Western Botanical

Detailed Flora and Vegetation Assessment of the Menzies Gold Project for Kingwest Resources Ltd, January 2025, V2

Prepared for: Kingwest Resources Ltd.

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1. Executive Summary

Kingwest Resources Limited (Kingwest) recently acquired the Menzies Gold Project (MGP) from Intermin Resources Limited. The MGP is located in the Eastern Goldfields region, 130 km north of Kalgoorlie, Western Australia. Kingwest commissioned Western Botanical to conduct a Detailed Flora and Vegetation Assessment of the Menzies Study Area in support of a proposed mining program.

The Study Area is 1645.14 ha in size, consisting of northern and southern sections, separated by the Evanston-Menzies Rd. The northern section (approx. 222 ha) is located within mining tenements M29/14 and M29/154; the southern section (approx. 1,423 ha) is located within M29/153, M29/184 and M29/88. A data sharing agreement between Kingwest and Juno Minerals Limited has permitted the simultaneous assessment of the largely overlapping Menzies Bypass – Yunndaga Siding Study Area – a concurrent project in preparation by Western Botanical for Juno Minerals.

This report describes the flora and vegetation within the Menzies Study Area, providing i) results of a desktop review of the likelihood of encountering Conservation Significant flora; ii) vegetation mapping at NVIS Level 5 'Association' level, supported by 44 permanent quadrat sites; iii) a flora species inventory including both opportunistic and targeted recording of known Priority Flora; iv) descriptions of Conservation Significant species; v) a vegetation condition assessment; and vi) an impact assessment against the 10 clearing principles.

The Desktop Assessment identified 72 Conservation Significant flora occurring within a 100 km radius of the Study Area. Twenty were considered as 'possibly' occurring in the Study Area, and one was considered as 'likely' occurring, based on the proximity and habitat information. There were no PECs and TECs found to occur within the Study Area.

The field assessment was conducted over two trips, between the 1st and 14th of May, and the 3rd and 11th August 2021. A total of 260 species from 115 genera and 49 families were encountered. Of these, 182 (70%) were recorded within quadrat sites; while 78 (30%) were recorded opportunistically. Fourteen taxa were unable to be identified to species level; at least ten of which were likely to be sterile duplicates of already collected taxa. Overall, the species encountered are widespread and well-represented in the Eastern Murchison subregion.

No Threatened or Priority Flora were encountered during the field assessment, however, one species of taxonomic interest, *Swainsona* sp. Menzies (J. Warden & J. Paterson WB WB40674) was encountered in three locations (three populations); restricted to the GHAS-Ac - Greenstone hill *Acacia collegialis* shrublands Vegetation Association. According to the Western Australian Herbarium, this taxon likely represents a new and undescribed species, thus clearing within the GHAS-Ac Vegetation Association is not recommended until further work is undertaken to understand the distribution of populations both within and outside of the Study Area.

Due to the disturbed nature of the Study Area, weed invasion is common across the site. A total of 22 weed species including two Declared Pests, *Cylindropuntia pallida* and *Rumex vesicaria,* were encountered during the field assessment.

Fourteen Vegetation Associations were recognised during the field assessment, strongly corresponding to the landform types present across the Study Area. These include; low basalt /greenstone hills and rises supporting i) Lateritic ironstone ridge *Acacia* shrublands, ii) Greenstone hill *Acacia sibirica* shrublands, iii) Greenstone hill *Acacia collegialis* shrublands, iv) and Greenstone hill *Eucalyptus celastroides* woodlands; stony plains supporting v) *Casuarina pauper* - *Acacia sibirica* shrublands and vi) Calcyphytic pearl bluebush (*Maireana sedifolia*) shrublands; calcrete platforms supporting vii) *Eucalyptus clelandiorum* woodlands; hardpan plains supporting viii) Mulga shrublands; and alluvial plains supporting ix) *Eremophila scoparia* - *Senna artemisioides* subsp. *filifolia* shrublands, x) Sago bush (*Maireana pyramidata*) low shrubland, xi) Calcareous plain *Eucalyptus oleosa* - *Acacia* woodlands, xii) Calcareous plain *Eucalyptus concinna* - *Acacia* woodlands, xii) and Open grassland; and drainage tracts supporting xiv) Mulga shrublands. The Vegetation Associations observed are representative of those previously known within the Eastern Murchison sub-biogeographical region.

The Condition of the vegetation comprising the Study Area ranged from Excellent to Completely degraded. Disturbance from prolonged historical mining development is evident across most of the site, with the condition typically improving with increasing distance from previously mined sites and the Menzies township. Weed species and extensive gridded clearing from historic exploration programs occur throughout the Study Area.

Overall, the survey effort was considered adequate in capturing the Flora and Vegetation within the Study Area. Preceding conditions of above average rainfall resulted in high proportion of taxa being present and observable at the time of the August 2021 field assessment.

2. Introduction

2.1. Project Background

Kingwest Resources Limited (Kingwest) plan to develop the Menzies Gold Project (MGP). The MGP is located approximately 130 km north of Kalgoorlie in the Eastern Goldfields region; comprising a continuous strike extending south 15 km from the town of Menzies, Figure 1. Menzies has been a centre for gold mining activity for well over a century, however, major operations have not been pursued here for over 20 years. Presently, five open pits are distributed over the Menzies Study Area – including the Selkirk and First Hit deposits to the north, and the Lady Shenton, Lady Harriet and Yunndaga deposits to the south.

Kingwest commissioned Western Botanical to conduct a Detailed Flora and Vegetation Survey of the Menzies Study Area. The survey and report were prepared to meet the requirements for Impact Assessment in accordance with the Environmental Protection Authority (2016), Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment.

2.2. Associated Surveys

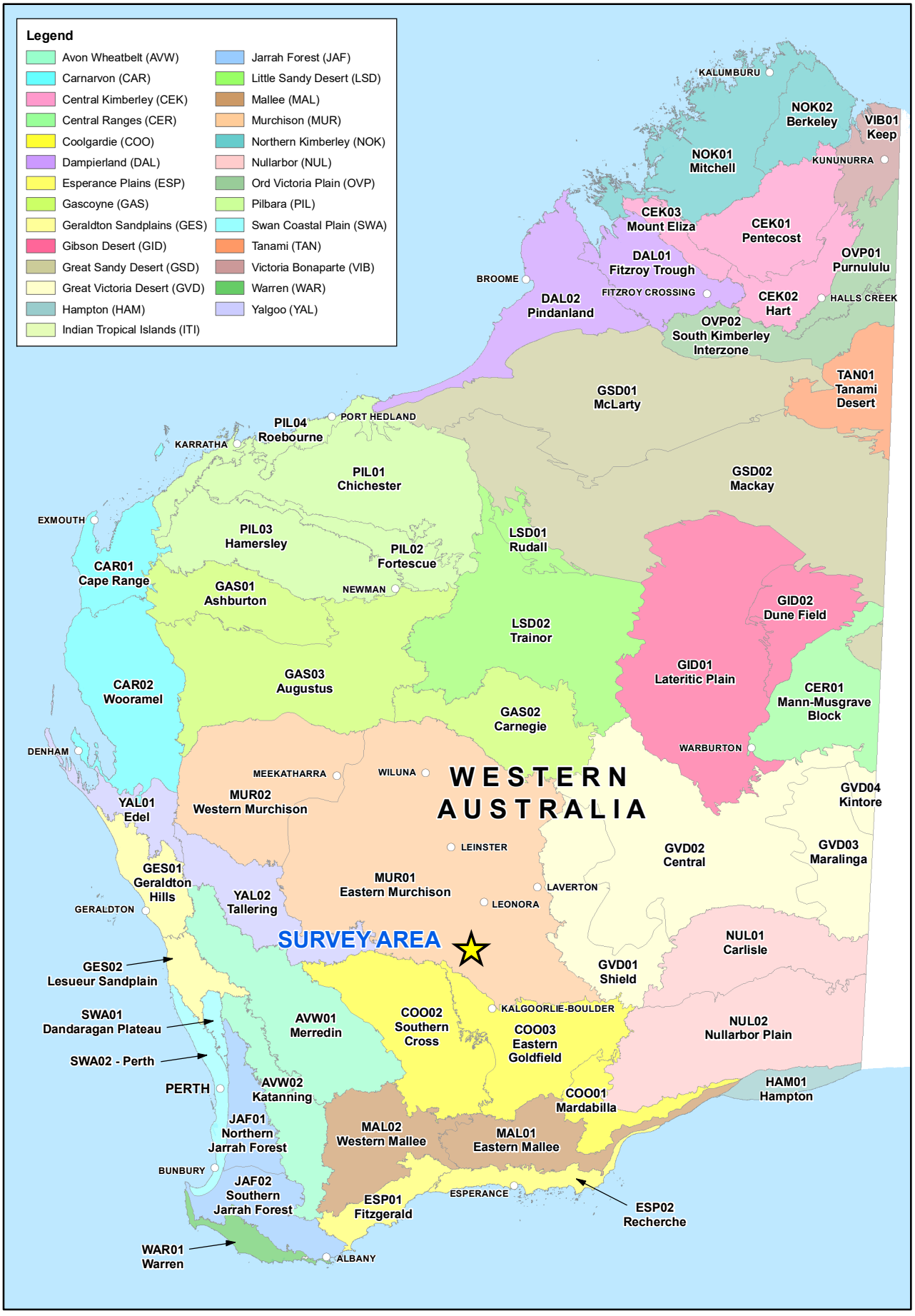
A Detailed Flora and Vegetation Assessment is currently in preparation by Western Botanical for the Menzies Bypass – Yunndaga Siding Study Aera for Juno Minerals Limited (Juno) (Western Botanical 2021) - consisting of an 11 km linear alignment (1370.59 ha) from the Menzies-Sandstone Road to Yunndaga Siding. Both the MGP and the Menzies Bypass – Yunndaga Siding Study Area have considerable overlap with 513.77 ha in common. A data-sharing agreement made between Kingwest and Juno, whereby contiguous and overlapping Study Areas were utilized enhances the contextual knowledge for each project.

2.3. Current Survey

The Menzies Study Area is 1645.14 ha in size, consisting of northern and southern sections, separated by the Evanston-Menzies Rd. The northern section (approx. 222 ha) is located within mining tenements M29/14 and M29/154; the southern section (approx. 1,423 ha) is located within M29/153, M29/184 and M29/88.

A map of the Menzies Study Area, with the Menzies Bypass – Yunndaga Siding Study Area superimposed is presented in Figure 2.

Figure 1. Location Map of the Menzies Study Area.



Interim Biogeographic Regionalisation for Australia (IBRA), Version 7 (Subregions): Australian Government Department of the Environment

0 200 km
Scale
MGA94 (Zone 51)

CAD Ref: a2796_M_R02_01
Date: January 2025 | Rev: A | A4

Western Botanical

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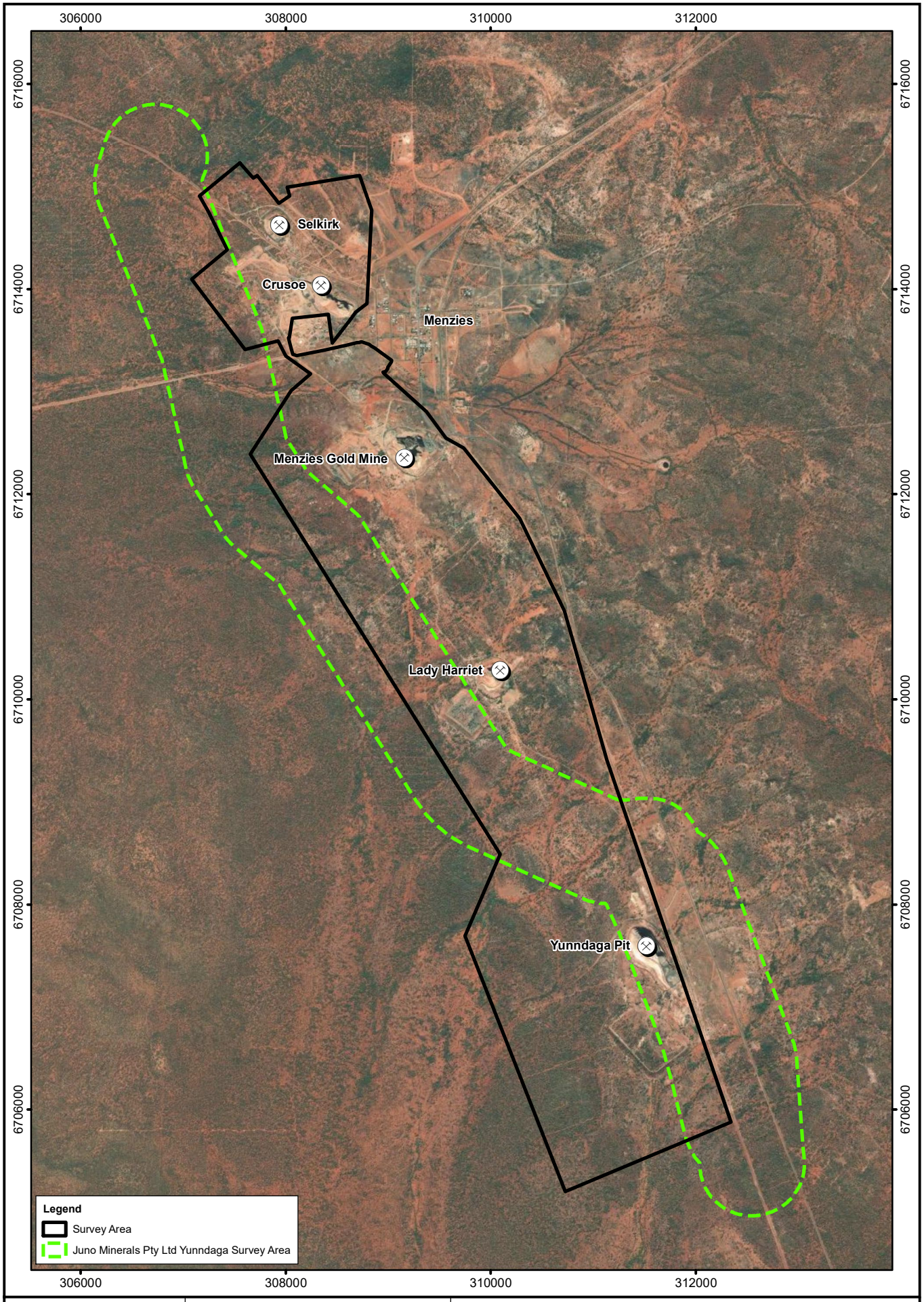
Kingwest Resources Limited
Menzies Study Area
Interim Biogeographic Regionalisation for Australia (IBRA)

Figure 2. Menzies Study Area Relative to the Menzies Bypass – Yunndaga Siding Study Area for Juno Minerals.



Imagery: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

0 0.5 1km

Scale: 1:50,000
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Kingwest Resources Limited
Menzies Study Area
Survey Area

2.4. Physical Environment

2.4.1. Climate

The Study Area experiences a semi-desert Mediterranean climate, characterised by long dry summers and mild wet winters (Payne et al. 1998). Historic (1995-2021) and recent (2021) monthly rainfall (Walling Rock – 12318) and mean maximum temperatures (Leonora aero – 12241) are presented in Figure 3. Total rainfall for the seven months leading up to the August survey was 205 mm, equivalent to the long-term average for the same period (70% of the annual). Notably, rainfall amounts in February, May and July 2021 were all above average.

Monthly mean-maximum temperatures illustrate a typical unimodal pattern, with July experiencing the lowest temperatures (~19 °C) and January experiencing the highest (~36 °C).

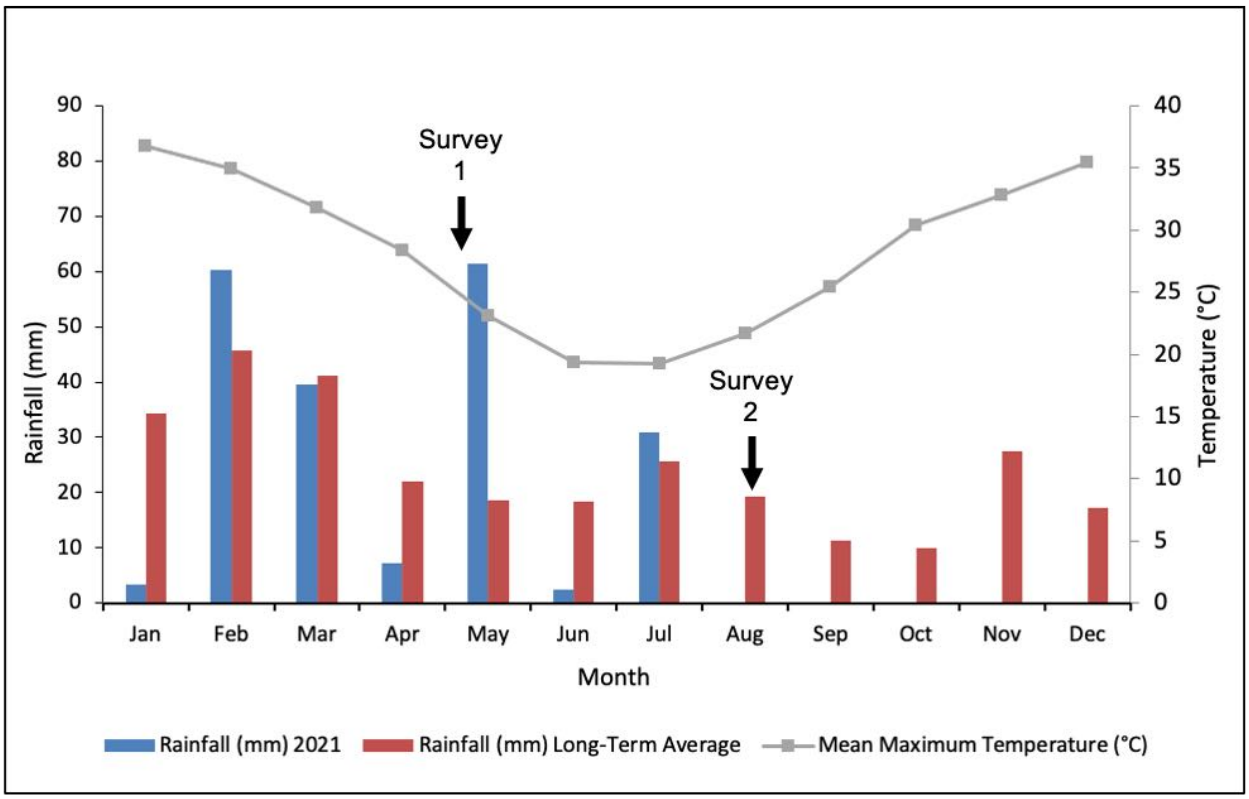


Figure 3. Monthly (2012-2021) and Long-Term Average Rainfall (mm) (Walling Rock – 12318) and Mean Maximum Temperature (°C) (Leonora Aero - 12241) (Bureau of Meteorology 2021).

2.4.2. Geology

The Menzies Gold Project is located along the western margin of the Menzies greenstone belt. Swager (1994) describes the geology of the Menzies area.

"The major greenstone belt is divided into two domains separated by the Menzies Shear. The western domain consists of an east-facing greenstone sequence on the eastern limb of the regional, north-northwest-trending Goongarrie-Mt Pleasant Anticline (F,). This greenstone sequence is the continuation of the Ora Banda stratigraphy. The sequence can he traced along strike onto the adjacent RIVERINA 1:100 000 sheet, where in the Ghost Rocks area it is deformed in a synctine-anticline fold pair. The anticline has strongly foliated monzogranite in its core.

The eastern domain contains a narrow and strongly foliated basalt-sedimentary-ultramafic schist association. Coarse clastic rocks, including conglomerate, dominate in the south of MENZIES and appear gradational, with all other rock types interleaved, to a basalt-dominated sequence in the north which is continuous onto the RIVERINA sheet."

The Menzies Gold Project follows a distinctive, well-foliated basalt and sedimentary rock association with extensive gold mineralisation (Swager 1994).

2.5. Biological Environment

2.5.1. Interim Biogeographic Regionalisation of Australia

The Menzies Study Area is located within the Murchison IBRA region, an area dominated by low mulga woodland (Department of Agriculture, Water and the Environment 2020; Bastin et al. 2008), Figure 1

The Study Area lies within the Eastern Murchison IBRA subregion, an area characterised by internal drainage and extensive areas of red desert sandplain with minimal dune development (Cowan et al. 2001). Vegetation occurring in this subregion commonly includes:

- *Acacia aneura* (mulga) woodlands associated with red loams on siliceous hardpan.
- Hummock grasslands consisting of *Eucalyptus* and *Acacia spp.* over hard spinifex on sandplain.
- Halophytic vegetation on areas associated with salt lake systems, breakaways and alluvial plains, with highly saline soils supporting salt bush (*Atriplex*) bluebush (*Maireana*) and samphire (*Tecticornia*) shrublands; while less saline soils support mulga with saltbush or bluebush understories.

2.5.2. Land Systems

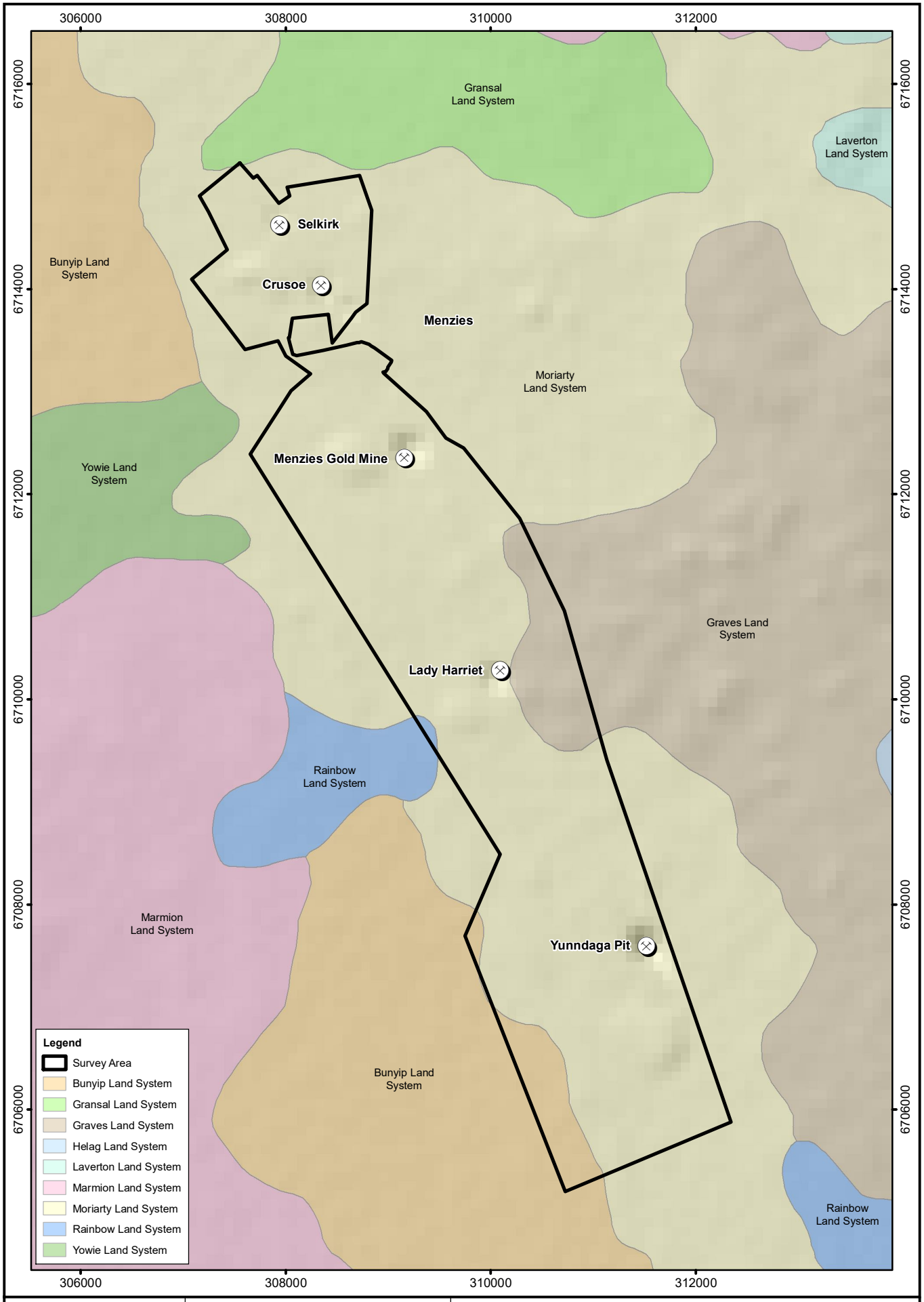
In the early 1990s, the Department of Agriculture and Food, Western Australia (DAFWA) conducted extensive Land System mapping and condition assessments of pastural lands within the north-eastern Goldfields (Pringle et al. 1994). The existence and condition of soils, landforms, vegetation, habitat, ecosystems and declared plants and animals were catalogued, with the goal of improving overall understanding of the area's natural resources, and assisting with planning and implementation of resource management practices.

Five Land Systems are present within the Study Area, each generally well represented within the broader north-eastern goldfields region (Table 1; Figure 4).

Table 1. Land Systems of the Menzies Study Area.

Land System	Description	In-Project Area (ha)	Regional Area (ha)
Bunyip	Gilgaied drainage tract, draining greenstone hills supporting mixed halophytic shrublands occasionally with a black oak overstorey	73.24	100,785.01
Gransal	Stony plains and low rises based on granite supporting mainly halophytic low shrublands	0.10	360,273.77
Graves	Basalt and greenstone rises and low hills supporting eucalypt woodlands with prominent saltbush and bluebush understoreys	103.21	111,361.53
Moriarty	Low greenstone rises and stony plains supporting chenopod shrublands with patchy eucalypt overstoreys.	1,465.33	265,252.11
Rainbow	Hardpan plains supporting mulga tall shrublands	3.27	258,976.19
	Total Area	**1,645.14**	

Figure 4. Land Systems of Menzies Study Area



Land Systems: Department of Primary Industries and Regional Development

0 0.5 1km

Scale: 1:50,000
MGA94 (Zone 51)

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Kingwest Resources Limited
Menzies Study Area
Land Systems

2.5.3. Beard Pre-European Vegetation

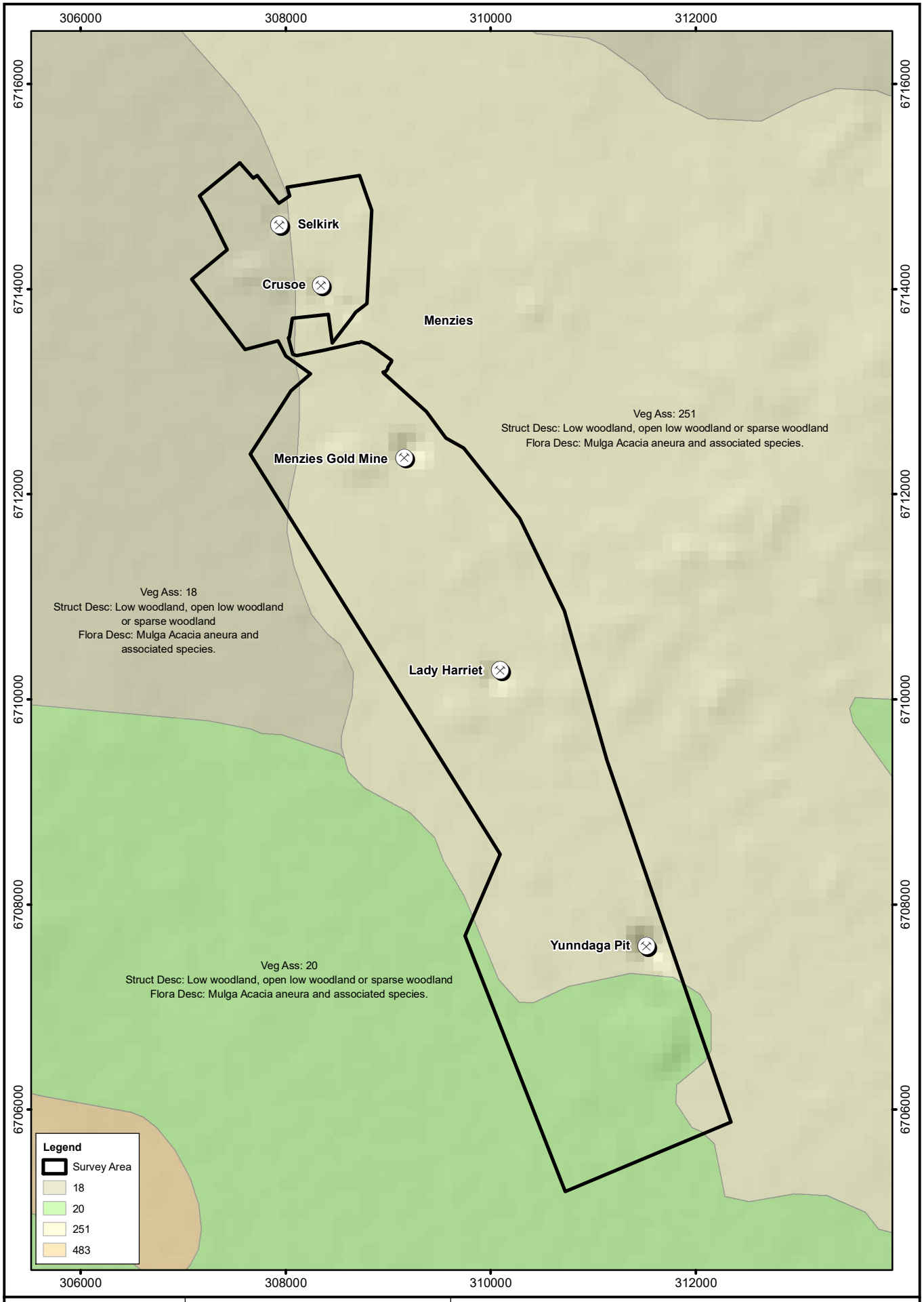
The first broad-scale vegetation mapping of Western Australia was conducted by J.S. Beard in 1979. Several revisions and updates have been made since then, resulting in the most recent and comprehensive iteration, detailed in Beard et al. (2013). The Menzies Study Area lies within the Austin District of the Eremaean botanical province – which roughly correlates to the Murchison IBRA region (Department of the Environment, Water, Heritage and the Arts 2020).

J.S. Beard describes three vegetation units across the Study Area, Mulga low woodland (Barlee 18; Barlee 20 and Barlee 251), consisting of low woodland, open low woodland or sparse woodland of Mulga *Acacia aneura* and associated species (Table 2; Figure 5).

Table 2. Pre-European Vegetation Systems of the Mt Alexander Study Area.

System	Description	Total Area in W.A. (ha)	Project Study Area (ha)	% Within Study Area
BARLEE_18	Mulga Low woodland	19,949,845.92	153.64	<0.01%
BARLEE_20	Mulga Low woodland	1,295,037.30	305.13	<0.01%
BARLEE_251	Mulga Low woodland	173,671.40	1,186.38	0.48%

Figure 5. Map of Pre-European Vegetation of the Study Area.



Pre European Vegetation: Department of Primary Industries and Regional Development

0 0.5 1km

Scale: 1:50,000
MGA94 (Zone 51)

CAD Ref: a2796_M_R02_05

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Kingwest Resources Limited
Menzies Study Area
Pre-Euorpean Vegetation

3. Methods

3.1. Desktop Survey

In preparation for the field assessment a database search conducted to identify potential Threatened and Priority Flora species, Threatened Ecological Communities (TEC's), Priority Ecological Communities (PEC's), or other areas of conservation significance that may be encountered during the study. The Department of Biodiversity Conservation and Attractions (DBCA) Framework for Conservation Significant Flora; and the Definitions of TEC's and PEC's are presented in Appendix 1 & 2.

Database searches were centred at 121° 1' 49.71" E, 29° 41' 29.93" S. The resources assessed included:

- Department of Biodiversity, Conservation and Attraction databases:
    - Threatened (Declared Rare) and Priority Flora database, 100 km radius (Ref: 10- 0321FL)
    - Western Australian Herbarium Specimen database, 100 km radius
    - Threatened Ecological Communities database, 50 km radius (Ref:26-0321EC)
- NatureMap Search with 20 km search radius for all flora records (Department of Biodiversity, Conservation and Attractions 2021)
- Protected Matters Search Tool with 50 km radius (Department of Agriculture, Water and the Environment 2021).

Subsequent to the database searches, a desktop assessment of the likelihood of each Threatened and Priority flora species, TEC or PEC occurring within the Study Area was performed by considering a) the proximity of known Conservation Significant flora and communities to the Study Area, and b) the similarities between supporting habitats for each species and those of the Study Area.

3.2. Field Assessment

The field assessment was conducted over two seasons in 2021 by Western Botanical personnel, Jonathan Warden and Jason Paterson. The initial assessment was conducted in autumn between the 1st and 14th of May 2021, and the second in late winter between the 3rd and 11th August 2021. Following techniques described in Environmental Protection Authority (EPA) (2016), a series of 44 quadrats were installed to catalogue all flora and vegetation within the Study Area.

3.3. Vegetation Mapping

The vegetation of the Study Area was mapped at NVIS level 5 *'Association'* level, using high-resolution aerial photography at a scale of 1:10,000 and Google Earth imagery. The boundaries of Vegetation Associations were defined on the ground and confirmed through extensive traverses

across the Study Area, both on-foot and in-vehicle. All Vegetation Association boundaries were marked on A3 laminated colour maps in the field, and supplied to CAD Resources for digitization.

3.4. Quadrats

A series of 20 m x 20 m quadrats were established within each recognized Vegetation Association, using galvanised fence droppers and measuring tapes to demarcate corners and boundaries. Where possible, at least three representative quadrat sites per described Vegetation Association were installed, taking care to avoid disturbed or interzonal areas. Results from preliminary analyses of the initial survey informed quadrat installation for the second survey, resulting in the addition of a further eight quadrat sites.

Photographs were taken from the two permanent corners (north-west and south-east), while data pertaining to the following parameters was recorded into notebooks at each quadrat site.

General: Vegetation Association, Date, Persons recording, Quadrat size;
Location: Unique site number, Project name, Co-ordinates recorded on handheld GPS, Datum GDA94 (accuracy +/- 5 m), Digital photograph;
Vegetation: Species present, Height and Projected Foliar Cover (PFC) for each species, Species outside of the quadrat (but not noted within), Structural description (Based on NVIS level 5 *'Association'* descriptions);
Disturbance: Vegetation Condition, Fire age;
Physical Conditions: Rock type, Soil, Landform Description, Runoff.

All taxa recorded during quadrat assessments were collected at least once, and given unique collection numbers to avoid unnecessary duplication. Taxa occurring within the quadrats were compared against previous collections. Where the PFC for a taxon was lower than 0.5%, it was recorded as a presence (+) only.

3.5. Flora Specimen Identification

Flora not readily recognised in the field were collected and pressed for later identification, together with information pertaining to the date, location, and field description. The identification of samples was carried out using the resources of both the Western Botanical herbarium and the Western Australian Herbarium (WAH). Taxa unable to be identified by Western Botanical were submitted to the Western Australian Herbarium for determination (ACC # 9308).

3.6. Significant Flora

The locations of all significant flora recognised during the field survey were recorded using GPS devices. Specimens of Significant Flora, represented by Threatened or Priority flora, flora considered novel or undescribed or flora representing an extension to the current known range for that species, were retained and a voucher specimen submitted to the WA herbarium.

3.7. Invasive species

Populations of invasive species were recorded both opportunistically and within quadrats. High occurrences of weed species across the site due to historical disturbances from mining activity, and the relatively close proximity to the Menzies townsite, meant that it was not practical to record every location throughout the Study Area. Rather, the vegetation condition scale reflects the presence of weeds and historical site disturbances

3.8. Vegetation Condition

Vegetation condition was assessed against the Vegetation Condition Scale presented in EPA (2016), Appendix 3.

3.9. Floristic Analysis

Flora data from all 44 quadrat sites were entered into a proprietary Microsoft Access database (Griffin 2012). Statistical analyses were conducted following each field assessment, to investigate floristic similarity amongst sites, groupings of sites, and to assess relationships amongst groupings.

Percent Foliar Coverage (PFC) scores were used for each species to incorporate dominance of key species within vegetation groupings. To optimise interpretive output, PFCs were standardised to cover scores, scaled from 0-5. Species recorded outside quadrats were excluded from the final analysis. The effects of excluding singleton sample sites, outlier sites and annuals were examined during initial runs – the results guiding later iterations of the analysis.

Analysis of flora data was conducted using PATN v3.12 statistical package software (Belbin 2010). Association (Bray and Curtis), Classification (Flexible UPGMA Agglomerative Hierarchical Fusion), and Ordination (Semi-Strong Hybrid) components of PATN were utilised in the analysis; primarily producing a dendrogram of site similarity/dissimilarity with suggested Vegetation Association groupings provided by PATN.

4. Results and Discussion

4.1. Desktop Survey

4.1.1. Species with Conservation Significance

The desktop survey identified 313 known flora species occurring around the study region, with a total of 72 possessing Conservation Significance (Threatened or Priority Flora). A list of these taxa together with an assessment of likelihood of encountering them in the Study Area based on their known distributions and habitats is presented in Table 3.

Results generated from the Nature map database search are displayed in Appendix 4.

4.1.1. Threatened and Priority Ecological Communities

An ecological community is defined as a naturally occurring biological assemblage that occurs in a particular type of habitat (Department of Environment and Conservation 2013). A Threatened Ecological Community (TEC) is one that is categorised as being either; "presumed totally destroyed", "critically endangered", "endangered", or "vulnerable".

No TECs were found within the Menzies Study Area.

Priority Ecological Communities (PEC) are defined as possibly Threatened Ecological Communities that do not meet survey criteria or that are not adequately defined due to lack of knowledge. They are ranked in order of priority based on their frequency and extent (Priority 1, 2 and 3), and the likelihood of becoming threatened in the future (Priority 4 and 5).

No PECs were found within the Menzies Study Area.

4.1.2. Areas of Conservation Significance

Results of the Protected Matters Search Tool (Department of the Environment and Energy 2019) found the Study Area to be outside any nationally protected conservation areas protected under the *EBPC Act 1999.*

Table 3. Summary of Conservation Significant flora database search results for the vicinity of the Menzies Study Area (sorted by conservation rank) and their likelihood of occurrence within the Study Area.

