

LAND, SOIL & AGRICULTURE ASSESSMENT

Radford Park Estate Planning Proposal

Prepared for:

Belford Land

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BASIS OF REPORT

This report has been prepared by SLR Consulting Australia Pty Ltd (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Belford Land (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

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DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
630.12465.001	March 2022	Murray Fraser	Rod Masters	Murray Fraser

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1 Introduction

This Land, Soil & Agriculture Assessment relates to land (the Study Area) located approximately 1.5 kilometres north of Branxton, adjoining an existing residential subdivision known as "Radford Park Estate" (**Figure 1**). The Study Area and Radford Park Estate are collectively held by the landowner.

The area is well-located less than 2 kilometres north of Branxton's Town Centre, at the western edge of the Greater Newcastle Metropolitan Area. This location benefits from convenient access to the New England Highway and Hunter Expressway, providing access in under 30 minutes to strategic centres at Singleton, Cessnock, and Maitland. The area is also less than an hour away from Newcastle.

The Study Area for this assessment covers approximately 83 hectares and comprises four separate adjoining lots:

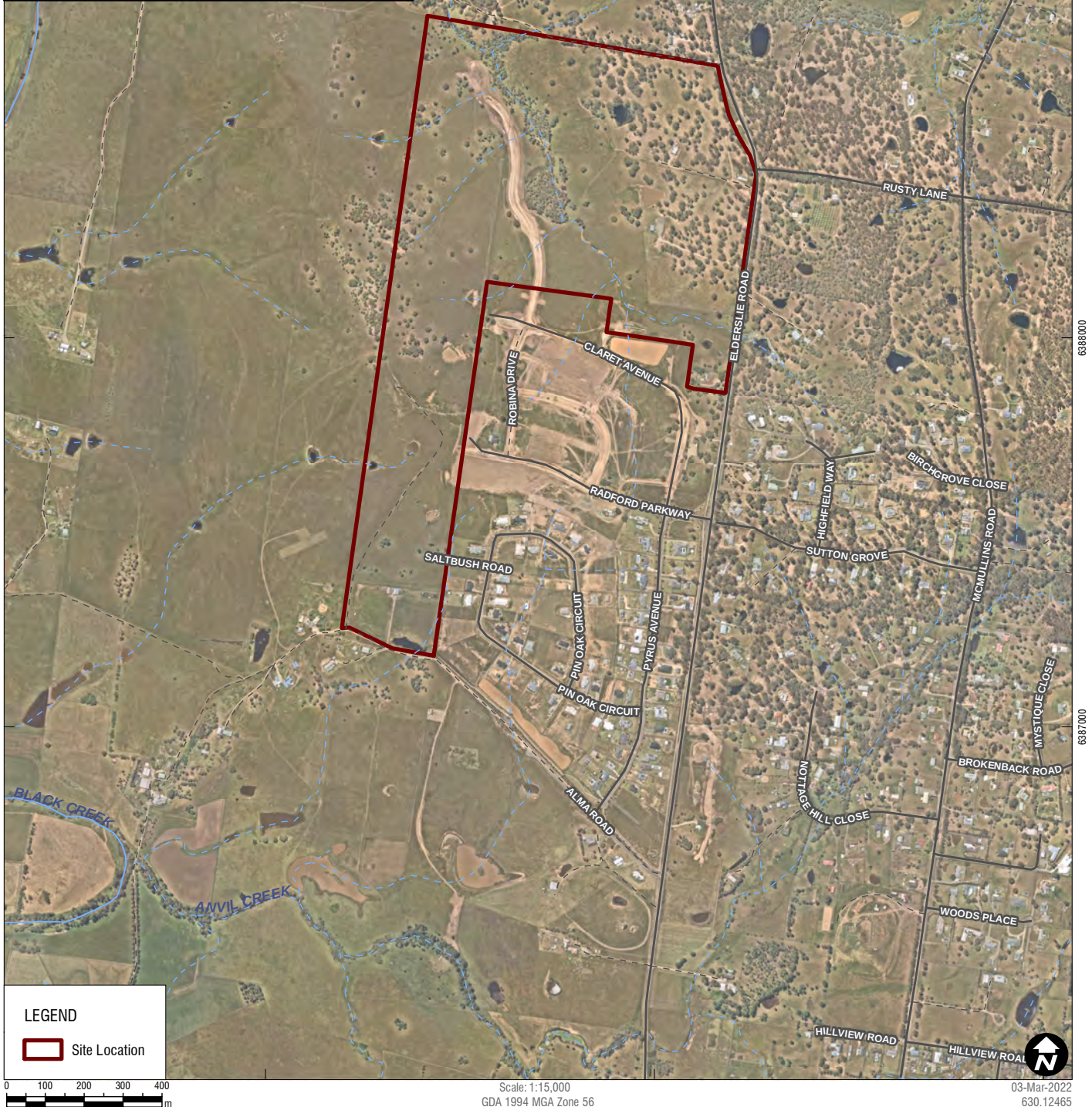
- Lot 1 in DP 1124566 (94 Alma Rd)
- Lot 111 in DP850244 (285 Elderslie Rd)
- Lot 122 in DP1165184 (225 Elderslie Rd)
- Part Lot 300 in DP1248134

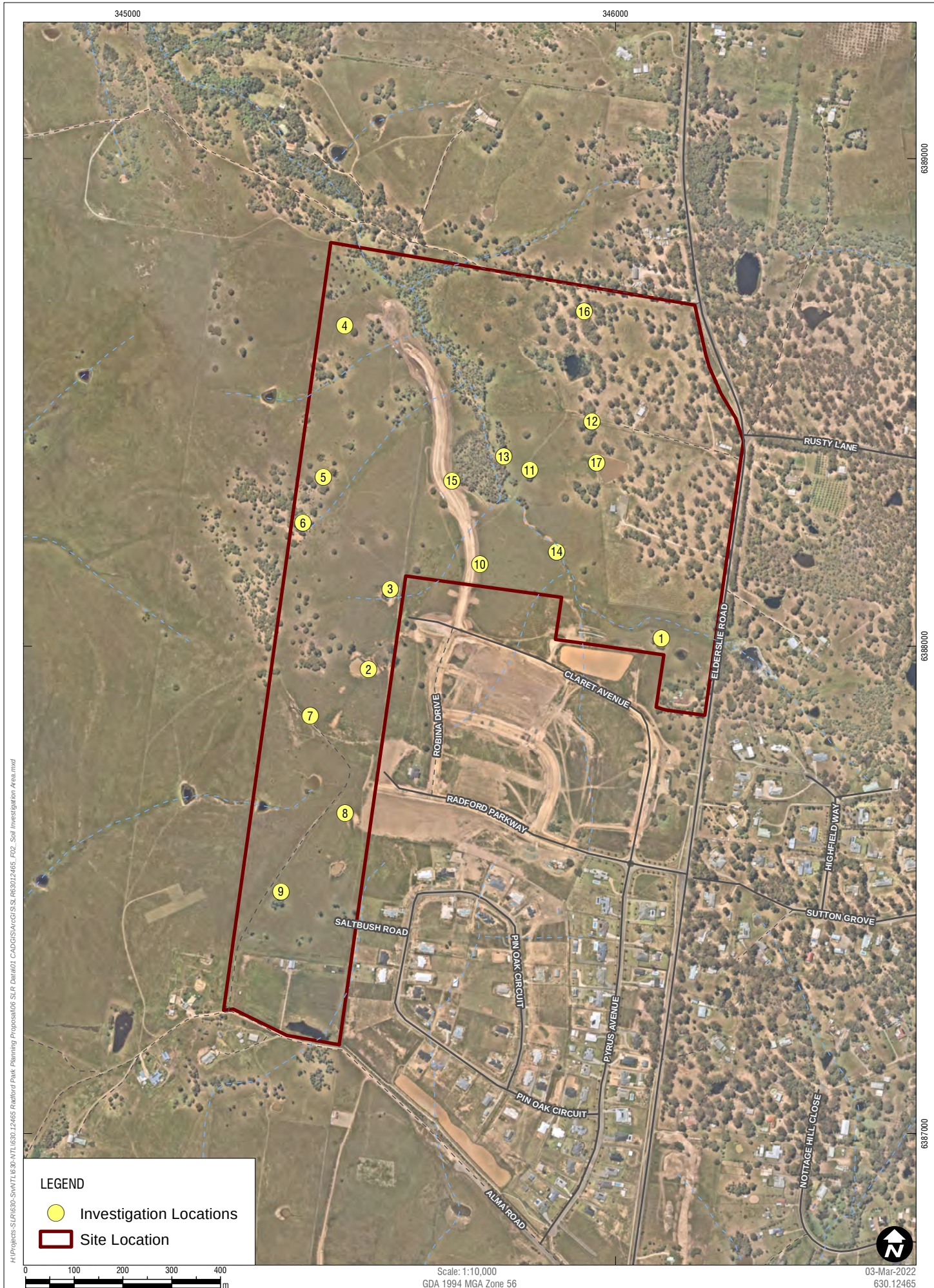
The Study Area has frontage to Elderslie Road. The Radford Park Estate already benefits from access to Elderslie Road and the entire site will benefit from connected road networks extending from this. Secondary access may also become available from Elderslie Road via an unnamed road at the site's southern boundary. We understand this road must be partially upgraded to service proposed (approved) residential development adjoining the site to the south.

The Study Area is largely cleared of vegetation (**Figure 2**), with remnants contained within the northernmost portion. It contains a single watercourse, which would have implications with regards to providing associated vegetated riparian corridors.

The Study Area contains existing land uses and improvements as follows.

- A commercial market garden previously operated within the southern portion of Lot 1 in DP 1124566. These operations have ceased, but the associated timber farm shed remains.
- Lot 111 in DP850244 contains two sheds (constructed circa 2006).
- Lot 122 in DP1165184 contains a dwelling, which is held in separate private ownership.
- The majority land use within the Study Area is vacant native pasture and cattle grazing semi-improved grass pasture.





1.1 Objectives

The site is subject to rezoning investigations, seeking to change the underlying land use zone from RU1 Primary Production to R5 Large Lot Residential. This Land, Soil & Agricultural Resource Assessment will address the following Ministerial Directions:

- 9.1 Rural Zones.
- 9.2 Rural Lands.
- 4.4 Remediation of Contaminated Land.
- 4.5 Acid Sulfate Soils.

To demonstrate that the development of the site will not adversely impact any ongoing agricultural operations in the vicinity. In order to achieve this SLR proposes to:

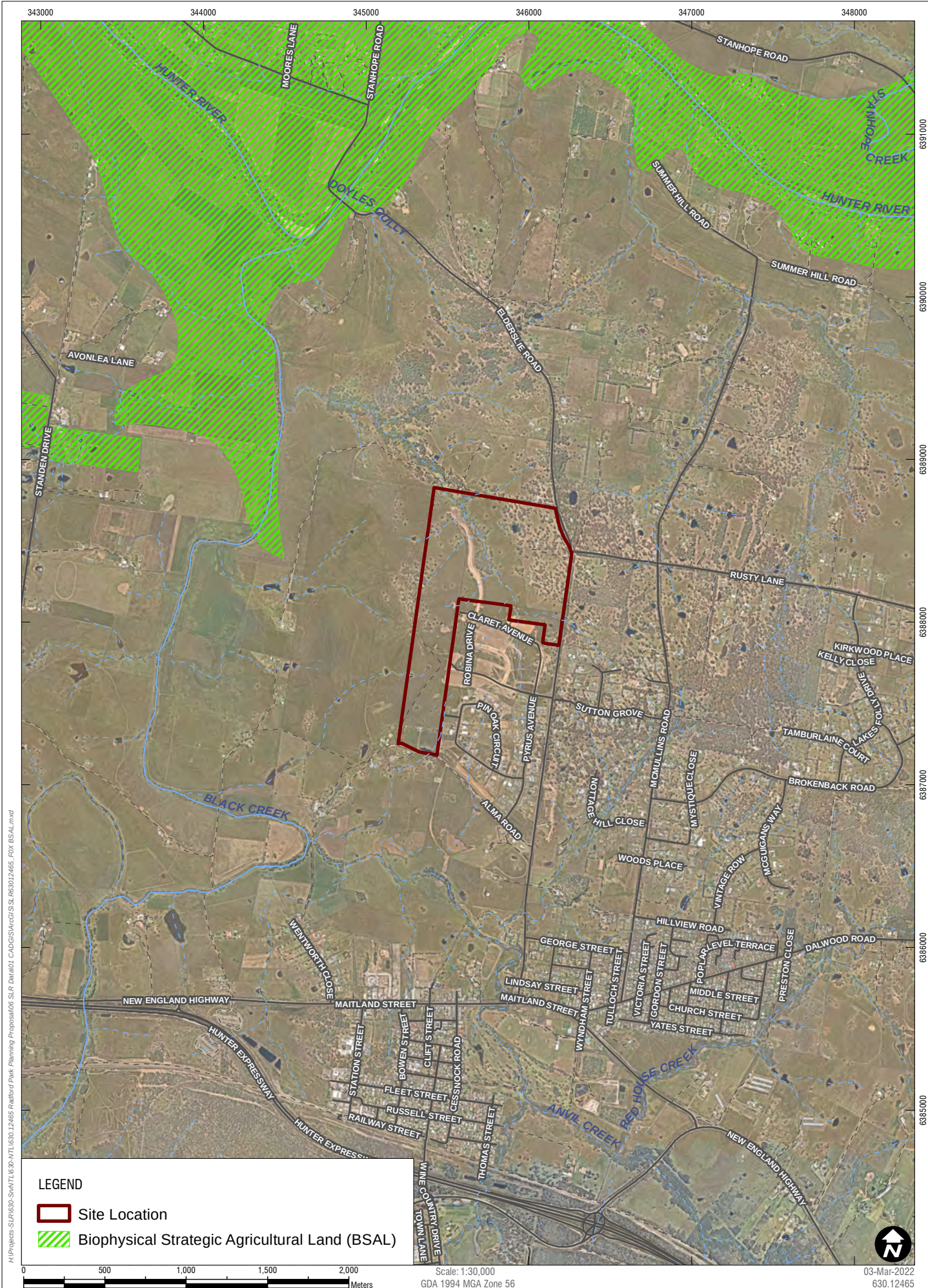
- Describe the current agricultural capability and production value of the site.
- Identify, map and characterise any current farming operations within 2 kilometres of the Study Area, which is consistent with previous agricultural assessments.
- Provide commentary as to the likely additional impacts to any farming operations in the vicinity arising from the proposal, utilising the existing Radford Park estate as a baseline.
- Should any significant impacts emerge, provide recommendations that could be taken to protect the existing farming operations.
- Provide a clear and concise concluding statement referring back to the Ministerial Directions.
- Review and ground-truth any mapped biophysical capability of the land.

There is no regionally mapped BSAL within or adjacent to the Study Area. The closest mapped BSAL is approximately 1 kilometre to the west, within the vicinity of Black Creek. (**Figure 3**).

1.1.1 Assessment Standards and Guidelines

The key standards for this Land, Soil & Agriculture Assessment include:

- The Land and Soil Capability Assessment Scheme; Second Approximation (OEH, 2012);
- the Interim protocol for site verification and mapping of biophysical strategic agricultural land (OEH, 2013);
- the Australian Soil Classification (ASC) system (Isbell, 2002);
- the Guidelines for Surveying Soil and Land Resources (National Committee on Soil and Terrain, 2008); and
- the Australian Soil and Land Survey Field Handbook (National Committee on Soil and Terrain, 2009).

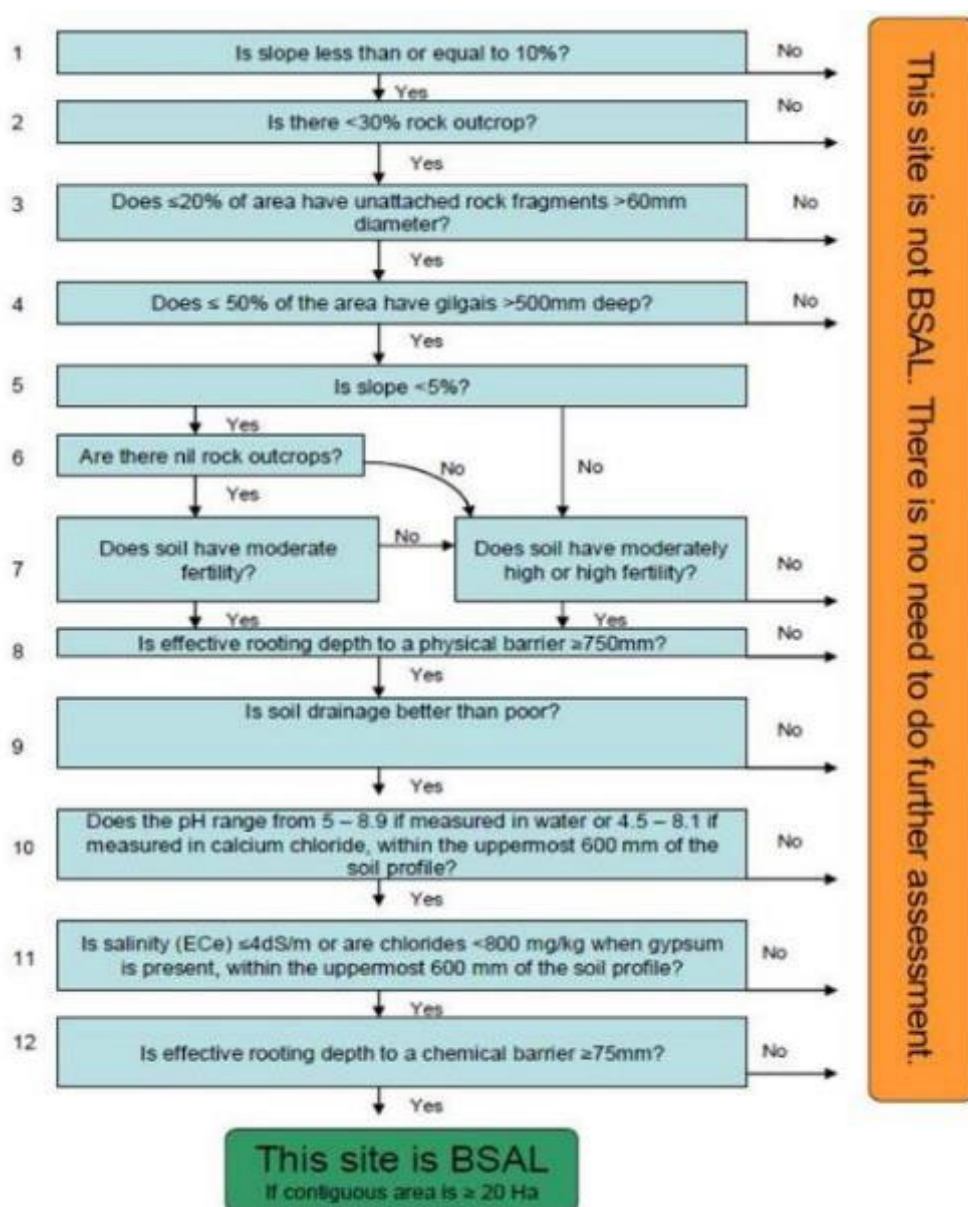


2 Methodology

Site inspections were undertaken by SLR's Principal Agronomist, Murray Fraser, during April 2018 and again in November 2022. A complete site walkover was completed and nine sites were sampled to a depth of 1.2 metres to assess soil types present according to the Australian Soil Classification (ASC) (Isbell, 2016).

Although the entire Study Area is not mapped as BSAL a precautionary assessment was undertaken according to the Interim Protocol (NSW Government, 2013). For land to be classified as BSAL it must meet the criteria outlined in the flow chart shown in **Diagram 1**. LSC assessment was undertaken according to the Land and Soil Capability Assessment Scheme; Second Approximation (OEH, 2012).

Diagram 1 BSAL Criteria Flow Diagram



Note: In applying step 12 it was assumed that the effective rooting depth to a chemical barrier of ≥ 75 mm was incorrect as stated in Diagram 1, and instead a value of ≥ 750 mm was adopted as stated in Section 6.10 of the Interim Protocol.

2.1.1 Soil Survey Density

To satisfy BSAL soil mapping requirements, the field soil survey program was undertaken for those areas both outside and inside the BSAL exclusion area with a total of 17 sites assessed, comprising 9 detailed sites and 8 check sites, as shown on **Figure 2** and **Figure 4**. A breakdown of the soil survey density, in accordance with the requirements of the Interim Protocol, is provided in **Table 2**.

Table 1 Assessment of Soil Survey Density

Survey Density	Survey Area
1:25,000 Survey Area	83 hectares
Target 1:25,000 Survey Density	Minimum Required 4 Sites
Detailed Sites	9
Check Sites	8
Total Number Sites	17
Laboratory Analysed Sites	6

*See Section 2.6.3 for an explanation of different soil survey observation types.

2.1.2 Soil Survey Observation Types

Soil profiles were assessed at the 9 detailed sites in accordance with the *Australian Soil and Land Survey Field Handbook* (National Committee on Soil and Terrain, 2009). Each soil-profile exposure was extracted with a hydraulic soil corer either a depth of 1 metre, to equipment refusal, or to bedrock. Detailed soil profile morphological descriptions were prepared at all sites to record the information specified in the Interim Protocol. Information was recorded for the major parameters specified in **Table 3**.

Global Positioning System (GPS) readings were taken for all sites with soil descriptions. Vegetation type, landform and aspect were also noted. Soil exposures and landscapes were photographed during field operations.

Table 2 Field Assessment Parameters

Descriptor	Application
Horizon depth	Weathering characteristics, soil development
Field colour	Permeability, susceptibility to dispersion/erosion
Field texture grade	Erodibility, hydraulic conductivity, moisture retention, root penetration
Boundary distinctness and shape	Erosional/dispositional status, textural grade
Consistence force	Structural stability, dispersion, ped formation
Structure pedality grade	Soil structure, root penetration, permeability, aeration
Structure pedality and size	Soil structure, root penetration, permeability, aeration
Stones – amount and size	Water holding capacity, weathering status, erosional/depositional character
Roots – amount and size	Effective rooting depth, vegetative sustainability
Ants, termites, worms etc.	Biological mixing depth

A total of 17 detailed and check sites were evaluated within the Study Area, giving one site evaluation per 5 hectares. Of the 16 sites assessed, 7 were check sites. Check sites are mapping observations examined in sufficient detail to allocate the site to a specific soil type and map unit. For detailed sites, soil was collected from each major soil horizon (soil layer).

