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**FMG IRON BRIDGE (AUST) PTY LTD  
NORTH STAR EXTENSION  
TARGETED FLORA ASSESSMENT**

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## EXECUTIVE SUMMARY

FMG Iron Bridge (Aust) Pty Ltd (FMGIB) operates the North Star Magnetite Project (the Approved Proposal) located approximately 110 kilometres (km) southeast of Port Hedland in the Pilbara region of Western Australia. The Approved Proposal comprises an open cut iron ore mine site and associated infrastructure. FMGIB is seeking to amend the Approved Proposal to include the North Star Extension (NSE) (the Proposed Amendment), which is an extension of the Mine Development Envelope (MDE).

FMGIB required a targeted flora assessment of the NSE, parts of the MDE, and an area to the west of the NSE (Western Addition), collectively referred to here as the survey area. The focus of this assessment was to determine the distribution and abundance of four significant plant taxa within the survey area to inform the potential impact of the Proposed Amendment to these taxa. The target taxa were:

- One Threatened (T) species, *Quoya zonalis* – listed under both the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the Western Australian *Biodiversity Conservation Act 2016* (BC Act); and
- Three Department of Biodiversity Conservation and Attraction (DBCA) listed Priority (P) taxa:
  - *Themeda* sp. Panorama (J. Nelson et al. NS 102) (P1)
  - *Triodia basitricha* (P3)
  - *Ptilotus mollis* (P4)

Ecologia Environment (*ecologia*) completed the targeted flora assessment over two surveys during April and May 2023. Most areas within the survey area identified as potential suitable habitat for the target species were systematically surveyed by walking approximately 360 km of transects. All target species were recorded within the survey area, including 2,762 individuals of *Quoya zonalis* (T), 12,583 individuals of *Themeda* sp. Panorama (J. Nelson et al. NS 102) (P1), 215,555 individuals of *Triodia basitricha* (P3), and 1,190 individuals of *Ptilotus mollis* (P4). No other EPBC Act or BC Act listed Threatened species or DBCA listed Priority species were recorded.

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## ABBREVIATIONS

<b>BC Act</b>	<i>Biodiversity Conservation Act 2016</i>
<b>BoM</b>	Bureau of Meteorology
<b>CSIRO</b>	Commonwealth Scientific and Industrial Research Organisation
<b>DBCA</b>	Department of Biodiversity, Conservation and Attractions (previously DPaW)
<b>DCCEEW</b>	Department of Climate Change, Energy, and Environment and Water
<b>DWER</b>	Department of Water and Environmental Regulation
<b>DoEE</b>	Department of Environment and Energy (previously DSEWPaC now DCCEEW)
<b>DPaW</b>	Department of Parks and Wildlife (now DBCA)
<b>DPIRD</b>	Department of Primary Industry and Regional Development
<b>DSEWPaC</b>	Department of Sustainability, Environment, Water, Population and Communities (now DAWE)
<b>EPA</b>	Environment Protection Authority
<b>EPBC Act</b>	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
<b>ha</b>	hectares
<b>IBRA</b>	Interim Biogeographic Regionalisation for Australia
<b>m</b>	metres
<b>NVIS</b>	National Vegetation Information System
<b>TPFL</b>	Threatened and Priority Flora List database
<b>TPFR</b>	Threatened and Priority Flora Report form
<b>WA</b>	Western Australia

# 1 INTRODUCTION

## 1.1 PROJECT BACKGROUND

FMG Iron Bridge (Aust) Pty Ltd (FMGIB) operates the existing North Star Magnetite Project (the Approved Proposal) located approximately 110 kilometres (km) southeast of Port Hedland in the Pilbara region of Western Australia. The Approved Proposal comprises an open cut iron ore mine site and associated infrastructure, including roads, administration buildings, accommodation camp, aerodrome, borefield and slurry/raw water pipeline(s). FMGIB is seeking to amend the Approved Proposal to include the North Star Extension (NSE) (the Proposed Amendment), which is an extension of the Mine Development Envelope (MDE) (Map 1). The NSE is proposed to facilitate the development of new mine pits (180.7 hectares (ha)), an extension of the waste rock dump (334.5 ha) and ancillary infrastructure (91.7 ha).

FMGIB required a targeted flora assessment of the NSE, with a focus on four significant plant taxa identified from previous surveys as occurring within the area, namely, Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and Western Australian *Biodiversity Conservation Act 2016* (BC Act) listed Threatened (T) species *Quoya zonalis*, and Department of Biodiversity Conservation and Attractions (DBCA) listed Priority (P) taxa *Themeda* sp. Panorama (J. Nelson et al. NS 102) (P1), *Ptilotus mollis* (P4), and *Triodia basitricha* (P3). Targeted surveys were also required within the MDE (excluding areas within the Mining Proposal disturbance footprint, that had previously been systematically surveyed), and within the Western Addition (Mining lease, M45/1244) area (Map 1), to provide additional local context. The combined NSE, MDE, and the Western Addition, are collectively referred to as the survey area here.

## 1.2 SCOPE OF WORK

The key objectives of the targeted flora assessment were to:

1. Undertake a desktop assessment including a literature review and database searches to:
  - a. quantify and consolidate all existing records and define the extent of occurrence of the target taxa (including where possible whether they occur in protected areas/areas unlikely to be disturbed by future development).
  - b. determine the known preferred habitat of targeted taxa.
2. Undertake targeted searches:
  - a. within the NSE to quantify the number of individuals of each of the target species, both within and outside the indicative disturbance footprint.
  - b. within the existing MDE, outside the Mining Proposal disturbance footprint, for local context and to quantify populations that are unlikely to be disturbed.
  - c. within the Western Addition to identify and quantify additional populations of target species (particularly *Themeda* sp. Panorama (J. Nelson et al. NS 102) (P1)), with a focus on areas of suitable habitat that are unlikely to be disturbed by future development.

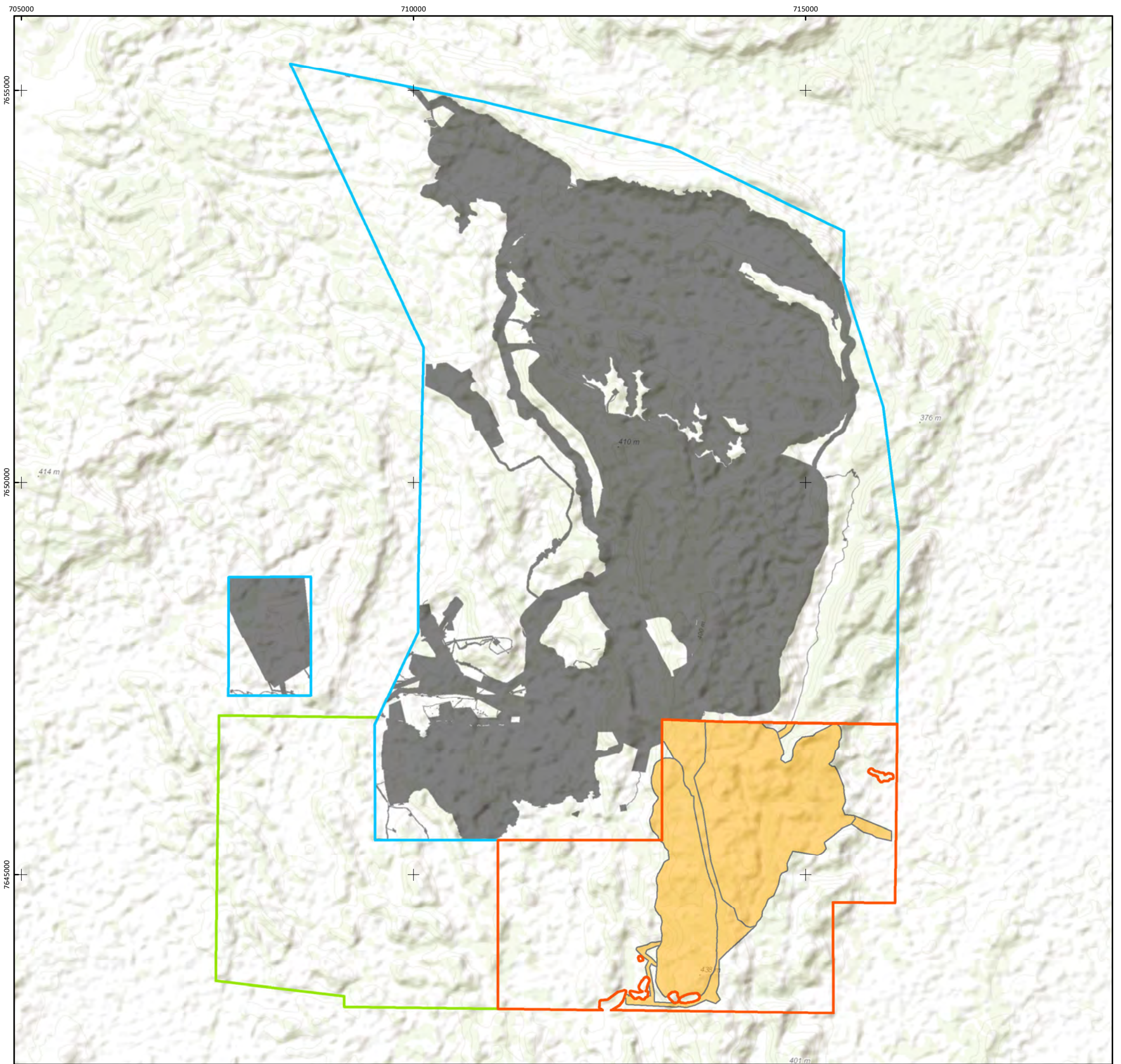
## 1.3 DEFINITIONS

According to the *EPA Factor Guideline: Flora and Vegetation* (EPA 2016a), plant taxa (or records) may be considered significant for reasons including, but not restricted to, the following:

- A taxon listed as Threatened under the Western Australian BC Act or the Commonwealth EPBC Act.
- A taxon on the DBCA Priority Flora List.
- Locally endemic species or those associated with a restricted habitat type (e.g., surface water or groundwater dependent ecosystems).
- New species or those having anomalous features that indicate a potential new species.
- Being representative of the range of a species (particularly, at the extremes of range, recently discovered range extensions, or isolated outliers of the main range).
- Unusual species, including restricted subspecies, varieties or naturally occurring hybrids.



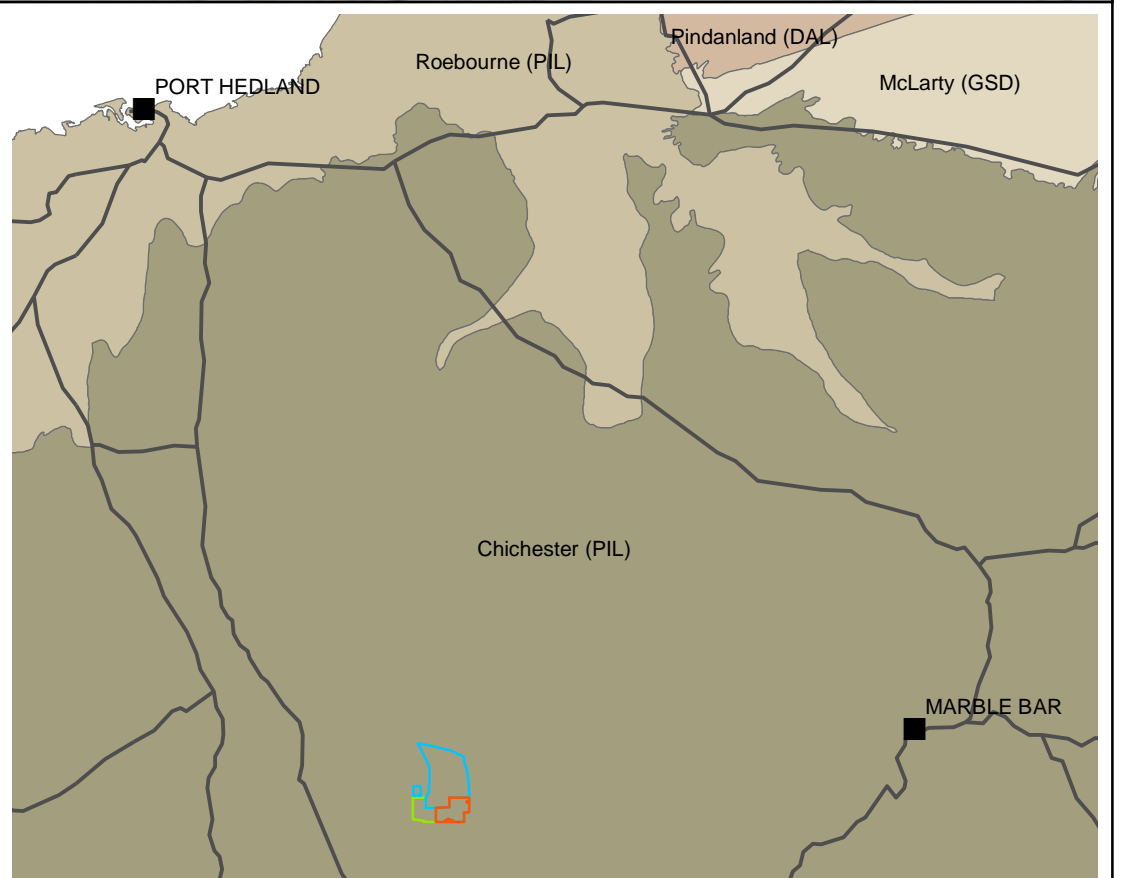
- Being representative of taxonomic groups that no longer occur widely in the broader landscape (relictual species/populations).



- North Star Extension
- Indicative Disturbance Footprint
- Mine Development Envelope
- Mining Proposal Footprint
- Western Addition (M45/1244)

**IBRA 7 subregion**

- DAL: Pindanland
- GSD: McLarty
- PIL: Chichester
- PIL: Roebourne



**Map 1: Location of the survey area.**



## 2 DESKTOP ASSESSMENT

### 2.1 DESKTOP METHODOLOGY

The methodology adopted for the desktop assessment was in accordance with the *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA 2016b). A review of background environmental information for the survey area was undertaken, including climate (Bureau of Meteorology, BoM), biogeography using the Interim Biogeographic Regionalisation for Australia (IBRA) 7 (IBRA) (DSEWPaC 2012), soil-landscape systems (land systems) (DPIRD 2016), the Surface Geology of Australia 1:1M spatial dataset (Geoscience Australia 2012), the Atlas of Australian Soils (Northcote *et al.* 1960-1968), pre-European native vegetation of Western Australia (Shepherd *et al.* 2002), and existing flora and vegetation survey reports relevant to the current project.

Searches of the databases listed in Table 1 were undertaken to identify significant plant species previously recorded within 50 kilometres (km) of the survey area (WAHERB and TPFL results are summarised in Appendix A). A NatureMap search was not conducted since a more complete dataset is available from the Western Australian Herbarium (WAHERB) and Threatened and Priority Flora (TPFL) database searches.

The criteria listed in Table 2 were applied to determine the likelihood of occurrence of the significant species within the survey area. Habitat preferences were sourced, where available, from relevant taxonomic literature, FloraBase (Western Australian Herbarium 1998–), Threatened Species Profiles (SPRATs), and specimen label information. The presence of potentially suitable habitat within the survey area was determined using broad landform mapping, vegetation mapping and aerial imagery, in comparison to the preferred habitat for each species.

**Table 1: Databases queried for the desktop assessment.**

Database	Search details	Access number/date
DBCA WAHERB and TPFL database (state-wide, species specific)	State-wide records for <i>Quoya zonalis</i> (T), <i>Themeda</i> sp. Panorama (J. Nelson et al. NS 102) (P1), <i>Triodia basitricha</i> (P3), and <i>Ptilotus mollis</i> (P4).	60-0323FL: 28 March 2023
DBCA WAHERB and TPFL database (all significant species)	All significant plant species records within 50 km of the survey area.	48-0323FL: 27 March 2023
Fortescue’s Significant Flora Database	All significant plant species records from Fortescue’s Significant Flora Database. The consolidated dataset of Spectrum (2023) was used for <i>Q. zonalis</i> .	8 March 2023

**Table 2: Criteria used to assess the likelihood of occurrence of significant species.**

Rating	Criterion
<b>Recorded</b>	The species has been recorded within the survey area previously or during the current survey.
<b>High (likely to occur)</b>	The species is likely to occur within the survey area as suitable habitat is known to be present and there are existing records very close to the survey area (within ca. 10 km).
<b>Moderate (possibly occurs)</b>	The species possibly occurs within the survey area as there are existing records in the vicinity of the survey area (ca. 10–20 km) and suitable habitat is likely to be present; or The species/community possibly occurs within the survey area as there is insufficient information available to exclude the possibility of occurrence.
<b>Low (unlikely to occur)</b>	The species is unlikely to occur within the survey area as suitable habitat is not present or is not likely to be present; or Suitable habitat is present within the survey area, but the taxon/community has not been recorded despite reasonable survey effort.

### 2.1.1 Calculation of species abundance from known records.

This assessment includes an estimate of the total number of individuals of each of the target species that have been recorded in Western Australia to date, based on abundance data from all available records. This is not intended to be an estimate of total abundance for the species in WA. A 'record' is defined here as a unique location at which individual plants have been recorded, and an 'individual' is defined here as a single plant.

The abundance estimate for *Quoya zonalis* (T) primarily used the dataset associated with the '*Quoya zonalis* data consolidation' (Spectrum Ecology 2023), which included an assessment of publicly available and Fortescue datasets for erroneous and duplicated records. An additional 661 *Q. zonalis* (T) individuals recorded during a survey of the 'West Star' area (ecologia 2022) were included in this estimate.

Abundance for *Themeda* sp. Panorama (J. Nelson et al. NS 102) (P1), *Triodia basitricha* (P3), and *Ptilotus mollis* (P4) was estimated from data associated with all species records in Western Australia available at the time of request. Duplicate records were identified from identical latitude and longitude values and were excluded; in these cases, the highest abundance value was used in the estimate. For records where no specific abundance value was provided, the following conversions were made:

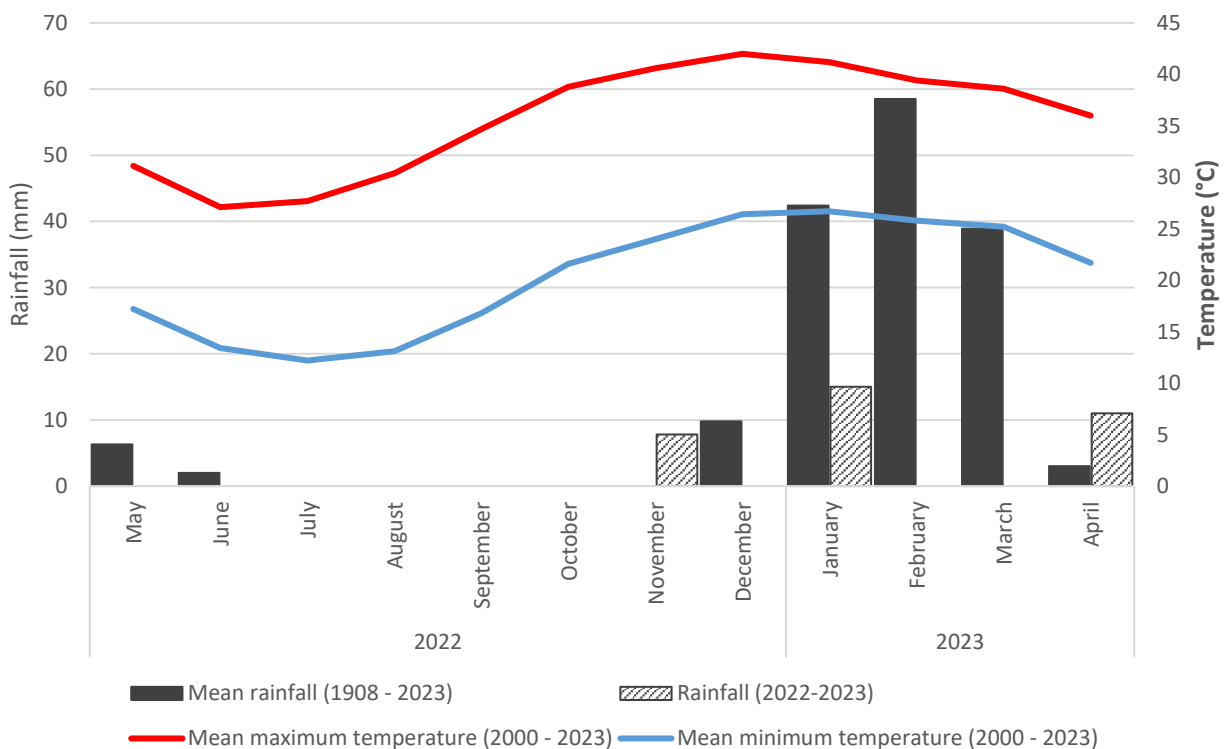
- Where no abundance information was provided abundance was assumed to be 1.
- Where a range was provided (e.g., '50–100 individuals') the maximum value was used.
- Where a minimum value was provided (e.g., '1000+ individuals') the minimum value was used.
- Where an approximate abundance was provided (e.g., 'approx. 50 plants') the approximate value was used.
- For erroneous values (e.g., -4, -5), cover percentages (e.g., '10% cover'), and qualitative descriptions (e.g., 'few', 'many'), abundance was assumed to be 1.

## 2.2 CLIMATE

The survey area is in the Pilbara region of Western Australia, which experiences an arid-tropical climate with two distinct seasons: a hot summer from October to April and a mild winter from May to September. Temperatures are generally high, with summer temperatures frequently exceeding 40°C. Light frosts occasionally occur inland during July and August.

Rainfall in the Pilbara is generally localised and unpredictable along with high temperatures resulting in annual evaporation exceeding rainfall by as much as 500 millimetres (mm) per year. Most of the Pilbara has a bimodal rainfall distribution. From December to March rains result from tropical storms producing sporadic thunderstorms. Tropical cyclones moving south also bring heavy rains. From May to June, extensive cold fronts move eastwards across the state and occasionally reach the Pilbara. These fronts usually produce only light rains. Surface water can be found in some pools and springs all year round, although watercourses generally flow intermittently due to the short wet season (Beard 1975).

Rainfall data from the nearest long-term BoM weather station (since 1908) were obtained from Wallareenya (Station No. 4038), located 53 km to the north of the survey area. Rainfall at Wallareenya over the 12 months prior to this assessment was approximately 10% of median annual rainfall, with little rainfall recorded in 2022 or early 2023 (Figure 1). Temperature data were obtained from Marble Bar (Station No. 4106) (BoM 2023) which is located 68 km east of the survey area (Figure 1). Maximum daytime temperatures at Marble Bar are frequently above 40°C between November and February and minimum temperatures can drop below 20°C between June and August.



**Figure 1: Monthly rainfall (Wallareenya) and temperature (Marble Bar).**

### **2.3 INTERIM BIOGEOGRAPHIC REGIONALISATION FOR AUSTRALIA**

The Interim Biogeographic Regionalisation for Australia (IBRA) classifies the Australian continent into bioregions on the basis of similar geology, landform, vegetation, fauna and climate characteristics (DSEWPac 2012). The survey area is in the Pilbara bioregion according to IBRA 7. The Pilbara region is further divided into four subregions: Hamersley, Fortescue Plains, Chichester, and Roebourne. The survey area is in the Chichester subregion.

The Chichester subregion comprises the northern section of the Pilbara Craton (Kendrick and McKenzie 2001). Undulating Archaean granite and basalt plains include significant areas of basaltic ranges. Plains support a shrub steppe characterised by *Acacia inaequilatera* over *Triodia wiseana* hummock grasslands, while *Eucalyptus leucophloia* tree steppes occur on ranges. The climate is semi desert tropical and receives approximately 300 mm of rainfall annually. Drainage occurs to the north via numerous rivers (e.g., De Grey, Oakover, Nullagine, Shaw, Yule, and Sherlock). The subregional area is 9,044,560 ha (Kendrick and McKenzie 2001).

### **2.4 LAND SYSTEMS**

In 2016 the Department of Primary Industries and Regional Development (DPIRD) consolidated soil-landscape mapping of Western Australia from two technical reports created by the Department of Agriculture and Food (Department of Agriculture Resource Management Technical Reports RMTR No. 280 (Purdie *et al.* 2016) and RMTR No. 313 (Tille 2006)). The resulting spatial dataset, *Soil-landscape mapping covering Western Australia at the best available scale (Version 05.01)* (DPIRD 2016), is a compilation of various surveys at different scales varying between 1:20,000 and 1:3,000,000. Mapping conforms to a nested hierarchy established to deal with the varying levels of information resulting from the variety of scales in mapping to provide soil-landscape data for all Western Australia. Four land systems are associated with the survey area, but are dominated by the Capricorn land system in the MDE and NSE, and by the Talga land system in the Western Addition (Table 3, Map 2).

### **2.5 SURFACE GEOLOGY**

The Surface Geology of Australia 1:1,000,000 scale spatial dataset is a seamless national coverage of outcrop and surficial geology (Geoscience Australia 2012). Six surface geological units are mapped within the survey area (Table 4, Map 3).

### **2.6 SOILS**

The Atlas of Australian Soils (Northcote *et al.* 1960-1968) was compiled by the CSIRO in the 1960's to provide a consistent national description of Australia's soils. The original maps used scales from 1:250,000 to 1:500,000. In 1991 the National Resource Information Centre used these maps to create the Digital Atlas of Australian Soils which describes over 14,000 soil units and their distribution across Australia. One soil type of the Atlas of Australian Soils is mapped within the survey area (Gf1) (Table 5, Map 4).

### **2.7 PRE-EUROPEAN VEGETATION**

The Western Australian Land Use and Vegetation Data Project produced a 1:250,000 scale digital spatial dataset of the pre-European native vegetation of Western Australia, compiled from previous vegetation mapping exercises, primarily by J.S. Beard from 1964 to 1981, with updates reflecting the National Vegetation Information System (NVIS) standards (Shepherd *et al.* 2002). One vegetation association (82) is mapped within the survey area (Table 6, Map 5).

### **2.8 PROTECTED AREAS**

Spatial datasets were queried for Department of Water and Environmental Regulation (DWER) Environmentally Sensitive Areas (ESAs) (DWER-046), Nationally Important Wetlands (DBCA-045), and DBCA

managed lands and waters (DBCA-011), occurring in the vicinity of the survey area. There are no ESAs, DBCA Managed Lands, or Nationally Important Wetlands within 50 km of the survey area.

## 2.9 PREVIOUS SURVEYS

### 2.9.1 Detailed flora and vegetation surveys.

Ecologia completed the earliest two-phase detailed flora and vegetation survey of the North Star area in 2011 and 2012 (*ecologia* 2012a) (Map 6). The survey area, including northern and southern sections, was 34,858.8 ha and encompassed most of the MDE and NSE. Two-hundred and seventy-two quadrats (272) were assessed, in addition to targeted searches for significant species. The following significant plant taxa were recorded:

- One EPBC Act and BC Act listed Threatened species: *Quoya zonalis*, which was at the time included on the Western Australian plant census as the Priority 1 listed phrase name *Pityrodia* sp. Marble Bar (G. Woodman & D. Coultas GWDC Opp 4).
- Two Priority 1 species: *Abutilon pritzelianum* ms (now *Abutilon* sp. *Pritzelianum* (S. van Leeuwen 5095) [P3]), and *Heliotropium muticum* (now *Euploca mutica* [P3]).
- One Priority 2 species: *Euphorbia clementii* (now P3).
- Two Priority 3 species: *Acacia glaucocaesia* (now delisted) and *Gymnanthera cunninghamii*.
- Two Priority 4 species: *Goodenia nuda* (now delisted) and *Ptilotus mollis*.

Ecologia completed a single-phase detailed flora and vegetation survey in 2015 of a 2,288 ha survey area for the proposed North Star Aerodrome, which is approximately 5 km west of the NSE (*ecologia* 2015a) (Map 6). Twenty-three quadrats were assessed, in addition to targeted searches for significant species. No significant plant species were recorded during the survey.

Ecoscope completed a single-phase, supplementary detailed flora and vegetation survey of the NSE in 2020 (Ecoscope 2023) (Map 6). Thirty quadrats were assessed to supplement the 21 existing quadrats previous surveyed within the area, in addition to targeted searches for significant species. The following significant plant taxa were recorded:

- One EPBC Act and BC Act listed Threatened species: *Quoya zonalis*.
- One Priority 3 species: *Triodia basitricha*.
- One Priority 4 species: *Ptilotus mollis*.
- One entity of potential taxonomic significance, which is now listed on the WA census as the Priority 1 phrase name *Themeda* sp. Panorama (J. Nelson et al. NS 102).

### 2.9.2 Targeted flora surveys.

Ecologia completed a species-specific targeted flora survey for *Quoya zonalis* in 2012 to identify additional populations within the North Star survey area, targeting steep rocky areas associated with the Capricorn land system (*ecologia* 2012b) (Map 6). A total of 343 new populations (defined as grouping of plants separated by at least 500 m), representing 688 individuals, were recorded.

Ecologia completed a targeted significant flora survey in 2015 of the North Star Water Corridor, extending north from the North Star project area to a proposed water borefield in the Canning Basin (ca. 190 km) (*ecologia* 2015b) (Map 6). The southern end of the corridor intersects the North Star project survey area (*ecologia* 2012a), extending to near the northern boundary of the MDE. The following significant plant taxa were recorded:

- One EPBC Act and BC Act listed Threatened species (*Quoya zonalis*, as *Pityrodia* sp. Marble Bar (G. Woodman & D. Coultas GWDC Opp 4)).

- Two Priority 1 species: *Heliotropium muticum* (now *Euploca mutica* [P3]), which was recorded opportunistically 10 km outside of the NSW survey area.
- One Priority 2 species: *Euphorbia clementii* (now P3).
- Two Priority 3 species: *Acacia glaucocaesia* (now delisted), *Eragrostis crateriformis*, and *Heliotropium murinum*.

