - visit 1 (21 Sep 2022)			
Sample description	Low *Casuarina pauper* and *Alectryon oleifolius* woodland over mid open *Eremophila oldfieldi* subsp. *angustifolia*, *Senna artemisioides* subsp. *filifolia* and *Dodonaea lobulata* shrubland over isolated low *Ptilotus obovatus* and *Maireana triptera* shrubs.		
Habitat	woodland		
Disturbance	evidence of feral animals, litter, vehicle tracks		
Vegetation condition	Very Good	**Fire age**	not evident
Total veg. cover (%)	20	**Tree cover (%)**	12
Shrub cover (%)	10	**Grass cover (%**	0.1
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	21-Sep-2022	unbounded	Grant Wells

Species (15)	Status	Cover (%)	Height (m)
Casuarina pauper		7	6
Senna artemisioides subsp. *filifolia*		5	1.6
Alectryon oleifolius		2	3
Eremophila oldfieldii subsp. *angustifolia*		2	2.2
Dodonaea lobulata		2	1.2
Ptilotus obovatus		2	0.25
Eremophila interstans subsp. *interstans*		1	4
Maireana triptera		0.5	0.2
Acacia hemiteles		0.1	1.5
Pittosporum angustifolium		0.1	1.2
Scaevola spinescens		0.1	0.6
Olearia muelleri		0.1	0.6
Acacia erinacea		0.1	0.5
Maireana georgei		0.1	0.2
Maireana trichoptera		0.1	0.1

Site details			
Site	**R049**	**Position (WGS84)**	-30.689087, 121.713435
Slope	negligible	**Topography**	plain
Soil colour	red-brown	**Soil texture**	sandy loam
Rock cover (%)	0	**Rock type**	ferrous - ironstone

Observation details - visit 1 (21 Sep 2022)			
Sample description	Low *Eucalyptus griffithsii* and *Casuarina pauper* woodland over tall open *Acacia quadrimarginea*, *A. burkittii* and *Eremophila interstans* subsp. *interstans* shrubland over mid open *Senna artemisioides* subsp. *filifolia, Eremophila oldfieldii* subsp. *angustifolia* and *Acacia tetragonophylla* shrubland.		
Habitat	woodland		
Disturbance	evidence of feral animals, vehicle tracks		
Vegetation condition	Very Good	**Fire age**	not evident
Total veg. cover (%)	25	**Tree cover (%)**	20
Shrub cover (%)	8	**Grass cover (%**	0.1
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	21-Sep-2022	unbounded	Grant Wells

Species (14)	Status	Cover (%)	Height (m)
Eucalyptus griffithsii		8	6
Eremophila interstans subsp. *interstans*		5	4
Senna artemisioides subsp. *filifolia*		5	1.6
Eremophila oldfieldii subsp. *angustifolia*		4	1.8
Casuarina pauper		3	7
Acacia quadrimarginea		3	3
Acacia tetragonophylla		1	1.8
Acacia burkittii		0.2	3
Santalum spicatum		0.2	2.2
Dodonaea lobulata		0.2	1.2
Acacia erinacea		0.1	1.3
Scaevola spinescens		0.1	1
Olearia muelleri		0.1	0.7
Ptilotus obovatus		0.1	0.3

Site details			
Site	**R050**	**Position (WGS84)**	-30.680542, 121.696428
Slope	negligible	**Topography**	drainage line
Soil colour	red-orange	**Soil texture**	sandy clay, sandy loam
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (21 Sep 2022)			
Sample description	Mid *Eucalyptus salmonophloia* woodland over tall *Acacia burkittii* and *Alectyron oleifolius* shrubland over mid open *Maireana sedifolia*, *M. pyramidata* and *Senna artemisioides* subsp. *filifolia* shrubland.		
Habitat	woodland		
Disturbance	none evident		
Vegetation condition	Excellent	**Fire age**	not evident
Total veg. cover (%)	70	**Tree cover (%)**	70
Shrub cover (%)	5	**Grass cover (%**	
Herb cover (%)			



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	21-Sep-2022	unbounded	Grant Wells

