SOIL AND LAND SUITABILITY ASSESSMENT

WIRRALIE GOLD MINE

SOLOMONS GOLD PTY LTD

DECEMBER 2021

WULGURU TECHNICAL SERVICES

Contact Details	
Company	Wulguru Technical Services Pty Ltd
Project Manager	Scott Hayes-Stanley, CEnvP, MSSSI
Email	scott@wulgurutechservices.com.au
Mail	PO Box 2553 IDALIA QLD 4810
ABN	79 644 301 655

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1. Introduction

Solomons Gold Pty Ltd (Solomons) is the owner and operator of the Wirralie Gold Mine (WGM) – Environmental Authority (EA) EPML00772413. Wulguru Technical Services Pty Ltd (WTS) has been engaged to undertake a soils and land suitability assessment (the Assessment) of the WGM to inform components of the WGM Progressive Rehabilitation and Closure Plan (PRCP).

This report provides a baseline understanding of soil and land resources, and their suitability for use in rehabilitation activities at the WGM. The Assessment focused on areas of minimal and previously undisturbed land, evaluating resources such as topsoil and capping material availability, suitability for use in rehabilitation and potential constraints to plant growth.

1.1. Purpose and Objectives

The purpose of this report is to evaluate the soil mapping units and land resources available within the WGM Mining Lease (ML). The objectives of this Assessment is:

- Identify and map soil mapping units and terrain that occurs within the WGM ML;
- Classify and determine soil types according to observed and analysed physical and chemical characteristics;
- Validate Land Suitability Classifications within the ML;
- Validate topsoil resources and rehabilitation materials; and
- Assess suitability of clay material available within the ML as potentially suitable for capping structures.

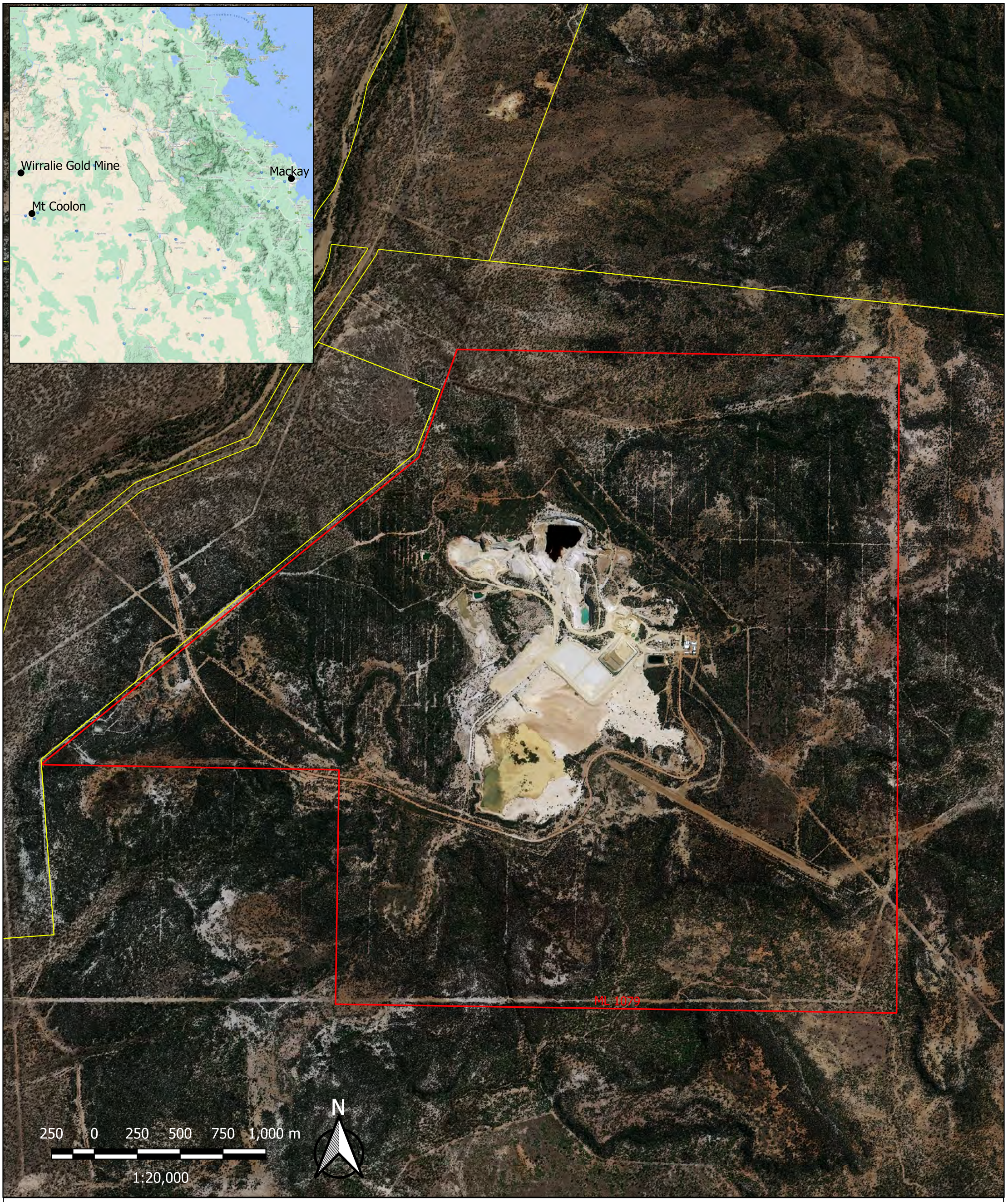
1.2. Project Description

WGM is located in the Drummond Basin, approximately 200 km south of Townsville, Queensland and 200 km west of Mackay. Access to WGM is via the Burdekin Falls Dam Road from Townsville or via Bowen Development Road from Mackay. The nearest township is Mt Coolon, approximately 40 km south of WGM.

WGM is located on ML 1079, covering approximately 1,301 ha on Lot 3272 on Plan PH2090 (referred to as Wirralie Station).

The WGM Plan of Operations September 2016 – September 2021 (Northern Resources Consultants Pty Limited, 2016) describes the WGM history as a low-grade, low-sulfidation epithermal system, which lies within cycle one rocks in the central part of the eastern Drummond Basin, and close to the basal unconformity with basement rocks of the Anakie Inlier.

Originally discovered in 1986, mining began at WGM in 1987 and continued until 1998, when the processing plant was relocated to the Yandan mine site, 30 km west of WGM. An upgraded 1.5 million tonne per annum treatment plant was reinstated at WGM in 1999. The plant treated low-grade oxide and Deep-Lead Pit mineralisation until January 2002, at which time WGM was placed into care and maintenance.



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Project number: 2021.02011
Coordinate Reference System: GDA 2020 Z 55
Date: 2021-12-10

Map provided for interpretation purposes only.

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Soil and land Suitability Assessment
Figure 1: Project Location

Legend

- Land parcel
- Mining Lease

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2. Existing Environment

2.1. Climate

The nearest Bureau of Meteorology (BoM) weather station is at Collinsville, Queensland (Station ID: 033013), approximately 85 km north-east of WGM. Climate statistics are available for a 82 year period from 1939 to 2021.

The mean maximum monthly temperature for the summer period (i.e. December to February) is 33.5°C, and the mean minimum monthly temperature for the same period is 21.7°C. The mean maximum monthly temperature for the winter period (i.e. June to August) is 25.7°C, and the mean minimum monthly temperature for the same period is 10.1°C (Bureau of Meteorology, 2021).

Mean annual rainfall for the location is 701.7 mm (Figure 2).

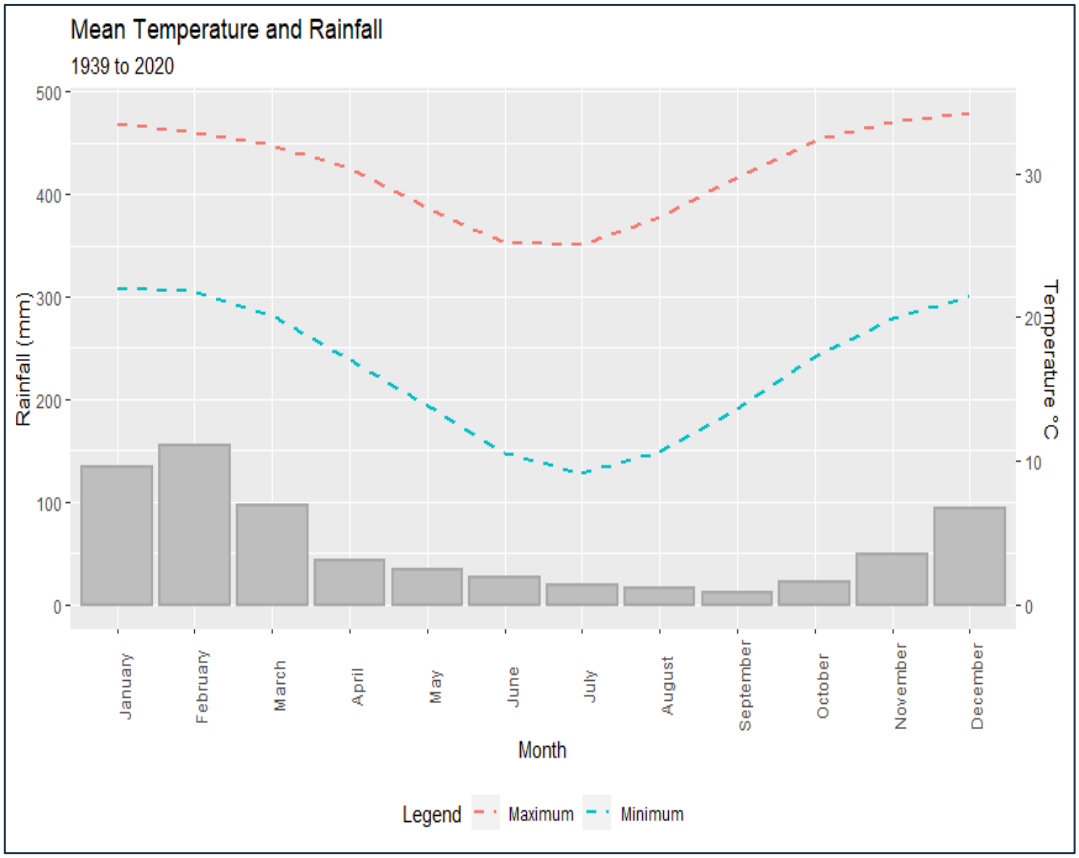

Figure 2. Mean monthly temperature and rainfall (Bureau of Meteorology, 2021)

2.2. Geology and Topography

The Project is regionally situated in the Drummond Basin, a 26,000 km2 area of central Queensland. The Drummond Basin is from the Upper Devonian to Lower Carboniferous periods that underwent 3 cycles (Olgers 1969). The Project has been historically described as a low-grade, low-sulfidation epithermal system, which lies within cycle one rocks in the central part of the eastern Drummond Basin, and close to the basal unconformity with basement rocks of the Anakie Inlier (NRC 2026).

Water bore establishment and publicly available information confirmed that ML1079 surface geology is predominately consisted of the Suttor Formation Formation, underlain by both the Rosetta Creek and Mt Rankin Formation (Queensland Government, 2021). Project geology is described below:

- Alluvium (Cz) – Alluvium, soil, sand, lateritic soils and gravels.
- Suttor Formation (Ta) – Quartz Sandstone, conglomerate, sandy claystone,silicified
- claystone.
- Rosetta Formation - Late Devonian interbedded siltstone to pebbly sandstone and relatively
- thin rhyolitic ignimbrite sheets.
- Mt Rankin Formation (C/Cr) – Siliceous Tuff, ashstone, tuffaceous conglomerate and sandstone, Ryoltite, Andesite

2.3. Topography

Regionally the Project lies to the east of the Great Dividing Range and is surrounded by low mountains ranging from 296 m AHD (Rodborough Hill) to 552 m AHD (Mount Landsborough).

The topography of ML1079 is variable with rolling rises and hills dominating the site transitioning to flats and plains. The highest local features are ~290 m AHD transitioning to ~260 m AHD north and south of the lease (

Figure 3).

2.4. Hydrology

Surface waters are characterised by predominantly unnamed Stream Order (SO) 1 watercourses and one SO2 watercourse. Drainage is generally in a westerly direction towards the nearby SO5, Rosetta Creek and contributes to the Suttor River sub-basin of the Burdekin River basin (Figure 4).

2.5. Regional Ecosystems

Regional ecosystems are vegetation communities within a Queensland bioregion that are consistently associated with a particular combination of geology, landform and soil (Queensland Government, 2021a). Regional ecosystems are managed under the *Vegetation Management Act 1999* (QLD) and detail the Vegetation management (VM) status of each Regional Ecosystem (RE) as either *Endangered, Of Concern, Least Concern or Non remnant*. Biodiversity Status (BD status) is utilised for regulation of mining activities under the *Environmental Protection Act 1994* (QLD). BD status is described as either *Endangered, Of Concern* and *No concern at present*.

Current mining disturbances at WGM are classified as non-remnant, the remainder of RE within the ML but outside mining disturbances are classified as either Least Concerned, Of Concern or Endangered (Table 1, Table 5)

Regional ecosystems broadly describe a landform morphology of scarps, mesas and rises with lateritic duricrusts, scarp retreat zones and alluvial plains, consistent with geology and topography descriptions within the WGM ML.

Table 1. Regional ecosystem codes and descriptions found within the WGM ML (Queensland Herbarium, 2019)

RE Code	Short Description	VM Status	BD Status
11.7.3/ 11.5.10/ 11.7.2	11.7.3 – Eucalyptus persistens, Triodia mitchellii open woodland on stripped margins of Cainozoic lateritic duricrust. 11.5.10 – Melaleuca tamariscina shrubland on Cainozoic sand plains and/or remnant surfaces. 11.7.2 – Acacia spp. Woodland on Cainozoic lateritic duricrust. Scarp retreat zone.	Least Concern	No concern at present
11.7.2	11.7.2 – Acacia spp. Woodland on Cainozoic lateritic duricrust. Scarp retreat zone.	Least Concern	No concern at present
11.5.9b/ 11.7.3/ 11.7.2	11.5.9b – Eucalyptus crebra and other Eucalyptus spp. And Corymbia spp. Woodland on Cainozoic sand plains and/or remnant surfaces. 11.7.3 – Eucalyptus persistens, Triodia mitchellii open woodland on stripped margins of Cainozoic lateritic duricrust. 11.7.2 – Acacia spp. Woodland on Cainozoic lateritic duricrust. Scarp retreat zone.	Least Concern	No concern at present
11.5.9b/ 11.7.2	11.5.9b – Eucalyptus crebra and other Eucalyptus spp. And Corymbia spp. Woodland on Cainozoic sand plains and/or remnant surfaces. 11.7.2 – Acacia spp. Woodland on Cainozoic lateritic duricrust. Scarp retreat zone.	Least Concern	No concern at present
11.4.9	11.4.9 – Acacia harpophylla shrubby woodland with Terminalia oblongata on Cainozoic clay plains.	Endangered	Endangered
11.3.2	11.3.2 – Eucalyptus populnea woodland on alluvial plains.	Of Concern	Of Concern
11.11.10	11.11.10 – Eucalyptus melanophloia woodland on deformed and metamorphosed sediments and interbedded volcanics.	Of Concern	Of Concern

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Soil and land Suitability Assessment
Figure 3: Surface Geology

Legend

- Land parcel
- Mining Lease

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ML 1079

250 0 250 500 750 1,000 m

1:18,000

N

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Soil and land Suitability Assessment
Figure 4. Hydrology and Topograpgy

Legend

Land parcel

Mining Lease

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Figure 5. Regional Ecosystems (VM Status)

3. Soil Survey

The distribution of main soil types within the Assessment area were identified, validated and refined from the field survey, which was conducted according to land resource assessment guidelines (The National Committee on Soil and Terrain, 2009). Locations observed to contain high clay content were also assessed during the field survey with collection of samples for construction testing undertaken at specific locations. The methods and results for the field and laboratory assessment are described herein.

