DRAYTON SOUTH

Soil and Land Capability Impact Assessment

ENVIRONMENTAL EARTH SCIENCES
THE KNOW AND THE HOW

REPORT NO. 612019

SOIL AND LAND CAPABILITY IMPACT ASSESSMENT, DRAYTON SOUTH COAL PROJECT

ENVIRONMENTAL EARTH SCIENCES NSW
REPORT TO HANSEN BAILEY
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FINAL VERSION

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EXECUTIVE SUMMARY

Environmental Earth Sciences NSW was commissioned by Hansen Bailey Environmental Consultants on behalf of Anglo American Metallurgical Coal Pty Ltd to undertake a soil and land capability impact assessment for the Drayton South Coal Project (the Project). The purpose of the assessment is to form part of an Environmental Assessment being prepared by Hansen Bailey Environmental Consultants to support an application for a contemporary Project Approval under Part 3A of the *Environmental Planning and Assessment Act 1979* to facilitate the continuation of the existing Drayton Mine by the development of an open cut and highwall coal mining operation and associated infrastructure within the Drayton South area.

The Environmental Earth Sciences NSW soil and land capability impact assessment provides:

- a description of the soil and land suitability classification across the study area in accordance with the *Australian Soil Classification* (Isbell, 1996);
- a description of agricultural land classes across the study area in accordance with *Agricultural Land Classification* (NSW Agriculture, 2002);
- a description of land capability based on *The Land and Soil Capability Assessment Scheme: Second Approximation* (OEH, 2012) ;
- an assessment of the Project impacts in accordance with the *Upper Hunter Strategic Regional Land Use Plan* (DP&I, September 2012) with specific consideration to the criteria for determining Biophysical Strategic Agricultural Land; and
- recommendations on soil stripping depths for all soil types across the study area along with recommendations for topsoil management, handling and stockpiling.

A “free survey” methodology, consistent with the *Guidelines for Surveying Soil and Land Resources* (McKenzie et al., 2008), was adopted for the field survey. A total of 37 soil profiles were collected and 39 surface observations were recorded across the study area to delineate the underlying soil properties. Selected soil samples were analysed for various physical and chemical soil parameters by a NATA accredited laboratory. Results of the desktop assessment, field survey and laboratory analysis showed that four major soil types occurred across the study area, including Sodosols, Dermosols, Vertosols and to a lesser extent, Tenosols. Soils were recommended for stripping at specific depths and reuse in rehabilitation, where required.

The rural land capability classification across the study area ranged from Class IV to Class VII with Classes VI and VII being the most dominant. Agricultural land suitability classification across the study area ranges from land suitability Class 3 to Class 5 with Class 4 land being the most dominant.

Post mining, land within the Drayton South disturbance footprint will no longer be available for the purposes outlined in *The Land and Soil Capability Assessment Scheme: Second Approximation* (OEH, 2012) and *Agricultural Land Classification* (NSW Agriculture, 2002). Instead, the affected land will be rehabilitated to establish threatened woodland communities. This area will be reserved in perpetuity as an onsite biodiversity offset for the Project.

Areas outside the disturbance footprint will retain the same pre-mining class. This land will continue to be suitable for livestock grazing, which is considered to be a component of the final land use goal for the study area.

1 INTRODUCTION

Environmental Earth Sciences NSW has been engaged by Hansen Bailey Environmental Consultants (Hansen Bailey) on behalf of Anglo American Metallurgical Coal Pty Ltd (Anglo American) to complete a soil and land capability impact assessment for the Drayton South Coal Project (the Project). The purpose of the assessment is to form part of an Environmental Assessment (EA) being prepared by Hansen Bailey to support an application for a contemporary Project Approval under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) to facilitate the continuation of the existing Drayton Mine by the development of an open cut and highwall coal mining operation and associated infrastructure within the Drayton South area.

In October 2011, Part 3A of the EP&A Act was repealed. However, the Project has been granted the benefit of transitional provisions, and as such, is a development to which Part 3A still applies.

The scope of work completed by Environmental Earth Sciences NSW for this assessment included:

- addressing the Director-General's Environmental Assessment Requirements relating to soils and land capability, issued on 3 August 2011;
- identification of soil types within the study area;
- assessment of pre and post mining land capability and classes;
- assessment of pre and post mining agricultural suitability;
- identification of any land that meets the criteria for Biophysical Strategic Agricultural Land (BSAL) and, where applicable, assessment of the Project impacts in accordance with the *Strategic Regional Land Use Plan – Upper Hunter* (SRLUP) (DP&I, September 2012);
- assessment of available topsoil resource for post mining rehabilitation and management measures;
- detailed description of the proposed mine rehabilitation process and implications for excavated overburden; and
- assessment of suitability of land uses post-closure of the mine.

1.1 Project description

Drayton Mine is managed by Anglo Coal (Drayton Management) Pty Ltd which is owned by Anglo American. Drayton Mine commenced production in 1983 and currently holds Project Approval 06_0202 (dated 1 February 2008) which expires in 2017, at which time the operation will have to close.

The Project will allow for the continuation of mining at Drayton Mine by the development of open cut and highwall mining operations within the Drayton South mining area while continuing to utilise the existing infrastructure and equipment from Drayton Mine.

The Project is located approximately 10 km north west of the village of Jerrys Plains and approximately 13 km south of the township of Muswellbrook in the Upper Hunter Valley of NSW. The Project is predominately situated within the Muswellbrook Shire Local Government Area (LGA), with the south west portion falling within the Singleton LGA.

Figure 1 illustrates the location of the Project. The Project is located adjacent to two thoroughbred horse studs, two power stations and several existing coal mines.

The Project will extend the life of Drayton Mine by a further 27 years ensuring the continuity of employment for its workforce, the ongoing utilisation of its infrastructure and the orderly rehabilitation of Drayton Mine's completed mining areas.

Anglo American is seeking Project Approval under Part 3A of the EP&A Act to facilitate the extraction of coal by both open cut and highwall mining methods within Exploration Licence (EL) 5460 for a period of 27 years. The Project Application Boundary (Project Boundary) is shown on Figure 1.

The Project generally comprises:

- the continuation of operations at Drayton Mine as presently approved with minor additional mining areas within the East, North and South Pits;
- the development of an open cut and highwall mining operation extracting up to 7 Mtpa of ROM coal over a period of 27 years;
- the utilisation of the existing Drayton Mine workforce and equipment fleet (with an addition of a highwall miner and coal haulage fleet);
    - the Drayton Mine fleet consists of at least a dragline, excavators, fleet of haul trucks, dozers, graders, water carts and associated supporting equipment;
- the use of the Drayton Mine existing voids for rejects and tailings disposal and water storage to allow for the optimisation of the Drayton Mine final landform;
- the utilisation of the existing Drayton Mine infrastructure including the Coal Handling and Preparation Plant (CHPP), rail loop and associated loadout infrastructure, workshops, bath houses and administration offices;
- the construction of a transport corridor between Drayton South and Drayton Mine;
- the utilisation of the Antiene Rail Spur off the Main Northern Railway to transport product coal to the Port of Newcastle for export;
- the realignment of a section of Edderton Road; and
- the installation of water management and power reticulation infrastructure at Drayton South.

The conceptual layout of the Project is shown in Figure 2.