Following the completion of the 'Pityrodia sp. Marble Bar Regional Survey Plan' (NS-PL-EN-0006), which included MaxEnt species distribution modelling for the Pilbara, Ecologia completed a species-specific targeted flora survey for *Quoya zonalis* in 2015, to identify additional populations within the North Star survey area (ecologia 2016). The survey targeted 144 locations identified by the model as suitable habitat. A total of 67 new *Q. zonalis* populations (defined as groupings separated by at least 500 m), representing 7,473 individuals, were identified during the survey.

Spectrum Ecology completed a targeted significant flora survey in 2020 for nine areas associated with the North Star Project (Spectrum Ecology 2020b) (Map 6). Four of the areas are immediately adjacent to the current MDE and NSE survey areas: 'WC Re-survey South', 'WC North', 'WC Camp North', and 'WC Camp South' (which corresponds with the Western Addition). Three significant species were recorded:

- One EPBC Act and BC Act listed Threatened species: *Quoya zonalis*.
- One Priority 3 species: *Heliotropium muticum* (now *Euploca mutica*).
- One Priority 4 species: *Ptilotus mollis*.

Two targeted surveys, primarily for *Quoya zonalis* (T), were completed by Spectrum Ecology between 2020 and 2021, which included three survey areas associated with the Mining Proposal Footprint within the MDE (Spectrum Ecology 2020a), two survey areas immediately to the north of the MDE (Spectrum Ecology 2021), and one survey area immediately to the south of the NSE (Spectrum Ecology 2021) (Map 6). A total of 3,514 *Q. zonalis* (T) individuals and 1,415 *P. mollis* (P4) individuals were recorded.



**Table 3: Land systems associated with the survey area (DPIRD 2016).**

Land system	Description	Extent within MDE (ha)	Extent within NSE (ha)	Extent within Western Addition (ha)
Boolgeeda	Stony lower slopes and plains below hill systems supporting hard and soft spinifex grasslands or mulga shrublands.	0.01 (<0.01%)	–	–
Capricorn	Rugged sandstone hills, ridges, stony footslopes and interfluves supporting low acacia shrublands or hard spinifex grasslands with scattered shrubs.	4,511.67 (85.52%)	1,164.70 (81.65%)	–
Rocklea	Basalt hills, plateaux, lower slopes and minor stony plains supporting hard spinifex and occasionally soft spinifex grasslands with scattered shrubs.	668.97 (12.68%)	232.05 (16.27%)	128.08 (12.3%)
Talga	Hills and ridges of greenstone and chert and stony plains supporting hard and soft spinifex grasslands.	95.22 (1.8%)	29.62 (2.08%)	914.08 (87.7%)

**Table 4: Surface geology associated with the survey area (Geoscience Australia 2012).**

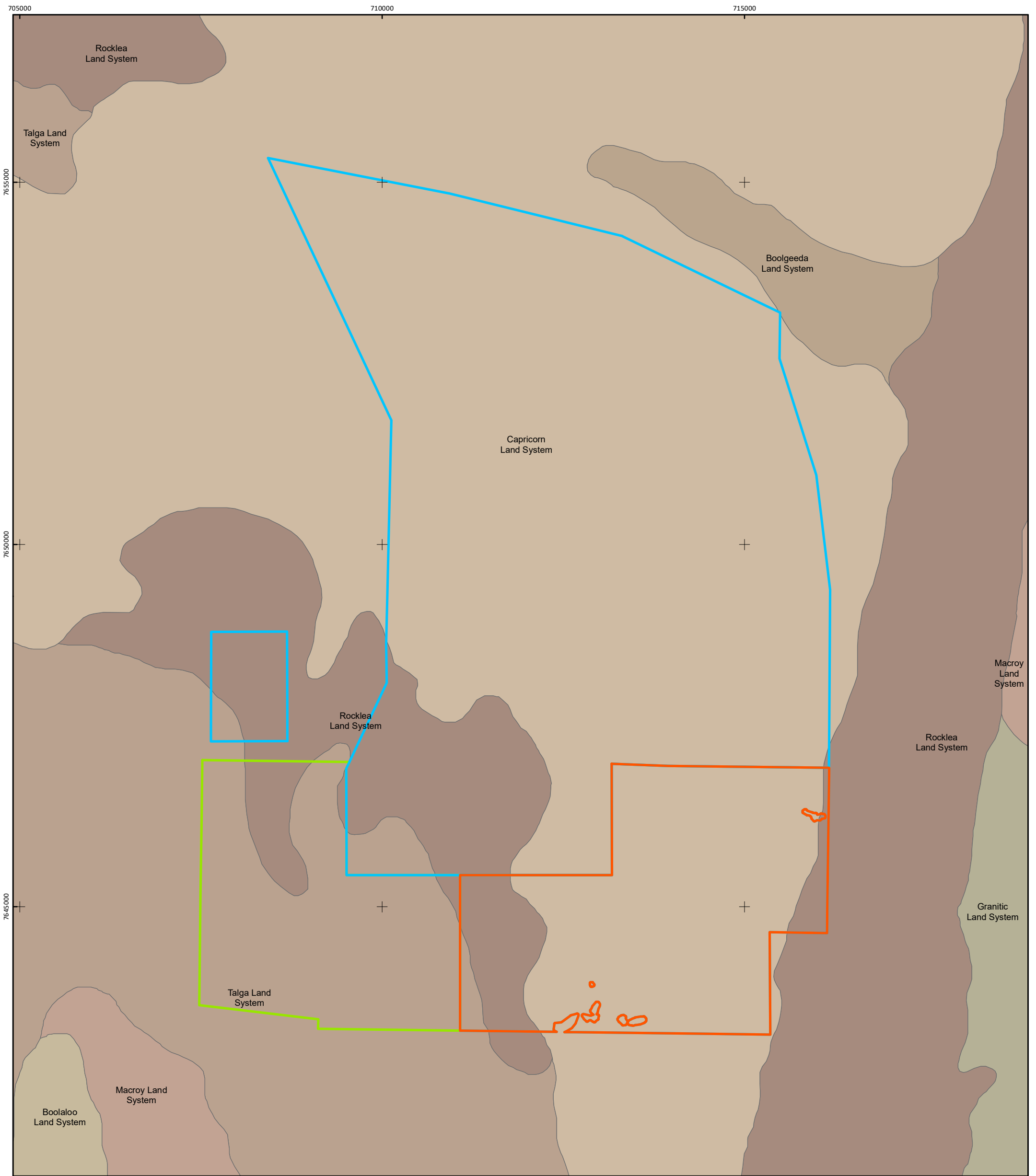
Map symbol	Surface geological unit	Description	Extent within MDE (ha)	Extent within NSE (ha)	Extent within Western Addition (ha)
Acp	chert 74258	Chert, some as tectonic dykes.	190.69 (3.61%)	–	–
Acukp	Pincunah Banded-iron Member	Banded-iron formation; jaspilitic; minor layered chert and shale; metamorphosed.	441.60 (8.37%)	335.48 (23.51%)	–
Adda	Dalton Suite	Gabbro, dolerite, dunite, peridotite, serpentine-chlorite schist, serpentinite, metaleucogabbro, metapyroxenite, ultramafic schist; metamorphosed.	–	33.05 (2.32%)	–
Adu	Sulphur Springs Group - metadolerite	Metadolerite.	54.88 (1.04%)	–	–
Awo	Soanesville Group	Conglomerate, arkosic sandstone, greywacke, lithic arenite, banded iron formation, shale, silicified shale (chert), sandstone, siltstone, quartzite, schist, basalt, mudstone, dacite, tuff, quartz-sericite schist; mafic schist.	2,666.30 (50.54%)	150.42 (10.55%)	–
Awu	Sulphur Springs Group	Felsic to mafic volcanics and volcanoclastic rocks, chert, volcanoclastic sandstone, greywacke, shale, basalt, komatiitic basalt, amphibolite, mafic and ultramafic schist, banded iron formation, quartz-carbonate rock, siltstone.	1,922.37 (36.44%)	907.42 (63.62%)	1,042.16 (100%)

**Table 5: Atlas of Australian Soil units associated with the survey area (Northcote *et al.* 1960-1968).**

Map code	Description	Extent within MDE (ha)	Extent within NSE (ha)	Extent within Western Addition (ha)
Gf1	Steep ranges on basic lavas along with dolomites, tuff, banded iron formations, and dolerite dykes, with some narrow valley plains and high-level gently undulating areas of limited extent. The soils are generally shallow and stony and there are large areas without soil cover: chief soils are brown loams (Um6.23) along with significant areas of earthy loams (Um5.51). (Dr2.33) soils occur on lower slopes, with (Uf6.71) and (Ug5.37) on valley floors.	5,275.86 (100%)	1,426.37 (100%)	1,042.16 (100%)

**Table 6: Pre-European vegetation associations mapped with the survey area (Shepherd *et al.* 2002).**

Vegetation association	Description	NVIS V	Pre-European extent within Pilbara IBRA region (ha)	Percentage remaining within Pilbara IBRA region	Current percentage protected for conservation within Pilbara IBRA region	Extent within MDE (ha)	Extent within NSE (ha)	Extent within Western Addition (ha)
82	Hummock grasslands, low tree steppe; snappy gum over <i>Triodia wiseana</i>	U <i>Eucalyptus leucophloia</i> tree\6\RG^ <i>Triodia wiseana</i> var. <i>brevifolia</i> , ^ <i>Triodia pungens</i> hummock grass\2\i	2,563,583.23	99.50%	10.26%	5,275.86 (100%)	1,426.37 (100%)	1,042.16 (100%)



- North Star Extension
- Mine Development Envelope
- Western Addition (M45/1244)

**Land system**

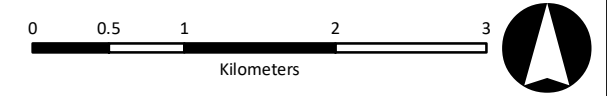
- Boolaloo Land System: Granite hills, domes, tor fields and sandy plains supporting spinifex grasslands with scattered shrubs.
- Boolgeeda Land System: Stony lower slopes and plains below hill systems supporting hard and soft spinifex grasslands or mulga shrublands.
- Capricorn Land System: Rugged sandstone hills, ridges, stony footslopes and interfluvies supporting low acacia shrublands or hard spinifex grasslands with scattered shrubs.
- Granitic Land System: Rugged granitic hills supporting shrubby hard and soft spinifex grasslands.
- Macroy Land System: Stony plains and occasional tor fields based on granite supporting hard and soft spinifex shrubby grasslands.
- Rocklea Land System: Basalt hills, plateaux, lower slopes and minor stony plains supporting hard spinifex and occasionally soft spinifex grasslands with scattered shrubs.
- Talga Land System: Hills and ridges of greenstone and chert and stony plains supporting hard and soft spinifex grasslands.

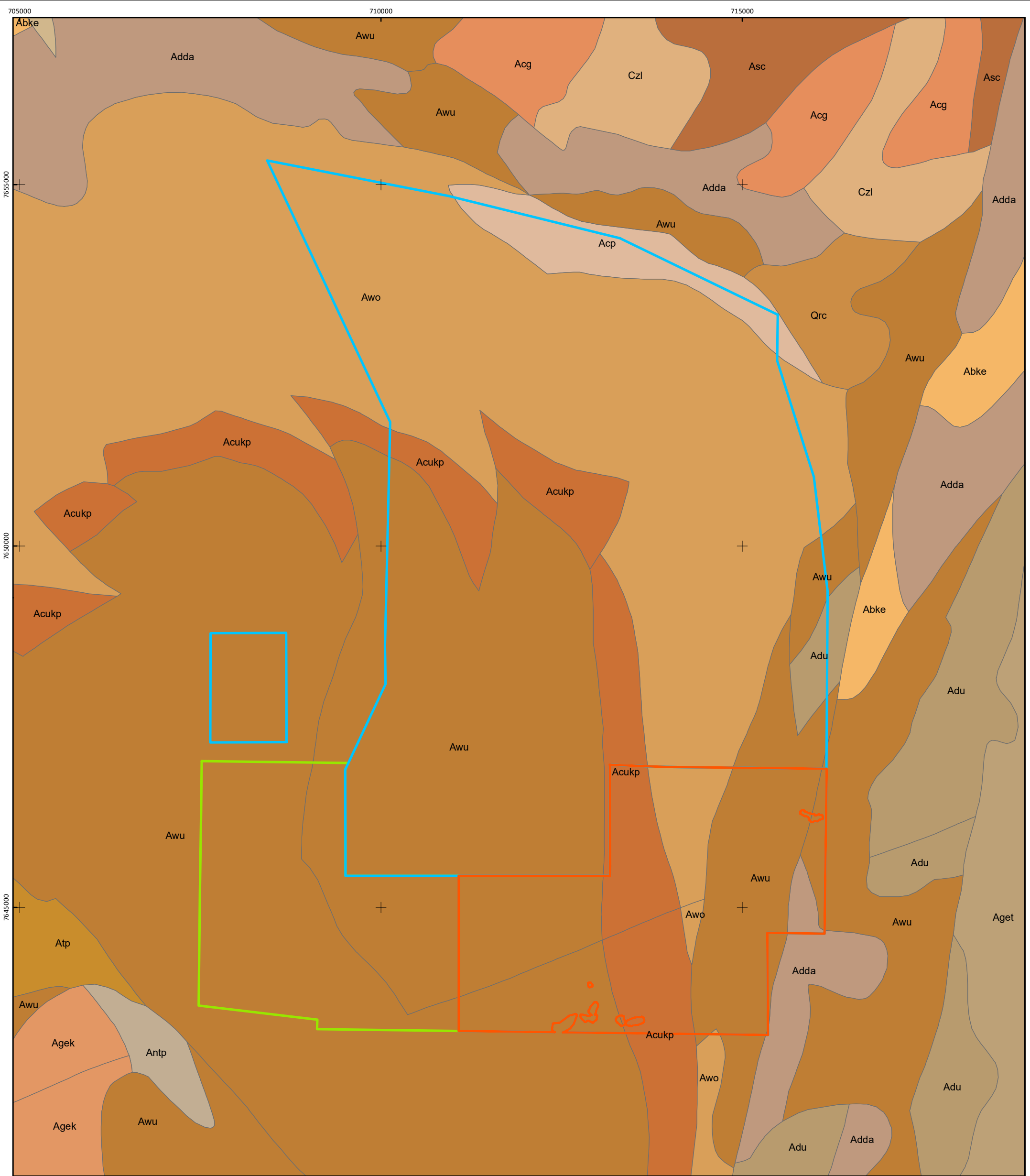
**Map 2: Land systems (DPIRD 2016).**



Project No.: 1961  
 Date: 23 March 2023  
 Author: AC  
 Coordinate System: GDA2020 MGA Zone 50  
 Projection: Transverse Mercator  
 Absolute Scale: 1:50,000 @A3

Service Layer Credits:

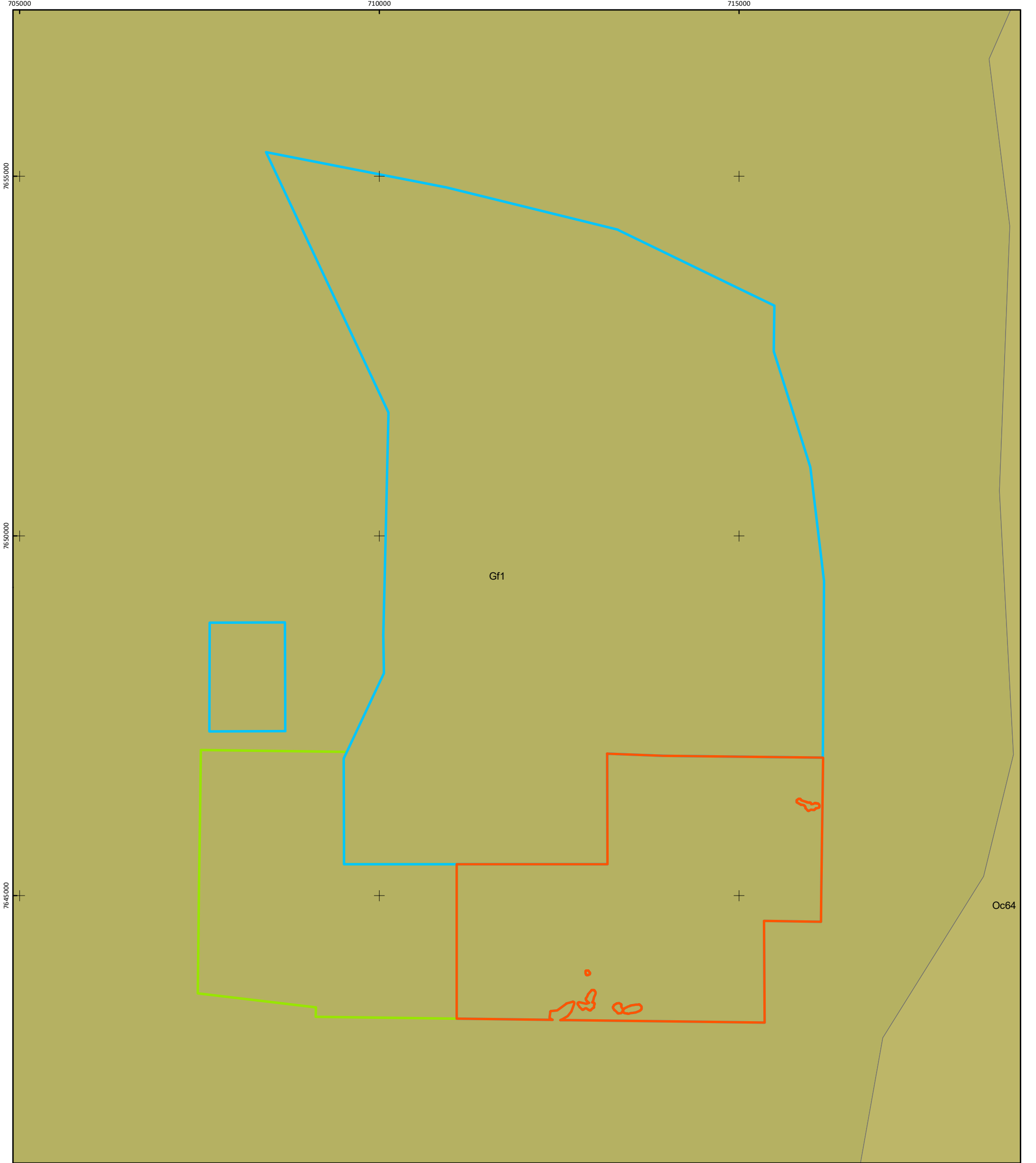




- North Star Extension
- Mine Development Envelope
- Western Addition (M45/1244)

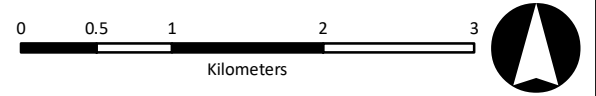
- Surface geology unit**
- Abke: Euro Basalt
  - Acg: Gorge Creek Group
  - Acp: chert 74258
  - Acukp: Pincunah Banded-iron Member
  - Adda: Dalton Suite
  - Adu: Sulphur Springs Group - metadolerite
  - Agek: Kavir Granodiorite

- Aget: Strelley Monzogranite
- Antp: Petroglyph Gneiss
- Asc: Croydon Group
- Atk: Kelly Group - amphibolite
- Atp: metamorphosed mafic rocks 74327
- Awo: Soanesville Group
- Awu: Sulphur Springs Group
- Czl: ferruginous duricrust 38498
- Qrc: colluvium 38491



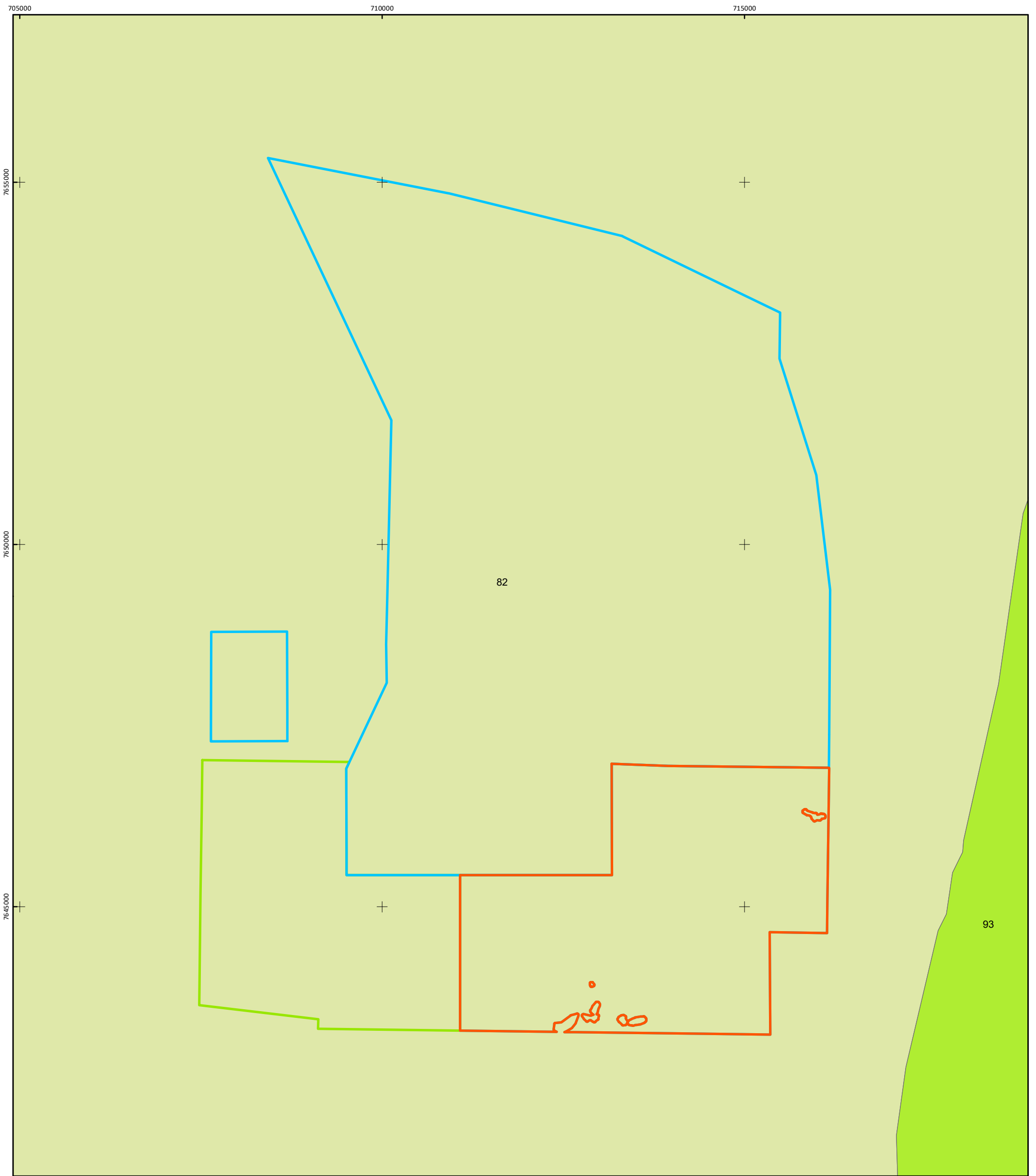
- North Star Extension
  - Mine Development Envelope
  - Western Addition (M45/1244)
- Soil map unit**
- Gf1
  - Oc64

**Map 4:** Atlas of Australian Soils map units associated with the survey area (Northcote et al. 1960-1968).



Project No.: 1961  
 Date: 23 March 2023  
 Author: AC  
 Coordinate System: GDA2020 MGA Zone 50  
 Projection: Transverse Mercator  
 Absolute Scale: 1:50,000 @A3

Service Layer Credits:

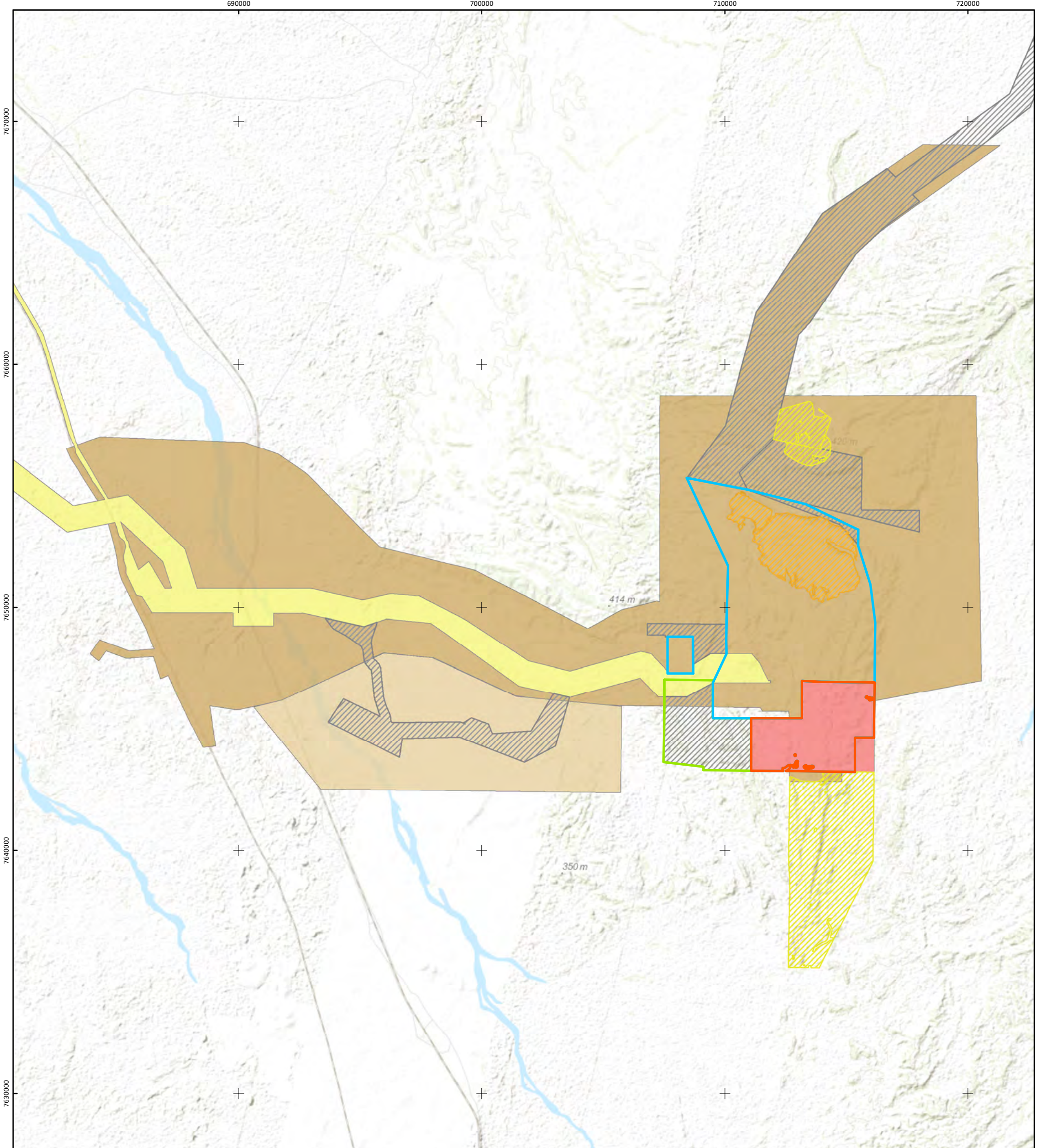


- North Star Extension
- Mine Development Envelope
- Western Addition (M45/1244)

**Vegetation association**

- 82: Hummock grasslands, low tree steppe; snappy gum over *Triodia wiseana*
- 93: Hummock grasslands, shrub steppe; kanji over soft spinifex





- North Star Extension
- Mine Development Envelope
- Western Addition (M45/1244)
- Survey**
- Ecologia (2012a) North Star Vegetation and Flora Assessment
- Ecologia (2015a) North Star Airstrip Flora Level 2 and Fauna Level 1 Assessment
- Ecologia (2015b) North Star Slurry and Infrastructure Corridors, Conservation Significant Flora and Vegetation Assessment
- Ecoscape (2023) North Star Extension Flora and Vegetation Survey
- Spectrum (2020b) Targeted Flora and Vegetation Survey, Iron Bridge
- Spectrum (2020a) Quoya Zonalis Targeted Flora Survey
- Spectrum (2021) Shooting Star & South Star Quoya zonalis Targeted Flora Survey, Iron Bridge

**Map 6: Locations of previous surveys of the North Star Project area.**



## 2.10 SIGNIFICANT PLANT SPECIES

### 2.10.1 Significant species recorded within 50 km of the survey area.

Twenty-six significant plant taxa were identified within 50 km of the survey area from DBCA database searches (WAHERB and TPFL) and Fortescue's Significant Flora Database (Table 7, Map 7). One EPBC Act and BC Act listed Threatened (Endangered) species occurs within and surrounding the survey area (*Quoya zonalis*). Twenty-five DBCA listed Priority taxa were also identified: five P1 taxa, one P2 taxon, 17 P3 taxa, and two P4 taxa. The likelihood for each taxon to occur within the survey area was assessed prior to the survey using the criteria outlined in section 2.1.

The four target significant taxa (*Quoya zonalis* (T), *Themeda* sp. Panorama (J. Nelson et al. NS 102) (P1), *Triodia basitricha* (P3), and *Ptilotus mollis* (P4)) had been recorded within both the MDE and NSE previously.

Based on the proximity of previous records and the potential presence of suitable habitat, two additional taxa were considered to have a moderate likelihood of occurrence within the survey area: *Eragrostis crateriformis* (P3) and *Euphorbia clementii* (P3).

