



# Round Hill Project Landform Assessment

**HanRoy Limited**

29 July 2025



**Mine Earth**

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# Summary

Mine Earth was commissioned by HanRoy Iron Ore Projects Pty Ltd (HanRoy) to complete a landform assessment for the proposed Round Hill Mine (the Project), located approximately 30 km west of Newman in the Pilbara region of Western Australia. The survey area was approximately 1903 hectares and is comprised of the tenements E 4701313 and P 4701718.

An assessment of the landforms within the survey area is required to support the relevant components of environmental approvals documentation and the mine closure plan.

The objectives of the assessment were to:

- Review regional land system information.
- Describe the landforms within the survey area and assess their significance in accordance with the EPA Environmental Factor Guideline for Landforms

## Landform assessment

The desktop and field assessment identified the following landforms as present within the survey area.

- Stony plains
- Rocky Hill
- Undulating Gravelly Plains
- Low Rises
- Drainage tracts
- Washplains

The extent, condition/integrity, geology, morphology and environmental values of each landform is described within this report.

The assessment landform significance was undertaken in accordance with the EPA Environmental Factor Guideline for Landforms and using the following criteria: Variety, Integrity, Ecological Importance, Scientific Importance, Rarity, Social Importance (EPA, 2018). Based on the assessment of the significance of the landforms against the criteria, none of the landforms within the survey area were considered significant.

# Introduction



# 1. Introduction

HanRoy Limited (HanRoy) is proposing development of the Round Hill Iron Ore Mine (the Project), located approximately 30 km west of Newman (Figure 1). Mine Earth was engaged to undertake an assessment of landforms within the survey area, to support the relevant components of environmental approvals documentation and the mine closure plan. The survey area for the assessment covers an area of approximately 1903 ha (Figure 2).

This report includes:

- A description of the survey area and summary of regional landform information.
- A description of the methods used for the landform survey and assessment.
- Landform descriptions and an assessment of landform significance.

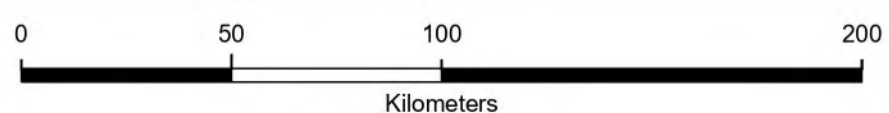
**Legend**

- Project Location
- Towns
- National Highways
- DBCA Legislated Lands and Waters



**Regional Location**

Figure 1





Scale: 1:1,800,000 at A3

Spatial Reference  
PCS: GDA 1994 MGA Zone 50  
GCS: GCS GDA 1994  
Datum: GDA 1994

Author: S. Parnaby  
Reviewed by: S. Perry  
Date: 19.06.2025

750000

### Legend

-  Survey Area
-  National highways

Great Northern Fwy

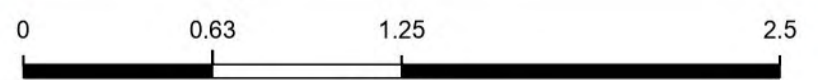
7430000

7430000



Survey Area

Figure 2



Kilometers

Scale: 1:25,000 at A3

Spatial Reference  
 PCS: GDA 1994 MGA Zone 50  
 GCS: GCS GDA 1994  
 Datum: GDA 1994

Author: S. Parnaby  
 Reviewed by: S. Perry  
 Date: 01.07.2025

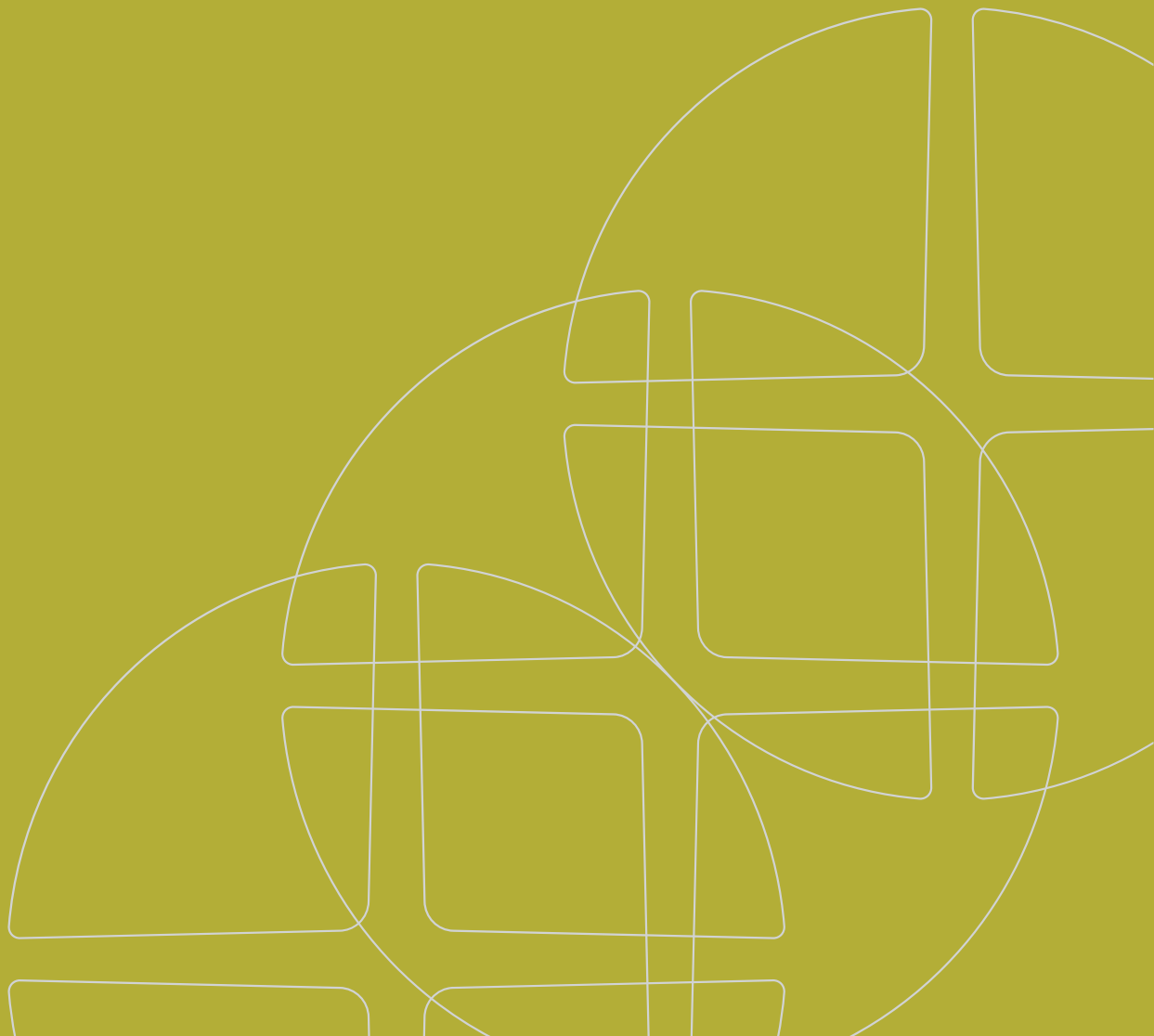
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# Description of survey area



## 2. Description of Survey Area

### 2.1 Climate

The climate in the survey area is characterised as having very hot summers and mild dry winters (BOM, 2025). The closest weather station is located at the Newman Airport, approximately 80 km southwest of the Project. Mean annual maximum temperatures range from 39.4°C in December to 23.1°C in June (Figure 3). Mean minimum temperatures range from 6.5°C in July to 25.2°C in January (BOM, 2025).

Rainfall in the region is highly variable and unpredictable, however more than half of the annual rainfall occurs between December and March. The survey area is also subject to tropical cyclones, generally between January and April, which are associated with destructive winds and large rainfall events. The mean annual rainfall is approximately 320 mm (BOM, 2025). The mean number of days of rain in a year is 41.6 (BOM, 2025).

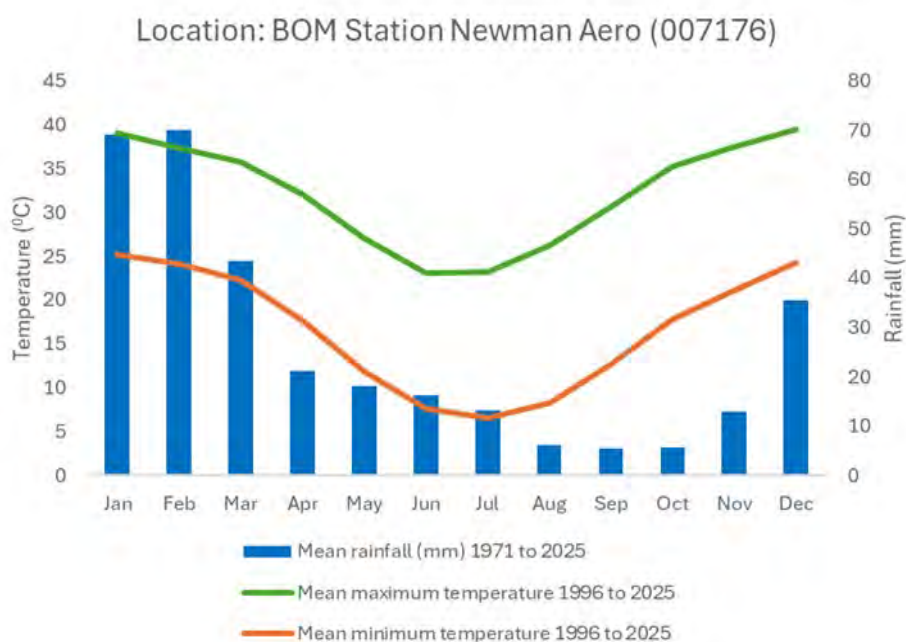


Figure 3: Mean monthly rainfall with monthly mean maximum and minimum temperatures as recorded at the Newman Airport weather station

### 2.2 Bioregion

The survey area is situated within the Pilbara biogeographic region of the Interim Biogeographic Regionalisation of Australia (IBRA). The Project is located within the Hamersley IBRA sub-region (Figure 4).

The Hamersley subregion is a mountainous area of Proterozoic sedimentary ranges and plateaux, dissected by basalt, shale and dolerite gorges. The valley floors have low mulga woodland over bunch grasses on fine textured soils, while the ranges have *Eucalyptus leucophloia* over *Triodia brizoides* on skeletal soils (CALM, 2002).


250000

500000

750000

1000000

### Legend


 Survey area location

### IBRA Sub-regions

 Chichester

 Fortescue

 Hamersley

 Roebourne

Survey Area Location



IBRA sub-regions

Figure 4



0 62,500 125,000 250,000

Meters

Scale: 1:2,500,000 at A3

Spatial Reference  
PCS: GDA 1994 MGA Zone 50  
GCS: GCS GDA 1994  
Datum: GDA 1994

Author: S. Parnaby  
Reviewed by: S. Perry  
Date:03.06.2025

Earthstar Geographics

250000

500000

750000

1000000

7750000

7750000

7500000

7500000

7250000

7250000

## 2.3 Landscape and land use

The survey area is located approximately 70 km south of the Hamersley range and approximately 140 km to the east of Karijini National Park. The survey area does not intersect with any nature reserves or national parks.

There are no geoheritage sites within the survey area and the closest geoheritage site to the survey area is Karijini national park (DMIRS, 2024).

There are numerous Aboriginal heritage sites within the survey area as identified by recent heritage surveys (in prep).