3.1. Methodology

3.1.1. Background Information

Descriptions of soil types/ units and their distribution with landforms and parent material refer to the Australian Soil Resource Information System (ASRIS) and other regional surveys as relevant. Preliminary soil unit boundaries were developed from:

- Satellite imagery – Qld Globe and recent high-resolution imagery (SPOT6/7 1.5m RGB orthomosaic current at 22 September 2020);
- Publicly available reports and data sources – Geological mapping, Qspatial databases, etc.; and
- Topographic mapping.

3.1.2. Field Investigations

A ‘free survey’ was adopted that complied with land suitability assessment criteria. Soil unit boundaries varied from abrupt to gradual and trends were associated with variations along geological mapping units and topographic sequences. Professional judgement was utilised to identify appropriate reference and detailed observation sites, check sites were utilised to confirm soil boundaries and points of interest.

Survey design details relating to map scale and survey density were developed in accordance with McKenzie et al. (2008b) (

Figure 6). 12 detailed observation sites were recorded with seven submitted for laboratory analysis. 24 check sites were collected to determine soil boundaries and units. On this basis it is considered that the survey design was sufficiently detailed to assess soil properties and their distribution across the Assessment area.

In addition to the soil survey, sampling was undertaken at locations of high clay content to assess suitability as a future capping/ rehabilitation material. Three locations were sampled based on field observations and discussions with Solomons operational personnel with approximately 60 kg sample submitted to a construction materials laboratory for analysis.

Table 2. Field survey observations.

Class	Observations	Land Suitability	Actual for Project
	Minimum map scale	1:50,000	1:50,000
	Site density	1 site/ 20 ha	1 site/ 20ha
	Total number	55	59
I	Detailed profiles	13	13
II	Reference profiles with laboratory data[1]	3	7
III	Check sites	39	39

[1] One reference site with laboratory analysis for each soil type identified.

3.1.3. Laboratory Analytes

Soils were classified from profile morphology and laboratory analyses according to the Australian Soil Classification (ASC) system. Laboratory samples were collected and submitted to a National Association of Testing Authorities (NATA) laboratory, ALS Environmental, including:

- pH;
- Chloride;
- Electrical Conductivity (EC);
- Exchange Acidity;
- Exchangeable Cations/ Cation Exchange Capacity (CEC);
- Sulphur as SO_4;
- Total metals – As, Cd, Cr, Cu, Fe, Hg, Ni, Pb and Zn;
- Nitrate and Nitrite (N as NO_x);
- Total Kjeldahl Nitrogen (TKN);
- Total Phosphorus;
- Bicarbonate Extractable Phosphorus;
- Total Organic Carbon; and
- Particle Size Analysis.

Additional clay material was collected for capping material suitability testing and provided to Construction Sciences for analysis.

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Soil and land Suitability Assessment
Figure 7. Survey Design

Legend

- Mining Lease
- Sampling Locations

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4. Results

4.1. Soil Map Units

WTS identified four soil map units across the Project. Representative soil profiles are described in Table 3 and distribution of soils is mapped in Figure 7.

Table 3. Representative soil profiles

Australian Soil Classification	Reference Site	Area (ha)	Area (percentage)
Eutrophic Brown Dermosol, Deep	S4	137.78	12.1885
Leptic Brown Rudosol	S6	365.22	32.30863
Leptic Brown-Orthic Tenosol, Shallow	S10	394.86	34.93069
Sodic Brown Dermosol, Deep	S11	148.40	13.12798
Self-Mulching Brown Vertosol, Moderate	S14	84.15	7.444202

4.2. Soil Profile 1 – Brown Dermosol

Project: Wirralie	**Site: S4**	
Location: Mt Coolon, Qld **Described by: Scott Hayes-Stanley** **Date: 28/02/2021**		
Site Description		
Geology: DCr **Landform pattern: Level plain** **Element: Flat** **Permeability: Moderate** **Microrelief:** None **Microrelief component:** No record. **Drainage:** Moderate **Slope: 0 – 1%** **Rock outcrops: nil.** **Surface coarse fragments:** nil. **Surface condition: soft – loose.** **Ground cover: 20 – 50%** **Disturbances: grazing impacts.**		

Australian Soil Classification: Eutrophic Brown Dermosol, Deep [AH] [AB] [DE] [W]

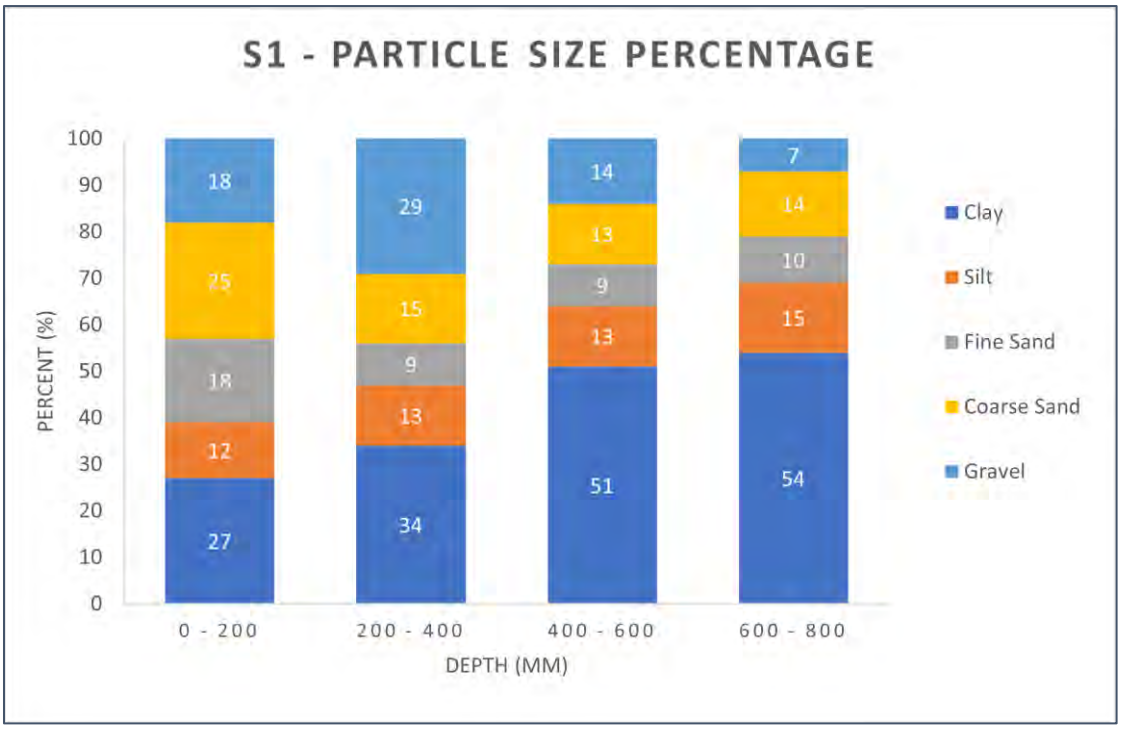
Profile Morphology

Horizon	Depth (m)	Description
A1	0.00 – 0.30	Grey (5/1 7.5YR) Clay loam, weak, 2-5 mm sub angular blocky structure; nil roots, nil mottles; moderately well drained with gradual transition to B21 horizon.
B21	0.30 – 0.50	Brown (4/2 7.5YR) Clay loam, weak, 5-10 mm angular blocky structure; nil roots, nil mottles; moderately well drained with diffuse transition to B22 horizon.
B22	0.50 – 1.10	Brown (4/2 7.5YR) Clay loam, weak, 2-5 mm sub angular blocky structure; nil roots, nil mottles; moderately well drained with diffuse transition to C horizon.

Depth (m)	pH	EC (µS/cm)	NOx as N (mg/kg)	TKN (mg/kg)	TN (mg/kg)	TP (mg/kg)	TOC (%w/w)	Colwell K (mg/kg)
0.00 – 0.30	5.3	15	1.0	490	490	117	0.83	<5
0.30 – 0.50	5.7	12	0.6	350	350	101	0.78	<5
0.50 – 0.80	5.8	12	0.7	310	310	95	0.84	<5
0.80 – 1.10	6.0	12	0.6	260	260	82	0.63	<5

Depth (m)	Exc. Na (meq/100g)	Exc. K (meq/100g)	Exc. Ca (meq/100g)	Exc. Mg (meq/100g)	Cation Exc. Capacity (meq/100g)	ESP (%)	Ca:Mg Ratio	S (mg/kg)
0.00 – 0.30	<0.1	<0.1	2.2	0.9	3.3	<0.1	2.4	0.03
0.30 – 0.50	<0.1	<0.1	2.3	0.9	3.2	<0.1	2.6	0.03
0.50 – 0.80	<0.1	<0.1	2.4	1.0	3.5	<0.1	2.4	0.03
0.80 – 1.10	<0.1	0.1	1.7	1.5	3.3	<0.1	1.1	0.03

Particle Size Distribution


S1 - PARTICLE SIZE PERCENTAGE
PERCENT (%)
100
90
80
70
60
50
40
30
20
10
0
18
25
18
12
27
29
15
9
13
34
14
13
9
13
51
7
14
10
15
54
0 - 200
200 - 400
400 - 600
600 - 800
DEPTH (MM)
Clay
Silt
Fine Sand
Coarse Sand
Gravel

4.3. Soil Profile 1 – Brown Rudosol

Project: Wirralie **Site: S10**

Location: Mt Coolon, Qld

Described by: Scott Hayes-Stanley

Date: 28/02/2021

Site Description

Geology: Tu

Landform pattern: Crest

Element: Flat

Permeability: Moderately well

Microrelief: None

Microrelief component: No Record

Drainage: Moderately well

Slope: 0 – 1 %

Rock outcrops: Slightly Rocky

Surface coarse fragments: Nil

Surface condition: Firm

Ground cover:10 - 20%

Disturbances: grazing impacts.

Australian Soil Classification: Leptic Brown Rudosol, Very Shallow [CY] [AB] [RU] [T]

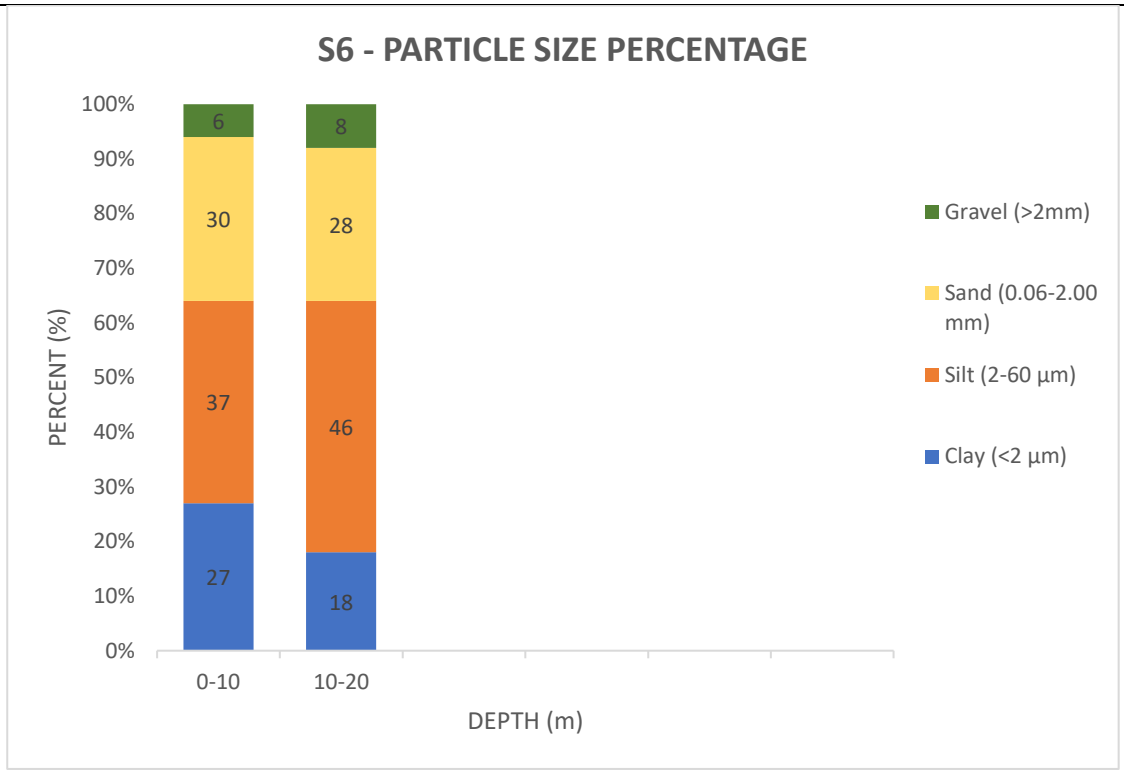
Profile Morphology

Horizon	Depth (m)	Description
A1	0-20	Brown (4/2 7.5YR) clay loam, weak, 5-10 mm, subangular blocky, nil roots, nil mottles, few ferruginous nodules, moderately well drained with clear transition to R horizon.
R	>20	

Depth (m)	pH	EC (µS/cm)	NOx as N (mg/kg)	TKN (mg/kg)	TN (mg/kg)	TP (mg/kg)	TOC (%w/w)	Colwell P (mg/kg)
0 - 10	4.4	234	69.4	1100	1170	104	1.98	<5
10 - 20	4.4	142	36.6	890	930	99	1.46	5

Depth (m)	Exc. Na (meq/100g)	Exc. K (meq/100g)	Exc. Ca (meq/100g)	Exc. Mg (meq/100g)	Cation Exc. Capacity (meq/100g)	ESP (%)	Ca:Mg Ratio	S (mg/kg)
0 - 10	0.3	0.2	0.5	0.7	3.6	16.2	0.7	0.02
10 - 20	<0.1	0.2	0.2	0.4	2.9	<0.1	0.5	0.02

Particle Size Distribution


S6 - PARTICLE SIZE PERCENTAGE
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
PERCENT (%)
6
30
37
27
8
28
46
18
0-10
10-20
DEPTH (m)
Gravel (>2mm)
Sand (0.06-2.00 mm)
Silt (2-60 µm)
Clay (<2 µm)

4.4. Soil Profile 3 – Brown Tenosol

Project: Wirralie	**Site: S10**	
Location: Mt Coolon, Qld **Described by: Scott Hayes-Stanley** **Date: 28/02/2021**		
Site Description		
Geology: Tu **Landform pattern: Level plain** **Element: Flat** **Permeability: Poor** **Microrelief:** None **Microrelief component:** No record. **Drainage:** Poor **Slope:** 0 – 1% **Rock outcrops: nil.** **Surface coarse fragments:** nil. **Surface condition: Seasonally hard setting.** **Ground cover: <2%** **Disturbances: grazing impacts, pest impacts.**		