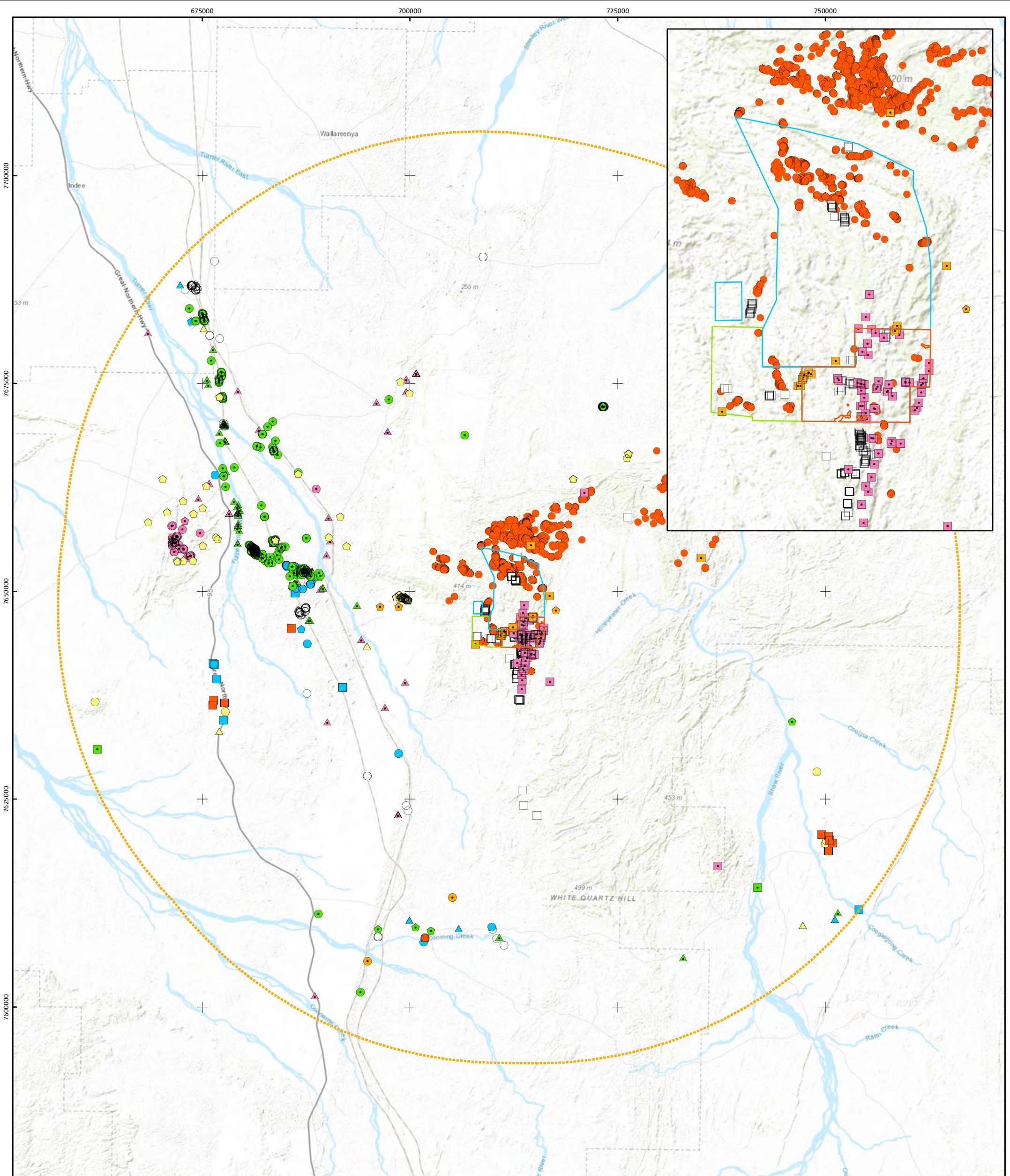
Parts of the survey area had been subject to targeted surveys previously, although in some cases these were species specific. Consequently, the remaining 20 taxa were considered to have a low likelihood of occurrence due to the probable absence of suitable habitat or because they have not been recorded within or near to the survey area during previous targeted surveys (Table 7). A species assessed with a low likelihood of occurrence, however, does not preclude its presence within the survey area.



**Table 7: Significant plant species recorded within 50 km of the survey area.**

Species	WA status	Habitat	Flowering period	Comment	Pre-survey likelihood of occurrence within the survey area
<i>Quoya zonalis</i>	Threatened	Steep, rocky, sandstone conglomerate and granite slopes in skeletal, brown, sandy loam soils.	July to September	Recorded.	RECORDED
<i>Themeda</i> sp. Panorama (J. Nelson et al. NS 102)	Priority 1	Rocky creek beds.	Unknown	Recorded.	RECORDED
<i>Triodia basitricha</i>	Priority 3	Rocky or gravelly slopes of mountains or low hills.	January to March	Recorded.	RECORDED
<i>Ptilotus mollis</i>	Priority 4	Steep rocky slopes, massive ironstone formations.	May to September	Recorded.	RECORDED
<i>Quoya zonalis</i>	Threatened	Steep, rocky, sandstone conglomerate and granite slopes in skeletal, brown, sandy loam soils.	July to September	Recorded.	RECORDED
<i>Euphorbia clementii</i>	Priority 3	Gravelly hillsides, flats, stony grounds.	April to June	Suitable habitat possibly present. Records within ca. 15 km of the survey area.	MODERATE
<i>Eragrostis crateriformis</i>	Priority 3	Clayey loam or clay. Flats, creek banks, depressions.	January to July	Suitable habitat possibly present. Records within ca. 15 km of the survey area.	MODERATE
<i>Abutilon</i> sp. Pritzelianum (S. van Leeuwen 5095)	Priority 3	Primarily coastal or near-coastal sand dunes, margins of estuaries, coastal plains, but with some outlying inland records. Red sand or clay.	–	One record from minor drainage within ca. 1.5 km of survey area boundary. This habitat is present within the survey area, but this taxon is typically restricted to deeper sand on sandplains and dunes.	LOW
<i>Euploca mutica</i>	Priority 3	Plains. Flat red silt sand on a low-lying floodplain.	–	Suitable habitat probably not present. No records within 10 km despite several targeted surveys within the survey area.	LOW
<i>Gomphrena leptophylla</i>	Priority 3	Sand, sandy to clayey loam, granite, quartzite. Open flats, sandy creek beds, edges salt pans & marshes, stony hillsides.	March to September	Suitable habitat possibly present, but no records within 20 km despite several targeted surveys within the survey area.	LOW
<i>Gymnanthera cunninghamii</i>	Priority 3	Permanent or semi-permanent water courses on sandy soils.	January to December	Suitable habitat (typically major sandy creeks) probably not present.	LOW
<i>Nicotiana umbratica</i>	Priority 3	Shallow soils. Rocky outcrops.	April to June	Suitable habitat possibly present, but no records within 20 km despite several targeted surveys within the survey area.	LOW
<i>Phyllanthus hebecarpus</i>	Priority 3	Sandy areas, granite domes.	April to August	Suitable habitat probably not present. No records within 20 km of survey area.	LOW
<i>Rothia indica</i> subsp. <i>australis</i>	Priority 3	Sandy soils. Sandhills and sandy flats.	April to August.	Suitable habitat probably not present.	LOW
<i>Stylidium weeliwollii</i>	Priority 3	Gritty sand soil, sandy clay. Edge of watercourses.	August to September	Suitable habitat possibly present, but no records within 30 km despite several targeted surveys within the survey area.	LOW
<i>Terminalia supranitifolia</i>	Priority 3	Sand. Among basalt rocks. Rocky cliffs.	July or December	Suitable habitat possibly present, but no records within 30 km despite several targeted surveys within the survey area.	LOW
<i>Triodia chichesterensis</i>	Priority 3	Sand or loam over rocky or gravelly substrates, often with quartzite.	–	Suitable habitat probably not present. No records within 30 km of survey area.	LOW
<i>Bulbostylis burbidgeae</i>	Priority 4	Granitic soils. Granite outcrops, cliff bases.	March to August	Suitable habitat probably not present. No records within 15 km of survey area.	LOW
<i>Acacia leeuweniana</i>	Priority 1	Skeletal granitic soil over massive granite.	–	Suitable habitat probably not present. No records within 20 km of survey area.	LOW
<i>Acacia levata</i>	Priority 3	Sand or sandy loam over granite. Low rocky hills.	May	Suitable habitat probably not present. No records within 30 km of survey area.	LOW
<i>Corchorus</i> sp. Yarrie (J. Bull & D. Roberts CAL 01.05)	Priority 1	Steep slopes, gullies, hilltops, mesas. Ironstone with brown silty loam or clay loam soils.	–	Suitable habitat present, but no records within 40 km despite several targeted surveys within the survey area.	LOW
<i>Dolichocarpa</i> sp. Hamersley Station (A.A. Mitchell PRP 1479)	Priority 3	Cracking clay, basalt. Gently undulating plain with large surface rocks, flat crabhole plain.	March	Suitable habitat probably not present. No records within 30 km of survey area.	LOW
<i>Euphorbia inappendiculata</i> var. <i>inappendiculata</i>	Priority 2	Heavy clay soils on open plains or gentle slopes.	August	Suitable habitat probably not present. No records within 30 km of survey area.	LOW
<i>Euploca argyrea</i>	Priority 1	Loose rubble on limestone ridge.	–	Suitable habitat probably not present. No records within 30 km of survey area.	LOW
<i>Heliotropium murinum</i>	Priority 3	Red sand plains, gibber plains, near granite and in <i>Triodia</i> hummock grasslands.	May to September	Suitable habitat probably not present. No records within 30 km of survey area.	LOW
<i>Josephinia</i> sp. Woodstock (A.A. Mitchell PRP 989)	Priority 1	Plains, drainage lines, valleys; red-brown clay loam to loam or heavy clay (crabhole).	–	Suitable habitat probably not present. No records within 30 km of survey area.	LOW
<i>Vigna triodiophila</i>	Priority 3	Apparently endemic to basalt rockpile habitats	May to September	Suitable habitat probably not present. No records within 30 km of survey area.	LOW





- North Star Extension
- Mine Development Envelope
- Western Addition (M45/1244)
- Desktop study area (50 km)

**Name**

- T, *Quoya zonalis*
- P1, *Acacia leeuweniana*
- ▲ P1, *Corchorus* sp. Yarrie (J. Bull ...)
- ◆ P1, *Euploca argyrea*
- P1, *Josephinia* sp. Woodstock (A.A. Mitchell PRP 989)

- P1, *Themeda* sp. Panorama (J. Nelson et al. NS 102)
- ▲ P2, *Euphorbia inappendiculata* var. *inappendiculata*
- ◆ P3, *Abutilon* sp. Pritzelianum (S. van Leeuwen 5095)
- P3, *Acacia levata*
- P3, *Dolichocarpa* sp. Hamersley Station (A.A. Mitchell PRP 1479)
- ▲ P3, *Eragrostis crateriformis*
- ◆ P3, *Euphorbia clementii*
- P3, *Euploca mutica*
- P3, *Gomphrena leptophylla*
- ▲ P3, *Gymnanthera cunninghamii*

- ◆ P3, *Heliotropium murinum*
- P3, *Nicotiana umbratica*
- P3, *Phyllanthus hebecarpus*
- ▲ P3, *Rothia indica* subsp. *australis*
- ◆ P3, *Stylidium weeliwoilli*
- P3, *Terminalia supranitfolia*
- P3, *Triodia basitricha*
- ▲ P3, *Triodia chichesterensis*
- ◆ P3, *Vigna triodiophila*
- P4, *Bulbostylis burbridgeae*
- P4, *Ptilotus mollis*

**Map 7: Significant plant species recorded within 50 km of the survey area.**



## 2.10.2 State-wide assessment of *Quoya zonalis* (T)

### Background.

*Quoya zonalis* (family Lamiaceae) was described in 2020 from material originally included on Western Australia's plant census as *Pityrodia* sp. Marble Bar (G. Woodman & D. Coultas GWDC Opp 4) (Shepherd and Hislop 2020). It is an erect shrub growing to approximately 2 metres (m) and is relatively distinctive from other co-occurring shrubs by its height, phyllotaxy, and leaf indumentum. The leaves are arranged in opposite pairs and the indumentum is of dense branched hairs ranging from white or cream to yellow or greenish yellow, which obscure a layer of short glandular hairs and sessile glands. There are greyish-green and yellowish-green colour variants (primarily related to the colour of the stem and leaf indumentum) that can co-occur. The inflorescence is typically a pedunculate cyme of 5–7 white to pale pink zygomorphic flowers with darker spots and marking on the lower lobe and throat (Shepherd and Hislop 2020). Flowering has been recorded from July to September, and fruiting from mid- to late spring (Shepherd and Hislop 2020). It is known to resprout after fire from a woody rootstock (Shepherd and Hislop 2020).

### Distribution and abundance.

The abundance estimate for *Quoya zonalis* in Western Australia used the consolidated dataset associated with the '*Quoya zonalis data consolidation*' (Spectrum Ecology 2023), and additional records from the 'West Star' area, immediately to the west of the MDE (*ecologia* 2022). A total of 17,701 individuals are currently recorded within Western Australia (Table 8). This estimate is likely to be an accurate representation of all current records of *Q. zonalis*.

*Quoya zonalis* is only known to occur within the Chichester IBRA subregion of the Pilbara IBRA region (Table 10), where it is restricted to an area of approximately 40 × 30 km, approximately 50 km west of Marble Bar (Map 8).

### Records within protected areas.

There are currently no records of *Quoya zonalis* within any protected area (DWER Environmentally Sensitive Areas [DWER-046], Nationally Important Wetlands [DBCA-045], and DBCA managed lands and waters [DBCA-011]).

### Habitat requirements.

*Quoya zonalis* is typically found on 'steep, rocky, sandstone conglomerate and granite slopes in skeletal, brown, sandy loam soils' (Shepherd and Hislop 2020). Habitat information from all available records indicates that it is mostly recorded from steep hillslopes and gorges of ironstone, granite, or sandstone, in red to reddish-brown skeletal sandy loam, sandy clay, or clay loam soil. It occurs less frequently on flatter hilltops. Spatial data show that most records are from elevations greater than 300 m.

Early species distribution modelling (which included environmental variables for land system, geology, elevation, slope, and aspect) identified land system and geology as likely the best predictors of species presence (*ecologia* 2014). *Quoya zonalis* is almost exclusively restricted to the Capricorn land system (97.13% of records) (Table 11), which is broadly characterised by 'hills and ridges of sandstone and dolomite supporting shrubby hard and soft spinifex grasslands' (Van Vreeswyk *et al.* 2004).

### Associated vegetation.

*Quoya zonalis* is primarily associated with Vegetation Association 82 (Hummock grasslands, low tree steppe; snappy gum [*Eucalyptus leucophloia* subsp. *leucophloia*] over *Triodia wiseana*) (99.98% of records), with two records from Vegetation Association 93 (Hummock grasslands, shrub steppe; kanji [*Acacia inaequilatera*] over soft spinifex). Vegetation Association 82 is widely distributed throughout much of the central and eastern parts of the Hamersley subregion but is less common in the Chichester subregion.

The most cited associated species for *Q. zonalis* are *Eucalyptus leucophloia*, *Acacia tumida* var. *pilbarensis*, *Grevillea wickhamii*, *Triodia epactia*, and *Triodia wiseana*, which are consistent with the description of

Vegetation Association 82. These species are common and widespread across the Pilbara region and are therefore not indicative of potential *Q. zonalis* habitat.

The North Star project area (*ecologia* 2012a) (Map 6) includes approximately one third of the known *Q. zonalis* records. Of these records, more than 95% are from eight of the vegetation types described by *ecologia* (2012a), which broadly correspond to: *Acacia acradenia* and *Acacia orthocarpa* open shrubland over *Triodia wiseana* hummock grassland (vegetation types AaTw3, AaTw4, AoTw); *Acacia inaequilatera* sparse shrubland over *Triodia basedowii* and *T. wiseana* hummock grassland (AiTb); *Acacia tumida* var. *pilbarensis* shrubland (At, AtEm); *Grevillea wickhamii* sparse tall shrubland over *Triodia pungens* hummock grassland (GwTp); and *Triodia lanigera* open hummock grassland (SpTl and Tl).

Within the NSE, *Q. zonalis* has been recorded from three vegetation types described by Ecoscape (2023): AiTb (*Acacia inaequilatera* mid sparse shrubland over *Triodia brizoides*, *T. wiseana* and *Acacia ptychophylla* low hummock grassland/shrubland); ElAaTw (*Eucalyptus leucophloia* subsp. *leucophloia* low isolated trees over *Acacia acradenia*, *Grevillea wickhamii* and *Acacia ptychophylla* mid sparse shrubland over *Triodia wiseana* low hummock grassland); and ElAtTw2 (*Eucalyptus leucophloia* subsp. *leucophloia* low isolated trees over *Acacia tumida* var. *pilbarensis* mid sparse shrubland over *Triodia wiseana* and *T. brizoides* low hummock grassland).

### 2.10.3 State-wide assessment of *Themeda* sp. Panorama (J. Nelson et al. NS 102) (P1)

#### Background.

*Themeda* sp. Panorama (J. Nelson et al. NS 102) (family Poaceae) is an undescribed phrase name first identified from material collected from the Glacier Valley area in 2018 (Ecoscape 2018), at which time it was tentatively identified as *Themeda avenacea*. Existing material of the same phrase name had been collected earlier in 1997, and again in 2006 during the Pilbara Region Biological Survey (e.g., S. van Leeuwen et al., PBS 0416, PERTH 8222371).

It is a robust perennial grass forming dense tussocks to approximately 1 m high, with the culms extending to approximately 2 m. There is currently no available descriptive information for distinguishing this taxon from similar *Themeda* species, but it is apparently genetically distinct from *T. avenacea* based on unpublished data (pers. comm. cited in Ecoscape [2023]). The flowering and fruiting period could not be determined from the few available records.

#### Distribution and abundance.

The abundance estimate for *Themeda* sp. Panorama (J. Nelson et al. NS 102) was obtained from a state-wide species-specific DBCA database search (27/3/2023) and Fortescue's Significant Flora Database (accessed on 8/3/2023). Current state-wide records indicate there are 2,913 individuals from 17 unique locations in Western Australia (Table 8, page 24). This abundance estimate is likely to be an accurate representation of all currently known records of *T. sp. Panorama* (J. Nelson et al. NS 102).

It is only known to occur within the Chichester IBRA subregion of the Pilbara IBRA region, where it is primarily restricted to an area of approximately 30 × 20 km, approximately 50 km west of Marble Bar (Map 9). There are two outlying populations that were recorded in 1997 and 2006, approximately 30 km south of Marble Bar and 37 km southwest of Marble Bar ('northern end of Black Range'), respectively (Map 9).

#### Records within protected areas.

There are currently no records of *Themeda* sp. Panorama (J. Nelson et al. NS 102) within any protected area (DWER Environmentally Sensitive Areas [DWER-046], Nationally Important Wetlands [DBCA-045], and DBCA managed lands and waters [DBCA-011]).

### Habitat requirements.

Most current records of *Themeda* sp. Panorama (J. Nelson et al. NS 102) are from the Capricorn land system (35.29% of records) (hills and ridges of sandstone and dolomite supporting shrubby hard and soft spinifex grasslands) and the Macroy land system (35.29% of records) (stony plains and occasional tor fields based on granite supporting hard and soft spinifex grasslands) (Table 11). The remaining records occur within the Rocklea land system (basalt hills, plateaux, lower slopes and minor stony plains supporting hard spinifex [and occasionally soft spinifex] grasslands) and the Talga land system (hills and ridges of greenstone and chert and stony plains supporting hard and soft spinifex grasslands) (Van Vreeswyk *et al.* 2004).

Plants in the vicinity of the North Star project have been recorded primarily from steep rocky slopes with shallow soils amongst exposed bedrock and boulders (PERTH 9214496), shaded rocky gorges/gullies below a large ironstone ridge with skeletal rocky clay loam (PERTH 9318011 and PERTH 9331891), and from stony creek beds and rocky drainage lines (Ecoscape 2023).

The population occurring approximately 37 km southwest of Marble Bar ('northern end of Black Range') is associated with steep colluvial foot slopes of approximately 115 degrees with shallow brown loam soil to 10 cm deep (PERTH 8222355, PERTH 8222363, and PERTH 8222371). Another population occurring approximately 30 km south of Marble Bar is associated with basalt hillslopes with very large boulders (PERTH 5634512).

### Associated vegetation.

The current records of *T. sp.* Panorama (J. Nelson et al. NS 102) are primarily associated with Vegetation Association 82 (Hummock grasslands, low tree steppe; snappy gum [*Eucalyptus leucophloia* subsp. *leucophloia*] over *Triodia wiseana*) (96.65% of records), but with approximately 100 individuals (3.35%) recorded from Vegetation Association 93 (Hummock grasslands, shrub steppe; kanji [*Acacia inaequilatera*] over soft spinifex).

Current Western Australian Herbarium records in the vicinity of the survey area, which are mostly from rocky slopes, are associated with *Eucalyptus leucophloia* subsp. *leucophloia*, *Acacia tumida* subsp. *pilbarensis*, *Acacia pruinocarpa*, *Quoya zonalis*, and *Eriachne mucronata*. Except for *Q. zonalis*, these species are common and widespread across the Pilbara region and are therefore not indicative of potential *T. sp.* Panorama (J. Nelson et al. NS 102) habitat.

Within the NSE it has been recorded from two mapped vegetation types described by Ecoscape (2023): EvApT1 (*Eucalyptus victrix* and *Corymbia hamersleyana* low open woodland over *Acacia pyrifolia* var. *pyrifolia*, *A. tumida* var. *pilbarensis* and *Petalostylis labicheoides* mid sparse shrubland over *Triodia longiceps*, *Cymbopogon ambiguus* and *Stemodia grossa* low open hummock/tussock grassland/forbland); and ElAtTw1 (*Eucalyptus leucophloia* subsp. *leucophloia* low isolated trees over *Acacia tumida* var. *pilbarensis* and *Grevillea wickhamii* mid open shrubland over *Triodia wiseana* mid hummock grassland).

The population recorded in 2006 (ca. 37 km southwest of Marble Bar) is associated with *Clerodendrum* sp., *Pentalepis trichodesmoides*, *Senna glutinosa*, *Cullen* sp., and *Triodia* sp. (PERTH 8222371). At the population recorded in 1997 (ca. 30 km south of Marble Bar) 'very little vegetation' was recorded (PERTH 5634512).

#### 2.10.4 State-wide assessment of *Triodia basitricha* (P3)

##### Background.

*Triodia basitricha* (family Poaceae) was described in 2015 from material originally included on Western Australia's plant census as *Triodia* sp. Millstream (A.A. Mitchell PRP 207) (Barrett and Barrett 2015). It is a non-resinous to weakly resinous perennial tussock grass belonging to the 'soft group' within *Triodia*, which have soft-type leaf blades. The leaf sheaths are generally non-resinous and are sparsely to moderately pilose. The lemmas are to approximately 16.5 mm long, 3-awned, and bi-textured, with the lower part somewhat hardened and uniformly appressed-hairy, and the upper part membranous or papery (Barrett and Barrett 2015). It is distinct from other *Triodia* species in the Pilbara with awned bi-textured lemmas primarily due to its hairy leaf sheaths. The primary flowering period is from January to March (Barrett and Barrett 2015), but with mature spikelets often persisting beyond this period.

##### Distribution and abundance.

Location and abundance data for *T. basitricha* were obtained from a state-wide species-specific DBCA database search (27/3/2023), Fortescue's Significant Flora Database (accessed on 8/3/2023), and some additional records provided by DBCA from unprocessed Threatened and Priority Flora Report Forms (TPRF). Current state-wide records indicate there are 189,508 recorded individuals from 162 unique locations in Western Australia (Table 8).

Location and abundance data for Priority listed species submitted to DBCA are not consistently entered into their Threatened and Priority Flora (TPFL) database (DBCA 2019). Only 34 of the unique *T. basitricha* records (79,027 individuals, of which 70,000 are associated with two records) included here are from Western Australian Herbarium collections and unprocessed TPRF data, and there are no records on the TPFL database. The remaining 110,481 individuals are from Fortescue's Significant Species Database.

Biota Environmental Sciences (Biota) estimated a total population size of 836,000 individuals for the Eliwana Mine Study Area (MSA) and Rail Study Area (RSA), which was based on an extrapolation from quadrat percent cover data (Biota 2018). This extrapolated estimate has been included in the final species abundance estimate for *T. basitricha* in Section 4.2 but has not been included in the calculations in this desktop assessment, which includes data from point records only.

It is widely distributed in the Pilbara IBRA bioregion and is present in the Chichester (45.68% of records), Fortescue (6.79% of records), and Hamersley (46.91% of records) subregions (Table 10). Its primary distribution in the Pilbara covers an area of approximately 350 × 200 km. There is a single outlying population within the Gascoyne IBRA region (Ashburton subregion), within the Barlee Range Nature Reserve (Map 10).

##### Records within protected areas.

Most records of *T. basitricha* (98.15%) occur outside of protected areas (DWER Environmentally Sensitive Areas [DWER-046], Nationally Important Wetlands [DBCA-045], and DBCA managed lands and waters [DBCA-011]). There is one record from the Barlee Range Nature Reserve, and two records from Millstream Chichester National Park (Table 9).

##### Habitat requirements.

*Triodia basitricha* is primarily associated with the slopes and crests of rocky hills, which potentially indicates a 'refugial habitat' requirement (Barrett and Barrett 2015). Most records are associated with four land systems (Table 11): Boolgeeda (8.02%), Capricorn (33.95%), Newman (15.43), and Platform (19.75%). The Boolgeeda, Newman, and Platform land systems are typically associated with each other (Van Vreeswyk *et al.* 2004).

##### Associated vegetation.

*Triodia basitricha* is almost exclusively associated with Vegetation Association 82 (Hummock grasslands, low tree steppe; snappy gum [*Eucalyptus leucophloia* subsp. *leucophloia*] over *Triodia wiseana*) (67.36% of

records), and Vegetation Association 645 (Hummock grasslands, shrub steppe; kanji [*Acacia inaequilatera*] & snakewood [*Acacia xiphophylla*] over soft spinifex & *Triodia wiseana*) (25.53% of records).

Within the NSE it has been recorded from three mapped vegetation types described by Ecoscape (2023): ElAaTw (*Eucalyptus leucophloia* subsp. *leucophloia* low isolated trees over *Acacia acradenia*, *Grevillea wickhamii* and *Acacia ptychophylla* mid sparse shrubland over *Triodia wiseana* low hummock grassland, ElAtTw2 (*Eucalyptus leucophloia* subsp. *leucophloia* low isolated trees over *Acacia tumida* var. *pilbarensis* mid sparse shrubland over *Triodia wiseana* and *T. brizoides* low hummock grassland), and ElAiTw2 (*Eucalyptus leucophloia* subsp. *leucophloia* low open woodland over *Acacia inaequilatera*, *A. acradenia* and *A. bivenosa* mid sparse shrubland over *Triodia wiseana* and *T. angusta* low hummock grassland).

## 2.10.5 State-wide assessment of *Ptilotus mollis* (P4)

### Background.

*Ptilotus mollis* (family Amaranthaceae) is a small perennial shrub growing to approximately 0.9 m high. It is characterised by its relatively rounded compact habit, short obovate or orbicular leaves with a dense indumentum of silky-silvery hairs, white to pink flowers in a dense terminal panicle, and style centrally placed on a hairy ovary (Benl 1970). Most collections are from stony screes and steep rocky slopes, often in association with massive ironstone formations (Western Australian Herbarium 2023). The primary flowering and fruiting period is from May to September (Western Australian Herbarium 2023).

### Distribution and abundance.

Location and abundance data for *P. mollis* were obtained from a state-wide species-specific DBCA database search (27/3/2023) and Fortescue's Significant Flora Database (accessed on 8/3/2023). Current state-wide records indicate there are 7,222 recorded individuals from 301 unique locations in Western Australia (Table 8).

Location and abundance data for Priority listed species submitted to DBCA are not consistently entered into their Threatened and Priority Flora (TPFL) database (DBCA 2019). Only 41 of the unique *P. mollis* records (2,512 individuals) included here are from Western Australian Herbarium collections, and there are no records on the TPFL database. The remaining 4,710 individuals are from Fortescue's Significant Species Database.

It is widely distributed in the Pilbara IBRA bioregion, with most records from the Chichester (80.73% of records) and Hamersley (18.27% of records) subregions, and a single record from the Roebourne subregion (Table 10). Its primary distribution in the Pilbara covers an area of approximately 400 × 300 km. There are two records outside of the Pilbara, both from the Rudall River area within the Little Sandy Desert region (Rudall subregion), approximately 200 km east-southeast of Nullagine (Map 11).

### Records within protected areas.

Most records of *P. mollis* (99.00%) occur outside of protected areas (DWER Environmentally Sensitive Areas [DWER-046], Nationally Important Wetlands [DBCA-045], and DBCA managed lands and waters [DBCA-011]). Two records are from the Cane River Conservation Park, and one record is from Karijini National Park (Table 9). The two records from the Little Sandy Desert occur adjacent to Karlamilyi National Park.

### Habitat Requirements.

*Ptilotus mollis* is primarily associated steep rocky sites, usually in full sun on massive ironstone formations (Western Australian Herbarium 2023). Most records are associated with three land systems: Capricorn (55.15%), Newman (12.96%), and Rocklea (11.96%) (Table 11).



**Associated vegetation.**

*Ptilotus mollis* is primarily associated with Vegetation Association 82 (Hummock grasslands, low tree steppe; snappy gum [*Eucalyptus leucophloia* subsp. *leucophloia*] over *Triodia wiseana*) (81.06% of records), Vegetation Association 567 (Hummock grasslands, shrub steppe; mulga [*Acacia aneura* and close relatives] & kanji [*Acacia inaequilatera*] over soft spinifex & *Triodia basedowii*) (9.25% of records), and Vegetation Association 173 (Hummock grasslands, shrub steppe; kanji [*Acacia inaequilatera*] over soft spinifex & *Triodia wiseana* on basalt) (8.97% of records).