## 2.4 Land systems

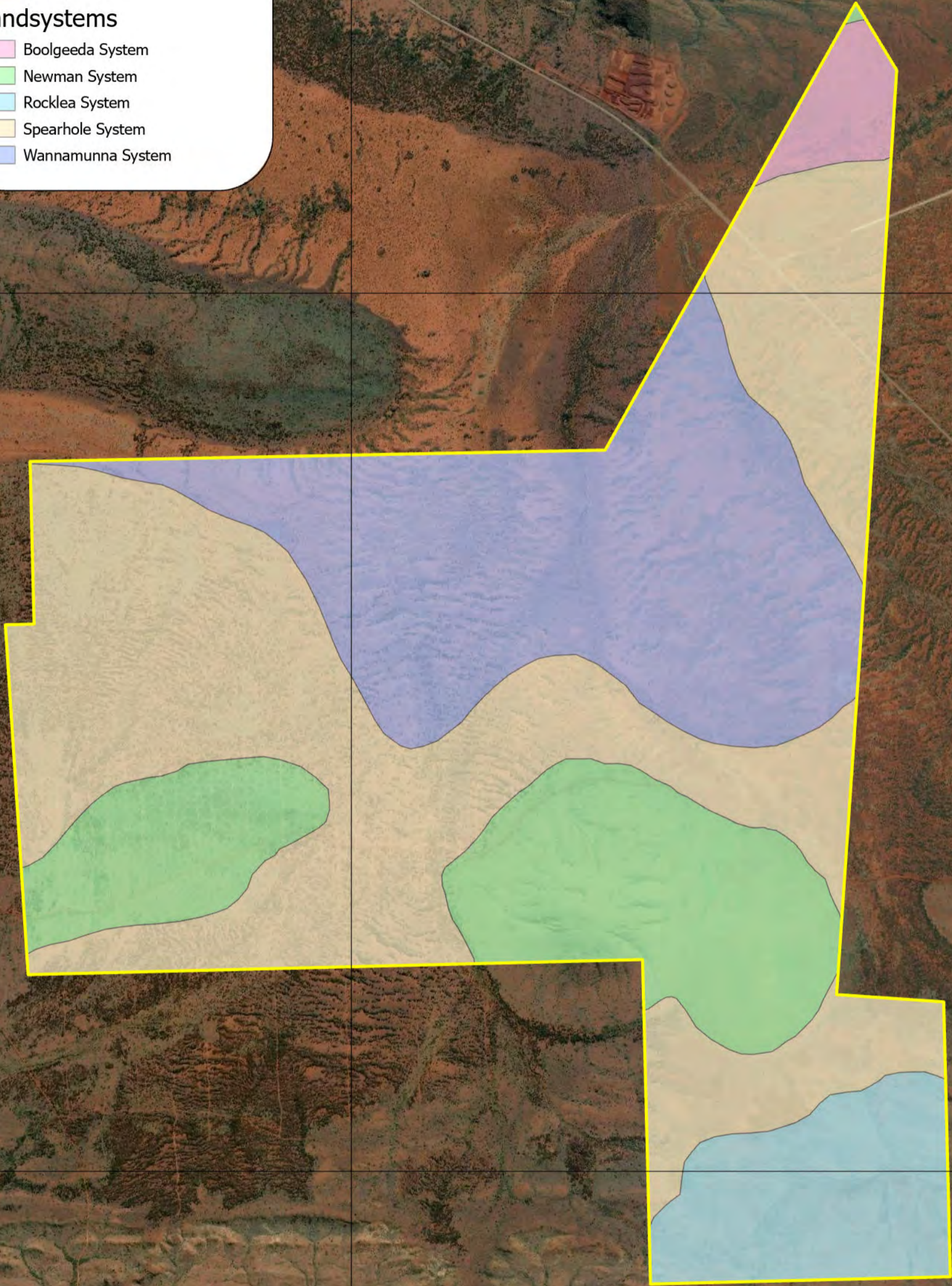
Land systems of the Pilbara region were mapped in 2004 (van Vreeswyk, Leighton, Payne, & Hennig, 2004). There are five land systems represented within the survey area (Figure 5). The approximate total area of each land system in the region, area of land system within the survey area, percentage of each regional land system within the survey area and the percentage of the survey area represented by each land system, is detailed in Table 1. Table 2 describes the major landform features and soils present within each land system within the survey area.

**Table 1: Land systems within the survey area**

Land system	Description	Area (ha) of land system in the region	Area (ha) of land system within survey area	Percentage of entire land system within survey area	Percentage of survey area represented by each land system
Spearhole System	Gently undulating hardpan plains supporting groved mulga shrublands and hard spinifex.	127,000	829	0.65	43.6
Wannamunna System	Hardpan plains and internal drainage tracts supporting mulga shrublands and woodlands (and occasionally eucalypt woodlands).	57,700	524	0.91	27.5
Newman System	Rugged jaspilite plateaux, ridges and mountains supporting hard spinifex grasslands.	1,458,000	354	0.02	18.6
Rocklea System	Basalt hills, plateaux, lower slopes and minor stony plains supporting hard spinifex (and occasionally soft spinifex) grasslands.	2,299,300	156	0.01	8.2
Boolgeeda System	Stony lower slopes and plains below hill systems supporting hard and soft spinifex grasslands and mulga shrublands.	774,800	40	0.01	2.1

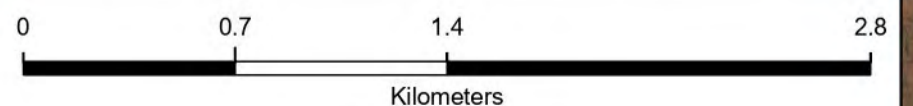
**Legend**

- Survey Area
- Landsystems**
- Boolgeeda System
- Newman System
- Rocklea System
- Spearhole System
- Wannamunna System



Land systems of the survey area

Figure 5



Scale: 1:25,000 at A3

Spatial Reference  
PCS: GDA 1994 MGA Zone 51  
GCS: GCS GDA 1994  
Datum: GDA 1994

Author: S. Parnaby  
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**Table 2: Characteristics of land systems within the survey area**

Land System	Geomorphology	Landforms	Major Soils <sup>1</sup>	Area of land system within survey area (ha)	Percentage of survey area (%)
Spearhole	Depositional surfaces; gently undulating non-saline plains with hardpan at shallow depth and groved vegetation, sparse patterns of tributary drainage with restricted areas of shallow valleys and finely dissected slopes. Relief up to 35 m.	Gravelly hardpan plains (55%) Low rises (15%) Groves (15%) Dissected slopes (10%) Drainage zones and channels (5%)	Red-brown hardpan shallow loams (523), red loamy earths (544), Red shallow loams (522), red sandy earths (463), channels with riverbed soils (705)	829	43.6
Wannamunna	Depositional surfaces; level hardpan washplains subject to overland sheet flow, drainage foci as discrete arcuate groves and broad internal drainage flats both receiving run-on from adjacent hardpan surfaces; rare, channelled tracts but mostly no organised through drainage. Relief up to 5 m.	Hardpan plains (56%) Internal drainage plains (20%) Groves (15%) Stony plains (8%) Calcrete platforms (1%)	Red loamy earths (544), red-brown hardpan shallow loams (523), red shallow loams (522), calcareous shallow loams (521), red deep loamy duplex soils (506), self-mulching cracking clays (602), deep red/brown noncracking clays (622)	524	27.5
Newman	Rugged jaspilite plateaux, ridges and mountains supporting hard spinifex grasslands. Erosional surfaces; plateaux and mountains - extensive high plateaux, mountains and strike ridges with vertical escarpments and steep scree slopes and more gently inclined lower slopes; moderately spaced dendritic and rectangular tributary drainage patterns of narrow valleys and gorges with narrow drainage floors and channels. Relief up to 450 m.	Plateaux, ridges, mountains and hills (70%) Lower slopes (20%) Stony plains (5%) Narrow drainage floors with channels (5%)	Stony soils (203), red shallow loams (522)	354	18.6
Rocklea	Erosional surfaces formed by partial dissection of the old Tertiary surface; very gently inclined upper plains with extensive marginal dissection zones with gently inclined to steep slopes, closely spaced dendritic or sub-parallel drainage patterns with narrow floors in upper parts, floors incised up to 30 m with steep stable marginal slopes and becoming wider downslope.	Hills, ridges, plateaux and upper slopes (65%) Lower slopes (15%) Stony plains and interfluves (10%) Gilgai plains (1%) Upper drainage lines (4%)	Red shallow loams (522), stony soils (203), red loamy earths (544), calcareous shallow loams (521), red sandy earths (463), shallow red/brown non-cracking clays (622), self-mulching cracking clays (602), red	156	8.2

Land System	Geomorphology	Landforms	Major Soils <sup>1</sup>	Area of land system within survey area (ha)	Percentage of survey area (%)
		Drainage floors and channels (5%)	shallow sands (423), minor red sandy duplex soils (406), channels with riverbed soils (705)		
Boolgeeda	<p>Stony lower slopes and plains below hill systems supporting hard and soft spinifex grasslands and mulga shrublands.</p> <p>Predominantly depositional surfaces; very gently inclined stony slopes and plains below hill systems becoming almost level further downslope; closely spaced, dendritic and sub-parallel drainage lines. Relief up to 20 m.</p>	<p>Stony lower plains (65%)</p> <p>Stony slopes and upper plains (20%)</p> <p>Narrow drainage floors and channels (10%)</p> <p>Low hills and rises (4%)</p> <p>Groves (1%)</p>	Red loamy earths (544), Red shallow loams (522)	40	2.1

<sup>1</sup> WA Soil Group names and numbers as classified by Schoknecht and Pathan (2013)

## 2.5 Landforms

The survey area is located south of the Hamersley Ranges on predominantly depositional surfaces. There are areas of erosional surfaces within the southern portion of the survey area. Characteristic landforms, predominant surface geology and distribution of landforms within each of the land systems within the survey area are detailed in Table 3.

**Table 3: Landforms within the survey area (van Vreeswyk, Leighton, Payne, & Hennig, 2004)**

Land surface type	Land system	Predominant surface geology	Characteristic landforms	Distribution within the Pilbara region
<b>Predominantly erosional surfaces</b>				
Hills and ridges	Newman	Jaspilite	Ridges, plateaux	Very common
<b>Predominantly depositional surfaces</b>				
Stony plains	Boolgeeda	Colluvium	Stony lower plains	Very common
	Rocklea	Laterite	Minor stony plains	Very common
Gravelly hardpan plains	Spearhole	Alluvium	Gently undulating gravelly plains	South and south-east common
	Wannamunna	Alluvium	Hardpan plains, internal drainage flats	Central south, common

## 2.6 Surface geology









The surface geology mapping for the region indicates that there are 7 surface geology units within the survey area, as outlined in Table 4 and Figure 6 (DMIRS, 2024). The majority of the survey area (65.4%) consists of the Qw unit described as alluvium and colluvium-red-brown sandy and clayey soil; on low slopes and sheetwash areas.