Species (17)	Status	Cover (%)	Height (m)
Acacia burkittii		35	4.5
Eucalyptus salmonophloia		20	25
Alectryon oleifolius		5	4
Maireana pyramidata		5	1.2
Senna artemisioides subsp. *filifolia*		3	1.5
Maireana sedifolia		2	1.3
Atriplex nummularia subsp. *spathulata*		1	2.2
Ptilotus obovatus		0.2	0.4
Atriplex vesicaria		0.2	0.4
Casuarina pauper		0.1	8
Eremophila scoparia		0.1	2
Eremophila granitica		0.1	1.8
Rhagodia drummondii		0.1	1.2
Eremophila decipiens subsp. *decipiens*		0.1	1
Lycium australe		0.1	1
Enchylaena tomentosa		0.1	0.3
**Oligocarpus calendulaceus*	Weed	0.1	0.15

Site details			
Site	**R051**	**Position (WGS84)**	-30.662917, 121.603192
Slope	gentle	**Topography**	undulating plain
Soil colour	red-brown, red-orange	**Soil texture**	sandy loam
Rock cover (%)	0	**Rock type**	ferrous - ironstone

Observation details - visit 1 (20 Sep 2022)			
Sample description	Low *Eucalyptus griffithsii* and *Casuarina pauper* woodland over tall open *Acacia burkittii* shrubland over isolated mid *Dodonaea lobulata* and *Santalum acuminatum* shrubs.		
Habitat	woodland		
Disturbance	evidence of feral animals, vehicle tracks		
Vegetation condition	Very Good	**Fire age**	not evident
Total veg. cover (%)	25	**Tree cover (%)**	17
Shrub cover (%)	15	**Grass cover (%**	0.1
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	20-Sep-2022	unbounded	Grant Wells

Species (12)	Status	Cover (%)	Height (m)
Acacia burkittii		10	2.8
Eucalyptus griffithsii		6	7
Senna artemisioides subsp. *filifolia*		5	1.8
Casuarina pauper		4	7
Eremophila oppositifolia subsp. *angustifolia*		3	2
Dodonaea lobulata		1	1.5
Santalum acuminatum		0.1	1.3
Scaevola spinescens		0.1	1
Eremophila granitica		0.1	0.8
Ptilotus obovatus		0.1	0.3
Maireana triptera		0.1	0.2
Maireana trichoptera		0.1	0.1

Site details			
Site	**R052**	**Position (WGS84)**	-30.731199, 121.586919
Slope	moderate	**Topography**	hill top
Soil colour	red-orange	**Soil texture**	sandy loam
Rock cover (%)	0	**Rock type**	ferrous - ironstone

Observation details - visit 1 (21 Sep 2022)			
Sample description	Isolated low *Eucalyptus stricklandii* trees over isolated mid *Melaleuca sheathiana*, *Acacia kalgoorliensis* and *Eremophila oppositifolia* subsp. *angustifolia* shrubs over mid open *Melaleuca sheathiana*, *Eremophila pustulata* and *Grevillea acuaria* shrubland.		
Habitat	shrubland		
Disturbance	none evident		
Vegetation condition	Excellent	**Fire age**	not evident
Total veg. cover (%)	25	**Tree cover (%)**	3
Shrub cover (%)	25	**Grass cover (%**	0
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	21-Sep-2022	unbounded	Grant Wells

Species (11)	Status	Cover (%)	Height (m)
Melaleuca sheathiana		15	2.2
Eucalyptus stricklandii		3	4
Eremophila pustulata		2	0.8
Acacia kalgoorliensis		1	2.1
Grevillea acuaria		1	1
Trymalium myrtillus		0.5	1.5
Eremophila oppositifolia subsp. *angustifolia*		0.2	1.5
Westringia rigida		0.2	0.3
Scaevola spinescens		0.1	0.6
Maireana georgei		0.1	0.2
Sclerolaena fusiformis		0.1	0.1

Site details			
Site	**R053**	**Position (WGS84)**	-30.742708, 121.639825
Slope	gentle	**Topography**	creek
Soil colour	red-orange	**Soil texture**	sand, sandy loam
Rock cover (%)	0	**Rock type**	ferrous - ironstone