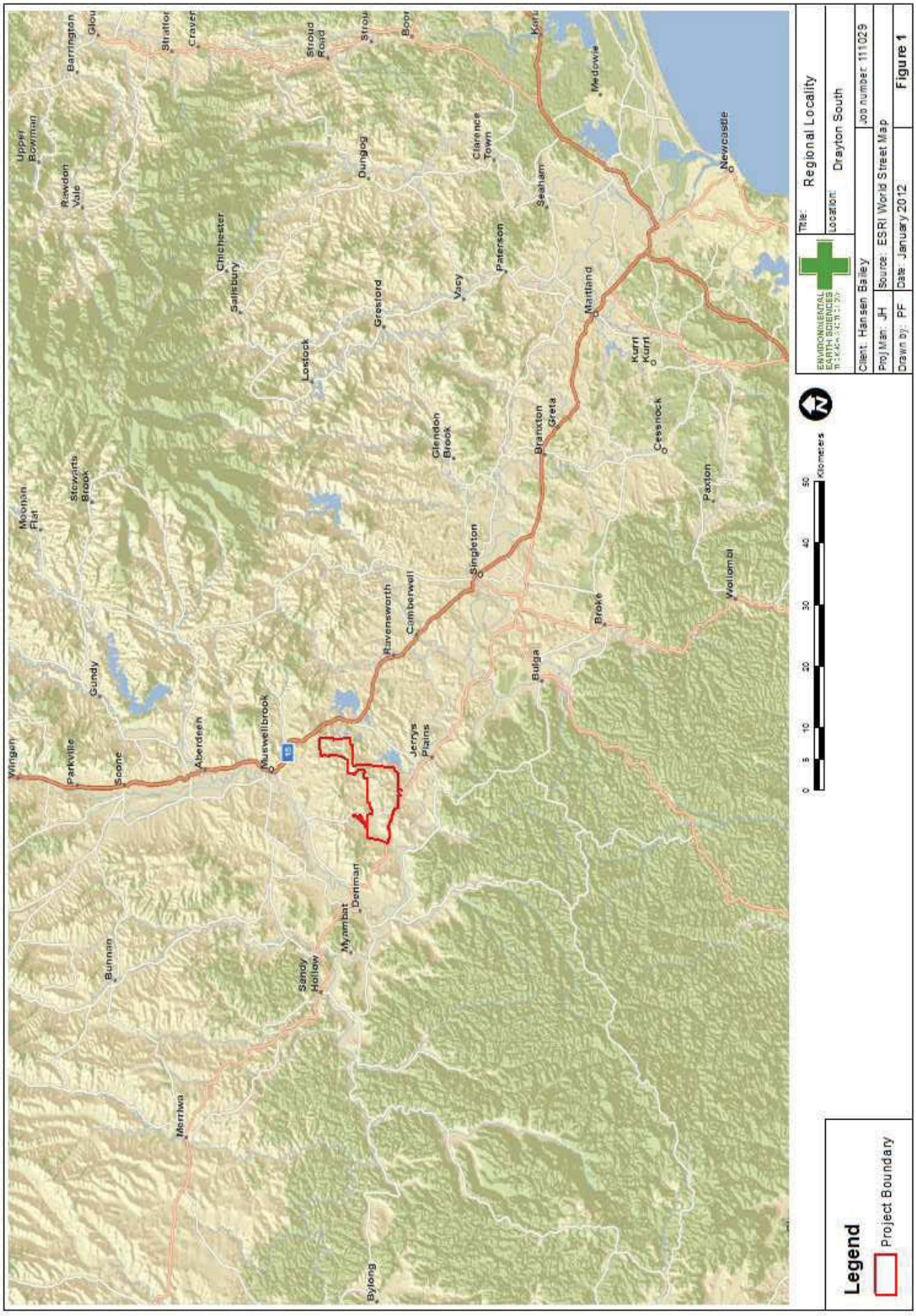
1.2 Study area

The study area comprises an overall area of approximately 4,597 ha (Figure 2) and includes the proposed Drayton South disturbance footprint and the transport corridor. This assessment does not address the existing Drayton Mine as GSS Environmental (2006) previously undertook a soil and land capability assessment as part of the Drayton Mine Extension EA.

1.3 Related studies

The detailed studies which are to be read in conjunction with this document include the following:

- the EA agricultural impact statement;
- the EA geochemistry impact assessment; and
- the EA ecology impact assessment.


Regional Locality
Drayton South
Job number 111029
Client: Hansen Bailey
Proj Man: JH
Source: ESRI World Street Map
Drawn by: PF
Date: January 2012
Figure 1
Legend
Project Boundary
Kilometers
0 5 10 20 30 40 50
Newcastle
Maitland
Cessnock
Singleton
Muswellbrook
Scone
Aberdeen
Gresford
Paterson
Dungog
Clarence Town
Seaham
Medowie
Raymond Terrace
Branxton
Greta
Kurri Kurri
Lostock
Glendon Brook
Ravensworth
Camberwell
Jerrys Plains
Broke
Bulga
Wollombi
Paxton
Denman
Mynmbat
Sandy Hollow
Bunnan
Merriwa
Bylong
Wingen
Parkville
Gundy
Stewarts Brook
Moonan Flat
Rawdon Vale
Upper Bowman
Barrington
Stroud Road
Chichester
Salisbury
Vacy


Existing CTU & Product Coal Stockyard
Existing Train Loading Station
Existing Dump Hopper & ROM Area
Existing Offices & Workshops
Proposed Construction Compound
DRAYTON MINE
Mount Arthur Coal Mine
Edderton Road
TRANSPORT CORRIDOR
Proposed Edderton Road Realignment
Mine Site Facilities
ROM Hopper, Crusher & Stockpile Area
DRAYTON SOUTH
Whynot
Blakefield
Houston
Redbank
Houston Visual Bund
Plashett Dam
Golden Highway
Project Boundary
Study Area
Mining Authorisation Boundaries
Mine Haul Roads
Haul Roads & Light Vehicle Access Road
Conveyor Option
Proposed Edderton Road Realignment Option 1
Proposed Edderton Road Realignment Option 2
Water Pipeline
Discharge Pipeline
Highwall Mining Areas
Overburden Emplacement
Proposed Infrastructure
Existing Infrastructure
Dams
Plashett Dam Notification Area
0 0.5 1 2 3 4 5 Kilometres
ENVIRONMENTAL EARTH SCIENCES
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Title: Conceptual Project Layout
Location: Drayton South
Client: Hansen Bailey
Job number: 612019
Proj Man: JH
Source: Hansen Bailey
Drawn by: PF
Date: Jun 2012
Figure 2

2 LEGISLATIVE FRAMEWORK

Section 2 describes the legislative framework relevant to this assessment and the Project.

This assessment has been prepared in response to specific requirements outlined in the Project's Director General's Environmental Assessment Requirements (EARs). The EARs document a list of policies, guidelines and plans which the Director General believes is relevant to the Project.

The guidelines and policies directly relating to soils include the following:

- Australian and New Zealand Environment Conservation Council (1992), *Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites*;
- National Environment Protection Council (1999), *National Environment Protection (Assessment of Site Contamination) Measure*;
- *State Environmental Protection Policy No. 55 – Remediation of Land*; and
- Department of Urban Affairs and Planning (1998), *Managing Land Contamination*: *Planning Guidelines – SEPP 55 – Remediation of Land.*

These guidance documents and policies relate to investigation and management of soil contamination and not a soil and land capability impact assessment. As such the documents were not relevant to this investigation. However, the guidance relating to rehabilitation, closure and completion are partially addressed by this document (where overburden management is addressed). Although these policies, guidelines or plans were not highlighted in the EARs, Environmental Earth Sciences NSW refers to the following relevant documents as part of the impact assessment:

- *Australian Soil and Land Survey: Field Handbook* (McDonald, et.al., 1998);
- *Guidelines for Surveying Soil and Land Resources* (McKenzie et al., 2008);
- *The Australian Soil Classification* (Isbell, 1996);
- *The Land and Soil Capability Assessment Scheme (Second Approximation): A General Rural Land Evaluation System for New South Wales* (OEH, 2012);
- *Agricultural Land Classification* (NSW Agriculture, 2002);
- *Guide for Selection of Topdressing Material for Rehabilitation of Disturbed Areas* (Elliot and Veness, 1981);
- *Strategic Regional Land Use Plan – Upper Hunter* (SRLUP) (DP&I, September 2012);

The Land and Soil Capability Assessment Scheme: Second Approximation (OEH, 2012) was employed to assist in determination of land capability across the study area. This supersedes *Systems used to Classify Rural Lands in New South Wales* (Cunningham, et.al. 1988).

The SRLUP is a component of the broader Strategic Regional Land Use Policy, which consists of various initiatives to manage land use conflicts in regional areas, in relation to agriculture, coal mining and coal seam gas. The plan maps areas of BSAL, which is defined as:

- *land that falls under soil fertility classes 'high' or 'moderately high' under the Draft Inherent General Fertility of NSW (OEH), and*

- *land capability classes I, II or III under the Land and Soil Capability Mapping of NSW (OEH), and*
- *reliable water of suitable quality, characterised by having rainfall of 350mm or more per annum (9 out of 10 years); or properties within 150m of a regulated river, or unregulated rivers where there are flows for at least 95% of the time (i.e. the 95th percentile flow of each month of the year is greater than zero) or 5th order and higher rivers; or groundwater aquifers (excluding miscellaneous alluvial aquifers, also known as small storage aquifers) which have a yield rate greater than 5L/s and total dissolved solids of less than 1,500mg/L.*

or

- *land that falls under soil fertility classes 'moderate' under the Draft Inherent General Fertility of NSW (OEH), and*
- *land capability classes I or II under the Land and Soil Capability Mapping of NSW (OEH), and*
- *reliable water of suitable quality, characterised by having rainfall of 350mm or more per annum (9 out of 10 years); or properties within 150m of a regulated river, or unregulated rivers where there are flows for at least 95% of the time (i.e. the 95th percentile flow of each month of the year is greater than zero) or 5th order and higher rivers; or groundwater aquifers (excluding miscellaneous alluvial aquifers, also known as small storage aquifers) which have a yield rate greater than 5L/s and total dissolved solids of less than 1,500mg/L.*

The study area has been assessed against the mapping and criteria outlined in the SRLUP and validated by the results of the field survey, to gain an appreciation of the extent and likely impact of the Project on potential BSAL.

