

# Strategic Cropping Land Assessment

Saraji East Project  
BHP Coal Pty Ltd

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# 1 INTRODUCTION

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GT Environmental Pty Ltd (GTE) was commissioned by AECOM Australia Pty Ltd (AECOM) on behalf of BHP Coal Pty Ltd to complete a Strategic Cropping Land (SCL) assessment as part of an Environmental Impact Assessment (EIS) for the Saraji East Mining Lease Project (SEMLP) herein known as 'The Project'.

The project site encompasses areas of the SCL trigger map which fall in Exploration Permit for Coal (EPC) 837 and Mining Lease Application (MLA) 70383 (Figure 1), herein known as the "Project Site". The project site encompasses 2,068 hectares (ha) of land.

## 1.1 Study Background

The *Regional Planning Interests Act 2014* (RPI Act) regulates impacts from mining activities on identified areas of regional interest, including the strategic cropping area (SCA). The SCA comprises the areas of potential SCL that are shown on the SCL trigger map (Figure 1).

SCL is land that is, or is likely to be, highly suitable for cropping because of a combination of the land's soil, climate and landscape features. The SCL trigger map indicates the location of land that is potentially SCL. The SCL trigger map is maintained and certified by the Department of Resources (DoR).

An assessment of site-specific soil conditions against the SCL criteria listed in Schedule 3, Part 2 of the RPI Act is required to confirm the actual extent of SCL at a local scale. This report presents a site-specific SCL assessment for the project site.

The information presented in this report is intended to be used by DoR to review the SCL trigger mapping for the project site.

## 1.2 Study Scope and Structure

This scope of work for this SCL assessment was developed in accordance with RPI Act Statutory Guideline 08/14 which describes how to demonstrate that land in the SCA does not meet the criteria for SCL (Queensland Government, 2017). The scope of work comprised:

- A desktop study of relevant information for the project site, including satellite imagery, topographic information and regional soils information. This information was used to review the current identified soil types and physical cropping limitations at the project site;
- A SCL field investigation to ground-truth the preliminary soil mapping and collect detailed information on soil distribution, topographic constraints, and physical and chemical soil conditions across the project site;
- Ground-truthed soil mapping at an appropriate scale for SCL assessment; and
- A site-specific assessment of SCL map unit polygons against the SCL criteria.

The following sections are outlined;

- The assessment methodology is presented in Section 2;
- The map units are presented in Section 3;
- SCL assessment for each of the map units is presented in Section 4; and,
- Conclusions of the assessment are presented in Section 5.

Appendices A to B provide detailed descriptions of each observation site, Appendix C presents the laboratory analysis and Appendices D and E provide soil water storage assessments and supporting calculations, respectively.

## 2 SCL METHODOLOGY

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### 2.1 Desktop Study

A desktop study was undertaken prior to the field investigation.

The purpose of the desktop study was to obtain background information on the potential soil types and landscapes likely to occur across the project site, information on the topography of the project site, and to understand potential SCL limitations.

The desktop assessment involved database searches, interpretation of recent high-resolution satellite imagery, a review of unpublished soils report, mapping, and reviews of previous relevant soils resources, including:

- Gunn et al. (1968), Lands of Dawson-Fitzroy Area, Queensland;
- GT Environmental Services (2011), Saraji East Coal Mine Project, Soils and Land Suitability (unpublished) [BHP Billiton Mitsubishi Alliance (2012), Saraji East EIS Project, Chapter 4 Land Resources (unpublished)]; and,
- CSIRO land system boundaries showing landscape patterns identified from air photo interpretation with some field descriptions. from Google Earth (accessed on June 2018).

This information was used to develop a map of soils and physical cropping limitations at the project site.

### 2.2 SCL Field Survey

Field surveys were undertaken between 30 June and 1 July 2018, 3 June and 6 June 2019 and 29 June to 30 June 2019 in accordance with the RPI Act Statutory Guideline 08/14. The field surveys were undertaken by Associate Environmental Scientist Reece McCann and Environmental Consultant Greg Tuck.

The field survey was developed to:

- Target potential soil types and landscapes identified from desktop assessment;
- Collect information to comprehensively map and describe all soil types and landscapes present in the project site (Figure 2); and,
- Gather sufficient information on each soil type and each of its component polygons (also known as 'map units') to confirm its SCL status.

A total of 174 observation sites were surveyed throughout the project site comprising:

- 81 detailed sites (Figure 2) to allow identification of any physiographic factors or vegetation associations that characterise the site and associated map unit, the pedological characterisation of the soil and identification of soil features of relevance to the SCL assessment criteria;

- 66 analysed sites (i.e. detailed site from which soil samples are collected and subsequently analysed in a laboratory). Where a site is associated with gilgai two sub-sites were undertaken on the mound and depression. For the purposes of this assessment these are considered one site); and,
- 93 check sites, including exclusion sites (Figure 2) to collect detail to allocate the site to a specific soil type and map unit.

Naming conventions for observation sites are as follows:

- Detailed sites with “-SCL” suffix indicates this is an existing site location (GT Environmental Services [GTES], 2011) with the same site number which was revisited and where required, samples for analysis taken, in order to confirm the accuracy of existing descriptions and to document the site in greater detail as required by RPI Act Statutory Guideline 08/14;
- Detailed sites with prefix “N” indicate this is a new location; and,
- Check sites with prefix “NC” indicate this is a new check site.

The field investigation layout is shown on Figure 2. The layout was developed from the desktop study information and refined in the field. The field investigation was based on existing soil survey site locations (GTES, 2011) and free survey techniques (McKenzie et al. 2008 and Gunn et al. 1988) to verify soil types and assign boundaries to each map unit.

Free survey is a commonly used method in broader scale land assessment as it enables flexibility in site selection (compared with more rigid grid mapping techniques), to achieve a more accurate and time effective result. This method is appropriate to detailed-scale surveys and provides a suitable basis for siting check sites, detailed sites and analysis sites.

The field investigation included representative observation sites for each target soil type and map unit. The field investigation exceeded the density and number of observation sites required to support SCL mapping and assessment.

The observation site methodology is described in Sections 2.2.1 to 2.2.3.

### **2.2.1 Detailed Sites**

Detailed sites were undertaken at 81 locations (Figure 2). The detailed sites were used to describe the range of soil profile morphological attributes as per the *National Committee on Soil and Terrain Guidelines* (2009) (including soil colour as per *Munsell Soil Colour Charts* [2009]), in addition to landforms, slope, surface conditions, rock cover and major vegetation (RPI 08/14).

Soil profiles were primarily sampled using 50-millimetre (mm) hand augers. The hand auger method is a suitable method and was undertaken in accordance with the *Guidelines for Surveying Soil and Land Resources* (McKenzie et al. 2008).

The information recorded for detailed sites included:

- site identification code;
- GPS location (GDA94);

- type of soil observation (e.g. erosion exposed cutting or hand auger);
- major vegetation types;
- landform type, position of the site and slope gradient;
- surface condition (e.g. presence of cracks, surface crust, rocks, stones and cobbles, 'erosion status, gilgai);
- types and vertical extent of soil horizons;
- colour (*Munsell Soil Colour Charts*, 2009) and mottling of each horizon;
- observations of field texture, pH, presence and abundance of segregations, coarse fragments, structure, consistence and pedality, moisture content and boundary type for each horizon;
- presence of organic matter, roots and prevalence of biological activity;
- presence of gleyed horizons, iron staining, jarosite presence and field pH; and,
- photographs of the soil profile, surface and surrounding landscape.

Detailed site descriptions for the project are presented in Appendix A.

### **2.2.2 Analysed Sites**

Detailed sites were selected for chemical analysis based on the density and map unit distribution.

Soil samples were collected from detailed sites for chemical analysis. Soil sampling of profiles was conducted as per McKenzie et al. (2008), with samples taken at standard depths incorporating the surface and every horizon change in the soil profile (typically at depths of 0.0-0.10 metres (m), 0.20-0.30 m, 0.50-0.60 m, 0.7-0.8 m and 0.90-1.00 m).

Where appropriate, these depths were modified for sites where field observations revealed soil horizons intersecting at these nominated depths, to ensure samples were collected in each separate horizon, and not across multiple horizons or in sub-horizon boundaries.

The detailed sites were analysed based on the western cropping zone requirements (RPI 08/14) for field identified rigid and non-rigid soils including:

- pH<sub>1:5</sub>;
- chloride;
- cation exchange capacity, (rigid soils only);
- exchangeable sodium percentage (rigid soils only);
- calcium and magnesium ratio (Ca:Mg ratio) (rigid soils only);
- particle size analysis; and,
- soil moisture content at -1.5Mpa (where required).

Laboratory results are presented in Appendix E.



### 2.2.3 Check Sites

Check sites were undertaken at 93 locations (Figure 2). These sites are used where defining attributes of the characteristic soil in a map unit could not be readily identified. Site attributes recorded include surface soil colour, texture, condition, presence of gilgai, vegetation, landform, site identification code, GPS coordinates, and where necessary for reference, photographs taken.

These sites record information and data for each site including a site identification code, GPS coordinates and SCL assessment criteria for slope, rockiness and/or gilgai (RPI 08/14). These sites may be used for the verification of slope, surface cover of rocks, gilgai coverage and depth.

Check site descriptions for the project site are presented in Appendix B.

## 2.3 SCL Mapping

The findings of the field investigation were used to produce a ground-truthed map of soil types (Figure 2) in the project site. The properties of each map unit have been assessed against the SCL assessment criteria.

## 2.4 SCL Assessment

The SCL assessment criteria thresholds for the SCA Western Cropping Zone are listed in Table 2-1.

**Table 2-1: SCL Assessment Criteria**

Criteria	Thresholds for Western Cropping Zone
Slope	Equal to or less than 3%
Rockiness	Equal to or less than 20% for rocks greater than 60mm in diameter
Gilgai	Less than 50% of land surface being gilgai of greater than 500mm in depth
Soil depth	Equal to or greater than 600mm
Soil wetness	Has favourable drainage
Soil pH	For rigid soils, the soil at 300mm and 600mm soil depth must be within the range of pH1:5 5.1 to pH1:5 8.9 inclusive For non-rigid soils, the soil at 300mm and 600mm soil depth must be greater than pH1:5 5.0.
Salinity	Chloride content is less than 800mg/kg at 600mm soil depth
Soil water storage	Equal to or greater than 100mm to a soil depth or soil physico-chemical limitation of equal to or less than 1000mm

Each map unit has been assessed against the SCL criteria thresholds for the SCA's Western Cropping Zone. This assessment was undertaken in accordance with the specific assessment techniques for each criterion described in RPI Act Statutory Guideline 08/14 Appendix 1: Measurement methods and reporting requirements. Map units must be within all SCL criteria to be considered SCL. Map units that do not meet one or more of the SCL criteria are not SCL.

The assessment techniques undertaken for each criterion are described below.

#### **2.4.1 Slope**

Slope was primarily assessed during fieldworks using a hand-held clinometer for on-ground measurements. The following procedures were applied to demonstrate either compliance or non-compliance with the slope criterion:

- Observation sites within exclusion areas were selected on an unbiased basis;
- Slope was measured over a minimum distance of 20m up to 50m with at least two measurements, an up and down gradient spanning the observation site;
- The site being assessed for slope did not include any significant changes or breaks of slope; and,
- Artificial features such as contour banks and tracks were excluded.

A minimum of three detailed sites and two check sites within each map unit were obtained with the average of recorded slope values determined to two decimal points and compared to the threshold values in A1.1 of the RPI Act Statutory Guideline 08/14.

GTE reviewed available soil survey information to highlight potential areas of concern to target during fieldwork and to assist in giving confidence that field observation sites accurately represent areas less than, equal to or more than 3.0% slope.

#### **2.4.2 Rockiness**

Rockiness was assessed by visually estimating the surface cover of coarse fragments (average maximum dimension larger than 60 mm) and rock outcrops within a ten-metre radius. Where rockiness was present and visually observed either at or above criterion, measurement tape was used over a random selected line in the site, with individual photos taken of each 1.0m<sup>2</sup> area for further assessment.

#### **2.4.3 Gilgai**

Gilgai was assessed during fieldworks by determining the depth of the gilgai (greater than 500 mm) and density of the gilgai depressions (greater than 50% of the land surface). Where sites may have been considered an exclusion site or where initial assessment required further measurement, the following would be completed.

- A horizontal tape was used between adjacent mounds and the height measured from the tape to the lowest part of the intervening depression.; and,

- GPS coordinates were recorded for the ten measurements to assist in assessing the density.

#### **2.4.4 Soil depth**

Soil depth was determined primarily by use of hand auger to expose the soil profile. The description of detailed sites soil profiles (Appendix A) includes any physical barrier encountered such as hard pans, gravel layers or bedrock.

#### **2.4.5 Soil wetness**

Soil wetness was determined by examining the soil profile for characteristics indicating severely impaired soil drainage. This was assessed by reviewing the soil horizons and mottle colours using a standard soil colour chart (Munsell Soil Colour Charts, 2009).

Colours of the soil matrix and all mottles have been identified for each soil horizon. All colours have been reported in a moist soil state other than conspicuously bleached horizons, where dry soil colour has been reported.

#### **2.4.6 Soil pH**

Determination of soil pH was measured by a National Association of Testing Authorities (NATA) accredited and Australasian Soil and Plant Analysis Council (ASPAC) certified laboratory using suitable methods (4A1 in Raymont & Lyons [2011]). pH 1:5 values were tested at all sampling depths including 300 mm and 600 mm soil depths.

#### **2.4.7 Soil salinity**

Soil salinity was determined by measurement of chloride by an accredited NATA and ASPAC accredited laboratory using suitable methods (5A2 in Raymont & Lyons [2011]). Chloride values were tested at all sampling depths including 300 mm and 600 mm soil depths.

#### **2.4.8 Soil water storage**

Soil water storage was determined by calculating the amount of water that is capable of being stored in a soil horizon layer within the effective rooting depth (ERD) in a soil profile and that is available for plant use. The ERD is whichever represents the lesser of the following:

- A depth of 1000 mm; or
- The depth at which a physio-chemical limitation is encountered; or,
- The depth of a physical barrier.

Physico-chemical limitation on effective rooting depth is represented by the following:

- a chloride content of more than 800mg/kg for any soil in the Western Cropping zone or Eastern Darling Downs zone; or,
- a pH1:5 value of 5.0 or less for any soil in any zone; or
- for rigid soils in any zone that are (1) not sandy loam or lighter textured soils, and (2) have a Cation Exchange Capacity (CEC) value greater than 3 cmol+/kg and have:

- a pH1:5 of more than 8.9; or
- an exchangeable sodium percentage value of more than 15; or,
- a calcium to magnesium ratio of 0.1 or less.

The RPI Act Statutory Guideline 08/14 provides a two-stage method for estimating soil water storage:

- Stage 1 uses a soil texture lookup table (Table A1.2 of the RPI Act Statutory Guideline 08/14; and,
- Stage 2 uses the PAWCER pedotransfer function (gravimetric water content, -1.5 MPa), herein referred to as PAWCER.

Stage 1 assessment is suitable where particle size analysis and soil texture lookup values are more than 15% below the SCL criterion threshold. If the Stage 1 assessment indicates marginal soil water storage (i.e. within 15% below the SCL criterion threshold) it is necessary to undertake a Stage 2 assessment.

The PAWCER calculation and assessments are presented in Appendix D.

### 3 SOIL MAPPING AND DESCRIPTIONS

A total of 20 map units were identified in the project site with spatial distribution shown on Figure 2. Table 3-1 provides a summary of each map unit including its concept, Australian Soil Classification (ASC) and Rigid or Non-Rigid status.

The soil type mapping shown on Figure 2 was compared with the SCL mapping criteria. The purpose of the SCL mapping criteria is to ensure that ground-truthed soil mapping is produced at a suitable scale. Soil types therefore meet the minimum SCL mapping criteria and are large enough to be mapped as map units on Figure 3.

A detailed description of each map unit based on the field investigation is provided in Sections 3.1 to 3.17.

**Table 3-1: Summary of Map Units**

Map Unit	Concept	Australian Soil Classification	Rigid or Non-Rigid <sup>1</sup>
1	Mixed brigalow scrub on black clay soils	Black Dermosol	Rigid
2	Dark sandy loams on sodic clay subsoils drainage lines	Black Sodosol	Rigid
3	Dark black clay soils on cleared gently undulating plains	Black Vertosol	Non-Rigid
4	Dark grey, greyish brown clay loams to clay near drainage lines	Black Dermosol	Rigid
5	Dark duplex sandy loam to clay soils on gently undulating plains	Black dermosol (with minor grey dermosol variant)	Rigid
6	Dark sandy clay loams with coarser structured clay subsoils on gently undulating plains	Black Dermosol	Rigid
7	Crusting grey clay with subdominant black soils on gently undulating plains with mixed shrubbery	Crusting Grey Vertosol (with sub-dominant black vertosol variant)	Non-Rigid
8	Dark greyish brown weak to moderately structured clay soils on cleared gently undulating plains	Black Dermosol	Rigid
9	Black vertosol on gently undulating plains	Black Vertosol	Non-rigid
10	Deep sandy clay loams with clay subsoils on gently undulating plains of tall woodlands	Black Sodosol	Rigid
11	Dark grey clay loams to grey brown clays within forested drainage line areas.	Grey Dermosol	Rigid
12	Black, well-structured clays on gently undulating plains	Black Vertosol	Non-rigid
13	Black, well-structured clays on gently undulating plains	Black Vertosol	Non-rigid

Map Unit	Concept	Australian Soil Classification	Rigid or Non-Rigid <sup>1</sup>
14	Sandy loams over red clay subsoils on cleared gently undulating plains	Red Chromosol	Rigid
15	Dark uniform to gradational clay soils on lower sloped plains	Black Vertosol	Non-rigid
16	Dark brown clay soils with gilgai microrelief on gently undulating plains of mixed regrowth	Black Vertosol	Non-rigid
17	Dark cracking clays with cropping on undulating plains	Black Vertosol	Non-rigid
18	Dark gradational sandy clay loams on clays on undulating plains	Black Dermosol	Rigid
19	Dark self-mulching clay soil on undulating plains	Black self-mulching Vertosol	Non-rigid
20	Dark self-mulching, cracking clay soil on gently undulating lower slopes and flat plains with minor areas of microrelief	Black self-mulching Vertosol	Non-rigid
1- Rigid and non-rigid assessment based on the RPI Regulation (2014) and The Australian Soils Classification, Third Edition (2021).			

## 3.1 Map Unit 1

### **Overview**

Map Unit 1 consists of light black clay with coarser structured subsoils on uplands of mixed brigalow scrub. This map unit is in the north-east portion of the project site and covers an area within the SCL trigger map of 70.6 ha.

### **Observation Sites**

A total of 6 observation sites were completed within this map unit and are summarised in Table 3-2. Density of sites in the map unit exceeds minimum density for western cropping zone as outlined in RPI 08/14 at one site per 11.76 ha.

**Table 3-2: Observation Sites for Map Unit 1**

Observation Sites	
Check	Detailed ( <i>analysed</i> )
3	3 (3)

A land summary of detailed Site N6 is presented in Table 3-3, soil profile description in Table 3-4 and detailed site descriptions are presented in Appendix A.

Three representative detailed sites, Site N6, Site N7 and Site N8, were selected to undergo chemical analysis for Map Unit 1. The soil particle size analysis (PSA) was assessed against the Marshall soil texture chart (NCST, 2009) and soil chemistry results for the three selected detailed sites are presented in Tables 3-5 to 3-8.

### **Map Unit Observations**


No further observations were made regarding the SCL assessment of the map unit.

**Table 3-3: Map Unit 1**

Item	Description
<b>Representative Site</b>	N6
<b>Representative Site photograph</b>	
<b>Location</b>	643271mE 7514881mN
<b>Current Use</b>	Grazing
<b>Site survey type</b>	Detailed, 50 mm hand auger.
<b>Vegetation</b>	Buffel grass
<b>Disturbance</b>	Semi-disturbed
<b>Landform element /pattern</b>	Very gently undulating plain midslope
<b>Micro relief</b>	Nil microrelief
<b>Erosion</b>	Nil erosion
<b>Slope (%)</b>	3.0/3.0
<b>Drainage</b>	Imperfect
<b>Surface coarse fragments</b>	Nil coarse fragments
<b>Surface condition</b>	Cracking, soft
<b>ASC Order (s)</b>	Black dermosol
<b>Total area (ha)</b>	70.6



**Table 3-4: Soil Profile Morphology Summary Map Unit 1**

<div>Site N6 (Previously N6-SCL as per photo)</div>										
	Horizon Depth (m), Boundary (Bdy)	Field Texture	Structure Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture Drainage	Roots	Depth (m) / Field pH / EC dS/m	Samples (m)	Observations
	A1 0.00-0.17 Abrupt	Clay Loam	Moderate, firm<30mm sub-angular	Nil	10YR3/2 Very dark greyish brown Nil mottles/bleach	Moderate moist, rapid	Few fine	0.10 / 7.0	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil
	B21 0.17-0.89 Abrupt	Medium clay	Moderate, firm<50mm sub-angular	5% calcium carbonate nodules	10YR3/1 Very dark grey Very dark grey Nil mottles/bleach	Dry, moderate	Very fine, very few	0.30 / 7.0 0.60 / 8.0		
B22 0.89-1.00	Medium clay	Moderate, firm<50mm sub-angular	5% calcium carbonate nodules	10YR3/2 Very dark greyish brown Nil mottles/bleach	Dry, moderate	Very fine, very few	0.90 / 8.5			

**Table 3-5: Sites Particle Size Analysis Texture Assessment**

Site	Sample Depth / Horizon (m approx.) Texture (PSA / Ternary Soil Texture Chart)				
	0.00-0.10	0.20-0.30	0.50-0.60	0.80-0.90	0.90-1.00
N6	Clay loam	Clay loam	Medium clay	Silty clay loam	Clay loam
N7	Clay loam	Clay loam	Light clay	Light clay	Light clay
N8	Sandy loam	Loam	Light clay	Light clay	Light medium clay

**Table 3-6: Soil Chemistry Results for Detailed Site N6**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.60	0.77-0.87	0.90-1.00
Soil pH	7.15	8.27	8.94	8.66	8.68
Soil Cl (mg/kg)	9	7	320	1429	1213
PSA-Sand (>20µm %)	54.4	56.7	29.0	36.9	47.5
PSA-Fine Silt (2-20µm %)	19.3	13.1	20.1	25.9	16.3
PSA-Clay (<2µm%)	26.2	30.2	51.0	37.2	36.3
15 Bar (%)	22	23	31	26	22
CEC (meq/100g)	38.0	36.2	41.9	43.7	40.0
Ca/Mg (ratio)	2.0	1.8	1.2	1.0	1.0
ESP (%NaCEC)	1	5	12	14	13

**Table 3-7: Soil Chemistry Results for Detailed Site N7**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.60	0.80-0.90	0.90-1.00
Soil pH	7.61	8.52	9.15	8.90	8.80
Soil Cl (mg/kg)	21	50	306	980	1014
PSA-Sand (>20µm %)	64.1	66.7	59.9	53.7	49.6
PSA-Fine Silt (2-20µm %)	12.4	9.9	4.3	11.3	11.3
PSA-Clay (<2µm%)	23.5	23.3	35.8	35.1	39.1
15 Bar (%)	14	17	20	23	22
CEC (meq/100g)	24.1	26.4	31.1	35.9	40.5
Ca/Mg (ratio)	2.7	2.2	0.8	0.6	0.6
ESP (%NaCEC)	1	2	9	13	13

**Table 3-8: Soil Chemistry Results for Detailed Site N8**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.60	0.80-0.90	0.90-1.00
Soil pH	7.29	8.87	9.37	9.16	8.98
Soil Cl (mg/kg)	15	82	166	643	949
PSA-Sand (>20µm %)	77.3	69.9	58.5	53.2	47.2
PSA-Fine Silt (2-20µm %)	6.0	10.7	7.4	7.3	9.9
PSA-Clay (<2µm%)	16.7	19.4	34.1	39.6	42.9
15 Bar (%)	13	17	24	26	26
CEC (meq/100g)	25.5	32.1	40.8	40.6	48.1
Ca/Mg (ratio)	1.6	1.0	0.6	0.5	0.5
ESP (%NaCEC)	0	4	11	13	13

## 3.2 Map Unit 2

### Overview

Map Unit 2 consists of dark sands on sodic clay subsoils near drainage lines. This map unit is in the north portion of the project site and covers an area within the SCL trigger map of 9.6 ha.

### Observation Sites

A total of 7 observation sites were completed within this map unit and are summarised in Table 3-9. Density of sites in the map unit exceeds minimum density for western cropping zone as outlined in RPI 08/14 at one site per 1.37 ha.

**Table 3-9: Observation Sites for Map Unit 2**

Observation Sites	
Check	Detailed ( <i>analysed</i> )
4	3 (3)


A land summary of detailed Site N17 is presented in Table 3-10, soil profile description in Table 3-11 and detailed site descriptions are presented in Appendix A.

Three representative detailed sites, Site N17, Site N18 and Site N19, were selected to undergo chemical analysis for Map Unit 2. The soil particle size analysis (PSA) was assessed against the Marshall soil texture chart (NCST, 2009) and soil chemistry results for the three selected detailed sites are presented in Tables 3-12 to 3-15.

### Map Unit Observations


No further observations were made regarding the SCL assessment of the map unit.

**Table 3-10: Map Unit 2**

Item	Description
<b>Representative Site</b>	N17
<b>Representative Site photograph</b>	
<b>Location</b>	643797mE 7514822mN
<b>Current Use</b>	Grazing
<b>Site survey type</b>	Detailed, 50 mm hand auger.
<b>Vegetation</b>	Brigalow, Mount Coolibah
<b>Disturbance</b>	Nil disturbance
<b>Landform element /pattern</b>	Gently undulating plain, stream channel / depression
<b>Micro relief</b>	Nil microrelief
<b>Erosion</b>	Nil erosion
<b>Slope (%)</b>	<2% / <2%
<b>Drainage</b>	Well-moderate
<b>Surface coarse fragments</b>	No coarse fragments
<b>Surface condition</b>	Soft
<b>ASC Order (s)</b>	Black Sodosol
<b>Total area (ha)</b>	9.6 (Extends outside the project site > 10 ha)



**Table 3-11: Soil Profile Morphology Summary Map Unit 2**

<div>Site N17</div>										
	Horizon Depth (m), Boundar- y (Bdy)	Field Texture	Structure Strength	Inclusions Segregatio- ns	Colour, Mottle, Bleaching	Moisture Drainage	Roots	Depth (m) / Field pH / EC dS/m	Samples (m)	Observati- ons
	A1 0.00-0.10 Abrupt	Loamy sand	Massive, loose	<1% coarse fragments	10YR3/1 Nil mottles / bleaching	Dry, well	Yes	0.10 / 8.5	0.00-0.10	Nil
	B21 0.10-0.20 Abrupt	Sandy loam	Moderate, very firm sub- angular <20mm	<1% coarse fragments	10YR3/1 Nil mottles / bleaching	Dry, well – moderate	Yes	0.20 / 8.5	0.10-0.20	
	B21 0.20-0.47 Abrupt	Sandy loam	Moderate, very firm sub- angular <10mm	<10% coarse fragments	10YR3/1 Nil mottles / bleaching	Dry, well – moderate	Yes	0.30 / 8.5	0.20-0.30	
B21 0.47-0.88 End of Borehole (EOBH)	Sandy loam	Moderate, very firm sub- angular <10mm	<20% coarse fragments	10YR4/2 Nil mottles / bleaching	Dry, well – moderate	Yes – 0.60m bgl	0.60 / 8.5	0.50-0.60 0.80-0.88		

**Table 3-12: Sites Particle Size Analysis Texture Assessment**

Site	Sample Depth / Horizon (m approx.) Texture (PSA / Ternary Soil Texture Chart)				
	0.00-0.10	0.20-0.30	0.50-0.60	0.80-0.90	0.90-1.00
N17	Sandy loam	Sandy clay loam	Sandy clay loam	Clay loam	Clay loam
N18	Sandy loam	Sandy clay	Light clay	Light clay	Light clay
N19	Loamy sand	Clay loam	Sandy clay loam	Sandy clay loam	Clay loam

**Table 3-13: Soil Chemistry Results for Detailed Site N17**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.10-0.20	0.20-0.30	0.50-0.60	0.80-0.88
Soil pH	6.75	8.62	9.25	9.43	9.31
Soil Cl (mg/kg)	9	39	186	540	800
PSA-Sand (>20µm %)	76.4	67.4	69.6	65.7	57.3
PSA-Fine Silt (2-20µm %)	6.0	3.3	1.5	5.9	9.4
PSA-Clay (<2µm%)	17.6	29.3	28.9	28.4	33.4
CEC (meq/100g)	16.2	22.08	23.15	20.55	19.97
ESP (%NaCEC)	2.5	10.4	14.2	20.5	23.2
Ca/Mg (ratio)	2.7	1.2	0.9	0.6	0.6

**Table 3-14: Soil Chemistry Results for Detailed Site N18**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.60	0.80-0.90	0.90-1.00
Soil pH	7.26	8.94	9.34	9.51	8.94
Soil Cl (mg/kg)	9	112	508	916	1194
PSA-Sand (>20µm %)	73.6	62.3	55.0	49.8	51.4
PSA-Fine Silt (2-20µm %)	4.9	3.2	4.5	12.9	11.2
PSA-Clay (<2µm%)	21.5	34.6	40.6	37.4	37.5
CEC (meq/100g)	14.54	20.26	21.74	24.98	29.45
ESP (%NaCEC)	1.4	13.4	20.7	23.5	24.7
Ca/Mg (ratio)	3.0	0.9	0.6	0.5	0.4

**Table 3-15: Soil Chemistry Results for Detailed Site N19**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.60	0.80-0.90	0.90-0.95
Soil pH	8.28	8.78	9.25	9.39	9.42
Soil Cl (mg/kg)	22	20	147	258	461
PSA-Sand (>20µm %)	87.8	65.5	73.2	70.7	65.6
PSA-Fine Silt (2-20µm %)	5.9	3.7	-1.5	5.8	7.0
PSA-Clay (<2µm%)	6.3	30.8	28.2	23.5	27.4
CEC (meq/100g)	15.09	18.99	17.52	16.55	17.69
ESP (%NaCEC)	1.6	5.6	12.6	16.6	19.4
Ca/Mg (ratio)	3.8	1.6	0.8	0.7	0.6

### 3.3 Map Unit 3

#### **Overview**

Map Unit 3 consists of black clay soils on cleared gently undulating plains. This map unit is in the north-east portion of the project site and covers an area within the SCL trigger map of 59.3 ha.

#### **Observation Sites**

A total of 5 observation sites were completed within this map unit and are summarised in Table 3-16. Density of sites in the map unit exceeds minimum density for western cropping zone as outlined in RPI 08/14 at one site per 11.86 ha.

**Table 3-16: Observation Sites for Map Unit 3**

Observation Sites	
Check	Detailed ( <i>analysed</i> )
2	3 (3)

A land summary of detailed site 60-SCL is presented in Table 3-17, soil profile description in Table 3-18 and detailed site descriptions are presented in Appendix A.

Three representative detailed sites, Site 60-SCL, Site N15 and Site N16, were selected to undergo chemical analysis for Map Unit 3. The soil particle size analysis (PSA) was assessed against the Marshall soil texture chart (NCST, 2009) and soil chemistry results for the three selected detailed sites are presented in Tables 3-19 to 3-22.

#### **Map Unit Observations**


No further observations were made regarding the SCL assessment of the map unit.

**Table 3-17: Map Unit 3**

Item	Description
<b>Representative Site</b>	60-SCL
<b>Representative Site photograph</b>	
<b>Location</b>	643839mE 7514447mN
<b>Current Use</b>	Cropping, Grazing
<b>Site survey type</b>	Detailed, 50 mm hand auger.
<b>Vegetation</b>	Grasses
<b>Disturbance</b>	Extensively disturbed
<b>Landform element /pattern</b>	Very gently undulating plains, upper slope
<b>Micro relief</b>	Nil microrelief
<b>Erosion</b>	Nil erosion
<b>Slope (%)</b>	0 / 2
<b>Drainage</b>	Well to well moderate
<b>Surface coarse fragments</b>	Nil coarse fragments
<b>Surface condition</b>	Self-mulching with cracking
<b>ASC Order (s)</b>	Black Vertosol
<b>Total area (ha)</b>	59.3



**Table 3-18: Soil Profile Morphology Summary Map Unit 3**

Site 60-SCL									
Horizon Depth (m), Boundar -y (Bdy)	Field Texture	Structure Strength	Inclusions Segregatio- ns	Colour, Mottle, Bleaching	Moisture Drainage	Roots	Depth (m) / Field pH	Samples (m)	Observati -ons
A1 0.0 – 0.13 Abrupt	Light clay	Moderate, Sub- rounded, peds <10 mm, soft	Nil	10YR3/2 Nil mottle / bleaching	Dry, well drained	Fine, very few	0.10 / 7.0	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil
B21 0.13 – 0.41 Abrupt	Medium clay	Moderate, Subangular blocky, peds <20 mm, firm	Nil	10YR2/1 Nil mottle / bleaching	Dry, well drained	Very fine, very few	0.30 / 7.5		
B22 0.41 – 1.00	Medium clay	Moderate, Subangular blocky, peds <20 mm, firm	<2% calcium carbonate	10YR2/1 Nil mottle / bleaching	Dry, moderately well drained	Nil roots	0.60 / 7.0 0.90 / 7.0		

**Table 3-19 Sites Particle Size Analysis Texture Assessment**

<b>Site</b>	<b>Sample Depth / Horizon (m approx.) Texture (PSA / Ternary Soil Texture Chart)</b>				
	<b>0.00-0.10</b>	<b>0.20-0.30</b>	<b>0.50-0.60</b>	<b>0.80-0.90</b>	<b>0.90-1.00</b>
60-SCL	Light clay	Medium clay	Medium clay	Light medium clay	Medium clay
N15	Light clay	Light clay	Light clay	Light medium clay	Medium clay
N16	Light clay	Light medium clay	Medium clay	Medium clay	Medium clay

**Table 3-20: Soil Chemistry Results for Detailed Site 60-SCL**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.60	0.80-0.90	0.90-1.00
Soil pH	7.72	8.90	8.38	8.72	8.73
Soil Cl (mg/kg)	9	17	163	458	633
PSA-Sand (>20µm %)	56.8	48.3	42.8	40.9	40.4
PSA-Fine Silt (2-20µm %)	6.6	10.4	10.2	9.0	5.9
PSA-Clay (<2µm %)	36.6	41.4	47.0	50.2	53.7

**Table 3-21: Soil Chemistry Results for Detailed Site N15**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.55-0.60	0.80-0.90	0.90-1.00
Soil pH	8.13	8.64	8.97	8.55	8.76
Soil Cl (mg/kg)	24	27	196	409	634
PSA-Sand (>20µm %)	59.9%	47.5%	46.2%	48.1%	39.9%
PSA-Fine Silt (2-20µm %)	2.8%	6.4%	7.5%	8.5%	8.0%
PSA-Clay (<2µm%)	37.2%	46.0%	46.3%	43.4%	52.1%

**Table 3-22: Soil Chemistry Results for Detailed Site N16**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.60	0.80-0.90	0.90-1.00
Soil pH	7.92	8.67	8.74	8.72	8.78
Soil Cl (mg/kg)	9	38	120	255	354
PSA-Sand (>20µm %)	59.5%	58.1%	53.3%	44.6%	46.7%
PSA-Fine Silt (2-20µm %)	7.9%	4.8%	7.5%	12.2%	5.2%
PSA-Clay (<2µm%)	32.6%	37.1%	39.2%	43.2%	48.1%

## 3.4 Map Unit 4

### Overview

Map Unit 4 consists of greyish brown clay loams to clay near drainage lines. This map unit is in the north-east portion of the project site and covers an area within the SCL trigger map of 8.3 ha.

### Observation Sites

A total of 6 observation sites were completed within this map unit and are summarised in Table 3-23. Density of sites in the map unit exceeds minimum density for western cropping zone as outlined in RPI 08/14 at one site per 1.38 ha.

**Table 3-23: Observation Sites for Map Unit 4**

Observation Sites	
Check	Detailed ( <i>analysed</i> )
3	3 (3)


A land summary of detailed Site N20 is presented in Table 3-24, soil profile description in Table 3-25 and detailed site descriptions are presented in Appendix A.

Three representative detailed sites, Site N20, Site N21 and Site N22, were selected to undergo chemical analysis for Map Unit 4. The soil particle size analysis (PSA) was assessed against the Marshall soil texture chart (NCST, 2009) and soil chemistry results for the three selected detailed sites are presented in Tables 3-26 to 3-29.

### Map Unit Observations


Cracking was observed on the surface, however these did not meet the requirements of at least 5mm consistently.

**Table 3-24: Map Unit 4**

Item	Description
<b>Representative Site</b>	N20
<b>Representative Site photograph</b>	
<b>Location</b>	642943mE 7513907mN
<b>Current Use</b>	Grazing
<b>Site survey type</b>	Detailed, 50 mm hand auger.
<b>Vegetation</b>	Brigalow
<b>Disturbance</b>	Nil disturbance, clearing nearby outside the immediate drainage line area
<b>Landform element /pattern</b>	Very gently undulating plain, Alluvial depression, stream channel
<b>Micro relief</b>	Nil microrelief
<b>Erosion</b>	Nearby sheet and gully erosion
<b>Slope (%)</b>	1.0 / 0.0
<b>Drainage</b>	Well to well and moderate
<b>Surface coarse fragments</b>	<10% <5mm
<b>Surface condition</b>	Soft
<b>ASC Order (s)</b>	Black Dermosol
<b>Total area (ha)</b>	8.3 (Extends outside the project site > 10 ha)



**Table 3-25: Soil Profile Morphology Summary Map Unit 4**

Site N20									
Horizon Depth (m), Boundary (Bdy)	Field Texture	Structure Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture Drainage	Roots	Depth (m) / Field pH / EC dS/m	Samples (m)	Observations
A1 0.00-0.12 Abrupt	Sandy loam	Weak to moderate, soft sub-rounded <10mm	Nil	10YR3/1 Very dark grey Nil mottles / bleaching	Dry, well	Yes	0.10 / 8.5	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.9-1.00	Nil
B21 0.12-0.37 Abrupt	Sandy loam	Moderate, firm sub-rounded <10mm	Nil	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Dry, well – moderate	Yes	0.20 / 8.5		
B22 0.37-0.68 Abrupt	Sandy loam	Moderate, firm sub-rounded <20mm	<2% calcium carbonate	7.5YR3/2 Dark brown Nil mottle / bleaching	Dry, well – moderate	Yes	0.30 / 8.5		
B23 0.68-0.85 Abrupt	Sandy clay loam	Moderate, very firm sub-rounded <20mm	<20% calcium carbonate	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Dry, well – moderate	Yes	-		
B24 0.85-1.00 EOBH	Sandy clay loam	Moderate, very firm sub-rounded <20mm	<5% calcium carbonate	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Dry, well – moderate	Nil	0.90 / 8.5		

**Table 3-26: Sites Particle Size Analysis Texture Assessment**

Site	Sample Depth / Horizon (m approx.) Texture (PSA / Ternary Soil Texture Chart)				
	0.00-0.10	0.20-0.30	0.50-0.60	0.80-0.90	0.90-1.00
N20	Clay loam	Sandy clay loam	Sandy clay loam	Light clay	Medium clay
N21	Sandy clay loam	Sandy clay	Light clay	Light medium clay	Medium clay
N22	Sandy clay loam	Sandy clay	Sandy clay	Light clay	Light medium clay

**Table 3-27: Soil Chemistry Results for Detailed Site N20**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.60	0.75-0.85	0.90-1.00
Soil pH	7.37	8.13	8.90	9.24	9.18
Soil Cl (mg/kg)	4	4	22	148	420
PSA-Sand (>20µm %)	60.6	68.0	67.3	55.9	48.7
PSA-Fine Silt (2-20µm %)	12.2	6.0	4.3	8.2	5.2
PSA-Clay (<2µm%)	27.2	25.9	28.4	35.8	46.1
CEC (meq/100g)	21.70	21.01	22.18	31.82	37.84
ESP (%NaCEC)	0.7	1.7	7.4	13.2	17.0
Ca/Mg (ratio)	3.0	2.0	1.1	0.7	0.6

**Table 3-28: Soil Chemistry Results for Detailed Site N21**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.58	0.80-0.90	0.90-1.00
Soil pH	7.19	8.10	9.08	9.23	9.04
Soil Cl (mg/kg)	3	27	87	304	591
PSA-Sand (>20µm %)	66.6	61.9	58.1	51.8	41.2
PSA-Fine Silt (2-20µm %)	4.0	6.7	5.1	5.9	7.2
PSA-Clay (<2µm%)	29.4	31.4	36.8	42.3	51.6
CEC (meq/100g)	24.20	22.93	28.42	26.27	42.90
ESP (%NaCEC)	0.6	3.1	10.5	10.7	15.8
Ca/Mg (ratio)	2.2	1.6	0.9	0.8	0.6

**Table 3-29: Soil Chemistry Results for Detailed Site N22**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.60	0.80-0.90	0.90-1.00
Soil pH	7.41	8.35	8.96	9.04	8.98
Soil Cl (mg/kg)	11	22	83	182	359
PSA-Sand (>20µm %)	64.9	62.1	61.9	60.7	55.5
PSA-Fine Silt (2-20µm %)	8.3	7.4	8.7	2.1	3.7
PSA-Clay (<2µm%)	26.8	30.4	29.4	37.3	40.8
CEC (meq/100g)	23.12	28.16	28.48	27.22	34.80
ESP (%NaCEC)	1.0	4.3	8.9	12.4	14.1
Ca/Mg (ratio)	2.7	1.8	1.1	0.8	0.7

### 3.5 Map Unit 5

#### Overview

Map Unit 5 consists of a dark duplex sandy loam to clay soils on gently undulating plains. It was observed a minor sub-dominant colour of brown duplex soils within the map unit with check site to the north indicating that the area is small. Map Unit 5 is in the northern portion of the project site and covers an area within the SCL trigger map of 18.3 ha.

#### Observation Sites

A total of 5 observation sites were identified within this map unit which are summarised in Table 3-30. Check site to the south (NC-13) indicates that the minor grey dermosol site observed is a very minor sub-dominant soil type in the map unit. Density of sites in the map unit exceeds minimum density for western cropping zone as outlined in RPI 08/14 at one site per 3.66 ha.

**Table 3-30: Observation Sites for Map Unit 5**

Observation Sites	
Check	Detailed ( <i>analysed</i> )
2 (Outside the map unit)	3 (3)

A land summary of Detailed Site N5 for the map unit is presented in Table 3-31, soil profile description in Table 3-32 and detailed site descriptions are presented in Appendix A.

Three representative detailed sites, Site N4, Site N5 and Site N9, were selected to undergo chemical analysis. The soil particle size analysis (PSA) was assessed against the Marshall soil texture chart (NCST, 2009) and chemistry results for the three selected detailed sites are presented in Tables 3-34 to 3-36.

#### Map Unit Observations


No further observations were made regarding the SCL assessment of the map unit.

**Table 3-31: Map Unit 5**

Item	Description
<b>Representative Site</b>	N5
<b>Representative Site photograph</b>	
<b>Location</b>	641792mE 7513825mN
<b>Current Use</b>	Grazing
<b>Site survey type</b>	Detailed, 50 mm hand auger.
<b>Vegetation</b>	Eucalyptus species
<b>Disturbance</b>	Semi-disturbed
<b>Landform element /pattern</b>	Very gently undulating plain mid-slope
<b>Micro relief</b>	Nil microrelief
<b>Erosion</b>	Nil erosion
<b>Slope (%)</b>	3.0/3.0
<b>Drainage</b>	Moderate
<b>Surface coarse fragments</b>	Nil
<b>Surface condition</b>	Soft
<b>ASC Order (s)</b>	Black dermosol (with minor grey dermosol variant, site N4)
<b>Total area (ha)</b>	18.3



**Table 3-32: Soil Profile Morphology Summary Map Unit 5**

<p><b>Site N5</b> (Previously N5-SCL as per photo)</p>									
Horizon Depth (m), Boundary (Bdy)	Field Texture	Structure Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture Drainage	Roots	Depth (m) / Field pH / EC dS/m	Samples (m)	Observations
A1 0.00-0.12 Abrupt	Sandy loam	Weak, soft <10mm sub-rounded	Nil	10YR3/1 Very dark grey Nil mottles/bleach	Moderate moist, rapid	Few fine	0.10 / 6.5	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil
B21 0.12-0.45 Abrupt	Light clay with minor sand	Moderate, firm <30mm sub-angular	Nil	10YR2/1 Black Nil mottles/bleach	Moderately moist, moderate	Very fine, very few	0.30 / 7.5		
B22 0.45-0.80 Abrupt	Medium clay	Moderate, firm <30mm sub-angular	2% calcium carbonate nodules	10YR2/1 Black Nil mottles/bleach	Dry, moderate	Very fine, very few	0.60 / 8.0		
B23 0.80-1.00 EOBH	Medium clay	Moderate, strong <30mm sub-angular	2% calcium carbonate nodules	10YR3/3 Dark brown Nil mottles/bleach	Dry, moderate	Very fine, very few	0.90 / 8.0		

**Table 3-33: Sites Particle Size Analysis Texture Assessment**

Site	Sample Depth / Horizon (m approx.) Texture (PSA / Ternary Soil Texture Chart)				
	0.00-0.10	0.20-0.30	0.50-0.60	0.80-0.90	0.90-1.00
N4	Sand	Clay Loam	Clay Loam	Clay Loam	Clay Loam
N5	Sandy Loam	Clay Loam	Clay Loam	Clay Loam	Clay Loam
N9	Sandy Loam	Clay Loam	Clay Loam	Clay Loam	Clay Loam

**Table 3-34: Soil Chemistry Results for Detailed Site N4**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.60	0.80-0.90	0.90-1.00
Soil pH	7.57	8.06	9.23	9.24	9.18
Soil Cl (mg/kg)	28	30	140	280	514
PSA-Sand (>20µm %)	93.2	66.2	65.6	60.7	59.3
PSA-Fine Silt (2-20µm %)	1.1	7.5	12.0	16.0	17.6
PSA-Clay (<2µm%)	5.7	26.3	22.5	23.3	23.1
15 Bar (%)	11	16	14	15	14
CEC (meq/100g)	14.6	21.9	20.9	21.0	22.6
Ca/Mg (ratio)	2.0	1.6	0.9	0.7	0.6
ESP (%NaCEC)	1	3	5	8	9

**Table 3-35: Soil Chemistry Results for Detailed Site N5**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.60	0.80-0.90	0.90-1.00
Soil pH	6.82	8.05	9.03	9.04	9.03
Soil Cl (mg/kg)	63	15	201	649	918
PSA-Sand (>20µm %)	78.6	67.0	65.0	62.2	61.6
PSA-Fine Silt (2-20µm %)	7.3	10.3	7.5	5.0	9.3
PSA-Clay (<2µm%)	14.1	22.6	27.5	32.9	29.1
15 Bar (%)	14	18	20	20	21
CEC (meq/100g)	18.6	27.8	36.6	33.8	32.0
Ca/Mg (ratio)	2.0	1.6	0.9	0.7	0.6
ESP (%NaCEC)	1	3	9	11	10

**Table 3-36: Soil Chemistry Results for Detailed Site N9**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.09	0.20-0.30	0.55-0.65	0.75-0.85	0.90-1.00
Soil pH	7.77	7.90	9.20	9.14	9.01
Soil Cl (mg/kg)	12	6	235	543	929
PSA-Sand (>20µm %)	81.8	76.4	65.1	59.9	55.5
PSA-Fine Silt (2-20µm %)	7.0	4.1	6.4	15.9	17.1
PSA-Clay (<2µm%)	11.2	19.5	28.5	24.2	27.4
15 Bar (%)	12	13	19	17	18
CEC (meq/100g)	17.0	18.8	32.9	25.4	29.8
Ca/Mg (ratio)	2.0	1.6	0.8	0.6	0.6
ESP (%NaCEC)	2	4	10	11	11

## 3.6 Map Unit 6

### Overview

Map Unit 6 consists of dark sandy clay loams with coarser structured clay subsoils on gently undulating plains. This map unit is in the northern portion of the project site and covers an area within the SCL trigger map of 307 ha.

### Observation Sites

A total of 20 observation sites were completed within this map unit and are summarised in Table 3-37. Density of sites in the map unit exceeds minimum density for western cropping zone as outlined in RPI 08/14 at one site per 15 ha.

**Table 3-37: Observation Sites for Map Unit 6**

Observation Sites	
Check	Detailed ( <i>analysed</i> )
12	8 (4)

A land summary of detailed site 91-SCL is presented in Table 3-38, soil profile description in Table 3-39 and detailed site descriptions are presented in Appendix A.

Six representative detailed sites, Site N26, Site N27, Site 32-SCL, Site 77-SCL, Site 80-SCL and Site 91-SCL, were selected to undergo chemical analysis for Map Unit 6. The soil particle size analysis (PSA) was assessed against the Marshall soil texture chart (NCST, 2009) and soil chemistry results for the three selected detailed sites are presented in Tables 3-40 to 3-44.

### Map Unit Observations


A sub-dominant soil type was observed in the northern area of Map Unit 6, site N48, less than 10 ha. The site and area have been aggregated into Map Unit 6.

**Table 3-38: Map Unit 6**

Item	Description
<b>Representative Site</b>	91-SCL
<b>Representative Site photograph</b>	
<b>Location</b>	643899mE 7510777mN
<b>Current Use</b>	Grazing
<b>Site survey type</b>	Detailed - 50mm hand auger
<b>Vegetation</b>	Cleared, nearby remnant Belah
<b>Disturbance</b>	Extensive disturbance
<b>Landform element /pattern</b>	Very gently undulating plain, mid-slope
<b>Micro relief</b>	Nil microrelief
<b>Erosion</b>	Nil erosion
<b>Slope (%)</b>	2.0/1.0
<b>Drainage</b>	Moderate
<b>Surface coarse fragments</b>	Nil coarse fragments
<b>Surface condition</b>	Firm
<b>ASC Order (s)</b>	Black Dermosol
<b>Total area (ha)</b>	307



**Table 3-39: Soil Profile Morphology Summary Map Unit 6**

Site 91-SCL									
	Horizon Depth (m), Boundary (Bdy)	Field Texture	Structure Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture Drainage	Roots	Depth (m) / Field pH / EC dS/m	Samples (m)
A1 0.00-0.12 Abrupt	Sandy Clay	Moderate, weak <20mm sub- angular	Nil	10YR2/1 Black Nil mottles/bleach	Dry, moderate	Few, fine	0.10 / 6.0	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.9-1.00	Nil
B21 0.12-0.50 Clear	Light sandy clay	Moderate, firm 20- 50mm sub- angular	Nil	10YR2/2 Very dark brown Nil mottles/bleach	Dry, moderate	Few, fine	0.30 / 6.5		
B22 0.50-1.00 EOBH	Light clay	Moderate, firm 20- 50mm sub- angular blocky	<2% calcium carbonate nodules	10YR3/3 Dark brown Mottles <2% 10YR5/3 Brown Nil bleach	Dry, moderate	Very few, very fine	0.60 / 7.0 0.60 / 7.5		

**Table 3-40: Sites Particle Size Analysis Texture Assessment**

Site	Sample Depth / Horizon (m approx.) Texture (PSA / Ternary Soil Texture Chart)				
	0.00-0.10	0.20-0.30	0.50-0.60	0.80-0.90	0.90-1.00
91-SCL	Sandy loam	Loam	Light clay	Light clay	Light clay
N27	Sandy clay loam	Sandy clay loam	Light medium clay	Light medium clay	Light medium clay
32-SCL	Sandy clay loam	Light clay	Clay loam	Clay loam	Clay loam
80-SCL	Sandy clay loam	Clay loam	Clay loam	Clay loam	Clay loam

**Table 3-41: Soil Chemistry Results for Detailed Site 91-SCL**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.60	0.80-0.90	0.90-1.00
Soil pH	6.99	8.02	9.13	9.07	8.95
Soil Cl (mg/kg)	12	12	211	701	1026
PSA-Sand (>20µm %)	82.0	74.5	59.6	58.7	47.3
PSA-Fine Silt (2-20µm %)	4.0	8.1	6.4	4.4	15.2
PSA-Clay (<2µm%)	13.9	17.4	34.0	36.9	37.5
15 Bar (%)	12	14	19	21	22

**Table 3-42: Soil Chemistry Results for Detailed Site N27**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.60	0.80-0.90	0.90-1.00
Soil pH	8.27	8.54	9.10	9.02	8.85
Soil Cl (mg/kg)	15	28	230	393	447
PSA-Sand (>20µm %)	71.2%	71.0%	54.0%	50.0%	44.4%
PSA-Fine Silt (2-20µm %)	2.2%	2.7%	5.0%	9.6%	11.3%
PSA-Clay (<2µm%)	26.6%	26.3%	41.0%	40.4%	44.3%
CEC (meq/100g)	21.28	20.20	31.88	31.67	26.34
ESP (%NaCEC)	0.3	4.0	13.6	15.5	12.4
Ca/Mg (ratio)	4.7	1.8	1.0	1.0	1.2

**Table 3-43: Soil Chemistry Results for Detailed Site 32-SCL**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.60	0.83-0.90	0.90-1.00
Soil pH	7.73	8.69	9.25	9.31	9.27
Soil Cl (mg/kg)	14	15	64	225	321
PSA-Sand (>20µm %)	68.0%	55.9%	60.6%	57.5%	60.2%
PSA-Fine Silt (2-20µm %)	8.4%	5.9%	8.2%	13.6%	7.2%
PSA-Clay (<2µm%)	23.7%	38.2%	31.3%	29.0%	32.6%
CEC (meq/100g)	14.30	21.03	15.64	16.48	17.98
ESP (%NaCEC)	1.0	2.9	8.0	12.7	14.9
Ca/Mg (ratio)	3.0	1.7	0.9	0.7	0.6

**Table 3-44: Soil Chemistry Results for Detailed Site 80-SCL**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.22-0.30	0.50-0.60	0.83-0.90	0.90-1.00
Soil pH	7.09	7.82	9.24	9.40	9.29
Soil Cl (mg/kg)	17	16	62	257	358
PSA-Sand (>20µm %)	79.7%	68.1%	63.3%	60.8%	63.3%
PSA-Fine Silt (2-20µm %)	1.9%	9.2%	5.8%	5.7%	6.2%
PSA-Clay (<2µm%)	18.4%	22.7%	30.9%	33.5%	30.5%
CEC (meq/100g)	13.57	14.57	19.82	21.29	21.16
ESP (%NaCEC)	0.6	2.9	10.0	20.2	20.7
Ca/Mg (ratio)	2.4	2.2	0.8	0.6	0.5

### 3.7 Map Unit 7

#### Overview

Map Unit 7 consists of a crusting grey clay soils on gently undulating alluvial plains with mixed shrubbery and woodlands. It was observed a minor sub-dominant colour of black soils within the map unit; however, this was aggregated within the larger dominant observed grey vertosol.

This map unit is in the north-west portion of the project site and covers an area within the SCL trigger map of 5.1 ha.

#### Observation Sites

A total of 5 observation sites were identified within Map Unit 7 and are summarised in Table 3-45. Density of sites in the map unit exceeds minimum density for western cropping zone as outlined in RPI 08/14 at one site per 1.02 ha.

**Table 3-45 Observation Sites for Map Unit 7**

Observation Sites	
Check	Detailed ( <i>analysed</i> )
2	3 (3)

A land summary of detailed site N1 for Map Unit 7 is presented in Table 3-46, soil profile description in Table 3-47 and detailed site descriptions are presented in Appendix A.

Three representative detailed sites, Site N1, Site N2 and Site N3, were selected to undergo chemical analysis. The soil particle size analysis (PSA) was assessed against the Marshall soil texture chart (NCST, 2009) and soil chemistry results for the three selected detailed sites are presented in Tables 3-48 to 3-51.

#### Map Unit Observations


Site 7 is a sub-dominant soil type, Crusting Black Vertosol and is included with the dominant soil type, Crusting Grey Vertosol of the map unit.



**Table 3-46: Map Unit 7**

Item	Description
<b>Representative Site</b>	N2
<b>Representative Site photograph</b>	
<b>Location</b>	641096mE 7512914mN
<b>Current Use</b>	Grazing
<b>Site survey type</b>	Detailed, 50 mm hand auger.
<b>Vegetation</b>	Various shrubs
<b>Disturbance</b>	Nil to semi-cleared
<b>Landform element / pattern</b>	Very gently undulating plain
<b>Micro relief</b>	Nil microrelief
<b>Erosion</b>	Nil erosion
<b>Slope (%)</b>	2.0/1.0
<b>Drainage</b>	Moderate
<b>Surface coarse fragments</b>	Nil coarse fragments
<b>Surface condition</b>	Firm <10mm peds, cracking 2-6mm, crust
<b>ASC Order (s)</b>	Crusting Grey Vertosol (minor sub-dominant black vertosol [Site N1])
<b>Total area (ha)</b>	5.1 (Extends outside the project site > 10 ha)

**Table 3-47: Soil Profile Morphology Summary Map Unit 7**

Site N2 (Previously N2-SCL as per photo)										
	Horizon Depth (m), Boundary (Bdy)	Field Texture	Structure Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture Drainage	Roots	Depth (m) / Field pH / EC dS/m	Samples (m)	Observations
A1 0.00-0.14 Abrupt	Light clay	Moderate, soft <10mm sub-angular	Nil	10YR3/1 Very dark grey Nil mottles/bleach	Moderate moist, moderate	Few fine	0.10 / 6.0	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.09-1.00	Nil	
B2 0.14-1.00 EOBH	Medium clay	Moderate, firm <10mm sub-angular	<2% black nodules	10YR4/2 Dark greyish brown Nil mottles/bleach	Dry, moderate	Very fine, very few	0.30 / 6.5 0.60 / 7.0 0.90 / 7.5			

**Table 3-48: Sites Particle Size Analysis Texture Assessment**

Site	Sample Depth / Horizon (m approx.) Texture (PSA / Ternary Soil Texture Chart)				
	0.00-0.10	0.20-0.30	0.50-0.60	0.80-0.90	0.90-1.00
N1	Heavy clay	Heavy clay	Heavy clay	Heavy clay	Heavy clay
N2	Medium clay	Medium clay	Medium clay	Medium clay	Medium clay
N3	Medium clay	Medium clay	Medium clay	Medium clay	Medium clay

**Table 3-49: Soil Chemistry Results for Detailed Site N1**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.60	0.80-0.90	0.90-1.00
Soil pH	7.96	8.23	8.29	8.25	8.22
Soil Cl (mg/kg)	23	82	384	582	669
PSA-Sand (>20µm %)	23.4	24.0	12.5	13.6	13.1
PSA-Fine Silt (2-20µm %)	18.1	11.8	24.3	19.2	24.2
PSA-Clay (<2µm%)	58.5	64.2	63.1	67.2	62.7
15 Bar (%)	31	33	34	34	34

**Table 3-50: Soil Chemistry Results for Detailed Site N2**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.60	0.80-0.90	0.90-1.00
Soil pH	7.67	8.23	8.52	8.47	8.48
Soil Cl (mg/kg)	39	59	50	73	114
PSA-Sand (>20µm %)	42.2	32.2	27.7	36.0	32.1
PSA-Fine Silt (2-20µm %)	11.6	18.1	18.7	12.6	16.9
PSA-Clay (<2µm%)	46.1	49.7	53.7	51.4	51.0
15 Bar (%)	30	30	31	31	31

**Table 3-51: Soil Chemistry Results for Detailed Site N3**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.60	0.80-0.90	0.90-1.00
Soil pH	7.78	8.34	8.52	8.61	8.66
Soil Cl (mg/kg)	35	15	14	14	21
PSA-Sand (>20µm %)	38.0	32.4	40.5	37.8	33.2
PSA-Fine Silt (2-20µm %)	9.7	16.9	11.3	9.7	16.8
PSA-Clay (<2µm%)	52.3	50.8	48.2	52.6	50.0
15 Bar (%)	30	29	29	29	29

### 3.8 Map Unit 8

#### Overview

Map Unit 8 consists of dark greyish brown weak to moderately structured clay soils on cleared gently undulating plains. This map unit is in the north-east portion of the project site and covers an area within the SCL trigger map of 3.3 ha.