Observation details - visit 1 (21 Sep 2022)			
Sample description	Mid open *Eucalyptus salmonophloia* woodland over isolated tall *Eremophila alternifolia* shrubs over mid *Maireana pyramidata*, *Senna artemisioides* subsp. x *artemisioides* and *Eremophila interstans* subsp. *virgata* shrubland.		
Habitat	open woodland		
Disturbance	evidence of feral animals, litter, livestock tracks, weed infestation		
Vegetation condition	Good	**Fire age**	not evident
Total veg. cover (%)	35	**Tree cover (%)**	8
Shrub cover (%)	30	**Grass cover (%**	0.1
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	21-Sep-2022	unbounded	Grant Wells

Species (24)	Status	Cover (%)	Height (m)
Maireana pyramidata		15	1.3
Eucalyptus salmonophloia		6	25
Senna artemisioides subsp. x*artemisioides*		5	1.6
Eremophila interstans subsp. *virgata*		2	2.5
Eremophila alternifolia		1	3
Eremophila maculata subsp. *brevifolia*		0.2	1
**Oligocarpus calendulaceus*	Weed	0.2	0.2
**Lysimachia arvensis*	Weed	0.2	0.2
**Carrichtera annua*	Weed	0.2	0.2
Acacia tetragonophylla		0.1	1.7
Maireana sedifolia		0.1	1.2
Pimelea microcephala		0.1	1.2
Glycyrrhiza acanthocarpa		0.1	0.5
Olearia pimeleoides		0.1	0.4
Cymbopogon ambiguus		0.1	0.3
Ptilotus exaltatus		0.1	0.2
Enteropogon ramosus		0.1	0.2
Rhodanthe charsleyae		0.1	0.15
**Salvia verbenaca*	Weed	0.1	0.15
Brachyscome ciliaris		0.1	0.15
**Sonchus oleraceus*	Weed	0.1	0.1
Eragrostis falcata		0.1	0.1
**Medicago laciniata*	Weed	0.1	0.03
Streptoglossa aff. *cylindriceps*	sp. nov.	0.1	0.01

Site details			
Site	**R054**	**Position (WGS84)**	-30.641852, 121.59388
Slope	gentle	**Topography**	undulating plain
Soil colour	whitish, orange	**Soil texture**	sandy clay, sandy loam
Rock cover (%)	0	**Rock type**	quartz

Observation details - visit 1 (22 Sep 2022)			
Sample description	Isolated mid *Eucalyptus salmonophloia* trees over low open *Tecticornia* sp., *Atriplex vesicaria* and *Maireana sedifolia* shrubland.		
Habitat	shrubland		
Disturbance	evidence of feral animals, exploration (drill pads and access tracks), vehicle tracks, weed infestation		
Vegetation condition	Good	**Fire age**	not evident
Total veg. cover (%)	15	**Tree cover (%)**	2
Shrub cover (%)	15	**Grass cover (%**	0.1
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	22-Sep-2022	unbounded	Grant Wells

Species (17)	Status	Cover (%)	Height (m)
Tecticornia disarticulata		12	0.9
Eucalyptus salmonophloia		2	20
Atriplex vesicaria		2	0.5
Maireana sedifolia		0.1	1.1
Minuria cunninghamii		0.1	0.4
Maireana georgei		0.1	0.4
Stenopetalum lineare		0.1	0.25
Sclerolaena cuneata		0.1	0.2
Solanum lasiophyllum		0.1	0.2
**Oligocarpus calendulaceus*	Weed	0.1	0.1
Sclerolaena diacantha		0.1	0.1
Maireana trichoptera		0.1	0.1
**Carrichtera annua*	Weed	0.1	0.1
Eriochiton sclerolaenoides		0.1	0.1
Plantago drummondii		0.1	0.1
Disphyma crassifolium subsp. *clavellatum*		0.1	0.06
**Medicago minima*	Weed	0.1	0.02

Site details			
Site	**R055**	**Position (WGS84)**	-30.641448, 121.603399
Slope	negligible	**Topography**	plain
Soil colour	orange	**Soil texture**	sandy clay, sandy loam
Rock cover (%)	0	**Rock type**	none