Australian Soil Classification: Leptic Brown-Orthic Tenosol, Shallow [CY] [IO] [TE] [U]

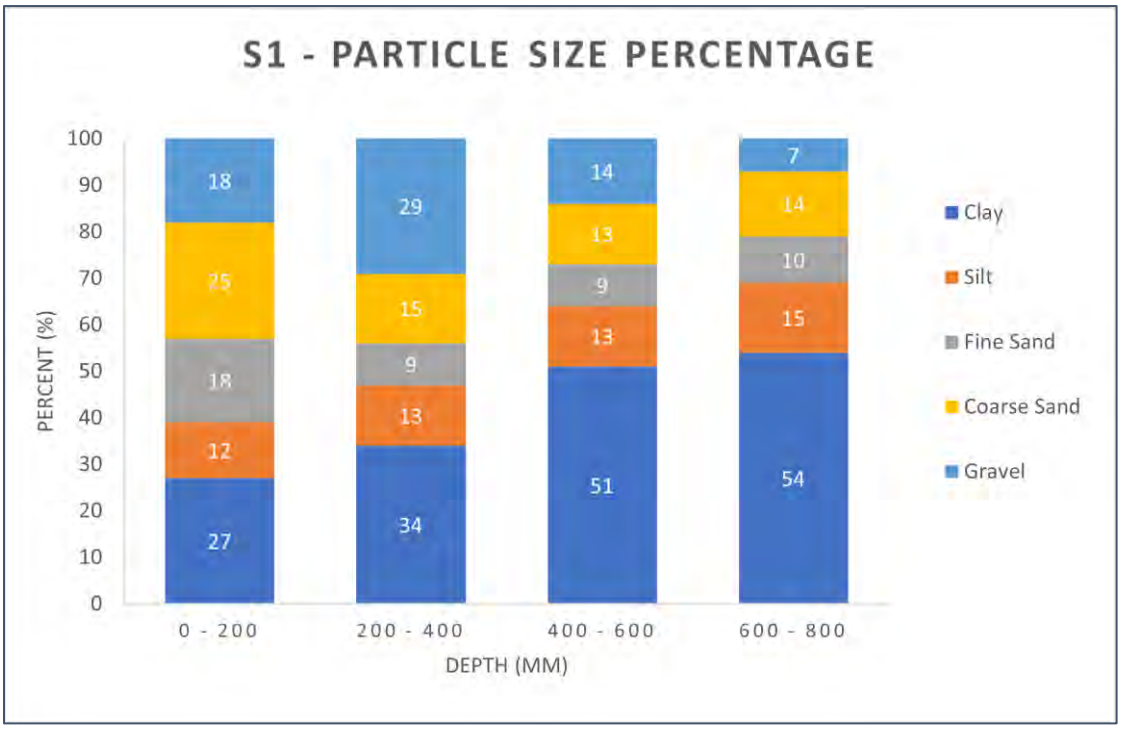
Profile Morphology

Horizon	Depth (m)	Description
A1	0.00 – 0.30	Light yellowish brown (6/4 10YR) Loamy silt, weak, 2-5 mm angular blocky structure; nil roots, nil mottles; poorly drained with abrupt transition to R horizon.
R	0.30 – 0.50	Light yellowish brown (6/4 10YR) Silt, weak, 2-5 mm angular blocky structure; nil roots, nil mottles; poorly drained – refusal met.

Depth (m)	pH	EC (µS/cm)	NOx as N (mg/kg)	TKN (mg/kg)	TN (mg/kg)	TP (mg/kg)	TOC (%w/w)	Colwell K (mg/kg)
0.00 – 0.30	4.9	20	1.2	350	350	71	0.46	<5
0.30 – 0.50	4.7	19	0.6	270	270	78	0.29	<5

Depth (m)	Exc. Na (meq/100g)	Exc. K (meq/100g)	Exc. Ca (meq/100g)	Exc. Mg (meq/100g)	Cation Exc. Capacity (meq/100g)	ESP (%)	Ca:Mg Ratio	S (mg/kg)
0.00 – 0.30	<0.1	<0.1	0.7	<0.1	1.5	<0.1	-	0.01
0.30 – 0.50	<0.1	<0.1	0.2	<0.1	1.3	<0.1	-	0.01

Particle Size Distribution


S1 - PARTICLE SIZE PERCENTAGE
PERCENT (%)
100
90
80
70
60
50
40
30
20
10
0
18
25
18
12
27
29
15
9
13
34
14
13
9
13
51
7
14
10
15
54
0 - 200
200 - 400
400 - 600
600 - 800
DEPTH (MM)
Clay
Silt
Fine Sand
Coarse Sand
Gravel

4.5. Soil Profile 4 – Brown Dermosol

Project: Wirralie	**Site: S11**	
Location: Mt Coolon, Qld **Described by: Scott Hayes-Stanley** **Date: 01/03/2021**		
Site Description		
Geology: DCr **Landform pattern: Level plain** **Element: Flat** **Permeability: Poor** **Microrelief:** None **Microrelief component:** No record. **Drainage:** Poor **Slope:** 0 – 1% **Rock outcrops: nil.** **Surface coarse fragments:** nil. **Surface condition: Seasonally hard setting.** **Ground cover: <2%** **Disturbances: grazing impacts, pest impacts.**		

Australian Soil Classification: Sodic Brown Dermosol, Deep [EO] [AB] [DE] [V]

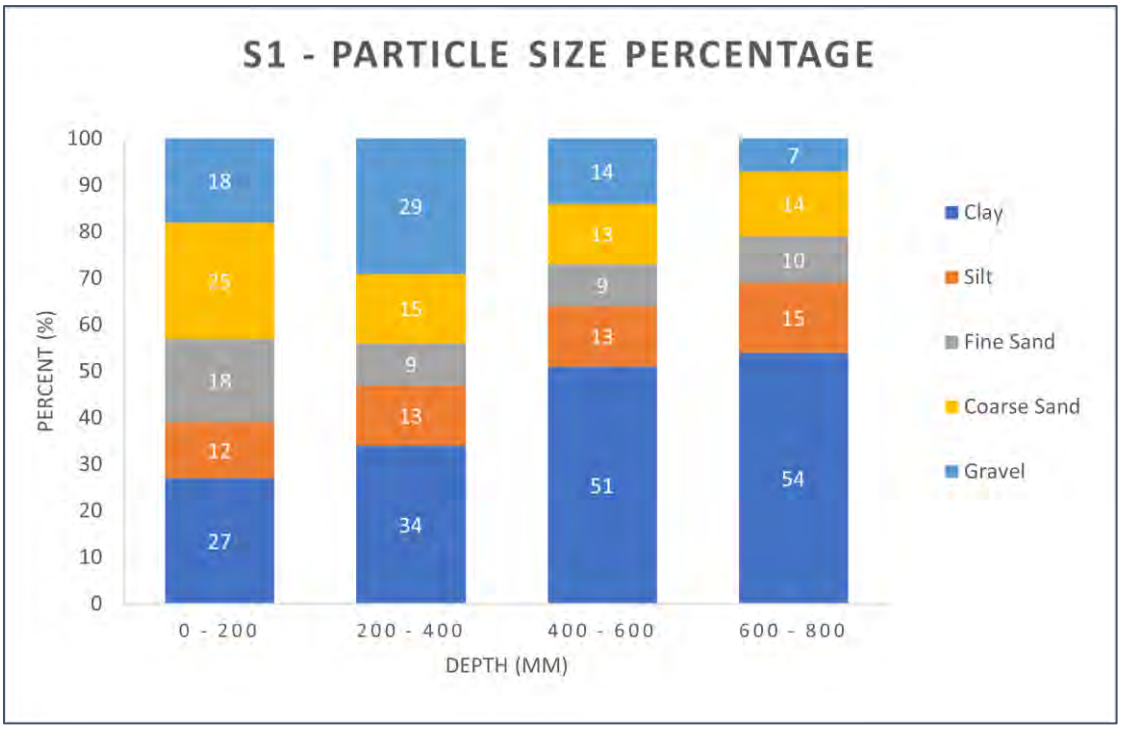
Profile Morphology

Horizon	Depth (m)	Description
A2	0.00 – 0.10	Brown (4/2 7.5YR) silty loam, weak, 2-5 mm angular blocky structure; some roots, nil mottles; moderately well drained with gradual transition to B21 horizon.
B21	0.10 – 0.30	Grey (5/1 7.5YR) Loamy silt, massive, weak consistency, nil structure; nil roots, nil mottles; moderately well drained with gradual transition to B22 horizon.
B22	0.30 – 0.50	Light yellowish brown (6/4 10YR) Loamy silt, massive, firm consistency, nil structure; nil roots, nil mottles; moderately well drained with gradual transition to C horizon.
C	0.50 – 0.70	Light yellowish brown (6/4 10YR) – Weathered siltstone.

Depth (m)	pH	EC (µS/cm)	NOx as N (mg/kg)	TKN (mg/kg)	TN (mg/kg)	TP (mg/kg)	TOC (%w/w)	Colwell K (mg/kg)
0.00 – 0.10	6.2	13	4.5	460	460	110	0.43	<5
0.10 – 0.30	6.4	22	5.8	270	280	82	0.26	<5
0.30 – 0.50	6.1	87	12.6	270	280	87	0.14	<5
0.50 – 0.75	6.0	108	11.4	160	170	77	0.17	<5

Depth (m)	Exc. Na (meq/100g)	Exc. K (meq/100g)	Exc. Ca (meq/100g)	Exc. Mg (meq/100g)	Cation Exc. Capacity (meq/100g)	ESP (%)	Ca:Mg Ratio	S (mg/kg)
0.00 – 0.30	0.2	0.3	4.3	1.2	6.0	2.9	3.6	<0.01
0.30 – 0.50	0.6	0.1	3.0	1.8	5.6	11.0	1.7	<0.01
0.30 – 0.50	2.5	<0.1	1.3	4.6	8.6	29.3	0.3	<0.01
0.50 – 0.75	2.9	<0.1	0.8	5.1	9.2	32.4	0.2	<0.01

Particle Size Distribution


S1 - PARTICLE SIZE PERCENTAGE
PERCENT (%)
100
90
80
70
60
50
40
30
20
10
0
18
25
18
12
27
29
15
9
13
34
14
13
9
13
51
7
14
10
15
54
0 - 200
200 - 400
400 - 600
600 - 800
DEPTH (MM)
Clay
Silt
Fine Sand
Coarse Sand
Gravel

4.6. Soil Profile 5 – Brown Vertosol

Project: Wirralie	**Site: S14**	
Location: Mt Coolon, Qld **Described by: Scott Hayes-Stanley** **Date: 28/02/2021**		
Site Description		
Geology: DCr **Landform pattern: Level plain** **Element: Flat** **Permeability: Poor** **Microrelief:** None **Microrelief component:** No record. **Drainage:** Poor **Slope:** 0 – 1% **Rock outcrops: nil.** **Surface coarse fragments:** nil. **Surface condition: self-mulching** **Ground cover: 20 – 50%** **Disturbances: grazing impacts, pest impacts.**		

Australian Soil Classification: Self-Mulching Brown Vertosol, Moderate [El] [AD] [VE] [V]