3 EXISTING ENVIRONMENT

Section 3 describes the existing environment of the study area.

3.1 Climate

Climate data for the regional locality has been sourced from the Bureau of Meteorology (BoM) Jerrys Plains Post Office or Site Number 061086 (Table 1).

TABLE 1 AVERAGE CLIMATIC STATISTICS BY BOM FROM 1884 TO 2011

Month	Mean Daily Temp (°C)		Mean Rainfall (mm)	Mean Rain Days (>1mm)	Mean Relative Humidity (%)		Mean Wind Speed (km/hr)	
	Min	Max			9 am	3 pm	9am	3pm
January	17.1	31.7	77.0	6.4	67	47	9.6	13.2
February	17.1	30.9	72.4	5.9	72	50	9.0	13.0
March	15.0	28.9	58.3	5.7	72	49	8.8	12.4
April	11.0	25.3	44.5	4.9	72	49	8.6	11.3
May	7.5	21.3	40.9	4.9	77	52	9.0	11.0
June	5.3	18.0	48.1	5.5	80	54	9.4	11.5
July	3.8	17.4	43.5	5.2	78	51	10.6	13.0
August	4.4	19.4	36.5	5.2	71	45	11.0	14.3
September	7.0	22.9	42.0	5.2	65	43	11.7	14.7
October	10.3	26.2	52.1	5.9	59	42	10.9	14.1
November	13.2	29.1	61.1	6.2	60	42	10.5	14.2
December	15.7	31.3	67.9	6.4	61	42	9.9	14.2
Annual	10.6	25.2	644.7	67.4	70	47	9.9	13.1

Mean annual rainfall for the region is 644.7 mm / year with a summer maximum distribution (Table 1). Average maximum temperatures are highest in December and January (summer) ranging from 31.3 – 31.7 °C. July is the coldest month; with a minimum mean daily temperature average of 3.8 °C.

Based upon the available data winds in the vicinity of the study area are from the north-west and south-east quadrants. Winds from the north-west and west are present throughout the year, however, strongest during spring. South-east winds dominate through the majority of the year, except during winter when winds are typically generated from the north-west.

3.2 Topography and hydrology

Local topography consists of low rolling to undulating hills with elevations ranging from 110 m AHD to 260 m AHD on the higher slopes. Main open drainage lines or gullies are also evident throughout the study area.

The study area is situated in the larger Hunter River Catchment which covers approximately 22,000 km^2 (OEH, 2 March 2011). The Hunter River is approximately 0.5 km to the south of the study area's southern boundary and Saddlers Creek, a tributary of the Hunter River that flows in a south-westerly direction through the western portion of the study area (Figure 2). Waterways within the study area are typically represented by unnamed perennial and

ephemeral streams all draining directly into the Hunter River, Saddlers Creek or Saltwater Creek.

3.3 Geology and soils

The study area is situated within the northern part of the Sydney Basin which generally comprises Permian to Triassic aged sedimentary units with occasional later igneous intrusions. The Sydney Basin forms part of the Sydney-Gunnedah-Bowen Basin, which extends from southern NSW to central Queensland.

The study area lies within the Hunter Valley region and forms part of the Tomago/Newcastle Coal Measures (Herbert, 1980). The geological unit which underlies the study area is the Wittingham Coal Measures, which is known to comprise of sandstone, claystone, siltstone, conglomerate and coal seams.

The generalised geology of the study area and its surrounds is further supplemented and confirmed by a review of registered groundwater bores in the vicinity on the *NSW Natural Resource Atlas*. The three registered bores (one immediately to the north of the study area across Saddlers Creek and two to the south immediately across the Hunter River) indicate shallow bedrock geology comprising of inter-bedded sandstone and shale layers.

The *1:250,000 Singleton Soil Landscape Series Sheet* (SI 56-1) (Kovac and Lawrie, 1991) indicates that the soils in the majority of the study area is characterised by the Brays Hill soil landscape. Land in the north-west of the study area associated with Saddlers Creek and its tributaries are underlain by soils of the Bayswater landscape grouping.

The Brays Hill landscape grouping is characterised by red clays (*Vertosol*) on the mid-slopes, black earths on steeper slopes and grey and brown clays (*Vertosols*) with linear gilgai (small ephemeral water bodies) and yellow solodic soils (soils with a strong texture contrast between the A and B horizon and a bleached A2 horizon (*Sodosols*)) on some lower slopes. Crests and upper slopes are characterised by red-brown earths (*Chromosols and Dermosols*) and alluvial soils are present in drainage lines.

The Bayswater landscape grouping is characterised by yellow solodic soils (*Sodosols)* and yellow and brown podzolic soils (*Chromosols)* on slopes with alluvial soils in drainage lines. Yellow solodic soils and red-brown earth (*Chromosols and Dermosols*) intergrades are also known to occur. Brown and yellow earths and prairie soils (a soil type occurring in temperate areas formerly under prairie grasses and characterized by a black A horizon) are present in some drainage lines.

3.4 Vegetation

A number of vegetation communities, including the Commonwealth and State listed Box Gum Woodland occur within the study area (Table 2). These habitats remain highly modified as a result of many years of agricultural use; however, it continues to retain some value for threatened species. Although degraded, the riparian habitat of Saddlers Creek and Saltwater Creek provides foraging habitat and also serves as movement corridors for fauna.

TABLE 2 VEGETATION COMMUNITIES WITHIN THE STUDY AREA

Vegetation Community	NSW Status (Threatened Species Conservation Act)	Federal Status (Environment Protection and Biodiversity Conservation Act)
Upper Hunter White Box – Ironbark Grassy Woodland	Endangered Ecological Community (EEC)	Critically Endangered Ecological Community (CEEC)
Upper Hunter White Box – Ironbark Grassy Woodland Derived Native Grassland	EEC	CEEC
Hunter Floodplain Red Gum Woodland Complex	EEC	CEEC
Hunter Floodplain Red Gum Woodland Complex Derived Native Grassland	EEC	CEEC
Central Hunter Box – Ironbark Woodland	EEC	-
Central Hunter Bulloak Forest Regeneration	-	-
Hunter Valley River Oak Forest	-	-
Narrabeen Footslopes Slaty Gum Woodland	Vulnerable	-
Cooba Scrub	-	-
Other Grassland	-	-
Planted Vegetation	-	-

3.5 Land use

3.5.1 Regional land use

The land use in the Upper Hunter region is generally associated with rural operations in conjunction with specialised industrial activities. Rural land uses predominantly involve grazing (cattle and sheep), thoroughbred horse breeding and viticulture. Significant industrial activities include coal mining and power generation. There are also a number of rural residential areas within the vicinity, including Jerrys Plains.

A large proportion of the prime agricultural land in the region surrounding the study area is situated on the floodplain of the Hunter River and its larger tributaries. The Hunter River also plays an important role in the operation of the region's mining and power generation industries and in irrigating two premier thoroughbred horse studs (Coolmore and Woodlands Stud), which share a common boundary with the Project.

The land to the north of the study area is associated with coal mines, including Mt Arthur Coal Mine and Drayton Mine. The Dellworth EL 6812 adjoins the study area to the immediate north-east and east and the Spur Hill EL 7429 adjoins the study area to the west. This is a strong indication of the prevalence of coal mining as a dominant land use in the surrounding area. Bayswater and Liddell Power Stations (both operated by Macquarie Generation) are located approximately 5 km and 7.5 km to the north-east of the study area, respectively.

The township of Jerrys Plains is situated approximately 10 km to the south east of the study area across the Hunter River. Small rural and rural-residential properties are also located to the south west and south east of the study area.