Observation details - visit 1 (22 Sep 2022)			
Sample description	Mid *Eucalyptus salmonophloia* and *E. salubris* woodland over isolated tall *Acacia oswaldii* and *Eremophila interstans* subsp. *interstans* shrubs over mid *Senna artemisioides* subsp. *filifolia, Maireana sedifolia* and *Eremophila scoparia* shrubland.		
Habitat	woodland		
Disturbance	none evident		
Vegetation condition	Excellent	**Fire age**	not evident
Total veg. cover (%)	40	**Tree cover (%)**	20
Shrub cover (%)	20	**Grass cover (%**	0.1
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	22-Sep-2022	unbounded	Grant Wells

Species (15)	Status	Cover (%)	Height (m)
Senna artemisioides subsp. *filifolia*		15	1.9
Eucalyptus salubris		13	15
Eucalyptus salmonophloia		7	25
Acacia oswaldii		1	5
Eremophila interstans subsp. *interstans*		1	3.5
Eremophila scoparia		1	1.8
Maireana sedifolia		1	1.4
Acacia tetragonophylla		0.1	2.2
Exocarpos aphyllus		0.1	2
Dodonaea lobulata		0.1	1.8
Lycium australe		0.1	1.2
Eremophila decipiens subsp. *decipiens*		0.1	1.2
Scaevola spinescens		0.1	1
Ptilotus obovatus		0.1	0.4
Maireana triptera		0.1	0.4

Site details			
Site	**R056**	**Position (WGS84)**	-30.642402, 121.603156
Slope	negligible	**Topography**	plain
Soil colour	orange	**Soil texture**	sandy loam
Rock cover (%)	0	**Rock type**	ferrous - ironstone

Observation details - visit 1 (22 Sep 2022)			
Sample description	Low *Eucalyptus transcontinentalis* and *E. salubris* woodland over mid open *Maireana sedifolia*, *Eremophila glabra* subsp. *glabra* and *E. scoparia* shrubland.		
Habitat	woodland		
Disturbance	evidence of feral animals, historic clearing, vehicle tracks		
Vegetation condition	Very Good	**Fire age**	not evident
Total veg. cover (%)	20	**Tree cover (%)**	10
Shrub cover (%)	15	**Grass cover (%**	0.1
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	22-Sep-2022	unbounded	Grant Wells

Species (16)	Status	Cover (%)	Height (m)
Maireana sedifolia		13	1.5
Eucalyptus transcontinentalis		7	12
Eucalyptus salubris		3	8
Eremophila glabra subsp. *glabra*		1	1.5
Eremophila scoparia		0.1	1.8
Atriplex nummularia subsp. *spathulata*		0.1	1.8
Senna artemisioides subsp. *filifolia*		0.1	1.2
Scaevola spinescens		0.1	1.2
Lycium australe		0.1	1.1
Roepera eremaea		0.1	0.5
Maireana georgei		0.1	0.3
Ptilotus obovatus		0.1	0.25
Maireana triptera		0.1	0.2
taxonid= 50462		0.1	0.15
Sclerolaena diacantha		0.1	0.15
Trichanthodium skirrophorum		0.1	0.06

Site details			
Site	**R057**	**Position (WGS84)**	-30.67982, 121.57056
Slope	negligible	**Topography**	plain
Soil colour	red-orange	**Soil texture**	sandy loam
Rock cover (%)	0	**Rock type**	ferrous - ironstone, quartz

Observation details - visit 1 (22 Sep 2022)			
Sample description	Isolated low *Casuarina pauper* trees over mid open *Senna artemisioides* subsp. *filifolia*, *Eremophila oldfieldii* subsp. *Angustifolia* and *Maireana sedifolia* shrubland.		
Habitat	shrubland		
Disturbance	evidence of feral animals, historic clearing, litter, vehicle tracks		
Vegetation condition	Very Good	**Fire age**	not evident
Total veg. cover (%)	25	**Tree cover (%)**	4
Shrub cover (%)	25	**Grass cover (%**	0.1
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	22-Sep-2022	unbounded	Grant Wells

Species (13)	Status	Cover (%)	Height (m)
Eremophila oldfieldii subsp. *angustifolia*		5	3
Casuarina pauper		3	6
Maireana sedifolia		3	1.6
Senna artemisioides subsp. *filifolia*		2	1.6
Atriplex nummularia subsp. *spathulata*		1	1.8
Acacia kalgoorliensis		0.5	1.4
Dodonaea lobulata		0.1	1.2
Scaevola spinescens		0.1	1
Leichardtia australis		0.1	1
Acacia erinacea		0.1	0.8
Ptilotus obovatus		0.1	0.3
Maireana triptera		0.1	0.2
Maireana georgei		0.1	0.2