Taxon	Conservation Rank	DBCA Data-bases	Nature Map	Habitat and Current Known Distribution	Likelihood within Study Area
Eucalyptus crucis subsp. *crucis*	T	✓		Sand, loam, granite outcrops. Avon Wheatbelt and Coolgardie. One historical record near the project.	Unlikely
Myriophyllum lapidicola	T	✓		Waterholes on granite outcrops. Avon Wheatbelt	Unlikely
Ricinocarpos brevis	T	✓		Rocky hillslopes, rock outcrops. Mt Jackson to Ularring.	Unlikely
Seringia exastia	T	✓		Widespread. DBCA database error	Unlikely
Acacia epedunculata	1	✓		Yellow sand, sandplains. Wallaroo to Kanowna.	Unlikely
Anacampseros sp. Eremaean (F. Hort, J. Hort & J. Shanks 3248)	1	✓		Sandy patches inside rock formations. Rock outcrops, breakaways, flats. Niagara Dam, 45 km NE of Menzies	Unlikely
Calandrinia quartzitica	1	✓	✓	Samphire shrublands on salt lake margins. Goongarrie to Leonora	Possible
Drosera eremaea	1	✓		Granitoid geology. Mt Mason to Cue	Unlikely
Eremophila eversa	1	✓		One specimen recorded at Yerilla Station	Unlikely
Jacksonia lanicarpa	1	✓		Red sand. Cue to Cundeelee	Possible
Persoonia leucopogon	1	✓		Yellow sand or sandy clay. Bonnie Rock to Goongarrie.	Unlikely
Pterostylis elegantissima	1	✓		Clay-loam, sand over granite. Goongarrie to Forrestania	Unlikely
Pterostylis xerampelina	1	✓		Granite. Mt Jackson to Wallaroo	Unlikely
Ptilotus chortophytus	1	✓		Sandplains near Geraldton/Northampton. One record near the project shown on Australia's Virtual Herbarium (AVH) website is possibly erroneous as it is not Listed on FloraBase or in WAHERB.	Unlikely
Ptilotus procumbens	1	✓		Red clay, drainage lines, gravelly plains. Kalgoorlie to Mt Magnet	Possible
Ptilotus rigidus	1	✓		Quartz outcrops. Menzies to Norseman	Unlikely

Taxon	Conservation Rank	DBCA Data-bases	Nature Map	Habitat and Current Known Distribution	Likelihood within Study Area
Ptilotus sp. Kalgoorlie (J. Jackson & B. Moyle 260)	1	✓		Quartz outcrops. Kalgoorlie	Unlikely
Ptilotus sp. Kookynie (J. Jackson & B. Moyle 261)	1	✓		Quartz hills. Niagra Dam	Unlikely
Ptilotus tetrandrus	1	✓		Loamy sand. Kookynie and Kumarina	Unlikely
Rhodanthe uniflora	1	✓		Red/brown clay soil under open eucalypt woodlands. Goongarrie to Kalgoorlie	Possible
Ricinocarpos digynus	1	✓		Red-brown loam, rocky surfaces. Wallaroo to Goongarrie	Possible
Thysanotus sp. Ennuin (N. Gibson & M. Lyons 2665)	1	✓		Orange-red clays. Lake Deborah to Wallaroo	Unlikely
Xanthoparmelia subbarbatica	1	✓		Red-brown clay, granite. Kalgoorlie to Kondinin (further south-west on AVH)	Unlikely
Calandrinia kalanniensis	2	✓		Shallow brown clay, granite-derived. Ularring to Kalannie.	Unlikely
Eremophila mirabilis	2	✓		Clay sand, stony clayey loam. Granite country. Kookynie and Nunierra, Woolgorong Station.	Unlikely
Eucalyptus educta	2	✓		Shallow soils. Granite and basalt. Kalgoorlie to Paynes Find.	Possible
Malleostemon sp. Adelong (G.J. Keighery 11825)	2	✓	✓	Red sand. Recorded in Menzies	Possible
Newcastelia insignis	2	✓	✓	Red or yellow sandy soils. Menzies. Previously recorded just west of Study Area.	Likely
Rumex crystallinus	2	✓		Near water edge. Ora Banda	Unlikely
Thryptomene eremaea	2	✓	✓	Red or yellow sand. Sandplains. Menzies to Zanthus.	Possible
Thysanotus brachyantherus	2	✓		Clay over limestone, loam. Menzies to Israelite Bay.	Possible

Taxon	Conservation Rank	DBCA Data-bases	Nature Map	Habitat and Current Known Distribution	Likelihood within Study Area
Thysanotus sp. Yellowdine (A.S. George 6040)	2	✓		Yellow sand, sandplain. Wallaroo to Hyden	Unlikely
Acacia cylindrica	3	✓		Yellow/brown sand, gravelly soils. Undulating plains, flats. Recorded in Avon Wheatbelt and Coolgardie.	Unlikely
Acacia eremophila var. *variabilis*	3	✓		Sand or sandy loam. Broad distribution.	Possible
Acacia sp. Marshall Pool (G. Cockerton 3024)	3	✓		Brown clayey sand. Basalt hills. Recorded north of Leonora	Unlikely
Alyxia tetanifolia	3	✓		Sandy clay, loam, concretionary gravel. drainage lines, near lakes. Coolgardie to Mt Magnet.	Possible
Angianthus prostratus	3	✓		Red clay or loamy soils. Saline depressions. Recorded north of Kalgoorlie.	Unlikely
Atriplex lindleyi subsp. *conduplicata*	3	✓		Crabhole plains. Widespread.	Unlikely
Austrostipa blackii	3	✓		Greenstone, banded ironstone, hill slopes and crests. Widespread	Unlikely
Calandrinia sp. Menzies (F. Hort et al. FH 4100)	3	✓		Red clayey sands, gravel. Lake Barlee to Kookynie	Possible
Calotis sp. Perrinvale Station (R.J. Cranfield 7096)	3	✓		Red loam, laterite, BIF. Mt Ida to Murchison.	Unlikely
Calytrix creswellii	3	✓		Yellow sand, sandplains. Wallaroo to Mt Magnet	Unlikely
Calytrix hislopii	3	✓		Laterite. BIF. Paynes Find to Laverton	Unlikely
Calytrix praecipua	3	✓		Skeletal sandy soils over granite or laterite. Breakaways, outcrops. North of Menzies	Possible
Chrysocephalum apiculatum subsp. *norsemanense*	3	✓		Variety of sandy soils to clay loam soils. Menzies to Norseman.	Possible

Taxon	Conservation Rank	DBCA Data-bases	Nature Map	Habitat and Current Known Distribution	Likelihood within Study Area
Elatine macrocalyx	3	✓		Shallow sands over clay. Margins of playa lakes and clay pans. Widespread.	Unlikely
Eleocharis papillosa	3	✓		Red clay over granite, open clay flats, claypans. Widespread.	Unlikely
Eremophila veronica	3	✓		Stony clay, clay loam. Lateritic breakaways. Menzies to Norseman.	Possible
Eutaxia nanophylla	3	✓		Variety of clay soils. Wet areas, plains. Menzies to Kojonup	Possible
Eutaxia rubricarina	3	✓		Gravelly sand, clay. Flats, slopes, valley floors, road verges. Goongarrie to Goomalling.	Possible
Grevillea georgeana	3	✓		Stony loam/clay. Ironstone hilltops & slopes. Mt Jackson to Creedo.	Unlikely
Grevillea subterlineata	3	✓		Red and brown sand or clay. Waterways. Lake Ballard and Gascoyne Junction.	Unlikely
Homalocalyx grandiflorus	3	✓		Yellow sand. Sandplains. Goongarrie to Mt Manning.	Unlikely
Hysterobaeckea ochropetala subsp. *cometes*	3	✓	✓	Yellow, orange/red sandy soils. Menzies to Boorabbin	Possible
Lepidium fasciculatum	3	✓		Brown clay-loam. Lake beds. Widespread.	Unlikely
Menkea draboides	3	✓		Red sand or clay, granite. Widespread. One record near Goongarrie	Unlikely
Micromyrtus serrulata	3	✓		Brownish sandy and clayey soils over granite. Bulga Downs to Cundeelee.	Unlikely
Mirbelia ferricola	3	✓		Brown sandy loam, ironstone. Leinster to Norseman, and Koolanooka.	Unlikely

Taxon	Conservation Rank	DBCA Data-bases	Nature Map	Habitat and Current Known Distribution	Likelihood within Study Area
Notisia intonsa	3	✓		Clay-sand. Plains and wet depressions. Widespread Ularring to Ravensthorpe.	Possible
Philotheca coateana	3	✓	✓	Red sand. Goongarrie to Meekatharra	Possible
Philotheca deserti subsp. *brevifolia*	3	✓		Red sandy clay. Mount Jackson to Ularring	Unlikely
Pterostylis virens	3	✓		Granite. West of Menzies.	Unlikely
Banksia arborea	4	✓		Stony loam. Ironstone hills. Mt Manning	Unlikely
Eucalyptus jutsonii subsp. *jutsonii*	4	✓		Red to pale orange deep sands, undulating areas and on dunes. Kookynie to Coolgardie	Unlikely
Goodenia berringbinensis	4	✓		Red sandy loam. Along watercourses. Widespread.	Unlikely
Grevillea erectiloba	4	✓	✓	Gravelly loam. Lateritic ridges. Jackson Ranges	Unlikely
Grevillea secunda	4	✓		Yellow or red sand. Sand dunes, sandplains.	Unlikely
Hemigenia exilis	4	✓		Laterite. Breakaways, slopes.	Unlikely
Sowerbaea multicaulis	4	✓		Yellow-brown sand. Sandplains	Unlikely
Wurmbea murchisoniana	4	✓		Clay, sandy clay, loam. Seasonally inundated clay hollows, rock pools.	Unlikely

4.2. Field Survey

4.2.1. Flora

Two hundred and sixty species from 115 genera and 49 families were recorded during the field assessment. All taxa were collected at least once for identification or verification using the resources of the WA Herbarium and Western Botanical's reference herbarium. No Threatened or Priority flora were encountered across the Study Area. The most prevalent family was the Fabaceae (39 species recorded), while the most well represented genera were *Acacia* (22 species) and *Eremophila* (18 species). Lists of the most dominant families and genera are presented in Table 4 & 5, respectively. A systematic species list is presented in

Appendix 5.

Table 4. Most dominant Families of the Menzies Study Area.

Family	Number of observed genera
Poaceae	17
Asteraceae	12
Chenopodiaceae	10

Table 5. Most dominant genera of the Menzies Study Area.

Genera	Number of observed species
Acacia	22
Eremophila	18
Eucalyptus	10

Fourteen taxa were unable to be identified to species level due to insufficient material being available at the time of sampling. This includes three individuals with questionable IDs, *Calotis* ?*hispidula*, *Menkea* ?*australis* and *Austrostipa* ?*scabra;* seven individuals from the *Brachyscome, Rhodanthe, Streptoglossa, Lysiana, Sida, Calandrinia, Austrostipa* genera and one from the Malvaceae family, which most likely represent duplicate collections of already observed taxa; and three non-duplicate taxa including *Thysanotus* sp. Indet., *Dodonaea* ?*pinifolia* and an unknown taxon described as 'glaucus blue annual' (sp. Indet.) – none of which represent potential conservation significant flora, Appendix 5.

Overall, the species encountered are widespread and well represented in the Eastern Murchison sub biogeographical region. Of the 260 species encountered, 182 (70%) were recorded within quadrat sites; and 78 (30%) recorded opportunistically. The species accumulation curve commences at the latter to include these taxa; and displays an asymptotic progression,

demonstrating the survey effort was sufficient in capturing most of the species present across the Study Area, Figure 6.

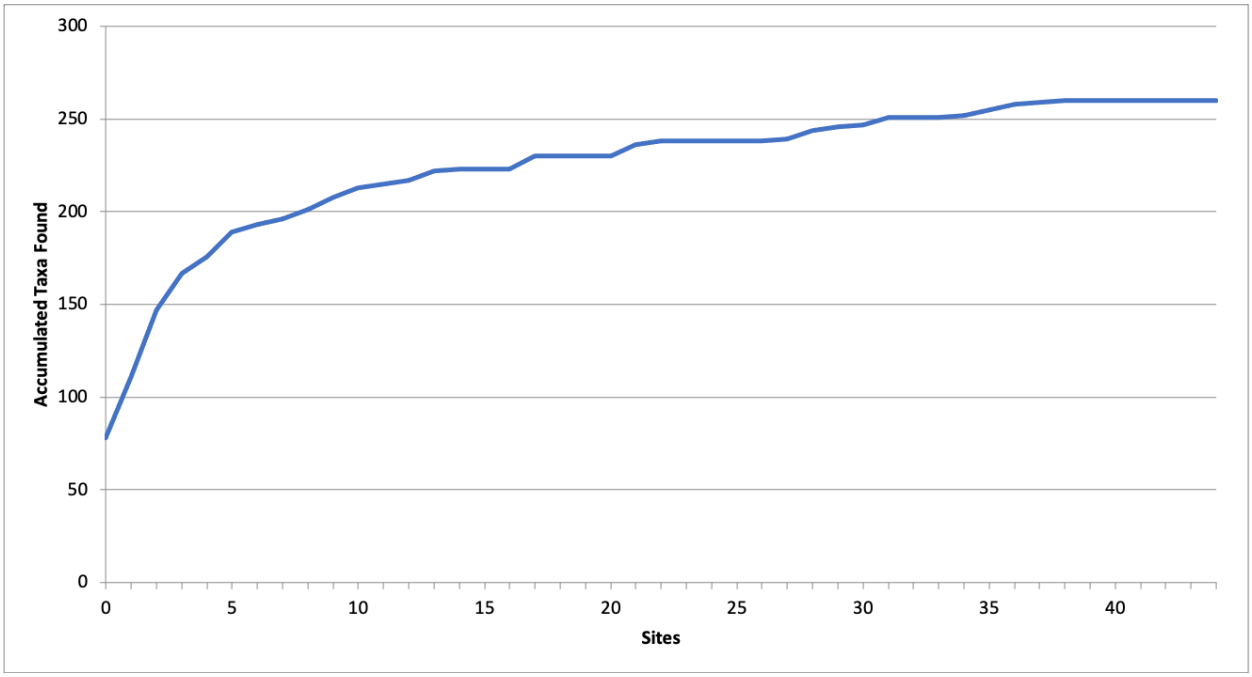


Figure 6. Species Accumulation Curve for the Menzies Study Area.

4.2.2. Range extensions

Sida sp. spiciform panicles (E.Leyland s.n. 14/8/90)

Sida sp. spiciform panicles (E.Leyland s.n. 14/8/90) is described as a spindly shrub growing from 0.4 m to 2 m tall. It has yellow flowers that have been recorded between August to September, and has been located growing in red brown clay soils associated with hillsides and river valleys.

During the survey *Sida* sp. spiciform panicles (E.Leyland s.n. 14/8/90) was recorded on clay loam soils associated weathered basalts of the GHAS-Ac - Greenstone hill *Acacia collegialis* shrublands. The record of this species within the Study Area represents a 240 km SSE range extension to its current known distribution of this species, and will represent the most southerly location for this species. Specimens of this species have been submitted to the WA herbarium for confirmation of the ID and will be vouchered for the WA herbarium records.

4.2.3. Weeds

Due to the highly disturbed nature of the Menzies Gold Project, weed invasion is common across many parts of the Study Area. Twenty-two weed species were encountered during the field assessment, most of which occur in low-lying areas of the landscape (i.e., alluvial plains) Table 6. One weed species is listed as a Weed of National Significance (WoNS) and two are recognised by the Department of Agriculture and Food as a Declared Pests in Western Australia. These are:

- *Cylindropuntia pallida* (Opuntioid Cactus, Hudson Pear) (Weed of National Significance; Declared Pest - s22(2), C3 Restricted) is an invasive cactus species, Plate 1. It has vicious spines which are capable of penetrating footwear and even vehicle tyres. It reproduces vegetatively when segments and fruit come into contact with the ground. It is best controlled through an integrated approach using mechanical removal, biological control and herbicides. A total of 18 plants recorded within the Study Area, north of the Selkirk Mine.

- *Rumex vesicarius* (Ruby Dock) (Declared Pest - s22(2); C1 Prohibited) is an annual herb. It is a disturbance opportunist, and common invader of rocky substrates such as waste-heaps, bund walls and other historical mining disturbance areas, Plate 1.

Plate 1. *Cylindropuntia pallida* (Left) and *Rumex vesicarius* (Right) – Declared pests.

These should be actively managed early in development of the Project.

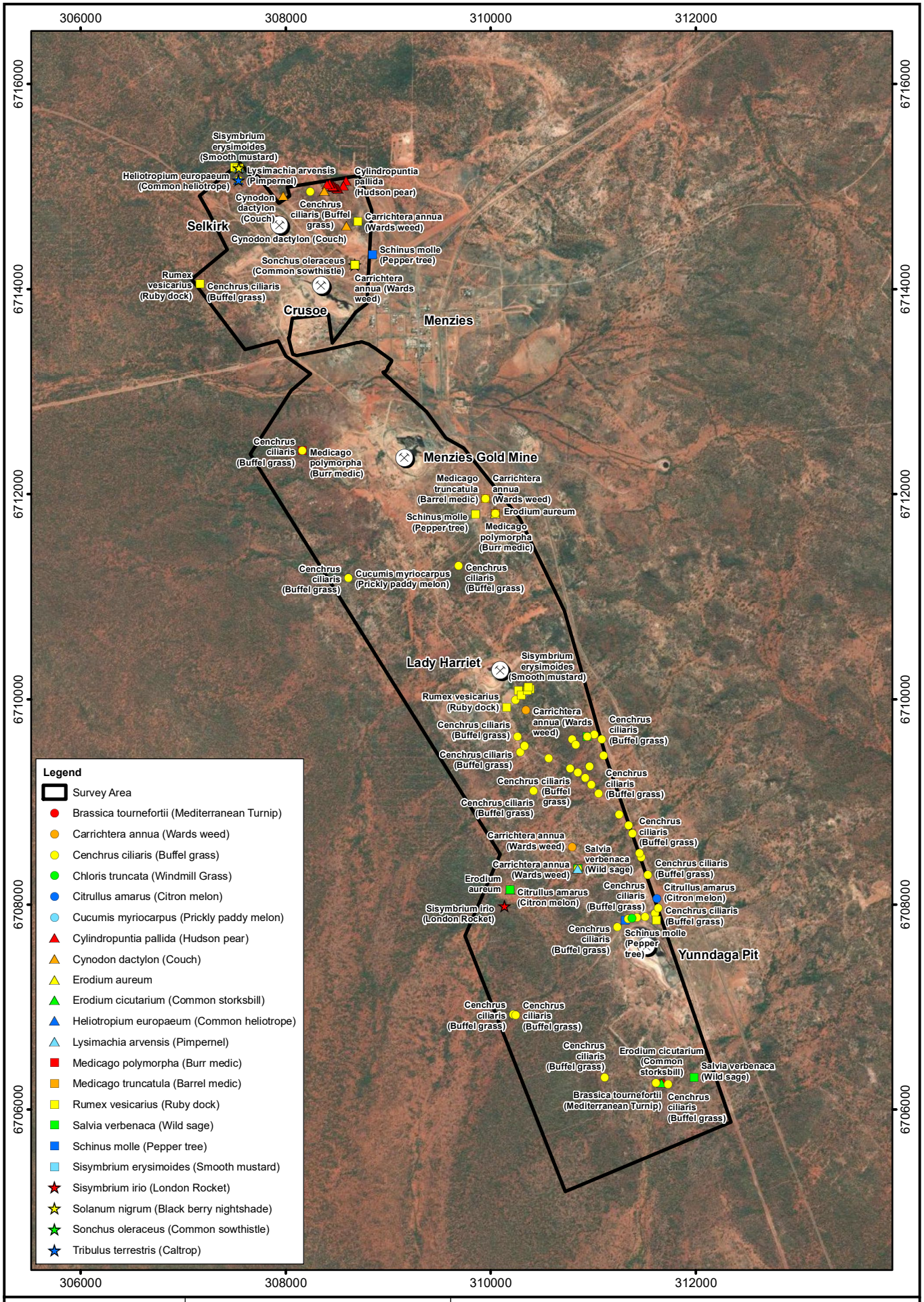
Whilst the remainder are not considered significant, *Cenchrus ciliaris* is an aggressive invader and efforts to control and minimise populations should be taken in the development and management of the Menzies Gold Project, particularly in the years following soil disturbance. Locations of weed species are presented in Table 6 and Figure 7.

Table 6. Weed species of the Menzies Study Area

Family	Species	# Plants Recorded	Comments
Anacardiaceae	*Schinus molle* (Pepper tree)	3	Generally occurring near previous mining operations
Asteraceae	*Sonchus oleraceus* (Common Sowthistle)	1	Common species in Vegetations Associations occurring on alluvial plains

Family	Species	# Plants Recorded	Comments
Boraginaceae	*Heliotropium europaeum* (Common Heliotrope)	1	Common species on alluvial plains.
Brassicaceae	*Brassica tournefortii* (Mediterranean Turnip)	1	One individual recorded in DRMS Vegetation Association
	Carrichtera annua (Ward's Weed)	8	Common species in Vegetations Associations occurring on alluvial plains
	Sisymbrium erysimoides (Smooth Mustard)	4	Common species in Vegetations Associations occurring on alluvial plains
	Sisymbrium irio (London Rocket)	1	One individual recorded in the DRMS Vegetation Association
Cactaceae	*Cylindropuntia pallida* (Hudson Pear)	18	Declared Pest. Not encountered within Yunndaga Study Area. Several populations recorded north of the Selkirk mine. Plant spreads vegetatively by segments which root where they contact the ground
Cucurbitaceae	*Citrullus amarus* (Citron melon)	2	Common species in Vegetations Associations occurring on alluvial plains
	Cucumis myriocarpus (Prickly Paddy Melon)	5	Common species in Vegetations Associations occurring on alluvial plains
Fabaceae	*Medicago polymorpha* (Burr Medic)	4	Common species in Vegetations Associations occurring on alluvial plains
	Medicago truncatula (Barrel medic)	3	Common species in Vegetations Associations occurring on alluvial plains
Geraniaceae	*Erodium aureum*	2	Common species in Vegetations Associations occurring on alluvial plains
	Erodium cicutarium (Common Storksbill)	1	One individual recorded in the DRMS Vegetation Association
Lamiaceae	*Salvia verbenaca* (Wild Sage)	5	Common species in Vegetations Associations occurring on alluvial plains
Poaceae	*Cenchrus ciliaris* (Buffel Grass)	900+	Aggressive invader and coloniser. Recorded throughout Study Area on alluvial plains and drainage sites. Particularly prevalent near Yunndaga Siding and other disturbed sites.
	Chloris truncata (Windmill Grass)	1	One individual recorded in disturbed area north of the Yunndaga pit
	Cynodon dactylon (Couch)	4	Three patches recorded north of the Selkirk mine
Polygonaceae	*Rumex vesicarius* (Ruby Dock)	150+	Declared Pest. Common invader of rocky substrates (i.e., Waste Rock Landform, and Pit bunding). Disturbance opportunist. Recorded throughout Study Area
Primulaceae	*Lysimachia arvensis* (Pimpernel)	2	Recorded in DRMS and HPMS Vegetation Associations.
Solanaceae	*Solanum nigrum* (Blackberry Nightshade)	1	One individual recorded in the HPMS association, north of the Selkirk mine.
Zygophyllaceae	*Tribulus terrestris* (Caltrop)	1	One individual recorded in the EsSaf Vegetation Association, north of the Selkirk mine.

Figure 7. Weed Locations across the Menzies Study Area.



Imagery: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

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Menzies Study Area

Weeds

4.2.1. Species of Taxonomic Interest

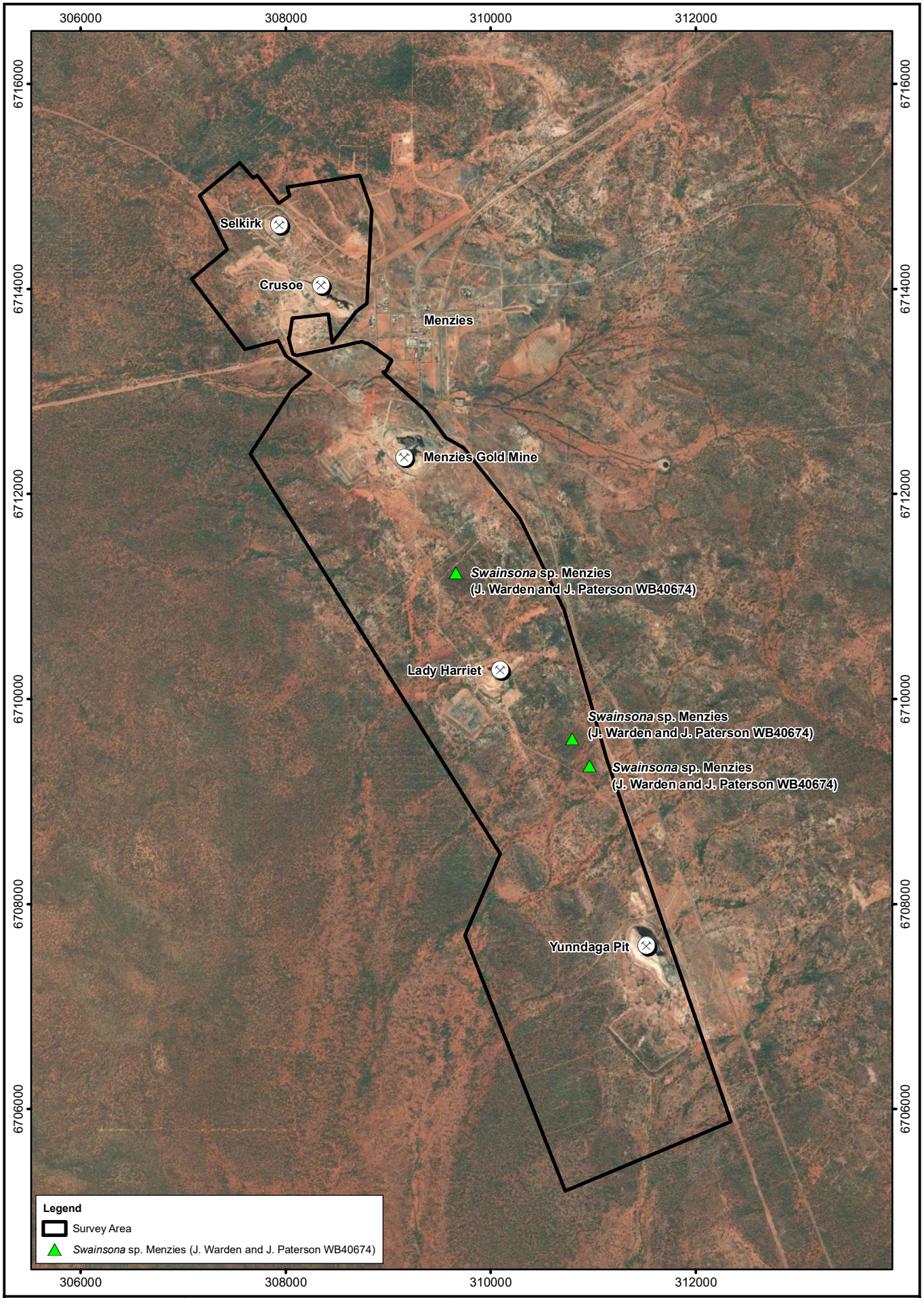
One species of taxonomic interest was encountered during the field assessment, *Swainsona* sp. Menzies (J. Warden & J. Paterson WB40674). It is described as a delicate herb to 0.05m, associated with weathered basalts of the GHAS-Ac - Greenstone hill *Acacia collegialis* shrublands Vegetation Association, Plate 2.

Plate 2. *Swainsona* sp. Menzies (J. Warden & J. Paterson WB40674) plant and habitat.

Swainsona sp. Menzies (J. Warden & J. Paterson WB40674) resembles *Swainsona rotunda* in both size and appearance, however, key differences are evident between flower morphologies. According to Western Australian taxonomist and *Swainsona* expert Rob Davis, this most likely represents a new and undescribed species, and should be treated as such (Per. Comms. Rob Davis. Friday 15th October 2021). A total of three records (representing three populations) were made, within quadrats sites Q21, Q22 and Q30. Further work is required to identify the extent and distribution of *Swainsona* sp. Menzies (J. Warden & J. Paterson WB40674) populations both within outside of the Study Area. During a separate field survey conducted during late October the *Swainsona* sp. Menzies (J. Warden & J. Paterson WB40674) sites were revisited, however no plants were able to be relocated. Given the annual and cryptic nature of these plants, future targeted surveys will be time-dependent.

Locations of *Swainsona* sp. Menzies (J. Warden & J. Paterson WB40674) are presented in Figure 8.

Figure 8. *Swainsona* sp. Menzies (J. Warden & J. Paterson WB40674) Locations Across the Menzies Study Area.



Imagery: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

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Species of Taxonomic Interest

4.3. Landforms

Six major landforms were observed across the Study Area, including; i) Low basalt / greenstone hills and rises, ii) Stony plains, iii) Calcrete platforms, iv) Hardpan plains, v) Alluvial plains, and vi) Drainage tracts.

4.4. Vegetation Mapping

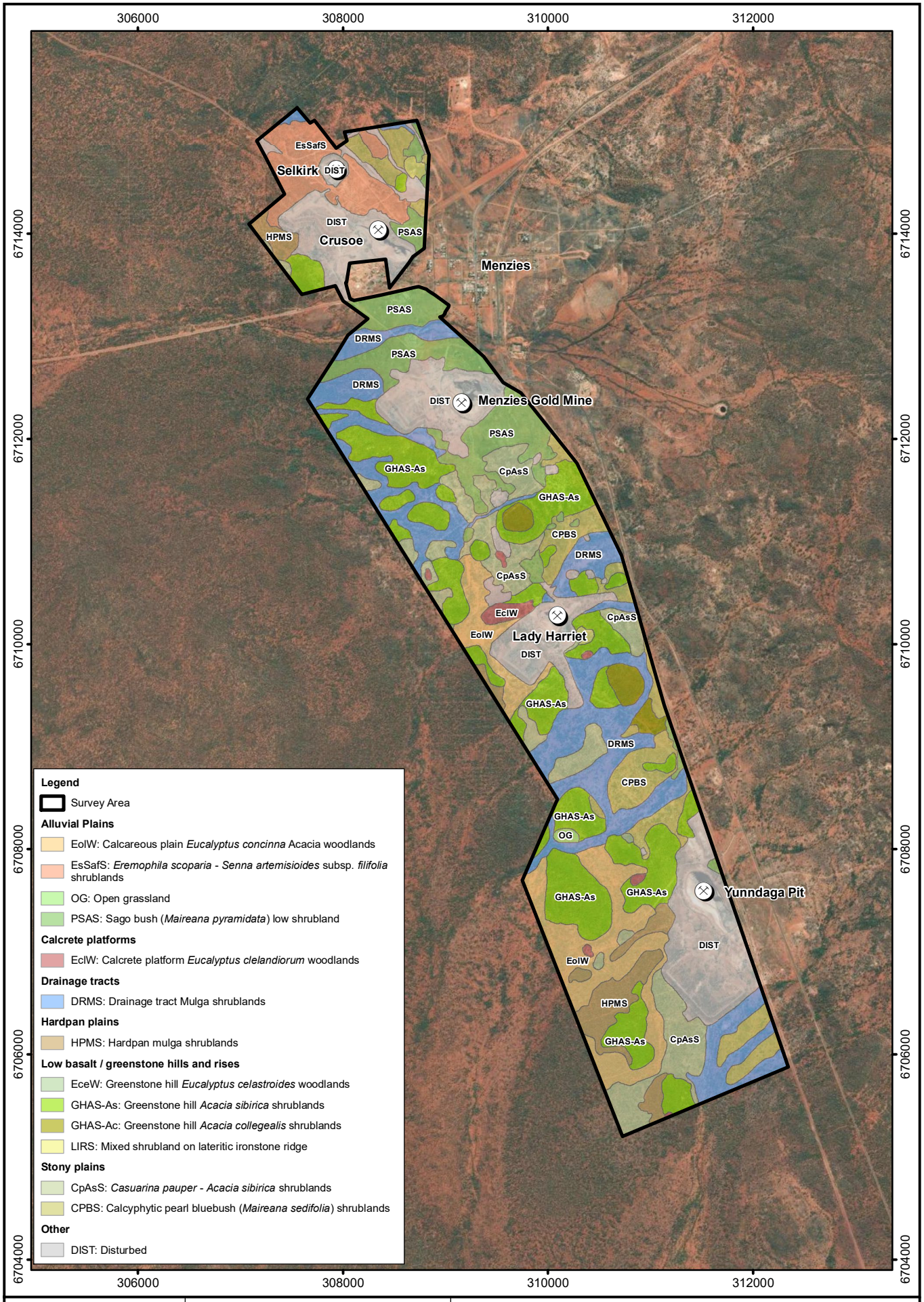
Fourteen Vegetation Associations were recognised within the Menzies Study Area. Following Pringle et. al. (1994), Table 7 briefly describes these Vegetation Associations, respective to landform units they occupy. An overview map displaying the distribution of Vegetation Associations is presented in Figure 9. Detailed Vegetation Association maps are presented in Appendix 6. Descriptions of Vegetation Associations and representative photographs are presented in Appendix 7. Quadrat site data are presented in Appendix 8. Quadrat site locations are presented in Figure 10.

Table 7. Vegetation Associations of the Menzies Study Area

Landform	Veg Code	Vegetation Association	Description
Low basalt /greenstone hills and rises	LIRS	Lateritic ironstone etailed ridge *Acacia* shrublands	Lateritic ironstone ridges with mixed *Acacia* shrublands.
	GHAS-As	Greenstone hill *Acacia sibirica* shrublands	Hills and low rises of red earths on greenstone or basalt indurated by iron, supporting *Acacia sibirica*
	GHAS-Ac	Greenstone hill *Acacia collegialis* shrublands	Summits of greenstone and basalt hills dominated by *Acacia collegialis.*
	EceW	Greenstone hill *Eucalyptus celastroides* woodlands	Eroding greenstone or basalt hill slopes supporting dominant *Eucalyptus celastroides* overstoreys with poorly developed mid and sub-strata.
Stony plains	CpAsS	*Casuarina pauper* - *Acacia sibirica* shrublands	Stoney rises and plains with moderate to abundant mixed mantles of greenstone, quartz and ironstone pebbles and cobbles, supporting prominent *Casuarina pauper* overstoreys with *Acacia sibirica.*
	CPBS	Calcyphytic pearl bluebush (*Maireana sedifolia*) shrublands	Stoney plains and slopes of greenstone hills supporting *Maireana sedifolia*
Calcrete platforms	EclW	Calcrete platform *Eucalyptus clelandiorum* woodlands	Low precipitated calcrete platforms supporting dominant *Eucalyptus clelandiorum* overstoreys with chenopod low shrublands.
Hardpan plains	HPMS	Hardpan mulga shrublands	Level to very gentle inclined plains subject to sheet flow, often with mantles of fine ironstone gravel, supporting scattered to moderately close *Acacia aneura* tall shrublands

Landform	Veg Code	Vegetation Association	Description
Alluvial plains	EsSafS	*Eremophila scoparia* - *Senna artemisioides* subsp. *filifolia* shrublands	Alluvial plains with sparse overstories and dominant *Eremophila scoparia* and *Senna artemisioides* mid-storeys.
	PSAS	Sago bush (*Maireana pyramidata*) low shrubland	Alluvial plains with red earths or duplex soils on hardpan dominated by *Maireana pyramidata.*
	EolW	Calcareous plain *Eucalyptus oleosa* - *Acacia* woodlands	Very gently undulating to level plains with dominant *Eucalyptus oleosa* overstory, and *Acacia aneura, Eremophila oppositifolia, Eremophila scoparia* midstory
	EcoW	Calcareous plain *Eucalyptus concinna* - Acacia woodlands	Very gently undulating to level plains with dominant *Eucalyptus concinna* overstory, and *Acacia aneura, Eremophila oppositifolia, Eremophila scoparia* midstory.
	OG	Open grassland	Alluvial plains dominated grasses and low chenopods
Drainage tracts	DRMS	Drainage tract Mulga shrublands	Narrow unincised linear drainage zones receiving concentrated run-on, supporting *A. aneura* tall shrublands.
Disturbed		Disturbed	

Figure 9. Distribution of Vegetation Associations Across the Menzies Study Area



Imagery: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

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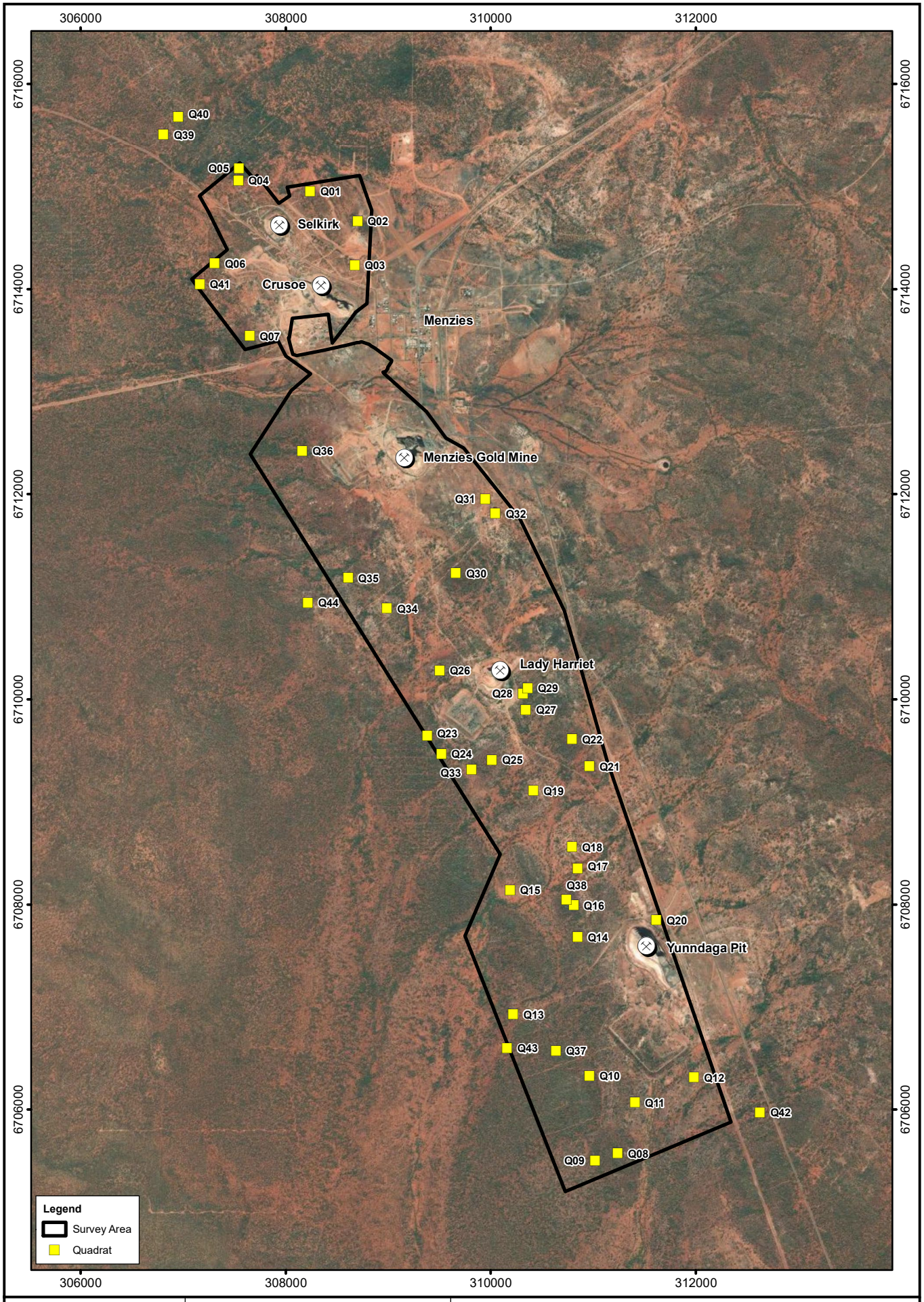
Figure 10. Quadrat Site Locations within the Menzies Study Area.



Imagery: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

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Quadrat Site Locations

4.5. Statistical Analysis

The initial PATN analysis incorporated 36 quadrat sites; providing good support for the preliminary version of the vegetation mapping. A total of 16 Vegetation Associations were recognised during this phase.