3.5.2 Land use within the study area

The study area is currently managed as agricultural land and operated by two licensees who occupy the land, which is owned by Anglo American. The predominant agricultural land use within the study area is extensive beef cattle grazing with the major enterprise being beef cattle breeding for the weaner and domestic market.

4 SOIL SURVEY METHODOLOGY

Section 4 outlines the activities undertaken to classify and analyse the main soil types located within the study area.

4.1 Desktop assessment

A desktop assessment was undertaken to gain an initial understanding of the different soil and landscapes types across the study area. This involved a review of available aerial photographs and topographic maps of the study area and its surrounds. These were reviewed for the purpose of delineating landscape features and geomorphic processes within the study area. This information was then correlated with soil and geological maps, including the *Soil Landscapes of the Singleton 1:250,000 Sheet* (Kovac and Lawrie, 1991), to gain an understanding of the relationships between geology and physical and biological processes, which may contribute to the formation of soil types within the study area.

Vegetation mapping, hydrological and hydrogeological data and previous assessments, including the *Drayton Mine Extension EA: Soil Survey and Land Capability Assessment Report* (GSS Environmental, 2006), were also reviewed to characterise soil attributes within the study area.

Following review of the available information, a conceptual soil plan was be prepared for the study area. This plan was then used to select sample locations for the field survey.

4.2 Field survey

The field survey was based upon the “free survey” method consistent with McKenzie et.al. (2008). A free survey is conducted by locating points in an irregular fashion (i.e. not grid-based) according to the survey team’s judgement to delineate soil boundaries at moderate to highly detailed scales.

Activities conducted during the field survey included:

- validation of soil sample locations;
- assessment of landform variability;
- assessment of geomorphologic units and landscape connectivity across the study area;
- refinement of soil units classifications across the study area;
- assessment of erosion features and indications of soil movement (e.g. slumping);
- search for salinity indicators across the study area (e.g. dead vegetation, salinity resistant vegetation, scalding, salt crusts, etc); and
- collection of soil profile exposures.

The field survey focussed on a detailed assessment of the Drayton South disturbance footprint (1,902 ha) within the study area. The survey of this area was undertaken at a scale of 1:50,000 (medium intensity), which is considered suitable for strategic planning of more intensive land use development (McKenzie et al., 2008). According to the *Guidelines for Surveying Soil and Land Resources* (McKenzie, et al., 2008), a 1:50,000 scale survey requires a total of between 38 and 76 locations across the extent of the area of interest. These locations can include both soil profile exposures and surface observations. A total of 26 soil profile exposures were collected (see Figure 3) within the Drayton South disturbance footprint. Due to the current condition of the land within the disturbance boundary and its

surrounds, numerous surface exposures are readily visible and identifiable. As such a total of 22 surface observations were recorded, thereby fulfilling the location density requirements. This approach provides a high degree of certainty of accurately identifying the soil types from the samples collected.

The remainder of the study area (2,695 ha), which will not be impacted by the Project, was surveyed at a scale of 1:100,000 (medium to low intensity), which is considered suitable for characterisation of major land use types and for regional and local planning (McKenzie et al., 2008). According to the *Guidelines for Surveying Soil and Land Resources* (McKenzie, *et. al*., 2008), a 1:100,000 scale survey requires a total of between 13 and 27 locations across the extent of the area of interest. A total of 11 soil profile exposures were collected (see Figure 3) and 17 surface observations were recorded within the remainder of the study area, thereby fulfilling the location density requirements. This approach allows for the surrounding land to be characterised for planning and management purposes, such as that of the SRLUP.

A due diligence assessment for ecology and Aboriginal archaeology was undertaken at each of the sample locations prior to commencement of fieldwork.

Soil sample locations were excavated with a backhoe and ranged in depth from 1 m to 2 m below ground level. Soil profiles were generally distinguished based on variations in structure, texture and colour. Soil colours were assessed in accordance with the *Munsell Soil Colour Charts* (Macbeth, 1975).

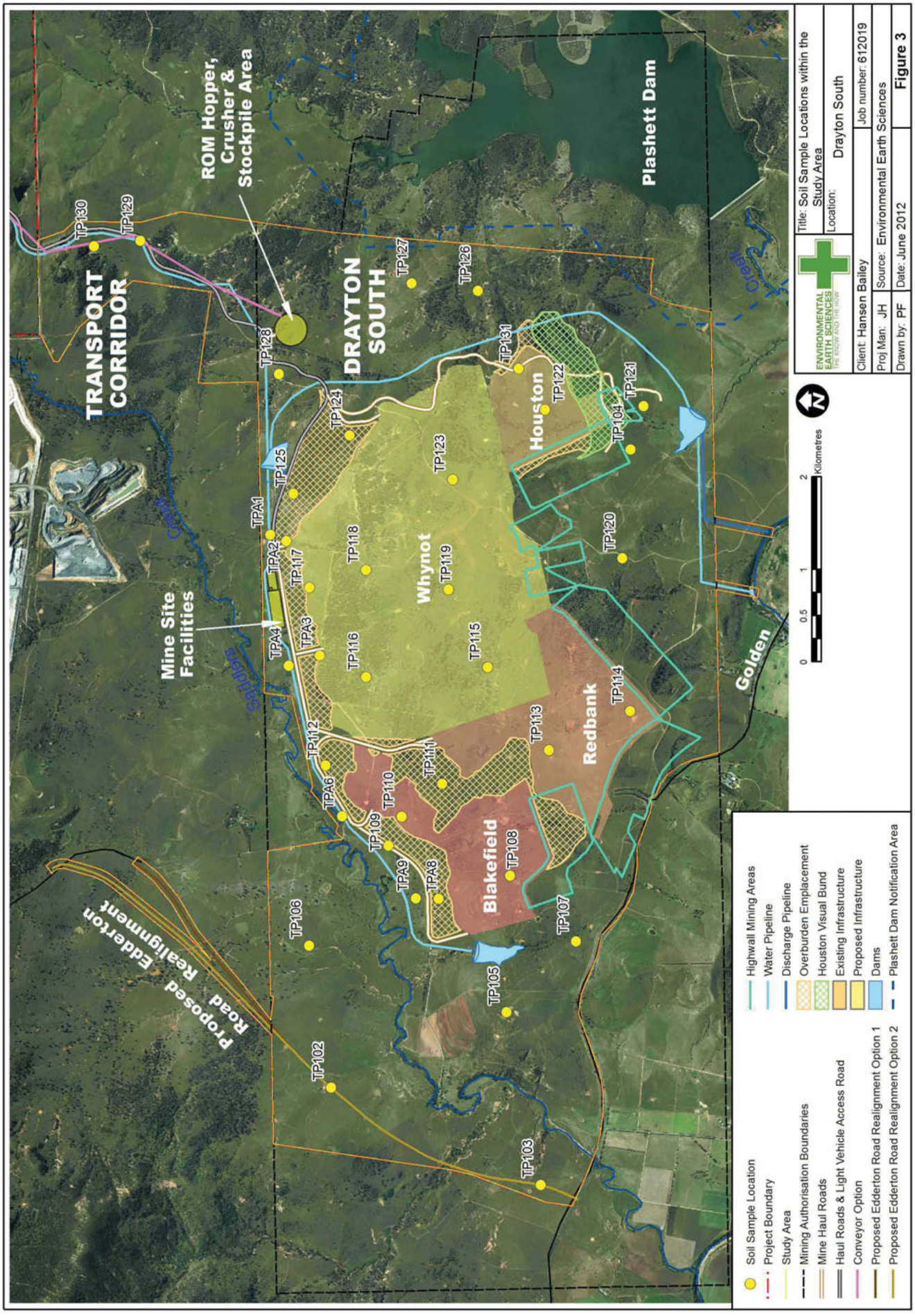
Soil profiles were described for all soil sample locations using the parameters outlined in Table 3. The stratigraphy of each soil sample location was logged and the results are presented in Appendix C.

TABLE 3 SOIL PROFILE DESCRIPTION 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 / depositional status, textual grade
Consistence force	Structural stability, dispersion, pedality formation
Structure pedality grade and ped size	Soil structure, root penetration, permeability, aeration
Gravel and cobble inclusion, composition, size	Water holding capacity, weathering status, erosional / depositional character
Roots – amount and size	Effective rooting depth, presence and prevalence of roots in the A and B horizons and vegetative stability
Bioturbation	Biological mixing depth (where discernible)

Soil profile exposures at each sample location were assessed according to a procedure devised by Elliot and Veness (1981) for the recognition of suitable topdressing materials (Appendix A). This procedure assesses soils based on grading, texture, structure, consistency, mottling and root presence.