Site details			
Site	**R058**	**Position (WGS84)**	-30.69127, 121.632574
Slope	negligible	**Topography**	plain
Soil colour	red-brown	**Soil texture**	sandy loam
Rock cover (%)	0	**Rock type**	ferrous - ironstone, quartz

Observation details - visit 1 (22 Sep 2022)			
Sample description	Mid *Eucalyptus salmonophloia* and *E. salubris* woodland over mid open *Maireana sedifolia*, *M. pyramidata* and *Eremophila scoparia* shrubland.		
Habitat			
Disturbance	historic clearing, litter, vehicle tracks, weed infestation		
Vegetation condition	Very Good	**Fire age**	not evident
Total veg. cover (%)	20	**Tree cover (%)**	15
Shrub cover (%)	10	**Grass cover (%**	0.1
Herb cover (%)	0.1		



Sample and effort summary				
Sample method	**Visit**	**Sample date**	**Dimensions**	**Observer**
Relevé	1	22-Sep-2022	unbounded	Grant Wells

Species (24)	Status	Cover (%)	Height (m)
Eucalyptus salubris		9	15
Eucalyptus salmonophloia		6	15
Maireana sedifolia		6	1.2
Maireana pyramidata		3	1.1
Eremophila scoparia		2	1.8
Eremophila ionantha		1	1.5
Eremophila interstans subsp. *interstans*		0.1	2
Acacia hemiteles		0.1	1.5
Atriplex vesicaria		0.1	0.8
Scaevola spinescens		0.1	0.5
Ptilotus exaltatus		0.1	0.4
Templetonia ceracea		0.1	0.3
Ptilotus obovatus		0.1	0.25
Maireana georgei		0.1	0.2
Maireana triptera		0.1	0.2
Atriplex codonocarpa		0.1	0.2
Sclerolaena fusiformis		0.1	0.15
Austrostipa scabra		0.1	0.15
Sclerolaena diacantha		0.1	0.1
**Salvia verbenaca*	Weed	0.1	0.1
Eriochiton sclerolaenoides		0.1	0.1
Ptilotus aervoides		0.1	0.1
**Oligocarpus calendulaceus*	Weed	0.1	0.1
Menkea australis		0.1	0.01

Appendix 2 NVIS hierarchy

Western Australia Current Practice			National Standard		
Hierarchy of terms	**Brief description in WA**	**Indicative scale**	**NVIS Level**	**Description**	**NVIS structural/floristic components required**
Vegetation formation	Structure and growth form – e.g. Forest, Woodland.	1:5 000 000	I	Class	Dominant growth form for the ecologically or structurally dominant stratum.
Vegetation sub-formation	Structural and dominant vegetation layer - Eucalypt Forest, Banksia Woodland	1:2 500 000 I	II	Structural Formation	Dominant growth form, cover and height for the ecologically or structurally dominant stratum.
Vegetation association	Structural form and dominant species – e.g. Medium woodland; York gum (*Eucalyptus loxophleba*) & Wandoo	1:1 000 000 to 1:250 000	III	Broad Floristic Formation	Dominant growth form, cover, height and dominant land cover genus for the uppermost or dominant stratum.
Vegetation complex	Structural and floristic description linked to geomorphology – e.g. Quindalup Complex.	1:250 000 to 1:100 000	IV	Sub-Formation	Dominant growth form, cover, height and dominant genus and Family for the three traditional strata. (i.e. Upper, Mid and Ground).
Vegetation type	Floristic definition by strata with structural detail. Often represented with a code and floristic description.	1:100 000 to 1:10 000	V	Association	Dominant growth form, height, cover and up to 3 species for the three traditional strata. (i.e. Upper, Mid and Ground).
Plant community	Basic unit of vegetation classification, site specific and highly localised with detailed floristics for each stratum.	1:10 000	VI	Sub-Association	Dominant growth form, height, cover and up to 5 species for all layers/ strata.
Floristic Community Type	Floristic composition definition; e.g. Northern banksia woodlands over herb rich shrublands on the Swan Coastal Plain.	No absolute scale			