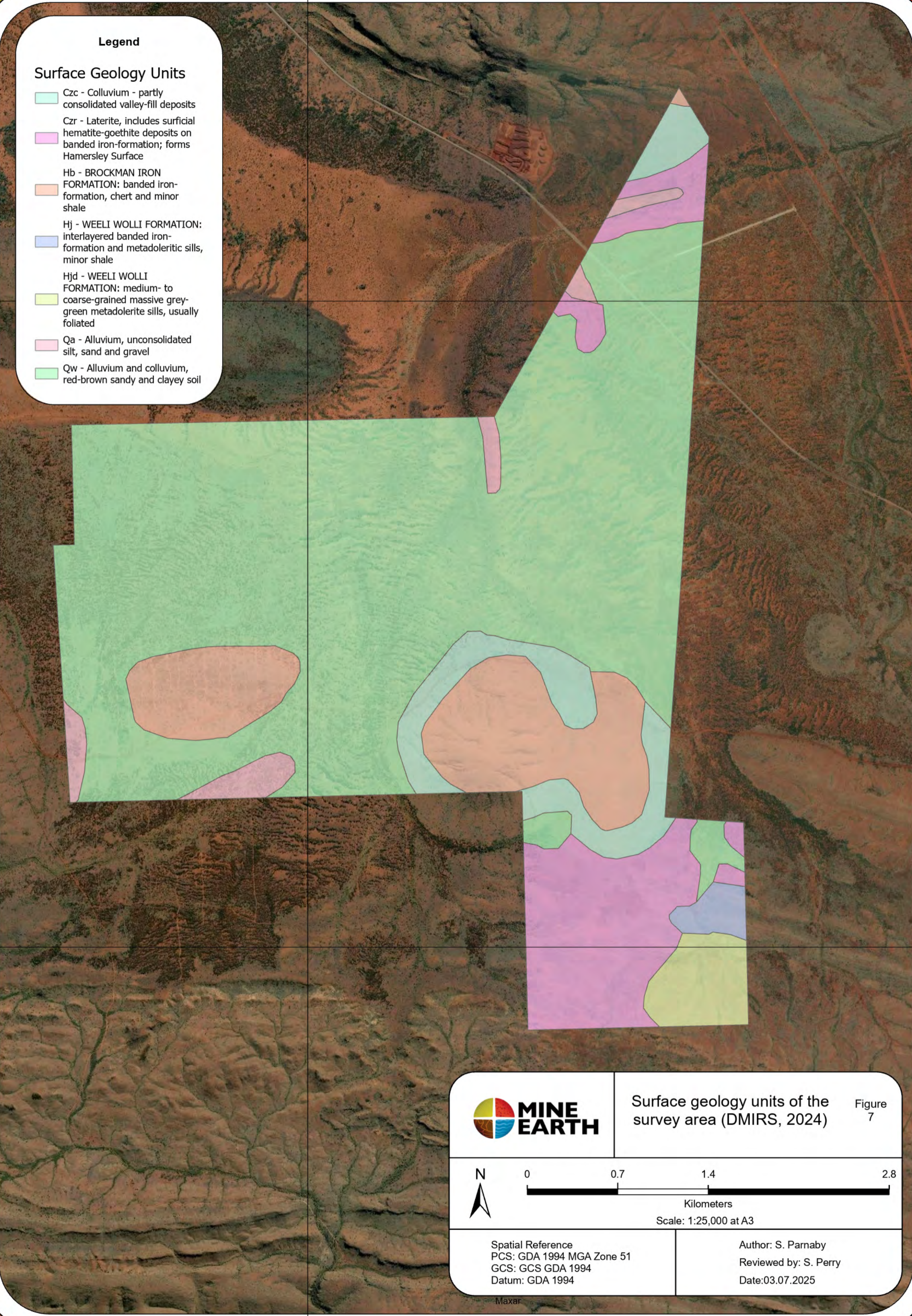
**Table 4: Surface geology units within the survey area (DMIRS, 2024)**

Code	Description	Area of surface geology unit within survey area (ha)	Percentage of survey area (%)
Qw	Alluvium and colluvium-red-brown sandy and clayey soil; on low slopes and sheetwash areas	1,243	65.4
Hb	BROCKMAN IRON FORMATION: banded iron-formation, chert and minor shale	224	11.8
Czr	Hematite-goethite deposits on banded iron-formation and adjacent scree deposits	208	10.9
Czc	Colluvium-partly consolidated quartz and rock fragments in silt and sand matrix; old valley-fill deposits	118	6.2
Hj	WEELI WOLLI FORMATION: interlayered banded iron-formation and metadoleritic sills, minor shale	18	0.9
Hjd	WEELI WOLLI FORMATION: medium- to coarse-grained massive grey-green metadolerite sills, usually foliated	49	2.6
Qa	Alluvium-unconsolidated silt, sand, and gravel; in drainage channels and on adjacent floodplains	43	2.2

**Legend**

**Surface Geology Units**

-  Czc - Colluvium - partly consolidated valley-fill deposits
-  Czc - Colluvium - partly consolidated valley-fill deposits
-  Czc - Colluvium - partly consolidated valley-fill deposits
-  Czc - Colluvium - partly consolidated valley-fill deposits
-  Czc - Colluvium - partly consolidated valley-fill deposits
-  Czc - Colluvium - partly consolidated valley-fill deposits
-  Czc - Colluvium - partly consolidated valley-fill deposits
-  Czc - Colluvium - partly consolidated valley-fill deposits



Surface geology units of the survey area (DMIRS, 2024)

Figure 7



0 0.7 1.4 2.8

Kilometers

Scale: 1:25,000 at A3

Spatial Reference  
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Datum: GDA 1994

Author: S. Parnaby  
Reviewed by: S. Perry  
Date: 03.07.2025

## 2.7 Vegetation and flora

A detailed flora and vegetation survey of the survey area was undertaken by Rapallo Environmental, with fieldwork conducted in September 2023 and April 2024 (Rapallo Environmental, 2024).

Six vegetation types were recorded within the survey area, as outlined in Table 5 and Figure 7. None of the vegetation types aligned with known Threatened or Priority Ecological Communities (Rapallo Environmental, 2024).

Grove-intergrove mulga communities (vegetation type A) may be considered locally significant as they comprise *Acacia aptaneura* (mulga) as the dominant upper storey species on stony plains and floodplains (Rapallo Environmental, 2024). This matches the broad description of ‘grove-intergrove mulga communities’ listed as one of the “ecosystems at risk” in the Fortescue Plains subregion (PIL2) of the Pilbara IBRA region (Rapallo Environmental, 2024).

Vegetation types F, A and B have a slightly raised local importance due to the presence of priority taxa as a dominant taxon in the vegetation structure (*Isotropis parviflora* – Priority 3 in vegetation type F and *Rhagodia* sp. Hamersley – Priority 3 in vegetation types A and B). However, these vegetation types are not considered regionally significant as *Isotropis parviflora* and *Rhagodia* sp. Hamersley (Priority 3) occur in a variety of habitats not only the vegetation types found in the survey area (Rapallo Environmental, 2024).

The vegetation condition ranged from Good to Excellent, with 41% mapped as Good to Very Good, 27% mapped as Very Good and 32% mapped as Excellent condition. Disturbance from grazing, exploration, rubbish and weed infestation were the main factors influencing vegetation condition (Rapallo Environmental, 2024).

**Table 5: Vegetation types within the survey area (Rapallo Environmental, 2024)**

Vegetation type		Area (ha)	Area %
A	Mulga woodland over diverse tussock grassland on plains	840.1	50.9
B	Banded mulga woodland over <i>Triodia pungens</i> and <i>Triodia vanleeuwenii</i>	398.7	24.2
C	<i>Eucalyptus leucophloia</i> over <i>Triodia vanleeuwenii</i> and <i>Triodia pungens</i> on stony plains and rises	179.1	10.9
D	<i>Acacia catenulata</i> and <i>Corymbia hamersleyana</i> over <i>Triodia pungens</i> and <i>Themeda triandra</i> in drainage at the base of low hills	14.4	0.9
F	<i>Triodia vanleeuwenii</i> and <i>Triodia wiseana</i> spinifex grassland with emergent <i>Eucalyptus leucophloia</i> on low hills and stony rises	63.2	3.8
G	<i>Triodia wiseana</i> and <i>Triodia angusta</i> closed spinifex grassland with emergent mallees and shrubs on undulating stony plain	154.8	9.4

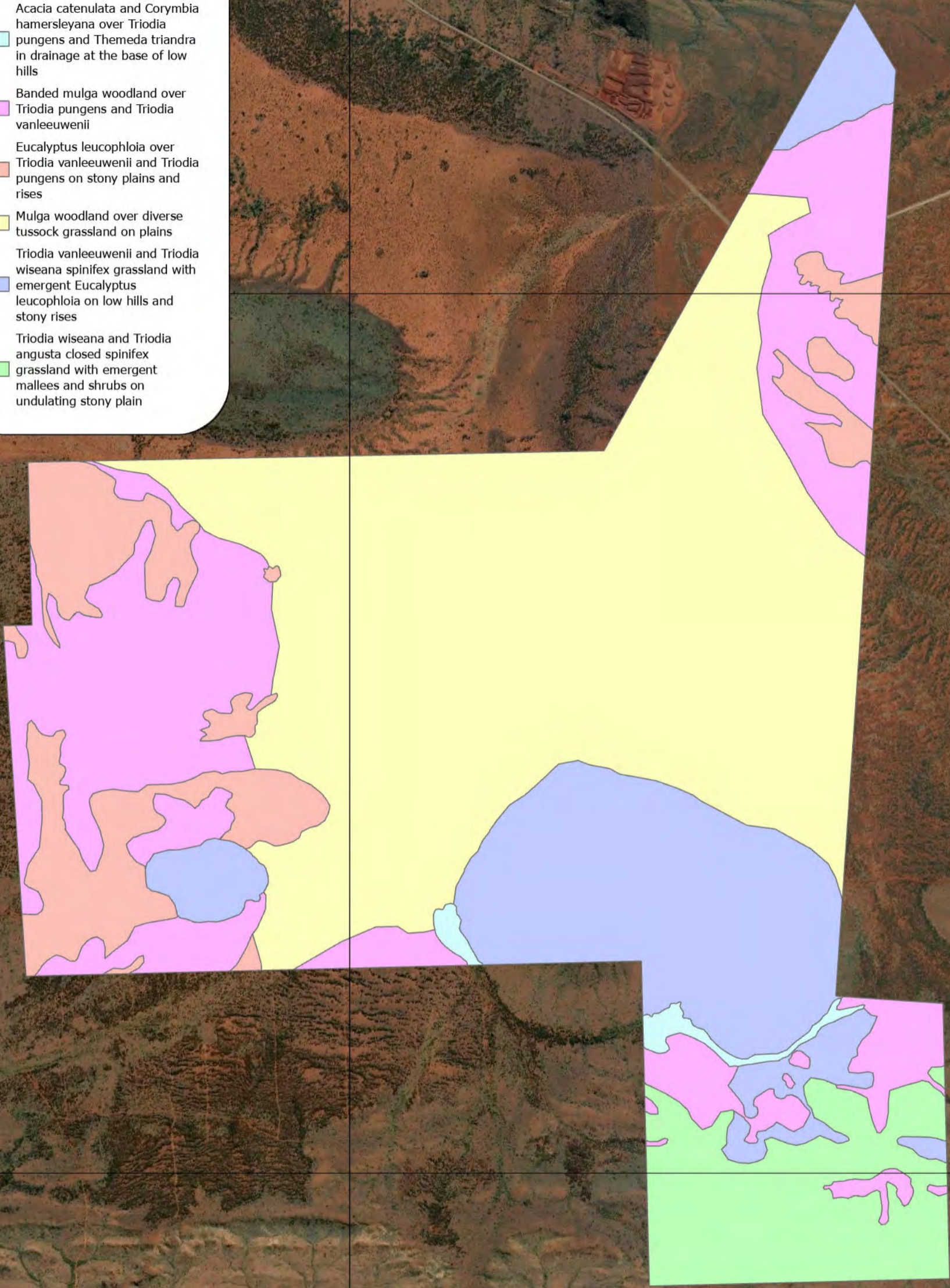
Five conservation significant flora taxa were recorded in the survey area (Rapallo Environmental, 2024):

- *Aristida jerichoensis* var. *subspinulifera* (Priority 3)
- *Indigofera gilesii* (Priority 3)
- *Ipomoea racemigera* (Priority 2)
- *Isotropis parviflora* (Priority 3)
- *Rhagodia* sp. Hamersley (Priority 3)

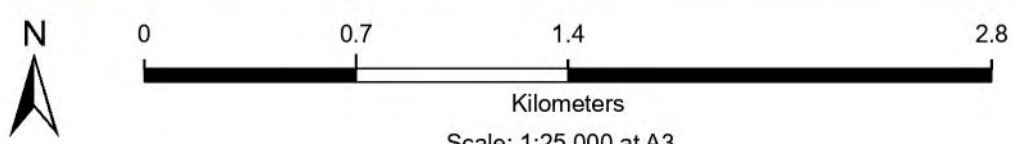
**Legend**

**Vegetation units**

-  Acacia catenulata and Corymbia hamersleyana over Triodia pungens and Themeda triandra in drainage at the base of low hills
-  Banded mulga woodland over Triodia pungens and Triodia vanleeuwenii
-  Eucalyptus leucophloia over Triodia vanleeuwenii and Triodia pungens on stony plains and rises
-  Mulga woodland over diverse tussock grassland on plains
-  Triodia vanleeuwenii and Triodia wiseana spinifex grassland with emergent Eucalyptus leucophloia on low hills and stony rises
-  Triodia wiseana and Triodia angusta closed spinifex grassland with emergent mallees and shrubs on undulating stony plain



Vegetation of the survey area (Rapallo Environmental, 2024) **Figure 7**



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PCS: GDA 1994 MGA Zone 51  
GCS: GCS GDA 1994  
Datum: GDA 1994

Author: S. Parnaby  
Reviewed by: S. Perry  
Date: 03.07.2025

## 2.8 Fauna

Both a detailed terrestrial vertebrate fauna survey (Rapallo Environmental, 2025a) and a targeted fauna survey (including a 'Matters of National Significance' (MNES) review) was completed for the Project in 2025 by Rapallo Environmental (Rapallo Environmental, 2025b). Six broad fauna habitats were mapped in the detailed terrestrial vertebrate fauna study. A description of each habitat and its conservation significance is detailed in Table 6 and shown in Figure 8 (Rapallo Environmental, 2025a).