Following the second phase, a further eight sites were included into the analysis. Several taxa were merged together due to low confidence in field IDs. These included; *Lysiana* spp.; *Erodium* spp.; and *Eremophila scoparia* with *Eremophila pantonii*. Distinction between *Lysiana casuarinae* and *L. murrayi* requires the plant to contain adequate flowering material, however, a large proportion of the specimens were sterile at the time of sampling. *Eremophila scoparia* and *E. pantonii* were not readily distinguished in the field, and *Eremophila pantonii* was only detected following specimen identification process after the second survey, thus confidence in field identification was reduced. Likewise, two additional *Erodium* spp. detected during the identification process following the second survey reduced the confidence in others identified in the field. These changes are unlikely to affect the final output.

The final PATN analysis incorporated 43 quadrat sites. Singleton site, Q15 Open Grassland (OG) was excluded from the final analysis. Non-metric multidimensional scaling (NMDS) analysis performed for 182 species from 43 sites found a stable 3-dimensional solution, generating an ordination stress value of 0.1925. While this value is higher than the preferred threshold of 0.15, the option of reducing non-discriminatory (less important) species from the analysis to reduce this value was discounted, in order to preserve the original dataset and retain species important in determining finer-scale floristic units.

The PATN generated dendrogram illustrates seven major branches, Figure 11. Six branches correspond to distinct Vegetation Associations, including; i) EclW – *Eucalyptus clelandiorum* woodlands; ii) PSAS – Sago bush (*Maireana pyramidata*) low shrubland; iii) HPMS – Hardpan mulga shrublands; iv) GHAS-Ac – *Acacia collegialis* shrublands; v) DRMS – Drainage tract mulga woodlands; and vi) EceW – *Eucalyptus celastroides* woodlands; while the final branch contains all remaining groups. Composite groups branching at the threshold line appear to be separated by *a*) groups dominated by *Senna artemisioides* subsp. *filifolia,* including EsSaf – *Eremophila scoparia – Senna artemisioides* subsp. *filifolia* shrublands, EcoW – *Eucalyptus concinna* woodland, and CPBS – Calcyphytic pearl bluebush (*Maireana sedifolia*) shrublands; and *b*) groups dominated by *Acacia sibirica*, including LIRS – Lateritic ironstone ridge *Acacia* shrubland; GHAS-As – Greenstone hill *Acacia sibirica* shrublands; EolW – *Eucalyptus oleosa* woodlands; and CpAsS – *Casuarina pauper – Acacia sibirica* shrublands).

Nesting of suggested Vegetation Associations within the *Senna artemisioides* subsp. *filifolia* dominated groups indicates high floristic similarity between these sites. The EsSaf, EcoW and CPBS groups all occur on lower areas of the landscape and possess largely similar halophytic understory species. Respective of the dominant species within these sites (i.e., *Eremophila scoparia, Eucalyptus concinna* and *Maireana pyramidata*), these Vegetation Associations should

still be still considered distinct. This is also the case for the *Acacia sibirica* dominated composite group (i.e., CpAsS, GHAS-As, EolW). While interspersion of sites within this broader group indicates strong floristic similarity, due to a suite of similar understorey species, the suggested Vegetation Associations remain supported by their dominant taxa (i.e., *Casuarina pauper, Acacia sibirica, Eucalyptus oleosa*).

Several outlier groups are evident within the dendrogram, including Q43 EolW, Q35 DRMS, Q41 HPMS and Q34 CpAsS. Q43 EolW appears to occur as an outlier to the HPMS group; explained by the lack of *Acacia sibirica* and *Dodonaea lobulata,* and higher *Acacia caesaneura* PFC. Conversely, Q35 DRMS is more closely related to Q19 CpAsS, due to high *Acacia sibirica* PFC (55%). Q41 HPMW is more closely related to Q36 DRMS, likely due to absence of *Acacia aneura* and high *Acacia caesaneura* PFC (14%). Although the dendrogram does not support their field allocations, basic characteristics of the vegetation in conjunction with the landforms these sites occupy provides reason to retain them as they have been described.

The CpAsS group appears to be largely unsupported by the dendrogram, with sites interspersed within the *Acacia sibirica* dominated composite group. This Vegetation Association occurs on undulating plains with varying degrees and types of surface rock – and with this, variation in the density of certain species. Sampling of this group aimed to capture this variation, which could explain its non-conforming nature in the dendrogram.

Overall, the Vegetation Associations of the Menzies Study Area are highly supported by robust statistical analyses. A summary of the key analysis points is presented in Table 8. Quadrat site data

Table 8. Summary of Floristic Analysis.

Veg Code	Analysis comments	# Quadrats
EsSafS	Moderate group; determined by dominance of *Eremophila scoparia*. Sites interspersed within composite *Senna artemisioides* subsp. *filifolia* dominated group.	3
EcoW	Strong group; determined by the dominance of *Eucalyptus concinna*. Q39 more closely related to Q06 EsSaf due to high levels of *Eremophila scoparia* and *Senna artemisioides* subsp. *filifolia*.	3
CPBS	Strong group; determined by the dominance of *Maireana sedifolia*. Q18 more closely related to outlier EsSafS (Q04), likely due to suite of similar species.	3
LIRS	Strong group; insufficient number of replicate sites (n=2); determined by suite of similar species.	2
GHAS-As	Strong group; determined by the dominance of *Acacia sibirica* and presence of *Dodonaea lobulata*.	4

EolW	Moderate group; determined by the dominance of *Eucalyptus oleosa*. Sites nested within composite group of *Acacia sibirica* dominated sites (i.e., GHAS-As & CpAsS). One outlier (Q43) more closely related to HPMW group due to lack of *Acacia sibirica*, *Dodonaea lobulata* and higher *Acacia caesaneura* PFC.	3
CpAsS	Weak group; sites interspersed within composite group of *Acacia sibirica* dominated sites (i.e., GHAS-As & EolW)	5
EceW	Perfect group; determined by the dominance of *Eucalyptus celastroides.*	3
DRMS	Strong group; determined by suit of similar species. One outlier (Q35) more closely related to Q19 CpAsS, likely due to high *Acacia sibirica* PFC (55%).	4
GHAS-Ac	Perfect group; determined by the dominance of *Acacia collegialis*.	3
HPMS	Strong group; determined by the dominance of *Acacia caesaneura*, *A. aneura* and *A. ramulosa* var. *ramulosa.* One outlier (Q41) more closely related to Q36 DRMS, likely due to absence of *A. aneura* and high *A. caesaneura* PFC (14%).	4
PSAS	Perfect group; determined by the dominance of *Maireana pyramidata*.	3
EclW	Perfect group; determined by the dominance of *Eucalyptus clelandiorum* and presence of *Eremophila scoparia*, *Scaevola spinescens* sens. lat. etc. All sites considered species-poor compared to other vegetation units.	3
OG	Singleton site; removed from final analysis.	1

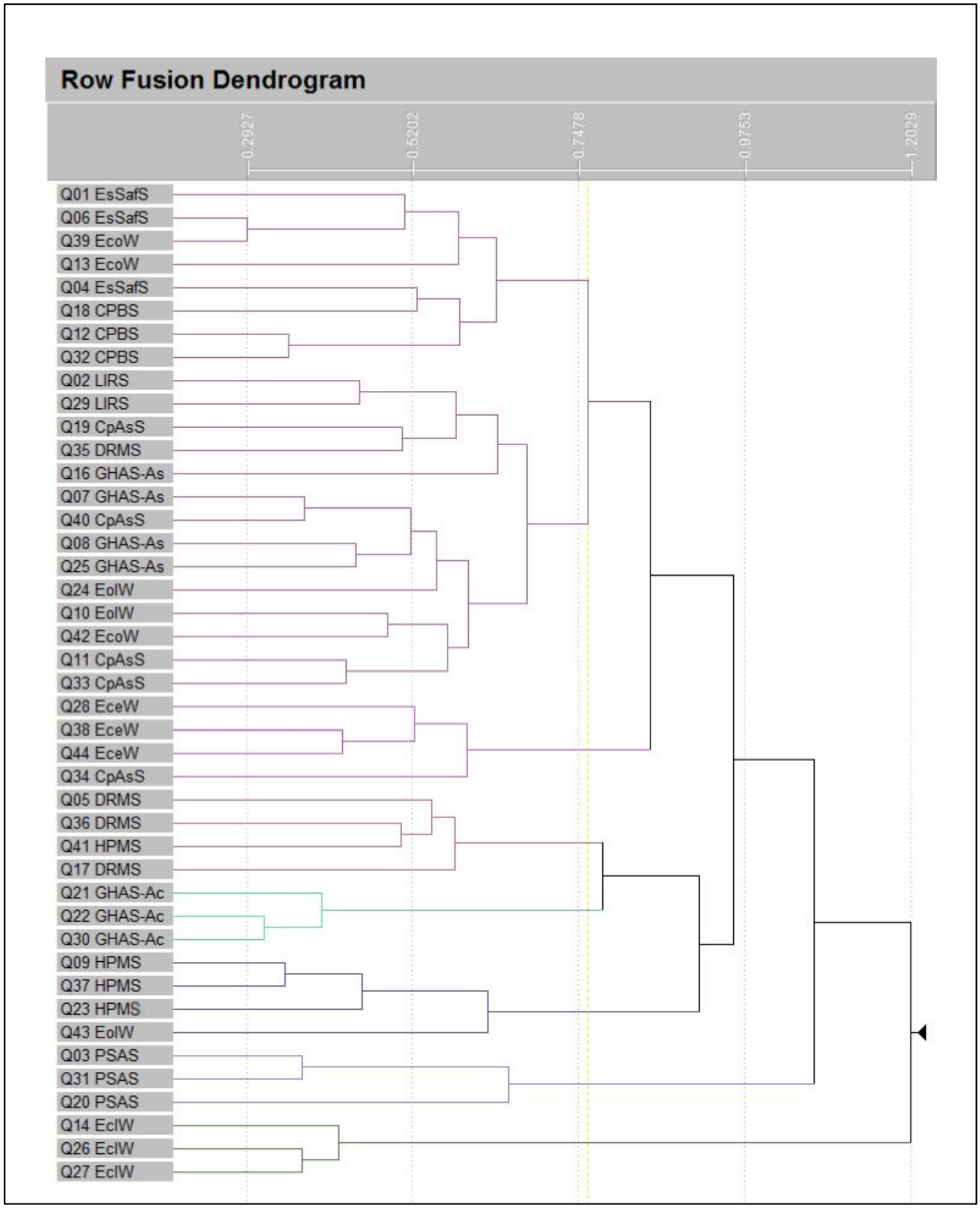


Figure 11. Dendrogram of Site vs. Species Analysis produced in PATN

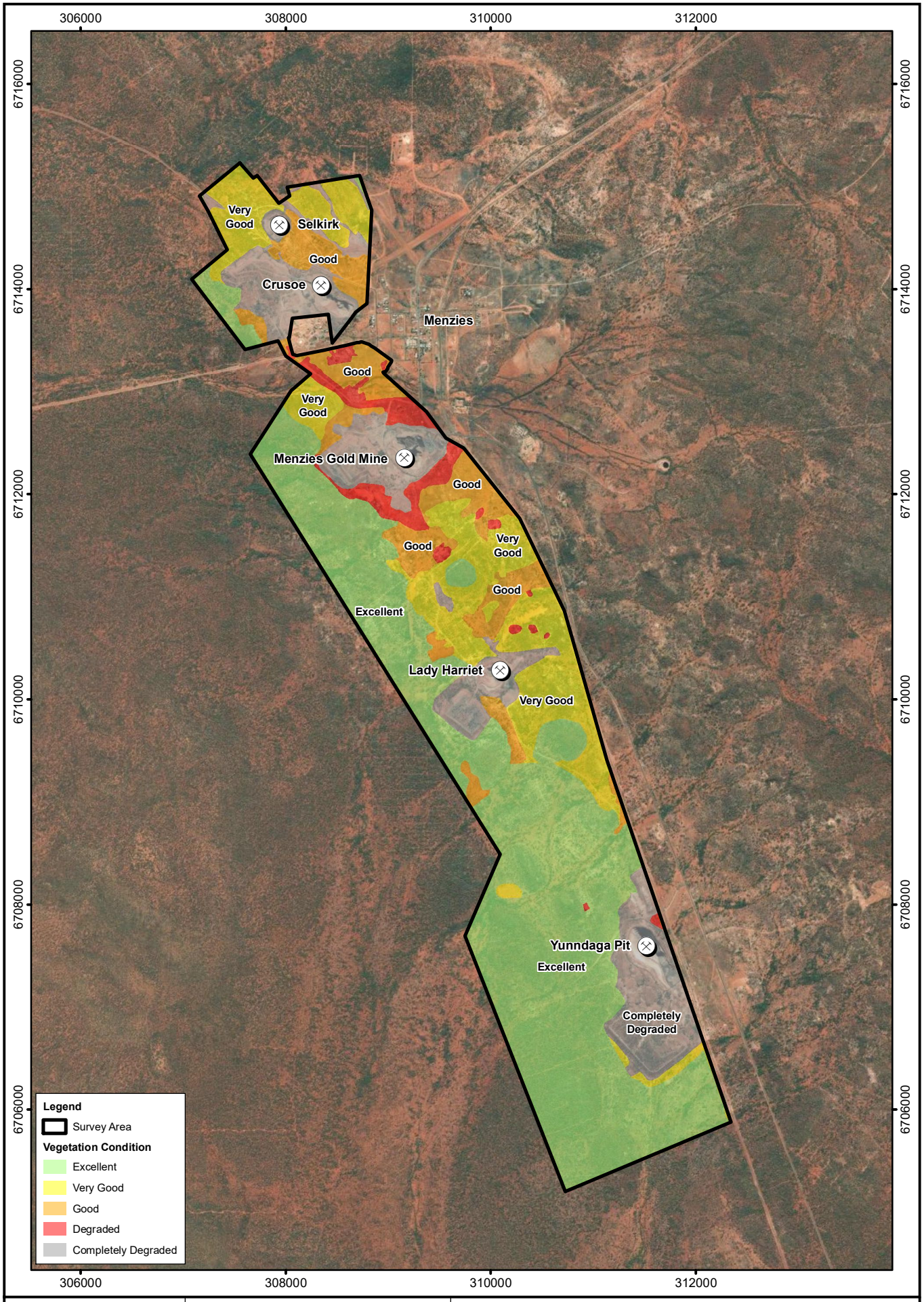
4.6. Vegetation Condition

The overall condition of the vegetation within the Menzies Study Area, based on the Vegetation Condition Scale as reported by Keighery (1994) (Appendix 3) is varied. The Menzies region has been subject to mining development for over a century, and as a result significant disturbance has occurred in many areas throughout. The five previous mining sites, including pits, associated Waste Rock Landforms and surrounding infrastructure are considered Completely Degraded. The condition of the vegetation typically improves with increasing distance from these sites. This is similar for vegetation around the Menzies township – improving with increasing distance, reaching Excellent condition in southern and eastern portions of the Study Area.

Many mine shafts, are distributed throughout the Study Areas, while extensive gridded clearing from more recent exploration programs cover the entirety of the project. Weed invasion is also considerable issue throughout the Study Area, and typically corresponds to the magnitude of disturbance.

A map of the Vegetation Condition is presented in Figure 12.

Figure 12. Vegetation Condition of the Menzies Study Area.



Imagery: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

0 0.5 1km

Scale: 1:50,000
MGA94 (Zone 51)

CAD Ref: a2796_M_R02_10L

Date: January 2025 | Rev: A | A4

Western Botanical

Author: G. Cockerton | WB Ref:

Drawn: CAD Resources ~ www.cadresources.com.au
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Kingwest Resources Limited
Menzies Study Area
Vegetation Condition

5. Assessment Against the 10 Clearing Principles

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

The Study Area contains species that are typical of the local Menzies region, and more broadly, representative of the Eastern Murchison subregion. Two-hundred and sixty taxa were encountered during the field assessment, as well as 21 minor weeds. Given the good seasonal conditions prior to the survey (i.e., above-average rainfall), the flora present and observable at the time of the field assessment is considered as excellent. The diversity of flora observed across the Study Area is consistent with what is expected in the Eastern Murchison region.

The Project is not at variance with this principle.

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

While flora and vegetation are utilised by fauna for food and habitat, there are no known obligate fauna-flora correlations within the Study Area.

The Project is not at variance with this principle.

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

The Study Area does not contain any Threatened (Declared Rare) or Priority flora. The results of the Desktop Review, showed one likely (*Newcastelia insignis* Priority 2) and 20 Priority species (including 5 Priority 1 species, 4 Priority 2 species and 11 Priority 3 species) with the possibility to occur. The field results showed none of these species were recorded within the Study area.

One species of taxonomic interest, *Swainsona* sp. Menzies (J. Warden & J. Paterson WB40674) was encountered during the field assessment – restricted to the GHAS-Ac Vegetation Association. As this taxon likely represents a new species, clearing within the GHAS-Ac Vegetation Association is not recommended until further work is undertaken to discern the extent and distribution of populations both within and outside of the Study Area.

Provided this recommendation is met, the Project is not at variance with this principle.

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

The Study Area does not lie within any known Threatened or Priority Ecological Communities (TEC), and conversely, the Vegetation Association present do not represent those of known

Threatened or Priority Ecological Communities. All of the described communities are considered well represented throughout the Murchison Bioregion.

The Project is not at variance with this principle.

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

The Study Area does not represent a significant remnant of native vegetation in an extensively cleared area. The Study Area falls within the Murchison Bioregion, where approximately 99.7% of the pre-European vegetation still exists (Government of Western Australia, 2019).

The Project is not at variance with this principle.

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

No significant watercourses (other than minor local drainage channels) or permanent wetlands are present within the Study Area.

The Project is not at variance with this principle.

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

The proposed development is not likely to cause significant land degradation beyond that caused by the mining and development of infrastructure, itself.

The Project is not at variance with this principle.

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

There are no conservation areas in the vicinity of the Study Area. The closest is Goongarrie National Park, 20 km south.

The Project is not at variance with this principle.

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

Not assessed.

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

The development is unlikely to cause or exacerbate any flooding.

The Project is not at variance with this principle.

6. Limitations

Limitation	Discussion
Available sources of contextual information	Excellent contextual information was available for this project including DBCA Threatened and Priority species and communities' datasets. Regional scale work on Land Systems by the DoA provided a good information on the geology, landforms, vegetation and their patterns in the region. This is not considered a limitation.
The Scope of the survey	The Scope of the survey was adequate to assess the flora and vegetation within the 1645.14 ha Study Area. The survey was conducted over two field trips, during May and August of 2021. A total of 20 days were spent on ground. This is not a limitation.
Proportion of flora collected and identified	Two hundred and sixty taxa were encountered during the field assessment, including 182 (70%) occurring within quadrats, and 78 (30%) recorded opportunistically. All taxa were collected at least once for vouchering or identification purposes. Fourteen taxa were unable to be identified due to insufficient material being available at the time of sampling. Ten of these were considered as most likely being duplicates of already collected specimens. While the remaining four were not duplicates, none are considered to represent potential conservation significant flora. This is not a limitation.
Completeness and further work which may be needed	The Study Area was adequately covered during the field assessment, as illustrated by the dispersal of quadrat sites (Figure 10) and tracklogs (Appendix 9) throughout. A total of 44 quadrat sites were established (i.e., three per Vegetation Association), providing adequate replication to support the statistical analyses. This component of the Project is considered complete. Further work is recommended to identify the extent and distribution of *Swainsona* sp. Menzies (J. Warden & J. Paterson WB40674) populations outside of the Study Area. According to WA Herbarium, this taxon likely represents a new species of *Swainsona*. Similar habitats are evident towards the north-east of the Study Area, however, encountering more populations depends on survey timing (i.e., early spring following sufficient winter rainfall). Albeit, this is not a limitation.
Mapping reliability	High-resolution aerial photography at a scale of 1:10,000 was used in conjunction with Google Earth imagery to map the vegetation of the Study Area. While most Vegetation Associations boundaries were clear, a select few that were unable to be distinguished using these methods were foot-traversed. All mapping polygons were ground-truthed by Western Botanical personnel. This is not a limitation.
Timing: weather, season	The 2021 field assessment was conducted during a very good season – above average rainfall recorded in the months February, May and July. As a result, the flora present during the survey was considered to be excellent. This is not a limitation.
Disturbances	Given the long history of mining in the Menzies region, disturbance was prevalent throughout the site. Vegetation adjacent to pits, waste heaps, and other legacy infrastructure was commonly in a 'Completely Degraded' condition, and thus, was mapped as 'Disturbed'. Weed infestation was common across the Study Area, and particularly prevalent at disturbed sites and nearing the Menzies township. Vegetation Associations occurring in low-lying parts of the landscape are clearly more susceptible to weed invasion (i.e., the Sago bush *(Maireana pyramidata)* low shrubland). *Cenchrus ciliaris*

Limitation	Discussion
	appears to dominate in these areas, and is clearly transforming these habitats to grass-dominated associations. This is not a limitation.
Intensity	The intensity of the field assessment reflects the appropriate level required for a Detailed Flora and Vegetation Survey, including comprehensive i) flora species inventory, ii) Vegetation Association mapping, iii) targeted searches for weeds, priority flora, and other species of taxonomic interest; and iv) vegetation condition assessment. This is not a limitation.
Resources	Adequate resources were available over the total duration of each survey. This is not a limitation.
Access	Access was excellent throughout the Study Area, as reflected by the distribution of tracklogs and quadrat site locations. This is not a limitation.
Experience levels	Jonathan Warden has over 15 years of experience in the assessment of flora and vegetation in WA; and Jason Paterson has 2 years of experience. This is not a limitation.

7. List of Participants

Staff Member	Field Surveys	Specimen Identification	Data Analysis	Report Preparation
Jonathan Warden B.Sc. (Environmental Biology) *License No. – FB62000044*	**1**	**1**		**1**
Jason Paterson B.Sc (Hons) (Environmental Science) *License No. – FB62000299*	**1**	**1**	**1**	**1**
Geoff Cockerton B.Sc. (Biology) *License No. – FB62000046*		**1**		

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- Juno Minerals Limited and for the Data Sharing Agreement with Kingwest.
- Rob Davis from the Western Australian Herbarium for assistance with the taxonomy of *Swainsona* sp. Menzies (J. Warden & J. Paterson WB40674)

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Appendix 1. Department of Biodiversity Conservation and Attractions (DBCA) Framework for Conservation Significant Flora

DBCA Conservation Codes for Western Australian Flora

Under the Wildlife Conservation Act 1950, the Minister for the Environment may declare species of flora to be protected if they are considered to be in danger of extinction, rare or otherwise in need of special protection.

Specially protected flora are species which have been adequately searched for and are deemed to be, in the wild, either rare, at risk of extinction, or otherwise in need of special protection, and have been gazetted as such.

Categories of specially protected flora are:

T Threatened species

Listed by order of the Minister as Threatened in the category of critically endangered, endangered or vulnerable under section 19(1), or is a rediscovered species to be regarded as threatened species under section 26(2) of the Biodiversity Conservation Act 2016 (BC Act).

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

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

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

CR Critically endangered species

Threatened species considered to be "facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines".

Listed as critically endangered under section 19(1)(a) of the BC Act in accordance with the criteria set out in section 20 and the ministerial guidelines. Published under schedule 1 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for critically endangered fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for critically endangered flora.

EN Endangered species

Threatened species considered to be "facing a very high risk of extinction in the wild in the near future, as determined in accordance with criteria set out in the ministerial guidelines".

Listed as endangered under section 19(1)(b) of the BC Act in accordance with the criteria set out in section 21 and the ministerial guidelines. Published under schedule 2 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for endangered fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for endangered flora.

VU Vulnerable species

Threatened species considered to be "facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines".

Listed as vulnerable under section 19(1)(c) of the BC Act in accordance with the criteria set out in section 22 and the ministerial guidelines. Published under schedule 3 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for vulnerable fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for vulnerable flora.

Extinct species

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

EX Extinct species

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

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

EW Extinct in the wild species

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

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

Specially protected species

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

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

MI Migratory species

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

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

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

CD Species of special conservation interest (conservation dependent fauna)

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

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

OS Other specially protected species

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

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

P Priority species

Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened fauna or flora.

Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring.

Assessment of Priority codes is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations.

1 Priority 1: Poorly-known species

Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.

2 Priority 2: Poorly-known species

Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.

3 Priority 3: Poorly-known species

Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.

4 Priority 4: Rare, Near Threatened and other species in need of monitoring

(a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection but could be if present circumstances change. These species are usually represented on conservation lands.

(b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for vulnerable but are not listed as Conservation Dependent.

(c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy

Last updated 3 January 2019

Appendix 2. DBCA Definitions of Threatened Ecological Communities (TECs) and Priority Ecological Communities (PECs)

DEFINITIONS, CATEGORIES AND CRITERIA FOR THREATENED AND PRIORITY ECOLOGICAL COMMUNITIES

1. GENERAL DEFINITIONS

Ecological Community
A naturally occurring biological assemblage that occurs in a particular type of habitat.

Note: The scale at which ecological communities are defined will often depend on the level of detail in the information source, therefore no particular scale is specified.

A **threatened ecological community** (TEC) is one which is found to fit into one of the following categories; "presumed totally destroyed", "critically endangered", "endangered" or "vulnerable".

Possible threatened ecological communities that do not meet survey criteria are added to DEC's Priority Ecological Community Lists under Priorities 1, 2 and 3. Ecological Communities that are adequately known, are rare but not threatened, or meet criteria for Near Threatened, or that have been recently removed from the threatened list, are placed in Priority 4. These ecological communities require regular monitoring. Conservation Dependent ecological communities are placed in Priority 5.

An **assemblage** is a defined group of biological entities.

Habitat is defined as the areas in which an organism and/or assemblage of organisms lives. It includes the abiotic factors (e.g. substrate and topography), and the biotic factors.

Occurrence: a discrete example of an ecological community, separated from other examples of the same community by more than 20 meters of a different ecological community, an artificial surface or a totally destroyed community.

By ensuring that every discrete occurrence is recognised and recorded future changes in status can be readily monitored.

Adequately Surveyed is defined as follows:

"An ecological community that has been searched for thoroughly in most likely habitats, by relevant experts."

Community structure is defined as follows:

"The spatial organisation, construction and arrangement of the biological elements comprising a biological assemblage" (e.g. *Eucalyptus salmonophloia* woodland over scattered small shrubs over dense herbs; structure in a faunal assemblage could refer to trophic structure, e.g. dominance by feeders on detritus as distinct from feeders on live plants).

Definitions of Modification and Destruction of an ecological community:

Modification: "changes to some or all of ecological processes (including abiotic processes such as hydrology), species composition and community structure as a direct or indirect result of human activities. The level of damage involved could be ameliorated naturally or by human intervention."

Destruction: "modification such that reestablishment of ecological processes, species composition and community structure within the range of variability exhibited by the original community is unlikely within the foreseeable future even with positive human intervention."

Note: Modification and destruction are difficult concepts to quantify, and their application will be determined by scientific judgment. Examples of modification and total destruction are cited below:

Modification of ecological processes: The hydrology of Toolibin Lake has been altered by clearing of the catchment such that death of some of the original flora has occurred due to dependence on fresh water. The system may be bought back to a semblance of the original state by redirecting saline runoff and pumping

waters of the rising water table away to restore the hydrological balance. Total destruction of downstream lakes has occurred due to hydrology being altered to the point that few of the original flora or fauna species are able to tolerate the level of salinity and/or water logging.

Modification of structure: The understorey of a plant community may be altered by weed invasion due to nutrient enrichment by addition of fertiliser. Should the additional nutrients be removed from the system the balance may be restored, and the original plant species better able to compete. Total destruction may occur if additional nutrients continue to be added to the system causing the understorey to be completely replaced by weed species, and death of overstorey species due to inability to tolerate high nutrient levels.

Modification of species composition: Pollution may cause alteration of the invertebrate species present in a freshwater lake. Removal of pollutants may allow the return of the original inhabitant species. Addition of residual highly toxic substances may cause permanent changes to water quality, and total destruction of the community.

Threatening processes are defined as follows:
"Any process or activity that threatens to destroy or significantly modify the ecological community and/or affect the continuing evolutionary processes within any ecological community."

Examples of some of the continuing threatening processes in Western Australia include: general pollution; competition, predation and change induced in ecological communities as a result of introduced animals; competition and displacement of native plants by introduced species; hydrological changes; inappropriate fire regimes; diseases resulting from introduced microorganisms; direct human exploitation and disturbance of ecological communities.

Restoration is defined as returning an ecological community to its pre-disturbance or natural state in terms of abiotic conditions, community structure and species composition.

Rehabilitation is defined as the re-establishment of ecological attributes in a damaged ecological community although the community will remain modified.

2. DEFINITIONS AND CRITERIA FOR PRESUMED TOTALLY DESTROYED, CRITICALLY ENDANGERED, ENDANGERED AND VULNERABLE ECOLOGICAL COMMUNITIES

Presumed Totally Destroyed (PD)
An ecological community that has been adequately searched for but for which no representative occurrences have been located. The community has been found to be totally destroyed or so extensively modified throughout its range that no occurrence of it is likely to recover its species composition and/or structure in the foreseeable future.

An ecological community will be listed as presumed totally destroyed if there are no recent records of the community being extant **and either** of the following applies (A or B):

A) Records within the last 50 years have not been confirmed despite thorough searches of known or likely habitats or

B) All occurrences recorded within the last 50 years have since been destroyed

Critically Endangered (CR)
An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or that was originally of limited distribution and is facing severe modification or destruction throughout its range in the immediate future, or is already severely degraded throughout its range but capable of being substantially restored or rehabilitated.

An ecological community will be listed as **Critically Endangered** when it has been adequately surveyed and s found to be facing an extremely high risk of total destruction in the immediate future. This will be determined on the basis of the best available information, by it meeting any one or more of the following criteria (A, B or C):

A) The estimated geographic range, and/or total area occupied, and/or number of discrete occurrences since European settlement have been reduced by at least 90% and either or both of the following apply (i or ii):

i) geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is imminent (within approximately 10 years);

ii) modification throughout its range is continuing such that in the immediate future (within approximately 10 years) the community is unlikely to be capable of being substantially rehabilitated.

B) Current distribution is limited, and one or more of the following apply (i, ii or iii):

i) geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the immediate future (within approximately 10 years);

ii) there are very few occurrences, each of which is small and/or isolated and extremely vulnerable to known threatening processes; iii) there may be many occurrences but total area is very small and each occurrence is small and/or isolated and extremely vulnerable to known threatening processes.

C) The ecological community exists only as highly modified occurrences that may be capable of being rehabilitated if such work begins in the immediate future (within approximately 10 years).

Endangered (EN)
An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or was originally of limited distribution and is in danger of significant modification throughout its range or severe modification or destruction over most of its range in the near future.

An ecological community will be listed as **Endangered** when it has been adequately surveyed and is not Critically Endangered but is facing a very high risk of total destruction in the near future. This will be determined on the basis of the best available information by it meeting any one or more of the following criteria (A, B, or C):

A) The geographic range, and/or total area occupied, and/or number of discrete occurrences have been reduced by at least 70% since European settlement **and either or both** of the following apply (i or ii):

i) the estimated geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is likely in the short term future (within approximately 20 years);

ii) modification throughout its range is continuing such that in the short term future (within approximately 20 years) the community is unlikely to be capable of being substantially restored or rehabilitated.

B) Current distribution is limited, **and one or more of** the following apply (i, ii or iii):

i) geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the short term future (within approximately 20 years);

ii) there are few occurrences, each of which is small and/or isolated and all or most occurrences are very vulnerable to known threatening processes;

iii) there may be many occurrences but total area is small and all or most occurrences are small and/or isolated and very vulnerable to known threatening processes.

C) The ecological community exists only as very modified occurrences that may be capable of being substantially restored or rehabilitated if such work begins in the short-term future (within approximately 20 years).

Vulnerable (VU)
An ecological community that has been adequately surveyed and is found to be declining and/or has declined in distribution and/or condition and whose ultimate security has not yet been assured and/or a community that is still widespread but is believed likely to move into a category of higher threat in the near future if threatening processes continue or begin operating throughout its range.

An ecological community will be listed as **Vulnerable** when it has been adequately surveyed and is not Critically Endangered or Endangered but is facing a high risk of total destruction or significant modification in the medium (within approximately 50 years) to long-term future. This will be determined on the basis of the best available information by it meeting **any one or more of** the following criteria (A, B or C):

A) The ecological community exists largely as modified occurrences that are likely to be capable of being substantially restored or rehabilitated.

B) The ecological community may already be modified and would be vulnerable to threatening processes, is restricted in area and/or range and/or is only found at a few locations.

C) The ecological community may be still widespread but is believed likely to move into a category of higher threat in the medium to long-term future because of existing or impending threatening processes

3. DEFINITIONS AND CRITERIA FOR PRIORITY ECOLOGICAL COMMUNITIES

Possible threatened ecological communities that do not meet survey criteria or that are not adequately defined are added to the Priority Ecological Community List under priorities 1, 2 and 3. These three categories are ranked in order of priority for survey and/or definition of the community. Ecological communities that are adequately known, and are rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list, are placed in Priority 4. These ecological communities require regular monitoring. Conservation Dependent ecological communities are placed in Priority 5.

Priority One: Poorly-known ecological communities

Ecological communities that are known from very few occurrences with a very restricted distribution (generally ≤5 occurrences or a total area of ≤ 100ha). Occurrences are believed to be under threat either due to limited extent, or being on lands under immediate threat (e.g. within agricultural or pastoral lands, urban areas, active mineral leases) or for which current threats exist. May include communities with occurrences on protected lands. Communities may be included if they are comparatively well-known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under immediate threat from known threatening processes across their range.

Priority Two: Poorly-known ecological communities

Communities that are known from few occurrences with a restricted distribution (generally ≤10 occurrences or a total area of ≤200ha). At least some occurrences are not believed to be under immediate threat (within approximately 10 years) of destruction or degradation. Communities may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under threat from known threatening processes.

Priority Three: Poorly known ecological communities

(i) Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or:

(ii) communities known from a few widespread occurrences, which are either large or with significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat (within approximately 10 years), or;

(iii) communities made up of large, and/or widespread occurrences, that may or may not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, inappropriate fire regimes, clearing, hydrological change etc.

Communities may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and/or are not well defined, and known threatening processes exist that could affect them.

Priority Four: Ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. These communities require regular monitoring.

(i) Rare. Ecological communities known from few occurrences that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These communities are usually represented on conservation lands.

(ii) Near Threatened. Ecological communities that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for a higher threat category.

(iii) Ecological communities that have been removed from the list of threatened communities during the past five years.

Priority Five: Conservation Dependent ecological communities

Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.

(Department of Environment and Conservation January 2013)

Appendix 3. Vegetation Condition Scale

Summary of Vegetation Condition Scale as reported by Keighery (1994) and as summarized in Bush Forever (Government of Western Australia 2000) Condition Scale Description.

Code	Description
Pristine (1)	Pristine or nearly so, no obvious signs of disturbance.
Excellent (2)	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species.
Very Good (3)	Vegetation structure altered, obvious signs of disturbance. For example, disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.
Good (4)	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. For example, disturbance to vegetation structure caused by very frequent fires, the presence of some very aggressive weeds at high density, partial clearing, dieback and grazing.
Degraded (5)	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. For example, disturbance to vegetation structure caused by frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing
Completely Degraded (6)	The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as “parkland cleared’ with the flora comprising weed or crop species with isolated native trees or shrubs.