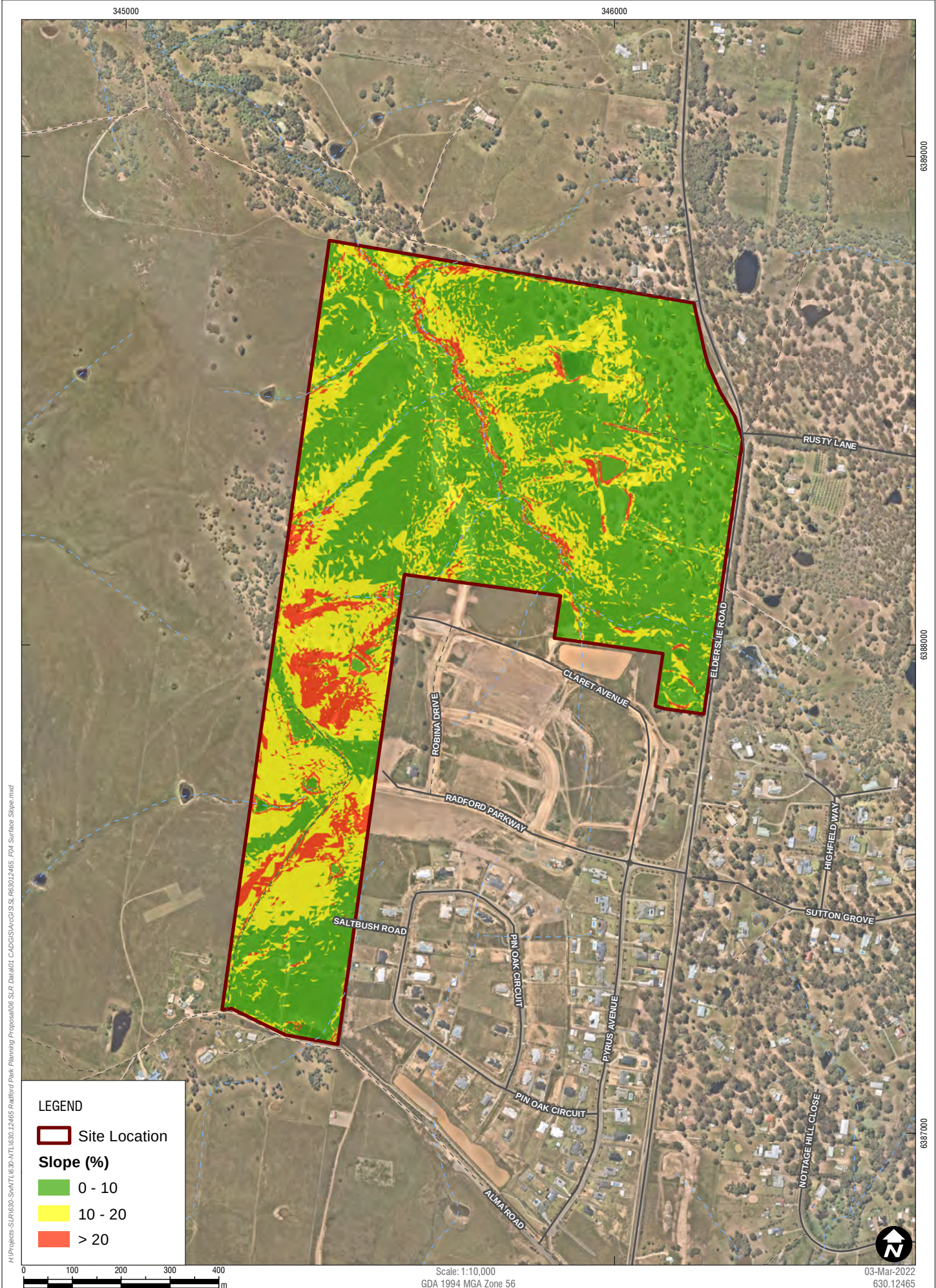
Soil samples from 6 detailed sites were utilised in the laboratory testing program. Samples were analysed in order to classify ASC (Isbell, 2002) soil taxonomic class, LSC evaluation and to enable BSAL verification.

Soil collected from each major soil horizon (soil layer) was sent to a National Association of Testing Authorities Australia (NATA) accredited laboratory (Environmental Analysis Laboratory) for analysis. The selected physical and chemical laboratory analysis properties and their relevant application are listed in **Table 4**.

Table 3 Laboratory Analysis Parameters

Property	Application
Coarse Fragments (>2mm)	Soil workability; root development
Particle-Size Distribution (<2mm)	Determine fraction of clay, silt, fine sand and coarse sand; nutrient retention; exchange properties; erodibility; workability; permeability; sealing; drainage; interpretation of most other physical and chemical properties and soil qualities
Soil Reaction (pH)	Nutrient availability; nutrient fixation; toxicities (especially aluminium and manganese); liming; sodicity; correlation with other soil properties
Electrical Conductivity (EC)	Appraisal of salinity hazard in soil substrates or groundwater; total soluble salts
Cation Exchange Capacity (CEC) & Exchangeable Cations	Nutrient status; calculation of exchangeable cations including sodium, calcium, magnesium, potassium and exchangeable sodium percentage (ESP); assessment of other physical and chemical properties, especially dispersivity, shrink – swell, water movement, aeration
Munsell Colour Chart (Munsell)	Drainage, oxidation, fertility, correlation with other physical, chemical and biological properties

Soil salinity in the samples from the detailed sites was determined through measurement of the electrical conductivity (EC) of soil:water (1:5) suspensions. These values were converted to the EC of a saturated extract (EC_e) based on soil texture to determine soil salinity risk.



3 Soil Assessment

One soil map unit (SMU) was identified in the Study Area and was mapped according to the dominant ASC soil type, a Brown Sodosol, using a combination of the soil survey and laboratory analysis results. This SMU and the observation sites associated with it are provided in **Table 4**.

Section 9.6.2 of the Interim Protocol states “All soil map units will have some soil variation. The dominant soil type upon which BSAL status is determined should comprise great [sic] than 70 per cent of a soil map unit.” Section 9.6.3 of the Interim Protocol further confirms “BSAL status is determined on the dominant soil type within a soil map unit.”

The entire Study Area is mapped as ASC soil type Brown Sodosol (Isbell, 2016), with all 7 of the 9 sample sites identified as a Brown Sodosol. Sodosols are soils with a strong texture contrast between the A horizon and a sodic B horizon which is not strongly acidic. The strongly sodic nature of the B horizon in these Sodosols, of between 20 and 60 percent exchangeable sodium, leave them prone to dispersion and tunnel erosion if left exposed for prolonged periods to water movement or rainfall. Full details of the soil assessment laboratory analysis are shown in **Appendix A**.

Sodosols are classed as having moderately low inherent fertility (OEH, 2013) and are generally suited to low impact agricultural uses such as grazing with minimal cultivation. Pasture improvement can be undertaken using low impact methods such as zero till sowing or aerial spreading of fertiliser and pasture seed. The Study Area is further limited to high impact agricultural uses due to the high proportion of slopes greater than ten percent (**Figure 4**).

Sodosols are not recognised as highly productive agricultural land and are not classified as BSAL according to the Interim Protocol (OEH, 2013), due to moderately low inherent fertility, generally poor drainage and a chemical barrier for rooting depth of less than 750 millimetres (see **Section 3.2**).

Laboratory analysis of the soil shows no salinity in the topsoil (to a depth of 30 centimetres) and only slight salinity levels in the subsoil (at +50 centimetres). Given the topography of the Study Area, this risk of increasing salinity is negligible.

Additionally, lab analysis shows that all subsoil is of pH >5. Given this, the landform of the Study Area and it’s position away from the coast the risk of potential acid sulfate soils is extremely low.

A description of 1 detailed representative site from the Brown Sodosol is provided in **Table 5** to **Table 8**, with the remaining soil profile descriptions provided in **Appendix B** and check site descriptions in **Appendix C**.

Table 4 Soil Map Units within Study Area

SMU	ASC Soil Type	Soil Type Group	Detailed Site	Check Site	Hectares
1 Brown Sodosol	Brown Sodosol	Dominant	1, 4, 5, 7, 9, 11, 16	2, 3, 6, 8, 13, 14, 17	83
	Red Chromosol	Sub-Dominant	10	15	
	Red Kurosol		12	-	

3.1 Soil Map Unit 1: Brown Sodosol

Site 4: Mesonatric Brown Sodosol

Table 5 Mesonatric Brown Sodosol (Site 4)

Overview	
	
Landscape Site 4	
ASC Name	Mesonatric Brown Sodosol
Representative Site	Site 4
Survey Type	Detailed Lab
Dominant Topography	Lower Slope
Dominant Land Use	Grazing
Pasture Type	Wire Grass, Kangaroo Grass, Barbed Wire Grass
Inherent Soil Fertility	Moderately Low
Slope	11%

Table 6 Profile: Mesonatric Brown Sodosol (Site 4)

Profile	Horizon / Depth (m)	Description
	A1 0.0 – 0.10	Very dark greyish-brown (10YR 3/2) loam, moderately structured 5-20 mm crumb peds with weak consistence and a rough fabric. Nil mottling, <5% gravel 5-10 mm, abundant fine roots. Well drained with a clear and even boundary. Sampled 0.0 – 0.10
	B21 0.10 – 0.40	Dark brown (7.5YR 3/3) heavy clay, massive with a rough fabric. 25% brown mottles at +0.30, <5% gravel 5-10 mm, coarse roots common. Poorly drained with a gradual and even boundary. Sampled 0.20 – 0.30
	B22 0.40 – 0.80	Dark reddish-brown (5YR 3/4) heavy clay, massive with a rough fabric. 40% brown mottles, <5% gravel 5-10 mm, few coarse roots. Poorly drained with a clear and even boundary. Sampled 0.50 – 0.60
	BC +0.80	Weathered parent material. Not sampled

Table 7 Chemical Parameters: Mesonatric Brown Sodosol (Site 4)

Layer	pH (1:5 water)		ESP		ECe (1:5)		Ca:Mg	
	Unit	Rating	%	Rating	dS/m	Rating	Ratio	Rating
A1	6.2	Slightly Acidic	7.1	Marginally Sodic	0.9	Non-Saline	1.0	Low
B21	5.9	Moderately Acidic	17.9	Strongly Sodic	0.5	Non-Saline	0.4	Very Low
B22	5.9	Moderately Acidic	21.2	Strongly Sodic	0.5	Non-Saline	0.1	Very Low

3.2 BSAL Assessment

This BSAL Verification Assessment has been conducted in accordance with the Interim Protocol. The BSAL status is determined by the dominant soil type within each soil mapping unit. According to the Interim Protocol, the findings of this BSAL Assessment are provided in **Table 8**. The entire Study Area is verified as non-BSAL.

Table 8 Detailed BSAL Assessment

Site Number	Inspection Type	ASC Soil Type	1. Is slope < 10%?	2. Is there < 30% rock outcrop?	3. < 20% unattached Rock Fragments > 60mm?	4. Does < 50% have gilgais >500mm deep?	5. Is Slope <5%?	6. Are there nil rock outcrops?	7a. Does soil have moderate fertility?	7b. Does soil have moderately high or high fertility?	8. Is ERD to a physical barrier >750mm?	9. Is drainage better than poor?	10. Is pH between 5.0 and 8.9 (water) and 4.5 and 8.1 (CaCl2)?	11. Is salinity (ECe) < 4 dS/m	12. Is ERD to a chemical barrier >750mm?	Is the Site BSAL?	Is the Soil Map Unit BSAL?
1	Detailed	Brown Sodosol	✓	✓	✓	✓	✗	✓	✗	✗	✓	✗	NLT	NLT	NLT	Non-BSAL	NO
4	Detailed Lab	Mesonatric Brown Sodosol	✗	✓	✓	✓	✗	✓	✗	✗	✓	✗	✓	✓	✗	Non-BSAL	
5	Detailed	Brown Sodosol	✗	✓	✓	✓	✗	✓	✗	✗	✓	✗	NLT	NLT	NLT	Non-BSAL	
7	Detailed Lab	Hypernatric Brown Sodosol	✗	✓	✓	✓	✗	✓	✗	✗	✗	✗	✓	✓	✗	Non-BSAL	
9	Detailed Lab	Hypernatric Brown Sodosol	✗	✓	✓	✓	✗	✓	✗	✗	✗	✗	✓	✓	✓	Non-BSAL	
10	Detailed Lab	Eutrophic Red Chromosol	✗	✓	✓	✓	✗	✓	✓	✓	✓	✗	✓	✓	✓	Non-BSAL	
11	Detailed	Brown Sodosol	✗	✓	✓	✓	✗	✓	✗	✗	✓	✓	NLT	NLT	NLT	Non-BSAL	
12	Detailed Lab	Magnesian Natric Red Kurosol	✓	✓	✓	✓	✗	✓	✗	✗	✗	✗	✓	✓	✗	Non-BSAL	
16	Detailed Lab	Mesonatric Brown Sodosol	✓	✓	✓	✓	✗	✓	✗	✗	✓	✓	✓	✓	✗	Non-BSAL	
✓ = passes the BSAL criteria ✗ = fails the criteria but not excluded as BSAL ✗ = fails the BSAL criteria NLT= not laboratory tested																	

3.3 LSC Assessment

The biophysical features of the land that are associated with various hazards are broadly soil, climate and landform and more specifically: slope, landform position, acidity, salinity, drainage, rockiness; and climate. The LSC Guideline requires the assessment of eight hazards associated with these biophysical features, specifically:

1. Water erosion
2. Wind erosion
3. Soil structure decline
4. Soil acidification
5. Salinity
6. Water logging
7. Shallow soils and rockiness
8. Mass movement

Each hazard is assessed against set criteria tables, which are described in the LSC Guideline. Individual hazards are ranked from 1 through to 8, with the overall ranking of the land determined by its most significant limitation.

Hazard 1: Water Erosion

The Study Area lies within the Eastern and Central NSW Division, and the appropriate criteria for this division were used in the assessment. Assessment of water erosion hazard is almost solely dependent on the slope percentage of the land, based on each Soil Landscape Unit. The only exception is land which falls within the slope range of 10 to 20%, which may be designated LSC Class 4 or LSC Class 5 depending on the presence of gully erosion and/or sodic/dispersible soils.

Hazard 2: Wind Erosion

Four factors are used to assess the wind erosion hazard for each soil type; average rainfall, wind erosive power, wind exposure, erodibility. Three criteria were assessed to be consistent for each soil type:

- Average rainfall determines the capacity of the land to maintain vegetative cover and keep soil wet. The average rainfall for the region is 740 millimetres (Cessnock Post Office BOM 061009, 2018), and therefore the Study Area lies within the “greater than 500 mm rainfall” category for the purpose of assessing wind erosion hazard.
- Wind erosive power for the Study Area has been mapped as “Moderate” (NSW Department of Trade and Investment)
- Exposure of the land to wind was also determined to be “Moderate” throughout the Study Area.

The determining factor with regard to wind erosion hazard was therefore the erodibility of each soil type, as determined by soil texture according the LSC Guideline.

Hazard 3: Soil Structure Decline

Soil structure decline is assessed based on soil characteristics, including surface soil texture, sodicity (laboratory tested) and degree of self-mulching (field tested). These parameters assess the soil structure, stability and resilience of the soil.

Hazard 4: Soil Acidification

The soil acidification hazard is assessed using three criteria, being soil buffering capacity, pH and mean annual rainfall. In this assessment, soil buffering capacity was based on the soil's Great Soil Group; the surface soil pH, and a regional mean annual rainfall range of greater than 700-900 millimetres.

Hazard 5: Salinity

The salinity hazard is determined through a range of data and criteria. The recharge potential for the site was determined based on an average annual rainfall of 740 millimetres, with annual evaporation of 1400 to 1600 millimetres (BOM, 2018). This would suggest a moderate recharge potential.

Based on the annual rainfall data (740 mm) and an average annual evapotranspiration of 800 to 900 mm (BOM, 2018), a low discharge potential for the site due to a likely balanced rate of water flow.

The Study Area according to the Salt Store Map of NSW, is located in an area of low salt store. However, due the current available scale of this mapping, laboratory tested EC values were used to determine salt store.

Hazard 6: Water Logging

Water logging was determined by the soils drainage characteristics, specifically field sample evidence of mottling, soil texture attributes as well as slope and climate.

Hazard 7: Shallow Soils and Rockiness

The shallow soils and rockiness hazard is determined by an estimated exposure of rocky outcrops and average soil depth.

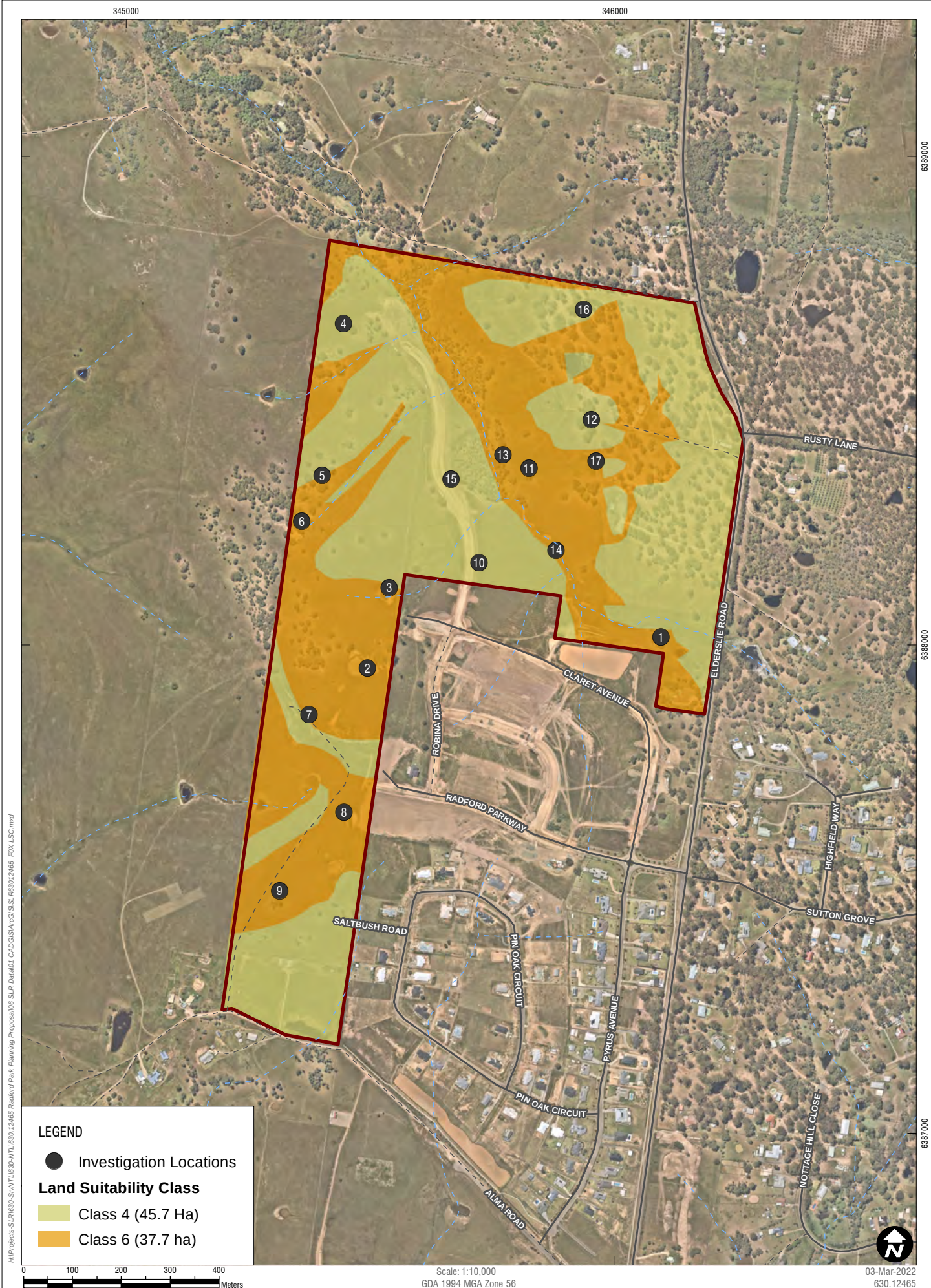
Hazard 8: Mass Movement

The mass movement hazard is assessed through a combination of three criteria; mean annual rainfall, presence of mass movement and slope class.

The LSC assessment parameters for each laboratory analysed site is shown in **Table 10** with LSC mapping on **Figure 5**.

Table 9 Land and Soil Capability Assessment

Soil Type		Hazard Criteria								
Site	ASC Great Group Name	1	2	3	4	5	6	7	8	LSC
4	Mesonatric Brown Sodosol	3	2	4	4	2	4	3	1	4
7	Hypernatric Brown Sodosol	3	2	6	4	2	4	4	1	6
9	Hypernatric Brown Sodosol	3	2	6	4	2	4	3	1	6
10	Eutrophic Red Chromosol	3	2	4	4	2	4	3	1	4
12	Magnesian-Natric Red Kurosol	3	2	4	4	2	4	4	1	4
16	Mesonatric Brown Sodosol	3	2	4	4	2	4	3	1	4



LSC within the Study Area is mapped as LSC Class 4 (45 hectares), moderate capability land which has moderate to high limitations for high-impact land uses and LSC Class 6 (38 hectares), low capability land which has very high limitations for high-impact land uses and is generally associated with slopes greater than 10%.

Current land use is cattle grazing semi-proved pastures consisting of kangaroo grass, wire grass, kikuyu and paspalum. The steeper areas in the middle of the Study Area have a number of gully erosion sites where the dispersive subsoil has been exposed to rainfall and surface water flows, which would significantly inhibit grazing production. Using the Industries 2019 Beef Cattle Gross Margin Budget (NSW DPI, 2019) (**Table 11**) the potential annual revenue which could be derived from each LSC class within the Study Area was determined (**Table 12**), with the entire Study Area having the potential to generate \$4,947 per annum (approximately \$60 per hectare).