The field survey for this assessment did not address the existing Drayton Mine, as GSS Environmental (2006) undertook a soils and land capability assessment over that land as part of the Drayton Mine Extension EA.


ROM Hopper, Crusher & Stockpile Area
Plashett Dam
TRANSPORT CORRIDOR
DRAYTON SOUTH
Mine Site Facilities
Proposed Edderton Road Realignment
Houston
Whynot
Redbank
Blakefield
Golden
Soil Sample Location
Project Boundary
Study Area
Mining Authorisation Boundaries
Mine Haul Roads
Haul Roads & Light Vehicle Access Road
Conveyor Option
Proposed Edderton Road Realignment Option 1
Proposed Edderton Road Realignment Option 2
Highwall Mining Areas
Water Pipeline
Discharge Pipeline
Overburden Emplacement
Houston Visual Bund
Existing Infrastructure
Proposed Infrastructure
Dams
Plashett Dam Notification Area
Kilometres
Title: Soil Sample Locations within the Study Area
Location: Drayton South
Client: Hansen Bailey
Job number: 612019
Proj Man: JH
Source: Environmental Earth Sciences
Drawn by: PF
Date: June 2012
Figure 3

4.3 Laboratory soil assessment

Samples were collected from the soil profile exposures of major units within the study area. Representative samples were selected for subsequent laboratory analysis at the following laboratories accredited by the National Association of Testing Laboratories (NATA):

- GHD Geotechnics Laboratory located at Artarmon NSW; and
- Sydney Analytical Laboratories (SAL) located at Seven Hills NSW.

Selection of samples for analysis was based on establishing the physical and geochemical suitability of surface and near-surface soil horizons for use as topdressing in rehabilitation works and to identify soils that may require particular management.

Table 4 indicates which soil profile exposures from the sample locations were selected for laboratory analysis.

TABLE 4 SOIL SAMPLES SELECTED FOR LABORATORY ANALYSIS

Site	Samples	Site	Samples
TP102	0.9-1.0m	TP117	0.0-0.2m, 0.4-0.5m
TP103	0.2-0.3m, 0.5-0.6m	TP118	0.5-0.7m
TP104	0.6-0.8m	TP119	0.0-0.2m, 0.6-0.8m
TP105	0.3-0.5m, 0.5-0.6m	TP120	0.0-0.1
TP106	0.2-0.3m	TP121	0.4-0.5m, 0.9-1.0m, 1.7-1.8m
TP107	0.3-0.4m	TP122	0.2-0.3m, 0.6-0.7m
TP108	0.0-0.1m, 0.6-0.8m	TP123	0.4-0.5m
TP109	0.0-0.1m, 0.7-0.8m	TP124	0.2-0.4m
TP110	0.2-0.4m, 0.8-1.0m	TP125	0.0-0.1m, 0.6-0.8m
TP111	0.4-0.5m	TP126	0.4-0.5m
TP112	0.0-0.1m	TP127	0.1-0.2m, 0.5-0.6m
TP113	0.2-0.3m	TP128	0.0-0.1m, 0.4-0.5m
TP114	0.6-0.8m	TP129	0.9-1.0m, 1.4-1.6m
TP115	0.3-0.4m, 0.8-1.0m	TP130	0.1-0.2m
TP116	0.0-0.2m		

The samples were analysed for the following parameters:

- pH;
- electrical conductivity (EC);
- chloride;
- cation exchange capacity and exchangeable ions;
- selected heavy metals (As, Cd, Mg, Mn, Mo, Pb, Se and V);
- particle size distribution; and
- emerson aggregate test.

The rationale for the selection of individual analyses is presented in Table 5.

TABLE 5 ANALYTICAL RATIONALE

Test	Application	Justification
pH	Nutrient availability, nutrient fixation, toxicities (Al, Mn), liming, sodicity and correlation with other physical, chemical and biological properties	Measurement of pH is a useful indicator of various soil properties (e.g. values >8.5 usually indicate high exchangeable sodium levels and the presence of carbonates) and if lime application is a required management measure.
Electrical Conductivity	Appraisal of salinity hazard in soil substrates or groundwater and total soluble salts	The measure of electrical conductivity is used as a means of appraising soil salinity. The electrical conductance increases with soluble salt content and thus allows simple interpretation of readings.
Chloride Content		The chloride anion is usually present in soil associated with sodium. It is highly mobile making it a valuable indicator of salt and water movement.
Cation Exchange Capacity and Exchangeable Ca, Mg, Na (Cations)	Nutrient status, calculation of exchangeable sodium percentage (ESP), assessment of other physical and chemical properties, dispersivity, shrink – swell, water movement and aeration	The amounts and relative proportions of the exchangeable cations in soil have important effects on both physical and chemical properties. High levels of exchangeable sodium cause dispersion and increased swelling, reducing water movement and affecting near surface aeration whereas exchangeable calcium flocculates colloids and will reduce swelling tendencies. Excessively high or low concentrations of one or the other of the cations may impact soil nutrient availability.
Particle Size Distribution (<2 mm)	Nutrient retention, exchange properties, erodibility, droughtiness, workability, permeability, sealing, drainage, interpretation of most other physical and chemical properties and soil qualities	Particle size distribution data provides an assessment of the composition of a soil (based upon the dominant grain size within a soil). This assists with confirmation of field observations as well as providing better grounds for identification of soil types and water holding capacity.
Aggregate Stability (Emerson Aggregate Test)	Susceptibility to surface sealing under rainfall or irrigation, effect of raindrop impact and slaking, permeability, infiltration, aeration, seedling emergence and correlation with other properties	This test provides information relating to the dispersivity of soil and its preponderance to becoming erosive under natural conditions. Therefore it is an important test in assessing options for ongoing management for excavated and stockpiled materials.
Selected Heavy Metals	Detection of heavy metals	The analysis of arsenic, cadmium, magnesium, manganese, lead, selenium and vanadium will assess natural concentrations of these select heavy metals in the soil.

Soil laboratory analysis was undertaken by NATA accredited laboratories with consideration of *Soil Chemical Methods – Australasia* (Rayment and Lyons, 2011).

The laboratory test results were used in conjunction with the field assessment results to determine the depth of soil material suitable for stripping and reuse for the rehabilitation of disturbed areas. The test results for the field survey are presented in Appendix B.

4.3.1 Soil classification

The applicable technical standard adopted to classify soil types identified across the study area is the *Australian Soil Classification* (Isbell, 1996). The standard is routinely used as the soil classification system in Australia and formed the key descriptor throughout this assessment. In addition to this classification system, soil types were also identified by a 'common name' for discussion in the assessment.

Soil types can be named based on their characteristics and attributes as follows:

- number of horizons (soil layers) in the profile;
- colour of various horizons with special emphasis on the surface horizons;
- texture, texture contrast and structure;
- relative arrangement and geochemistry;
- geological origin of the soil material (i.e. alluvial, colluvial, residual, etc); and
- thickness of the horizons.

5 SOIL SURVEY RESULTS

Section 5 provides an overview of each soil type identified within study area, its characteristics and distribution (Table 6). Figure 4 illustrates the spatial distribution of all soil types within the study area.

TABLE 6 SOIL TYPES

Soil Type	ASC Soil Name	Project Soil Name	Area (%)	Area (ha)
1a	Pedaric Subnatric Brown Sodosol	Mottled and Pedaric Brown Sodosol Complex	54.7	2,513
1b	Pedaric Mesonatric Brown Sodosol			
1c	Pedaric Hypernatric Brown Sodosol			
1d	Mottled Subnatric Brown Sodosol			
2a	Pedaric Brown Dermosol	Pedaric Brown Dermosol Complex	25.5	1,174
2b	Pedaric Sodic Brown Dermosol			
2c	Pedaric Acid Sodic Brown Dermosol			
3a	Massive Brown Vertosol	Brown Vertosol Complex	15.5	712
3b	Epipedal Brown Vertosol			
4a	Orthic Tenosol	Orthic Tenosols	4.3	198
4b	Bleached Orthic Tenosol			
4c	Lithic Orthic Tenosol			
Total			**100.0**	**4,597**

Individual soil sample logs are presented in Appendix C and a summary of the laboratory results and associated certificates are presented in Appendix B.

The geochemistry of the soil profile within the study area is discussed further in the geochemical impact assessment (RGS, 2012) (Appendix P of the EA).