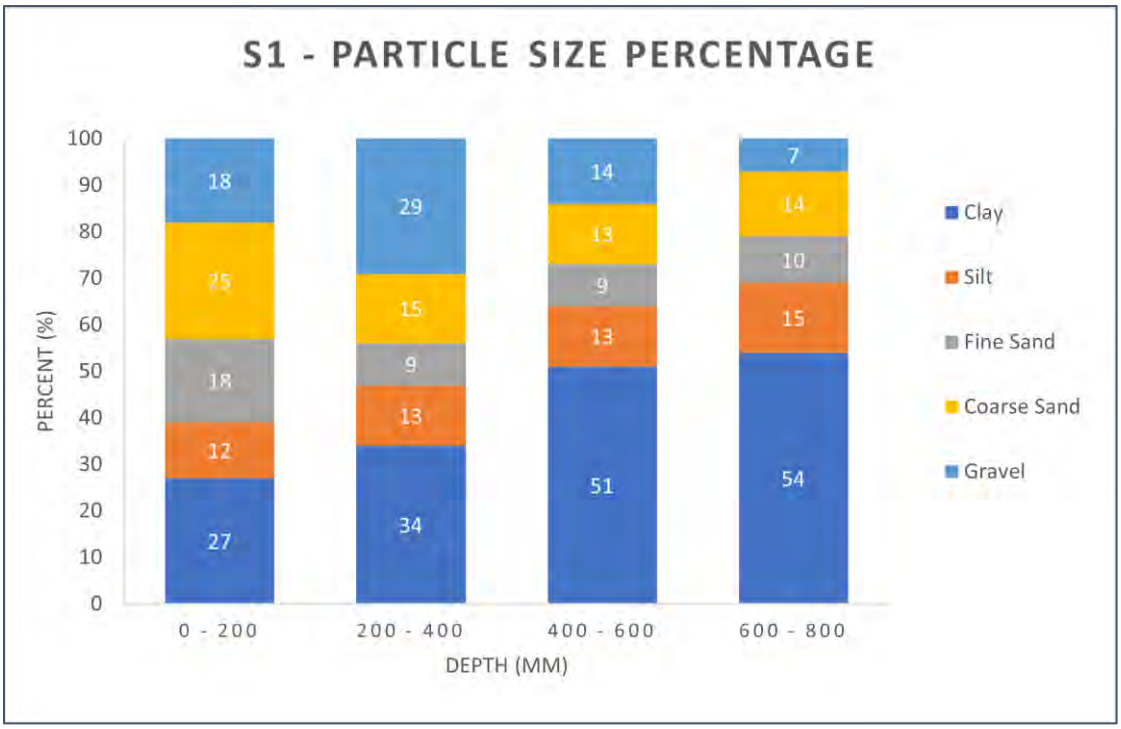
Profile Morphology

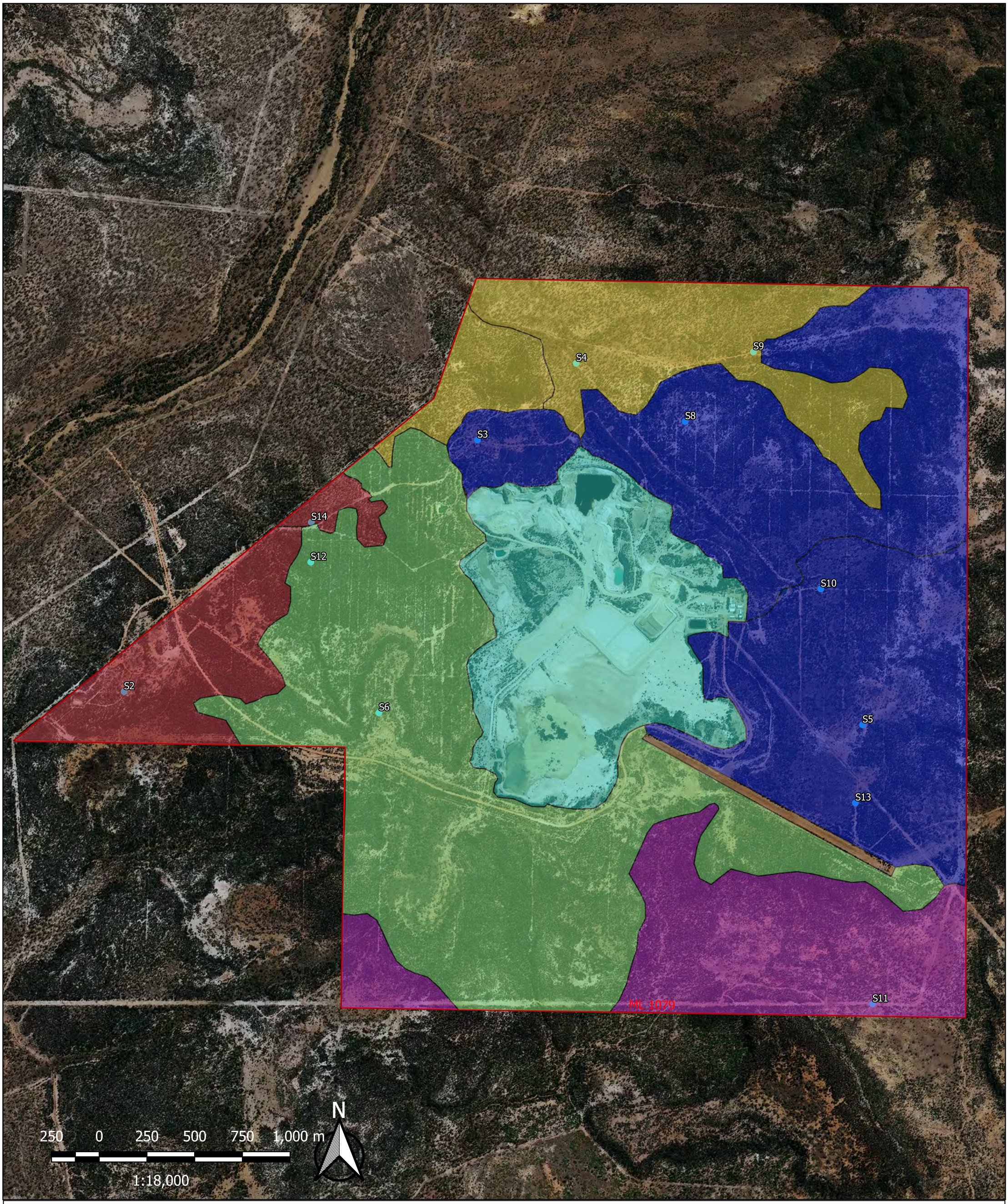
Horizon	Depth (m)	Description
A2	0.00 – 0.20	Brown (4/2 7.5YR) Clay loam, moderate, 5-10 mm sub angular blocky structure; some roots, nil mottles; imperfectly drained with clear transition to B21 horizon.
B21	0.20 – 0.50	Grey (5/1 7.5YR) Light clay, moderate, 10-25 mm sub angular blocky, firm consistency; nil roots, nil mottles; poorly drained with gradual transition to B22 horizon.
B22	0.50 – 0.90	Light grey (7/1 7.5YR) Medium clay, massive, firm consistency, nil structure; nil roots, nil mottles; poorly drained – practical refusal met.

Depth (m)	pH	EC (µS/cm)	NOx as N (mg/kg)	TKN (mg/kg)	TN (mg/kg)	TP (mg/kg)	TOC (%w/w)	Colwell K (mg/kg)
0.00 – 0.20	6.4	60	1.1	710	710	199	0.83	<5
0.20 – 0.50	6.4	222	0.5	390	390	170	0.28	<5
0.50 – 0.80	6.4	226	0.4	390	390	185	0.24	<5
0.80 – 1.00	6.6	265	0.2	200	200	136	0.11	<5

Depth (m)	Exc. Na (meq/100g)	Exc. K (meq/100g)	Exc. Ca (meq/100g)	Exc. Mg (meq/100g)	Cation Exc. Capacity (meq/100g)	ESP (%)	Ca:Mg Ratio	S (mg/kg)
0.00 – 0.20	0.4	0.1	1.9	2.3	4.9	8.8	0.8	0.04
0.20 – 0.50	1.4	0.1	1.4	2.9	5.9	23.6	0.5	0.04
0.50 – 0.80	1.5	0.2	1.2	2.7	5.7	26.7	0.4	0.04
0.80 – 1.00	1.7	0.2	1.0	2.5	5.5	31.7	0.4	0.04

Particle Size Distribution


S1 - PARTICLE SIZE PERCENTAGE
PERCENT (%)
100
90
80
70
60
50
40
30
20
10
0
18
25
18
12
27
29
15
9
13
34
14
13
9
13
51
7
14
10
15
54
0 - 200
200 - 400
400 - 600
600 - 800
DEPTH (MM)
Clay
Silt
Fine Sand
Coarse Sand
Gravel



Client: Solomons Gold Pty Ltd
Project number: 2021.02011
Coordinate Reference System: GDA 2020 Z 55
Date: 2021-12-10

Map provided for interpretation purposes only.

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Soil and land Suitability Assessment
Figure 7. Survey Design

Legend

- Mining Lease
- Sampling Locations
- Leptic Brown Rudosol
- Eutrophic Brown Dermosol
- Leptic Brown-Orthic Tenosol
- Sodic Brown Dermosol
- Self-Mulching Brown Vertosol

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5. Land Assessment

5.1. Land Suitability Assessment

Land Suitability has been assessed using the methods and criteria provided in the Guideline for Agricultural Land Evaluation (Department of Science Information Technology and Innovation and Department of Natural Resources and Mines, 2015) and Guideline for Land Suitability Assessment Techniques (Department of Mines and Energy, 1995). This assesses how suitable an area of land is for two major rural agricultural enterprises: rainfed broadacre cropping and beef cattle grazing.

The Land Suitability assessment cross-references each soil unit's characteristics with suitability criteria from Department of Mines and Energy (1995). The Land Suitability assessment uses a five-class system, where Class 1 indicates that the land is most suitable for the enterprise and Class 5 the least suitable. The overall land suitability ranking for each specific soil unit is determined by the most severe limitation, or a combination of the varying limitations. Land is considered less suitable as the severity of limitations for a land use increases. The increasing limitations may reflect any combination of:

- Reduced potential for production;
- Increased inputs to achieve an acceptable level of production; and/or
- Increased inputs required to prevent land degradation.

The Land Suitability Classes are described in Table 4.

Table 4. Land Suitability Classes

Class	Suitability	Limitations	Description
1	Suitable	Negligible	Highly productive land requiring only simple management practices to maintain economic production.
2	Suitable	Minor	Land with limitations that either constrain production, or require more than the simple management practices of class 1 land to maintain economic production.
3	Suitable	Moderate	Land with limitations that either further constrain production, or require more than those management practices of class 2 land to maintain economic production.
4	Unsuitable	Severe	Currently unsuitable land. The limitations are so severe that the sustainable use of the land in the proposed manner is precluded. In some circumstances, the limitations may be surmountable with changes to knowledge, economics or technology.

5	Unsuitable	Extreme	Land with extreme limitations that preclude any possibility of successful sustained use of the land in the proposed manner.

WTS' analysis provides a considered approach to land suitability assessments whereby each soil management unit's characteristics have been cross-referenced against Department of Mines and Energy (1995) and Guidelines for Agricultural Land Evaluation in Queensland (Department of Science Information Technology and Innovation and Department of Natural Resources and Mines, 2015). The overall land suitability class for each SMU is determined by the most severe limitation, or a combination of varying limiting components under both the rainfed broadacre cropping and beef cattle grazing.

5.1.1. Plant Available Water Capacity and Effective Rooting Depth

The primary land suitability assessment attribute is 'moisture'. The indicator for moisture is Plant Available Water Capacity (PAWC). PAWC is an estimate of the amount of moisture stored in the soil profile that is available for plant extraction. It is generally defined as the difference between field capacity and permanent wilting point. PAWC is calculated for the soil profile by summing the available water capacity over the soil's effective rooting depth (ERD). For the purposes of this assessment, PAWC is calculated based on the soil texture methods detailed in *How to demonstrate that land in the strategic cropping area does not meet the criteria for strategic cropping land* (Department of State Development Manufacturing Infrastructure and Planning, 2014). Soil water storage based on field texture is outlined in Table 5.

Table 5. Soil Texture Table (Department of State Development Manufacturing Infrastructure and Planning, 2014)

Soil Texture	Soil Water Storage
Sand; clayey sand; loamy sand	4 mm / 100 mm
Sandy loam	5 mm / 100 mm
Loam; silty loam; sandy clay loam	6 mm / 100 mm
Clay loam; clay loam, sandy; silty clay loam	8 mm / 100 mm
Silty clay; clays with <45% clay fraction	10 mm / 100 mm
Clays with >45% clay fraction	12 mm / 100 mm

Effective rooting depth is defined as the soil depth to which 90% of the plant roots will extract water and can be estimated through observed rooting depth, soil chemical parameters or a standardised soil rooting depth (McKenzie et al., 2008a). For the purposes of this assessment methodologies employed to determine ERD, and subsequently PAWC are determined based on guideline *How to demonstrate that land in the strategic cropping area does not meet the criteria for strategic cropping land* (Department of State Development Manufacturing Infrastructure and Planning, 2014) (Table 6).

Table 6. Effective Rooting Depth Criteria

Descriptor	ERD Limitation Threshold
Electrical Conductivity	> 0.8 dS/cm
Chloride	> 800 ppm
Sodicity	> 15%
pH	<= 5.0
Soil Structure	Moderate or strong columnar structure. Sandy free draining horizons. Significant rock content.

5.1.2. Beef Cattle Grazing

Limitations for Beef Cattle Grazing suitability on improved pastures have been assessed in accordance with Department of Mines and Energy (1995), including categories:

- Water availability;
- Nutrient deficiency;
- Soil physical factors;
- Salinity;
- Rockiness;
- Microrelief;
- pH;
- ESP;
- Wetness;
- Topography;
- Water erosion;
- Flooding; and
- Vegetation.

Note: a depth of 0.6 m has been assumed for root zone depth for any profile in which weathered rock, and/ or a salt bulge was absent as outlined in Department of Mines and Energy (1995).

5.1.2.1. Water Availability

PAWC thresholds for land suitability classes are as follows:

- **Class 1:** > 125 mm;
- **Class 2:** 100 – 125 mm;
- **Class 3:** 75 – 100 mm;
- **Class 4:** 50 – 75 mm;
- **Class 5:** <50 mm.

The thresholds stated are based on pasture generally, and do not account for specific pasture species. Land Suitability Classes are described in Table 7.

Table 7. PAWC, ERD and Land Suitability Classes

SMU	ERD (m)	PAWC (mm)	Land Suitability Class
Eutrophic Brown Dermosol, Deep	1.10	66	4
Leptic Brown Rudosol	0.2	8	5
Leptic Brown-Orthic Tenosol, Shallow	0.50	30	5
Sodic Brown Dermosol, Deep	0.50	30	5
Self-Mulching Brown Vertosol, Moderate	0.20	20	5

5.1.2.2. Nutrient Deficiency

Nutrient deficiency for each SMU is based on thresholds in Department of Mines and Energy (1995) and presented in Table 8.

Table 8. Nutrient Deficiency

SMU	Limitation	Land Suitability Class
Eutrophic Brown Dermosol, Deep	Brigalow, gidgee, blackwood or softwood scrub soils and former scrub soils with Bicarbonate P > 10 ppm.	1
Leptic Brown Rudosol	Euclyptus woodland on shallow soils wit Bicarbonate P <5 ppm	5
Leptic Brown-Orthic Tenosol, Shallow	Sands and loams at least 75 cm dep or overlying rock at shallow depth, with Bicarbonate P 5 – 10 ppm, or Bicarbonate P <=4 ppm.	4
Sodic Brown Dermosol, Deep	Brigalow, gidgee, blackwood or softwood scrub soils and former scrub soils with Bicarbonate P > 10 ppm.	1
Self-Mulching Brown Vertosol, Moderate	Brigalow, gidgee, blackwood or softwood scrub soils and former scrub soils with Bicarbonate P > 10 ppm.	1

5.1.2.3. Soil Physical Factors

Soil physical factors for each SMU is based on thresholds in Department of Mines and Energy (1995) and presented in Table 9.

Table 9. Soil Physical Factors

SMU	Limitation	Land Suitability Class
Eutrophic Brown Dermosol, Deep	Cracking clays with very fine self-mulch (peds <2mm), or Rigid soils with a loose, soft or firm surface when dry.	1
Leptic Brown Rudosol	Clay Loam with a firm surface when dry	1
Leptic Brown-Orthic Tenosol, Shallow	Cracking clays with very fine self-mulch (peds <2mm), or Rigid soils with a hard setting surface when dry.	2
Sodic Brown Dermosol, Deep	Rigid soils with a loose, soft or firm surface when dry.	1
Self-Mulching Brown Vertosol, Moderate	Cracking clays with very fine self-mulch (peds <2mm), or	1

5.1.2.4. Salinity

Salinity limitations for each SMU is based on thresholds in Department of Mines and Energy (1995) and presented in Table 10.

Table 10. Salinity

SMU	Limitation	Land Suitability Class
Eutrophic Brown Dermosol, Deep	Rootzone EC < 0.15 mS/cm, or Rootzone Cl < 300 ppm.	1
Leptic Brown Rudosol	Rootzone EC < 0.15 mS/cm, or Rootzone Cl < 300 ppm.	1
Leptic Brown-Orthic Tenosol, Shallow	Rootzone EC < 0.15 mS/cm, or Rootzone Cl < 300 ppm.	1
Sodic Brown Dermosol, Deep	Rootzone EC < 0.15 mS/cm, or Rootzone Cl < 300 ppm.	1
Self-Mulching Brown Vertosol, Moderate	Rootzone EC 0.15 – 0.3 mS/cm, or Rootzone Cl 300 – 600 ppm.	2

5.1.2.5. Rockiness

Salinity limitations for each SMU is based on thresholds in Department of Mines and Energy (1995) and presented in Table 11.

Table 11. Rockiness

SMU	Limitation	Land Suitability Class
Eutrophic Brown Dermosol, Deep	<20% coarse surface gravel (>6 cm diam.) and rock outcrop.	1
Leptic Brown Rudosol	<20% coarse surface gravel (>6 cm diam.) and rock outcrop.	1
Leptic Brown-Orthic Tenosol, Shallow	<20% coarse surface gravel (>6 cm diam.) and rock outcrop.	1
Sodic Brown Dermosol, Deep	<20% coarse surface gravel (>6 cm diam.) and rock outcrop.	1
Self-Mulching Brown Vertosol, Moderate	<20% coarse surface gravel (>6 cm diam.) and rock outcrop.	1

5.1.2.6. Microrelief

Microrelief limitations for each SMU is based on thresholds in Department of Mines and Energy (1995) and presented in Table 12.

Table 12. Microrelief

SMU	Limitation	Land Suitability Class
Eutrophic Brown Dermosol, Deep	Melonholes cover <20% surface area (semi-circular depressions at least 30 cm deep and usually surrounded by mounds).	1
Leptic Brown Rudosol	Melonholes cover <20% surface area (semi-circular depressions at least 30 cm deep and usually surrounded by mounds)	1
Leptic Brown-Orthic Tenosol, Shallow	Melonholes cover <20% surface area (semi-circular depressions at least 30 cm deep and usually surrounded by mounds).	1
Sodic Brown Dermosol, Deep	Melonholes cover <20% surface area (semi-circular depressions at least 30 cm deep and usually surrounded by mounds).	1

Self-Mulching Brown Vertosol, Moderate	Melonholes cover <20% surface area (semi-circular depressions at least 30 cm deep and usually surrounded by mounds).	1

5.1.2.7. pH

pH limitations for each SMU is based on thresholds in Department of Mines and Energy (1995) and presented in Table 13.