Table 10 LSC Class Gross Margin

LSC	Stocking Rate	Cow Calf Unit	Revenue	Variable Costs	Gross Margin
Class	DSE	Per Hectare	Per Hectare	Per Hectare	Per Hectare
4	8	0.47	\$119	\$38	\$81
6	4	0.24	\$61	\$20	\$39

Table 11 Study Area Gross Margin

LSC	Gross Margin	LSC	Total
Class	Per Hectare	Hectares	Revenue
4	\$81	45	\$3,645
6	\$39	38	\$1,482
Total		83	\$4,947

3.4 Preliminary Contamination Assessment

During the site inspections, no areas of potential contamination were identified across the undeveloped grazing land, which comprises the majority of the Study Area. Therefore, the likelihood that the undeveloped grazing land may be affected by contamination is “unlikely”, as available information does not indicate that the subject site, or land within 50 metres of the subject site:

- Is currently identified as being contaminated on a public register of contaminated sites maintained by a regulator.
- Is or has been the subject of an activity which is frequently associated with contamination.
- Has been historically filled with imported material, the origin of which is unknown.
- Has groundwater records indicating the potential for contamination.

The disused timber shed (**Plate 1**) and previous vegetable/market garden (**Plate 2**) off Alma Road in the south of the Study Area may have involved the storage and application of herbicides and pesticides, which could result in localised contamination. Therefore, the likelihood that the vegetable/market garden and disused timber shed may be affected by contamination is “possible”, as available information indicates that the subject site, or land within 50 metres of the subject site is, or has been the subject of an activity which in some circumstances is known to be associated with contamination. This would require confirmation through a future invasive contamination investigation. If localised contamination has occurred, it is expected that this would be readily amenable to remediation through conventional methods.

A search of the NSW EPA Contaminated Land Record of Notices shows no current or historical notices have been issued for the Study Area.



Plate 1 Timber shed & greenhouse in 2018



Plate 2 Vegetable production in 2018

Plate 1 and Plate 2 showing a greenhouse, timber shed and vegetable production during the site inspection in 2018.

3.5 Surrounding Land Use

Land uses within a 2 kilometre radius of the Study Area were assessed during field inspections and also with current and historical imagery from Google Earth and Nearmap and have been categorised into three types (**Figure 6**):

- Residential and rural residential areas, comprising the majority of the land bounded by Rusty Lane, Alma Road and Maitland Street, comprising approximately one third of the Study Area (**Plate 3**). Included in this land use area is an established vineyard at 82 Elderslie Rd, opposite the existing Radford Park Estate and an established orchard at 16 Rusty Lane.
- Cattle grazing semi-improved grass pasture, which comprises the remainder (and majority) of the Study Area (**Plate 4**).
- Fodder crop production, mainly in the area west of Black Creek, which comprises creek flats with minimal slope (**Plate 5**).

Cattle grazing, fodder cropping, orchard and vine production have been undertaken adjacent to, and within a 2 kilometre radius of the current Radford Park Estate and are highly unlikely to experience any additional impacts on day to day operations of these enterprises from the proposed development.



Plate 3 South-Eastern landscape in the vicinity of Site 8

Plate 3 showing Radford Park Estate adjoining semi-improved grass pasture.



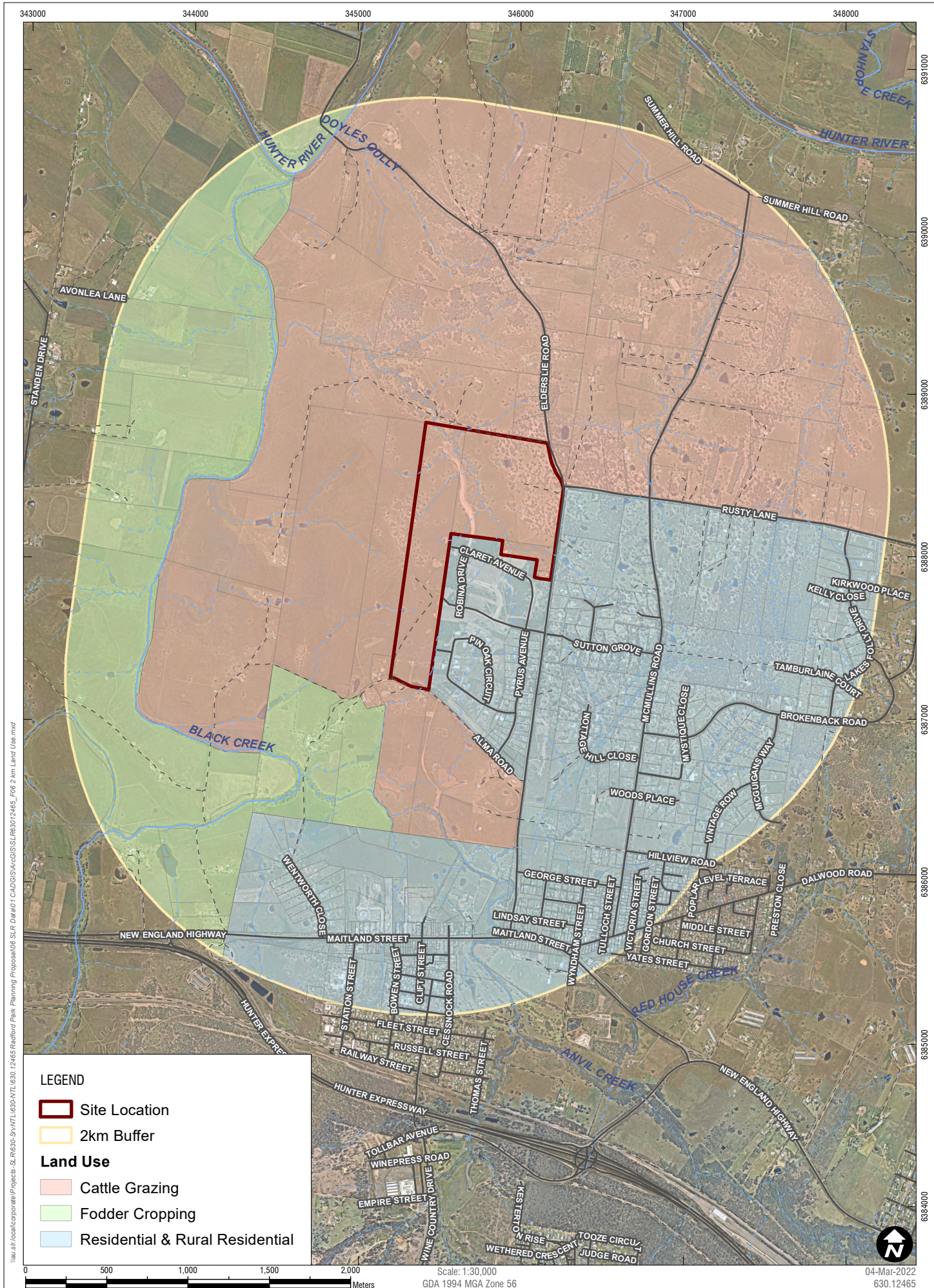
Plate 4 Western landscape in the vicinity of Site 10

Plate 4 showing semi-improved grass pasture within the Study Area.



Plate 5 South-Western landscape in the vicinity of Site 8

Plate 5 showing fodder crop production along the flats of Black Creek.



4 Conclusion

The Study Area is not considered by definition as highly productive agricultural land, having been verified as non-BSAL and being LSC Classes 4 and 6, which is rated as moderate to low capability land.

The further development of Radford Park Estate will not impact the normal activities of agricultural operations within the vicinity of the Study Area.

Ministerial Directions Summary

- Describe the current agricultural capability and production value of the site.

Current land use is cattle grazing semi-improved grass pasture on LSC Class 4 and 6 land dominated by Brown Sodosols. Potential annual revenue from cattle grazing the entire Study Area is \$4,947.

- Identify, map and characterise any current farming operations within 2 kilometres of the Study Area, which is consistent with previous agricultural assessments.

Fodder crop production, mainly in the area west of Black Creek. Cattle grazing, which comprises the remainder (and majority) of agricultural land use within the Study Area.

In addition to the farming operations there is residential and rural residential areas, comprising the majority of the land bounded by Rusty Lane, Alma Road and Maitland Street.

- Provide commentary as to the likely additional impacts to any farming operations in the vicinity arising from the proposal, utilising the existing Radford Park estate as a baseline.

There are no likely additional impacts to farming operations in the vicinity, considering fodder crop production and cattle grazing have been successfully undertaken adjacent to, and within a 2 kilometre radius of the existing Radford Park Estate.

- Should any significant impacts emerge, provide recommendations that could be taken to protect the existing farming operations.

No significant impacts are predicted upon existing farming operations.

- Review and ground-truth any mapped biophysical capability of the land.

There is no verified BSAL within or adjacent to the Study Area.

APPENDIX A

Laboratory Certificates of Analysis



SOIL TEST REPORT ADVICE

Page 1 of 1

Scone Research Centre

REPORT NO: SCO18/051R1

REPORT TO: Murray Fraser
SLR Consulting
10 Kings Road
New Lambton NSW 2305

The following nine samples, Reference Radford Park 630.12465.0040 were analysed by SESL Australia.

Client Sample ID	Laboratory ID
R4 0-10 cm	SCO18/051/1
R4 20-30cm	SCO18/051/2
R4 50-60cm	SCO18/051/3
R7 0-10 cm	SCO18/051/4
R7 20-30cm	SCO18/051/5
R7 50-60cm	SCO18/051/6
R9 0-10 cm	SCO18/051/7
R9 20-30cm	SCO18/051/8
R9 50-60cm	SCO18/051/9

SESL REPORT NUMBER	PRELIMINARY RESULTS ISSUED	REPORT STATUS	DATE REPORTED
47487	Not Issued	Final	23/04/2018



L Dunn
Scone Laboratory
27 April 2018



General Soil Chemistry Profile

Sample Drop Off: 16 Chilvers Road
Thornleigh NSW 2120

Mailing Address: PO Box 357
Pennant Hills NSW 1715

Tel: 1300 30 40 80
Fax: 1300 64 46 89
Em: info@sesl.com.au
Web: www.sesl.com.au

Tests are performed under a quality system certified as complying with ISO 9001: 2008. Results and conclusions assume that sampling is representative. This document shall not be reproduced except in full.

Batch N°: 47487	Sample N°: 1	Date Instructions Received: 11/4/18	Report Status: ☐ Draft ☒ Final
Client Name: Soil Conservation Service	Project Name: SCO18/051		
Client Contact: Lynn Dunn	SESL Quote N°:		
Client Order N°: 800203186	Sample Name: SC018/051/1		
Address: PO Box 3935	Description: Soil		
Parramatta NSW 2124	Test Type: ECEC_NH4Cl, PSA_AS, Colour_S, pHEC_S		

SUMMARY AND RECOMMENDATIONS

Unified Soil Classification, Colour: 10YR 3/2 Very Dark Greyish Brown

pH & ELECTRICAL CONDUCTIVITY

TEST	RESULT	COMMENTS
pH in water 1:5	6.2	Slight acidity
pH in CaCl ₂ 1:5	5.3	Strong acidity
EC dS/m 1:5	0.09	Very low
Chlorides (mg/kg)	-	
AE Buffer pH	7.6	

CATION ANALYSIS

TEST	SOLUBLE	EXCHANGEABLE		
Unit	cmol(+)/kg	cmol(+)/kg	% of ECEC	COMMENTS
Sodium	0.11	0.169	1.1	
Potassium	0.14	1.25	8	
Calcium	0.09	5.83	37.4	
Magnesium	0.21	5.93	38	
Aluminium	N/A	<0.03	0.2	
Hydrogen	N/A	2.43	15.6	

Cation Exchange Capacity (cmol(+)/kg)	15.6	
Ca:Mg Ratio	1	
Sodium Absorbtion Ratio (SAR)	0.4	0.4 Low

AVAILABLE NUTRIENT PROFILE			AVAILABLE MICRONUTRIENT PROFILE		
TEST	mg/kg	COMMENTS	TEST	mg/kg	COMMENTS
Ammonium as N	-		Boron	N.D.	
Nitrate as N	-		Copper	N.D.	
Phosphate as P	-		Iron	N.D.	
Potassium	543		Manganese	N.D.	
Sulphate as S	-		Zinc	N.D.	
Calcium	1186				
Magnesium	747				

Explanation of the Methods:

pH, EC, Soluble Cations, Nitrate: Bradley et al (1983). Exchangeable Cations, ECEC: Method 15A1 Rayment & Higginson (1992). Chloride: Vogel (1961). Aluminium: Method 3500 APHA (1992). Phosphate: Method 9E1 Rayment & Higginson (1992). Ammonium, Sulphate, Iron, Copper, Manganese + Zinc: Method 83-1 to 83-5 Black (1983). Boron: Method 12C2 Rayment & Higginson (1992).

NOTE:

* Chloride only determined if EC(1:5) is >0.25 dS/m
** Al only determined if pH in CaCl₂ is <= 5.2

Consultant: Michelle Murphy

Authorised Signatory: Simon Leake

Date Report Generated
23/04/2018



General Soil Chemistry Profile

Sample Drop Off: 16 Chilvers Road
Thornleigh NSW 2120

Mailing Address: PO Box 357
Pennant Hills NSW 1715

Tel: 1300 30 40 80
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Em: info@sesl.com.au
Web: www.sesl.com.au

Tests are performed under a quality system certified as complying with ISO 9001: 2008. Results and conclusions assume that sampling is representative. This document shall not be reproduced except in full.

Batch N°: 47487	Sample N°: 2	Date Instructions Received: 11/4/18	Report Status: ☐ Draft ☒ Final
Client Name: Soil Conservation Service	Project Name: SCO18/051		
Client Contact: Lynn Dunn	SESL Quote N°:		
Client Order N°: 800203186	Sample Name: SC018/051/2		
Address: PO Box 3935 Parramatta NSW 2124	Description: Soil		
	Test Type: ECEC_NH4Cl, PSA_AS, Colour_S, pHEC_S		

SUMMARY AND RECOMMENDATIONS

Unified Soil Classification, Colour: 7.5YR 3/3 Dark Brown

pH & ELECTRICAL CONDUCTIVITY

TEST	RESULT	COMMENTS
pH in water 1:5	5.9	Medium acidity
pH in CaCl ₂ 1:5	4.5	Very strong acidity
EC dS/m 1:5	0.08	Very low
Chlorides (mg/kg)	-	
AE Buffer pH	7.4	

CATION ANALYSIS

TEST	SOLUBLE	EXCHANGEABLE		
Unit	cmol(+)/kg	cmol(+)/kg	% of ECEC	COMMENTS
Sodium	0.37	0.903	4	
Potassium	0.48	0.495	2.2	
Calcium	0.14	4.6	20.5	
Magnesium	1.3	12.6	56.3	
Aluminium	N/A	1.69	7.5	
Hydrogen	N/A	3.81	17	

Cation Exchange Capacity (cmol(+)/kg)	22.4	
Ca:Mg Ratio	.3	
Sodium Absorbtion Ratio (SAR)	0.6	0.6 Low

AVAILABLE NUTRIENT PROFILE			AVAILABLE MICRONUTRIENT PROFILE		
TEST	mg/kg	COMMENTS	TEST	mg/kg	COMMENTS
Ammonium as N	-		Boron	N.D.	
Nitrate as N	-		Copper	N.D.	
Phosphate as P	-		Iron	N.D.	
Potassium	379		Manganese	N.D.	
Sulphate as S	-		Zinc	N.D.	
Calcium	950				
Magnesium	1682				

Explanation of the Methods:

pH, EC, Soluble Cations, Nitrate: Bradley et al (1983). Exchangeable Cations, ECEC: Method 15A1 Rayment & Higginson (1992). Chloride: Vogel (1961). Aluminium: Method 3500 APHA (1992). Phosphate: Method 9E1 Rayment & Higginson (1992). Ammonium, Sulphate, Iron, Copper, Manganese + Zinc: Method 83-1 to 83-5 Black (1983). Boron: Method 12C2 Rayment & Higginson (1992).

NOTE:

* Chloride only determined if EC(1:5) is >0.25 dS/m
** Al only determined if pH in CaCl₂ is <= 5.2

Consultant: Michelle Murphy

Authorised Signatory: Simon Leake

Date Report Generated
23/04/2018



General Soil Chemistry Profile

Sample Drop Off: 16 Chilvers Road
Thornleigh NSW 2120

Mailing Address: PO Box 357
Pennant Hills NSW 1715

Tel: 1300 30 40 80
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Em: info@sesl.com.au
Web: www.sesl.com.au

Tests are performed under a quality system certified as complying with ISO 9001: 2008. Results and conclusions assume that sampling is representative. This document shall not be reproduced except in full.

Batch N°: 47487	Sample N°: 3	Date Instructions Received: 11/4/18	Report Status: ☐ Draft ☒ Final
Client Name: Soil Conservation Service	Project Name: SCO18/051		
Client Contact: Lynn Dunn	SESL Quote N°:		
Client Order N°: 800203186	Sample Name: SC018/051/3		
Address: PO Box 3935 Parramatta NSW 2124	Description: Soil		
	Test Type: ECEC_NH4Cl, PSA_AS, Colour_S, pHEC_S		

SUMMARY AND RECOMMENDATIONS

Unified Soil Classification, Colour: 5YR 3/4 Dark Reddish Brown

pH & ELECTRICAL CONDUCTIVITY

TEST	RESULT	COMMENTS
pH in water 1:5	5.9	Medium acidity
pH in CaCl ₂ 1:5	4.5	Very strong acidity
EC dS/m 1:5	0.09	Very low
Chlorides (mg/kg)	-	
AE Buffer pH	7.3	

CATION ANALYSIS

TEST	SOLUBLE	EXCHANGEABLE		
Unit	cmol(+)/kg	cmol(+)/kg	% of ECEC	COMMENTS
Sodium	0.51	0.997	4.6	
Potassium	0.54	0.235	1.1	
Calcium	0.13	4.23	19.5	
Magnesium	1.3	11.7	53.9	
Aluminium	N/A	1.93	8.9	
Hydrogen	N/A	4.49	20.7	

Cation Exchange Capacity (cmol(+)/kg)	21.7	
Ca:Mg Ratio	.3	
Sodium Absorbtion Ratio (SAR)	0.9	0.9 Low

AVAILABLE NUTRIENT PROFILE			AVAILABLE MICRONUTRIENT PROFILE		
TEST	mg/kg	COMMENTS	TEST	mg/kg	COMMENTS
Ammonium as N	-		Boron	N.D.	
Nitrate as N	-		Copper	N.D.	
Phosphate as P	-		Iron	N.D.	
Potassium	303		Manganese	N.D.	
Sulphate as S	-		Zinc	N.D.	
Calcium	875				
Magnesium	1583				

Explanation of the Methods:
pH, EC, Soluble Cations, Nitrate: Bradley et al (1983). **Exchangeable Cations, ECEC:** Method 15A1 Rayment & Higginson (1992)
Chloride: Vogel (1961). **Aluminium:** Method 3500 APHA (1992). **Phosphate:** Method 9E1 Rayment & Higginson (1992).
Ammonium, Sulphate, Iron, Copper, Manganese + Zinc: Method 83-1 to 83-5 Black (1983). **Boron:** Method 12C2 Rayment & Higginson (1992).

NOTE:
 * Chloride only determined if EC(1:5) is >0.25 dS/m
 ** Al only determined if pH in CaCl₂ is <= 5.2

Consultant: Michelle Murphy

Authorised Signatory: Simon Leake

Date Report Generated
23/04/2018



General Soil Chemistry Profile

Sample Drop Off: 16 Chilvers Road
Thornleigh NSW 2120

Mailing Address: PO Box 357
Pennant Hills NSW 1715

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Em: info@sesl.com.au
Web: www.sesl.com.au

Tests are performed under a quality system certified as complying with ISO 9001: 2008. Results and conclusions assume that sampling is representative. This document shall not be reproduced except in full.

Batch N°: 47487	Sample N°: 4	Date Instructions Received: 11/4/18	Report Status: ☐ Draft ☒ Final
Client Name: Soil Conservation Service	Project Name: SCO18/051		
Client Contact: Lynn Dunn	SESL Quote N°:		
Client Order N°: 800203186	Sample Name: SC018/051/4		
Address: PO Box 3935 Parramatta NSW 2124	Description: Soil		
	Test Type: ECEC_NH4Cl, PSA_AS, Colour_S, pHEC_S		

SUMMARY AND RECOMMENDATIONS

Unified Soil Classification, Colour: 10YR 3/2 Very Dark Greyish Brown

pH & ELECTRICAL CONDUCTIVITY

TEST	RESULT	COMMENTS
pH in water 1:5	5.8	Medium acidity
pH in CaCl ₂ 1:5	4.9	Very strong acidity
EC dS/m 1:5	0.09	Very low
Chlorides (mg/kg)	-	
AE Buffer pH	7.5	

CATION ANALYSIS

TEST	SOLUBLE	EXCHANGEABLE		
Unit	cmol(+)/kg	cmol(+)/kg	% of ECEC	COMMENTS
Sodium	0.14	0.189	1.4	
Potassium	0.14	1.25	9.1	
Calcium	0.03	4.43	32.1	
Magnesium	0.15	4.94	35.8	
Aluminium	N/A	0.094	0.7	
Hydrogen	N/A	3	21.7	

Cation Exchange Capacity (cmol(+)/kg)	13.8	
Ca:Mg Ratio	.9	
Sodium Absorbtion Ratio (SAR)	0.7	0.7 Low

AVAILABLE NUTRIENT PROFILE

TEST	mg/kg	COMMENTS
Ammonium as N	-	
Nitrate as N	-	
Phosphate as P	-	
Potassium	542	
Sulphate as S	-	
Calcium	894	
Magnesium	619	

AVAILABLE MICRONUTRIENT PROFILE

TEST	mg/kg	COMMENTS
Boron	N.D.	
Copper	N.D.	
Iron	N.D.	
Manganese	N.D.	
Zinc	N.D.	