#### Observation Sites

A total of 5 observation sites were completed within this map unit and are summarised in Table 3-52. Density of sites in the map unit exceeds minimum density for western cropping zone as outlined in RPI 08/14 at one site per 0.66 ha.

**Table 3-52: Observation Sites for Map Unit 8**

Observation Sites	
Check	Detailed ( <i>analysed</i> )
2	3 (3)

A land summary of detailed site N13 is presented in Table 3-53, soil profile description in Table 3-54 and detailed site descriptions are presented in Appendix A.


Three representative detailed sites, Site N12, Site N13 and Site N14, were selected to undergo chemical analysis for Map Unit 8. The soil particle size analysis (PSA) was assessed against the Marshall soil texture chart (NCST, 2009) and soil chemistry results for the three selected detailed sites are presented in Tables 3-55 to 3-58.

#### Map Unit Observations


No further observations were made regarding the SCL assessment of the map unit.



**Table 3-53: Map Unit 8**

Item	Description
<b>Representative Site</b>	N13
<b>Representative Site photograph</b>	
<b>Location</b>	640940mE 7512735mN
<b>Current Use</b>	Grazing
<b>Site survey type</b>	Detailed - 50mm hand auger
<b>Vegetation</b>	Grasses
<b>Disturbance</b>	Extensive disturbance
<b>Landform element / pattern</b>	Gently undulating plains, mid-slope
<b>Micro relief</b>	Nil microrelief
<b>Erosion</b>	Nil erosion
<b>Slope (%)</b>	<2.0/<2.0
<b>Drainage</b>	Moderate – well
<b>Surface coarse fragments</b>	Nil
<b>Surface condition</b>	Firm
<b>ASC Order (s)</b>	Black Dermosol
<b>Total area (ha)</b>	3.3 (Extends outside the project site > 10 ha)

**Table 3-54: Soil Profile Morphology Summary Map Unit 8**

Site N13									
Horizon Depth (m), Boundary (Bdy)	Field Texture	Structure Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture Drainage	Roots	Depth (m) / Field pH / EC dS/m	Samples (m)	Observations
A1 0.00-0.15 Abrupt	Sandy clay loam	Weak to moderate. Soft, sub rounded <10mm	Nil	10YR3/2 Nil mottles/bleaching	Dry, well	Present	0.10 / 7.0	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.9-1.00	Nil
B21 0.15-0.75 gradual	Light clay	Weak to moderate. Firm, sub rounded <20mm	Nil	10YR3/2 Nil mottles/bleaching	Dry, moderate – well	Present	0.30 / 7.5 0.60 / 7.5		
B22 0.75-1.00 EOBH	Light clay	Weak to moderate. Firm, sub rounded <20mm	Nil	10YR3/2 Nil mottles/bleaching	Dry, moderate – well	Present	0.90 / 7.5		

**Table 3-55: Sites Particle Size Analysis Texture Assessment**

Site	Sample Depth / Horizon (m approx.) Texture (PSA / Ternary Soil Texture Chart)				
	0.00-0.10	0.20-0.30	0.50-0.60	0.80-0.90	0.90-1.00
N12	Clay loam	Light clay	Medium clay	Light medium clay	Light medium clay
N13	Sandy clay loam	Light medium clay	Medium clay	Light medium clay	Medium clay
N14	Sandy loam	Medium clay	Light medium clay	Light medium clay	Medium clay

**Table 3-56: Soil Chemistry Results for Detailed Site N12**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.60	0.80-0.90	0.90-1.00
Soil pH	7.23	7.93	8.63	8.59	8.53
Soil Cl (mg/kg)	22	155	481	793	747
PSA-Sand (>20µm %)	66.3%	57.5%	44.2%	45.2%	50.6%
PSA-Fine Silt (2-20µm %)	10.6%	6.0%	9.4%	10.0%	9.3%
PSA-Clay (<2µm%)	23.1%	36.5%	46.3%	44.8%	40.0%
CEC (meq/100g)	15.52	23.08	30.45	30.79	32.41
ESP (%NaCEC)	2.2	6.9	8.3	9.2	9.8
Ca/Mg (ratio)	1.6	1.3	0.9	0.8	0.8

**Table 3-57: Soil Chemistry Results for Detailed Site N13**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.60	0.80-0.90	0.90-1.00
Soil pH	7.01	8.03	8.48	8.57	8.50
Soil Cl (mg/kg)	9	163	355	683	826
PSA-Sand (>20µm %)	70.7	49.2	48.1	47.0	47.9
PSA-Fine Silt (2-20µm %)	2.8	5.8	5.6	8.2	5.1
PSA-Clay (<2µm%)	26.5	44.9	46.3	44.7	47.1
CEC (meq/100g)	14.92	26.15	26.77	28.40	30.66
ESP (%NaCEC)	1.8	6.8	7.3	8.3	8.6
Ca/Mg (ratio)	1.7	1.1	1.0	0.8	0.7

**Table 3-58: Soil Chemistry Results for Detailed Site N14**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.60	0.80-0.90	0.90-1.00
Soil pH	6.85	8.29	8.78	8.62	8.57
Soil Cl (mg/kg)	9	86	368	671	768
PSA-Sand (>20µm %)	72.3%	47.1%	47.4%	49.1%	44.7%
PSA-Fine Silt (2-20µm %)	10.6%	6.1%	8.6%	8.1%	9.2%
PSA-Clay (<2µm%)	17.1%	46.8%	44.0%	42.7%	46.1%
CEC (meq/100g)	10.26	23.98	29.98	27.95	27.41
ESP (%NaCEC)	1.6	7.0	8.2	9.0	9.1
Ca/Mg (ratio)	1.7	1.2	0.9	0.8	0.8



### 3.9 Map Unit 9

#### Overview

Map Unit 9 consists of black vertosol on gently undulating plains. This map unit is in the centre-north portion of the project site and covers an area within the SCL trigger map of 142.3 ha.

#### Observation Sites

A total of 13 observation sites were completed within this map unit and are summarised in Table 3-59. Density of sites in the map unit exceeds minimum density for western cropping zone as outlined in RPI 08/14 at one site per 10.95 ha.

**Table 3-59: Observation Sites for Map Unit 9**

Observation Sites	
Check	Detailed ( <i>analysed</i> )
6	7 (7)


A land summary of detailed Site 65-SCL is presented in Table 3-60, soil profile description in Table 3-61 and detailed site descriptions are presented in Appendix A.

Seven representative detailed sites, Site 65-SCL, Site N29, Site N30, Site N31, Site N32, Site N33 and Site N34 were selected to undergo chemical analysis for Map Unit 9. The soil particle size analysis (PSA) was assessed against the Marshall soil texture chart (NCST, 2009) and soil chemistry results for the three selected detailed sites are presented in Tables 3-62 to 3-69.


#### Map Unit Observations

No further observations were made regarding the SCL assessment of the map unit.

**Table 3-60: Map Unit 9**

Item	Description
<b>Representative Site</b>	65-SCL
<b>Representative Site photograph</b>	
<b>Location</b>	643019mE 7513552mN
<b>Current Use</b>	Cropping
<b>Site survey type</b>	Detailed - 50mm hand auger
<b>Vegetation</b>	Cropping
<b>Disturbance</b>	Extensive disturbance
<b>Landform element /pattern</b>	Very gently undulating plain Flat plain
<b>Micro relief</b>	Nil microrelief
<b>Erosion</b>	Nil erosion
<b>Slope (%)</b>	1.0/1.0
<b>Drainage</b>	Moderate
<b>Surface coarse fragments</b>	Nil coarse fragments
<b>Surface condition</b>	Soft, self-mulching
<b>ASC Order (s)</b>	Black Vertosol
<b>Total area (ha)</b>	142.3

**Table 3-61: Soil Profile Morphology Summary Map Unit 9**

<div>Site 65-SCL</div>										
	Horizon Depth (m), Boundar -y (Bdy)	Field Texture	Structure Strength	Inclusions Segregatio- ns	Colour, Mottle, Bleaching	Moisture Drainage	Roots	Depth (m) / Field pH / EC dS/m	Samples (m)	Observati -ons
	A1 0.00-0.11 Abrupt	Light clay	Moderate, weak <10mm sub- angular	Nil	10YR3/1 Very dark grey Nil mottles/ bleach	Dry, moderate	Few fine	0.10 / 6.0	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil
	B21 0.11-0.80 Abrupt	Medium clay	Moderate, weak <10mm sub- angular	Nil	10YR2/2 Very dark brown Nil mottles/ bleach	Dry, moderate	Very fine, very few	0.30 / 6.5 0.60 / 7.0		
B22 0.80-1.00 EOBH	Medium clay	Moderate, weak <10mm sub- angular	2% calcium carbonate nodules	10YR3/3 Dark brown Nil mottles/ bleach	Dry, moderate	Very fine, very few	0.90 / 7.5			

**Table 3-62: Sites Particle Size Analysis Texture Assessment**

Site	Sample Depth / Horizon (m approx.) Texture (PSA / Ternary Soil Texture Chart)				
	0.00-0.10	0.20-0.30	0.50-0.60	0.80-0.90	0.90-1.00
65-SCL	Light medium clay	Light medium clay	Medium clay	Medium clay	Medium clay
N29	Light medium clay	Light clay	Light clay	Medium clay	Light medium clay
N30	Light medium clay	Light clay	Light clay	Light medium clay	Light clay
N31	Light medium clay	Light medium clay	Medium clay	Medium clay	Medium clay
N32	Light clay	Light medium clay	Light medium clay	Medium clay	Medium clay
N33	Light medium clay	Light clay	Medium clay	Medium clay	Medium clay

**Table 3-63: Soil Chemistry Results for Detailed Site 65-SCL**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.60	0.80-0.90	0.90-1.00
Soil pH	7.83	8.47	8.90	8.93	8.96
Soil Cl (mg/kg)	12	10	18	101	159
PSA-Sand (>20µm %)	28.9	41.6	26.8	25.8	28.0
PSA-Fine Silt (2-20µm %)	28.0	14.1	25.6	23.4	20.5
PSA-Clay (<2µm%)	43.1	44.3	47.6	50.8	51.6
15 Bar (%)	27	28	30	31	31

**Table 3-64: Soil Chemistry Results for Detailed Site N29**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.60	0.80-0.90	0.90-1.00
Soil pH	8.69	8.87	9.18	9.39	9.42
Soil Cl (mg/kg)	8	13	30	18	14
PSA-Sand (>20µm %)	50	57	53	44	45
PSA-Fine Silt (2-20µm %)	8	6	7	10	11
PSA-Clay (<2µm%)	41	37	40	46	44

**Table 3-65: Soil Chemistry Results for Detailed Site N30**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.60	0.80-0.90	0.90-1.00
Soil pH	8.35	8.80	9.21	9.41	9.07
Soil Cl (mg/kg)	24	11	14	17	11
PSA-Sand (>20µm %)	47	61	57	54	58
PSA-Fine Silt (2-20µm %)	6	7	4	5	3
PSA-Clay (<2µm%)	46	32	40	41	39

**Table 3-66: Soil Chemistry Results for Detailed Site N31**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.60	0.80-0.90	0.90-1.00
Soil pH	8.54	8.34	8.44	8.88	9.02
Soil Cl (mg/kg)	12	21	18	21	12
PSA-Sand (>20µm %)	57	49	39	40	41
PSA-Fine Silt (2-20µm %)	0	8	11	6	6
PSA-Clay (<2µm%)	43	43	50	53	53

**Table 3-67: Soil Chemistry Results for Detailed Site N32**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.60	0.80-0.90	0.90-1.00
Soil pH	8.32	8.51	8.90	9.12	9.11
Soil Cl (mg/kg)	16	15	16	14	14
PSA-Sand (>20µm %)	54	50	51	41	40
PSA-Fine Silt (2-20µm %)	8	6	7	10	10
PSA-Clay (<2µm%)	38	44	42	49	51

**Table 3-68: Soil Chemistry Results for Detailed Site N33**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.60	0.80-0.90	0.90-1.00
Soil pH	8.22	8.92	9.23	8.71	9.27
Soil Cl (mg/kg)	24	15	11	14	12
PSA-Sand (>20µm %)	51	52	45	39	38
PSA-Fine Silt (2-20µm %)	8	8	0	11	8
PSA-Clay (<2µm%)	42	40	55	51	54

**Table 3-69: Soil Chemistry Results for Detailed Site N34**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.60	0.80-0.90	0.90-1.00
Soil pH	9.06	8.88	9.19	9.41	9.48
Soil Cl (mg/kg)	24	14	11	22	25
PSA-Sand (>20µm %)	55	59	64	52	49
PSA-Fine Silt (2-20µm %)	7	5	1	6	10
PSA-Clay (<2µm%)	38	36	35	42	41

### 3.10 Map Unit 10

#### **Overview**

Map Unit 10 consists of clay loams with sodic clay subsoils on gently undulating plains. This map unit is in the north-east portion of the project site and covers an area within the SCL trigger map of 32.9 ha.

#### **Observation Sites**

A total of 5 observation sites were completed within this map unit and are summarised in Table 3-70. Density of sites in the map unit exceeds minimum density for western cropping zone as outlined in RPI 08/14 at one site per 6.58 ha.

**Table 3-70: Observation Sites for Map Unit 10**

Observation Sites	
Check	Detailed ( <i>analysed</i> )
2	3 (3)

A land summary of detailed site N43 is presented in Table 3-71, soil profile description in Table 3-72 and detailed site descriptions are presented in Appendix A.


Three representative detailed sites, Site N28, Site N43 and Site N45, were selected to undergo chemical analysis for Map Unit 10. The soil particle size analysis (PSA) was assessed against the Marshall soil texture chart (NCST, 2009) and soil chemistry results for the three selected detailed sites are presented in Tables 3-73 to 3-76.

#### **Map Unit Observations**

No further observations were made regarding the SCL assessment of the map unit.




**Table 3-71: Map Unit 10**

Item	Description
<b>Representative Site</b>	N43
<b>Representative Site photograph</b>	
<b>Location</b>	643716mE 7513193mN
<b>Current Use</b>	Grazing
<b>Site survey type</b>	Detailed - 50mm hand auger
<b>Vegetation</b>	Eucalyptus species
<b>Disturbance</b>	Semi disturbed,
<b>Landform element /pattern</b>	Gently Undulating Plains, Upper slope
<b>Micro relief</b>	Nil microrelief
<b>Erosion</b>	Nil erosion
<b>Slope (%)</b>	<2 / <2
<b>Drainage</b>	Well to well-moderate
<b>Surface coarse fragments</b>	Nil coarse fragments
<b>Surface condition</b>	Firm
<b>ASC Order (s)</b>	Black Sodosol
<b>Total area (ha)</b>	32.9



**Table 3-72: Soil Profile Morphology Summary Map Unit 10**

Site N43										
Horizon Depth (m), Boundary (Bdy)	Field Texture	Structure Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture Drainage	Roots	Depth (m) / Field pH / EC dS/m	Samples (m)	Observations	
A11 0.0 – 0.06 Abrupt	Sandy clay loam	Massive	Nil	10YR3/2 Nil mottles / bleaching	Dry, well drained	Present	0.10 / 7.5	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.9-1.00	Nil	
A12 0.06 – 0.20 Gradual	Sandy clay loam	Weak, sub-rounded peds <10 mm	Nil	10YR3/2 Nil mottles / bleaching	Dry, well drained	Present	0.20 / 7.5			
B21 0.20 – 0.46 Gradual	Sandy clay loam	Subangular blocky, moderate, peds <20 mm, firm	Nil	10YR3/2 Nil mottles / bleaching	Dry, well drained	Present	0.30 / 7.5			
B22 0.46 – 1.00 EOBH	Medium clay, sandy	Subangular blocky, moderate, peds <20 mm, firm	<20% calcium carbonate	10YR3/3 Nil mottles / bleaching	Dry, well – moderate drained	Present	0.60 / 7.5 0.90 / 7.5			

**Table 3-73: Sites Particle Size Analysis Texture Assessment**

Site	Sample Depth / Horizon (m approx.) Texture (PSA / Ternary Soil Texture Chart)				
	0.00-0.10	0.20-0.30	0.50-0.60	0.80-0.90	0.90-1.00
N28	Clay loam	Clay loam	Light clay	Light clay	Light clay
N43	Clay loam	Clay loam	Light clay	Light clay	Light clay
N45	Clay loam	Light clay	Medium clay	Light medium clay	Medium clay

**Table 3-74: Soil Chemistry Results for Detailed Site N28**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.05	0.20-0.30	0.50-0.60	0.80-0.90	0.90-1.00
Soil pH	8.10	8.46	8.99	9.09	9.04
Soil Cl (mg/kg)	13	23	227	522	686
PSA-Sand (>20µm %)	72	66	48	55	49
PSA-Fine Silt (2-20µm %)	9	6	6	7	7
PSA-Clay (<2µm%)	20	29	46	38	44
15 Bar (%)	17	17	25	22	22
CEC (meq/100g)	21.46	21.65	30.84	24.84	26.78
ESP (%NaCEC)	0.3	2.0	9.4	11.2	12.1
Ca/Mg (ratio)	7.3	2.6	0.8	0.7	0.6

**Table 3-75: Soil Chemistry Results for Detailed Site N43**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.60	0.77-0.87	0.90-1.00
Soil pH	8.26	8.27	8.79	9.04	8.93
Soil Cl (mg/kg)	16	17	157	270	910
PSA-Sand (>20µm %)	67	64	52	51	51
PSA-Fine Silt (2-20µm %)	6	6	6	7	6
PSA-Clay (<2µm%)	27	30	42	42	43
15 Bar (%)	15	15	23	21	21
CEC (meq/100g)	21.19	21.84	27.10	25.56	28.30
ESP (%NaCEC)	0.3	0.9	5.5	8.3	12.7
Ca/Mg (ratio)	5.3	3.0	1.1	0.8	0.6

**Table 3-76: Soil Chemistry Results for Detailed Site N45**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.60	0.80-0.90	0.90-1.00
Soil pH	8.36	8.80	8.92	8.93	8.94
Soil Cl (mg/kg)	14	40	333	803	840
PSA-Sand (>20µm %)	61	57	44	52	44
PSA-Fine Silt (2-20µm %)	13	6	5	5	5
PSA-Clay (<2µm%)	25	37	51	42	51
CEC (meq/100g)	26.63	27.55	31.88	29.14	30.59
ESP (%NaCEC)	0.3	5.1	10.9	13.1	12.9
Ca/Mg (ratio)	6.0	1.5	0.8	0.7	0.7

### 3.11 Map Unit 11

#### Overview

Map Unit 11 consists of dark grey clay loams to grey brown clays within forested drainage line areas. This map unit is in the north-east portion of the project site and covers an area within the SCL trigger map of 6 ha.

#### Observation Sites

A total of 5 observation sites were completed within this map unit and are summarised in Table 3-77. Density of sites in the map unit exceeds minimum density for western cropping zone as outlined in RPI 08/14 at one site per 1.2 ha.

**Table 3-77: Observation Sites for Map Unit 11**

Observation Sites	
Check	Detailed ( <i>analysed</i> )
2	3 (3)

A land summary of detailed Site N23 is presented in Table 3-78, soil profile description in Table 3-79 and detailed site descriptions are presented in Appendix A.

Three representative detailed sites, Site N23, Site N24 and Site N25, were selected to undergo chemical analysis for Map Unit 1. The soil particle size analysis (PSA) was assessed against the Marshall soil texture chart (NCST, 2009) and soil chemistry results for the three selected detailed sites are presented in Tables 3-80 to 3-83.

#### Map Unit Observations

Cracking was observed on the surface; however these did not meet the requirements of at least 5 mm consistently.

The map unit was assessed against having vertic properties, however the surface field texture did not meet a clayey field texture (Light clay, medium clay, heavy clay) [R.F.Isbell, 2021], laboratory textures were marginal for one site (34.4% for N24) and below 35% for sites N23 and N25. Cracks observed were not strong and the structure of soils, was not assessed as slickenside and/or lenticular structure.


It may be a marginal assessment of site N24 as a non-rigid soil, however the proximity of the other two rigid soil sites and narrow landform in which the polygon is based indicates that the assessment as a non-rigid map unit is acceptable.

**Table 3-78: Map Unit 11**

Item	Description
<b>Representative Site</b>	N23
<b>Representative Site photograph</b>	
<b>Location</b>	642838mE 7513991mN
<b>Current Use</b>	Grazing
<b>Site survey type</b>	Detailed - 50mm hand auger
<b>Vegetation</b>	Mixed vegetation
<b>Disturbance</b>	Cropping nearby disturbance
<b>Landform element / pattern</b>	Depression
<b>Micro relief</b>	Nil microrelief
<b>Erosion</b>	Minor sheet erosion
<b>Slope (%)</b>	<1% / <1%
<b>Drainage</b>	Well to well-moderate
<b>Surface coarse fragments</b>	Soft, <10% cf <5mm
<b>Surface condition</b>	Firm, crust with minor self mulching
<b>ASC Order (s)</b>	Grey Dermosol
<b>Total area (ha)</b>	6



**Table 3-79: Soil Profile Morphology Summary Map Unit 11**

Site N23									
Horizon Depth (m), Boundary (Bdy)	Field Texture	Structure Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture Drainage	Roots	Depth (m) / Field pH / EC dS/m	Samples (m)	Observations
A1 0.00-0.12 Abrupt	Clay loam	Weak, soft sub-rounded <10mm	Nil	10YR3/1 Very dark grey Nil mottles / bleaching	Dry, well	Present	0.10 / 8.5	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil
B21 0.12-0.48 Abrupt	Light clay	Weak to moderate, firm sub-rounded <10mm	<5% weathered rock	10YR4/2 Dark greyish brown Nil mottles / bleaching	Dry, well – moderate	Present	0.30 / 8.5		
B22 0.48-1.00 EOBH	Light clay	Moderate, very firm sub-rounded <20mm	<5% calcium carbonate	10YR4/2 Dark greyish brown Nil mottles / bleaching	Dry, well – moderate	Present	0.60 / 8.5 0.90 / 8.5		

**Table 3-80: Sites Particle Size Analysis Texture Assessment**

Site	Sample Depth / Horizon (m approx.) Texture (PSA / Ternary Soil Texture Chart)				
	0.00-0.10	0.20-0.30	0.50-0.60	0.80-0.90	0.90-1.00
N23	Clay loam	Light medium clay	Light medium clay	Medium clay	Medium clay
N24	Sandy clay	Light clay	Light clay	Light clay	Light clay
N25	Clay loam	Medium clay	Light medium clay	Medium clay	Medium clay

**Table 3-81: Soil Chemistry Results for Detailed Site N23**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.60	0.77-0.87	0.90-1.00
Soil pH	8.33	8.71	9.31	9.46	9.50
Soil Cl (mg/kg)	20	27	42	225	440
PSA-Sand (>20µm %)	56.7	50.4	44.5	34.8	39.9
PSA-Fine Silt (2-20µm %)	11.9	9.5	15.1	16.3	8.9
PSA-Clay (<2µm%)	31.4	40.1	40.4	48.9	51.1
CEC (meq/100g)	27.67	25.03	23.49	26.84	26.59
ESP (%NaCEC)	0.2	0.7	7.9	16.0	20.3
Ca/Mg (ratio)	4.7	2.3	0.7	0.4	0.3

**Table 3-82: Soil Chemistry Results for Detailed Site N24**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.60	0.80-0.90	0.90-1.00
Soil pH	8.59	8.98	9.45	9.49	9.48
Soil Cl (mg/kg)	18	21	122	284	445
PSA-Sand (>20µm %)	59.9	54.8	47.0	37.7	43.9
PSA-Fine Silt (2-20µm %)	5.7	8.0	13.6	15.4	10.8
PSA-Clay (<2µm%)	34.4	37.1	39.4	46.8	45.2
CEC (meq/100g)	27.47	25.47	25.09	27.88	28.79
ESP (%NaCEC)	0.4	3.3	12.7	17.6	19.4
Ca/Mg (ratio)	3.8	1.4	0.6	0.4	0.4

**Table 3-83: Soil Chemistry Results for Detailed Site N25**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.60	0.80-0.90	0.90-1.00
Soil pH	8.36	9.11	9.33	9.30	9.23
Soil Cl (mg/kg)	22	108	317	563	792
PSA-Sand (>20µm %)	60.6	46.3	53.0	42.1	36.6
PSA-Fine Silt (2-20µm %)	8.0	4.3	4.6	8.7	8.8
PSA-Clay (<2µm%)	31.4	49.3	42.4	49.2	54.6
CEC (meq/100g)	34.74	42.08	39.17	31.05	33.12
ESP (%NaCEC)	0.6	8.0	14.9	17.4	18.4
Ca/Mg (ratio)	3.7	1.0	0.6	0.5	0.5

## 3.12 Map Unit 12

### **Overview**

Map Unit 12 consists of black, well-structured clays on gently undulating plains. This map unit is in the north-east portion of the project site and covers an area within the SCL trigger map of 137 ha.

### **Observation Sites**

A total of 8 observation sites were completed within this map unit and are summarised in Table 3-84. Density of sites in the map unit exceeds minimum density for western cropping zone as outlined in RPI 08/14 at one site per 17 ha.

**Table 3-84: Observation Sites for Map Unit 12**

Observation Sites	
Check	Detailed ( <i>analysed</i> )
5	3 (3)

A land summary of detailed Site N35 is presented in Table 3-85, soil profile description in Table 3-86 and detailed site descriptions are presented in Appendix A.

Three representative detailed sites, Site N35, Site N36 and Site N37 were selected to undergo chemical analysis for Map Unit 1. The soil particle size analysis (PSA) was assessed against the Marshall soil texture chart (NCST, 2009) and soil chemistry results for the three selected detailed sites are presented in Tables 3-87 to 3-90.

### **Map Unit Observations**


No further observations were made regarding the SCL assessment of the map unit.



**Table 3-85: Map Unit 12**

Item	Description
<b>Representative Site</b>	N35
<b>Representative Site photograph</b>	
<b>Location</b>	643659mE 7511986mN
<b>Current Use</b>	Cropping
<b>Site survey type</b>	Detailed - 50mm hand auger
<b>Vegetation</b>	Cropping
<b>Disturbance</b>	Extensive disturbed,
<b>Landform element / pattern</b>	Gently undulating plain, mid slope
<b>Micro relief</b>	Nil microrelief
<b>Erosion</b>	Nil erosion
<b>Slope (%)</b>	2% / 2%
<b>Drainage</b>	Well to well-moderate drained
<b>Surface coarse fragments</b>	Nil
<b>Surface condition</b>	Self-mulching
<b>ASC Order (s)</b>	Black Vertosol
<b>Total area (ha)</b>	137

**Table 3-86: Soil Profile Morphology Summary Map Unit 12**

Site N35									
	Horizon Depth (m), Boundar-y (Bdy)	Field Texture	Structure Strength	Inclusions Segregati-ons	Colour, Mottle, Bleaching	Moisture Drainage	Roots	Depth (m) / Field pH / EC dS/m	Samples (m)
A11 0.0 – 0.04 Abrupt	Light medium clay	Moderate, firm, sub-rounded peds 20-50 mm	Nil	10YR3/2 Nil mottles / bleaching	Dry, well drained	Present	0.10 / 8.0	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil
A12 0.04 – 0.20 Abrupt	Medium clay	Moderate, firm, sub-rounded peds 50-80 mm	Nil	10YR3/2 Nil mottles / bleaching	Dry, well-moderate drained	Present	0.30 / 8.0		
B21 0.20 – 0.45 Abrupt	Medium heavy clay	Moderate, - strong firm, sub-rounded peds 50-80 mm	Nil	10YR2/1 Nil mottles / bleaching	Dry, well-moderate drained	Present	0.60 / 8.0		
B22 0.45 – 1.00 EOBH	Medium heavy clay	Moderate, - strong firm, sub-rounded peds 50-80 mm	Nil	10YR2/1 Nil mottles / bleaching	Dry, well-moderate drained	Nil	0.90 / 8.0		

**Table 3-87: Sites Particle Size Analysis Texture Assessment**

Site	Sample Depth / Horizon (m approx.) Texture (PSA / Ternary Soil Texture Chart)				
	0.00-0.10	0.20-0.30	0.50-0.60	0.80-0.90	0.90-1.00
N35	Medium clay	Medium clay	Medium clay	Medium clay	Medium clay
N36	Light medium clay	Medium clay	Medium clay	Medium heavy clay	Medium clay
N37	Medium clay	Light medium clay	Light medium clay	Light medium clay	Medium heavy clay

**Table 3-88 Soil Chemistry Results for Detailed Site N35**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.04	0.20-0.30	0.50-0.60	0.77-0.87	0.90-1.00
Soil pH	8.70	8.68	8.99	9.10	9.12
Soil Cl (mg/kg)	7	24	33	75	149
PSA-Sand (>20µm %)	47	45	39	41	36
PSA-Fine Silt (2-20µm %)	5	7	5	7	11
PSA-Clay (<2µm%)	47	47	55	52	53

**Table 3-89: Soil Chemistry Results for Detailed Site N36**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.05	0.20-0.30	0.50-0.60	0.80-0.90	0.90-1.00
Soil pH	8.69	8.46	8.50	8.80	8.90
Soil Cl (mg/kg)	11	32	25	39	66
PSA-Sand (>20µm %)	49	41	42	24	35
PSA-Fine Silt (2-20µm %)	8	12	9	15	12
PSA-Clay (<2µm%)	44	47	49	61	54

**Table 3-90: Soil Chemistry Results for Detailed Site N37**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.05	0.20-0.30	0.50-0.60	0.80-0.90	0.90-1.00
Soil pH	8.70	8.67	8.86	8.99	9.04
Soil Cl (mg/kg)	8	17	24	49	99
PSA-Sand (>20µm %)	49	50	53	56	36
PSA-Fine Silt (2-20µm %)	6	7	2	2	1
PSA-Clay (<2µm%)	45	44	44	42	63

### 3.13 Map Unit 13

#### Overview

Map Unit 13 consists of black, well-structured clays on gently undulating plains. This map unit is in the north-east portion of the project site and covers an area within the SCL trigger map of 109 ha.

#### Observation Sites

A total of 8 observation sites were completed within this map unit and are summarised in Table 3-91. Density of sites in the map unit exceeds minimum density for western cropping zone as outlined in RPI 08/14 at one site per 8 ha.

**Table 3-91: Observation Sites for Map Unit 13**

Observation Sites	
Check	Detailed ( <i>analysed</i> )
7	5 (3)

A land summary of detailed Site 6-SCL is presented in Table 3-92, soil profile description in Table 3-93 and detailed site descriptions are presented in Appendix A.


Three representative detailed sites, Site 6-SCL, Site 7-SCL and Site 100-SCL, were selected to undergo chemical analysis for Map Unit 13. The soil particle size analysis (PSA) was assessed against the Marshall soil texture chart (NCST, 2009) and soil chemistry results for the three selected detailed sites are presented in Tables 3-94 to 3-97.

#### Map Unit Observations


No further observations were made regarding the SCL assessment of the map unit.



**Table 3-92: Map Unit 13**

Item	Description
<b>Representative Site</b>	6-SCL
<b>Representative Site photograph</b>	
<b>Location</b>	641287mE 7510129mN
<b>Current Use</b>	Grazing
<b>Site survey type</b>	Detailed - 50mm hand auger
<b>Vegetation</b>	Grasses
<b>Disturbance</b>	Extensively disturbance
<b>Landform element / pattern</b>	Gently undulating plains, mid-slope
<b>Micro relief</b>	Nil microrelief
<b>Erosion</b>	Nil erosion
<b>Slope (%)</b>	2.0/2.0
<b>Drainage</b>	Well – moderate
<b>Surface coarse fragments</b>	Coarse fragments' <5mm <5%
<b>Surface condition</b>	Humid self-mulching with crust 2-6 mm thick, fine sand on surface.
<b>ASC Order (s)</b>	Black Vertosol
<b>Total area (ha)</b>	109

**Table 3-93: Soil Profile Morphology Summary Map Unit 13**

<div>Site 6-SCL</div>										
	Horizon Depth (m), Boundar-y (Bdy)	Field Texture	Structure Strength	Inclusions Segregatio-n s	Colour, Mottle, Bleaching	Moisture Drainage	Roots	Depth (m) / Field pH / EC dS/m	Samples (m)	Observati- ons
	A1 0.00 – 0.15 Abrupt	Light clay, sandy	Weak, firm Subangular blocky, peds 10-30 mm,	Nil	10YR2/1 Black Nil mottles / bleaching	Humid, Well – moderate drained	Fine, very few	0.10 / 6.5	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil
	B21 0.15 – 0.30 Abrupt	Medium heavy clay	Weak, firm Subangular blocky, peds 20-30 mm,	Nil	10YR2/1 Black Nil mottles / bleaching	Humid, Well – moderate drained	Fine, very few	0.35 / 7.0		
	B22 0.30 – 0.80 Abrupt	Medium heavy clay	Weak to moderate, very firm Subangular blocky, peds 20-30 mm,	<5% calcium carbonate	10YR2/1 Black Nil mottles / bleaching	Humid, Well – moderate drained	Fine, very few	0.60 / 7.0		
B23 0.80 – 1.00 EOBH	Medium heavy clay, sandy	Weak to moderate, very firm Subangular blocky, peds 40-60 mm,	Nil	10YR4/2 Dark greyish brown Nil mottles / bleaching	Humid, Well – moderate drained	Nil roots	0.90 / 7.5			

**Table 3-94: Sites Particle Size Analysis Texture Assessment**

<b>Site</b>	<b>Sample Depth / Horizon (m approx.) Texture (PSA / Ternary Soil Texture Chart)</b>				
	<b>0.00-0.10</b>	<b>0.20-0.30</b>	<b>0.50-0.60</b>	<b>0.80-0.90</b>	<b>0.90-1.00</b>
6-SCL	Medium clay	Light medium clay	Medium clay	Medium clay	Light clay
7-SCL	Light clay	Light clay	Medium clay	Sandy clay	Light medium clay
100-SCL	Medium clay	Medium clay	Medium heavy clay	Medium heavy clay	Medium clay



**Table 3-95: Soil Chemistry Results for Detailed Site 6-SCL**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.60	0.77-0.87	0.90-1.00
Soil pH	7.88	8.43	8.61	8.55	8.72
Soil Cl (mg/kg)	22	117	626	1042	917
PSA-Sand (>20µm %)	38.2	52.4	43.2	41.5	54.3
PSA-Fine Silt (2-20µm %)	13.6	5.9	7.3	9.0	8.9
PSA-Clay (<2µm%)	48.2	41.6	49.5	49.5	36.8
CEC (meq/100g)	36.65	34.09	34.70	37.27	28.91
ESP (%NaCEC)	0.6	4.3	11.8	15.5	15.2
Ca/Mg (ratio)	2.3	1.8	1.1	1.0	1.0

**Table 3-96: Soil Chemistry Results for Detailed Site 7-SCL**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.60	0.80-0.90	0.90-1.00
Soil pH	7.47	9.05	9.18	9.16	9.16
Soil Cl (mg/kg)	10	29	232	354	417
PSA-Sand (>20µm %)	54.8	51.9	40.2	59.9	46.8
PSA-Fine Silt (2-20µm %)	9.8	8.4	13.8	6.6	12.0
PSA-Clay (<2µm%)	35.5	39.6	46.0	33.5	41.1
15 Bar (%)	19	24	26	20	21
CEC (meq/100g)	27.53	25.76	32.45	34.30	27.51
ESP (%NaCEC)	0.5	0.5	8.8	15.6	16.0
Ca/Mg (ratio)	3.2	3.2	1.3	1.0	1.0

**Table 3-97: Soil Chemistry Results for Detailed Site 100-SCL**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.60	0.80-0.90	0.90-1.00
Soil pH	7.92	8.44	8.60	8.53	8.63
Soil Cl (mg/kg)	8	57	244	467	449
PSA-Sand (>20µm %)	48.3	45.9	42.6	34.9	34.9
PSA-Fine Silt (2-20µm %)	9.2	12.7	11.6	9.8	14.2
PSA-Clay (<2µm%)	42.5	41.4	45.8	55.3	50.9
CEC (meq/100g)	29.18	33.32	38.02	37.41	36.61
ESP (%NaCEC)	0.8	4.8	10.0	11.6	10.5
Ca/Mg (ratio)	2.1	2.5	1.8	1.5	1.6

### 3.14 Map Unit 14

#### **Overview**

Map Unit 14 consists of a sandy loams over red clay subsoils on cleared gently undulating plains. This map unit is in the centre, south area of the project site and covers an area of 27 ha.

#### **Observation Sites**

A total of 8 observation sites were identified within the Map Unit 14 and are summarised in Table 3-98. Density of sites in the map unit exceeds minimum density for western cropping zone as outlined in RPI 08/14 at one site per 2 ha.

**Table 3-98: Observation Sites for Map Unit 14**

Observation Sites	
Check	Detailed ( <i>analysed</i> )
6	5 (3)

A land summary of detailed Site 10-SCL for the map unit is presented in Table 3-99, soil profile description in Table 3-100 and detailed site descriptions are presented in Appendix A.

Three representative detailed sites, Site 10-SCL, Site N41 and Site N42, were selected as to undergo chemical analysis. The soil particle size analysis (PSA) was assessed against the Marshall soil texture chart (NCST, 2009) and soil chemistry results for the three selected detailed sites are presented in Tables 3-101 to 3-104.


#### **Map Unit Observations**

No further observations were made regarding the SCL assessment of the map unit.

**Table 3-99: Map Unit 14**

Item	Description
<b>Representative Site</b>	10-SCL
<b>Representative Site photograph</b>	
<b>Location</b>	642525mE 7510097mN
<b>Current Use</b>	Grazing
<b>Site survey type</b>	Detailed, 50 mm hand auger.
<b>Vegetation</b>	Buffel Grass
<b>Disturbance</b>	Extensive disturbance
<b>Landform element /pattern</b>	Very gently undulating plain, Mid-slope
<b>Micro relief</b>	Nil microrelief
<b>Erosion</b>	Nil erosion
<b>Slope (%)</b>	2.0/1.0
<b>Drainage</b>	Moderate
<b>Surface coarse fragments</b>	Nil coarse fragments
<b>Surface condition</b>	Soft
<b>ASC Order (s)</b>	Red Chromosol
<b>Total area (ha)</b>	27

**Table 3-100: Soil Profile Morphology Summary Map Unit 14**

Site 10-SCL									
	Horizon Depth (m), Boundar -y (Bdy)	Field Texture	Structure Strength	Inclusions Segregatio- ns	Colour, Mottle, Bleaching	Moisture Drainage	Roots	Depth (m) / Field pH / EC dS/m	Samples (m)
A1 0.00-0.13 Abrupt	Sandy clay	Moderate, firm, <10mm sub- angular	<1% calcium carbonate nodules	10YR3/2 Very dark greyish brown Nil mottles/ bleach	Dry, moderate	Few, fine	0.10 / 7.0	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	First borehole, 0.20 mbgl Second borehole 0.40 mbgl Refusal likely due to roots, no physical barrier
A2 0.13-0.39 Abrupt	Light sandy clay	Moderate, firm, <10mm sub- angular	Nil	10YR3/3 Dark Brown Nil mottles/ bleach	Dry, moderate	Few, fine	0.30 / 7.0		
B21 0.39-0.84 Abrupt	Light sandy clay	Moderate, firm, <10mm sub- angular	<10% calcium carbonate nodules	5YR4/4 Reddish brown Nil mottles /bleach	Dry, moderate	Few, fine	0.60 / 7.5		
B22 0.84-1.00 EOBH	Light clay	Moderate, firm, <10mm sub- angular	<2% calcium carbonate nodules	10YR4/4 Dark yellowish brown Nil mottles/ bleach	Dry, moderate	Very few, very fine	0.90 / 8.5		

**Table 3-101: Sites Particle Size Analysis Texture Assessment**

Site	Sample Depth / Horizon (m approx.) Texture (PSA / Ternary Soil Texture Chart)				
	0.00-0.10	0.20-0.30	0.50-0.60	0.80-0.90	0.90-1.00
10-SCL	Sandy loam	Loam	Clay loam	Clay loam	Clay loam
N41	Sandy clay loam	Sandy clay	Clay loam	Sandy loam	Light clay
N42	Sandy loam	Light clay	Light clay	Light clay	Light clay

**Table 3-102: Soil Chemistry Results for Detailed Site 10-SCL**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.60	0.70-0.80	0.90-1.00
Soil pH	7.22	7.28	8.21	8.40	8.56
Soil Cl (mg/kg)	13	11	14	25	73
PSA-Sand (>20µm %)	75.1	67.5	67.3	59.0	49.3
PSA-Fine Silt (2-20µm %)	8.1	11.9	9.8	16.6	21.1
PSA-Clay (<2µm%)	16.8	20.5	22.9	24.4	29.5
15 Bar (%)	16	13	14	15	17

**Table 3-103: Soil Chemistry Results for Detailed Site N41**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.60	0.80-0.90	0.90-1.00
Soil pH	7.27	7.70	7.95	8.28	8.51
Soil Cl (mg/kg)	9	9	9	12	17
PSA-Sand (>20µm %)	71	63	53	81	55
PSA-Fine Silt (2-20µm %)	6	4	13	3	10
PSA-Clay (<2µm%)	23	33	34	15	35
CEC (meq/100g)	14.90	11.44	11.63	13.31	16.35
ESP (%NaCEC)	1.1	0.8	1.9	3.1	2.3
Ca/Mg (ratio)	2.0	1.6	1.2	1.0	1.1

**Table 3-104: Soil Chemistry Results for Detailed Site N42**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.60	0.80-0.90	0.90-1.00
Soil pH	7.02	7.79	7.97	8.32	8.80
Soil Cl (mg/kg)	8	9	7	12	21
PSA-Sand (>20µm %)	77	59	61	57	56
PSA-Fine Silt (2-20µm %)	5	6	2	6	6
PSA-Clay (<2µm%)	19	35	37	37	38
15 Bar (%)	12	15	16	18	18
CEC (meq/100g)	13.23	12.92	10.81	12.95	18.45
ESP (%NaCEC)	0.4	0.4	1.4	2.7	3.0
Ca/Mg (ratio)	2.3	1.8	1.3	1.1	1.0

### 3.15 Map Unit 15

#### **Overview**

Map Unit 15 consists of a dark uniform to gradational clay soils on lower sloped plains. This map unit is in the central east portion of the project site and covers an area within the SCL trigger map of 107.7 ha.

#### **Observation Sites**

A total of 5 observation sites were completed within this map unit and are summarised in Table 3-105. Density of sites in the map unit exceeds minimum density for western cropping zone as outlined in RPI 08/14 at one site per 21.54 ha.

**Table 3-105: Observation Sites for Map Unit 15**

Observation Sites	
Check	Detailed ( <i>analysed</i> )
2	3 (3)

A land summary of detailed Site N38 is presented in Table 3-106, soil profile description in Table 3-107 and detailed site descriptions are presented in Appendix A.


Three representative detailed sites, Site N38, Site N39 and Site N40, were selected to undergo chemical analysis for Map Unit 15. The soil particle size analysis (PSA) was assessed against the Marshall soil texture chart (NCST, 2009) and soil chemistry results for the three selected detailed sites are presented in Tables 3-108 to 3-111.

#### **Map Unit Observations**


No further observations were made regarding the SCL assessment of the map unit.



**Table 3-106: Map Unit 15**

Item	Description
<b>Representative Site</b>	N38
<b>Representative Site photograph</b>	
<b>Location</b>	645726mE 7510395mN
<b>Current Use</b>	Grazing
<b>Site survey type</b>	Detailed - 50mm hand auger
<b>Vegetation</b>	Mixed vegetation, eucalyptus species,
<b>Disturbance</b>	Semi disturbed
<b>Landform element / pattern</b>	GUP Lower slope to depression
<b>Micro relief</b>	Nil microrelief
<b>Erosion</b>	Nil erosion
<b>Slope (%)</b>	1% / 2%
<b>Drainage</b>	Well to well-moderate drained
<b>Surface coarse fragments</b>	<2% coarse fragments <5mm
<b>Surface condition</b>	Crust
<b>ASC Order (s)</b>	Black Vertosol
<b>Total area (ha)</b>	107.7

**Table 3-107: Soil Profile Morphology Summary Map Unit 15**

Site N38										
	Horizon Depth (m), Boundary (Bdy)	Field Texture	Structure Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture Drainage	Roots	Depth (m) / Field pH / EC dS/m	Samples (m)	Observations
A11 0.0 – 0.12 Abrupt	Light clay	Moderate, firm, sub-angular <20 mm	Nil	10YR3/2 Nil mottles / bleaching	Dry, well drained	Present	0.10 / 7.0	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.9-1.00	Nil	
B21 0.12 – 0.90 Abrupt	Medium clay	Moderate-strong, strong, sub-angular <20 mm	Nil	10YR3/2 Nil mottles / bleaching	Dry, well-moderate drained	Present	0.30 / 7.5 0.60 / 7.5			
B22 0.90 – 1.00 EOBH	Medium clay	Moderate-strong, strong, sub-angular <20 mm	<2% calcium carbonate	10YR3/2 Nil mottles / bleaching	Dry, well-moderate drained	Present	0.90 / 8.0			

**Table 3-108: Sites Particle Size Analysis Texture Assessment**

Site	Sample Depth / Horizon (m approx.) Texture (PSA / Ternary Soil Texture Chart)				
	0.00-0.10	0.20-0.30	0.50-0.60	0.80-0.90	0.90-1.00
N38	Light medium clay	Light medium clay	Light clay	Light clay	Light medium clay
N39	Light medium clay	Medium clay	Sandy clay	Medium clay	Light clay
N40	Light medium clay	Light clay	Light medium clay	Medium clay	Medium clay

**Table 3-109: Soil Chemistry Results for Detailed Site N38**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.60	0.77-0.87	0.90-1.00
Soil pH	8.03	7.72	8.04	8.59	8.59
Soil Cl (mg/kg)	37	68	221	640	802
PSA-Sand (>20µm %)	60	57	58	53	54
PSA-Fine Silt (2-20µm %)	4	2	5	8	4
PSA-Clay (<2µm%)	36	41	37	40	43

**Table 3-110: Soil Chemistry Results for Detailed Site N39**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.60	0.80-0.90	0.90-1.00
Soil pH	7.69	7.90	8.49	8.75	8.74
Soil Cl (mg/kg)	18	33	220	534	562
PSA-Sand (>20µm %)	52	45	60	51	57
PSA-Fine Silt (2-20µm %)	7	9	8	3	6
PSA-Clay (<2µm%)	41	46	32	46	37

**Table 3-111: Soil Chemistry Results for Detailed Site N40**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.60	0.80-0.90	0.90-1.00
Soil pH	7.92	8.76	9.04	8.98	8.80
Soil Cl (mg/kg)	8	11	107	384	669
PSA-Sand (>20µm %)	49	50	46	46	41
PSA-Fine Silt (2-20µm %)	8	9	9	7	11
PSA-Clay (<2µm%)	43	40	45	47	48

### 3.16 Map Unit 16

#### **Overview**

Map Unit 16 consists of dark brown clay soils with gilgai microrelief on gently undulating plains of mixed regrowth. This map unit is in the south-west portion of the project site and covers an area within the SCL trigger map of 383.0 ha.

#### **Observation Sites**

A total of 8 observation sites were completed within this map unit and are summarised in Table 3-112. Density of sites in the map unit exceeds minimum density for western cropping zone as outlined in RPI 08/14 at one site per 47.87 ha.

**Table 3-112: Observation Sites for Map Unit 16**

Observation Sites	
Check	Detailed ( <i>analysed</i> )
4	4 (3)

A land summary of detailed Site 5\_SCL is presented in Table 3-113, soil profile description in Table 3-114 and detailed site descriptions are presented in Appendix A.


Three representative detailed sites, Site 5-SCL, Site 102-SCL and Site 103-SCL, were selected to undergo chemical analysis for with two soil profiles for each (Mound [M] and Depression [D]) were analysed. The soil particle size analysis (PSA) was assessed against the Marshall soil texture chart (NCST, 2009) and soil chemistry results for the three selected detailed sites are presented in Tables 3-115 to 3-121.

#### **Map Unit Observations**


No further observations were made regarding the SCL assessment of the map unit.



**Table 3-113: Map Unit 16**

Item	Description
<b>Representative Site</b>	5-SCL-M (Mound)
<b>Representative Site photograph</b>	
<b>Location</b>	641663mE 7508746mN
<b>Current Use</b>	Grazing
<b>Site survey type</b>	Detailed - 50mm hand auger
<b>Vegetation</b>	Grasses
<b>Disturbance</b>	Extensively disturbed
<b>Landform element / pattern</b>	Gently undulating plain, mid-slope
<b>Micro relief</b>	Gilgai microrelief present 40% coverage
<b>Erosion</b>	Nil erosion
<b>Slope (%)</b>	2% / 1%
<b>Drainage</b>	Well to moderately drained
<b>Surface coarse fragments</b>	Nil coarse fragments
<b>Surface condition</b>	Self-mulching with cracking
<b>ASC Order (s)</b>	Black Vertosol
<b>Total area (ha)</b>	383.0

**Table 3-114: Soil Profile Morphology Summary Map Unit 16**

Site 5-SCL-M										
	Horizon Depth (m), Boundar -y (Bdy)	Field Texture	Structure Strength	Inclusions Segregatio- ns	Colour, Mottle, Bleaching	Moisture Drainage	Roots	Depth (m) / Field pH / EC dS/m	Samples (m)	Observati -ons
	A1 0.00-0.12 Abrupt	Light clay	Moderate, soft <20mm sub- angular	Nil	10YR2/1 Nil mottle / bleaching	Humid, Well drained	Comm on, mediu m	0.10 / 6.5	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil
	B21 0.12-0.60 Abrupt	Medium heavy clay	Moderate, Firm <30mm sub- angular	Nil	10YR3/1 Nil mottle / bleaching	Humid, Well drained	Few, mediu m	0.30 / 7.0		
B22 0.60-1.00 EOBH	Medium heavy clay	Moderate, Firm <30mm sub- angular	<2% Calcium carbonate	10YR3/1 Nil mottle / bleaching	Humid, Well - moderate drained	Few, fine	0.10 / 7.0			

**Table 3-115: Sites Particle Size Analysis Texture Assessment**

Site	Sample Depth / Horizon (m approx.) Texture (PSA / Ternary Soil Texture Chart)				
	0.00-0.10	0.20-0.30	0.50-0.60	0.80-0.90	0.90-1.00
5-SCL (Mound)	Medium clay	Medium clay	Medium clay	Medium heavy clay	Medium heavy clay
5-SCL (Depression)	Medium clay	Medium heavy clay	Medium heavy clay	Heavy clay	Heavy clay
102-SCL (Mound)	Medium clay	Medium heavy clay	Medium heavy clay	Medium heavy clay	Medium heavy clay
102-SCL (Depression)	Sandy clay	Light clay	Light medium clay	Medium clay	Medium clay
103-SCL (Mound)	Medium clay	Medium clay	Medium clay	Medium clay	Medium clay
103-SCL (Depression)	Light clay	Light clay	Light clay	Light clay	Light clay



**Table 3-116: Soil Chemistry Results for Detailed Site 5-SCL-M (Mound)**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.60	0.80-0.90	0.90-1.00
Soil pH	8.19	8.38	8.40	8.53	8.55
Soil Cl (mg/kg)	15	17	16	19	39
PSA-Sand (>20µm %)	37.0	35.7	36.9	32.7	35.6
PSA-Fine Silt (2-20µm %)	10.4	9.2	9.3	8.0	7.5
PSA-Clay (<2µm%)	52.6	55.1	53.8	59.2	56.9

**Table 3-117: Soil Chemistry Results for Detailed Site 5-SCL-D (Depression)**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.60	0.80-0.90	0.90-1.00
Soil pH	8.19	8.38	8.40	8.53	8.55
Soil Cl (mg/kg)	15	17	16	19	39
PSA-Sand (>20µm %)	37.0	35.7	36.9	32.7	35.6
PSA-Fine Silt (2-20µm %)	10.4	9.2	9.3	8.0	7.5
PSA-Clay (<2µm%)	52.6	55.1	53.8	59.2	56.9

**Table 3-118: Soil Chemistry Results for Detailed Site 102-SCL-M (Mound)**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.60	0.80-0.90	0.90-1.00
Soil pH	7.33	8.23	8.81	8.98	8.92
Soil Cl (mg/kg)	10	16	23	74	151
PSA-Sand (>20µm %)	64.	54.3	50.4	47.7	36.6
PSA-Fine Silt (2-20µm %)	6.4	7.6	8.3	7.2	15.7
PSA-Clay (<2µm%)	29.0	38.1	41.4	45.1	47.7

**Table 3-119: Soil Chemistry Results for Detailed Site 102-SCL-D (Depression)**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.60	0.80-0.90	0.90-1.00
Soil pH	7.56	8.19	8.80	8.74	8.54
Soil Cl (mg/kg)	24	32	95	230	426
PSA-Sand (>20µm %)	43.2	31.5	32.5	30.5	32.4
PSA-Fine Silt (2-20µm %)	11.2	11.2	8.0	10.2	8.5
PSA-Clay (<2µm%)	45.6	57.3	59.4	59.2	59.1

**Table 3-120: Soil Chemistry Results for Detailed Site 103-SCL-M (Mound)**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.60	0.80-0.90	0.90-1.00
Soil pH	8.65	8.36	9.20	9.15	9.09
Soil Cl (mg/kg)	11	78	174	485	665
PSA-Sand (>20µm %)	57.3	55.7	57.7	59.2	55.6
PSA-Fine Silt (2-20µm %)	7.3	5.6	4.1	7.4	6.2
PSA-Clay (<2µm%)	35.4	38.8	38.2	33.4	38.2

**Table 3-121: Soil Chemistry Results for Detailed Site 103-SCL-D (Depression)**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.60	0.80-0.90	0.90-1.00
Soil pH	7.11	7.90	7.80	6.99	6.28
Soil Cl (mg/kg)	11	53	463	818	821
PSA-Sand (>20µm %)	33.7	29.8	28.4	32.2	36.9
PSA-Fine Silt (2-20µm %)	16.4	13.1	13.0	12.3	12.0
PSA-Clay (<2µm%)	49.8	57.1	58.6	55.5	51.1

### 3.17 Map Unit 17

#### **Overview**

Map Unit 17 consists of dark cracking clays with cropping on undulating plains. This map unit is in the southern area of the project site and covers an area of 495.5 ha.

#### **Observation Sites**

A total of 11 observation sites were identified within Map Unit 17 and summarised in Table 3-122. Density of sites in the map unit exceeds minimum density for western cropping zone as outlined in RPI 08/14 at one site per 45.05 ha.

**Table 3-122: Observation Sites for Map Unit 17**

Observation Sites	
Check	Detailed ( <i>analysed</i> )
7	4 (3)

A land summary of detailed Site 4-SCL is presented in Table 3-123, soil profile description in Table 3-124 and detailed site descriptions are presented in Appendix A.

Three representative detailed sites, Site 4-SCL, Site 110-SCL and Site 115-SCL, were selected to undergo chemical analysis. The soil particle size analysis (PSA) was assessed against the Marshall soil texture chart (NCST, 2009) and soil chemistry results for the three selected detailed sites are presented in Tables 3-125 to 3-128.


#### **Map Unit Observations**

No further observations were made regarding the SCL assessment of the map unit.