Table 13. pH

SMU	Limitation	Land Suitability Class
Eutrophic Brown Dermosol, Deep	5.6 – 6.6	1
Leptic Brown Rudosol	4.4	3
Leptic Brown-Orthic Tenosol, Shallow	8.0 – 9.0/ 4.5 – 5.0	3
Sodic Brown Dermosol, Deep	5.6 – 6.6	1
Self-Mulching Brown Vertosol, Moderate	5.6 – 6.6	1

5.1.2.8. Exchangeable Sodium Percentage (ESP)

ESP limitations for each SMU is based on thresholds in Department of Mines and Energy (1995) and presented in Table 14.

Table 14. Exchangeable Sodium Percentage

SMU	Limitation	Land Suitability Class
Eutrophic Brown Dermosol, Deep	<5.0	1
Leptic Brown Rudosol	16	4
Leptic Brown-Orthic Tenosol, Shallow	<5.0	1
Sodic Brown Dermosol, Deep	10 – 15	3
Self-Mulching Brown Vertosol, Moderate	15 – 30	4

5.1.2.9. Wetness

Wetness limitations for each SMU is based on thresholds in Department of Mines and Energy (1995) and presented in Table 15.

Table 15. Wetness

SMU	Limitation	Land Suitability Class
Eutrophic Brown Dermosol, Deep	Undulating terrain or elevated plains.	1
Leptic Brown Rudosol	Undulating terrain or elevated plains	1
Leptic Brown-Orthic Tenosol, Shallow	Undulating terrain or elevated plains.	1
Sodic Brown Dermosol, Deep	Low-lying level plains, or Rigid soils with strongly sodic (ESP >=15) within 60 cm of the surface, or Non-sodic rigid soils with coarse pale grey and yellow mottles within 50 cm of the surface.	2
Self-Mulching Brown Vertosol, Moderate	Low-lying level plains, or Rigid soils with strongly sodic (ESP >=15) within 60 cm of the surface, or Non-sodic rigid soils with coarse pale grey and yellow mottles within 50 cm of the surface.	2

5.1.2.10. Topography

Topography limitations for each SMU is based on thresholds in Department of Mines and Energy (1995) and presented in Table 16.

Table 16. Topography

SMU	Limitation	Land Suitability Class
Eutrophic Brown Dermosol, Deep	Strongly dissected terrain over 75% of the area preventing adequate herd management.	5
Leptic Brown Rudosol	Strongly dissected terrain over 75% of the area preventing adequate herd management.	5

Leptic Brown-Orthic Tenosol, Shallow	Strongly dissected terrain over 75% of the area preventing adequate herd management.	5
Sodic Brown Dermosol, Deep	Strongly dissected terrain over 75% of the area preventing adequate herd management.	5
Self-Mulching Brown Vertosol, Moderate	Strongly dissected terrain over 75% of the area preventing adequate herd management.	5

5.1.2.11. Water Erosion

Water erosion limitations for each SMU is based on thresholds in Department of Mines and Energy (1995) and presented in Table 17.

Table 17. Water Erosion

SMU	Limitation	Land Suitability Class
Eutrophic Brown Dermosol, Deep	Slopes <1% on sodic rigid soils, or Slopes on <3% on all other soils.	1
Leptic Brown Rudosol	Slopes on <3% on all other soils.	1
Leptic Brown-Orthic Tenosol, Shallow	Slopes <1% on sodic rigid soils, or	1
Sodic Brown Dermosol, Deep	Slopes on <3% on all other soils.	1
Self-Mulching Brown Vertosol, Moderate	Slopes <1% on sodic rigid soils, or	1

5.1.2.12. Flooding

Flooding limitations for each SMU is based on thresholds in Department of Mines and Energy (1995) and presented in Table 18.

Table 18. Flooding

SMU	Limitation	Land Suitability Class
Eutrophic Brown Dermosol, Deep	No flooding.	1
Leptic Brown Rudosol	No flooding	1
Leptic Brown-Orthic Tenosol, Shallow	No flooding.	1
Sodic Brown Dermosol, Deep	No flooding.	1
Self-Mulching Brown Vertosol, Moderate	No flooding.	1

5.1.2.13. Vegetation

Vegetation limitations for each SMU is based on thresholds in Department of Mines and Energy (1995) and presented in Table 19.

Table 19. Vegetation

SMU	Limitation	Land Suitability Class
Eutrophic Brown Dermosol, Deep	Eucalypt woodlands with wattle understorey, or Broad-leaved teatree woodlands.	4
Leptic Brown Rudosol	Eucalypt woodlands with wattle understorey,	4
Leptic Brown-Orthic Tenosol, Shallow	Eucalypt woodlands with wattle understorey, or	4
Sodic Brown Dermosol, Deep	Broad-leaved teatree woodlands.	4
Self-Mulching Brown Vertosol, Moderate	Eucalypt woodlands with wattle understorey, or	4

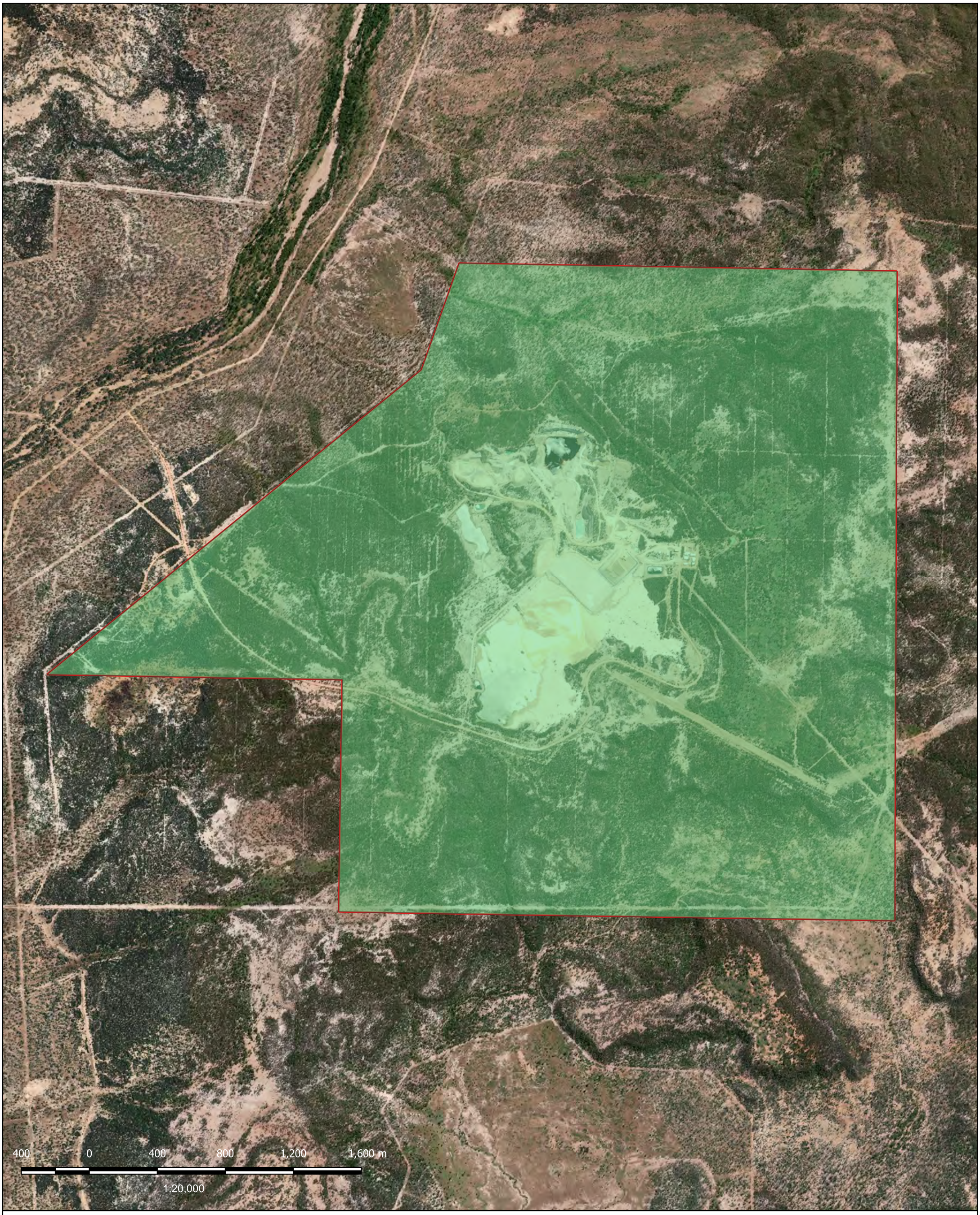
5.1.2.14. Summary of Land Suitability Class for Beef Cattle Grazing

Overall, SMUs were found to be limited by Vegetation, Water Availability and Topography. These factors combined have the potential to limit pasture and therefore livestock production across much of the Site. Vegetation is dominated by woody species on undulating terrain with highly erosive properties, making SMUs unsuitable for grazing.

No land was identified within the Site that was deemed suitable for beef cattle grazing (i.e. Class 1, 2 or 3), with approx.. 50.1 % (67.75 ha) of the Site found to require significant inputs to maintain production, 49.9 % (65.25 ha) encountering extreme limitations (Class 5) (Table 20, Figure 8).

Table 20. Summary of Land Suitability Classes for Beef Cattle Grazing

Limitation	Eutrophic Brown Dermosol, Deep	Leptic Brown Rudosol	Leptic Brown-Orthic Tenosol, Shallow	Sodic Brown Dermosol, Deep	Self-Mulching Brown Vertosol, Moderate
Water Availability	4	5	5	5	5
Nutrient Deficiency	1	5	4	1	1
Soil Physical Factors	1	1	2	1	1
Salinity	1	1	1	1	2
Rockiness	1	1	1	1	1
Mocirorelief	1	1	1	1	1
pH	1	3	3	1	1
ESP (10cm)	1	4	1	3	4
Wetness	1	1	1	2	2
Topography	5	5	5	5	5
Water Erosion	1	1	1	1	1
Flooding	1	1	1	1	1
Vegetation	4	4	4	4	4
Land Suitability Class	**5**	**5**	**5**	**5**	**5**



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Project number: 2020.10003
CRS: GDA2020 z54
Date: 15 December 2021

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Figure 8. Land Suitability

Mine Lease

Land Suitability Class

Class 5

ESRI Satellite

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5.1.3. Rainfed Broadacre Cropping

Limitations for Rainfed Broadacre Cropping (Cropping) have been assessed in accordance with thresholds detailed in Department of Mines and Energy (1995), including:

- Water Availability;
- Nutrient Deficiency;
- Soil physical factors;
- Soil workability;
- Salinity;
- Rockiness;
- Microrelief;
- Wetness;
- Topography;
- Water Erosion; and
- Flooding.

Assessment of the SMUs suitability for cropping has been conducted in accordance with Department of Science Information Technology and Innovation and Department of Natural Resources and Mines (2015).

Note: a depth of 0.6 m has been assumed for root zone depth for any profile in which weathered rock, and/ or a salt bulge was absent as outlined in Department of Mines and Energy (1995).

5.1.3.1. Water Availability

PAWC thresholds for land suitability classes are as follows:

- **Class 1:** > 150 mm;
- **Class 2:** 125 - 150 mm;
- **Class 3:** 100 - 125 mm;
- **Class 4:** 75 - 100 mm;
- **Class 5:** <75 mm.

The thresholds stated are based on pasture generally, and do not account for specific pasture species. Land Suitability Classes are described in Table 21.

Table 21. PAWC, ERD and Land Suitability Class

SMU	ERD	PAWC	Land Suitability Class
Eutrophic Brown Dermosol, Deep	1.10	66	5
Leptic Brown Rudosol	0.2	8	5
Leptic Brown-Orthic Tenosol, Shallow	0.50	30	5
Sodic Brown Dermosol, Deep	0.50	30	5
Self-Mulching Brown Vertosol, Moderate	0.20	20	5

5.1.3.2. Nutrient Deficiency

Nutrient deficiency for each SMU is based on thresholds in Department of Mines and Energy (1995) and presented in Table 22.

Table 22. Nutrient Deficiency

SMU	Limitation	Land Suitability Class
Eutrophic Brown Dermosol, Deep	Brigalow, gidgee, blackwood or softwood scrub soils and former scrub soils with Bicarbonate P > 10 ppm.	1
Leptic Brown Rudosol	Euclyptus woodland on shallow soils wit Bicarbonate P <5 ppm	5
Leptic Brown-Orthic Tenosol, Shallow	Sands and loams at least 75 cm dep or overlying rock at shallow depth, with Bicarbonate P 5 – 10 ppm, or Bicarbonate P <=4 ppm.	4
Sodic Brown Dermosol, Deep	Brigalow, gidgee, blackwood or softwood scrub soils and former scrub soils with Bicarbonate P > 10 ppm.	1
Self-Mulching Brown Vertosol, Moderate	Brigalow, gidgee, blackwood or softwood scrub soils and former scrub soils with Bicarbonate P > 10 ppm.	1
Eutrophic Brown Dermosol, Deep	Brigalow, gidgee, blackwood or softwood scrub soils and former scrub soils with Bicarbonate P > 10 ppm.	1

5.1.3.3. Soil Physical Factors

Soil physical factors for each SMU is based on thresholds in Department of Mines and Energy (1995) and presented in Table 23.

Table 23. Soil Physical Factors

SMU	Limitation	Land Suitability Class
Eutrophic Brown Dermosol, Deep	Cracking clays with very fine self-mulch (peds <2mm), or Rigid soils with a loose, soft or firm surface when dry.	1
Leptic Brown Rudosol	Clay Loam with a firm surface when dry	1
Leptic Brown-Orthic Tenosol, Shallow	Cracking clays with very fine self-mulch (peds <2mm), or Rigid soils with a hard setting surface when dry.	2
Sodic Brown Dermosol, Deep	Rigid soils with a loose, soft or firm surface when dry.	1
Self-Mulching Brown Vertosol, Moderate	Cracking clays with very fine self-mulch (peds <2mm), or	1

5.1.3.4. Soil Workability

Soil workability limitations for each SMU is based on thresholds in Department of Mines and Energy (1995) and presented in Table 24.

Table 24. Soil Workability

SMU	Limitation	Land Suitability Class
Eutrophic Brown Dermosol, Deep	Friable cracking clays (indicated by very fine self-mulch), or Rigid soils with a loose, soft or firm surface when dry.	1
Leptic Brown Rudosol	Rigid soils with a loose, soft or firm surface when dry.	1
Leptic Brown-Orthic Tenosol, Shallow	Firm cracking clays (indicated by fine self-mulch), or Rigid soils with a hard setting surface when dry.	2
Sodic Brown Dermosol, Deep	Friable cracking clays (indicated by very fine self-mulch), or	1

Self-Mulching Brown Vertosol, Moderate	Rigid soils with a loose, soft or firm surface when dry.	1

5.1.3.5. Salinity

Salinity limitations for each SMU is based on thresholds in Department of Mines and Energy (1995) and presented in Table 25.