Appendix 3 Introduced flora identified in the desktop review

Family	Name	Declared Pest/WoNS
Aizoaceae	**Aizoon pubescens*	
Aizoaceae	**Mesembryanthemum crystallinum*	
Aizoaceae	**Mesembryanthemum nodiflorum*	
Amaranthaceae	**Amaranthus viridis*	
Anacardiaceae	**Schinus molle*	
Anacardiaceae	**Schinus molle* var. *areira*	
Apocynaceae	**Asclepias curassavica*	
Apocynaceae	**Orbea variegata*	
Arecaceae	**Phoenix dactylifera*	
Asparagaceae	**Agave americana*	
Asteraceae	**Arctotheca calendula*	
Asteraceae	**Carthamus lanatus*	
Asteraceae	**Centaurea melitensis*	
Asteraceae	**Erigeron bonariensis*	
Asteraceae	**Gazania linearis*	
Asteraceae	**Helianthus annuus*	
Asteraceae	**Lactuca serriola* forma *serriola*	
Asteraceae	**Monoculus monstrosus*	
Asteraceae	**Oligocarpus calendulaceus*	
Asteraceae	**Oncosiphon suffruticosum*	
Asteraceae	**Sonchus oleraceus*	
Asteraceae	**Symphyotrichum squamatum*	
Boraginaceae	**Buglossoides arvensis*	
Boraginaceae	**Echium plantagineum*	Declared pest, S22(2) (C3)
Boraginaceae	**Heliotropium europaeum*	
Brassicaceae	**Alyssum linifolium*	
Brassicaceae	**Brassica tournefortii*	
Brassicaceae	**Capsella bursa-pastoris*	
Brassicaceae	**Carrichtera annua*	
Brassicaceae	**Sisymbrium irio*	
Brassicaceae	**Sisymbrium orientale*	
Cactaceae	**Cylindropuntia fulgida* var. *mamillata*	Declared pest, S22(2) (C3), WoNS
Cactaceae	**Cylindropuntia imbricata*	Declared pest, S22(2) (C3), WoNS
Cactaceae	**Cylindropuntia kleiniae*	Declared pest, S22(2) (C3), WoNS
Cactaceae	**Opuntia elata*	Declared pest, S22(2) (C3), WoNS
Cactaceae	**Opuntia ficus-indica*	Declared pest, S22(2) (C3), WoNS
Caryophyllaceae	**Spergularia diandra*	

Family	Name	Declared Pest/WoNS
Caryophyllaceae	**Spergularia rubra*	
Chenopodiaceae	**Chenopodium album*	
Chenopodiaceae	**Chenopodium murale*	
Cucurbitaceae	**Cucumis myriocarpus*	
Didiereaceae	**Portulacaria afra*	
Fabaceae	**Alhagi maurorum*	Declared pest, S22(2) (C3)
Fabaceae	**Erythrostemon gilliesii*	
Fabaceae	**Medicago minima*	
Fabaceae	**Medicago polymorpha*	
Geraniaceae	**Erodium cicutarium*	
Lamiaceae	**Marrubium vulgare*	
Lamiaceae	**Mentha suaveolens*	
Lamiaceae	**Salvia reflexa*	
Lamiaceae	**Salvia verbenaca*	
Liliaceae	**Asphodelus fistulosus*	
Malvaceae	**Malva parviflora*	
Oxalidaceae	**Oxalis bowiei*	
Oxalidaceae	**Oxalis pes-caprae*	
Poaceae	**Bromus diandrus*	
Poaceae	**Cenchrus ciliaris*	
Poaceae	**Cenchrus clandestinus*	
Poaceae	**Cynodon dactylon*	
Poaceae	**Hordeum glaucum*	
Poaceae	**Hordeum leporinum*	
Poaceae	**Rostraria pumila*	
Poaceae	**Schismus arabicus*	
Poaceae	**Schismus barbatus*	
Poaceae	**Stenotaphrum secundatum*	
Polygonaceae	**Polygonum aviculare*	
Polygonaceae	**Rumex hypogaeus*	
Polygonaceae	**Rumex vesicarius*	
Primulaceae	**Lysimachia arvensis*	
Solanaceae	**Datura inoxia*	
Solanaceae	**Lycium ferocissimum*	WoNS
Solanaceae	**Nicotiana glauca*	
Solanaceae	**Solanum nigrum*	
Tamariaceae	**Tamarix aphylla*	Declared pest, S22(2) (C3), WoNS
Urticaceae	**Urtica urens*	
Verbenaceae	**Phyla canescens*	
Zygophyllaceae	**Tribulus terrestris*	