5.1 Mottled and Pedaric Brown Sodosol Complex

5.1.1 Overview

The Mottled and Pedaric Brown Sodosol Complex (soil type 1) is represented at 17 soil sample locations (TP103, TP104, TP107, TP108, TP110, TP114, TP115, TP117, TP118, TP120, TP121, TP122, TP123, TP125, TP126, TP127, TP130 and TPA2). This soil type has subnatric to hypernatric sodicity, predominantly moderate to strong pedality (largely polyhedral peds) with occasional mottled layers in the B horizon and strong texture contrast between the A and B horizons. Soil type 1 has largely been generated within residual and colluvial landscapes across the study area.

The laboratory assessment indicates that soil type 1 varies from a low to a high salinity level as per the *Site Investigations for Urban Salinity* (DLWC, 2002). Soils of high salinity are largely confined to the B horizon. This soil type is situated on hill crests, slopes and in proximity to drainage lines. Surface erosion, including gully and rill formations and slumping can be encountered in the general vicinity.

The results of the field assessment and laboratory analyses for soil type 1 are presented in Table 7 and Appendix B.

5.1.2 Soil stability

The topsoil of soil type 1 is slightly acidic to neutral, non-saline, non-sodic and often contains aggregates (peds) that exhibit a degree of soil stability. Organic staining, the presence of loam and plant roots, and lack of mottling is indicative of the effective infiltration and aeration of the topsoil and suitability for vegetation establishment.

In the subsoil, Emerson Aggregate testing indicates that the soils are generally dispersive and have a tendency to slake when exposed to moisture. This process is verified through the occurrence of surface erosion, such as gullies and rills and slumping near soil sample locations. The occasional presence of mottling in the subsoil is indicative of issues with water infiltration and soil permeability.

Particle size distribution (PSD) testing confirms that the majority of the soil matrix in the subsoil comprises of fine particulate matter.

5.1.3 Distribution

Soil type 1 covers 54.7% or 2,513 ha of the study area and is typically situated on the slopes and crests of hills. This soil type is present within the Whynot, Blakefield, Redbank and Houston mining areas and in associated infrastructure areas.

5.1.4 Rehabilitation suitability

The top 0.20 m of soil type 1 is suitable for stripping and reuse as topdressing during rehabilitation. Due to the naturally dispersive nature and saline conditions of the subsoil, it is not recommended for reuse in rehabilitation unless appropriate soil stabilisation measures are implemented (e.g. surface topdressing and vegetation and slope stabilisation measures).

TABLE 7 MOTTLED AND PEDARIC BROWN SODOSOL COMPLEX ANALYTICAL SUMMARY

Sample Location	ASC Inferred Classification	A Horizon Thickness	Field pH	Lab pH	Chloride	ECe	Soil Salinity Class	Cation Exchange Capacity	Exchangeable Sodium Percentage	Soil Sodicity	Emerson Aggregate Test		Particle Size Distribution (% passing through sieve mm)												
		m			mg/kg	dS/m		MEQ%	MEQ%		Class	Classification	200	75	63	37.5	26.5	19	13.2	9.5	6.7	4.75	2.36	1.18	0.6	0.425
TP103	Pedaric Hypernatric Brown Sodosol	0.3	6																						
			7	7.5	250	1.68	Non-saline						100	100	100	100	100	100	100	100	100	100	100	98.6	97.2	96
			8					20.5	37.1	Strongly sodic	1	Slakes – complete dispersion	100	100	100	100	100	100	98.9	97.9	97.5	97.2	96.2	94.8	93.5	92.6
			8																						
			8																						
TP104	Pedaric Subnatric Brown Sodosol	0.4	5.5																						
			6																						
			7	7.7	29	1.12	Non-saline	20.7	2.6	Non-sodic	4	Slakes – no dispersion (carbonate or gypsum present)	100	100	100	100	100	100	100	100	100	100	100	99.8	98.7	96.9
			7																						
			7																						
TP107	Pedaric Subnatric Brown Sodosol	0.1	5.5																						
			6	8.5	73	2.32	Moderately saline	22.9	8.5	Marginally sodic to sodic	4	Slakes – no dispersion (carbonate or gypsum present)	100	100	100	100	100	100	100	100	100	100	100	98.7	97.4	96.1
			7																						
			8																						
			8																						
			8																						
TP108	Pedaric Hypernatric Brown Sodosol	0.2	5.5	6.4	51	0.638	Non-saline																		
			6																						
			7	8.5	1,020	6.64	Moderately saline	18.2	26.1	Strongly sodic	1	Slakes – complete dispersion	100	100	100	100	100	100	100	99.8	99	98.5	97.4	95.9	94.6	93.4
			8																						
			8										100	100	100	100	100	94.2	94.2	92.9	92.8	91.8	89.6	87.3	85.3	84.5
			8																						
TP110	Pedaric Subnatric Brown Sodosol	0.1	7																						
			8	8.5	52	1.44	Non-saline																		
			8					19.1	6.3	Marginally sodic to sodic	4	Slakes – No dispersion (carbonate or gypsum present)	100	100	100	100	100	100	100	97.5	94.9	91.9	86.5	79.6	71.9	68.2
			8																						
TP114	Mottled Subnatric Brown Sodosol	0.1									2	Slakes – some dispersion	100	100	100	100	100	100	100	100	100	100	100	98.5	95.1	91.3
				9.1	1,150	8.55	Very saline	21	13.8	Strongly sodic	4	Slakes – No dispersion (carbonate or gypsum present)	100	100	100	100	100	100	100	100	99.9	99.7	99.2	98.8	97.8	96.8
													100	100	100	100	100	100	100	99.8	99.1	98.1	96.5	95.2	93.5	92.1
TP115	Pedaric Subnatric Brown Sodosol	0.4	5																						
			6	8.0	110	1.33	Non-saline																		
			9	8.7	570	4.72	Moderately saline	20.3	14.5	Strongly sodic	1	Slakes – complete dispersion	100	100	100	100	100	100	100	100	100	100	100	99.1	97	94.9
			7																						
TP117	Pedaric	0.2	6	6.7	120	1.28	Non-saline																		

Sample Location	ASC Inferred Classification	A Horizon Thickness	Field pH	Lab pH	Chloride	ECe	Soil Salinity Class	Cation Exchange Capacity	Exchangeable Sodium Percentage	Soil Sodicity	Emerson Aggregate Test		Particle Size Distribution (% passing through sieve mm)												
		m			mg/kg	dS/m		MEQ%	MEQ%		Class	Classification	200	75	63	37.5	26.5	19	13.2	9.5	6.7	4.75	2.36	1.18	0.6	0.425
	Subnatric Brown Sodosol		6																							
			7	7.8	68	1.14	Non-saline																			
			7.5										100	100	100	100	100	100	100	100	99.9	99.8	99.6	99.2	98.6	98.2
			7.5																							
TP118	Pedaric Subnatric Brown Sodosol	0.3	7																							
			6.5																							
			6																							
			7	8.6	100	1.36	Non-saline	15.7	3.3	Non-sodic	4	Slakes – No dispersion (carbonate or gypsum present)	100	100	100	100	100	100	100	100	100	100	99.8	98.3	93.5	87.5
			7.5																							
TP120	Pedaric Subnatric Brown Sodosol	0.1	5.5	6.2	55	0.81	Non-saline																			
			6																							
			7																							
			7																							
			7																							
TP121	Pedaric Subnatric Brown Sodosol	0.3	6.5																							
			7																							
			7	7.3	30	0.78	Non-saline																			
			8	8.5	230	2.82	Moderately saline	24.1	8.1	Marginally sodic to sodic	4	Slakes – No dispersion (carbonate or gypsum present)	100	100	100	100	100	100	100	100	100	100	100	98.9	96.3	93.7
			8					24.4	8.6	Marginally sodic to sodic			100	100	100	100	100	100	100	99.8	99.2	98.5	96.6	92.8	88.5	85.7
TP122	Pedaric Subnatric Brown Sodosol	0.1	7																							
			6	7.2	65	1.2	Non-saline																			
			8					20.2	2.7	Non-sodic	4	Slakes – No dispersion (carbonate or gypsum present)	100	100	100	100	100	100	100	100	100	99.9	99.7	99.1	95.5	86.1
			8																							
TP123	Pedaric Mesonatric Brown Sodosol	0.1	6																							
			6																							
			6	8.3	110	1.7	Non-saline						100	100	100	100	100	100	100	100	99.8	99.3	98.1	97.6	95.5	92.9
			7																							
			8								2	Slakes-some dispersion	100	100	100	100	100	100	100	99.5	98.9	98.5	97.8	96.5	95.5	94.8
TP125	Pedaric Mesonatric Brown Sodosol	0.1	6	6.8	66	1.89	Non-saline						100	100	100	100	100	100	100	100	100	100	100	99.6	97.8	95.6
			6																							
			7																							
			7					26.7	23.2	Strongly sodic	4	Slakes – No dispersion (carbonate or gypsum present)	100	100	100	100	100	100	100	100	100	98.4	91.1	88.4	85.8	84.2
			5																							
TP126	Pedaric Subnatric Brown Sodosol	0.1	7																							
			6																							
			7	7.8	30	0.72	Non-saline						100	100	100	100	100	100	100	100	100	100	100	99.3	98.1	96.5
			8																							
TP127	Pedaric Mesonatric Brown Sodosol	0.1	7																							
			6	7.5	170	2.16	Moderately saline																			
			6																							