**Table 3-123: Map Unit 17**

Item	Description
<b>Representative Site</b>	4-SCL
<b>Representative Site photograph</b>	
<b>Location</b>	643527mE 7507664mN
<b>Current Use</b>	Grazing
<b>Site survey type</b>	Detailed, 50 mm hand auger.
<b>Vegetation</b>	Cleared, very sparse mixed regrowth
<b>Disturbance</b>	Semi-Cleared
<b>Landform element /pattern</b>	Very gently undulating plains, mid-slope
<b>Micro relief</b>	Nil microrelief
<b>Erosion</b>	Nil erosion
<b>Slope (%)</b>	<1.0/1.0
<b>Drainage</b>	Moderate/imperfect
<b>Surface coarse fragments</b>	Nil coarse fragments
<b>Surface condition</b>	Cracking, self-mulching
<b>ASC Order (s)</b>	Black Vertosol
<b>Total area (ha)</b>	495.5

**Table 3-124: Soil Profile Morphology Summary Map Unit 17**

Site 4-SCL									
	Horizon Depth (m), Boundar -y (Bdy)	Field Texture	Structure Strength	Inclusions Segregatio- ns	Colour, Mottle, Bleaching	Moisture Drainage	Roots	Depth (m) / Field pH / EC dS/m	Samples (m)
A1 0.00-0.14 Abrupt	Light clay	Weak, firm, <10mm sub- angular	Nil inclusion or segregation s	10YR3/2 Very dark greyish brown Nil mottles/ble ach	Dry, moderate	Fine, few	0.10 / 6.5	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil
B21 0.14-0.90 Abrupt	Medium clay	Moderate, firm <40% 20- 60mm, <20% 60- 100 sub- angular blocky peds	<1% calcium carbonate nodules	10YR3/2 Very dark greyish brown Nil mottles/ble ach	Dry, moderate	Very fine, very few	0.30 / 6.5 0.60 / 7.5		
B22 0.90-1.00 EOBH	Medium clay	Moderate, firm <40% 20- 60mm, <20% 60- 100 sub- angular blocky peds	2% calcium carbonate nodules	10YR4/2 Dark greyish brown Mottles 2% 10YR3/2 Very dark greyish brown Nil bleach	Dry, Imperfect	Very fine, very few	0.90 / 8.0		

**Table 3-125: Sites Particle Size Analysis Texture Assessment**

Site	Sample Depth / Horizon (m approx.) Texture (PSA / Ternary Soil Texture Chart)				
	0.00-0.10	0.20-0.30	0.50-0.60	0.80-0.90	0.90-1.00
4-SCL	Medium clay	Medium clay	Medium clay	Medium clay	Silty clay loam
110-SCL	Light clay	Medium clay	Medium clay	Medium clay	Loam
115-SCL	Clay loam	Light clay	Medium clay	Light clay	Medium clay

**Table 3-126: Soil Chemistry Results for Detailed Site 4-SCL**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.60	0.70-0.80	0.90-1.00
Soil pH	7.74	8.82	8.82	8.60	8.65
Soil Cl (mg/kg)	7	13	124	419	799
PSA-Sand (>20µm %)	36.5	28.6	30.3	32.9	36.7
PSA-Fine Silt (2-20µm %)	16.6	23.4	20.7	20.3	25.2
PSA-Clay (<2µm%)	46.8	48.0	49.0	46.8	38.1
15 Bar (%)	28	32	32	33	30

**Table 3-127: Soil Chemistry Results for Detailed Site 110-SCL**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.60	0.70-0.80	0.90-1.00
Soil pH	7.30	7.93	8.83	8.91	9.04
Soil Cl (mg/kg)	27	12	39	72	47
PSA-Sand (>20µm %)	56.3	43.4	36.6	28.8	55.5
PSA-Fine Silt (2-20µm %)	6.5	9.3	5.4	25.4	23.0
PSA-Clay (<2µm%)	37.2	47.3	58.0	45.8	21.5
15 Bar (%)	22	28	30	33	33

**Table 3-128: Soil Chemistry Results for Detailed Site 115-SCL**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.60	0.70-0.80	0.90-1.00
Soil pH	7.85	8.19	8.57	8.69	8.78
Soil Cl (mg/kg)	34	14	68	16	40
PSA-Sand (>20µm %)	46.1	38.7	44.1	36.2	38.9
PSA-Fine Silt (2-20µm %)	17.1	19.5	6.4	19.0	7.5
PSA-Clay (<2µm%)	36.8	41.8	49.6	44.7	53.7
15 Bar (%)	24	29	31	32	32



### 3.18 Map Unit 18

#### **Overview**

Map Unit 18 consists of dark gradational sandy clay loams on clays on undulating plains. This map unit is in the north to northwest area of the project site and covers an area of 91 ha.

#### **Observation Sites**

A total of 16 observation sites were identified within Map Unit 18 and summarised in Table 3-129. Density of sites in the map unit exceeds minimum density for western cropping zone as outlined in RPI 08/14 at one site per 6 ha.

**Table 3-129: Observation Sites for Map Unit 17**

Observation Sites	
Check	Detailed ( <i>analysed</i> )
9	7 (4)

A land summary of detailed Site N46 is presented in Table 3-130, soil profile description in Table 3-131 and detailed site descriptions are presented in Appendix A.

Four representative detailed sites, N26, N46, N52 and 77-SCL, were selected to undergo chemical analysis. The soil particle size analysis (PSA) was assessed against the Marshall soil texture chart (NCST, 2009) and soil chemistry results for the three selected detailed sites are presented in Tables 3-132 to 3-136.


#### **Map Unit Observations**

The extent of the compliant SCL within Map Unit 18, which includes Site 77-SCL totalled 5.6 ha, which is less than 10 ha based on surrounding check, detailed and non-SCL compliant analytical sites.

**Table 3-130: Map Unit 18**

Item	Description
<b>Representative Site</b>	N46
<b>Representative Site photograph</b>	
<b>Location</b>	641947mE 7512737mN
<b>Current Use</b>	Grazing
<b>Site survey type</b>	Detailed, 50 mm hand auger.
<b>Vegetation</b>	Spear grasses, sparse brigalow
<b>Disturbance</b>	Extensive clearing
<b>Landform element /pattern</b>	Gently undulating plains, mid-slope
<b>Micro relief</b>	Nil microrelief
<b>Erosion</b>	Nil erosion
<b>Slope (%)</b>	2.0/2.0
<b>Drainage</b>	Moderate well
<b>Surface coarse fragments</b>	Nil coarse fragments
<b>Surface condition</b>	Firm
<b>ASC Order (s)</b>	Black Dermosol
<b>Total area (ha)</b>	91

**Table 3-131: Soil Profile Morphology Summary Map Unit 18**

<b>Site N46</b>										
	<b>Horizon Depth (m), Boundar -y (Bdy)</b>	<b>Field Texture</b>	<b>Structure Strength</b>	<b>Inclusions Segregatio- ns</b>	<b>Colour, Mottle, Bleaching</b>	<b>Moisture Drainage</b>	<b>Roots</b>	<b>Depth (m) / Field pH / EC dS/m</b>	<b>Samples (m)</b>	<b>Observati -ons</b>
	A1 0.00-0.12 Clear 20- 50mm	Clay loam sandy	Moderate Firm Subangular blocky	Nil inclusions or segregations	10YR3/2 Very dark greyish brown Nil mottles or bleaching	Moderately moist Moderately well drained	Fine 1- 2mm Comm on	6.0	0.00-0.10 0.20-0.30 0.50-0.60 0.70-0.80 0.90-1.00	Nil
	B21 0.10-0.46 Clear 20- 50mm	Medium clay	Strong Very firm Angular blocky	Nil inclusions or segregations	10YR3/1 Very dark grey Nil mottles or bleaching	Moderately moist Moderately well drained	Fine 1- 2mm Comm on	7.5		
	B22 0.46-0.86 Clear 20- 50mm	Medium clay	Strong Very firm	<2% calcium carbonate 2-6mm	10YR3/1 Very dark grey Nil mottles or bleaching	Moderately moist Moderately well drained	Fine 1- 2mm Few	7.5		
	B23 0.86-1.00	Medium clay	Strong Strong	Nil inclusions or segregations	10YR4/2 Dark greyish brown Nil mottles or bleaching	Dry Moderately well drained	Fine 1- 2mm Few	7.5		

**Table 3-132: Sites Particle Size Analysis Texture Assessment**

<b>Site</b>	<b>Sample Depth (m) Texture (PSA / Ternary Soil Texture Chart)</b>				
	<b>0.00-0.10</b>	<b>0.20-0.30</b>	<b>0.50-0.60</b>	<b>0.80-0.90</b>	<b>0.90-1.00</b>
N26	Sandy clay loam	Sandy clay	Light medium clay	Light medium clay	Light clay
N46	Sandy clay loam	Light medium clay	Medium clay	Medium clay	Medium clay
N52	Sandy clay loam	Light medium clay	Medium clay	Light medium clay	Light medium clay
77-SCL	Clay Loam (marginal)	Light medium clay	Light clay	Light medium clay	Medium clay

**Table 3-133: Soil Chemistry Results for Detailed Site N26**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.60	0.80-0.90	0.90-1.00
Soil pH	8.47	8.58	8.93	9.21	8.98
Soil Cl (mg/kg)	5	19	125	252	307
PSA-Sand (>20µm %)	67.4	59.8	50.3	46.3	54.1
PSA-Fine Silt (2-20µm %)	3.0	5.2	5.4	10.0	6.7
PSA-Clay (<2µm%)	29.6	35.0	44.3	43.8	39.1
CEC (meq/100g)	26.74	30.53	37.34	42.10	34.73
ESP (%NaCEC)	0.8	5.9	15.7	19.1	18.4
Ca/Mg (ratio)	4.6	1.6	0.8	0.7	0.7

**Table 3-134: Soil Chemistry Results for Detailed Site N46**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.60	0.70-0.80	0.90-1.00
Soil pH	7.26	8.96	9.13	9.08	8.96
Soil Cl (mg/kg)	72	29	99	156	407
PSA-Sand (>20µm %)	67	49	45	36	36
PSA-Fine Silt (2-20µm %)	7	8	9	10	12
PSA-Clay (<2µm%)	26	42	46	53	52
CEC (meq/100g)	23.9	32.0	35.3	37.4	37.6
ESP (%NaCEC)	0.7	2.5	7.1	8.9	9.5
Ca/Mg (ratio)	1.9	1.2	0.7	0.7	0.6

**Table 3-135: Soil Chemistry Results for Detailed Site N52**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.60	0.70-0.80	0.90-1.00
Soil pH	7.20	9.31	9.10	8.99	8.81
Soil Cl (mg/kg)	5	41	879	807	879
PSA-Sand (>20µm %)	70	51	41	47	45
PSA-Fine Silt (2-20µm %)	7	7	10	10	8
PSA-Clay (<2µm%)	23	42	49	43	47
CEC (meq/100g)	23.1	27.3	31.4	26.3	25.6
ESP (%NaCEC)	0.7	6.1	15.3	17.4	17.5
Ca/Mg (ratio)	1.9	0.9	0.4	0.4	0.4

**Table 3-136: Soil Chemistry Results for Detailed Site 77-SCL**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.60	0.80-0.90	0.90-1.00
Soil pH	7.71	8.47	8.71	8.71	8.48
Soil Cl (mg/kg)	8	6	75	404	759
PSA-Sand (>20µm %)	61.8	52.3	58.2	46.7	44.2
PSA-Fine Silt (2-20µm %)	7.6	7.3	4.3	8.8	8.0
PSA-Clay (<2µm%)	30.6	40.4	37.6	44.5	47.7
CEC (meq/100g)	27.26	33.68	32.53	39.41	42.78
ESP (%NaCEC)	0.5	2.6	7.7	11.9	14.2
Ca/Mg (ratio)	3.2	2.2	1.3	1.0	0.9

### 3.19 Map Unit 19

#### **Overview**

Map Unit 19 consists of dark self-mulching clay soil on undulating plains. This map unit is in the north area of the project site and covers an area of 18 ha.

#### **Observation Sites**

A total of 16 observation sites were identified within Map Unit 18 and summarised in Table 3-137. Density of sites in the map unit exceeds minimum density for western cropping zone as outlined in RPI 08/14 at one site per 3 ha.

**Table 3-137: Observation Sites for Map Unit 17**

Observation Sites	
Check	Detailed ( <i>analysed</i> )
4	3 (3)

A land summary of detailed Site N57 is presented in Table 3-138, soil profile description in Table 3-139 and detailed site descriptions are presented in Appendix A.

Three representative detailed sites, N47, N49 and N57, were selected to undergo chemical analysis. The soil particle size analysis (PSA) was assessed against the Marshall soil texture chart (NCST, 2009) and soil chemistry results for the three selected detailed sites are presented in Tables 3-140 to 3-143.

#### **Map Unit Observations**


No further observations were made regarding the SCL assessment of the map unit.



**Table 3-138: Map Unit 19**

Item	Description
<b>Representative Site</b>	N57
<b>Representative Site photograph</b>	
<b>Location</b>	641884 mE 7513451mN
<b>Current Use</b>	Grazing
<b>Site survey type</b>	Detailed, 50 mm hand auger.
<b>Vegetation</b>	Sparse brigalow nearby
<b>Disturbance</b>	Extensive clearing
<b>Landform element /pattern</b>	Gently undulating plains, mid-slope
<b>Micro relief</b>	Nil microrelief
<b>Erosion</b>	Nil erosion
<b>Slope (%)</b>	1.0/1.0
<b>Drainage</b>	Moderate well
<b>Surface coarse fragments</b>	Nil coarse fragments
<b>Surface condition</b>	Self-mulching
<b>ASC Order (s)</b>	Black Self mulching Vertosol
<b>Total area (ha)</b>	18

**Table 3-139: Soil Profile Morphology Summary Map Unit 19**

Site N57									
	Horizon Depth (m), Boundar -y (Bdy)	Field Texture	Structure Strength	Inclusions Segregatio -ns	Colour, Mottle, Bleaching	Moisture Drainage	Roots	Depth (m) / Field pH / EC dS/m	Samples (m)
A1 0.00-0.10 Abrupt 5-20mm	Light clay	Moderate Firm Angular blocky	Nil inclusions or segregations	10YR2/1 Black Nil mottles or bleaching	Moist Well drained	Fine 1- 2mm Few	7.0	0.00-0.10 0.20-0.30 0.50-0.60 0.70-0.80 0.90-1.00	Nil
B21 0.10-0.50 Gradual 50- 100mm	Medium clay	Moderate Strong Subangular blocky	<2% calcium carbonate	10YR3/1 Very dark grey Nil mottles or bleaching	Dry Moderate well drained	Very fine <1mm Few	8.5		
B22 0.50-0.85 Clear 20- 50mm	Medium heavy clay	Moderate Strong Subangular blocky	Nil inclusions or segregations	10YR3/1 Very dark grey Nil mottles or bleaching	Dry Moderate well drained	Nil roots	8.5		
B23 0.85-1.00 EOBH	Medium heavy clay	Moderate Strong Subangular blocky	Nil inclusions or segregations	10YR4/3 Brown Nil mottles or bleaching	Dry Moderate well drained	Nil roots	6.5		

**Table 3-140: Sites Particle Size Analysis Texture Assessment**

Site	Sample Depth (m) Texture (PSA / Ternary Soil Texture Chart)				
	0.00-0.10	0.20-0.30	0.50-0.60	0.80-0.90	0.90-1.00
N47	Medium Clay	Medium Clay	Medium Clay	Medium Clay	Medium Clay
N49	Medium Clay	Medium Clay	Medium Clay	Medium Clay	Medium heavy clay
N57	Light clay	Medium Clay	Medium Clay	Medium Clay	Medium Clay

**Table 3-141: Soil Chemistry Results for Detailed Site N47**

Analysis (Unit)	Sample Depth (m)				
	0.00-0.10	0.20-0.30	0.50-0.60	0.70-0.80	0.90-1.00
Soil pH	8.05	8.73	9.28	9.22	9.11
Soil Cl (mg/kg)	11	13	149	326	630
PSA-Sand (>20µm %)	29	45	48	50	47
PSA-Fine Silt (2-20µm %)	17	4	7	5	7
PSA-Clay (<2µm%)	54	51	45	45	47
CEC (meq/100g)	38.7	31.8	30.0	29.2	30.7
ESP (%NaCEC)	1.0	2.4	10.1	11.2	11.9
Ca/Mg (ratio)	2.4	1.5	0.6	0.5	0.5

**Table 3-142: Soil Chemistry Results for Detailed Site N49**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.60	0.70-0.80	0.90-1.00
Soil pH	7.78	9.08	9.18	9.13	9.07
Soil Cl (mg/kg)	60	41	299	414	704
PSA-Sand (>20µm %)	39	43	39	38	35
PSA-Fine Silt (2-20µm %)	14	9	9	8	9
PSA-Clay (<2µm%)	47	48	52	53	56
CEC (meq/100g)	35.4	37.5	37.4	40.2	39.0
ESP (%NaCEC)	0.8	3.8	7.1	8.3	8.5
Ca/Mg (ratio)	2.3	0.6	0.4	0.3	0.3

**Table 3-143: Soil Chemistry Results for Detailed Site N57**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.60	0.70-0.80	0.90-1.00
Soil pH	7.79	9.02	8.93	8.43	6.28
Soil Cl (mg/kg)	75	41	246	753	1003
PSA-Sand (>20µm %)	45	20	33	24	27
PSA-Fine Silt (2-20µm %)	14	12	9	12	12
PSA-Clay (<2µm%)	41	68	58	63	61
CEC (meq/100g)	32.4	40.0	33.3	34.0	31.6
ESP (%NaCEC)	0.8	4.5	9.3	12.0	11.4
Ca/Mg (ratio)	1.9	1.2	0.8	0.7	0.7

## 3.20 Map Unit 20

### Overview

Map Unit 20 consists of dark self-mulching, cracking clay soil on gently undulating lower slopes and flat plains with minor areas of microrelief. This map unit is in the north area of the project site and covers an area of 36 ha.

### Observation Sites

A total of 16 observation sites were identified within Map Unit 18 and summarised in Table 3-144. Density of sites in the map unit exceeds minimum density for western cropping zone as outlined in RPI 08/14 at one site per 4 ha.

**Table 3-144: Observation Sites for Map Unit 17**

Observation Sites	
Check	Detailed ( <i>analysed</i> )
7	3 (3)


A land summary of detailed Site N56 is presented in Table 3-145, soil profile description in Table 3-146 and detailed site descriptions are presented in Appendix A.

Three representative detailed sites, N54, N56 and N58, were selected to undergo chemical analysis. The soil particle size analysis (PSA) was assessed against the Marshall soil texture chart (NCST, 2009) and soil chemistry results for the three selected detailed sites are presented in Tables 3-147 to 3-150.

### Map Unit Observations


Microrelief observed in the map unit. The area was assessed to be less than 10 ha and is considered a sub-dominant attribute of the map unit.

**Table 3-145: Map Unit 20**

Item	Description
<b>Representative Site</b>	N56
<b>Representative Site photograph</b>	
<b>Location</b>	641970mE 7512389mN
<b>Current Use</b>	Grazing
<b>Site survey type</b>	Detailed, 50 mm hand auger.
<b>Vegetation</b>	Bull Mitchell grass
<b>Disturbance</b>	Complete clearing, not cultivated
<b>Landform element /pattern</b>	Gently undulating plains, flat
<b>Micro relief</b>	Nil microrelief
<b>Erosion</b>	Nil erosion
<b>Slope (%)</b>	1.0/1.0
<b>Drainage</b>	Moderate well
<b>Surface coarse fragments</b>	Nil coarse fragments
<b>Surface condition</b>	Self-mulching
<b>ASC Order (s)</b>	Black Self mulching Vertosol
<b>Total area (ha)</b>	36



**Table 3-146: Soil Profile Morphology Summary Map Unit 20**

<b>Site N56</b>										
	<b>Horizon Depth (m), Boundar -y (Bdy)</b>	<b>Field Texture</b>	<b>Structure Strength</b>	<b>Inclusions Segregatio -ns</b>	<b>Colour, Mottle, Bleaching</b>	<b>Moisture Drainage</b>	<b>Roots</b>	<b>Depth (m) / Field pH / EC dS/m</b>	<b>Samples (m)</b>	<b>Observati -ons</b>
	A1 0.00-0.10 Clear 20- 50mm	Light clay	Moderate Firm	Nil inclusions or segregations	10YR3/1 Very dark grey Nil mottles or bleaching	Moderately moist Moderately well drained	Fine 1- 2mm Few	6.5	0.00-0.10 0.20-0.30 0.50-0.60 0.70-0.80 0.90-1.00	Nil
	B21 0.10-0.65 Clear 20- 50mm	Medium clay	Strong Very firm	<2% coarse fragments 6-20mm	10YR3/2 Very dark greyish brown Nil mottles or bleaching	Moderately moist Moderately well drained	Fine 1- 2mm Few	7.5		
	B22 0.68-0.85 Clear 20- 50mm	Medium heavy clay	Strong Very firm	Nil inclusions or segregations	10YR4/2 Dark greyish brown Nil mottles or bleaching	Dry Moderately well drained	Fine 1- 2mm Few	7.5		
B22 0.85-1.00 EOBH	Medium heavy clay	Strong Very firm	Nil inclusions or segregations	10YR4/3 Brown Nil mottles or bleaching	Dry Moderately well drained	Fine 1- 2mm Few	7.5			

**Table 3-147: Sites Particle Size Analysis Texture Assessment**

Site	Sample Depth / Horizon (m approx.) Texture (PSA / Ternary Soil Texture Chart)				
	0.00-0.10	0.20-0.30	0.50-0.60	0.70-0.80	0.90-1.00
N54	Medium clay	Medium clay	Medium heavy clay	Medium heavy clay	Medium heavy clay
N56	Light clay	Medium clay	Medium clay	Medium heavy clay	Medium clay
N58	Medium clay	Light medium clay	Medium clay	Medium clay	Medium clay



**Table 3-148: Soil Chemistry Results for Detailed Site N54**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.60	0.70-0.80	0.90-1.00
Soil pH	7.20	8.92	8.98	8.71	8.40
Soil Cl (mg/kg)	11	34	258	831	1002
PSA-Sand (>20µm %)	42	41	17	25	27
PSA-Fine Silt (2-20µm %)	11	6	12	13	12
PSA-Clay (<2µm%)	47	53	71	61	61
CEC (meq/100g)	37.2	40.0	42.7	29.9	31.8
ESP (%NaCEC)	1.0	4.5	10.4	11.9	12.6
Ca/Mg (ratio)	1.6	1.3	0.7	0.7	0.7

**Table 3-149: Soil Chemistry Results for Detailed Site N56**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.60	0.70-0.80	0.90-1.00
Soil pH	7.59	9.11	9.03	8.94	8.81
Soil Cl (mg/kg)	97	40	302	696	919
PSA-Sand (>20µm %)	47	37	37	35	36
PSA-Fine Silt (2-20µm %)	11	10	10	9	10
PSA-Clay (<2µm%)	42	53	53	56	54
CEC (meq/100g)	32.7	37.5	39.5	38.6	41.1
ESP (%NaCEC)	0.9	6.0	11.5	12.2	13.1
Ca/Mg (ratio)	2.1	0.9	0.7	0.7	0.6

**Table 3-150: Soil Chemistry Results for Detailed Site N58**

	Sample Depth (m)				
Analysis (Unit)	0.00-0.10	0.20-0.30	0.50-0.60	0.66-0.76	0.90-1.00
Soil pH	7.82	8.79	9.12	9.00	8.97
Soil Cl (mg/kg)	6	22	72	153	175
PSA-Sand (>20µm %)	35	47	43	40	30
PSA-Fine Silt (2-20µm %)	13	10	9	12	15
PSA-Clay (<2µm%)	51	43	48	48	55
CEC (meq/100g)	29.7	36.6	35.4	37.7	43.4
ESP (%NaCEC)	0.5	1.8	6.0	7.8	9.6
Ca/Mg (ratio)	1.7	1.4	0.8	0.7	0.6

## 4 SCL ASSESSMENT

The SCL map units were assessed against the SCL criteria for the SCA's Western Cropping Zone. The findings of the SCL assessment are summarised in Table 4-1.

**Table 4-1: SCL Assessment of Map Units**

Map Unit	SCL Criteria Exceedances	SCL Status
1	pH – Sites N6-SCL, N7-SCL and N8-SCL	Not SCL
2	pH – Sites N17, N18 and N19	Not SCL
3	No SCL criteria exceedances reported	Likely SCL
4	pH – Sites N21 and N22. Chemical limitation for SWS – Site N20	Not SCL
5	pH – Sites N4-SCL, N5-SCL and N9-SCL	Not SCL
6	pH – Sites N26, N27, N32 and 80-SCL SWS – Site 91-SCL	Not SCL
7	No SCL criteria exceedances reported	Likely SCL
8	No SCL criteria exceedances reported	Likely SCL
9	No SCL criteria exceedances reported	Likely SCL
10	pH – Sites N28 and N43	Not SCL
11	pH – Sites N23, N24 and N25	Not SCL
12	No SCL criteria exceedances reported	Likely SCL
13	pH – Site 7-SCL Remaining two sites have no SCL criteria exceedances reported	Likely SCL
14	SWS – Site 10-SCL, N41 and N42	Not SCL
15	No SCL criteria exceedances reported	Likely SCL
16	No SCL criteria exceedances reported	Likely SCL
17	No SCL criteria exceedances reported	Likely SCL
18	pH – Sites N26, N46 and N52	Not SCL
19	No SCL criteria exceedances reported	Likely SCL
20	SWS – Marginal results Site N54 Remaining two sites have no SCL criteria exceedances reported	Likely SCL

This assessment shows that the map units in the project site which are not SCL. A detailed assessment of each map unit is presented in Sections 4.1 to 4.20.

## 4.1 Map Unit 1

The SCL assessment of Map Unit 1 is summarised below in Table 4-2.

**Table 4-2: SCL Assessment of Map Unit 1**

SCL Criterion	Slope	Rockiness	Gilgai	Soil Depth	Soil Wetness	Soil pH	Salinity	Soil Water Storage	SCL Status
Criterion Threshold	≤3%	≤20 rocks >60mm	<50% of gilgai >500m m depth	≥600 mm	Favourable drainage	300/600 mm within range of pH 5.1 – 8.9 inclusive	<800mg/ kg at 600mm	≥100mm to soil depth ≥1000m m	
Site N6-SCL	Pass	Pass	Pass	Pass	Pass	Exceeded (pH 8.94 at 0.50-0.60 mbgl)	Not Required	Not Required	Not SCL
Site N7-SCL	Pass	Pass	Pass	Pass	Pass	Exceeded (pH 9.15 at 0.50-0.60 mbgl)	Not Required	Not Required	Not SCL
Site N8-SCL	Pass	Pass	Pass	Pass	Pass	Exceeded (pH 9.37 at 0.50-0.60 mbgl)	Not Required	Not Required	Not SCL
<b>Overall</b>									<b>Not SCL</b>

Map Unit 1 exhibited limitation relating to SCL criterion soil pH.

pH levels were above pH 8.9 at 600 mm soil depth at Sites N6-SCL, N7-SCL and N8-SCL ranged from 8.94 to 9.37. These concentrations did not meet the SCL pH criterion within range pH 5.1 and pH 8.9 for rigid soils.

None of the analysed sites meet the SCL criteria, therefore Map Unit 1 is not SCL.

## 4.2 Map Unit 2

The SCL assessment of Map Unit 1 is summarised below in Table 4-3.

**Table 4-3: SCL Assessment of Map Unit 2**

SCL Criterion	Slope	Rockiness	Gilgai	Soil Depth	Soil Wetness	Soil pH	Salinity	Soil Water Storage	SCL Status
Criterion Threshold	≤3%	≤20 rocks >60mm	<50% of gilgai >500m m depth	≥600 mm	Favourable drainage	300/600 mm within range of pH 5.1 – 8.9 inclusive	<800mg/ kg at 600mm	≥100mm to soil depth ≥1000m m	
N17	Pass	Pass	Pass	Pass	Pass	Exceeded (pH 9.25 at 0.20-0.30 mbgl)	Not required	Not required	Not SCL

SCL Criterion	Slope	Rockiness	Gilgai	Soil Depth	Soil Wetness	Soil pH	Salinity	Soil Water Storage	SCL Status
Criterion Threshold	≤3%	≤20 rocks >60mm	<50% of gilgai >500m m depth	≥600 mm	Favourable drainage	300/600 mm within range of pH 5.1 – 8.9 inclusive	<800mg/kg at 600mm	≥100mm to soil depth ≥1000m m	
N18	Pass	Pass	Pass	Pass	Pass	Exceeded (pH 8.94 at 0.20-0.30 mbgl)	Not required	Not required	Not SCL
N19	Pass	Pass	Pass	Pass	Pass	Exceeded (pH 9.25 at 0.50-0.60 mbgl)	Not required	Not required	Not SCL
<b>Overall</b>									<b>Not SCL</b>

Map Unit 2 exhibited limitations relating to SCL criterion soil pH.

pH levels were above pH 8.9 at 300- and 600-mm soil depth at Sites N17, N18 and N19 from 8.94 to 9.25. These concentrations did not meet the SCL pH criterion within range pH 5.1 and pH 8.9 for rigid soils.

None of the analysed sites meet the SCL criteria, therefore Map Unit 2 is not SCL.

### 4.3 Map Unit 3

The SCL assessment of Map Unit 3 is summarised below in Table 4-4.

**Table 4-4: SCL Assessment of Map Unit 3**

SCL Criterion	Slope	Rockiness	Gilgai	Soil Depth	Soil Wetness	Soil pH	Salinity	Soil Water Storage	SCL Status
Criterion Threshold	≤3%	≤20 rocks >60mm	<50% of gilgai >500m m depth	≥600 mm	Favourable drainage	300/600 mm greater than pH 5.0	<800mg/kg at 600mm	≥100mm to soil depth ≥1000m m	
60-SCL	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Likely SCL
N15	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Likely SCL
N16	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Likely SCL
<b>Overall</b>									<b>Likely SCL</b>

Map Unit 3 did not exhibit any limitations relating to SCL criteria. All the analysed sites met the SCL criteria, therefore Map Unit 3 is likely SCL.

## 4.4 Map Unit 4

The SCL assessment of Map Unit 4 is summarised below in Table 4-5.

**Table 4-5: SCL Assessment of Map Unit 4**

SCL Criterion	Slope	Rockiness	Gilgai	Soil Depth	Soil Wetness	Soil pH	Salinity	Soil Water Storage	SCL Status
Criterion Threshold	≤3%	≤20 rocks >60mm	<50% of gilgai >500m m depth	≥600 mm	Favourable drainage	300/600 mm within range of pH 5.1 – 8.9 inclusive	<800mg/kg at 600mm	≥100mm to soil depth ≥1000m m	
N20	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Fail – Chemical limitation of pH 9.24 at 0.75-0.85 restricts PAWC	Not SCL
N21	Pass	Pass	Pass	Pass	Pass	Exceeded (pH 9.01 at 0.50-0.58 mbgl)	Not Required	Not Required	Not SCL
N22	Pass	Pass	Pass	Pass	Pass	Exceeded (pH 8.96 at 0.50-0.60 mbgl)	Not Required	Not Required	Not SCL
<b>Overall</b>									<b>Not SCL</b>

Map Unit 4 exhibited limitations relating to SCL criterion soil pH.

pH levels were above pH 8.9 at 600 mm soil depth at Sites N21 and N22 from 8.96 to 9.01. These concentrations did not meet the SCL pH criterion within range pH 5.1 and pH 8.9 for rigid soils. pH levels were above 9.0 within Site N20 at 0.75-0.85 m, indicating a chemical limitation for PAWC.

None of the analysed sites meet the SCL criteria, therefore Map Unit 4 is not SCL.

## 4.5 Map Unit 5

The SCL assessment of Map Unit 5 is summarised below in Table 4-6.

**Table 4-6: SCL Assessment of Map Unit 4**

SCL Criterion	Slope	Rockiness	Gilgai	Soil Depth	Soil Wetness	Soil pH	Salinity	Soil Water Storage	SCL Status
Criterion Threshold	≤3%	≤20 rocks >60mm	<50% of gilgai >500m m depth	≥600 mm	Favourable drainage	300/600 mm within range of pH 5.1 – 8.9 inclusive	<800mg/ kg at 600mm	≥100mm to soil depth ≥1000m m	
Site N4-SCL	Pass	Pass	Pass	Pass	Pass	Exceeded (pH 9.23 at 0.50- 0.60 mbgl)	Not required	Not required	Not SCL
Site N5-SCL	Pass	Pass	Pass	Pass	Pass	Exceeded (pH 9.03 at 0.5- 0.60 mbgl)	Not required	Not required	Not SCL
Site N9-SCL	Pass	Pass	Pass	Pass	Pass	Exceeded (pH 9.20 at 0.55- 0.65 mbgl)	Not required	Not required	Not SCL
<b>Overall</b>									<b>Not SCL</b>

Map Unit 5 exhibited limitations relating to SCL criterion soil pH.

pH levels were above pH 8.9 at 600 mm soil depth at Sites N4-SCL, N5-SCL and N9-SCL ranged from 9.03 to 9.23. These concentrations did not meet the SCL pH criterion within range pH 5.1 and pH 8.9 for rigid soils.

None of the analysed sites meet the SCL criteria, therefore Map Unit 5 is not SCL.



## 4.6 Map Unit 6

The SCL assessment of Map Unit 6 is summarised below in Table 4-7.

**Table 4-7: SCL Assessment of Map Unit 6**

SCL Criterion	Slope	Rockiness	Gilgai	Soil Depth	Soil Wetness	Soil pH	Salinity	Soil Water Storage	SCL Status
Criterion Threshold	≤3%	≤20 rocks >60mm	<50% of gilgai >500m m depth	≥600 mm	Favourable drainage	300/600 mm within range of pH 5.1 – 8.9 inclusive	<800mg/kg at 600mm	≥100mm to soil depth ≥1000mm	
91-SCL	Pass	Pass	Pass	Pass	Pass	Exceeded (pH 9.13 at 0.50-0.60 mbgl)	Not Required	Not Required	Not SCL
N27	Pass	Pass	Pass	Pass	Pass	Exceeded (pH 9.10 at 0.50-0.60 mbgl)	Not Required	Not Required	Not SCL
32-SCL	Pass	Pass	Pass	Pass	Pass	Exceeded (pH 9.10 at 0.50-0.60 mbgl)	Not Required	Not Required	Not SCL
80-SCL	Pass	Pass	Pass	Pass	Pass	Exceeded (pH 9.24 at 0.50-0.60 mbgl)	Not Required	Not Required	Not SCL
<b>Overall</b>									<b>Not SCL</b>

Map Unit 6 exhibited limitations relating to SCL criterion soil pH.

pH levels were above pH 8.9 at 600 mm soil depth at Sites 26, 27, 32 and 80-SCL from 8.93 to 9.24. These concentrations did not meet the SCL pH criterion within range pH 5.1 and pH 8.9 for rigid soils. SWS at site 91-SCL was 72.13 mm (Pawcer Pedotransfer function) and does not meet the SCL SWS criterion.

All the analysed sites did not meet the SCL criteria, therefore Map Unit 6 is not SCL.

## 4.7 Map Unit 7

The SCL assessment of Map Unit 7 is summarised below in Table 4-8.

**Table 4-8: SCL Assessment of Map Unit 7**

SCL Criterion	Slope	Rockiness	Gilgai	Soil Depth	Soil Wetness	Soil pH	Salinity	Soil Water Storage	SCL Status
Criterion Threshold	≤3%	≤20 rocks >60mm	<50% of gilgai >500m m depth	≥600 mm	Favourable drainage	300/600 mm greater than pH 5.0	<800mg/kg at 600mm	≥100mm to soil depth ≥1000m m	
Site N1-SCL	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Likely SCL
Site N2-SCL	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Likely SCL
Site N3-SCL	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Likely SCL
<b>Overall</b>									<b>Likely SCL</b>

Map Unit 7 did not exhibit any limitations relating to SCL criteria. All the analysed sites met the SCL criteria, therefore Map Unit 7 is likely SCL.

## 4.8 Map Unit 8

The SCL assessment of Map Unit 8 is summarised below in Table 4-9.

**Table 4-9: SCL Assessment of Map Unit 8**

SCL Criterion	Slope	Rockiness	Gilgai	Soil Depth	Soil Wetness	Soil pH	Salinity	Soil Water Storage	SCL Status
Criterion Threshold	≤3%	≤20 rocks >60mm	<50% of gilgai >500m m depth	≥600 mm	Favourable drainage	300/600 mm within range of pH 5.1 – 8.9 inclusive	<800mg/kg at 600mm	≥100mm to soil depth ≥1000m m	
N12	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Likely SCL
N13	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Likely SCL
N14	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Likely SCL
<b>Overall</b>									<b>Likely SCL</b>

Map Unit 8 did not exhibit any limitations relating to SCL criteria. All the analysed sites met the SCL criteria, therefore Map Unit 8 is likely SCL.

## 4.9 Map Unit 9

The SCL assessment of Map Unit 9 is summarised below in Table 4-10.

**Table 4-10: SCL Assessment of Map Unit 9**

SCL Criterion	Slope	Rockiness	Gilgai	Soil Depth	Soil Wetness	Soil pH	Salinity	Soil Water Storage	SCL Status
Criterion Threshold	≤3%	≤20 rocks >60mm	<50% of gilgai >500m m depth	≥600 mm	Favourable drainage	300/600 mm greater than pH 5.0	<800mg/kg at 600mm	≥100mm to soil depth ≥1000m m	
65-SCL	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Likely SCL
N29	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Likely SCL
N30	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Likely SCL
N31	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Likely SCL
N32	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Likely SCL
N33	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Likely SCL
<b>Overall</b>									<b>Likely SCL</b>

Map Unit 9 did not exhibit any limitations relating to SCL criteria. All the analysed sites met the SCL criteria, therefore Map Unit 9 is likely SCL.

## 4.10 Map Unit 10

The SCL assessment of Map Unit 10 is summarised below in Table 4-11.

**Table 4-11: SCL Assessment of Map Unit 10**

SCL Criterion	Slope	Rockiness	Gilgai	Soil Depth	Soil Wetness	Soil pH	Salinity	Soil Water Storage	SCL Status
Criterion Threshold	≤3%	≤20 rocks >60mm	<50% of gilgai >500m m depth	≥600 mm	Favourable drainage	300/600 mm within range of pH 5.1 – 8.9 inclusive	<800mg/kg at 600mm	≥100mm to soil depth ≥1000m m	
N28	Pass	Pass	Pass	Pass	Pass	Exceeded (pH 8.92 at 0.50-0.60 mbgl)	Not required	Not required	Not SCL
N43	Pass	Pass	Pass	Pass	Pass	Exceeded (pH 8.99 at 0.50-0.60 mbgl)	Not required	Not required	Not SCL
N45	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Likely SCL
<b>Overall</b>									<b>Not SCL</b>

Map Unit 10 exhibited limitations relating to SCL criterion soil pH.

pH levels were above pH 8.9 at 600 mm soil depth at Sites N28 and N43 from 8.92 to 8.99. These concentrations did not meet the SCL pH criterion within range pH 5.1 and pH 8.9 for rigid soils.

Most of the analysed sites did not meet the SCL criteria, therefore Map Unit 10 is not SCL.

## 4.11 Map Unit 11

The SCL assessment of Map Unit 11 is summarised below in Table 4-12.

**Table 4-12: SCL Assessment of Map Unit 11**

SCL Criterion	Slope	Rockiness	Gilgai	Soil Depth	Soil Wetness	Soil pH	Salinity	Soil Water Storage	SCL Status
Criterion Threshold	≤3%	≤20 rocks >60mm	<50% of gilgai >500m m depth	≥600 mm	Favourable drainage	300/600 mm within range of pH 5.1 – 8.9 inclusive	<800mg/ kg at 600mm	≥100mm to soil depth ≥1000m m	
N23	Pass	Pass	Pass	Pass	Pass	Exceeded (pH 9.31 at 0.50- 0.60 mbgl)	Not Required	Not Required	Not SCL
N24	Pass	Pass	Pass	Pass	Pass	Exceeded (pH 8.98 at 0.20- 0.30 mbgl)	Not Required	Not Required	Not SCL
N25	Pass	Pass	Pass	Pass	Pass	Exceeded (pH 9.11 at 0.22- 0.30 mbgl)	Not Required	Not Required	Not SCL
<b>Overall</b>									<b>Not SCL</b>

Map Unit 11 exhibited limitations relating to SCL criterion soil pH.

pH levels were above pH 8.9 at 300- and 600-mm soil depth at Sites N23, N24 and N25 from 8.98 to 9.31. These concentrations did not meet the SCL pH criterion within range pH 5.1 and pH 8.9 for rigid soils.

All the analysed sites did not meet the SCL criteria, therefore Map Unit 11 is not SCL.

## 4.12 Map Unit 12

The SCL assessment of Map Unit 12 is summarised below in Table 4-13.

**Table 4-13: SCL Assessment of Map Unit 12**

SCL Criterion	Slope	Rockiness	Gilgai	Soil Depth	Soil Wetness	Soil pH	Salinity	Soil Water Storage	SCL Status
Criterion Threshold	≤3%	≤20 rocks >60mm	<50% of gilgai >500m m depth	≥600 mm	Favourable drainage	300/600 mm greater than pH 5.0	<800mg/kg at 600mm	≥100mm to soil depth ≥1000m m	
N35	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Likely SCL
N36	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Likely SCL
N37	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Likely SCL
<b>Overall</b>									<b>Likely SCL</b>

Map Unit 12 did not exhibit any limitations relating to SCL criteria. All the analysed sites met the SCL criteria, therefore Map Unit 12 is likely SCL.

## 4.13 Map Unit 13

The SCL assessment of Map Unit 13 is summarised below in Table 4-14.

**Table 4-14: SCL Assessment of Map Unit 13**

SCL Criterion	Slope	Rockiness	Gilgai	Soil Depth	Soil Wetness	Soil pH	Salinity	Soil Water Storage	SCL Status
Criterion Threshold	≤3%	≤20 rocks >60mm	<50% of gilgai >500m m depth	≥600 mm	Favourable drainage	300/600 mm greater than pH 5.0	<800mg/kg at 600mm	≥100mm to soil depth ≥1000m m	
6-SCL	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Likely SCL
7-SCL	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Likely SCL
100-SCL	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Likely SCL
<b>Overall</b>									<b>Likely SCL</b>

Map Unit 13 did not exhibit any limitations relating to SCL criteria. All the analysed sites met the SCL criteria, therefore Map Unit 13 is likely SCL.

## 4.14 Map Unit 14

The SCL assessment of Map Unit 14 is summarised below in Table 4-15.

**Table 4-15: SCL Assessment of Map Unit 14**

SCL Criterion	Slope	Rockiness	Gilgai	Soil Depth	Soil Wetness	Soil pH	Salinity	Soil Water Storage	SCL Status
Criterion Threshold	≤3%	≤20 rocks >60mm	<50% of gilgai >500m m depth	≥600 mm	Favourable drainage	300/600 mm within range of pH 5.1 – 8.9 inclusive	<800mg/ kg at 600mm	≥100mm to soil depth ≥1000m m	
Site 10-SCL	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Below limit at 83.79 mm Pedotran sfer Function	Not SCL
N41	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Below limit at 75 mm PAWC	Not SCL
N42	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Below limit at 98.64 mm Pedotran sfer Function	Not SCL
<b>Overall</b>									<b>Not SCL</b>

Map Unit 14 exhibited limitations relating to SCL criterion SWS.

SWS at site 10-SCL, N41 and N42 were 83.79 mm (Pawcer Pedotransfer function), 75mm (SWS Lookup table) and 98.64 mm (Pawcer Pedotransfer function) and do not meet the SCL SWS criterion.

All the analysed sites did not meet the SCL criteria, therefore Map Unit 14 is not SCL.



## 4.15 Map Unit 15

The SCL assessment of Map Unit 15 is summarised below in Table 4-16.

**Table 4-16: SCL Assessment of Map Unit 15**

SCL Criterion	Slope	Rockiness	Gilgai	Soil Depth	Soil Wetness	Soil pH	Salinity	Soil Water Storage	SCL Status
Criterion Threshold	≤3%	≤20 rocks >60mm	<50% of gilgai >500m m depth	≥600 mm	Favourable drainage	300/600 mm greater than pH 5.0	<800mg/ kg at 600mm	≥100mm to soil depth ≥1000m m	
N38	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Likely SCL
N39	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Likely SCL
N40	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Likely SCL
<b>Overall</b>									<b>Likely SCL</b>

Map Unit 15 did not exhibit any limitations relating to SCL criteria. All the analysed sites met the SCL criteria, therefore Map Unit 15 is likely SCL.

## 4.16 Map Unit 16

The SCL assessment of Map Unit 15 is summarised below in Table 4-17.

**Table 4-17: SCL Assessment of Map Unit 15**

SCL Criterion	Slope	Rockiness	Gilgai	Soil Depth	Soil Wetness	Soil pH	Salinity	Soil Water Storage	SCL Status
Criterion Threshold	≤3%	≤20 rocks >60mm	<50% of gilgai >500m m depth	≥600 mm	Favourable drainage	300/600 mm greater than pH 5.0	<800mg/ kg at 600mm	≥100mm to soil depth ≥1000m m	
5-SCL-M	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Likely SCL
5-SCL-D	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Likely SCL
102-SCL-M	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Likely SCL
102-SCL-D	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Likely SCL
103-SCL-M	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Likely SCL
103-SCL-D	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Likely SCL
<b>Overall</b>									<b>Likely SCL</b>

Map Unit 16 did not exhibit any limitations relating to SCL criteria. All the analysed sites met the SCL criteria, therefore Map Unit 16 is likely SCL.

## 4.17 Map Unit 17

The SCL assessment of Map Unit 17 is summarised below in Table 4-18.

**Table 4-18: SCL Assessment of Map Unit 17**

SCL Criterion	Slope	Rockiness	Gilgai	Soil Depth	Soil Wetness	Soil pH	Salinity	Soil Water Storage	SCL Status
Criterion Threshold	≤3%	≤20 rocks >60mm	<50% of gilgai >500m m depth	≥600 mm	Favourable drainage	300/600 mm greater than pH 5.0	<800mg/kg at 600mm	≥100mm to soil depth ≥1000m m	
Site 4-SCL	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Likely SCL
Site 110-SCL	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Likely SCL
Site 115-SCL	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Likely SCL
<b>Overall</b>									<b>Likely SCL</b>

Map Unit 17 did not exhibit any limitations relating to SCL criteria. All the analysed sites met the SCL criteria, therefore Map Unit 17 is likely SCL

## 4.18 Map Unit 18

The SCL assessment of Map Unit 18 is summarised below in Table 4-19.

**Table 4-19: SCL Assessment of Map Unit 18**

SCL Criterion	Slope	Rockiness	Gilgai	Soil Depth	Soil Wetness	Soil pH	Salinity	Soil Water Storage	SCL Status
Criterion Threshold	≤3%	≤20 rocks >60mm	<50% of gilgai >500m m depth	≥600 mm	Favourable drainage	300/600 mm within range of pH 5.1 – 8.9 inclusive	<800mg/kg at 600mm	≥100mm to soil depth ≥1000m m	
N26	Pass	Pass	Pass	Pass	Pass	Exceeded (pH 8.93 at 0.50-0.60 mbgl)	Not Required	Not Required	Not SCL
N46	Pass	Pass	Pass	Pass	Pass	Exceeded (pH 8.96 at 0.20-0.30 mbgl)	Not Required	Not Required	Not SCL
N52	Pass	Pass	Pass	Pass	Pass	Exceeded (pH 9.31 at 0.20-0.30 mbgl)	Not Required	Not Required	Not SCL
77-SCL	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Likely SCL
<b>Overall</b>									<b>Not SCL</b>

Map Unit 18 exhibited limitations relating to SCL criterion soil pH.

pH levels were above pH 8.9 at 300 mm and 600 mm soil depth at Site N46 at 8.96, Site N52 at 9.31 and N26 at 8.93. This concentration did not meet the SCL pH criterion within range pH 5.1 and pH 8.9 for rigid soils.

Most of the analysed sites did meet the SCL criteria, therefore Map Unit 18 is not SCL.

## 4.19 Map Unit 19

The SCL assessment of Map Unit 19 is summarised below in Table 4-20.

**Table 4-20: SCL Assessment of Map Unit 19**

SCL Criterion	Slope	Rockiness	Gilgai	Soil Depth	Soil Wetness	Soil pH	Salinity	Soil Water Storage	SCL Status
Criterion Threshold	≤3%	≤20 rocks >60mm	<50% of gilgai >500m m depth	≥600 mm	Favourable drainage	300/600 mm greater than pH 5.0	<800mg/ kg at 600mm	≥100mm to soil depth ≥1000m m	
N47	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Likely SCL
N49	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Likely SCL
N57	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Likely SCL
<b>Overall</b>									<b>Likely SCL</b>

Map Unit 19 did not exhibit any limitations relating to SCL criteria. All the analysed sites met the SCL criteria, therefore Map Unit 19 is likely SCL.

## 4.20 Map Unit 20

The SCL assessment of Map Unit 20 is summarised below in Table 4-21.

**Table 4-21: SCL Assessment of Map Unit 20**

SCL Criterion	Slope	Rockiness	Gilgai	Soil Depth	Soil Wetness	Soil pH	Salinity	Soil Water Storage	SCL Status
Criterion Threshold	≤3%	≤20 rocks >60mm	<50% of gilgai >500m m depth	≥600 mm	Favourable drainage	300/600 mm greater than pH 5.0	<800mg/kg at 600mm	≥100mm to soil depth ≥1000m m	
N54	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Marginal Fail (Chloride 831 mg/kg at 0.70-0.80m, PAWC 84mm/1000mm) / PACWER – 102.09m m/100m m	Marginal Likely SCL
N56	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Likely SCL
N58	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Likely SCL
<b>Overall</b>									<b>Likely SCL</b>

Map Unit 20 exhibited limitations relating to SCL plant available water content criterion soil pH.

Chemical barrier of chloride in Site N54, 831 mg/kg at 0.70-0.80 mbgl reduced the PAWC calculated (refer Appendix X) to 84mm/1000mm, a marginal failure. Re-assessment of gravimetric water content using 15 bar analytical results indicates that the clay soil has 102.09mm/100mm water holding capacity. Therefore, it is considered a likely SCL.

Most of the analysed sites did meet the SCL criteria and on further assessment, Map Unit 20 is likely SCL.

## CONCLUSIONS

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The key conclusions of the SCL assessment are as follows:

- Twenty map units have been identified within the project site;
- Eleven map units, 3, 7, 8, 9, 12, 13, 15, 16, 17, 19 and 20 meet the SCL criteria;
- Six map units, 1, 2, 5, 10, 11, and 18 do not meet the SCL criterion for soil chemistry pH limitation exceedance;
- One map unit, Map Unit 14, does not meet the SCL criterion for soil water storage; and,
- Two map units 4, 6, do not meet the SCL criteria for pH and soil water storage.

## 5 REFERENCES

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- Baker, D.E. and Eldershaw, V.J. (1993) *Interpreting Soil Analysis for agricultural use in Queensland*. QDPI QO93014. Brisbane.
- Bruce, R.C. and Rayment, G.F. (1982), *Analytical Methods and interpretations used by the Agricultural Chemical Branch, QDPI, for soil and land use surveys*. QDPI Bulletin QB82004. Brisbane
- Bruce, R.C. and Rayment, G.F. (1984), *Soil Testing and Some Test Interpretations used by the QDPI*. QDPI Bulletin QI84029. Brisbane.
- Department of Minerals and Energy (1995), *Technical Guidelines for the Environmental Management of Exploration and Mining in Queensland – Land Suitability Assessment Techniques*. Environmental Protection Agency. Brisbane.
- Google Earth (2018), CNES / Digital Globe Image, 7520399 mS 639150 mE (GDA94 Zone 55), Accessed 25 January 2018, <<http://www.google.com/earth/index.html>>.
- GT Environmental Services (2011), Saraji East Coal Mine Project, Soils and Land Suitability.
- Gunn, R.H, Beattie, J.A., Reid, R.E. and van de Graff, R. (1988), *Australian Soil and Land Survey: Guidelines for Conducting Surveys*. Inkata Press. Melbourne.
- Gunn, R.H, Speck, N.H, Wright, R.L, Sweeney, F.C, Perry, R.A, Fitzpatrick, E.A, Wilson, I.B (1968) *Lands of the Dawson-Fitzroy Area, Queensland*. Commonwealth Scientific and Industrial Research Organisation. Melbourne.
- Isbell, R.F. (2002), *The Australian Soil Classification*. CSIRO Publishing. Collingwood VIC.
- Land Resources Branch Staff (1990), *Guidelines for agricultural land evaluation in Queensland*. Queensland Department of Primary Industries. QI9005.
- McKenzie, N.J., Grundy, M.J., Webster, R. Ringrose-Voase, A.J. (2008), *Guidelines for Surveying Soils and Land Resources*. Second Edition. CSIRO Publishing.
- Munsell Color (Firm). (2009). *Munsell soil color charts*: with genuine Munsell color chips. Grand Rapids, MI: Munsell Color.
- National Committee on Soil and Terrain (2009), *Australian Soil and Land Survey: Field Handbook*. Third Edition, CSIRO Publishing. Melbourne.
- Northcote, K. H (1979). *A factual key for the recognition of Australian soils*. 4<sup>th</sup> Edition, Rellim Tech Publishing, Glenside, South Australia.
- Queensland Government, (2014), *Regional Planning Interests Act 2014*.
- Queensland Government, (2014), *Regional Planning Interests Regulation 2014*.
- Queensland Government, (2014), *Regional Planning Interests Act Statutory Guideline 08/14 2017*.



## 6 GLOSSARY OF TERMS

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The following descriptions are of terms used in the text of this report.

**Alluvial.** Describes material, sand, silt, clay, gravel or other material deposited by, or in transit in, flowing water.

**ASC.** Australian soil class

**ASPAC.** Australasian Soil and Plant Analysis Council.

**Cation Exchange Capacity (CEC).** The maximum positive charge required to balance the negative charge on colloids (clays and other charged particles). The units are milli-equivalents per 100 grams of material or centimoles of charge per kilogram of exchanger. CEC is often used as a measure of soil fertility and nutrient retention capacity.

**Chloride.** The concentration of chloride is usually an indicator of the severity of potential salinity.

**Chromosol.** Soils with a clear or abrupt textural B horizon and in which the major part<sup>1</sup> of the upper 0.2 m of the B2 horizon (or the major part of the entire B2 horizon if it is less than 0.2 m thick) is not strongly acid.

**Clay.** A soil material composed of particles finer than 0.002 mm. When used as a soil texture group such soils contain at least 35% clay.

**Dermosol.** Soils with structured B2 horizons and lacking strong texture contrast between A and B horizons.

**Erosion.** The displacement of soil, rock or dissolved material by wind or water flow from one location on the earth and then travels to another location.

**ESP.** The amount of sodium as a proportion of all cations in a soil is termed the Exchangeable Sodium Percentage. It is calculated by dividing the exchangeable sodium by the cation exchange capacity (CEC), multiplied by 100. ESP values greater than 6% are considered sodic, with values greater than 15% considered very sodic.  $ESP = (\text{Exchangeable sodium (meq/100g)} / \text{Cation exchange capacity (meq/100g)}) \times 100$

**Field pH.** The measurement of the pH in the field by utilising Manutec Pty Ltd, Soil pH Test Kit. This kit consists of pH dye indicator, Barium Sulphate and reference colour chart.

**Gradational.** The lower boundary between soil layers (horizons) has a gradual transition to the next layer. The solum (soil horizon) becomes gradually more clayey with depth.

**Gradient.** The rate of inclination of a slope. The degree of deviation from the horizontal.

**Horizon.** An individual soil layer, based on texture and colour, which differs from those above and below.

**Loam.** A medium textured soil of approximate composition 10-25% clay, 25-50% silt and >50% sand.

**Mottles.** Areas of contrasting colour within the overall soil colour which are caused by anerobic conditions as a result of poor aeration. Usually an indicator of poor drainage and retention of water.

**NATA.** National Association of Testing Authority.

**Non-rigid (soils).** Non-rigid soils are soils other than rigid soils.

**Ped.** An individual natural soil aggregate. In an undisturbed state peds will group together to form larger aggregates.

**pH.** A logarithmic index for the concentration of hydrogen ions in an aqueous solution, which is used as a measure of acidity.

**Profile.** The solum. This includes the soil A and B horizons and is basically the depth of soil to weathered rock.

**Rigid (soils).** Rigid soils are soils with minimal capacity to shrink and swell with changing water content. Minimum capacity to shrink and swell exists only if, when dry, the soil does not have, open cracks that are 5mm wide or more and extend from at least 300mm below the surface vertically upwards to the surface or immediately below a layer disturbed by human intervention, including, for example by ploughing or immediately below a thin (0.03m), natural surface layer or gilgai.

**Sodic.** Also commonly referred to as a non-saline alkali soil. It is a soil that contains sufficient exchangeable sodium and does not contain appreciable quantities of soluble salts. A term given to soil with a level of exchangeable sodium cations greater than 10-15% of the soils cation exchange capacity (CEC), or soluble sodium cations greater than 10-15 times the square root of soluble calcium and magnesium cations.

**Soil Type.** Soils grouped into a single management unit on the basis of similar morphology, position on the landscape, substrate and chemistry.

**Subsoil.** Subsurface material comprising the B and C horizons of soils with distinct profiles. They often have brighter colours and higher clay content than topsoils.

**Texture.** The size of particles in the soil. Texture is divided into six groups, depending on the amount of coarse sand, fine sand, silt and clay in the soil.

**Vertosol.** Soils that have a clay field texture of 35% or more clay throughout the solum except for thin, surface crusty horizons 0.03m or less thick, have open cracks at some time in most years that are at least 5mm wide and extend upward to the surface or to the base of any plough layer, self-mulching horizon, or thin, surface crusty horizon and at some depth in the solum have slicken sides and/or lenticular peds.