No MNES threatened fauna species were recorded during the targeted survey. A sloughed skin of one Pilbara olive python (listed as vulnerable under EPBC Act) was recorded and three DBCA listed priority species were recorded in the survey area, namely the Western pebble-mound mouse (Priority 4), long-tailed dunnart (Priority 4) and Gane's blind snake (Priority 1) (Rapallo Environmental, 2025b). The survey area is considered unlikely to contain critical habitat for MNES threatened fauna (Rapallo Environmental, 2025b).

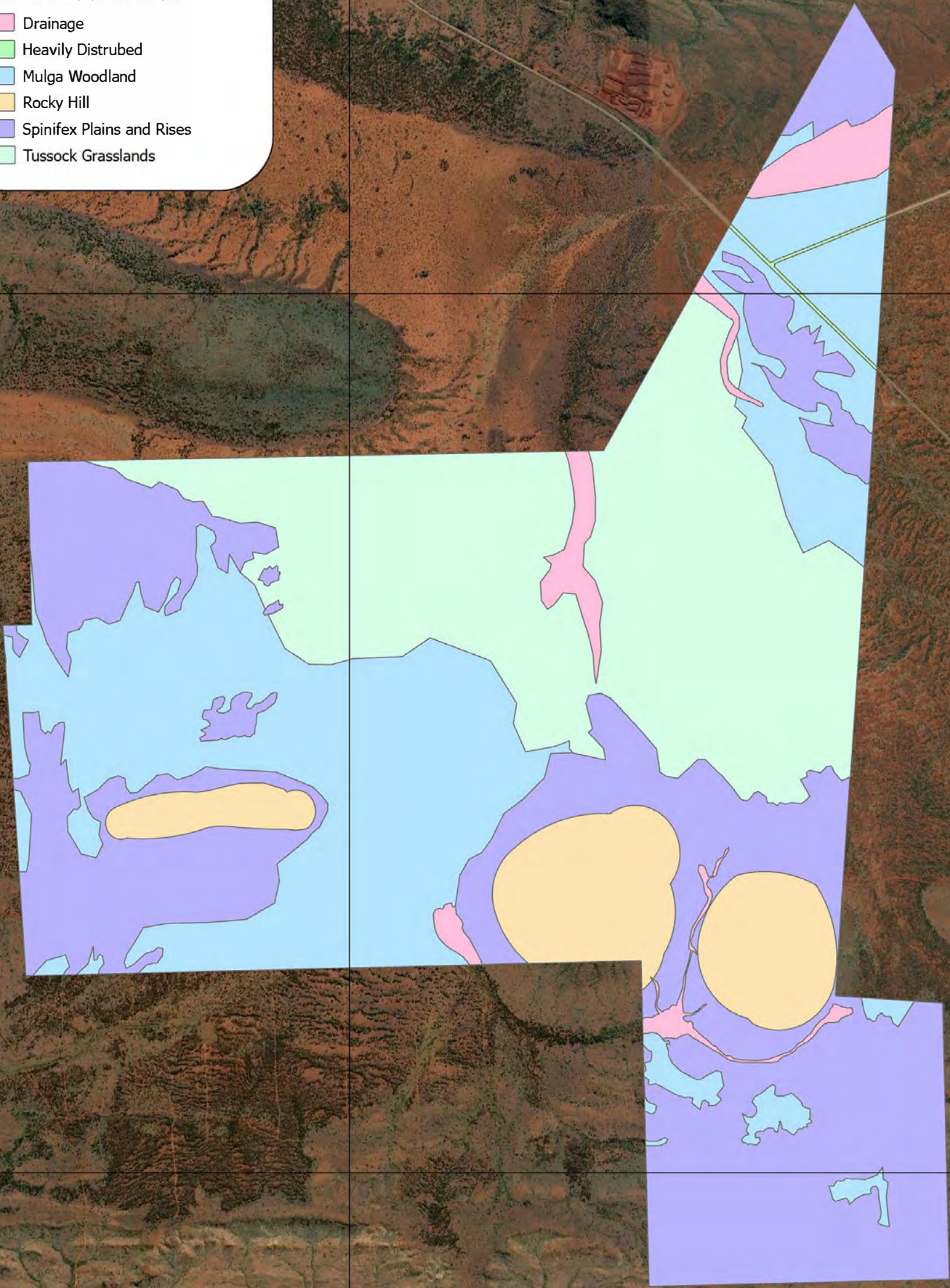
**Table 6: Fauna habitats in the survey area and their conservation significance (Rapallo Environmental, 2025a)**

Habitat type	Proportion of the survey area	Conservation significance
Spinifex Stony Plains and Rises	34%	Conservation significant fauna, the Western pebble-mound mouse (Priority 4) had activity observed in this habitat. Brush-tailed mulgara could persist in this habitat if feral predators were controlled.
Tussock Grasslands	28%	No conservation significant fauna was directly observed during the study in this habitat type. This habitat may be used sporadically during times of high rainfall by some migratory bird species such as sandpipers and stints.
Mulga Woodlands	27%	No conservation significant fauna was directly observed during the study in this habitat type. Greater Bilby and Brush-tailed mulgara could persist in this habitat if feral predators were controlled.
Rocky Hills	8%	Conservation significant fauna, the Western pebble-mound mouse (Priority 4), Long-tailed dunnart, Gane's blind Snake and a sloughed skin of a Pilbara olive python were observed in this habitat. Northern quoll could persist in this habitat type if feral predators were controlled. Habitat also seems suitable for Pilbara barking gecko.
Drainage	3%	No conservation significant fauna was directly observed during the study in this habitat type. Brush-tailed mulgara could persist in this habitat if feral predators were controlled. Gane's blind snake could persist in this habitat type
Disturbed	0.2%	No conservation significant fauna was directly observed during the study in this habitat type.

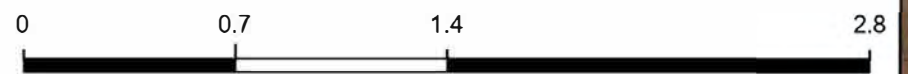
**Legend**

**Fauna habitat unit**

- Drainage
- Heavily Disturbed
- Mulga Woodland
- Rocky Hill
- Spinifex Plains and Rises
- Tussock Grasslands



Fauna habitats of the survey area Figure 8  
(Rapallo Environmental, 2025a)

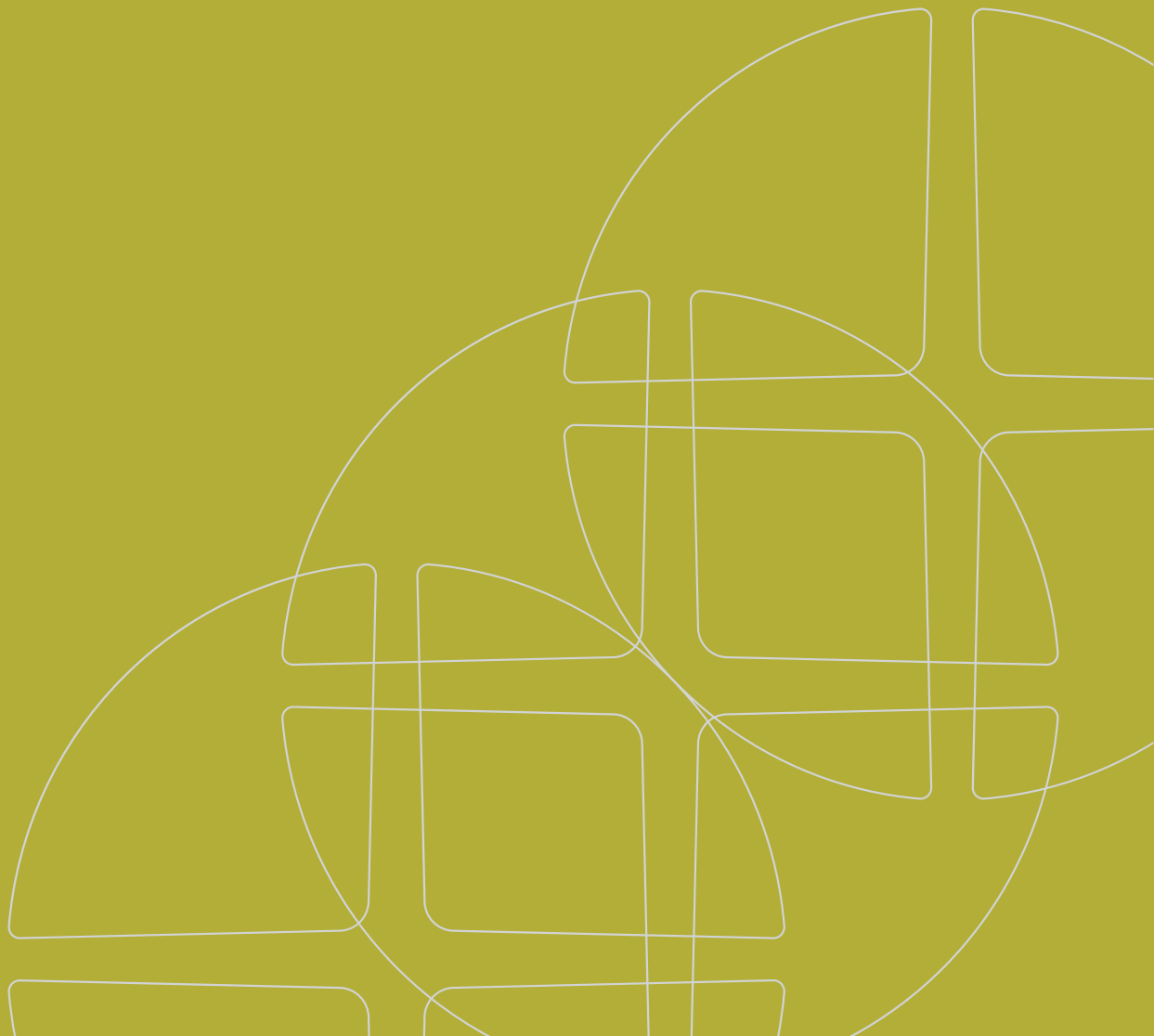


Kilometers  
Scale: 1:25,000 at A3

Spatial Reference  
PCS: GDA 1994 MGA Zone 51  
GCS: GCS GDA 1994  
Datum: GDA 1994

Author: S. Parnaby  
Reviewed by: S. Perry  
Date: 03.07.2025

# Landform assessment



## 3. Landform assessment

### 3.1 Methodology for landform mapping

The likely landforms within the survey area were initially identified via desktop assessment, using aerial imagery, land system mapping and descriptions, Digital Elevation Model (DEM) and vegetation/fauna mapping. Each landform was then visited in the field (where possible) with photos and field observations recorded at various observation sites (Figure 9), as per the Environmental Factor Guideline for Landforms (EPA, 2018). Field notes and photos for each landform are included in Appendix A.