Appendix 4. NatureMap Search Results

NatureMap
Mapping Western Australia's biodiversity

NatureMap Species Report

Created By Guest user on 30/04/2021

Current Names Only Yes
Core Datasets Only Yes
Method 'By Circle'
Centre 121° 01' 50" E,29° 41' 30" S
Buffer 20km
Group By Kingdom

Kingdom	Species	Records
Animalia	123	653
Fungi	2	2
Plantae	250	482
TOTAL	**375**	**1137**

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Animalia					
1.	24559	*Acanthagenys rufogularis (Spiny-cheeked Honeyeater)*			
2.	24260	*Acanthiza apicalis (Broad-tailed Thornbill, Inland Thornbill)*			
3.	24261	*Acanthiza chrysorrhoa (Yellow-rumped Thornbill)*			
4.	24265	*Acanthiza uropygialis (Chestnut-rumped Thornbill)*			
5.	25536	*Accipiter fasciatus (Brown Goshawk)*			
6.	24561	*Anthochaera carunculata (Red Wattlebird)*			
7.	25528	*Aphelocephala leucopsis (Southern Whiteface)*			
8.	24285	*Aquila audax (Wedge-tailed Eagle)*			
9.	47673	*Aspidites ramsayi subsp. (southwest subpop.) (Woma (southwest subpop.))*		P1	
10.		*Barnardius zonarius*			
11.	42380	*Brachyurophis fasciolatus subsp. fasciolatus (Narrow-banded Shovel-nosed Snake)*			
12.		*Bursaria sp.*			
13.	42307	*Cacomantis pallidus (Pallid Cuckoo)*			
14.	24086	*Cercartetus concinnus (Western Pygmy-possum, Mundarda)*			
15.	24377	*Charadrius ruficapillus (Red-capped Plover)*			
16.	47909	*Cheramoeca leucosterna (White-backed Swallow)*			
17.	25580	*Cinclosoma castaneothorax (Chestnut-breasted Quail-thrush)*			
18.	24774	*Cladorhynchus leucocephalus (Banded Stilt)*			
19.	25675	*Colluricincla harmonica (Grey Shrike-thrush)*			
20.	25568	*Coracina novaehollandiae (Black-faced Cuckoo-shrike)*			
21.	24416	*Corvus bennetti (Little Crow)*			
22.	25592	*Corvus coronoides (Australian Raven)*			
23.	25593	*Corvus orru (Torresian Crow)*			
24.	24420	*Cracticus nigrogularis (Pied Butcherbird)*			
25.	25595	*Cracticus tibicen (Australian Magpie)*			
26.	25596	*Cracticus torquatus (Grey Butcherbird)*			
27.	24873	*Ctenophorus fordi (Mallee Sand Dragon)*			
28.	24888	*Ctenophorus salinarum (Salt Pan Dragon)*			
29.	24889	*Ctenophorus scutulatus (Lozenge-marked Dragon)*			
30.	25026	*Ctenotus atlas*			
31.	25461	*Ctenotus brooksi*			
32.	25050	*Ctenotus leae*			
33.	25052	*Ctenotus leonhardii*			
34.	25074	*Ctenotus schomburgkii*			
35.	25082	*Ctenotus xenopleura*			
36.	25089	*Cyclodomorphus melanops subsp. elongatus (Slender Blue-tongue)*			
37.	24997	*Delma butleri*			
38.	25247	*Demansia psammophis subsp. psammophis (Yellow-faced Whipsnake)*			
39.	25607	*Dicaeum hirundinaceum (Mistletoebird)*			
40.	24929	*Diplodactylus granariensis subsp. granariensis*			
41.	24930	*Diplodactylus granariensis subsp. rex*			
42.	24940	*Diplodactylus pulcher*			
43.	24470	*Dromaius novaehollandiae (Emu)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
44.	25092	*Egernia depressa (Southern Pygmy Spiny-tailed Skink)*			
45.		*Elanus axillaris*			
46.		*Eolophus roseicapillus*			
47.	24567	*Epthianura albifrons (White-fronted Chat)*			
48.	24568	*Epthianura aurifrons (Orange Chat)*			
49.	25621	*Falco berigora (Brown Falcon)*			
50.	25622	*Falco cenchroides (Australian Kestrel, Nankeen Kestrel)*			
51.	25301	*Furina ornata (Moon Snake)*			
52.	24959	*Gehyra variegata*			
53.	24443	*Grallina cyanoleuca (Magpie-lark)*			
54.	24961	*Heteronotia binoei (Bynoe's Gecko)*			
55.	47965	*Hieraaetus morphnoides (Little Eagle)*			
56.	24491	*Hirundo neoxena (Welcome Swallow)*			
57.		*Hoggicosa alfi*			
58.		*Hoggicosa forresti*			
59.	24557	*Leipoa ocellata (Malleefowl)*		T	
60.	25162	*Lerista picturata*			
61.	42411	*Lerista timida*			
62.	25659	*Lichenostomus leucotis (White-eared Honeyeater)*			
63.	25661	*Lichmera indistincta (Brown Honeyeater)*			
64.	41411	*Liopholis inornata (Desert Skink)*			
65.	24135	*Macropus robustus subsp. erubescens (Euro, Biggada)*			
66.		*Mainosa longipes*			
67.	25652	*Malurus leucopterus (White-winged Fairy-wren)*			
68.	25654	*Malurus splendens (Splendid Fairy-wren)*			
69.	24583	*Manorina flavigula (Yellow-throated Miner)*			
70.		*Masasteron piankai*			
71.	47997	*Melanodryas cucullata (Hooded Robin)*			
72.	25663	*Melithreptus brevirostris (Brown-headed Honeyeater)*			
73.	25184	*Menetia greyii*			
74.	25693	*Microeca fascinans (Jacky Winter)*			
75.	24904	*Moloch horridus (Thorny Devil)*			
76.	25190	*Morethia butleri*			
77.	24223	*Mus musculus (House Mouse)*	Y		
78.	25248	*Neelaps bimaculatus (Black-naped Snake)*			
79.	24966	*Nephrurus laevissimus*			
80.	24971	*Nephrurus vertebralis*			
81.		*Nicodamus mainae*			
82.	24094	*Ningaui ridei (Wongai Ningaui)*			
83.	24194	*Nyctophilus geoffroyi (Lesser Long-eared Bat)*			
84.	24407	*Ocyphaps lophotes (Crested Pigeon)*			
85.	24618	*Oreoica gutturalis (Crested Bellbird)*			
86.	25680	*Pachycephala rufiventris (Rufous Whistler)*			
87.	25682	*Pardalotus striatus (Striated Pardalote)*			
88.		*Pediana occidentalis*			
89.	48060	*Petrochelidon ariel (Fairy Martin)*			
90.	48061	*Petrochelidon nigricans (Tree Martin)*			
91.	24659	*Petroica goodenovii (Red-capped Robin)*			
92.	24409	*Phaps chalcoptera (Common Bronzewing)*			
93.	24907	*Pogona minor subsp. minor (Dwarf Bearded Dragon)*			
94.	24683	*Pomatostomus superciliosus (White-browed Babbler)*			
95.	24230	*Pseudomys albocinereus (Ash-grey Mouse)*			
96.	24237	*Pseudomys hermannsburgensis (Sandy Inland Mouse)*			
97.	42416	*Pseudonaja mengdeni (Western Brown Snake)*			
98.		*Ptilonorhynchus guttatus*			
99.	42344	*Purnella albifrons (White-fronted Honeyeater)*			
100.	25009	*Pygopus nigriceps*			
101.	24278	*Pyrrholaemus brunneus (Redthroat)*			
102.	48096	*Rhipidura albiscapa (Grey Fantail)*			
103.	25614	*Rhipidura leucophrys (Willie Wagtail)*			
104.	24982	*Rhynchoedura ornata (Western Beaked Gecko)*			
105.	25266	*Simoselaps bertholdi (Jan's Banded Snake)*			
106.	30948	*Smicrornis brevirostris (Weebill)*			
107.	24109	*Sminthopsis dolichura (Little long-tailed Dunnart)*			
108.	24114	*Sminthopsis hirtipes (Hairy-footed Dunnart)*			
109.	25597	*Strepera versicolor (Grey Currawong)*			
110.	24923	*Strophurus assimilis (Goldfields Spiny-tailed Gecko)*			
111.	24927	*Strophurus elderi*			
112.	24946	*Strophurus strophurus*			
113.	24949	*Strophurus wellingtonae*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
114.	24207	*Tachyglossus aculeatus (Short-beaked Echidna)*			
115.	24331	*Tadorna tadornoides (Australian Shelduck, Mountain Duck)*			
116.	30870	*Taeniopygia guttata (Zebra Finch)*			
117.	25203	*Tiliqua occipitalis (Western Bluetongue)*			
118.	42351	*Todiramphus pyrrhopygius (Red-backed Kingfisher)*			
119.	24983	*Underwoodisaurus milii (Barking Gecko)*			
120.		*Urodacus hoplurus*			
121.	25211	*Varanus caudolineatus*			
122.	25216	*Varanus giganteus (Perentie)*			
123.	25218	*Varanus gouldii (Bungarra or Sand Monitor)*			
Fungi					
124.		*Poronia erici*			
125.	48835	*Pycnoporus coccineus*			
Plantae					
126.	3217	*Acacia aneura (Mulga, Wanari)*			
127.	37260	*Acacia aptaneura*			
128.	3248	*Acacia burkittii (Sandhill Wattle)*			
129.	36417	*Acacia caesaneura*			
130.	3264	*Acacia colletioides (Wait-a-while)*			
131.	3273	*Acacia craspedocarpa (Hop Mulga)*			
132.	15281	*Acacia desertorum var. desertorum*			
133.	3315	*Acacia duriuscula*			
134.	32118	*Acacia effusifolia*			
135.	3324	*Acacia erinacea*			
136.	3364	*Acacia helmsiana*			
137.	3366	*Acacia hemiteles*			
138.	36418	*Acacia incurvaneura*			
139.	3393	*Acacia jennerae*			
140.	3419	*Acacia ligulata (Umbrella Bush, Watarka)*			
141.	36416	*Acacia mulganeura*			
142.	3452	*Acacia murrayana (Sandplain Wattle)*			
143.	15479	*Acacia nigripilosa subsp. nigripilosa*			
144.	19499	*Acacia ramulosa var. ramulosa*			
145.	3513	*Acacia resinimarginea*			
146.	8949	*Acacia sibirica (Bastard Mulga)*			
147.	11730	*Alectryon oleifolius subsp. canescens*			
148.	12655	*Allocasuarina spinosissima*			
149.	19466	*Aluta aspera subsp. aspera*			
150.	2372	*Amyema fitzgeraldii (Pincushion Mistletoe)*			
151.	2992	*Arabidella trisecta*			
152.	7846	*Asteridea athrixioides*			
153.	7847	*Asteridea chaetopoda*			
154.	2453	*Atriplex codonocarpa (Flat-topped Saltbush)*			
155.	11516	*Atriplex nummularia subsp. spathulata (Old Man Saltbush)*			
156.	2476	*Atriplex semilunaris (Annual Saltbush)*			
157.	2481	*Atriplex vesicaria (Bladder Saltbush)*			
158.	17246	*Austrostipa nitida*			
159.	17247	*Austrostipa platychaeta*			
160.	4591	*Bertya dimerostigma*			
161.	7871	*Brachyscome ciliaris*			
162.	247	*Bromus arenarius (Sand Brome)*			
163.	19069	*Brunonia sp. Goldfields (K.R. Newbey 6044)*			
164.	3167	*Bursaria occidentalis*			
165.	2853	*Calandrinia eremaea (Twining Purslane)*			
166.	48773	*Calandrinia quartzitica*		P1	
167.	8466	*Callitris columellaris (White Cypress Pine)*			
168.	96	*Callitris preissii (Rottnest Island Pine, Maro)*			
169.	7905	*Calotis multicaulis (Many-stemmed Burr-daisy)*			
170.	9138	*Calytrix watsonii*			
171.	12658	*Casuarina pauper (Black Oak)*			
172.	7922	*Cephalipterum drummondii (Pompom Head)*			
173.	5491	*Chamelaucium ciliatum*			
174.	2487	*Chenopodium curvispicatum*			
175.	47153	*Chrysocephalum apiculatum subsp. glandulosum*			
176.	2778	*Codonocarpus cotinifolius (Native Poplar, Kundurangu)*			
177.	40927	*Commersonia magniflora subsp. oblongifolia*			
178.	6612	*Convolvulus clementii*			
179.	6614	*Convolvulus remotus*			
180.	45514	*Cylindropuntia pallida*	Y		

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
181.	7469	*Dampiera roycei*			
182.	7480	*Dampiera tenuicaulis (Slender-stemmed Dampiera)*			
183.	6218	*Daucus glochidiatus (Australian Carrot)*			
184.	310	*Digitaria brownii (Cotton Panic Grass)*			
185.	19854	*Dillwynia sp. Coolgardie (V.E. Sands 637.3.1)*			
186.	4753	*Dodonaea amblyophylla*			
187.	4769	*Dodonaea lobulata (Bead Hopbush)*			
188.	4779	*Dodonaea rigida*			
189.	11247	*Dodonaea viscosa subsp. angustissima*			
190.	6966	*Duboisia hopwoodii (Pituri, Kundugu)*			
191.	2511	*Enchylaena tomentosa (Barrier Saltbush)*			
192.	380	*Eragrostis eriopoda (Woollybutt Grass, Wangurnu)*			
193.	13807	*Eremophila caperata*			
194.	7189	*Eremophila clarkei (Turpentine Bush)*			
195.	14895	*Eremophila decipiens subsp. decipiens*			
196.	7204	*Eremophila eriocalyx (Desert Pride)*			
197.	15052	*Eremophila forrestii subsp. forrestii*			
198.	14340	*Eremophila glabra subsp. glabra*			
199.	16475	*Eremophila glandulifera*			
200.	7219	*Eremophila granitica (Thin-leaved Poverty Bush)*			
201.	16363	*Eremophila maculata subsp. brevifolia (Native Fuchsia)*			
202.	7242	*Eremophila miniata (Kopi Poverty Bush)*			
203.	15003	*Eremophila oldfieldii subsp. angustifolia*			
204.	18570	*Eremophila oppositifolia subsp. angustifolia*			
205.	7250	*Eremophila pantonii*			
206.	48951	*Eremophila platycalyx subsp. Leonora (J. Morrisey 252)*			
207.	15054	*Eremophila platythamnos subsp. exotrachys*			
208.	15055	*Eremophila platythamnos subsp. platythamnos*			
209.	7267	*Eremophila scoparia (Broom Bush ()*			
210.	7269	*Eremophila serrulata (Serrate-leaved Eremophila)*			
211.	17162	*Eremophila subfloccosa subsp. lanata*			
212.	15155	*Eremophila youngii subsp. youngii*			
213.	2514	*Eriochiton sclerolaenoides (Woolly Bindii)*			
214.	4335	*Erodium cygnorum (Blue Heronsbill)*			
215.	5588	*Eucalyptus ceratocorys*			
216.	48436	*Eucalyptus clelandiorum*			
217.	5595	*Eucalyptus comitae-vallis (Comet Vale Mallee)*			
218.	5596	*Eucalyptus concinna (Victoria Desert Mallee)*			
219.	5662	*Eucalyptus gracilis (Yorrell)*			
220.	5673	*Eucalyptus horistes*			
221.	13056	*Eucalyptus leptopoda subsp. subluta*			
222.	5697	*Eucalyptus lesouefii (Goldfields Blackbutt)*			
223.	5701	*Eucalyptus longicornis (Red Morrel, Moril)*			
224.	20802	*Eucalyptus longissima*			
225.	19323	*Eucalyptus moderata*			
226.	5725	*Eucalyptus oldfieldii (Oldfield's Mallee)*			
227.	5726	*Eucalyptus oleosa (Giant Mallee)*			
228.	20091	*Eucalyptus oleosa subsp. oleosa*			
229.	5761	*Eucalyptus rigidula (Stiff-leaved Mallee)*			
230.	13054	*Eucalyptus websteriana subsp. websteriana*			
231.	5802	*Eucalyptus yilgarnensis (Yorrell)*			
232.	42869	*Euphorbia porcata*			
233.	17027	*Euryomyrtus leptospermoides*			
234.	16722	*Euryomyrtus maidenii*			
235.	6143	*Glischrocaryon aureum (Common Popflower)*			
236.	7988	*Gnephosis arachnoidea (Cobwebby-headed Gnephosis)*			
237.	11801	*Gonocarpus confertifolius var. helmsii*			
238.	19776	*Goodenia gypsicola*			
239.	7527	*Goodenia mimuloides*			
240.	1949	*Grevillea acuaria*			
241.	1998	*Grevillea erectiloba*		P4	
242.	14413	*Grevillea haplantha subsp. haplantha*			
243.	15844	*Grevillea juncifolia subsp. temulenta*			
244.	19541	*Grevillea nematophylla subsp. nematophylla*			
245.	19137	*Hakea lorea subsp. lorea*			
246.	17556	*Hakea recurva subsp. arida*			
247.	17557	*Hakea recurva subsp. recurva*			
248.	6172	*Haloragis dura*			
249.	6180	*Haloragis trigonocarpa*			
250.	8045	*Helipterum craspedioides (Yellow Billy Buttons)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
251.	6776	*Hemiphora elderi (Red Velvet)*			
252.	5815	*Homalocalyx thryptomenoides*			
253.	48649	*Hysterobaeckea ochropetala subsp. cometes*		P3	
254.	6779	*Lachnostachys coolgardiensis*			
255.	17209	*Lachnostachys verbascifolia var. verbascifolia*			
256.	13289	*Lawrencella davenportii*			
257.	12628	*Lemooria burkittii*			
258.	3044	*Lepidium rotundum (Veined Peppercress)*			
259.	5848	*Leptospermum fastigiatum*			
260.	41770	*Leucopogon sp. Boorabbin (K.R. Newbey 8374)*			
261.	20763	*Leucopogon sp. Coolgardie (M. Hislop & F. Hort MH 3197)*			
262.	2398	*Lysiana murrayi (Mistletoe, Parka-Parka)*			
263.	2533	*Maireana amoena*			
264.	2535	*Maireana appressa*			
265.	2538	*Maireana carnosa (Cottony Bluebush)*			
266.	2543	*Maireana eriosphaera*			
267.	2544	*Maireana georgei (Satiny Bluebush)*			
268.	2545	*Maireana glomerifolia (Ball Leaf Bluebush)*			
269.	2556	*Maireana planifolia (Low Bluebush)*			
270.	2560	*Maireana pyramidata (Sago Bush)*			
271.	11662	*Maireana tomentosa subsp. tomentosa*			
272.	2568	*Maireana trichoptera (Downy Bluebush)*			
273.	2569	*Maireana triptera (Threewinged Bluebush)*			
274.	5865	*Malleostemon roseus*			
275.	16295	*Malleostemon sp. Adelong (G.J. Keighery 11825)*		P2	
276.	41544	*Malva weinmanniana*			
277.	19421	*Marianthus bicolor (Painted Marianthus)*			
278.	12949	*Marsdenia australis*			
279.	4077	*Medicago minima (Small Burr Medic)*	Y		
280.	4079	*Medicago polymorpha (Burr Medic)*	Y		
281.	19486	*Melaleuca hamata*			
282.	5995	*Micromyrtus flaviflora*			
283.	12629	*Millotia incurva*			
284.	8116	*Myriocephalus guerinae*			
285.	6791	*Newcastelia hexarrhena (Lambs' Tails)*			
286.	6792	*Newcastelia insignis*		P2	
287.	11331	*Nicotiana occidentalis subsp. obliqua*			
288.	8140	*Olearia muelleri (Goldfields Daisy)*			
289.	8145	*Olearia pimeleoides (Pimelea Daisybush, Burrobunga)*			
290.	8151	*Olearia stuartii*			
291.	8152	*Olearia subspicata (Spiked Daisy Bush)*			
292.	14886	*Phebalium brevifolium*			
293.	4497	*Phebalium canaliculatum*			
294.	14883	*Phebalium laevigatum*			
295.	18537	*Philotheca brucei subsp. brucei*			
296.	16833	*Philotheca coateana*		P3	
297.	13229	*Phyllota humilis*			
298.	17206	*Physopsis viscida*			
299.	5231	*Pimelea angustifolia (Narrow-leaved Pimelea)*			
300.	11185	*Pimelea microcephala subsp. microcephala*			
301.	5271	*Pimelea trichostachya (Spiked Riceflower)*			
302.	6812	*Pityrodia lepidota*			
303.	7300	*Plantago drummondii (Sago Weed)*			
304.	45238	*Podolepis aristata subsp. affinis*			
305.	8188	*Pogonolepis stricta*			
306.	2708	*Ptilotus chamaecladus*			
307.	2718	*Ptilotus drummondii (Narrowleaf Mulla Mulla)*			
308.	2721	*Ptilotus exaltatus (Tall Mulla Mulla)*			
309.	2727	*Ptilotus gaudichaudii*			
310.	2731	*Ptilotus helipteroides (Hairy Mulla Mulla)*			
311.	2732	*Ptilotus holosericeus*			
312.	2747	*Ptilotus obovatus (Cotton Bush)*			
313.	2751	*Ptilotus polystachyus (Prince of Wales Feather)*			
314.	4964	*Radyera farragei (Knobby Hibiscus)*			
315.	11254	*Rhagodia preissii subsp. preissii*			
316.	13308	*Rhodanthe charsleyae*			
317.	13241	*Rhodanthe chlorocephala subsp. rosea*			
318.	13242	*Rhodanthe chlorocephala subsp. splendida*			
319.	13301	*Rhodanthe floribunda*			
320.	13293	*Rhodanthe haigii*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
321.	13238	*Rhodanthe maryonii*			
322.	13249	*Rhodanthe oppositifolia subsp. oppositifolia*			
323.	13252	*Rhodanthe pygmaea*			
324.	13254	*Rhodanthe stricta*			
325.	48890	*Roepera eremaea*			
326.	40425	*Rytidosperma caespitosum*			
327.	30434	*Salsola australis*			
328.	2356	*Santalum acuminatum (Quandong, Warnga)*			
329.	7604	*Scaevola collaris*			
330.	7644	*Scaevola spinescens (Currant Bush, Maroon)*			
331.	17056	*Schinus molle var. areira*	Y		
332.	8200	*Schoenia cassiniana (Schoenia)*			
333.	1015	*Schoenus subaphyllus*			
334.	2606	*Sclerolaena cuneata (Yellow Bindii)*			
335.	2609	*Sclerolaena diacantha (Grey Copperburr)*			
336.	2613	*Sclerolaena fimbriolata*			
337.	8877	*Sclerolaena gardneri*			
338.	2627	*Sclerolaena patenticuspis (Spear-fruit Saltbush)*			
339.	12276	*Senna artemisioides subsp. filifolia*			
340.	18430	*Senna cardiosperma*			
341.	12315	*Senna pleurocarpa var. angustifolia*			
342.	14577	*Senna sp. Meekatharra (E. Bailey 1-26)*			
343.	4970	*Sida calyxhymenia (Tall Sida)*			
344.	7018	*Solanum lasiophyllum (Flannel Bush, Mindjulu)*			
345.	7023	*Solanum nummularium (Money-leaved Solanum)*			
346.	19555	*Stackhousia muricata subsp. annual (W.R. Barker 2172)*			
347.	16200	*Stenanthemum stipulosum*			
348.	3076	*Stenopetalum filifolium*			
349.	30212	*Stenopetalum lineare var. lineare*			
350.	3081	*Stenopetalum sphaerocarpum*			
351.	8238	*Streptoglossa liatroides*			
352.	12355	*Swainsona affinis*			
353.	4220	*Swainsona canescens (Grey Swainsona)*			
354.	4221	*Swainsona colutoides (Bladder Vetch)*			
355.	12356	*Swainsona formosa*			
356.	13590	*Swainsona halophila*			
357.	4243	*Swainsona rostellata*			
358.	33216	*Tecticornia sp. Dennys Crossing (K.A. Shepherd & J. English KS 552)*			
359.	35841	*Templetonia incrassata*			
360.	48603	*Teucrium teucriiflorum*			
361.	19695	*Thryptomene eremaea*		P2	
362.	6068	*Thryptomene urceolaris*			
363.	1338	*Thysanotus manglesianus (Fringed Lily)*			
364.	6268	*Trachymene cyanopetala*			
365.	6279	*Trachymene ornata (Spongefruit)*			
366.	12652	*Trichanthodium skirrophorum*			
367.	7657	*Velleia daviesii (Hairy Velleia)*			
368.	7664	*Velleia rosea (Pink Velleia)*			
369.	6087	*Verticordia helmsii*			
370.	48986	*Vincetoxicum lineare*			
371.	13331	*Waitzia acuminata var. acuminata*			
372.	46093	*Waitzia fitzgibbonii*			
373.	9247	*Westringia rigida (Stiff Westringia)*			
374.	1403	*Wurmbea tenella (Eight Nancy)*			
375.	1257	*Xanthorrhoea thorntonii (Grass Tree)*			

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

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

Appendix 5. Systematic Species List of the Flora Recorded within the Menzies Study Area

Family	Taxon	Cons. Status
Aizoaceae	Gunniopsis propinqua	Range Extension 100km
Aizoaceae	Tetragonia eremaea	
Amaranthaceae	Ptilotus aervoides	
Amaranthaceae	Ptilotus exaltatus	
Amaranthaceae	Ptilotus gaudichaudii	
Amaranthaceae	Ptilotus helipteroides	
Amaranthaceae	Ptilotus holosericeus	
Amaranthaceae	Ptilotus obovatus	
Amaranthaceae	Ptilotus obovatus (upright form)	
Amaranthaceae	Ptilotus polystachyus	
Anacardiaceae	Schinus molle	Weed
Apiaceae	Daucus glochidiatus	
Apocynaceae	Alyxia buxifolia	
Apocynaceae	Leichhardtia australis	
Araliaceae	Hydrocotyle intertexta	
Araliaceae	Trachymene ornata	
Araliaceae	Trachymene pilosa	
Asparagaceae	Thysanotus sp. indet	
Asphodelaceae	Bulbine semibarbata	
Asteraceae	Brachyscome ciliaris	
Asteraceae	Brachyscome iberidifolia	
Asteraceae	Brachyscome sp. indet	
Asteraceae	Calotis ?hispidula	
Asteraceae	Calotis hispidula	
Asteraceae	Calotis multicaulis	
Asteraceae	Cephalipterum drummondii	
Asteraceae	Chrysocephalum apiculatum subsp. glandulosum	
Asteraceae	Chrysocephalum puteale	
Asteraceae	Cratystylis subspinescens	
Asteraceae	Olearia muelleri	
Asteraceae	Olearia pimeleoides	
Asteraceae	Rhodanthe battii	
Asteraceae	Rhodanthe charsleyae	
Asteraceae	Rhodanthe floribunda	
Asteraceae	Rhodanthe sp. indet	
Asteraceae	Roebuckiella ciliocarpa	
Asteraceae	Senecio lacustrinus	
Asteraceae	Sonchus oleraceus	Weed
Asteraceae	Streptoglossa liatroides	
Asteraceae	Streptoglossa sp. Indet.	
Asteraceae	Vittadinia eremaea	

Family	Taxon	Cons. Status
Asteraceae	Vittadinia humerata	
Boraginaceae	Heliotropium europaeum	Weed
Brassicaceae	Brassica tournefortii	Weed
Brassicaceae	Carrichtera annua	Weed
Brassicaceae	Lepidium oxytrichum	
Brassicaceae	Lepidium phlebopetalum	
Brassicaceae	Menkea ?australis	Insufficient material to ID
Brassicaceae	Menkea australis	
Brassicaceae	Menkea sphaerocarpa	
Brassicaceae	Sisymbrium erysimoides	Weed
Brassicaceae	Sisymbrium irio	Weed
Brassicaceae	Stenopetalum filifolium	
Cactaceae	Cylindropuntia pallida	Weed
Casuarinaceae	Casuarina pauper	
Celastraceae	Stackhousia muricata	
Chenopodiaceae	Atriplex bunburyana	
Chenopodiaceae	Atriplex codonocarpa	
Chenopodiaceae	Atriplex nummularia subsp. spathulata	
Chenopodiaceae	Chenopodium curvispicatum	
Chenopodiaceae	Dissocarpus paradoxus	
Chenopodiaceae	Dysphania cristata	
Chenopodiaceae	Dysphania melanocarpa	
Chenopodiaceae	Enchylaena tomentosa var. tomentosa	
Chenopodiaceae	Eriochiton sclerolaenoides	
Chenopodiaceae	Maireana georgei	
Chenopodiaceae	Maireana planifolia	
Chenopodiaceae	Maireana pyramidata	
Chenopodiaceae	Maireana sedifolia	
Chenopodiaceae	Maireana tomentosa subsp. tomentosa	
Chenopodiaceae	Maireana trichoptera	
Chenopodiaceae	Maireana triptera	
Chenopodiaceae	Rhagodia drummondii	
Chenopodiaceae	Salsola australis	
Chenopodiaceae	Sclerolaena cuneata	
Chenopodiaceae	Sclerolaena densiflora	
Chenopodiaceae	Sclerolaena diacantha	
Chenopodiaceae	Sclerolaena eriacantha	
Chenopodiaceae	Sclerolaena fusiformis	
Chenopodiaceae	Sclerolaena gardneri	
Chenopodiaceae	Sclerolaena obliquicuspis	
Colchicaceae	Wurmbea tenella	
Convolvulaceae	Convolvulus clementii	

Family	Taxon	Cons. Status
Convolvulaceae	Convolvulus recurvatus subsp. nullarborensis	Range Extension 100km Infill
Convolvulaceae	Convolvulus remotus	
Crassulaceae	Crassula colorata var. acuminata	
Cucurbitaceae	Citrullus amarus	Weed
Cucurbitaceae	Cucumis myriocarpus	Weed
Euphorbiaceae	Euphorbia australis	
Euphorbiaceae	Euphorbia australis var. subtomentosa	Range Extension 100km south
Euphorbiaceae	Euphorbia drummondii	
Fabaceae	Acacia acanthoclada subsp. acanthoclada	
Fabaceae	Acacia acuminata (narrow phyllode form)	
Fabaceae	Acacia aneura	
Fabaceae	Acacia aptaneura	
Fabaceae	Acacia burkittii	
Fabaceae	Acacia caesaneura	
Fabaceae	Acacia caesaneura (narrow phyllode variant)	
Fabaceae	Acacia collegialis	
Fabaceae	Acacia colletioides	
Fabaceae	Acacia craspedocarpa	
Fabaceae	Acacia hemiteles	
Fabaceae	Acacia incurvaneura	
Fabaceae	Acacia jennerae	
Fabaceae	Acacia ligulata	
Fabaceae	Acacia mulganeura	
Fabaceae	Acacia oswaldii	
Fabaceae	Acacia pteraneura	
Fabaceae	Acacia ramulosa var. ramulosa	
Fabaceae	Acacia sibirica	
Fabaceae	Acacia steedmanii	
Fabaceae	Acacia tetragonophylla	
Fabaceae	Acacia thoma	
Fabaceae	Medicago polymorpha	Weed
Fabaceae	Medicago truncatula	Weed
Fabaceae	Senna artemisioides subsp. ×artemisioides	
Fabaceae	Senna artemisioides subsp. ×sturtii	
Fabaceae	Senna artemisioides subsp. filifolia	
Fabaceae	Senna artemisioides subsp. helmsii	
Fabaceae	Senna cardiosperma	
Fabaceae	Senna glutinosa subsp. chatelainiana	
Fabaceae	Senna pleurocarpa subsp. angustifolia	
Fabaceae	Senna sp. Meekatharra (E. Bailey 1-26)	
Fabaceae	Swainsona canescens	

Family	Taxon	Cons. Status
Fabaceae	Swainsona kingii	
Fabaceae	Swainsona laciniata	
Fabaceae	Swainsona oliveri	
Fabaceae	Swainsona rostellata	
Fabaceae	Swainsona sp. Menzies (J. Warden & J. Paterson WB40674)	SOI - Undescribed taxon
Fabaceae	Templetonia incrassata	
Frankeniaceae	Frankenia desertorum	
Geraniaceae	Erodium aureum	Weed
Geraniaceae	Erodium cicutarium	Weed
Geraniaceae	Erodium crinitum	
Geraniaceae	Erodium cygnorum	
Goodeniaceae	Brunonia australis	
Goodeniaceae	Goodenia havilandii	
Goodeniaceae	Goodenia mimuloides	
Goodeniaceae	Goodenia occidentalis	
Goodeniaceae	Scaevola spinescens (broad leaf, non-spiny form)	
Goodeniaceae	Scaevola spinescens (broad leaf, spiny form)	
Goodeniaceae	Scaevola spinescens (narrow leaf, spiny form)	
Haloragaceae	Haloragis trigonocarpa	
Lamiaceae	Prostanthera althoferi subsp. althoferi	
Lamiaceae	Salvia verbenaca	Weed
Lamiaceae	Teucrium teucriiflorum	
Loranthaceae	Amyema benthamii	
Loranthaceae	Amyema fitzgeraldii	
Loranthaceae	Lysiana casuarinae	
Loranthaceae	Lysiana exocarpi	
Loranthaceae	Lysiana murrayi	
Loranthaceae	Lysiana sp. Indet.	Insufficient material to ID
Malvaceae	Abutilon cryptopetalum	
Malvaceae	Abutilon otocarpum subsp. prostratum	
Malvaceae	Brachychiton gregorii	
Malvaceae	Lawrencia densiflora	Range Extension 100km south
Malvaceae	Sida calyxhymenia	Check ID
Malvaceae	Sida ectogama	
Malvaceae	Sida fibulifera	
Malvaceae	Sida sp. dark green fruits (S. van Leeuwen 2260)	
Malvaceae	Sida sp. spiciform panicles (E.Leyland s.n. 14/8/90)	Range extension 240km SSE
Malvaceae	Sida sp. Indet.	Insufficient material to ID
Malvaceae	Sida spodochroma	

Family	Taxon	Cons. Status
Malvaceae	Unknown sp. Indet.	Insufficient material to ID
Montiaceae	Calandrinia eremaea	
Montiaceae	Calandrinia porifera	
Montiaceae	Calandrinia sp. Indet.	Insufficient material to ID
Myrtaceae	Eucalyptus celastroides subsp. celastroides	
Myrtaceae	Eucalyptus clelandiorum	
Myrtaceae	Eucalyptus concinna	
Myrtaceae	Eucalyptus corrugata	Growing in rehab
Myrtaceae	Eucalyptus griffithsii	Growing in rehab
Myrtaceae	Eucalyptus oleosa subsp. oleosa	
Myrtaceae	Eucalyptus ravida	Growing in rehab
Myrtaceae	Eucalyptus salubris	Growing in rehab
Myrtaceae	Eucalyptus striaticalyx	Growing in rehab
Myrtaceae	Eucalyptus woodwardii	Growing in rehab
Nyctaginaceae	Boerhavia coccinea	
Pittosporaceae	Pittosporum angustifolium	
Plantaginaceae	Plantago debilis	
Plantaginaceae	Plantago drummondii	
Plantaginaceae	Plantago sp. Mt Magnet (A.S. George 6793)	
Poaceae	Amphipogon caricinus	
Poaceae	Aristida contorta	
Poaceae	Austrostipa ?scabra	Insufficient material to ID
Poaceae	Austrostipa elegantissima	
Poaceae	Austrostipa platychaeta	
Poaceae	Austrostipa scabra subsp. scabra	
Poaceae	Austrostipa sp. Indet	Insufficient material to ID
Poaceae	Austrostipa tuckeri	
Poaceae	Cenchrus ciliaris	Weed
Poaceae	Cynodon dactylon	Weed
Poaceae	Dactyloctenium radulans	
Poaceae	Dichanthium sericeum subsp. humilius	
Poaceae	Enneapogon avenaceus	
Poaceae	Enneapogon caerulescens	
Poaceae	Enneapogon cylindricus	
Poaceae	Enneapogon polyphyllus	
Poaceae	Enteropogon ramosus	
Poaceae	Eragrostis dielsii	
Poaceae	Eragrostis eriopoda	
Poaceae	Eragrostis kennedyae	
Poaceae	Eragrostis setifolia	

Family	Taxon	Cons. Status
Poaceae	Eriachne pulchella subsp. pulchella	
Poaceae	Iseilema membranaceum	Range Extension 100 km
Poaceae	Lachnagrostis filiformis	
Poaceae	Monachather paradoxus	
Poaceae	Paspalidium clementii	
Poaceae	Rytidosperma caespitosum	
Poaceae	Tripogonella loliiformis	
Polygonaceae	Rumex vesicarius	Weed
Portulacaceae	Portulaca oleracea	
Primulaceae	Lysimachia arvensis	Weed
Proteaceae	Grevillea berryana	
Proteaceae	Hakea preissii	
Proteaceae	Hakea recurva subsp. recurva	
Pteridaceae	Cheilanthes brownii	
Pteridaceae	Cheilanthes sieberi subsp. sieberi	
Rubiaceae	Psydrax suaveolens	
Rutaceae	Philotheca brucei subsp. brucei	
Santalaceae	Exocarpos aphyllus	
Santalaceae	Santalum spicatum	
Sapindaceae	Alectryon oleifolius	
Sapindaceae	Dodonaea ?pinifolia	Insufficient material to ID
Sapindaceae	Dodonaea lobulata	
Sapindaceae	Dodonaea rigida	
Sapindaceae	Dodonaea viscosa subsp. angustissima	
Scrophulariaceae	Eremophila alternifolia	
Scrophulariaceae	Eremophila clarkei	
Scrophulariaceae	Eremophila decipiens subsp. decipiens	
Scrophulariaceae	Eremophila eriocalyx	
Scrophulariaceae	Eremophila georgei	
Scrophulariaceae	Eremophila glabra subsp. glabra	
Scrophulariaceae	Eremophila granitica	
Scrophulariaceae	Eremophila latrobei subsp. latrobei	
Scrophulariaceae	Eremophila longifolia	
Scrophulariaceae	Eremophila metallicorum	
Scrophulariaceae	Eremophila oldfieldii subsp. angustifolia	
Scrophulariaceae	Eremophila oppositifolia subsp. angustifolia	
Scrophulariaceae	Eremophila pantonii	
Scrophulariaceae	Eremophila pustulata	
Scrophulariaceae	Eremophila scoparia	
Scrophulariaceae	Eremophila serrulata	
Scrophulariaceae	Eremophila sp. Mt Jackson (G.J. Keighery 4372)	

Family	Taxon	Cons. Status
Scrophulariaceae	Myoporum montanum	Range Extension 100km Infill
Solanaceae	Duboisia hopwoodii	
Solanaceae	Lycium australe	
Solanaceae	Nicotiana occidentalis	
Solanaceae	Nicotiana rotundifolia	
Solanaceae	Solanum cleistogamum	
Solanaceae	Solanum hoplopetalum	
Solanaceae	Solanum lasiophyllum	
Solanaceae	Solanum nigrum	Weed
Solanaceae	Solanum nummularium	
Thymelaeaceae	Pimelea microcephala subsp. microcephala	
Urticaceae	Parietaria cardiostegia	
Zygophyllaceae	Roepera apiculata	
Zygophyllaceae	Roepera iodocarpa	
Zygophyllaceae	Tribulus terrestris	Weed
Unknown	sp. Indet.	Glaucus blue annual?

Appendix 6. Detailed Vegetation mapping of the Menzies Study Area

307000
308000
309000
6715000
6714000

DRMS
DIST
EsSafS
DIST
DRMS
DIST
CPBS
EsSafS
PSAS
CPBS
CPBS
LIRS
DIST
GHAS-As
DIST
CPBS
PSAS
HPMS
DIST
CpAsS
GHAS-As
PSAS
DRMS

Imagery: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Legend

Survey Area

Sheet Layout

N

0 100 200 m

Scale: 1:10,000
MGA94 (Zone 51)

CAD Ref: a2796_M_R02_09

Date: Jan 2025 | Rev: A | A3

Western Botanical

Author: G. Cockerton | WB Ref:

Drawn: CAD Resources ~ www.cadresources.com.au
Tel: (08) 9246 3242 ~ Fax (08) 9246 3202

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Menzies Study Area
Vegetation Mapping - Sheet 1 of 5

308000 309000 310000

6713000

6712000

GHAS-As
DIST
DIST
PSAS
DRMS
PSAS
DIST
GHAS-As
GHAS-As
PSAS
CPBS
DIST
DRMS
GHAS-As
DIST
CpAsS
CpAsS
GHAS-As
GHAS-As
DIST
GHAS-As
CpAsS
GHAS-As
GHAS-Ac
PSAS
CpAsS
CPBS
PSAS
PSAS

308000 309000 310000

Imagery: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Legend

Survey Area

Sheet Layout

N

0 100 200 m

Scale: 1:10,000
MGA94 (Zone 51)

CAD Ref: a2796_M_R02_09

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Menzies Study Area
Vegetation Mapping - Sheet 2 of 5

308000 309000 310000 311000

6711000 6710000 6709000

GHAS-As GHAS-As GHAS-As GHAS-As CpAsS PSAS DIST CpAsS GHAS-As GHAS-Ac PSAS PSAS PSAS DRMS GHAS-As PSAS CPBS DIST CpAsS CpAsS GHAS-As EclW GHAS-As DRMS PSAS CpAsS DIST DIST GHAS-As GHAS-As GHAS-As EclW CpAsS DIST GHAS-As DRMS CPBS DRMS EclW EolW DIST GHAS-As CpAsS LIRS GHAS-As EclW GHAS-Ac CPBS GHAS-As GHAS-As DRMS GHAS-Ac CPBS CpAsS CpAsS CPBS

Imagery: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Legend

Survey Area

Sheet Layout

0 100 200 m

Scale: 1:10,000
MGA94 (Zone 51)

CAD Ref: a2796_M_R02_09

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Menzies Study Area
Vegetation Mapping - Sheet 3 of 5

309000 310000 311000 312000

6709000 6708000 6707000

EolW
GHAS-As
GHAS-As
CpAsS
CpAsS
DRMS
CPBS
GHAS-Ac
CPBS
GHAS-As
CPBS
GHAS-As
CPBS
GHAS-As
CPBS
OG
EceW
EolW
GHAS-As
EclW
GHAS-As
HPMS
CpAsS
EclW
CpAsS
HPMS
PSAS
DIST

309000 310000 311000 312000

Legend

Survey Area

Sheet Layout

N

0 100 200 m

Scale: 1:10,000
MGA94 (Zone 51)

CAD Ref: a2796_M_R02_09

Date: Jan 2025 | Rev: A | A3

Western Botanical

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Menzies Study Area
Vegetation Mapping - Sheet 4 of 5

Imagery: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

310000 311000 312000 313000

6707000 6706000 6705000

GHAS-As
CpAsS
HPMS
EclW
CpAsS
EolW
HPMS
DIST
HPMS
GHAS-As
CPBS
DRMS
CPBS
CpAsS
GHAS-As
HPMS

Imagery: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Legend

Survey Area

Sheet Layout

0 100 200 m

Scale: 1:10,000
MGA94 (Zone 51)

CAD Ref: a2796_M_R02_09

Date: Jan 2025 | Rev: A | A3

Western Botanical

Author: G. Cockerton | WB Ref:

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Menzies Study Area
Vegetation Mapping - Sheet 5 of 5

Appendix 7. Descriptions of Vegetation Associations of the Menzies Study Area.

LIRS - Lateritic ironstone ridge *Acacia* shrubland

The Lateritic ironstone ridge *Acacia* shrubland Vegetation Association consists of an upper-stratum dominated by *Acacia caesaneura* 3 m, *Acacia sibirica* 3 m, *Acacia tetragonophylla* 3 m *Eremophila oldfieldii* 3 m, occasional *Casuarina pauper* 3 m and *Hakea recurva* subsp. *recurva* 2.5 m with a PFC of 2-10%, over a mid-stratum shrubland comprised of *Philotheca brucei* subsp. *brucei* 1-1.5m, *Dodonaea lobulata* 1 m, *Eremophila latrobei* subsp. *latrobei* 1.2 m, *Sida ectogama* 1m, *Leichhardtia australis* 1.5 m and *Scaevola spinescens* 1 m with a PFC of 5-15%. The lower-stratum consists of *Sida calyxhymenia* 0.2 m, *Ptilotus obovatus* (upright form) 0.2 m, *Boerhavia clementii* 0.01 m, *Abutilon cryptopetalum* 0.1 m, *Cheilanthes sieberi* 0.2 m and annual grasses including *Enneapogon caerulescens, E. polyphyllus* and *E. cylindricus* 0.1-0.2 m with a 2-5% PFC.