Explanation of the Methods:

pH, EC, Soluble Cations, Nitrate: Bradley et al (1983). Exchangeable Cations, ECEC: Method 15A1 Rayment & Higginson (1992). Chloride: Vogel (1961). Aluminium: Method 3500 APHA (1992). Phosphate: Method 9E1 Rayment & Higginson (1992). Ammonium, Sulphate, Iron, Copper, Manganese + Zinc: Method 83-1 to 83-5 Black (1983). Boron: Method 12C2 Rayment & Higginson (1992).

NOTE:

* Chloride only determined if EC(1:5) is >0.25 dS/m
** Al only determined if pH in CaCl₂ is <= 5.2

Consultant: Michelle Murphy

Authorised Signatory: Simon Leake

Date Report Generated
23/04/2018



General Soil Chemistry Profile

Sample Drop Off: 16 Chilvers Road
Thornleigh NSW 2120

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Pennant Hills NSW 1715

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Em: info@sesl.com.au
Web: www.sesl.com.au

Tests are performed under a quality system certified as complying with ISO 9001: 2008. Results and conclusions assume that sampling is representative. This document shall not be reproduced except in full.

Batch N°: 47487	Sample N°: 5	Date Instructions Received: 11/4/18	Report Status: ☐ Draft ☒ Final
Client Name: Soil Conservation Service	Project Name: SCO18/051		
Client Contact: Lynn Dunn	SESL Quote N°:		
Client Order N°: 800203186	Sample Name: SC018/051/5		
Address: PO Box 3935 Parramatta NSW 2124	Description: Soil		
	Test Type: ECEC_NH4Cl, PSA_AS, Colour_S, pHEC_S		

SUMMARY AND RECOMMENDATIONS

Unified Soil Classification, Colour: 10YR 4/4 Dark Yellowish Brown

pH & ELECTRICAL CONDUCTIVITY

TEST	RESULT	COMMENTS
pH in water 1:5	6.2	Slight acidity
pH in CaCl ₂ 1:5	4.8	Very strong acidity
EC dS/m 1:5	0.09	Very low
Chlorides (mg/kg)	-	
AE Buffer pH	7.4	

CATION ANALYSIS

TEST	SOLUBLE	EXCHANGEABLE		
Unit	cmol(+)/kg	cmol(+)/kg	% of ECEC	COMMENTS
Sodium	0.48	1.11	5.8	
Potassium	0.59	0.012	0.1	
Calcium	0.18	4.25	22.3	
Magnesium	1.9	9.89	51.8	
Aluminium	N/A	0.819	4.3	
Hydrogen	N/A	3.81	19.9	

Cation Exchange Capacity (cmol(+)/kg)	19.1	
Ca:Mg Ratio	.4	
Sodium Absorbtion Ratio (SAR)	0.7	0.7 Low

AVAILABLE NUTRIENT PROFILE			AVAILABLE MICRONUTRIENT PROFILE		
TEST	mg/kg	COMMENTS	TEST	mg/kg	COMMENTS
Ammonium as N	-		Boron	N.D.	
Nitrate as N	-		Copper	N.D.	
Phosphate as P	-		Iron	N.D.	
Potassium	233		Manganese	N.D.	
Sulphate as S	-		Zinc	N.D.	
Calcium	889				
Magnesium	1437				

Explanation of the Methods:

pH, EC, Soluble Cations, Nitrate: Bradley et al (1983). Exchangeable Cations, ECEC: Method 15A1 Rayment & Higginson (1992). Chloride: Vogel (1961). Aluminium: Method 3500 APHA (1992). Phosphate: Method 9E1 Rayment & Higginson (1992). Ammonium, Sulphate, Iron, Copper, Manganese + Zinc: Method 83-1 to 83-5 Black (1983). Boron: Method 12C2 Rayment & Higginson (1992).

NOTE:

* Chloride only determined if EC(1:5) is >0.25 dS/m
** Al only determined if pH in CaCl₂ is <= 5.2

Consultant: Michelle Murphy

Authorised Signatory: Simon Leake

Date Report Generated
23/04/2018



General Soil Chemistry Profile

Sample Drop Off: 16 Chilvers Road
Thornleigh NSW 2120

Mailing Address: PO Box 357
Pennant Hills NSW 1715

Tel: 1300 30 40 80
Fax: 1300 64 46 89
Em: info@sesl.com.au
Web: www.sesl.com.au

Tests are performed under a quality system certified as complying with ISO 9001: 2008. Results and conclusions assume that sampling is representative. This document shall not be reproduced except in full.

Batch N°: 47487	Sample N°: 6	Date Instructions Received: 11/4/18	Report Status: ☐ Draft ☒ Final
Client Name: Soil Conservation Service	Project Name: SCO18/051		
Client Contact: Lynn Dunn	SESL Quote N°:		
Client Order N°: 800203186	Sample Name: SC018/051/6		
Address: PO Box 3935 Parramatta NSW 2124	Description: Soil		
	Test Type: ECEC_NH4Cl, PSA_AS, Colour_S, pHEC_S		

SUMMARY AND RECOMMENDATIONS

Unified Soil Classification, Colour: 10YR 4/6 Dark Yellowish Brown

pH & ELECTRICAL CONDUCTIVITY

TEST	RESULT	COMMENTS
pH in water 1:5	6.2	Slight acidity
pH in CaCl ₂ 1:5	5.3	Strong acidity
EC dS/m 1:5	0.27	Moderate
Chlorides (mg/kg)	-	
AE Buffer pH	7.7	

CATION ANALYSIS

TEST	SOLUBLE	EXCHANGEABLE		
Unit	cmol(+)/kg	cmol(+)/kg	% of ECEC	COMMENTS
Sodium	1.3	2.63	11.5	
Potassium	0.75	0	0	
Calcium	0.22	4.89	21.4	
Magnesium	2.5	13.2	57.6	
Aluminium	N/A	0.101	0.4	
Hydrogen	N/A	2.18	9.5	

Cation Exchange Capacity (cmol(+)/kg)	22.9	
Ca:Mg Ratio	.3	
Sodium Absorbtion Ratio (SAR)	1.6	1.6 Low

AVAILABLE NUTRIENT PROFILE

TEST	mg/kg	COMMENTS
Ammonium as N	-	
Nitrate as N	-	
Phosphate as P	-	
Potassium	131	
Sulphate as S	-	
Calcium	1025	
Magnesium	1908	

AVAILABLE MICRONUTRIENT PROFILE

TEST	mg/kg	COMMENTS
Boron	N.D.	
Copper	N.D.	
Iron	N.D.	
Manganese	N.D.	
Zinc	N.D.	

Explanation of the Methods:

pH, EC, Soluble Cations, Nitrate: Bradley et al (1983). Exchangeable Cations, ECEC: Method 15A1 Rayment & Higginson (1992). Chloride: Vogel (1961). Aluminium: Method 3500 APHA (1992). Phosphate: Method 9E1 Rayment & Higginson (1992). Ammonium, Sulphate, Iron, Copper, Manganese + Zinc: Method 83-1 to 83-5 Black (1983). Boron: Method 12C2 Rayment & Higginson (1992).

NOTE:

* Chloride only determined if EC(1:5) is >0.25 dS/m
** Al only determined if pH in CaCl₂ is <= 5.2

Consultant: Michelle Murphy

Authorised Signatory: Simon Leake

Date Report Generated
23/04/2018



General Soil Chemistry Profile

Sample Drop Off: 16 Chilvers Road
Thornleigh NSW 2120

Mailing Address: PO Box 357
Pennant Hills NSW 1715

Tel: 1300 30 40 80
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Em: info@sesl.com.au
Web: www.sesl.com.au

Tests are performed under a quality system certified as complying with ISO 9001: 2008. Results and conclusions assume that sampling is representative. This document shall not be reproduced except in full.

Batch N°: 47487	Sample N°: 7	Date Instructions Received: 11/4/18	Report Status: ☐ Draft ☒ Final
Client Name: Soil Conservation Service	Project Name: SCO18/051		
Client Contact: Lynn Dunn	SESL Quote N°:		
Client Order N°: 800203186	Sample Name: SC018/051/7		
Address: PO Box 3935 Parramatta NSW 2124	Description: Soil		
	Test Type: ECEC_NH4Cl, PSA_AS, Colour_S, pHEC_S		

SUMMARY AND RECOMMENDATIONS

Unified Soil Classification, Colour: 10YR 2/2 Very Dark Brown

pH & ELECTRICAL CONDUCTIVITY

TEST	RESULT	COMMENTS
pH in water 1:5	5.9	Medium acidity
pH in CaCl ₂ 1:5	4.9	Very strong acidity
EC dS/m 1:5	0.06	Very low
Chlorides (mg/kg)	-	
AE Buffer pH	7.5	

CATION ANALYSIS

TEST	SOLUBLE	EXCHANGEABLE		
Unit	cmol(+)/kg	cmol(+)/kg	% of ECEC	COMMENTS
Sodium	0.09	0.147	1.3	
Potassium	0.05	0.667	5.9	
Calcium	0.02	4.69	41.5	
Magnesium	0.06	2.7	23.9	
Aluminium	N/A	0.083	0.7	
Hydrogen	N/A	3.06	27.1	

Cation Exchange Capacity (cmol(+)/kg)	11.3	
Ca:Mg Ratio	1.7	
Sodium Absorbtion Ratio (SAR)	0.7	0.7 Low

AVAILABLE NUTRIENT PROFILE

TEST	mg/kg	COMMENTS
Ammonium as N	-	
Nitrate as N	-	
Phosphate as P	-	
Potassium	281	
Sulphate as S	-	
Calcium	943	
Magnesium	336	

AVAILABLE MICRONUTRIENT PROFILE

TEST	mg/kg	COMMENTS
Boron	N.D.	
Copper	N.D.	
Iron	N.D.	
Manganese	N.D.	
Zinc	N.D.	

Explanation of the Methods:

pH, EC, Soluble Cations, Nitrate: Bradley et al (1983). Exchangeable Cations, ECEC: Method 15A1 Rayment & Higginson (1992). Chloride: Vogel (1961). Aluminium: Method 3500 APHA (1992). Phosphate: Method 9E1 Rayment & Higginson (1992). Ammonium, Sulphate, Iron, Copper, Manganese + Zinc: Method 83-1 to 83-5 Black (1983). Boron: Method 12C2 Rayment & Higginson (1992).

NOTE:

* Chloride only determined if EC(1:5) is >0.25 dS/m
** Al only determined if pH in CaCl₂ is <= 5.2

Consultant: Michelle Murphy

Authorised Signatory: Simon Leake

Date Report Generated
23/04/2018



General Soil Chemistry Profile

Sample Drop Off: 16 Chilvers Road
Thornleigh NSW 2120

Mailing Address: PO Box 357
Pennant Hills NSW 1715

Tel: 1300 30 40 80
Fax: 1300 64 46 89
Em: info@sesl.com.au
Web: www.sesl.com.au

Tests are performed under a quality system certified as complying with ISO 9001: 2008. Results and conclusions assume that sampling is representative. This document shall not be reproduced except in full.

Batch N°: 47487	Sample N°: 8	Date Instructions Received: 11/4/18	Report Status: ☐ Draft ☒ Final
Client Name: Soil Conservation Service	Project Name: SCO18/051		
Client Contact: Lynn Dunn	SESL Quote N°:		
Client Order N°: 800203186	Sample Name: SC018/051/8		
Address: PO Box 3935	Description: Soil		
Parramatta NSW 2124	Test Type: ECEC_NH4Cl, PSA_AS, Colour_S, pHEC_S		

SUMMARY AND RECOMMENDATIONS

Unified Soil Classification, Colour: 10YR 3/4 Dark Yellowish Brown

pH & ELECTRICAL CONDUCTIVITY

TEST	RESULT	COMMENTS
pH in water 1:5	6.6	Very slight acidity
pH in CaCl ₂ 1:5	5.6	Medium acidity
EC dS/m 1:5	0.2	Low
Chlorides (mg/kg)	-	
AE Buffer pH	-	

CATION ANALYSIS

TEST	SOLUBLE	EXCHANGEABLE		
Unit	cmol(+)/kg	cmol(+)/kg	% of ECEC	COMMENTS
Sodium	1.3	1.72	10.2	
Potassium	0.94	0	0	
Calcium	0.63	6.23	36.9	
Magnesium	3.5	8.93	52.8	
Aluminium	N/A	0.037	0.2	
Hydrogen	N/A	-	-	

Cation Exchange Capacity (cmol(+)/kg)	16.9	
Ca:Mg Ratio	.6	
Sodium Absorbtion Ratio (SAR)	1.3	1.3 Low

AVAILABLE NUTRIENT PROFILE			AVAILABLE MICRONUTRIENT PROFILE		
TEST	mg/kg	COMMENTS	TEST	mg/kg	COMMENTS
Ammonium as N	-		Boron	N.D.	
Nitrate as N	-		Copper	N.D.	
Phosphate as P	-		Iron	N.D.	
Potassium	108		Manganese	N.D.	
Sulphate as S	-		Zinc	N.D.	
Calcium	1375				
Magnesium	1513				

Explanation of the Methods:

pH, EC, Soluble Cations, Nitrate: Bradley et al (1983). Exchangeable Cations, ECEC: Method 15A1 Rayment & Higginson (1992). Chloride: Vogel (1961). Aluminium: Method 3500 APHA (1992). Phosphate: Method 9E1 Rayment & Higginson (1992). Ammonium, Sulphate, Iron, Copper, Manganese + Zinc: Method 83-1 to 83-5 Black (1983). Boron: Method 12C2 Rayment & Higginson (1992).

NOTE:

* Chloride only determined if EC(1:5) is >0.25 dS/m
** Al only determined if pH in CaCl₂ is <= 5.2

Consultant: Michelle Murphy

Authorised Signatory: Simon Leake

Date Report Generated
23/04/2018



General Soil Chemistry Profile

Sample Drop Off: 16 Chilvers Road
Thornleigh NSW 2120

Mailing Address: PO Box 357
Pennant Hills NSW 1715

Tel: 1300 30 40 80
Fax: 1300 64 46 89
Em: info@sesl.com.au
Web: www.sesl.com.au

Tests are performed under a quality system certified as complying with ISO 9001: 2008. Results and conclusions assume that sampling is representative. This document shall not be reproduced except in full.

Batch N°: 47487	Sample N°: 9	Date Instructions Received: 11/4/18	Report Status: ☐ Draft ☒ Final
Client Name: Soil Conservation Service	Project Name: SCO18/051		
Client Contact: Lynn Dunn	SESL Quote N°:		
Client Order N°: 800203186	Sample Name: SC018/051/9		
Address: PO Box 3935 Parramatta NSW 2124	Description: Soil		
	Test Type: ECEC_NH4Cl, PSA_AS, Colour_S, pHEC_S		

SUMMARY AND RECOMMENDATIONS

Unified Soil Classification, Colour: 7.5YR 4/4 Brown

pH & ELECTRICAL CONDUCTIVITY

TEST	RESULT	COMMENTS
pH in water 1:5	6.4	Slight acidity
pH in CaCl ₂ 1:5	6	Medium acidity
EC dS/m 1:5	0.63	High
Chlorides (mg/kg)	-	
AE Buffer pH	-	

CATION ANALYSIS

TEST	SOLUBLE	EXCHANGEABLE		
Unit	cmol(+)/kg	cmol(+)/kg	% of ECEC	COMMENTS
Sodium	2.2	3.52	13.8	
Potassium	<0.05	0.292	1.1	
Calcium	0.06	6.75	26.4	
Magnesium	0.21	15	58.6	
Aluminium	N/A	0.043	0.2	
Hydrogen	N/A	-	-	

Cation Exchange Capacity (cmol(+)/kg)	25.6	
Ca:Mg Ratio	.4	
Sodium Absorbtion Ratio (SAR)	8.4	8.4 High

AVAILABLE NUTRIENT PROFILE			AVAILABLE MICRONUTRIENT PROFILE		
TEST	mg/kg	COMMENTS	TEST	mg/kg	COMMENTS
Ammonium as N	-		Boron	N.D.	
Nitrate as N	-		Copper	N.D.	
Phosphate as P	-		Iron	N.D.	
Potassium	117		Manganese	N.D.	
Sulphate as S	-		Zinc	N.D.	
Calcium	1364				
Magnesium	1845				

Explanation of the Methods:

pH, EC, Soluble Cations, Nitrate: Bradley et al (1983). Exchangeable Cations, ECEC: Method 15A1 Rayment & Higginson (1992). Chloride: Vogel (1961). Aluminium: Method 3500 APHA (1992). Phosphate: Method 9E1 Rayment & Higginson (1992). Ammonium, Sulphate, Iron, Copper, Manganese + Zinc: Method 83-1 to 83-5 Black (1983). Boron: Method 12C2 Rayment & Higginson (1992).

NOTE:

* Chloride only determined if EC(1:5) is >0.25 dS/m
** Al only determined if pH in CaCl₂ is <= 5.2

Consultant: Michelle Murphy

Authorised Signatory: Simon Leake

Date Report Generated
23/04/2018

Client:

Urgent TAT +3 days

Certificate of Analysis

Attention: Ryan Jacka

Regarding your booking:

Client Ref No.:	47487	Report Ref No:	181186
Date Received:	11/04/18	Issue Date:	20/04/18
Time Received:	15:02	Lab Due Date:	20/04/18
No. of samples:	9	Turn Around Time:	Normal

Report Details:

Accredited for compliance with ISO/IEC 17025, NATA accreditation number 15633
NATA accreditation does not cover the performance of a service if not indicated

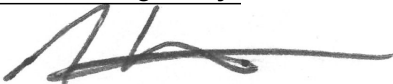
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian standards

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Results are based on the analysis of the sample taken or received by SESL.

Due to the environmental conditions and managerial factors, SESL does not accept any liability for a lack of performance based on its interpretations

Authorised Signatory:



Sample Number	Sample Matrix	Client Sample ID	Sample Name
1	Soil	47487-1	SC018/051/1
2	Soil	47487-2	SC018/051/2
3	Soil	47487-3	SC018/051/3
4	Soil	47487-4	SC018/051/4
5	Soil	47487-5	SC018/051/5
6	Soil	47487-6	SC018/051/6
7	Soil	47487-7	SC018/051/7
8	Soil	47487-8	SC018/051/8
9	Soil	47487-9	SC018/051/9

Sample No: Client Reference: Test	Units	Method	Accredited	1 47487-1	2 47487-2	3 47487-3	4 47487-4
pH of soil:water mix	pH units	CM0002pH	NATA	6.19	5.92	5.88	5.81
pH 1:5 in CaCl ₂	pH units	CM0002pH	NATA	5.34	4.52	4.51	4.93
Exch acidity (Al+H) pHAE	meq%	CM0024 AE Buffer		4.00	3.95	4.43	4.16
pHAE sample (FMP)	(buff 8.0pH corr)			7.61	7.39	7.28	7.52
EC 1:5 soil:water wtcor	mS/cm	CM0025 extraction	NATA	0.0900	0.0800	0.0900	0.0900
Na in soil by M3	mg/kg	CM0025 extraction	NATA	-	-	-	-
K in soil by M3	mg/kg	CM0025 extraction	NATA	-	-	-	-
Ca in soil by M3	mg/kg	CM0025 extraction	NATA	-	-	-	-
Mg in soil by M3	mg/kg	CM0025 extraction	NATA	-	-	-	-
Al in soil by M3	mg/kg	CM0025 extraction	NATA	-	-	-	-
Na in soil sol ext	meq %	CM0025 extraction	NATA	0.110	0.370	0.510	0.140
K in soil sol ext	meq %	CM0025 extraction	NATA	0.140	0.480	0.540	0.140
Ca in soil sol ext	meq %	CM0025 extraction	NATA	<0.10	0.140	0.130	<0.10
Mg in soil sol ext	meq %	CM0025 extraction	NATA	0.210	1.27	1.28	0.150
Na in soil by NH ₄ Cl	meq %	CM0025 extraction	NATA	0.280	1.27	1.51	0.330
K in soil by NH ₄ Cl	meq %	CM0025 extraction	NATA	1.39	0.970	0.780	1.39
Ca in soil by NH ₄ Cl	meq %	CM0025 extraction	NATA	5.92	4.74	4.36	4.46
Mg in soil by NH ₄ Cl	meq %	CM0025 extraction	NATA	6.14	13.8	13.0	5.09
Al NH ₄ Cl (mg/kg)	mg/kg	CM0025 extraction		2.64	151.59	173.78	8.46
Water loss for const mass req	gH ₂ O/100g as-rec'd			0.0	0.0	0.0	0.0
%ww ret on 75mm sieve	%w/w	PM0001 PSA	NATA	0.00	0.00	0.00	0.00
Solid ratio in as rec'd sample	gSolid/100g as-rec'd	PM0004MC		84.8	79.6	79.1	81.1
Water ratio in as rec'd sample	gH ₂ O/100g as-rec'd	PM0004MC		15.2	20.4	20.9	18.9
Moisture of as rec'd sample	gH ₂ O/g oven dry	PM0004MC		0.179	0.256	0.265	0.233
total sample mass	g			63.66	76.66	50.93	59.81
%ww ret on 63mm sieve	%w/w	PM0001 PSA	NATA	0.00	0.00	0.00	0.00
%ww ret on 37.5mm sieve	%w/w	PM0001 PSA	NATA	0.00	0.00	0.00	0.00
%ww ret on 26.5mm sieve	%w/w	PM0001 PSA	NATA	0.00	0.00	0.00	0.00
%ww ret on 19mm sieve	%w/w	PM0001 PSA	NATA	0.00	0.00	0.00	0.00