The field data, DEM, land system mapping, vegetation mapping and fauna habitat mapping were then used to digitise the approximate boundaries of the landforms.

### 3.2 Limitations for landform assessment

The following limitations are associated with the landform assessment:

- Short range endemics were not considered as part of the landform assessment as the survey was not available at the time.
- Given the large size of the survey area, only a small proportion of each landform was observed and hence the condition/integrity of the entire landform could not be viewed. The condition/integrity of the landforms was determined from a combination of field observations, erosion risk classification (from the land system mapping) and vegetation condition mapping.
- Landform mapping utilised survey imagery, DEM visualisation and publicly available data (such as land system mapping) and vegetation mapping (Rapallo Environmental, 2024) to inform the interpretation and digitisation of landform boundaries. These datasets include a level of inherent approximation and generalisation.
- The mapping of landform boundaries was limited by the accuracy of the available datasets and scope of the field survey.
- The significance of heritage sites within the survey area is unknown, and therefore the social importance cannot be determined for each landform at this time.

### 3.3 Landforms present within the survey area

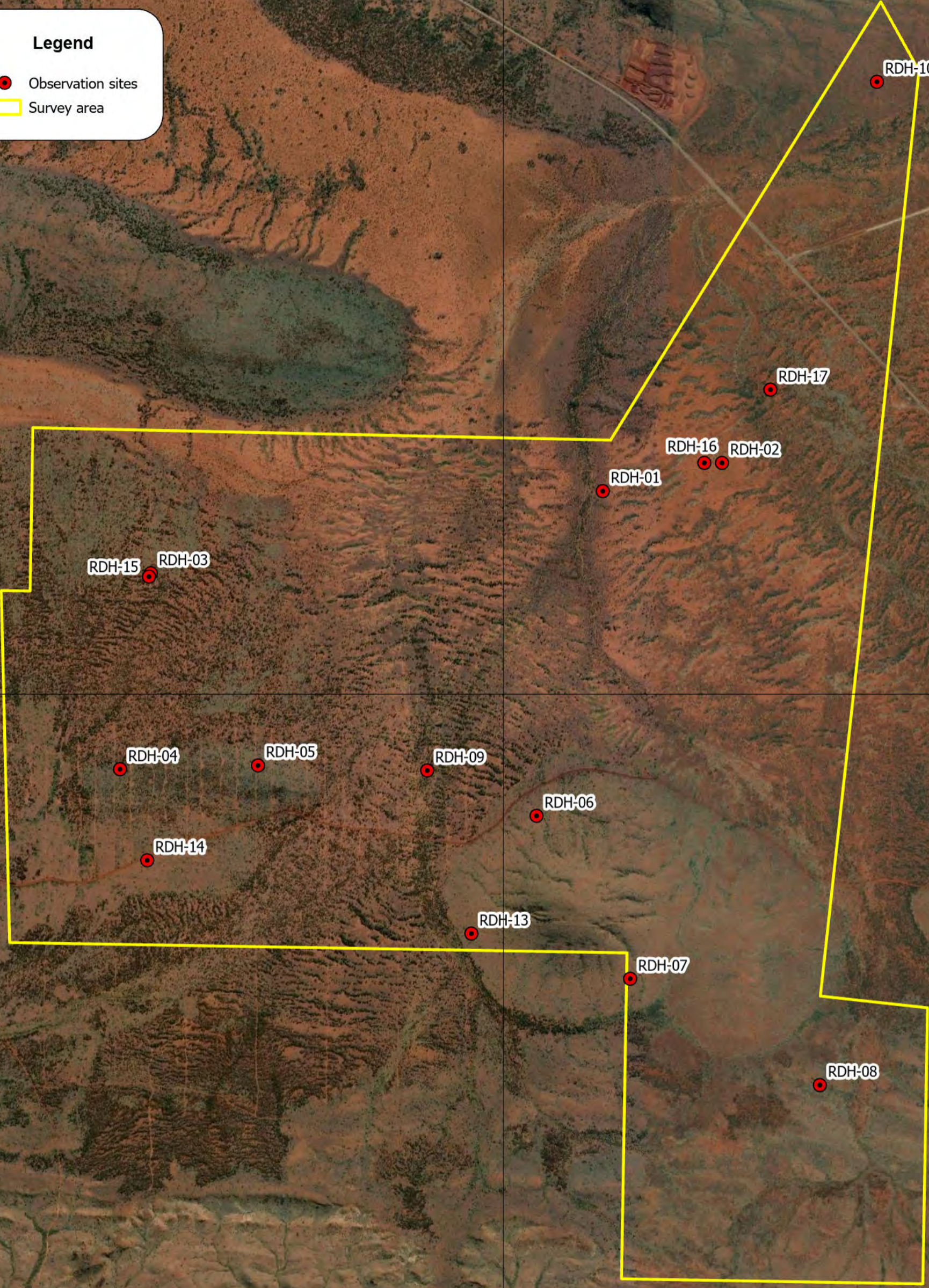
The observation points assessed during the field survey are presented in Figure 9. The landforms identified during the field survey are listed below, with their approximate extent within the survey area detailed in Figure 10. Field observations and photos of each of the landforms is included in Appendix A. The extent, condition/integrity, geology, morphology and environmental values of each landform are summarised in Table 7.

- Stony plains
- Rocky Hill
- Undulating Gravelly Plains
- Low Rises
- Drainage tracts
- Washplains

750000

**Legend**

- Observation sites
- ▭ Survey area



7430000

7430000

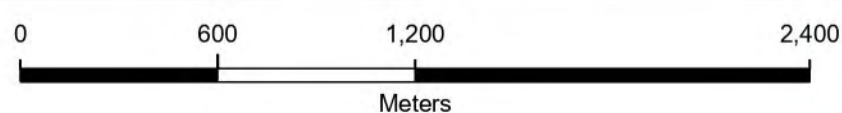
7425000

7425000



Round Hill landform  
assessment sites

Figure  
9



Scale: 1:23,000 at A3

Spatial Reference  
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GCS: GCS GDA 1994  
Datum: GDA 1994

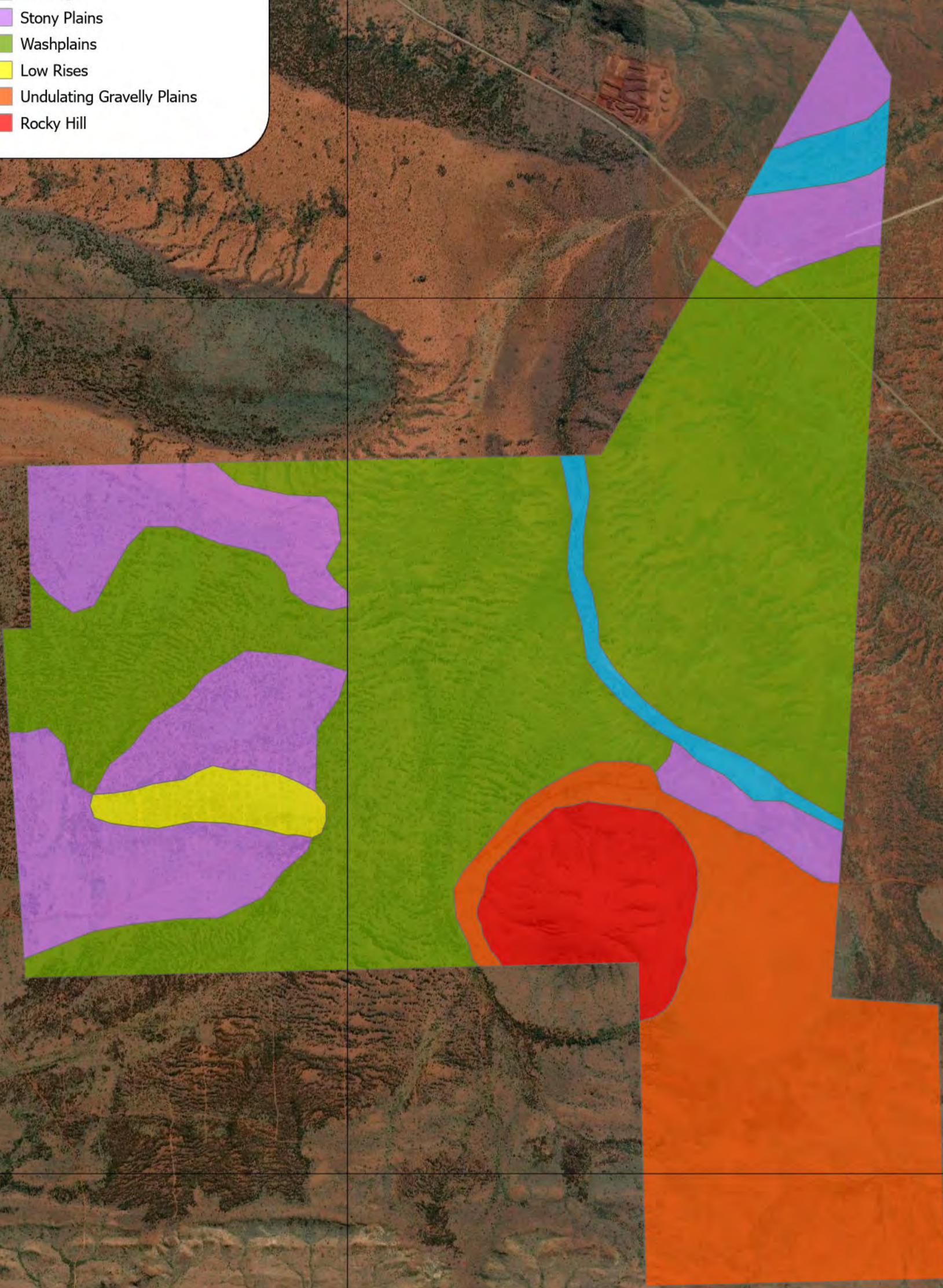
Author: S. Parnaby  
Reviewed by: S. Perry  
Date: 01.07.2025

750000

Maxar

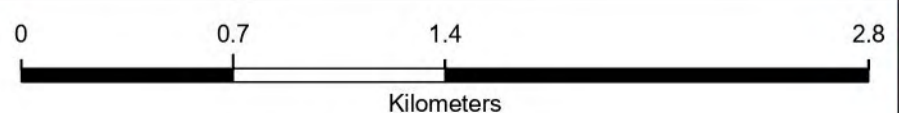
**Legend**

- Drainage
- Stony Plains
- Washplains
- Low Rises
- Undulating Gravelly Plains
- Rocky Hill



Landforms of the survey area

Figure 10



Scale: 1:25,000 at A3

Spatial Reference  
PCS: GDA 1994 MGA Zone 51  
GCS: GCS GDA 1994  
Datum: GDA 1994

Author: S. Parnaby  
Reviewed by: S. Perry  
Date:01.07.2025

Maxar

### 3.4 Assessment of landform significance

For the purposes of EIA, the EPA defines landforms as:

*The distinctive, recognisable physical features of the earth's surface having a characteristic shape produced by natural processes. A landform is defined by the combination of its geology (composition) and morphology (form) (EPA, 2018).*

The following criteria are used to determine if a landform is significant: Variety, Integrity, Ecological Importance, Scientific Importance, Rarity, Social Importance (EPA, 2018). The information summarised in Table 7 is used to conduct the assessment for each landform. The assessment of the landform significance within the survey area against the criteria is provided in Table 8.