This unit is associated with pronounced greenstone ridges with red loamy soils and abundant large lateritic ironstone surface fragments. It is restricted to two sites, in the north and the centre, making up 5.32 ha (0.33%) of the Study Area. The condition of the vegetation comprising the LIRS Vegetation Association ranges from Good to Excellent with clearing and environmental rubbish evident and present at both sites.

GHAS-As - Greenstone hill *Acacia sibirica* shrublands

The Greenstone hill *Acacia sibirica* shrublands Vegetation Association consists of an upper-stratum dominated by *Acacia sibirica* 4-7 m, *Casuarina pauper* 4-8 m, and *Acacia aneura* 4-5 m with a PFC of 5-15%, over a mid-stratum shrubland of *Acacia tetragonophylla* 2-3 m, *Dodonaea lobulata* 1-1.6 m, *Eremophila oldfieldii* 2-3 m, *Scaevola spinescens* 1.5 m, *Leichhardtia australis* 2 m, *Senna artemisioides* subsp. *filifolia* 1.5 m with occasional *Santalum spicatum* 3 m, *Eremophila oppositifolia* 3 m and *Dodonaea rigida* 1.2 m with a PFC of 3-10%, over an open understory composed of *Ptilotus obovatus* 0.4 m, *Enchylaena tomentosa* var. *tomentosa* 0.1 m, *Enneapogon caerulescens* 0.2 m and *Haloragis trigonocarpa* 0.05 m.

It is associated with red earths on hills and low rises of greenstones or basalts indurated by iron. This association comprises 315.71 ha (19.38%) of the Study Area. The condition of the vegetation is considered mostly Excellent, with evidence of grazing from rabbits apparent at all sites.

GHAS-Ac - Greenstone hill *Acacia collegialis* shrublands

The Greenstone hill *Acacia collegialis* shrublands Vegetation Association consists of an upper-stratum dominated by *Acacia collegialis* 3-5 m and occasional *Acacia craspedocarpa* 3-4 m with a PFC of 10-20%, over a mid-stratum shrubland of *Eremophila latrobei* subsp. *latrobei* 1.6 m, *Senna artemisioides* subsp. *filifolia.* 1.2 m, *Scaevola spinescens* (narrow leaf, spiny form) 1.2 m, *Acacia tetragonophylla* 1-2 m, *Dodonaea lobulata* 1.3 m and *Senna cardiosperma* 1 m with a PFC of 5- 10%; over herbs; *Chrysocephalum puteale* 0.3 m, *Cheilanthes sieberi* subsp. *sieberi* 0.2 m, *Sida* sp. spiciform panicles (E.Leyland s.n. 14/8/90) 0.6 m *Swainsona* sp. Menzies (J. Warden & J. Paterson WB40674), *Goodenia mimuloides* 0.05 m, *Ptilotus helipteroides* 0.05 m, *Calandrinia eremaea* 0.5 m and grasses including *Amphipogon caricinus* 0.2 m, *Aristida contorta* 0.2 m, *Enneapogon caerulescens* 0.2 m, *Austrostipa scabra* subsp. *scabra* 0.3 m with a PFC of 10%.

It is strongly associated with summits of greenstone hills comprising red earths and highly weathered basalts. The GHAS-Ac Vegetation Association is restricted to just three locations located around the central portion of the Study Area, comprising 24.3 ha (1.49%). The condition of the vegetation is considered mostly Excellent, with limited clearing from historic mining and exploration programs evident throughout.

EceW - Greenstone hill *Eucalyptus celastroides* woodlands

The Greenstone hill *Eucalyptus celastroides* woodlands Vegetation Association consists of an upper-stratum dominated by *Eucalyptus celastroides* 6-7 m and occasional *Casuarina pauper* 6- 8 m and *Acacia sibirica* 5 m with a PFC of 10-20%, over a mid-story open shrubland of *Eremophila oppositifolia subsp. angustifolia* 2-3m, *Eremophila* sp. Mt Jackson (G.J. Keighery 4372) 2-3 m and occasional *Dodonaea lobulata* 1 m, *Eremophila scoparia* 1.5 m, *Scaevola spinescens* (broad leaf, spiny form) 1.2 m and *Eremophila pustulata* 1.2 m with a PFC of 2-5%, over an open Chenopod-dominated understory of *Atriplex bunburyana* 0.3 m, *Maireana georgei* 0.2 m, *Maireana trichoptera* 0.2 m, *Sclerolaena fusiformis* 0.1 m, *Sclerolaena gardneri* 0.2 m, *Enchylaena tomentosa* var. *tomentosa* 0.3 m PFC 1-3%. Steeper breakaway sites contain *Frankenia desertorum* 0.2 m.

This Vegetation Association is strongly associated with eroding greenstone or basalt hillslopes and breakaways. It is reasonably restricted, only occurring in three sites around the central portion of the Study Area, and comprising 1.63 ha (0.1%) of the Study Area. The condition of the vegetation within this unit is considered Excellent, with disturbance from historic mining evident in Q28 only.

CpAsS - *Casuarina pauper - Acacia sibirica* shrublands

The *Casuarina pauper - Acacia sibirica* shrublands Vegetation Association consists of an upper-stratum dominated by *Casuarina pauper* 6-8m and *Acacia sibirica* 4-6m with a PFC of 10-15%, over a mid-storey shrubland of *Senna artemisioides* subsp. *filifolia* 1-2m, *Acacia tetragonophylla* 1-2 m, *Dodonaea lobulata* 1.5 m, *Eremophila scoparia* 2 m, *Leichhardtia australis* 2 m and occasional *Acacia burkittii* 3 m, *Acacia hemiteles* 3 m and *Sida ectogama* 1.2 m with a PFC of 10- 15%. The lower stratum consists of *Austrostipa elegantissima* 0.5 m, *Maireana trichoptera* 0.2 m, *Enchylaena tomentosa var. tomentosa,* 0.2 m *Erodium* spp. 0.01 m, *Roepera apiculata* 0.1 m and *Atriplex bunburyana* 0.3 m with a PFC of 1-25%.

This Vegetation Association is widespread across the Study Area – making up and comprises 149.5 ha (9.18%) of the total area. It occurring on stony rises and plains with moderate to abundant mixed mantles of greenstone, quartz and ironstone pebbles and cobbles. The condition of the vegetation within this unit it typically Excellent, becoming poorer on approach to heavily mined locations.

CPBS - Calcyphytic pearl bluebush (*Maireana sedifolia*) shrublands

The Calcyphytic pearl bluebush (*Maireana sedifolia*) shrublands Vegetation Association consists of an emergent upper-stratum of *Casuarina pauper* 6-8 m and *Acacia sibirica* 4-6 m with a PFC of 1-2%, over a mid-stratum shrubland dominated by *Maireana sedifolia* 1.5 m with *Senna artemisioides* subsp. *filifolia* 1 m, *Maireana pyramidata* 1 m, *Leichhardtia australis* 1 m and occasional *Eremophila scoparia* 1.5 m with a PFC of 5-12%. The understory consists of *Enneapogon caerulescens* 0.1 m, *Enneapogon polyphyllus* 0.1 m, *Erodium* spp. 0.01 m, *Atriplex bunburyana* 0.3 m, *Convolvulus clementii* 0.05 m, *Solanum lasiophyllum* 0.1 m, *Enteropogon ramosus* 0.2 m, *Sida fibulifera* 0.01 m and *Abutilon cryptopetalum* 0.1 m with a 2-5% PFC.

This unit occurs on stony plains and foot slopes of low greenstone rises with creamy orange clay loam soils and abundant mantles of mixed quartz, ironstone and calcrete. It is common and comprises 118.6 ha (7.28%) of the Study Area, located particularly towards the southeast. The condition of the Vegetation comprising this Vegetation Association is considered Good to Excellent, with areas close to mining and disturbance in poorer condition.

EclW - Calcrete platform *Eucalyptus clelandiorum* woodlands

The Calcrete platform *Eucalyptus clelandiorum* woodlands Vegetation Association consists of an emergent upper-stratum of *Eucalyptus clelandiorum* 8-10 m with a PFC of 10-20% over a mid-stratum scattered shrubland of *Eremophila scoparia* 1 m, *Acacia oswaldii* 1.5 m, *Scaevola spinescens* 1 m and *Senna artemisioides* subsp. *filifolia* 1.2 m with a PFC of 1%, over a sparse understorey of *Ptilotus obovatus* (upright form) 0.6m, *Roepera apiculata* 0.1 m, *Enneapogon caerulescens* 0.1 m, *Maireana trichoptera* 0.1 m, *Olearia muelleri* 0.3 m with a PFC of <1%.

Eucalyptus clelandiorum woodlands are associated with low calcrete platforms, limited to several areas around the central portion of the Study Area comprises 12.27 ha (0.75%). While these sites are generally species-poor compared to other Vegetation Associations, this is a result of plant allelopathy, and are considered to be in Excellent condition.

HPMS - Hardpan mulga shrublands

The Hardpan mulga shrublands Vegetation Association consists of an upper-stratum dominated by *Acacia caesaneura* 4-6 m, *Acacia aneura* 5-7 m, *Acacia ramulosa* var. *ramulosa* 3-4 m, occasional *Acacia mulganeura* 3-4 m and *Acacia craspedocarpa* 3-4 m with a PFC of 15-35%, over a mid-stratum shrubland of *Acacia tetragonophylla* 2.5 m, *Scaevola spinescens* 1.2 m and occasional *Acacia ligulata* 3 m and *Dodonaea rigida* 1.2 m with a PFC of 8-12%, over a lower-stratum of *Enneapogon caerulescens* 0.2 m, *Erodium* spp. 0.01 m, *Leichhardtia australis* 0.1 m, *Solanum lasiophyllum* 0.1 m, *Cheilanthes sieberi* subsp. *sieberi* 0.2 m, *Eragrostis eriopoda* 0.2 m, *Monachather paradoxus* 0.2 m *and Goodenia mimuloides* 0.05 m with a PFC of 2-10%.

It is associated with level to very gentle inclined plains subject to sheet flow, often with mantles of fine ironstone gravel. This Vegetation Association is common across the Study Area comprising 63.03 ha (3.87%) – primarily to the west, where it corresponds to the Rainbow land system i.e., hardpan plains supporting Mulga tall shrublands (Pringle et al. 1994). The condition of the vegetation within this unit is considered Excellent, however, extensive gridded clearing from historic mining and exploration drilling programs is evident throughout.

EsSafS - *Eremophila scoparia - Senna artemisioides* subsp. *filifolia* shrublands

The *Eremophila scoparia - Senna artemisioides* subsp. *filifolia* shrublands Vegetation Association consists of an emergent upper-stratum of *Casuarina pauper* 4-6 m with occasional *Acacia aptaneura* 5 m, *Acacia caesaneura* 5 m and *Alectryon oleifolius* 4-5 m with a PFC of 1-5%, over a mid-stratum shrubland dominated by *Eremophila scoparia* 1-3 m, *Senna artemisioides* subsp. *filifolia* 1-2 m with *Acacia jennerae* 2-3 m, *Scaevola spinescens* (narrow leaf, spiny form) 1-1.5 m, *Pimelea microcephala* 1.5 m, *Leichhardtia australis* 1.5 m and *Rhagodia drummondii* 1 m with a PFC of 10-25%. The lower-stratum consists of *Enchylaena tomentosa* var. *tomentosa* 0.3 m, *Erodium* spp., 0.01 m, *Maireana trichoptera* 0.2 m, *Atriplex bunburyana* 0.3 m, *Convolvulus angustissimus* 0.05 m, *Solanum lasiophyllum* 0.2 m, *Austrostipa elegantissima* 0.5 m, *Paspalidium basicladum* 0.2 m, *Enneapogon caerulescens* 0.2 m and *Enneapogon polyphyllus* 0.1 m with a PFC of 3%.

This Vegetation Association is associated with orange sandy clay soils occurring on flat plains and areas of broad drainage; common in the northern portion of the Study Area comprising 70.45 ha (4.32%). The condition of the vegetation is considered as Excellent.

PSAS - Sago bush (*Maireana pyramidata*) low shrubland

The Sago bush (*Maireana pyramidata*) low shrubland Vegetation Association consists of an upper-stratum dominated by *Maireana pyramidata* 0.5-1.5 m with *Atriplex bunburyana* 0.6-1.2 m and **Cenchrus ciliaris* 0.6 m with a PFC of 5-25%, over low herbs and grasses including *Enneapogon caerulescens* 0.2 m, *Enneapogon polyphyllus* 0.2 m, *Dactyloctenium radulans* 0.1 m, *Dysphania melanocarpa* 0.1 m, *Sida fibulifera* 0.01 m, **Carrichtera annua* 0.1 m and *Enteropogon ramosus* 0.3 m with a PFC of 10-15%.

This unit commonly occurs on self-mulching clay soils, in alluvial plains and is widespread in the eastern portion of the Study Area comprising 131.34 ha (8.06%). Out of all Vegetation Associations observed, the *Maireana pyramidata* low shrubland appears to be most susceptible to weed invasion, perhaps a function of its low position in the landscape and availability to receive run-on from adjacent disturbed areas. Also, *Maireana pyramidata* is preferentially grazed by cattle which has added to the transportation of these weed species to these locations.

EolW - Calcareous plain *Eucalyptus oleosa -Acacia* woodlands

The Calcareous plain *Eucalyptus oleosa* - *Acacia* woodlands Vegetation Association consists of an upper-stratum dominated by *Eucalyptus oleosa* 6-8 m and occasional *Eucalyptus concinna* 6- 8 m with a PFC of 5-15%, over mulga-dominated shrublands consisting of *Acacia aneura* 4 m, *Acacia caesaneura* (narrow phyllode variant) 5 m, *Acacia sibirica* 5 m and *Acacia ramulosa* var. *ramulosa* 3 m with a PFC of 10%, over a lower-stratum shrubland of *Dodonaea lobulata* 2 m, *Eremophila oldfieldii* 2 m, *Acacia tetragonophylla* 2 m, *Dodonaea rigida* 1.5 m, *Senna artemisioides* subsp. *filifolia* 1.5 m and *Scaevola spinescens* (narrow leaf, spiny form) 1 m with a PFC 5-10%, over *Eremophila longifolia* 0.2 m, *Ptilotus obovatus* (upright form) 0.6 m, *Sida* sp. dark green fruits (S. van Leeuwen 2260) 0.3 m, *Solanum lasiophyllum* 0.1 m and *Enneapogon caerulescens* 0.1 m with a PFC of 2%.

This Vegetation Association comprises 139.85 ha (8.58%) of the Study Area. It occurs on orange sandy clay loam on very gently undulating to level plains and is strongly related to the Calcareous plain *Eucalyptus concinna* - *Acacia* woodlands, separated by the dominant overstorey eucalypt species. It is generally in an Excellent condition.

EcoW - Calcareous plain *Eucalyptus concinna* - *Acacia* woodlands

The Calcareous plain *Eucalyptus concinna* - *Acacia* woodlands Vegetation Association consists of an upper-stratum dominated by *Eucalyptus concinna* 6-10 m with occasional *Eucalyptus oleosa* 6-8 m with a PFC of 10-15%, over an *Acacia*-dominated mid-stratum shrubland consisting of *Acacia sibirica* 4-5 m, and occasional mulgas, *Acacia aneura* 4-5 m, *Acacia aptaneura* 6-7 m and *Acacia incurvaneura* 6-8 m with a PFC 5-10%, over a lower shrubland of *Dodonaea lobulata* 1 m, *Senna artemisioides* subsp. f*ilifolia* 1.5 m, *Acacia tetragonophylla* 1-2 m, *Eremophila scoparia* 1.5 m, *Scaevola spinescens* (narrow leaf, spiny form) 1.2 m, and occasional *Santalum spicatum* 2.5 m, with a PFC of 10-15%, over a grasses and Chenopods including *Enneapogon caerulescens* 0.1 m *Paspalidium basicladum* 0.2 m, *Monachather paradoxus* 0.2 m, *Enchylaena tomentosa* var. *tomentosa* 0.2 m, *Maireana trichoptera* 0.2 m, *Atriplex bunburyana* 0.3 m, *Olearia muelleri* 0.4 m and *Ptilotus obovatus* 0.4 m with a PFC of 1-3%

This Vegetation Association occurs on orange sandy clay loam on very gently undulating to level plains, and is strongly related to the Calcareous plain *Eucalyptus oleosa* - *Acacia* woodlands, separated by the dominant overstorey eucalypt species. It is generally in an Excellent condition.

OG - Open grassland

The Open grassland Vegetation Association consists of a very open grassland dominated by *Enneapogon* spp. The upper-stratum includes emergent *Acacia aptaneura* 1 m, *Senna artemisioides* subsp. *filifolia* 1 m, *Atriplex bunburyana* 0.1 m and *Ptilotus obovatus* 0.6 m with a PFC of <1%, over grasses including *Enneapogon caerulescens*, *E. polyphyllus*, and *E. cylindricus* 0.2 m with low Chenopods including *Sclerolaena obliquicuspis* 0.1 m, *Maireana trichoptera* 0.1 m, *Eriochiton sclerolaenoides* 0.1 m *Dysphania melanocarpa* 0.1 m *Sclerolaena diacantha* 0.1 m, and herbs including **Salvia verbenaca* 0.1 m, *Swainsona laciniata* 0.01 m, *Swainsona rostellata* 0.01 m, **Citrullus amarus* 0.05 m and *Salsola australis* 0.1 m.

The Open grassland Vegetation Association was only encountered in one location and comprises 3.01 ha (0.18%) of the Study Area. It is associated with silty clay soils, occurring at foot of a low greenstone rise near a drainage channel. The vegetation comprising this unit is considered Good, with evidence of historical disturbance and grazing by cattle and rabbits at this site.

DRMS - Drainage tract Mulga shrublands

The Drainage tract Mulga shrublands Vegetation Association consists of an *Acacia*-dominated upper-stratum of *Acacia aptaneura* 6-8 m, *Acacia caesaneura* 6 m, *Acacia mulganeura* 3-6 m with *Acacia sibirica* 4-6 m and *Casuarina pauper* 6-8 m with a PFC of 15-35%, over a mid-stratum shrubland of *Acacia ramulosa* var. *ramulosa* 3-4 m, *Acacia tetragonophylla* 3-4 m, *Eremophila oldfieldii* subsp. *angustifolia* 3 m, *Eremophila longifolia* 3 m and occasional *Senna artemisioides* subsp. *filifolia* 2 m and *Acacia burkittii* 3 m with a PFC of 10-20%, over a species-rich herb understory of *Abutilon cryptopetalum* 0.1 m, *Enneapogon caerulescens* 0.1 m, *Goodenia mimuloides* 0.05 m, *Paspalidium basicladum* 0.2 m, *Swainsona laciniata* 0.01 m, *Haloragis trigonocarpa* 0.1 m, *Dysphania melanocarpa* 0.1 m, *Vittadinia eremaea* 0.1 m, *Rhodanthe charsleyae* 0.1 m, *Calotis hispidula* 0.1 m, *Calandrinia eremaea* 0.1 m, *Portulaca oleracea* 0.01 m and *Convolvulus angustissimus* 0.1 m with. PFC of 10-15%.

This Vegetation Association is strongly associated with red-brown silty clay sands occurring in broad to narrow incised drainage channels. The vegetation comprising the Drainage tract Mulga Woodland Vegetation makes up 256.73 ha (15.76%) of the Study Area, and is generally in Excellent condition with some evidence of grazing weed invasion. Due to its lower level in the landscape the DRMS association is more susceptible to spread of weeds through hydrochory following rainfall events.

Appendix 8. Quadrat Site Descriptions and Data

Kingwest Menzies **Site** Q01

Described by JW JP **Date** 6/05/2021 **Type** Q 20x20

MGA Zone 51 308240 **mE** 6714953 **mN**

Habitat EsSaf - Eremophila scoparia - Senna artemisioides subsp. filifolia. Flat to gentle slope. Broad drainage.

Soil Orange/red sandy clay loam with isolated (<2%) quartz and rounded ironstone lag gravel (2-60mm)

Rock Type Unknown, subcropping

Vegetation Acacia aptaneura 4-6m, Alectryon oleifolius 4-5m PFC 1-5% over Eremophila scoparia 1-3m, Acacia jennerae 2m, Hakea preissii 3m PFC 2-5% over Senna artemisioides subsp. filifolia 1.2m Eremophila scoparia 1m, Scaevola spinescens 0.5m and occasional Maireana sedifolia PFC 20-25% over herbs inc. Solanum lasiophyllum 1.2m Ptilotus obovatus 0.3m Sclerolaena diacantha 0.1m and grasses inc. Enneapogon caerulescens, E. polyphyllus, PFC <1%.

Veg Condition Excellent

Fire Age Long unburnt

Notes Evidence of rabbit grazing.

SPECIES LIST:

Name	Cover	Height
Hakea preissii	2	3.5
Eremophila scoparia	5	3-3.5
Acacia jennerae	1	2.5
Senna artemisioides subsp. filifolia	15	1-1.8
Eremophila scoparia	2	1
Maireana sedifolia	0.5	0.8
Pimelea microcephala subsp. microcephala	+	0.5-1
Casuarina pauper	+	1.6
Ptilotus obovatus	+	0.1
Eremophila scoparia	+	0.3
Maireana pyramidata	+	0.5
Enteropogon ramosus	+	0.2
Acacia jennerae	+	0.1-0.4
Solanum lasiophyllum	+	0.2
Brachyscome iberidifolia	+	0.4
Enneapogon caerulescens	1	0.1
Enneapogon polyphyllus	+	0.1
Sida spodochroma	+	0.05
Senna artemisioides subsp. filifolia	+	0.2
Leichhardtia australis	+	0.2
Enchylaena tomentosa var. tomentosa	+	0.15
Monachather paradoxus	+	0.2
Austrostipa elegantissima	+	0.3
Sclerolaena diacantha	+	0.1
Acacia tetragonophylla	+	1
Enneapogon cylindricus	+	0.1
Chenopodium curvispicatum	+	0.2
Cenchrus ciliaris	out	0.5
Scaevola spinescens (narrow leaf, spiny form)	+	0.6
Rhagodia drummondii	out	0.6
Euphorbia drummondii	out	0.01
Dodonaea lobulata	out	1
Salsola australis	out	0.1
Alectryon oleifolius	out	4
Acacia aptaneura	out	4
Paspalidium basicladum	out	0.4
Maireana trichoptera	+	0.2
Erodium cygnorum	+	0.1
Sclerolaena obliquicuspis	+	0.1
Eriochiton sclerolaenoides	+	0.1
Swainsona rostellata	+	0.01
Convolvulus angustissimus	+	0.1
Lepidium oxytrichum	+	0.1
Cephalipterum drummondii	+	0.1
Swainsona laciniata	+	0.01
Vittadinia eremaea	out	0.15
Senna artemisioides subsp. artemisioides	out	0.6

Kingwest Menzies **Site** Q02

Described by JW JP **Date** 6/05/2021 **Type** Q 20x20

MGA Zone 51 308703 **mE** 6714664 **mN**

Habitat Lateritic Ironstone Ridge

Soil Firm orange-red sandy clay loam with discontinuous (80-85%) lateritic lag gravel (2-600mm) and some (10-20%)

Rock Type Lateritic ironstone

Vegetation Eremophila oldfieldii 3-4m, Acacia sibirica 3m, Casuarina pauper 2m, PFC 1-2% over Acacia tetragonophylla 1m, Dodonaea lobulata 1m, Scaevola spinescens 0.8m, Philotheca brucei 0.7m, Sida ectogama 1m PFC 5-10% over herbs and grasses PFC 2-3% with Maireana sedifolia 0.6m Ptilotus obovatus, Enneapogon caerulescens, Enneapogon polyphyllus, Sida sp. spiciform panicles (E.Leyland s.n. 14/8/90) and Cheilanthes sieberi.

Veg Condition Excellent

Fire Age Long unburnt

Notes Track/lookout adjacent to plot. Many broken bottles and discarded rubbish around

SPECIES LIST:

Name	Cover	Height
Eremophila oldfieldii	1	2-3
Casuarina pauper	+	2.5
Acacia aneura	+	3
Maireana sedifolia	1	0.8
Dodonaea lobulata	3	1-1.6
Philotheca brucei subsp. brucei	2	1.2
Sida ectogama	1	1.2
Acacia tetragonophylla	+	1-2
Scaevola spinescens (narrow leaf, spiny form)	+	1.2
Scaevola spinescens (broad leaf, spiny form)	1	1.2-2
Leichhardtia australis	+	0.6
Eremophila oppositifolia	+	0.8
Ptilotus obovatus (upright form)	1	0.7
Ptilotus helipteroides	+	0.1
Enneapogon polyphyllus	+	0.1
Enneapogon caerulescens	3	0.1
Cheilanthes brownii	+	0.1
Tribulus occidentalis	+	0.05
Portulaca oleracea	+	0.1
Sida sp. spiciform panicles (E.Leyland s.n. 14/8/90)	+	0.6
Boerhavia repleta	1	0.1
Ptilotus exaltatus	+	0.1
Cenchrus ciliaris	+	0.3
Sclerolaena gardneri	+	0.2
Enchylaena tomentosa var. tomentosa	+	0.5
Maireana triptera	+	0.3
Pimelea microcephala subsp. microcephala	+	0.8
Senna sp. Meekatharra (E. Bailey 1-26)	+	0.5
Atriplex bunburyana	+	0.5
Paspalidium basicladum	+	0.4
Rhagodia drummondii	+	0.5
Senna artemisioides subsp. filifolia	+	0.6
Senna cardiosperma	out	1.2
Solanum lasiophyllum	out	0.01
Abutilon cryptopetalum	+	0.2
Acacia sibirica	out	4
Lysiana murrayi	out	
Maireana planifolia	+	0.5
Maireana tomentosa subsp. tomentosa	+	0.4
Erodium cygnorum	+	0.1
Carrichtera annua	+	0.2
Sclerolaena eriacantha	+	0.2
Austrostipa elegantissima	+	0.4
Calandrinia eremaea	+	0.05
Rumex vesicarius	+	0.1
Sclerolaena densiflora	+	0.2
Eriochiton sclerolaenoides	+	0.1
Maireana georgei	+	0.3
Roepera apiculata	+	0.1
Enteropogon ramosus	+	0.1
Calotis hispidula	+	0.01
Chenopodium curvispicatum	+	0.4
Euphorbia drummondii	+	0.01
Sida sp. dark green fruits (S. van Leeuwen 2260)	+	0.1
Stenopetalum filifolium	+	0.1
Tetragonia eremaea	+	0.05
Lepidium oxytrichum	+	
Crassula colorata	+	

Kingwest Menzies **Site** Q03

Described by JW JP **Date** 6/05/2021 **Type** Q 20x20

MGA Zone 51 308674 **mE** 6714235 **mN**

Habitat MpS - Maireana pyramidata Shrubland

Soil Self-mulching/firm sandy clay loam with discontinuous (10-20%) quartz (20-200mm) and basaltic lag gravel (2-20mm)

Rock Type Subcropping basalt

Vegetation Maireana pyramidata 0.6m, Cenchrus ciliaris 0.6m, PFC 2-5% over Eragrostis sedifolia 0.3m, Enneapogon polyphyllus 0.2, Enneapogon caerulescens 0.15m, Dactylon radulans 0.1m, Sida fibulifera, Dysphania melanocarpa, Streptoglossa liatroides, Euphorbia australis, Euphorbia drummondii, Plantago debilis, Carrichtera annua.

Veg Condition Good

Fire Age Long unburnt

Notes Evidence of rabbit herbivory and limited clearing.

SPECIES LIST:

Name	Cover	Height
Maireana pyramidata	5	0.5-0.8
Cenchrus ciliaris	2	0.6
Maireana sedifolia	+	0.4
Enneapogon polyphyllus	5	0.05
Dactyloctenium radulans	+	0.05
Eragrostis setifolia	1	0.4
Enneapogon cylindricus	+	0.1
Sida fibulifera	2	0.1
Sida fibulifera	1	0.2
Sclerolaena gardneri	+	0.05
Plantago drummondii	+	0.05
Euphorbia drummondii	+	0.05
Convolvulus angustissimus	+	0.1
Dissocarpus paradoxus	+	0.1
Salvia verbenaca	+	0.05
Enneapogon caerulescens	+	0.2
Streptoglossa liatroides	+	0.1
Heliotropium sp.	+	0.1
Euphorbia australis subsp. subtomentosa	+	0.1
Medicago polymorpha	+	0.1
Erodium cygnorum	+	0.1
Carrichtera annua	+	0.1
Dysphania melanocarpa	+	0.1
Sclerolaena obliquicuspis	+	0.1
Solanum lasiophyllum	+	0.1
Vittadinia eremaea	+	0.1
Portulaca oleracea	+	0.1
Calotis multicaulis	+	0.1
Enteropogon ramosus	+	0.2
Cylindropuntia pallida	out	
Lawrencia densiflora	+	0.1
Cucumis myriocarpus	+	0.1
Atriplex bunburyana	out	0.3
Abutilon cryptopetalum	out	0.1
Solanum nummularium	+	0.2
Abutilon otocarpum	+	0.1
Ptilotus aervoides	+	0.1
Swainsona oliveri	+	0.1
Erodium cicutarium	+	0.1
Plantago debilis	+	0.1
Lepidium oxytrichum	+	0.1
Roepera apiculata	+	0.01
Medicago truncatula	+	0.01
Vittadinia eremaea	+	0.1
Swainsona oliveri	+	0.01
Sonchus oleraceus	+	0.5
Calotis hispidula	+	0.15
Rumex vesicarius	+	0.3
Vittadinia eremaea	+	0.1
Sida calyxhymenia	+	0.2
Cephalipterum drummondii	+	0.1
Maireana trichoptera	+	0.1
Maireana tomentosa subsp. tomentosa	+	0.1
Crassula colorata	+	0.05
Acacia tetragonophylla	out	0.3
Scaevola spinescens	out	0.3
Enchylaena tomentosa var. tomentosa	out	0.5
Eremophila longifolia	out	1

Kingwest Menzies **Site** Q04

Described by JW JP **Date** 6/05/2021 **Type** Q 20x20

MGA Zone 51 307540 **mE** 6715061 **mN**

Habitat Flat broad drainage.

Soil Shallow sandy clay loam with isolated (2-10%) quartz and basalt lag gravel (2-5mm) and no outcropping cover.

Rock Type Subcropping basalt.

Vegetation Acacia caesaneura 3m, Casuarina pauper 4m PFC 1-2% over Eremophila scoparia 1-2.5m, Acacia jennerae 2.5m Acacia tetragonophylla 2.5m, Acacia hemiteles 1.6-1.8m, PFC 10-15%, over Scaevola spinescens (narrow leaf spiney form) 1-1.5m, Rhagodia drummondii 0.6m, Atriplex bunburyana 0.3m, Maireana triptera 0.3m Ptilotus obovatus 0.4m Paspalidium basicladum, Cenchrus ciliaris 0.6m.

Veg Condition Excellent

Fire Age Long unburnt

Notes North-eastern corner has drainage channel through. Evidence of clearing from mining activity.

SPECIES LIST:

Name	Cover	Height
Casuarina pauper	+	4.5
Eremophila scoparia	4	3.5-4
Senna artemisioides subsp. filifolia	1	1.7
Acacia hemiteles	1	1.5-2
Eremophila scoparia	2	1.2-1.8
Scaevola spinescens (broad leaf, spiny form)	0.5	1.5
Scaevola spinescens (narrow leaf, spiny form)	0.5	1.5
Acacia tetragonophylla	+	1.3
Senna sp. Meekatharra (E. Bailey 1-26)	+	0.9
Pimelea microcephala subsp. microcephala	+	0.8
Eremophila decipiens subsp. decipiens	+	1.3
Leichhardtia australis	+	1.6
Olearia muelleri	+	0.6
Rhagodia drummondii	+	1
Atriplex bunburyana	+	1
Solanum lasiophyllum	out	0.1
Dactyloctenium radulans	+	0.05
Cenchrus ciliaris	1	0.8
Ptilotus obovatus	+	0.5
Paspalidium basicladum	2	0.4
Senna artemisioides subsp. filifolia	+	0.4
Atriplex bunburyana	+	0.5
Leichhardtia australis	+	0.5
Maireana pyramidata	+	0.4
Chenopodium curvispicatum	+	0.2
Enteropogon ramosus	+	0.3
Enneapogon polyphyllus	+	0.2
Enneapogon caerulescens	+	0.2
Maireana triptera	+	0.2
Portulaca oleracea	+	0.01
Vittadinia eremaea	+	0.01
Convolvulus angustissimus	+	0.01
Enchylaena tomentosa var. tomentosa	+	0.4
Sida fibulifera	+	0.1
Iseilema membranaceum	+	0.1
Sclerolaena gardneri	+	0.05
Austrostipa elegantissima	+	0.6
Abutilon cryptopetalum	+	0.2
Acacia aptaneura	out	6-8
Acacia caesaneura	out	5
Lysiana murrayi	out	
Amyema benthamii	out	
Hakea preissii	out	1.6
Eremophila oldfieldii	out	3
Eremophila longifolia	out	2
Ptilotus exaltatus	out	0.1
Sida calyxhymenia	+	0.1
Bulbine semibarbata	+	0.05
Crassula colorata	+	0.01
Eragrostis dielsii	+	0.01
Calandrinia eremaea	+	0.01
Maireana tomentosa subsp. tomentosa	+	0.2
Maireana trichoptera	+	0.1
Calotis multicaulis	+	0.05
Tribulus terrestris	+	0.01
Erodium cygnorum	+	0.1
Abutilon otocarpum	+	0.01
Abutilon otocarpum	+	0.1
Sclerolaena cuneata	+	0.1

Kingwest Menzies **Site** Q05

Described by JW JP **Date** 6/05/2021 **Type** Q 20x20

MGA Zone 51 307546 **mE** 6715180 **mN**

Habitat DRMS - Broad drainage Mulga Shrubland

Soil Very fine orange sandy clay loam, with discontinuous (10-20%) lag gravel (2-5mm) between cryptogam cover. No outcropping

Rock Type Subcropping basalt.

Vegetation Acacia craspedocarpa 3-6m, Acacia aptaneura 6-7m, Acacia ramulosa var. ramulosa, Acacia tetragonophylla 3-4m PFC 15-20% over Acacia hemiteles 1.7m PFC 5-10% over grasses and herbs PFC 5-10%, including Enneapogon caerulescens, Erodium cygnorum 0.5m, Dysphania melanocarpa 0.6m, Leichhardtia australis 0.2m, Ptilotus obovatus 0.2m.

Veg Condition Excellent

Fire Age Long unburnt

Notes Evidence of clearing for mining development nearby.

SPECIES LIST:

Name	Cover	Height
Acacia aptaneura	1.-12	5-7
Acacia ramulosa var. ramulosa	2	4
Acacia craspedocarpa	2	4
Acacia tetragonophylla	1	4
Eremophila oldfieldii	0.5	4
Maireana pyramidata	0.5	1.2
Acacia craspedocarpa	+	1-3
Eremophila metallicorum	+	1.2
Leichhardtia australis	+	1.3
Rhagodia drummondii	+	0.6
Paspalidium basicladum	+	0.3
Enneapogon caerulescens	1	0.1
Portulaca oleracea	+	0.01
Euphorbia drummondii	+	0.01
Roepera iodocarpa	+	0.2
Erodium cygnorum	+	0.05
Abutilon cryptopetalum	+	0.1
Dysphania melanocarpa	1	0.2
Goodenia havilandii	+	0.01
Calandrinia eremaea	+	0.05
Swainsona laciniata	+	0.05
Sida fibulifera	+	0.07
Tripogonella loliiformis	+	0.05
Abutilon otocarpum	+	0.1
Paspalidium basicladum	+	0.05
Swainsona oliveri	+	0.01
Enchylaena tomentosa var. tomentosa	out	0.2
Goodenia mimuloides	+	0.01
Rhodanthe sp.	+	0.1
Atriplex bunburyana	out	0.4
Rhodanthe charsleyae	+	0.2
Menkea sphaerocarpa	+	0.1
Medicago polymorpha	+	0.01
Swainsona rostellata	+	0.058
Tetragonia eremaea	+	0.1
Solanum nigrum	+	0.5
Crassula colorata	+	0.01
Austrostipa scabra subsp. scabra	+	0.4
Sisymbrium erysimoides	+	0.25
Roepera apiculata	+	0.01
Menkea australis	+	0.01
Eriachne pulchella subsp. pulchella	+	0.01
Rumex vesicarius	+	0.01
Bulbine semibarbata	+	0.1
Rumex vesicarius	out	0.6
Maireana planifolia	out	0.5
Pimelea microcephala subsp. microcephala	out	1.8
Lysimachia arvensis	out	0.1
Cephalipterum drummondii	out	0.1
Rhagodia drummondii	out	1.7
Parietaria cardiostegia	out	0.2

Kingwest Menzies **Site** Q06

Described by JW JP **Date** 6/05/2021 **Type** Q 20x20

MGA Zone 51 307309 **mE** 6714251 **mN**

Habitat EsSaf - Eremophila scoparia - Senna artemisioides subsp. filifolia. Broad drainage.

Soil Firm orange/red sandy clay loam with discontinuous (2-10%) sandy lag gravel (2-6mm) between cryptogam cover. No outcropping cover.

Rock Type Subcropping basalt.

Vegetation Casuarina pauper 6m, Eremophila scoparia 3.5m, Acacia jennerae 2.5-3m PFC 1-3% over Senna artemisioides subsp. filifolia 1.8m, Acacia tetragonophylla 2m, Pimelea microcephala 1.5m, Acacia sibirica 1.5m, Scaevola spinescens (broad leaf, spiney form) PFC 15-20% over Eremophila decipiens 0.5m Atriplex bunburyana 0.4m, Eremophila scoparia 0.4m, Solanum lasiophyllum, 0.2m PFC 1-2%

Veg Condition Excellent

Fire Age Long unburnt

Notes Limited clearing evident.

SPECIES LIST:

Name	Cover	Height
Casuarina pauper	1	6
Eremophila scoparia	2	4
Acacia jennerae	+	3.5
Senna artemisioides subsp. filifolia	10-12	1-1.8
Eremophila scoparia	1	1-2
Acacia tetragonophylla	1	1.8
Acacia sibirica	+	0.8
Scaevola spinescens (broad leaf, spiny form)	1	1.2
Scaevola spinescens (narrow leaf, spiny form)	+	1.5
Dodonaea viscosa subsp. angustissima	+	1.6
Pimelea microcephala subsp. microcephala	+	1.6
Dodonaea lobulata	+	1
Acacia hemiteles	+	0.6
Eremophila decipiens subsp. decipiens	+	0.8
Ptilotus obovatus (upright form)	0.5	0.5
Atriplex bunburyana	+	0.8
Solanum nummularium	+	0.4
Solanum lasiophyllum	+	0.4
Dodonaea lobulata	+	0.4
Austrostipa elegantissima	+	0.8
Senna artemisioides subsp. filifolia	+	0.6
Enneapogon polyphyllus	+	0.1
Enneapogon caerulescens	+	0.2
Enchylaena tomentosa var. tomentosa	+	0.2
Paspalidium basicladum	+	0.2
Sida spodochroma	+	0.05
Leichhardtia australis	+	0.3
Chenopodium curvispicatum	+	0.4
Acacia jennerae	+	0.6
Brachyscome iberidifolia	+	0.05
Convolvulus angustissimus	out	0.1
Roepera apiculata	+	0.1
Erodium cygnorum	+	0.1
Acacia aptaneura	out	4.5
Acacia oswaldii	+	1.8
Roepera iodocarpa	+	0.05
Maireana trichoptera	+	0.1
Eriochiton sclerolaenoides	+	0.05
Euphorbia drummondii	+	0.01
Maireana georgei	+	0.5
Sclerolaena gardneri	+	0.05
Swainsona laciniata	+	0.012
Rhagodia drummondii	+	0.5
Lepidium oxytrichum	out	0.1
Olearia muelleri	+	0.6

Kingwest Menzies **Site** Q07

Described by JW JP **Date** 7/05/2021 **Type** Q 20x20

MGA Zone 51 307649 **mE** 6713546 **mN**

Habitat SIMS – Stoney ironstone Mulga Shrubland.