Sample Location	ASC Inferred Classification	A Horizon Thickness	Field pH	Lab pH	Chloride	ECe	Soil Salinity Class	Cation Exchange Capacity	Exchangeable Sodium Percentage	Soil Sodicity	Emerson Aggregate Test		Particle Size Distribution (% passing through sieve mm)													
		m			mg/kg	dS/m		MEQ%	MEQ%		Class	Classification	200	75	63	37.5	26.5	19	13.2	9.5	6.7	4.75	2.36	1.18	0.6	0.425
			7	8.5	1,380	9.1	Very saline	27	15.7	Strongly sodic	4	Slakes – No dispersion (carbonate or gypsum present)	100	100	100	100	100	100	100	100	100	100	100	99.4	98.8	98.3
			8										100	100	100	100	100	100	100	100	100	99.7	98.6	96.8	94.4	93.4
TP130	Mottled Subnatric Brown Sodosol	0.1	7																							
			6.5	7.0	24	0.595	Non-saline	16.3	3.5	Non-sodic	8	No slaking – does not swell	100	100	100	100	100	100	100	100	100	100	100	97.8	92.5	87.6
			8																							
			6								2	Slakes – some dispersion														
			8																							

5.2 Pedaric Brown Dermosol Complex

5.2.1 Overview

Pedaric Brown Dermosol Complex (soil type 2) is represented at five soil sample locations (TP102, TP105, TP113, TP128, TP129 and TPA8). This soil type predominantly has moderate to strong pedality (largely polyhedral peds) and is derived from weathered bedrock on slopes within the study area. Soil type 2 is classed as Dermosols because it possesses a structured B2 horizon but lacks a strong texture contrast between the A and B horizons.

Within the study area, soil type 2 has a soft to firm, brown to dark yellowish brown clay and clayey silt topsoil, which grades to a very firm or sandy clay. The soil type is largely non-saline (with the exception of moderate salinity detected in TP129) and possesses non-sodic to strongly sodic properties. This soil type is generally situated on slopes and at the edge of floodplains. Surface erosion, including gully and rill formations and slumping can be encountered in the general vicinity.

The results of the field assessment and laboratory analyses for soil type 2 are presented in Table 8 and Appendix B.

5.2.2 Soil stability

The topsoil of soil type 2 is slightly acidic, non-saline, non-sodic and contains aggregates (peds) that exhibit a degree of soil stability. The presence of gravel and silt, the prevalence of plant roots and lack of mottling is indicative of the effective infiltration and aeration of the topsoil and suitability for vegetation establishment.

In the subsoil, Emerson Aggregate testing indicates that while the soils are non-dispersive, it has a tendency to slake when exposed to moisture. This process is verified through the occurrence of surface erosion, such as channel incision, sheet erosion and some slumping on slopes near soil sample locations. The presence of mottling in the subsoil is indicative of issues with water infiltration and soil permeability. While the pH in TP105 was generally acidic, alkaline pH results in TP102 may be indicative of the effects of soil sodicity at and around this location. Moderate sodicity was also identified in the subsoil at TP129.

PSD testing confirms that the majority of the soil matrix in the subsoil comprises of fine (silt and clay particles) particulate matter.

5.2.3 Distribution

Soil type 2 covers 25.5% or 1,174 ha of the study area and is typically situated on the mid-slopes of hills at a gradient generally between 2 and 4%. The soil type is present within the Whynot, Blakefield, Redbank and Houston mining areas and in associated infrastructure areas.

5.2.4 Rehabilitation suitability

The top 0.25 m of soil type 2 is suitable for stripping and reuse as topdressing during rehabilitation. As the subsoil has variable sodic and dispersive characteristics, it is not recommended for reuse in rehabilitation unless appropriate soil stabilisation measures are implemented (e.g. surface topdressing and vegetation and slope stabilisation measures).

TABLE 8 PEDARIC BROWN DERMOSOL COMPLEX ANALYTICAL SUMMARY

Sample Location	ASC Inferred Classification	A Horizon Thickness	Field pH	Lab pH	Chloride	ECe	Soil Salinity Class	Cation Exchange Capacity	Exchangeable Sodium Percentage	Soil Sodicity	Emerson Aggregate Test		Particle Size Distribution (% passing through sieve mm)												
		m			mg/kg	dS/m		MEQ%	MEQ%		Class	Classification	200	75	63	37.5	26.5	19	13.2	9.5	6.7	4.75	2.36	1.18	0.6	0.425
TP102	Pedaric Brown Dermosol	0.3	6																						
			5																						
			7																						
			7	8.2	37	0.88	Non-saline	17.2	1.7	Non-sodic	4	Slakes – No dispersion (carbonate or gypsum present)	100	100	100	100	100	100	100	99.5	99.0	98.6	97.1	94.9	91.7	89.3
TP105	Pedaric Brown Dermosol	0.1	5																						
			6	6.5	42	0.48	Non-saline																		
			6																						
			6																						
TP113	Pedaric Sodic Brown Dermosol	0.1	5																						
			6	8.1	110	1.36	Non-saline	19.9	8.5	Marginally sodic to sodic	2	Slakes – some dispersion	100	100	100	100	100	100	100	100	100	100	100	99.0	95.9	92.3
			7																						
			7																						
			8																						
TP128	Pedaric Sodic Brown Dermosol	0.3	6	7.5	46	1.17	Non-saline	11.9	0.5	Non-sodic	8	No slaking – does not swell	100	100	100	100	100	100	100	100	100	100	100	99.1	96.6	92.8
			7																						
			7	8.8	18	0.9	Non-saline																		
			7																						
TP129	Pedaric Acid Sodi Brown Dermosol	0.2	7.5																						
			8																						
			7																						
			5																						
			5.5	4.8	1,420	7.35	Moderately saline	20.0	13.0	Strongly sodic															
			6	5.6	660	3.78	Moderately saline																		

5.3 Brown Vertosol Complex

5.3.1 Overview

Brown Vertosol Complex (soil type 3) is represented at four soil sample locations (TP106, TP109, TP112, TP119, TPA1, TPA3, TPA4, TPA6 and TPA9). This soil type predominantly comprises massive, epipedal Vertosols with vertical and diagonal cracking within the A and upper B horizons. Vertosols are clay soils with shrink-swell properties which results in strong cracking when dry and slickensides and/or lenticular structural aggregates at depth.

Soil type 3 is largely non-saline (with the exception of moderate salinity detected in TP109) and possesses non-sodic to strongly sodic properties. These soil types are generally situated on floodplains, along streamlines and on lower hill slopes. Surface erosion, including channel incision and gully and rill formations, can be encountered in the general vicinity.

The results of the field assessment and laboratory analyses for soil type 3 are presented in Table 9 and Appendix B.

5.3.2 Soil stability

The topsoil for soil type 3 is slightly acidic to neutral, non-saline, non-sodic and can contain aggregates (peds) that exhibit a degree of soil stability. The presence of loam, sand and gravel, the prevalence of plant roots, and lack of mottling is indicative of the effective infiltration and aeration of the topsoil and suitability for vegetation establishment.

In the subsoil, Emerson Aggregate testing indicates that while the soils are non-dispersive, it has a tendency to slake when exposed to moisture. This process is verified through the occurrence of surface erosion near soil sample locations. The presence of mottling in the subsoil is indicative of issues with water infiltration and soil permeability. Saline and sodic soils were encountered in the subsoil which can increase the potential for dispersivity and erosion.

PSD testing confirms that the majority of the soil matrix in the subsoil comprises of fine particulate matter.