Within the NSE it has been recorded from two mapped vegetation types described by Ecoscape (2023): AiTb (*Acacia inaequilatera* mid sparse shrubland over *Triodia brizoides*, *T. wiseana* and *Acacia ptychophylla* low hummock grassland/shrubland), and EIAaTw (*Eucalyptus leucophloia* subsp. *leucophloia* low isolated trees over *Acacia acradenia*, *Grevillea wickhamii* and *Acacia ptychophylla* mid sparse shrubland over *Triodia wiseana* low hummock grassland).

**Table 8: Target species estimated abundance from known records.**

Taxon	Unique records	Est. abundance
<i>Quoya zonalis</i> (T)	5,501	17,701
<i>Themeda</i> sp. Panorama (J. Nelson et al. NS 102) (P1)	17	2,913
<i>Triodia basitricha</i> (P3)	162	189,508
<i>Ptilotus mollis</i> (P4)	301	7,222

**Table 9: Target species records within protected areas (DBCA Managed Lands).**

DBCA managed land	Est. abundance	Unique records	% of records
<i>Quoya zonalis</i> (T)			
Not within protected area	17,701	5,501	100.00%
<i>Themeda</i> sp. Panorama (J. Nelson et al. NS 102) (P1)			
Not within protected area	2,913	17	100.00%
<i>Triodia basitricha</i> (P3)			
Not within protected area	189,505	159	98.15%
Barlee Range Nature Reserve	1	1	0.62%
<i>Ptilotus mollis</i> (P4)			
Not within protected area	7,219	298	99.00%
Cane River Conservation Park	2	2	0.66%
Karrijini National Park	1	1	0.33%
Millstream Chichester National Park	2	2	1.23%



**Table 10: Target species IBRA 7 subregion distribution.**

IBRA subregion <sup>1</sup>	Est. abundance	Unique records	% of records
<i>Quoya zonalis</i> (T)			
Chichester (PIL)	17,701	5,501	100.00%
<i>Themeda</i> sp. Panorama (J. Nelson et al. NS 102) (P1)			
Chichester (PIL)	2,913	17	100.00%
<i>Triodia basitricha</i> (P3)			
Ashburton (GAS)	1	1	0.62%
Chichester (PIL)	26292	74	45.68%
Fortescue (PIL)	51471	11	6.79%
<i>Ptilotus mollis</i> (P4)			
Chichester (PIL)	4,476	243	80.73%
Hamersley (PIL)	2,743	55	18.27%
Roebourne (PIL)	1	1	0.33%
Rudall (LSD)	2	2	0.66%
Hamersley (PIL)	111744	76	46.91%

<sup>1</sup>PIL=Pilbara, LSD=Little Sandy Desert, GAS=Gascoyne.

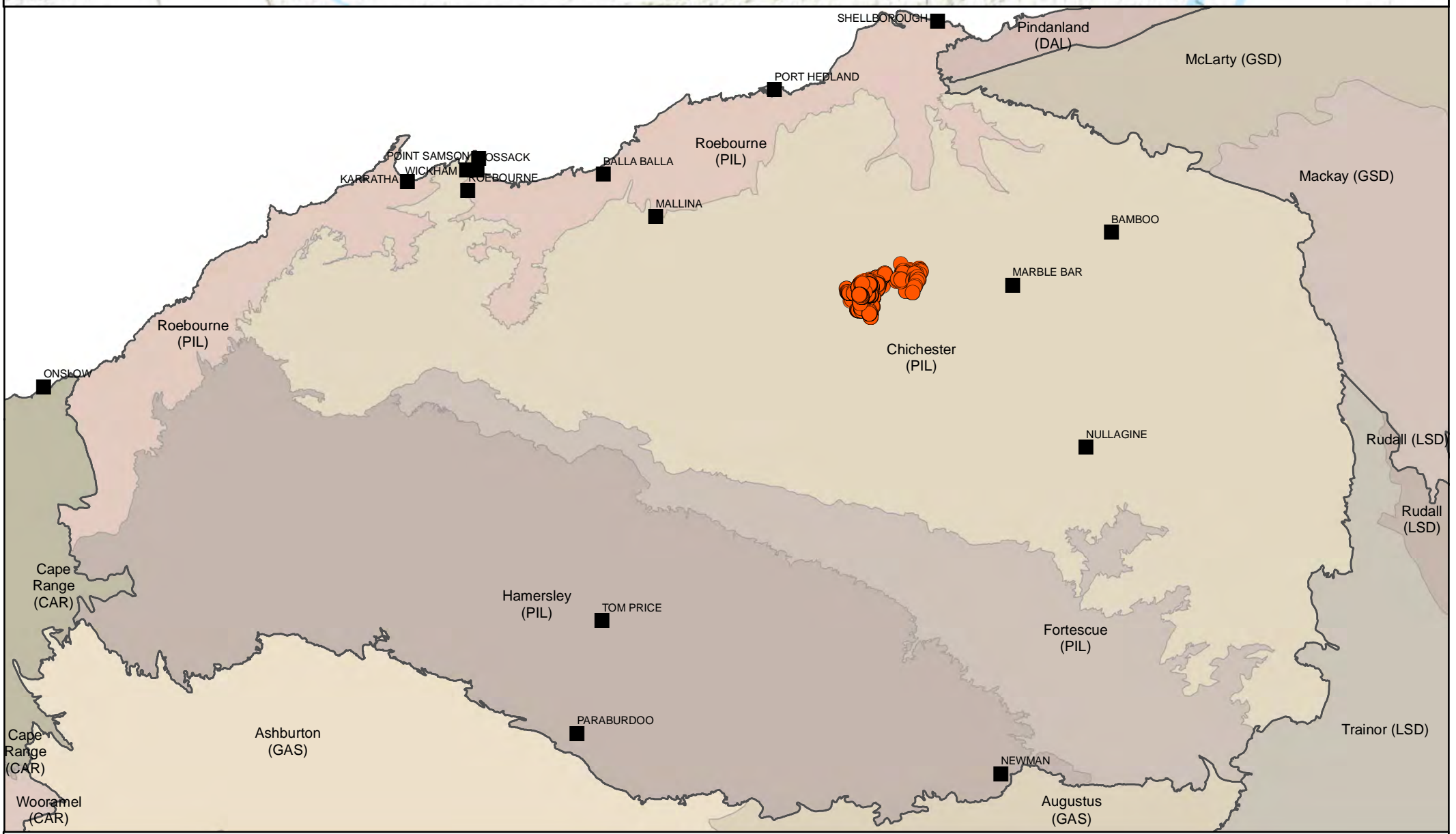
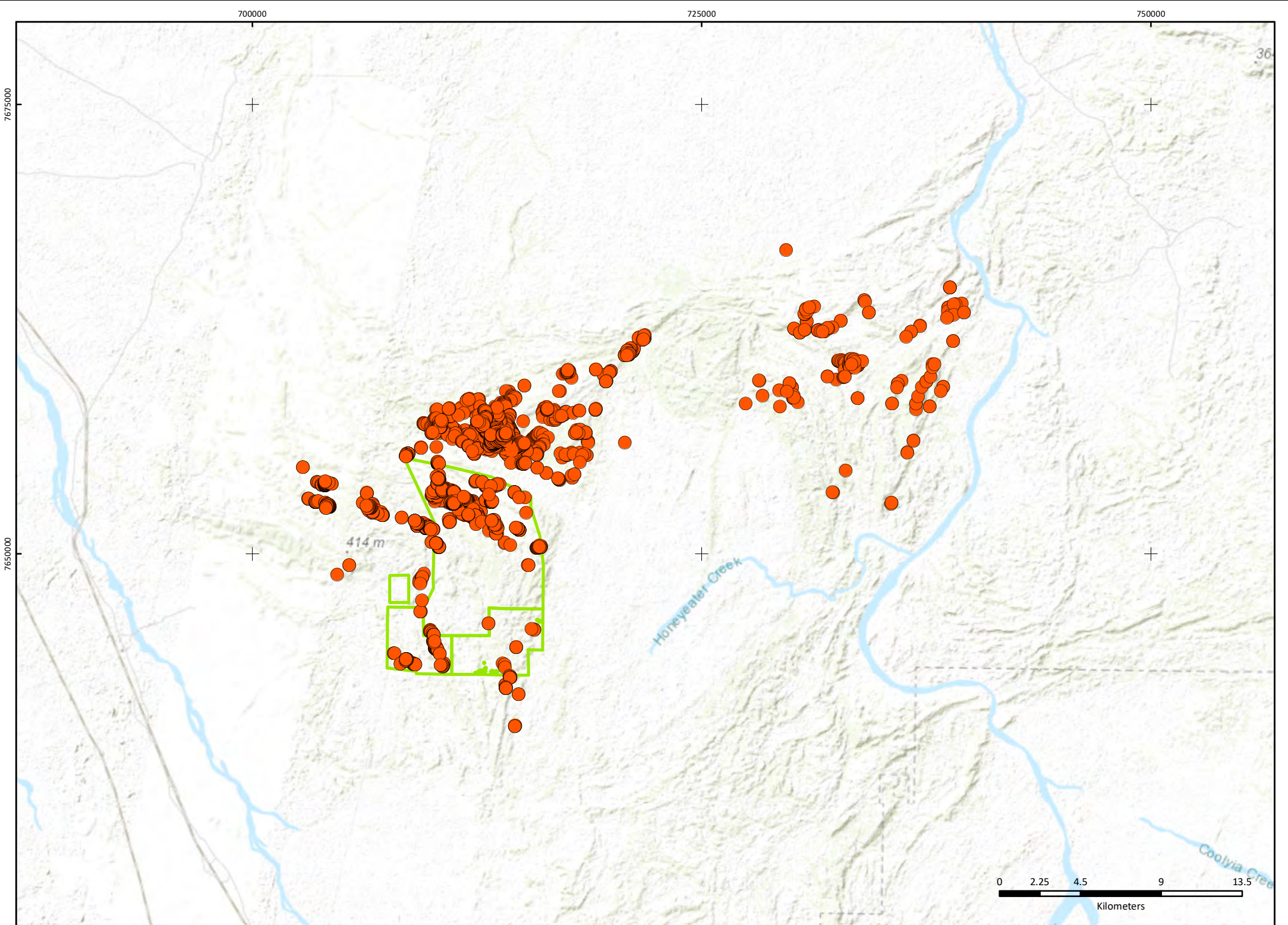
**Table 11: Target species land system distribution.**

Land system	Description	Est. abundance	Unique records	% of records
<i>Quoya zonalis</i> (T)				
Boolgeeda	Granite hills, domes and tor fields and sandy plains with shrubby spinifex grasslands.	1	1	0.02%
Capricorn	Hills and ridges of sandstone and dolomite supporting shrubby hard and soft spinifex grasslands.	17131	5343	97.13%
Granitic	Rugged granitic hills supporting shrubby hard and soft spinifex grasslands.	1	1	0.02%
Rocklea	Basalt hills, plateaux, lower slopes and minor stony plains supporting hard spinifex (and occasionally soft spinifex) grasslands.	32	11	0.20%
Talga	Hills and ridges of greenstone and chert and stony plains supporting hard and soft spinifex grasslands.	536	145	2.64%
<i>Themeda</i> sp. Panorama (J. Nelson et al. NS 102) (P1)				
Black	Linear ridges of dolerite or basalt supporting hard spinifex grasslands, with unvegetated boulder slopes and rock piles along summits.	1	1	5.88%
Capricorn	Hills and ridges of sandstone and dolomite supporting shrubby hard and soft spinifex grasslands.	2,851	6	35.29%
Macroy	Stony plains and occasional tor fields based on granite supporting hard and soft spinifex grasslands.	1	1	5.88%
Rocklea	Basalt hills, plateaux, lower slopes and minor stony plains supporting hard spinifex (and occasionally soft spinifex) grasslands.	33	6	35.29%
Talga	Hills and ridges of greenstone and chert and stony plains supporting hard and soft spinifex grasslands.	27	3	17.65%
<i>Triodia basitricha</i> (P3)				
Augustus	Rugged ranges, hills, ridges and plateaux supporting mulga shrublands and hard spinifex grasslands.	2	1	0.62%
Boolgeeda	Granite hills, domes and tor fields and sandy plains with shrubby spinifex grasslands.	55,203	13	8.02%
Capricorn	Hills and ridges of sandstone and dolomite supporting shrubby hard and soft spinifex grasslands.	17,924	55	33.95%
Kumina	Duricrust plains and plateau remnants supporting hard spinifex grasslands.	1	1	0.62%
McKay	Hills, ridges, plateaux remnants and breakaways of meta sedimentary and sedimentary rocks supporting hard spinifex grasslands.	9,935	14	8.64%
Newman	Rugged jaspilite plateaux, ridges and mountains supporting hard spinifex grasslands.	42,337	25	15.43%
Platform	Dissected slopes and raised plains supporting hard spinifex grasslands.	66,006	32	19.75%
River	Active flood plains and major rivers supporting grassy eucalypt woodlands, tussock grasslands and soft spinifex grasslands.	100	1	0.62%
Robe	Low limonite mesas and buttes supporting soft spinifex (and occasionally hard spinifex) grasslands.	1	1	0.62%
Rocklea	Basalt hills, plateaux, lower slopes and minor stony plains supporting hard spinifex (and occasionally soft spinifex) grasslands.	4,305	15	9.26%
Satirist	Stony plains and low rises supporting hard spinifex grasslands, and gilgai plains supporting tussock grasslands.	1	1	0.62%
Talga	Hills and ridges of greenstone and chert and stony plains supporting hard and soft spinifex grasslands.	1	1	0.62%
<i>Ptilotus mollis</i> (P4)				
Unallocated	NA	2	2	0.66%
Capricorn	Hills and ridges of sandstone and dolomite supporting shrubby hard and soft spinifex grasslands.	2,458	166	55.15%
Coongimah	Plateau surfaces, low hills with steep slopes and undulating uplands supporting hard spinifex grasslands.	2	2	0.66%
Houndstooth	Rough shale hills, stony plains and broad drainage floors supporting hard spinifex grasslands and sparse shrubs.	1	1	0.33%
McKay	Hills, ridges, plateaux remnants and breakaways of meta sedimentary and sedimentary rocks supporting hard spinifex grasslands.	20	1	0.33%
Mosquito	Stony plains and prominent ridges of schist and other metamorphic rocks supporting hard spinifex grasslands.	2	2	0.66%
Nanutarra	Low mesas and hills of sedimentary rocks supporting soft and hard spinifex grasslands.	1	1	0.33%
Newman	Rugged jaspilite plateaux, ridges and mountains supporting hard spinifex grasslands.	2,072	39	12.96%
Paradise	Alluvial plains supporting soft spinifex grasslands and tussock grasslands.	1	1	0.33%
Robe	Low limonite mesas and buttes supporting soft spinifex (and occasionally hard spinifex) grasslands.	412	20	6.64%
Rocklea	Basalt hills, plateaux, lower slopes and minor stony plains supporting hard spinifex (and occasionally soft spinifex) grasslands.	1,420	36	11.96%
Talga	Hills and ridges of greenstone and chert and stony plains supporting hard and soft spinifex grasslands.	801	29	9.63%
Uaroo	Broad sandy plains supporting shrubby hard and soft spinifex grasslands.	30	1	0.33%
Wona	Basalt upland gilgai plains supporting tussock grasslands and minor hard spinifex grasslands.	5	2	1.23%

**Table 12: Target species vegetation association distribution.**

Veg. association	Source description	Est. abundance	Unique records	% of records
<i>Quoya zonalis</i> (T)				
82	Hummock grasslands, low tree steppe; snappy gum [ <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> ] over <i>Triodia wiseana</i>	17,700	5,500	99.98%
93	Hummock grasslands, shrub steppe; kanji [ <i>Acacia inaequilatera</i> ] over soft spinifex	1	1	0.02%
<i>Themeda</i> sp. Panorama (J. Nelson et al. NS 102) (P1)				
82	Hummock grasslands, low tree steppe; snappy gum [ <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> ] over <i>Triodia wiseana</i>	2,911	15	88.24%
93	Hummock grasslands, shrub steppe; kanji [ <i>Acacia inaequilatera</i> ] over soft spinifex	2	2	11.76%
<i>Triodia basitricha</i> (P3)				
29	Sparse low woodland; mulga [ <i>Acacia aneura</i> and close relatives], discontinuous in scattered groups	165	5	3.09%
82	Hummock grasslands, low tree steppe; snappy gum [ <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> ] over <i>Triodia wiseana</i>	131,914	121	74.69%
157	Hummock grasslands, grass steppe; hard spinifex, <i>Triodia wiseana</i>	2	1	0.62%
171	Hummock grasslands, low tree steppe; snappy gum [ <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> ] over soft spinifex & <i>Triodia brizoides</i>	1	1	0.62%
173	Hummock grasslands, shrub steppe; kanji [ <i>Acacia inaequilatera</i> ] over soft spinifex & <i>Triodia wiseana</i> on basalt	7	4	2.47%
175	Short bunch grassland - savanna/grass plain (Pilbara)	1602	6	3.70%
562	Mosaic: Low woodland; mulga [ <i>Acacia aneura</i> and close relatives] in valleys / Hummock grasslands, open low tree-steppe; snappy gum [ <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> ] over <i>Triodia wiseana</i>	5307	5	3.09%
565	Hummock grasslands, low tree steppe; bloodwood [ <i>Corymbia hamersleyana</i> ] over soft spinifex	1203	5	3.09%
567	Hummock grasslands, shrub steppe; mulga [ <i>Acacia aneura</i> and close relatives] & kanji [ <i>Acacia inaequilatera</i> ] over soft spinifex & <i>Triodia basedowii</i>	1006	7	4.32%
569	Hummock grasslands, low tree steppe; bloodwood [ <i>Corymbia hamersleyana</i> ] over soft spinifex & <i>Triodia wiseana</i>	150	1	0.62%
607	Hummock grasslands, low tree steppe; snappy gum [ <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> ] & bloodwood [ <i>Corymbia hamersleyana</i> ] over soft spinifex & <i>Triodia wiseana</i>	4463	4	2.47%
609	Mosaic: Hummock grasslands, open low tree steppe; bloodwood [ <i>Corymbia hamersleyana</i> ] with sparse kanji [ <i>Acacia inaequilatera</i> ] shrubs over soft spinifex / Hummock grasslands, open low tree steppe; snappy gum [ <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> ] over <i>Triodia wiseana</i> on a lateritic crust	1	1	0.62%
<i>Ptilotus mollis</i> (P4)				
18	Low woodland; mulga [ <i>Acacia aneura</i> and close relatives]	102	4	1.33%
29	Sparse low woodland; mulga [ <i>Acacia aneura</i> and close relatives], discontinuous in scattered groups	1	1	0.33%
82	Hummock grasslands, low tree steppe; snappy gum [ <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> ] over <i>Triodia wiseana</i>	5,800	244	81.06%
93	Hummock grasslands, shrub steppe; kanji [ <i>Acacia inaequilatera</i> ] over soft spinifex	31	2	0.66%
99	Hummock grasslands, shrub steppe; <i>Acacia coriacea</i> & hakea over hard spinifex, <i>Triodia basedowii</i>	1	1	0.33%
117	Hummock grasslands, grass steppe; soft spinifex	1	1	0.33%
171	Hummock grasslands, low tree steppe; snappy gum [ <i>Eucalyptus leucophloia</i> subsp. <i>leucophloia</i> ] over soft spinifex & <i>Triodia brizoides</i>	57	3	1.00%
173	Hummock grasslands, shrub steppe; kanji [ <i>Acacia inaequilatera</i> ] over soft spinifex & <i>Triodia wiseana</i> on basalt	555	27	8.97%
190	Hummock grasslands, sparse shrub steppe; <i>Acacia bivenosa</i> & <i>A. trachycarpa</i> over hard spinifex, <i>Triodia wiseana</i> , Very poor rocky country on gneiss	2	2	0.66%
567	Hummock grasslands, shrub steppe; mulga [ <i>Acacia aneura</i> and close relatives] & kanji [ <i>Acacia inaequilatera</i> ] over soft spinifex & <i>Triodia basedowii</i>	668	12	3.99%
569	Hummock grasslands, low tree steppe; bloodwood [ <i>Corymbia hamersleyana</i> ] over soft spinifex & <i>Triodia wiseana</i>	1	1	0.33%
583	Hummock grasslands, sparse shrub steppe; kanji [ <i>Acacia inaequilatera</i> ] & <i>Acacia bivenosa</i> over hard spinifex <i>Triodia basedowii</i> & <i>T. wiseana</i>	2	2	0.66%
589	Mosaic: Short bunch grassland - savanna / grass plain (Pilbara) / Hummock grasslands, grass steppe; soft spinifex	1	1	0.33%
645	Hummock grasslands, shrub steppe; kanji [ <i>Acacia inaequilatera</i> ] & snakewood [ <i>Acacia xiphophylla</i> ] over soft spinifex & <i>Triodia wiseana</i>	50,000	1	0.62%





- *Quoya zonalis*
- Survey area
- IBRA 7 region boundary
- IBRA 7 subregion boundary

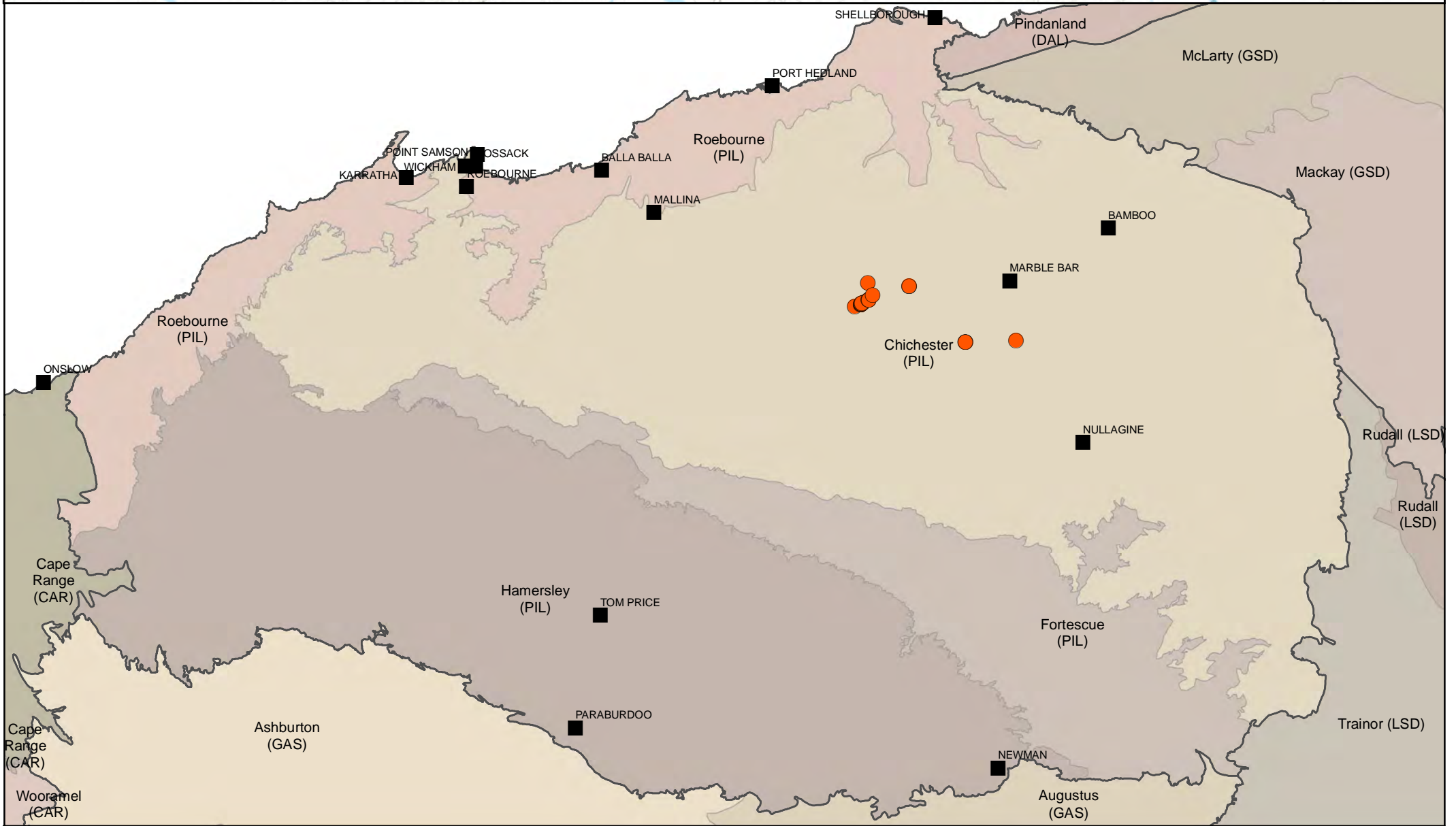
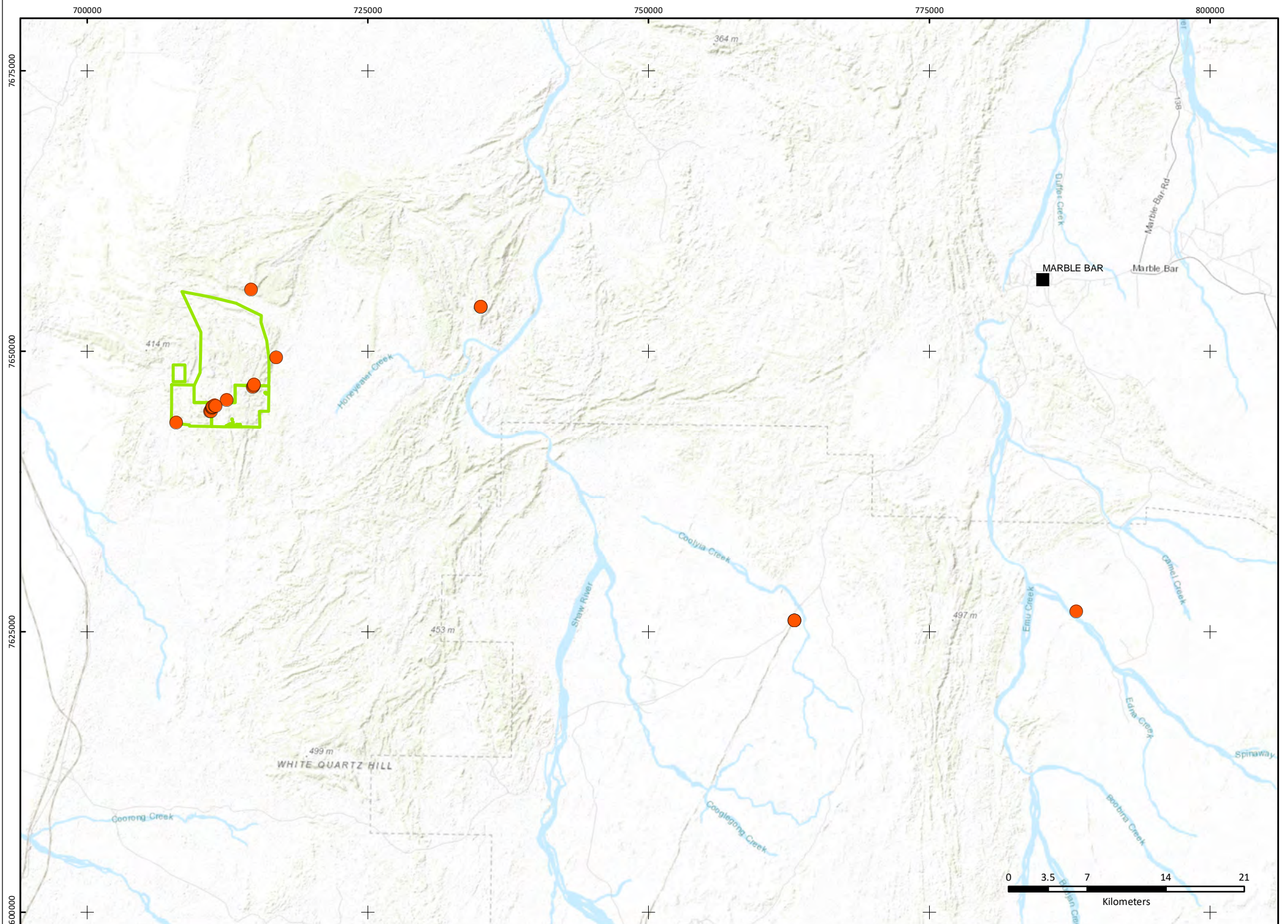


Project No.: 1961  
 Date: 30 March 2023  
 Author: AC  
 Coordinate System: GDA2020 MGA Zone 50  
 Projection: Transverse Mercator  
 Absolute Scale: 1:250,000 @A3