Sample No: Client Reference: Test	Units	Method	Accredited	1 47487-1	2 47487-2	3 47487-3	4 47487-4
%ww ret on 13.2mm sieve	%w/w	PM0001 PSA	NATA	0.00	0.00	0.00	0.00
%ww ret on 9.5mm sieve	%w/w	PM0001 PSA	NATA	0.00	0.00	0.00	0.00
%ww ret on 6.7mm sieve	%w/w	PM0001 PSA	NATA	0.00	0.00	0.00	0.00
%ww ret on 4.75mm sieve	%w/w	PM0001 PSA	NATA	0.52	0.03	0.29	0.95
%ww ret on 2.36mm sieve	%w/w	PM0001 PSA	NATA	0.64	0.25	0.29	1.84
%ww ret on 1.18mm sieve	%w/w	PM0001 PSA	NATA	1.12	0.46	0.59	1.72
%ww ret on 600µm sieve	%w/w	PM0001 PSA	NATA	1.37	0.57	0.59	3.06
%ww ret on 425µm sieve	%w/w	PM0001 PSA	NATA	0.94	0.43	0.43	1.92
%ww ret on 300µm sieve	%w/w	PM0001 PSA	NATA	1.35	0.59	0.67	2.37
%ww ret on 150µm sieve	%w/w	PM0001 PSA	NATA	4.46	2.18	1.94	8.19
%ww ret on 75µm sieve	%w/w	PM0001 PSA	NATA	7.93	3.93	3.89	11.79
silt + clay: %ww passing 20µm	%w/w	PM0001 PSA		39.59	67.18	63.22	37.12
clay only: %ww passing 2µm	%w/w	PM0001 PSA		16.18	49.83	53.41	13.88
silt only: %ww retained on 2µm	%w/w	PM0001 PSA	NATA	23.41	17.35	9.82	23.24
Soil colour by Munsell table		PM0003TSC		10YR 3/2 Very Dark Greyish Bwn	7.5YR 3/3 Dark Brown	5YR 3/4 Dark Reddish Brown	10YR 3/2 Very Dark Greyish Bwn

Sample No: Client Reference: Test	Units	Method	Accredited	5 47487-5	6 47487-6	7 47487-7	8 47487-8
pH of soil:water mix	pH units	CM0002pH	NATA	6.18	6.21	5.92	6.64
pH 1:5 in CaCl ₂	pH units	CM0002pH	NATA	4.80	5.29	4.92	5.61
Exch acidity (Al+H) pHAE	meq%	CM0024 AE Buffer		3.90	2.25	3.87	X
pHAE sample (FMP)	(buff 8.0pH corr)			7.39	7.65	7.51	X
EC 1:5 soil:water wtcor	mS/cm	CM0025 extraction	NATA	0.0900	0.270	0.0600	0.200
Na in soil by M3	mg/kg	CM0025 extraction	NATA	-	-	-	-
K in soil by M3	mg/kg	CM0025 extraction	NATA	-	-	-	-
Ca in soil by M3	mg/kg	CM0025 extraction	NATA	-	-	-	-
Mg in soil by M3	mg/kg	CM0025 extraction	NATA	-	-	-	-
Al in soil by M3	mg/kg	CM0025 extraction	NATA	-	-	-	-
Na in soil sol ext	meq %	CM0025 extraction	NATA	0.480	1.34	0.090	1.28
K in soil sol ext	meq %	CM0025 extraction	NATA	0.590	0.750	0.050	0.940
Ca in soil sol ext	meq %	CM0025 extraction	NATA	0.180	0.220	<0.10	0.630
Mg in soil sol ext	meq %	CM0025 extraction	NATA	1.94	2.52	<0.10	3.52
Na in soil by NH ₄ Cl	meq %	CM0025 extraction	NATA	1.59	3.97	0.240	3.01
K in soil by NH ₄ Cl	meq %	CM0025 extraction	NATA	0.600	0.340	0.720	0.280
Ca in soil by NH ₄ Cl	meq %	CM0025 extraction	NATA	4.44	5.11	4.70	6.86
Mg in soil by NH ₄ Cl	meq %	CM0025 extraction	NATA	11.8	15.7	2.76	12.4
Al NH ₄ Cl (mg/kg)	mg/kg	CM0025 extraction		73.64	9.07	7.49	3.32
Water loss for const mass req	gH ₂ O/100g as-rec'd			0.0	0.0	0.0	0.0
%ww ret on 75mm sieve	%w/w	PM0001 PSA	NATA	0.00	0.00	0.00	0.00
Solid ratio in as rec'd sample	gSolid/100g as-rec'd	PM0004MC		81.9	82.8	76.8	78.4
Water ratio in as rec'd sample	gH ₂ O/100g as-rec'd	PM0004MC		18.1	17.2	23.2	21.6
Moisture of as rec'd sample	gH ₂ O/g oven dry	PM0004MC		0.220	0.208	0.303	0.276
total sample mass	g			76.36	70.72	63.22	58.37
%ww ret on 63mm sieve	%w/w	PM0001 PSA	NATA	0.00	0.00	0.00	0.00
%ww ret on 37.5mm sieve	%w/w	PM0001 PSA	NATA	0.00	0.00	0.00	0.00
%ww ret on 26.5mm sieve	%w/w	PM0001 PSA	NATA	0.00	0.00	0.00	0.00
%ww ret on 19mm sieve	%w/w	PM0001 PSA	NATA	0.00	0.00	0.00	0.00

Sample No: Client Reference: Test	Units	Method	Accredited	5 47487-5	6 47487-6	7 47487-7	8 47487-8
%ww ret on 13.2mm sieve	%w/w	PM0001 PSA	NATA	0.00	0.00	0.00	0.00
%ww ret on 9.5mm sieve	%w/w	PM0001 PSA	NATA	0.00	0.00	0.00	0.00
%ww ret on 6.7mm sieve	%w/w	PM0001 PSA	NATA	0.00	0.00	0.00	0.00
%ww ret on 4.75mm sieve	%w/w	PM0001 PSA	NATA	0.01	0.01	0.17	0.02
%ww ret on 2.36mm sieve	%w/w	PM0001 PSA	NATA	0.42	0.30	0.90	0.15
%ww ret on 1.18mm sieve	%w/w	PM0001 PSA	NATA	1.15	0.57	1.68	1.34
%ww ret on 600µm sieve	%w/w	PM0001 PSA	NATA	1.47	0.82	4.67	2.78
%ww ret on 425µm sieve	%w/w	PM0001 PSA	NATA	0.80	0.52	3.26	1.59
%ww ret on 300µm sieve	%w/w	PM0001 PSA	NATA	0.98	0.66	4.00	1.66
%ww ret on 150µm sieve	%w/w	PM0001 PSA	NATA	4.22	5.73	10.28	5.38
%ww ret on 75µm sieve	%w/w	PM0001 PSA	NATA	9.06	9.54	13.70	6.12
silt + clay: %ww passing 20µm	%w/w	PM0001 PSA		59.46	61.23	27.36	67.33
clay only: %ww passing 2µm	%w/w	PM0001 PSA		39.55	38.46	8.38	53.45
silt only: %ww retained on 2µm	%w/w	PM0001 PSA	NATA	19.91	22.77	18.98	13.88
Soil colour by Munsell table		PM0003TSC		10YR 4/4 Dark Yellowish Brown	10YR 4/6 Dark Yellowish Brown	10YR 2/2 Very Dark Brown	10YR 3/4 Dark Yellowish Brown

Sample No: Client Reference: Test	Units	Method	Accredited	9 47487-9
pH of soil:water mix	pH units	CM0002pH	NATA	6.38
pH 1:5 in CaCl ₂	pH units	CM0002pH	NATA	5.95
Exch acidity (Al+H) pHAE	meq%	CM0024 AE Buffer		X
pHAE sample (FMP)	(buff 8.0pH corr)			X
EC 1:5 soil:water wtcor	mS/cm	CM0025 extraction	NATA	0.630
Na in soil by M3	mg/kg	CM0025 extraction	NATA	-
K in soil by M3	mg/kg	CM0025 extraction	NATA	-
Ca in soil by M3	mg/kg	CM0025 extraction	NATA	-
Mg in soil by M3	mg/kg	CM0025 extraction	NATA	-
Al in soil by M3	mg/kg	CM0025 extraction	NATA	-
Na in soil sol ext	meq %	CM0025 extraction	NATA	2.19
K in soil sol ext	meq %	CM0025 extraction	NATA	0.01
Ca in soil sol ext	meq %	CM0025 extraction	NATA	<0.10
Mg in soil sol ext	meq %	CM0025 extraction	NATA	0.210
Na in soil by NH ₄ Cl	meq %	CM0025 extraction	NATA	5.71
K in soil by NH ₄ Cl	meq %	CM0025 extraction	NATA	0.300
Ca in soil by NH ₄ Cl	meq %	CM0025 extraction	NATA	6.80
Mg in soil by NH ₄ Cl	meq %	CM0025 extraction	NATA	15.2
Al NH ₄ Cl (mg/kg)	mg/kg	CM0025 extraction		3.83
Water loss for const mass req	gH ₂ O/100g as-rec'd			0.0
%ww ret on 75mm sieve	%w/w	PM0001 PSA	NATA	0.00
Solid ratio in as rec'd sample	gSolid/100g as-rec'd	PM0004MC		80.1
Water ratio in as rec'd sample	gH ₂ O/100g as-rec'd	PM0004MC		19.9
Moisture of as rec'd sample	gH ₂ O/g oven dry	PM0004MC		0.249
total sample mass	g			80.42
%ww ret on 63mm sieve	%w/w	PM0001 PSA	NATA	0.00
%ww ret on 37.5mm sieve	%w/w	PM0001 PSA	NATA	0.00
%ww ret on 26.5mm sieve	%w/w	PM0001 PSA	NATA	0.00
%ww ret on 19mm sieve	%w/w	PM0001 PSA	NATA	0.00

Sample No: Client Reference: Test	Units	Method	Accredited	9 47487-9
%ww ret on 13.2mm sieve	%w/w	PM0001 PSA	NATA	0.00
%ww ret on 9.5mm sieve	%w/w	PM0001 PSA	NATA	0.00
%ww ret on 6.7mm sieve	%w/w	PM0001 PSA	NATA	0.00
%ww ret on 4.75mm sieve	%w/w	PM0001 PSA	NATA	0.05
%ww ret on 2.36mm sieve	%w/w	PM0001 PSA	NATA	0.14
%ww ret on 1.18mm sieve	%w/w	PM0001 PSA	NATA	1.18
%ww ret on 600µm sieve	%w/w	PM0001 PSA	NATA	2.11
%ww ret on 425µm sieve	%w/w	PM0001 PSA	NATA	1.09
%ww ret on 300µm sieve	%w/w	PM0001 PSA	NATA	1.16
%ww ret on 150µm sieve	%w/w	PM0001 PSA	NATA	4.08
%ww ret on 75µm sieve	%w/w	PM0001 PSA	NATA	6.16
silt + clay: %ww passing 20µm	%w/w	PM0001 PSA		70.38
clay only: %ww passing 2µm	%w/w	PM0001 PSA		55.09
silt only: %ww retained on 2µm	%w/w	PM0001 PSA	NATA	15.29
Soil colour by Munsell table		PM0003 TSC		7.5YR 4/4 Brown

Method	Method Summary
CM0002 pH	pH of soils, sands, media, composts and waters by automated pH/EC meter based on Rayment & Higginson 4A1, 4B2, C1a
CM0024 AE Buffer	Exchangeable acidity of soil by Adams Evans single buffer pH method based on SSSA Methods of Soil Analysis (2007)
CM0025 extraction	Liquid chemical extraction of soils, media and composts
PM0001 PSA	Particle size analysis of soils and sands by hydrometer and mechanical sieving using AS1289 and ASTM F1632
PM0004 MC	Gravimetric Moisture Content in soil/compost/waste products by oven drying based on AS1289.2.1.1



Particle Size Distribution

- Australian Standard sieves

Sample Drop Off: 16 Chilvers Road
Thornleigh NSW 2120

Mailing Address: PO Box 357
Pennant Hills NSW 1715

Tel: 1300 30 40 80
Fax: 1300 64 46 89
Em: info@sesl.com.au
Web: www.sesl.com.au

Batch N°: 47487 **Sample N°:** 1 **Date Received:** 11/4/18 **Report Status:** ☐ Draft ☒ Final

Client Name: Soil Conservation Service	Project Name: SCO18/051
Client Contact: Lynn Dunn	SESL Quote N°:
Client Order N°: 800203186	Sample Name: SC018/051/1
Address: PO Box 3935 Parramatta NSW 2124	Description: Soil
	Test Type: ECEC_NH4Cl, PSA_AS, Colour_S, pHEC_S

SUMMARY	D VALUES	PERFORMANCE FACTORS
Results only requested.	D₉₅: 0.387 D₉₀: 0.163 D₈₅: 0.106 D₆₀: 0.047 D₅₀: 0.034 D₁₅: 0.002 D₁₀: 0.001 D₅: 0.001	Gradation Index (D₉₀/D₁₀): 160.00 Coefficient of Uniformity (D₆₀/D₁₀): 47.00

PARTICLE SIZE DISTRIBUTION GRAPH		PARTICLE SIZE ANALYSIS																																																																							
PERCENT RETAINED Cumulative Percent Passing		<table><tr><th>Sieve (mm)</th><th>Fraction</th><th>% Retained by mass</th><th>% Passing by mass</th></tr><tr><td>75.0</td><td>Cobbles</td><td>0</td><td>100</td></tr><tr><td>63.0</td><td>Very Coarse Gravel</td><td>0</td><td>100</td></tr><tr><td>37.5</td><td>Coarse Gravel</td><td>0</td><td>100</td></tr><tr><td>26.5</td><td>Coarse Gravel</td><td>0</td><td>100</td></tr><tr><td>19.0</td><td>Medium Gravel</td><td>0</td><td>100</td></tr><tr><td>13.2</td><td>Medium Gravel</td><td>0</td><td>100</td></tr><tr><td>9.5</td><td>Medium Gravel</td><td>0</td><td>100</td></tr><tr><td>6.7</td><td>Fine Gravel</td><td>0</td><td>100</td></tr><tr><td>4.75</td><td>Fine Gravel</td><td>0.52</td><td>99.48</td></tr><tr><td>2.36</td><td>Fine Gravel</td><td>0.64</td><td>98.84</td></tr><tr><td>1.18</td><td>Very Coarse Sand</td><td>1.12</td><td>97.72</td></tr><tr><td>0.6</td><td>Medium Sand</td><td>1.37</td><td>96.36</td></tr><tr><td>0.425</td><td>Medium Sand</td><td>0.94</td><td>95.41</td></tr><tr><td>0.3</td><td>Medium Sand</td><td>1.35</td><td>94.06</td></tr><tr><td>0.15</td><td>Fine Sand</td><td>4.46</td><td>89.6</td></tr><tr><td>0.075</td><td>Fine Sand</td><td>7.93</td><td>81.67</td></tr></table>				Sieve (mm)	Fraction	% Retained by mass	% Passing by mass	75.0	Cobbles	0	100	63.0	Very Coarse Gravel	0	100	37.5	Coarse Gravel	0	100	26.5	Coarse Gravel	0	100	19.0	Medium Gravel	0	100	13.2	Medium Gravel	0	100	9.5	Medium Gravel	0	100	6.7	Fine Gravel	0	100	4.75	Fine Gravel	0.52	99.48	2.36	Fine Gravel	0.64	98.84	1.18	Very Coarse Sand	1.12	97.72	0.6	Medium Sand	1.37	96.36	0.425	Medium Sand	0.94	95.41	0.3	Medium Sand	1.35	94.06	0.15	Fine Sand	4.46	89.6	0.075	Fine Sand	7.93	81.67
Sieve (mm)	Fraction	% Retained by mass	% Passing by mass																																																																						
75.0	Cobbles	0	100																																																																						
63.0	Very Coarse Gravel	0	100																																																																						
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26.5	Coarse Gravel	0	100																																																																						
19.0	Medium Gravel	0	100																																																																						
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6.7	Fine Gravel	0	100																																																																						
4.75	Fine Gravel	0.52	99.48																																																																						
2.36	Fine Gravel	0.64	98.84																																																																						
1.18	Very Coarse Sand	1.12	97.72																																																																						
0.6	Medium Sand	1.37	96.36																																																																						
0.425	Medium Sand	0.94	95.41																																																																						
0.3	Medium Sand	1.35	94.06																																																																						
0.15	Fine Sand	4.46	89.6																																																																						
0.075	Fine Sand	7.93	81.67																																																																						
		FINE PARTICLES (Hydrometer calculated)																																																																							
		<table><tr><td>0.02</td><td>Very Fine Sand</td><td>42.08</td><td>39.59</td></tr><tr><td>0.002</td><td>Silt</td><td>23.41</td><td>16.18</td></tr><tr><td><0.002</td><td>Clay</td><td>16.18</td><td>N/A</td></tr></table>				0.02	Very Fine Sand	42.08	39.59	0.002	Silt	23.41	16.18	<0.002	Clay	16.18	N/A																																																								
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Consultant: Michelle Murphy

Authorised Signatory: Simon Leake

Date Report Generated
23/04/2018

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Method Reference: SESL PM 0001 : Particle Size Analysis



Particle Size Distribution

- Australian Standard sieves

Sample Drop Off: 16 Chilvers Road
Thornleigh NSW 2120

Mailing Address: PO Box 357
Pennant Hills NSW 1715

Tel: 1300 30 40 80
Fax: 1300 64 46 89
Em: info@sesl.com.au
Web: www.sesl.com.au

Batch N°: 47487 **Sample N°:** 2 **Date Received:** 11/4/18 **Report Status:** ☐ Draft ☒ Final

Client Name: Soil Conservation Service	Project Name: SCO18/051
Client Contact: Lynn Dunn	SESL Quote N°:
Client Order N°: 800203186	Sample Name: SC018/051/2
Address: PO Box 3935 Parramatta NSW 2124	Description: Soil
	Test Type: ECEC_NH4Cl, PSA_AS, Colour_S, pHEC_S

SUMMARY	D VALUES	PERFORMANCE FACTORS
Results only requested.	D₉₅: 0.14 D₉₀: 0.071 D₈₅: 0.06 D₆₀: 0.013 D₅₀: 0.002 D₁₅: 0.001 D₁₀: 00 D₅: 00	Gradation Index (D₉₀/D₁₀): ? Coefficient of Uniformity: ? (D ₆₀ /D ₁₀)

PARTICLE SIZE DISTRIBUTION GRAPH		PARTICLE SIZE ANALYSIS																																																																							
PERCENT RETAINED Cumulative Percent Passing		<table><tr><th>Sieve (mm)</th><th>Fraction</th><th>% Retained by mass</th><th>% Passing by mass</th></tr><tr><td>75.0</td><td>Cobbles</td><td>0</td><td>100</td></tr><tr><td>63.0</td><td>Very Coarse Gravel</td><td>0</td><td>100</td></tr><tr><td>37.5</td><td>Coarse Gravel</td><td>0</td><td>100</td></tr><tr><td>26.5</td><td>Coarse Gravel</td><td>0</td><td>100</td></tr><tr><td>19.0</td><td>Medium Gravel</td><td>0</td><td>100</td></tr><tr><td>13.2</td><td>Medium Gravel</td><td>0</td><td>100</td></tr><tr><td>9.5</td><td>Medium Gravel</td><td>0</td><td>100</td></tr><tr><td>6.7</td><td>Fine Gravel</td><td>0</td><td>100</td></tr><tr><td>4.75</td><td>Fine Gravel</td><td>0.03</td><td>99.97</td></tr><tr><td>2.36</td><td>Fine Gravel</td><td>0.25</td><td>99.73</td></tr><tr><td>1.18</td><td>Very Coarse Sand</td><td>0.46</td><td>99.27</td></tr><tr><td>0.6</td><td>Medium Sand</td><td>0.57</td><td>98.7</td></tr><tr><td>0.425</td><td>Medium Sand</td><td>0.43</td><td>98.27</td></tr><tr><td>0.3</td><td>Medium Sand</td><td>0.59</td><td>97.68</td></tr><tr><td>0.15</td><td>Fine Sand</td><td>2.18</td><td>95.5</td></tr><tr><td>0.075</td><td>Fine Sand</td><td>3.93</td><td>91.57</td></tr></table>				Sieve (mm)	Fraction	% Retained by mass	% Passing by mass	75.0	Cobbles	0	100	63.0	Very Coarse Gravel	0	100	37.5	Coarse Gravel	0	100	26.5	Coarse Gravel	0	100	19.0	Medium Gravel	0	100	13.2	Medium Gravel	0	100	9.5	Medium Gravel	0	100	6.7	Fine Gravel	0	100	4.75	Fine Gravel	0.03	99.97	2.36	Fine Gravel	0.25	99.73	1.18	Very Coarse Sand	0.46	99.27	0.6	Medium Sand	0.57	98.7	0.425	Medium Sand	0.43	98.27	0.3	Medium Sand	0.59	97.68	0.15	Fine Sand	2.18	95.5	0.075	Fine Sand	3.93	91.57
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		0.02	Very Fine Sand	24.39	67.18																																																																				
		0.002	Silt	17.35	49.83																																																																				
		<0.002	Clay	49.83	N/A																																																																				

Consultant: Michelle Murphy

Authorised Signatory: Simon Leake

Date Report Generated
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Method Reference: SESL PM 0001 : Particle Size Analysis



Particle Size Distribution

- Australian Standard sieves

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Thornleigh NSW 2120

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Pennant Hills NSW 1715

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Em: info@sesl.com.au
Web: www.sesl.com.au

Batch N°: 47487 **Sample N°:** 3 **Date Received:** 11/4/18 **Report Status:** ☐ Draft ☒ Final

Client Name: Soil Conservation Service	Project Name: SCO18/051
Client Contact: Lynn Dunn	SESL Quote N°:
Client Order N°: 800203186	Sample Name: SC018/051/3
Address: PO Box 3935 Parramatta NSW 2124	Description: Soil
	Test Type: ECEC_NH4Cl, PSA_AS, Colour_S, pHEC_S

SUMMARY	D VALUES	PERFORMANCE FACTORS
Results only requested.	D₉₅: 0.146 D₉₀: 0.072 D₈₅: 0.063 D₆₀: 0.014 D₅₀: 0.002 D₁₅: 0.001 D₁₀: 00 D₅: 00	Gradation Index (D₉₀/D₁₀): ? Coefficient of Uniformity: ? (D ₆₀ /D ₁₀)