Soil Shallow (5-10cm) red orange sandy clay loam with continuous (50-90%) ironstone lag gravel (2-6mm some to 60mm) between cryptogam patches. No outcropping cover.

Rock Type Subcropping calcrete.

Vegetation Acacia sibirica 5m, Casuarina pauper 6m, Acacia aneura 4m, PFC 8-10% over Acacia tetragonophylla 1.8m, Eremophila oldfieldii 2m, Dodonaea lobulata 1.6m, Senna artemisioides subsp. filifolia 1m, Scaevola spinescens 1.6m PFC 2-5% over a very sparse understorey <1% of Ptilotus obovatus and Enchylaena tomentosa var. tomentosa

Veg Condition Excellent

Fire Age Long unburnt

Notes Evidence of rabbit herbivory.

SPECIES LIST:

Name	Cover	Height
Acacia sibirica	6	5
Eremophila oldfieldii	+	1.8
Acacia sibirica	3	2-3
Senna artemisioides subsp. filifolia	1	1.6
Scaevola spinescens (narrow leaf, spiny form)	+	1.4
Acacia tetragonophylla	+	1.8
Dodonaea lobulata	1	1.8
Rhagodia drummondii	+	1.6
Lysiana murrayi	+	
Amyema benthamii	+	
Eremophila oldfieldii	+	0.6
Ptilotus obovatus	+	0.1-0.4
Leichhardtia australis	+	0.1-0.4
Enneapogon caerulescens	+	0.1
Enchylaena tomentosa var. tomentosa	+	0.1
Dodonaea lobulata	+	0.1
Austrostipa scabra subsp. scabra	+	0.05
Eremophila latrobei subsp. latrobei	out	1
Roepera apiculata	+	0.01
Roepera iodocarpa	+	0.01
Casuarina pauper	out	8
Brachychiton gregorii	out	1.8
Acacia aneura	out	3-4
Senna cardiosperma	out	0.6
Menkea australis	+	0.01
Haloragis trigonocarpa	+	0.01
Erodium cygnorum	+	0.01

Kingwest Menzies **Site** Q08

Described by JW JP **Date** 7/05/2021 **Type** Q 20x20

MGA Zone 51 311241 **mE** 6705573 **mN**

Habitat SIMS - Stoney Ironstone Mulga Shrubland.

Soil Firm orange red silty clay loam with abundant (50-90%) lateritic ironstone lag gravel (2-200-600mm) and minimal (<2%) outcropping cover.

Rock Type Laterized ironstone.

Vegetation Acacia sibirica 4m, Casuarina pauper 4m, Acacia aneura 4m PFC 10-15%, over Acacia tetragonophylla 2m, Eremophila oldfieldii 2-3m, Santalum spicatum 3m, PFC 5-8% over Philotheca brucei 1m, Dodonaea lobulata 1.6m, Scaevola spinescens (narrow leaf, spiney form) 1.5m, over scattered herbs and grasses inc. Ptilotus obovatus (upright form) 0.6m, Dodonaea lobulata 0.4m, Enneapogon caerulescens 0.1m, Acacia tetragonophylla 0.1m

Veg Condition Excellent

Fire Age Long unburnt

Notes Some evidence of calcrete subcropping outside of quadrat. No effective disturbance.

SPECIES LIST:

Name	Cover	Height
Casuarina pauper	0.5	3-4
Acacia sibirica	4	5
Eremophila oldfieldii	1	3-4
Acacia tetragonophylla	+	3.5
Dodonaea lobulata	4	1.6
Acacia tetragonophylla	+	1.8
Scaevola spinescens (narrow leaf, spiny form)	2	1-1.5
Leichhardtia australis	+	1.6
Senna artemisioides subsp. filifolia	+	0.8-1.6
Dodonaea rigida	+	1.2
Philotheca brucei subsp. brucei	0.5	1.5
Eremophila oldfieldii	+	1
Enchylaena tomentosa var. tomentosa	+	0.7
Acacia sibirica	+	1.6
Dodonaea lobulata	+	0.4
Ptilotus obovatus	+	0.4
Enneapogon caerulescens	+	0.1
Acacia mulganeura	+	0.3
Acacia aneura	+	0.3
Eriachne pulchella subsp. pulchella	+	0.01
Sida sp. dark green fruits (S. van Leeuwen 2260)	out	0.01
Ptilotus helipteroides	+	0.01
Olearia pimeleoides	+	0.15
Solanum lasiophyllum	out	0.1
Cheilanthes sieberi subsp. sieberi	out	0.1
Austrostipa elegantissima	+	0.5
Santalum spicatum	out	4
Eremophila latrobei subsp. latrobei	out	3
Sida ectogama	+	0.1
Eragrostis eriopoda	out	0.2
Roepera apiculata	+	0.05
Ptilotus aervoides	+	0.01
Aristida contorta	+	0.1
Erodium cygnorum	+	0.01
Haloragis trigonocarpa	+	0.01
Trachymene ornata	out	0.01
Lepidium phlebopetalum	+	0.1
Goodenia mimuloides	+	0.01
Amyema fitzgeraldii	out	
Eremophila serrulata	out	0.6
Maireana trichoptera	+	0.01

Kingwest Menzies **Site** Q09

Described by JW JP **Date** 7/05/2021 **Type** Q 20x20

MGA Zone 51 311018 **mE** 6705505 **mN**

Habitat HPMW - Hardpan Mulga woodland /broad drainage, lower slope.

Soil Firm orange silty clay loam with discontinuous (20-50%) ironstone lag gravel (2-60mm) with quartz, and basalt derived rounded stones. No outcropping cover

Rock Type Subcropping basalt

Vegetation Acacia caesaneura, Acacia aneura 4-6m PFC 15-50% over Acacia ramulosa var. ramulosa 2m, Acacia tetragonophylla 2m, Dodonaea rigida 2m, Scaevola spinescens 1.6m, Sida ectogama 1.6m, PFC 10-12% over Scattered herbs and grasses inc. Enneapogon caerulescens and Cheilanthes sieberi PFC <1%.

Veg Condition Excellent

Fire Age Long unburnt

Notes Some evidence of exploration drilling south of quadrat. Evidence of rabbit grazing. New tracks pushed through SW of quadrat

SPECIES LIST:

Name	Cover	Height
Acacia aneura	2	7-8
Acacia caesaneura	20	7
Acacia ramulosa var. ramulosa	4	2.5
Acacia tetragonophylla	1	1.5-3
Dodonaea rigida	2	1-2
Scaevola spinescens (narrow leaf, spiny form)	1	1-1.8
Eremophila latrobei subsp. latrobei	+	1.6-1.8
Leichhardtia australis	+	1.5
Cheilanthes sieberi subsp. sieberi	+	0.3
Dodonaea rigida	+	0.4
Ptilotus obovatus	+	0.4
Enneapogon caerulescens	+	0.1
Eremophila latrobei subsp. latrobei	+	0.4
Eragrostis eriopoda	+	0.2
Eremophila georgei	+	0.5
Austrostipa elegantissima	out	0.3
Solanum lasiophyllum	Dead	0.3
Monachather paradoxus	+	0.1
Senna artemisioides subsp. filifolia	out	2.5
Goodenia mimuloides	out	0.01
Casuarina pauper	out	3.5
Sida ectogama	+	0.7
Rhagodia drummondii	out	0.6
Haloragis trigonocarpa	+	0.1
Thysanotus sp.	+	0.1
Erodium cygnorum	+	0.01
Daucus glochidiatus	+	0.01
Acacia burkittii	out	3
Eremophila oldfieldii	out	2
Calandrinia eremaea	out	0.01

Kingwest Menzies **Site** Q10

Described by JW JP **Date** 7/05/2021 **Type** Q 20x20

MGA Zone 51 310963 **mE** 6706329 **mN**

Habitat EoW – Eucalyptus oleosa subsp. oleosa Woodland. Lower slope of drainage of SMS hill.

Soil Firm red/orange sandy clay loam with discontinuous (10-20%) weathered basalt fragment and ironstone and quartz lag gravel (2-60mm).

Rock Type Subcropping basalt.

Vegetation Eucalyptus oleosa 6-7m, Acacia aneura 4m, Acacia ramulosa var. ramulosa 3m, Acacia sibirica 4m PFC 15-20%, over Dodonaea lobulata 1.8m, Senna artemisioides subsp. filifolia 1.6m, Eremophila oldfieldii 1.8, Acacia tetragonophylla 1.7m, with a PFC of 5-12% over scaevola spinescens (narrow leaf, spiney form), Ptilotus obovatus and Rhagodia drummondii 1m

Veg Condition Excellent

Fire Age Long unburnt

Notes Evidence of rabbit grazing.

SPECIES LIST:

Name	Cover	Height
Eucalyptus oleosa subsp. oleosa	25	6-8
Acacia sibirica	4	3.5-8
Eremophila oldfieldii	3	3
Dodonaea lobulata	2	3
Acacia tetragonophylla	+	3
Leichhardtia australis	+	3
Grevillea berryana	+	3
Scaevola spinescens (narrow leaf, spiny form)	2	1
Atriplex bunburyana	1	0.4
Senna artemisioides subsp. filifolia	1	0.5-1.5
Maireana triptera	+	0.3
Rhagodia drummondii	+	1-2
Ptilotus obovatus (upright form)	+	0.6
Maireana pyramidata	+	0.5
Eremophila eriocalyx	+	1.5
Dodonaea rigida	+	1.6
Casuarina pauper	+	1
Acacia ramulosa var. ramulosa	+	0.5
Casuarina pauper	+	0.4
Paspalidium basicladum	+	0.1
Austrostipa elegantissima	+	0.4
Enneapogon caerulescens	+	0.1
Senna artemisioides subsp. filifolia	+	0.2
Ptilotus obovatus	+	0.3
Sclerolaena gardneri	+	0.1
Sida sp. dark green fruits (S. van Leeuwen 2260)	+	0.2
Solanum lasiophyllum	+	0.12
Ptilotus exaltatus	+	0.01
Salsola australis	+	0.01
Enchylaena tomentosa var. tomentosa	+	0.1
Leichhardtia australis	+	0.1
Acacia aneura	out	5
Acacia mulganeura	out	2
Eremophila longifolia	+	3
Aristida contorta	+	0.05
Dodonaea ?pinifolia	out	0.4

Kingwest Menzies **Site** Q11

Described by JW JP **Date** 7/05/2021 **Type** Q 20x20

MGA Zone 51 311408 **mE** 6706067 **mN**

Habitat CpAsSaf-S. Casuarina pauper - Acacia sibirica - Senna artemisioides subsp. artemisioides Shrubland on flat wash plain.

Soil Firm creamy orange red silty clay loam with discontinuous (2-10%) calcrete lag gravel as well as basalt derived coarse fragments (2-200mm). No outcropping cover.

Rock Type Calcrete subcropping.

Vegetation Casuarina pauper 6-8m, PFC 1-2% over Acacia sibirica and Acacia aneura 6m, PFC 2-5%, over Senna artemisioides subsp. filifolia 1.6m, Acacia hemiteles 1.6m, Dodonaea lobulata 1.6m, PFC 5-15% over herbs and grasses PFC <1%

Veg Condition Excellent

Fire Age Long unburnt

Notes No effective disturbance.

SPECIES LIST:

Name	Cover	Height
Acacia sibirica	3	5-6
Acacia oswaldii	+	3
Acacia hemiteles	2	2
Senna artemisioides subsp. filifolia	5	0.8-2.5
Dodonaea lobulata	1	0.8-2.4
Acacia sibirica	+	0.8-1.1
Eremophila eriocalyx	+	1.8
Casuarina pauper	+	2.4
Acacia tetragonophylla	+	1-2
Leichhardtia australis	+	1.6
Ptilotus obovatus	+	0.3
Dodonaea lobulata	1	0.5
Ptilotus obovatus (upright form)	+	0.4
Atriplex bunburyana	+	0.4
Solanum lasiophyllum	+	0.1-0.3
Roepera apiculata	+	0.01
Scaevola spinescens (broad leaf, spiny form)	+	0.4-0.8
Maireana triptera	+	0.1
Austrostipa scabra subsp. scabra	+	0.2
Euphorbia drummondii	+	0.1
Leichhardtia australis	+	0.1
Eriochiton sclerolaenoides	+	0.5
Austrostipa elegantissima	+	0.2
Solanum nummularium	+	0.2
Austrostipa platychaeta	+	1
Maireana trichoptera	+	
Eremophila longifolia	out	2
Sida spodochroma	+	0.01
Exocarpos aphyllus	out	0.6
Acacia jennerae	out	0.8
Maireana pyramidata	out	1
Acacia burkittii	out	2
Lysiana sp. out		
Alectryon oleifolius	out	3.5
Erodium cygnorum	+	0.01
Eremophila metallicorum	+	0.4
Salsola australis	+	0.01
Aristida contorta	+	0.01
Rhagodia drummondii	out	0.8
Wurmbea tenella	+	0.01

Kingwest Menzies **Site** Q12

Described by JW JP **Date** 7/05/2021 **Type** Q 20x20

MGA Zone 51 311983 **mE** 6706313 **mN**

Habitat MsS - Maireana sedifolia Shrubland. Broad drainage.

Soil Creamy orange clay loam, with quartz lag gravel (2-60mm) and ironstone. No outcropping cover.

Rock Type Unknown

Vegetation Casuarina pauper 6-8m PFC 1-2% with occasional Acacia sibirica over Acacia jennerae 2-3m and Acacia tetragonophylla 2m, PFC 1-2% over Maireana sedifolia 1m, Senna artemisioides subsp. filifolia 1.5m, Maireana pyramidata PFC 15-20% over herbs and grasses PFC 2-3%.

Veg Condition Excellent

Fire Age Long unburnt

Notes Cattle tracks present through quadrat.

SPECIES LIST:

Name	Cover	Height
Maireana sedifolia	8	1.5
Senna artemisioides subsp. filifolia	1	0.8-1.5
Leichhardtia australis	+	1.2
Austrostipa platychaeta	+	1.4
Senna artemisioides subsp. filifolia	1	0.3-0.7
Atriplex bunburyana	+	0.7
Eremophila metallicorum	+	0.7
Rhagodia drummondii	+	1
Solanum nummularium	Dead	0.6
Ptilotus obovatus	+	0.3
Enneapogon cylindricus	1	0.1
Enneapogon caerulescens	1	0.1
Enneapogon polyphyllus	+	0.1
Solanum lasiophyllum	+	0.2
Acacia hemiteles	+	0.2
Enteropogon ramosus	+	0.3
Maireana triptera	+	0.1
Sida fibulifera	+	0.1
Roepera apiculata	+	0.1
Salvia verbenaca	+	0.01
Euphorbia drummondii	+	0.01
Abutilon cryptopetalum	+	0.1
Convolvulus angustissimus	+	0.1
Maireana trichoptera	+	0.1
Vittadinia eremaea	+	0.1
Acacia jennerae	out	2-3
Eragrostis setifolia	+	0.3
Eremophila longifolia	out	3
Casuarina pauper	out	4-8
Acacia sibirica	out	2
Acacia tetragonophylla	+	0.1
Sida calyxhymenia	+	0.01
Eremophila latrobei subsp. latrobei	out	2
Erodium cygnorum	+	0.1
Maireana pyramidata	out	1
Swainsona rostellata	+	0.01
Plantago sp. Mt Magnet (A.S. George 6793)	+	0.1
Salsola australis	+	0.1
Sida spodochroma	+	0.01
Aristida contorta	+	0.1
Acacia aptaneura	out	1.2
Cephalipterum drummondii	+	0.1
Erodium cygnorum	+	0.01

Kingwest Menzies **Site** Q13

Described by JW JP **Date** 8/05/2021 **Type** Q 20x20

MGA Zone 51 310221 **mE** 6706931 **mN**

Habitat EcoW - Eucalyptus concinna Woodland.

Soil Orange red sandy clay loam with discontinuous (2-10%) lag gravel (2-60mm) and no outcropping cover.

Rock Type Subcropping weathered basalt

Vegetation Eucalyptus concinna 6-8m with occasional Acacia aptaneura 6-7m and Casuarina pauper 8m PFC 20-25% over Acacia burkittii 4m, Senna artemisioides subsp. filifolia 0.8-1.5m, Dodonaea lobulata 0.8m, Acacia tetragonophylla 3m, Eremophila scoparia 2m, Santalum spicatum 3m PFC 15-20% over Ptilotus obovatus, Enneapogon spp. Paspalidium basicladum, Monachather paradoxus PFC 2-5%.

Veg Condition Excellent

Fire Age Long unburnt

Notes Slight incised drainage. Eucalyptus concinna dominating but interchanges with E. oleosa at other sites.

SPECIES LIST:

Name	Cover	Height
Eucalyptus concinna	13	6-8
Acacia aptaneura	2	6
Acacia ramulosa var. ramulosa	1	3-4
Santalum spicatum	1	3
Acacia burkittii	+	2.5
Casuarina pauper	+	3
Acacia tetragonophylla	1	2.5-3.5
Senna artemisioides subsp. filifolia	4	0.8-2.5
Eremophila scoparia	2	1.8
Eremophila eriocalyx	+	1-2
Grevillea berryana	+	1.3
Amyema benthamii	+	
Eremophila longifolia	+	1.5
Scaevola spinescens (narrow leaf, spiny form)	+	1.6
Atriplex bunburyana	+	1.2
Austrostipa elegantissima	+	0.9
Leichhardtia australis	+	2
Dodonaea lobulata	+	1.2
Paspalidium basicladum	1	
Ptilotus obovatus (upright form)	+	0.5
Maireana triptera	out	0.4
Enneapogon polyphyllus	+	0.2
Enneapogon caerulescens	+	0.2
Eremophila eriocalyx	+	0.4
Acacia aptaneura	+	0.4
Senna artemisioides subsp. filifolia	+	0.2
Monachather paradoxus	+	0.3
Sclerolaena diacantha	+	0.2
Roepera apiculata	out	0.05
Amphipogon caricinus	+	0.2
Eremophila serrulata	+	0.4
Abutilon cryptopetalum	+	0.2
Enchylaena tomentosa var. tomentosa	+	0.2
Euphorbia drummondii	+	0.01
Ptilotus exaltatus	+	0.01
Eremophila glabra subsp. glabra	+	0.3
Scaevola spinescens (narrow leaf, spiny form)	+	0.1
Sida fibulifera	+	0.1
Haloragis trigonocarpa	out	0.1
Olearia muelleri	out	0.6
Cenchrus ciliaris	out	0.6
Acacia sibirica	out	4
Dodonaea rigida	out	2.5
Exocarpos aphyllus	out	1.6
Enneapogon cylindricus	out	0.2
Alectryon oleifolius	out	4
Solanum lasiophyllum	out	0.2
Convolvulus angustissimus	+	0.1
Erodium cygnorum	+	0.01
Eremophila metallicorum	+	
Goodenia mimuloides	+	0.01
Rhagodia drummondii	+	0.4
Maireana trichoptera	+	
Maireana triptera	out	0.3
Austrostipa tuckeri	+	
Sida sp. dark green fruits (S. van Leeuwen 2260)	+	

Kingwest Menzies **Site** Q14

Described by JW JP **Date** 8/05/2021 **Type** Q 20x20

MGA Zone 51 310849 **mE** 6707685 **mN**

Habitat EclW - Eucalyptus clelandiorum Woodland on clacrete rise

Soil Orange sandy clay loam with continuous (50-90%) mixed calcrete, quartz, and angular basalt lag gravel (2-200mm). No outcropping cover.

Rock Type Subcropping calcrete

Vegetation Eucalyptus clelandiorum 8m PFC 10-20% over Eremophila scoparia 1m, Ptilotus obovatus (upright form) 0.7m Senna artemisioides subsp. filifolia 1m, PFC <1% over open herbs inc. Sclerolaena diacantha, and Roepera apiculatum 0.1m PFC <1%.

Veg Condition Excellent

Fire Age Long unburnt

Notes Vehicle tracks present through quadrat.

SPECIES LIST:

Name	Cover	Height
Eucalyptus clelandiorum	12	8-9
Ptilotus obovatus (upright form)	+	0.8
Eremophila scoparia	+	1
Senna artemisioides subsp. filifolia	+	1.2
Scaevola spinescens (narrow leaf, spiny form)	+	0.5
Sclerolaena diacantha	+	0.1
Acacia tetragonophylla	+	0.3
Roepera apiculata	+	0.1
Enneapogon caerulescens	out	0.1
Casuarina pauper	out	0.4
Acacia oswaldii	out	1.6
Enchylaena tomentosa var. tomentosa	out	0.2
Eriochiton sclerolaenoides	out	0.1
Maireana trichoptera	out	0.1

Kingwest Menzies **Site** Q15

Described by JW JP **Date** 8/05/2021 **Type** Q 20x20

MGA Zone 51 310189 **mE** 6708144 **mN**

Habitat Open grassland. (OG)

Soil Creamy orange silty clay loam with discontinuous (20-50%) rounded greenstone, calcrete (2-20mm) with angular quartz fragments (20-60mm)

Rock Type Subcropping weathered basalt.

Vegetation Very open grassland dominated by Enneapogon spp. upper story <1% Acacia aptaneura 1m, Senna artemisioides subsp. filifolia 1m, over grasses inc. Enneapogon caerulescens, Enneapogon polyphyllus, Enneapogon cylindrica 0.1m Salsola australis, Sclerolaena diacantha 0.1m Eriochiton sclerioides, Solanum lasiophyllum.

Veg Condition Excellent

Fire Age Long unburnt

Notes Evidence of cow/ rabbit grazing.

SPECIES LIST:

Name	Cover	Height
Ptilotus obovatus	1	0.5
Atriplex bunburyana	+	0.5
Enneapogon caerulescens	8-10	0.1
Enneapogon polyphyllus	6	0.1
Enneapogon cylindricus	4	0.1
Dysphania melanocarpa	+	0.1
Sclerolaena diacantha	+	0.1
Salvia verbenaca	+	0.1
Sida fibulifera	+	0.1
Dactyloctenium radulans	out	0.1
Maireana trichoptera	+	0.1
Sclerolaena obliquicuspis	+	0.1
Erodium aureum	+	0.1
Swainsona laciniata	+	0.1
Abutilon otocarpum	+	0.1
Euphorbia drummondii	+	0.1
Solanum lasiophyllum	+	0.4
Senna artemisioides subsp. filifolia	out	0.6
Acacia aptaneura	out	1
Amphipogon caricinus	out	0.2
Paspalidium basicladum	out	0.1
Convolvulus angustissimus	+	0.1
Sclerolaena obliquicuspis	out	0.1
Leichhardtia australis	out	0.1
Eremophila longifolia	out	0.1
Citrullus amarus	out	0.1
Salsola australis	+	0.1
Swainsona rostellata	+	0.01
Eriochiton sclerolaenoides	+	0.1
Swainsona rostellata	+	0.01
Solanum nummularium	out	0.2
Wurmbea tenella	out	0.05
Tetragonia eremaea	out	0.1
Chenopodium curvispicatum	out	0.4
Erodium crinitum	out	0.05

Kingwest Menzies **Site** Q16

Described by JW JP **Date** 8/05/2021 **Type** Q 20x20

MGA Zone 51 310812 **mE** 6707992 **mN**

Habitat Stoney Ironstone Mulga Shrubland (SIMS)

Soil Firm red/orange clay loam with abundant (50-90%) lateralized ironstone lag gravel (2-200mm) and minimal (<2%) outcropping cover

Rock Type Lateritized ironstone outcropping

Vegetation Acacia sibirica 6-7m and occasional Casuarina pauper 8m, Acacia aneura 4-5m PFC 15-20% over Dodonaea lobulata 0.7-2m Scaevola spinescens (broad leaf spiny form) 1m, Eremophila oppositifolia 0.5-3m, Ptilotus obovatus (upright form) 0.7m Scaevola spinescens (narrow leaf, spiny form) 1m, Eremophila oldfieldii 3m.

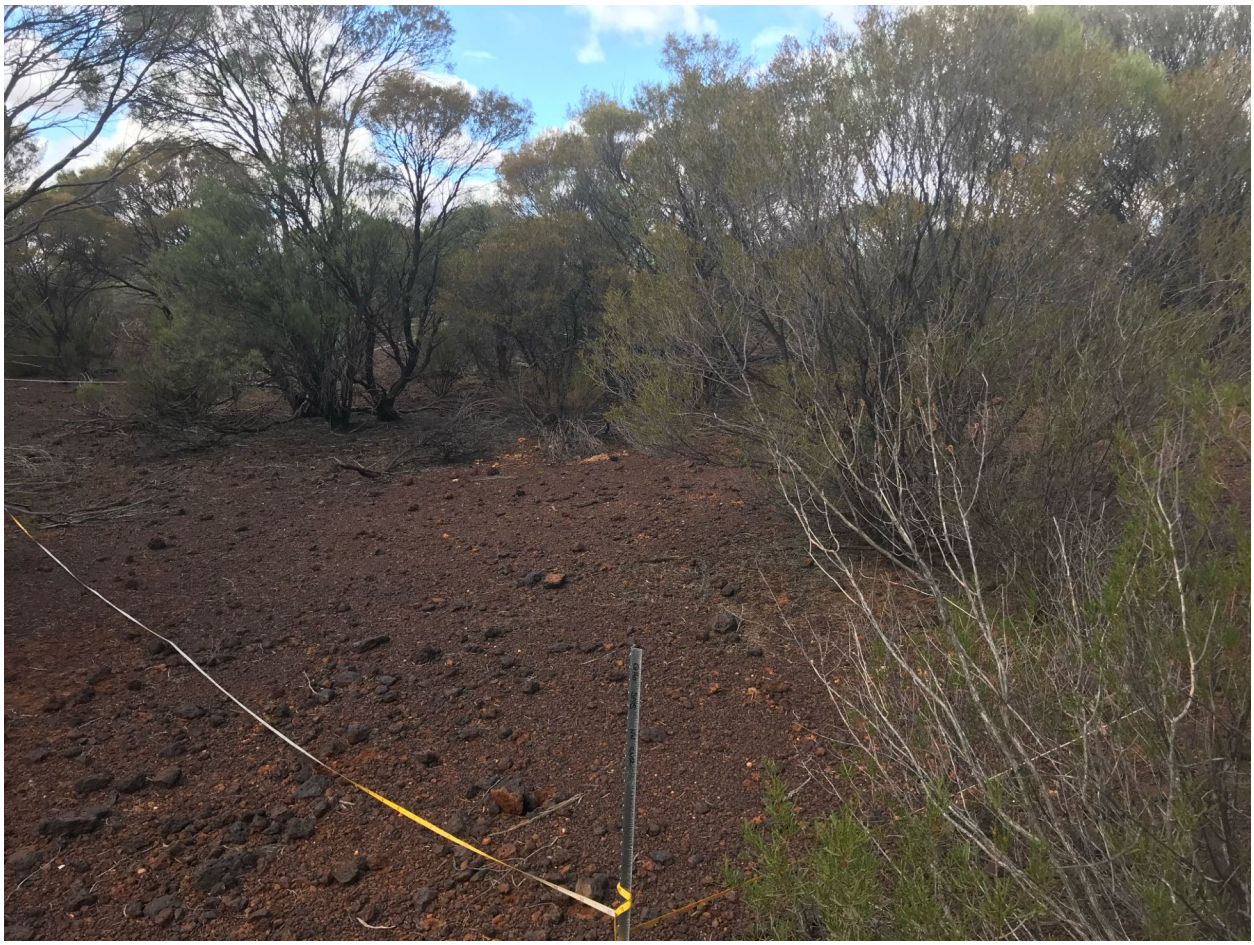
Veg Condition Excellent.

Fire Age Long unburnt

Notes Many outs in this quadrat. influence from exposed calcrete and surrounding veg association. Quadrat appears to be species poor.

SPECIES LIST:

Name	Cover	Height
Acacia sibirica	10-12	4-7
Acacia aneura	2	5
Eremophila oppositifolia	2	4
Eremophila oldfieldii	1	4
Dodonaea lobulata	1	1-1.5
Scaevola spinescens (broad leaf, spiny form)	+	1-1.5
Scaevola spinescens (narrow leaf, spiny form)	1	1-1.2
Eremophila oppositifolia	+	0.5-1
Ptilotus obovatus (upright form)	+	0.6-1
Acacia aneura	+	0.5-0.6
Leichhardtia australis	+	0.6
Olearia muelleri	+	0.5
Calandrinia eremaea	+	0.01
Roepera apiculata	+	0.01
Amyema benthamii	+	
Acacia sibirica	+	0.6
Enchylaena tomentosa var. tomentosa	+	0.6
Enteropogon ramosus	+	0.5
Austrostipa elegantissima	out	0.5
Lycium australe	out	1.4
Eremophila scoparia	out	0.6
Casuarina pauper	out	8
Acacia tetragonophylla	out	0.1
Enneapogon caerulescens	out	0.1
Ptilotus exaltatus	+	0.01
Euphorbia drummondii	out	0.01
Solanum lasiophyllum	+	0.1
Sida calyxhymenia	out	0.01
Exocarpos aphyllus	out	1.6
Rhagodia drummondii	out	0.9
Dodonaea rigida	out	0.9
Cratystylis subspinescens	out	1.1
Atriplex bunburyana	out	0.6
Chenopodium curvispicatum	out	0.1
Abutilon cryptopetalum	out	0.01
Senna artemisioides subsp. filifolia	out	1.8
Erodium cygnorum	+	0.01
Maireana triptera	out	0.1
Sclerolaena gardneri	out	0.1
Sclerolaena fusiformis	out	0.1
Haloragis trigonocarpa	out	0.05



Kingwest Menzies **Site** Q17

Described by JW JP **Date** 8/05/2021 **Type** Q 20x20

MGA Zone 51 310849 **mE** 6708348 **mN**

Habitat DRMS – Drainage Mulga Shrubland - open drainage.

Soil Red/orange sandy clay loam with discontinuous (2-10%) coarse fragments (2-20mm to 60mm). No outcropping cover

Rock Type Unknown subcropping

Vegetation Acacia aptaneura 8-9m. Casuarina pauper 6m, Acacia sibirica 6m PFC 5-25% over Acacia burkittii 3m, eremophila oldfieldii 3m, Acacia tetragonophylla 2m, Acacia sibirica 2.5m, Acacia oswaldii 3m PFC 5-15% over herbs and grasses, PFC 8-10% inc. Ptilotus obovatus, Enneapogon spp., Convolvulus angustissimus, Amphipogon caricinus.

Veg Condition Excellent

Fire Age Long unburnt

Notes Incised drainage channel 0.6m deep through eastern side of quadrat.

SPECIES LIST:

Name	Cover	Height
Acacia aptaneura	11	5-6
Eremophila oldfieldii	+	2-3
Acacia oswaldii	+	1.5-3.5
Acacia tetragonophylla	+	1.6
Leichhardtia australis	+	2
Amyema benthamii	+	
Acacia burkittii	+	3
Acacia burkittii	+	1.2
Atriplex bunburyana	+	0.7
Senna artemisioides subsp. filifolia	+	0.8
Senna artemisioides subsp. artemisioides	+	0.8
Ptilotus obovatus	+	0.3
Enneapogon caerulescens	+	0.2
Amphipogon caricinus	1	0.4
Dysphania melanocarpa	+	0.1
Ptilotus exaltatus	+	0.2
Swainsona laciniata	+	0.05
Euphorbia australis subsp. subtomentosa	+	0.01
Abutilon cryptopetalum	+	0.1
Euphorbia drummondii	+	0.01
Solanum lasiophyllum	+	0.1
Rhodanthe floribunda	+	0.1
Enteropogon ramosus	+	0.15
Sclerolaena gardneri	+	0.1
Haloragis trigonocarpa	+	0.1
Cenchrus ciliaris	+	0.5
Sida fibulifera	+	0.01
Convolvulus angustissimus	+	0.05
Streptoglossa sp.	+	0.1
Erodium cygnorum	+	0.05
Enchylaena tomentosa var. tomentosa	+	0.3
Leichhardtia australis	+	0.6
Salvia verbenaca	+	0.01
Portulaca oleracea	+	0.01
Swainsona oliveri	+	0.01
Acacia burkittii	+	0.2
Bulbine semibarbata	+	0.1
Calotis multicaulis	+	0.01
Dactyloctenium radulans	+	0.1
Nicotiana occidentalis	+	0.3
Digitaria brownii	+	0.2
Paspalidium basicladum	+	0.3
Maireana tomentosa subsp. tomentosa	+	0.2
Enneapogon polyphyllus	+	0.1
Eremophila oldfieldii	+	0.2
Eremophila alternifolia	+	1.5
Roepera iodocarpa	+	0.1
Vittadinia eremaea	+	0.1
Rhodanthe charsleyae	+	0.1
Acacia sibirica	out	4-5
Maireana pyramidata	out	1.1
Casuarina pauper	out	5
Atriplex nummularia subsp. spathulata	out	0.5
Cucumis myriocarpus	out	0.1
Exocarpos aphyllus	out	0.5
Santalum spicatum	out	2
Acacia aneura	out	2
Carrichtera annua	+	0.1
Ptilotus aervoides	+	0.01
Roepera apiculata	+	0.01
Tetragonia eremaea	+	0.01
Cephalipterum drummondii	+	0.1
Lysimachia arvensis	+	0.05

Sisymbrium erysimoides	out	0.2
Roebuckiella ciliocarpa	+	0.1
Calotis hispidula	+	0.1
Calotis multicaulis	+	0.2
Goodenia mimuloides	+	0.05
Rhodanthe charsleyae	+	0.05

Kingwest Menzies **Site** Q18

Described by JW JP **Date** 8/05/2021 **Type** Q 20x20

MGA Zone 51 310795 **mE** 6708561 **mN**

Habitat MsS - Maireana sedifolia shrubland. Broad drainage.

Soil Creamy orange silty clay loam with abundant (50-90%) quartz lag gravel (2-20mm with some to 200m). No outcropping cover

Rock Type Subcropping basalt

Vegetation Casuarina pauper 2.5-7m, Acacia sibirica 4m, Eremophila oldfieldii 4m PFC 2-5% over Maireana sedifolia 1m, Senna artemisioides subsp. filifolia 1m, Acacia burkittii 1.5m, Eremophila oppositifolia 1.5m, Acacia aptaneura 2m, over Ptilotus obovatus, and chenopods inc. Atriplex bunburyana, Maireana pyramidata, 0.7m

Veg Condition Excellent

Fire Age Long unburnt

Notes Limited clearing from previous mining activities nearby.

SPECIES LIST:

Name	Cover	Height
Casuarina pauper	+	3
Maireana sedifolia	4-5	0.6-1.2
Eremophila oppositifolia	+	1.5
Senna artemisioides subsp. filifolia	+	1.5
Casuarina pauper	+	1
Senna artemisioides subsp. filifolia	+	0.4-1.2
Atriplex bunburyana	+	0.5
Enteropogon ramosus	+	0.3
Enneapogon caerulescens	+	0.1
Enneapogon polyphyllus	+	0.1
Abutilon cryptopetalum	+	0.1
Ptilotus obovatus	+	0.4
Sclerolaena cuneata	+	0.1
Sclerolaena gardneri	+	0.1
Convolvulus angustissimus	+	0.1
Maireana tomentosa subsp. tomentosa	+	0.2
Roepera iodocarpa	+	0.1
Leichhardtia australis	+	0.5
Paspalidium basicladum	+	0.1
Solanum lasiophyllum	+	0.1
Eremophila scoparia	+	1
Maireana pyramidata	out	0.5
Eremophila oldfieldii	out	1.8
Atriplex nummularia subsp. spathulata	out	0.8
Acacia sibirica	out	4
Acacia aptaneura	out	2
Rhagodia drummondii	out	0.5
Ptilotus exaltatus	out	0.01
Sida fibulifera	out	0.1
Dysphania melanocarpa	+	0.1
Enchylaena tomentosa var. tomentosa	+	0.2
Erodium cygnorum	+	0.01
Chenopodium curvispicatum	+	0.4
Lawrencia densiflora	+	0.01
Lysiana casuarinae	+	
Carrichtera annua	out	
Senna artemisioides subsp. x artemisioides	out	
Swainsona laciniata	out	
Tetragonia eremaea	out	
Vittadinia eremaea	out	

Kingwest Menzies **Site** Q19

Described by JW JP **Date** 8/05/2021 **Type** Q 20x20

MGA Zone 51 310418 **mE** 6709110 **mN**

Habitat CpAsSaf - Casuarina pauper - Acacia sibirica - Senna artemisioides subsp. artemisioides Shrubland on broad drainage

Soil Shallow (10-20cm) orange sandy clay loam with discontinuous (20-50%) angular quartz lag gravel (2-20mm to 200mm)

Rock Type Subcropping basalt.

Vegetation Casuarina pauper 6-8m, Acacia sibirica 6m PFC 15-20% over Eremophila ?pantonii 1-3m, Sida ectogama 1.8m, Ptilotus obovatus (upright form) 0.8m Scaevola spinescens (narrow leaf, spiny form) 0.8m Eremophila eriocalyx PFC 5-15% over Enneapogon caerulescens, Sclerolaena diacantha.

Veg Condition Excellent

Fire Age Long unburnt

Notes Exploration drill tracks and old mine shafts throughout area.

SPECIES LIST:

Name	Cover	Height
Casuarina pauper	1	3.5
Acacia sibirica	3	3.5-4
Eremophila pantonii	3	1.8
Senna artemisioides subsp. filifolia	+	1.7
Scaevola spinescens (narrow leaf, spiny form)	0.5	1.1
Sida ectogama	1	1.6
Eremophila oldfieldii	+	1.5
Acacia sibirica	+	1-1.8
Dodonaea lobulata	+	0.8
Ptilotus obovatus (upright form)	1	0.8
Atriplex bunburyana	+	0.7
Enneapogon caerulescens	+	0.1
Maireana trichoptera	+	0.1
Euphorbia drummondii	+	0.01
Eremophila pantonii	+	0.4
Acacia sibirica	+	0.4
Sida sp. dark green fruits (S. van Leeuwen 2260)	+	0.2
Leichhardtia australis	+	0.4
Solanum lasiophyllum	+	0.1
Sida calyxhymenia	+	0.01
Enchylaena tomentosa var. tomentosa	+	0.2
Austrostipa elegantissima	+	0.5
Sclerolaena diacantha	+	0.01
Abutilon cryptopetalum	+	0.1
Cenchrus ciliaris	+	0.2
Austrostipa scabra subsp. scabra	+	0.1
Goodenia mimuloides	+	0.01
Acacia tetragonophylla	out	1.4
Santalum spicatum	out	2.5
Maireana sedifolia	out	1.2
Maireana triptera	+	03
Eremophila longifolia	out	3
Roepera apiculata	+	
Erodium cygnorum	+	
Eriochiton sclerolaenoides	+	
Calandrinia eremaea	+	
Crassula colorata	+	
Cephalipterum drummondii	+	

Kingwest Menzies **Site** Q20

Described by JW JP **Date** 9/05/2021 **Type** Q 20x20

MGA Zone 51 311617 **mE** 6707848 **mN**

Habitat MpS - Maireana pyramidata Shrubland.