**Map 8: State-wide distribution of *Quoya zonalis* (T).**





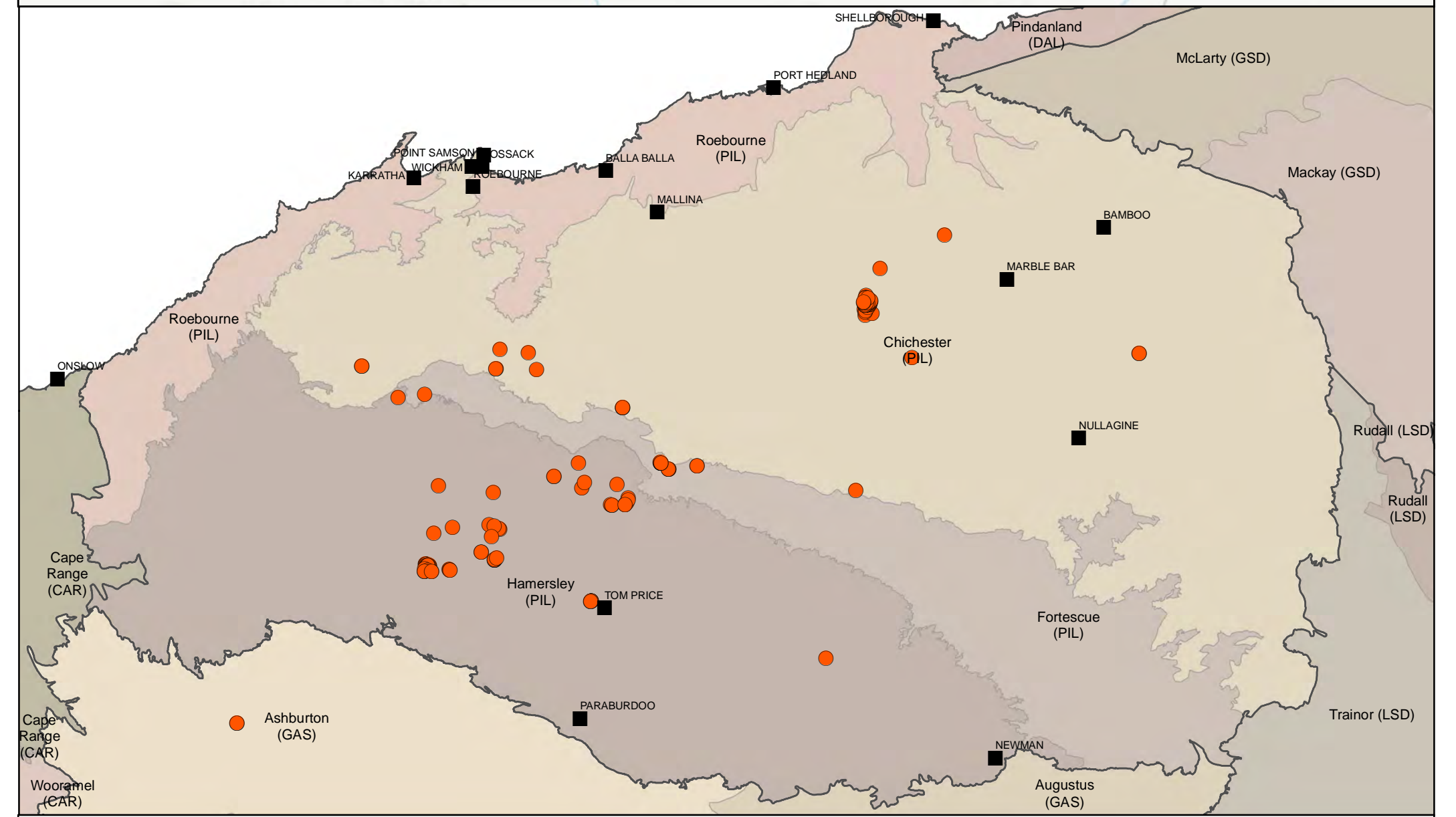
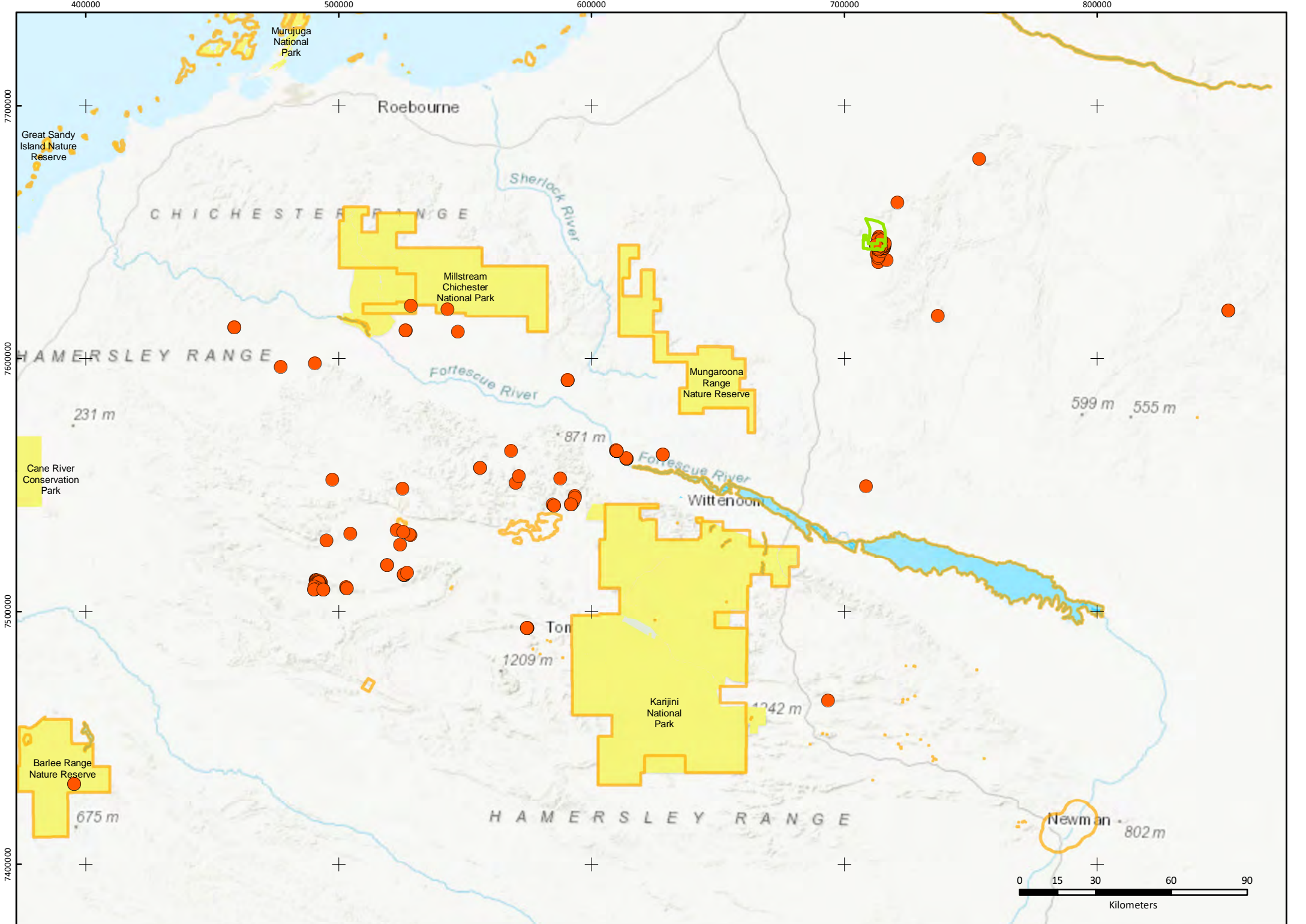


● *Themeda* sp. Panorama (J. Nelson et al. NS 102)
  IBRA 7 region boundary
  IBRA 7 subregion boundary
  Survey area

**Map 9: State-wide distribution of *Themeda* sp. Panorama (J. Nelson et al. NS 102) (P1).**

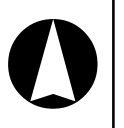




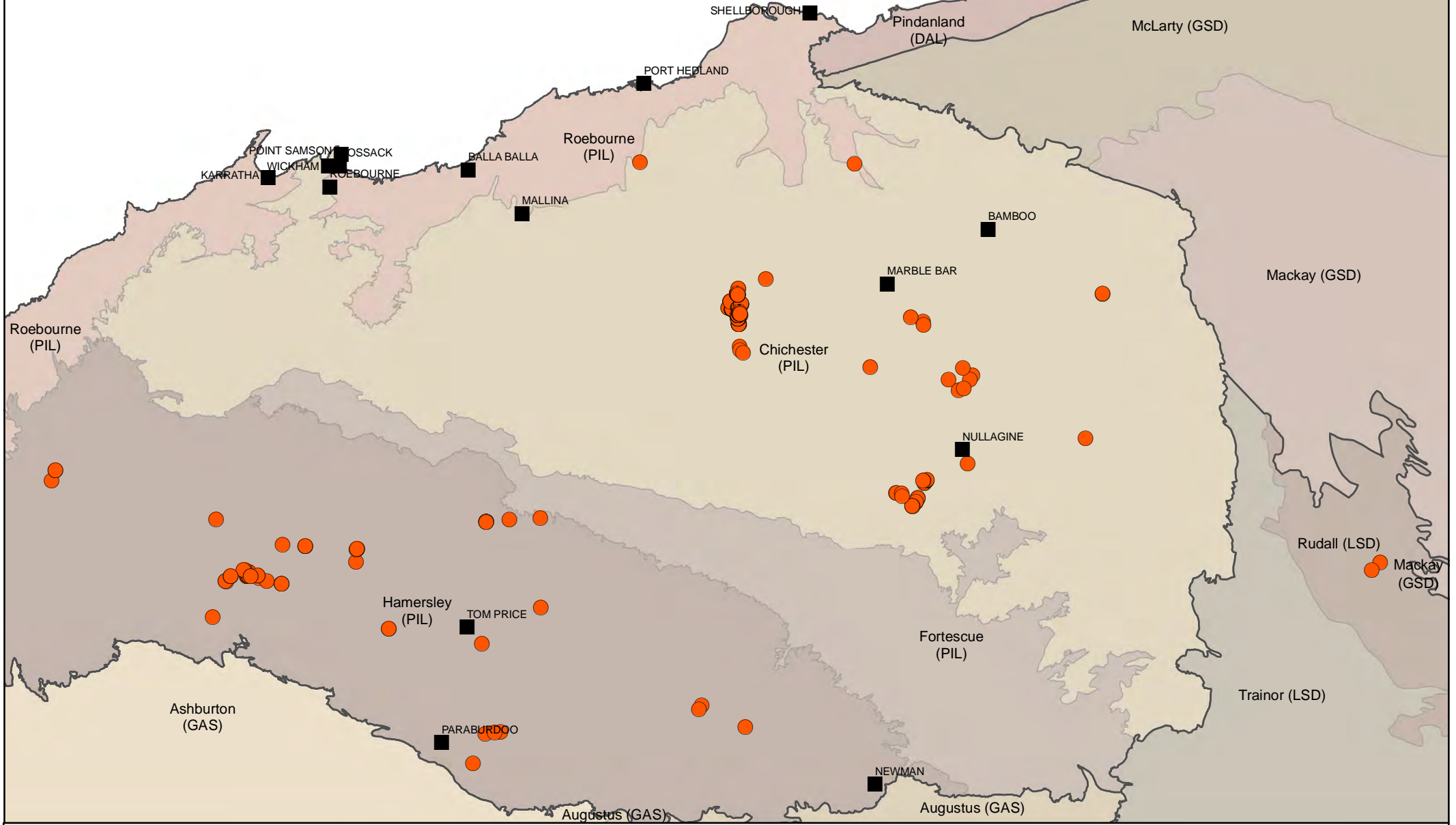
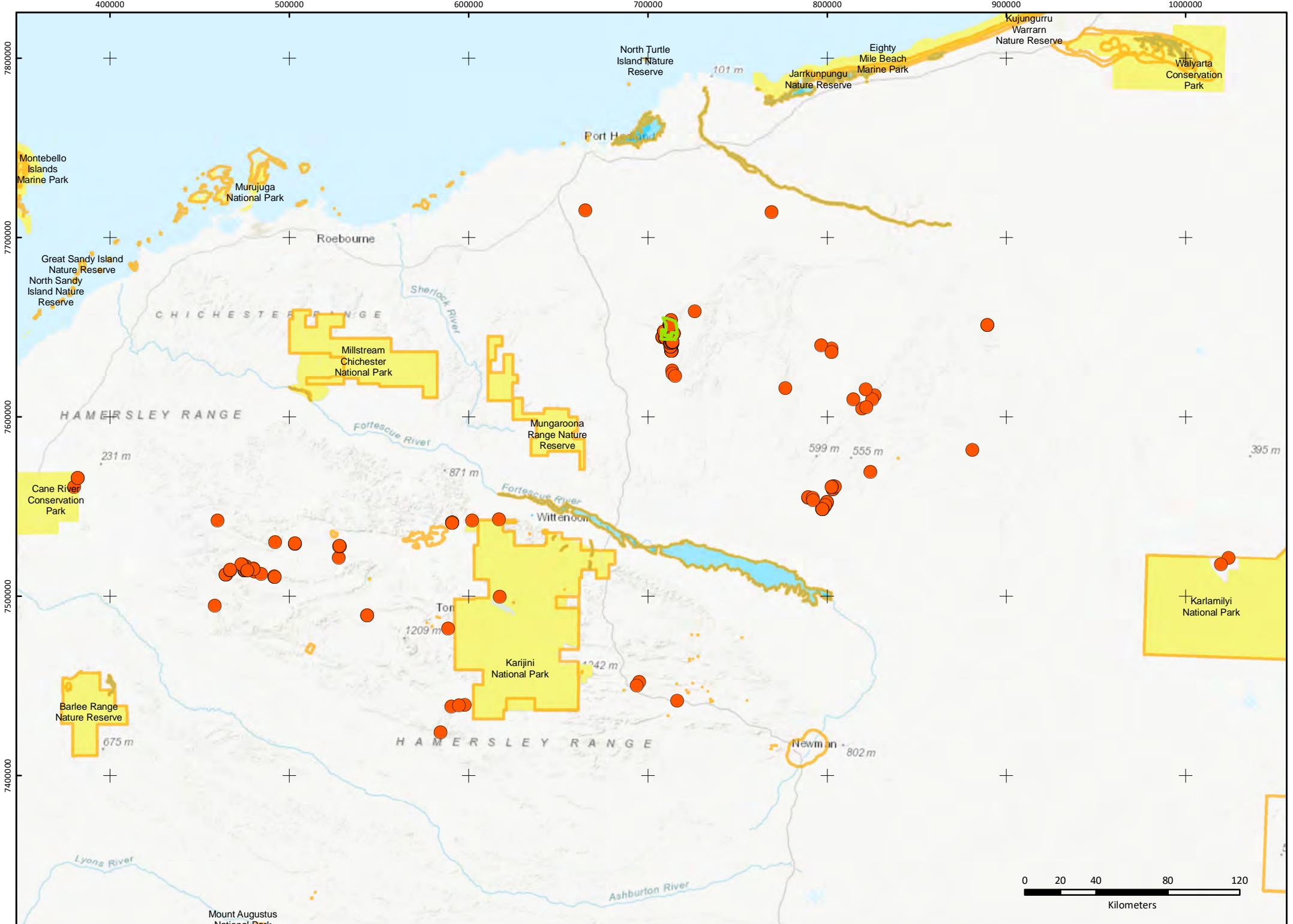


- *Tridodia basitricha*
- IBRA 7 region boundary
- Environmentally Sensitive Areas (DWER-046)
- Survey area
- IBRA 7 subregion boundary
- Nationally Important Wetlands (DBCAs-045)
- DBCA managed lands and waters (DBCAs-011)

**Map 10: State-wide distribution of *Tridodia basitricha* (P3).**







- *Ptilotus mollis*
- IBRA 7 region boundary
- Environmentally Sensitive Areas (DWER-046)
- Survey area
- IBRA 7 subregion boundary
- Nationally Important Wetlands (DBCAs-045)
- DBCA managed lands and waters (DBCAs-011)

**Map 11: State-wide distribution of *Ptilotus mollis* (P4).**



### 3 METHODOLOGY

#### 3.1 SURVEY TIMING

The targeted flora assessment was undertaken by three botanists over two surveys from 3–10 April 2023 and 1–8 May 2023, during the primary survey season for the Pilbara region (EPA 2016b).

#### 3.2 SURVEY AREA

##### 3.2.1 North Star Extension

The NSE is approximately 1,426 ha in area and includes records of all four target species. Most of the NSE was systematically surveyed for all four target species, including all of the Indicative Disturbance Footprint (Map 12). The far western section of the NSE consists mostly of the Rocklea land system and is characterised by lower hills less likely to support *Quoya zonalis* (T). The hills in this western part of the NSE were therefore not fully surveyed for *Quoya zonalis* (T), but the creeks and more prominent drainage lines were surveyed for *Themeda* sp. Panorama (J. Nelson et al. NS 102) (P1).

##### 3.2.2 Mine Development Envelope

The MDE is approximately 5275 ha and includes records of all four target species (Map 12). Potential *Quoya zonalis* habitat within the Mining Proposal Footprint within the MDE had previously been systematically searched for *Quoya zonalis* (T). The primary objective of this survey was to quantify target species populations in parts of the MDE outside the Mining Proposal Footprint to provide local context. The larger creeks and gullies within this area also potentially support undiscovered populations of *Themeda* sp. Panorama (J. Nelson et al. NS 102) (P1), so these habitats were also searched.

##### 3.2.3 Western Addition

The Western Addition is approximately 1,042 ha and was the primary target area to survey for local populations of *Themeda* sp. Panorama (J. Nelson et al. NS 102) (P1) outside of the NSE (Map 12). Prior to the current survey there were existing records of *Quoya zonalis* (T), *Themeda* sp. Panorama (J. Nelson et al. NS 102) (P1), and *Ptilotus mollis* (P4) within the Western Addition (Map 12). The larger creeks and drainage lines in this area were systematically surveyed for *Themeda* sp. Panorama (J. Nelson et al. NS 102) (P1) and some ridgelines were surveyed opportunistically for *Q. zonalis*.

#### 3.3 SURVEY METHODOLOGY

The survey was completed in accordance with the *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA 2016b), primarily by systematically searching potentially suitable habitat determined from the desktop assessment (section 2.10) for the four target species. Other non-target significant species were recorded if encountered.

Targeted searches were made along transects in areas of potential suitable habitat that were identified as part of the desktop assessment, as well as within representative areas of each of the major landforms and plant communities present within the survey area. The targeted survey transects were therefore undertaken primarily along rocky ridgelines, adjacent slopes and the edges of mesas (for *Quoya zonalis* (T) *Ptilotus mollis* (P4), and *Triodia basitricha* (P3)), and in drainage lines, creeks, and gorges/gullies (for *Themeda* sp. Panorama (J. Nelson et al. NS 102) (P1)). Because transect location was dependant on habitat features, transects were not undertaken at fixed spacings. Where populations of the target species were recorded, survey effort was increased to record additional individuals in the vicinity of the transect, with priority given to *Q. zonalis* (T) and *T. sp. Panorama* (J. Nelson et al. NS 102) (P1).

Where significant species were observed, the following parameters were recorded:

- Date and observer.



- GPS coordinate.
- Abundance and count method (count or estimate).
  - Count of individual plants (for solitary individuals or small groups of plants) or
  - Estimated abundance for groups of plants (within approx. 25 m radius) that were too numerous to accurately count, or in cases where plants could not be safely accessed.

Representative photographs were taken of all significant species encountered. Representative specimens of all significant species were collected and included a record of reproductive state (vegetative, flowering, fruiting), landform, soil, surface geology, associated dominant species, vegetation condition, and fire history.

### 3.4 SPECIMEN IDENTIFICATION

Specimen identification was undertaken by plant identification specialist Dr Andrew Craigie with reference to current taxonomic literature and herbarium reference specimens. Scientific names used in this report follow the species concepts currently adopted by the Western Australian Herbarium.

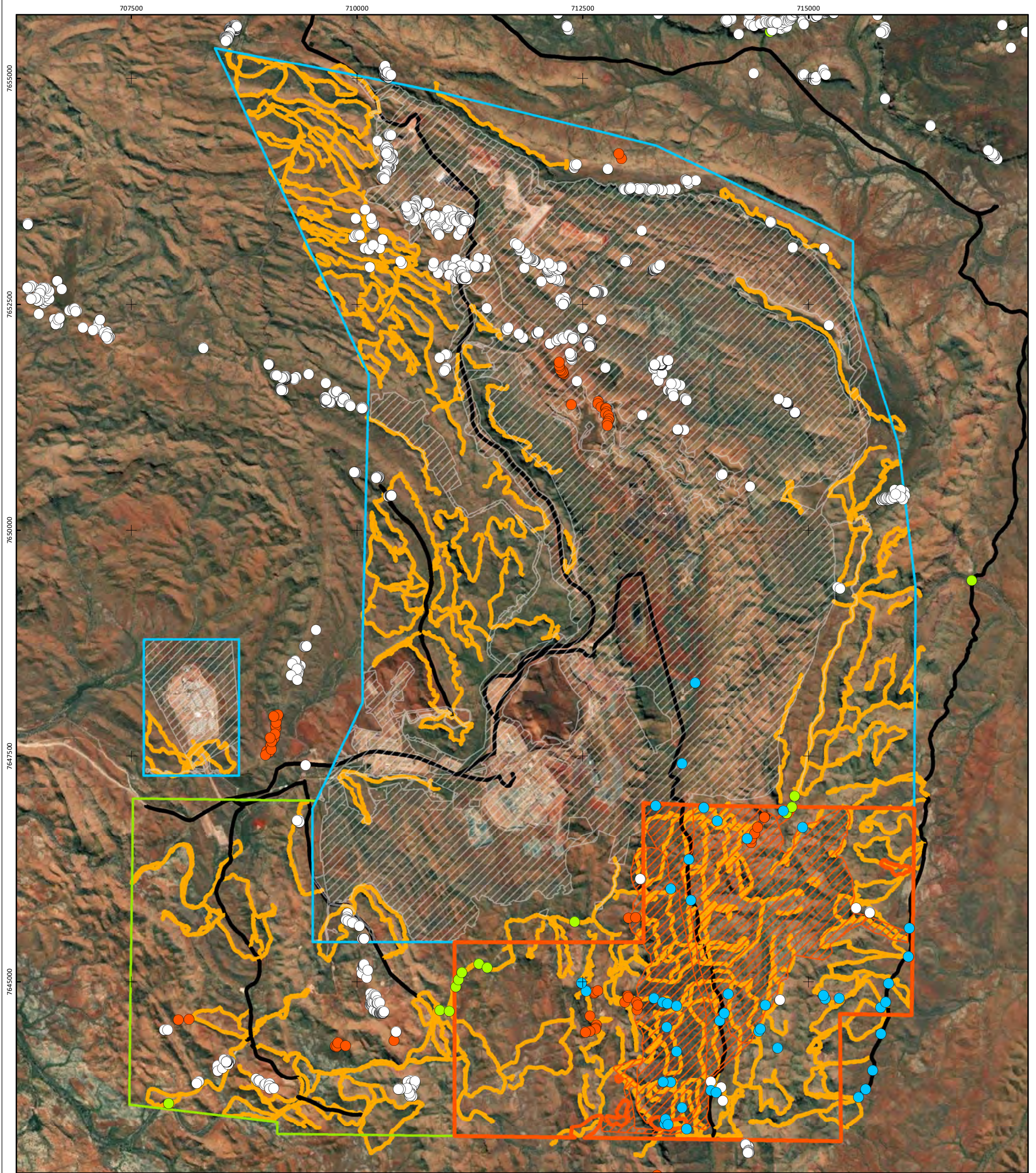
### 3.5 STUDY TEAM AND LICENCES

The assessment was undertaken by those summarised in Table 13.

**Table 13: Project staff and licences.**

Project staff				
Name	Qualification	Role	Project role	Experience
Shaun Grein	B.App. Sc (Biol.); Grad. Dip. Nat. Resources; MBA	Managing Director/Senior Principal Scientist	Project management, QA	30+
Andrew Craigie	B.Sc (Hons.) (Botany); PhD (Botany)	Principal Botanist	Field survey, specimen identification, data analysis, reporting	15+
Rob Sellers	B.Sc (Cons. Biol. and Mngment)	Senior Botanist	Field survey	8+
Sam Hall	B.Sc. (Hons.) (Botany and Cons. Biol.)	Level 1 Botanist	Field survey	5+
Licences				
Rob Sellers	Flora Taking (Biological Assessment) Licence: FB62000198-2 (exp. 30/03/2026)			
Andrew Craigie	Flora Taking (Biological Assessment) Licence: FB62000135-2 (exp. 30/04/2025); Authorisation to Take or Disturb Threatened Species: TFL 2223-0145 (exp. 30/04/2026)			
Sam Hall	Flora Taking (Biological Assessment) Licence: FB62000450 (exp. 3/07/2025)			





- |                                  |                   |   |
|----------------------------------|-------------------|---|
| North Star Extension             | <b>Tracks</b>     | <b>Existing significant species record</b>            |
| Indicative Disturbance Footprint | Driven road/track | <i>Ptilotus mollis</i>                                |
| Mine Development Envelope        | Walked transect   | <i>Quoya zonalis</i>                                  |
| Mining Proposal Footprint        |                   | <i>Themeda</i> sp. Panorama (J. Nelson et al. NS 102) |
| Western Addition (M45/1244)      |                   | <i>Triodia basitricha</i>                             |





## 4 RESULTS & DISCUSSION

### 4.1 TARGETED FLORA SURVEY

The targeted survey was conducted by three botanists over two eight-day periods from 3–10 April and 1–8 May 2023. The survey was completed in accordance with the *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA 2016b). Most areas that were identified as potential suitable habitat for the target species (primarily rocky ridges, adjacent rocky slopes, and creeks), as well as representative areas of all the major landforms and habitats, were systematically surveyed (Map 12). Approximately 360 km of walked transects were completed. Seasonal conditions were suitable for detecting the target species during searches. Although some relatively recent fires had affected parts of the survey area, mostly along the eastern border of the MDE, these areas had regenerated sufficiently to be able to determine the presence of the target species. The overall level of survey effort is sufficient to quantify the distribution and abundance of significant plant species within the previously unsurveyed parts of the MDE and NSE.

All four target species were recorded within the survey area, and no other EPBC Act or BC Act listed Threatened species or DBCA listed Priority species were recorded. Two species that in the desktop assessment were assessed with a ‘moderate’ likelihood of occurrence within the survey area (*Euphorbia clementii* (P3) and *Eragrostis crateriformis* (P3)), were downgraded to a ‘low’ likelihood of occurrence following the survey as the area has now been adequately surveyed and they were not recorded.

The numbers provided in sections 4.1.1 to 4.1.4 represent individuals recorded during the current survey (excluding previous records). For a summary of all available records of target species within and outside the survey area see section 4.2.

#### 4.1.1 *Quoya zonalis* (T)

A total of 2,762 individuals (260 records) of *Quoya zonalis* (Figure 2) were recorded during the survey: seven (two records) within the NSE; 2,747 (255 records) within the MDE; five (one record) within the Western Addition area; and three (two records) just outside of the survey area (Table 14, Map 13). Within the NSE Indicative Disturbance Footprint, only one additional individual was recorded from an existing location.

Most *Q. zonalis* records from this survey were from the northern and western parts of the MDE (Map 13), where it is often locally abundant on rocky ridges or adjacent slopes among outcrops. It becomes much less frequent in the southern part of the MDE and in the whole of the NSE, where it occurs only in isolated patches of few plants (ca. 1 – 10 individuals). Some larger groups of plants have been recorded in the Western Addition in the past (Map 13), but no notable populations were observed within this area during this survey.

The preferred habitats of *Q. zonalis* are well documented (Section 2.10.2) and all records from this survey occurred within the typical habitat. Based on the current distribution and known habitat preferences of *Q. zonalis*, it is highly likely that additional populations occur immediately to the west of the MDE within the Capricorn land system.

#### 4.1.2 *Themeda* sp. Panorama (J. Nelson et al. NS 102) (P1)

A total of 12,583 individuals (626 records) of *Themeda* sp. Panorama (J. Nelson et al. NS 102) were recorded during the survey: 169 (35 records) within the NSE; 10,998 (517 records) within the MDE; 1,133 (67 records) within the Western Addition; and 283 (seven records) recorded opportunistically along an access track outside of the survey area (Table 14, Map 14). Most plants were either fully vegetative or in a late fruiting stage during both surveys (Figure 2). Some plants were observed to be regenerating after a recent fire that had occurred in part of the south-eastern section of the MDE (Figure 3).

*Themeda* sp. Panorama (J. Nelson et al. NS 102) was recorded primarily from the sandy-loam banks of major stony creeks and less frequently from sheltered gullies and steep rocky slopes with shallow soil. In the creek habitats it was usually a dominant component of the understorey and frequently associated with the following species: *Eucalyptus camaldulensis*, *Eucalyptus victrix*, *Corymbia hamersleyana*, *Acacia pyrifolia*, *Acacia tumida* var. *pilbarensis*, *Grevillea wickhamii*, *Gossypium robinsonii*, *Petalostylis labicheoides*, *Stemodia grossa*, *Arivela viscosa*, *Themeda triandra*, *Cymbopogon ambiguus*, *Triodia epactia*, *Triodia longiceps*, and *Triodia wiseana*. In gullies and steep rocky slope habitats it was often associated with the following species: *Eucalyptus leucophloia* subsp. *leucophloia*, *Corymbia ferriticola*, *Acacia tumida* var. *pilbarensis*, *Acacia pruinocarpa*, *Terminalia circumalata*, *Eriachne mucronata*, *Cymbopogon ambiguus*, *Triodia basitricha*, and *Triodia wiseana*.

Within the NSE Indicative Disturbance Footprint, it was only recorded from two of the larger gorges along the western border and from one creek along the northern border (Map 14). There is little additional suitable habitat for *T. sp. Panorama* (J. Nelson et al. NS 102) within the Indicative Disturbance Footprint, and within the few potentially suitable areas that were surveyed it was not recorded.

Most *T. sp. Panorama* (J. Nelson et al. NS 102) records from the survey (accounting for over 70% of known individuals) were from major creeks in the southeast of the MDE and in the east of the Western Addition (Map 14). These populations are likely to extend along the same creeks to the east of the MDE and to a lesser extent into the Mining Proposal Footprint, but it is apparently absent from most associated tributaries. Two isolated occurrences were recorded from similar habitats in the western section of the MDE (two plants) and northern section of the MDE (three plants) (Map 14). The ecology of this species is largely unknown, but given its preference for major drainage channels, it is potentially reliant on surface water flows.