## **7      FIGURES**

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- Figure 1      SCL Trigger Map**
- Figure 2      Map Units**
- Figure 3      Strategic Cropping Land**



# Figure 1: SCL Trigger Map

Version 2  
02/09/2019

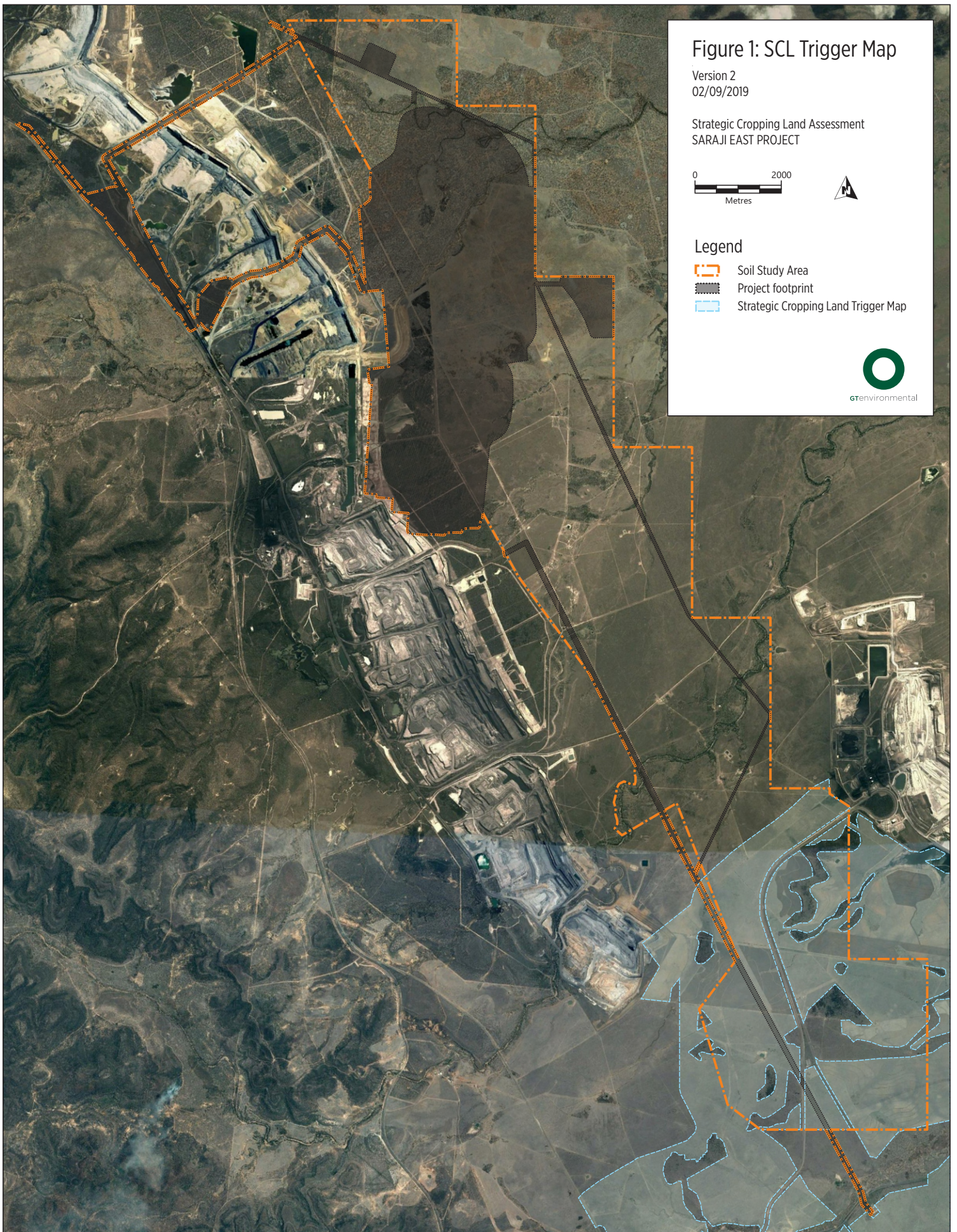
Strategic Cropping Land Assessment  
SARAJI EAST PROJECT

0 2000  
Metres



## Legend

-  Soil Study Area
-  Project footprint
-  Strategic Cropping Land Trigger Map





# Figure 2: Map Units

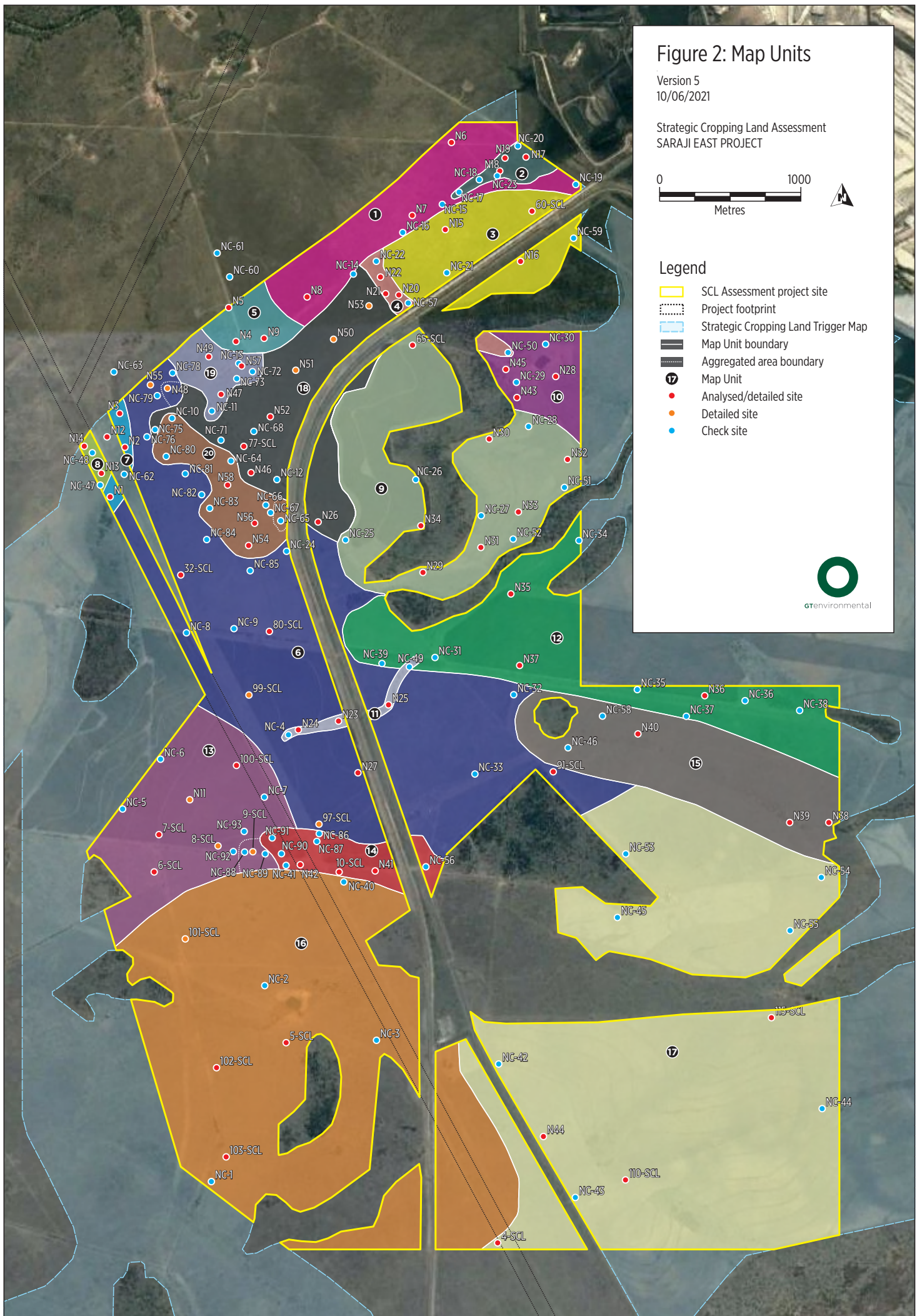
Version 5  
10/06/2021

Strategic Cropping Land Assessment  
SARAJI EAST PROJECT



## Legend

- SCL Assessment project site
- Project footprint
- Strategic Cropping Land Trigger Map
- Map Unit boundary
- Aggregated area boundary
- Map Unit
- Analysed/detailed site
- Detailed site
- Check site





### Figure 3: Strategic Cropping Land

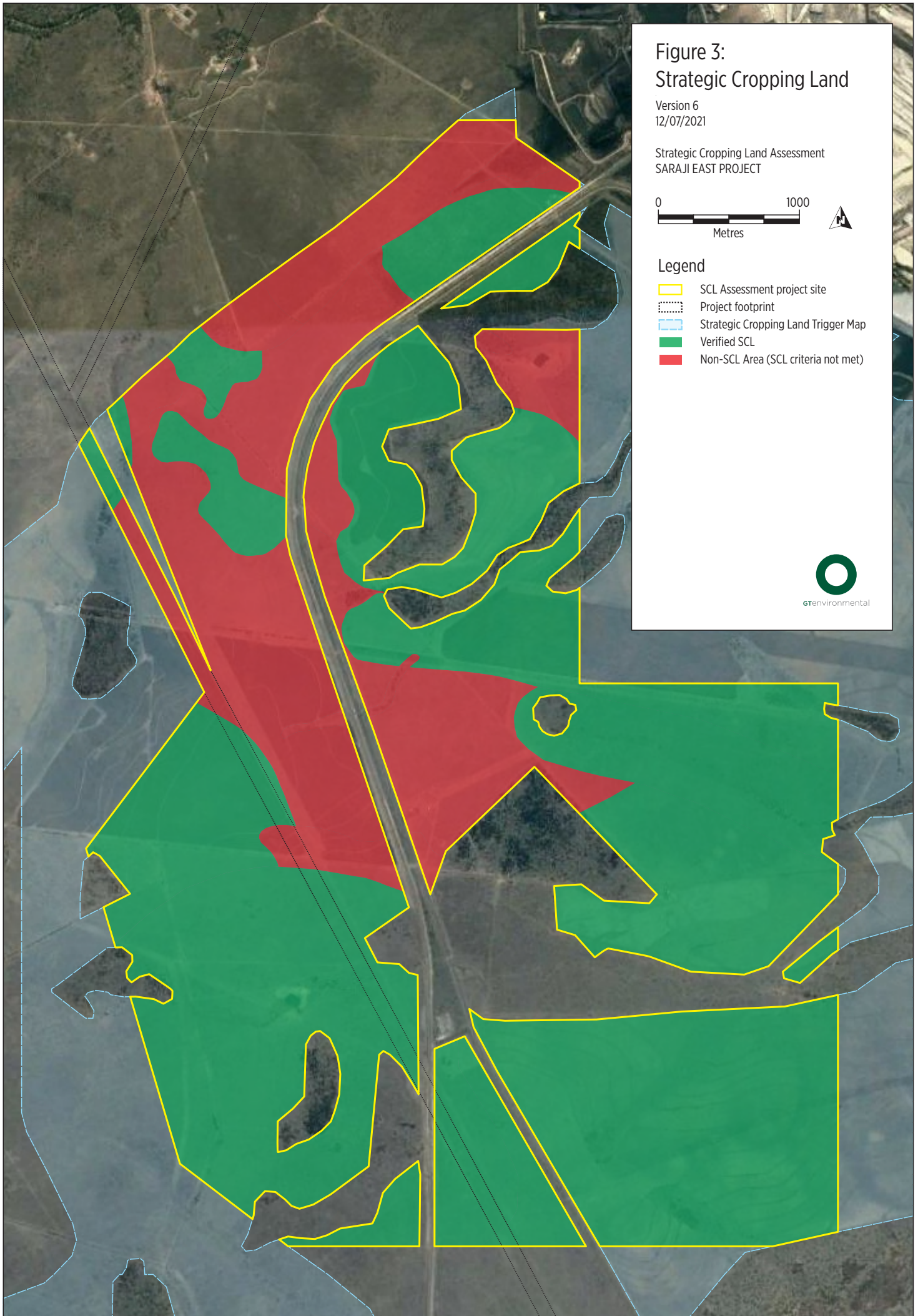
Version 6  
12/07/2021

Strategic Cropping Land Assessment  
SARAJI EAST PROJECT



#### Legend

- SCL Assessment project site
- Project footprint
- Strategic Cropping Land Trigger Map
- Verified SCL
- Non-SCL Area (SCL criteria not met)





## **8 APPENDICES**

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<b>Appendix A</b>	<b>Detailed site descriptions</b>
<b>Appendix B</b>	<b>Check site descriptions</b>
<b>Appendix C</b>	<b>Soil Water Storage Calculations</b>
<b>Appendix D</b>	<b>PAWCER Calculations</b>
<b>Appendix E</b>	<b>Laboratory Certificates</b>

## SITE N1

<b>Map Unit</b> 7	<b>Location (GDA94 ZONE 55):</b> 641005 mE 7512573 mN	<b>Aust. Soil Class.:</b> Crusting Black Vertosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 30/06/2018
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Landscape



Surface



Soil Profile



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Grazing Gently undulating plains, Open depression 2.0/1.0	Mount coolabah, semi-cleared	Nil microrelief Semi-cleared Nil erosion	Cracking, crust Nil coarse fragments	A11 0.00-0.02 Abrupt	Light clay	Moderate, firm <10mm sub- angular	Nil inclusions and segregations	10YR3/1 Very dark grey Nil mottles/bleach	Moderately moist, moderate	Few fine	0.02 / 6.5	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil additional observations
				A12 0.02-0.10 Abrupt	Light clay	Moderate, firm 10- 30mm sub- angular	<1% calcium carbonate	10YR2/2 Very dark brown Nil mottles/bleach	Dry, moderate	Few fine	0.10 / 6.5		
				B21 0.10-0.70 Abrupt	Medium clay	Moderate, firm 10- 30mm sub- angular	2% calcium carbonate nodules	10YR2/2 Very dark brown Nil mottles/bleach	Dry, moderate	Very fine, very few	0.30 / 7.0 0.60 / 7.5		
				B22 0.70-1.00 EOBH	Medium clay	Moderate, firm 10- 30mm sub- angular	2% calcium carbonate nodules	10YR4/2 Dark greyish brown Nil mottles/bleach	Dry, moderate	Very fine, very few	0.90 / 7.5		

## SITE N2

<b>Map Unit</b> 7	<b>Location (GDA94 ZONE 55):</b> 641096mE 7512914mN	<b>Aust. Soil Class.:</b> Crusting Grey Vertosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 30/06/2018
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**Landscape**



**Surface**



**Soil Profile**



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Grazing Very gently undulating plain 2.0/1.0	Various shrubs	Nil microrelief Nil to semi disturbance Nil erosion	Firm, crust Nil coarse fragments	A1 0.00-0.14 Abrupt	Light clay	Moderate, soft <10mm sub- angular	Nil inclusions and segregations	10YR3/1 Very dark grey Nil mottles/bleach	Moderate moist, moderate	Few fine	0.10 / 6.0	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil additional observations
				B2 0.14-1.00 EOBH	Medium clay	Moderate, firm <10mm sub- angular	<2% black nodules	10YR4/2 Dark greyish brown Nil mottles/bleach	Dry, moderate	Very fine, very few	0.30 / 6.5 0.60 / 7.0 0.90 / 7.5		



## SITE N3

<b>Map Unit</b> 7	<b>Location (GDA94 ZONE 55):</b> 641074mE 7513152mN	<b>Aust. Soil Class.:</b> Crusting Grey Vertosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 30/06/2018
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Landscape



Surface



Soil Profile



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Grazing Very gently undulating plain 2.0/1.0	Various shrubs	Nil microrelief Nil disturbance Nil erosion	Crusting, Nil coarse fragments	A1 0.00-0.16 Abrupt	Light clay	Weak, soft <10mm sub- angular	Nil inclusions and segregations	10YR3/1 Very dark grey Nil mottles/bleach	Moderate moist, moderate	Few fine	0.10 / 6.0	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil additional observations
				B2 0.16-1.00 EOBH	Medium clay	Moderate, firm <10mm sub- angular	<2% black nodules	10YR4/2 Dark greyish brown Nil mottles/bleach	Dry, moderate	Very fine, very few	0.30 / 6.5 0.60 / 7.0 0.90 / 7.5		

## SITE N4

<b>Map Unit</b> 5	<b>Location (GDA94 ZONE 55):</b> 641871mE 7513601mN	<b>Aust. Soil Class.:</b> Grey dermosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 1/07/2018
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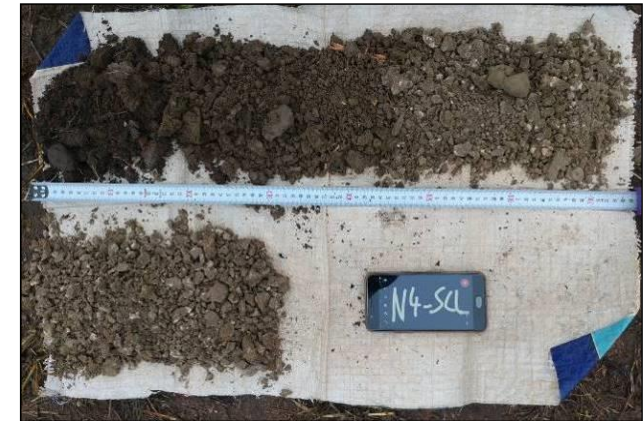
**Landscape**



**Surface**



**Soil Profile**



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Grazing Very gently undulating plain 2.0/1.0	Eucalyptus species	Nil microrelief Semi disturbed Nil erosion	Soft, <5% 2-6mm coarse fragments	A1 0.00-0.17 Abrupt	Sandy loam	Weak, soft <10mm sub- rounded	Nil inclusions and segregations	10YR3/2 Very dark greyish brown Nil mottles/bleach	Moderate moist, rapid	Few fine	0.10 / 6.0	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil additional observations
				B21 0.17-0.44 Abrupt	Light clay with minor sand	Moderate, firm <30mm sub- angular	<2% pale red nodules	10YR4/2 Dark greyish brown Nil mottles/bleach	Moderately moist, moderate	Very fine, very few	0.30 / 7.5		
				B22 0.44-1.00 EOBH	Medium clay	Moderate, firm <30mm sub- angular	10-15% calcium carbonate nodules	10YR5/3 Brown Nil mottles/bleach	Dry, moderate	Very fine, very few	0.60 / 7.5 0.90 / 7.5		



## SITE N5

<b>Map Unit</b> 5	<b>Location (GDA94 ZONE 55):</b> 641792mE 7513825mN	<b>Aust. Soil Class.:</b> Black dermosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 1/07/2018
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**Landscape**



**Surface**



**Soil Profile**



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Grazing Very gently undulating plain midslope 3.0/3.0	Sparse shrub species	Nil microrelief Nil disturbance Nil erosion	Soft, Nil coarse fragments	A1 0.00-0.12 Abrupt	Sandy loam	Weak, soft <10mm sub- rounded	Nil inclusions and segregations	10YR3/1 Very dark grey Nil mottles/bleach	Moderate moist, rapid	Few fine	0.10 / 6.5	0.00-0.10	Nil additional observations
				B21 0.12-0.45 Abrupt	Light clay with minor sand	Moderate, firm <30mm sub-angular	Nil inclusions and segregations	10YR2/1 Black Nil mottles/bleach	Moderately moist, moderate	Very fine, very few	0.30 / 7.5	0.20-0.30	
				B22 0.45-0.80 Abrupt	Medium clay	Moderate, firm <30mm sub-angular	2% calcium carbonate nodules	10YR2/1 Black Nil mottles/bleach	Dry, moderate	Very fine, very few	0.60 / 8.0	0.50-0.60	
				B23 0.80-1.00 EOBH	Medium clay	Strong, strong <30mm sub- angular	2% calcium carbonate nodules	10YR3/3 Dark brown Nil mottles/bleach	Dry, moderate	Very fine, very few	0.90 / 8.0	0.80-0.90 0.90-1.00	



## SITE N6

<b>Map Unit</b> 1	<b>Location (GDA94 ZONE 55):</b> 643271mE 7514881mN	<b>Aust. Soil Class.:</b> Black dermosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 1/07/2018
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**Landscape**



**Surface**



**Soil Profile**



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Grazing Very gently undulating plain midslope 3.0/3.0	Buffel grass	Nil microrelief Semi disturbed Nil erosion	Cracking, soft Nil coarse fragments	A1 0.00-0.17 Abrupt	Clay Loam	Moderate, firm<30mm sub- angular	Nil inclusions and segregations	10YR3/2 Very dark greyish brown Nil mottles/bleach	Moderate moist, rapid	Few fine	0.10 / 7.0	0.00-0.10 0.20-0.30 0.50-0.60 0.77-0.87 0.90-1.00	Large root encountered at 0.60 mbgl
				B21 0.17-0.89 Abrupt	Medium clay	Moderate, firm<50mm sub- angular	5% calcium carbonate nodules	10YR3/1 Very dark grey Very dark grey Nil mottles/bleach	Dry, moderate	Very fine, very few	0.30 / 7.0 0.60 / 8.0		
				B22 0.89-1.00 EOBH	Medium clay	Strong , firm<50mm sub- angular	5% calcium carbonate nodules	10YR3/2 Very dark greyish brown Nil mottles/bleach	Dry, moderate	Very fine, very few	0.90 / 8.5		

## SITE N7

<b>Map Unit</b> 1	<b>Location (GDA94 ZONE 55):</b> 643071mE 7514453mN	<b>Aust. Soil Class.:</b> Black dermosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 1/07/2018
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**Landscape**



**Surface**



**Soil Profile**



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Grazing Very gently undulating plain midslope 2.0/2.0	Buffel grass, nearby brigalow	Nil microrelief Nil disturbance Nil erosion	Firm, Nil coarse fragments	A1 0.00-0.15 Abrupt	Clay loam with minor sands	Moderate, firm<30mm sub- angular	Nil inclusions and segregations	10YR3/1 Very dark grey Black Nil mottles/bleach	Moderate moist, rapid	Few fine	0.10 / 6.5	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil additional observations
				B21 0.15-0.50 Abrupt	Light clay with minor sands	Moderate, firm<50mm sub- angular	Nil inclusions and segregations	10YR3/1 Very dark grey Nil mottles/bleach	Dry, moderate	Very fine, very few	0.30 / 7.0		
				B22 0.50-0.70 Abrupt	Medium clay	Moderate, firm<50mm sub- angular	5% calcium carbonate nodules	10YR3/2 Very dark greyish brown Nil mottles/bleach	Dry, moderate	Very fine, very few	0.60 / 8.0		
				B23 0.70-1.00 EOBH	Medium clay	Strong, firm<50mm sub- angular	Nil inclusions and segregations	10YR3/2 Very dark greyish brown Nil mottles/bleach	Dry, moderate	Very fine, very few	0.90 / 8.0		



## SITE N8

<b>Map Unit</b> 1	<b>Location (GDA94 ZONE 55):</b> 642368mE 7513895mN	<b>Aust. Soil Class.:</b> Black dermosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 1/07/2018
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Landscape



Surface



Soil Profile



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Grazing Very gently undulating plain midslope 2.0/2.0	Buffel grass	Nil microrelief Extensively disturbed Nil erosion	Soft <10% 10- 15mm coarse fragments	A11 0.00-0.17 Abrupt	Sandy clay loam	Moderate, soft, sub- rounded	Nil inclusions and segregations	10YR3/1 Very dark grey Black Nil mottles/bleach	Moderate moist, rapid	Few fine	0.10 / 7.0	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil additional observations
				A12 0.17-0.37 Abrupt	Clay loam	Moderate, soft, sub- angular	Nil inclusions and segregations	10YR4/1 Dark grey Nil mottles/bleach	Dry, moderate	Very fine, very few	0.30 / 7.5		
				B21 0.37-0.70 Abrupt	Medium clay	Moderate, soft, sub- angular	<2% calcium carbonate nodules	10YR3/1 Very dark grey Nil mottles/bleach	Dry, moderate	Very fine, very few	0.60 / 7.0		
				B22 0.70-1.00 EOBH	Medium clay	Moderate, soft, sub- angular	Nil inclusions and segregations	10YR4/2 Dark greyish brown Nil mottles/bleach	Dry, moderate	Very fine, very few	0.90 / 7.0		

## SITE N9

<b>Map Unit</b> 5	<b>Location (GDA94 ZONE 55):</b> 642032mE 7513619mN	<b>Aust. Soil Class.:</b> Black dermosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 01/07/2018
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**Landscape**



**Surface**



**Soil Profile**



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Very gently undulating plain mid slope 2.0/2.0	Buffel grass, Brigalow, and belah on fence line, 100 m nearby	Nil microrelief Nil disturbed Nil erosion	Soft, moist, Nil coarse fragments	A11 0.00-0.09 Abrupt	Sandy loam	Weak, loose	Nil inclusions and segregations	10YR2/2 Very dark brown Nil mottles	Moderate moist, rapid	Few fine	0.10 / 6.5	0.00-0.09 0.20-0.30 0.55-0.65 0.75-0.85 0.90-1.00	Nil additional observations
				A12 0.09-0.35 Clear	Sandy Loam	Weak, loose	Nil inclusions and segregations	10YR2/1 Black Nil mottles/bleach	Dry, moderate	Very fine, very few	0.30 / 7.5		
				B21 0.35-0.55 Abrupt	Medium clay	Moderate, strong, sub-angular <20 mm	Nil inclusions and segregations	10YR2/1 Black Nil mottles/bleach	Dry, moderate	Very fine, very few	-		
				B22 0.55-0.85 Abrupt	Medium clay	Moderate, strong, sub-angular <20 mm	<2% calcium carbonate nodules	10YR2/1 Black Nil mottles/bleach	Dry, moderate	-	0.60 / 8.5		
				B23 0.85-1.00 EOBH	Medium clay	Strong, strong, sub-angular <20 mm	Nil inclusions and segregations	10YR3/3 Dark brown Nil mottles/bleach	Dry, moderate	-	0.90 / 7.5		

**SITE N10 removed**



## SITE N11

<b>Map Unit</b> 13	<b>Location (GDA94 ZONE 55):</b> 641522mE 7510593mN	<b>Aust. Soil Class.:</b> Black Vertosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 04/06/2019
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Landscape



Surface



Soil Profile



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Cropping, Very gently undulating plain, mid-slope, 1% slope	Forage crops	Nil microrelief Extensive disturbance Nil erosion	Self-mulching with crust, minor sand on surface. Coarse fragments<5 mm <5%	A1 0.00 – 0.12 Abrupt	Light clay, sandy	Subangular blocky, Moderate peds 10-30 mm, firm	Nil inclusions and segregations	10YR2/1 Black Nil mottles / bleaching	Humid, well drained	Fine, very few	0.10 / 7.0	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil additional observations
				B21 0.12 – 0.68 Abrupt	Medium heavy clay	Subangular blocky, Strong peds 20-30 mm, strong	<5% calcium carbonate	10YR2/1 Black Nil mottles / bleaching	Humid, well drained	Fine, very few	0.30 / 7.0 0.60 / 6.5		
				B22 0.68 – 1.00 EOBH	Medium heavy clay, sandy	Subangular blocky, Strong peds 40-60 mm, strong	<1% red nodules <2mm	10YR3/1 Very dark grey Nil mottles / bleaching	Humid, well drained	Nil	0.90 / 6.5		

## SITE N12

<b>Map Unit</b> 8	<b>Location (GDA94 ZONE 55):</b> 640984mE 7512975mN	<b>Aust. Soil Class.:</b> Black Dermosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 05/06/2019
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**Landscape**



**Surface**



**Soil Profile**



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
GUP Mid-slope	Grasses	Nil microrelief Semi disturbance Nil erosion	Firm, Nil coarse fragments	A1 0.00-0.11 Abrupt	Sandy clay loam	Weak to moderate. Soft, sub rounded <10mm	Nil inclusions and segregations	10YR3/2 Very dark greyish brown Nil mottles/bleaching	Dry, well	Present	0.10 / 7.0	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil additional observations
				B21 0.11-0.62 gradual	Light clay	Weak to moderate. Firm, sub rounded <20mm	Nil inclusions and segregations	10YR3/2 Very dark greyish brown Nil mottles/bleaching	Dry, moderate – well	Present	0.30 / 7.5 0.60 / 7.5		
				B22 0.62-1.00 EOBH	Light clay	Weak to moderate. Firm, sub rounded <20mm	Nil inclusions and segregations	10YR3/2 Very dark greyish brown Nil mottles/bleaching	Dry, moderate – well	Present	0.90 / 7.5		



## SITE N13

<b>Map Unit</b> 8	<b>Location (GDA94 ZONE 55):</b> 640940mE 7512735mN	<b>Aust. Soil Class.:</b> Black Dermosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 05/06/2019
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**Landscape**



**Surface**



**Soil Profile**



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
GUP Mid-slope <2.0/<2.0	Grasses	Nil microrelief Extensive disturbance Nil erosion	Firm, Nil coarse fragments	A1 0.00-0.15 Abrupt	Sandy clay loam	Weak to moderate. Soft, sub rounded <10mm	Nil inclusions and segregations	10YR3/2 Very dark greyish brown Nil mottles/bleaching	Dry, well	Present	0.10 / 7.0	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil additional observations
				B21 0.15-0.75 gradual	Light clay	Weak to moderate. Firm, sub rounded <20mm	Nil inclusions and segregations	10YR3/2 Very dark greyish brown Nil mottles/bleaching	Dry, moderate – well	Present	0.30 / 7.5 0.60 / 7.5		
				B22 0.75-1.00 EOBH	Light clay	Weak to moderate. Firm, sub rounded <20mm	Nil inclusions and segregations	10YR3/2 Very dark greyish brown Nil mottles/bleaching	Dry, moderate – well	Present	0.90 / 7.5		

## SITE N14

<b>Map Unit</b> 8	<b>Location (GDA94 ZONE 55):</b> 640810mE 7512936mN	<b>Aust. Soil Class.:</b> Black Dermosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 05/06/2019
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**Landscape**



**Surface**



**Soil Profile**



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
GUP Mid-slope	Grasses	Nil microrelief Extensive disturbance Nil erosion	Firm. cracking, Nil coarse fragments	A1 0.00-0.15 Abrupt	Sandy clay loam	Weak to moderate. Soft, sub rounded <10mm	Nil inclusions and segregations	10YR3/2 Very dark greyish brown Nil mottles/bleaching	Dry, well	Present	0.10 / 7.0	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil additional observations
				B21 0.15-0.75 gradual	Light clay	Weak to moderate. Firm, sub rounded <20mm	Nil inclusions and segregations	10YR3/2 Very dark greyish brown Nil mottles/bleaching	Dry, moderate – well	Present	0.30 / 7.5 0.60 / 7.5		
				B22 0.75-1.00 EOBH	Light clay	Weak to moderate. Firm, sub rounded <20mm	Nil inclusions and segregations	10YR3/2 Very dark greyish brown Nil mottles/bleaching	Dry, moderate – well	Present	0.90 / 7.5		



## SITE N15

<b>Map Unit</b> 3	<b>Location (GDA94 ZONE 55):</b> 643200mE 7514334mN	<b>Aust. Soil Class.:</b> Black Vertosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 06/06/2019
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**Landscape**



**Surface**



**Soil Profile**



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Grazing, upper-slope, 1%/2% slope	Grasses	Nil microrelief  Nil erosion  Extensively disturbed	Self-mulching, Nil coarse fragments	A1 0.0 – 0.15 Abrupt	Light clay	Moderate, Sub- rounded, peds <10 mm, soft	Nil inclusions or segregations	10YR3/2 Very dark greyish brown Nil mottles	Dry, well drained	Fine, very few	0.10 / 7.0	0.00-0.10 0.20-0.30 0.55-0.60 0.80-0.90 0.90-1.00	Nil additional observations
				B21 0.15 – 0.55 Abrupt	Medium clay	Moderate, Subangular blocky, peds <20 mm, firm	Nil inclusions or segregations	10YR2/1 Black 2% brown mottle	Dry, well drained	Very fine, very few	0.30 / 7.5		
				B22 0.55 – 1.00 EOBH	Medium clay	Strong, Subangular blocky, peds <20 mm, firm	<2% calcium carbonate	7.5YR3/2 Dark brown Nil mottles	Dry, moderately well drained	Nil roots	0.60 / 7.0 0.90 / 7.0		



## SITE N16

<b>Map Unit</b> 3	<b>Location (GDA94 ZONE 55):</b> 643734mE 7514136mN	<b>Aust. Soil Class.:</b> Black Vertosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 06/06/2019
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Landscape



Surface



Soil Profile



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Grazing, upper-slope, 1%/1% slope	Grasses	Nil microrelief  Nil erosion  extensively disturbed	Self- mulching, Nil coarse fragments	A1 0.0 – 0.12 Abrupt	Light clay	Moderate, Sub- rounded, peds <10 mm, soft	Nil inclusions or segregations	10YR3/2 Very dark greyish brown Nil mottles	Humid, well drained	Fine, very few	0.10 / 6.5	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil additional observations
				B21 0.12 – 0.40 Abrupt	Medium clay	Moderate, Subangular blocky, peds <20 mm, firm	Nil inclusions or segregations	10YR3/2 Very dark greyish brown Nil mottles	Dry, well drained	Very fine, very few	0.30 / 6.5		
				B22 0.40 – 0.50 Abrupt	Medium clay	Moderate, Subangular blocky, peds <20 mm, very firm	Nil inclusions or segregations	7.5YR3/3 Dark brown 5% brown mottle	Dry, well drained	Very fine, very few	0.45 / 7.0		
				B23 0.50 – 0.80 Abrupt	Medium clay	Strong, Subangular blocky, peds <20 mm, very firm	<1% calcium carbonate	10YR3/2 Very dark greyish brown Nil mottles	Dry, moderately well drained	Nil roots	0.60 / 7.0		
				B24 0.80 – 1.00 EOBH	Medium clay	Strong, Subangular blocky, peds <20 mm, very firm	<2% calcium carbonate	10YR3/2 Nil mottles 5% brown mottle	Dry, moderately well drained	Nil roots	0.90 / 7.0		

## SITE N17

<b>Map Unit</b> 2	<b>Location (GDA94 ZONE 55):</b> 643797mE 7514822mN	<b>Aust. Soil Class.:</b> Black Sodosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 06/06/2019
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Landscape



Surface



Soil Profile



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Grazing GUP Stream channel / Depression <2% / <2%	Brigalow, Mount Coolibah	Nil microrelief Nil disturbance Nil erosion	Soft, Nil coarse fragments	A1 0.00-0.10 Abrupt	Loamy sand	Massive, loose	<1% coarse fragments	10YR3/1 Very dark grey Nil mottles / bleaching	Dry, well	Present	0.10 / 8.5	0.00-0.10 0.10-0.20 0.20-0.30 0.50-0.60 0.80-0.88	Nil additional observations
				B21 0.10-0.20 Abrupt	Sandy loam	Moderate, very firm sub- angular <20mm	<1% coarse fragments	10YR3/1 Very dark grey Nil mottles / bleaching	Dry, well – moderate	Present	0.20 / 8.5		
				B22 0.20-0.47 Abrupt	Sandy loam	Moderate, very firm sub- angular <10mm	<10% coarse fragments	10YR3/1 Very dark grey Nil mottles / bleaching	Dry, well – moderate	Present	0.30 / 8.5		
				B23 0.47-0.88 EOBH	Sandy loam	Moderate, very firm sub- angular <10mm	<20% coarse fragments	10YR4/2 Brown Nil mottles / bleaching	Dry, well – moderate	Present – 0.60mbgl	0.60 / 8.5		



## SITE N18

<b>Map Unit</b> 2	<b>Location (GDA94 ZONE 55):</b> 643600mE 7514680mN	<b>Aust. Soil Class.:</b> Black Sodosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 06/06/2019
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**Landscape**



**Surface**



**Soil Profile**



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
GUP mid slope <1% / <1%	Brigalow, Mount Coolibah	Nil micro relief Nil disturbance Nil erosion	Soft, Nil coarse fragments	A1 0.00-0.14 Abrupt	Loamy sand	Massive, loose	<1% coarse fragments	10YR3/1 Very dark grey Nil mottles / bleaching	Dry, well	Present	0.10 / 8.5	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil additional observations
				B21 0.14-0.32 Abrupt	Sandy loam	Moderate, very firm sub- angular <20mm	<1% coarse fragments	10YR3/1 Very dark grey Nil mottles / bleaching	Dry, well – moderate	Present	0.20 / 8.5		
				B22 0.32-0.60 Diffused	Sandy loam	Moderate, very firm sub- angular <10mm	<10% coarse fragments	10YR3/1 Very dark grey 2% 10YR6/4 mottle. Nil bleaching	Dry, well – moderate	Present	0.30 / 8.5		
				B23 0.60-1.00 EOBH	Sandy loam	Moderate, very firm sub- angular <10mm	<20% coarse fragments	10YR4/2 Brown Nil mottles / bleaching	Dry, well – moderate	Present – 0.60mbgl	0.60 / 8.5		

## SITE N19

<b>Map Unit</b> 2	<b>Location (GDA94 ZONE 55):</b> 643668mE 7514813mN	<b>Aust. Soil Class.:</b> Black Sodosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 06/06/2019
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Landscape



Surface



Soil Profile



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
GUP Upper slope <2% / <2%	Brigalow, Mount Coolibah	Nil micro relief Nil disturbance Nil erosion	Soft, Nil coarse fragments	A1 0.00-0.18 Abrupt	Loamy sand	Massive, loose	<1% coarse fragments	10YR3/1 Very dark grey Nil mottles / bleaching	Dry, well	Present	0.10 / 8.5	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-0.95	Nil additional observations
				B21 0.18-0.33 Abrupt	Sandy loam	Moderate, very firm sub-angular <20mm	<1% coarse fragments	10YR3/1 Very dark grey Nil mottles / bleaching	Dry, well – moderate	Present	0.20 / 8.5		
				B22 0.33-0.68 Diffuse	Sandy loam	Moderate, very firm sub-angular <10mm	<10% coarse fragments	10YR3/1 Very dark grey 2% 10YR6/4 mottle. Nil bleaching	Dry, well – moderate	Present	0.30 / 8.5		
				B23 0.68-0.95 EOBH	Sandy loam	Moderate, very firm sub-angular <10mm	<20% coarse fragments	10YR4/2 Brown Nil mottles / bleaching	Dry, well – moderate	Present – 0.60mbgl	0.60 / 8.5		



## SITE N20

<b>Map Unit</b> 4	<b>Location (GDA94 ZONE 55):</b> 642943mE 7513907mN	<b>Aust. Soil Class.:</b> Black Dermosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 07/06/2019
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**Landscape**



**Surface**



**Soil Profile**



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Grazing Alluvial near stream channel 1% / 0%	Brigalow	Nil microrelief Nil disturbance Nearby sheet / gully erosion	Soft, <10% coarse fragments <5mm	A1 0.00-0.12 Abrupt	Sandy loam	Weak to moderate, soft sub-rounded <10mm	Nil inclusions / segregations	10YR3/1 Very dark grey Nil mottles / bleaching	Dry, well	Present	0.10 / 8.5	0.00-0.10 0.20-0.30 0.50-0.60 0.75-0.85 0.90-1.00	Nil additional observations
				B21 0.12-0.37 Abrupt	Sandy loam	Moderate, firm sub-rounded <10mm	Nil inclusions / segregations	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Dry, well – moderate	Present	0.20 / 8.5		
				B22 0.37-0.68 Abrupt	Sandy loam	Moderate, firm sub-rounded <20mm	<2% calcium carbonate	7.5YR3/2 Dark brown Nil mottle / bleaching	Dry, well – moderate	Present	0.30 / 8.5		
				B23 0.68-0.85 Abrupt	Sandy clay loam	Moderate, very firm sub-rounded <20mm	<20% calcium carbonate	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Dry, well – moderate	Present	-		
				B24 0.85-1.00 EOBH	Sandy clay loam	Moderate, very firm sub-rounded <20mm	<5% calcium carbonate	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Dry, well – moderate	-	0.90 / 8.5		



## SITE N21

<b>Map Unit</b> 4	<b>Location (GDA94 ZONE 55):</b> 642847mE 7513907mN	<b>Aust. Soil Class.:</b> Black Dermosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 07/06/2019
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**Landscape**



**Surface**



**Soil Profile**



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Grazing Alluvial near stream channel 1% / 0%	Brigalow	Nil microrelief Nil disturbance Nearby sheet / gully erosion	Soft, <10% coarse fragments <5mm	A1 0.00-0.10 Abrupt	Sandy loam	Weak to moderate, soft sub-rounded <10mm	Nil inclusions / segregations	10YR3/1 Very dark grey Nil mottles / bleaching	Dry, well	Present	0.10 / 7.5	0.00-0.10	Nil additional observations
				B21 0.10-0.40 Abrupt	Sandy loam	Moderate, firm sub- rounded <10mm	Nil inclusions / segregations	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Dry, well – moderate	Present	0.20 / 8.5	0.20-0.30	
				B22 0.40-0.58 Abrupt	Sandy loam	Moderate, firm sub- rounded <20mm	<2% calcium carbonate	7.5YR3/2 Dark brown Nil mottle / bleaching	Dry, well – moderate	Present	0.30 / 8.5	0.50-0.60	
				B23 0.58-0.90 Abrupt	Sandy clay loam	Moderate, very firm sub-rounded <20mm	10% calcium carbonate	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Dry, well – moderate	Present	-	0.80-0.90	
				B24 0.90-1.00 EOBH	Sandy clay loam	Moderate, very firm sub-rounded <20mm	<5% calcium carbonate	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Dry, well – moderate			0.90-1.00	

## SITE N22

<b>Map Unit</b> 4	<b>Location (GDA94 ZONE 55):</b> 642838mE 7513991mN	<b>Aust. Soil Class.:</b> Black Dermosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 07/06/2019
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**Landscape**



**Surface**



**Soil Profile**



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Grazing Depression <1% / <1%	Brigalow woodlands	Nil microrelief Semi disturbance Minor sheet erosion	Soft, <10% coarse fragments <5mm	A1 0.00-0.11 Abrupt	Sandy loam	Weak to moderate, soft sub- rounded <10mm	Nil inclusions / segregations	10YR3/1 Very dark grey Nil mottles / bleaching	Dry, well	Present	0.10 / 7.5	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil additional observations
				B21 0.11-0.48 Abrupt	Sandy loam	Moderate, firm sub- rounded <10mm	Nil inclusions / segregations	10YR3/1 Very dark grey Nil mottles / bleaching	Dry, well – moderate	Present	0.30 / 8.5		
				B22 0.48-1.00 EOBH	Sandy clay loam	Moderate, very firm sub- rounded <20mm	<5% calcium carbonate	10YR3/1 Very dark grey Nil mottles / bleaching	Dry, well – moderate	Present	0.60 / 8.5 0.90 / 8.5		



## SITE N23

<b>Map Unit</b> 11	<b>Location (GDA94 ZONE 55):</b> 642506mE 7511103mN	<b>Aust. Soil Class.:</b> Grey Dermosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 07/06/2019
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**Landscape**



**Surface**



**Soil Profile**



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Grazing Depression Alluvial / stream channel nearby <1% / <1%	Mixed vegetation	Nil microrelief Forage cropping nearby disturbance Nil erosion	Firm, crust with minor self-mulching Nil coarse fragments	A1 0.00-0.12 Abrupt	Clay loam	Weak, soft sub- rounded <10mm	Nil inclusions / segregations	10YR3/1 Very dark grey Nil mottles / bleaching	Dry, well	Present	0.10 / 8.5	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil additional observations
				B21 0.12-0.48 gradual	Light clay	Weak to moderate, firm sub- rounded <10mm	<5% weathered rock	10YR4/2 Dark greyish brown Nil mottles / bleaching	Dry, well – moderate	Present	0.30 / 8.5		
				B22 0.48-1.00 EOBH	Light clay	Strong, very firm sub- rounded <20mm	<5% calcium carbonate	10YR4/2 Dark greyish brown Nil mottles / bleaching	Dry, well – moderate	Present	0.60 / 8.5 0.90 / 8.5		

## SITE N24

<b>Map Unit</b> 11	<b>Location (GDA94 ZONE 55):</b> 642250mE 7511049mN	<b>Aust. Soil Class.:</b> Grey Dermosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 07/06/2019
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**Landscape**



**Surface**



**Soil Profile**



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Grazing Depression Alluvial / stream channel nearby <1% / <1%	Mixed vegetation	Nil microrelief Forage cropping nearby disturbance Nil erosion	Firm, crust Nil coarse fragments	A1 0.00-0.15 Abrupt	Clay loam	Weak, soft sub- rounded <10mm	Nil inclusions / segregations	10YR3/1 Very dark grey Nil mottles / bleaching	Dry, well	Present	0.10 / 8.5	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil additional observations
				B21 0.15-0.50 gradual	Light clay	Weak to moderate, firm sub- rounded <10mm	<5% calcium carbonate	10YR4/2 Dark greyish brown Nil mottles / bleaching	Dry, well – moderate	Present	0.30 / 8.5		
				B22 0.50-1.00 EOBH	Light clay	Strong, very firm sub- rounded <20mm	Nil inclusions / segregations	10YR4/2 Dark greyish brown Nil mottles / bleaching	Dry, well – moderate	Present	0.60 / 8.5 0.90 / 8.5		



## SITE N25

<b>Map Unit</b> 11	<b>Location (GDA94 ZONE 55):</b> 642810mE 7511185mN	<b>Aust. Soil Class.:</b> Grey Dermosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 28/06/2019
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**Landscape**



**Surface**



**Soil Profile**



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Grazing Depression Alluvial / stream channel nearby <1% / <1%	Mixed vegetation	Nil microrelief Forage cropping nearby disturbance Nil erosion	Firm Nil coarse fragments	A1 0.00-0.12 Abrupt	Clay loam	Weak, soft sub- rounded <10mm	Nil inclusions / segregations	10YR3/1 Very dark grey Nil mottles / bleaching	Dry, well	Present	0.10 / 8.5	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil additional observations
				B21 0.12-0.62 gradual	Light clay	Weak to moderate, firm sub- rounded <10mm	Nil inclusions / segregations	10YR4/2 Dark greyish brown Nil mottles / bleaching	Dry, well – moderate	Present	0.30 / 8.5		
				B22 0.62-1.00 EOBH	Light clay	Strong, very firm sub- rounded <20mm	<5% calcium carbonate	10YR4/2 Dark greyish brown Nil mottles / bleaching	Dry, well – moderate	Present	0.60 / 8.5 0.90 / 8.5		



## SITE N26

<b>Map Unit</b> 6	<b>Location (GDA94 ZONE 55):</b> 642370mE 7512434mN	<b>Aust. Soil Class.:</b> Black Dermosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 28/06/2019
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**Landscape**



**Surface**



**Soil Profile**



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Grazing GUP Lower slope 1% / 1%	Short grasses	Nil microrelief Extensive disturbance Nil erosion	Firm, crust Nil coarse fragments	A1 0.00-0.14 Clear	Sandy clay	Weak, soft sub- rounded <10mm	Nil inclusions / segregations	10YR3/1 Very dark grey Nil mottles/bleach	Dry, moderate	Few fine	0.10 / 6.0	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil additional observations
				B21 0.14-0.33 clear	Medium clay	Weak to moderate, firm sub- rounded <10mm	Nil inclusions / segregations	10YR2/2 Very dark brown Nil mottles/bleach	Dry, moderate	Very fine, very few	0.30 / 6.5		
				B22 0.33-0.90 gradual	Medium clay	Moderate, firm sub- rounded <20mm	Nil inclusions / segregations	10YR3/3 Dark brown Nil mottles/bleach	Dry, moderate	Very fine, very few	0.60 / 7.0		
				B23 0.90-1.00 EOBH	Medium clay	Moderate, very firm sub- rounded <20mm	<2% calcium carbonate	10YR3/3 Dark brown Nil mottles/bleach	Dry, moderate	Very fine, very few	0.90 / 7.5		

## SITE N27

<b>Map Unit</b> 6	<b>Location (GDA94 ZONE 55):</b> 642614mE 7510764mN	<b>Aust. Soil Class.:</b> Black Dermosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 28/06/2019
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Landscape



Surface



Soil Profile



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Mid-slope, 1% slope	Forage cropping	Nil Microrelief  Nil erosion  Extensively cleared	Firm, Nil coarse fragments	A1 0.0 – 0.13 Abrupt	Sandy clay loam	Weak, sub- rounded peds 5-20 mm, firm	Nil inclusions or segregations	10YR3/1 Very dark grey Nil mottles	Humid, well drained	Fine, very few	0.10 / 6.5	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil additional observations
				B21 0.13 – 0.50 gradual	Sandy clay loam	Moderate, peds 30-40 mm, very firm	Nil inclusions or segregations	10YR2/1 Black Nil mottles	Humid, well drained	Nil roots	0.30 / 6.5		
				B22 0.50 – 0.75 clear	Light clay, sandy	Subangular blocky, moderate, peds <20 mm, very firm	<2% calcium carbonate	10YR2/1 Nil mottles Black	Humid, moderately well drained	Nil roots	0.60 / 6.5		
				B23 0.75 – 1.00 EOBH	Medium clay, sandy	Subangular blocky, moderate, peds <20 mm, very firm	<2% calcium carbonate	10YR3/1 Very dark grey Nil mottles	Humid, moderately well drained	Nil roots	0.90 / 6.5		



## SITE N28

<b>Map Unit</b> 10	<b>Location (GDA94 ZONE 55):</b> 643924mE 7513310mN	<b>Aust. Soil Class.:</b> Black Sodosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 28/07/2019
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**Landscape**



**Surface**



**Soil Profile**



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Grazing GUP lower slope <2% / <2%	Eucalyptus species	Nil microrelief Semi disturbed, contour banks nearby	Firm, Nil coarse fragments	A11 0.0 – 0.08 Abrupt	Sandy clay loam	Massive	Nil inclusions or segregations	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Dry, well drained	Present	0.10 / 7.5	0.00-0.05 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil additional observations
				A12 0.08 – 0.35 gradual	Sandy clay loam	Weak, sub- rounded peds <10 mm	Nil inclusions or segregations	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Dry, well drained	Present	0.20 / 7.5		
				B22 0.35 – 0.60 gradual	Sandy clay loam	Subangular blocky, moderate, peds <20 mm, firm	Nil inclusions or segregations	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Dry, well drained	Present	0.30 / 7.5		
				B23 0.60 – 1.00 EOBH	Medium clay, sandy	Subangular blocky, moderate, peds <20 mm, firm	<15% calcium carbonate	10YR3/3 Dark brown Nil mottles / bleaching	Dry, well – moderate drained	Present	0.60 / 7.5 0.90 / 7.5		

## SITE N29

<b>Map Unit</b> 9	<b>Location (GDA94 ZONE 55):</b> 643062mE 7512049mN	<b>Aust. Soil Class.:</b> Black Vertosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 28/06/2019
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**Landscape**



**Surface**



**Soil Profile**



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Cropping / Grazing GUP mid slope 2% / 2%	Cropping	Nil microrelief Extensive disturbed, contour banks nearby	Cracking, self mulching Nil coarse fragments	A11 0.0 – 0.11 Abrupt	Light medium clay	Moderate, firm, sub- rounded peds <10 mm	<1% coarse fragments <2mm	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Dry, well drained	Present	0.10 / 8.0	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil additional observations
				B21 0.11 – 0.35 Abrupt	Medium clay	Moderate - strong, firm, sub-rounded peds 20 mm	<2% calcium carbonate	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Dry, well- moderate drained	Present	0.30 / 8.0		
				B22 0.35 – 0.66 Clear	Medium clay	Moderate - strong, firm, sub-rounded peds 20 mm	<30% calcium carbonate	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Dry, well- moderate drained	Present	0.60 / 8.0		
				B23 0.66 – 1.00 EOBH	Medium clay	Moderate - strong, firm, sub-rounded peds 20 mm	<20% calcium carbonate	10YR4/4 Dark yellowish brown Nil mottles / bleaching	Dry, well- moderate drained	Nil	0.90 / 8.0		



## SITE N30

<b>Map Unit</b> 9	<b>Location (GDA94 ZONE 55):</b> 643464mE 7512936mN	<b>Aust. Soil Class.:</b> Black Vertosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 29/06/2019
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**Landscape**



**Surface**



**Soil Profile**



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Cropping / Grazing GUP upper slope 2% / 2%	Cropping	Nil microrelief Extensive disturbed, contour banks nearby	Cracking, self mulching, Nil coarse fragments	A11 0.0 – 0.11 Abrupt	Light medium clay	Moderate, firm, sub- rounded peds <10 mm	<1% coarse fragments <2mm	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Dry, well drained	Present	0.10 / 8.0	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil additional observations
				B21 0.11 – 0.35 Abrupt	Medium clay	Moderate - strong, firm, sub-rounded peds 20 mm	<2% calcium carbonate	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Dry, well- moderate drained	Present	0.30 / 8.0		
				B22 0.35 – 0.66 Clear	Medium clay	Moderate - strong, firm, sub-rounded peds 20 mm	<30% calcium carbonate	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Dry, well- moderate drained	Present	0.60 / 8.0		
				B23 0.66 – 1.00 EOBH	Medium clay	Moderate - strong, firm, sub-rounded peds 20 mm	<10% calcium carbonate	10YR4/4 Dark yellowish brown Nil mottles / bleaching	Dry, well- moderate drained	Nil	0.90 / 8.0		

## SITE N31

<b>Map Unit</b> 9	<b>Location (GDA94 ZONE 55):</b> 643487mE 7512205mN	<b>Aust. Soil Class.:</b> Black Vertosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 29 29/06/2019
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**Landscape**



**Surface**



**Soil Profile**



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Cropping / Grazing GUP Lower slope / flat plain <1% / 1%	Cropping	Nil microrelief Extensive disturbed, contour banks nearby	Firm, self mulching Nil coarse fragments	A11 0.0 – 0.10 Abrupt	Light clay	Weak, firm, sub- rounded peds <10 mm	Nil inclusions or segregations	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Dry, well drained	Present	0.10 / 8.0	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil additional observations
				B21 0.11 – 0.50 Abrupt	Medium clay	Moderate - strong, firm, sub- angular peds <20 mm	Nil inclusions or segregations	10YR3/1 Very dark grey Nil mottles / bleaching	Dry, well- moderate drained	Present	0.30 / 8.0		
				B22 0.50 – 1.00 EOBH	Medium clay	Moderate - strong, firm, sub- angular peds <20 mm	<2% calcium carbonate	10YR3/1 Very dark grey Nil mottles / bleaching	Dry, well- moderate drained	Present	0.60 / 7.0 0.90 / 7.0		



## SITE N32

<b>Map Unit</b> 9	<b>Location (GDA94 ZONE 55):</b> 644077mE 7512794mN	<b>Aust. Soil Class.:</b> Black Vertosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 29/06/2019
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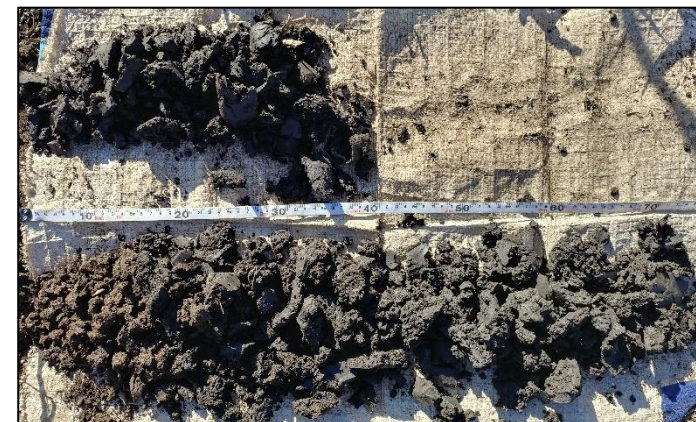
**Landscape**



**Surface**



**Soil Profile**



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Cropping / Grazing GUP Lower slope / flat plain <1% / 1%	Cropping	Nil microrelief Extensive disturbed, contour banks nearby	Firm, self mulching Nil coarse fragments	A11 0.0 – 0.10 Abrupt	Light clay	Weak, firm, sub- rounded peds <10 mm	Nil inclusions or segregations	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Dry, well drained	Present	0.10 / 8.0	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil additional observations
				B21 0.11 – 0.53 Abrupt	Medium clay	Moderate - strong, firm, sub- angular peds 20-40 mm	Nil inclusions or segregations	10YR3/1 Very dark grey Nil mottles / bleaching	Dry, well- moderate drained	Present	0.30 / 8.0		
				B22 0.53 – 1.00 EOBH	Medium clay	Moderate - strong, firm, sub- angular peds 20-40 mm	<2% calcium carbonate	10YR3/1 Very dark grey Nil mottles / bleaching	Dry, well- moderate drained	Present	0.60 / 7.0 0.90 / 7.0		

## SITE N33

<b>Map Unit</b> 9	<b>Location (GDA94 ZONE 55):</b> 643707mE 7512426mN	<b>Aust. Soil Class.:</b> Black Vertosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 29/06/2019
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**Landscape**



**Surface**



**Soil Profile**



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Cropping / Grazing GUP Lower slope / flat plain <1% / 1%	Cropping	Nil microrelief Extensive disturbed, contour banks nearby	Self-mulching, firm, Nil coarse fragments	A11 0.0 – 0.12 Abrupt	Light clay	Weak, firm, sub-rounded peds <10 mm	Nil inclusions / segregations	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Dry, well drained	Present	0.10 / 8.0	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil additional observations
				B21 0.12 – 0.45 Abrupt	Medium clay	Moderate - strong, firm, sub-angular peds 20-40 mm	Nil inclusions / segregations	10YR3/1 Very dark grey Nil mottles / bleaching	Dry, well- moderate drained	Present	0.30 / 8.0		
				B22 0.45 – 0.60 Abrupt	Medium clay	Moderate - strong, firm, sub-angular peds 30-60 mm	Nil inclusions / segregations	10YR3/1 Very dark grey Nil mottles / bleaching	Dry, well- moderate drained	Present	0.60 / 7.0		
				B22 0.60 – 1.00 EOBH	Medium clay	Moderate - strong, firm, sub-angular peds 30-60 mm	<2% calcium carbonate	10YR3/1 Very dark grey Nil mottles / bleaching	Dry, well- moderate drained	Present	0.90 / 7.0		



## SITE N34

<b>Map Unit</b> 9	<b>Location (GDA94 ZONE 55):</b> 643069mE 7512379mN	<b>Aust. Soil Class.:</b> Black Vertosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 29/06/2019
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### Landscape



### Surface



### Soil Profile



<u>Land use</u> <u>Landform</u> <u>Pattern,</u> <u>Element,</u> <u>Slope</u>	<u>Vegetation</u>	<u>Microrelief</u> <u>Disturbance</u> <u>Erosion</u>	<u>Surface</u> <u>condition,</u> <u>surface rock</u>	<u>Soil Profile Description</u>									
				<u>Horizon</u> <u>Depth (m),</u> <u>Boundary</u>	<u>Field</u> <u>Texture</u>	<u>Structure,</u> <u>Strength</u>	<u>Inclusions</u> <u>Segregations</u>	<u>Colour, Mottle,</u> <u>Bleaching</u>	<u>Moisture,</u> <u>Drainage</u>	<u>Roots</u>	<u>Depth (m) /</u> <u>Field pH</u>	<u>Sample (m)</u>	<u>Observations</u>
Grazing GUP mid slope 2% / 2%	Grasses, tall woodland nearby	Nil microrelief Extensive disturbed, contour banks nearby	Self mulching, firm, Nil coarse fragments	A11 0.0 – 0.20 Abrupt	Light medium clay	Moderate, firm, sub- rounded peds < 10 mm	Nil inclusions / segregations	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Dry, well drained	Present	0.10 / 8.0	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil additional observations
				B21 0.20 – 0.46 Abrupt	Medium clay	Moderate - strong, firm, sub-rounded peds 20 mm	Nil inclusions / segregations	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Dry, well- moderate drained	Present	0.30 / 8.0		
				B22 0.46 – 0.80 Abrupt	Medium clay	Moderate - strong, firm, sub-rounded peds 20 mm	<2% calcium carbonate	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Dry, well- moderate drained	Present	0.60 / 8.0		
				B23 0.80 – 1.00 EOBH	Medium clay	Moderate - strong, firm, sub-rounded peds 20 mm	<2% calcium carbonate	10YR4/4 Dark yellowish brown Nil mottles / bleaching	Dry, well- moderate drained	Nil	0.90 / 8.0		

## SITE N35

<b>Map Unit</b> 12	<b>Location (GDA94 ZONE 55):</b> 643659mE 7511986mN	<b>Aust. Soil Class.:</b> Black Vertosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 29/06/2019
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**Landscape**