Soil Creamy tan brown sandy clay loam, cracking surface. No coarse fragments of outcropping cover.

Rock Type Unknown subcropping.

Vegetation Maireana pyramidata 1.4m Atriplex bunburyana 1.2m Cenchrus ciliaris 0.8m PFC 15-20%. over Chenopods and grasses inc. Sclerolaena diacantha, Enneapogon caerulescens, Dactyloctenium radulans, Salsola australis, Dysphania melanocarpa PFC 1-5%.

Veg Condition Excellent

Fire Age Long unburnt

Notes Heavily disturbed area.

SPECIES LIST:

Name	Cover	Height
Maireana pyramidata	12	1.1
Atriplex bunburyana	6	0.9
Maireana sedifolia	+	1
Maireana tomentosa subsp. tomentosa	2	0.7
Cenchrus ciliaris	0.5	0.8
Rumex vesicarius	+	0.3
Maireana tomentosa subsp. tomentosa	+	0.2
Enchylaena tomentosa var. tomentosa	+	1
Carrichtera annua	1	0.1
Sclerolaena diacantha	1	0.2
Enneapogon caerulescens	+	0.1
Dysphania melanocarpa	+	0.1
Dactyloctenium radulans	+	0.1
Sisymbrium erysimoides	+	0.2
Ptilotus exaltatus	+	0.01
Enneapogon polyphyllus	+	0.1
Sida fibulifera	+	0.1
Salsola australis	+	0.2
Cucumis myriocarpus	+	0.1
Atriplex codonocarpa	out	0.3
Solanum lasiophyllum	out	0.2
Acacia sibirica	out	4
Eragrostis kennedyae	out	0.5
Eremophila longifolia	out	1.8
Enteropogon ramosus	out	0.5
Sida fibulifera	out	0.2
Atriplex bunburyana	+	0.5
Erodium cygnorum	out	0.01
Atriplex codonocarpa	+	

Kingwest Menzies **Site** Q21

Described by JW JP **Date** 9/05/2021 **Type** Q 20x20

MGA Zone 51 310964 **mE** 6709347 **mN**

Habitat Ac-SMS - Stoney Mulga Shrubland with Acacia collegialis. Upper slope

Soil Orange red sandy clay loam with areas of outcropping cover (2-10%), large platy rocks (2-200mm) and quartz lag gravel.

Rock Type Weathered basalt

Vegetation Acacia collegialis 3-4m, Acacia craspedocarpa 3-4m PFC 15-20% over Acacia collegialis 0.5m Senna cardiosperma 1m, Dodonaea rigida 1.3m Scaevola spinescens (narrow leaf, spiny form) 0.8m, Eremophila latrobei subsp. latrobei 1.6m PFC 3-5% over Ptilotus obovatus 0.3m Amphipogon caricinus. Aristida contorta, Enneapogon caerulescens, Eriachne pulchella, Haloragis trigonocarpa, Sida sp. spiciform panicles (E.Leyland s.n. 14/8/90) PFC 2-5%.

Veg Condition Excellent

Fire Age Long unburnt

Notes Evidence of previous mining activity within and around quadrat.

SPECIES LIST:

Name	Cover	Height
Acacia collegialis	6	3-4
Acacia craspedocarpa	4	3-4
Acacia caesaneura	1	4
Acacia collegialis	2	1-2.5
Dodonaea viscosa subsp. angustissima	+	1
Senna cardiosperma	0.5	1
Dodonaea lobulata	1	1.5
Dodonaea rigida	1	1
Eremophila eriocalyx	+	1.5
Leichhardtia australis	+	1.5
Acacia collegialis	1	0.5-1
Acacia craspedocarpa	+	0.5
Acacia caesaneura	+	0.5
Eremophila serrulata	+	0.5
Sida sp. spiciform panicles (E.Leyland s.n. 14/8/90)	+	0.2-0.5
Abutilon cryptopetalum	+	0.2
Amphipogon caricinus	+	0.2
Solanum lasiophyllum	+	.01
Haloragis trigonocarpa	+	0.1
Austrostipa scabra subsp. scabra	+	0.1
Eriachne pulchella subsp. pulchella	+	0.05
Euphorbia drummondii	+	0.01
Aristida contorta	1	0.2
Paspalidium basicladum	+	0.2
Enneapogon caerulescens	+	0.1
Ptilotus helipteroides	+	0.1
Cucumis myriocarpus	+	0.01
Ptilotus aervoides	+	0.1
Senna cardiosperma	+	0.1
Ptilotus obovatus	+	0.01
Goodenia occidentalis	+	0.01
Eremophila longifolia	+	0.1
Scaevola spinescens (narrow leaf, spiny form)	out	1
Chrysocephalum puteale	out	0.3
Cenchrus ciliaris	out	0.3
Solanum cleistogamum	out	0.1
Acacia tetragonophylla	+	0.1
Calandrinia eremaea	out	0.01
Cheilanthes sieberi subsp. sieberi	out	0.1
Erodium cygnorum	+	
Vittadinia humerata	+	0.05
Stackhousia muricata	+	0.2
Thysanotus sp.	+	
Swainsona sp. Menzies (J. Warden & J. Paterson)	+	
Roepera apiculata	+	0.1
Euphorbia drummondii	+	0.01
Lysiana casuarinae	+	
Austrostipa elegantissima	+	0.4
Cheilanthes sieberi subsp. sieberi	out	0.1
Ptilotus exaltatus	out	0.1
Goodenia mimuloides	+	
Eremophila latrobei subsp. latrobei	+	
Enneapogon polyphyllus	+	

Kingwest Menzies **Site** Q22

Described by JW JP **Date** 9/05/2021 **Type** Q 20x20

MGA Zone 51 310794 **mE** 6709613 **mN**

Habitat Ac-SMS - Stoney Mulga Shrubland with Acacia collegialis. Upper slope

Soil Orange / red silty clay loam with discontinuous (50-90%) large platy rocks (200-600mm) and angular basaltic lag gravel (2-200mm). Some exposed calcrete and areas of outcropping cover.

Rock Type Weathered basalt

Vegetation Acacia collegialis 3-5m PFC 5-8% over Acacia collegialis 1-3m, Senna artemisioides subsp. filifolia 1.2m, Eremophila latrobei subsp. latrobei 1.6m Scaevola spinescens (narrow leaf, spiny form) 1.2m, Acacia tetragonophylla 1-2m, Dodonaea lobulata 1.3m PFC 5-10% over herbs and grasses inc. Chrysocephalum puteale, Cheilanthes sieberi, Sida sp. spiciform panicles (E.Leyland s.n. 14/8/90), Amphipogon caricinus, Aristida contorta, Enneapogon caerulescens, Ptilotus helipteroides.

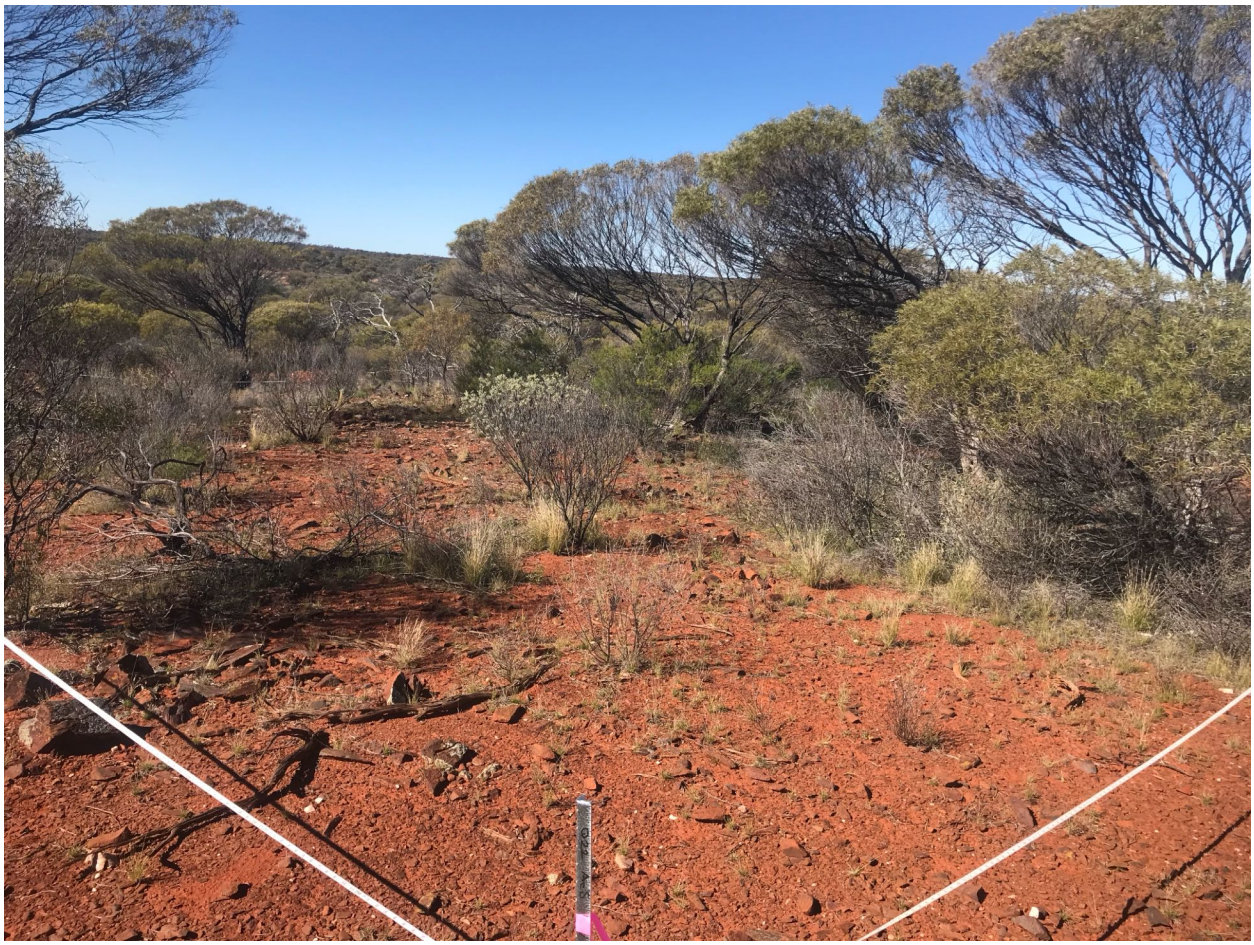
Veg Condition Excellent

Fire Age Long unburnt

Notes No effective disturbance.

SPECIES LIST:

Name	Cover	Height
Acacia collegialis	9	3.5-5.5
Scaevola spinescens (narrow leaf, spiny form)	+	1.6
Dodonaea lobulata	1	0.7-1.6
Acacia collegialis	1	1-2.5
Eremophila latrobei subsp. latrobei	+	1.6
Senna artemisioides subsp. x sturtii	+	1.2
Leichhardtia australis	+	1.5
Eremophila latrobei subsp. latrobei	+	1.8
Sida sp. spiciform panicles (E.Leyland s.n. 14/8/90)	1	0.3-0.6
Haloragis trigonocarpa	+	0.1
Enneapogon caerulescens	+	0.2
Senna artemisioides subsp. x sturtii	+	0.1
Chrysocephalum puteale	+	0.3
Aristida contorta	+	0.2
Amphipogon caricinus	+	0.2
Ptilotus helipteroides	+	0.1
Roepera apiculata	+	0.1
Eremophila latrobei subsp. latrobei	+	0.2
Acacia collegialis	+	0.5
Paspalidium basicladum	out	0.3
Senna cardiosperma	+	0.3
Ptilotus obovatus	+	0.1-0.3
Eremophila serrulata	+	0.5
Enneapogon polyphyllus	+	0.1
Goodenia havilandii	+	0.01
Erodium cygnorum	+	0.01
Eriachne pulchella subsp. pulchella	+	0.01
Solanum lasiophyllum	+	0.1
Senna artemisioides subsp. filifolia	+	0.1
Roepera iodocarpa	+	0.1
Sclerolaena eriacantha	+	0.1
Cheilanthes brownii	+	0.1
Enchylaena tomentosa var. tomentosa	+	0.1
Maireana planifolia	+	0.4
Goodenia mimuloides	+	0.01
Roepera apiculata	+	0.01
Austrostipa scabra subsp. scabra	+	0.2
Acacia tetragonophylla	+	0.1
Solanum cleistogamum	out	0.3
Cheilanthes sieberi subsp. sieberi	out	0.1
Dodonaea viscosa subsp. angustissima	out	0.3
Cenchrus ciliaris	out	0.2
Calandrinia eremaea	+	0.01
Goodenia havilandii	out	0.01
Stenopetalum filifolium	+	0.4
Euphorbia drummondii	+	0.1
Vittadinia eremaea	+	0.1
Eriochiton sclerolaenoides	+	0.01
Swainsona sp. Menzies (J. Warden & J. Paterson)	+	0.1
Eremophila longifolia	out	1.5
Stackhousia muricata	out	0.2
Calotis hispidula	out	0.01
Rhodanthe battii	out	0.2



Kingwest Menzies **Site** Q23

Described by JW JP **Date** 9/05/2021 **Type** Q 20x20

MGA Zone 51 309381 **mE** 6709643 **mN**

Habitat Hardpan mulga Woodland. (HPMW)

Soil ? with discontinuous (20-50%) angular ironstone and quartz log gravel (2-60mm) and no outcropping cover

Rock Type Unknown subcropping

Vegetation Acacia aneura 5-6m, Acacia ramulosa var. ramulosa 3-4m PFC 20-25% over Scaevola spinescens 1.2m, Eremophila latrobei subsp. latrobei 1.8m, Dodonaea rigida 1.8m PFC 2-5% over Eragrostis eriopoda, Ptilotus obovatus, Cheilanthes sieberi PFC 1-2%.

Veg Condition Excellent

Fire Age Long unburnt

Notes Quadrat is relatively species-poor with many taxa recorded as outs.

SPECIES LIST:

Name	Cover	Height
Acacia aneura	18	5-6
Acacia caesaneura	2	5-6
Scaevola spinescens (narrow leaf, spiny form)	1	1.7
Eragrostis eriopoda	+	0.4
Cheilanthes sieberi subsp. sieberi	2	0.2
Leichhardtia australis	+	0.4
Erodium cygnorum	+	0.01
Solanum lasiophyllum	Dead	0.1
Monachather paradoxus	+	0.1
Eremophila latrobei subsp. latrobei	out	2
Ptilotus obovatus (upright form)	out	0.3
Dodonaea rigida	out	1
Casuarina pauper	out	8
Acacia ramulosa var. ramulosa	out	1.8
Psydrax suaveolens	out	1.6
Acacia tetragonophylla	out	1.2
Goodenia mimuloides	+	0.01
Euphorbia drummondii	+	0.01
Enneapogon caerulescens	+	0.1
Calotis hispidula	+	0.01
Thysanotus sp.	out	0.1
Brunonia australis	out	0.01

Kingwest Menzies **Site** Q24

Described by JW JP **Date** 9/05/2021 **Type** 20x20

MGA Zone 51 309520 **mE** 6709471 **mN**

Habitat EolW - Eucalyptus oleosa Woodland\

Soil Firm orange sandy clay loam with limited (2-10%) ironstone lag gravel (2-6mm) and no outcropping cover.

Rock Type Subcropping weathered basalt.

Vegetation Eucalyptus oleosa 6-8m OFC 2-10% over Acacia sibirica 5m 2-10% over Senna artemisioides subsp. filifolia 2m, Dodonaea lobulata 1.8m PFC 4-20% over herbs and grasses.

Veg Condition Excellent

Fire Age Long unburnt

Notes No effective disturbance.

SPECIES LIST:

Name	Cover	Height
Eucalyptus oleosa subsp. oleosa	18	8-12
Acacia sibirica	14	5-6
Dodonaea lobulata	8	1.8
Senna artemisioides subsp. filifolia	+	1-1.7
Dodonaea rigida	+	0.7
Senna artemisioides subsp. filifolia	+	0.4-1
Dodonaea lobulata	+	0.4
Austrostipa elegantissima	+	0.5
Leichhardtia australis	+	0.4-2
Acacia tetragonophylla	+	0.2
Goodenia mimuloides	+	0.01
Ptilotus obovatus (upright form)	+	0.3-0.5
Eremophila longifolia	+	0.2
Swainsona laciniata	+	0.01
Haloragis trigonocarpa	+	0.01
Scaevola spinescens (narrow leaf, spiny form)	+	0.8
Enneapogon polyphyllus	+	0.01
Ptilotus exaltatus	out	0.01
Enneapogon caerulescens	out	0.01
Sida sp. dark green fruits (S. van Leeuwen 2260)	out	0.1
Acacia aneura	out	5
Santalum spicatum	out	3
Sclerolaena gardneri	out	0.2
Acacia aptaneura	out	4
Acacia ramulosa var. ramulosa	out	2
Acacia ligulata	out	4
Monachather paradoxus	out	0.3
Euphorbia drummondii	+	0.01
Erodium cygnorum	+	0.01
Eremophila longifolia	+	1.6
Sida spodochroma	+	0.05
Eremophila oldfieldii	out	0.3
Maireana trichoptera	out	0.01
Roepera apiculata	out	
Austrostipa scabra subsp. scabra	out	0.3

Kingwest Menzies **Site** Q25

Described by JW JP **Date** 9/05/2021 **Type** Q 20x20

MGA Zone 51 310014 **mE** 6709412 **mN**

Habitat SIMS - Stoney Ironstone Mulga shrubland.

Soil Orange red silty clay loam with discontinuous (20-50%) ironstone lag gravel (2-60mm) and no outcropping cover.

Rock Type Subcropping basalt.

Vegetation Acacia sibirica 6m Casuarina pauper 8m PFC 2-5% over Acacia sibirica 3m, Acacia tetragonophylla 3m PFC 5-8% over Scaevola spinescens 1m, Senna artemisioides subsp. filifolia 1m, Dodonaea lobulata 1.2m Eremophila oldfieldii 0.5m PFC 8-10% over Ptilotus obovatus, Enneapogon polyphyllus and E. caerulescens.

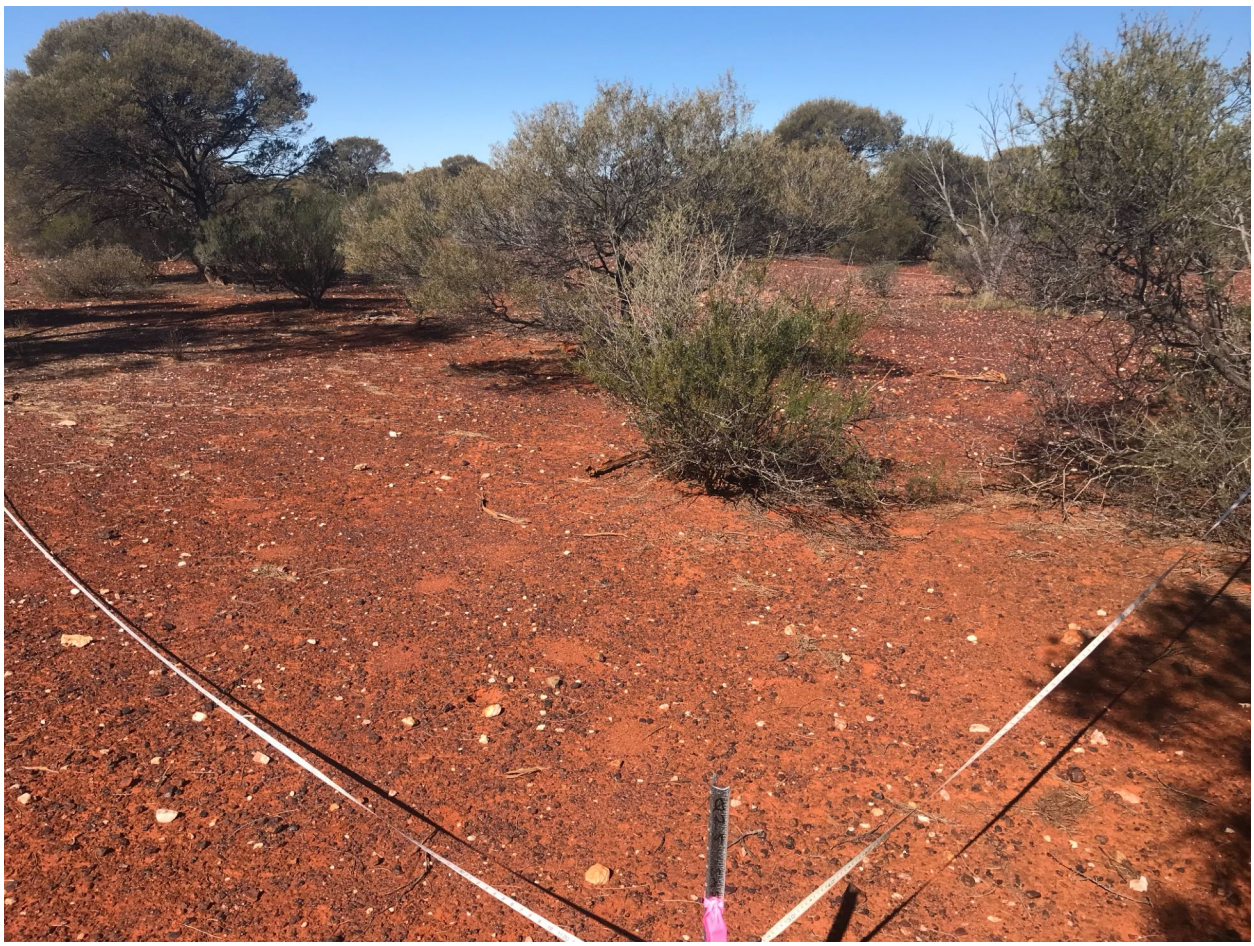
Veg Condition Excellent

Fire Age Long unburnt

Notes Evidence of rabbit grazing.

SPECIES LIST:

Name	Cover	Height
Casuarina pauper	0.5	8
Acacia sibirica	2	4-6
Santalum spicatum	1	3.5
Acacia sibirica	1	1-2.5
Acacia tetragonophylla	1	3.5
Dodonaea lobulata	1	1-1.6
Senna artemisioides subsp. filifolia	+	1.4
Scaevola spinescens (narrow leaf, spiny form)	0.5	1
Eremophila oldfieldii	+	1.4
Acacia sibirica	+	1
Senna cardiosperma	+	1
Sida ectogama	+	1.5
Leichhardtia australis	+	1.4
Enchylaena tomentosa var. tomentosa	+	0.4
Ptilotus obovatus (upright form)	+	0.4
Dodonaea lobulata	+	0.4
Acacia sibirica	+	0.7
Acacia tetragonophylla	+	0.4
Sida sp. dark green fruits (S. van Leeuwen 2260)	+	0.4
Dysphania melanocarpa	+	0.1
Dodonaea rigida	+	0.7
Enneapogon caerulescens	1	0.2
Enneapogon polyphyllus	+	0.1
Sida ectogama	+	0.2
Eremophila oldfieldii	+	0.3
Eremophila longifolia	out	1.2
Maireana trichoptera	out	0.1
Eremophila alternifolia	+	0.4
Austrostipa elegantissima	+	0.2
Erodium cygnorum	+	0.01
Austrostipa scabra subsp. scabra	+	0.1
Haloragis trigonocarpa	+	0.1
Lysiana casuarinae	out	
Eremophila metallicorum	+	0.1



Kingwest Menzies **Site** Q26

Described by JW JP **Date** 9/05/2021 **Type** Q 20x20

MGA Zone 51 309503 **mE** 6710283 **mN**

Habitat EclW - Eucalyptus clelandiorum Woodland on calcrete platform

Soil Creamy orange silty clay loam with mixed abundant (50-90%) greenstone and quartz lag gravel (2-200mm) with some calcrete patches.

Rock Type Calcrete

Vegetation Eucalyptus clelandiorum 8-10m PFC 5-20% over Casuarina pauper 6m, Acacia sibirica 3-4m, PFC 1-2% over Eremophila ?pantonii 1.6m, Scaevola spinescens 1-1.2m Senna artemisioides subsp. filifolia 1.2m Senna artemisioides subsp. x sturtii 0.6m PFC 1-8%

Veg Condition Excellent

Fire Age Long unburnt

Notes No effective disturbance.

SPECIES LIST:

Name	Cover	Height
Eucalyptus clelandiorum	10	8-10
Eremophila scoparia	+	1-2
Scaevola spinescens (broad leaf, spiny form)	+	0.6
Acacia oswaldii	+	1
Eremophila scoparia	+	0.1
Senna artemisioides subsp. filifolia	+	0.1
Scaevola spinescens (broad leaf, spiny form)	+	0.2
Maireana trichoptera	out	.01
Acacia sibirica	out	3
Casuarina pauper	out	7
Solanum lasiophyllum	out	0.1
Olearia muelleri	+	0.5
Ptilotus obovatus (upright form)	out	0.4
Eremophila glabra subsp. glabra	out	0.4
Austrostipa elegantissima	out	1
Senna artemisioides subsp. x sturtii	out	0.5
Roepera apiculata	out	0.01
Enneapogon caerulescens	+	0.01
Eremophila longifolia	out	1

Kingwest Menzies **Site** Q27

Described by JW JP **Date** 10/05/2021 **Type** Q 20x20

MGA Zone 51 310343 **mE** 6709899 **mN**

Habitat EclW - Eucalyptus clelandiorum Woodland.

Soil Creamy sandy loam with abundant (50-90%) mixed basalt, quartz and calcrete lag gravel. No outcropping cover

Rock Type Calcrete subcropping.

Vegetation Eucalyptus clelandiorum 8-10m PFC 5-15% over open shrubland of Eremophila sp. Mt Jackson 3-4m, Acacia sibirica 2-3m, PFC 1-2%, over very open Eremophila ?pantonii and Senna artemisioides subsp. filifolia.

Veg Condition Excellent

Fire Age Long unburnt

Notes Small site with evidence of disturbance and exploration camp. Rip lines and rehab evident within the northern section. Quadrat is species poor within, with number of outs from other encroaching Veg units.

SPECIES LIST:

Name	Cover	Height
Eucalyptus clelandiorum	15	6-8
Eremophila sp. Mt Jackson (G.J. Keighery 4372)	+	1.7
Eremophila scoparia	+	1.5
Scaevola spinescens (broad leaf, spiny form)	+	0.6
Sclerolaena obliquicuspis	+	0.1
Maireana trichoptera	+	0.1
Leichhardtia australis	out	0.4
Ptilotus obovatus (upright form)	out	1.3
Acacia sibirica	out	3.5
Enneapogon caerulescens	out	0.1
Dodonaea lobulata	out	1.2
Senna artemisioides subsp. filifolia	out	2.8
Solanum lasiophyllum	out	0.4
Casuarina pauper	out	3
Austrostipa platychaeta	out	0.3
Eremophila oldfieldii	out	3
Roepera apiculata	+	0.01
Carrichtera annua	out	0.1

Kingwest Menzies **Site** Q28

Described by JW JP **Date** 10/05/2021 **Type** Q 20x20

MGA Zone 51 310315 **mE** 6710059 **mN**

Habitat EceW – Eucalyptus celastroides Woodland on scree slope of SLR (

Soil Creamy tan sandy loam.

Rock Type Laterized ironstone.

Vegetation Eucalyptus celastroides 6-7m PFC 5-12% over Eremophila sp. Mt Jackson (G.J. Keighery 4372) 2-3m PFc 1-3% over Scaevola spinescens (broad leaf, spiny form) 0.8m, Ptilotus obovatus 0.8m, Atriplex bunburyana 0.6m, Frankenia sp. 0.3m Sclerolaena diacantha 0.2, Eriochiton sclerioides 0.1m Enchylaena tomentosa 0.4m, Eremophila pustulata 1.2 PFC 2-5%.

Veg Condition Very Good

Fire Age Long Unburnt

Notes Evidence of soil being pushed up. Lots of mining activity around. Old drilling samples in quadrat.

SPECIES LIST:

Name	Cover	Height
Eucalyptus celastroides	6	6-7
Eremophila sp. Mt Jackson (G.J. Keighery 4372)	1	2-3
Eremophila pustulata	1	0.4-1.4
Scaevola spinescens (broad leaf, spiny form)	+	0.7
Atriplex bunburyana	1	0.7
Atriplex nummularia subsp. spathulata	+	0.6
Ptilotus obovatus (upright form)	+	0.7
Enneapogon polyphyllus	+	0.1
Eriochiton sclerolaenoides	+	0.1
Frankenia sp.	2	0.3
Casuarina pauper	+	0.4
Eremophila sp. Mt Jackson (G.J. Keighery 4372)	+	0.3
Enchylaena tomentosa var. tomentosa	+	0.3
Sclerolaena gardneri	+	0.2
Sclerolaena fusiformis	+	0.1
Olearia muelleri	out	0.4
Eremophila oppositifolia	out	1.2
Acacia sibirica	out	1
Senna artemisioides subsp. filifolia	out	0.4
Austrostipa elegantissima	out	0.2
Solanum lasiophyllum	out	0.2
Maireana trichoptera	+	0.2
Roepera apiculata	+	0.01
Maireana georgei	+	0.2
Roepera iodocarpa	out	0.1
Ptilotus exaltatus	out	0.05

Kingwest Menzies **Site** Q29

Described by JW JP **Date** 10/05/2021 **Type** Q 20x20

MGA Zone 51 310363 **mE** 6710111 **mN**

Habitat SLR - Stoney lateritic ridge.

Soil Creamy orange sandy clay loam with continuus (>20%) lateritic ironstone lag gravel (2-600mm), calcrete patches and 20-50% outcropping cover.

Rock Type Laterised ironstone.

Vegetation Acacia caesaneura 3-4m, Hakea recurva subsp. recurva 3m, Eremophila oldfieldii 3m, Acacia tetragonophylla 3m, casuarina pauper 3 m PFC 5-10%, over Philotheca brucei 1.5m, Atriplex bunburyana, Ptilotus obovatus (upright form), Enneapogon caerulescens, Abutilon cryptopetalum, Enneapogon cylindricus PFC 10-15%.

Veg Condition Excellent.

Fire Age Long unburnt

Notes North slope of SLR has been cleared historically, now dominated by Atriplex bunburyana with no upper storey. This veg unit is the highest point in the landscape.

SPECIES LIST:

Name	Cover	Height
Acacia caesaneura	1	3
Acacia tetragonophylla	2	2.7
Hakea recurva subsp. recurva	1	2.5
Acacia aneura	+	2.5
Psydrax suaveolens	+	1.6
Eremophila oldfieldii	2	1.5
Senna artemisioides subsp. filifolia	+	1.8
Dodonaea lobulata	1	1.8
Leichhardtia australis	+	1.5
Scaevola spinescens (narrow leaf, spiny form)	+	1.5
Philotheca brucei subsp. brucei	1	0.8
Acacia mulganeura	+	1.8
Dodonaea rigida	1	1.3
Eremophila latrobei subsp. latrobei	2	1.3
Atriplex bunburyana	+	0.8
Ptilotus obovatus (upright form)	+	0.5
Scaevola spinescens (narrow leaf, spiny form)	+	0.5
Enneapogon caerulescens	3	0.1
Abutilon cryptopetalum	+	0.15
Cheilanthes brownii	+	0.1
Enchylaena tomentosa var. tomentosa	+	0.4
Sida sp. spiciform panicles (E.Leyland s.n. 14/8/90)	+	0.1
Solanum lasiophyllum	+	0.1
Hakea recurva subsp. recurva	+	0.4
Sida sp. dark green fruits (S. van Leeuwen 2260)	+	0.1
Amphipogon caricinus	+	0.3
Sida sp. spiciform panicles (E.Leyland s.n. 14/8/90)	+	0.5
Sida ectogama	+	1.4
Sida sp. spiciform panicles (E.Leyland s.n. 14/8/90)	+	0.01
Monachather paradoxus	+	0.1
Casuarina pauper	+	0.5
Haloragis trigonocarpa	+	0.01
Boerhavia repleta	out	0.1
Frankenia sp.	out	0.4
Erodium cygnorum	+	0.1
Cenchrus ciliaris	out	0.4
Ptilotus exaltatus	+	0.01
Eriachne pulchella subsp. pulchella	out	0.01
Maireana planifolia	out	0.3
Stenopetalum filifolium	+	0.1
Calandrinia eremaea	+	0.05
Sclerolaena gardneri	+	0.02
Eriochiton sclerolaenoides	+	0.01
Roepera apiculata	+	0.01
Erodium cicutarium	out	0.01
Paspalidium basicladum	out	0.1
Senecio lacustrinus	out	0.15
Crassula colorata	out	0.01
Sisymbrium erysimoides	out	0.3
Rumex vesicarius	out	0.5

Kingwest Menzies **Site** Q30

Described by JW JP **Date** 12/05/2021 **Type** Q 20x20

MGA Zone 51 309663 **mE** 6711231 **mN**

Habitat Ac-SMS - Acacia collegialis Shrubland.

Soil Red/orange silty clay loam with abundant (50-90%) plate-like greenstone and angular quartz lag gravel (2-200mm). No outcropping cover.

Rock Type Weathered basalt

Vegetation Acacia collegialis 2.5-4m, PFC 15-20% over Dodonaea rigida, Scaevola spinescens, Senna cardiosperma, Dodonaea lobulata, Acacia tetragonophylla, Eremophila latrobei 1-2m PFC 5-10% over Enneapogon caerulescens, Sida sp. spiciform panicles (E.Leyland s.n. 14/8/90), Ptilotus obovatus, Abutilon cryptopetalum, 0.1-0.4m PFC 5-10%.

Veg Condition Excellent

Fire Age Long unburnt

Notes No effective disturbance.

SPECIES LIST:

Name	Cover	Height
Acacia collegialis	4	4-5
Acacia collegialis	12	1.0-2.5
Leichhardtia australis	+	2.5
Eremophila latrobei subsp. latrobei	1	2
Dodonaea rigida	1	0.6-1.8
Acacia sibirica	+	1.3
Scaevola spinescens (narrow leaf, spiny form)	+	0.6-1.2
Senna cardiosperma	2	0.6
Acacia tetragonophylla	+	1.4
Acacia collegialis	+	0.5
Chrysocephalum puteale	2	0.3
Senna cardiosperma	+	0.3
Ptilotus obovatus	+	0.3
Sida sp. spiciform panicles (E.Leyland s.n. 14/8/90)	+	0.2
Dodonaea rigida	+	0.3
Enneapogon caerulescens	3	0.1
Ptilotus helipteroides	+	0.1
Solanum lasiophyllum	+	0.2
Haloragis trigonocarpa	+	0.1
Austrostipa elegantissima	+	0.5
Amphipogon caricinus	+	0.2
Acacia tetragonophylla	+	0.3
Abutilon cryptopetalum	+	0.2
Eremophila georgei	+	0.3
Dodonaea lobulata	+	0.4
Ptilotus aervoides	+	0.01
Sida sp. spiciform panicles (E.Leyland s.n. 14/8/90)	+	0.01
Eremophila latrobei subsp. latrobei	+	0.1
Austrostipa scabra subsp. scabra	+	0.1
Paspalidium basicladum	+	0.1
Aristida contorta	+	0.2
Maireana planifolia	+	0.4
Roepera apiculata	out	0.1
Calandrinia eremaea	+	0.01
Erodium cygnorum	+	0.01
Goodenia mimuloides	+	0.01
Rhodanthe battii	+	0.01
Goodenia havilandii	+	0.1
Swainsona sp. Menzies (J. Warden & J. Paterson)	+	0.1
Euphorbia drummondii	+	0.01
Stenopetalum filifolium	+	0.2
Eriachne pulchella subsp. pulchella	+	0.01

Kingwest Menzies **Site** Q31

Described by JW JP **Date** 12/05/2021 **Type** Q 20x20

MGA Zone 51 309949 **mE** 6711956 **mN**

Habitat MpS - Maireana pyramidata Shrubland.

Soil Self-mulching orange clay loam with discontinuous (2-10%) angular quartz lag gravel (2-60mm) and no outcropping cover.

Rock Type Subcropping weathered basalt.

Vegetation Maireana pyramidata 0.8m Atriplex bunburyana 0.6m, Cenchrus ciliaris PFC 20-30% over Enneapogon caerulescens, E. polyphyllus, E. cylindricus, Dactyloctenium radulans, Dysphania melanocarpa, Dissocarpus paradoxus, Enteropogon ramosus, Dysphania sp. Eragrostis setifolia. PFC 10-15%

Veg Condition Excellent

Fire Age Long unburnt

Notes Limited clearing, exploration drilling nearby. Cenchrus ciliaris invasion (almost 10-15% cover).

SPECIES LIST:

Name	Cover	Height
Maireana pyramidata	15-18	0.6-0.8
Atriplex bunburyana	+	0.6
Cenchrus ciliaris	1	0.6
Dissocarpus paradoxus	+	0.3
Enneapogon polyphyllus	1	0.2
Enneapogon caerulescens	1	0.1
Enneapogon cylindricus	+	0.1
Dactyloctenium radulans	+	0.1
Dysphania melanocarpa	3	0.1
Sclerolaena diacantha	+	0.1
Abutilon cryptopetalum	+	0.1
Haloragis trigonocarpa	+	0.1
Plantago drummondii	+	0.1
Ptilotus aervoides	+	0.01
Enteropogon ramosus	+	0.4
Sida fibulifera	+	0.4
Euphorbia drummondii	+	0.01
Carrichtera annua	+	0.01
Convolvulus angustissimus	+	0.1
Medicago truncatula	+	0.01
Abutilon otocarpum	+	0.1
Bulbine semibarbata	+	0.1
Eragrostis kennedyae	+	0.2
Boerhavia repleta	+	0.1
Sida fibulifera	+	0.1
Swainsona rostellata	+	0.1
Streptoglossa liatroides	+	0.1
Sclerolaena obliquicuspis	+	0.2
Erodium cygnorum	+	0.1
Roepera apiculata	+	0.01
Portulaca oleracea	+	0.01
Salsola australis	+	0.3
Eragrostis setifolia	+	0.2
Calotis multicaulis	+	0.1
Vittadinia eremaea	+	0.2
Maireana sedifolia	out	0.4
Plantago drummondii	+	0.1
Vittadinia eremaea	+	0.1
Euphorbia drummondii	+	0.3
Convolvulus recurvatus subsp. nullarborensis	+	0.1
Cephalipterum drummondii	+	0.1
Trachymene pilosa	+	0.05
Chrysocephalum apiculatum subsp. glandulosum	+	0.1
Stenopetalum filifolium	+	0.1
Abutilon otocarpum	+	0.1
Crassula colorata	+	0.01
Solanum lasiophyllum	out	0.1
Lepidium phlebopetalum	out	
Lepidium phlebopetalum	out	
Calotis hispidula	out	

Kingwest Menzies **Site** Q32

Described by JW JP **Date** 12/05/2021 **Type** Q 20x20

MGA Zone 51 310047 **mE** 6711813 **mN**

Habitat MsS - Maireana sedifolia Shrubland.

Soil Creamy orange silty clay loam with discontinuous (10-20mm) mixed large quartz and smaller basaltic lag gravel. (2-200mm). No outcropping cover.

Rock Type Weathered basalt subcropping

Vegetation Casuarina pauper 6 m, Acacia sibirica 6m, PFC 1-2% over Eremophila oldfieldii, Maireana sedifolia, Acacia tetragonophylla, Senna artemisioides subsp. filifolia, Dodonaea lobulata 1-2.5m PFC 8-12% over Enneapogon polyphyllus, Enteropogon ramosus, Chrysocephalum apiculatum, Solanum lasiophyllum PFC 5-10%

Veg Condition Excellent

Fire Age Long unburnt

Notes Clearing north of quadrat from historical mining. Vehicle tracks through quadrat.