Table 25. Salinity

SMU	Limitation	Land Suitability Class
Eutrophic Brown Dermosol, Deep	Rootzone EC < 0.15 mS/cm, or Rootzone Cl < 300 ppm.	1
Leptic Brown Rudosol	Rootzone EC < 0.15 mS/cm, or Rootzone Cl < 300 ppm.	1
Leptic Brown-Orthic Tenosol, Shallow	Rootzone EC < 0.15 mS/cm, or Rootzone Cl < 300 ppm.	1
Sodic Brown Dermosol, Deep	Rootzone EC < 0.15 mS/cm, or Rootzone Cl < 300 ppm.	1
Self-Mulching Brown Vertosol, Moderate	Rootzone EC 0.15 – 0.3 mS/cm, or Rootzone Cl 300 – 600 ppm.	2

5.1.3.6. Rockiness

Salinity limitations for each SMU is based on thresholds in Department of Mines and Energy (1995) and presented in Table 11.

Table 26. Rockiness

SMU	Limitation	Land Suitability Class
Eutrophic Brown Dermosol, Deep	<20% coarse surface gravel (>6 cm diam.) and rock outcrop.	1
Leptic Brown Rudosol	<20% coarse surface gravel (>6 cm diam.) and rock outcrop.	1
Leptic Brown-Orthic Tenosol, Shallow	<20% coarse surface gravel (>6 cm diam.) and rock outcrop.	1
Sodic Brown Dermosol, Deep	<20% coarse surface gravel (>6 cm diam.) and rock outcrop.	1
Self-Mulching Brown Vertosol, Moderate	<20% coarse surface gravel (>6 cm diam.) and rock outcrop.	1

5.1.3.7. Microrelief

Microrelief limitations for each SMU is based on thresholds in Department of Mines and Energy (1995) and presented in Table 27.

Table 27. Mircorelief

SMU	Limitation	Land Suitability Class
Eutrophic Brown Dermosol, Deep	Melonholes cover <20% surface area (semi-circular depressions at least 30 cm deep and usually surrounded by mounds).	1
Leptic Brown Rudosol	Melonholes cover <20% surface area (semi-circular depressions at least 30 cm deep and usually surrounded by mounds)	1
Leptic Brown-Orthic Tenosol, Shallow	Melonholes cover <20% surface area (semi-circular depressions at least 30 cm deep and usually surrounded by mounds).	1
Sodic Brown Dermosol, Deep	Melonholes cover <20% surface area (semi-circular depressions at least 30 cm deep and usually surrounded by mounds).	1
Self-Mulching Brown Vertosol, Moderate	Melonholes cover <20% surface area (semi-circular depressions at least 30 cm deep and usually surrounded by mounds).	1

5.1.3.8. Wetness

Wetness limitations for each SMU is based on thresholds in Department of Mines and Energy (1995) and presented in Table 28.

Table 28. Wetness

SMU	Limitation	Land Suitability Class
Eutrophic Brown Dermosol, Deep	Undulating terrain or elevated plains.	1
Leptic Brown Rudosol	Undulating terrain or elevated plains	1
Leptic Brown-Orthic Tenosol, Shallow	Undulating terrain or elevated plains.	1
Sodic Brown Dermosol, Deep	Low-lying level plains, or	2

SMU	Limitation	Land Suitability Class
	Rigid soils with strongly sodic (ESP >=15) within 60 cm of the surface, or Non-sodic rigid soils with coarse pale grey and yellow mottles within 50 cm of the surface.	
Self-Mulching Brown Vertosol, Moderate	Low-lying level plains, or Rigid soils with strongly sodic (ESP >=15) within 60 cm of the surface, or Non-sodic rigid soils with coarse pale grey and yellow mottles within 50 cm of the surface.	2

5.1.3.9. Topography

Topography limitations for each SMU is based on thresholds in Department of Mines and Energy (1995) and presented in Table 29.

Table 29. Topography

SMU	Limitation	Land Suitability Class
Eutrophic Brown Dermosol, Deep	Strongly dissected terrain over 75% of the area preventing adequate herd management.	5
Leptic Brown Rudosol	Strongly dissected terrain over 75% of the area preventing adequate herd management.	5
Leptic Brown-Orthic Tenosol, Shallow	Strongly dissected terrain over 75% of the area preventing adequate herd management.	5
Sodic Brown Dermosol, Deep	Strongly dissected terrain over 75% of the area preventing adequate herd management.	5
Self-Mulching Brown Vertosol, Moderate	Strongly dissected terrain over 75% of the area preventing adequate herd management.	5

5.1.3.10. Water erosion

Water erosion limitations for each SMU is based on thresholds in Department of Mines and Energy (1995) and presented in Table 30.

Table 30. Water Erosion

SMU	Limitation	Land Suitability Class
Eutrophic Brown Dermosol, Deep	Slopes <1% on sodic rigid soils, or Slopes on <3% on all other soils.	1
Leptic Brown Rudosol	Slopes on <3% on all other soils.	1
Leptic Brown-Orthic Tenosol, Shallow	Slopes <1% on sodic rigid soils, or	1
Sodic Brown Dermosol, Deep	Slopes on <3% on all other soils.	1
Self-Mulching Brown Vertosol, Moderate	Slopes <1% on sodic rigid soils, or	1

5.1.3.11. Flooding

Flooding limitations for each SMU is based on thresholds in Department of Mines and Energy (1995) and presented in Table 31.

Table 31. Flooding

SMU	Limitation	Land Suitability Class
Eutrophic Brown Dermosol, Deep	No flooding.	1
Leptic Brown Rudosol	No flooding	1
Leptic Brown-Orthic Tenosol, Shallow	No flooding.	1
Sodic Brown Dermosol, Deep	No flooding.	1
Self-Mulching Brown Vertosol, Moderate	No flooding.	1

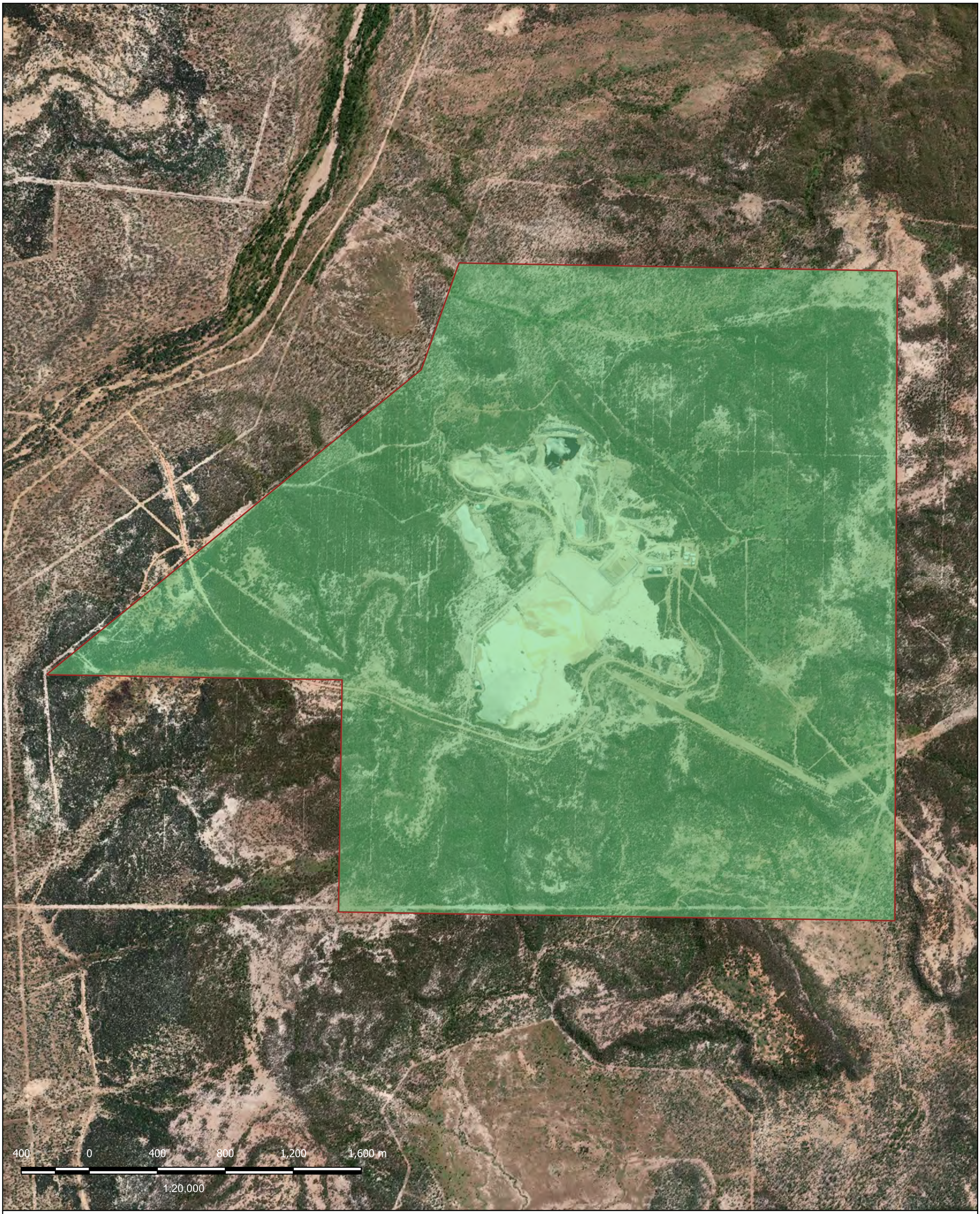
5.1.3.12. Summary of Land Suitability Class for Rainfed Broadacre Cropping

Overall, SMUs were found to be limited by Vegetation, Topography and Erosion. These factors combined have the potential to limit production across much of the Site. Vegetation is dominated by woody species on undulating terrain with highly erosive properties, making SMUs unsuitable for grazing.

No land was identified within the Site that was deemed suitable for rainfed broadacre grazing (i.e. Class 1, 2 or 3), with approx. 82.1 % (109.14 ha) of the Site found to require extreme inputs to maintain production (Class 5), 17.9 % (23.86 ha) encountering significant limitations (Class 4) (Table 32).

Table 32. Summary of Land Suitability Classes for Rainfed Broadacre Cropping

Limitation	Eutrophic Brown Dermosol, Deep	Leptic Brown Rudosol	Eutrophic Brown Dermosol, Deep	Eutrophic Brown Dermosol, Deep	Eutrophic Brown Dermosol, Deep
Water Availability	5	5	5	5	5
Nutrient Deficiency	1	4	1	1	1
Soil Physical Factors	1	1	3	1	1
Soil Workability	1	1	2	1	1
Salinity	1	1	1	1	2
Rockiness	1	1	1	1	1
Microrelief	1	1	1	1	1
Wetness	1	1	1	2	2
Topography	1	5	2	1	1
Water Erosion	1	1	1	1	1
Flooding	1	1	1	1	1
Land Suitability Class	**5**	**5**	**5**	**5**	**5**



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Project number: 2020.10003
CRS: GDA2020 z54
Date: 15 December 2021

Print as A3

Figure 9. Land Suitability

Mine Lease

Land Suitability Class

Class 5

ESRI Satellite

WULGURU TECHNICAL SERVICES

5.2. Soil Resource Assessment

Topsoil resources are predominantly limited to surface soil horizons, with the upper horizons maintaining seedbank, micro-organisms, nutrients and organics necessary for plant growth and establishment. Generally, soil nutrients and micro-organism activity decrease with depth.

Soil resources are based on factors such as ERD, PAWC, nutrient availability, sodicity, etc. and represent the recommended maximum stripping depth for stockpiling and future rehabilitation. Generally, soil stripping should be timed based on favourable climatic conditions to avoid soil loss, compaction or erosion. Two stage stripping is recommended where sub soils may be encountered, unless topsoil can be recovered in a single pass. Topsoil resources should be placed directly onto rehabilitation areas as soon as possible to limit handling. Where stockpiling is required, it is recommended that stockpiles be shaped to no greater than 2 m high, and stabilised using suitable erosion and sediment controls (e.g. hydromulch, jute mesh, etc.).

Table 33 details the maximum soil resources stripping depths and potential volumes available for use.

Table 33. Maximum Soil Resource Stripping Depths and Potential Volumes Available

SMU	Stripping Depth (m)	SMU Area (m^2)	Potential Volume Available (m^3)
Eutrophic Brown Dermosol, Deep	1.10	1,377,800	1,515, 580
Leptic Brown Rudosol	0.2	3,652,200	730,440
Leptic Brown-Orthic Tenosol, Shallow	0.50	3,948,600	1,974,300
Sodic Brown Dermosol, Deep	0.50	1,484,000	742,000
Self-Mulching Brown Vertosol, Moderate	0.20	841,500	168,300

Respreading of soil resources should occur on prepared, reshaped areas as soon as possible. Where soil resources allow, soils should be spread to a nominal depth of 0.10 m on all re-graded spoil or disturbance areas. Soil resources should be spread with fertiliser and seed in one consecutive operation to reduce the potential for soil losses to wind and water erosion.

5.3. Land Stability

5.3.1. Soil Erosion Hazard

An assessment of soil erosion susceptibility is given in Table 34, which lists influencing factors for both soil types that have been identified.

Table 34. Soil Erosion Susceptibility

Soil Type	Sodicity	Texture	Landform	Groundcover	Erosion Susceptibility
Eutrophic Brown Dermosol, Deep	Non- Sodic	Clay Loam	Flat to gently undulated	20-50%	Low susceptibility
Leptic Brown Rudosol	Highly Sodic	Clay Loam	Flat to gently undulated	10-20%	Moderate susceptibility
Leptic Brown-Orthic Tenosol, Shallow	Non- Sodic	Loamy Silt	Flat to gently undulated	<2%	High susceptibility due sparse erosion protection
Sodic Brown Dermosol, Deep	Non sodic topsoil. Moderately sodic subsoil	Silty Loam	Flat to gently undulated	<2%	High susceptibility due sparse erosion protection
Self-Mulching Brown Vertosol, Moderate	sodic to highly sodic	Clay Loam to light/medium clay	Flat to gently undulated	20-50%	Moderate susceptibility

5.3.2. Erosion Hazard (Average Rainfall)

The International Erosion Control Association's (IECA) Best Practice Erosion and Sediment Control Guidelines (IECA 2008) sets erosion hazard based on average rainfalls for regions around Australia. IECA erosion hazard for the Charters Towers region is detailed in Table 35.

Table 35. Erosion Hazard (IECA, 2008)

Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
H	H	H	L	VL	VL	VL	VL	VL	VL	L	H

5.3.3. Erosion Hazard (Calculated)

Soil erosion presents a significant hazard on downstream receptors, particularly where ground cover is disturbed, and the soil is subject to erosive agents of wind and water. Soil erosion occurs when soil particles detach and are transported off site. This detachment and subsequent entrainment of sediment is affected by a range of factors, predominantly soil erodibility and steepness of terrain. Soil Erosion Hazard has been assessed for each soil type using the RUSLE equation to determine soil loss (t/ha/yr) and assess erosion risk. The RUSLE equation is outlined below:

$$A = R \times K \times LS \times C \times P$$

Where:

A = estimated average soil loss in tons per hectare per year

R = rainfall-runoff erosivity factor

K = soil erodibility factor

L = slope length factor

S = slope steepness factor

C = cover-management factor

P = support practice factor

RULSE calculations for each soil type are detailed in Table 36.