PARTICLE SIZE DISTRIBUTION GRAPH		PARTICLE SIZE ANALYSIS																																																																					
PERCENT RETAINED Sieve Sizes (mm)		<table><tr><th>Sieve (mm)</th><th>Fraction</th><th>% Retained by mass</th><th>% Passing by mass</th></tr><tr><td>75.0</td><td>Cobbles</td><td>0</td><td>100</td></tr><tr><td>63.0</td><td>Very Coarse Gravel</td><td>0</td><td>100</td></tr><tr><td>37.5</td><td>Coarse Gravel</td><td>0</td><td>100</td></tr><tr><td>26.5</td><td>Coarse Gravel</td><td>0</td><td>100</td></tr><tr><td>19.0</td><td>Medium Gravel</td><td>0</td><td>100</td></tr><tr><td>13.2</td><td>Medium Gravel</td><td>0</td><td>100</td></tr><tr><td>9.5</td><td>Medium Gravel</td><td>0</td><td>100</td></tr><tr><td>6.7</td><td>Fine Gravel</td><td>0</td><td>100</td></tr><tr><td>4.75</td><td>Fine Gravel</td><td>0.29</td><td>99.71</td></tr><tr><td>2.36</td><td>Fine Gravel</td><td>0.29</td><td>99.41</td></tr><tr><td>1.18</td><td>Very Coarse Sand</td><td>0.59</td><td>98.82</td></tr><tr><td>0.6</td><td>Medium Sand</td><td>0.59</td><td>98.23</td></tr><tr><td>0.425</td><td>Medium Sand</td><td>0.43</td><td>97.8</td></tr><tr><td>0.3</td><td>Medium Sand</td><td>0.67</td><td>97.13</td></tr><tr><td>0.15</td><td>Fine Sand</td><td>1.94</td><td>95.19</td></tr><tr><td>0.075</td><td>Fine Sand</td><td>3.89</td><td>91.3</td></tr></table>	Sieve (mm)	Fraction	% Retained by mass	% Passing by mass	75.0	Cobbles	0	100	63.0	Very Coarse Gravel	0	100	37.5	Coarse Gravel	0	100	26.5	Coarse Gravel	0	100	19.0	Medium Gravel	0	100	13.2	Medium Gravel	0	100	9.5	Medium Gravel	0	100	6.7	Fine Gravel	0	100	4.75	Fine Gravel	0.29	99.71	2.36	Fine Gravel	0.29	99.41	1.18	Very Coarse Sand	0.59	98.82	0.6	Medium Sand	0.59	98.23	0.425	Medium Sand	0.43	97.8	0.3	Medium Sand	0.67	97.13	0.15	Fine Sand	1.94	95.19	0.075	Fine Sand	3.89	91.3	
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Cumulative Percent Passing Sieve Sizes (mm)		<table><tr><th colspan="4">FINE PARTICLES (Hydrometer calculated)</th></tr><tr><td>0.02</td><td>Very Fine Sand</td><td>28.08</td><td>63.22</td></tr><tr><td>0.002</td><td>Silt</td><td>9.82</td><td>53.41</td></tr><tr><td><0.002</td><td>Clay</td><td>53.41</td><td>N/A</td></tr></table>			FINE PARTICLES (Hydrometer calculated)				0.02	Very Fine Sand	28.08	63.22	0.002	Silt	9.82	53.41	<0.002	Clay	53.41	N/A																																																			
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Consultant: Michelle Murphy

Authorised Signatory: Simon Leake

Date Report Generated
23/04/2018

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Method Reference: SESL PM 0001 : Particle Size Analysis



Particle Size Distribution

- Australian Standard sieves

Sample Drop Off: 16 Chilvers Road
Thornleigh NSW 2120

Mailing Address: PO Box 357
Pennant Hills NSW 1715

Tel: 1300 30 40 80
Fax: 1300 64 46 89
Em: info@sesl.com.au
Web: www.sesl.com.au

Batch N°: 47487 **Sample N°:** 4 **Date Received:** 11/4/18 **Report Status:** ☐ Draft ☒ Final

Client Name: Soil Conservation Service

Project Name: SCO18/051

Client Contact: Lynn Dunn

SESL Quote N°:

Client Order N°: 800203186

Sample Name: SC018/051/4

Address: PO Box 3935
Parramatta NSW 2124

Description: Soil

Test Type: ECEC_NH4Cl, PSA_AS, Colour_S, pHEC_S

SUMMARY

Results only requested.

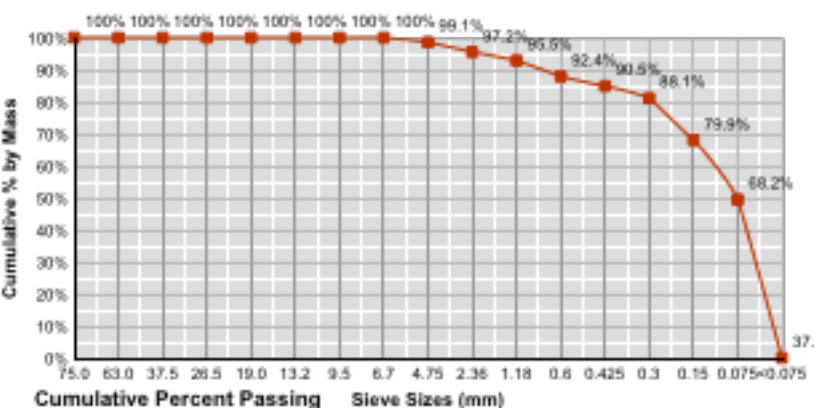
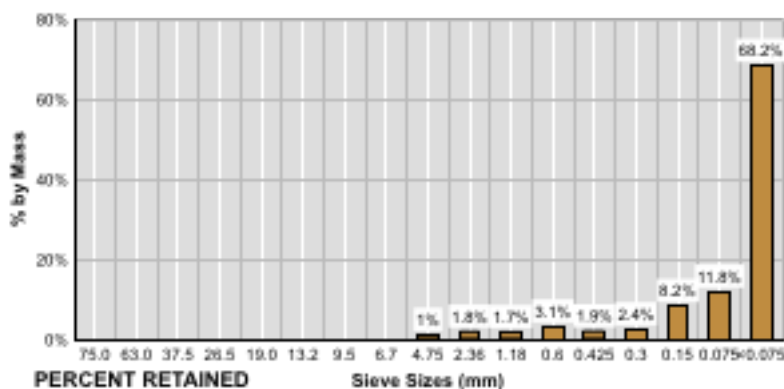
D VALUES

D₉₅: 1.09
D₉₀: 0.399
D₈₅: 0.243
D₆₀: 0.061
D₅₀: 0.043
D₁₅: 0.003
D₁₀: 0.001
D₅: 0.001

PERFORMANCE FACTORS

Gradation Index (D₉₀/D₁₀): 400.00
Coefficient of Uniformity (D₆₀/D₁₀): 61.00

PARTICLE SIZE DISTRIBUTION GRAPH



PARTICLE SIZE ANALYSIS

Sieve (mm)	Fraction	% Retained by mass	% Passing by mass
75.0	Cobbles	0	100
63.0	Very Coarse Gravel	0	100
37.5	Coarse Gravel	0	100
26.5	Coarse Gravel	0	100
19.0	Medium Gravel	0	100
13.2	Medium Gravel	0	100
9.5	Medium Gravel	0	100
6.7	Fine Gravel	0	100
4.75	Fine Gravel	0.95	99.05
2.36	Fine Gravel	1.84	97.21
1.18	Very Coarse Sand	1.72	95.49
0.6	Medium Sand	3.06	92.43
0.425	Medium Sand	1.92	90.5
0.3	Medium Sand	2.37	88.13
0.15	Fine Sand	8.19	79.94
0.075	Fine Sand	11.79	68.15

FINE PARTICLES (Hydrometer calculated)

0.02	Very Fine Sand	31.03	37.12
0.002	Silt	23.24	13.88
<0.002	Clay	13.88	N/A

Consultant: Michelle Murphy

Authorised Signatory: Simon Leake

Date Report Generated: 23/04/2018

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Method Reference: SESL PM 0001 : Particle Size Analysis



Particle Size Distribution

- Australian Standard sieves

Sample Drop Off: 16 Chilvers Road
Thornleigh NSW 2120

Mailing Address: PO Box 357
Pennant Hills NSW 1715

Tel: 1300 30 40 80
Fax: 1300 64 46 89
Em: info@sesl.com.au
Web: www.sesl.com.au

Batch N°: 47487 **Sample N°:** 5 **Date Received:** 11/4/18 **Report Status:** ☐ Draft ☒ Final

Client Name: Soil Conservation Service	Project Name: SCO18/051
Client Contact: Lynn Dunn	SESL Quote N°:
Client Order N°: 800203186	Sample Name: SC018/051/5
Address: PO Box 3935 Parramatta NSW 2124	Description: Soil
	Test Type: ECEC_NH4Cl, PSA_AS, Colour_S, pHEC_S

SUMMARY	D VALUES	PERFORMANCE FACTORS
Results only requested.	D₉₅: 0.294 D₉₀: 0.142 D₈₅: 0.101 D₆₀: 0.021 D₅₀: 0.011 D₁₅: 0.001 D₁₀: 0.001 D₅: 00	Gradation Index (D₉₀/D₁₀): 140.00 Coefficient of Uniformity (D₆₀/D₁₀): 21.00

PARTICLE SIZE DISTRIBUTION GRAPH		PARTICLE SIZE ANALYSIS																																																																							
PERCENT RETAINED Cumulative Percent Passing		<table><tr><th>Sieve (mm)</th><th>Fraction</th><th>% Retained by mass</th><th>% Passing by mass</th></tr><tr><td>75.0</td><td>Cobbles</td><td>0</td><td>100</td></tr><tr><td>63.0</td><td>Very Coarse Gravel</td><td>0</td><td>100</td></tr><tr><td>37.5</td><td>Coarse Gravel</td><td>0</td><td>100</td></tr><tr><td>26.5</td><td>Coarse Gravel</td><td>0</td><td>100</td></tr><tr><td>19.0</td><td>Medium Gravel</td><td>0</td><td>100</td></tr><tr><td>13.2</td><td>Medium Gravel</td><td>0</td><td>100</td></tr><tr><td>9.5</td><td>Medium Gravel</td><td>0</td><td>100</td></tr><tr><td>6.7</td><td>Fine Gravel</td><td>0</td><td>100</td></tr><tr><td>4.75</td><td>Fine Gravel</td><td>0.01</td><td>99.99</td></tr><tr><td>2.36</td><td>Fine Gravel</td><td>0.42</td><td>99.57</td></tr><tr><td>1.18</td><td>Very Coarse Sand</td><td>1.15</td><td>98.42</td></tr><tr><td>0.6</td><td>Medium Sand</td><td>1.47</td><td>96.95</td></tr><tr><td>0.425</td><td>Medium Sand</td><td>0.8</td><td>96.15</td></tr><tr><td>0.3</td><td>Medium Sand</td><td>0.98</td><td>95.17</td></tr><tr><td>0.15</td><td>Fine Sand</td><td>4.22</td><td>90.95</td></tr><tr><td>0.075</td><td>Fine Sand</td><td>9.06</td><td>81.89</td></tr></table>				Sieve (mm)	Fraction	% Retained by mass	% Passing by mass	75.0	Cobbles	0	100	63.0	Very Coarse Gravel	0	100	37.5	Coarse Gravel	0	100	26.5	Coarse Gravel	0	100	19.0	Medium Gravel	0	100	13.2	Medium Gravel	0	100	9.5	Medium Gravel	0	100	6.7	Fine Gravel	0	100	4.75	Fine Gravel	0.01	99.99	2.36	Fine Gravel	0.42	99.57	1.18	Very Coarse Sand	1.15	98.42	0.6	Medium Sand	1.47	96.95	0.425	Medium Sand	0.8	96.15	0.3	Medium Sand	0.98	95.17	0.15	Fine Sand	4.22	90.95	0.075	Fine Sand	9.06	81.89
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Consultant: Michelle Murphy

Authorised Signatory: Simon Leake

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Particle Size Distribution

- Australian Standard sieves

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Web: www.sesl.com.au

Batch N°: 47487 **Sample N°:** 6 **Date Received:** 11/4/18 **Report Status:** ☐ Draft ☒ Final

Client Name: Soil Conservation Service	Project Name: SCO18/051
Client Contact: Lynn Dunn	SESL Quote N°:
Client Order N°: 800203186	Sample Name: SC018/051/6
Address: PO Box 3935 Parramatta NSW 2124	Description: Soil
	Test Type: ECEC_NH4Cl, PSA_AS, Colour_S, pHEC_S

SUMMARY	D VALUES	PERFORMANCE FACTORS
Results only requested.	D₉₅: 0.245 D₉₀: 0.139 D₈₅: 0.1 D₆₀: 0.019 D₅₀: 0.011 D₁₅: 0.001 D₁₀: 0.001 D₅: 0.0	Gradation Index (D₉₀/D₁₀): 140.00 Coefficient of Uniformity (D₆₀/D₁₀): 19.00

PARTICLE SIZE DISTRIBUTION GRAPH		PARTICLE SIZE ANALYSIS																																																																							
PERCENT RETAINED Cumulative Percent Passing		<table><tr><th>Sieve (mm)</th><th>Fraction</th><th>% Retained by mass</th><th>% Passing by mass</th></tr><tr><td>75.0</td><td>Cobbles</td><td>0</td><td>100</td></tr><tr><td>63.0</td><td>Very Coarse Gravel</td><td>0</td><td>100</td></tr><tr><td>37.5</td><td>Coarse Gravel</td><td>0</td><td>100</td></tr><tr><td>26.5</td><td>Coarse Gravel</td><td>0</td><td>100</td></tr><tr><td>19.0</td><td>Medium Gravel</td><td>0</td><td>100</td></tr><tr><td>13.2</td><td>Medium Gravel</td><td>0</td><td>100</td></tr><tr><td>9.5</td><td>Medium Gravel</td><td>0</td><td>100</td></tr><tr><td>6.7</td><td>Fine Gravel</td><td>0</td><td>100</td></tr><tr><td>4.75</td><td>Fine Gravel</td><td>0.01</td><td>99.99</td></tr><tr><td>2.36</td><td>Fine Gravel</td><td>0.3</td><td>99.69</td></tr><tr><td>1.18</td><td>Very Coarse Sand</td><td>0.57</td><td>99.12</td></tr><tr><td>0.6</td><td>Medium Sand</td><td>0.82</td><td>98.3</td></tr><tr><td>0.425</td><td>Medium Sand</td><td>0.52</td><td>97.78</td></tr><tr><td>0.3</td><td>Medium Sand</td><td>0.66</td><td>97.12</td></tr><tr><td>0.15</td><td>Fine Sand</td><td>5.73</td><td>91.39</td></tr><tr><td>0.075</td><td>Fine Sand</td><td>9.54</td><td>81.84</td></tr></table>				Sieve (mm)	Fraction	% Retained by mass	% Passing by mass	75.0	Cobbles	0	100	63.0	Very Coarse Gravel	0	100	37.5	Coarse Gravel	0	100	26.5	Coarse Gravel	0	100	19.0	Medium Gravel	0	100	13.2	Medium Gravel	0	100	9.5	Medium Gravel	0	100	6.7	Fine Gravel	0	100	4.75	Fine Gravel	0.01	99.99	2.36	Fine Gravel	0.3	99.69	1.18	Very Coarse Sand	0.57	99.12	0.6	Medium Sand	0.82	98.3	0.425	Medium Sand	0.52	97.78	0.3	Medium Sand	0.66	97.12	0.15	Fine Sand	5.73	91.39	0.075	Fine Sand	9.54	81.84
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		<table><tr><td>0.02</td><td>Very Fine Sand</td><td>20.62</td><td>61.23</td></tr><tr><td>0.002</td><td>Silt</td><td>22.77</td><td>38.46</td></tr><tr><td><0.002</td><td>Clay</td><td>38.46</td><td>N/A</td></tr></table>				0.02	Very Fine Sand	20.62	61.23	0.002	Silt	22.77	38.46	<0.002	Clay	38.46	N/A																																																								
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<0.002	Clay	38.46	N/A																																																																						

Consultant: Michelle Murphy

Authorised Signatory: Simon Leake

Date Report Generated
23/04/2018

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Method Reference: SESL PM 0001 : Particle Size Analysis



Particle Size Distribution

- Australian Standard sieves

Sample Drop Off: 16 Chilvers Road
Thornleigh NSW 2120

Mailing Address: PO Box 357
Pennant Hills NSW 1715

Tel: 1300 30 40 80
Fax: 1300 64 46 89
Em: info@sesl.com.au
Web: www.sesl.com.au

Batch N°: 47487 **Sample N°:** 7 **Date Received:** 11/4/18 **Report Status:** ☐ Draft ☒ Final

Client Name: Soil Conservation Service

Project Name: SCO18/051

Client Contact: Lynn Dunn

SESL Quote N°:

Client Order N°: 800203186

Sample Name: SC018/051/7

Address: PO Box 3935
Parramatta NSW 2124

Description: Soil

Test Type: ECEC_NH4Cl, PSA_AS, Colour_S, pHEC_S

SUMMARY

Results only requested.

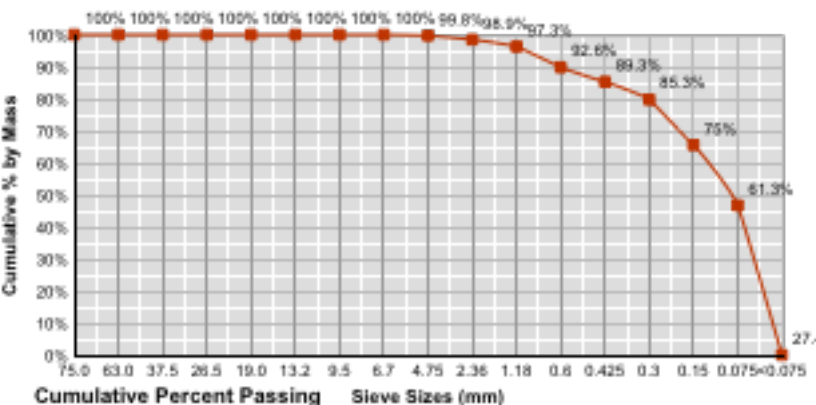
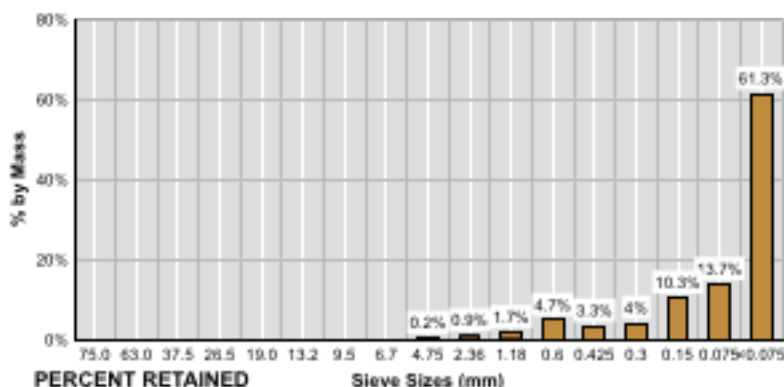
D VALUES

D₉₅: 0.901
D₉₀: 0.462
D₈₅: 0.295
D₆₀: 0.073
D₅₀: 0.057
D₁₅: 0.008
D₁₀: 0.004
D₅: 0.001

PERFORMANCE FACTORS

Gradation Index (D₉₀/D₁₀): 120.00
Coefficient of Uniformity (D₆₀/D₁₀): 18.00

PARTICLE SIZE DISTRIBUTION GRAPH



PARTICLE SIZE ANALYSIS

Sieve (mm)	Fraction	% Retained by mass	% Passing by mass
75.0	Cobbles	0	100
63.0	Very Coarse Gravel	0	100
37.5	Coarse Gravel	0	100
26.5	Coarse Gravel	0	100
19.0	Medium Gravel	0	100
13.2	Medium Gravel	0	100
9.5	Medium Gravel	0	100
6.7	Fine Gravel	0	100
4.75	Fine Gravel	0.17	99.83
2.36	Fine Gravel	0.9	98.92
1.18	Very Coarse Sand	1.68	97.25
0.6	Medium Sand	4.67	92.58
0.425	Medium Sand	3.26	89.32
0.3	Medium Sand	4	85.32
0.15	Fine Sand	10.28	75.04
0.075	Fine Sand	13.7	61.34

FINE PARTICLES (Hydrometer calculated)

0.02	Very Fine Sand	33.98	27.36
0.002	Silt	18.98	8.38
<0.002	Clay	8.38	N/A

Consultant: Michelle Murphy

Authorised Signatory: Simon Leake

Date Report Generated: 23/04/2018

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Method Reference: SESL PM 0001 : Particle Size Analysis



Particle Size Distribution

- Australian Standard sieves

Sample Drop Off: 16 Chilvers Road
Thornleigh NSW 2120

Mailing Address: PO Box 357
Pennant Hills NSW 1715

Tel: 1300 30 40 80
Fax: 1300 64 46 89
Em: info@sesl.com.au
Web: www.sesl.com.au

Batch N°: 47487 **Sample N°:** 8 **Date Received:** 11/4/18 **Report Status:** ☐ Draft ☒ Final

Client Name: Soil Conservation Service

Project Name: SCO18/051

Client Contact: Lynn Dunn

SESL Quote N°:

Client Order N°: 800203186

Sample Name: SC018/051/8

Address: PO Box 3935
Parramatta NSW 2124

Description: Soil

Test Type: ECEC_NH4Cl, PSA_AS, Colour_S, pHEC_S

SUMMARY

Results only requested.