SPECIES LIST:

Name	Cover	Height
Eremophila oldfieldii	0.5	2.5
Dodonaea lobulata	+	1.6
Maireana sedifolia	4	1.5
Senna artemisioides subsp. filifolia	1	1.2
Eremophila oldfieldii	+	0.8
Atriplex bunburyana	+	0.8
Hakea preissii	+	0.8
Acacia tetragonophylla	+	1.3
Cenchrus ciliaris	+	1.1
Solanum nummularium	+	0.4
Maireana sedifolia	4	0.1-0.5
Solanum lasiophyllum	+	0.3
Enneapogon polyphyllus	3	0.2
Enteropogon ramosus	+	0.3
Euphorbia drummondii	+	0.1
Sida fibulifera	+	0.1
Enneapogon cylindricus	+	0.2
Sida calyxhymenia	+	0.4
Enneapogon caerulescens	+	0.1
Atriplex bunburyana	+	0.5
Cenchrus ciliaris	+	0.3
Ptilotus obovatus (upright form)	+	0.3
Abutilon cryptopetalum	+	0.1
Convolvulus angustissimus	+	0.1
Leichhardtia australis	+	1.2
Sida spodochroma	+	0.2
Dysphania melanocarpa	+	0.1
Dissocarpus paradoxus	+	0.1
Chrysocephalum apiculatum subsp. glandulosum	+	0.4
Eremophila scoparia	+	0.5
Dodonaea lobulata	+	0.4
Enchylaena tomentosa var. tomentosa	+	0.4
Paspalidium basicladum	+	0.1
Eriochiton sclerolaenoides	+	0.1
Maireana triptera	+	0.4
Casuarina pauper	out	6
Acacia sibirica	out	4-5
Cephalipterum drummondii	+	0.01
Maireana trichoptera	+	0.1
Erodium cygnorum	+	0.01
Medicago polymorpha	out	0.01
Carrichtera annua	+	0.1
Vittadinia eremaea	+	0.15
Plantago sp. Mt Magnet (A.S. George 6793)	+	0.1
Convolvulus recurvatus subsp. nullarborensis	+	0.1
Medicago truncatula	out	0.01
Roepera apiculata	+	0.01
Sclerolaena gardneri	+	0.01
Roepera iodocarpa	+	0.1
Swainsona rostellata	+	0.01
Trachymene pilosa	out	0.1
Erodium aureum	out	0.01
Maireana pyramidata	out	0.3

Kingwest Menzies **Site** Q33

Described by JW JP **Date** 12/05/2021 **Type** Q 20x20

MGA Zone 51 309812 **mE** 6709317 **mN**

Habitat CpAsSaf - Casuarina pauper - Acacia sibirica - Senna artemisioides subsp. artemisioides Shrubland

Soil Orange clay loam with discontinuous (50-90%) ironstone lag gravel (2-60mm) and no outcropping cover

Rock Type Weathered basalt subcropping

Vegetation Casuarina pauper 6m, Acacia sibirica 4m Acacia hemiteles 3m PFC 15-20% over Senna artemisioides subsp. filifolia 1-1.8m, Acacia burkittii 1.6m PFC 5-10% over Ptilotus obovatus, Enneapogon caerulescens 0.1m Eriochiton sclerolaenoides PFC 1-2%.

Veg Condition Excellent

Fire Age Long unburnt

Notes Old access track/drill line in quadrat. Limited clearing.

SPECIES LIST:

Name	Cover	Height
Acacia sibirica	1	3.5
Acacia hemiteles	1	3
Acacia hemiteles	9	1-2.5
Casuarina pauper	+	2.5
Acacia sibirica	0.5	1.3
Senna artemisioides subsp. filifolia	0.5	1-1.5
Acacia tetragonophylla	+	1.5
Leichhardtia australis	+	1.3
Rhagodia drummondii	+	1.5
Atriplex bunburyana	+	0.15
Senna artemisioides subsp. filifolia	+	0.3
Ptilotus obovatus	+	0.3
Eriochiton sclerolaenoides	+	0.1
Austrostipa elegantissima	+	0.3
Sida spodochroma	+	0.01
Enneapogon caerulescens	+	0.1
Sclerolaena obliquicuspis	+	0.1
Eremophila oldfieldii	+	0.4
Acacia sibirica	+	0.2
Sclerolaena gardneri	+	0.1
Roepera apiculata	+	0.1
Leichhardtia australis	+	0.01
Enchylaena tomentosa var. tomentosa	+	0.1
Euphorbia drummondii	+	0.01
Chenopodium curvispicatum	+	0.4
Solanum nummularium	out	0.3
Atriplex nummularia subsp. spathulata	out	1.6
Solanum lasiophyllum	out	0.1
Scaevola spinescens (narrow leaf, spiny form)	out	0.4
Pittosporum angustifolium	out	4
Eremophila scoparia	out	1.8
Eremophila longifolia	+	1.8
Sida ectogama	out	0.6
Ptilotus exaltatus	out	0.01
Dodonaea lobulata	out	0.5
Acacia burkittii	out	1.5
Ptilotus aervoides	out	0.01
Erodium cygnorum	+	0.01
Maireana trichoptera	+	0.05
Eremophila metallicorum	+	1.8
Convolvulus angustissimus	out	0.01
Paspalidium basicladum	out	0.1
Maireana tomentosa subsp. tomentosa	+	0.15

Kingwest Menzies **Site** Q34

Described by JW JP **Date** 13/05/2021 **Type** Q 20x20

MGA Zone 51 308989 **mE** 6710888 **mN**

Habitat CpAsSaf - Casuarina pauper - Acacia sibirica - Senna artemisioides subsp. artemisioides Shrubland

Soil Creamy orange red clay with discontinuous (50-90%) angular quartz lag gravel with small amount of lateritic gravel. No outcropping cover

Rock Type Weathered basalt subcropping

Vegetation Casuarina pauper 6-8m PFC 2-5% over Acacia sibirica 4-5m PFC 1-5% over Eremophila scoparia 1-2.5m Scaevola spinescens Ptilotus obovatus (upright form), Senna artemisioides subsp. filifolia Eremophila oppositifolia 1-2.5m PFC 10-12% over Chenopods inc. Sclerolaena diacantha, Maireana triptera PFC <1%.

Veg Condition Excellent

Fire Age Long unburbt

Notes No effective disturbance.

SPECIES LIST:

Name	Cover	Height
Casuarina pauper	3	6-8
Acacia sibirica	6	2-3.5
Santalum spicatum	+	2.5
Casuarina pauper	+	2.5
Eremophila scoparia	+	2
Eremophila oppositifolia	1	2.5
Scaevola spinescens (broad leaf, non-spiny form)	1	1-1.8
Eremophila scoparia	3-4	1-1.8
Senna artemisioides subsp. filifolia	+	1.2
Casuarina pauper	+	1
Acacia sibirica	+	1.2
Eremophila oppositifolia	+	1.2
Scaevola spinescens (narrow leaf, spiny form)	+	1.5
Ptilotus obovatus (upright form)	1	0.8
Atriplex bunburyana	1	0.7
Maireana georgei	+	0.3
Scaevola spinescens (broad leaf, non-spiny form)	+	0.2
Scaevola spinescens (narrow leaf, spiny form)	1	0.5
Sclerolaena diacantha	+	0.1
Maireana pyramidata	+	0.4
Austrostipa elegantissima	+	0.4
Enchylaena tomentosa var. tomentosa	+	0.4
Eremophila decipiens subsp. decipiens	+	0.3
Eremophila scoparia	2	0.6
Acacia tetragonophylla	+	0.5
Casuarina pauper	+	.05
Acacia sibirica	+	0.2
Leichhardtia australis	+	0.6
Sclerolaena fusiformis	+	0.1
Austrodanthonia sp.	+	0.1
Eremophila oldfieldii	out	1.6
Olearia muelleri	out	0.6
Malvaceae sp.	out	0.01
Roepera apiculata	+	0.1
Rhagodia drummondii	+	1.2
Sclerolaena eriacantha	+	0.2
Roepera iodocarpa	+	0.01
Maireana georgei	+	0.15
Maireana trichoptera	+	0.15
Chenopodium curvispicatum	+	0.5
Eremophila metallicorum	out	0.5
Erodium cygnorum	out	0.05
Sida spodochroma	out	0.01
Solanum cleistogamum	out	0.01

Kingwest Menzies **Site** Q35

Described by JW JP **Date** 13/05/2021 **Type** Q 20x20

MGA Zone 51 308610 **mE** 6711184 **mN**

Habitat DRMS - Drainage Mulga Woodland dominated by Acacia sibirica and Casuarina pauper

Soil Orange red silty clay loam with isolated (<2%) quartz lag gravel ()2-20mm) and no outcropping

Rock Type Weathered basalt subcropping

Vegetation Acacia sibirica 4-5m Casuarina pauper 6-8m PFC 15-35% over Eremophila scoparia, Sida ectogama, Dodonaea lobulata, Eremophila granitica 1-2.5m Senna artemisioides subsp. filifolia., Scaevola spinescens, Exocarpos aphyllus 1-2.5m PFC 5-15% over Ptilotus obovatus, Abutilon cryptopetalum, Erodium cygnorum, Swainsona laciniata, Euphorbia drummondii PFC 2-10%.

Veg Condition Excellent

Fire Age Long Unburnt

Notes Limited clearing - Old Stumps scattered through quadrat.

SPECIES LIST:

Name	Cover	Height
Acacia sibirica	55	5-6
Santalum spicatum	+	3
Eremophila metallicorum	+	2
Dodonaea lobulata	1	1.5-2.5
Eremophila oldfieldii	+	1.5
Acacia sibirica	+	1.5-3
Sida ectogama	1	1-1.5
Senna artemisioides subsp. filifolia	+	1.2
Leichhardtia australis	+	3
Acacia acanthoclada subsp. acanthoclada	+	1.2
Exocarpos aphyllus	+	1.2
Acacia sibirica	+	0.8
Ptilotus obovatus (upright form)	1	0.4
Enneapogon caerulescens	+	0.1
Abutilon cryptopetalum	+	0.1
Monachather paradoxus	+	0.2
Enchylaena tomentosa var. tomentosa	+	0.3
Erodium cygnorum	+	0.1
Haloragis trigonocarpa	+	0.1
Swainsona laciniata	+	0.1
Leichhardtia australis	+	0.1
Roepera iodocarpa	+	0.1
Austrostipa elegantissima	+	0.4
Acacia tetragonophylla	+	0.3
Euphorbia drummondii	+	0.1
Sida ectogama	1	0.6
Paspalidium basicladum	+	0.3
Lysiana murrayi	+	
Cenchrus ciliaris	+	0.2
Swainsona oliveri	+	0.01
Cucumis myriocarpus	+	0.1
Convolvulus angustissimus	+	0.1
Solanum lasiophyllum	+	0.1
Eremophila scoparia	+	0.6
Goodenia mimuloides	+	0.01
Ptilotus exaltatus	+	0.0.1
Vittadinia eremaea	+	0.1
Eremophila metallicorum	+	0.6
Scaevola spinescens (narrow leaf, spiny form)	out	1.2
Atriplex bunburyana	out	1
Casuarina pauper	+	1-6
Rhagodia drummondii	out	0.6
Olearia muelleri	out	0.6
Senna cardiosperma	out	1.5
Calandrinia porifera	+	0.01
Nicotiana occidentalis	+	0.1
Sclerolaena gardneri	+	0.01
Bulbine semibarbata	+	0.05
Menkea sphaerocarpa	+	0.01
Calandrinia eremaea	+	0.01
Daucus glochidiatus	+	0.01
Calotis hispidula	+	0.1
Lepidium oxytrichum	out	0.05

Kingwest Menzies **Site** Q36

Described by JW JP **Date** 13/05/2021 **Type** Q 20x20

MGA Zone 51 308164 **mE** 6712425 **mN**

Habitat DRMS – Drainage line Mulga Shrubland.

Soil Creamy orange silty clay loam with isolated (<2%) ironstone lag gravel (2-6mm) and no outcropping cover.

Rock Type Weathered basalt

Vegetation Acacia caesaneura, Acacia aptaneura, Eucalyptus oleosa 4-8m PFC 10-30% over tall shrubs of Acacia tetragonophylla 3m Eremophila longifolia, Acacia ramulosa var. ramulosa PFC 10-25% over Ptilotus obovatus, Scaevola spinescens, Enneapogon spp. Enchylaena tomentosa, Paspalidium basicladum, Abutilon cryptopetalum 0.1-0.8m PFC 1-10%.

Veg Condition Excellent

Fire Age Long unburnt

Notes Limited clearing: Access track to north and east of quadrat.

SPECIES LIST:

Name	Cover	Height
Acacia caesaneura	14	4-8
Eremophila longifolia	2	8
Acacia ramulosa var. ramulosa	1-2	5-6
Acacia burkittii	2	5-6
Acacia tetragonophylla	4	2-4
Dodonaea lobulata	+	1
Senna cardiosperma	+	1.2
Eremophila metallicorum	1	1.2
Scaevola spinescens (narrow leaf, spiny form)	+	1.2
Acacia tetragonophylla	+	1.3
Leichhardtia australis	+	1.4
Dodonaea viscosa subsp. angustissima	+	0.7
Enchylaena tomentosa var. tomentosa	1	0.6
Ptilotus obovatus (upright form)	0.5	0.3
Sida ectogama	+	0.3
Paspalidium basicladum	1	0.1
Erodium cygnorum	2	0.05
Dysphania melanocarpa	1	0.1
Iseilema membranaceum	1	0.01
Abutilon cryptopetalum	+	0.15
Enneapogon caerulescens	+	0.1
Euphorbia drummondii	+	0.01
Eremophila longifolia	1	0.3
Cheilanthes sieberi subsp. sieberi	+	0.1
Sida fibulifera	+	0.1
Goodenia mimuloides	+	0.1
Goodenia havilandii	+	0.1
Medicago polymorpha	+	0.1
Digitaria brownii	+	0.2
Haloragis trigonocarpa	+	0.1
Portulaca oleracea	+	0.1
Sclerolaena gardneri	+	0.1
Euphorbia drummondii	+	0.2
Vittadinia eremaea	+	0.1
Sida calyxhymenia	+	0.1
Solanum lasiophyllum	+	0.01
Amyema benthamii	+	
Swainsona laciniata	+	0.1
Convolvulus angustissimus	+	0.1
Cenchrus ciliaris	+	0.2
Enneapogon polyphyllus	+	0.1
Leichhardtia australis	+	0.1
Roepera iodocarpa	+	0.3
Sida calyxhymenia	+	0.4
Rhodanthe sp.	+	0.3
Calotis hispidula	+	0.05
Crassula colorata	+	0.05
Rhodanthe charsleyae	+	0.3
Calandrinia eremaea	+	0.01
Swainsona rostellata	+	0.01
Parietaria cardiostegia	+	0.1
Calotis multicaulis	+	0.05
Euphorbia australis subsp. subtomentosa	+	0.01
Chenopodium curvispicatum	+	0.05
Austrostipa elegantissima	+	0.3
Erodium cicutarium	+	0.01
Rhodanthe charsleyae	+	
Rhodanthe battii	out	0.4
Eriochiton sclerolaenoides	out	0.01
Hydrocotyle intertexta	+	
Brachyscome sp.	+	

Kingwest Menzies **Site** Q37

Described by JW JP **Date** 9/08/2021 **Type** Q 20x20

MGA Zone 51 310638 **mE** 6706573 **mN**

Habitat HPMW - Hardpan Mulga Woodland

Soil Orange brown clay loam with discontinuous (50-60%) rounded ironstone lag gravel (2-6mm) and occasional quartz fragments (2-5%)

Rock Type Unknown / subcropping

Vegetation Acacia caesaneura 6-8m, Acacia aneura 6-8m, Acacia mulganeura 4-5m PFC 15-20% over Acacia ramulosa var. ramulosa 2.5m, Acacia mulganeura 3m PFC 10-15% over Scaevola spinescens, Acacia tetragonophylla 2m, Psydrax suaveolens 1m, Teucrium teucriiflorum 0.8m, Eragrostis eriopoda 0.4m, Cheilanthes sieberi 0.3m, Dodonaea rigida 1.6m, Eremophila longifolia 1.2m, Ptilotus obovatus 0.5m PFC 2-10%

Veg Condition Excellent

Fire Age Long unburnt

Notes The HPMW has Eucalyptus oleosa scattered throughout

SPECIES LIST:

Name	Cover	Height
Acacia caesaneura	8	6-7
Acacia aneura	2	6
Acacia mulganeura	4	1.4
Acacia ramulosa var. ramulosa	2	3
Psydrax suaveolens	+	1.4
Acacia caesaneura	1	3-3.5
Acacia tetragonophylla	+	2.5-3
Dodonaea rigida	+	1.6
Scaevola spinescens (narrow leaf, spiny form)	+	1.2
Psydrax suaveolens	1	0.8
Eremophila eriocalyx	+	0.8
Teucrium teucriiflorum	+	0.8
Eragrostis eriopoda	+	0.3
Cheilanthes sieberi subsp. sieberi	+	0.2
Psydrax suaveolens	0.5	0.1
Erodium cygnorum	+	0.01
Leichhardtia australis	+	2
Acacia caesaneura	+	0.5
Thysanotus sp.	+	0.2
Enneapogon caerulescens	+	0.05
Sida fibulifera	+	0.01
Monachather paradoxus	+	0.1
Solanum lasiophyllum	+	0.15
Goodenia mimuloides	+	0.01
Senna artemisioides subsp. filifolia	+	0.01
Sida ectogama	out	1.6
Casuarina pauper	out	8
Ptilotus obovatus	out	0.3
Eremophila longifolia	out	1.6
Austrostipa platychaeta	out	0.5
Senna artemisioides subsp. filifolia	out	2
Sida sp. dark green fruits (S. van Leeuwen 2260)	out	0.1
Rhagodia drummondii	out	1.6

Kingwest Menzies **Site** Q38

Described by JW JP **Date** 9/08/2021 **Type** Q 20x20

MGA Zone 51 310741 **mE** 6708047 **mN**

Habitat EceW - Eucalyptus celastroides Woodland on laterized ironstone breakaway

Soil Creamy orange clay loam with continuous (>90%) angular lateritic lag gravel and occasional quartz (2-200mm)

Rock Type Laterized ironstone breakaway

Vegetation Eucalyptus celastroides 6-7m with occasional Casuarina pauper 6-8m and Acacia sibirica 5m PFC 15-20% over Scaevola spinescens, Eremophila scoparia 1.2m, Eremophila oppositifolia 2m PFC 2-3% over Olearia muelleri, Acacia acanthoclada, Maireana georgei,, Sclerolaena fusiformis, Atriplex bunburyana, Ptilotus exaltatus, Sclerolaena gardneri PFC 1-2%

Veg Condition Excellent

Fire Age Long unburnt

Notes No effective disturbance

SPECIES LIST:

Name	Cover	Height
Eucalyptus celastroides	18	6-7
Eremophila scoparia	0.5	1-1.7
Eremophila oppositifolia	+	2..6
Scaevola spinescens (broad leaf, spiny form)	+	1.2
Acacia tetragonophylla	+	1.1
Acacia acanthoclada subsp. acanthoclada	+	1
Casuarina pauper	+	0.8
Scaevola spinescens (narrow leaf, spiny form)	+	0.8
Maireana georgei	+	0.2
Ptilotus exaltatus	+	0.2
Atriplex bunburyana	+	0.3
Sclerolaena fusiformis	+	0.01
Gunniopsis propinqua	+	0.01
Sclerolaena gardneri	+	0.01
Maireana trichoptera	+	0.01
Olearia muelleri	+	0.4
Acacia sibirica	+	0.3
Roepera iodocarpa	+	0.01
Dodonaea lobulata	+	0.2
Austrostipa elegantissima	+	0.2
Lawrencia densiflora	out	0.01
Ptilotus obovatus (upright form)	out	0.6
Maireana sedifolia	out	0.5
Austrostipa platychaeta	out	0.6

Kingwest Menzies **Site** Q39

Described by JW JP **Date** 10/08/2021 **Type** Q 20x20

MGA Zone 51 306810 **mE** 6715505 **mN**

Habitat EcoW - Eucalyptus concinna Woodland

Soil Sandy loam with abundant (50-90%) small granulated surface lag gravel (2-6mm)

Rock Type Deep sand

Vegetation Eucalyptus concinna 7-8m PFC 10-20% over Acacia sibirica 4m, Acacia aneura 4-5m PFC 1-2% over Senna artemisioides subsp. filifolia 1.6m, Eremophila scoparia 1m, Eremophila alternifolia 2m, Scaevola spinescens (narrow leaf, spiny form), Ptilotus obovatus 0.3m, Enchylaena tomentosa, Solanum lasiophyllum, Olearia muelleri, Eremophila georgei PFC 25-30%.

Veg Condition Excellent

Fire Age Long unburnt

Notes No effective disturbance

SPECIES LIST:

Name	Cover	Height
Eucalyptus concinna	10-15	7-9
Acacia oswaldii	+	3
Eremophila alternifolia	+	2.4
Eremophila scoparia	2	1-1.8
Senna artemisioides subsp. filifolia	5	1-1.6
Scaevola spinescens (broad leaf, spiny form)	0.5	1.2
Olearia muelleri	+	0.9
Acacia hemiteles	+	1.6
Leichhardtia australis	+	1.5
Acacia tetragonophylla	+	1
Dodonaea lobulata	+	1.2
Ptilotus obovatus	+	0.4
Sclerolaena gardneri	+	0.1
Roepera apiculata	+	0.1
Enchylaena tomentosa var. tomentosa	+	0.2-0.6
Eremophila decipiens subsp. decipiens	+	0.6
Pimelea microcephala subsp. microcephala	+	0.2-1
Paspalidium basicladum	+	0.3
Roepera iodocarpa	+	0.01
Enneapogon caerulescens	+	0.1
Sida spodochroma	+	0.01
Maireana trichoptera	+	0.1
Scaevola spinescens (narrow leaf, spiny form)	+	0.6
Enneapogon polyphyllus	+	0.1
Rhagodia drummondii	+	1.1
Austrostipa elegantissima	+	0.4
Salsola australis	+	0.1
Ptilotus exaltatus	+	0.1
Solanum lasiophyllum	+	0.4
Maireana georgei	+	0.2
Swainsona laciniata	+	0.01
Enchylaena tomentosa var. tomentosa	+	0.4
Acacia jennerae	out	1.6
Brachyscome ciliaris	out	0.2
Santalum spicatum	out	2
Solanum nummularium	out	0.3
Acacia sibirica	out	4
Cenchrus ciliaris	out	0.4
Eremophila oldfieldii	out	2
Eriochiton sclerolaenoides	out	0.1
Dodonaea viscosa subsp. angustissima	out	1.78
Convolvulus angustissimus	out	0.1
Acacia colletioides	out	2
Eremophila longifolia	out	1.8
Erodium cygnorum	out	0.01
Acacia aneura	out	5
Swainsona rostellata	out	0.05
Crassula colorata	out	0.01

Kingwest Menzies **Site** Q40

Described by JW JP **Date** 10/08/2021 **Type** Q 20x20

MGA Zone 51 306954 **mE** 6715678 **mN**

Habitat CpAsSaf - Casuarina pauper - Acacia sibirica - Senna artemisioides subsp. artemisioides Shrubland on Broad drainage.

Soil Deep orange brown sandy clay loam

Rock Type Subcropping basalt

Vegetation Casuarina pauper 6-8m, Acacia sibirica 4-6m PFC 10-15% over Senna artemisioides subsp. filifolia 1-1.6m, Scaevola spinescens, Eremophila scoparia 1.6m, Atriplex bunburyana, Ptilotus obovatus 0.3m PFC 15-20% over Dodonaea lobulata 1.2m, Sida spodochroma 0.1m, Paspalidium basicladum 0.2m, Maireana trichoptera, Sclerolaena gardneri PFC 1-2%.

Veg Condition Excellent

Fire Age Long unburnt

Notes No effective disturbance.

SPECIES LIST:

Name	Cover	Height
Casuarina pauper	2	6-8
Acacia sibirica	8	4-6
Senna artemisioides subsp. filifolia	4	1-2
Scaevola spinescens (broad leaf, spiny form)	+	1.6
Acacia sibirica	+	1.5
Eremophila scoparia	1	1-1.8
Dodonaea lobulata	1	1-1.6
Leichhardtia australis	+	1.5
Acacia tetragonophylla	+	1.2
Rhagodia drummondii	+	1.4
Ptilotus obovatus	+	0.3
Erodium cygnorum	+	0.01
Casuarina pauper	+	0.2
Maireana trichoptera	+	0.1
Enchylaena tomentosa var. tomentosa	+	0.1
Austrostipa elegantissima	+	0.5
Rhagodia drummondii	+	0.6
Roepera iodocarpa	+	0.2
Enneapogon caerulescens	+	0.1
Pimelea microcephala subsp. microcephala	+	0.7
Senna artemisioides subsp. filifolia	+	0.3
Goodenia mimuloides	+	0.1
Calandrinia eremaea	+	0.01
Sida spodochroma	+	0.01
Lysiana murrayi	+	
Salsola australis	+	0.1
Templetonia incrassata	out	2.5
Atriplex bunburyana	out	0.5
Eremophila decipiens subsp. decipiens	out	0.5
Swainsona rostellata	out	0.01

Kingwest Menzies **Site** Q41

Described by JW JP **Date** 10/08/2021 **Type** Q 20x20

MGA Zone 51 307163 **mE** 6714048 **mN**

Habitat Hardpan Mulga woodland

Soil Orange clay loam with abundant (50-90%) sandy quartz surface lag (2-20mm) and occasional coarse fragments (20-200mm)

Rock Type Subcropping calcrete/ basalt

Vegetation Acacia caesaneura (narrow phyllode variant) 5-7m, Acacia craspedocarpa 3-5m, Acacia ramulosa var. ramulosa 3.5m, Acacia sibirica 4.5m PFC 15-20% over Senna artemisioides subsp. filifolia 1.5m, Acacia ligulata 3m, Scaevola spinescens, Enchylaena tomentosa, Ptilotus obovatus, Acacia tetragonophylla PFC 5-15% over Enneapogon caerulescens, Haloragis trigonocarpa, Aristida contorta, Erodium cygnorum, Solanum lasiophyllum, Sida calyxhymenia PFC 5-8%.

Veg Condition Excellent

Fire Age Long unburnt

Notes No effective disturbance

SPECIES LIST:

Name	Cover	Height
Acacia caesaneura	5	6-8
Acacia ramulosa var. ramulosa	2	3.5
Acacia craspedocarpa	3	3.5-4
Rhagodia drummondii	+	1.2
Ptilotus obovatus	+	0.4
Cenchrus ciliaris	+	0.4
Enneapogon caerulescens	1	0.1
Erodium cygnorum	+	0.1
Swainsona rostellata	+	0.01
Sida calyxhymenia	+	0.2
Sclerolaena gardneri	+	0.01
Calandrinia porifera	+	0.1
Haloragis trigonocarpa	+	0.2
Euphorbia drummondii	+	0.01
Portulaca oleracea	+	0.01
Swainsona laciniata	+	0.1
Tetragonia eremaea	+	0.1
Solanum lasiophyllum	+	0.1
Austrostipa elegantissima	+	0.5
Paspalidium basicladum	+	0.2
Convolvulus angustissimus	+	0.3
Vittadinia eremaea	+	0.1
Wurmbea tenella	+	0.05
Menkea australis	+	0.01
Abutilon otocarpum	+	0.01
Crassula colorata	+	0.02
Aristida contorta	+	0.05
Maireana planifolia	+	0.4
Enneapogon cylindricus	+	0.02
Boerhavia repleta	+	0.01
Dysphania melanocarpa	+	0.01
Goodenia mimuloides	+	0.01
Abutilon cryptopetalum	+	0.15
Leichhardtia australis	+	0.6
Acacia tetragonophylla	out	1.8
Roepera iodocarpa	out	0.1
Lysiana murrayi	out	0.1
Senna artemisioides subsp. filifolia	out	1.6
Acacia ligulata	out	2.5
Goodenia havilandii	out	0.1
Roepera apiculata	out	0.05
Sida ectogama	out	0.8
Rumex vesicarius	out	0.4
Maireana pyramidata	out	0.6
Maireana georgei	out	0.2

Kingwest Menzies **Site** Q42

Described by JW JP **Date** 11/08/2021 **Type** Q 20x20

MGA Zone 51 312628 **mE** 6705973 **mN**

Habitat EcoW – Eucalyptus concinna Woodland

Soil Orange brown clay loam with abundant ironstone lag gravel with lateritic gravel and quartz

Rock Type Subcropping

Vegetation Eucalyptus concinna 8-10m and occasional Eucalyptus oleosa 8-10m PFC 5-15% over Acacia aneura, Acacia sibirica, Acacia incurvaneura 6-8m PFC 10-20% over Acacia tetragonophylla 1-2m, Scaevola spinescens 1.2m, Sida ectogama, Senna artemisioides subsp. filifolia 1.5m, Ptilotus obovatus, Atriplex bunburyana PFC 10-15%

Veg Condition Excellent - Very good

Fire Age Long unburnt

Notes Evidence of limited clearing nearby - quadrat close to main road.

SPECIES LIST:

Name	Cover	Height
Eucalyptus oleosa subsp. oleosa	3	10-12
Eucalyptus concinna	12	8-9
Acacia sibirica	1	5
Eremophila scoparia	1	1-2
Eremophila oldfieldii	+	1.6
Senna cardiosperma	+	1.2
Acacia sibirica	+	1.2
Eremophila eriocalyx	+	1
Pimelea microcephala subsp. microcephala	+	1.5
Sida ectogama	+	1.4
Acacia tetragonophylla	+	1.5
Leichhardtia australis	+	1
Senna artemisioides subsp. filifolia	+	1.1
Atriplex bunburyana	+	0.8
Ptilotus obovatus	+	0.4
Acacia tetragonophylla	+	0.5
Austrostipa elegantissima	+	0.5
Solanum lasiophyllum	+	0.4
Maireana trichoptera	+	0.2
Sclerolaena gardneri	+	0.2
Roepera apiculata	+	0.01
Maireana georgei	+	0.2
Erodium cygnorum	+	0.01
Eremophila longifolia	+	0.4
Scaevola spinescens (narrow leaf, spiny form)	+	0.7
Enchylaena tomentosa var. tomentosa	+	0.3
Paspalidium basicladum	+	0.1
Dodonaea rigida	out	0.5
Ptilotus exaltatus	out	0.1
Acacia mulganeura	out	0.4
Atriplex nummularia subsp. spathulata	+	0.3
Eremophila latrobei subsp. latrobei	+	0.8
Maireana pyramidata	out	0.4
Abutilon cryptopetalum	out	0.3
Eremophila metallicorum	out	0.5
Eriochiton sclerolaenoides	out	0.1
Convolvulus angustissimus	out	0.1

Kingwest Menzies **Site** Q43

Described by JW JP **Date** 11/08/2021 **Type** Q 20x20

MGA Zone 51 310162 **mE** 6706601 **mN**

Habitat EolW - Eucalyptus oleosa Woodland

Soil Orange brown clay loam with abundant ironstone lag gravel (2-20mm) and larger quartz fragments (20-200mm)

Rock Type Subcropping calcrete/ weathered basalt

Vegetation Eucalyptus oleosa 6-8m, Eucalyptus concinna 6-7m PFC 15-20% over Acacia aneura 5m, Acacia caesaneura (narrow phyllode variant) 5m, Acacia ramulosa var. ramulosa 3m, PFC 10-15% over Scaevola spinescens, Acacia tetragonophylla, Dodonaea rigida, Senna artemisioides subsp. filifolia, Eremophila scoparia, Ptilotus obovatus (upright) PFC 5-10%.

Veg Condition Excellent

Fire Age Long unburnt

Notes No effective disturbance. Drainage channel running down western side of quadrat.

SPECIES LIST:

Name	Cover	Height
Eucalyptus oleosa subsp. oleosa	10	7-11
Acacia caesaneura	2	6
Acacia aneura	1	5
Scaevola spinescens (narrow leaf, spiny form)	1	0.8-1.2
Eremophila latrobei subsp. latrobei	+	1.1
Dodonaea rigida	+	1.2
Acacia tetragonophylla	+	1.2
Acacia caesaneura	0.5	0.8
Olearia muelleri	+	0.4
Ptilotus obovatus (upright form)	+	0.6
Leichhardtia australis	+	0.4
Solanum lasiophyllum	+	0.4
Sida sp. dark green fruits (S. van Leeuwen 2260)	+	0.3
Maireana trichoptera	+	0.2
Eremophila scoparia	+	0.7
Roepera iodocarpa	+	0.1
Acacia burkittii	out	1-1.6
Acacia sibirica	out	4
Acacia ramulosa var. ramulosa	out	1.8
Alyxia buxifolia	out	1.2
Austrostipa scabra subsp. scabra	out	0.4
Euphorbia australis subsp. subtomentosa	out	0.01
Haloragis trigonocarpa	out	0.1
Enneapogon caerulescens	out	0.1

Kingwest Menzies **Site** Q44

Described by JW JP **Date** 11/08/2021 **Type** Q 20x20

MGA Zone 51 308219 **mE** 6710944 **mN**

Habitat EceW - Eucalyptus celastroides Woodland on eroding slope

Soil Creamy orange brown sandy clay loam with continuous (90%) lateritic lag gravel (2-60mm) and quartz fragments.

Rock Type Subcropping/ weathered duricrust.

Vegetation Eucalyptus celastroides 6m, Casuarina pauper 8m PFC 10-15% over Acacia sibirica 4m, Eremophila sp. Mt Jackson 3m, Eremophila oppositifolia 2.5m PFC 5% over Scaevola spinescens (broad leaf, spiny form), Eremophila scoparia 0.8-1m, Olearia muelleri 0.4m, Ptilotus obovatus (upright form) 0.4-0.5m, and small Chenopods 0.2m, PFC 5-8%.

Veg Condition Excellent

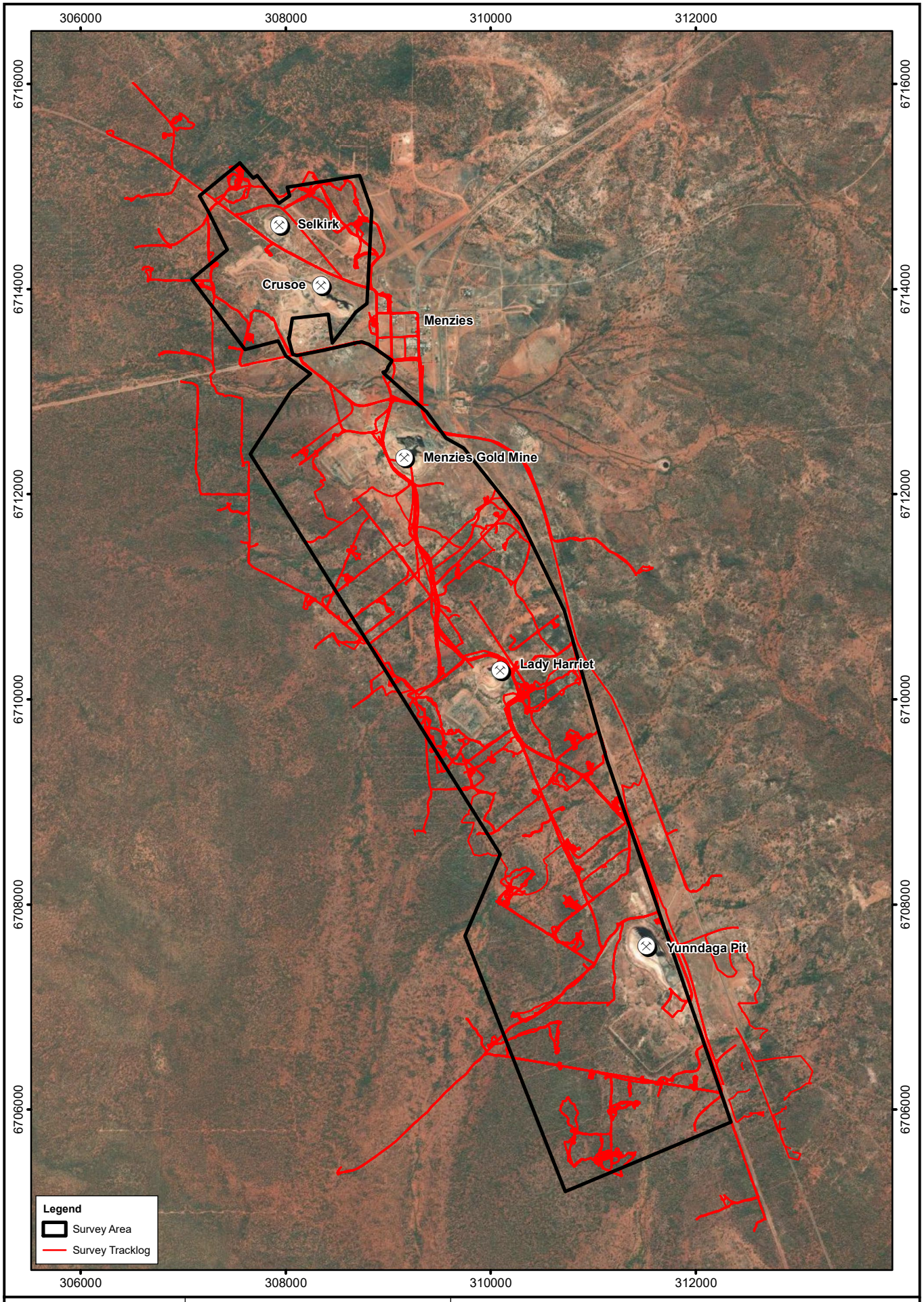
Fire Age Long unburnt

Notes No effective disturbance

SPECIES LIST:

Name	Cover	Height
Eucalyptus celastroides	4	4-6
Acacia sibirica	2	3-4
Casuarina pauper	+	3.5
Eremophila oppositifolia	+	3.5
Eremophila sp. Mt Jackson (G.J. Keighery 4372)	1	3
Eremophila scoparia	1	1-1.7
Eremophila oppositifolia	+	1
Casuarina pauper	+	0.5-1
Senna artemisioides subsp. filifolia	+	1.2
Scaevola spinescens (broad leaf, spiny form)	0.5	1
Ptilotus obovatus (upright form)	0.5	0.6
Maireana georgei	+	0.2
Olearia muelleri	+	0.4
Sclerolaena fusiformis	+	0.2
Roepera apiculata	+	0.1
Senna artemisioides subsp. artemisioides	+	0.4
Eremophila decipiens subsp. decipiens	+	0.3
Maireana trichoptera	+	0.2
Sclerolaena gardneri	+	0.1
Dodonaea lobulata	+	0.7
Atriplex bunburyana	+	0.6
Enneapogon caerulescens	+	0.1
Roepera iodocarpa	+	0.2
Enchylaena tomentosa var. tomentosa	+	1
Leichhardtia australis	+	0.4
Eremophila oldfieldii	+	1.2
Acacia oswaldii	+	0.4
Acacia acanthoclada subsp. acanthoclada	out	0.5
Hakea recurva subsp. recurva	out	1
Santalum spicatum	out	1.6
Haloragis trigonocarpa	out	0.1

Appendix 9. Combined GPS Tracklogs



Imagery: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

0 0.5 1km

Scale: 1:50,000
MGA94 (Zone 51)

CAD Ref: a2796_M_R02_07

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Western Botanical

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