Appendix 4 Flora species inventory

Family	Species
Aizoaceae	*Disphyma crassifolium* subsp. *clavellatum*
Amaranthaceae	*Ptilotus aervoides*
Amaranthaceae	*Ptilotus exaltatus*
Amaranthaceae	*Ptilotus holosericeus*
Amaranthaceae	*Ptilotus obovatus*
Apocynaceae	*Alyxia buxifolia*
Asclepiadaceae	*Leichardtia australis*
Asphodelaceae	*Bulbine semibarbata*
Asteraceae	**Oligocarpus calendulaceus*
Asteraceae	**Sonchus oleraceus*
Asteraceae	*Brachyscome ciliaris*
Asteraceae	*Cephalipterum drummondii*
Asteraceae	*Cratystylis microphylla*
Asteraceae	*Cratystylis subspinescens*
Asteraceae	*Lawrencella rosea*
Asteraceae	*Minuria cunninghamii*
Asteraceae	*Olearia muelleri*
Asteraceae	*Olearia pimeleoides*
Asteraceae	*Rhodanthe charsleyae*
Asteraceae	*Streptoglossa* aff. *cylindriceps*
Asteraceae	*Trichanthodium skirrophorum*
Boraginaceae	**Echium plantagineum*
Brassicaceae	**Carrichtera annua*
Brassicaceae	*Menkea australis*
Brassicaceae	*Stenopetalum lineare*
Casuarinaceae	*Allocasuarina eriochlamys* subsp. *grossa*
Casuarinaceae	*Casuarina pauper*
Chenopodiaceae	*Atriplex codonocarpa*
Chenopodiaceae	*Atriplex nummularia* subsp. *spathulata*
Chenopodiaceae	*Atriplex vesicaria*
Chenopodiaceae	*Enchylaena tomentosa*
Chenopodiaceae	*Eriochiton sclerolaenoides*
Chenopodiaceae	*Maireana georgei*
Chenopodiaceae	*Maireana pentatropis*
Chenopodiaceae	*Maireana pyramidata*
Chenopodiaceae	*Maireana sedifolia*
Chenopodiaceae	*Maireana tomentosa*
Chenopodiaceae	*Maireana trichoptera*
Chenopodiaceae	*Maireana triptera*
Chenopodiaceae	*Maireana turbinata*
Chenopodiaceae	*Rhagodia drummondii*
Chenopodiaceae	*Sclerolaena cuneata*