The 'Rocky Hill' landform within the survey area is rare on a local scale, hence an investigation of other 'Rocky Hills' in the region was conducted to determine its rarity in the region.

The investigation aimed to identify whether other rocky hill landforms with the following characteristics are present within the region:

- a similar shape and size (i.e. a hill) that is set apart from ranges as a discrete landform surrounded by plains.
- was formed by the same processes (erosional).
- consists of similar geology (i.e. Brockman Iron Formation, according to the surface geology mapping).
- is in a similar environment (i.e. Newman land system).
- has a similar elevation.

Seven other rocky hill landforms with the above characteristics were identified within the region as outlined in Figure 11. Visual comparisons of the surface geology and land systems for the rocky hills are shown in Figure 12 and Figure 13. It should be noted that the surface geology and land systems shown are based on broad scale regional mapping. Elevation of the rocky hills examined ranged between approximately 1,430m (AHD) and 1,778m (AHD) and the hills ranged between approximately 14 ha and 75 ha in area.

All of the hills had similar morphological characteristics, being roughly round in shape and were set apart from ranges as discrete landforms, often surrounded by plains. All hills shared the same surface geology, being the Brockman Iron Formation, and were a part of the same Newman land system.

There is inherent variability between these landforms, however all share the characteristics listed above which define them as rocky hill landforms. Hence, rocky hills of this type are not considered to be rare in the region.

Based on the assessment of the significance of the landforms against the criteria in Table 8 and observations made on site, none of the landforms present within the Round Hill survey area are considered significant.

**Table 7: Characteristics of landforms of the survey area**

Landform	Extent (ha)	Condition/integrity	Geology	Morphology	Environmental Values <sup>1</sup>
Wash plains	971	Moderate to good condition, with impact from cattle in parts. Good integrity. Exploration disturbance evident in some areas. Low wind erosion risk and low water erosion risk if undisturbed. The vegetation within the wash plains has been mapped as good to excellent condition (Rapallo Environmental, 2024).	Partially cemented Quaternary alluvium and colluvium	Extensive level washplains which have been shaped by sheet flow, where water disperses across the surface and converges in densely vegetated groves. These groves typically form curved, banded patterns that lie counter to the main direction of flow.	<p><u>Major vegetation types:</u> Mulga woodland over diverse tussock grassland on plains, Banded mulga woodland over <i>Triodia pungens</i> and <i>Triodia vanleeuwenii</i>.</p> <p><u>Minor vegetation types:</u> <i>Eucalyptus leucophloia</i> over <i>Triodia vanleeuwenii</i> and <i>Triodia pungens</i> on stony plains and rises, <i>Triodia vanleeuwenii</i> and <i>Triodia wiseana</i> spinifex grassland with emergent <i>Eucalyptus leucophloia</i> on low hills and stony rises, <i>Acacia catenulata</i> and <i>Corymbia hamersleyana</i> over <i>Triodia pungens</i> and <i>Themeda triandra</i> in drainage at the base of low hills and <i>Triodia wiseana</i> and <i>Triodia angusta</i> closed spinifex grassland with emergent mallees and shrubs on undulating stony plain.</p> <p>Significant flora species which may occur in this landform include <i>Rhagodia</i> sp. Hamersley (M. Trudgen 17794) (P3), <i>Indigofera gilesii</i> (P3), <i>Isotropis parviflora</i> (P3), <i>Ipomoea racemigera</i> (P2) and <i>Aristida jerichoensis</i> var. <i>subspinulifera</i> (P3)</p> <p><u>Major fauna habitat:</u> Tussock grassland – Not critical for conservation significant fauna taxa. Mulga woodlands – Not critical for conservation significant fauna taxa.</p> <p><u>Minor fauna habitat:</u> Spinifex Stony Plains and Rises – Not critical for conservation significant fauna taxa. Drainage – Not critical for conservation significant fauna taxa.</p>
Stony plains	360	Moderate to good condition and good integrity, evidence of cattle disturbance. Low risk of wind erosion and low risk of water erosion. The vegetation within the stony plain has been mapped as good to very good condition (Rapallo Environmental, 2024).	Partially cemented Quaternary alluvium and colluvium	Level to gently sloped depositional plains with possible hardpan, broad disparate drainage foci and moderate to high density surface lag of predominantly iron stone.	<p><u>Major vegetation types:</u> <i>Eucalyptus leucophloia</i> over <i>Triodia vanleeuwenii</i> and <i>Triodia pungens</i> on stony plains and rises, Mulga woodland over diverse tussock grassland on plains, Banded mulga woodland over <i>Triodia pungens</i> and <i>Triodia vanleeuwenii</i>,</p> <p><u>Minor vegetation types:</u> <i>Triodia vanleeuwenii</i> and <i>Triodia wiseana</i> spinifex grassland with emergent <i>Eucalyptus leucophloia</i> on low hills and stony rises.</p> <p>Significant flora species which may occur in this landform include: <i>Rhagodia</i> sp. Hamersley (M. Trudgen 17794) (P3), <i>Ipomoea racemigera</i> (P2), and <i>Aristida jerichoensis</i> var. <i>subspinulifera</i> (P3), <i>Indigofera gilesii</i> (P3) and <i>Isotropis parviflora</i> (P3).</p> <p><u>Major fauna habitat:</u> Mulga woodlands – Not critical for conservation significant fauna taxa. Spinifex Stony Plains and Rises – Not critical for conservation significant fauna taxa</p> <p><u>Minor fauna habitat:</u> Tussock grassland – Not critical for conservation significant fauna taxa. Drainage – Not critical for conservation significant fauna taxa. Rocky Hill – Stony slopes within this habitat are used by the conservation significant Western Pebble-mound mouse, Long-tailed Dunnart and Gane’s Blind Snake. Disturbed – Not critical for conservation significant fauna taxa.</p>
Undulating gravelly plains	379	Good condition and good integrity with low wind and water erosion risk if undisturbed. Exploration disturbance evident. The vegetation within the undulating gravelly plains has been mapped as very good to excellent condition (Rapallo Environmental, 2024).	Archaean basalt, Lower Proterozoic basalt, dolerite, tuff and agglomerate, minor shale and jaspilite.	Undulating plains with predominantly gravel-sized ironstone surface lag, interspersed with minor shallow drainage channels. Located at the south-eastern foot of Round Hill.	<p><u>Major vegetation types:</u> <i>Triodia wiseana</i> and <i>Triodia angusta</i> closed spinifex grassland with emergent mallees and shrubs on undulating stony plain, <i>Triodia vanleeuwenii</i> and <i>Triodia wiseana</i> spinifex grassland with emergent <i>Eucalyptus leucophloia</i> on low hills and stony rises.</p> <p><u>Minor vegetation types:</u> Banded mulga woodland over <i>Triodia pungens</i> and <i>Triodia vanleeuwenii</i>, <i>Acacia catenulata</i> and <i>Corymbia hamersleyana</i> over <i>Triodia pungens</i></p> <p>Significant flora species which may occur in this landform include: <i>Rhagodia</i> sp. Hamersley (M. Trudgen 17794) (P3), <i>Indigofera gilesii</i> (P3) and <i>Isotropis parviflora</i> (P3).</p> <p><u>Major fauna habitat:</u> Rocky Hill – Stony slopes within this habitat are used by the conservation significant Western Pebble-mound mouse, Long-tailed Dunnart and Gane’s Blind Snake. Spinifex Stony Plains and Rises – Not critical for conservation significant fauna taxa</p> <p><u>Minor fauna habitat:</u> Drainage – Not critical for conservation significant fauna taxa. Mulga woodlands – Not critical for conservation significant fauna taxa.</p>

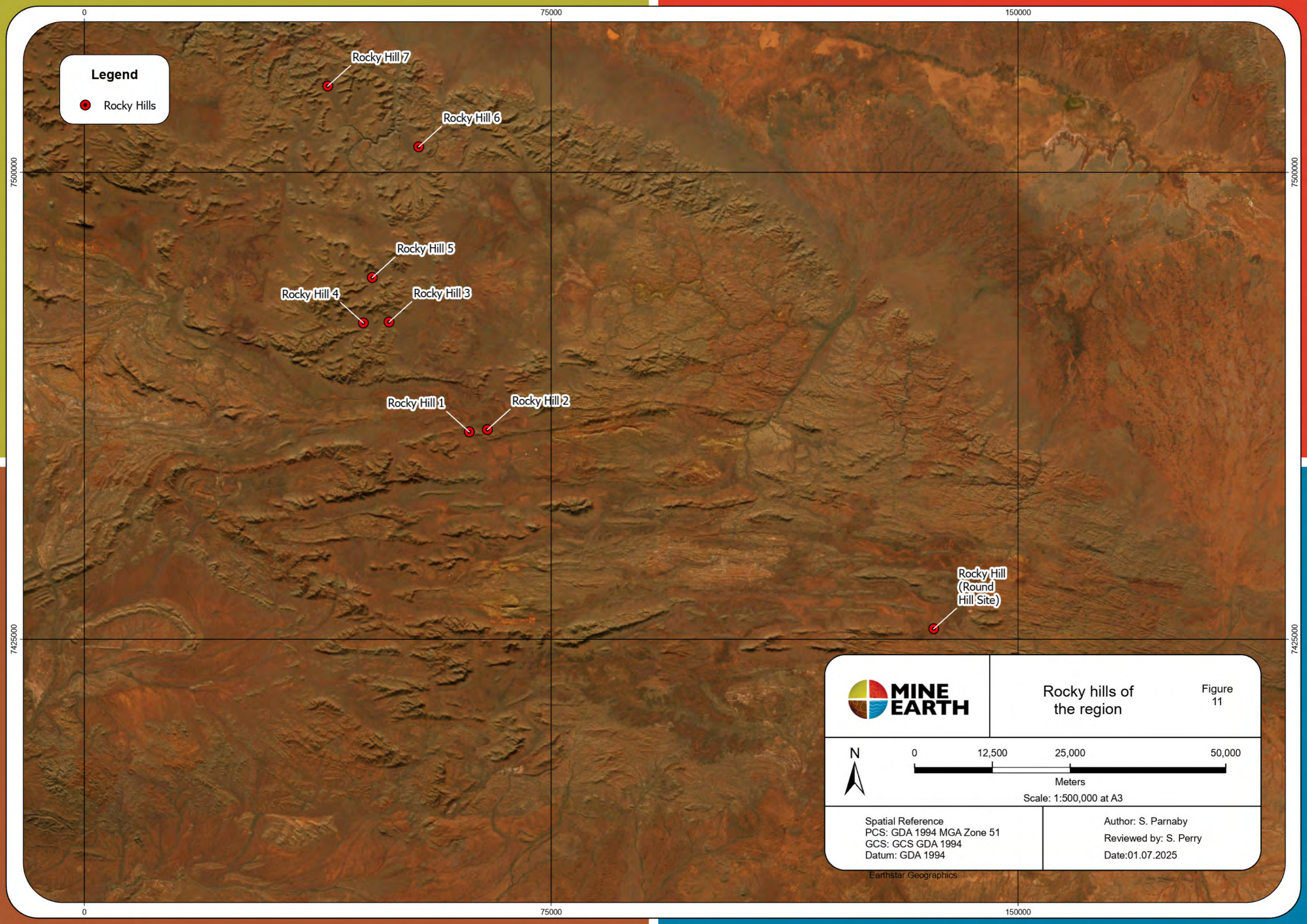
Landform	Extent (ha)	Condition/integrity	Geology	Morphology	Environmental Values <sup>1</sup>
Rocky Hill	104	Good condition and good integrity, exploration disturbance on parts of slopes, large gullies on all sides, with low wind and water erosion risk if undisturbed. The vegetation at the base of the rocky hill has been mapped as very good to excellent condition (Rapallo Environmental, 2024).	Jaspilite, chert, siltstone, shale, dolomite and minor acid volcanics	Isolated, discrete round hill with steep, mid to high slope position with gentle relief lower slopes/footslopes. Large steep sided gullies on mid slope, approximately equidistant from one another on all sides. Hill crest is rounded with gentle relief.	<u>Major vegetation types:</u> <i>Triodia vanleeuwenii</i> and <i>Triodia wiseana</i> spinifex grassland with emergent <i>Eucalyptus leucophloia</i> on low hills and stony rises. Significant flora species which may occur in this landform include: <i>Rhagodia</i> sp. Hamersley (M. Trudgen 17794) (P3), <i>Indigofera gilesii</i> (P3) and <i>Isotropis parviflora</i> (P3). <u>Major fauna habitat:</u> Rocky Hill - Stony slopes within this habitat are used by the conservation significant Western Pebble-mound mouse, Long-tailed Dunnart and Gane's Blind Snake. <u>Minor fauna habitat:</u> Spinifex Stony Plains and Rises – Not critical for conservation significant fauna taxa. Drainage – Not critical for conservation significant fauna taxa.
Drainage tracts	52	Good to Very Good condition and good integrity with low wind and low-moderate water erosion risk, some cattle grazing disturbance evident on fringing vegetation. The vegetation within the drainage tracts has been mapped as very good to excellent condition (Rapallo Environmental, 2024).	Quaternary alluvium and colluvium	Discrete drainage foci intersecting broad internal drainage flats with intermittent narrow channelled tracts. Receives run-on from adjacent washplains and hardpan surfaced channel beds.	<u>Major vegetation types:</u> Mulga woodland over diverse tussock grassland on plains <u>Minor vegetation types:</u> Banded mulga woodland over <i>Triodia pungens</i> and <i>Triodia vanleeuwenii</i> Significant flora species which may occur in this landform include: <i>Rhagodia</i> sp. Hamersley (M. Trudgen 17794) (P3), <i>Ipomoea racemigera</i> (P2), and <i>Aristida jerichoensis</i> var. <i>subspinulifera</i> (P3) <u>Major fauna habitat:</u> Drainage – Not critical for conservation significant fauna taxa. <u>Minor fauna habitat:</u> Tussock grassland – Not critical for conservation significant fauna taxa.
Low rises	36	Good condition, good integrity with exploration disturbance evident.	Jaspilite, chert, siltstone, shale, dolomite and minor acid volcanics	Erosional surface, gently inclined low rises sloping towards surrounding washplains. Sparse open woodland over a predominantly spinifex understorey, outcropping rock near the crest of the low rise.	<u>Major vegetation types:</u> Banded mulga woodland over <i>Triodia pungens</i> and <i>Triodia vanleeuwenii</i> , <i>Eucalyptus leucophloia</i> over <i>Triodia vanleeuwenii</i> and <i>Triodia pungens</i> on stony plains and rises. <u>Minor vegetation types:</u> Mulga woodland over diverse tussock grassland on plains Significant flora species which may occur in this landform include: <i>Rhagodia</i> sp. Hamersley (M. Trudgen 17794) (P3), <i>Ipomoea racemigera</i> (P2), and <i>Aristida jerichoensis</i> var. <i>subspinulifera</i> (P3) <u>Major fauna habitat:</u> Rocky Hill – Stony slopes within this habitat are used by the conservation significant Western Pebble-mound mouse, Long-tailed Dunnart and Gane's Blind Snake. Spinifex Stony Plains and Rises – Not critical for conservation significant fauna taxa <u>Minor fauna habitat:</u> Mulga woodlands – Not critical for conservation significant fauna taxa.