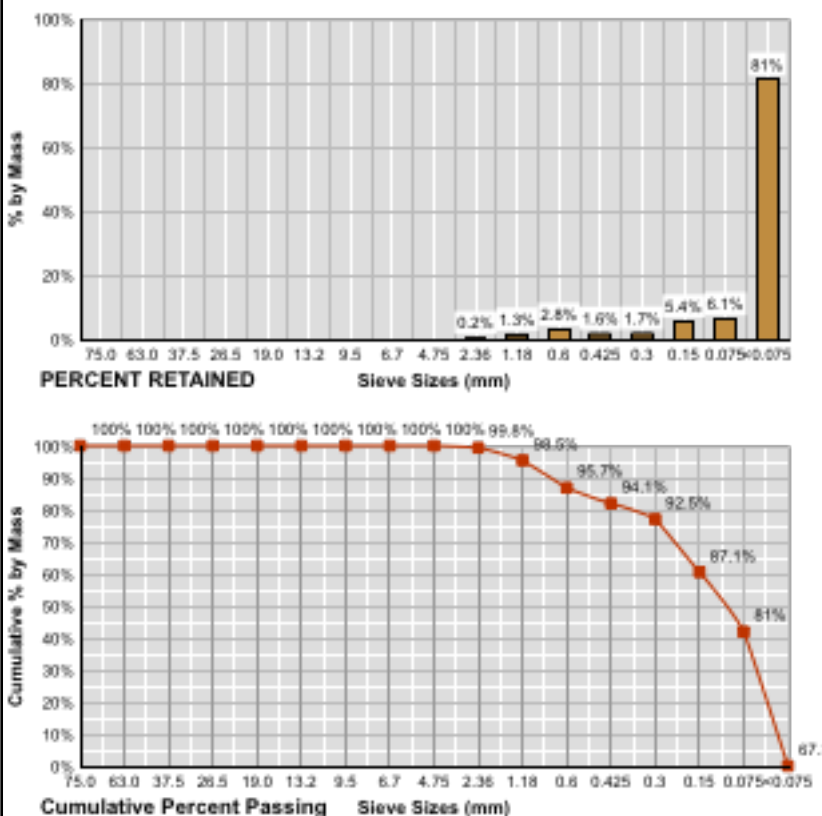
D VALUES

D₉₅: 0.521
D₉₀: 0.231
D₈₅: 0.124
D₆₀: 0.01
D₅₀: 0.002
D₁₅: 0.001
D₁₀: 00
D₅: 00

PERFORMANCE FACTORS

Gradation Index (D₉₀/D₁₀): ?
Coefficient of Uniformity: ?
(D₆₀/D₁₀)

PARTICLE SIZE DISTRIBUTION GRAPH



PARTICLE SIZE ANALYSIS

Sieve (mm)	Fraction	% Retained by mass	% Passing by mass
75.0	Cobbles	0	100
63.0	Very Coarse Gravel	0	100
37.5	Coarse Gravel	0	100
26.5	Coarse Gravel	0	100
19.0	Medium Gravel	0	100
13.2	Medium Gravel	0	100
9.5	Medium Gravel	0	100
6.7	Fine Gravel	0	100
4.75	Fine Gravel	0.02	99.98
2.36	Fine Gravel	0.15	99.83
1.18	Very Coarse Sand	1.34	98.49
0.6	Medium Sand	2.78	95.72
0.425	Medium Sand	1.59	94.12
0.3	Medium Sand	1.66	92.46
0.15	Fine Sand	5.38	87.08
0.075	Fine Sand	6.12	80.97

FINE PARTICLES (Hydrometer calculated)

0.02	Very Fine Sand	13.64	67.33
0.002	Silt	13.88	53.45
<0.002	Clay	53.45	N/A

Consultant: Michelle Murphy

Authorised Signatory: Simon Leake

Date Report Generated
23/04/2018

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Method Reference: SESL PM 0001 : Particle Size Analysis



Particle Size Distribution

- Australian Standard sieves

Sample Drop Off: 16 Chilvers Road
Thornleigh NSW 2120

Mailing Address: PO Box 357
Pennant Hills NSW 1715

Tel: 1300 30 40 80
Fax: 1300 64 46 89
Em: info@sesl.com.au
Web: www.sesl.com.au

Batch N°: 47487 **Sample N°:** 9 **Date Received:** 11/4/18 **Report Status:** ☐ Draft ☒ Final

Client Name: Soil Conservation Service	Project Name: SCO18/051
Client Contact: Lynn Dunn	SESL Quote N°:
Client Order N°: 800203186	Sample Name: SC018/051/9
Address: PO Box 3935 Parramatta NSW 2124	Description: Soil
	Test Type: ECEC_NH4Cl, PSA_AS, Colour_S, pHEC_S

SUMMARY	D VALUES	PERFORMANCE FACTORS
Results only requested.	D₉₅: 0.379 D₉₀: 0.148 D₈₅: 0.087 D₆₀: 0.008 D₅₀: 0.002 D₁₅: 0.001 D₁₀: 00 D₅: 00	Gradation Index (D₉₀/D₁₀): ? Coefficient of Uniformity: ? (D ₆₀ /D ₁₀)

PARTICLE SIZE DISTRIBUTION GRAPH		PARTICLE SIZE ANALYSIS																																																																							
PERCENT RETAINED Cumulative Percent Passing		<table><tr><th>Sieve (mm)</th><th>Fraction</th><th>% Retained by mass</th><th>% Passing by mass</th></tr><tr><td>75.0</td><td>Cobbles</td><td>0</td><td>100</td></tr><tr><td>63.0</td><td>Very Coarse Gravel</td><td>0</td><td>100</td></tr><tr><td>37.5</td><td>Coarse Gravel</td><td>0</td><td>100</td></tr><tr><td>26.5</td><td>Coarse Gravel</td><td>0</td><td>100</td></tr><tr><td>19.0</td><td>Medium Gravel</td><td>0</td><td>100</td></tr><tr><td>13.2</td><td>Medium Gravel</td><td>0</td><td>100</td></tr><tr><td>9.5</td><td>Medium Gravel</td><td>0</td><td>100</td></tr><tr><td>6.7</td><td>Fine Gravel</td><td>0</td><td>100</td></tr><tr><td>4.75</td><td>Fine Gravel</td><td>0.05</td><td>99.95</td></tr><tr><td>2.36</td><td>Fine Gravel</td><td>0.14</td><td>99.81</td></tr><tr><td>1.18</td><td>Very Coarse Sand</td><td>1.18</td><td>98.63</td></tr><tr><td>0.6</td><td>Medium Sand</td><td>2.11</td><td>96.52</td></tr><tr><td>0.425</td><td>Medium Sand</td><td>1.09</td><td>95.42</td></tr><tr><td>0.3</td><td>Medium Sand</td><td>1.16</td><td>94.27</td></tr><tr><td>0.15</td><td>Fine Sand</td><td>4.08</td><td>90.19</td></tr><tr><td>0.075</td><td>Fine Sand</td><td>6.16</td><td>84.03</td></tr></table>				Sieve (mm)	Fraction	% Retained by mass	% Passing by mass	75.0	Cobbles	0	100	63.0	Very Coarse Gravel	0	100	37.5	Coarse Gravel	0	100	26.5	Coarse Gravel	0	100	19.0	Medium Gravel	0	100	13.2	Medium Gravel	0	100	9.5	Medium Gravel	0	100	6.7	Fine Gravel	0	100	4.75	Fine Gravel	0.05	99.95	2.36	Fine Gravel	0.14	99.81	1.18	Very Coarse Sand	1.18	98.63	0.6	Medium Sand	2.11	96.52	0.425	Medium Sand	1.09	95.42	0.3	Medium Sand	1.16	94.27	0.15	Fine Sand	4.08	90.19	0.075	Fine Sand	6.16	84.03
Sieve (mm)	Fraction	% Retained by mass	% Passing by mass																																																																						
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		<table><tr><td>0.02</td><td>Very Fine Sand</td><td>13.65</td><td>70.38</td></tr><tr><td>0.002</td><td>Silt</td><td>15.29</td><td>55.09</td></tr><tr><td><0.002</td><td>Clay</td><td>55.09</td><td>N/A</td></tr></table>				0.02	Very Fine Sand	13.65	70.38	0.002	Silt	15.29	55.09	<0.002	Clay	55.09	N/A																																																								
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Consultant: Michelle Murphy

Authorised Signatory: Simon Leake

Date Report Generated
23/04/2018

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Method Reference: SESL PM 0001 : Particle Size Analysis

AGRICULTURAL SOIL ANALYSIS REPORT

11 samples supplied by SLR Consulting Australia Pty Ltd on 1/11/2021. Lab Job No.M3021
Analysis requested by Murray Fraser. Your Job: PO: SLR 630.12465.001 Radford Park
10 Kings Road NEW LAMBTON NSW 2305

		Sample 1 R10 0-10	Sample 2 R10 20-13	Sample 3 R10 50-60	Sample 4 R10 65-75	Sample 5 R12 0-10	Sample 6 R12 30-40	Sample 7 R12 60-70
Sample ID:		R10 0-10	R10 20-13	R10 50-60	R10 65-75	R12 0-10	R12 30-40	R12 60-70
Crop:		Soil	Soil	Soil	Soil	Soil	Soil	Soil
Client:		Radford Park	Radford Park	Radford Park	Radford Park	Radford Park	Radford Park	Radford Park
Parameter	Method reference	M3021/1	M3021/2	M3021/3	M3021/4	M3021/5	M3021/6	M3021/7
pH	Rayment & Lyons 2011 - 4A1 (1:5 Water)	6.04	5.79	5.60	5.37	5.83	5.42	5.28
Electrical Conductivity (dS/m)	Rayment & Lyons 2011 - 3A1 (1:5 Water)	0.074	0.063	0.096	0.240	0.056	0.149	0.366
Exchangeable Calcium (cmol./kg) (kg/ha) (mg/kg)	Rayment & Lyons 2011 - 15D3 (Ammonium Acetate)	4.1 1,819 812	3.2 1,424 636	1.8 790 353	1.0 467 208	2.7 1,191 532	0.31 140 63	0.47 211 94
Exchangeable Magnesium (cmol./kg) (kg/ha) (mg/kg)		4.4 1,209 540	12 3,158 1,410	11 3,068 1,370	11 2,974 1,328	2.1 569 254	8.3 2,266 1,012	9.5 2,582 1,153
Exchangeable Potassium (cmol./kg) (kg/ha) (mg/kg)		1.5 1,345 600	0.81 711 318	0.44 388 173	0.35 307 137	0.57 502 224	0.44 382 171	0.26 223 100
Exchangeable Sodium (cmol./kg) (kg/ha) (mg/kg)		0.15 76 34	0.79 408 182	1.3 684 305	2.6 1,331 594	0.13 68 30	1.5 797 356	3.4 1,734 774
Exchangeable Aluminium (cmol./kg) (kg/ha) (mg/kg)		0.07 14 6.4	1.6 332 148	3.3 657 293	3.3 657 293	0.22 45 20	2.6 519 232	2.1 433 193
Exchangeable Hydrogen (cmol./kg) (kg/ha) (mg/kg)		0.19 4.2 1.9	0.46 10 4.6	1.6 36 16	2.1 47 21	0.30 6.8 3.0	1.4 31 14	1.6 35 16
Effective Cation Exchange Capacity (CEC) (cmol./kg)		10	18	20	20	6.0	15	17
Calcium (%)		39	17	9.0	5.1	44	2.1	2.7
Magnesium (%)		43	63	57	54	35	57	55
Potassium (%)		15	4.4	2.3	1.7	9.6	3.0	1.5
Sodium - ESP (%)		1.4	4.3	6.8	13	2.2	11	19
Aluminium (%)		0.68	8.9	17	16	3.7	18	12
Hydrogen (%)		1.8	2.5	8.1	10	5.1	9.4	9.1
Calcium/Magnesium Ratio	**Calculation: Calcium / Magnesium (cmol./kg)	0.91	0.27	0.16	0.10	1.3	0.04	0.05

Notes:

- All results presented as a 40°C oven dried weight. Soil sieved and lightly crushed to < 2 mm.
- Methods from Rayment and Lyons, 2011. *Soil Chemical Methods - Australasia*. CSIRO Publishing: Collingwood.
- Soluble Salts included in Exchangeable Cations - NO PRE-WASH (unless requested).
- 'Morgan 1 Extract' adapted from 'Science in Agriculture', 'Non-Toxic Farming' and LaMotte Soil Handbook.
- Guidelines for phosphorus have been reduced for Australian soils.
- Indicative guidelines are based on 'Albrecht' and 'Reams' concepts.
- Total Acid Extractable Nutrients indicate a store of nutrients.
- National Environmental Protection (Assessment of Site Contamination) Measure 2013, Schedule B(1) - Guideline on Investigation Levels for Soil and Groundwater. Table 5-A Background Ranges.
- Information relating to testing colour codes is available on sheet 2 - 'Understanding your agricultural soil results'.
- Conversions for 1 cmol./kg = 230 mg/kg Sodium, 390 mg/kg Potassium, 122 mg/kg Magnesium, 200 mg/kg Calcium
- Conversions to kg/ha = mg/kg x 2.24
- The chloride calculation of Cl mg/L = EC x 640 is considered an estimate, and most likely an over-estimate
- ** NATA accreditation does not cover the performance of this service.
- Analysis conducted between sample arrival date and reporting date.
- This report is not to be reproduced except in full. Results only relate to the item tested.
- All services undertaken by EAL are covered by the EAL Laboratory Services Terms and Conditions (refer [SCU.edu.au/eal/t&cs](http://scu.edu.au/eal/t&cs)).
- This report was issued on 05/11/2021.

Quality Checked: Kris Saville
Agricultural Co-Ordinator

KS



AGRICULTURAL SOIL ANALYSIS REPORT

11 samples supplied by SLR Consulting Australia Pty Ltd on 1/11/2021. Lab Job No.M3021
Analysis requested by Murray Fraser. Your Job: PO: SLR 630.12465.001 Radford Park
10 Kings Road NEW LAMBTON NSW 2305

10 Kings Road NEW LAMBTON NSW 2305

		Sample ID:	Sample 8	Sample 9	Sample 10	Sample 11
		Crop:	R16 0-10	R16 20-30	R16 50-60	R16 65-75
		Client:	Soil	Soil	Soil	Soil
			Radford Park	Radford Park	Radford Park	Radford Park
	Parameter	Method reference	M3021/8	M3021/9	M3021/10	M3021/11
	pH	Rayment & Lyons 2011 - 4A1 (1:5 Water)	7.07	7.06	5.54	5.47
	Electrical Conductivity (dS/m)	Rayment & Lyons 2011 - 3A1 (1:5 Water)	0.048	0.039	0.205	0.281
	Exchangeable Calcium	(cmol./kg)	9.0	3.6	0.52	0.17
		(kg/ha)	4,059	1,601	233	77
		(mg/kg)	1,812	715	104	34
	Exchangeable Magnesium	(cmol./kg)	2.2	1.4	8.7	8.4
		(kg/ha)	595	379	2,370	2,286
		(mg/kg)	265	169	1,058	1,020
	Exchangeable Potassium	(cmol./kg)	0.44	0.23	0.25	0.24
		(kg/ha)	385	206	217	210
		(mg/kg)	172	92	97	94
	Exchangeable Sodium	(cmol./kg)	0.14	0.16	2.4	3.5
		(kg/ha)	72	85	1,251	1,777
		(mg/kg)	32	38	559	794
	Exchangeable Aluminium	(cmol./kg)	0.01	<0.01	1.0	0.95
		(kg/ha)	2.9	2.0	208	192
		(mg/kg)	1.3	<1	93	86
	Exchangeable Hydrogen	(cmol./kg)	<0.01	<0.01	0.78	0.42
		(kg/ha)	<1	<1	17	9.4
		(mg/kg)	<1	<1	7.8	4.2
	Effective Cation Exchange Capacity (ECEC) (cmol./kg)	**Calculation: Sum of Ca,Mg,K,Na,Al,H (cmol./kg)	12	5.4	14	14
	Calcium (%)	**Base Saturation Calculations - Cation cmol./kg / ECEC x 100	76	66	3.8	1.3
	Magnesium (%)		18	26	63	62
	Potassium (%)		3.7	4.4	1.8	1.8
	Sodium - ESP (%)		1.2	3.1	18	25
	Aluminium (%)		0.12	0.18	7.5	7.0
	Hydrogen (%)		0.00	0.00	5.7	3.1
	Calcium/Magnesium Ratio	**Calculation: Calcium / Magnesium (cmol./kg)	4.1	2.6	0.06	0.02

Notes:

- All results presented as a 40°C oven dried weight. Soil sieved and lightly crushed to < 2 mm.
- Methods from Rayment and Lyons, 2011. *Soil Chemical Methods - Australasia*. CSIRO Publishing: Collingwood.
- Soluble Salts included in Exchangeable Cations - NO PRE-WASH (unless requested).
- 'Morgan 1 Extract' adapted from 'Science in Agriculture', 'Non-Toxic Farming' and LaMotte Soil Handbook.
- Guidelines for phosphorus have been reduced for Australian soils.
- Indicative guidelines are based on 'Albrecht' and 'Reams' concepts.
- Total Acid Extractable Nutrients indicate a store of nutrients.
- National Environmental Protection (Assessment of Site Contamination) Measure 2013, Schedule B(1) - Guideline on Investigation Levels for Soil and Groundwater. Table 5-A Background Ranges.
- Information relating to testing colour codes is available on sheet 2 - 'Understanding your agricultural soil test'.
- Conversions for 1 cmol./kg = 230 mg/kg Sodium, 390 mg/kg Potassium, 122 mg/kg Magnesium, 200 mg/kg Calcium
- Conversions to kg/ha = mg/kg x 2.24
- The chloride calculation of Cl mg/L = EC x 640 is considered an estimate, and most likely an over-estimate
- ** NATA accreditation does not cover the performance of this service.
- Analysis conducted between sample arrival date and reporting date.
- This report is not to be reproduced except in full. Results only relate to the item tested.
- All services undertaken by EAL are covered by the EAL Laboratory Services Terms and Conditions.
- This report was issued on 05/11/2021.

Quality Checked: Kris Saville
Agricultural Co-Ordinator

KS

GRAIN SIZE ANALYSIS (hydrometer and sieving techniques)

11 soil samples supplied by SLR Consulting Australia Pty Ltd on 1st November, 2021 - Lab Job No. M3021.

Analysis requested by Murray Fraser. **Your Project: PO: SLR 630.12465.001 Radford Park**

10 Kings Road NEW LAMBTON NSW 2305

SAMPLE ID	Lab Code	MOISTURE CONTENT (% of water in sample)	Wet Munsell Colour		Wet Munsell Mottle Colour			TOTAL GRAVEL > 2 mm (% of total oven- dry equivalent)	GRAVEL > 4.75 mm (% of total oven-dry equivalent)	GRAVEL 2.00-4.75 mm (% of total oven- dry equivalent)	COARSE SAND 200-2000 µm (0.2-2.0 mm) (% of total oven-dry equivalent)	FINE SAND 20-200 µm (0.02-0.2 mm) (% of total oven-dry equivalent)	SILT 2-20 µm ISSS (% of total oven- dry equivalent)	CLAY < 2 µm (% of total oven- dry equivalent)
			Code	Description	Code	Description	egree of Mottling (%)							
R10 0-10	M3021/1	36.5%	10 YR 2/2	Very Dark Brown	..	..	..	2.2%	0.9%	1.2%	8.9%	46.5%	23.3%	19.1%
R10 20-13	M3021/2	20.5%	2.5 YR 3/6	Dark Red	10 YR 4/3	Brown	7	0.0%	0.0%	0.0%	3.1%	25.4%	13.4%	58.1%
R10 50-60	M3021/3	20.5%	5 YR 4/6	Yellowish Red	..	..	..	0.2%	0.0%	0.2%	1.9%	27.6%	17.1%	53.2%
R10 65-75	M3021/4	18.1%	5 YR 4/6	Yellowish Red	10 YR 5/3	Brown	10	0.0%	0.0%	0.0%	1.2%	30.5%	22.3%	46.0%
R12 0-10	M3021/5	11.1%	7.5 YR 2.5/2	Very Dark Brown	..	..	..	14.3%	9.6%	4.7%	8.8%	57.4%	7.1%	12.3%
R12 30-40	M3021/6	17.8%	2.5 YR 3/6	Dark Red	10 YR 5/4	Yellowish Brown	40	1.1%	0.0%	1.1%	2.2%	43.1%	11.1%	42.5%
R12 60-70	M3021/7	14.4%	5 YR 4/4	Reddish Brown	10 YR 6/3	Pale Brown	30	0.6%	0.4%	0.2%	5.3%	44.6%	14.5%	35.0%
R16 0-10	M3021/8	11.6%	10 YR 2/2	Very Dark Brown	7.5 YR 5/8	Strong Brown	40	7.7%	4.9%	2.8%	6.5%	65.3%	8.5%	12.1%
R16 20-30	M3021/9	7.8%	7.5 YR 3/2	Dark Brown	..	..	..	13.8%	9.3%	4.4%	7.5%	62.8%	7.1%	8.7%
R16 50-60	M3021/10	11.5%	10 YR 5/3	Brown	5 YR 4/6	Yellowish Red	40	0.0%	0.0%	0.0%	3.1%	43.9%	14.6%	38.3%
R16 65-75	M3021/11	10.0%	2.5 Y 6/2	Light Brownish Gray	10 YR 5/8	Yellowish Brown	30	0.1%	0.0%	0.1%	0.8%	51.2%	16.9%	31.0%

Note:

- 1: The Hydrometer Analysis method was used to determine the percentage sand, silt and clay, modified from SOP meth004 (California Dept of Pesticide Regulation), using method of Gee & Bauder (1986), in *Methods of Soil Analysis. Part 1* Agron. Monogr. 9 (2nd Ed). Klute, A., American Soc. of Agronomy Inc., Soil Sci. Soc. America Inc., Madison WI: 383-411.
- 2: Australian Standard 1289.3.8.1-1997 (see attached)
3. Analysis conducted between sample arrival date and reporting date.
4. This report is not to be reproduced except in full. Results only relate to the item tested.
5. All services undertaken by EAL are covered by the EAL Laboratory Services Terms and Conditions (refer scu.edu.au/eal).
6. This report was issued on 15/11/2021.