**Surface**



**Soil Profile**



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregation s	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Cropping / Grazing GUP mid slope 2% / 2%	Cropping	Nil microrelief Extensive disturbed, Nil erosion	Self-mulching, crust, Nil coarse fragments	A11 0.0 – 0.04 Abrupt	Light medium clay	Moderate, firm, sub-rounded peds 20-50 mm	Nil inclusions / segregations	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Dry, well drained	Present	0.10 / 8.0	0.00-0.04 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil additional observations
				A12 0.04 – 0.20 Abrupt	Medium clay	Moderate, firm, sub-rounded peds 50-80 mm	Nil inclusions / segregations	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Dry, well- moderate drained	Present	0.30 / 8.0		
				B21 0.20 – 0.45 Abrupt	Medium heavy clay	Moderate, - strong firm, sub-rounded peds 50-80 mm	Nil inclusions / segregations	10YR2/1 Black Nil mottles / bleaching	Dry, well- moderate drained	Present	0.60 / 8.0		
				B22 0.45 – 1.00 EOBH	Medium heavy clay	Moderate, - strong firm, sub-rounded peds 50-80 mm	Nil inclusions / segregations	10YR2/1 Black Nil mottles / bleaching	Dry, well- moderate drained	Nil	0.90 / 8.0		



## SITE N36

<b>Map Unit</b> 12	<b>Location (GDA94 ZONE 55):</b> 644933mE 7511241mN	<b>Aust. Soil Class.:</b> Black Vertosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 30/06/2019
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**Landscape**



**Surface**



**Soil Profile**



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregation s	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Cropping / Grazing GUP mid slope 2% / 2%	Cropping	Nil microrelief Extensive disturbed, Nil erosion	Self-mulching, crust, Nil coarse fragments	A11 0.0 – 0.06 Abrupt	Light medium clay	Moderate, firm, sub-rounded peds 20-50 mm	Nil inclusions / segregations	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Dry, well drained	Present	0.10 / 8.0	0.00-0.05 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil additional observations
				A12 0.06 – 0.22 Abrupt	Medium clay	Moderate, firm, sub-rounded peds 50-80 mm	Nil inclusions / segregations	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Dry, well- moderate drained	Present	0.30 / 8.0		
				B21 0.22 – 0.50 Abrupt	Medium heavy clay	Moderate, - strong firm, sub-rounded peds 50-80 mm	Nil inclusions / segregations	10YR2/1 Black Nil mottles / bleaching	Dry, well- moderate drained	Present	0.60 / 8.0		
				B22 0.50 – 1.00 EOBH	Medium heavy clay	Moderate, - strong firm, sub-rounded peds 50-80 mm	Nil inclusions / segregations	10YR2/1 Black Nil mottles / bleaching	Dry, well- moderate drained	Nil	0.90 / 8.0		

## SITE N37

<b>Map Unit</b> 12	<b>Location (GDA94 ZONE 55):</b> 643706mE 7511439mN	<b>Aust. Soil Class.:</b> Black Vertosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 30/06/2019
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**Landscape**



**Surface**



**Soil Profile**



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Cropping / Grazing GUP mid slope 2% / 2%	Cropping	Nil microrelief Extensive disturbed, Nil erosion	Self-mulching, crust, Nil coarse fragments	A11 0.00 – 0.05 Abrupt	Light medium clay	Moderate, firm, sub-rounded peds 20-50 mm	Nil inclusions / segregations	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Dry, well drained	Present	0.10 / 8.0	0.00-0.05 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil additional observations
				A12 0.05 – 0.20 Abrupt	Medium clay	Moderate, firm, sub-rounded peds 50-80 mm	Nil inclusions / segregations	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Dry, well- moderate drained	Present	0.30 / 8.0		
				B21 0.20 – 0.47 Abrupt	Medium heavy clay	Moderate, - strong firm, sub-rounded peds 50-80 mm	Nil inclusions / segregations	10YR2/1 Black Nil mottles / bleaching	Dry, well- moderate drained	Present	0.60 / 8.0		
				B22 0.47 – 1.00 EOBH	Medium heavy clay	Moderate, - strong firm, sub-rounded peds 50-80 mm	Nil inclusions / segregations	10YR2/1 Black Nil mottles / bleaching	Dry, well- moderate drained	Nil	0.90 / 8.0		



## SITE N38

<b>Map Unit</b> 15	<b>Location (GDA94 ZONE 55):</b> 645726mE 7510395mN	<b>Aust. Soil Class.:</b> Black Vertosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 30/06/2019
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Landscape



Surface



Soil Profile



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Grazing GUP Lower slope to depression 1% / 2%	Mixed vegetation, eucalyptus species, Grasses	Nil microrelief Semi disturbed, Nil erosion	Crust, <2% coarse fragments <5mm	A11 0.0 – 0.12 Abrupt	Light clay	Moderate, firm, sub- angular <20 mm	Nil inclusions / segregations	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Dry, well drained	Present	0.10 / 7.0	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil additional observations
				B21 0.12 – 0.90 Abrupt	Medium clay	Moderate- strong, strong, sub- angular <20 mm	Nil inclusions / segregations	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Dry, well- moderate drained	Present	0.30 / 7.5 0.60 / 7.5		
				B22 0.90 – 1.00 EOBH	Medium clay	Moderate- strong, strong, sub- angular <20 mm	<2% calcium carbonate	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Dry, well- moderate drained	Present	0.90 / 8.0		

## SITE N39

<b>Map Unit</b> 15	<b>Location (GDA94 ZONE 55):</b> 645496mE 7510399mN	<b>Aust. Soil Class.:</b> Black Vertosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 30/06/2019
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**Landscape**



**Surface**



**Soil Profile**



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Grazing GUP Lower slope to depression 1% / 2%	Mixed vegetation, eucalyptus species, Grasses	Nil microrelief Semi disturbed, Nil erosion	Crust, <2% coarse fragments <5mm	A11 0.0 – 0.13 Abrupt	Light clay	Moderate, firm, sub- angular <20 mm	Nil inclusions / segregations	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Dry, well drained	Present	0.10 / 7.0	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil additional observations
				B21 0.13 – 0.85 Abrupt	Medium clay	Moderate- strong, strong, sub- angular <20 mm	Nil inclusions / segregations	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Dry, well- moderate drained	Present	0.30 / 7.5 0.60 / 7.5		
				B22 0.85 – 1.00 EOBH	Medium clay	Moderate- strong, strong, sub- angular <20 mm	<2% calcium carbonate	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Dry, well- moderate drained	Present	0.90 / 8.0		



## SITE N40

<b>Map Unit</b> 15	<b>Location (GDA94 ZONE 55):</b> 644518mE 7510978mN	<b>Aust. Soil Class.:</b> Black Vertosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 30/06/2019
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**Landscape**



**Surface**



**Soil Profile**

Picture not available

Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Grazing GUP mid slope 1% / 2%	Mixed vegetation, eucalyptus species, Grasses	Nil microrelief Semi disturbed, Nil erosion	Crust, <2% coarse fragments <5mm	A11 0.0 – 0.14 Abrupt	Light clay	Moderate, firm, sub- angular <20 mm	Nil inclusions / segregations	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Dry, well drained	Present	0.10 / 7.0	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil additional observations
				B21 0.14 – 1.00 EOBH	Medium clay	Moderate- strong, strong, sub- angular <20 mm	Nil inclusions / segregations	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Dry, well- moderate drained	Present	0.30 / 7.5 0.60 / 7.5 0.90 / 8.0		

## SITE N41

<b>Map Unit</b> 14	<b>Location (GDA94 ZONE 55):</b> 642742mE 7510104mN	<b>Aust. Soil Class.:</b> Red Chromosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 30/06/2019
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Landscape



Surface



Soil Profile



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Grazing GUP Mid - lower slope <2% / <2%	Grasses, shrubs	Nil microrelief Extensive disturbed, Nil erosion	Firm Nil coarse fragments	A11 0.0 – 0.12 Abrupt	Sandy loam	Weak- moderate, firm, sub- rounded <20 mm	Nil inclusions / segregations	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Dry, well drained	Present	0.10 / 6.5	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil additional observations
				B21 0.12 – 0.70 Abrupt	Sandy clay loam	Moderate, firm, sub- angular <20 mm	Nil inclusions / segregations	5YR4/3 Reddish brown Nil mottles / bleaching	Dry, well- moderate drained	Present	0.30 / 7.0 0.60 / 7.5		
				B22 0.70 – 1.00 EOBH	Light clay	Moderate, firm, sub- angular <20 mm	<5% calcium carbonate	7.5YR4/4 Brown Nil mottles / bleaching	Dry, well- moderate drained	Present	0.90 / 7.5		



## SITE N42

<b>Map Unit</b> 14	<b>Location (GDA94 ZONE 55):</b> 642252mE 7510143mN	<b>Aust. Soil Class.:</b> Red Chromosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 01/07/2019
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**Landscape**



**Surface**



**Soil Profile**



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Grazing GUP Mid - lower slope <2% / <2%	Grasses	Nil microrelief Extensive disturbed, Nil erosion	Firm Nil coarse fragments	A11 0.0 – 0.14 Clear	Sandy loam	Weak- moderate, firm, sub- rounded <20 mm	Nil inclusions / segregations	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Dry, well drained	Present	0.10 / 6.5	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil additional observations
				B21 0.14 – 0.70 Abrupt	Light clay	Moderate, firm, sub- angular <20 mm	Nil inclusions / segregations	5YR4/3 Reddish brown Nil mottles / bleaching	Dry, well- moderate drained	Present	0.30 / 7.0 0.60 / 7.5		
				B22 0.70 – 1.00 EOBH	Light clay	Moderate, firm, sub- angular <20 mm	<5% calcium carbonate	7.5YR4/4 Brown Nil mottles / bleaching	Dry, well- moderate drained	Present	0.90 / 7.5		

## SITE N43

<b>Map Unit</b> 10	<b>Location (GDA94 ZONE 55):</b> 643716mE 7513193mN	<b>Aust. Soil Class.:</b> Black Sodosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 011/07/2019
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**Landscape**



**Surface**



**Soil Profile**



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Grazing GUP upper slope <2% / <2%	Eucalyptus species	Nil microrelief Semi disturbed, contour banks nearby Nil erosion	Firm, Nil coarse fragments	A11 0.0 – 0.06 Abrupt	Sandy clay loam	Massive	Nil inclusions or segregations	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Dry, well drained	Present	0.10 / 7.5	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil additional observations
				A12 0.06 – 0.20 gradual	Sandy clay loam	Weak, sub- rounded peds <10 mm	Nil inclusions or segregations	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Dry, well drained	Present	0.20 / 7.5		
				B21 0.20 – 0.46 gradual	Sandy clay loam	Subangular blocky, moderate, peds <20 mm, firm	Nil inclusions or segregations	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Dry, well drained	Present	0.30 / 7.5		
				B22 0.46 – 1.00 EOBH	Medium clay, sandy	Subangular blocky, moderate, peds <20 mm, firm	<20% calcium carbonate	10YR3/3 Dark reddish brown Nil mottles / bleaching	Dry, well – moderate drained	Present	0.60 / 7.5 0.90 / 7.5		



## SITE N44

<b>Map Unit</b> 17	<b>Location (GDA94 ZONE 55):</b> 643817mE 7508323mN	<b>Aust. Soil Class.:</b> Black Vertosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 01/07/2019
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**Landscape**



**Surface**



**Soil Profile**



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Grazing GUP Lower slope 1% / 1%	Short grasses	Nil microrelief Extensive disturbance Nil erosion	Cracking, self- mulching, Nil coarse fragments	A1 0.00-0.15 Abrupt	Light clay	Weak, soft sub- rounded <10mm	Nil inclusions / segregations	10YR3/1 Very dark grey Nil mottles/bleach	Dry, moderate	Few fine	0.10 / 6.0	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil additional observations
				B21 0.15-0.45 Abrupt	Medium clay	Weak to moderate, firm sub- rounded <10mm	Nil inclusions / segregations	10YR2/2 Very dark brown Nil mottles/bleach	Dry, moderate	Very fine, very few	0.30 / 6.5		
				B22 0.45-1.00 EOBH	Medium clay	Moderate, firm sub- rounded <20mm	Nil inclusions / segregations	10YR3/3 Dark brown Nil mottles/bleach	Dry, moderate	Very fine, very few	0.60 / 7.0 0.90 / 7.0		

## SITE N45

<b>Map Unit</b> 10	<b>Location (GDA94 ZONE 55):</b> 643622mE 7513388mN	<b>Aust. Soil Class.:</b> Black Sodosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 01/07/2019
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**Landscape**



**Surface**



**Soil Profile**



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Grazing GUP upper slope <2% / <2%	Eucalyptus species	Nil microrelief Semi disturbed, contour banks nearby	Firm, Nil coarse fragments	A11 0.0 – 0.09 Abrupt	Sandy clay loam	Massive	Nil inclusions or segregations	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Dry, well drained	Present	0.10 / 7.5	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil additional observations
				A12 0.09 – 0.25 gradual	Sandy clay loam	Weak, sub- rounded peds <10 mm	Nil inclusions or segregations	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Dry, well drained	Present	0.20 / 7.5		
				B22 0.25 – 0.50 gradual	Sandy clay loam	Subangular blocky, moderate, peds <20 mm, firm	Nil inclusions or segregations	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Dry, well drained	Present	0.30 / 7.5		
				B23 0.50 – 1.00 EOBH	Medium clay, sandy	Subangular blocky, moderate, peds <20 mm, firm	<20% calcium carbonate	10YR3/3 Dark brown Nil mottles / bleaching	Dry, well – moderate drained	Present	0.60 / 7.5 0.90 / 7.5		



## SITE 4-SCL

<b>Map Unit</b> 17	<b>Location (GDA94 ZONE 55):</b> 643527mE 7507664mN	<b>Aust. Soil Class.:</b> Black Vertosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 30/06/2018
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**Landscape**



**Surface**



**Soil Profile**



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Grazing, Very gently undulating plains, upper slope, <1.0/1.0	Cleared, very sparse mixed regrowth	Nil microrelief Semi cleared, Nil erosion	Cracking, self mulching Nil coarse fragments	A1 0.00-0.14 Abrupt	Light clay	Weak, firm, <10mm sub-angular	Nil inclusion or segregations	10YR3/2 Very dark greyish brown Nil mottles/bleach	Dry, moderate	Fine, few	0.10 / 6.5	0.00-0.10 0.20-0.30 0.50-0.60 0.70-0.80 0.90-1.00	Nil additional observations
				B21 0.14-0.90 Abrupt	Medium clay	Moderate, firm <40% 20-60mm, <20% 60-100 sub- angular blocky peds	<1% calcium carbonate nodules	10YR3/2 Very dark greyish brown Nil mottles/bleach	Dry, moderate	Very fine, very few	0.30 / 6.5 0.60 / 7.5		
				B22 0.90-1.00 EOBH	Medium clay	Moderate, firm <40% 20-60mm, <20% 60-100 sub- angular blocky peds	2% calcium carbonate nodules	10YR4/2 Dark greyish brown Mottles 2% 10YR3/2 Very dark greyish brown Nil bleach	Dry, Imperfect	Very fine, very few	0.90 / 8.0		

## SITE 5-SCL-Depression

<b>Map Unit</b> 16	<b>Location (GDA94 ZONE 55):</b> 642166mE 7508999mN	<b>Aust. Soil Class.:</b> Black Vertosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 04/06/2019
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**Landscape**



**Surface**



**Soil Profile**



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Gently undulating plain 2.0/2.0	Grasses, recent regrowth and shrubs	Microrelief present – Depression <0.2m deep, 40% coverage Extensive clearing Nil Erosion	Self-mulching with cracking Nil coarse fragments	A1 0.00-0.17 Abrupt	Light medium clay	Weak, firm <20mm sub-angular	<1% Calcium carbonate <2mm	10YR3/1 Very dark grey Nil mottle / bleaching	Dry, Well drained	Common, medium	0.10 / 6.5	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil additional observations
				B2 0.17-1.00 EOBH	Medium heavy clay	Moderate, Very firm 20-40mm sub-angular	<2% Calcium carbonate <2mm	10YR3/2 Very dark greyish brown Nil mottle / bleaching	Dry, Moderate drained	Few, medium	0.30 / 6.5 0.60 / 6.5 0.90 / 6.5		



## SITE 5-SCL-Mound

<b>Map Unit</b> 16	<b>Location (GDA94 ZONE 55):</b> 642163mE 7508998mN	<b>Aust. Soil Class:</b> Black Vertosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 04/06/2019
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**Landscape**



**Surface**



**Soil Profile**



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Gently undulating plain, mid-slope 2.0/2.0	101	Microrelief present – Mound 40% coverage Extensive clearing Nil Erosion	Self-mulching with cracking Nil coarse fragments	A1 0.00-0.12 Abrupt	Light clay	Moderate, soft <20mm sub-angular	Nil inclusions and segregations	10YR2/1 Black Nil mottle / bleaching	Humid, Well drained	Common, medium	0.10 / 6.5	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil additional observations
				B21 0.12-0.60 Abrupt	Medium heavy clay	Moderate, Firm <30mm sub-angular	Nil inclusions and segregations	10YR3/1 Very dark grey Nil mottle / bleaching	Humid, Well drained	Few, medium	0.30 / 7.0		
				B22 0.60-1.00 EOBH	Medium heavy clay	Moderate, Firm <30mm sub-angular	<2% Calcium carbonate	10YR3/1 Very dark grey Nil mottle / bleaching	Humid, Well - moderate drained	Few, fine	0.10 / 7.0		

## SITE 6-SCL

<b>Map Unit</b> 13	<b>Location (GDA94 ZONE 55):</b> 641287mE 7510129mN	<b>Aust. Soil Class:</b> Black Vertosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 03/06/2019
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**Landscape**



**Surface**



**Soil Profile**



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Grazing, mid-slope, 2.0/2.0	Grasses	Nil microrelief Extensive disturbance Nil erosion	Humid self- mulching with crust 2-6, fine sand on surface. Coarse fragments` <5 mm <5%	A1 0.00 – 0.15 Abrupt	Light clay, sandy	Weak, firm Subangular blocky, peds 10-30 mm,	Nil inclusions and segregations	10YR2/1 Black Nil mottles / bleaching	Humid, Well – moderate drained	Fine, very few	0.10 / 6.5	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil additional observations
				B21 0.15 – 0.30 Abrupt	Medium heavy clay	Weak, firm Subangular blocky, peds 20-30 mm,	Nil inclusions and segregations	10YR2/1 Black Nil mottles / bleaching	Humid, Well – moderate drained	Fine, very few	0.35 / 7.0		
				B22 0.30 – 0.80 Abrupt	Medium heavy clay	Weak to moderate, very firm Subangular blocky, peds 20-30 mm,	<5% calcium carbonate	10YR2/1 Black Nil mottles / bleaching	Humid, Well – moderate drained	Fine, very few	0.60 / 7.0		
				B23 0.80 – 1.00 EOBH	Medium heavy clay, sandy	Moderate, very firm Subangular blocky, peds 40-60 mm,	Nil inclusions and segregations	10YR4/2 Dark greyish brown Nil mottles / bleaching	Humid, Well – moderate drained	Nil roots	0.90 / 7.5		



## SITE 7-SCL

<b>Map Unit</b> 13	<b>Location (GDA94 ZONE 55):</b> 641298mE 7510328mN	<b>Aust. Soil Class:</b> Black Vertosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 03/06/2019
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**Landscape**



**Surface**



**Soil Profile**



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Cropping, Very gently undulating plain, mid-slope, 1% slope	Forage crops	Nil microrelief Extensive disturbance  Nil erosion	Self-mulching fine sand on surface. Coarse fragments <5 mm <5%	A1 0.00 – 0.14 Abrupt	Light clay, sandy	Subangular blocky, peds 10-30 mm, firm	Nil inclusions and segregations	10YR2/1 Black Nil mottles / bleaching	Humid, well drained	Fine, very few	0.10 / 7.0	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil additional observations
				B21 0.14 – 0.70 Abrupt	Medium heavy clay	Subangular blocky, peds 20-30 mm, strong	<5% calcium carbonate	10YR2/1 Black Nil mottles / bleaching	Humid, well drained	Fine, very few	0.30 / 7.0 0.60 / 6.5		
				B22 0.70 – 1.00 EOBH	Medium heavy clay, sandy	Subangular blocky, peds 40-60 mm, strong	<1% red nodules <2mm	10YR3/1 Very dark grey Nil mottles / bleaching	Humid, well drained	Nil roots	0.90 / 6.5		

## SITE 8-SCL

<b>Map Unit</b> 13	<b>Location (GDA94 ZONE 55):</b> 641694mE 7510274 mN	<b>Aust. Soil Class.:</b> Black Vertosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 03/06/2019
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**Landscape**



**Surface**



**Soil Profile**



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Cropping, mid-slope, 2% slope	Forage crops	Nil microrelief Extensive disturbance Nil erosion	Humid, self- mulching occasional coarse fragments <5mm	A1 0.0 – 0.10 Abrupt	Medium Clay	Subangular blocky, peds 20-30 mm, firm	Nil inclusions and segregations	10YR2/1 Black Nil mottles / bleaching	Humid, well drained	Fine, very few	0.10 / 6.5	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil additional observations
				B21 0.10 – 0.70 Abrupt	Medium heavy clay	Subangular blocky, peds 20-30 mm, strong	Nil inclusions and segregations	10YR2/1 Black Nil mottles / bleaching	Humid, well drained	Fine, very few	0.30 / 6.5 0.60 / 7.0		
				B22 0.70 – 1.00 EOBH	Medium heavy clay	Subangular blocky, peds 40-60 mm, strong	Nil inclusions and segregations	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Humid, well drained	Nil roots	0.90 / 6.5		



## SITE 9-SCL

<b>Map Unit</b> 13	<b>Location (GDA94 ZONE 55):</b> 641919mE 7510236mN	<b>Aust. Soil Class.:</b> Brown Chromosol (Sub-dominant soil, aggregated into Map unit 13)	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 03/06/2019
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**Landscape**



**Surface**



**Soil Profile**



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Cropping, mid-slope, 2% slope	Forage crops	Nil microrelief Nil erosion  Extensively disturbed for cropping	Self-mulching, Nil coarse fragments	A1 0.0 – 0.07 Abrupt	Light clay, sandy	Subangular blocky, peds 20-30 mm, firm	Nil inclusions and segregations	10YR3/2 Greyish brown Nil mottles / bleaching	Humid, well drained	Fine, very few	0.10 / 6.5	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil additional observations
				B21 0.07 – 0.60 Abrupt	Light clay, sandy	Subangular blocky, peds 20-30 mm, strong	20% calcium carbonate	10YR4/3 Brown Mottle: 5% 10YR6/4 light yellowish brown	Humid, moderately well drained	Fine, very few	0.30 / 7.0 0.60 / 7.0		
				B22 0.60 – 1.00 EOBH	Medium clay	Subangular blocky, moderate, peds 40-60 mm, firm	Nil inclusions and segregations	10YR4/4 Dark yellowish brown Nil mottles / bleaching	dry, well drained	Nil roots	0.90 / 7.0		

## SITE 10-SCL

<b>Map Unit</b> 14	<b>Location (GDA94 ZONE 55):</b> 642525mE 7510097mN	<b>Aust. Soil Class.:</b> Red Chromosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 30/06/2018
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**Landscape**



**Surface**



**Soil Profile**



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Grazing Very gently undulating plain, Midslope 2.0/1.0	Buffel grass	Nil microrelief Extensive cleared Nil erosion	Soft, Nil coarse fragments	A1 0.00-0.13 Abrupt	Sandy clay	Moderate, firm, <10mm sub-angular	<1% calcium carbonate nodules	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Dry, moderate	Few, fine	0.10 / 7.0	0.00-0.10	First borehole,
				A2 0.13-0.39 Abrupt	Light sandy clay	Moderate, firm, <10mm sub-angular	Nil inclusion or segregations	10YR3/3 Dark Brown Nil mottles / bleaching	Dry, moderate	Few, fine	0.30 / 7.0	0.20-0.30	0.20 mbgl
				B21 0.39-0.84 Abrupt	Light sandy clay	Moderate, firm, <10mm sub-angular	<10% calcium carbonate nodules	5YR4/4 Reddish brown Nil mottles / bleaching	Dry, moderate	Few, fine	0.60 / 7.5	0.50-0.60	Second
				B22 0.84-1.00 EOBH	Light clay	Moderate, firm, <10mm sub-angular	<2% calcium carbonate nodules	10YR4/4 Dark yellowish brown Nil mottles/bleach	Dry, moderate	Very few, very fine	0.90 / 8.5	0.70-0.80 0.90-1.00	borehole 0.40 mbgl Refusal likely due to roots, no physical barrier



## SITE 32-SCL

<b>Map Unit</b> 6	<b>Location (GDA94 ZONE 55):</b> 641452mE 7512060mN	<b>Aust. Soil Class.:</b> Black Dermosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 05/06/2019
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**Landscape**



**Surface**



**Soil Profile**



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Upper- slope, 2% slope	Grasses, with Brigalow nearby	Nil Microrelief  Nil erosion  Extensively cleared	Firm, Nil coarse fragments	A1 0.0 – 0.12 gradual	Sandy clay loam	Weak, sub- rounded peds <10 mm, soft	Nil inclusions or segregations	10YR2/2 Very dark brown Nil mottles / bleaching	Humid, well drained	Fine, very few	0.10 / 6.5	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil additional observations
				B21 0.12 – 0.22 gradual	Sandy clay loam	Weak, peds <10 mm, very firm	Nil inclusions or segregations	10YR2/2 Very dark brown Nil mottles / bleaching	Humid, well drained	Fine, very few	0.20 / 6.5		
				B22 0.22 – 0.55 gradual	Light clay, sandy	Subangular blocky, moderate, peds <20 mm, very firm	<2% calcium carbonate	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Humid, moderate y well drained	Nil roots	0.30 / 6.5		
				B23 0.55 – 1.00 EOBH	Medium clay, sandy	Subangular blocky, moderate, peds <20 mm, very firm	<2% calcium carbonate	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Humid, moderate y well drained	Nil roots	0.60 / 7.0 0.90 / 6.5		

## SITE 60-SCL

<b>Map Unit</b> 3	<b>Location (GDA94 ZONE 55):</b> 643839mE 7514447mN	<b>Aust. Soil Class.:</b> Black Vertosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 07/06/2019
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**Landscape**



**Surface**



**Soil Profile**



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregation s	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Grazing, upper-slope, 0% / 2% slope	Grasses	Nil microrelief Extensively disturbed Nil erosion	Self-mulching, cracking, Nil coarse fragments	A1 0.0 – 0.13 Abrupt	Light clay	Moderate, Sub- rounded, peds <10 mm, soft	Nil inclusions or segregations	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Dry, well drained	Fine, very few	0.10 / 7.0	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil additional observations
				B21 0.13 – 0.41 Abrupt	Medium clay	Moderate, Subangular blocky, peds <20 mm, firm	Nil inclusions or segregations	10YR2/1 Black Nil mottles / bleaching	Dry, well drained	Very fine, very few	0.30 / 7.5		
				B22 0.41 – 1.00 EOBH	Medium clay	Moderate, Subangular blocky, peds <20 mm, firm	<2% calcium carbonate	10YR2/1 Black Nil mottles / bleaching	Dry, moderately well drained	Nil roots	0.60 / 7.0 0.90 / 7.0		



## SITE 65-SCL

<b>Map Unit</b> 9	<b>Location (GDA94 ZONE 55):</b> 643019mE 7513552mN	<b>Aust. Soil Class.:</b> Black Vertosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 30/06/2018
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**Landscape**



**Surface**



**Soil Profile**



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Cropping Very gently undulating plain Flat plain 1.0/1.0	Cropping, Brigalow 100-200m nearby	Nil microrelief Cropping disturbance Nil erosion	Soft, self-mulching, Nil coarse fragments	A1 0.00-0.11 Abrupt	Light clay	Moderate, weak <10mm sub-angular	Nil inclusions and segregations	10YR3/1 Very dark grey Nil mottles / bleaching	Dry, moderate	Few fine	0.10 / 6.0	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil additional observations
				B21 0.11-0.80 Abrupt	Medium clay	Moderate, weak <10mm sub-angular	Nil inclusions and segregations	10YR2/2 Very dark brown Nil mottles / bleaching	Dry, moderate	Very fine, very few	0.30 / 6.5 0.60 / 7.0		
				B22 0.80-1.00 EOBH	Medium clay	Moderate, weak <10mm sub-angular	2% calcium carbonate nodules	10YR3/3 Dark brown Nil mottles / bleaching	Dry, moderate	Very fine, very few	0.90 / 7.5		

## SITE 77-SCL

<b>Map Unit</b> 18	<b>Location (GDA94 ZONE 55):</b> 641884mE 7512916mN	<b>Aust. Soil Class.:</b> Black Dermosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 07/06/2019
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**Landscape**



**Surface**



**Soil Profile**



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Grazing, Gently undulating plain upper-slope, 1% / 2% slope	Grasses, with Brigalow scrub nearby	Nil microrelief Extensive disturbance Nil erosion	Firm, minor crust Nil coarse fragments	A1 0.0 – 0.13 Abrupt	Sandy clay loam	Weak, Sub- rounded, peds <10 mm, soft	Nil inclusions or segregations	10YR3/1 Very dark grey Nil mottles / bleaching	Humid, well drained	Fine, very few	0.10 / 7.5	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil additional observations
				B21 0.13 – 0.39 gradual	Medium clay	Moderate, Subangular blocky, peds <20 mm, firm	Nil inclusions or segregations	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Dry, well drained	Very fine, very few	0.30 / 7.5		
				B22 0.39 – 0.90 clear	Medium clay	Moderate, Subangular blocky, peds <20 mm, firm	<2% calcium carbonate	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Dry, moderately well drained	Very fine, very few	0.60 / 7.0		
				B23 0.90 – 1.00 EOBH	Medium clay	Strong, Subangular blocky, peds <20 mm, firm	<2% calcium carbonate	10YR4/2 Dark greyish brown Nil mottles / bleaching	Dry, moderately well drained	Very fine, very few	0.90 / 7.0		



## SITE 80-SCL

<b>Map Unit</b> 6	<b>Location (GDA94 ZONE 55):</b> 642045mE 7511689mN	<b>Aust. Soil Class.:</b> Black Dermosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 05/06/2019
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Landscape



Surface



Soil Profile



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Grazing Gently undulating plain Upper- slope, 2% slope	Grasses, with Brigalow nearby	Nil Microrelief  Nil erosion  Extensively cleared	Firm, Nil coarse fragments	A1 0.0 – 0.11 Abrupt	Sandy clay loam	Weak, sub- rounded peds <10 mm, soft	Nil inclusions or segregations	10YR2/2 Very dark brown Nil mottles / bleaching	Humid, well drained	Fine, very few	0.10 / 6.5	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil additional observations
				A2 0.11 – 0.22 clear	Sandy clay loam	Weak, peds <10 mm, very firm	Nil inclusions or segregations	10YR2/2 Nil mottles / bleaching	Humid, well drained	Nil roots	0.20 / 6.5		
				B21 0.22 – 0.49 gradual	Light clay, sandy	Subangular blocky, moderate, peds <20 mm, very firm	<2% calcium carbonate	10YR3/1 Very dark grey Nil mottles / bleaching	Humid, moderately well drained	Nil roots	0.30 / 7.0		
				B22 0.49 – 1.00 EOBH	Medium clay, sandy	Subangular blocky, moderate, peds <20 mm, very firm	<1% calcium carbonate	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Humid, moderately well drained	Nil roots	0.60 / 7.0 0.90 / 6.5		

## SITE 91-SCL

<b>Map Unit</b> 6	<b>Location (GDA94 ZONE 55):</b> 643899mE 7510777mN	<b>Aust. Soil Class.:</b> Black Dermosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 30/06/2018
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**Landscape**



**Surface**



**Soil Profile**



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Grazing, Gently undulating plain, Midslope 2.0/1.0	Cleared, nearby remnant Belah	Nil microrelief Extensive disturbance Nil erosion	Firm, Nil coarse fragments	A1 0.00-0.12 Abrupt	Sandy Clay	Moderate, weak <20mm sub- angular	Nil inclusions and segregations	10YR2/1 Black Nil mottles / bleaching	Dry, moderate	Few, fine	0.10 / 6.0	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil additional observations
				B21 0.12-0.50 Clear	Light sandy clay	Moderate, firm 20- 50mm sub- angular	Nil inclusions and segregations	10YR2/2 Very dark brown Nil mottles / bleaching	Dry, moderate	Few, fine	0.30 / 6.5		
				B22 0.50-1.00 EOBH	Light clay	Moderate, firm 20- 50mm sub- angular blocky	<2% calcium carbonate nodules	10YR3/3 Dark brown Mottles: <2% 10YR5/3 Brown Nil bleach	Dry, moderate	Very few, very fine	0.60 / 7.0 0.60 / 7.5		



## SITE 97-SCL

<b>Map Unit</b> 6	<b>Location (GDA94 ZONE 55):</b> 642351mE 7510427mN	<b>Aust. Soil Class.:</b> Black Dermosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 04/06/2019
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Landscape



Surface



Soil Profile



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Grazing Gently undulating plain Mid-slope, 1%/ 1% slope	Forage cropping	Nil Microrelief Extensive disturbance Nil erosion	Firm, Nil coarse fragments	A1 0.0 – 0.08 Abrupt	Sandy loam	Weak, sub- rounded peds 5-20 mm, firm	Nil inclusions or segregations	10YR3/1 Very dark grey Nil mottles / bleaching	Humid, well drained	Fine, very few	0.05 / 6.5	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil additional observations
				B21 0.08 – 0.47 Abrupt	Sandy clay loam	Moderate, peds 30-40 mm, very firm	Nil inclusions or segregations	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Humid, well drained	Nil roots	0.30 / 6.5		
				B22 0.47 – 0.70 Abrupt	Light clay, sandy	Subangular blocky, moderate, peds <30 mm, very firm	<1% calcium carbonate	10YR2/1 Black Nil mottles / bleaching	Humid, moderately well drained	Nil roots	0.60 / 6.5		
				B23 0.70 – 1.00 EOBH	Medium clay, sandy	Subangular blocky, moderate, peds <20 mm, very firm	<10% calcium carbonate	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Humid, moderately well drained	Nil roots	0.90 / 6.5		

## SITE 99-SCL

<b>Map Unit</b> 6	<b>Location (GDA94 ZONE 55):</b> 7510427mE 7511265mN	<b>Aust. Soil Class.:</b> Black Dermosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 04/06/2019
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**Landscape**



**Surface**



**Soil Profile**



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Grazing Gently undulating plain Mid-slope, <1% / 1% slope	Forage cropping	Nil Microrelief Extensive disturbance Nil erosion	Firm, Nil coarse fragments	A1 0.0 – 0.18 Abrupt	Sandy loam	Weak, sub- rounded peds 5-20 mm, firm	Nil inclusions or segregations	10YR3/1 Very dark grey Nil mottles / bleaching	Humid, well drained	Fine, very few	0.10 / 6.5	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil additional observations
				B21 0.18 – 0.50 Abrupt	Sandy clay loam	Moderate, peds 30-40 mm, very firm	Nil inclusions or segregations	10YR2/2 Very dark brown Nil mottles / bleaching	Humid, well drained	Nil roots	0.30 / 6.5		
				B22 0.50 – 1.00 EOBH	Light clay, sandy	Subangular blocky, moderate, peds <40 mm, very firm	<5% calcium carbonate	10YR3/3 Dark brown Mottles: Nil mottles / bleaching	Humid, moderately well drained	Nil roots	0.60 / 6.5		



## SITE 100-SCL

<b>Map Unit</b> 13	<b>Location (GDA94 ZONE 55):</b> 641820mE 7510822mN	<b>Aust. Soil Class.:</b> Black Vertosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 03/06/2019
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**Landscape**



**Surface**



**Soil Profile**



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Cropping Gently undulating plain, upper-slope, 1% / 2% slope	Forage crops	Nil microrelief Extensive disturbance Nil erosion	Self-mulching, minor crust, Nil coarse fragments	A1 0.0 – 0.17 Abrupt	Light clay	Subangular blocky, weak, peds <20 mm, firm	<5% coarse fragments	10YR3/1 Very dark grey Nil mottles / bleaching	Humid, well drained	Fine, very few	0.10 / 6.5	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil additional observations
				B2 0.17 – 1.00 EOBH	Medium clay	Subangular blocky, strong, weak, peds <30 mm, very firm	<1% coarse fragments	10YR3/1 Very dark grey Nil mottles / bleaching	Humid, Moderately well drained	Nil roots	0.30 / 7.0 0.60 / 7.0 0.90 / 6.5		

## SITE 101-SCL

<b>Map Unit</b> 16	<b>Location (GDA94 ZONE 55):</b> 641451mE 7509683mN	<b>Aust. Soil Class.:</b> Black Vertosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 03/06/2019
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**Landscape**



**Surface**



**Soil Profile**



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Grazing, Gently undulating plain mid-slope, 1% / 2% slope	Grasses, recent regrowth and shrubs	Normal gilgai <0.2 m deep, 30-40% coverage  Nil erosion  Extensively disturbed for cropping	Self-mulching, minor crust, Nil coarse fragments	A1 0.0 – 0.13 Abrupt	Medium Clay	Subangular blocky, moderate, peds <20 mm, soft	Nil inclusions or segregations	10YR3/1 Very dark grey Nil mottles / bleaching	Humid, well drained	Fine, very few	0.10 / 6.5	No samples taken	Nil additional observations
				B21 0.13 – 0.62 Abrupt	Medium clay	Subangular blocky, moderate, peds <30 mm, firm	Nil inclusions or segregations	10YR3/1 Very dark grey Nil mottles / bleaching	Humid, well drained	Nil roots	0.30 / 7.0 0.60 / 7.0		
				B22 0.62 – 1.00 EOBH	Medium clay	Subangular blocky, strong, peds <30 mm, very firm	<2% calcium carbonate	10YR3/1 Very dark grey Nil mottles / bleaching	Humid, moderately well drained	Nil roots	0.90 / 6.5		



## SITE 102-SCL-M (Gilgai mound)

<b>Map Unit</b> 16	<b>Location (GDA94 ZONE 55):</b> 641663mE 7508746mN	<b>Aust. Soil Class.:</b> Black Vertosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 03/06/2019
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Landscape



Surface



Soil Profile



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Grazing, Gently undulating plain mid-slope, 2% / 1%	Grasses, recent regrowth and shrubs	Crabhole gilgai <0.2 m deep, 30% coverage Nil erosion Extensively disturbed	Self-mulching, Nil coarse fragments	A1 0.0 – 0.12 Abrupt	Light clay	Subangular blocky, moderate, peds <20 mm, soft	Nil inclusions or segregations	10YR2/1 Black Nil mottles / bleaching	Humid, well drained	Fine, very few	0.10 / 6.5	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil additional observations
				B21 0.12 – 0.50 Abrupt	Medium heavy clay	Subangular blocky, moderate, peds <30 mm, firm	Nil inclusions or segregations	10YR2/1 Black Nil mottles / bleaching	Humid, well drained	Fine, very few	0.30 / 7.0 0.60 / 7.0		
				B22 0.50 – 1.00 EOBH	Medium heavy clay	Subangular blocky, strong, peds <30 mm, very firm	<2% calcium carbonate	10YR2/1 Black Nil mottles / bleaching	Humid, moderately well drained	Nil roots	0.90 / 6.5		

## SITE 102-SCL-D (Gilgai depression)

<b>Map Unit</b> 16	<b>Location (GDA94 ZONE 55):</b> 641658mE 7508739mN	<b>Aust. Soil Class.:</b> Black Vertosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 03/06/2019
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Landscape



Surface



Soil Profile



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregation s	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Grazing, Gently undulating plain mid-slope, 2%, Gilgai depression	Grasses, recent regrowth and shrubs	Crabhole gilgai <0.2 m deep, 30% coverage Nil erosion Extensively disturbed	Self-mulching, Nil coarse fragments	A1 0.0 – 0.10 Abrupt	Medium Clay	Subangular blocky, moderate, peds <20 mm, soft	Nil inclusions or segregations	10YR2/1 Black Nil mottles / bleaching	Humid, well drained	Fine, very few	0.10 / 6.5	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil additional observations
				B21 0.10 – 0.60 Abrupt	Medium heavy clay	Subangular blocky, moderate, peds <30 mm, firm	Nil inclusions or segregations	10YR2/1 Black Nil mottles / bleaching	Humid, well drained	Fine, very few	0.30 / 7.0 0.60 / 7.0		
				B22 0.60 – 1.00 EOBH	Medium heavy clay	Subangular blocky, strong, peds <30 mm, very firm	<2% calcium carbonate	10YR2/1 Black Nil mottles / bleaching	Humid, moderately well drained	Nil roots	0.90 / 6.5		



## SITE 103-SCL-M (Gilgai mound)

<b>Map Unit</b> 16	<b>Location (GDA94 ZONE 55):</b> 641736mE 7508275mN	<b>Aust. Soil Class.:</b> Black Vertosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 04/06/2019
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Landscape



Surface



Soil Profile



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Grazing Gently undulating plain mid-slope, 2%, Gilgai depression	Grasses, recent regrowth and shrubs	Crabhole gilgai <0.2 m deep, 50% coverage Nil erosion Extensively disturbed	Self-mulching, Nil coarse fragments	A1 0.0 – 0.12 Abrupt	Light clay	Subangular blocky, moderate, peds <10 mm, soft	Nil inclusions or segregations	10YR3/1 Very dark grey Nil mottles / bleaching	Humid, well drained	Fine, very few	0.10 / 6.5	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil additional observations
				B21 0.12 – 0.60 Abrupt	Medium clay	Subangular blocky, moderate, peds <30 mm, firm	Nil inclusions or segregations	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Humid, well drained	Fine, very few	0.30 / 7.0 0.60 / 7.0		
				B22 0.60 – 1.00 EOBH	Medium heavy clay	Subangular blocky, strong, peds <30 mm, very firm	<2% calcium carbonate	10YR4/2 Dark greyish brown Nil mottles / bleaching	Humid, moderately well drained	Nil roots	0.90 / 6.5		

## SITE 103-SCL-D (Gilgai depression)

<b>Map Unit</b> 16	<b>Location (GDA94 ZONE 55):</b> 641732mE 7508275mN	<b>Aust. Soil Class.:</b> Black Vertosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 04/06/2019
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Landscape



Surface



Soil Profile



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Grazing Gently undulating plain mid-slope, 2%, Gilgai depression	Grasses, recent regrowth and shrubs	Crabhole gilgai <0.22 m deep, 50% coverage Nil erosion Extensively disturbed	Self-mulching, Nil coarse fragments	A1 0.0 – 0.10 Abrupt	Light Medium Clay	Subangular blocky, moderate, peds <20 mm, weak	<1% calcium carbonate	10YR3/1 Very dark grey Nil mottles / bleaching	Humid, well drained	Fine, very few	0.10 / 7.0	0.00-0.10 0.20-0.30 0.50-0.60 0.83-0.90 0.90-1.00	Nil additional observations
				B21 0.10 – 0.83 Abrupt	Medium heavy clay	Subangular blocky, moderate, peds 20-40 mm, very firm	<2% calcium carbonate	10YR3/1 Very dark grey Nil mottles / bleaching	Dry, moderately well drained	Fine, very few	0.30 / 6.5 0.60 / 6.5		
				B23 0.83 – 1.00 EOBH	Medium heavy clay	Subangular blocky, strong, peds 20-40 mm, very firm	Nil inclusions or segregations	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Dry, moderately well drained	Nil roots	0.90 / 6.5		



## SITE 110-SCL

<b>Map Unit</b> 17	<b>Location (GDA94 ZONE 55):</b> 644310mE 7508052mN	<b>Aust. Soil Class.:</b> Black Vertosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 30/06/2018
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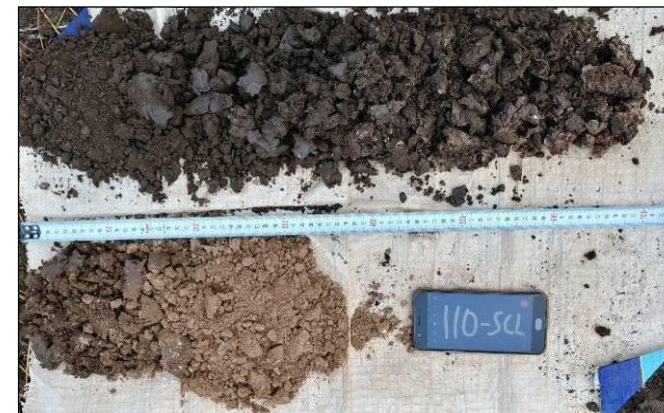
**Landscape**



**Surface**



**Soil Profile**



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Cropping Flat plain, level, 0.0/0.0%	Cropping	Nil microrelief Cropping disturbance Nil erosion	Cracking, surface mulch Nil coarse fragments	A1 0.0-0.13 Abrupt	Light clay	Weak, firm, <10mm sub-angular	2% 2-6mm coarse fragments	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Dry, moderate	Fine, few	0.10 / 6.5	0.00-0.10	Nil additional observations
				B21 0.13-0.38 Abrupt	Medium clay	Moderate, firm <40% 20-60mm, <20% 60-100 sub- angular blocky peds	<1% black nodules <1% calcium carbonate nodules	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Dry, moderate	Very fine, very few	0.30 / 6.5	0.20-0.30	
				B22 0.38-0.82 Abrupt	Medium clay	Moderate, firm <40% 20-60mm, <20% 60-100 sub- angular blocky peds	<5% calcium carbonate nodules	10YR4/2 Dark greyish brown Nil mottles / bleaching	Dry, moderate	Very fine, very few	0.60 / 8.0	0.50-0.60	
				B23 0.82 – 1.00 EOBH	Light clay	Moderate, firm <20mm, sub- angular blocky peds	<2% calcium carbonate nodules	10YR4/4 Dark yellowish brown Nil mottles / bleaching	Dry, Imperfect	Very fine, very few	0.90 / 8.0	0.70-0.80 0.90-1.00	



## SITE 115-SCL

<b>Map Unit</b> 17	<b>Location (GDA94 ZONE 55):</b> 645410mE 7509123mN	<b>Aust. Soil Class.:</b> Black Vertosol	<b>Site Survey Type:</b> Detailed - 50mm hand auger	<b>Survey Date:</b> 30/06/2018
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**Landscape**



**Surface**



**Soil Profile**



Land use Landform Pattern, Element, Slope	Vegetation	Microrelief Disturbance Erosion	Surface condition, surface rock	Soil Profile Description									
				Horizon Depth (m), Boundary	Field Texture	Structure, Strength	Inclusions Segregations	Colour, Mottle, Bleaching	Moisture, Drainage	Roots	Depth (m) / Field pH	Sample (m)	Observations
Cropping Very gently undulating plain Flat plain 1.0/1.0	Cropping	Nil microrelief Cropping disturbance Nil erosion	Soft, loose 2-5% medium pebbles >600mm	A1 0.00-0.16 Abrupt	Light clay	Moderate, weak <10mm sub- angular blocky	<2% calcium carbonate nodules	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Dry, moderate	Few fine	0.10 / 6.0	0.00-0.10 0.20-0.30 0.50-0.60 0.80-0.90 0.90-1.00	Nil additional observations
				B2 0.16-1.00 EOBH	Medium clay	Strong, firm <10mm sub- angular blocky	Nil inclusions and segregations	10YR3/2 Very dark greyish brown Nil mottles / bleaching	Dry, moderate	Very fine, very few	0.30 / 6.5 0.60 / 7.0 0.90 / 7.5		

<b>Site N46</b>	Map Unit: 18	Location (mE/mS GDA94 ZONE 55): 641947 7512737	Australian Soil Class: Black Dermosol	Soil Survey Type: Detailed 50 mm hand auger	Survey Date: 01/05/2021
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**Landscape**



**Surface**



**Soil Profile**

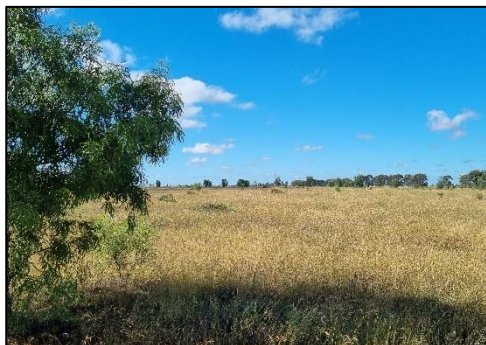


Land use / Landform Pattern / Element / Slope	Vegetation / Microrelief / Disturbance / Erosion	Surface condition / surface rock	Soil Profile Description								
			Horizon / Depth (m / Boundary	Field Texture	Structure / Strength / Pedality	Inclusions / Segregations	Colour / Mottle / Bleaching	Moisture / Drainage	Roots Size / Abundance	Depth (m) / Field pH	Sample (m) / Observations
Grazing Gently undulating plain Mid-slope 2%/2%	Spear grass, sparse brigalow Nil microrelief Extensive clearing	Firm Nil coarse fragments	A1 0.00-0.12 Clear 20-50mm	Clay loam sandy	Moderate Firm Subangular blocky	Nil inclusions or segregations	10YR3/2 Very dark greyish brown Nil mottles or bleaching	Moderately moist Moderately well drained	Fine 1- 2mm Common	6.0	0.00-0.10 0.20-0.30 0.50-0.60 0.70-0.80
			B21 0.10-0.46 Clear 20-50mm	Medium clay	Strong Very firm Angular blocky	Nil inclusions or segregations	10YR3/1 Very dark grey Nil mottles or bleaching	Moderately moist Moderately well drained	Fine 1- 2mm Common	7.5	0.90-1.00
			B22 0.46-0.86 Clear 20-50mm	Medium clay	Strong Very firm	<2% calcium carbonate 2-6mm	10YR3/1 Very dark grey Nil mottles or bleaching	Moderately moist Moderately well drained	Fine 1- 2mm Few	7.5	Rainfall night before
			B23 0.86-1.00 EOBH	Medium clay	Strong Strong	Nil inclusions or segregations	10YR4/2 Dark greyish brown Nil mottles or bleaching	Dry Moderately well drained	Fine 1- 2mm Few	7.5	



<b>Site N47</b>	Map Unit: 19	Location (mE/mS GDA94 ZONE 55): 641755 7513256	Australian Soil Class: Black self-mulching Vertosol	Soil Survey Type: Detailed 50 mm hand auger	Survey Date: 01/05/2021
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**Landscape**



**Surface**



**Soil Profile**



Land use / Landform Pattern / Element / Slope	Vegetation / Microrelief / Disturbance / Erosion	Surface condition / surface rock	Soil Profile Description								
			Horizon / Depth (m / Boundary	Field Texture	Structure / Strength / Pedality	Inclusions / Segregations	Colour / Mottle / Bleaching	Moisture / Drainage	Roots Size / Abundance	Depth (m) / Field pH	Sample (m) / Observations
Grazing Gently undulating plain Flat 0%/<1%	Brigalow nearby Nil microrelief Extensive clearing	Self-mulching Nil coarse fragments Moist	A1 0.00-0.08 Clear 20-50mm	Light clay	Moderate Firm Angular blocky	Nil inclusions or segregations	10YR2/1 Black Nil mottles or bleaching	Moist Well drained	Fine 1- 2mm Few	7.0	0.00-0.08 0.20-0.30 0.50-0.60
			B21 0.08-0.40 Sharp <5mm	Medium clay	Moderate Strong Subangular blocky	<2% calcium carbonate	10YR3/2 Very dark greyish brown Nil mottles or bleaching	Moderately moist Well drained	Very fine <1mm Few	8.0	0.70-0.80 0.90-1.00
			B22 0.40-0.80 Clear 20-50mm	Medium clay / medium heavy clay	Moderate Strong Subangular blocky	2-10% calcium carbonate	10YR3/2 Very dark greyish brown Nil mottles or bleaching	Dry Moderately well drained	Very fine <1mm Few	8.0	
			B23 0.80-1.00 EOBH	Medium clay	Strong Strong Subangular blocky	Nil inclusions or segregations	10YR3/3 Dark brown Nil mottles or bleaching	Dry Moderately well drained	Nil roots	8.0	



<b>Site N48</b>	<b>Map Unit:</b> 6 (Aggregated, soil map unit observed as <10 ha)	<b>Location (mE/mS GDA94 ZONE 55):</b> 641406 7513300	<b>Australian Soil Class:</b> Black Dermosol	<b>Soil Survey Type:</b> Detailed 50 mm hand auger	<b>Survey Date:</b> 01/05/2021
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**Landscape**



**Surface**



**Soil Profile**



Land use / Landform Pattern / Element / Slope	Vegetation / Microrelief / Disturbance / Erosion	Surface condition / surface rock	Soil Profile Description								
			Horizon / Depth (m / Boundary	Field Texture	Structure / Strength / Pedality	Inclusions / Segregations	Colour / Mottle / Bleaching	Moisture / Drainage	Roots Size / Abundance	Depth (m) / Field pH	Sample (m) / Observations
Grazing Undulating plain Mid-slope 2%/2%	Current bush, bull Mitchell grass Nil microrelief Extensive clearing	Firm Nil coarse fragments	A1 0.00-0.10 Clear 20-50mm	Sandy clay loam	Massive Weak	Nil inclusions or segregations	10YR3/2 Very dark greyish brown Nil mottles or bleaching	Moderately moist Rapidly drained	Very fine <1mm Common	7.0	0.00-0.10 0.20-0.30 0.50-0.60 0.70-0.80
			B21 0.10-0.30 Gradual 50- 100mm	Sandy clay loam	Moderate Weak Subangular blocky	Nil inclusions or segregations	10YR3/2 Very dark greyish brown Nil mottles or bleaching	Dry Well drained	Very fine <1mm Common	7.0	0.90-1.00
			B22 0.30-0.45 Gradual 50- 100mm	Sandy clay loam	Moderate Firm Subangular blocky	Nil inclusions or segregations	7.5YR3/4 Nil mottles or bleaching	Dry Well drained	Nil roots	7.5	
			B23 0.45-1.00 EOBH	Sandy loam / Sandy clay loam	Massive Weak Subangular blocky	2-10% coarse fragments	10YR3/4 Nil mottles or bleaching	Dry Rapidly drained	Nil roots	7.5	

<b>Site N49</b>	Map Unit: 19	Location (mE/mS GDA94 ZONE 55): 641677 7513512	Australian Soil Class: Black self-mulching Vertosol	Soil Survey Type: Detailed 50 mm hand auger	Survey Date: 01/05/2021
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**Landscape**



**Surface**



**Soil Profile**



Land use / Landform Pattern / Element / Slope	Vegetation / Microrelief / Disturbance / Erosion	Surface condition / surface rock	Soil Profile Description								
			Horizon / Depth (m / Boundary	Field Texture	Structure / Strength / Pedality	Inclusions / Segregations	Colour / Mottle / Bleaching	Moisture / Drainage	Roots Size / Abundance	Depth (m) / Field pH	Sample (m) / Observations
Grazing Gently undulating plain Upper slope 2%/2%	Current bush, Bull Mitchell grass Nil microrelief Extensive clearing	Self-mulching Nil coarse fragments	A1 0.00-0.13 Clear 20-50mm	Light clay	Moderate Very firm	<2% calcium carbonate	10YR3/2 Very dark greyish brown Nil mottles or bleaching	Dry Moderately well drained	Fine 1- 2mm Common	6.0	0.00-0.10 0.20-0.30 0.50-0.60
			B21 0.13-0.61 Clear 20-50mm	Light medium clay	Moderate Firm	2-10% calcium carbonate	10YR3/2 Very dark greyish brown Nil mottles or bleaching	Dry Moderately well drained	Very fine <1mm Few	8.0	0.70-0.80 0.90-1.00
			B22 0.61-1.00 EOBH	Clay loam	Moderate Firm	Nil inclusions or segregations	10YR4/2 Dark greyish brown Nil mottles or bleaching	Dry Moderately well drained	Nil roots	8.0	



<b>Site N50</b>	Map Unit: 18	Location (mE/mS GDA94 ZONE 55): 642495 7513615	Australian Soil Class: Black Dermosol	Soil Survey Type: Detailed 50 mm hand auger	Survey Date: 01/05/2021
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**Landscape**



**Surface**



**Soil Profile**



Land use / Landform Pattern / Element / Slope	Vegetation / Microrelief / Disturbance / Erosion	Surface condition / surface rock	Soil Profile Description								
			Horizon / Depth (m / Boundary	Field Texture	Structure / Strength / Pedality	Inclusions / Segregations	Colour / Mottle / Bleaching	Moisture / Drainage	Roots Size / Abundance	Depth (m) / Field pH	Sample (m) / Observations
Grazing Gently undulating plain Flat 0%/0%	Grasses Nil microrelief Complete clearing, not cultivated	Firm Nil coarse fragments	A1 0.00-0.09 Abrupt 5-20mm	Clay loam, sandy	Moderate Firm Subangular blocky	Nil inclusions or segregations	10YR3/1 Very dark grey Nil mottles or bleaching	Dry Moderately well drained	Fine 1- 2mm Few	7.0	0.00-0.09 0.20-0.30 0.50-0.60 0.70-0.80 0.90-1.00
			B21 0.09-0.31 Abrupt 5-20mm	Medium clay	Moderate Firm Angular blocky	<2% calcium carbonate <2mm	10YR3/2 Very dark greyish brown Nil mottles or bleaching	Dry Moderately well drained	Fine 1- 2mm Few	7.5	
			B22 0.31-0.62 Abrupt 5-20mm	Medium clay	Moderate Firm Angular blocky	<2% calcium carbonate 2-6mm	10YR3/2 Very dark greyish brown Nil mottles or bleaching	Dry Moderately well drained	Fine 1- 2mm Few	7.5	
			B23 0.62-0.85 Abrupt 5-20mm	Medium clay	Moderate Very firm Angular blocky	<2% calcium carbonate <2mm	10YR3/3 Dark brown Nil mottles or bleaching	Dry Moderately well drained	Nil roots	8.0	
			B24 0.85-1.00 EOBH	Medium clay	Moderate Very firm Subangular blocky	Nil inclusions or segregations	10YR3/2 Very dark greyish brown Nil mottles or bleaching	Moderately moist Well drained	Nil roots	8.0	



<b>Site N51</b>	Map Unit: 18	Location (mE/mS GDA94 ZONE 55): 642242 7513413	Australian Soil Class: Black Dermosol	Soil Survey Type: Detailed 50 mm hand auger	Survey Date: 01/05/2021
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**Landscape**