<sup>1</sup> Major vegetation types and significant species within each landform was sourced from GIS data associated with the 'Detailed flora and vegetation survey of the Round Hill project' (Rapallo Environmental, 2024)

<sup>2</sup> Fauna habitat within each landform was sourced from GIS data associated with the 'Detailed terrestrial vertebrate fauna survey of the Round Hill project (Rapallo Environmental, 2025a)

**Table 8: Assessment of significance of landforms within the survey area**

Landform	Variety	Integrity	Ecological Importance	Criteria			Significant (Y/N)
				Scientific Importance	Rarity	Social Importance	
Washplains	Washplains are well represented at the local and regional scale.	The washplains are degraded in places by cattle and are in moderate to good condition.	The washplains do not have a distinctive or exclusive role in maintaining existing ecological or physical processes and do not support endemic or highly restricted plants or animals.	The washplains are not an important geomorphological or geological site, nor are of recognised scientific interest as a reference site or an example of where important natural processes are operating.	Washplains are not rare at the local or regional scale.	There are Aboriginal heritage sites in this area, however the landform has unknown social importance.	N
Stony plains	Stony plains are well represented at the local and regional scale	The stony plains are in moderate to good condition.	The stony plains do not have a distinctive or exclusive role in maintaining existing ecological or physical processes and do not support endemic or highly restricted plants or animals.	The stony plains are not an important geomorphological or geological site, nor are of recognised scientific interest as a reference site or an example of where important natural processes are operating.	Stony plains are not rare at the local or regional scale.	There are Aboriginal heritage sites in this area, however the landform has unknown social importance.	N
Rocky Hill (Round Hill)	Rocky hills are well represented at the local and regional scale.	The rocky hill is in good condition.	The rocky hill does not have a distinctive or exclusive role in maintaining existing ecological or physical processes but does provide habitat for conservation significant species.	The rocky hill is not an important geomorphological or geological site, nor is of recognised scientific interest as a reference site or an example of where important natural processes are operating.	There is only one example of this landform within the survey area and immediate surrounds, such that it is uncommon at the local scale. However, there are numerous examples of rocky hills with similar morphology and composition in the region (Figure 11). Rocky hills are not rare at the regional scale.	There are Aboriginal heritage sites in this area, however the landform has unknown social importance.	N
Low rises	Low rises are well represented at the local and regional scale.	Low rises are degraded in places by cattle and are in moderate to good condition.	Low rises do not have a distinctive or exclusive role in maintaining existing ecological or physical processes and do not support endemic or highly restricted plants or animals.	Low rises are not an important geomorphological or geological site, nor are of recognised scientific interest as a reference site or an example of where important natural processes are operating.	Low rises are not rare at the local or regional scale.	There are Aboriginal heritage sites in this area, however the landform has unknown social importance.	N
Undulating gravelly plains	Undulating gravelly plains are well represented at the local and regional scale	The undulating gravelly plains are in moderate to good condition.	The undulating gravelly plains do not have a distinctive or exclusive role in maintaining existing ecological or physical processes and do not support endemic or highly restricted plants or animals.	The undulating gravelly plains are not an important geomorphological or geological site, nor are of recognised scientific interest as a reference site or an example of where important natural processes are operating.	Undulating gravelly plains are not rare at the local or regional scale.	There are Aboriginal heritage sites in this area, however the landform has unknown social importance.	N
Drainage tracts	Drainage tracts are well represented at the local and regional scale.	The drainage tracts are in good condition.	The drainage tracts do not have a distinctive or exclusive role in maintaining existing ecological or physical processes and do not support endemic or highly restricted plants or animals.	The drainage tracts are not an important geomorphological or geological site, nor are of recognised scientific interest as a reference site or an example of where important natural processes are operating.	Drainage tracts are not rare at the local or regional scale.	There are Aboriginal heritage sites in this area, however the landform has unknown social importance.	N



**Legend**

- Rocky Hills

Rocky Hill 7

Rocky Hill 6

Rocky Hill 5

Rocky Hill 4

Rocky Hill 3

Rocky Hill 1

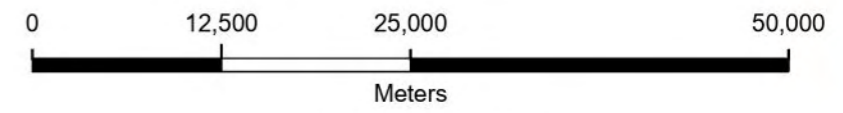
Rocky Hill 2

Rocky Hill  
(Round Hill Site)



Rocky hills of the region

Figure 11

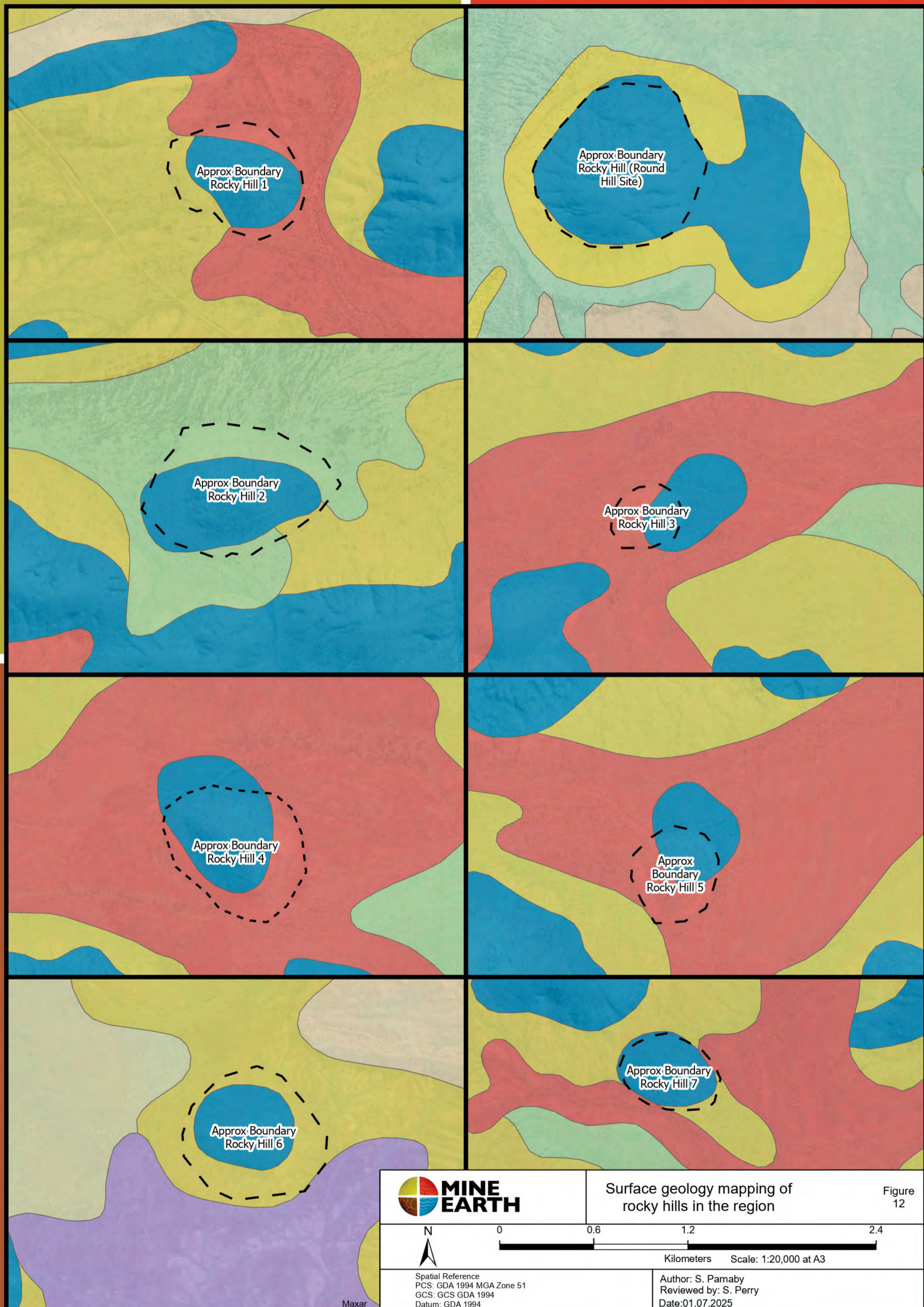


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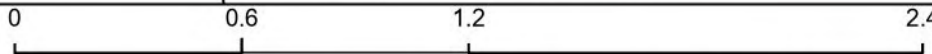
Author: S. Parnaby  
Reviewed by: S. Perry  
Date: 01.07.2025