Table 36. RUSLE Calculations

Soil Type	R	K	LS	C	P	A
Eutrophic Brown Dermosol, Deep	1804	0.030	3.5	0.1	0.8	**15.5**
Leptic Brown Rudosol	1804	0.055	1.0	0.19	0.8	**15.0**
Leptic Brown-Orthic Tenosol, Shallow	1804	0.055	1.0	0.40	0.8	**31.75**
Sodic Brown Dermosol, Deep	1804	0.055	1.2	0.40	0.8	**38.1**
Self-Mulching Brown Vertosol, Moderate	1804	0.030	2.4	0.10	0.8	**10.39**

Regarding erosion risk, it is considered that:

- the average Australian rate of erosion is 6.3 t/ha/yr;
- a low rate of erosion is defined as less than (<) 0.5 t/ha/yr;
- a medium rate of erosion is defined as 0.5-10 t/ha/yr ; and
- a high rate of erosion is defined as greater than (>) 10 t/ha/yr (Lu et al. 2001).

All soil types identified at the Project, with the exception of Self-Mulching Brown Vertosol, express a high erosion risk. It is noted that high erosion rates in reflects the seasonal variance in climate, vegetation cover and seasonal rainfall. With a vegetation cover spare with coverage dominantly between <2 – 20 %, and seasonal heavy rainfall (November – April) soil may readily be lost naturally due to naturally low erosion protection. Self-Mulching Brown Vertosols have significantly higher vegetation cover and intern good erosion protection resulting in a lower erosion rate. However, erosion is still considered moderate for Self-Mulching Brown Vertosols due to soil Sodicity and the risk of dispersion where groundcover is disturbed.

5.3.4. Erosion Management

Soil erosion presents a significant hazard on downstream receptors, particularly where ground cover is disturbed, and the soil is subject to erosive agents of wind and water. Soil erosion occurs when soil particles detach and are transported off site. This detachment and subsequent entrainment of sediment is affected by a range of factors, predominantly soil erodibility and steepness of terrain.

Management recommendations to reduce the likelihood and potential impact of erosion include:

- Prioritising land clearing so as to only disturb areas necessary for development;
- Divert clean water and upstream catchments around proposed disturbances;
- Manage on site “dirty/ impacted” waters in such a way as to capture and treat sediment laden waters prior to leaving site;
- Ensure soil resources stockpiled are placed away from drainage areas, roads, machinery, transport, and grazing areas;
- Undertake progressive rehabilitation activities on landforms no longer required for operations.
- Staging the clearing activities where possible such that this is limited only in areas which are being actively cleared, therefore, limiting the time such areas are exposed;
- Erosion and Sediment Control Plans will be developed in accordance with IECA best practice guidelines such that these will highlight how far in advance vegetation clearing can be undertaken prior to construction works; and
- Develop and implement management strategies (as above) through an EM Plan and Erosion and Sediment Control Management Plan in line with all statutory legislation and regulations;
- General vegetation clearing and soil stripping should not be undertaken until earthwork and construction operations are ready to commence. All proposed erosion and sediment control measures will be implemented prior to, or in conjunction with, clearing activities.
- Prior to commencement of clearing and soil stripping, the limits of these works need to be clearly delineated by pegs placed at intervals on each side of the disturbed area by a suitably qualified supervisor.
- All operations will be planned to ensure that there is no damage to any trees, cropping or pasture areas outside the limits to be cleared.

Erosion of rehabilitated landforms/ domains reduces the potential for rehabilitation success and closure. In extreme instances, erosion can lead to the failure of structures (e.g. Tailings Storage Facility embankments), resulting in potential for environmental harm via release of sediment and contaminants to downstream receptors.

Pre-development landform is required to be re-established at post-development or post-land use as practical as possible. In areas where infrastructures maybe required for retention (i.e. dams or ponds), a provision for landform design in rehabilitation for such areas is recommended.

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Appendix A – Certificates of Analysis

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EB2105900**	Page	: 1 of 13
Client	: **WULGURU TECHNICAL SERVICES PTY LTD**	Laboratory	: Environmental Division Brisbane
Contact	: SCOTT HAYES-STANLEY	Contact	: Customer Services EB
Address	: 17 MUELLER ST WULGURU QLD 4811	Address	: 2 Byth Street Stafford QLD Australia 4053
Telephone	: ----	Telephone	: +61-7-3243 7222
Project	: 2021.02011 - WGM Soil Survey	Date Samples Received	: 04-Mar-2021 08:30
Order number	: ----	Date Analysis Commenced	: 08-Mar-2021
C-O-C number	: ----	Issue Date	: 22-Mar-2021 14:17
Sampler	: SCOTT HAYES-STANLEY		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 23		
No. of samples analysed	: 23		

ilac-MRA NATA
Accreditation No. 825
Accredited for compliance with ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ben Felgendrejeris	Senior Acid Sulfate Soil Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD
Ben Felgendrejeris	Senior Acid Sulfate Soil Chemist	Brisbane Inorganics, Stafford, QLD
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
Kim McCabe	Senior Inorganic Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Mark Hallas	Senior Inorganic Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD
Mark Hallas	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- ED007 (Exchangeable Cations): Unable to calculate Magnesium/Potassium Ratio for sample S11_30_50 (EB2105900-015) as the required results for Magnesium/Potassium are below limit of reporting.
- EA150H: Soil particle density results fell outside the scope of AS1289.3.6.3. Results should be scrutinised accordingly.
- ALS is not NATA accredited for the analysis of Exchangeable Aluminium and Exchange Acidity in soils when performed under ALS Method ED005.
- ALS is not NATA accredited for the analysis of Exchangeable Cations on Alkaline Soils when performed under ALS Method ED006.
- EK067G: EB2105900 #2 Poor matrix spike recovery for TP due to matrix effects.
- EG005T (Total Metals by ICP-AES): Sample S4_0_30 (EB2105900_001) shows poor duplicate results due to sample heterogeneity. Confirmed by visual inspection.
- ED007 (Exchangeable Cations by ICP-AES): Unable to calculate Exchangeable Percent results for sample S12_40_60 (E EB2105900-019) as required Calcium, Magnesium, Potassium & Sodium results are less than the limit of reporting.
- ED007 (Exchangeable Cations by ICP-AES): Unable to calculate Magnesium/Potassium Ratio for some samples as required Exchangeable Magnesium and/or Potassium results are less than the limit of reporting.
- ED007 (Exchangeable Cations by ICP-AES): Unable to calculate Calcium/Magnesium Ratio for some samples as required Exchangeable Calcium and/or Magnesium results are less than the limit of reporting.
- ED007 (Exchangeable Cations by ICP-AES): Limit of reporting has been raised some samples due to matrix interference.
- ED007 and ED008: When Exchangeable Al is reported from these methods, it should be noted that Rayment & Lyons (2011) suggests Exchange Acidity by 1M KCl - Method 15G1 (ED005) is a more suitable method for the determination of exchange acidity (H+ + Al3+).

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	S4_0_30	S4_30_50	S4_50_80	S4_80_110	S6_0_10
			Sampling date / time	28-Feb-2021 00:00	28-Feb-2021 00:00	28-Feb-2021 00:00	28-Feb-2021 00:00	01-Mar-2021 00:00
Compound	CAS Number	LOR	Unit	EB2105900-001	EB2105900-002	EB2105900-003	EB2105900-004	EB2105900-005
				Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	5.3	5.7	5.8	6.0	4.4
EA010: Conductivity (1:5)								
Electrical Conductivity @ 25°C	----	1	µS/cm	15	12	12	12	234
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	5.0	5.1	4.8	5.0	6.9
EA150: Particle Sizing								
+75µm	----	1	%	44	49	49	53	33
+150µm	----	1	%	37	42	41	44	25
+300µm	----	1	%	29	33	32	33	19
+425µm	----	1	%	24	28	26	26	17
+600µm	----	1	%	19	22	20	20	14
+1180µm	----	1	%	8	10	8	8	9
+2.36mm	----	1	%	2	3	2	3	5
+4.75mm	----	1	%	1	1	<1	<1	2
+9.5mm	----	1	%	<1	<1	<1	<1	<1
+19.0mm	----	1	%	<1	<1	<1	<1	<1
+37.5mm	----	1	%	<1	<1	<1	<1	<1
+75.0mm	----	1	%	<1	<1	<1	<1	<1
EA150: Soil Classification based on Particle Size								
Clay (<2 µm)	----	1	%	15	23	12	14	27
Silt (2-60 µm)	----	1	%	38	26	37	31	37
Sand (0.06-2.00 mm)	----	1	%	43	46	47	51	30
Gravel (>2mm)	----	1	%	4	5	4	4	6
Cobbles (>6cm)	----	1	%	<1	<1	<1	<1	<1
EA152: Soil Particle Density								
Soil Particle Density (Clay/Silt/Sand)	----	0.01	g/cm3	2.40	2.66	2.50	2.60	2.43
ED005: Exchange Acidity								
ø Exchange Acidity	----	0.1	meq/100g	<0.1	<0.1	<0.1	<0.1	1.9
ø Exchangeable Aluminium	----	0.1	meq/100g	<0.1	<0.1	<0.1	<0.1	1.5
ED007: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	2.2	2.3	2.4	1.7	0.5
Exchangeable Magnesium	----	0.1	meq/100g	0.9	0.9	1.0	1.5	0.7
Exchangeable Potassium	----	0.1	meq/100g	<0.1	<0.1	<0.1	0.1	0.2
Exchangeable Sodium	----	0.1	meq/100g	<0.1	<0.1	<0.1	<0.1	0.3

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	S4_0_30	S4_30_50	S4_50_80	S4_80_110	S6_0_10
			Sampling date / time	28-Feb-2021 00:00	28-Feb-2021 00:00	28-Feb-2021 00:00	28-Feb-2021 00:00	01-Mar-2021 00:00
Compound	CAS Number	LOR	Unit	EB2105900-001	EB2105900-002	EB2105900-003	EB2105900-004	EB2105900-005
				Result	Result	Result	Result	Result
ED007: Exchangeable Cations - Continued								
Cation Exchange Capacity	----	0.1	meq/100g	3.3	3.2	3.5	3.3	3.6
Exchangeable Sodium Percent	----	0.1	%	<0.1	<0.1	<0.1	<0.1	16.2
Calcium/Magnesium Ratio	----	0.1	-	2.4	2.6	2.4	1.1	0.7
Magnesium/Potassium Ratio	----	0.1	-	----	----	----	13.9	4.2
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	110	<100	<100	<100	220
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.03	0.03	0.03	0.03	0.02
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	10	mg/kg	<10	<10	<10	<10	120
EG005(ED093)T: Total Metals by ICP-AES								
Iron	7439-89-6	50	mg/kg	4240	7450	3380	6470	5050
Arsenic	7440-38-2	5	mg/kg	<5	6	<5	6	<5
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	6	6	6	6	2
Copper	7440-50-8	5	mg/kg	<5	<5	<5	<5	<5
Lead	7439-92-1	5	mg/kg	7	10	6	10	8
Nickel	7440-02-0	2	mg/kg	<2	<2	<2	<2	<2
Zinc	7440-66-6	5	mg/kg	<5	<5	<5	<5	<5
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	1.0	0.6	0.7	0.6	69.4
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	20	mg/kg	490	350	310	260	1100
EK062: Total Nitrogen as N (TKN + NOx)								
^ Total Nitrogen as N	----	20	mg/kg	490	350	310	260	1170
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	2	mg/kg	117	101	95	82	104
EK080: Bicarbonate Extractable Phosphorus (Colwell)								
Bicarbonate Ext. P (Colwell)	----	5	mg/kg	<5	<5	<5	<5	<5
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	0.83	0.78	0.84	0.63	1.98

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	S6_10_20	S9_0_20	S9_20_40	S9_40_70	S9_70_90
			Sampling date / time	01-Mar-2021 00:00	01-Mar-2021 00:00	01-Mar-2021 00:00	01-Mar-2021 00:00	01-Mar-2021 00:00
Compound	CAS Number	LOR	Unit	EB2105900-006	EB2105900-007	EB2105900-008	EB2105900-009	EB2105900-010
				Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	4.4	5.1	5.1	5.3	5.5
EA010: Conductivity (1:5)								
Electrical Conductivity @ 25°C	----	1	µS/cm	142	76	64	60	49
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	6.6	5.0	3.8	3.9	3.7
EA150: Particle Sizing								
+75µm	----	1	%	33	68	66	66	66
+150µm	----	1	%	24	55	54	55	57
+300µm	----	1	%	19	41	35	38	41
+425µm	----	1	%	17	32	25	28	33
+600µm	----	1	%	14	25	18	21	26
+1180µm	----	1	%	11	14	8	10	15
+2.36mm	----	1	%	7	7	3	3	6
+4.75mm	----	1	%	4	2	<1	<1	1
+9.5mm	----	1	%	<1	<1	<1	<1	<1
+19.0mm	----	1	%	<1	<1	<1	<1	<1
+37.5mm	----	1	%	<1	<1	<1	<1	<1
+75.0mm	----	1	%	<1	<1	<1	<1	<1
EA150: Soil Classification based on Particle Size								
Clay (<2 µm)	----	1	%	18	13	12	12	7
Silt (2-60 µm)	----	1	%	46	19	20	20	24
Sand (0.06-2.00 mm)	----	1	%	28	59	63	63	60
Gravel (>2mm)	----	1	%	8	9	5	5	9
Cobbles (>6cm)	----	1	%	<1	<1	<1	<1	<1
EA152: Soil Particle Density								
Soil Particle Density (Clay/Silt/Sand)	----	0.01	g/cm3	2.41	2.53	2.43	2.46	2.48
ED005: Exchange Acidity								
ø Exchange Acidity	----	0.1	meq/100g	2.1	0.1	0.2	<0.1	<0.1
ø Exchangeable Aluminium	----	0.1	meq/100g	1.8	<0.1	<0.1	<0.1	<0.1
ED007: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	0.2	1.5	1.6	1.9	1.8
Exchangeable Magnesium	----	0.1	meq/100g	0.4	0.7	1.1	1.4	1.5
Exchangeable Potassium	----	0.1	meq/100g	0.2	0.3	0.2	0.2	0.1
Exchangeable Sodium	----	0.1	meq/100g	<0.1	<0.1	<0.1	<0.1	<0.1