#### **Descriptive information for *Themeda* sp. Panorama (J. Nelson et al. NS 102)**

There is currently no descriptive information available for *Themeda* sp. Panorama (J. Nelson et al. NS 102), so a basic morphological description based on the material collected during this survey is as follows: robust perennial grass forming dense tussocks to approximately 1 m high, the culms extending to approximately 2 m high; leaf blades green to greyish-green, minutely scabrous, with strigose margins and the central portion thickened and adaxially white; leaf sheaths paler than the blades and usually densely white-villous at the base; culms more or less erect with loose pedicellate clusters of spikelets; spikelet clusters with approximately four subsessile involucre spikelets (male or sterile) and two pedicellate spikelets (male or sterile) subtending a solitary fertile spikelet; involucre spikelets approximately 15 mm long; fertile spikelets 1-awned at the apex, with short appressed ferruginous hairs on the body; awns approximately 40–50 mm long, once-bent at maturity, puberulent to scabrous, with a twisted column. Mature fertile spikelets have been observed in April and early May. The fertile spikelets appear to fall after maturity, but the involucre spikelets persist longer.

*Themeda* sp. Panorama (J. Nelson et al. NS 102) is morphologically similar to *Themeda avenacea* and the fruiting specimens key broadly to this species using AusGrass2 (Simon 2013), except that the involucre spikelets are shorter (ca. 15 mm long, compared to 19 – 28 mm long in *T. avenacea*), the awns do not appear to much exceed 50 mm long (40 – 100 mm long in *T. avenacea*), and the ligule is a fringe of long soft hairs (membranous in *T. avenacea*).

#### **4.1.3 *Triodia basitricha* (P3)**

A total of 215,555 individuals (304 records) of *Triodia basitricha* were recorded: 65,500 (184 records) within the NSE; 138,055 (109 records) within the MDE; and 12,000 (11 records) recorded opportunistically along access tracks outside of the survey area (Table 14, Map 15). Plants were mostly in a late fruiting stage during both surveys (Figure 3). *Triodia basitricha* is widespread and abundant over most of the NSE and MDE (Map 15), where it is usually a dominant component of plant communities occurring on rocky slopes and ridges. It is occasionally the dominant *Triodia* species where it occurs but is more commonly co-dominant with *T. wiseana*. Suitable habitat for this species is present immediately outside of the MDE and



NSE, and is also common in the region more generally. In addition, older records of *Triodia bitextura* (e.g., Ecologia (2012a)) in this area that predate the formal recognition of *Triodia basitricha* in 2015 are likely to represent *T. basitricha*.

#### 4.1.4 *Ptilotus mollis* (P4)

A total of 1,190 individuals (46 records) of *Ptilotus mollis* were recorded: 867 (30 records) within the NSE; 307 (15 records) within the MDE; and 16 (one record) within the Western Addition (Table 14, Map 16). There were no fertile plants observed during either survey (Figure 3). *Ptilotus mollis* was recorded primarily from two locations during this survey: in the central western section of the MDE, and from the central-western section of the NSE (Map 16). It was recorded from a single location within the Western Addition. At these locations it typically occurs on steep scree slopes, and very occasionally from stony creeks. Suitable habitat for this species is also present immediately outside of the MDE and NSE.

**Table 14: Number of individuals and records from the current survey.**

Taxon	Number of individuals (number of records) from the current survey				
	NSE	MDE	Western Addition	Outside survey area	Total
<i>Quoya zonalis</i> (T)	7 (2)	2,747 (255)	5 (1)	3 (2)	2,762 (260)
<i>Themeda</i> sp. Panorama (J. Nelson et al. NS 102) (P1)	169 (35)	10,998 (517)	1,133 (67)	283 (7)	12,583 (626)
<i>Triodia basitricha</i> (P3)	65,500 (184)	138,055 (109)	–	12,000 (11)	215,555 (304)
<i>Ptilotus mollis</i> (P4)	867 (30)	307 (15)	16 (1)	–	1,190 (46)

## 4.2 SUMMARY OF TARGET SPECIES ABUNDANCE

The abundance estimate for each of the target species across Western Australia is presented below against the individuals recorded within the existing Mining Proposal Footprint (approved), and the proposed NSE Indicative Disturbance Footprint (Table 15).

**Table 15: Summary of target species abundance and number of records.**

Taxon	Total abundance estimate (number of records) <sup>1</sup>	Individuals within MDE Mining Proposal Footprint (% of total)	Individuals within NSE Indicative Disturbance Footprint (% of total)	Individuals outside of Indicative Disturbance Footprint and Mining Proposal Footprint (% of total)
<i>Quoya zonalis</i> (T)	20,463 (5,761)	2,172 (10.61%)	3 (0.01%)	18,288 (89.37%)
<i>Themeda</i> sp. Panorama (J. Nelson et al. NS 102) (P1)	15,496 (643)	4,570 (29.49%)	555 (3.58%)	10,371 (66.93%)
<i>Triodia basitricha</i> (P3)	1,231,052 (466) <sup>2</sup>	16,000 (1.3%)	59,583 (4.84%)	1,155,469 (93.86%)
<i>Ptilotus mollis</i> (P4)	8,412 (347)	315 (3.74%)	188 (2.23%)	7,909 (94.02%)

<sup>1</sup>Includes abundance estimates from state-wide records outlined in section 2.1 and records from the current survey.

<sup>2</sup>Total estimated abundance for *T. basitricha* includes the extrapolated estimate of 836,000 individuals for the Eliwana MSA and RSA (Biota 2018). This value therefore excludes the abundance estimates of 18 *T. basitricha* point records from Fortescue's Significant Flora Database recorded by Biota in 2017 within the Eliwana MSA and RSA (est. 10,011 individuals).

The numbers of individuals of each target species within the NSE Indicative Disturbance Footprint are:

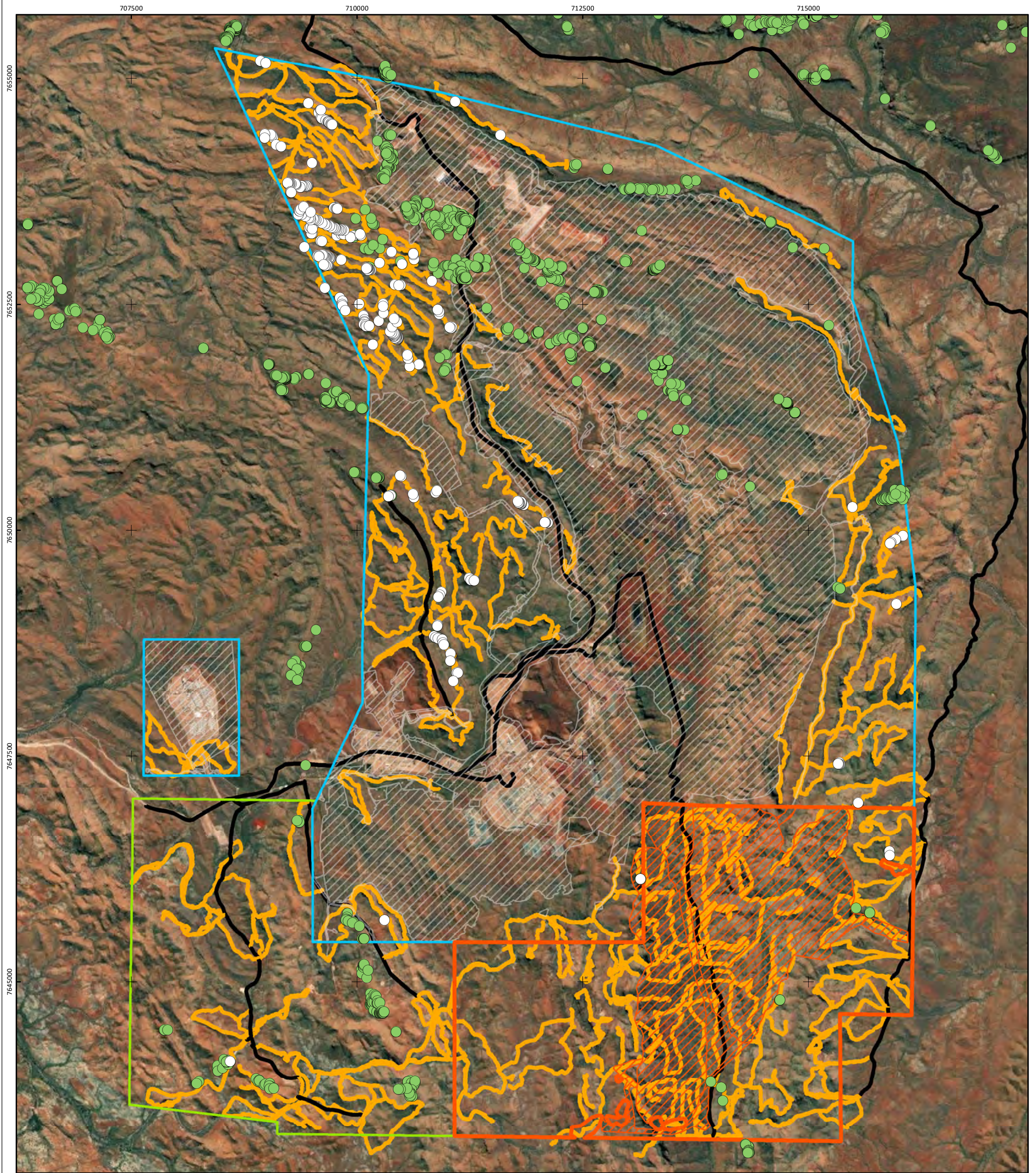
- Three individuals of *Quoya zonalis*, representing 0.01% of recorded individuals in Western Australia (note that these individuals occur within the indicative disturbance footprint but outside of the NSE).
- 555 individuals of *Themeda* sp. Panorama (J. Nelson et al. NS 102), representing 3.58% of the recorded individuals in Western Australia.

- 59,583 individuals of *Triodia basitricha*, representing 4.84% of the recorded individuals in Western Australia.
- 188 individuals of *Ptilotus mollis*, representing 2.23% of the recorded individuals in Western Australia.

The relative abundance of *Q. zonalis*, *T. sp.* Panorama (J. Nelson et al. NS 102) and *P. mollis* within the Indicative Disturbance Footprint is low compared to the known total abundance of these species. Furthermore, the actual percentage of total abundance of these taxa is likely to be lower than indicated, because additional populations are likely to occur in suitable habitat that surrounds the MDE, NSE, and Western Addition.

The relative abundance of *T. basitricha* within the Indicative Disturbance Footprint was comparatively higher than the other species; however, as far as can be determined from the available data, there have been few systematic surveys targeting this species in the Pilbara. Given *T. basitricha* is widespread across much of the Pilbara, and because it is often a dominant component of the communities in which it occurs, it is likely the abundance estimate used here is a significant underestimate of actual population size. Based on the currently known distribution and habitat preferences of *T. basitricha*, additional populations are likely to occur within the Capricorn and Rocklea land systems surrounding MDE and NSE.



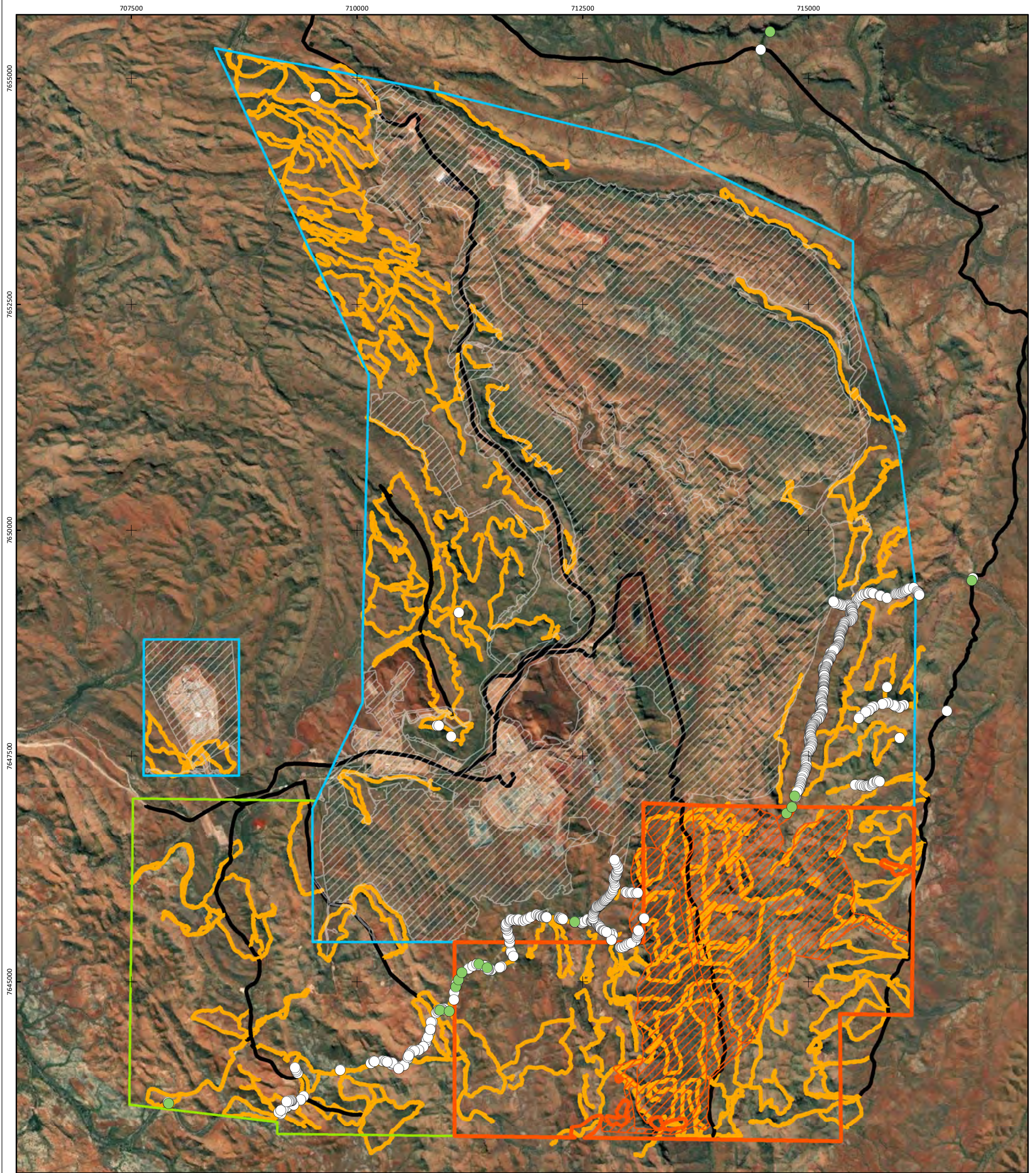


- |                                  |                   |  |
|----------------------------------|-------------------|--|
| North Star Extension             | <b>Tracks</b>     | <b>Species records</b>                 |
| Indicative Disturbance Footprint | Driven road/track | <i>Quoya zonalis</i> (existing record) |
| Mine Development Envelope        | Walked transect   | <i>Quoya zonalis</i> (current survey)  |
| Mining Proposal Footprint        |                   |  |
| Western Addition (M45_1244)      |                   |  |

**Map 13:** Locations of *Quoya zonalis* within the survey area.







- |                                  |                   |   |
|----------------------------------|-------------------|---|
| North Star Extension             | <b>Tracks</b>     | <b>Species records</b>  |
| Indivative Disturbance Footprint | Driven road/track | <i>Themeda</i> sp. Panorama (J. Nelson et al. NS 102) (existing record) |
| Mine Development Envelope        | Walked transect   | <i>Themeda</i> sp. Panorama (J. Nelson et al. NS 102) (current survey)  |
| Mining Proposal Footprint        |                   |   |
| Western Addition (M45/1244)      |                   |   |





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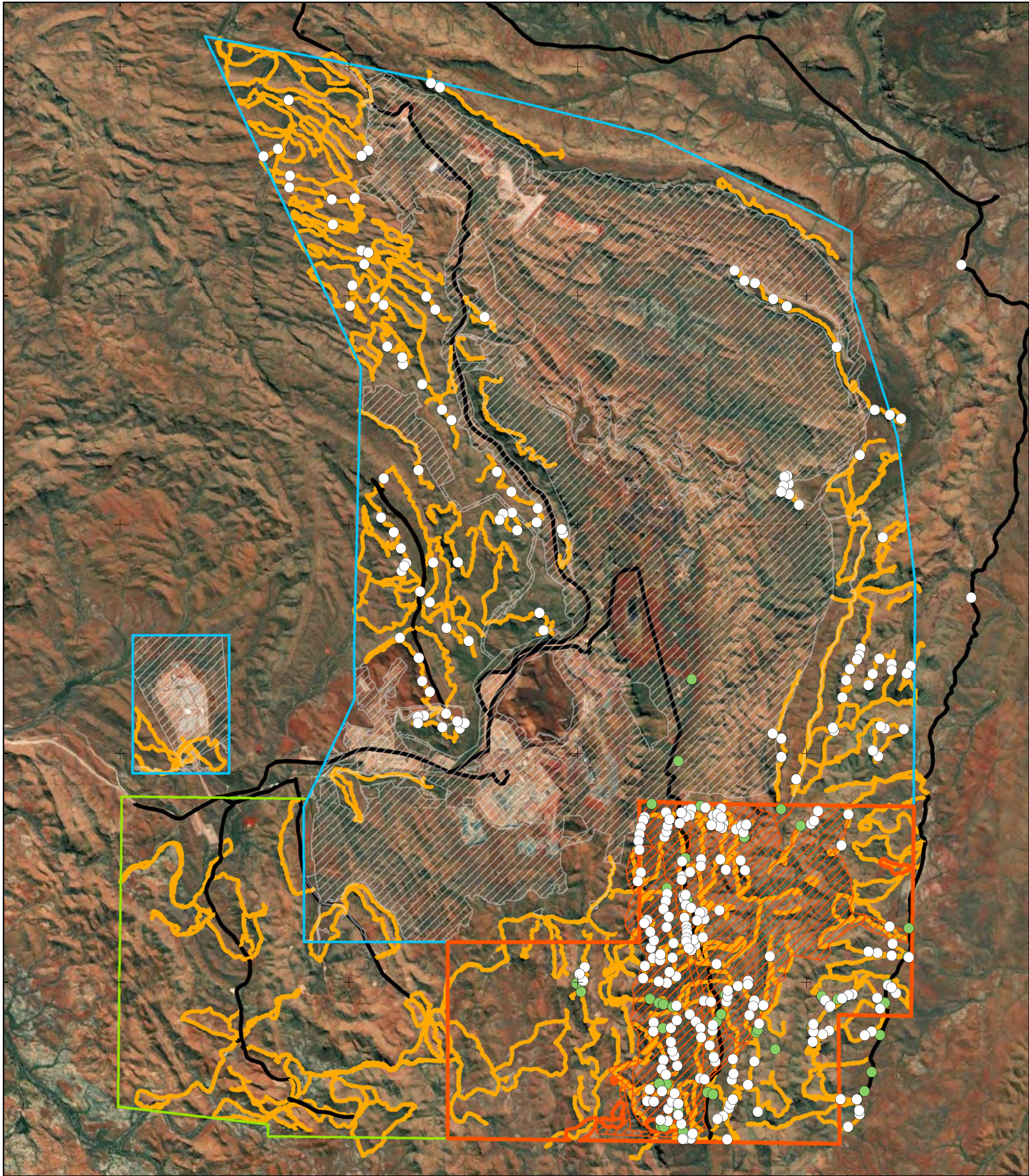
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|----------------------------------|-------------------|---|
| North Star Extension             | <b>Tracks</b>     | <b>Species records</b>                      |
| Indicative Disturbance Footprint | Driven road/track | <i>Triodia basitricha</i> (current survey)  |
| Mine Development Envelope        | Walked transect   | <i>Triodia basitricha</i> (existing record) |
| Western Addition (M45/1244)      |                   |   |
| Mining Proposal Footprint        |                   |   |



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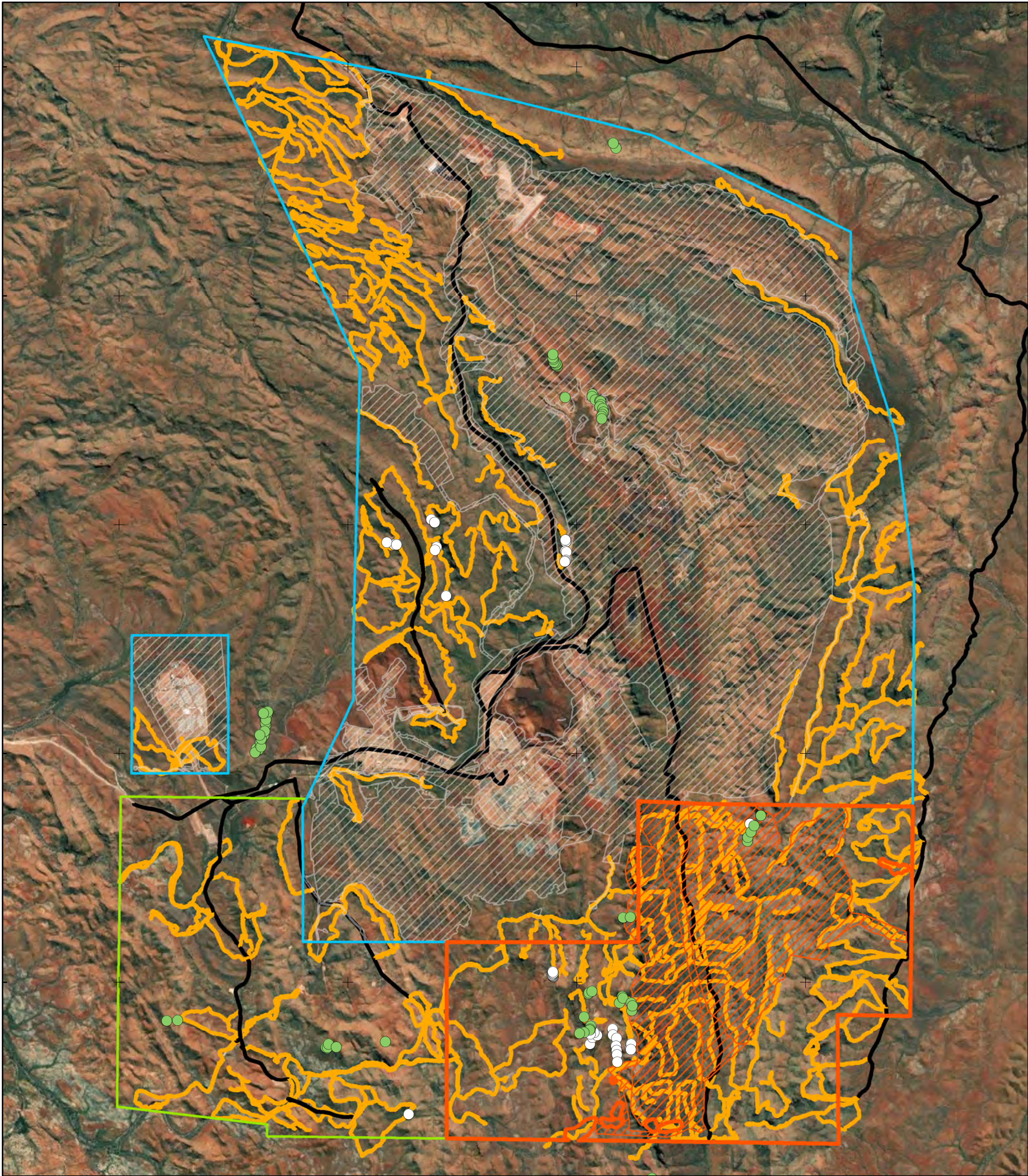
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|----------------------------------|-------------------|--|
| North Star Extension             | <b>Tracks</b>     | <b>Species records</b>                   |
| Indicative Disturbance Footprint | Driven road/track | <i>Ptilotus mollis</i> (existing record) |
| Mine Development Envelope        | Walked transect   | <i>Ptilotus mollis</i> (current survey)  |
| Mining Proposal Footprint        |                   |  |
| Western Addition (M45/1244)      |                   |  |





**Figure 2: Photographs of significant species recorded within the survey area - 1.**

A - B. *Quoya zonalis*. C. *Themeda* sp. Panorama (J. Nelson et al. NS 102) dominant in stony creek. D. *Themeda* sp. Panorama (J. Nelson et al. NS 102) on rocky slope. E. *Themeda* sp. Panorama (J. Nelson et al. NS 102) late fruiting inflorescence.





**Figure 3: Photographs of significant species recorded within the survey area - 2.**

A *Themeda* sp. Panorama (J. Nelson et al. NS 102) post-fire regeneration. B - C. *Ptilotus mollis*. D. *Triodia basitricha*.



### 4.3 SURVEY LIMITATIONS AND CONSTRAINTS

An assessment of survey-specific issues and limitations is detailed in Table 16. There were no significant limitations identified for the survey.

**Table 16: Flora and vegetation survey limitations.**

Aspect	Assessment	Constraint
Availability of contextual information at a regional and local scale	Vegetation, land system, soil, and geology mapping data were available for the survey area, in addition to FMG and DBCA Threatened and Priority species spatial data. This information was adequate to provide appropriate contextual information for the survey.	Nil
Competency/experience of the team carrying out the survey, including experience in the bioregion surveyed	The personnel undertaking field work and specimen identification were suitably qualified and have conducted numerous botanical surveys within the Eremaean botanical province. Key personnel leading the field survey and undertaking specimen identification, data analysis, and reporting have over 10 years' experience with flora and vegetation surveys in the Pilbara region, including targeted surveys for <i>Quoya zonalis</i> .	Nil
Proportion of flora recorded and/or collected, any identification issues	Representative specimens of all taxa recorded in the field were collected for confirmation. Sufficient material was available for confident identification to species level.	Nil
Was the appropriate area fully surveyed (effort and extent)	Most areas of suitable habitat for the target species within the survey area were surveyed. The appropriate area was sufficiently surveyed.	Nil
Access restrictions within the survey area	There were no access restrictions. A helicopter was used to access more remote parts of the survey area.	Nil
Survey timing, rainfall, season of survey	The first surveys were conducted in April and May 2023 during the primary survey season for flora and vegetation surveys in the Eremaean botanical province. Seasonal conditions were adequate for a targeted flora and vegetation survey for the target species. Even though the survey occurred outside of the flowering periods of some of the significant species identified from the desktop assessment, this is unlikely to have had any impact on detecting of these species in the field. Except for the significant species recorded, there were no other species observed during the survey that bore any resemblance (flowering or otherwise) to the other significant species identified from the desktop assessment.	Nil
Disturbance that may have affected the results of survey such as fire, flood or clearing	No significant limitations identified. Grazing disturbance was negligible in most cases and did not affect the interpretation of survey results. A small section of the south-eastern MDE had been affected by relatively recent fire (within the last year), but regeneration of vegetation in the area was sufficient to detect the target species.	Nil

## 5 CONCLUSIONS

The key findings of the NSE targeted flora survey are:

- A total of 2,762 individuals (260 records) of *Quoya zonalis* were recorded: seven (two records) within the NSE; 2,747 (255 records) within the MDE; five (one record) within the Western Addition area; and three (two records) outside of the survey area.
- A total of 12,583 individuals (626 records) of *Themeda* sp. Panorama (J. Nelson et al. NS 102) were recorded during the survey: 169 (35 records) within the NSE; 10,998 (517 records) within the MDE; 1,133 (67 records) within the Western Addition; and 283 (seven records) outside of the survey area.
- A total of 215,555 individuals (304 records) of *Triodia basitricha* were recorded: 65,500 (184 records) within the NSE; 138,055 (109 records) within the MDE; and 12,000 (11 records) outside of the survey area.
- A total of 1,190 individuals (46 records) of *Ptilotus mollis* were recorded: 867 (30 records) within the NSE; 307 (15 records) within the MDE; and 16 (one record) within the Western Addition.
- No other EPBC Act or BC Act listed Threatened species or DBCA listed Priority species were recorded within the survey area.
- The percentage of the total known population of *Quoya zonalis* (0.01%), *Themeda* sp. Panorama (J. Nelson et al. NS 102) (3.58%), and *Ptilotus mollis* (2.23%) within the NSE Indicative Disturbance Footprint is relatively low.
- The percentage of the total known population of *Triodia basitricha* within the NSE Indicative Disturbance Footprint is 4.84%; however, the total state-wide abundance for this species is likely to be a considerable underestimate, and the actual percentage impact is likely to be substantially lower.