Earthstar Geographics



Surface geology mapping of rocky hills in the region

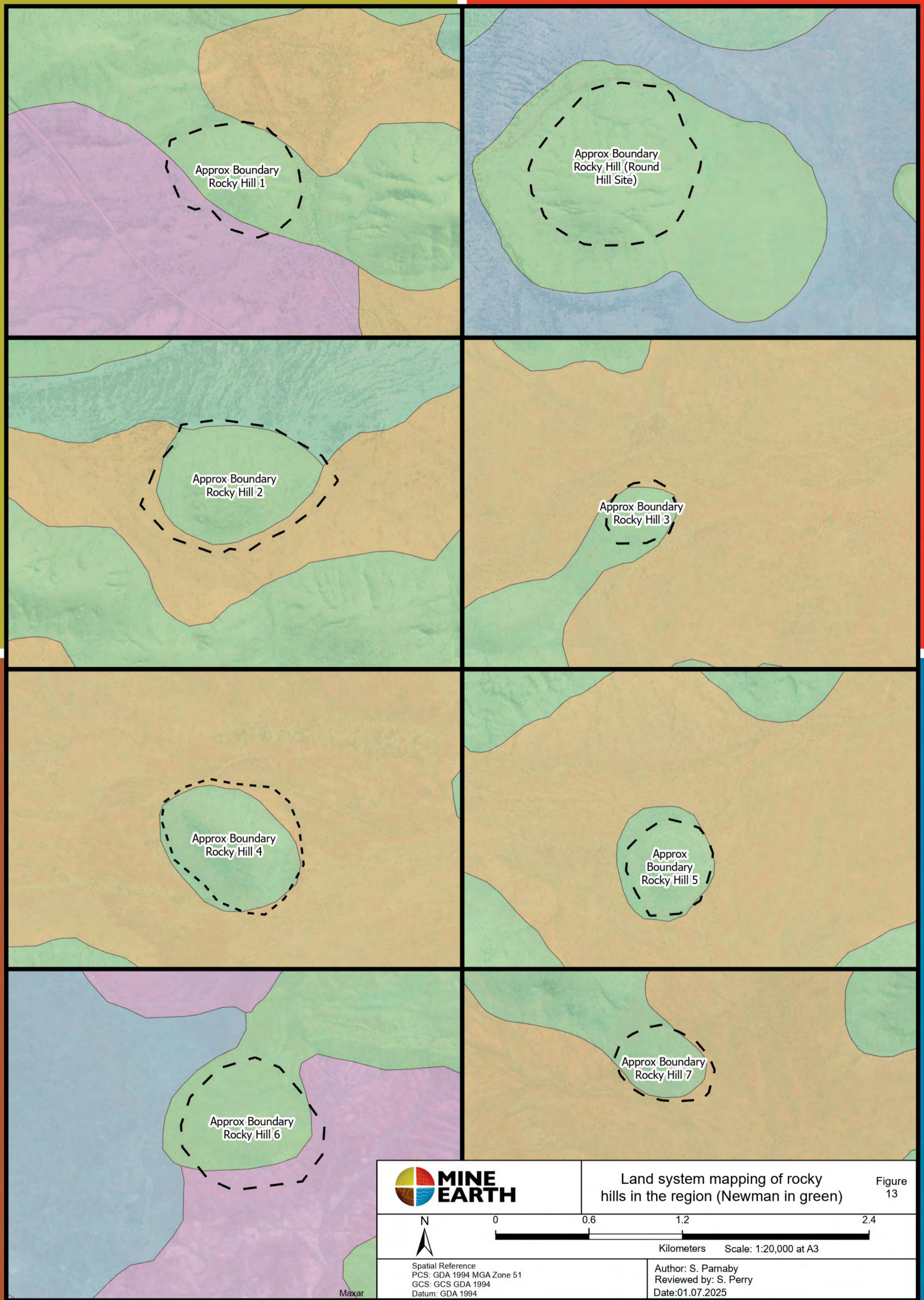
Figure 12



Scale: 1:20,000 at A3

Spatial Reference  
 PCS: GDA 1994 MGA Zone 51  
 GCS: GCS GDA 1994  
 Datum: GDA 1994

Author: S. Parnaby  
 Reviewed by: S. Perry  
 Date: 01.07.2025



Approx Boundary  
Rocky Hill 1

Approx Boundary  
Rocky Hill (Round  
Hill Site)

Approx Boundary  
Rocky Hill 2

Approx Boundary  
Rocky Hill 3

Approx Boundary  
Rocky Hill 4

Approx  
Boundary  
Rocky Hill 5

Approx Boundary  
Rocky Hill 6

Approx Boundary  
Rocky Hill 7



Land system mapping of rocky hills in the region (Newman in green)

Figure 13



0 0.6 1.2 2.4

Kilometers Scale: 1:20,000 at A3

Spatial Reference  
PCS: GDA 1994 MGA Zone 51  
GCS: GCS GDA 1994  
Datum: GDA 1994

Author: S. Parnaby  
Reviewed by: S. Perry  
Date: 01.07.2025

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# Appendix A

## Landform field observations and photos



**Site RDH01**

**Eastings:** 0750562

**Northings:** 7431150

Cryptogammic gravelly plain with sparse mulga and buffel grass, with other shrubs present. Heritage area with low to flat relief. Drainage channel or floor nearby with fringing vegetation. Moderate condition and may be disturbed by cattle historically. Plate 6 and 7 are of the channel nearby.



**Plate 1**



**Plate 2**



**Plate 3**



**Plate 4**



**Plate 5**



**Plate 6**



**Plate 7**

**Site RDH02**

**Eastings:** 07511237

**Northings:** 7431310

Similar to sites 1 and 16. Sparse mulga and other trees with short buffel and other grasses. Historically impacted by cattle and presents a loamy cryptogamic crust in most places. Lag of stones is sparse and small in size, this area is north of the round hill.



**Plate 8**



**Plate 9**



**Plate 10**



**Plate 11**



**Plate 12**



**Plate 13**



**Plate 14**



**Plate 15**

**Site RDH03**

**Eastings:** 0748003

**Northings:** 7430685

Stony spinifex plain with stony coarse fragments as a lag and cryptogams on the surface. Above wash plain (slight elevation difference was observed but probably still a plain). Mulga, eucalyptus and other trees with very dense spinifex.



**Plate 16**



**Plate 17**



**Plate 18**



**Plate 19**



**Plate 20**

**Site RDH04**

**Eastings:** 0747829

**Northings:** 7429575

Slightly sloping plain. Spinifex dominant with Eucalyptus, mulga and other shrubs in open woodland. Slightly above wash plain and may be lower footslopes from RD05, which is a part of the Newman landsystem. This area is in good condition but with some exploration disturbance.



**Plate 21**



**Plate 22**



**Plate 23**



**Plate 24**



**Plate 25**



**Plate 26**

**Site RDH05**

**Eastings:** 0748610

**Northings:** 7429596

Mid-sized discrete slope with a mild slope angle. Spinifex dominated tops also with sparse mulga. Pad shows potentially BIF material. A stony surface lag and some weeds were found to be present. Mild slope angle. Good condition except for exploration disturbance. Another rise was observed in the distance to the north.



**Plate 27**



**Plate 28**



**Plate 29**



**Plate 30**



**Plate 31**



**Plate 32**



**Plate 33**



**Plate 34**



**Plate 35**

**Site RDH06**

**Eastings:** 0750187

**Northings:** 7429311

Lower slopes of the round hill. Possess a larger coarse fraction. Spinifex dominates with some Eucalyptus and mulga trees. This site is near a drainage line of the hill and above the wash plain area. Rehabilitation areas nearby, site is in good condition except for presence of some weeds.



**Plate 36**



**Plate 37**



**Plate 38**



**Plate 39**



**Plate 40**



**Plate 41**



**Plate 42**



**Plate 43**

**Site RDH07**

**Eastings:** 0750717

**Northings:** 7428388

South-east of the round hill. Hill has moderate slope angle, domed top, defined drainage courses, concentrated at the hill's base. Vegetation is mostly eucalyptus and spinifex. This area is defined by stony undulating plains with low rises around the hill, there was a stony surface of larger coarse fragments.



**Plate 44**



**Plate 45**



**Plate 46**



**Plate 47**



**Plate 48**



**Plate 49**



**Plate 50**



**Plate 51**

**Site RDH08**

**Eastings:** 0751791

**Northings:** 7427786

Stony spinifex plain with low rises and open woodland. There were stony surface soils and drainage floors between rises. Cryptogams present, with mature mulga. Good condition and integrity.



**Plate 52**



**Plate 53**



**Plate 54**



**Plate 55**



**Plate 56**



**Plate 57**



**Plate 58**



**Plate 59**

**Site RDH09**

**Eastings:** 07429568

**Northings:** 7429568

Wash plain area where Mulga and spinifex dominate. Lower coarse frag percentage and size was noted. Generally flat and non-undulating. Some sparse buffel grass and cattle disturbance present.



**Plate 60**



**Plate 61**



**Plate 62**



**Plate 63**



**Plate 64**



**Plate 65**



**Plate 66**



**Plate 67**

**Site RDH10**

**Eastings:** 0754114

**Northings:** 7436469

Flat sandy plain, cryptogams, adjacent to drainage channel, semi open woodland, outcropping rocks near drainage channel, good condition, signs of flooding. Exploration disturbance nearby.



**Plate 68**



**Plate 69**



**Plate 70**



**Plate 71**



**Plate 72**

**Site RDH13**

**Eastings:** 0749818

**Northings:** 7428644

Base of round hill where spinifex dominates above, a vegetation transition zone where there is thicker open woodland of Mulga and Eucalyptus in the washplains. Larger coarse frag and drainage into wash plain evident.



**Plate 73**



**Plate 74**



**Plate 75**



**Plate 76**



**Plate 77**



**Plate 78**



**Plate 79**

**Site RDH14**

**Eastings:** 747983

**Northings:** 7429059

Upland flat stony plain, outcropping rock, cryptogams present, mid-sized abundant coarse fragment lag of moderate to large size, spinifex dominant with adjacent sparse mulga. Dormant pebble mound, and the area is in good condition with minimal disturbance. Possibly top of a low relief rise.



**Plate 80**



**Plate 81**



**Plate 82**



**Plate 83**



**Plate 84**

**Site RDH15**

**Eastings:** 0747993

**Northings:** 7430666

Similar to RD03 in morphology and vegetation, cryptogams with mature vegetation, semi open woodland. Unable to exit vehicle due to heritage restrictions.



**Plate 85**



**Plate 86**



**Plate 87**

**Site RDH16**

**Eastings:** 0748319

**Northings:** 7431390

Sparse mulga woodland with open buffel grassland plain. This area has been disturbed by cattle. Low rise to south and north with a loamy crust surface compacted by cattle, cryptogams present.



**Plate 88**



**Plate 89**



**Plate 90**



**Plate 91**



**Plate 92**



**Plate 93**



**Plate 94**

**Site RDH17**

**Eastings:** 0751137

**Northings:** 7431310

Distinct drainage channel on the side of the road. Dense mulga and other fringing vegetation present, along with outcropping rock. This area is adjacent to woodlands and plains. There are visible signs of flooding as well as cattle disturbance.



**Plate 95**



**Plate 96**



**Plate 97**



**Plate 98**



**Plate 99**



**Plate 100**



**Plate 101**

**Site RDH18**

**Eastings:** 0751511

**Northings:** 7431725

RD16. Grassy plain with pockets of open woodland and cryptogammic crust in places. Relief of the area is flat to slightly sloped with a gravelly to stony surface lag. Cattle disturbance evident and sandy in some areas.



**Plate 102**



**Plate 103**



**Plate 104**



**Plate 105**



**Plate 106**



**Plate 107**



**Plate 108**



**Plate 109**