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	S6_10_20	S9_0_20	S9_20_40	S9_40_70	S9_70_90
			Sampling date / time	01-Mar-2021 00:00	01-Mar-2021 00:00	01-Mar-2021 00:00	01-Mar-2021 00:00	01-Mar-2021 00:00
Compound	CAS Number	LOR	Unit	EB2105900-006	EB2105900-007	EB2105900-008	EB2105900-009	EB2105900-010
				Result	Result	Result	Result	Result
ED007: Exchangeable Cations - Continued								
Cation Exchange Capacity	----	0.1	meq/100g	2.9	2.6	3.1	3.4	3.4
Exchangeable Sodium Percent	----	0.1	%	<0.1	<0.1	<0.1	<0.1	<0.1
Calcium/Magnesium Ratio	----	0.1	-	0.5	2.1	1.4	1.4	1.2
Magnesium/Potassium Ratio	----	0.1	-	2.4	2.2	4.3	7.7	13.0
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	140	<100	<100	<100	<100
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.02	0.02	0.01	0.02	0.01
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	10	mg/kg	70	10	<10	<10	<10
EG005(ED093)T: Total Metals by ICP-AES								
Iron	7439-89-6	50	mg/kg	6200	9020	7910	8200	7140
Arsenic	7440-38-2	5	mg/kg	<5	<5	5	5	<5
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	2	<2	<2	<2	<2
Copper	7440-50-8	5	mg/kg	<5	<5	<5	<5	<5
Lead	7439-92-1	5	mg/kg	9	7	8	8	7
Nickel	7440-02-0	2	mg/kg	<2	<2	<2	<2	<2
Zinc	7440-66-6	5	mg/kg	<5	15	14	13	12
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	36.6	29.2	29.8	29.6	24.9
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	20	mg/kg	890	410	290	250	200
EK062: Total Nitrogen as N (TKN + NOx)								
^ Total Nitrogen as N	----	20	mg/kg	930	440	320	280	220
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	2	mg/kg	99	139	120	108	112
EK080: Bicarbonate Extractable Phosphorus (Colwell)								
Bicarbonate Ext. P (Colwell)	----	5	mg/kg	5	<5	<5	<5	<5
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	1.46	0.57	0.54	0.42	0.65

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	S10_0_30	S10_30_50	S11_0_10	S11_10_30	S11_30_50
			Sampling date / time	28-Feb-2021 00:00	28-Feb-2021 00:00	01-Mar-2021 00:00	01-Mar-2021 00:00	01-Mar-2021 00:00
Compound	CAS Number	LOR	Unit	EB2105900-011	EB2105900-012	EB2105900-013	EB2105900-014	EB2105900-015
				Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	4.9	4.7	6.2	6.4	6.1
EA010: Conductivity (1:5)								
Electrical Conductivity @ 25°C	----	1	µS/cm	20	19	13	22	87
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	3.3	2.8	8.0	4.5	5.8
EA150: Particle Sizing								
+75µm	----	1	%	47	47	62	67	59
+150µm	----	1	%	40	40	56	62	54
+300µm	----	1	%	31	32	48	56	49
+425µm	----	1	%	25	27	42	52	44
+600µm	----	1	%	19	20	35	46	38
+1180µm	----	1	%	6	7	18	29	21
+2.36mm	----	1	%	<1	<1	3	12	4
+4.75mm	----	1	%	<1	<1	<1	3	<1
+9.5mm	----	1	%	<1	<1	<1	<1	<1
+19.0mm	----	1	%	<1	<1	<1	<1	<1
+37.5mm	----	1	%	<1	<1	<1	<1	<1
+75.0mm	----	1	%	<1	<1	<1	<1	<1
EA150: Soil Classification based on Particle Size								
Clay (<2 µm)	----	1	%	12	15	6	10	14
Silt (2-60 µm)	----	1	%	37	36	29	22	24
Sand (0.06-2.00 mm)	----	1	%	49	47	57	51	52
Gravel (>2mm)	----	1	%	2	2	8	17	10
Cobbles (>6cm)	----	1	%	<1	<1	<1	<1	<1
EA152: Soil Particle Density								
Soil Particle Density (Clay/Silt/Sand)	----	0.01	g/cm3	2.54	2.70	2.58	2.62	2.54
ED005: Exchange Acidity								
ø Exchange Acidity	----	0.1	meq/100g	0.8	1.1	----	----	----
ø Exchangeable Aluminium	----	0.1	meq/100g	0.6	0.8	----	----	----
ED007: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	0.7	0.2	4.3	3.0	1.3
Exchangeable Magnesium	----	0.1	meq/100g	<0.1	<0.1	1.2	1.8	4.6
Exchangeable Potassium	----	0.1	meq/100g	<0.1	<0.1	0.3	0.1	<0.1
Exchangeable Sodium	----	0.1	meq/100g	<0.1	<0.1	0.2	0.6	2.5

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	S10_0_30	S10_30_50	S11_0_10	S11_10_30	S11_30_50
			Sampling date / time	28-Feb-2021 00:00	28-Feb-2021 00:00	01-Mar-2021 00:00	01-Mar-2021 00:00	01-Mar-2021 00:00
Compound	CAS Number	LOR	Unit	EB2105900-011	EB2105900-012	EB2105900-013	EB2105900-014	EB2105900-015
				Result	Result	Result	Result	Result
ED007: Exchangeable Cations - Continued								
Cation Exchange Capacity	----	0.1	meq/100g	1.5	1.3	6.0	5.6	8.6
Exchangeable Sodium Percent	----	0.1	%	<0.1	<0.1	2.9	11.0	29.3
Calcium/Magnesium Ratio	----	0.1	-	----	----	3.6	1.7	0.3
Magnesium/Potassium Ratio	----	0.1	-	----	----	4.6	17.9	----
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	<100	<100	<100	<100	<100
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.01	0.01	<0.01	<0.01	<0.01
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	10	mg/kg	10	10	<10	10	50
EG005(ED093)T: Total Metals by ICP-AES								
Iron	7439-89-6	50	mg/kg	4720	4340	11200	10800	9800
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	<5	<5
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	4	4	<2	<2	<2
Copper	7440-50-8	5	mg/kg	<5	<5	<5	<5	<5
Lead	7439-92-1	5	mg/kg	8	9	9	12	8
Nickel	7440-02-0	2	mg/kg	<2	<2	<2	<2	<2
Zinc	7440-66-6	5	mg/kg	<5	<5	17	18	17
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	1.2	0.6	4.5	5.8	12.6
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	20	mg/kg	350	270	460	270	270
EK062: Total Nitrogen as N (TKN + NOx)								
^ Total Nitrogen as N	----	20	mg/kg	350	270	460	280	280
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	2	mg/kg	71	78	110	82	87
EK080: Bicarbonate Extractable Phosphorus (Colwell)								
Bicarbonate Ext. P (Colwell)	----	5	mg/kg	<5	<5	<5	<5	<5
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	0.46	0.29	0.43	0.26	0.14

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	S11_50_70	S12_0_20	S12_20_40	S12_40_60	S14_0_20
			Sampling date / time	01-Mar-2021 00:00	01-Mar-2021 00:00	01-Mar-2021 00:00	01-Mar-2021 00:00	28-Feb-2021 00:00
Compound	CAS Number	LOR	Unit	EB2105900-016	EB2105900-017	EB2105900-018	EB2105900-019	EB2105900-020
				Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	6.0	4.5	4.5	4.4	6.4
EA010: Conductivity (1:5)								
Electrical Conductivity @ 25°C	----	1	µS/cm	108	15	14	17	60
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	6.6	7.5	8.0	8.8	8.8
EA150: Particle Sizing								
+75µm	----	1	%	53	54	48	43	27
+150µm	----	1	%	47	44	39	35	21
+300µm	----	1	%	41	34	29	28	14
+425µm	----	1	%	36	26	23	23	11
+600µm	----	1	%	31	18	17	19	8
+1180µm	----	1	%	18	5	6	9	3
+2.36mm	----	1	%	4	<1	<1	<1	<1
+4.75mm	----	1	%	<1	<1	<1	<1	<1
+9.5mm	----	1	%	<1	<1	<1	<1	<1
+19.0mm	----	1	%	<1	<1	<1	<1	<1
+37.5mm	----	1	%	<1	<1	<1	<1	<1
+75.0mm	----	1	%	<1	<1	<1	<1	<1
EA150: Soil Classification based on Particle Size								
Clay (<2 µm)	----	1	%	24	25	28	36	29
Silt (2-60 µm)	----	1	%	21	20	22	19	43
Sand (0.06-2.00 mm)	----	1	%	47	53	48	42	27
Gravel (>2mm)	----	1	%	8	2	2	3	1
Cobbles (>6cm)	----	1	%	<1	<1	<1	<1	<1
EA152: Soil Particle Density								
Soil Particle Density (Clay/Silt/Sand)	----	0.01	g/cm3	2.58	2.60	2.53	2.61	2.65
ED005: Exchange Acidity								
ø Exchange Acidity	----	0.1	meq/100g	0.4	1.8	2.0	1.8	----
ø Exchangeable Aluminium	----	0.1	meq/100g	0.1	1.5	1.8	1.8	----
ED007: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	0.8	<0.1	<0.1	<0.1	1.9
Exchangeable Magnesium	----	0.1	meq/100g	5.1	<0.1	<0.1	<0.1	2.3
Exchangeable Potassium	----	0.1	meq/100g	<0.1	0.1	<0.1	<0.1	0.1
Exchangeable Sodium	----	0.1	meq/100g	2.9	<0.1	<0.1	<0.1	0.4

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	S11_50_70	S12_0_20	S12_20_40	S12_40_60	S14_0_20
			Sampling date / time	01-Mar-2021 00:00	01-Mar-2021 00:00	01-Mar-2021 00:00	01-Mar-2021 00:00	28-Feb-2021 00:00
Compound	CAS Number	LOR	Unit	EB2105900-016	EB2105900-017	EB2105900-018	EB2105900-019	EB2105900-020
				Result	Result	Result	Result	Result
ED007: Exchangeable Cations - Continued								
Cation Exchange Capacity	----	0.1	meq/100g	9.2	1.9	2.0	1.8	4.9
Exchangeable Sodium Percent	----	0.1	%	32.4	<0.1	<0.1	----	8.8
Calcium/Magnesium Ratio	----	0.1	-	0.2	----	----	----	0.8
Magnesium/Potassium Ratio	----	0.1	-	----	<0.1	----	----	18.9
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	<100	110	130	110	260
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	<0.01	0.02	0.02	0.02	0.04
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	10	mg/kg	80	<10	20	<10	50
EG005(ED093)T: Total Metals by ICP-AES								
Iron	7439-89-6	50	mg/kg	7950	2020	2800	3760	620
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	<5	<5
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	<2	2	3	4	2
Copper	7440-50-8	5	mg/kg	<5	<5	<5	<5	<5
Lead	7439-92-1	5	mg/kg	7	<5	<5	<5	<5
Nickel	7440-02-0	2	mg/kg	<2	<2	<2	<2	<2
Zinc	7440-66-6	5	mg/kg	12	<5	<5	<5	<5
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	11.4	2.5	1.6	0.4	1.1
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	20	mg/kg	160	960	810	430	710
EK062: Total Nitrogen as N (TKN + NOx)								
^ Total Nitrogen as N	----	20	mg/kg	170	960	810	430	710
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	2	mg/kg	77	119	127	118	199
EK080: Bicarbonate Extractable Phosphorus (Colwell)								
Bicarbonate Ext. P (Colwell)	----	5	mg/kg	<5	<5	<5	<5	<5
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	0.17	1.55	1.13	0.49	0.83

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	S14_20_50	S14_50_80	S14_80_100	----	----
			Sampling date / time	28-Feb-2021 00:00	28-Feb-2021 00:00	28-Feb-2021 00:00	----	----
Compound	CAS Number	LOR	Unit	EB2105900-021	EB2105900-022	EB2105900-023	--------	--------
				Result	Result	Result	----	----
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	6.4	6.4	6.6	----	----
EA010: Conductivity (1:5)								
Electrical Conductivity @ 25°C	----	1	µS/cm	222	226	265	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	11.2	11.1	10.5	----	----
EA150: Particle Sizing								
+75µm	----	1	%	18	22	27	----	----
+150µm	----	1	%	13	14	19	----	----
+300µm	----	1	%	9	9	12	----	----
+425µm	----	1	%	7	6	9	----	----
+600µm	----	1	%	5	4	6	----	----
+1180µm	----	1	%	2	1	3	----	----
+2.36mm	----	1	%	<1	<1	2	----	----
+4.75mm	----	1	%	<1	<1	1	----	----
+9.5mm	----	1	%	<1	<1	<1	----	----
+19.0mm	----	1	%	<1	<1	<1	----	----
+37.5mm	----	1	%	<1	<1	<1	----	----
+75.0mm	----	1	%	<1	<1	<1	----	----
EA150: Soil Classification based on Particle Size								
Clay (<2 µm)	----	1	%	47	44	43	----	----
Silt (2-60 µm)	----	1	%	34	34	29	----	----
Sand (0.06-2.00 mm)	----	1	%	18	22	26	----	----
Gravel (>2mm)	----	1	%	1	<1	2	----	----
Cobbles (>6cm)	----	1	%	<1	<1	<1	----	----
EA152: Soil Particle Density								
Soil Particle Density (Clay/Silt/Sand)	----	0.01	g/cm3	2.71	2.57	2.53	----	----
ED007: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	1.4	1.2	1.0	----	----
Exchangeable Magnesium	----	0.1	meq/100g	2.9	2.7	2.5	----	----
Exchangeable Potassium	----	0.1	meq/100g	0.1	0.2	0.2	----	----
Exchangeable Sodium	----	0.1	meq/100g	1.4	1.5	1.7	----	----
Cation Exchange Capacity	----	0.1	meq/100g	5.9	5.7	5.5	----	----
Exchangeable Sodium Percent	----	0.1	%	23.6	26.7	31.7	----	----
Calcium/Magnesium Ratio	----	0.1	-	0.5	0.4	0.4	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	S14_20_50	S14_50_80	S14_80_100	----	----
			Sampling date / time	28-Feb-2021 00:00	28-Feb-2021 00:00	28-Feb-2021 00:00	----	----
Compound	CAS Number	LOR	Unit	EB2105900-021	EB2105900-022	EB2105900-023	--------	--------
				Result	Result	Result	----	----
ED007: Exchangeable Cations - Continued								
Magnesium/Potassium Ratio	----	0.1	-	**22.6**	**17.2**	**16.8**	----	----
ED040: Sulfur as SO4 2-								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	**520**	**390**	**360**	----	----
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	**0.04**	**0.04**	**0.04**	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	10	mg/kg	**300**	**340**	**400**	----	----
EG005(ED093)T: Total Metals by ICP-AES								
Iron	7439-89-6	50	mg/kg	**840**	**650**	**1760**	----	----
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	----	----
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	----	----
Chromium	7440-47-3	2	mg/kg	**3**	<2	<2	----	----
Copper	7440-50-8	5	mg/kg	<5	<5	<5	----	----
Lead	7439-92-1	5	mg/kg	**6**	<5	<5	----	----
Nickel	7440-02-0	2	mg/kg	<2	<2	<2	----	----
Zinc	7440-66-6	5	mg/kg	<5	<5	<5	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg	**0.5**	**0.4**	**0.2**	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	20	mg/kg	**390**	**390**	**200**	----	----
EK062: Total Nitrogen as N (TKN + NOx)								
^ Total Nitrogen as N	----	20	mg/kg	**390**	**390**	**200**	----	----
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	2	mg/kg	**170**	**185**	**136**	----	----
EK080: Bicarbonate Extractable Phosphorus (Colwell)								
Bicarbonate Ext. P (Colwell)	----	5	mg/kg	<5	<5	<5	----	----
EP003: Total Organic Carbon (TOC) in Soil								
Total Organic Carbon	----	0.02	%	**0.28**	**0.24**	**0.11**	----	----

Inter-Laboratory Testing

Analysis conducted by ALS Melbourne, NATA accreditation no. 825, site no. 13778 (Chemistry).

(SOIL) EK067G: Total Phosphorus as P by Discrete Analyser

(SOIL) EK062: Total Nitrogen as N (TKN + NOx)

(SOIL) EK061G: Total Kjeldahl Nitrogen By Discrete Analyser