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## 7 APPENDICES

**Appendix A WAHERB and TPFL database search results.**



PopId	Taxon	ConsStatus	WARank	PopNumber	Gda94Lat	Gda94Long	CountDate	MatCount	JuvCount	SeedCount	LiveTotal
95486	Acacia leeuweniana		1	1	-21.504778	119.417972	20/05/1982				0
95487	Acacia leeuweniana		1	2	-21.364222	118.713556	27/10/1988				0
92998	Acacia levata		3	1	-21.409444	119.561389	20/05/1982				0
92999	Acacia levata		3	2	-21.505278	119.414444	17/10/1983				0
93000	Acacia levata		3	3	-21.765	119.219722	1/11/1995				0
93001	Acacia levata		3	4	-21.391389	119.560278	17/10/1983				0
93002	Acacia levata		3	5	-21.364222	118.563556	29/05/2004				0
84445	Bulbostylis burbridgeae		4	1	-21.623889	119.041667	15/03/1988				0
84446	Bulbostylis burbridgeae		4	2	-21.938611	119.258611	2/08/1996				0
84447	Bulbostylis burbridgeae		4	3	-20.876056	119.007111	27/08/1997				0
84448	Bulbostylis burbridgeae		4	4	-20.909222	118.673	15/05/2006				0
87203	Euphorbia clementii		3	3	-21.121806	118.63925	15/05/2001				0
87204	Euphorbia clementii		3	4	-21.145278	118.66325	15/05/2001				0
87205	Euphorbia clementii		3	5	-21.15925	118.675611	15/05/2001				0
90519	Gymnanthera cunninghamii		3	7	-21.233333	118.793056	7/05/2006				4
94145	Indigofera gilesii		3	2	-22.116551	118.787401	9/06/1997				0
109605	Quooya zonalis	T	EN	1	-21.137833	119.12775	30/08/2010		27		0
109606	Quooya zonalis	T	EN	2	-21.187969	119.062278	19/09/2015		1036		0
109649	Quooya zonalis	T	EN	3	-21.147028	119.095694	29/05/2013		11		0
109650	Quooya zonalis	T	EN	4	-21.125778	119.218806	31/05/2013		10		0
109651	Quooya zonalis	T	EN	5	-21.145722	119.109889	28/05/2010		6		0
109789	Quooya zonalis	T	EN	6	-21.204162	118.96139	23/04/2012		115		0
109790	Quooya zonalis	T	EN	7	-21.24569	118.979116	17/08/2011		1		0
109791	Quooya zonalis	T	EN	8	-21.221464	119.006918	17/08/2011		1		0
109792	Quooya zonalis	T	EN	9	-21.167391	119.024568	17/08/2011		25		0
109829	Quooya zonalis	T	EN	10	-21.177153	119.02537	17/08/2011		176		0
109830	Quooya zonalis	T	EN	11	-21.185791	119.02504	17/08/2011		26		0
109831	Quooya zonalis	T	EN	12	-21.188818	119.045188	21/09/2015		3036		0
109832	Quooya zonalis	T	EN	13	-21.193387	119.070442	17/08/2011		12		0
109833	Quooya zonalis	T	EN	14	-21.216165	119.045073	17/08/2011		80		0
109834	Quooya zonalis	T	EN	15	-21.223367	119.055893	17/08/2011		55		0
109835	Quooya zonalis	T	EN	16	-21.244661	119.075156	17/08/2011		7		0
109836	Quooya zonalis	T	EN	17	-21.277011	119.07875	21/04/2012		1		0
109837	Quooya zonalis	T	EN	18	-21.285896	119.069287	17/08/2011		2		0
109838	Quooya zonalis	T	EN	19	-21.201002	119.09082	17/08/2011		27		0
109839	Quooya zonalis	T	EN	20	-21.198667	119.099184	17/08/2011		9		0
109840	Quooya zonalis	T	EN	21	-21.19045	119.092617	3/06/2015		31		0
109841	Quooya zonalis	T	EN	22	-21.182078	119.106422	17/08/2011		1		0
109842	Quooya zonalis	T	EN	23	-21.182241	119.125875	17/08/2011		1		0
109843	Quooya zonalis	T	EN	24	-21.148484	119.114274	17/04/2012		2		0
109844	Quooya zonalis	T	EN	25	-21.130519	119.134665	17/04/2012		2		0
109849	Quooya zonalis	T	EN	26	-21.15354	119.215291	22/04/2012		31		0
109850	Quooya zonalis	T	EN	27	-21.158842	119.215938	20/04/2012		3		0
109851	Quooya zonalis	T	EN	28	-21.158496	119.25032	28/05/2013		6		0
109852	Quooya zonalis	T	EN	29	-21.147685	119.2341	29/05/2013		19		0
109853	Quooya zonalis	T	EN	30	-21.142197	119.24552	19/04/2012		438		0
109854	Quooya zonalis	T	EN	31	-21.125266	119.231117	18/04/2012		16		0
109855	Quooya zonalis	T	EN	32	-21.119592	119.240897	28/05/2013		30		0
109856	Quooya zonalis	T	EN	33	-21.115213	119.255796	28/05/2013		1		0
109857	Quooya zonalis	T	EN	34	-21.109089	119.253231	28/05/2013		38		0
109858	Quooya zonalis	T	EN	35	-21.114034	119.222066	28/05/2013		31		0
109859	Quooya zonalis	T	EN	36	-21.08445	119.211032	17/08/2011		3		0
109861	Quooya zonalis	T	EN	38	-21.166708	119.101304	25/09/2015		236		0
109862	Quooya zonalis	T	EN	39	-21.156902	119.090941	3/06/2015		27		0
109863	Quooya zonalis	T	EN	40	-21.172316	119.071333	4/06/2015		361		0
109864	Quooya zonalis	T	EN	41	-21.154257	119.071775	4/06/2015		7		0
110329	Quooya zonalis	T	EN	42	-21.196792	118.953675	26/09/2015		1		0
110330	Quooya zonalis	T	EN	43	-21.214097	118.961406	26/09/2015				400
110331	Quooya zonalis	T	EN	44	-21.216683	118.990421	24/09/2015				411
110332	Quooya zonalis	T	EN	45	-21.209288	118.98803	24/09/2015				9
110333	Quooya zonalis	T	EN	46	-21.174395	119.018915	17/09/2015				118
110334	Quooya zonalis	T	EN	47	-21.186052	119.016829	22/09/2015				6
110335	Quooya zonalis	T	EN	48	-21.223314	119.03267	16/09/2015				36
110336	Quooya zonalis	T	EN	49	-21.207701	119.028815	23/09/2015				1047
110337	Quooya zonalis	T	EN	50	-21.178913	119.033776	17/09/2015				220
110338	Quooya zonalis	T	EN	51	-21.204976	119.053953	27/09/2015				198
110349	Quooya zonalis	T	EN	52	-21.235181	119.08085	22/09/2015		173		0
110350	Quooya zonalis	T	EN	53	-21.195654	119.079275	26/09/2015		6		0
110351	Quooya zonalis	T	EN	54	-21.198294	119.084147	26/09/2015		4		0
110352	Quooya zonalis	T	EN	55	-21.198294	119.084147	26/09/2015		4		0
110353	Quooya zonalis	T	EN	56	-21.210616	119.269396	18/09/2015		20		0
110354	Quooya zonalis	T	EN	57	-21.18536	119.277377	18/09/2015		30		0
110355	Quooya zonalis	T	EN	58	-21.179429	119.28055	18/09/2015				0
110356	Quooya zonalis	T	EN	59	-21.160876	119.268868	18/09/2015		10		0
110357	Quooya zonalis	T	EN	60	-21.16071	119.281881	18/09/2015				0
110358	Quooya zonalis	T	EN	61	-21.162056	119.289198	18/09/2015		2		0
110369	Quooya zonalis	T	EN	62	-21.150875	119.27194	18/09/2015		47		0
110370	Quooya zonalis	T	EN	63	-21.149361	119.287116	18/09/2015		200		0
110371	Quooya zonalis	T	EN	64	-21.152001	119.296167	18/09/2015		3		0
110372	Quooya zonalis	T	EN	65	-21.140723	119.290151	18/09/2015		58		0
110373	Quooya zonalis	T	EN	66	-21.129062	119.301049	18/09/2015				0
110374	Quooya zonalis	T	EN	67	-21.124716	119.2785	18/09/2015		7		0
110375	Quooya zonalis	T	EN	68	-21.121618	119.283264	18/09/2015		3		0
110376	Quooya zonalis	T	EN	69	-21.112278	119.298182	18/09/2015		144		0
110377	Quooya zonalis	T	EN	70	-21.114537	119.306695	18/09/2015		5		0
110378	Quooya zonalis	T	EN	71	-21.102117	119.299017	18/09/2015		9		0
112029	Quooya zonalis	T	EN	72	-21.250556	118.972778	16/09/2016		5	3	0

Sheet	Taxon	Cons_Code	Latitude	Longitude	Date
	8575185 Abutilon sp. Pritzelianum (S. van Leeuwen 5095)	3	-20.616389	118.660833	19/04/2011
	8559082 Abutilon sp. Pritzelianum (S. van Leeuwen 5095)	3	-20.855894	118.548121	10/05/2013
	8561966 Abutilon sp. Pritzelianum (S. van Leeuwen 5095)	3	-20.575694	118.513333	17/07/2013
	8767211 Abutilon sp. Pritzelianum (S. van Leeuwen 5095)	3	-20.585153	118.574055	24/03/2011
	8955883 Abutilon sp. Pritzelianum (S. van Leeuwen 5095)	3	-20.519139	118.494778	2/05/2011
	8955891 Abutilon sp. Pritzelianum (S. van Leeuwen 5095)	3	-20.519944	118.495167	2/05/2011
	8955905 Abutilon sp. Pritzelianum (S. van Leeuwen 5095)	3	-20.598861	118.587	30/06/2011
	8974578 Abutilon sp. Pritzelianum (S. van Leeuwen 5095)	3	-20.610385	118.5848	2/07/2015
	8973822 Abutilon sp. Pritzelianum (S. van Leeuwen 5095)	3	-20.695127	118.653127	21/04/2015
	8955867 Abutilon sp. Pritzelianum (S. van Leeuwen 5095)	3	-20.545806	118.508583	24/06/2011
	5540798 Abutilon sp. Pritzelianum (S. van Leeuwen 5095)	3	-20.716111	118.684722	27/08/1997
	8647143 Abutilon sp. Pritzelianum (S. van Leeuwen 5095)	3	-20.6243	118.673508	7/06/2011
	8710317 Abutilon sp. Pritzelianum (S. van Leeuwen 5095)	3	-20.611528	118.557806	2/08/2010
	8710309 Abutilon sp. Pritzelianum (S. van Leeuwen 5095)	3	-20.653778	118.586278	30/08/2010
	8672245 Abutilon sp. Pritzelianum (S. van Leeuwen 5095)	3	-22.1061	119.01135	29/04/2012
	8768005 Abutilon sp. Pritzelianum (S. van Leeuwen 5095)	3	-20.584051	118.578043	24/03/2011
	8955735 Abutilon sp. Pritzelianum (S. van Leeuwen 5095)	3	-20.557389	118.589722	27/06/2011
	8767203 Abutilon sp. Pritzelianum (S. van Leeuwen 5095)	3	-20.652248	118.582585	25/03/2011
	8766983 Abutilon sp. Pritzelianum (S. van Leeuwen 5095)	3	-20.581581	118.577538	24/03/2011
	8766916 Abutilon sp. Pritzelianum (S. van Leeuwen 5095)	3	-20.744004	118.603627	7/04/2011
	9211179 Abutilon sp. Pritzelianum (S. van Leeuwen 5095)	3	-20.560833	118.484167	23/08/2004
	9441549 Abutilon sp. Pritzelianum (S. van Leeuwen 5095)	3	-20.538681	118.476064	23/05/2019
	8511616 Acacia cyperophylla var. omearana	1	-21.703253	119.811754	24/07/2013
	5234808 Acacia cyperophylla var. omearana	1	-20.879444	119.509722	23/08/1997
	5639573 Acacia leeuweniana	1	-21.507264	119.421615	18/07/2000
	7298609 Acacia leeuweniana	1	-21.361111	118.701111	9/09/2004
	8925682 Acacia leeuweniana	1	-21.282058	118.79046	5/12/2010
	990973 Acacia leeuweniana	1	-21.366667	118.7	27/10/1988
	7854722 Acacia leeuweniana	1	-21.516667	119.416667	20/05/1982
	164283 Acacia leeuweniana	1	-21.516667	119.416667	27/06/1981
	164305 Acacia leeuweniana	1	-21.516667	119.416667	27/06/1981
	165263 Acacia leeuweniana	1	-21.516667	119.416667	27/06/1981
	164291 Acacia leeuweniana	1	-21.516667	119.416667	27/06/1981
	164313 Acacia leeuweniana	1	-21.516667	119.416667	27/06/1981
	164267 Acacia leeuweniana	1	-21.516667	119.416667	27/06/1981
	6791476 Acacia leeuweniana	1	-21.364214	118.71356	29/05/2004
	6791212 Acacia leeuweniana	1	-21.498375	119.408837	28/05/2004
	6791433 Acacia leeuweniana	1	-21.364214	118.71356	29/05/2004
	7740352 Acacia leeuweniana	1	-21.366667	118.2	10/05/1986
	6791468 Acacia leeuweniana	1	-21.364214	118.71356	29/05/2004
	6791441 Acacia leeuweniana	1	-21.364214	118.71356	29/05/2004
	165239 Acacia leeuweniana	1	-21.516667	119.416667	18/10/1983
	165271 Acacia leeuweniana	1	-21.516667	119.416667	27/06/1981
	164275 Acacia leeuweniana	1	-21.516667	119.416667	19/04/1967
	164259 Acacia leeuweniana	1	-21.516667	119.416667	19/04/1967
	164240 Acacia leeuweniana	1	-21.516667	119.416667	20/05/1982
	990434 Acacia leeuweniana	1	-21.5	119.416667	26/10/1988
	990442 Acacia leeuweniana	1	-21.5	119.416667	26/10/1988
	165204 Acacia leeuweniana	1	-21.516667	119.416667	18/10/1983
	165212 Acacia leeuweniana	1	-21.516667	119.416667	18/10/1983
	9347445 Acacia leeuweniana	1	-21.516667	119.416667	20/05/1982
	1274023 Acacia levata	3	-21.508056	119.413056	15/10/1988
	4966686 Acacia levata	3	-21.388056	119.556944	21/05/1997
	919713 Acacia levata	3	-21.844444	119.74	23/09/1988
	6927432 Acacia levata	3	-21.387028	119.559972	10/10/2004
	6791409 Acacia levata	3	-21.364214	118.71356	29/05/2004
	8064911 Acacia levata	3	-21.361111	118.701111	9/09/2004
	4181301 Acacia levata	3	-21.373611	118.714722	3/04/1995
	4322932 Acacia levata	3	-21.766667	119.216667	1/11/1995
	606081 Acacia levata	3	-21.516667	119.416667	17/10/1983
	8672253 Acacia levata	3	-21.950125	118.99598	24/03/2012
	8741816 Acacia levata	3	-21.744444	119.176806	28/10/2012
	990922 Acacia levata	3	-21.75	119.183333	27/10/1988
	603279 Acacia levata	3	-21.430556	119.402222	20/05/1982
	5639549 Acacia levata	3	-21.383929	119.561058	18/07/2000
	6791174 Acacia levata	3	-21.384485	119.559669	28/05/2004
	990930 Acacia levata	3	-21.383333	119.566667	26/10/1988
	990949 Acacia levata	3	-21.383333	119.566667	26/10/1988
	6863892 Acacia sp. Marble Bar (J.G. & M.H. Simmons 3499)	1	-21.278333	119.807778	26/09/1997
	8511640 Bulbostylis burbidgeae	4	-21.613333	119.47282	12/07/2013
	8710287 Bulbostylis burbidgeae	4	-20.951861	118.672083	2/06/2010
	8710279 Bulbostylis burbidgeae	4	-20.813583	118.630583	22/06/2010
	1848372 Bulbostylis burbidgeae	4	-21.616667	119.033333	/03/1988
	8559120 Bulbostylis burbidgeae	4	-21.33834	118.704223	8/05/2013
	1083007 Bulbostylis burbidgeae	4	-20.95	119.683333	4/08/1970
	8721564 Bulbostylis burbidgeae	4	-21.908969	118.973061	20/04/2012
	5223741 Bulbostylis burbidgeae	4	-20.876056	119.007111	27/08/1997
	8647100 Bulbostylis burbidgeae	4	-20.883897	118.696667	8/06/2011
	8647097 Bulbostylis burbidgeae	4	-20.968404	118.703399	10/06/2011
	5876877 Bulbostylis burbidgeae	4	-21.926111	119.554444	1/11/1995
	8721203 Bulbostylis burbidgeae	4	-21.606572	119.028372	27/04/2012
	8694214 Bulbostylis burbidgeae	4	-22.077588	118.99706	23/03/2012
	8767009 Bulbostylis burbidgeae	4	-20.82477	118.649253	8/04/2011
	8766991 Bulbostylis burbidgeae	4	-20.910518	118.67179	9/04/2011
	8671990 Bulbostylis burbidgeae	4	-21.854263	118.940142	3/11/2011
	8672210 Bulbostylis burbidgeae	4	-21.479041	118.928085	28/11/2011
	8672261 Bulbostylis burbidgeae	4	-21.473102	118.926212	24/11/2011
	8672288 Bulbostylis burbidgeae	4	-21.854263	118.940142	19/04/2012
	8721572 Bulbostylis burbidgeae	4	-21.854263	118.940142	19/04/2012
	8767122 Bulbostylis burbidgeae	4	-20.915681	118.662897	9/04/2011
	9060243 Bulbostylis burbidgeae	4	-21.753483	119.509021	19/06/2014
	8925380 Bulbostylis burbidgeae	4	-21.352847	118.809416	3/04/2011
	8974659 Bulbostylis burbidgeae	4	-21.213588	118.783449	8/07/2015
	9138692 Bulbostylis burbidgeae	4	-20.676091	118.902908	25/05/2018
	5634199 Bulbostylis burbidgeae	4	-21.938611	119.275278	2/08/1996
	9356827 Bulbostylis burbidgeae	4	-21.36506	118.70086	1/06/2006
	7472382 Bulbostylis burbidgeae	4	-20.910646	118.671686	15/05/2006
	8330050 Cochlospermum macnamarae	1	-21.850388	118.953924	30/09/2011
	8330018 Cochlospermum macnamarae	1	-21.850526	118.952252	30/09/2011
	8511691 Cochlospermum macnamarae	1	-21.603389	119.485144	12/07/2013
	9060286 Cochlospermum macnamarae	1	-21.7332	119.548925	21/06/2014
	8330042 Cochlospermum macnamarae	1	-21.852046	118.952021	30/09/2011
	8798451 Cochlospermum macnamarae	1	-21.556911	119.641674	5/04/2014
	8330026 Cochlospermum macnamarae	1	-21.851637	118.952238	30/09/2011
	1524747 Corchorus sp. Yarrrie (J. Bull & D. Roberts CAL 01.05)	1	-21.150556	119.685556	11/08/1965
	1525166 Corchorus sp. Yarrrie (J. Bull & D. Roberts CAL 01.05)	1	-20.635556	119.584167	20/05/1941
	9207198 Corchorus sp. Yarrrie (J. Bull & D. Roberts CAL 01.05)	1	-20.972316	119.417849	28/05/2019
	9207287 Corchorus sp. Yarrrie (J. Bull & D. Roberts CAL 01.05)	1	-20.973557	119.434017	28/05/2019
	8645000 Diptera canthus chichesterensis	1	-22.102868	119.009087	28/03/2004
	8644985 Diptera canthus chichesterensis	1	-22.087179	118.796659	15/03/2013
	5052394 Diptera canthus chichesterensis	1	-21.995556	118.566389	19/05/1996
	8618577 Dolichocarpa sp. Hamersley Station (A.A. Mitchell PRP 1479)	3	-22.10686	119.00031	27/04/2004
	9207058 Dolichocarpa sp. Hamersley Station (A.A. Mitchell PRP 1479)	3	-21.00209	119.294991	16/05/2019
	8646872 Eragrostis crateriformis	3	-20.474312	118.638546	5/05/2011
	8710449 Eragrostis crateriformis	3	-21.300167	118.87825	27/08/2010
	8386188 Eragrostis crateriformis	3	-20.41937	118.801444	14/04/2012
	9207309 Eragrostis crateriformis	3	-21.000788	119.310462	16/05/2019
	8559139 Eragrostis crateriformis	3	-21.394554	118.708076	8/05/2013
	8511586 Eragrostis crateriformis	3	-21.597069	119.388414	11/07/2013
	4132033 Eragrostis crateriformis	3	-20.65	119.583333	/05/1941
	8767130 Eragrostis crateriformis	3	-20.659292	118.579923	25/03/2011
	8766940 Eragrostis crateriformis	3	-20.680801	118.587728	6/04/2011
	8766975 Eragrostis crateriformis	3	-20.680675	118.587593	25/03/2011
	8766932 Eragrostis crateriformis	3	-20.69815	118.592085	6/04/2011
	8766711 Eragrostis crateriformis	3	-20.957351	118.684888	9/04/2011
	8767319 Eragrostis crateriformis	3	-20.798987	118.659837	8/04/2011
	8767181 Eragrostis crateriformis	3	-20.781439	118.602533	7/04/2011
	8766924 Eragrostis crateriformis	3	-20.453056	118.733889	9/04/2011
	461970 Eragrostis crateriformis	3	-20.635556	119.584167	/05/1941
	462020 Eragrostis crateriformis	3	-21.616667	118.95	//1952
	9060251 Eragrostis crateriformis	3	-21.86615	119.442273	22/05/2014
	9492429 Eragrostis crateriformis	3	-21.354403	119.849147	27/04/2019
	9122575 Euphorbia clementii	3	-20.899997	119.286053	3/06/2016
	8632650 Euphorbia clementii	3	-21.116542	119.115072	30/05/2013
	8710333 Euphorbia clementii	3	-21.193556	118.686528	28/05/2010



8710376	Euphorbia clementii	3	-21.209639	118.675333	27/05/2010
8710384	Euphorbia clementii	3	-21.210944	118.657528	29/05/2010
8710392	Euphorbia clementii	3	-21.184139	118.701806	29/05/2010
8710406	Euphorbia clementii	3	-21.210278	118.664389	29/05/2010
8672016	Euphorbia clementii	3	-21.182986	118.832465	25/04/2012
8525617	Euphorbia clementii	3	-21.087934	119.178435	3/07/2011
8221170	Euphorbia clementii	3	-21.12875	118.69011	31/05/2006
8526516	Euphorbia clementii	3	-21.157836	118.644952	17/05/2011
8589380	Euphorbia clementii	3	-21.152674	118.685711	7/06/2011
8673489	Euphorbia clementii	3	-21.11453	118.796412	15/05/2008
8673578	Euphorbia clementii	3	-21.160333	118.845361	10/07/2008
8721270	Euphorbia clementii	3	-21.092389	119.176797	13/06/2012
8710341	Euphorbia clementii	3	-21.186083	118.703889	28/05/2010
8710368	Euphorbia clementii	3	-21.210278	118.657056	26/05/2010
2845121	Euphorbia clementii	3	-20.914722	119.938056	9/06/1941
4201787	Euphorbia clementii	3	-21.168889	118.623056	3/04/1995
8767114	Euphorbia clementii	3	-20.805238	118.640116	8/04/2011
8974535	Euphorbia clementii	3	-21.250079	118.925398	9/07/2015
9138706	Euphorbia clementii	3	-21.012687	118.9136	8/05/2017
9138684	Euphorbia clementii	3	-20.62018	118.94596	21/05/2018
9441441	Euphorbia clementii	3	-21.025572	118.924068	7/06/2019
3402258	Euphorbia inappendiculata var. inappendiculata	2	-20.646667	119.588333	19/05/1941
9207384	Euphorbia inappendiculata var. inappendiculata	2	-21.00209	119.294991	16/05/2019
7952082	Euphorbia inappendiculata var. inappendiculata	2	-20.739377	119.496672	21/04/2005
8221162	Euphorbia stevenii	3	-22.04833	118.80278	1/06/2006
8221340	Euphorbia stevenii	3	-22.04833	118.80278	1/06/2006
4201779	Euphorbia stevenii	3	-22.076944	118.801667	3/04/1995
8540470	Euploca argyrea	1	-21.616667	118.95	23/09/1958
9441425	Euploca mutica	3	-21.032097	118.900216	10/06/2019
8955808	Euploca mutica	3	-20.5845	118.669833	28/06/2011
8955743	Euploca mutica	3	-20.578444	118.683539	3/05/2011
8955816	Euploca mutica	3	-20.595958	118.664928	2/11/2011
8215502	Euploca mutica	3	-20.487222	118.635556	23/07/2009
8422745	Euploca mutica	3	-20.520118	118.687772	16/11/2012
7773811	Euploca mutica	3	-21.117792	118.709903	13/05/2008
5219787	Euploca mutica	3	-20.731667	118.946389	26/08/1997
9465375	Euploca mutica	3	-20.441389	118.674167	30/08/1997
9465413	Euploca mutica	3	-20.731667	118.946389	26/08/1997
8955506	Euploca mutica	3	-20.525861	118.64025	2/06/2011
8955468	Euploca mutica	3	-20.532694	118.664833	28/06/2011
8955433	Euploca mutica	3	-20.549972	118.618806	27/06/2011
8955786	Euploca mutica	3	-20.596464	118.686469	3/05/2011
8955794	Euploca mutica	3	-20.498303	118.625528	3/05/2011
8955441	Euploca mutica	3	-20.552044	118.659556	3/05/2011
8647127	Euploca mutica	3	-20.597606	118.665245	11/05/2011
8215510	Euploca mutica	3	-20.478611	118.635	23/07/2009
8575215	Euploca mutica	3	-20.58	118.653889	19/04/2011
8386293	Euploca mutica	3	-20.430079	118.804396	14/04/2012
8589232	Euploca mutica	3	-20.884923	118.496897	17/06/2010
8647119	Euploca mutica	3	-20.846524	118.691616	17/05/2011
8955778	Euploca mutica	3	-20.589139	118.686083	28/06/2011
8955492	Euploca mutica	3	-20.539592	118.671261	2/05/2011
8955751	Euploca mutica	3	-20.505083	118.618583	3/05/2011
5687098	Euploca mutica	3	-20.441389	118.674167	30/08/1997
8955549	Euploca mutica	3	-20.532624	118.62725	27/06/2011
8859825	Euploca mutica	3	-21.189539	119.95895	17/05/2012
8859833	Euploca mutica	3	-21.186869	119.948939	17/05/2012
8859841	Euploca mutica	3	-21.183681	119.939919	16/05/2012
8860262	Euploca mutica	3	-21.06331	118.76019	31/05/2006
8849811	Euploca mutica	3	-20.626478	118.660291	2/12/2011
8810362	Euploca mutica	3	-20.606944	118.668333	6/03/2010
8849838	Euploca mutica	3	-20.857197	118.678292	29/11/2011
8955425	Euploca mutica	3	-20.563417	118.627778	26/06/2011
8710244	Euploca mutica	3	-20.554889	118.572389	2/08/2010
8710155	Euploca mutica	3	-21.112972	118.796083	28/05/2010
8703752	Euploca mutica	3	-21.037123	119.147549	15/10/2011
8710228	Euploca mutica	3	-20.949389	118.675139	2/06/2010
8703787	Euploca mutica	3	-21.036959	119.147633	15/10/2011
8767041	Euploca mutica	3	-21.081836	118.70515	7/04/2011
8767033	Euploca mutica	3	-21.10945	118.708575	7/04/2011
8917779	Euploca mutica	3	-20.553202	118.659383	28/08/2010
8917787	Euploca mutica	3	-20.60682	118.671869	28/08/2010
8955530	Euploca mutica	3	-20.519258	118.689928	5/05/2011
8925518	Euploca mutica	3	-20.728444	118.598268	7/07/2011
8925704	Euploca mutica	3	-21.129311	118.712326	28/10/2010
8925798	Euploca mutica	3	-21.591972	118.825284	26/07/2011
8925836	Euploca mutica	3	-20.93601	118.667948	25/07/2011
9138668	Euploca mutica	3	-20.468925	119.010301	25/05/2018
8703604	Euploca mutica	3	-21.037211	119.147665	15/10/2011
8703779	Euploca mutica	3	-21.037312	119.147542	15/10/2011
8703701	Euploca mutica	3	-21.037644	119.148451	15/10/2011
8673551	Euploca mutica	3	-21.118056	118.710111	10/07/2008
8525595	Euploca mutica	3	-21.186458	118.770344	5/04/2011
8525633	Euploca mutica	3	-21.184357	118.806654	18/08/2011
9067655	Euploca mutica	3	-20.478333	118.635	8/05/2008
8671974	Euploca mutica	3	-21.676728	118.875212	26/03/2012
8677271	Euploca mutica	3	-20.440006	118.637224	1/08/2012
8710139	Euploca mutica	3	-20.567472	118.6445	3/08/2010
8710147	Euploca mutica	3	-20.642167	118.594639	31/07/2010
8703744	Euploca mutica	3	-21.037113	119.149732	15/10/2011
8703736	Euploca mutica	3	-21.037093	119.147731	15/10/2011
8703795	Euploca mutica	3	-21.037473	119.14841	15/10/2011
8703728	Euploca mutica	3	-21.037773	119.14875	15/10/2011
8703582	Euploca mutica	3	-21.037371	119.147879	15/10/2011
8703760	Euploca mutica	3	-21.037186	119.147569	15/10/2011
8710260	Euploca mutica	3	-20.992472	118.694222	31/05/2010
8710236	Euploca mutica	3	-20.949083	118.67625	1/06/2010
8721556	Fimbristylis sieberiana	3	-21.950125	118.99598	19/04/2012
8710430	Gomphrena leptophylla	3	-21.557222	119.335389	19/06/2010
5331692	Gomphrena leptophylla	3	-21.133333	119.9	11/09/1968
5861799	Gomphrena leptophylla	3	-21.416111	118.566667	11/05/1997
8974551	Gomphrena leptophylla	3	-21.189017	118.76919	4/07/2015
8646813	Gymnanthera cunninghamii	3	-20.623871	118.685162	14/05/2011
8525609	Gymnanthera cunninghamii	3	-21.188062	118.770652	4/04/2011
8511667	Gymnanthera cunninghamii	3	-21.58307	119.429164	11/07/2013
7522959	Gymnanthera cunninghamii	3	-21.233333	118.793056	7/05/2006
8721114	Gymnanthera cunninghamii	3	-21.614913	119.035992	27/04/2012
8516499	Gymnanthera cunninghamii	3	-21.634395	119.250035	13/04/2013
8767025	Gymnanthera cunninghamii	3	-21.018379	118.690989	10/04/2011
8767017	Gymnanthera cunninghamii	3	-20.691773	118.576275	6/04/2011
8925372	Gymnanthera cunninghamii	3	-21.070581	118.704252	19/05/2011
8925461	Gymnanthera cunninghamii	3	-21.112391	118.712507	9/04/2011
8925402	Gymnanthera cunninghamii	3	-21.012976	118.68934	25/07/2011
9138676	Gymnanthera cunninghamii	3	-20.534217	119.002486	22/05/2018
3613038	Gymnanthera cunninghamii	3	-21.616667	118.95 //1952	
8516464	Heliotropium murinum	3	-21.608634	118.956511	12/04/2013
8511594	Heliotropium murinum	3	-21.607756	118.895057	1/07/2013
8511608	Heliotropium murinum	3	-21.728387	119.727416	24/07/2013
4512081	Heliotropium murinum	3	-20.65	119.583333	24/05/1941
4512103	Heliotropium murinum	3	-20.65	119.583333	23/05/1941
8720959	Heliotropium murinum	3	-21.605518	118.938757	28/04/2012
8860300	Heliotropium murinum	3	-21.42547	119.55247	30/04/2006
9122583	Heliotropium murinum	3	-20.567201	119.562814	4/06/2016
9060316	Heliotropium murinum	3	-21.743444	119.515524	19/06/2014
9040552	Heliotropium murinum	3	-21.36074	119.902829	11/04/2018
8860254	Heliotropium murinum	3	-21.37592	119.3725	30/04/2006
4739892	Heliotropium murinum	3	-21.083333	119.833333	12/09/1982
5219655	Heliotropium murinum	3	-21.582778	119.767778	24/06/1997
4570677	Josephinia sp. Woodstock (A.A. Mitchell PRP 989)	1	-21.5725	118.981111	2/11/1995
3080161	Josephinia sp. Woodstock (A.A. Mitchell PRP 989)	1	-21.616667	118.95	6/05/1958
5908957	Josephinia sp. Woodstock (A.A. Mitchell PRP 989)	1	-21.642778	118.883333	9/05/1997
9492372	Josephinia sp. Woodstock (A.A. Mitchell PRP 989)	1	-21.354403	119.849147	27/04/2019
8516421	Nicotiana umbratica	3	-21.604364	119.02725	13/04/2013
8559155	Nicotiana umbratica	3	-21.3227	118.701093	13/05/2013
3685381	Nicotiana umbratica	3	-20.866667	119.783056	8/06/1941
3685411	Nicotiana umbratica	3	-21.416667	118.916667	26/04/1958
3685454	Nicotiana umbratica	3	-21.616667	118.95	30/04/1958