Chenopodiaceae	*Sclerolaena diacantha*
Chenopodiaceae	*Sclerolaena fusiformis*
Chenopodiaceae	*Sclerolaena patenticuspis*
Chenopodiaceae	*Tecticornia disarticulata*
Convolvulaceae	**Cuscuta epithymum*
Fabaceae	**Medicago laciniata*
Fabaceae	**Medicago minima*
Fabaceae	*Acacia burkittii*
Fabaceae	*Acacia colletioides*
Fabaceae	*Acacia erinacea*
Fabaceae	*Acacia hemiteles*
Fabaceae	*Acacia kalgoorliensis*
Fabaceae	*Acacia nyssophylla*
Fabaceae	*Acacia oswaldii*
Fabaceae	*Acacia quadrimarginea*
Fabaceae	*Acacia tetragonophylla*
Fabaceae	*Glycyrrhiza acanthocarpa*
Fabaceae	*Senna artemisioides* subsp. *filifolia*
Fabaceae	*Senna artemisioides* subsp. x *artemisioides*
Fabaceae	*Templetonia ceracea*
Geraniaceae	*Erodium crinitum*
Geraniaceae	*Erodium cygnorum*
Goodeniaceae	*Goodenia sp. Midwest (K.A. Shepherd & C.F.* Wilkins KS 1609)
Goodeniaceae	*Scaevola spinescens*
Lamiaceae	**Salvia verbenaca*
Lamiaceae	*Prostanthera althoferi* subsp. *althoferi*
Lamiaceae	*Prostanthera grylloana*
Lamiaceae	*Westringia rigida*
Loranthaceae	*Amyema gibberula* var. *gibberula*
Loranthaceae	*Lysiana casuarinae*
Malvaceae	*Sida calyxhymenia*
Myrtaceae	*Eucalyptus celastroides* subsp. *celastroides*
Myrtaceae	*Eucalyptus griffithsii*
Myrtaceae	*Eucalyptus lesouefii*
Myrtaceae	*Eucalyptus oleosa subsp. oleosa*
Myrtaceae	*Eucalyptus prolixa*
Myrtaceae	*Eucalyptus ravida*
Myrtaceae	*Eucalyptus salmonophloia*
Myrtaceae	*Eucalyptus salubris*
Myrtaceae	*Eucalyptus stricklandii*
Myrtaceae	*Eucalyptus transcontinentalis*
Myrtaceae	*Eucalyptus yilgarnensis*
Myrtaceae	*Melaleuca hamata*

Myrtaceae	*Melaleuca sheathiana*
Nitrariaceae	*Nitraria billardierei*
Pittosporaceae	*Pittosporum angustifolium*
Plantaginaceae	*Plantago drummondii*
Plantaginaceae	*Plantago* sp. Mt Magnet (A.S. George 6793)
Poaceae	*Austrostipa elegantissima*
Poaceae	*Austrostipa nodosa*
Poaceae	*Austrostipa scabra*
Poaceae	*Austrostipa tuckeri*
Poaceae	*Cymbopogon ambiguus*
Poaceae	*Enneapogon caerulescens*
Poaceae	*Enteropogon ramosus*
Poaceae	*Eragrostis falcata*
Poaceae	*Monachather paradoxus*
Poaceae	*Triodia irritans*
Portulacaceae	*Calandrinia eremaea*
Primulaceae	**Lysimachia arvensis*
Proteaceae	*Grevillea acuaria*
Proteaceae	*Grevillea nematophylla*
Rhamnaceae	*Trymalium myrtillus*
Rutaceae	*Philotheca brucei* subsp. *brucei*
Santalaceae	*Exocarpos aphyllus*
Santalaceae	*Santalum acuminatum*
Santalaceae	*Santalum spicatum*
Sapindaceae	*Alectryon oleifolius*
Sapindaceae	*Dodonaea inaequifolia*
Sapindaceae	*Dodonaea lobulata*
Scrophulariaceae	*Eremophila alternifolia*
Scrophulariaceae	*Eremophila decipiens* subsp. *decipiens*
Scrophulariaceae	*Eremophila dempsteri*
Scrophulariaceae	*Eremophila georgei*
Scrophulariaceae	*Eremophila glabra* subsp. *glabra*
Scrophulariaceae	*Eremophila granitica*
Scrophulariaceae	*Eremophila interstans* subsp. *interstans*
Scrophulariaceae	*Eremophila interstans* subsp. *virgata*
Scrophulariaceae	*Eremophila ionantha*
Scrophulariaceae	*Eremophila longifolia*
Scrophulariaceae	*Eremophila maculata* subsp. *brevifolia*
Scrophulariaceae	*Eremophila oblonga*
Scrophulariaceae	*Eremophila oldfieldii* subsp. *angustifolia*
Scrophulariaceae	*Eremophila oppositifolia* subsp. *angustifolia*
Scrophulariaceae	*Eremophila parvifolia* subsp. *auricampa*
Scrophulariaceae	*Eremophila praecox*
Scrophulariaceae	*Eremophila pustulata*

Scrophulariaceae	*Eremophila scoparia*
Solanaceae	**Lycium ferocissimum*
Solanaceae	*Lycium australe*
Solanaceae	*Solanum lasiophyllum*
Solanaceae	*Solanum nummularium*
Thymelaeaceae	*Pimelea microcephala*
Zygophyllaceae	*Roepera eremaea*