**Surface**



**Soil Profile**



Land use / Landform Pattern / Element / Slope	Vegetation / Microrelief / Disturbance / Erosion	Surface condition / surface rock	Soil Profile Description								
			Horizon / Depth (m / Boundary	Field Texture	Structure / Strength / Pedality	Inclusions / Segregations	Colour / Mottle / Bleaching	Moisture / Drainage	Roots Size / Abundance	Depth (m) / Field pH	Sample (m) / Observations
Grazing Gently undulating plain Flat 0%/0%	Grasses Nil microrelief Complete clearing, not cultivated	Firm Nil coarse fragments	A1 0.00-0.09 Abrupt 5-20mm	Clay loam, sandy	Moderate Firm Subangular blocky	Nil inclusions or segregations	10YR2/1 Black Nil mottles or bleaching	Moderately moist Well drained	Fine 1- 2mm Few	6.5	0.00-0.09 0.13-0.23 0.23-0.30
			B21 0.09-0.23 Abrupt 5-20mm	Medium clay	Moderate Strong Subangular blocky	Nil inclusions or segregations	10YR3/1 Very dark grey Nil mottles or bleaching	Moderately moist Well drained	Fine 1- 2mm Few	8.0	0.52-0.60 0.70-0.80 0.90-1.00
			B22 0.23-0.52 Abrupt 5-20mm	Medium clay	Moderate Strong Subangular blocky	<2% calcium carbonate	10YR3/1 Very dark grey Nil mottles or bleaching	Dry Moderately well drained	Very fine <1mm Few	8.0	
			B23 0.52-0.85 Abrupt 5-20mm	Medium clay	Strong Strong Subangular blocky	Nil inclusions or segregations	10YR3/1 Very dark grey Nil mottles or bleaching	Dry Well drained	Nil roots	8.0	
			B24 0.85-1.00 EOBH	Medium clay	Strong Very firm Subangular blocky	Nil inclusions or segregations	10YR3/2 Very dark greyish brown Nil mottles or bleaching	Moderately moist Well drained	Nil roots	8.0	

<b>Site N52</b>	Map Unit: 18	Location (mE/mS GDA94 ZONE 55): 642079 7513098	Australian Soil Class: Black Dermosol	Soil Survey Type: Detailed 50 mm hand auger	Survey Date: 01/05/2021
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**Landscape**



**Surface**



**Soil Profile**



Land use / Landform Pattern / Element / Slope	Vegetation / Microrelief / Disturbance / Erosion	Surface condition / surface rock	Soil Profile Description								
			Horizon / Depth (m / Boundary	Field Texture	Structure / Strength / Pedality	Inclusions / Segregations	Colour / Mottle / Bleaching	Moisture / Drainage	Roots Size / Abundance	Depth (m) / Field pH	Sample (m) / Observations
Grazing Gently undulating plain Flat 0%/0%	Grasses Nil microrelief Complete clearing, not cultivated	Firm Nil coarse fragments	A1 0.00-0.12 Clear 20-50mm	Clay loam sandy	Moderate Weak Subangular blocky	Nil inclusions or segregations	10YR3/1 Very dark grey Nil mottles or bleaching	Moderately moist Moderately well drained	Fine 1- 2mm Few	6.5	0.00-0.10 0.20-0.30 0.50-0.60 0.70-0.80 0.90-1.00
			B21 0.12-0.45	Medium clay	Moderate Very firm Angular blocky	2-10% calcium carbonate 2-6mm	10YR3/2 Very dark greyish brown Nil mottles or bleaching	Moderately moist Moderately well drained	Fine 1- 2mm Few	7.5	
			B22 0.45-0.65	Medium clay	Moderate Firm Angular blocky Possible lenticular	Nil inclusions or segregations	10YR3/3 Dark brown Nil mottles or bleaching	Dry	Fine 1- 2mm Few	7.5	
			B23 0.65-0.80 Abrupt 5-20mm	Medium heavy clay	Strong Firm Subangular blocky	Nil inclusions or segregations	10YR4/2 Dark greyish brown Nil mottles or bleaching	Dry	Nil roots	8.0	
			B23 0.80-1.00	Medium heavy clay	Strong Very firm Subangular blocky	Nil inclusions or segregations	10YR4/3 Brown Nil mottles or bleaching	Dry	Nil roots	8.0	



<b>Site N53</b>	Map Unit: 18	Location (mE/mS GDA94 ZONE 55): 642729 7513832	Australian Soil Class: Black Dermosol	Soil Survey Type: Detailed 50 mm hand auger	Survey Date: 01/05/2021
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**Landscape**



**Surface**



**Soil Profile**



Land use / Landform Pattern / Element / Slope	Vegetation / Microrelief / Disturbance / Erosion	Surface condition / surface rock	Soil Profile Description								
			Horizon / Depth (m / Boundary	Field Texture	Structure / Strength / Pedality	Inclusions / Segregations	Colour / Mottle / Bleaching	Moisture / Drainage	Roots Size / Abundance	Depth (m) / Field pH	Sample (m) / Observations
Grazing Gently undulating plain Flat 0%/0%	Grasses Nil microrelief Complete clearing, not cultivated	Firm Nil coarse fragments	A1 0.00-0.12 Abrupt 5-20mm	Sandy clay loam	Weak Weak Angular blocky	Nil inclusions or segregations	10YR2/2 Very dark brown Nil mottles or bleaching	Moderately moist Well drained	Fine 1- 2mm Common	7.0	0.00-0.10 0.20-0.30 0.50-0.60 0.72-0.80 0.90-1.00
			B21 0.12-0.45 Abrupt 5-20mm	Medium clay	Moderate Very firm Angular blocky	<2% coarse fragments	10YR2/2 Very dark brown Nil mottles or bleaching	Dry Moderately well drained	Fine 1- 2mm Few	7.5	
			B22 0.45-0.72 Abrupt 5-20mm	Medium clay	Moderate Very firm Sub-angular blocky	Nil inclusions or segregations	10YR2/2 Very dark brown Nil mottles or bleaching	Dry Moderately well drained	Nil roots	8.0	
			B23 0.72-1.00 EOBH	Medium clay	Moderate Very firm Sub-angular blocky	Nil inclusions or segregations	10YR3/1 Very dark grey Nil mottles or bleaching	Dry Moderately well drained	Nil roots	7.5	



<b>Site N54</b>	Map Unit: 20	Location (mE/mS GDA94 ZONE 55): 641925 7512253	Australian Soil Class: Black self-mulching Vertosol	Soil Survey Type: Detailed 50 mm hand auger	Survey Date: 01/05/2021
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**Landscape**



**Surface**



**Soil Profile**



Land use / Landform Pattern / Element / Slope	Vegetation / Microrelief / Disturbance / Erosion	Surface condition / surface rock	Soil Profile Description								
			Horizon / Depth (m / Boundary	Field Texture	Structure / Strength / Pedality	Inclusions / Segregations	Colour / Mottle / Bleaching	Moisture / Drainage	Roots Size / Abundance	Depth (m) / Field pH	Sample (m) / Observations
Grazing Gently undulating plain Flat 0%/0%	Bull Mitchell grass, Nil microrelief Complete clearing, not cultivated	Self-mulching, cracking Nil coarse fragments	A1 0.00-0.12 Abrupt 5-20mm	Light medium clay	Moderate Very firm Angular blocky	Nil inclusions or segregations	10YR3/1 Very dark grey Nil mottles or bleaching	Moderately moist Moderately well drained	Fine 1- 2mm Common	7.0	0.00-0.10 0.20-0.30 0.50-0.60 0.70-0.80 0.90-1.00
			B21 0.12-0.34 Clear 20-50mm	Medium clay	Strong Very firm Angular blocky	<2% calcium carbonate	10YR2/1 Black Nil mottles or bleaching	Moderately moist Moderately well drained	Fine 1- 2mm Few	8.0	
			B22 0.34-0.88 Clear 20-50mm	Medium clay	Strong Very firm Angular blocky lenticular	Nil inclusions or segregations	10YR3/1 Very dark grey Nil mottles or bleaching	Dry Moderately well drained	Very fine <1mm Few	8.0	
			B23 0.88-1.00 EOBH	Medium heavy clay	Strong Very firm Angular blocky	Nil inclusions or segregations	10YR3/2 Very dark greyish brown Nil mottles or bleaching	Dry Moderately well drained	Nil roots	7.5	

<b>Site N55</b>	Map Unit: 6	Location (mE/mS GDA94 ZONE 55): 641290 7513322	Australian Soil Class: Black Dermosol	Soil Survey Type: Detailed 50 mm hand auger	Survey Date: 01/05/2021
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**Landscape**



**Surface**



**Soil Profile**



Land use / Landform Pattern / Element / Slope	Vegetation / Microrelief / Disturbance / Erosion	Surface condition / surface rock	Soil Profile Description								
			Horizon / Depth (m / Boundary	Field Texture	Structure / Strength / Pedality	Inclusions / Segregations	Colour / Mottle / Bleaching	Moisture / Drainage	Roots Size / Abundance	Depth (m) / Field pH	Sample (m) / Observations
Grazing Undulating plain Mid-slope 2%/2%	Current Bush, Bull Mitchell grass Nil microrelief Extensive clearing	Firm Nil coarse fragments	A1 0.00-0.12 Gradual 50- 100mm	Sandy clay loam	Massive Weak	Nil inclusions or segregations	10YR2/2 Very dark brown Nil mottles or bleaching	Moderately moist Rapidly drained	Very fine <1mm Common	6.5	0.00-0.10 0.15-0.25 0.25-0.30
			B21 0.12-0.25 Gradual 50- 100mm	Medium clay	Moderate Strong Subangular blocky	Nil inclusions or segregations	10YR2/1 Black Nil mottles or bleaching	Dry Moderately well drained	Very fine <1mm Common	6.5	0.50-0.60 0.70-0.80 0.90-1.00
			B22 0.25-0.85 Gradual 50- 100mm	Medium clay	Moderate Strong Subangular blocky	<2% coarse fragments	10YR2/1 Black Nil mottles or bleaching	Dry Well drained	Nil roots	8.0	
			B23 0.85-1.00 EOBH	Medium clay to sandy clay loam	Moderate Very firm Subangular blocky	Nil inclusions or segregations	10YR3/3 Dark brown Nil mottles or bleaching	Dry Well drained	Nil roots	8.0	



<b>Site N56</b>	Map Unit: 20	Location (mE/mS GDA94 ZONE 55): 641970 7512389	Australian Soil Class: Black Self mulching Vertosol	Soil Survey Type: Detailed 50 mm hand auger	Survey Date: 02/05/2021
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**Landscape**



**Surface**



**Soil Profile**



Land use / Landform Pattern / Element / Slope	Vegetation / Microrelief / Disturbance / Erosion	Surface condition / surface rock	Soil Profile Description								
			Horizon / Depth (m / Boundary	Field Texture	Structure / Strength / Pedality	Inclusions / Segregations	Colour / Mottle / Bleaching	Moisture / Drainage	Roots Size / Abundance	Depth (m) / Field pH	Sample (m) / Observations
Grazing Gently undulating plain Flat 1%/1%	Bull Mitchell grass Nil microrelief Complete clearing, not cultivated	Self-mulching, cracking Nil coarse fragments	A1 0.00-0.10 Clear 20-50mm	Light clay	Moderate Firm	Nil inclusions or segregations	10YR3/1 Very dark grey Nil mottles or bleaching	Moderately moist Moderately well drained	Fine 1- 2mm Few	6.5	0.00-0.10 0.20-0.30 0.50-0.60 0.70-0.80 0.90-1.00
			B21 0.10-0.65 Clear 20-50mm	Medium clay	Strong Very firm	<2% coarse fragments 6-20mm	10YR3/2 Very dark greyish brown Nil mottles or bleaching	Moderately moist Moderately well drained	Fine 1- 2mm Few	7.5	
			B22 0.68-0.85 Clear 20-50mm	Medium heavy clay	Strong Very firm	Nil inclusions or segregations	10YR4/2 Dark greyish brown Nil mottles or bleaching	Dry Moderately well drained	Fine 1- 2mm Few	7.5	
			B22 0.85-1.00 EOBH	Medium heavy clay	Strong Very firm	Nil inclusions or segregations	10YR4/3 Brown Nil mottles or bleaching	Dry Moderately well drained	Fine 1- 2mm Few	7.5	



<b>Site N57</b>	Map Unit: 19	Location (mE/mS GDA94 ZONE 55): 641884 7513451	Australian Soil Class: Black self-mulching Vertosol	Soil Survey Type: Detailed 50 mm hand auger	Survey Date: 02/05/2021
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**Landscape**



**Surface**



**Soil Profile**



Land use / Landform Pattern / Element / Slope	Vegetation / Microrelief / Disturbance / Erosion	Surface condition / surface rock	Soil Profile Description								
			Horizon / Depth (m / Boundary	Field Texture	Structure / Strength / Pedality	Inclusions / Segregations	Colour / Mottle / Bleaching	Moisture / Drainage	Roots Size / Abundance	Depth (m) / Field pH	Sample (m) / Observations
Grazing Gently undulating plain Mid-slope 1.%/1.1%	Sparse Brigalow nearby Nil microrelief Extensive clearing	Self-mulching Nil coarse fragments	A1 0.00-0.10 Abrupt 5-20mm	Light clay	Moderate Firm Angular blocky	Nil inclusions or segregations	10YR2/1 Black Nil mottles or bleaching	Moist Well drained	Fine 1- 2mm Few	7.0	0.00-0.10
			B21 0.10-0.50 Gradual 50- 100mm	Medium clay	Moderate Strong Subangular blocky	<2% calcium carbonate	10YR3/1 Very dark grey Nil mottles or bleaching	Dry Moderate well drained	Very fine <1mm Few	8.5	0.20-0.30
			B22 0.50-0.85 Clear 20-50mm	Medium heavy clay	Moderate Strong Subangular blocky	Nil inclusions or segregations	10YR3/1 Very dark grey Nil mottles or bleaching	Dry Moderate well drained	Nil roots	8.5	0.50-0.60
			B23 0.85-1.00 EOBH	Medium heavy clay	Moderate Strong Subangular blocky	Nil inclusions or segregations	10YR4/3 Brown Nil mottles or bleaching	Dry Moderate well drained	Nil roots	6.5	0.70-0.80 0.90-1.00

<b>Site N58</b>	Map Unit: 20	Location (mE/mS GDA94 ZONE 55): 641792 7512652	Australian Soil Class: Black self-mulching Vertosol	Soil Survey Type: Detailed 50 mm hand auger	Survey Date: 02/05/2021
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**Landscape**



**Surface**



**Soil Profile**






Land use / Landform Pattern / Element / Slope	Vegetation / Microrelief / Disturbance / Erosion	Surface condition / surface rock	Soil Profile Description								
			Horizon / Depth (m / Boundary	Field Texture	Structure / Strength / Pedality	Inclusions / Segregations	Colour / Mottle / Bleaching	Moisture / Drainage	Roots Size / Abundance	Depth (m) / Field pH	Sample (m) / Observations
Grazing Gently undulating plain Flat <1%/<1%	Bull Mitchell grass Nil microrelief Complete clearing, not cultivated	Self-mulching, cracking Nil coarse fragments	A1 0.00-0.11 Abrupt 5-20mm	Light clay	Moderate Firm Subangular blocky	Nil inclusions or segregations	10YR2/1 Black Nil mottles or bleaching	Moderately moist Moderately well drained	Fine 1- 2mm Few	7.5	0.00-0.10 0.20-0.30 0.50-0.60
			B21 0.11-0.45 Clear 20-50mm	Medium clay	Strong Very firm Angular blocky	<2% calcium carbonate 2-6mm	10YR3/1 Very dark grey Nil mottles or bleaching	Dry Moderately well drained	Fine 1- 2mm Few	7.5	0.66-0.76 0.90-1.00
			B22 0.45-0.76 Clear 20-50mm	Medium clay	Strong Very firm Angular blocky	2-10% calcium carbonate 2-6mm	10YR3/1 Very dark grey Nil mottles or bleaching	Dry Moderately well drained	Fine 1- 2mm Few	7.5	
			B23 0.76-1.00 EOBH	Medium heavy clay	Moderate Very firm Angular blocky	<2% calcium carbonate 2-6mm	10YR4/2 Dark greyish brown Nil mottles or bleaching	Dry Moderately well drained	Nil roots	7.5	




Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-1	641651 7508111	16	Gently undulating plain, lower slope, 1%, 2% Crabhole gilgai, 50% coverage <200 mm deep Surface – cracking and self mulching	





Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-2	641972 7509347	16	Gently undulating plain, lower slope, 1% Crabhole and linear gilgai, 50% coverage 150-200 mm deep Surface – cracking and self mulching	 

Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-3	642749 7508963	16	Gently undulating plain, lower slope, 1% Normal gilgai, 40% coverage 150-200 mm deep Surface – cracking and self mulching	 



Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-4	642189 7511009	11	Wide depression, drainage line Soft surface, with <2% <6mm coarse fragments	



Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-5	641073 7510547	13	Gently undulating plain, Cropping, extensively disturbed, lower slope Surface cracking, light clay, no coarse fragments	 



Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-6	641305 7510835	13	Gently undulating plain, Cropping, extensively disturbed, lower slope Surface cracking, light clay, no coarse fragments	
NC-7	641985 7510605	13	Gently undulating plain, Cropping, extensively disturbed, lower slope Surface cracking, light clay, no coarse fragments	





Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-8	641519 7511677	6	Gently undulating plain, mid slope Firm, sandy clay loam, no coarse fragments	
NC-9	641777 7511708	6	Gently undulating plain, mid slope, Sparse Brigalow Firm, sandy clay loam, no coarse fragments	




Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-10	641414 7513101	20	Gently undulating plain, lower slope, 1%, 2% Grass, various trees regrowth Surface – Crust, light clay	 



Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-11	641676 7513156	19	Gently undulating plain, lower slope, 1%, 2% Limited disturbance, Brigalow Surface – cracking and self mulching, light clay	
NC-12	642118 7512668	6	Gently undulating plain, flat plain Limited disturbance, Brigalow Surface – Firm, clay loam sandy	




Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-13	641869 7513464	19	Gently undulating plain, crest, 1%, 0% Limited disturbance, Brigalow Surface – Self mulching, black light clay	 






Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-14	642641 7514052	18	Gently undulating plain, crest, 1%, 0% Limited disturbance, Brigalow, Belah Surface -, clay loam sandy 10YR3/1	


Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-15	643244 7514499	1	<p>Gently undulating plain, lower slope &lt;2%</p> <p>Limited disturbance, Brigalow</p> <p>Surface – cracking 2-6 mm, light clay, no coarse fragments</p> <p>0.00 – 0.11 m</p> <p>Clay loam</p> <p>Moderate, firm, peds &lt;20 mm</p> <p>10YR3/1</p> <p>0.11 – 0.30+ m</p> <p>Medium clay</p> <p>Moderate, very firm, peds 20-40 mm</p> <p>10YR2/1</p>	 

Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-16	642934 7514283	1	<p>Gently undulating plain, mid slope &lt;2%</p> <p>Limited disturbance</p> <p>Surface – cracking 2-6 mm, light clay, no coarse fragments</p> <p>0.00 – 0.11 m</p> <p>Clay loam</p> <p>Moderate, firm, peds &lt;20 mm</p> <p>10YR3/2</p> <p>0.11 – 0.45+ m</p> <p>Medium clay</p> <p>Moderate, very firm, peds 20-40 mm</p> <p>10YR2/1</p>	






Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-17	643327 7514558	2	Gully erosion, drainage line  0-0.30 m sandy loam 0.30-1.00 m + Sandy clay loam	 



Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-18	643487 7514650	2	Gully erosion, drainage line Gums Surface non-cracking	

NC-19	644123 7514610	1	<p>Gently undulating plain, upper slope 1%, 2% Limited disturbance, Surface – cracking &lt;2 mm, and self mulching, light clay, no coarse fragments</p> <p>0.00 – 0.11 m Clay loam Moderate, firm, peds &lt;10 mm 10YR3/2</p> <p>0.11 – 0.30 m Medium clay Moderate, subangular blocky, peds &lt;20 mm 10YR2/1</p> <p>0.30 – 0.40+ m Medium clay with &lt;2% calcium carbonate Moderate, subangular blocky, peds &lt;20 mm 10YR2/1</p>	
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Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
				

Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-20	643734 7514870	2	Gently undulating plain, lower slope 1%, 2% Limited disturbance, Surface – cracking <2 mm, and self mulching, clay loam, no coarse fragments Brigalow, Belah	 

Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-21	643283 7514051	3	Gently undulating plain, upper slope 1%, 2% Brigalow, Belah Limited disturbance, Surface – cracking 2-8 mm, and self mulching, sandy clay loam, no coarse fragments	 







Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-22	642804 7514097	4	Gently undulating plain, lower slope 1%, 2% Wide depression, inactive drainage line Brigalow, Belah Surface – cracking 2-8 mm, and self mulching, sandy clay loam <2% coarse fragments <2 mm	 

Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-23	643584 7514647	2	Gently undulating plain, lower slope 1%, Surface light clay, cracking 2-6 mm, no coarse fragments	
NC-24	642191 7512204	6	Gently undulating plain, mid slope 1%, 1% Limited disturbance, Surface - Sandy clay loam 10YR3/1, firm, no coarse fragments	



Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-25	642541 7512279	9	Gently undulating plain, flat plain Surface light clay, self mulching, no coarse fragments Cropping nearby	 





NC-26	643047 7512703	9	Gently undulating plain, lower slope 1%, Surface light clay, self mulching, no coarse fragments Cropping nearby	 
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NC-27	643449 7512385	9	Gently undulating plain, flat plain <1% slope Surface light clay, self mulching, no coarse fragments Cropping nearby	 
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NC-28	643790 7513018	9	Gently undulating plain, lower slope 1%, Surface light clay, self mulching, no coarse fragments Cropping nearby	 
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NC-29	643707 7513294	10	Gently undulating plain, upper slope 2%, 2% Surface sandy clay loam, no coarse fragments	 
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NC-30	643918 7513548	10	Gently undulating plain, upper slope 2% Surface sandy clay loam, <2% <2mm coarse fragments	 
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NC-31	643165 7511509	12	Gently undulating plain, lower slope 1% Surface light clay, minor crusting, no coarse fragments Limited disturbance	 
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NC-32	643661 7511295	6	Gently undulating plain, mid slope 1%, 1% Surface, soft, sandy clay loam, no coarse fragments Forage cropping disturbance	 
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Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-33	643394 7510738	6	<p>Gently undulating plain, upper slope 1%, 1% Surface, soft, no coarse fragments Forage cropping disturbance</p> <p>0.00 – 0.09 m Sandy loam, massive, weak, peds &lt;100mm 10YR3/2</p> <p>0.09 – 0.30+ m Sandy clay loam, peds &lt;200mm 10YR3/2</p> 	 





NC-34	644122 7512307	12	Gently undulating plain, flat plain Surface light clay 10YR3/2, cracking 2 mm, no coarse fragments Limited disturbance	 
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NC-35	644475 7511295	12	Gently undulating plain, mid slope 1%, 1% Surface light clay 10YR3/2, cracking 2-6 mm, no coarse fragments Cropping disturbance	 
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NC-36	645158 7511201	12	Gently undulating plain, mid slope 1%, 1% Surface light clay 10YR3/2, cracking <2 mm, self mulching, no coarse fragments Cropping disturbance	 
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NC-37	644857 7511101	12	Gently undulating plain, upper slope <2%, <3% Surface light clay 10YR3/2, cracking 2-6 mm, no coarse fragments	 
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Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-38	645563 7511106	12	Gently undulating plain, upper slope 2%, 2% Surface light clay 10YR3/2, cracking 2-6 mm, no coarse fragments	


NC-39	642769 7511490	12	Gently undulating plain, mid slope 2%, 2% Surface light clay 10YR3/2, firm, no coarse fragments Forage cropping disturbance	 
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Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-40	642555 7510052	16	<p>Gently undulating plain, upper slope 1%, 1%</p> <p>Surface light clay 10YR3/2, self mulching, no coarse fragments.</p> <p>Gilgai located in area, map boundary</p> <p>Limited disturbance</p> <p>0.00 – 0.20 m</p> <p>Light clay, moderate, 10YR3/2</p> <p>0.20 – 0.40+ m</p> <p>Medium clay, subangular blocky, 10YR3/1</p>	  





NC-41	642161 7510152	14	<p>Brown surface colour to the north, change to grey surface colour nearby towards the south</p> <p>Surface - firm, sandy loam, 10YR3/3 No coarse fragments, mid slope 1%</p>	 
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Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-42	643510 7508834	17	<p>Gently undulating plain, upper slope 1%, 1%</p> <p>Surface cracking &lt;2 mm, self mulching, no coarse fragments</p> <p>Cropping disturbance</p> <p>0.00 – 0.10 m Light clay, 10YR3/2</p> <p>0.10 – 0.35 m Medium clay, 10YR3/2</p> <p>0.35 – 0.50+ m Medium clay, 10YR4/2</p> 	 





Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-43	644026 7507963	17	<p>Gently undulating plain, lower slope 2%, 2%</p> <p>Surface cracking 2-6 mm, no coarse fragments</p> <p>Cropping disturbance</p> <p>0.00 – 0.07 m Light clay, 10YR3/2 Weak, peds &lt;10 mm</p> <p>0.07 – 0.50 + m Medium clay, 10YR3/2 Moderate, subangular blocky, peds &lt;30 mm very firm</p>	 
				





NC-44	645697 7508528	17	Gently undulating plain, mid slope <2%, 1% Surface light clay 10YR3/2, cracking <2 mm, self mulching, <2% coarse fragments Cropping disturbance	 
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NC-45	644367 7509819	17	Gently undulating plain, mid slope 1%, 1% Surface light clay 10YR3/2, cracking <2 mm, self mulching, <2% coarse fragments Cropping disturbance	 
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Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-46	644024 7510908	15	Gently undulating plain, lower slope 2%, 1% Surface light clay 10YR3/2, cracking 2-6 mm, No coarse fragments	
NC-47	640942 7512659	8	Gently undulating plain, mid slope 1%, 1% Surface light clay 10YR3/2, cracking 2-6 mm, no coarse fragments	



Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-48	640883 7512861	8	Gently undulating plain, mid slope 1%, 1% Surface light clay 10YR3/2, cracking 2-6 mm, no coarse fragments	
NC-49	642978 7511443	11	Wide depression, drainage line, lower slope 2%, 1% Surface sandy light clay,, No coarse fragments Sheet erosion	



Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-50	643674 7513508	4	Wide depression, drainage line, lower slope 2% Surface sandy light clay,, No coarse fragments Sheet erosion	
NC-51	644005 7512609	9	Gently undulating plain, lower slope 2%, 2% Surface light clay,, self mulching, no coarse fragments Cropping disturbance	



Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-52	643635 7512290	9	Gently undulating plain, lower slope 2%, 2% Surface light clay, self mulching, no coarse fragments Cropping disturbance	 







Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-53	644440 7510181	17	Gently undulating plain, lower slope 2%, 2% Surface light clay, cracking 2-6 mm, no coarse fragments Limited disturbance	-

Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-54	645704 7510053	17	Gently undulating plain, upper slope 1%, 1% Surface light clay, self mulching, no coarse fragments Cropping disturbance	 



Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-55	645506 7509704	17	Gently undulating plain, upper slope 1%, 1% Surface light clay, self mulching, Some cracking 2-6 mm, No coarse fragments, Cropping disturbance	 





Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-56	643093 7510114	14	<p>Gently undulating plain, mid slope 1%</p> <p>Surface - firm, sandy loam, 10YR3/3, no coarse fragments</p> <p>0.00 – 0.10 m Sandy loam 10YR3/3</p> <p>0.10 – 0.42 m Sandy clay loam 5YR4/3</p> <p>0.42 – 0.65 + m Sandy clay loam 7.5Y4/4 &lt;5% calcium carbonate</p>	 



NC-57	642985 7513858	4	<p>Gently undulating plain, lower slope 1%, 2%</p> <p>Wide depression, inactive drainage line</p> <p>Brigalow, Belah</p> <p>Surface – firm, cracking 2 mm, sandy clay loam</p> <p>&lt;2% coarse fragments &lt;2 mm</p>	 
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Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-58	644239 7511127	15	Gently undulating plain, mid slope 2%, 1% Surface light clay 10YR3/2, cracking 2-6 mm, No coarse fragments	
NC-59	644073 7514265	3	Gently undulating plain, upper slope 1%, 2% Brigalow, Belah Limited disturbance, Surface – cracking 2-8 mm, and self mulching, sandy clay loam, no coarse fragments	





Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-60	641787 7514024	5	Same as sites N4 and N5, mid slope 2.0%, no erosion or microrelief, soft surface with no coarse fragments. Surface texture black sandy loam.	
NC-61	641691 7514197	5	Same as sites N4 and N5, mid slope 2.0%, no erosion or microrelief, soft surface with no coarse fragments. Surface texture black sandy loam.	



Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-62	641100 7512707	7	Wide depression, surface hard setting with cracking 2-6mm. Surface texture light clay.	
NC-63	641030 7513411	7	Wide depression, surface firm with cracking 2-6mm. Surface texture light clay.	




Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-64	641815 7512824	20	Nil microrelief, extensive clearing Surface light clay with cracking, 10YR3/2 very dark greyish brown	 







Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-65	642145 7512424	20	Grazing, level plain, flat Normal gilgai observed, <20% coverage, area less than 10 ha, aggregated with Map Unit 20 Complete clearing Surface self-mulching with nil coarse fragments	
NC-66	642040 7512523	20	Grazing, level plain, flat Nil microrelief Complete clearing Surface self-mulching with nil coarse fragments	


Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-67	642071 7512485	20	Grazing, level plain, flat Nil microrelief in immediate area Normal gilgai begins to the east Complete clearing Surface self-mulching with nil coarse fragments	
NC-68	641951 7513006	18	Grazing, gently undulating plain, flat, 0% / 1% slope Nil microrelief observed in area or along transect to site 77-SCL Surface texture, Clay loam sandy	

Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-69	641577 7513080	18	Grazing, gently undulating plain, mid slope Brigalow regrowth, nil microrelief Surface firm, clay loam, sandy, 10YR3/2 very dark greyish brown	






Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-70	641635 7513191	18	Grazing, gently undulating plain Surface firm, clay loam sandy	
NC-71	641749 7512962	18	Grazing, gently undulating plain, upper slope <2% Surface firm, clay loam sandy	

Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-72	641914 7513441	19	Grazing, gently undulating plain, upper slope Nil microrelief, complete clearing, not cultivated Surface firm, light clay, 10YR3/2 very dark greyish brown, self-mulching	 



Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-73	641851 7513420	19	Grazing, gently undulating plain, upper slope Nil microrelief, complete clearing, not cultivated Surface firm, light clay, 10YR3/2 very dark greyish brown, self-mulching	






Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-74	641503 7513177	18	Grazing, gently undulating plain, mid slope Various regrowth, nil microrelief Surface firm, no cracking, clay loam sandy, 10YR3/2 very dark greyish brown	
NC-75	641318 7513030	18	Grazing, gently undulating plain, simple slope 3% / 3% Nil microrelief, complete clearing, cultivated Surface firm, clay loam sandy	



Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-76	641267 7512983	6	Grazing, gently undulating plain, lower slope <2%/3% Nil microrelief Surface firm, sandy clay loam, 10YR3/2 very dark greyish brown Boundary observed between NC-75 and NC-76	





Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-77	641559 7513265	18	<p>Grazing, gently undulating plain, simple slope 3%/3%</p> <p>Nil microrelief, complete clearing</p> <p>Surface firm</p> <ul style="list-style-type: none"> <li>• 0.00-0.10m, Clay loam, sandy, 10YR3/1 very dark grey</li> <li>• 0.10-0.30m+, Light clay, sandy, 10YR3/2 very dark greyish brown</li> </ul>	 





Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-78	641444 7513398	6	<p>Grazing, gently undulating plain, mid slope 2%</p> <p>Grasses</p> <p>Nil microrelief</p> <p>Complete clearing, not cultivated</p> <ul style="list-style-type: none"> <li>A1, 0.00-0.12m, Sandy clay loam, 7.5YR3/3 dark brown</li> <li>B21, 0.12-0.34+, medium clay, 10YR3/2 very dark greyish brown</li> </ul>	  


Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-79	641336 7513255	6	<p>Grazing, gently undulating plain, mid slope</p> <p>Grasses, nil microrelief, complete clearing, not cultivated</p> <p>Surface firm,</p> <ul style="list-style-type: none"> <li>• A1, 0.00-0.12m, sandy clay loam 7.5YR3/3 dark brown</li> <li>• B21, 0.12-0.34m+, medium clay, 10YR3/2 very dark greyish brown</li> </ul>	 





Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-80	641391 7512856	6	Grazing, gently undulating plain, mid slope 2%/2% Nil microrelief, complete clearing, not cultivated Surface self-mulching cracking, light clay, 10YR3/1 very dark grey	 




Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-81	641512 7512735	6	Grazing, gently undulating plain, lower slope Bull Mitchell grass, mixed regrowth, extensive clearing Surface firm with no cracking or coarse fragments, sandy clay loam, 10YR3/2 very dark greyish brown	 

Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-82	641616 7512602	6	Grazing, gently undulating plain, mid slope <2% Nil microrelief, extensive clearing Surface firm, sandy clay loam, 10YR3/2 very dark greyish brown	





Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-83	641670 7512506	20	Nil microrelief, extensive clearing Surface light clay with cracking and self mulching, 10YR3/2 very dark greyish brown	 
NC-84	641652 7512295	6	Grazing, gently undulating plain, lower slope Surface firm with no cracking or coarse fragments, sandy clay loam, 10YR3/2 very dark greyish brown	
NC-85	641933 7512095	6	Grazing, gently undulating plain, lower slope Surface firm with no cracking or coarse fragments, sandy clay loam, 10YR3/2 very dark greyish brown	






Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-86	642366 7510364	14	South of boundary, reddish brown surface colour begins towards to the south	



Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-87	642365 7510309	14	<p>Grazing, gently undulating plain, lower slope &lt;2%</p> <p>Extensive disturbance, within existing power line easement</p> <p>Surface firm</p> <ul style="list-style-type: none"> <li>• 0.00-0.12m, sandy loam, weak, 10YR3/2 greyish brown</li> <li>• 0.12-0.40+m, Light clay, moderate 5YR4/3 reddish brown</li> </ul>	  





Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-88	641880 7510244	13	<p>Forage cropping, surface firm, mid slope &lt;2%</p> <ul style="list-style-type: none"> <li>0.00-0.10m, sandy clay loam, weak, 10YR3/2 greyish brown</li> <li>0.10-0.14m, light clay, weak, 10YR4/3 brown</li> <li>0.14-0.40+m, light clay, strong, 10YR4/3 brown, with 5% mottle 10YR4/4 dark yellowish brown</li> </ul> <p>As per site 9-SCL</p> <p>Aggregated with Map Unit 13 due to polygon size being less than 10 ha</p>	 






Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-89	642019 7510231	13	<p>Forage cropping, surface firm, flat</p> <p>Nil microrelief</p> <ul style="list-style-type: none"> <li>0.00-0.12m, sandy clay loam, weak, very firm 10YR3/2 greyish brown</li> <li>0.10-0.45m, light clay, moderate, firm, 10YR4/3 brown, nil mottles</li> </ul> <p>As per site 9-SCL</p> <p>Aggregated with Map Unit 13 due to polygon size being less than 10 ha</p>	  




Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-90	642122 7510236	14	<p>Grazing, gently undulating plain, flat</p> <p>Extensive disturbance, forage cropping</p> <p>Surface firm</p> <ul style="list-style-type: none"> <li>• 0.00-0.12m, sandy loam, weak, 10YR3/2 greyish brown</li> <li>• 0.12-0.40+m, Light clay, moderate 5YR4/3 reddish brown</li> </ul>	 



Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-91	642063 7510332	14	<p>Grazing, gently undulating plain, mid slope &lt;1%</p> <p>Extensive disturbance, forage cropping</p> <p>Surface firm</p> <ul style="list-style-type: none"> <li>• 0.00-0.14m, sandy loam, weak, 10YR3/2 greyish brown</li> <li>• 0.14-0.40+m, Light clay, moderate 5YR4/3 reddish brown</li> </ul>	 



Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-92	641808 7510250	13	<p>Gently undulating plain, flat 1%/1%</p> <p>Nil microrelief, complete clearing, forage cropping</p> <p>Surface firm, nil coarse fragments</p> <ul style="list-style-type: none"> <li>A1, 0.00-0.11m, Light clay, moderate, firm, 10YR2/1 Black, nil mottles, nil inclusions, moderately moist, moderately well drained, roots fine/few</li> <li>B21, 0.11-0.40+m, Medium clay, moderate, firm, 10YR2/1 Black, nil mottles, nil inclusions, moderately moist, moderately well drained, roots fine/few</li> </ul>	  

Site No.	Location - mE, mN (GDA94 Zone 55)	Map Unit	Comments	Pictures
NC-93	641880 7510362	13	<p>Gently undulating plain, mid slope 1%</p> <p>Nil microrelief, complete clearing, forage cropping</p> <p>Surface firm, nil coarse fragments</p> <ul style="list-style-type: none"> <li>• A1, 0.00-0.11m, Light clay, moderate, 10YR2/1 Black</li> <li>• B21, 0.11-0.40+m, Medium clay, moderate, 10YR2/1 Black</li> </ul>	  



Key	Acceptable SWS Result	
	Marginal SWS Result. PAWCER Required	
	Failed SWS Result	
	Physical / Chemical Barrier	

1	Map Unit	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)
		N6-SCL-0.0-0.1	CL				N7-SCL-0.0-0.1	CL				N8-SCL-0.0-0.1	SL			
		N6-SCL-0.2-0.3	CL				N7-SCL-0.2-0.3	CL				N8-SCL-0.2-0.3	L			
		N6-SCL-0.5-0.6	MC			No assessment due to pH > 8.9	N7-SCL-0.5-0.6	LC			No assessment due to pH > 8.9	N8-SCL-0.5-0.6	LC			No assessment due to pH > 8.9
		N6-SCL-0.77-0.87	ZCL				N7-SCL-0.8-0.9	LC				N8-SCL-0.8-0.9	LC			
		N6-SCL-0.9-1.0	CL			N7-SCL-0.9-1.0	LC				N8-SCL-0.9-1.0	LMC				
					0	0				0	0				0	0
2	Map Unit	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)
		N17-0.0-0.1	SL				N18-0.0-0.1	SL				N19-0.0-0.1	LS			
		N17-0.1-0.2	SCL			No assessment due to pH > 8.9	N18-0.2-0.3	SC			No assessment due to pH > 8.9	N19-0.2-0.3	CL			
		N17-0.2-0.3	SCL				N18-0.5-0.6	LC				N19-0.5-0.6	SCL			No assessment due to pH > 8.9
		N12-0.5-0.6	CL				N18-0.8-0.9	LC				N19-0.8-0.9	SCL			
		N12-0.8-0.88	CL			N18-0.9-1.0	LC				N19-0.9-0.95	CL				
					0	0				0	0				0	0
3	Map Unit	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)
		N15-0.0-0.1	LC	10	10	10	N16-0.0-0.1	LC				60-SCL-0.0-0.1	LC			0
		N15-0.2-0.3	MC				N16-0.2-0.3	LC				60-SCL-0.2-0.3	LMC	10	30	30
		N15-0.55-0.6	MC	12	50	60	N16-0.5-0.6	LC				60-SCL-0.5-0.6	MC			0
		N15-0.8-0.9	LMC	10	30	30	N16-0.8-0.9	LMC	10	90	90	60-SCL-0.8-0.9	MC			0
		N15-0.9-1.0	MC	12	10	12	N16-0.9-1.0	MC	12	10	12	60-SCL-0.9-1.0	MC	12	70	84
					100	112				100	102				100	114
4	Map Unit	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)
		N20-0.0-0.1	CL	8	10	8	N21-0.0-0.1	SCL				N22-0.0-0.1	SCL			
		N20-0.2-0.3	CL				N21-0.2-0.3	SC				N22-0.2-0.3	SC			
		N20-0.5-0.6	SCL	6	50	30	N21-0.5-0.58	LC			No assessment due to pH > 8.9	N22-0.5-0.6	SC			No assessment due to pH > 8.9
		N20-0.75-0.85	LC			No assessment due to pH > 8.9	N21-0.8-0.9	LMC				N22-0.8-0.9	LC			
		N20-0.9-1.0	MC			N21-0.9-1.0	MC				N22-0.9-1.0	LMC				
					60	38				0	0				0	0
5	Map Unit	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)
		N4-SCL-0.0-0.1	S				N5-SCL-0.0-0.1	SL				N9-SCL-0.0-0.1	SL			
		N4-SCL-0.2-0.3	CL				N5-SCL-0.2-0.3	CL				N9-SCL-0.2-0.3	CL			
		N4-SCL-0.5-0.6	CL			No assessment due to pH > 8.9	N5-SCL-0.5-0.6	CL			No assessment due to pH > 8.9	N9-SCL-0.55-0.65	CL			No assessment due to pH > 8.9
		N4-SCL-0.8-0.9	CL				N5-SCL-0.8-0.9	CL				N9-SCL-0.75-0.85	CL			
		N4-SCL-0.9-1.0	CL			N5-SCL-0.9-1.0	CL				N9-SCL-0.9-1.0	CL				
					0	0				0	0				0	0
6	Map Unit	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)
		N27-0.0-0.1	SCL				91-0.0-0.1	SL	5	10	5	32-SCL-0.0-0.1	SCL			
		N27-0.2-0.3	SCL				91-0.2-0.3	L	6	20	12	32-SCL-0.2-0.3	LC			
		N27-0.5-0.6	LMC			No assessment due to pH > 8.9	91-0.5-0.6	LC				32-SCL-0.5-0.6	CL			No assessment due to pH > 8.9
		N27-0.8-0.9	LMC				91-0.8-0.9	LC	10	60	60	32-SCL-0.8-0.9	CL			
		N27-0.9-1.0	LMC			91-0.9-1.0	LC			Chloride Exceedance of 1026 mg/kg	32-SCL-0.9-1.0	CL				
					0	0				90	77				0	0
	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)	
	80-SCL-0.0-0.1	SCL														
	80-SCL-0.22-0.3	CL														
	80-SCL-0.5-0.6	CL			No assessment due to pH > 8.9											
	80-SCL-0.8-0.9	CL														
		80-SCL-0.9-1.0	CL													
					0	0										
7	Map Unit	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)
		N1-0.0-0.1	Heavy Clay	12	0	0	N2-0.0-0.1	Medium Clay		0	0	N3-0.0-0.1	Medium Clay		0	0
		N1-0.2-0.3	Heavy Clay	12	0	0	N2-0.2-0.3	Medium Clay		0	0	N3-0.2-0.3	Medium Clay		0	0
		N1-0.5-0.6	Heavy Clay	12	0	0	N2-0.5-0.6	Medium Clay		0	0	N3-0.5-0.6	Medium Clay		0	0
		N1-0.8-0.9	Heavy Clay	12	0	0	N2-0.8-0.9	Medium Clay		0	0	N3-0.8-0.9	Medium Clay		0	0
		N1-0.9-1.0	Heavy Clay	12	100	120	N2-0.9-1.0	Medium Clay	12	100	120	N3-0.9-1.0	Medium Clay	12	100	120
					100	120				100	120				100	120
8	Map Unit	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)
		N12-0.0-0.1	CL	8	10	8	N13-0.0-0.1	SCL	6	10	6	N14-0.0-0.1	SL	5	10	5
		N12-0.2-0.3	LC	10	20	20	N13-0.2-0.3	LMC	10	20	20	N14-0.2-0.3	MC	12	20	24
		N12-0.5-0.6	MC	12	30	36	N13-0.5-0.6	MC	12	30	36	N14-0.5-0.6	LMC			
		N12-0.8-0.9	LMC				N13-0.8-0.9	LMC	10	30	30	N14-0.8-0.9	LMC	10	60	60
		N12-0.9-1.0	LMC	10	40	40	N13-0.9-1.0	MC	12	10	12	N14-0.9-1.0	MC	12	10	12
					100	104				100	104				100	101
9	Map Unit	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)
		65-0.0-0.1	LMC	10	10	10	N29-SCL-0.0-0.10	LMC				N30-SCL-0.0-0.1	LMC			
		65-0.2-0.3	LMC	10	20	20	N29-SCL-0.2-0.3	LC				N30-SCL-0.2-0.3	LC			
		65-0.5-0.6	MC	10	30	30	N29-SCL-0.5-0.6	LC	10	60	60	N30-SCL-0.5-0.6	LC			
		65-0.8-0.9	MC				N29-SCL-0.8-0.9	MC	12	30	36	N30-SCL-0.8-0.9	LMC			
		65-0.9-1.0	MC	12	40	48	N29-SCL-0.9-1.0	LMC	10	10	10	N30-SCL-0.9-1.0	LC	10	100	100
					100	108				100	106				100	100
	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)	
	N31-SCL-0.0-0.1	LMC				N32-SCL-0.0-0.1	LC				N33-SCL-0.0-0.1	LMC				
	N31-SCL-0.2-0.3	LMC	10	30	30	N32-SCL-0.2-0.3	LMC				N33-SCL-0.2-0.3	LC	10	30	30	
	N31-SCL-0.5-0.6	MC				N32-SCL-0.5-0.6	LMC	10	60	60	N33-SCL-0.5-0.6	MC				
	N31-SCL-0.8-0.9	MC				N32-SCL-0.8-0.9	MC				N33-SCL-0.8-0.9	MC				
		N31-SCL-0.9-1.0	MC	12	70	84	N32-SCL-0.9-1.0	MC	12	40	48	N33-SCL-0.9-1.0	MC	12	70	84
					100	114				100	108				100	114
10	Map Unit	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)
		N45-SCL-0.0-0.05	CI	8	5	4	N28-SCL-0.0-0.05	CL				N43-SCL-0.0-0.1	CL			
		N45-SCL-0.25-0.3	LC	10	25	25	N28-SCL-0.2-0.3	CL				N43-SCL-0.2-0.3	CL			
		N45-SCL-0.5-0.6	MC	12	30	36	N28-SCL-0.5-0.6	LC			No assessment due to pH > 8.9	N43-SCL-0.5-0.6	LC			No assessment due to pH > 8.9
		N45-SCL-0.8-0.9	LMC	10	30	30	N28-SCL-0.8-0.9	LC				N43-SCL-0.8-0.9	LC			
		N45-SCL-0.9-1.0	MC	12	10	12	N28-SCL-0.9-1.0	LC				N43-SCL-0.9-1.0	LC			
					100	107				0	0				0	0
11	Map Unit	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)
		N23-0.0-0.1	CL				N24-0.0-0.1	SC				N25-0.0-0.1	MC			
		N23-0.2-0.3	LMC				N24-0.2-0.3	LC			No assessment due to pH > 8.9	N25-0.22-0.3	MC			No assessment due to pH > 8.9
		N23-0.5-0.6	LMC			No assessment due to pH > 8.9	N24-0.5-0.6	LC				N25-0.5-0.6	LMC			
		N23-0.8-0.9	MC				N24-0.8-0.9	LC				N25-0.8-0.9	MC			
		N23-0.9-1.0	MC		</											



Map Unit	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)
15	N38-SCL-0.0-0.1	LMC				N39-SCL-0.0-0.1	LMC	10	10	10	N40-SCL-0.0-0.1	LMC			
	N38-SCL-0.2-0.3	LMC				N39-SCL-0.2-0.3	MC	12	20	24	N40-SCL-0.2-0.3	LC			
	N39-SCL-0.5-0.6	LC				N39-SCL-0.5-0.6	SC	10	30	30	N40-SCL-0.5-0.6	LMC	10	60	60
	N38-SCL-0.8-0.9	LC				N39-SCL-0.8-0.9	MC	12	30	36	N40-SCL-0.8-0.9	MC			
	N38-SCL-0.9-1.0	LMC	10	100	100	N39-SCL-0.9-1.0	LC	10	10	48	N40-SCL-0.9-1.0	MC	12	40	48
				100	100				100	110				100	108
Map Unit	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)
16	102-SCL-D-0.0-0.1	MC				102-SCL-M-0.0-0.1	SC	8	10	8	103-SCL-D-0.0-0.1	MC			
	102-SCL-D-0.2-0.3	MHC				102-SCL-M-0.2-0.3	LC			0	103-SCL-D-0.2-0.3	MC			
	102-SCL-D-0.5-0.6	MHC				102-SCL-M-0.5-0.6	LMC	10	50	50	103-SCL-D-0.5-0.6	MC			
	102-SCL-D-0.8-0.9	MHC				102-SCL-M-0.83-0.9	MC			0	103-SCL-D-0.8-0.9	MC			
	102-SCL-D-0.9-1.0	MHC	12	100	120	102-SCL-M-0.9-1.0	MC	12	40	48	103-SCL-D-0.9-1.0	MC	12	100	120
				100	120				100	106				100	120
	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)
	103-SCL-M-0.0-0.1	LC				5-SCL-M-0.0-0.1	MC				5-SCL-D-0.0-0.1	MC			
	103-SCL-M-0.2-0.3	LC				5-SCL-M-0.2-0.3	MC				5-SCL-D-0.2-0.3	MHC			
	103-SCL-M-0.5-0.6	LC				5-SCL-M-0.5-0.6	MC				5-SCL-D-0.5-0.6	MHC			
	103-SCL-M-0.8-0.9	LC				5-SCL-M-0.8-0.9	MHC				5-SCL-D-0.8-0.9	HC			
	103-SCL-M-0.9-1.0	LC	10	100	100	5-SCL-M-0.9-1.0	MHC	12	100	120	5-SCL-D-0.9-1.0	HC	12	100	120
				100	100				100	120				100	120
Map Unit	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)
17	4-SCL-0.0-0.1	Medium Clay		0		110-SCL-0.0-0.1	Light Clay	10	10	10	115-SCL-0.0-0.1	Clay loam	8	10	8
	4-SCL-0.2-0.3	Medium Clay		0		110-SCL-0.2-0.3	Medium Clay				115-SCL-0.2-0.3	Light Clay	10	20	20
	4-SCL-0.5-0.6	Medium Clay		0		110-SCL-0.5-0.6	Medium Clay				115-SCL-0.5-0.6	Medium Clay	12	30	36
	4-SCL-0.7-0.8	Medium Clay	12	80	96	110-SCL-0.7-0.8	Medium Clay	12	70	84	115-SCL-0.8-0.9	Light Clay	10	30	30
	4-SCL-0.9-1.0	Silty clay loam	8	20	16	110-SCL-0.9-1.0	Loam	6	20	12	115-SCL-0.9-1.0	Medium Clay	12	10	12
				100	112				100	106				100	106
Map Unit	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)
18	N46-0.00-0.10	Sandy Clay Loam	6	12	7.2	N52-0.00-0.10	Sandy Clay Loam	8	12	9.6	N26-0.0-0.1	SCL			
	N46-0.20-030	Light clay	10	8	8	N52-0.20-030	Light clay	10	8	8	N26-0.2-0.3	SC			
	N46-0.50-0.60	Medium Clay	12	0		N52-0.50-0.60	Medium Clay	12	0		N26-0.5-0.6	LMC	No assessment due to pH >8.9		
	N46-0.70-0.80	Medium Clay	12	0		N52-0.70-0.80	Light medium clay	12	0		N26-0.83-0.9	LMC			
	N46-0.90-1.00	Medium Clay	12	0		N52-0.90-1.00	Medium Clay	12	0		N26-0.9-1.0	LC			
				20	15.2				20	17.6				0	0
	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)
	77-SCL-0.0-0.1	CL	8	10	8										
	77-SCL-0.2-0.3	LMC													
	77-SCL-0.5-0.6	LC													
	77-SCL-0.8-0.9	LMC	10	80	80										
	77-SCL-0.9-1.0	MC	12	10	12				0	0				0	0
				100	100										
Map Unit	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)
19	N47-0.0-0.08	Medium Clay	12	8	9.6	N49-0.0-0.1	Medium Clay	12	13	15.6	N57-0.0-0.1	ght medium Cl	12	8	9.6
	N47-0.2-0.3	Medium Clay	12	32	38.4	N49-0.2-0.3	Medium Clay	12	0	0	N57-0.2-0.3	Medium Clay	12	42	50.4
	N47-0.5-0.6	Medium Clay	12	0	0	N49-0.5-0.6	Medium Clay	12	48	57.6	N57-0.5-0.6	Medium Clay	12	0	0
	N47-0.7-0.8	Medium Clay	12	40	48	N49-0.7-0.8	Medium Clay	12	0	0	N57-0.7-0.8	Medium Clay	12	40	48
	N47-0.9-1.0	Medium Clay	12	20	24	N49-0.9-1.0	Medium Heavy Cla	12	39	46.8	N57-0.9-1.0	Medium Clay		0	0
				100	120				100	120				90	108
Map Unit	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)	Sample	PSA Texture	Texture (mm)	Horizon depth (mm)	Total SWS (mm)
20	N54-0.0-0.1	Medium Clay	12	12	14.4	N56-0.0-0.1	Medium Clay	12	10	12	N58-0.00-0.10	Medium Clay	12	11	13.2
	N54-0.2-0.3	Medium Clay	12	22	26.4	N56-0.2-0.3	Medium Clay	12	0	0	N58-0.20-0.30	ght medium Cl	12	34	40.8
	N54-0.5-0.6	Medium Clay	12	36	43.2	N56-0.5-0.6	Medium Clay	12	55	66	N58-0.50-0.60	Medium Clay	12	0	0
	N54-0.7-0.8	Medium Clay	12		0	N56-0.7-0.8	Medium Clay	12	25	30	N58-0.66-0.76	Medium Clay	12	31	37.2
	N54-0.9-1.0	Medium Clay	12		0	N56-0.9-1.0	Medium Clay	12		0	N58-0.90-1.00	Medium Clay	12	24	28.8
				70	84				90	108				100	120

Acceptable SWS Result	
Marginal SWS Result	
Failed SWS Result	

Sample No.	Upper Depth (m)	Lower Depth (m)	Depth Factor	FS	CS	Cl	15 Bar	Field Capacity	Bulk Density	Wilting Point	delta AWC	PAWC
10-SCL	0	0.1	1.3	0	75.1	16.8	16	31.41	1.27	18.65	16.21	
	0.2	0.3	2.6	0	67.5	20.5	13	22.15	1.47	14.72	10.96	
	0.5	0.6	2.1	0	67.3	22.9	14	18.79	1.57	14.81	6.24	
	0.7	0.8	2.4	0	59.0	24.4	15	18.49	1.58	15.31	5.02	
	0.9	1	1.6	0	49.3	29.5	17	20.22	1.54	16.93	5.07	82.83

Sample No.	Upper Depth (m)	Lower Depth (m)	Depth Factor	FS	CS	Cl	15 Bar	Field Capacity	Bulk Density	Wilting Point	delta AWC	PAWC
91-SCL	0	0.1	1.2	0	82.0	13.9	12	27.07	1.35	14.92	16.40	
	0.2	0.3	3.8	0	74.5	17.4	14	23.12	1.44	15.96	10.35	
	0.5	0.6	1	0	59.6	34.0	19	25.13	1.43	19.42	8.16	
	0.8	0.9	3	0	58.7	36.9	21	25.73	1.42	21.11	6.56	
	0.9	1	1	0	47.3	37.5	22	26.57	1.40	22.06	6.34	93.19

Sample No.	Upper Depth (m)	Lower Depth (m)	Depth Factor	FS	CS	Cl	15 Bar	Field Capacity	Bulk Density	Wilting Point	delta AWC	PAWC
N42	0	0.1	1.4	0	77.0	19.0	12	27.25	1.36	14.41	17.40	
	0.2	0.3	1.6	0	59.0	35.0	15	25.15	1.43	15.65	13.61	
	0.5	0.6	4	0	61.0	37.0	16	21.89	1.51	16.29	8.47	
	0.8	0.9	2	0	57.0	37.0	18	22.26	1.50	18.10	6.26	
	0.9	1	1	0	56.0	38.0	19	23.14	1.48	19.05	6.08	98.64

Sample No.	Upper Depth (m)	Lower Depth (m)	Depth Factor	FS	CS	Cl	15 Bar	Field Capacity	Bulk Density	Wilting Point	delta AWC	PAWC
N54	0	0.1	1.2	0	41.5	47.0	13	29.31	1.36	12.63	22.76	
	0.2	0.3	2.2	0	40.8	52.7	17	28.54	1.39	16.34	16.96	
	0.5	0.6	2.6	0	17.1	71.1	21	30.46	1.38	20.05	14.41	
	Chemical Barrier											
												102.09

PAWC is determined using the above PAWCER Pedo-transfer Function (supplied by Ian Grant, Agricultural Chemistry Pty Ltd). Ian Grant was suggested by Dennis Baker (E.S.S.A / Nominated Laboratory Representative) and has worked previously in PAWCER development for soil science applications.

A summary of the function is as follows:

Steps	Function
1	Upper and lower depths relate to the soil samples collected
2	Depth factor is the height of the soil column based on the texture observed, within the upper and lower depths. These values may extend beyond the upper/lower depth, however this is to ensure accuracy of the texture and depth of texture observed. The depth factor must equal 10 for 1.0m
3	CS (Coarse Sand/Sand) and Cl (Clay) laboratory result percentages are inserted. FS (Silt) is not included, as per RPI 08/14 example calculation.
4	15 Bar laboratory result is inserted.
5	Field Capacity is determined by assessing upper depth, FS, CS, CL and 15 Bar. Example calculation below; $(0.995+0.0011*(FS+CS))*13.2*EXP(-2.845*Upper\ depth)+(1.0054+0.0041*Cl)*15\ Bar$
6	Bulk density is determined by the calculation using the field capacity and CL percentage. Example calculation below; $(85.82+0.12*Cl)/(37.74+Field\ Capacity)$
7	Wilting point is determined by the calculation using the upper depth, Cl and 15 Bar. Example calculation below; $100*(-2.41+0.0566*Cl)*(-0.0176+0.022*Upper\ Depth)+1.0054*15\ Bar$
8	delta AWC is calculated for the individual depth using the field capacity, bulk density and wilting point. Example calculation below; $(Bulk\ Density*Field\ Capacity)-(Bulk\ Density*Wilting\ point)$
9	PAWC is then calculated by the delta AWC multiplied against the depth factor, with all results added. Example calculation below; $delta\ AWC*Depth\ Factor+ delta\ AWC*Depth\ Factor + delta\ AWC*Depth\ Factor + delta\ AWC*Depth\ Factor + delta\ AWC*Depth\ Factor\ (Five\ Depths)$

**ESSA Pty Ltd /EAL NATA (ASPAC certified)**

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References: H2096

Sheet 1 of 4

Date Received: 06/07/2018  
Date Completec 25/07/2018 Reissued 24/2/21

## **FINAL REPORT**

### **Project:**

Project -Saraji East (18SRE)

All results in this report relate only to the items tested.  
Results are expressed on an "as received basis".