3685403	Nicotiana umbratica	3	-21.621389	118.948333 //	
3685446	Nicotiana umbratica	3	-21.616667	118.95	23/04/1958
1584448	Nicotiana umbratica	3	-21.5	119.416667	27/06/1981
8798486	Nicotiana umbratica	3	-21.373685	119.680993	8/04/2014
6724051	Nicotiana umbratica	3	-21.116667	118.7	21/09/1995
8716250	Nicotiana umbratica	3	-21.50619	119.41764	1/05/2006
8511632	Nicotiana umbratica	3	-21.681529	119.88507	24/07/2013
9060413	Nicotiana umbratica	3	-21.898901	119.296602	18/06/2014
8925801	Nicotiana umbratica	3	-21.29848	118.808952	30/03/2011
8974640	Nicotiana umbratica	3	-21.213872	118.783944	8/07/2015
8115834	Nicotiana umbratica	3	-21.513375	119.416893	30/04/2006
8982716	Paspalidium retiglume	2	-22.030327	118.621314	9/06/2008
8982732	Paspalidium retiglume	2	-22.015776	118.597534	9/06/2008
8982708	Paspalidium retiglume	2	-22.022555	118.608953	9/06/2008
9357378	Paspalidium retiglume	2	-22.04833	118.80278	1/06/2006
8559171	Phyllanthus hebecarpus	3	-21.32132	118.700084	13/05/2013
8559198	Phyllanthus hebecarpus	3	-21.382889	118.712946	8/05/2013
8511705	Phyllanthus hebecarpus	3	-21.613829	119.472278	12/07/2013
8511675	Phyllanthus hebecarpus	3	-21.57957	119.453557	11/07/2013
8158789	Phyllanthus hebecarpus	3	-21.322389	118.701533	30/04/2009
8559163	Phyllanthus hebecarpus	3	-21.33834	118.704223	8/05/2013
8974543	Phyllanthus hebecarpus	3	-21.236668	118.79259	10/07/2015
8525641	Ptilotus mollis	4	-21.267678	119.067395	21/08/2011
8710503	Ptilotus mollis	4	-20.653778	118.586278	19/08/2010
8772371	Ptilotus mollis	4	-21.455	119.06061	25/05/2011
8772398	Ptilotus mollis	4	-21.471383	119.062722	24/05/2011
4275144	Ptilotus mollis	4	-21.333333	119.916667	21/09/1994
8798370	Ptilotus mollis	4	-21.535926	119.67304	7/04/2014
4275152	Ptilotus mollis	4	-21.31575	119.859417	5/08/1995
9040544	Ptilotus mollis	4	-21.349419	119.917502	13/04/2018
8772320	Ptilotus mollis	4	-21.481875	119.078163	24/05/2011
999288	Ptilotus mollis	4	-20.65	119.583333	/05/1941
9468528	Ptilotus mollis	4	-21.156841	119.178874	14/02/2022
9479899	Ptilotus mollis	4	-21.356373	119.055497	12/08/2018
8710120	Quoya zonalis	T	-21.145722	119.109889	28/05/2010
8253757	Quoya zonalis	T	-21.137833	119.12775	30/08/2010
8525676	Quoya zonalis	T	-21.135965	119.129699	4/07/2011
8525587	Quoya zonalis	T	-21.136318	119.129627	4/07/2011
8632669	Quoya zonalis	T	-21.147028	119.095683	29/05/2013
8632685	Quoya zonalis	T	-21.125781	119.218805	31/05/2013
8632677	Quoya zonalis	T	-21.147028	119.095683	29/05/2013
8589224	Quoya zonalis	T	-21.189013	119.067098	22/09/2011
8859892	Quoya zonalis	T	-21.158915	119.215939	20/04/2012
8859884	Quoya zonalis	T	-21.138259	119.127528	12/04/2012
8710112	Quoya zonalis	T	-21.137833	119.12775	26/05/2010
8974608	Quoya zonalis	T	-21.235864	119.079402	22/09/2015
8974594	Quoya zonalis	T	-21.209364	118.988027	24/09/2015
9107002	Quoya zonalis	T	-21.213718	119.034676	4/09/2017
9019820	Quoya zonalis	T	-21.156939	119.090248	15/07/2017
9208615	Quoya zonalis	T	-21.15433	119.071776	3/06/2015
8253749	Quoya zonalis	T	-21.189	119.067111	30/08/2010
9358420	Quoya zonalis	T	-21.211287	119.269178	3/12/2020
9468560	Quoya zonalis	T	-21.1619	119.190587	15/02/2022
9479856	Quoya zonalis	T	-21.309665	119.070921	10/08/2018
9479805	Quoya zonalis	T	-21.289735	119.00368	14/08/2018
9479937	Quoya zonalis	T	-21.295089	119.014421	14/08/2018
9060308	Rhynchosia bungarensis	4	-21.743851	119.542667	19/06/2014
8798478	Rostellularia adscendens var. latifolia	3	-21.462842	119.6162	3/04/2014
9060375	Rostellularia adscendens var. latifolia	3	-21.743851	119.542667	20/06/2014
8767092	Rothia indica subsp. australis	3	-20.69815	118.592085	6/04/2011
8767084	Rothia indica subsp. australis	3	-20.697877	118.590335	6/04/2011
1197983	Rothia indica subsp. australis	3	-20.646667	119.588333	19/05/1941
8767076	Rothia indica subsp. australis	3	-20.698303	118.58625	6/04/2011
8511659	Rothia indica subsp. australis	3	-21.590379	119.425753	11/07/2013
8647089	Rothia indica subsp. australis	3	-20.519031	118.667461	6/05/2011
8720932	Rothia indica subsp. australis	3	-21.606406	118.988987	28/04/2012
8721157	Rothia indica subsp. australis	3	-21.597744	118.931594	28/04/2012
9060421	Rothia indica subsp. australis	3	-21.776377	119.481687	25/05/2014
8767068	Rothia indica subsp. australis	3	-20.910363	118.657118	9/04/2011
8715718	Schoenus coultasii	1	-21.395468	119.554516	9/05/2014
8767106	Styliidium weeliwollii	3	-20.949793	118.670832	9/04/2011
7887167	Styliidium weeliwollii	3	-22.009436	119.26108	4/05/2007
8798389	Styliidium weeliwollii	3	-21.395468	119.554516	9/05/2014
8925453	Styliidium weeliwollii	3	-21.282858	118.801899	29/03/2011
8470685	Terminalia supranitifolia	3	-21.172068	118.651754	13/12/2012
8631425	Terminalia supranitifolia	3	-21.179994	118.683372	7/03/2012
8710481	Terminalia supranitifolia	3	-21.130528	118.817472	30/08/2010
8470677	Terminalia supranitifolia	3	-21.172416	118.650304	13/12/2012
9275169	Terminalia supranitifolia	3	-21.176387	118.662636	4/04/2019
9172262	Themeda sp. Hamersley Station (M.E. Trudgen 11431)	3	-22.072008	118.794403	11/05/2018
5634512	Themeda sp. Panorama (J. Nelson et al. NS 102)	1	-21.437778	119.779444	/05/1997
9214496	Themeda sp. Panorama (J. Nelson et al. NS 102)	1	-21.189159	119.066907	8/05/2019
8222355	Themeda sp. Panorama (J. Nelson et al. NS 102)	1	-21.449	119.53775	19/08/2006
9318011	Themeda sp. Panorama (J. Nelson et al. NS 102)	1	-21.200321	119.264248	4/12/2020
9331891	Themeda sp. Panorama (J. Nelson et al. NS 102)	1	-21.200321	119.264248	16/03/2021
8222363	Themeda sp. Panorama (J. Nelson et al. NS 102)	1	-21.449	119.53775	1/05/2006
8222371	Themeda sp. Panorama (J. Nelson et al. NS 102)	1	-21.449	119.53775	1/05/2006
9207333	Triodia basitricha	3	-20.971889	119.437919	28/05/2019
8710562	Triodia basitricha	3	-21.534528	119.288889	19/06/2010
8710082	Triodia basitricha	3	-21.131167	119.127972	16/06/2010
9215921	Triodia basitricha	3	-22.14572	119.022166	9/04/2017
9479848	Triodia basitricha	3	-21.285748	119.074122	10/08/2018
573698	Triodia chichesterensis	3	-21.483333	118.916667	/08/1946
573671	Triodia chichesterensis	3	-21.483333	118.916667	/08/1946
573728	Triodia chichesterensis	3	-21.483333	118.916667	/08/1946
573701	Triodia chichesterensis	3	-21.483333	118.916667	/08/1946
573736	Triodia chichesterensis	3	-21.483333	118.916667	/08/1946
403679	Triodia chichesterensis	3	-21.066667	118.75	29/04/1977
4366077	Triodia chichesterensis	3	-20.700556	118.621944	21/10/1995
5779669	Triodia chichesterensis	3	-20.731667	118.946389	26/08/1997
402796	Triodia chichesterensis	3	-21.366667	118.9	28/03/1984
403318	Triodia chichesterensis	3	-21.339167	118.923056	19/04/1967
9207368	Triodia chichesterensis	3	-20.999402	119.307482	16/05/2019
9138811	Triodia chichesterensis	3	-21.009681	118.9199	8/05/2017
1848615	Triodia chichesterensis	3	-21.383333	118.833333	/04/1988
9138609	Triodia chichesterensis	3	-20.621056	118.946777	21/05/2018
9105956	Triodia chichesterensis	3	-21.20763	118.667311	26/04/2018
9138625	Triodia chichesterensis	3	-20.705824	118.85845	21/05/2018
9138617	Triodia chichesterensis	3	-20.504116	119.000762	22/05/2018
9275207	Triodia chichesterensis	3	-21.142362	118.680906	7/04/2019
9275193	Triodia chichesterensis	3	-21.125519	118.69325	9/04/2019
8618852	Triodia chichesterensis	3	-20.6875	118.686611	19/03/2013
8776318	Triodia chichesterensis	3	-21.024806	118.725528	19/03/2013
9411933	Triodia chichesterensis	3	-21.157833	118.716917	22/02/2014
9411941	Triodia chichesterensis	3	-21.157833	118.716917	22/02/2014
9410082	Triodia chichesterensis	3	-21.06731	118.89925	31/05/2006
9410090	Triodia chichesterensis	3	-21.06731	118.89925	31/05/2006
9412034	Triodia chichesterensis	3	-21.1865	118.833944	24/08/2010
9411976	Triodia chichesterensis	3	-21.293389	118.871639	27/08/2010
9411968	Triodia chichesterensis	3	-20.677444	118.596417	2/08/2010
9412026	Triodia chichesterensis	3	-21.681	118.822278	23/02/2014
9412018	Triodia chichesterensis	3	-20.962833	118.620639	22/02/2014
9441506	Triodia chichesterensis	3	-21.035662	118.885956	10/06/2019
9441336	Triodia chichesterensis	3	-21.0238	118.920258	7/06/2019
9441344	Triodia chichesterensis	3	-21.0238	118.920258	7/06/2019
9441484	Triodia chichesterensis	3	-21.003478	118.931364	10/06/2019
9441492	Triodia chichesterensis	3	-21.003478	118.931364	10/06/2019
9441514	Triodia chichesterensis	3	-21.003309	118.931474	10/06/2019
9441522	Triodia chichesterensis	3	-21.003309	118.931474	10/06/2019
9275185	Vigna triodiophila	3	-21.166675	118.665609	9/04/2019



PopId	Taxon	ConsStatus	WARank	PopNumber	Gda94Lat	Gda94Long	CountDate	MatCount	JuvCount	SeedCount	LiveTotal
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109606	Quoya zonalis	T	EN	2	-21.187969	119.06228	19/09/2015		1036		0
109649	Quoya zonalis	T	EN	3	-21.147028	119.09569	29/05/2013		11		0
109650	Quoya zonalis	T	EN	4	-21.125778	119.21881	31/05/2013		10		0
109651	Quoya zonalis	T	EN	5	-21.145722	119.10989	28/05/2010		6		0
109789	Quoya zonalis	T	EN	6	-21.204162	118.96139	23/04/2012		115		0
109790	Quoya zonalis	T	EN	7	-21.24569	118.97912	17/08/2011		1		0
109791	Quoya zonalis	T	EN	8	-21.221464	119.00692	17/08/2011		1		0
109792	Quoya zonalis	T	EN	9	-21.167391	119.02457	17/08/2011		25		0
109829	Quoya zonalis	T	EN	10	-21.177153	119.02537	17/08/2011		176		0
109830	Quoya zonalis	T	EN	11	-21.185791	119.02504	17/08/2011		26		0
109831	Quoya zonalis	T	EN	12	-21.188818	119.04519	21/09/2015		3036		0
109832	Quoya zonalis	T	EN	13	-21.193387	119.07044	17/08/2011		12		0
109833	Quoya zonalis	T	EN	14	-21.216165	119.04507	17/08/2011		80		0
109834	Quoya zonalis	T	EN	15	-21.223367	119.05589	17/08/2011		55		0
109835	Quoya zonalis	T	EN	16	-21.244661	119.07516	17/08/2011		7		0
109836	Quoya zonalis	T	EN	17	-21.277011	119.07875	21/04/2012		1		0
109837	Quoya zonalis	T	EN	18	-21.285896	119.06929	17/08/2011		2		0
109838	Quoya zonalis	T	EN	19	-21.201002	119.09082	17/08/2011		27		0
109839	Quoya zonalis	T	EN	20	-21.198667	119.09918	17/08/2011		9		0
109840	Quoya zonalis	T	EN	21	-21.19045	119.09262	3/06/2015		31		0
109841	Quoya zonalis	T	EN	22	-21.182078	119.10642	17/08/2011		1		0
109842	Quoya zonalis	T	EN	23	-21.182241	119.12588	17/08/2011		1		0
109843	Quoya zonalis	T	EN	24	-21.148484	119.11427	17/04/2012		2		0
109844	Quoya zonalis	T	EN	25	-21.130519	119.13467	17/04/2012		2		0
109849	Quoya zonalis	T	EN	26	-21.15354	119.21529	22/04/2012		31		0
109850	Quoya zonalis	T	EN	27	-21.158842	119.21594	20/04/2012		3		0
109851	Quoya zonalis	T	EN	28	-21.158496	119.25032	28/05/2013		6		0
109852	Quoya zonalis	T	EN	29	-21.147685	119.2341	29/05/2013		19		0
109853	Quoya zonalis	T	EN	30	-21.142197	119.24552	19/04/2012		438		0
109854	Quoya zonalis	T	EN	31	-21.125266	119.23112	18/04/2012		16		0
109855	Quoya zonalis	T	EN	32	-21.119592	119.2409	28/05/2013		30		0
109856	Quoya zonalis	T	EN	33	-21.115213	119.2558	28/05/2013		1		0
109857	Quoya zonalis	T	EN	34	-21.109089	119.25323	28/05/2013		38		0
109858	Quoya zonalis	T	EN	35	-21.114034	119.22207	28/05/2013		31		0
109859	Quoya zonalis	T	EN	36	-21.08445	119.21103	17/08/2011		3		0
109861	Quoya zonalis	T	EN	38	-21.166708	119.1013	25/09/2015		236		0
109862	Quoya zonalis	T	EN	39	-21.156902	119.09094	3/06/2015		27		0
109863	Quoya zonalis	T	EN	40	-21.172316	119.07133	4/06/2015		361		0
109864	Quoya zonalis	T	EN	41	-21.154257	119.07178	4/06/2015		7		0
110329	Quoya zonalis	T	EN	42	-21.196792	118.95368	26/09/2015		1		0
110330	Quoya zonalis	T	EN	43	-21.214097	118.96141	26/09/2015				400
110331	Quoya zonalis	T	EN	44	-21.216683	118.99042	24/09/2015				411
110332	Quoya zonalis	T	EN	45	-21.209288	118.98803	24/09/2015				9
110333	Quoya zonalis	T	EN	46	-21.174395	119.01892	17/09/2015				118
110334	Quoya zonalis	T	EN	47	-21.186052	119.01683	22/09/2015				6
110335	Quoya zonalis	T	EN	48	-21.223314	119.03267	16/09/2015				36
110336	Quoya zonalis	T	EN	49	-21.207701	119.02882	23/09/2015				1047
110337	Quoya zonalis	T	EN	50	-21.178913	119.03378	17/09/2015				220
110338	Quoya zonalis	T	EN	51	-21.204976	119.05395	27/09/2015				198
110349	Quoya zonalis	T	EN	52	-21.235181	119.08085	22/09/2015		173		0
110350	Quoya zonalis	T	EN	53	-21.195654	119.07928	26/09/2015		6		0
110351	Quoya zonalis	T	EN	54	-21.198294	119.08415	26/09/2015		4		0
110352	Quoya zonalis	T	EN	55	-21.198294	119.08415	26/09/2015		4		0
110353	Quoya zonalis	T	EN	56	-21.210616	119.2694	18/09/2015		20		0
110354	Quoya zonalis	T	EN	57	-21.18536	119.27738	18/09/2015		30		0
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110356	Quoya zonalis	T	EN	59	-21.160876	119.26887	18/09/2015		10		0
110357	Quoya zonalis	T	EN	60	-21.16071	119.28188	18/09/2015				0
110358	Quoya zonalis	T	EN	61	-21.162056	119.2892	18/09/2015		2		0
110369	Quoya zonalis	T	EN	62	-21.150875	119.27194	18/09/2015		47		0
110370	Quoya zonalis	T	EN	63	-21.149361	119.28712	18/09/2015		200		0
110371	Quoya zonalis	T	EN	64	-21.152001	119.29617	18/09/2015		3		0
110372	Quoya zonalis	T	EN	65	-21.140723	119.29015	18/09/2015		58		0
110373	Quoya zonalis	T	EN	66	-21.129062	119.30105	18/09/2015				0
110374	Quoya zonalis	T	EN	67	-21.124716	119.2785	18/09/2015		7		0
110375	Quoya zonalis	T	EN	68	-21.121618	119.28326	18/09/2015		3		0
110376	Quoya zonalis	T	EN	69	-21.112278	119.29818	18/09/2015		144		0
110377	Quoya zonalis	T	EN	70	-21.114537	119.3067	18/09/2015		5		0
110378	Quoya zonalis	T	EN	71	-21.102117	119.29902	18/09/2015		9		0
112029	Quoya zonalis	T	EN	72	-21.250556	118.97278	16/09/2016		5	3	0

Sheet	Taxon	Cons_Code	Latitude	Longitude	Date
	8680361 Ptilotus mollis	4	-21.564293	120.15221	22/05/2012
	8680426 Ptilotus mollis	4	-21.583455	120.139462	22/05/2012
	8680388 Ptilotus mollis	4	-21.630492	120.087485	10/05/2013
	8525641 Ptilotus mollis	4	-21.267678	119.067395	21/08/2011
	8384614 Ptilotus mollis	4	-22.473899	116.755518	17/07/2011
	8424144 Ptilotus mollis	4	-21.95035	120.137371	28/07/2005
	8568839 Ptilotus mollis	4	-21.623589	120.110879	11/04/2013
	8511543 Ptilotus mollis	4	-21.58532	120.039181	12/07/2013
	1226533 Ptilotus mollis	4	-22.333333	122.083333	/06/1987
	7888295 Ptilotus mollis	4	-22.410871	117.268487	12/09/2007
	8568863 Ptilotus mollis	4	-21.533924	120.104901	29/04/2013
	6746942 Ptilotus mollis	4	-23.152194	117.955917	15/07/2003
	8710503 Ptilotus mollis	4	-20.653778	118.586278	19/08/2010
	8772371 Ptilotus mollis	4	-21.455	119.06061	25/05/2011
	8772398 Ptilotus mollis	4	-21.471383	119.062722	24/05/2011
	4275144 Ptilotus mollis	4	-21.333333	119.916667	21/09/1994
	8798370 Ptilotus mollis	4	-21.535926	119.67304	7/04/2014
	7090447 Ptilotus mollis	4	-21.197529	120.75133	26/08/2004
	6746926 Ptilotus mollis	4	-23.159722	117.883111	7/09/2003
	6746934 Ptilotus mollis	4	-23.154194	117.925861	7/08/2003
	4275152 Ptilotus mollis	4	-21.31575	119.859417	5/08/1995
	9077014 Ptilotus mollis	4	-22.767034	117.863552	9/08/2003
	9084940 Ptilotus mollis	4	-23.289713	117.825667	12/11/2003
	9040544 Ptilotus mollis	4	-21.349419	119.917502	13/04/2018
	1714805 Ptilotus mollis	4	-22.605	118.141389	17/08/1974
	6422373 Ptilotus mollis	4	-21.195584	120.751052	27/05/2001
	8642478 Ptilotus mollis	4	-22.051714	115.837942	9/08/2008
	8772320 Ptilotus mollis	4	-21.481875	119.078163	24/05/2011
	8362602 Ptilotus mollis	4	-23.026333	118.904702	26/09/2010
	9248900 Ptilotus mollis	4	-22.3679	122.043789	14/10/2012
	9221328 Ptilotus mollis	4	-21.827778	120.686111	28/08/2004
	8771685 Ptilotus mollis	4	-22.651649	116.594659	23/08/2013
	8670641 Ptilotus mollis	4	-23.044025	118.892393	26/06/2011
	8929173 Ptilotus mollis	4	-23.118583	119.112833	23/07/2015
	9290230 Ptilotus mollis	4	-22.085278	119.803889	30/08/2004
	8430950 Ptilotus mollis	4	-22.701194	117.423583	21/07/2012
	9385940 Ptilotus mollis	4	-22.701194	117.423583	21/07/2012
	8462232 Ptilotus mollis	4	-22.006019	115.856852	24/06/2011
	8462240 Ptilotus mollis	4	-22.006019	115.856852	24/06/2011
	999288 Ptilotus mollis	4	-20.65	119.583333	/05/1941
	7144482 Ptilotus mollis	4	-22.083931	119.805231	30/08/2004
	9468528 Ptilotus mollis	4	-21.156841	119.178874	14/02/2022
	9479899 Ptilotus mollis	4	-21.356373	119.055497	12/08/2018
	8710120 Quoyia zonalis	T	-21.145722	119.109889	28/05/2010
	8253757 Quoyia zonalis	T	-21.137833	119.12775	30/08/2010
	8525676 Quoyia zonalis	T	-21.135965	119.129699	4/07/2011
	8525587 Quoyia zonalis	T	-21.136318	119.129627	4/07/2011
	8632669 Quoyia zonalis	T	-21.147028	119.095683	29/05/2013
	8632685 Quoyia zonalis	T	-21.125781	119.218805	31/05/2013
	8632677 Quoyia zonalis	T	-21.147028	119.095683	29/05/2013
	8589224 Quoyia zonalis	T	-21.189013	119.067098	22/09/2011
	8859892 Quoyia zonalis	T	-21.158915	119.215939	20/04/2012
	8859884 Quoyia zonalis	T	-21.138259	119.127528	12/04/2012
	8710112 Quoyia zonalis	T	-21.137833	119.12775	26/05/2010
	8974608 Quoyia zonalis	T	-21.235864	119.079402	22/09/2015
	8974594 Quoyia zonalis	T	-21.209364	118.988027	24/09/2015
	9107002 Quoyia zonalis	T	-21.213718	119.034676	4/09/2017
	9019820 Quoyia zonalis	T	-21.156939	119.090248	15/07/2017
	9208615 Quoyia zonalis	T	-21.15433	119.071776	3/06/2015
	8253749 Quoyia zonalis	T	-21.189	119.067111	30/08/2010
	9358420 Quoyia zonalis	T	-21.211287	119.269178	3/12/2020
	9468560 Quoyia zonalis	T	-21.1619	119.190587	15/02/2022
	9479856 Quoyia zonalis	T	-21.309665	119.070921	10/08/2018
	9479805 Quoyia zonalis	T	-21.289735	119.00368	14/08/2018
	9479937 Quoyia zonalis	T	-21.295089	119.014421	14/08/2018
	5634512 Themeda sp. Panorama (J. Nelson et al. NS 102)	1	-21.437778	119.779444	/05/1997
	9214496 Themeda sp. Panorama (J. Nelson et al. NS 102)	1	-21.189159	119.066907	8/05/2019
	8222355 Themeda sp. Panorama (J. Nelson et al. NS 102)	1	-21.449	119.53775	19/08/2006
	9318011 Themeda sp. Panorama (J. Nelson et al. NS 102)	1	-21.200321	119.264248	4/12/2020
	9331891 Themeda sp. Panorama (J. Nelson et al. NS 102)	1	-21.200321	119.264248	16/03/2021
	8222363 Themeda sp. Panorama (J. Nelson et al. NS 102)	1	-21.449	119.53775	1/05/2006
	8222371 Themeda sp. Panorama (J. Nelson et al. NS 102)	1	-21.449	119.53775	1/05/2006
	7506414 Triodia basitricha	3	-23.218528	115.97775	26/07/2002
	5040906 Triodia basitricha	3	-21.59	116.601667	31/03/1994
	8669473 Triodia basitricha	3	-22.220688	117.891937	9/07/2014
	9207333 Triodia basitricha	3	-20.971889	119.437919	28/05/2019
	9247602 Triodia basitricha	3	-22.222417	117.820778	4/04/2020
	5040760 Triodia basitricha	3	-22.040833	118.243333	2/04/1995
	9215913 Triodia basitricha	3	-22.91328	118.886985	8/04/2017
	6652794 Triodia basitricha	3	-21.606056	117.455056	21/04/1997
	6652786 Triodia basitricha	3	-21.513381	117.275659	24/05/1997
	6652808 Triodia basitricha	3	-21.526191	117.415696	23/04/1997
	7759541 Triodia basitricha	3	-22.092975	117.542012	7/08/2007
	9203729 Triodia basitricha	3	-22.353888	116.953245	12/07/2016
	9203710 Triodia basitricha	3	-22.146452	117.67967	20/03/2016
	8710562 Triodia basitricha	3	-21.534528	119.288889	19/06/2010
	8710082 Triodia basitricha	3	-21.131167	119.127972	16/06/2010
	8376328 Triodia basitricha	3	-21.602114	117.257897	//
	4965078 Triodia basitricha	3	-21.732778	116.778889	7/09/1996
	9106936 Triodia basitricha	3	-22.315635	117.223466	28/05/2018
	8957215 Triodia basitricha	3	-22.16792	117.245269	10/06/2015
	9215921 Triodia basitricha	3	-22.14572	119.022166	9/04/2017
	8974497 Triodia basitricha	3	-22.027315	118.06341	6/07/2014
	9138803 Triodia basitricha	3	-21.719715	116.909383	16/06/2018
	8974489 Triodia basitricha	3	-22.057701	118.104219	6/07/2014
	5634407 Triodia basitricha	3	-21.496944	120.396667	18/06/1997
	8618941 Triodia basitricha	3	-22.664833	117.724972	13/02/2015
	8307520 Triodia basitricha	3	-22.135556	116.975972	14/07/2011
	4995619 Triodia basitricha	3	-21.7775	117.876389	11/05/1996
	8781710 Triodia basitricha	3	-21.7775	117.876389	11/05/1996
	8613516 Triodia basitricha	3	-22.662972	117.726944	12/03/2013
	8615047 Triodia basitricha	3	-22.662972	117.726944	12/03/2013
	8669392 Triodia basitricha	3	-22.028648	118.066243	6/07/2014
	8669406 Triodia basitricha	3	-22.028648	118.066243	6/07/2014
	9479848 Triodia basitricha	3	-21.285748	119.074122	10/08/2018
	9529861 Triodia basitricha	3	-21.601552	117.255094	18/08/2022