APPENDIX B

Detailed Soil Profile Descriptions



Table 1 Summary: Brown Sodosol (Site 1)

Overview	
	
Landscape Site 1	
ASC Name	Brown Sodosol
Representative Site	Site 1
Survey Type	Detailed
Dominant Topography	Lower Slope
Dominant Land Use	Grazing
Pasture Type	Wire Grass, Kangaroo Grass, Barbed Wire Grass
Inherent Soil Fertility	Moderately Low
Slope	9%

Table 2 Field Chemical Parameters: Brown Sodosol (Site 1)

Horizon	Field pH		Dispersivity
	Unit	Rating	Rating
A1	6.5	Slightly Acidic	Non
B21	6.0	Moderately Acidic	Highly
B22	6.0	Moderately Acidic	Highly

Table 3 Profile: Brown Sodosol (Site 1)

Profile	Horizon / Depth (m)	Description
	A1 0.0 – 0.15	Very dark brown (10YR 2/2) loam, moderately structured 5-10 mm crumb peds with weak consistence and a rough fabric. Nil mottling, <5% gravel 5-10 mm, abundant fine roots. Well drained with a clear and even boundary. Sampled 0.0 – 0.10
	B21 0.15 – 0.50	Dark brown (7.5YR 3/2) light clay, strongly structured 20-50 mm angular blocky peds with strong consistence and a rough fabric. 30% grey mottles at +0.30, <5% gravel 5-10 mm, coarse roots common. Poorly drained with a gradual and even boundary. Sampled 0.20 – 0.30
	B22 0.50 – 0.90	Yellowish brown (10YR 5/8) heavy clay, massive with a rough fabric. 40% grey mottles, <5% gravel 5-10 mm, few coarse roots. Poorly drained with a clear and even boundary. Sampled 0.50 – 0.60
	BC +0.90	Weathered parent material. Not sampled

Table 4 Summary: Mesonatric Brown Sodosol (Site 4)

Overview	
	
Landscape Site 4	
ASC Name	Mesonatric Brown Sodosol
Representative Site	Site 4
Survey Type	Detailed Lab
Dominant Topography	Lower Slope
Dominant Land Use	Grazing
Pasture Type	Wire Grass, Kangaroo Grass, Barbed Wire Grass
Inherent Soil Fertility	Moderately Low
Slope	11%

Table 5 Chemical Parameters: Mesonatric Brown Sodosol (Site 4)

Layer	pH (1:5 water)		ESP		ECe (1:5)		Ca:Mg	
	Unit	rating	%	rating	dS/m	rating	ratio	rating
A1	6.2	Slightly Acidic	7.1	Marginally Sodic	0.9	Non-Saline	1.0	Low
B21	5.9	Moderately Acidic	17.9	Strongly Sodic	0.5	Non-Saline	0.4	Very Low
B22	5.9	Moderately Acidic	21.2	Strongly Sodic	0.5	Non-Saline	0.14	Very Low

Table 6 Profile: Mesonatric Brown Sodosol (Site 4)

Profile	Horizon / Depth (m)	Description
	A1 0.0 – 0.10	Very dark greyish-brown (10YR 3/2) loam, moderately structured 5-20 mm crumb peds with weak consistence and a rough fabric. Nil mottling, <5% gravel 5-10 mm, abundant fine roots. Well drained with a clear and even boundary. Sampled 0.0 – 0.10
	B21 0.10 – 0.40	Dark brown (7.5YR 3/3) heavy clay, massive with a rough fabric. 25% brown mottles at +0.30, <5% gravel 5-10 mm, coarse roots common. Poorly drained with a gradual and even boundary. Sampled 0.20 – 0.30
	B22 0.40 – 0.80	Dark reddish-brown (5YR 3/4) heavy clay, massive with a rough fabric. 40% brown mottles, <5% gravel 5-10 mm, few coarse roots. Poorly drained with a clear and even boundary. Sampled 0.50 – 0.60
	BC +0.80	Weathered parent material. Not sampled

Table 7 Summary: Brown Sodosol (Site 5)

Overview	
	
Landscape Site 5	
ASC Name	Brown Sodosol
Representative Site	Site 5
Survey Type	Detailed
Dominant Topography	Upper Slope
Dominant Land Use	Grazing
Pasture Type	Kangaroo Grass, Wire Grass
Inherent Soil Fertility	Moderately Low
Slope	12%

Table 8 Field Chemical Parameters: Brown Sodosol (Site 5)

Horizon	Field pH		Dispersivity
	Unit	Rating	Rating
A1	6.0	Moderately Acidic	Non
B21	6.5	Slightly Acidic	Moderately
B22	6.0	Moderately Acidic	Highly

Table 9 Profile: Brown Sodosol (Site 5)

Profile	Horizon / Depth (m)	Description
	A1 0.0 – 0.15	Very dark greyish-brown (10YR 3/2) loam, moderately structured 5-20 mm crumb peds with weak consistence and a rough fabric. Nil mottling, <5% gravel 5-10 mm, abundant fine roots. Well drained with a clear and even boundary. Sampled 0.0 – 0.10
	B21 0.15 – 0.40	Strong brown (7.5YR 5/6) heavy clay, massive with a sandy fabric. 25% grey mottles at +0.25, <5% gravel 5-10 mm, coarse roots common. Poorly drained with a gradual and even boundary. Sampled 0.20 – 0.30
	B22 +0.40	Reddish brown (5YR 5/4) heavy clay, massive with a rough fabric. 40% grey mottles, <5% gravel 5-10 mm, few coarse roots. Poorly drained with layer continuing beyond sample depth. Sampled 0.50 – 0.60

Table 10 Summary: Hypernatric Brown Sodosol (Site 7)

Overview	
	
Landscape Site 7	
ASC Name	Hypernatric Brown Sodosol
Representative Site	Site 7
Survey Type	Detailed Lab
Dominant Topography	Upper Slope
Dominant Land Use	Grazing
Pasture Type	Wire Grass, Kangaroo Grass, Barbed Wire Grass
Inherent Soil Fertility	Moderately Low
Slope	13%

Table 11 Chemical Parameters: Hypernatric Brown Sodosol (Site 7)

Layer	pH (1:5 water)		ESP		ECe (1:5)		Ca:Mg	
	Unit	rating	%	rating	dS/m	rating	ratio	rating
A1	5.8	Moderately Acidic	10.1	Sodic	0.9	Non-Saline	0.9	Very Low
B21	6.2	Slightly Acidic	30.4	Strongly Sodic	0.8	Non-Saline	0.4	Very Low
B22	6.2	Slightly Acidic	50.2	Strongly Sodic	2.3	Slightly Saline	0.4	Very Low

Table 12 Profile: Hypernatric Brown Sodosol (Site 7)

Profile	Horizon / Depth (m)	Description
	A1 0.0 – 0.10	Very dark greyish-brown (10YR 3/2) loam, moderately structured 5-20 mm crumb peds with weak consistence and a rough fabric. Nil mottling, <5% gravel 5-10 mm, abundant fine roots. Well drained with a clear and even boundary. Sampled 0.0 – 0.10
	B21 0.10 – 0.40	Dark yellowish-brown (10YR 4/4) light clay, strongly structure 20-50 mm angular blocky peds with strong consistence and a rough fabric. 25% grey mottles at +0.20, <5% gravel 5-10 mm, coarse roots common. Poorly drained with a gradual and even boundary. Sampled 0.20 – 0.30
	B22 0.40 – 0.65	Dark brown (10YR 4/6) clay loam, strongly structured <50 mm angular blocky peds with strong consistence and a rough fabric. 30% grey mottles, <5% gravel 5-10 mm, few coarse roots. Poorly drained with a clear and even boundary. Sampled 0.50 – 0.60
	BC +0.65	Weathered parent material. Not sampled

Table 13 Summary: Hypernatric Brown Sodosol (Site 9)

Overview	
	
Landscape Site 9	
ASC Name	Hypernatric Brown Sodosol
Representative Site	Site 9
Survey Type	Detailed Lab
Dominant Topography	Lower Slope
Dominant Land Use	Grazing
Pasture Type	Paspalum, Wire Grass, Kangaroo Grass
Inherent Soil Fertility	Moderately Low
Slope	17%

Table 14 Chemical Parameters: Hypernatric Brown Sodosol (Site 9)

Layer	pH (1:5 water)		ESP		ECe (1:5)		Ca:Mg	
	Unit	rating	%	rating	dS/m	rating	ratio	rating
A1	5.9	Moderately Acidic	11.5	Sodic	1.4	Non-Saline	1.7	Low
B21	6.6	Neutral	60.4	Strongly Sodic	1.2	Non-Saline	0.7	Very Low
B22	6.4	Slightly Acidic	53.9	Strongly Sodic	3.7	Slightly Saline	0.5	Very Low

Table 15 Profile: Hypernatric Brown Sodosol (Site 9)

Profile	Horizon / Depth (m)	Description
	A1 0.0 – 0.20	Very dark brown (10YR 2/2) loamy sand, weakly structured 5-10 mm crumb peds with weak consistence and a rough fabric. Nil mottling, <5% gravel 5-10 mm, abundant fine roots. Well drained with a clear and even boundary. Sampled 0.0 – 0.10
	B21 0.20 – 0.50	Dark yellowish-brown (10YR 3/4) heavy clay, massive with a rough fabric. 20% yellow mottles at +0.30, <5% gravel 5-10 mm, coarse roots common. Poorly drained with a gradual and even boundary. Sampled 0.20 – 0.30
	B22 0.50 – 0.90	Very dark brown (7.5YR 4/4) heavy clay, massive with a rough fabric. 30% grey mottles, <5% gravel 5-10 mm, few coarse roots. Poorly drained with layer continuing beyond sample depth. Sampled 0.50 – 0.60

Table 16 Summary: Eutrophic Red Chromosol (Site 10)

Overview	
	
Landscape Site 10	
ASC Name	Eutrophic Red Chromosol
Representative Site	Site 10
Survey Type	Detailed Lab
Dominant Topography	Mid Slope
Dominant Land Use	Grazing
Pasture Type	Paspalum, Kikuyu
Inherent Soil Fertility	Moderately High
Slope	10%

Table 17 Chemical Parameters: Eutrophic Red Chromosol (Site 10)

Layer	pH (1:5 water)		ESP		ECe (1:5)		Ca:Mg	
	Unit	rating	%	rating	dS/m	rating	ratio	rating
A1	6.0	Slightly Acidic	1.4	Non Sodic	0.7	Non-Saline	0.9	Very Low
B21	5.8	Moderately Acidic	4.3	Non Sodic	0.4	Non-Saline	0.3	Very Low
B22	5.6	Moderately Acidic	6.8	Marginally Sodic	0.6	Non-Saline	0.2	Very Low
B22	5.4	Strongly Acidic	12.8	Sodic	1.8	Non-Saline	0.1	Very Low

Table 18 Profile: Eutrophic Red Chromsol (Site 10)

Profile	Horizon / Depth (m)	Description
	A1 0.0 – 0.10	Very dark brown (10YR 2/2) loam, weakly structured 5-10 mm crumb peds with weak consistence and a rough fabric. Nil mottling, <5% gravel 5-10 mm, abundant fine roots. Well drained with a clear and even boundary. Sampled 0.0 – 0.10
	B21 0.10 – 0.60	Dark red (2.5YR 3/6) heavy clay, massive with a rough fabric. 20% distinct yellow mottles at +0.30, Nil gravel, coarse roots common. 10% distinct brown mottles. Poorly drained with a gradual and even boundary. Sampled 0.20 – 0.30
	B22 0.60 – 1.0	Yellowish red (5YR 4/6) heavy clay, massive with a rough fabric. 20% distinct brown mottles, <5% gravel 5-10 mm, few coarse roots. Poorly drained with a clear and even boundary. Sampled 0.50 – 0.60 and 0.65 – 0.75
	BC +1.0	Weathered parent material. Not sampled

Table 19 Summary: Brown Sodosol (Site 11)

Overview	
	
Landscape Site 11	
ASC Name	Brown Sodosol
Representative Site	Site 11
Survey Type	Detailed
Dominant Topography	Lower Slope Creek Flat
Dominant Land Use	Grazing
Pasture Type	Paspalum, Kikuyu
Inherent Soil Fertility	Moderately Low
Slope	11%

Table 20 Field Chemical Parameters: Brown Sodosol (Site 11)

Horizon	Field pH		Dispersivity
	Unit	Rating	Rating
A1	6.5	Slightly Acidic	Non
A2	6.5	Slightly Acidic	Non
B2	6.0	Moderately Acidic	Highly

Table 21 Profile: Brown Sodosol (Site 11)

Profile	Horizon / Depth (m)	Description
	A1 0.0 – 0.25	Black (7.5YR 2.5/1) loam, weakly structured 5-15 mm crumb peds with weak consistence and a rough fabric. Nil mottling, <5% gravel 5-10 mm, abundant fine roots. Well drained with a gradual and even boundary. Sampled 0.0 – 0.10
	A2 0.25 – 0.40	Very dark greyish-brown (10YR 3/2) sandy loam, weakly structured 5-25 mm crumb peds with weak consistence and a rough fabric. Nil mottling, <5% gravel 5-10 mm, abundant fine roots. Well drained with a clear and even boundary. Sampled 0.20 – 0.30
	B2 +0.40	Dark yellowish brown (10YR 4/4) light clay, moderately structured 10-30 mm blocky peds with moderate consistence and a rough-fabric. 30% distinct grey mottles, nil gravel, few coarse roots. Poorly drained with layer continuing beyond sample depth. Sampled 0.50 – 0.60 and 0.65 – 0.75

Table 22 Summary: Magnesic-Natric Red Kurosol (Site 12)

Overview	
	
Landscape Site 12	
ASC Name	Magnesic-Natric Red Kurosol
Representative Site	Site 12
Survey Type	Detailed Lab
Dominant Topography	Upper Slope
Dominant Land Use	Grazing
Pasture Type	Wire Grass, Kangaroo Grass, Barbed Wire Grass
Inherent Soil Fertility	Moderately Low
Slope	8%

Table 23 Chemical Parameters: Magnesic-Natric Red Kurosol (Site 12)

Layer	pH (1:5 water)		ESP		ECe (1:5)		Ca:Mg	
	Unit	rating	%	rating	dS/m	rating	ratio	rating
A1	5.8	Moderately Acidic	2.2	Non Sodic	0.8	Non-Saline	1.3	Low
B21	5.4	Strongly Acidic	10.6	Sodic	1.3	Non-Saline	<0.1	Very Low
B22	5.3	Strongly Acidic	19.5	Strongly Sodic	3.1	Slightly Saline	<0.1	Very Low

Table 24 Profile: Magnesic-Natric Red Kurosol (Site 12)

Profile	Horizon / Depth (m)	Description
	A1 0.0 – 0.20	Very dark brown (7.5YR 2.5/2) sandy loam, weakly structured 5-10 mm crumb peds with weak consistence and a rough fabric. Nil mottling, 20% gravel 5-10 mm, abundant fine roots. Well drained with a clear and even boundary. Sampled 0.0 – 0.10
	B21 0.20 – 0.40	Dark red (2.5YR 3/6) light-medium clay, massive with a rough fabric. 40% distinct yellow mottles, <5% gravel 5-10 mm, coarse roots common. Poorly drained with a gradual and even boundary. Sampled 0.30 – 0.40
	B22 0.40 – 0.60	Reddish brown (5YR 4/4) light clay, massive with a rough fabric. 40% distinct brown mottles, <5% gravel 5-10 mm, few coarse roots. Poorly drained with a clear and even boundary. Sampled 0.50 – 0.60
	BC +0.60	Weathered parent material. Not sampled

Table 25 Summary: Mesonatric Brown Sodosol (Site 16)

Overview	
	
Landscape Site 16	
ASC Name	Mesonatric Brown Sodosol
Representative Site	Site 16
Survey Type	Detailed Lab
Dominant Topography	Upper Slope
Dominant Land Use	Grazing
Pasture Type	Wire Grass, Kangaroo Grass, Barbed Wire Grass
Inherent Soil Fertility	Moderately Low
Slope	7%

Table 26 Chemical Parameters: Mesonatric Brown Sodosol (Site 16)

Layer	pH (1:5 water)		ESP		ECe (1:5)		Ca:Mg	
	Unit	rating	%	rating	dS/m	rating	ratio	rating
A1	7.1	Neutral	1.2	Non Sodic	0.7	Non-Saline	4.1	Balanced
A2	7.1	Neutral	3.1	Non Sodic	0.5	Non-Saline	2.6	Low
B21	5.5	Moderately Acidic	17.7	Strongly Sodic	1.8	Non-Saline	0.1	Very Low
B22	5.5	Strongly Acidic	25.3	Strongly Sodic	2.4	Non-Saline	<0.1	Very Low

Table 27 Profile: Mesonatric Brown Sodosol (Site 16)

Profile	Horizon / Depth (m)	Description
	A1 0.0 – 0.15	Very dark brown (10YR 2/2) sandy loam, weakly structured 5-10 mm crumb peds with weak consistence and a rough fabric. Nil mottling, 10% gravel 5-10 mm, abundant fine roots. Well drained with a gradual and even boundary. Sampled 0.0 – 0.10
	A2 0.15 – 0.30	Dark brown (7.5YR 3/2) sandy loam, weakly structured 2-5 mm crumb peds with weak consistence and a rough fabric. Nil mottling, 20% gravel 5-10 mm, abundant fine roots. Well drained with a clear and even boundary. Sampled 0.20 – 0.30
	B21 0.30 – 0.60	Brown (10YR 5/3) light clay, massive with a rough fabric. 30% distinct yellow mottles, nil gravel, few coarse roots. Poorly drained with a clear and even boundary. Sampled 0.50 – 0.60
	B22 0.60 – 0.90	Light brownish grey (2.5Y 6/2) clay loam, moderately structured 5-25 mm blocky peds with moderate consistence and a rough fabric. 30% grey mottles, nil gravel, few coarse roots. Poorly drained with a clear and even boundary. Sampled 0.65 – 0.75
	BC +0.90	Weathered parent material. Not sampled

APPENDIX C

Check Site Descriptions



Table 1 Summary: Brown Sodosol (Site 2)

Overview	
	
Landscape Site 2	
ASC Name	Brown Sodosol
Representative Site	Site 2
Survey Type	Observation
Dominant Topography	Mid Slope
Dominant Land Use	Grazing
Pasture Type	Wire Grass, Kangaroo Grass, Barbed Wire Grass
Inherent Soil Fertility	Moderately Low
Slope	25%

Table 2 Field Chemical Parameters: Brown Sodosol (Site 2)

Horizon	Field pH		Field Dispersivity
	Unit	Rating	Rating
A1	6.5	Slightly Acidic	Non
B2	6.5	Slightly Acidic	High

Table 3 Summary: Brown Sodosol (Site 3)

Overview	
	
Landscape Site 3	
ASC Name	Brown Sodosol
Representative Site	Site 3
Survey Type	Observation
Dominant Topography	Mid Slope (Dam Bank)
Dominant Land Use	Grazing
Pasture Type	Wire Grass, Kangaroo Grass, Barbed Wire Grass
Inherent Soil Fertility	Moderately Low
Slope	16%

Table 4 Field Chemical Parameters: Brown Sodosol (Site 3)

Horizon	Field pH		Field Dispersivity
	Unit	Rating	Rating
A1	6.0	Moderately Acidic	Non
B2	6.0	Moderately Acidic	High

Table 5 Summary: Brown Sodosol (Site 6)

Overview	
	
Landscape Site 6	
ASC Name	Brown Sodosol
Representative Site	Site 6
Survey Type	Observation
Dominant Topography	Mid Slope
Dominant Land Use	Grazing
Pasture Type	Kangaroo Grass, Wire Grass
Inherent Soil Fertility	Moderately Low
Slope	13%

Table 6 Field Chemical Parameters: Brown Sodosol (Site 6)

Horizon	Field pH		Field Dispersivity
	Unit	Rating	Rating
A1	6.0	Moderately Acidic	Non
B2	6.5	Slightly Acidic	High

Table 7 Summary: Brown Sodosol (Site 8)

Overview	
	
Landscape Site 8	
ASC Name	Brown Sodosol
Representative Site	Site 8
Survey Type	Observation
Dominant Topography	Mid Slope
Dominant Land Use	Grazing
Pasture Type	Kangaroo Grass, Wire Grass
Inherent Soil Fertility	Moderately Low
Slope	25%

Table 8 Field Chemical Parameters: Brown Sodosol (Site 8)

Horizon	Field pH		Field Dispersivity
	Unit	Rating	Rating
A1	6.0	Moderately Acidic	Non
B2	6.5	Slightly Acidic	High

Table 9 Summary: Brown Sodosol (Site 13)

Overview	
	
Landscape Site 13	
ASC Name	Brown Sodosol
Representative Site	Site 13
Survey Type	Observation
Dominant Topography	Drainage Line
Dominant Land Use	Grazing
Pasture Type	Kangaroo Grass, Wire Grass, Kikuyu
Inherent Soil Fertility	Moderately Low
Slope	10%

Table 10 Field Chemical Parameters: Brown Sodosol (Site 13)

Horizon	Field pH		Field Dispersivity
	Unit	Rating	Rating
A1	7.0	Neutral	Non
B2	6.0	Moderately Acidic	High

Table 11 Summary: Brown Sodosol (Site 14)

Overview	
	
Landscape Site 14	
ASC Name	Brown Sodosol
Representative Site	Site 14
Survey Type	Observation
Dominant Topography	Drainage Line
Dominant Land Use	Grazing
Pasture Type	Kangaroo Grass, Wire Grass, Kikuyu
Inherent Soil Fertility	Moderately Low
Slope	2%

Table 12 Field Chemical Parameters: Brown Sodosol (Site 14)

Horizon	Field pH		Field Dispersivity
	Unit	Rating	Rating
A1	6.0	Moderately Acidic	Non
B2	6.5	Slightly Acidic	Moderate

Table 13 Summary: Red Chromosol (Site 15)

Overview	
	
Landscape Site 15	
ASC Name	Red Chromosol
Representative Site	Site 15
Survey Type	Observation
Dominant Topography	Mid Slope
Dominant Land Use	Grazing
Pasture Type	Kangaroo Grass, Wire Grass, Kikuyu
Inherent Soil Fertility	Moderately High
Slope	10%

Table 14 Field Chemical Parameters: Red Chromosol (Site 15)

Horizon	Field pH		Field Dispersivity
	Unit	Rating	Rating
A1	6.5	Slightly Acidic	Non
B2	6.5	Slightly Acidic	Slight

Table 15 Summary: Brown Sodosol (Site 17)

Overview	
	
Landscape Site 17	
ASC Name	Brown Sodosol
Representative Site	Site 17
Survey Type	Observation
Dominant Topography	Drainage Line
Dominant Land Use	Grazing
Pasture Type	Kangaroo Grass, Wire Grass
Inherent Soil Fertility	Moderately Low
Slope	10%

Table 16 Field Chemical Parameters: Brown Sodosol (Site 17)

Horizon	Field pH		Field Dispersivity
	Unit	Rating	Rating
A1	6.0	Moderately Acidic	Non
B2	6.5	Slightly Acidic	High

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