Client Name: GT Environmental

Contact Mr Reece Mc Cann

Sample Type: Soil

Number of samples: 75



Soil Analysis Report  
Batch Numbers: H2096

Date Received: 06/07/2018  
Date Completed:25/07/2018

Client: GTE sARAJI- Results Page 1 of 2

ESSA Ref	field ref	Soil pH	Soil EC	Soil Cl		Exch.Ca	Exch. Mg	Exch.K	Exch. Na	CEC	ESP	Ca/Mg
	depth (m)		dS/m	mg/kg		meq/100g	meq/100g	meq/100g	meq/100g	meq/100g	%Na/CEC	Ratio
H2096/1	4-SCL-0.0-0.1	7.74	0.08	7								
H2096/2	4-SCL-0.2-0.3	8.82	0.19	13								
H2096/3	4-SCL-0.5-0.6	8.82	0.26	124								
H2096/4	4-SCL-0.7-0.8	8.60	0.44	419								
H2096/5	4-SCL-0.9-1.0	8.65	0.63	799								
H2096/6	10-SCL-0.0-0.1	7.22	0.08	13								
H2096/7	10-SCL-0.2-0.3	7.28	0.03	11								
H2096/8	10-SCL-0.5-0.6	8.21	0.04	14								
H2096/9	10-SCL-0.7-0.8	8.40	0.04	25								
H2096/10	10-SCL-0.9-1.0	8.56	0.06	73								
H2096/11	65-SCL-0.0-0.1	7.83	0.08	12								
H2096/12	65-SCL-0.2-0.3	8.47	0.13	10								
H2096/13	65-SCL-0.5-0.6	8.90	0.18	18								
H2096/14	65-SCL-0.8-0.9	8.93	0.32	101								
H2096/15	65-SCL-0.9-1.0	8.96	0.37	159								
H2096/16	91-SCL-0.0-0.1	6.99	0.08	12								
H2096/17	91-SCL-0.2-0.3	8.02	0.07	12								
H2096/18	91-SCL-0.5-0.6	9.13	0.33	211								
H2096/19	91-SCL-0.8-0.9	9.07	0.76	701								
H2096/20	91-SCL-0.9-1.0	8.95	0.94	1026								
H2096/21	110-SCL-0.0-0.1	7.30	0.10	27								
H2096/22	110-SCL-0.2-0.3	7.93	0.09	12								
H2096/23	110-SCL-0.5-0.6	8.83	0.26	39								
H2096/24	110-SCL-0.7-0.8	8.91	0.31	72								
H2096/25	110-SCL-0.9-1.0	9.04	0.29	47								
H2096/26	115-SCL-0.0-0.1	7.85	0.14	34								
H2096/27	150-SCL-0.2-0.3	8.19	0.16	14								
H2096/28	115-SCL-0.5-0.6	8.57	0.19	68								
H2096/29	115-SCL-0.8-0.9	8.69	0.22	16								
H2096/30	115-SCL-0.9-1.0	8.78	0.26	40								
H2096/31	N1-SCL-0.0-0.1	7.96	0.16	23								
H2096/32	N1-SCL-0.2-0.3	8.23	0.14	82								
H2096/33	N1-SCL-0.5-0.6	8.29	0.47	384								
H2096/34	N1-SCL-0.8-0.9	8.25	0.52	582								
H2096/35	N1-SCL-0.9-1.0	8.22	0.58	669								
H2096/36	N2-SCL-0.0-0.1	7.67	0.13	39								
H2096/37	N2-SCL-0.2-0.3	8.23	0.12	59								
H2096/38	N2-SCL-0.5-0.6	8.52	0.10	50								
H2096/39	N2-SCL-0.8-0.9	8.47	0.15	73								
H2096/40	N2-SCL-0.9-1.0	8.48	0.18	114								
H2096/41	N3-SCL-0.0-0.1	7.78	0.12	35								
H2096/42	N3-SCL-0.2-0.3	8.34	0.08	15								
H2096/43	N3-SCL-0.5-0.6	8.52	0.10	14								
H2096/44	N3-SCL-0.8-0.9	8.61	0.15	14								
H2096/45	N3-SCL-0.9-1.0	8.66	0.17	21		11.09	7.08	0.22	0.86	19.2	4.4	1.6
H2096/46	N4-SCL-0.0-0.1	7.57	0.25	28		9.04	4.50	0.91	0.18	14.6	1.2	2.0
H2096/47	N4-SCL-0.2-0.3	8.06	0.11	30		13.00	8.04	0.19	0.65	21.9	3.0	1.6
H2096/48	N4-SCL-0.5-0.6	9.23	0.27	140		9.34	10.33	0.06	1.14	20.9	5.5	0.9
H2096/49	N4-SCL-0.8-0.9	9.24	0.43	280		7.70	11.55	0.08	1.63	21.0	7.8	0.7
H2096/50	N4-SCL-0.9-1.0	9.18	0.54	514		7.79	12.78	0.07	1.92	22.6	8.5	0.6
H2096/51	N5-SCL-0.0-0.1	6.82	0.09	63		11.53	5.73	1.23	0.10	18.6	0.6	2.0
H2096/52	N5-SCL-0.2-0.3	8.05	0.09	15		16.60	10.13	0.24	0.87	27.8	3.1	1.6
H2096/53	N5-SCL-0.5-0.6	9.03	0.34	201		15.55	17.77	0.09	3.19	36.6	8.7	0.9
H2096/54	N5-SCL-0.8-0.9	9.04	0.71	649		12.21	17.99	0.03	3.56	33.8	10.5	0.7
H2096/55	N5-SCL-0.9-1.0	9.03	0.78	918		11.19	17.41	0.04	3.34	32.0	10.4	0.6
H2096/56	N6-SCL-0.0-0.1	7.15	0.11	9		24.76	12.10	0.74	0.37	38.0	1.0	2.0
H2096/57	N6-SCL-0.2-0.3	8.27	0.22	7		22.26	12.16	0.11	1.66	36.2	4.6	1.8
H2096/58	N6-SCL-0.5-0.6	8.94	0.46	320		20.31	16.39	0.02	5.19	41.9	12.4	1.2
H2096/59	N6-SCL-0.77-0.87	8.66	1.06	1429		18.88	18.62	0.09	6.13	43.7	14.0	1.0
H2096/60	N6-SCL-0.9-1.0	8.68	1.08	1213		17.42	17.46	0.05	5.09	40.0	12.7	1.0
H2096/61	N7-SCL-0.0-0.1	7.61	0.11	21		17.28	6.41	0.17	0.28	24.1	1.2	2.7
H2096/62	N7-SCL-0.2-0.3	8.52	0.10	50		17.58	8.15	0.08	0.57	26.4	2.2	2.2
H2096/63	N7-SCL-0.5-0.6	9.15	0.43	306		12.73	15.60	0.03	2.70	31.1	8.7	0.8
H2096/64	N7-SCL-0.8-0.9	8.90	1.02	980		12.12	19.17	0.02	4.63	35.9	12.9	0.6
H2096/65	N7-SCL-0.9-1.0	8.80	1.16	1014		13.39	21.72	0.05	5.38	40.5	13.3	0.6
H2096/66	N8-SCL-0.0-0.1	7.29	0.06	15		15.30	9.66	0.41	0.12	25.5	0.5	1.6
H2096/67	N8-SCL-0.2-0.3	8.87	0.16	82		15.69	14.97	0.07	1.33	32.1	4.1	1.0
H2096/68	N8-SCL-0.5-0.6	9.37	0.35	166		13.74	22.47	0.09	4.52	40.8	11.1	0.6
H2096/69	N8-SCL-0.8-0.9	9.16	0.81	643		11.56	23.51	0.09	5.45	40.6	13.4	0.5
H2096/70	N8-SCL-0.9-1.0	8.98	1.02	949		13.44	28.20	0.10	6.36	48.1	13.2	0.5
H2096/71	N9-SCL-0.0-0.09	7.77	0.23	12		10.73	5.32	0.66	0.26	17.0	1.5	2.0
H2096/72	N9-SCL-0.2-0.3	7.90	0.09	6		10.99	6.93	0.08	0.84	18.8	4.5	1.6
H2096/73	N9-SCL-0.55-0.65	9.20	0.40	235		12.80	16.78	0.03	3.26	32.9	9.9	0.8
H2096/74	N9-SCL-0.75-0.85	9.14	0.62	543		8.86	13.84	0.04	2.68	25.4	10.5	0.6
H2096/75	N9-SCL-0.9-1.0	9.01	0.90	929		9.62	16.95	0.02	3.25	29.8	10.9	0.6

Soil Analysis Report  
Batch Numbers: H2096

Date Received: 06/07/2018  
Date Completed: 25/07/2018

Client: GTE Saraji Results Page 2 of 2

Lab No	Sample No	ADMC	Gravel	CS>50µm	CS>20µm	2-50µm-Silt	2-20µm-Silt	Clay <2µm	15 Bar
	Depth (m)	%	%	%	%	%	%	%	%
H2096/1	4-SCL-0.0-0.1	11.2	0.3	36.5	36.5	16.6	16.6	46.8	28
H2096/2	4-SCL-0.2-0.3	14.9	0.3	28.6	28.6	23.4	23.4	48.0	32
H2096/3	4-SCL-0.5-0.6	15.8	0.0	27.4	30.3	23.6	20.7	49.0	32
H2096/4	4-SCL-0.7-0.8	17.5	1.6	29.3	32.9	23.9	20.3	46.8	33
H2096/5	4-SCL-0.9-1.0	16.5	1.0	24.0	36.7	37.9	25.2	38.1	30
H2096/6	10-SCL-0.0-0.1	13.4	0.6	68.2	75.1	15.0	8.1	16.8	16
H2096/7	10-SCL-0.2-0.3	6.0	0.4	70.0	67.5	9.5	11.9	20.5	13
H2096/8	10-SCL-0.5-0.6	7.2	3.8	65.9	67.3	11.2	9.8	22.9	14
H2096/9	10-SCL-0.7-0.8	8.1	6.4	52.9	59.0	22.7	16.6	24.4	15
H2096/10	10-SCL-0.9-1.0	9.2	3.5	45.7	49.3	24.8	21.1	29.5	17
H2096/11	65-SCL-0.0-0.1	22.5	0.5	22.4	28.9	34.6	28.0	43.1	27
H2096/12	65-SCL-0.2-0.3	13.9	0.3	30.1	41.6	25.7	14.1	44.3	28
H2096/13	65-SCL-0.5-0.6	15.0	0.1	16.7	26.8	35.7	25.6	47.6	30
H2096/14	65-SCL-0.8-0.9	16.3	3.1	22.9	25.8	26.3	23.4	50.8	31
H2096/15	65-SCL-0.9-1.0	16.9	6.1	24.7	28.0	23.7	20.5	51.6	31
H2096/16	91-SCL-0.0-0.1	11.0	1.5	70.4	82.0	15.7	4.0	13.9	12
H2096/17	91-SCL-0.2-0.3	9.0	1.0	67.6	74.5	15.0	8.1	17.4	14
H2096/18	91-SCL-0.5-0.6	8.9	1.5	54.5	59.6	11.5	6.4	34.0	19
H2096/19	91-SCL-0.8-0.9	11.6	2.6	53.1	58.7	10.0	4.4	36.9	21
H2096/20	91-SCL-0.9-1.0	12.1	1.7	45.0	47.3	17.5	15.2	37.5	22
H2096/21	110-SCL-0.0-0.1	9.3	0.5	44.3	56.3	18.5	6.5	37.2	22
H2096/22	110-SCL-0.2-0.3	15.9	0.5	31.3	43.4	21.3	9.3	47.3	28
H2096/23	110-SCL-0.5-0.6	17.3	7.2	20.4	36.6	21.6	5.4	58.0	30
H2096/24	110-SCL-0.7-0.8	19.4	24.8	20.9	28.8	33.3	25.4	45.8	33
H2096/25	110-SCL-0.9-1.0	17.9	22.3	41.3	55.5	37.1	23.0	21.5	33
H2096/26	115-SCL-0.0-0.1	18.0	0.8	40.4	46.1	22.8	17.1	36.8	24
H2096/27	150-SCL-0.2-0.3	17.0	0.2	36.2	38.7	22.0	19.5	41.8	29
H2096/28	115-SCL-0.5-0.6	22.1	0.6	32.2	44.1	18.2	6.4	49.6	31
H2096/29	115-SCL-0.8-0.9	22.7	5.1	27.3	36.2	28.0	19.0	44.7	32
H2096/30	115-SCL-0.9-1.0	22.3	1.2	35.7	38.9	10.6	7.5	53.7	32
H2096/31	N1-SCL-0.0-0.1	23.4	0.0	20.7	23.4	20.8	18.1	58.5	31
H2096/32	N1-SCL-0.2-0.3	16.1	0.0	16.5	24.0	19.3	11.8	64.2	33
H2096/33	N1-SCL-0.5-0.6	17.6	0.0	9.5	12.5	27.4	24.3	63.1	34
H2096/34	N1-SCL-0.8-0.9	17.8	0.4	14.2	13.6	18.6	19.2	67.2	34
H2096/35	N1-SCL-0.9-1.0	17.7	0.4	6.1	13.1	31.2	24.2	62.7	34
H2096/36	N2-SCL-0.0-0.1	16.1	0.0	33.1	42.2	20.8	11.6	46.1	30
H2096/37	N2-SCL-0.2-0.3	13.6	0.3	27.0	32.2	23.3	18.1	49.7	30
H2096/38	N2-SCL-0.5-0.6	13.8	0.1	21.3	27.7	25.0	18.7	53.7	31
H2096/39	N2-SCL-0.8-0.9	15.3	0.7	25.8	36.0	22.8	12.6	51.4	31
H2096/40	N2-SCL-0.9-1.0	15.5	0.3	25.0	32.1	24.0	16.9	51.0	31
H2096/41	N3-SCL-0.0-0.1	22.4	0.0	9.9	38.0	37.8	9.7	52.3	30
H2096/42	N3-SCL-0.2-0.3	14.4	0.4	25.2	32.4	24.0	16.9	50.8	29
H2096/43	N3-SCL-0.5-0.6	14.5	0.7	33.1	40.5	18.7	11.3	48.2	29
H2096/44	N3-SCL-0.8-0.9	14.8	0.3	20.7	37.8	26.8	9.7	52.6	29
H2096/45	N3-SCL-0.9-1.0	14.9	0.5	21.3	33.2	28.6	16.8	50.0	29
H2096/46	N4-SCL-0.0-0.1	12.2	0.7	76.4	93.2	17.9	1.1	5.7	11
H2096/47	N4-SCL-0.2-0.3	9.1	0.2	56.3	66.2	17.3	7.5	26.3	16
H2096/48	N4-SCL-0.5-0.6	8.1	0.4	56.0	65.6	21.5	12.0	22.5	14
H2096/49	N4-SCL-0.8-0.9	7.8	0.3	58.5	60.7	18.2	16.0	23.3	15
H2096/50	N4-SCL-0.9-1.0	8.3	0.5	50.1	59.3	26.8	17.6	23.1	14
H2096/51	N5-SCL-0.0-0.1	16.9	0.3	78.3	78.6	7.6	7.3	14.1	14
H2096/52	N5-SCL-0.2-0.3	11.0	1.2	62.8	67.0	14.6	10.3	22.6	18
H2096/53	N5-SCL-0.5-0.6	9.3	1.3	65.5	65.0	7.0	7.5	27.5	20
H2096/54	N5-SCL-0.8-0.9	10.9	2.1	63.1	62.2	4.0	5.0	32.9	20
H2096/55	N5-SCL-0.9-1.0	11.2	1.6	55.7	61.6	15.2	9.3	29.1	21
H2096/56	N6-SCL-0.0-0.1	22.8	0.1	51.2	54.4	22.5	19.3	26.2	22
H2096/57	N6-SCL-0.2-0.3	13.9	0.0	48.3	56.7	21.5	13.1	30.2	23
H2096/58	N6-SCL-0.5-0.6	16.5	0.1	21.8	29.0	27.2	20.1	51.0	31
H2096/59	N6-SCL-0.77-0.87	15.9	1.6	32.0	36.9	30.8	25.9	37.2	26
H2096/60	N6-SCL-0.9-1.0	14.7	4.3	40.5	47.5	23.2	16.3	36.3	22
H2096/61	N7-SCL-0.0-0.1	25.9	1.1	64.1	64.1	12.4	12.4	23.5	14
H2096/62	N7-SCL-0.2-0.3	9.8	1.4	52.5	66.7	24.2	9.9	23.3	17
H2096/63	N7-SCL-0.5-0.6	10.6	0.6	50.1	59.9	14.1	4.3	35.8	20
H2096/64	N7-SCL-0.8-0.9	13.8	2.4	42.0	53.7	22.9	11.3	35.1	23
H2096/65	N7-SCL-0.9-1.0	14.6	1.5	42.9	49.6	17.9	11.3	39.1	22
H2096/66	N8-SCL-0.0-0.1	15.8	1.3	74.1	77.3	9.2	6.0	16.7	13
H2096/67	N8-SCL-0.2-0.3	9.8	1.2	62.2	69.9	18.4	10.7	19.4	17
H2096/68	N8-SCL-0.5-0.6	12.1	3.4	44.6	58.5	21.3	7.4	34.1	24
H2096/69	N8-SCL-0.8-0.9	14.0	1.2	35.1	53.2	25.3	7.3	39.6	26
H2096/70	N8-SCL-0.9-1.0	15.9	2.8	34.4	47.2	22.8	9.9	42.9	26
H2096/71	N9-SCL-0.0-0.09	16.1	1.7	71.5	81.8	17.3	7.0	11.2	12
H2096/72	N9-SCL-0.2-0.3	7.0	1.2	62.2	76.4	18.3	4.1	19.5	13
H2096/73	N9-SCL-0.55-0.65	10.4	1.6	55.6	65.1	15.9	6.4	28.5	19
H2096/74	N9-SCL-0.75-0.85	9.5	2.3	60.8	59.9	15.0	15.9	24.2	17
H2096/75	N9-SCL-0.9-1.0	10.4	0.7	59.1	55.5	13.5	17.1	27.4	18

## METHOD DESCRIPTIONS

## Soil

Referenc H2096

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## Methods used to Analyse Samples

Analyte	ALHS*	Uncertainty	LOQ	Unit	Name	Method Description
pH	4A1	1.1	0.1	pH	pH	1:5 water extr, pH meter
EC	3A1	5.4	0.01	dS/m	Electrical conductivity	1:5 water extr, EC meter
Cl	5A2	10.0	10.0	mg/kg	Chloride	1:5 water extr, (AA) colorimetric
NO3-N	7C2	6.7	1.0	mg/kg	Nitrate-nitrogen	1:5 water extr, (AA) colorimetric
NH4-N	7C2	7.8	0.6	mg/kg	Ammonium-nitrogen	1M KCl extr, (AA) colorimetric
Bicarb.P	9B2	16.8	1.0	mg/kg	Bicarb.ext.phosphorus	0.5M NaHCO3 @ pH 8.5, (AA) colorimetric
Exch.Ca	15B/C1	7.2	0.18	meq/100g	Exchangeable calcium	1M NH4OAc @ pH 7.0/8.5 leach, AAS
Exch.Mg	15B/C1	4.7	0.31	meq/100g	Exchangeable magnesium	1M NH4OAc @ pH 7.0/8.5 leach, AAS
Exch.Na	15B/C1	9.6	0.09	meq/100g	Exchangeable calcium	1M NH4OAc @ pH 7.0/8.5 leach, AAS
Exch.K	15B/C1	4.8	0.02	meq/100g	Exchangeable calcium	1M NH4OAc @ pH 7.0/8.5 leach, AAS
CEC	15I3	5.7	1.0	meq/100g	Cation Exchange Capac	KNO3 + Ca(NO3)2 extr, (AA) colorimetric
ADMC	2A1	11.9	0.4	%	Air Dried Moisture Conte	Gravimetric oven dry @ 105C
R1	NA	20.2	NA		Dispersion Ratio	Ratio [Aqueous dispersible (Silt + Clay):Total (Silt + Clay)]
SO4-S	10B3	11.5	0.6	mg/kg	Sulfate sulfur	Ca(H2PO4)2 @ pH 4.0 extractable sulfate-sulfur, ICPOES
Sand	no ref	22.1	1.0	%	Particle size, sand	Hydrometer, gravimetric & Sieve
Silt	no ref	16.6	1.0	%	Particle size, silt	Hydrometer, gravimetric
Clay	no ref	12.7	1.0	%	Particle size, clay	Hydrometer, gravimetric

\* Australian Laboratory Handbook of Soil and Water Chemical Methods (1992)

For Manager **D E Baker BSc MASSSI**  
Analytical Services: \_\_\_\_\_

Methods from Rayment and Lyons, 2011. *Soil Chemical Methods - Australasia*. CSIRO Publishing: Collingwood.  
Soluble Salts included in Exchangeable Cations - Except PRE-WASHED (if EC>0.3dS/m).



## QUALITY CONTROL DATA

Soil

Reference: H2096

Page: 4 of 4

Methods from Rayment and Lyons, 2011. *Soil Chemical Methods - Australasia*. CSIRO Publishing: Collingwood.

Test Method	Units		Acceptance Criteria	
			Actual Value	[Range]
pH	pH	B		5.0 - 5.3
EC	dS/m	B		0.27 - 0.32
Cl	mg/kg	B		10 - 35
NO3-N	mg/kg	B		10 - 16
NH4-N	mg/kg	NA		NA
Bicarb.P	mg/kg	B		51 -75
Total Kjeldahl N	%	ASPAC 34	0.110	.100 - .120
Total P	%	ASPAC 34	0.02	.019 - .021
Organic Carbon	%	B		1.82 - 2.3
Ca (Exch. cations)pH	meq/100g	B		6.96 - 8.04
Mg (Exch. cations)pH	meq/100g	B		1.88 - 2.22
Na (Exch. cations)pH	meq/100g	B		.057 - .182
K (Exch. cations)pH	meq/100g	B		1.209 - 1.411
Exch. Acidity	meq/100g			NA
ECEC	meq/100g	A		NA
CEC	meq/100g	S12		58 - 73
ESP	%	A		NA
Coarse sand	%	B	17.0	17.3 - 22.4
Fine Sand	%	B	22.0	20.0 - 25.7
Silt	%	B	16.0	10.5 - 19.8
Clay	%	B	44.0	37.9 - 48.9
R1		B		0.23 - 0.38

Test Method	Units	Test Soil	Acceptance Criteria	
			Actual Value	[Range]
DTPA-Cu	mg/kg	SB		2.37 - 3.25
DTPA-Zn	mg/kg	SB		3.15 - 3.81
DTPA-Mn	mg/kg	SB		97.7 - 149.0
DTPA-Fe	mg/kg	SB		24.3 - 32.6
0.33 Bar	%	G		32 - 51
15 Bar	%	G		23 - 30
Ca (Exch. cations)pH8.5	meq/100g	S12		27.7 - 35.4
Mg (Exch. cations)pH8.5	meq/100g	S12		22.88 - 24.5
Na (Exch. cations)pH8.5	meq/100g	S12		2.0 - 2.28
K (Exch. cations)pH8.5	meq/100g	S12		1.64 - 2.09

**ESSA Pty Ltd /EAL NATA (ASPAC certified)**

**For Info Refer ESSA Pty Ltd  
PO Box 442 Sunnybank Q 4109**

**Phone: 0403245560**

**email: e.s.s.a@bigpond.net.au**

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References: I2733

Sheet 1 of 4

Date Received: 13/06/2019

Date Completed: 14/07/2019 Reissue 24.2/21

**FINAL REPORT**

**Project:**

Project -Saraji East (18SRE) No 1

All results in this report relate only to the items tested. Results are expressed on an "as received basis".

Client Name: GT Environmental

Contact: Mr Reece Mc Cann

Sample Type: Soil

Number of samples: 145

Soil Analysis Report  
Batch Numbers: I2733Date Received: 13/06/2019  
Date Completed:14/07/2019

Client: GTE SARAJI- Results Page 1 of 2

ESSA Ref	field ref	Soil pH	Soil EC	Soil Cl	Exch.Ca	Exch. Mg	Exch.K	Exch. Na	CEC	ESP	Ca/Mg
	depth (m)		dS/m	mg/kg	meq/100g	meq/100g	meq/100g	meq/100g	meq/100g	%Na/CEC	Ratio
i2733/1	6-SCL-0.0-0.1	7.88	0.191	22	24.22	10.38	1.85	0.21	36.65	0.6	2.3
i2733/2	6-SCL-0.2-0.3	8.43	0.264	117	19.94	11.38	1.30	1.47	34.09	4.3	1.8
i2733/3	6-SCL-0.5-0.6	8.61	0.694	626	15.46	14.40	0.75	4.09	34.70	11.8	1.1
i2733/4	6-SCL-0.8-0.9	8.55	1.005	1042	15.16	15.83	0.53	5.76	37.27	15.5	1.0
i2733/5	6-SCL-0.9-1.0	8.72	0.904	917	11.77	12.31	0.43	4.40	28.91	15.2	1.0
i2733/6	7-SCL-0.0-0.1	7.47	0.182	10	19.92	6.20	1.29	0.13	27.53	0.5	3.2
i2733/7	7-SCL-0.2-0.3	9.05	0.173	29	18.59	5.80	1.25	0.12	25.76	0.5	3.2
i2733/8	7-SCL-0.5-0.6	9.18	0.361	232	16.24	12.83	0.53	2.85	32.45	8.8	1.3
i2733/9	7-SCL-0.8-0.9	9.16	0.454	354	14.01	14.53	0.40	5.36	34.30	15.6	1.0
i2733/10	7-SCL-0.9-1.0	9.16	0.494	417	11.29	11.48	0.35	4.39	27.51	16.0	1.0
i2733/11	100-SCL-0.0-0.1	7.92	0.088	8	19.29	9.13	0.55	0.22	29.18	0.8	2.1
i2733/12	100-SCL-0.2-0.3	8.44	0.105	57	22.50	8.89	0.34	1.59	33.32	4.8	2.5
i2733/13	100-SCL-0.5-0.6	8.60	0.258	244	21.83	12.10	0.28	3.81	38.02	10.0	1.8
i2733/14	100-SCL-0.8-0.9	8.53	0.456	467	19.82	12.99	0.27	4.34	37.41	11.6	1.5
i2733/15	100-SCL-0.9-1.0	8.63	0.467	449	19.89	12.62	0.25	3.86	36.61	10.5	1.6
i2733/16	102-SCL-D-0.0-0.1	7.56	0.050	24	..	..	..	..	..	..	..
i2733/17	102-SCL-D-0.2-0.3	8.19	0.086	32	..	..	..	..	..	..	..
i2733/18	102-SCL-D-0.5-0.6	8.80	0.212	95	..	..	..	..	..	..	..
i2733/19	102-SCL-D-0.8-0.9	8.74	0.309	230	..	..	..	..	..	..	..
i2733/20	102-SCL-D-0.9-1.0	8.54	0.447	426	..	..	..	..	..	..	..
i2733/21	102-SCL-M-0.0-0.1	7.33	0.042	10	..	..	..	..	..	..	..
i2733/22	102-SCL-M-0.2-0.3	8.23	0.058	16	..	..	..	..	..	..	..
i2733/23	102-SCL-M-0.5-0.6	8.81	0.149	23	..	..	..	..	..	..	..
i2733/24	102-SCL-M-0.83-0.9	8.98	0.215	74	..	..	..	..	..	..	..
i2733/25	102-SCL-M-0.9-1.0	8.92	0.266	151	..	..	..	..	..	..	..
i2733/26	103-SCL-D-0.0-0.1	7.11	0.074	11	..	..	..	..	..	..	..
i2733/27	103-SCL-D-0.2-0.3	7.90	0.086	53	..	..	..	..	..	..	..
i2733/28	103-SCL-D-0.5-0.6	7.80	0.359	463	..	..	..	..	..	..	..
i2733/29	103-SCL-D-0.8-0.9	6.99	0.634	818	..	..	..	..	..	..	..
i2733/30	103-SCL-D-0.9-1.0	6.28	0.621	821	..	..	..	..	..	..	..
i2733/31	103-SCL-M-0.0-0.1	8.65	0.107	11	..	..	..	..	..	..	..
i2733/32	103-SCL-M-0.2-0.3	8.36	0.131	78	..	..	..	..	..	..	..
i2733/33	103-SCL-M-0.5-0.6	9.20	0.296	174	..	..	..	..	..	..	..
i2733/34	103-SCL-M-0.8-0.9	9.15	0.540	485	..	..	..	..	..	..	..
i2733/35	103-SCL-M-0.9-1.0	9.09	0.656	665	..	..	..	..	..	..	..
i2733/36	5-SCL-M-0.0-0.1	8.19	0.117	15	..	..	..	..	..	..	..
i2733/37	5-SCL-M-0.2-0.3	8.38	0.120	17	..	..	..	..	..	..	..
i2733/38	5-SCL-M-0.5-0.6	8.40	0.124	16	..	..	..	..	..	..	..
i2733/39	5-SCL-M-0.8-0.9	8.53	0.146	19	..	..	..	..	..	..	..
i2733/40	5-SCL-M-0.9-1.0	8.55	0.165	39	..	..	..	..	..	..	..
i2733/41	5-SCL-D-0.0-0.1	7.33	0.077	11	..	..	..	..	..	..	..
i2733/42	5-SCL-D-0.2-0.3	7.58	0.058	15	..	..	..	..	..	..	..
i2733/43	5-SCL-D-0.5-0.6	7.89	0.061	45	..	..	..	..	..	..	..
i2733/44	5-SCL-D-0.8-0.9	8.20	0.183	143	..	..	..	..	..	..	..
i2733/45	5-SCL-D-0.9-1.0	8.30	0.244	215	..	..	..	..	..	..	..
i2733/46	N23-0.0-0.1	8.33	0.135	20	22.33	4.79	0.49	0.06	27.67	0.2	4.7
i2733/47	N23-0.2-0.3	8.71	0.111	27	17.17	7.49	0.21	0.16	25.03	0.7	2.3
i2733/48	N23-0.5-0.6	9.31	0.220	42	8.48	13.01	0.14	1.87	23.49	7.9	0.7
i2733/49	N23-0.8-0.9	9.46	0.415	225	6.60	15.76	0.17	4.31	26.84	16.0	0.4
i2733/50	N23-0.9-1.0	9.50	0.615	440	5.24	15.84	0.11	5.40	26.59	20.3	0.3
i2733/51	N24-0.0-0.1	8.59	0.099	18	21.39	5.64	0.32	0.12	27.47	0.4	3.8
i2733/52	N24-0.2-0.3	8.98	0.143	21	14.26	10.19	0.18	0.85	25.47	3.3	1.4
i2733/53	N24-0.5-0.6	9.45	0.280	122	7.95	13.82	0.15	3.18	25.09	12.7	0.6
i2733/54	N24-0.8-0.9	9.49	0.476	284	6.56	16.21	0.20	4.91	27.88	17.6	0.4
i2733/55	N24-0.9-1.0	9.48	0.594	445	6.24	16.83	0.13	5.59	28.79	19.4	0.4
i2733/56	N25-0.0-0.1	8.36	0.123	22	26.83	7.20	0.51	0.19	34.74	0.6	3.7
i2733/57	N25-0.2-0.3	9.11	0.240	108	19.44	19.10	0.17	3.36	42.08	8.0	1.0
i2733/58	N25-0.5-0.6	9.33	0.438	317	12.65	20.50	0.20	5.82	39.17	14.9	0.6
i2733/59	N25-0.8-0.9	9.30	0.614	563	8.57	16.90	0.17	5.41	31.05	17.4	0.5
i2733/60	N25-0.9-1.0	9.23	0.798	792	8.51	18.25	0.26	6.09	33.12	18.4	0.5
i2733/61	N27-0.0-0.1	8.27	0.106	15	17.10	3.65	0.47	0.06	21.28	0.3	4.7
i2733/62	N27-0.2-0.3	8.54	0.109	28	12.18	6.85	0.36	0.80	20.20	4.0	1.8
i2733/63	N27-0.5-0.6	9.10	0.324	230	13.68	13.63	0.23	4.34	31.88	13.6	1.0
i2733/64	N27-0.8-0.9	9.02	0.483	393	13.00	13.54	0.23	4.90	31.67	15.5	1.0
i2733/65	N27-0.9-1.0	8.85	0.440	447	12.43	10.32	0.32	3.26	26.34	12.4	1.2



ESSA Ref	field ref	Soil pH	Soil EC	Soil Cl	Exch.Ca	Exch. Mg	Exch.K	Exch. Na	CEC	ESP	Ca/Mg
	depth (m)		dS/m	mg/kg	meq/100g	meq/100g	meq/100g	meq/100g	meq/100g	%Na/CEC	Ratio
i2733/66	32-SCL-0.0-0.1	7.73	0.108	14	10.27	3.39	0.50	0.14	14.30	1.0	3.0
i2733/67	32-SCL-0.2-0.3	8.69	0.128	15	12.56	7.60	0.26	0.62	21.03	2.9	1.7
i2733/68	32-SCL-0.5-0.6	9.25	0.205	64	6.72	7.47	0.20	1.26	15.64	8.0	0.9
i2733/69	32-SCL-0.8-0.9	9.31	0.332	225	5.78	8.44	0.18	2.09	16.48	12.7	0.7
i2733/70	32-SCL-0.9-1.0	9.27	0.470	321	5.86	9.28	0.17	2.67	17.98	14.9	0.6
i2733/71	80-SCL-0.0-0.1	7.09	0.059	17	9.33	3.81	0.34	0.08	13.57	0.6	2.4
i2733/72	80-SCL-0.22-0.3	7.82	0.040	16	9.65	4.44	0.05	0.43	14.57	2.9	2.2
i2733/73	80-SCL-0.5-0.6	9.24	0.203	62	8.05	9.79	0.02	1.97	19.82	10.0	0.8
i2733/74	80-SCL-0.8-0.9	9.40	0.395	257	6.07	10.90	0.01	4.31	21.29	20.2	0.6
i2733/75	80-SCL-0.9-1.0	9.29	0.530	358	5.74	11.02	0.02	4.37	21.16	20.7	0.5
i2733/76	N12-0.0-0.1	7.23	0.042	22	9.06	5.72	0.40	0.34	15.52	2.2	1.6
i2733/77	N12-0.2-0.3	7.93	0.015	155	12.07	9.08	0.35	1.59	23.08	6.9	1.3
i2733/78	N12-0.5-0.6	8.63	0.484	481	13.10	14.49	0.33	2.53	30.45	8.3	0.9
i2733/79	N12-0.8-0.9	8.59	0.671	793	12.32	15.25	0.38	2.85	30.79	9.2	0.8
i2733/80	N12-0.9-1.0	8.53	0.739	747	12.46	16.26	0.52	3.17	32.41	9.8	0.8
i2733/81	N13-0.0-0.1	7.01	0.045	9	9.06	5.19	0.41	0.27	14.92	1.8	1.7
i2733/82	N13-0.2-0.3	8.03	0.204	163	12.80	11.28	0.31	1.77	26.15	6.8	1.1
i2733/83	N13-0.5-0.6	8.48	0.351	355	12.02	12.55	0.25	1.95	26.77	7.3	1.0
i2733/84	N13-0.8-0.9	8.57	0.668	683	11.16	14.61	0.27	2.35	28.40	8.3	0.8
i2733/85	N13-0.9-1.0	8.50	0.787	826	11.66	16.02	0.33	2.65	30.66	8.6	0.7
i2733/86	N14-0.0-0.1	6.85	0.031	9	6.19	3.56	0.36	0.16	10.26	1.6	1.7
i2733/87	N14-0.2-0.3	8.29	0.097	86	12.11	9.83	0.36	1.68	23.98	7.0	1.2
i2733/88	N14-0.5-0.6	8.78	0.382	368	12.90	14.21	0.40	2.46	29.98	8.2	0.9
i2733/89	N14-0.8-0.9	8.62	0.656	671	11.10	13.95	0.38	2.52	27.95	9.0	0.8
i2733/90	N14-0.9-1.0	8.57	0.731	768	10.69	13.85	0.37	2.50	27.41	9.1	0.8
i2733/91	77-SCL-0.0-0.1	7.71	0.115	8	20.50	6.31	0.31	0.13	27.26	0.5	3.2
i2733/92	77-SCL-0.2-0.3	8.47	0.014	6	22.54	10.15	0.10	0.88	33.68	2.6	2.2
i2733/93	77-SCL-0.5-0.6	8.71	0.022	75	16.79	13.18	0.06	2.50	32.53	7.7	1.3
i2733/94	77-SCL-0.8-0.9	8.71	0.439	404	17.23	17.45	0.05	4.68	39.41	11.9	1.0
i2733/95	77-SCL-0.9-1.0	8.48	0.703	759	16.96	19.65	0.08	6.09	42.78	14.2	0.9
i2733/96	N26-0.0-0.1	8.47	0.119	5	21.58	4.64	0.30	0.21	26.74	0.8	4.6
i2733/97	N26-0.2-0.3	8.58	0.186	19	17.76	10.92	0.06	1.79	30.53	5.9	1.6
i2733/98	N26-0.5-0.6	8.93	0.331	125	13.97	17.50	0.01	5.86	37.34	15.7	0.8
i2733/99	N26-0.80-0.9	9.21	0.526	252	13.56	20.51	0.00	8.03	42.10	19.1	0.7
i2733/100	N26-0.9-1.0	8.98	0.592	307	11.36	16.97	0.01	6.39	34.73	18.4	0.7
i2733/101	N20-0.0-0.1	7.37	0.053	4	15.93	5.34	0.28	0.14	21.70	0.7	3.0
i2733/102	N20-0.2-0.3	8.13	0.054	4	13.69	6.95	0.01	0.36	21.01	1.7	2.0
i2733/103	N20-0.5-0.6	8.90	0.154	22	10.56	9.98	0.00	1.63	22.18	7.4	1.1
i2733/104	N20-0.75-0.85	9.24	0.316	148	11.33	16.25	0.02	4.21	31.82	13.2	0.7
i2733/105	N20-0.9-1.0	9.18	0.533	420	11.57	19.78	0.08	6.42	37.84	17.0	0.6
i2733/106	N21-0.0-0.1	7.19	0.053	3	16.29	7.27	0.49	0.15	24.20	0.6	2.2
i2733/107	N21-0.2-0.3	8.10	0.071	27	13.56	8.45	0.21	0.70	22.93	3.1	1.6
i2733/108	N21-0.5-0.58	9.08	0.221	87	11.77	13.64	0.03	2.98	28.42	10.5	0.9
i2733/109	N21-0.8-0.9	9.23	0.375	304	10.73	12.67	0.06	2.81	26.27	10.7	0.8
i2733/110	N21-0.9-1.0	9.04	0.628	591	13.42	22.55	0.16	6.78	42.90	15.8	0.6
i2733/111	N22-0.0-0.1	7.41	0.069	11	15.58	5.70	1.61	0.23	23.12	1.0	2.7
i2733/112	N22-0.2-0.3	8.35	0.078	22	17.20	9.61	0.13	1.22	28.16	4.3	1.8
i2733/113	N22-0.5-0.6	8.96	0.205	83	13.62	12.30	0.02	2.54	28.48	8.9	1.1
i2733/114	N22-0.8-0.9	9.04	0.329	182	10.88	12.92	0.04	3.38	27.22	12.4	0.8
i2733/115	N22-0.9-1.0	8.98	0.499	359	12.68	17.13	0.09	4.89	34.80	14.1	0.7
i2733/116	N15-0.0-0.1	8.13	0.141	24	..	..	..	..	..	..	..
i2733/117	N15-0.2-0.3	8.64	0.134	27	..	..	..	..	..	..	..
i2733/118	N15-0.55-0.6	8.97	0.307	196	..	..	..	..	..	..	..
i2733/119	N15-0.8-0.9	8.55	0.480	409	..	..	..	..	..	..	..
i2733/120	N15-0.9-1.0	8.76	0.577	634	..	..	..	..	..	..	..
i2733/121	N16-0.0-0.1	7.92	0.089	9	..	..	..	..	..	..	..
i2733/122	N16-0.2-0.3	8.67	0.150	38	..	..	..	..	..	..	..
i2733/123	N16-0.5-0.6	8.74	0.215	120	..	..	..	..	..	..	..
i2733/124	N16-0.8-0.9	8.72	0.325	255	..	..	..	..	..	..	..
i2733/125	N16-0.9-1.0	8.78	0.392	354	..	..	..	..	..	..	..
i2733/126	60-SCL-0.0-0.1	7.72	0.056	9	..	..	..	..	..	..	..
i2733/127	60-SCL-0.2-0.3	8.90	0.145	17	..	..	..	..	..	..	..
i2733/128	60-SCL-0.5-0.6	8.38	0.298	163	..	..	..	..	..	..	..
i2733/129	60-SCL-0.8-0.9	8.72	0.454	458	..	..	..	..	..	..	..
i2733/130	60-SCL-0.9-1.0	8.73	0.542	633	..	..	..	..	..	..	..
i2733/131	N17-0.0-0.1	6.75	0.062	9	11.47	4.26	0.15	0.40	16.28	2.5	2.7
i2733/132	N17-0.1-0.2	8.62	0.251	39	10.86	8.81	0.12	2.29	22.08	10.4	1.2
i2733/133	N17-0.2-0.3	9.25	0.340	186	9.14	10.62	0.09	3.29	23.15	14.2	0.9
i2733/134	N17-0.5-0.6	9.43	0.608	540	6.39	9.85	0.10	4.21	20.55	20.5	0.6
i2733/135	N17-0.8-0.88	9.31	0.815	800	5.77	9.47	0.09	4.64	19.97	23.2	0.6
i2733/136	N18-0.0-0.1	7.26	0.066	9	10.64	3.58	0.12	0.20	14.54	1.4	3.0
i2733/137	N18-0.2-0.3	8.94	0.281	112	8.51	8.98	0.07	2.71	20.26	13.4	0.9
i2733/138	N18-0.5-0.6	9.34	0.634	508	6.10	11.02	0.12	4.50	21.74	20.7	0.6
i2733/139	N18-0.8-0.9	9.51	0.500	916	6.19	12.75	0.17	5.87	24.98	23.5	0.5
i2733/140	N18-0.9-1.0	8.94	1.137	1194	6.82	15.18	0.19	7.26	29.45	24.7	0.4
i2733/141	N19-0.0-0.1	8.28	0.142	22	11.36	2.99	0.49	0.25	15.09	1.6	3.8
i2733/142	N19-0.2-0.3	8.78	0.167	20	10.80	6.88	0.25	1.06	18.99	5.6	1.6
i2733/143	N19-0.5-0.6	9.25	0.291	147	6.98	8.26	0.07	2.21	17.52	12.6	0.8
i2733/144	N19-0.8-0.9	9.39	0.427	258	5.53	8.20	0.08	2.75	16.55	16.6	0.7
i2733/145	N19-0.9-0.95	9.42	0.611	461	5.13	8.99	0.15	3.43	17.69	19.4	0.6

**Soil Analysis Report**  
**Batch Numbers: I2733**

**Date Received: 13/06/2019**  
**Date Completed:14/07/2019**

**Client: GTE Saraji Results Page 2 of2**

Lab No	Sample No	ADMC	Gravel	CS>50µm	CS>20µm	2-50µm-Silt	2-20µm-Silt	Clay <2µm	15 Bar
	Depth (m)	%	%	%	%	%	%	%	%
i2733/1	6-SCL-0.0-0.1	23.1%	1.7%	38.5%	38.2%	13.4%	13.6%	48.2%	
i2733/2	6-SCL-0.2-0.3	16.8%	2.2%	47.5%	52.4%	10.9%	5.9%	41.6%	
i2733/3	6-SCL-0.5-0.6	14.6%	2.1%	39.6%	43.2%	11.0%	7.3%	49.5%	
i2733/4	6-SCL-0.8-0.9	15.6%	2.0%	39.5%	41.5%	11.0%	9.0%	49.5%	
i2733/5	6-SCL-0.9-1.0	14.3%	1.2%	52.4%	54.3%	10.8%	8.9%	36.8%	
i2733/6	7-SCL-0.0-0.1	19.9%	0.6%	49.3%	54.8%	15.3%	9.8%	35.5%	19
i2733/7	7-SCL-0.2-0.3	14.6%	0.5%	47.7%	51.9%	12.6%	8.4%	39.6%	24
i2733/8	7-SCL-0.5-0.6	15.0%	2.8%	32.6%	40.2%	21.4%	13.8%	46.0%	26
i2733/9	7-SCL-0.8-0.9	12.8%	8.5%	53.2%	59.9%	13.3%	6.6%	33.5%	20
i2733/10	7-SCL-0.9-1.0	13.8%	2.0%	40.8%	46.8%	18.1%	12.0%	41.1%	21
i2733/11	100-SCL-0.0-0.1	18.9%	0.1%	40.1%	48.3%	17.4%	9.2%	42.5%	
i2733/12	100-SCL-0.2-0.3	14.4%	0.6%	38.0%	45.9%	20.6%	12.7%	41.4%	
i2733/13	100-SCL-0.5-0.6	16.0%	0.2%	37.5%	42.6%	16.8%	11.6%	45.8%	
i2733/14	100-SCL-0.8-0.9	17.8%	0.1%	31.1%	34.9%	13.5%	9.8%	55.3%	
i2733/15	100-SCL-0.9-1.0	16.8%	0.5%	32.7%	34.9%	16.3%	14.2%	50.9%	
i2733/16	102-SCL-D-0.0-0.1	18.1%	0.4%	39.3%	43.2%	15.1%	11.2%	45.6%	
i2733/17	102-SCL-D-0.2-0.3	17.0%	0.7%	27.7%	31.5%	15.0%	11.2%	57.3%	
i2733/18	102-SCL-D-0.5-0.6	15.3%	1.0%	28.7%	32.5%	11.8%	8.0%	59.4%	
i2733/19	102-SCL-D-0.8-0.9	16.6%	2.8%	28.6%	30.5%	12.2%	10.2%	59.2%	
i2733/20	102-SCL-D-0.9-1.0	18.3%	2.9%	28.1%	32.4%	12.7%	8.5%	59.1%	
i2733/21	102-SCL-M-0.0-0.1	15.1%	4.8%	61.6%	64.6%	9.5%	6.4%	29.0%	
i2733/22	102-SCL-M-0.2-0.3	11.8%	0.3%	51.1%	54.3%	10.8%	7.6%	38.1%	
i2733/23	102-SCL-M-0.5-0.6	11.8%	0.9%	47.4%	50.4%	11.2%	8.3%	41.4%	
i2733/24	102-SCL-M-0.83-0.9	11.6%	8.8%	46.0%	47.7%	8.9%	7.2%	45.1%	
i2733/25	102-SCL-M-0.9-1.0	12.7%	5.3%	32.7%	36.6%	19.6%	15.7%	47.7%	
i2733/26	103-SCL-D-0.0-0.1	19.2%	0.2%	30.1%	33.7%	20.0%	16.4%	49.8%	
i2733/27	103-SCL-D-0.2-0.3	15.0%	0.2%	16.8%	29.8%	26.1%	13.1%	57.1%	
i2733/28	103-SCL-D-0.5-0.6	13.4%	0.0%	24.9%	28.4%	16.4%	13.0%	58.6%	
i2733/29	103-SCL-D-0.8-0.9	14.6%	0.1%	28.6%	32.2%	16.0%	12.3%	55.5%	
i2733/30	103-SCL-D-0.9-1.0	14.7%	0.3%	33.3%	36.9%	15.6%	12.0%	51.1%	
i2733/31	103-SCL-M-0.0-0.1	15.0%	2.0%	52.0%	57.3%	12.6%	7.3%	35.4%	
i2733/32	103-SCL-M-0.2-0.3	11.0%	0.3%	52.6%	55.7%	8.7%	5.6%	38.8%	
i2733/33	103-SCL-M-0.5-0.6	10.8%	3.1%	49.0%	57.7%	12.8%	4.1%	38.2%	
i2733/34	103-SCL-M-0.8-0.9	10.6%	5.7%	55.7%	59.2%	10.9%	7.4%	33.4%	
i2733/35	103-SCL-M-0.9-1.0	11.7%	3.1%	52.3%	55.6%	9.6%	6.2%	38.2%	
i2733/36	5-SCL-M-0.0-0.1	24.6%	4.7%	30.5%	37.0%	16.9%	10.4%	52.6%	
i2733/37	5-SCL-M-0.2-0.3	18.5%	2.4%	30.4%	35.7%	14.5%	9.2%	55.1%	
i2733/38	5-SCL-M-0.5-0.6	18.8%	3.9%	32.6%	36.9%	13.6%	9.3%	53.8%	
i2733/39	5-SCL-M-0.8-0.9	18.2%	5.9%	27.3%	32.7%	13.4%	8.0%	59.2%	
i2733/40	5-SCL-M-0.9-1.0	17.3%	13.2%	30.9%	35.6%	12.3%	7.5%	56.9%	
i2733/41	5-SCL-D-0.0-0.1	24.6%	0.4%	31.5%	35.4%	13.8%	9.9%	54.7%	
i2733/42	5-SCL-D-0.2-0.3	19.8%	0.3%	24.9%	29.0%	14.8%	10.7%	60.4%	
i2733/43	5-SCL-D-0.5-0.6	19.5%	0.3%	22.6%	26.2%	13.2%	9.5%	64.3%	
i2733/44	5-SCL-D-0.8-0.9	19.7%	0.2%	17.6%	21.7%	11.3%	7.2%	71.1%	
i2733/45	5-SCL-D-0.9-1.0	21.3%	3.9%	16.8%	21.1%	11.7%	7.4%	71.5%	
i2733/46	N23-0.0-0.1	11.2%	0.6%	57.1%	56.7%	11.5%	11.9%	31.4%	
i2733/47	N23-0.2-0.3	11.4%	2.9%	46.6%	50.4%	13.3%	9.5%	40.1%	
i2733/48	N23-0.5-0.6	11.0%	3.9%	38.5%	44.5%	21.1%	15.1%	40.4%	
i2733/49	N23-0.8-0.9	11.6%	1.8%	33.1%	34.8%	18.0%	16.3%	48.9%	
i2733/50	N23-0.9-1.0	12.6%	1.8%	35.1%	39.9%	13.8%	8.9%	51.1%	
i2733/51	N24-0.0-0.1	12.7%	2.5%	60.1%	59.9%	5.5%	5.7%	34.4%	
i2733/52	N24-0.2-0.3	12.0%	2.1%	51.9%	54.8%	11.0%	8.0%	37.1%	
i2733/53	N24-0.5-0.6	11.4%	2.4%	43.5%	47.0%	17.1%	13.6%	39.4%	
i2733/54	N24-0.8-0.9	11.8%	1.2%	33.2%	37.7%	20.0%	15.4%	46.8%	
i2733/55	N24-0.9-1.0	12.6%	0.7%	39.3%	43.9%	15.5%	10.8%	45.2%	
i2733/56	N25-0.0-0.1	15.3%	1.2%	59.0%	60.6%	9.6%	8.0%	31.4%	
i2733/57	N25-0.2-0.3	18.0%	0.4%	41.0%	46.3%	9.7%	4.3%	49.3%	
i2733/58	N25-0.5-0.6	17.4%	2.0%	48.5%	53.0%	9.2%	4.6%	42.4%	
i2733/59	N25-0.8-0.9	15.8%	0.7%	42.3%	42.1%	8.6%	8.7%	49.2%	
i2733/60	N25-0.9-1.0	15.8%	1.7%	34.5%	36.6%	10.9%	8.8%	54.6%	
i2733/61	N27-0.0-0.1	9.6%	1.0%	72.0%	71.2%	1.4%	2.2%	26.6%	
i2733/62	N27-0.2-0.3	8.9%	0.4%	67.6%	71.0%	6.1%	2.7%	26.3%	
i2733/63	N27-0.5-0.6	11.0%	1.2%	52.1%	54.0%	6.8%	5.0%	41.0%	
i2733/64	N27-0.8-0.9	12.7%	3.9%	48.3%	50.0%	11.4%	9.6%	40.4%	
i2733/65	N27-0.9-1.0	11.9%	3.4%	38.6%	44.4%	17.2%	11.3%	44.3%	

Lab No	Sample No	ADMC	Gravel	CS>50µm	CS>20µm	2-50µm-Silt	2-20µm-Silt	Clay <2µm	15 Bar
	Depth (m)	%	%	%	%	%	%	%	%
i2733/66	32-SCL-0.0-0.1	9.9%	1.3%	64.4%	68.0%	11.9%	8.4%	23.7%	
i2733/67	32-SCL-0.2-0.3	9.6%	0.7%	53.2%	55.9%	8.6%	5.9%	38.2%	
i2733/68	32-SCL-0.5-0.6	7.9%	2.4%	57.6%	60.6%	11.1%	8.2%	31.3%	
i2733/69	32-SCL-0.8-0.9	7.5%	4.2%	61.7%	57.5%	9.4%	13.6%	29.0%	
i2733/70	32-SCL-0.9-1.0	8.7%	1.0%	55.7%	60.2%	11.7%	7.2%	32.6%	
i2733/71	80-SCL-0.0-0.1	9.6%	0.2%	77.8%	79.7%	3.9%	1.9%	18.4%	
i2733/72	80-SCL-0.22-0.3	7.1%	0.9%	65.2%	68.1%	12.1%	9.2%	22.7%	
i2733/73	80-SCL-0.5-0.6	8.5%	0.5%	59.4%	63.3%	9.7%	5.8%	30.9%	
i2733/74	80-SCL-0.8-0.9	8.1%	1.1%	55.1%	60.8%	11.4%	5.7%	33.5%	
i2733/75	80-SCL-0.9-1.0	9.3%	1.3%	58.2%	63.3%	11.2%	6.2%	30.5%	
i2733/76	N12-0.0-0.1	12.1%	0.2%	54.2%	66.3%	22.8%	10.6%	23.1%	
i2733/77	N12-0.2-0.3	12.6%	0.2%	48.1%	57.5%	15.4%	6.0%	36.5%	
i2733/78	N12-0.5-0.6	12.5%	1.3%	30.6%	44.2%	23.1%	9.4%	46.3%	
i2733/79	N12-0.8-0.9	12.2%	0.8%	38.6%	45.2%	16.6%	10.0%	44.8%	
i2733/80	N12-0.9-1.0	11.7%	1.8%	39.6%	50.6%	20.3%	9.3%	40.0%	
i2733/81	N13-0.0-0.1	11.3%	0.2%	55.8%	70.7%	17.7%	2.8%	26.5%	
i2733/82	N13-0.2-0.3	11.8%	0.0%	38.0%	49.2%	17.0%	5.8%	44.9%	
i2733/83	N13-0.5-0.6	11.1%	0.5%	37.4%	48.1%	16.3%	5.6%	46.3%	
i2733/84	N13-0.8-0.9	11.5%	0.8%	35.8%	47.0%	19.4%	8.2%	44.7%	
i2733/85	N13-0.9-1.0	11.6%	0.4%	40.8%	47.9%	12.1%	5.1%	47.1%	
i2733/86	N14-0.0-0.1	9.6%	0.2%	60.3%	72.3%	22.6%	10.6%	17.1%	
i2733/87	N14-0.2-0.3	12.7%	0.0%	36.4%	47.1%	16.8%	6.1%	46.8%	
i2733/88	N14-0.5-0.6	12.4%	0.7%	30.8%	47.4%	25.2%	8.6%	44.0%	
i2733/89	N14-0.8-0.9	11.7%	0.8%	40.6%	49.1%	16.7%	8.1%	42.7%	
i2733/90	N14-0.9-1.0	11.9%	1.0%	38.2%	44.7%	15.7%	9.2%	46.1%	
i2733/91	77-SCL-0.0-0.1	15.2%	0.8%	58.6%	61.8%	10.8%	7.6%	30.6%	
i2733/92	77-SCL-0.2-0.3	12.6%	1.1%	45.7%	52.3%	13.9%	7.3%	40.4%	
i2733/93	77-SCL-0.5-0.6	12.9%	0.6%	51.3%	58.2%	11.1%	4.3%	37.6%	
i2733/94	77-SCL-0.8-0.9	15.9%	0.3%	43.1%	46.7%	12.5%	8.8%	44.5%	
i2733/95	77-SCL-0.9-1.0	16.4%	0.0%	35.5%	44.2%	16.8%	8.0%	47.7%	
i2733/96	N26-0.0-0.1	13.6%	5.0%	59.7%	67.4%	10.7%	3.0%	29.6%	
i2733/97	N26-0.2-0.3	13.9%	5.1%	56.1%	59.8%	9.0%	5.2%	35.0%	
i2733/98	N26-0.5-0.6	17.0%	4.1%	45.3%	50.3%	10.4%	5.4%	44.3%	
i2733/99	N26-0.80-0.9	17.5%	7.0%	42.0%	46.3%	14.2%	10.0%	43.8%	
i2733/100	N26-0.9-1.0	13.9%	10.0%	50.0%	54.1%	10.9%	6.7%	39.1%	
i2733/101	N20-0.0-0.1	9.4%	2.4%	60.2%	60.6%	12.6%	12.2%	27.2%	
i2733/102	N20-0.2-0.3	8.9%	2.2%	65.0%	68.0%	9.1%	6.0%	25.9%	
i2733/103	N20-0.5-0.6	9.0%	4.5%	63.5%	67.3%	8.1%	4.3%	28.4%	
i2733/104	N20-0.75-0.85	11.0%	6.4%	57.2%	55.9%	6.9%	8.2%	35.8%	
i2733/105	N20-0.9-1.0	13.5%	3.1%	44.8%	48.7%	9.1%	5.2%	46.1%	
i2733/106	N21-0.0-0.1	10.7%	3.2%	66.0%	66.6%	4.5%	4.0%	29.4%	
i2733/107	N21-0.2-0.3	10.6%	2.9%	60.3%	61.9%	8.3%	6.7%	31.4%	
i2733/108	N21-0.5-0.58	11.4%	4.8%	56.4%	58.1%	6.8%	5.1%	36.8%	
i2733/109	N21-0.8-0.9	12.6%	4.5%	46.0%	51.8%	11.7%	5.9%	42.3%	
i2733/110	N21-0.9-1.0	14.8%	2.9%	37.3%	41.2%	11.1%	7.2%	51.6%	
i2733/111	N22-0.0-0.1	11.5%	0.7%	62.9%	64.9%	10.3%	8.3%	26.8%	
i2733/112	N22-0.2-0.3	11.5%	2.2%	60.5%	62.1%	9.1%	7.4%	30.4%	
i2733/113	N22-0.5-0.6	11.4%	2.8%	61.9%	61.9%	8.7%	8.7%	29.4%	
i2733/114	N22-0.8-0.9	12.4%	4.2%	56.8%	60.7%	6.0%	2.1%	37.3%	
i2733/115	N22-0.9-1.0	13.9%	7.3%	51.5%	55.5%	7.7%	3.7%	40.8%	
i2733/116	N15-0.0-0.1	17.6%	1.5%	51.4%	59.9%	11.3%	2.8%	37.2%	
i2733/117	N15-0.2-0.3	15.7%	2.2%	41.4%	47.5%	12.6%	6.4%	46.0%	
i2733/118	N15-0.55-0.6	15.9%	4.8%	41.9%	46.2%	11.8%	7.5%	46.3%	
i2733/119	N15-0.8-0.9	16.2%	6.8%	41.5%	48.1%	15.1%	8.5%	43.4%	
i2733/120	N15-0.9-1.0	16.7%	7.9%	35.6%	39.9%	12.3%	8.0%	52.1%	
i2733/121	N16-0.0-0.1	16.1%	0.4%	53.7%	59.5%	13.7%	7.9%	32.6%	
i2733/122	N16-0.2-0.3	14.8%	0.2%	52.0%	58.1%	10.9%	4.8%	37.1%	
i2733/123	N16-0.5-0.6	16.1%	0.2%	40.3%	53.3%	20.5%	7.5%	39.2%	
i2733/124	N16-0.8-0.9	18.8%	0.2%	40.1%	44.6%	16.7%	12.2%	43.2%	
i2733/125	N16-0.9-1.0	18.9%	2.0%	39.8%	46.7%	12.1%	5.2%	48.1%	
i2733/126	60-SCL-0.0-0.1	17.6%	0.2%	53.1%	56.8%	10.3%	6.6%	36.6%	
i2733/127	60-SCL-0.2-0.3	15.9%	1.0%	44.3%	48.3%	14.3%	10.4%	41.4%	
i2733/128	60-SCL-0.5-0.6	17.0%	0.4%	38.9%	42.8%	14.1%	10.2%	47.0%	
i2733/129	60-SCL-0.8-0.9	18.1%	0.9%	36.3%	40.9%	13.5%	9.0%	50.2%	
i2733/130	60-SCL-0.9-1.0	17.5%	4.1%	36.0%	40.4%	10.3%	5.9%	53.7%	
i2733/131	N17-0.0-0.1	7.8%	2.2%	76.9%	76.4%	5.5%	6.0%	17.6%	
i2733/132	N17-0.1-0.2	10.3%	1.0%	63.6%	67.4%	7.1%	3.3%	29.3%	
i2733/133	N17-0.2-0.3	9.9%	5.1%	66.1%	69.6%	5.0%	1.5%	28.9%	
i2733/134	N12-0.5-0.6	9.4%	5.9%	60.3%	65.7%	11.3%	5.9%	28.4%	
i2733/135	N12-0.8-0.88	9.1%	23.7%	52.9%	57.3%	13.7%	9.4%	33.4%	
i2733/136	N18-0.0-0.1	7.7%	4.3%	74.2%	73.6%	4.2%	4.9%	21.5%	
i2733/137	N18-0.2-0.3	10.5%	2.6%	60.7%	62.3%	4.8%	3.2%	34.6%	
i2733/138	N18-0.5-0.6	10.7%	2.4%	51.5%	55.0%	8.0%	4.5%	40.6%	
i2733/139	N18-0.8-0.9	11.7%	15.2%	43.0%	49.8%	19.6%	12.9%	37.4%	
i2733/140	N18-0.9-1.0	12.5%	17.8%	41.6%	51.4%	20.9%	11.2%	37.5%	
i2733/141	N19-0.0-0.1	7.6%	3.6%	82.4%	87.8%	11.3%	5.9%	6.3%	
i2733/142	N19-0.2-0.3	10.8%	4.6%	56.8%	65.5%	12.4%	3.7%	30.8%	
i2733/143	N19-0.5-0.6	9.8%	2.5%	58.6%	73.2%	13.2%	-1.5%	28.2%	
i2733/144	N19-0.8-0.9	8.3%	3.1%	67.1%	70.7%	9.4%	5.8%	23.5%	
i2733/145	N19-0.9-0.95	9.5%	6.5%	60.2%	65.6%	12.4%	7.0%	27.4%	



## METHOD DESCRIPTIONS

## Soil

Reference: I2733

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## Methods used to Analyse Samples

Analyte	ALHS*	Uncertainty %	LOQ	Unit	Name	Method Description
pH	4A1	1.1	0.1	pH	pH	1:5 water extr, pH meter
EC	3A1	5.4	0.01	dS/m	Electrical conductivity	1:5 water extr, EC meter
Cl	5A2	10.0	10.0	mg/kg	Chloride	1:5 water extr, (AA) colorimetric
NO3-N	7C2	6.7	1.0	mg/kg	Nitrate-nitrogen	1:5 water extr, (AA) colorimetric
NH4-N	7C2	7.8	0.6	mg/kg	Ammonium-nitrogen	1M KCl extr, (AA) colorimetric
Bicarb.P	9B2	16.8	1.0	mg/kg	Bicarb.ext.phosphorus	0.5M NaHCO <sub>3</sub> @ pH 8.5, (AA) colorimetric
Exch.Ca	15B/C1	7.2	0.18	meq/100g	Exchangeable calcium	1M NH <sub>4</sub> OAc @ pH 7.0/8.5 leach, AAS
Exch.Mg	15B/C1	4.7	0.31	meq/100g	Exchangeable magnesium	1M NH <sub>4</sub> OAc @ pH 7.0/8.5 leach, AAS
Exch.Na	15B/C1	9.6	0.09	meq/100g	Exchangeable calcium	1M NH <sub>4</sub> OAc @ pH 7.0/8.5 leach, AAS
Exch.K	15B/C1	4.8	0.02	meq/100g	Exchangeable calcium	1M NH <sub>4</sub> OAc @ pH 7.0/8.5 leach, AAS
CEC	15I3	5.7	1.0	meq/100g	Cation Exchange Capacity	KNO <sub>3</sub> + Ca(NO <sub>3</sub> ) <sub>2</sub> extr, (AA) colorimetric
ADMC	2A1	11.9	0.4	%	Air Dried Moisture Content	Gravimetric oven dry @ 105C
R1	NA	20.2	NA		Dispersion Ratio	Ratio [Aqueous dispersible (Silt + Clay):Total (Silt + Clay)]
SO4-S	10B3	11.5	0.6	mg/kg	Sulfate sulfur	Ca(H <sub>2</sub> PO <sub>4</sub> ) <sub>2</sub> @ pH 4.0 extractable sulfate-sulfur, ICPOES
Sand	no ref	22.1	1.0	%	Particle size, sand	Hydrometer, gravimetric & Sieve
Silt	no ref	16.6	1.0	%	Particle size, silt	Hydrometer, gravimetric
Clay	no ref	12.7	1.0	%	Particle size, clay	Hydrometer, gravimetric

\* Australian Laboratory Handbook of Soil and Water Chemical Methods (1992)

For Manager

D E Baker BSc MASSSI

Analytical Services:

Methods from Rayment and Lyons, 2011. *Soil Chemical Methods - Australasia*. CSIRO Publishing: Collingwood.

Soluble Salts included in Exchangeable Cations - Except PRE-WASHED (if EC&gt;0.3dS/m).

## QUALITY CONTROL DATA

Soil

Reference: I2733

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Methods from Rayment and Lyons, 2011. *Soil Chemical Methods - Australasia*. CSIRO Publishing: Collingwood.

Test Method	Units		Acceptance Criteria	
			Actual Value	[Range]
pH	pH	B		5.0 - 5.3
EC	dS/m	B		0.27 - 0.32
Cl	mg/kg	B		10 - 35
NO3-N	mg/kg	B		10 - 16
NH4-N	mg/kg	NA		NA
Bicarb.P	mg/kg	B		51 - 75
Total Kjeldahl N	%	ASPAC 34	0.110	.100 - .120
Total P	%	ASPAC 34	0.02	.019 - .021
Organic Carbon	%	B		1.82 - 2.3
Ca (Exch. cations)pH7	meq/100g	B		6.96 - 8.04
Mg (Exch. cations)pH7	meq/100g	B		1.88 - 2.22
Na (Exch. cations)pH7	meq/100g	B		.057 - .182
K (Exch. cations)pH7	meq/100g	B		1.209 - 1.411
Exch. Acidity	meq/100g			NA
ECEC	meq/100g	A		NA
CEC	meq/100g	S12		58 - 73
ESP	%	A		NA
Coarse sand	%	B	17.0	17.3 - 22.4
Fine Sand	%	B	22.0	20.0 - 25.7
Silt	%	B	16.0	10.5 - 19.8
Clay	%	B	44.0	37.9 - 48.9
R1		B		0.23 - 0.38

Test Method	Units	Test Soil	Acceptance Criteria	
			Actual Value	[Range]
DTPA-Cu	mg/kg	SB		2.37 - 3.25
DTPA-Zn	mg/kg	SB		3.15 - 3.81
DTPA-Mn	mg/kg	SB		97.7 - 149.0
DTPA-Fe	mg/kg	SB		24.3 - 32.6
0.33 Bar	%	G		32 - 51
15 Bar	%	G		23 - 30
Ca (Exch. cations)pH8.5	meq/100g	S12		27.7 - 35.4
Mg (Exch. cations)pH8.5	meq/100g	S12		22.88 - 24.5
Na (Exch. cations)pH8.5	meq/100g	S12		2.0 - 2.28
K (Exch. cations)pH8.5	meq/100g	S12		1.64 - 2.09

**ESSA Pty Ltd /EAL NATA (ASPAC certified)**

**For Info Refer ESSA Pty Ltd  
PO Box 442 Sunnybank Q 4109**

**Phone: 0403245560**

**email: [e.s.s.a@bigpond.net.au](mailto:e.s.s.a@bigpond.net.au)**

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References: I3569

Sheet 1 of 4

Date Received: 09/07/2019

Date Completed: 31/07/2019 Reissue 24/2/21

**FINAL REPORT**

**Project:**

Project -Saraji East (18SRE) No 2

All results in this report relate only to the items tested. Results are expressed on an "as received basis".

Client Name: GT Environmental

Contact: Mr Reece Mc Cann

Sample Type: Soil

Number of samples: 85



Soil Analysis Report  
Batch Number: I3569

Date Received: 09/07/2019  
Date Completed:31/07/2019

Client: GTE SARAJI Part 2- Results Page 1 of 2

ESSA Ref	field ref	Soil pH	Soil EC	Soil Cl	Exch.Ca	Exch. Mg	Exch.K	Exch. Na	CEC	ESP	Ca/Mg
	depth (m)		dSm	mg/kg	meq/100g	meq/100g	meq/100g	meq/100g	meq/100g	%Na/CEC	Ratio
I3569/1	N45-SCL-0.0-0.05	8.36	0.115	14	22.54	3.74	0.27	0.08	26.63	0.3	6.0
I3569/2	N45-SCL-0.25-0.3	8.80	0.164	40	15.73	10.28	0.13	1.41	27.55	5.1	1.5
I3569/3	N45-SCL-0.5-0.6	8.92	0.445	333	12.80	15.36	0.24	3.47	31.88	10.9	0.8
I3569/4	N45-SCL-0.8-0.9	8.93	0.824	803	10.26	14.78	0.27	3.83	29.14	13.1	0.7
I3569/5	N45-SCL-0.9-1.0	8.94	0.827	840	10.67	15.68	0.28	3.96	30.59	12.9	0.7
I3569/6	N28-SCL-0.0-0.05	8.10	0.107	13	18.46	2.54	0.41	0.06	21.46	0.3	7.3
I3569/7	N28-SCL-0.2-0.3	8.46	0.089	23	15.14	5.85	0.23	0.42	21.65	2.0	2.6
I3569/8	N28-SCL-0.5-0.6	8.99	0.346	227	12.50	15.12	0.33	2.88	30.84	9.4	0.8
I3569/9	N28-SCL-0.8-0.9	9.09	0.588	522	8.67	13.10	0.28	2.79	24.84	11.2	0.7
I3569/10	N28-SCL-0.9-1.0	9.04	0.701	686	9.03	14.19	0.32	3.24	26.78	12.1	0.6
I3569/11	N43-SCL-0.0-0.1	8.26	0.122	16	17.36	3.28	0.49	0.06	21.19	0.3	5.3
I3569/12	N43-SCL-0.2-0.3	8.27	0.090	17	15.98	5.30	0.37	0.19	21.84	0.9	3.0
I3569/13	N43-SCL-0.5-0.6	8.79	0.258	157	13.55	11.83	0.24	1.48	27.10	5.5	1.1
I3569/14	N43-SCL-0.8-0.9	9.04	0.376	270	10.08	12.97	0.39	2.12	25.56	8.3	0.8
I3569/15	N43-SCL-0.9-1.0	8.93	0.827	910	9.14	15.09	0.49	3.59	28.30	12.7	0.6
I3569/16	N29-SCL-0.0-0.10	8.69	0.097	8	..	..	..	..	..	..	..
I3569/17	N29-SCL-0.2-0.3	8.87	0.123	13	..	..	..	..	..	..	..
I3569/18	N29-SCL-0.5-0.6	9.18	0.178	30	..	..	..	..	..	..	..
I3569/19	N29-SCL-0.8-0.9	9.39	0.256	18	..	..	..	..	..	..	..
I3569/20	N29-SCL-0.9-1.0	9.42	0.344	14	..	..	..	..	..	..	..
I3569/21	N30-SCL-0.0-0.1	8.35	0.113	24	..	..	..	..	..	..	..
I3569/22	N30-SCL-0.2-0.3	8.80	0.117	11	..	..	..	..	..	..	..
I3569/23	N30-SCL-0.5-0.6	9.21	0.183	14	..	..	..	..	..	..	..
I3569/24	N30-SCL-0.8-0.9	9.41	0.223	17	..	..	..	..	..	..	..
I3569/25	N30-SCL-0.9-1.0	9.07	0.172	11	..	..	..	..	..	..	..
I3569/26	N34-SCL-0.0-0.1	9.06	0.170	24	..	..	..	..	..	..	..
I3569/27	N34-SCL-0.2-0.3	8.88	0.099	14	..	..	..	..	..	..	..
I3569/28	N34-SCL-0.5-0.6	9.19	0.182	11	..	..	..	..	..	..	..
I3569/29	N34-SCL-0.8-0.9	9.41	0.233	22	..	..	..	..	..	..	..
I3569/30	N34-SCL-0.9-1.0	9.48	0.285	25	..	..	..	..	..	..	..
I3569/31	N31-SCL-0.0-0.1	8.54	0.084	12	..	..	..	..	..	..	..
I3569/32	N31-SCL-0.2-0.3	8.34	0.082	21	..	..	..	..	..	..	..
I3569/33	N31-SCL-0.5-0.6	8.44	0.167	18	..	..	..	..	..	..	..
I3569/34	N31-SCL-0.8-0.9	8.88	0.112	21	..	..	..	..	..	..	..
I3569/35	N31-SCL-0.9-1.0	9.02	0.178	12	..	..	..	..	..	..	..
I3569/36	N32-SCL-0.0-0.1	8.32	0.138	16	..	..	..	..	..	..	..
I3569/37	N32-SCL-0.2-0.3	8.51	0.146	15	..	..	..	..	..	..	..
I3569/38	N32-SCL-0.5-0.6	8.90	0.190	16	..	..	..	..	..	..	..
I3569/39	N32-SCL-0.8-0.9	9.12	0.226	14	..	..	..	..	..	..	..
I3569/40	N32-SCL-0.9-1.0	9.11	0.246	14	..	..	..	..	..	..	..
I3569/41	N33-SCL-0.0-0.1	8.22	0.079	24	..	..	..	..	..	..	..
I3569/42	N33-SCL-0.2-0.3	8.92	0.196	15	..	..	..	..	..	..	..
I3569/43	N33-SCL-0.5-0.6	9.23	0.248	11	..	..	..	..	..	..	..
I3569/44	N33-SCL-0.8-0.9	8.71	0.091	14	..	..	..	..	..	..	..
I3569/45	N33-SCL-0.9-1.0	9.27	0.300	12	..	..	..	..	..	..	..
I3569/46	N35-SCL-0.0-0.04	8.70	0.091	7	..	..	..	..	..	..	..
I3569/47	N35-SCL-0.2-0.3	8.68	0.140	24	..	..	..	..	..	..	..
I3569/48	N35-SCL-0.5-0.6	8.99	0.214	33	..	..	..	..	..	..	..
I3569/49	N35-SCL-0.8-0.9	9.10	0.261	75	..	..	..	..	..	..	..
I3569/50	N35-SCL-0.9-1.0	9.12	0.353	149	..	..	..	..	..	..	..
I3569/51	N36-SCL-0.0-0.05	8.69	0.090	11	..	..	..	..	..	..	..
I3569/52	N36-SCL-0.2-0.3	8.46	0.133	32	..	..	..	..	..	..	..
I3569/53	N36-SCL-0.5-0.6	8.50	0.117	25	..	..	..	..	..	..	..
I3569/54	N36-SCL-0.8-0.9	8.80	0.190	39	..	..	..	..	..	..	..
I3569/55	N36-SCL-0.9-1.0	8.90	0.248	66	..	..	..	..	..	..	..
I3569/56	N37-SCL-0.0-0.05	8.70	0.089	8	..	..	..	..	..	..	..
I3569/57	N37-SCL-0.2-0.3	8.67	0.120	17	..	..	..	..	..	..	..
I3569/58	N37-SCL-0.5-0.6	8.86	0.118	24	..	..	..	..	..	..	..
I3569/59	N37-SCL-0.8-0.9	8.99	0.233	49	..	..	..	..	..	..	..
I3569/60	N37-SCL-0.9-1.0	9.04	0.288	99	..	..	..	..	..	..	..
I3569/61	N38-SCL-0.0-0.1	8.03	0.091	37	..	..	..	..	..	..	..
I3569/62	N38-SCL-0.2-0.3	7.72	0.068	68	..	..	..	..	..	..	..
I3569/63	N38-SCL-0.5-0.6	8.04	0.168	221	..	..	..	..	..	..	..
I3569/64	N38-SCL-0.8-0.9	8.59	0.543	640	..	..	..	..	..	..	..
I3569/65	N38-SCL-0.9-1.0	8.59	0.615	802	..	..	..	..	..	..	..
I3569/66	N39-SCL-0.0-0.1	7.69	0.058	18	..	..	..	..	..	..	..
I3569/67	N39-SCL-0.2-0.3	7.90	0.051	33	..	..	..	..	..	..	..
I3569/68	N39-SCL-0.5-0.6	8.49	0.173	220	..	..	..	..	..	..	..
I3569/69	N39-SCL-0.8-0.9	8.75	0.443	534	..	..	..	..	..	..	..
I3569/70	N39-SCL-0.9-1.0	8.74	0.561	562	..	..	..	..	..	..	..
I3569/71	N40-SCL-0.0-0.1	7.92	0.056	8	..	..	..	..	..	..	..
I3569/72	N40-SCL-0.2-0.3	8.76	0.133	11	..	..	..	..	..	..	..
I3569/73	N40-SCL-0.5-0.6	9.04	0.235	107	..	..	..	..	..	..	..
I3569/74	N40-SCL-0.8-0.9	8.98	0.426	384	..	..	..	..	..	..	..
I3569/75	N40-SCL-0.9-1.0	8.80	0.628	669	..	..	..	..	..	..	..
I3569/76	N41-SCL-0.0-0.1	7.27	0.036	9	9.77	4.81	0.16	0.16	14.90	1.1	2.0
I3569/77	N41-SCL-0.2-0.3	7.70	0.049	9	6.73	4.20	0.41	0.09	11.44	0.8	1.6
I3569/78	N41-SCL-0.5-0.6	7.95	0.036	9	5.86	5.00	0.55	0.22	11.63	1.9	1.2
I3569/79	N41-SCL-0.8-0.9	8.28	0.060	12	6.10	6.29	0.50	0.41	13.31	3.1	1.0
I3569/80	N41-SCL-0.9-1.0	8.51	0.170	17	8.21	7.32	0.45	0.37	16.35	2.3	1.1
I3569/81	N42-SCL-0.0-0.1	7.02	0.035	8	9.03	3.99	0.16	<0.065	13.23	0.4	2.3
I3569/82	N42-SCL-0.2-0.3	7.79	0.025	9	8.00	4.51	0.37	0.05	12.92	0.4	1.8
I3569/83	N42-SCL-0.5-0.6	7.97	0.027	7	5.84	4.45	0.37	0.15	10.81	1.4	1.3
I3569/84	N42-SCL-0.8-0.9	8.32	0.066	12	6.26	5.93	0.40	0.36	12.95	2.7	1.1
I3569/85	N42-SCL-0.9-1.0	8.80	0.162	21	8.55	8.99	0.37	0.55	18.45	3.0	1.0

Soil Analysis Report  
Batch Numbers: I3569

Date Received: 09/07/2019  
Date Completed: 31/07/2019

Client: GTE SarajiPart 2 Results Page 2 of2

Lab No	Sample No	ADMC	Gravel	CS>50µm	CS>20µm	2-50µm-Silt	2-20µm-Silt	Clay <2µm	15 Bar
	Depth (m)	%	%	%	%	%	%	%	%
I3569/1	N45-SCL-0.0-0.05	10	0	56	61	19	13	25	
I3569/2	N45-SCL-0.25-0.3	14	0	51	57	12	6	37	
I3569/3	N45-SCL-0.5-0.6	17	1	42	44	7	5	51	
I3569/4	N45-SCL-0.8-0.9	16	3	48	52	9	5	42	
I3569/5	N45-SCL-0.9-1.0	17	1	40	44	8	5	51	
I3569/6	N28-SCL-0.0-0.05	9	0	67	72	14	9	20	17
I3569/7	N28-SCL-0.2-0.3	11	1	60	66	11	6	29	17
I3569/8	N28-SCL-0.5-0.6	16	2	38	48	16	6	46	25
I3569/9	N28-SCL-0.8-0.9	14	3	51	55	11	7	38	22
I3569/10	N28-SCL-0.9-1.0	14	4	42	49	14	7	44	22
I3569/11	N43-SCL-0.0-0.1	8	0	62	67	11	6	27	15
I3569/12	N43-SCL-0.2-0.3	10	1	61	64	9	6	30	15
I3569/13	N43-SCL-0.5-0.6	14	1	48	52	10	6	42	23
I3569/14	N43-SCL-0.8-0.9	13	3	49	51	9	7	42	21
I3569/15	N43-SCL-0.9-1.0	13	2	47	51	10	6	43	21
I3569/16	N29-SCL-0.0-0.10	15	1	45	50	14	8	41	
I3569/17	N29-SCL-0.2-0.3	16	2	51	57	12	6	37	
I3569/18	N29-SCL-0.5-0.6	15	5	50	53	11	7	40	
I3569/19	N29-SCL-0.8-0.9	18	2	40	44	14	10	46	
I3569/20	N29-SCL-0.9-1.0	19	2	41	45	15	11	44	
I3569/21	N30-SCL-0.0-0.1	19	1	42	47	12	6	46	
I3569/22	N30-SCL-0.2-0.3	17	1	50	61	18	7	32	
I3569/23	N30-SCL-0.5-0.6	16	6	48	57	13	4	40	
I3569/24	N30-SCL-0.8-0.9	16	6	41	54	18	5	41	
I3569/25	N30-SCL-0.9-1.0	18	4	47	58	13	3	39	
I3569/26	N34-SCL-0.0-0.1	11	1	51	55	11	7	38	
I3569/27	N34-SCL-0.2-0.3	14	1	48	59	16	5	36	
I3569/28	N34-SCL-0.5-0.6	15	2	52	64	14	1	35	
I3569/29	N34-SCL-0.8-0.9	17	4	39	52	19	6	42	
I3569/30	N34-SCL-0.9-1.0	17	3	41	49	19	10	41	
I3569/31	N31-SCL-0.0-0.1	15	0	38	57	20	0	43	
I3569/32	N31-SCL-0.2-0.3	22	0	35	49	22	8	43	
I3569/33	N31-SCL-0.5-0.6	21	0	29	39	21	11	50	
I3569/34	N31-SCL-0.8-0.9	21	0	34	40	12	6	53	
I3569/35	N31-SCL-0.9-1.0	21	0	35	41	12	6	53	
I3569/36	N32-SCL-0.0-0.1	19	0	51	54	11	8	38	
I3569/37	N32-SCL-0.2-0.3	21	1	35	50	21	6	44	
I3569/38	N32-SCL-0.5-0.6	21	1	44	51	13	7	42	
I3569/39	N32-SCL-0.8-0.9	21	2	33	41	18	10	49	
I3569/40	N32-SCL-0.9-1.0	22	2	33	40	16	10	51	
I3569/41	N33-SCL-0.0-0.1	17	0	47	51	11	8	42	
I3569/42	N33-SCL-0.2-0.3	21	1	46	52	14	8	40	
I3569/43	N33-SCL-0.5-0.6	20	4	29	45	16	0	55	
I3569/44	N33-SCL-0.8-0.9	18	5	29	39	20	11	51	
I3569/45	N33-SCL-0.9-1.0	19	3	27	38	19	8	54	
I3569/46	N35-SCL-0.0-0.04	17	1	40	47	13	5	47	
I3569/47	N35-SCL-0.2-0.3	20	0	42	45	11	7	47	
I3569/48	N35-SCL-0.5-0.6	24	0	39	39	6	5	55	
I3569/49	N35-SCL-0.8-0.9	25	6	37	41	11	7	52	
I3569/50	N35-SCL-0.9-1.0	24	9	33	36	14	11	53	
I3569/51	N36-SCL-0.0-0.05	17	1	44	49	12	8	44	
I3569/52	N36-SCL-0.2-0.3	20	0	42	41	12	12	47	
I3569/53	N36-SCL-0.5-0.6	26	0	40	42	11	9	49	
I3569/54	N36-SCL-0.8-0.9	26	0	25	24	14	15	61	
I3569/55	N36-SCL-0.9-1.0	25	1	31	35	16	12	54	
I3569/56	N37-SCL-0.0-0.05	13	1	50	49	5	6	45	23
I3569/57	N37-SCL-0.2-0.3	20	0	46	50	11	7	44	28
I3569/58	N37-SCL-0.5-0.6	23	0	40	53	16	2	44	31
I3569/59	N37-SCL-0.8-0.9	24	0	51	56	7	2	42	35
I3569/60	N37-SCL-0.9-1.0	26	4	31	36	6	1	63	35
I3569/61	N38-SCL-0.0-0.1	16	2	59	60	4	4	36	
I3569/62	N38-SCL-0.2-0.3	15	1	55	57	4	2	41	
I3569/63	N38-SCL-0.5-0.6	14	2	58	58	5	5	37	
I3569/64	N38-SCL-0.8-0.9	14	2	49	53	11	8	40	
I3569/65	N38-SCL-0.9-1.0	14	1	50	54	8	4	43	
I3569/66	N39-SCL-0.0-0.1	15	1	47	52	12	7	41	
I3569/67	N39-SCL-0.2-0.3	15	1	43	45	11	9	46	
I3569/68	N39-SCL-0.5-0.6	12	5	55	60	12	8	32	
I3569/69	N39-SCL-0.8-0.9	13	2	49	51	5	3	46	
I3569/70	N39-SCL-0.9-1.0	13	1	56	57	7	6	37	
I3569/71	N40-SCL-0.0-0.1	15	2	46	49	12	8	43	
I3569/72	N40-SCL-0.2-0.3	15	2	45	50	15	9	40	
I3569/73	N40-SCL-0.5-0.6	15	3	38	46	17	9	45	
I3569/74	N40-SCL-0.8-0.9	15	3	42	46	11	7	47	
I3569/75	N40-SCL-0.9-1.0	15	3	33	41	19	11	48	
I3569/76	N41-SCL-0.0-0.1	9	1	71	71	7	6	23	
I3569/77	N41-SCL-0.2-0.3	11	3	57	63	10	4	33	
I3569/78	N41-SCL-0.5-0.6	10	5	53	53	12	13	34	
I3569/79	N41-SCL-0.8-0.9	12	1	76	81	8	3	15	
I3569/80	N41-SCL-0.9-1.0	10	2	51	55	14	10	35	
I3569/81	N42-SCL-0.0-0.1	9	1	73	77	8	5	19	12
I3569/82	N42-SCL-0.2-0.3	11	3	55	59	9	6	35	15
I3569/83	N42-SCL-0.5-0.6	11	4	55	61	8	2	37	16
I3569/84	N42-SCL-0.8-0.9	11	2	52	57	11	6	37	18
I3569/85	N42-SCL-0.9-1.0	12	2	53	56	10	6	38	18

## METHOD DESCRIPTIONS

## Soil

Reference: I3569

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## Methods used to Analyse Samples

Analyte	ALHS*	Uncertainty %	LOQ	Unit	Name	Method Description
pH	4A1	1.1	0.1	pH	pH	1:5 water extr, pH meter
EC	3A1	5.4	0.01	dS/m	Electrical conductivity	1:5 water extr, EC meter
Cl	5A2	10.0	10.0	mg/kg	Chloride	1:5 water extr, (AA) colorimetric
NO3-N	7C2	6.7	1.0	mg/kg	Nitrate-nitrogen	1:5 water extr, (AA) colorimetric
NH4-N	7C2	7.8	0.6	mg/kg	Ammonium-nitrogen	1M KCl extr, (AA) colorimetric
Bicarb.P	9B2	16.8	1.0	mg/kg	Bicarb.ext.phosphorus	0.5M NaHCO <sub>3</sub> @ pH 8.5, (AA) colorimetric
Exch.Ca	15B/C1	7.2	0.18	meq/100g	Exchangeable calcium	1M NH <sub>4</sub> OAc @ pH 7.0/8.5 leach, AAS
Exch.Mg	15B/C1	4.7	0.31	meq/100g	Exchangeable magnesium	1M NH <sub>4</sub> OAc @ pH 7.0/8.5 leach, AAS
Exch.Na	15B/C1	9.6	0.09	meq/100g	Exchangeable calcium	1M NH <sub>4</sub> OAc @ pH 7.0/8.5 leach, AAS
Exch.K	15B/C1	4.8	0.02	meq/100g	Exchangeable calcium	1M NH <sub>4</sub> OAc @ pH 7.0/8.5 leach, AAS
CEC	15I3	5.7	1.0	meq/100g	Cation Exchange Capacity	KNO <sub>3</sub> + Ca(NO <sub>3</sub> ) <sub>2</sub> extr, (AA) colorimetric
ADMC	2A1	11.9	0.4	%	Air Dried Moisture Content	Gravimetric oven dry @ 105C
R1	NA	20.2	NA		Dispersion Ratio	Ratio [Aqueous dispersible (Silt + Clay):Total (Silt + Clay)]
SO4-S	10B3	11.5	0.6	mg/kg	Sulfate sulfur	Ca(H <sub>2</sub> PO <sub>4</sub> ) <sub>2</sub> @ pH 4.0 extractable sulfate-sulfur, ICPOES
Sand	no ref	22.1	1.0	%	Particle size, sand	Hydrometer, gravimetric & Sieve
Silt	no ref	16.6	1.0	%	Particle size, silt	Hydrometer, gravimetric
Clay	no ref	12.7	1.0	%	Particle size, clay	Hydrometer, gravimetric

\* Australian Laboratory Handbook of Soil and Water Chemical Methods (1992)

For Manager

D E Baker BSc MASSSI

Analytical Services:

Methods from Rayment and Lyons, 2011. *Soil Chemical Methods - Australasia*. CSIRO Publishing: Collingwood.

Soluble Salts included in Exchangeable Cations - Except PRE-WASHED (if EC&gt;0.3dS/m).



## QUALITY CONTROL DATA

Soil

Reference: I3569

Page: 4 of 4

Methods from Rayment and Lyons, 2011. *Soil Chemical Methods - Australasia*. CSIRO Publishing: Collingwood.

Test Method	Units		Acceptance Criteria	
			Actual Value	[Range]
pH	pH	B		5.0 - 5.3
EC	dS/m	B		0.27 - 0.32
Cl	mg/kg	B		10 - 35
NO3-N	mg/kg	B		10 - 16
NH4-N	mg/kg	NA		NA
Bicarb.P	mg/kg	B		51 - 75
Total Kjeldahl N	%	ASPAC 34	0.110	.100 - .120
Total P	%	ASPAC 34	0.02	.019 - .021
Organic Carbon	%	B		1.82 - 2.3
Ca (Exch. cations)pH7	meq/100g	B		6.96 - 8.04
Mg (Exch. cations)pH7	meq/100g	B		1.88 - 2.22
Na (Exch. cations)pH7	meq/100g	B		.057 - .182
K (Exch. cations)pH7	meq/100g	B		1.209 - 1.411
Exch. Acidity	meq/100g			NA
ECEC	meq/100g	A		NA
CEC	meq/100g	S12		58 - 73
ESP	%	A		NA
Coarse sand	%	B	17.0	17.3 - 22.4
Fine Sand	%	B	22.0	20.0 - 25.7
Silt	%	B	16.0	10.5 - 19.8
Clay	%	B	44.0	37.9 - 48.9
R1		B		0.23 - 0.38

Test Method	Units	Test Soil	Acceptance Criteria	
			Actual Value	[Range]
DTPA-Cu	mg/kg	SB		2.37 - 3.25
DTPA-Zn	mg/kg	SB		3.15 - 3.81
DTPA-Mn	mg/kg	SB		97.7 - 149.0
DTPA-Fe	mg/kg	SB		24.3 - 32.6
0.33 Bar	%	G		32 - 51
15 Bar	%	G		23 - 30
Ca (Exch. cations)pH8.5	meq/100g	S12		27.7 - 35.4
Mg (Exch. cations)pH8.5	meq/100g	S12		22.88 - 24.5
Na (Exch. cations)pH8.5	meq/100g	S12		2.0 - 2.28
K (Exch. cations)pH8.5	meq/100g	S12		1.64 - 2.09

**ESSA Pty Ltd / by EAL NATA (ASPAC certified)**

**For Info Refer ESSA Pty Ltd  
PO Box 442 Sunnybank Q 4109**

**Phone: 0403245560**

**email: [e.s.s.a@bigpond.net.au](mailto:e.s.s.a@bigpond.net.au)**

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**References**K6315,6319,6329,6331 to 6333, 6344 to 6351

Sheet 1 of 4:

Date Received: 15/05/2021

Date Completed: 30/05/2021

**Final REPORT**

**Project:ESSA 21 6793  
Project - 20SRE May 27 2021**

**All results in this report relate only to the items tested. Results are  
expressed on an "as received basis".**

**Client Name:** GT Environmental  
**Contact:** Mr Reece Mc Cann  
**Sample Type:** Soil

**Number of samples:** 40Tested

ESSA Ref	field ref	Soil pH	Soil EC	Soil Cl	Exch.Ca	Exch. Mg	Exch.K	CEC	ESP	Ca/Mg	
	depth (m)	H2O	dS/m	mg/kg	meq/100g	meq/100g	meq/100g	meq/100g	%Na/CEC	Ratio	
K7115/1	N47-0.00-0.08	8.05	0.079	11	27.0	11.1	0.26	38.7	1.0	2.4	
K7115/2	N47-0.20-0.30	8.73	0.143	13	18.4	12.3	0.41	31.8	2.4	1.5	
K7115/3	N47-0.50-0.60	9.28	0.352	149	9.9	17.0	<0.12	30.0	10.1	0.6	
K7115/4	N47-0.70-0.80	9.22	0.537	326	8.8	17.1	<0.12	29.2	11.2	0.5	
K7115/5	N47-0.90-1.00	9.11	0.668	630	8.7	18.2	<0.12	30.7	11.9	0.5	
K7115/6	N49-0.00-0.10	7.78	0.049	60	24.4	10.4	0.28	35.4	0.8	2.3	
K7115/7	N49-0.20-0.30	9.08	0.218	41	13.1	22.9	<0.12	37.5	3.8	0.6	
K7115/8	N49-0.50-0.60	9.18	0.484	299	9.2	25.4	<0.12	37.4	7.1	0.4	
K7115/9	N49-0.70-0.80	9.13	0.658	414	9.0	27.7	0.15	40.2	8.3	0.3	
K7115/10	N49-0.90-1.00	9.07	0.753	704	8.3	27.2	<0.12	39.0	8.5	0.3	
K7115/11	N57-0.00-0.10	7.79	0.088	75	21.1	10.9	0.23	32.4	0.8	1.9	
K7115/12	N57-0.20-0.30	9.02	0.166	41	21.1	17.1	<0.12	40.0	4.5	1.2	
K7115/13	N57-0.50-0.60	8.93	0.457	246	13.5	16.6	<0.12	33.3	9.3	0.8	
K7115/14	N57-0.70-0.80	8.43	0.731	753	12.7	17.2	<0.12	34.0	12.0	0.7	
K7115/15	N57-0.90-1.00	6.28	0.813	1003	11.4	16.6	<0.12	31.6	11.4	0.7	
K7115/16	N54-0.00-0.10	7.20	0.051	11	22.5	13.9	0.39	37.2	1.0	1.6	
K7115/17	N54-0.20-0.30	8.92	0.159	34	21.3	16.9	<0.12	40.0	4.5	1.3	
K7115/18	N54-0.50-0.60	8.98	0.435	258	16.1	22.1	<0.12	42.7	10.4	0.7	
K7115/19	N54-0.70-0.80	8.71	0.663	831	10.5	15.7	<0.12	29.9	11.9	0.7	
K7115/20	N54-0.90-1.00	8.40	0.784	1002	11.0	16.7	<0.12	31.8	12.6	0.7	
K7115/21	N56-0.00-0.10	7.59	0.068	97	21.3	10.3	0.77	32.7	0.9	2.1	
K7115/22	N56-0.20-0.30	9.11	0.195	40	16.6	18.5	0.14	37.5	6.0	0.9	
K7115/23	N56-0.50-0.60	9.03	0.470	302	14.4	20.5	<0.12	39.5	11.5	0.7	
K7115/24	N56-0.70-0.80	8.94	0.714	696	13.4	20.4	<0.12	38.6	12.2	0.7	
K7115/25	N56-0.90-1.00	8.81	0.875	919	13.5	22.2	<0.12	41.1	13.1	0.6	
K7115/26	N58-0.00-0.10	7.82	0.074	6	18.6	10.6	0.31	29.7	0.5	1.7	
K7115/27	N58-0.20-0.30	8.79	0.117	22	21.2	14.7	<0.12	36.6	1.8	1.4	
K7115/28	N58-0.50-0.60	9.12	0.230	72	14.6	18.6	0.14	35.4	6.0	0.8	
K7115/29	N58-0.66-0.76	9.00	0.349	153	14.1	20.6	<0.12	37.7	7.8	0.7	
K7115/30	N58-0.90-1.00	8.97	0.493	175	14.9	24.0	0.27	43.4	9.6	0.6	
K7115/31	N46-0.00-0.10	7.26	0.062	72	15.2	8.0	0.54	23.9	0.7	1.9	
K7115/32	N46-0.20-0.30	8.96	0.122	29	16.9	14.2	<0.12	32.0	2.5	1.2	
K7115/33	N46-0.50-0.60	9.13	0.220	99	13.9	18.8	<0.12	35.3	7.1	0.7	
K7115/34	N46-0.70-0.80	9.08	0.380	156	13.4	20.6	<0.12	37.4	8.9	0.7	
K7115/35	N46-0.90-1.00	8.96	0.552	407	13.2	20.7	<0.12	37.6	9.5	0.6	
K7115/36	N52-0.00-0.10	7.20	0.054	5	14.7	7.9	0.35	23.1	0.7	1.9	
K7115/37	N52-0.20-0.30	9.31	0.205	41	11.8	13.8	<0.12	27.3	6.1	0.9	
K7115/38	N52-0.50-0.60	9.10	0.982	879	8.1	18.5	<0.12	31.4	15.3	0.4	
K7115/39	N52-0.70-0.80	8.99	1.165	807	6.3	15.5	<0.12	26.3	17.4	0.4	
K7115/40	N52-0.90-1.00	8.81	1.287	879	5.9	15.2	<0.12	25.6	17.5	0.4	

Ex Cations Bold = Method 15C1 Other =15A1

All done by 15C1



ESSA Ref	field ref	Soil pH	Soil EC	Soil Cl	Exch.Ca	Exch. Mg	Exch.K	CEC	ESP	Ca/Mg	
	depth (m)	H20	dS/m	mg/kg	meq/100g	meq/100g	meq/100g	meq/100g	%Na/CEC	Ratio	

Client: GTE 20SRE- Results Page 2 of 2

ESSA Ref	Sample No	Moisture	Gravel	Sand	Sand	Silt	Silt	Clay
	Depth (m)	Content	> 2 mm	> 50 µm	> 20 µm	2-50 µm	2-20 µm	< 2 µm
				<2mm	<2mm	<2mm	<2mm	<2mm
K7115/1	N47-0.00-0.08	11	0	27	29	20	17	54
K7115/2	N47-0.20-0.30	14	1	42	45	7	4	51
K7115/3	N47-0.50-0.60	12	4	42	48	13	7	45
K7115/4	N47-0.70-0.80	12	3	46	50	9	5	45
K7115/5	N47-0.90-1.00	12	1	43	47	10	7	47
K7115/6	N49-0.00-0.10	11	0	36	39	17	14	47
K7115/7	N49-0.20-0.30	13	2	39	43	13	9	48
K7115/8	N49-0.50-0.60	12	10	33	39	16	9	52
K7115/9	N49-0.70-0.80	13	8	33	38	13	8	53
K7115/10	N49-0.90-1.00	13	6	31	35	13	9	56
K7115/11	N57-0.00-0.10	15	1	41	45	18	14	41
K7115/12	N57-0.20-0.30	15	1	16	20	16	12	68
K7115/13	N57-0.50-0.60	16	1	29	33	13	9	58
K7115/14	N57-0.70-0.80	19	1	21	24	16	12	63
K7115/15	N57-0.90-1.00	19	0	23	27	16	12	61
K7115/16	N54-0.00-0.10	19	0	38	42	15	11	47
K7115/17	N54-0.20-0.30	14	0	37	41	10	6	53
K7115/18	N54-0.50-0.60	18	0	11	17	18	12	71
K7115/19	N54-0.70-0.80	18	1	21	25	17	13	61
K7115/20	N54-0.90-1.00	18	0	23	27	16	12	61
K7115/21	N56-0.00-0.10	9	0	44	47	14	11	42
K7115/22	N56-0.20-0.30	14	1	34	37	13	10	53
K7115/23	N56-0.50-0.60	14	2	33	37	14	10	53
K7115/24	N56-0.70-0.80	14	2	33	35	11	9	56
K7115/25	N56-0.90-1.00	15	0	33	36	14	10	54
K7115/26	N58-0.00-0.10	15	1	27	35	21	13	51
K7115/27	N58-0.20-0.30	13	0	42	47	16	10	43
K7115/28	N58-0.50-0.60	14	4	39	43	13	9	48
K7115/29	N58-0.66-0.76	15	5	34	40	18	12	48
K7115/30	N58-0.90-1.00	17	3	24	30	21	15	55
K7115/31	N46-0.00-0.10	13	1	62	67	13	7	26
K7115/32	N46-0.20-0.30	12	1	46	49	12	8	42
K7115/33	N46-0.50-0.60	12	3	41	45	13	9	46
K7115/34	N46-0.70-0.80	13	2	32	36	14	10	53
K7115/35	N46-0.90-1.00	14	2	32	36	16	12	52
K7115/36	N52-0.00-0.10	13	1	66	70	11	7	23
K7115/37	N52-0.20-0.30	11	2	48	51	10	7	42
K7115/38	N52-0.50-0.60	12	1	37	41	14	10	49
K7115/39	N52-0.70-0.80	13	1	43	47	14	10	43
K7115/40	N52-0.90-1.00	15	0	39	45	14	8	47

## METHOD DESCRIPTIONS

## Soil

Reference:K7115

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## Methods used to Analyse Samples

Analyte	ALHS*	Uncertainty %	LOQ	Unit	Name
pH	4A1	1.1	0.1	pH	pH
EC	3A1	5.4	0.01	dS/m	Electrical conductivity
Cl	5A2	10.0	10.0	mg/kg	Chloride
NO3-N	7C2	6.7	1.0	mg/kg	Nitrate-nitrogen
NH4-N	7C2	7.8	0.6	mg/kg	Ammonium-nitrogen
Bicarb.P	9B2	16.8	1.0	mg/kg	Bicarb.ext.phosphorus
Exch.Ca	15D/C1	7.2	0.18	meq/100g	Exchangeable calcium
Exch.Mg	15D/C1	4.7	0.31	meq/100g	Exchangeable magnesium
Exch.Na	15D/C1	9.6	0.09	meq/100g	Exchangeable calcium
Exch.K	15D/C1	4.8	0.02	meq/100g	Exchangeable calcium
EX Sodium %	15N1				Exch Na/CEC x100
Ca/Mg	NA				Ca/Mg Ratio
Exch Cations	15D/C1				If EC >0.3dS/m then Prewashed with ethanol /glycerol
Org Matter	NA				Leco Furnace
CEC	15I3	5.7	1.0	meq/100g	Cation Exchange Capacity
ADMC	2A1	11.9	0.4	%	Air Dried Moisture Content
R1	NA	20.2	NA		Dispersion Ratio
SO4-S	10B3	11.5	0.6	mg/kg	Sulfate sulfur
Sand	no ref	22.1	1.0	%	Particle size, sand
Silt	no ref	16.6	1.0	%	Particle size, silt
Clay	no ref	12.7	1.0	%	Particle size, clay
Emerson No	Emerson	CSIRO		Index	Emerson Number

\* Australian Laboratory Handbook of Soil and Water Chemical Methods (1992 /2011)

D E Baker BSc CPSS

Director and Principal Soil Scientist – ESSA Pty Ltd

Methods from Rayment and Lyons, 2011. *Soil Chemical Methods - Australasia*.

Published : CSIRO Collingwood

Soluble Salts included in Exch. Cations - Except PRE-WASHED (if EC&gt;0.3dS/m).



Adjunct Professional Fellow Southern Cross University  
 Chief Soil Chemistry Trainer Soil Science Australia (National & Qld)  
 Hon. Life Member Soil Science Australia (National & Qld)  
 Certified Professional Practicing Soil Scientist CPSS



## QUALITY CONTROL DATA

Soil

Reference: J7115

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\* Australian Laboratory Handbook of Soil and Water Chemical Methods (1992)

Test Method	Units		Acceptance Criteria	
			Actual Value	[Range]
pH	pH	B		5.0 - 5.3
EC	dS/m	B		0.27 - 0.32
Cl	mg/kg	B		10 - 35
NO3-N	mg/kg	B		10 - 16
NH4-N	mg/kg	NA		NA
Bicarb.P	mg/kg	B		51 - 75
Total Kjeldahl N	%	ASPAC 34	0.110	.100 - .120
Total P	%	ASPAC 34	0.02	.019 - .021
Organic Carbon	%	B		1.82 - 2.3
Ca (Exch. cations)pH7	meq/100g	B		6.96 - 8.04
Mg (Exch. cations)pH7	meq/100g	B		1.88 - 2.22
Na (Exch. cations)pH7	meq/100g	B		.057 - .182
K (Exch. cations)pH7	meq/100g	B		1.209 - 1.411
Exch. Acidity	meq/100g			NA
ECEC	meq/100g	A		NA
CEC	meq/100g	S12		58 - 73
ESP	%	A		NA
Coarse sand	%	B	17.0	17.3 - 22.4
Fine Sand	%	B	22.0	20.0 - 25.7
Silt	%	B	16.0	10.5 - 19.8
Clay	%	B	44.0	37.9 - 48.9
R1		B		0.23 - 0.38

Test Method	Test Soil	Acceptance Criteria	
		Actual Value	[Range]
DTPA-Cu	SB		2.37 - 3.25
DTPA-Zn	SB		3.15 - 3.81
DTPA-Mn	SB		97.7 - 149.0
DTPA-Fe	SB		24.3 - 32.6
0.33 Bar	G		32 - 51
15 Bar	G		23 - 30
Ca (Exch. cations)p	S12		27.7 - 35.4
Mg (Exch. cations)p	S12		22.88 - 24.5
Na (Exch. cations)p	S12		2.0 - 2.28
K (Exch. cations)p	S12		1.64 - 2.09



**ESSA / ACL (ASPAC)**

**5 Dunphy St Sunnybank Hills  
Qld 4109**

**Phone: 0403245560**

**email: e.s.s.a@bigpond.net.au**

---

Reference: **21/21**

Page: 1 of 5

Date Received: 7/6/2021  
Date Completed: 18/6/2021

**FINAL REPORT**

**Project: -15 Bar K7115  
20SRE**

All results in this report relate only to the items tested. Results are expressed on an "as received basis".

Client Name: GTE

Contact: Mr R Mc Cann

Sample Type: Soil

Number of samples: 20

**ESSA (ACL) Pty Ltd****Soil Analysis Report****Batch Number: (K7115) 21/21****Date Received: 7/6/2021****Date Completed: 18/6/2021****Client: GTE**

Lab No	Site		Sample ID	15 bar
				%
195	K 7115/31	N46-0.00-0.10	11	19
196	K7115/32	N46-0.20-0.30	12	24
197	K7115/33	N46-0.50-0.60	13	26
198	K 7115/34	N46-0.70-0.80	14	27
199	K7115/35	N46-0.90-1.00	15	28
200	K7115/36	N52-0.00-0.10	16	20
201	K 7115/37	N52-0.20-0.30	17	23
202	K7115/38	N52-0.50-0.60	18	29
203	K7115/39	N52-0.70-0.80	19	29
204	K 7115/40	N52-0.90-1.00	20	27
205	K7115/11	N57-0.00-0.10	31	13
206	K7115/12	N57-0.20-0.30	32	20
207	K 7115/13	N57-0.50-0.60	33	22
208	K7115/14	N57-0.70-0.80	34	24
209	K7115/15	N57-0.90-1.00	35	24
210	K 7115/16	N54-0.00-0.10	36	13
211	K7115/17	N54-0.20-0.30	37	17
212	K 7115/18	N54-0.50-0.60	38	21
213	K7115/19	N54-0.70-0.80	39	21
214	K7115/20	N54-0.90-1.00	40	22

## METHOD DESCRIPTIONS

## Soil

Reference: 21/21

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## Methods used to Analyse Samples

Analyte	ALHS*	Uncertainty %	LOQ	Unit	Name	Method Description
pH	4A1	1.1	0.1	pH	pH	1:5 water extr, pH meter
EC	3A1	5.4	0.01	dS/m	Electrical conductivity	1:5 water extr, EC meter
Cl	5A2	10.0	10.0	mg/kg	Chloride	1:5 water extr, (AA) colorimetric
NO3-N	7C2	6.7	1.0	mg/kg	Nitrate-nitrogen	1:5 water extr, (AA) colorimetric
NH4-N	7C2	7.8	0.6	mg/kg	Ammonium-nitrogen	1M KCl extr, (AA) colorimetric
Bicarb.P	9B2	16.8	1.0	mg/kg	Bicarb.ext.phosphorus	0.5M NaHCO3 @ pH 8.5, (AA) colorimetric
TN	7A2	12.9	0.01	%	Total Kjeldahl Nitrogen	Sulphuric acid digest, (AA) colorimetric
OC	8B1	9.7	0.02	%	Organic Carbon	Walkley & Black, (H2SO4/K2Cr2O7), titr.
Ca (Neut)	15A1	10.3	0.10	meq/100g	Exchangeable calcium	1M NH4Cl @ pH 7.0 shake, AAS
Mg (Neut)	15A1	6.6	0.10	meq/100g	Exchangeable magnesium	1M NH4Cl @ pH 7.0 shake, AAS
Na (Neut)	15A1	7.3	0.03	meq/100g	Exchangeable sodium	1M NH4Cl @ pH 7.0 shake, AAS
K (Neut)	15A1	3.9	0.02	meq/100g	Exchangeable potassium	1M NH4Cl @ pH 7.0 shake, AAS
ECEC	15J1	5.0	1	meq/100g	Effective cation ex.capacity	Sum of exchangeable cations
ESP	15N1	5.0	3	%	Exchangeable Na%	(Exchangeable Na/sum of exch.cations)%
Sand	no ref	22.1	1.0	%	Particle size, sand	Hydrometer, gravimetric
Silt	no ref	16.6	1.0	%	Particle size, silt	Hydrometer, gravimetric
Clay	no ref	12.7	1.0	%	Particle size, clay	Hydrometer, gravimetric
(-) 15 Bar	no Ref				Pressure Plate	15 Bar Ceramic Pressure Plate

\* Australian Laboratory Handbook of Soil and Water Chemical Methods (1992 /2011)

For Manager

Analytical Services: D Baker

Dennis Baker Soil Scientist (ESSA)



Soil Science Leader and Soil Chemistry Specialist

Adjunct Professional Fellow Southern Cross University

Chief Soil Chemistry Trainer Soil Science Australia (National &amp; Qld)

Trainer in Soil Science Soil Science Australia (National &amp; Qld)

Hon. Life Member Soil Science Australia (National &amp; Qld)

Certified Professional Practicing Soil Scientist CPSS





## METHOD DESCRIPTIONS

## Soil

Reference: 21/21

Page 4 of 5

## Methods used to Analyse Samples

Analyte	ALHS*	Uncertainty %	LOQ	Unit	Name	Method Description
Ca (Alc)	15C1	7.2	0.18	meq/100g	Exchangeable calcium	1M NH4Cl (alcoholic) @ pH 8.5 leach, AAS
Mg (Alc)	15C1	4.7	0.31	meq/100g	Exchangeable magnesium	1M NH4Cl (alcoholic) @ pH 8.5 leach, AAS
Na (Alc)	15C1	9.6	0.09	meq/100g	Exchangeable sodium	1M NH4Cl (alcoholic) @ pH 8.5 leach, AAS
K (Alc)	15C1	4.8	0.02	meq/100g	Exchangeable potassium	1M NH4Cl (alcoholic) @ pH 8.5 leach, AAS
CEC	15I3	5.7	1.0	meq/100g	Cation Exchange Capacity	KNO3 + Ca(NO3)2 extr, (AA) colorimetric
DTPA-Cu	12A1	17.1	0.26	mg/kg	DTPA ext. copper	DTPA extraction, AAS
DTPA-Zn	12A1	16.4	0.10	mg/kg	DTPA ext. zinc	DTPA extraction, AAS
DTPA-Mn	12A1	9.0	0.32	mg/kg	DTPA ext. manganese	DTPA extraction, AAS
DTPA-Fe	12A1	13.0	0.23	mg/kg	DTPA ext. iron	DTPA extraction, AAS
ADMC	2A1	11.9	0.4	%	Air Dried Moisture Content	Gravimetric oven dry @ 105C
R1	NA	20.2	NA		Dispersion Ratio	Ratio [Aqueous dispersible (Silt + Clay):Total (Silt + Clay)]
SO4-S	10B3	11.5	0.6	mg/kg	Sulfate sulfur	Ca(H2PO4)2 @ pH 4.0 extractable sulfate-sulfur, ICPOES
Al	15G1	NA	NA	meq/100g	Exchangeable Aluminium	Exch. Hydrogen and Aluminium by 1M KCl
H+	15G1	NA	NA	meq/100g	Exchangeable Acidity	Exch. Hydrogen and Aluminium by 1M KCl
15 Bar		NA	NA		15 Bar Analysis	Pressure Plate/Gravimetric oven dry @ 105C
1/3 Bar		NA	NA		15 Bar Analysis	Pressure Plate/Gravimetric oven dry @ 105C

\* Australian Laboratory Handbook of Soil and Water Chemical Methods (1992)

For Manager

Analytical Services: \_\_\_\_\_

## QUALITY CONTROL DATA

Soil

Reference: 21/21

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\* Australian Laboratory Handbook of Soil and Water Chemical Methods (1992)

Test Method	Units		Actual Value		Acceptance Criteria	
					[Range]	
pH	pH	r118			9.7 - 10.1	
EC	dS/m	r118			.301 - .334	
Cl	mg/kg	r118			28 -40	
NO3-N	mg/kg	rv			3 - 8	
NH4-N	mg/kg	B			80-96	
Olsen P	mg/kg	rv			15 - 20	
Total Kjeldahl N	%	32-13			.329 - .485	
Total P	%	aspac 111			.040 - .052	
Organic Carbon	%	rv			1.82 - 2.3	
Ca (Exch. cations)pH7	meq/100g	B			6.96 - 8.04	
Mg (Exch. cations)pH7	meq/100g	B			1.88 - 2.22	
Na (Exch. cations)pH7	meq/100g	B			.057 - .182	
K (Exch. cations)pH7	meq/100g	B			1.21 - 1.41	
Exch. Acidity	meq/100g				NA	
ECEC	meq/100g	A			NA	
CEC	meq/100g	S12			58 - 73	
ESP	%	A			NA	
Coarse sand	%	RD			29 -33	
Fine Sand	%	RD			27 - 32	
Silt	%	RD			10 - 16	
Clay	%	RD			21 - 29	
R1		RD			.38 - .57	

Test Method	Units	Test Soil	Actual Value		Acceptance Criteria	
					[Range]	
DTPA-Cu	mg/kg	112-09			1.52 - 1.82	
DTPA-Zn	mg/kg	112-09			1.25 - 1.45	
DTPA-Mn	mg/kg	112-09			148 - 178	
DTPA-Fe	mg/kg	112-09			7.9 - 13.2	
Sulfate-sulfur	mg/kg	B			5 - 12	
ADMC	%				NA	
15 Bar	%	G	29, 29, 30, 30		23 - 32	
0.33 Bar	%	G			36 - 52	
Ca (Exch. cations)pH8.5	meq/100g	S12			27.7 - 37.4	
Mg (Exch. cations)pH8.5	meq/100g	S12			22.6 - 26.5	
Na (Exch. cations)pH8.5	meq/100g	S12			2.0 - 2.28	
K (Exch. cations)pH8.5	meq/100g	S12			1.64 - 2.09	



## Environmental Soil Solutions *Australia Pty Ltd*

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E- [e.s.s.a@bigpond.net.au](mailto:e.s.s.a@bigpond.net.au)

24/02/2021 – GTE Query Soil Chemical Reports

RE: Method Codes

- **Methods from Rayment and Lyons, 2011. *Soil Chemical Methods - Australasia*. CSIRO Publishing: Collingwood.**
- **Australian Laboratory Handbook of Soil and Water Chemical Methods (1992)**

The methods references reported in recent GTE Saraji reports By ESSA

- H2096
- I2733
- I3569.

Have been updated

In addition the Ca/ Mg and ESP have been checked and any errors updated

### COMMENT

In relation to the 1992 and 2001 versions of George Rayment's Methods

- 1) no numbering has been changed in the updates
- 2) any new methods added have been allocated subsequent codes

So,

4A1 in 1992 = 4A1 in 2011

3A1 in 1992 = 3A1 in 2011 And so on

If you have any further queries, please do not hesitate giving me a call on the number below.

Regards

Dennis Baker Soil Scientist

D E Baker BSc  
Soil Science Leader and Soil Chemistry Specialist  
Adjunct Professional Fellow Southern Cross University  
Chief Soil Chemistry Trainer Soil Science Australia (Qld & National)  
Hon Life Member Soil Science Australia (Qld & National)  
ESSA Pty Ltd  
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