5.3.3 Distribution

Soil type 3 covers 15.5% or 712 ha of the study area and is typically situated close to waterways in the west, east and south of the study area. This soil type is present within the Whynot, Blakefield and Houston mining areas and in associated infrastructure areas.

5.3.4 Rehabilitation suitability

The top 0.30 m of soil type 3 is suitable for stripping and reuse as topdressing during rehabilitation. As the subsoil has variable sodic and dispersive characteristics, it is not recommended for reuse in rehabilitation unless appropriate soil stabilisation measures are implemented (e.g. surface topdressing and vegetation and slope stabilisation measures).

TABLE 9 BROWN VERTOSOL COMPLEX ANALYTICAL SUMMARY

Sample Location	ASC Inferred Classification	A Horizon Thickness	Field pH	Lab pH	Chloride	ECe	Soil Salinity Class	Cation Exchange Capacity	Exchangeable Sodium Percentage	Soil Sodicity	Emerson Aggregate Test		Particle Size Distribution (% passing through sieve mm)												
		m			mg/kg	dS/m		MEQ%	MEQ%		Class	Classification	200	75	63	37.5	26.5	19	13.2	9.5	6.7	4.75	2.36	1.18	0.6	0.425
TP106	Epipedal Brown Vertosol	0.1	5																							
			5.5	7.2	38	0.72	Non-saline																			
			6																							
			7																							
			8																							
TP109	Massive Brown Vertosol	0.1	5	6.2	200	1.20	Non-saline																			
			7																							
			7																							
			8	8.4	950	5.22	Moderately saline	23.1	20.4	Strongly sodic	4	Slakes – No dispersion (carbonate or gypsum present)	100	100	100	100	100	100	100	100	100	100	100	99.3	97.5	95.9
			8																							
TP112	Massive Brown Vertosol	0.1	6	6.0	160	1.955	Non-saline						100	100	100	100	100	100	100	100	100	100	100	99.9	99.4	99.0
			6.5																							
			8																							
			8																							
TP119	Massive Brown Vertosol	0.2	5.5	6.5	160	1.68	Non-saline																			
			7																							
			6																							
			8																							
			8																							

5.4 Orthic Tenosols

5.4.1 Overview

Orthic Tenosols (soil type 4) is represented at four soil sample locations (TP111, TP116, TP124 and TP131). This soil type predominantly comprises of a weak pedologic organisation (with the exception of the A horizon) and a sandy composition greater than that of other soils within the study area. The soil type is also generally orthic with a tenic B horizon.

Based upon field and laboratory assessments, soil type 4 is generally sodic, ranging from non-sodic to strongly sodic soils, with the potential for the presence of saline soils. This soil type is generally situated in residual terrain and in the upper catchment of secondary watercourses. Surface erosion, including channel incision and gully and rill formations, can be encountered in the general vicinity.

The results of the field assessment and laboratory analyses for soil type 4 are presented in Table 10 and Appendix B.

5.4.2 Soil stability

The topsoil of soil type 4 is slightly acidic, non-saline, non-sodic and can contain aggregates (peds) that exhibit a degree of soil stability. The presence of loam, sand and gravel, the prevalence of plant roots and lack of mottling is indicative of the effective infiltration and aeration of the topsoil and suitability for vegetation establishment.

In the subsoil, Emerson Aggregate testing indicates that the soils are dispersive and have a tendency to slake when exposed to moisture. This process is verified through the occurrence of surface erosion near soil sample locations. Saline and sodic soils were encountered in the subsoil, which can increase the potential for dispersivity and erosion.

PSD testing confirms that the majority of the soil matrix in the subsoil comprises a mix of fine and coarser particulate matter.

5.4.3 Distribution

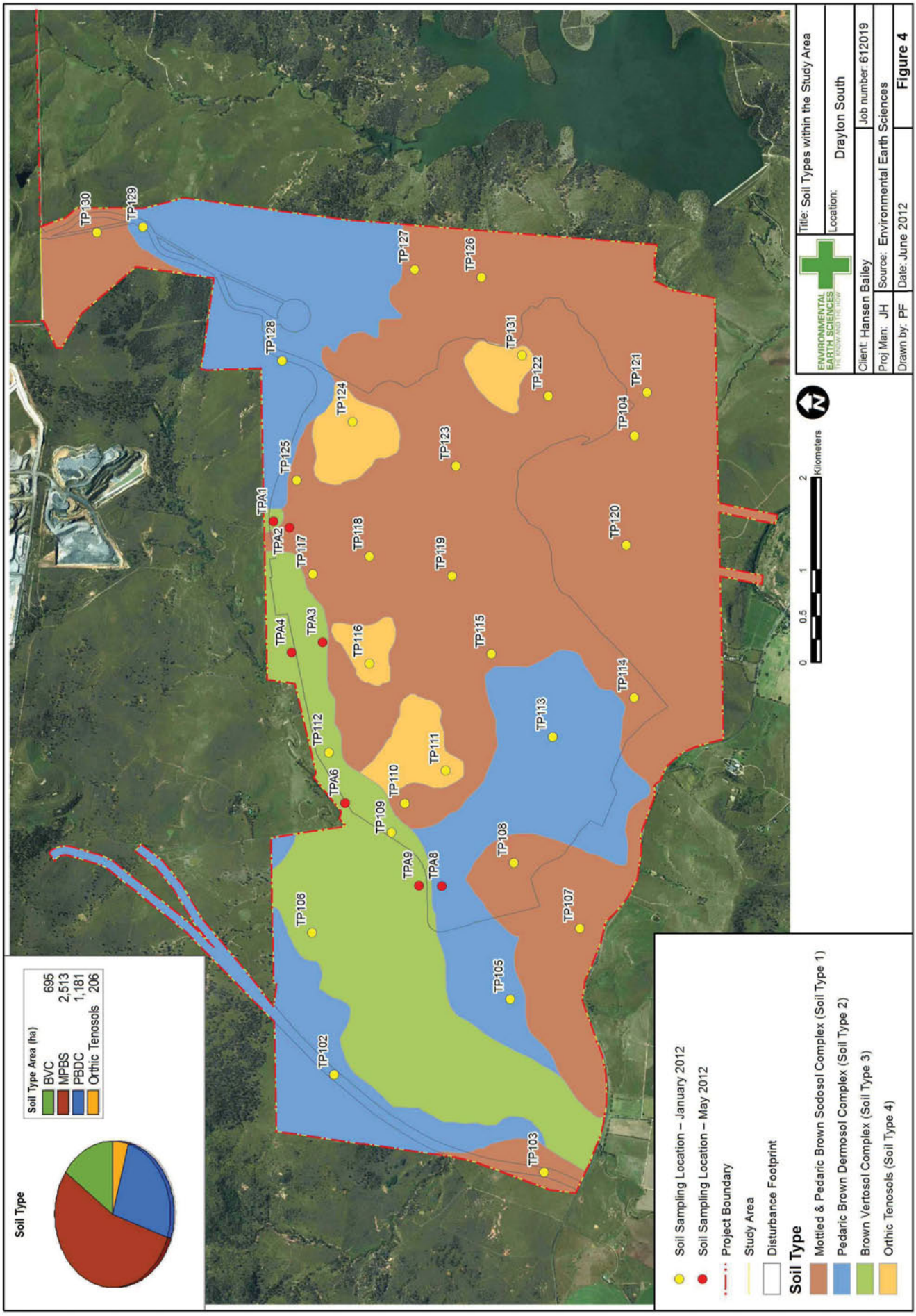
Soil type 4 covers 4.3% or 198 ha of the study area and is typically situated close to waterways in the west, east and south of the study area. This soil type is present within the Whynot, Blakefield and Houston mining areas and in associated infrastructure areas.

5.4.4 Rehabilitation suitability

The top 0.20 m of soil type 4 is suitable for stripping and reuse as topdressing during rehabilitation. Due to the naturally dispersive nature and saline conditions of the subsoil, it is not recommended for reuse in rehabilitation unless appropriate soil stabilisation measures are implemented (e.g. surface topdressing and vegetation and slope stabilisation measures).

TABLE 10 ORTHIC TENOSOL COMPLEX ANALYTICAL SUMMARY

Sample Location	ASC Inferred Classification	A Horizon Thickness	Field pH	Lab pH	Chloride	ECe	Soil Salinity Class	Cation Exchange Capacity	Exchangeable Sodium Percentage	Soil Sodicity	Emerson Aggregate Test		Particle Size Distribution (% passing through sieve mm)													
		m			mg/kg	dS/m		MEQ%	MEQ%		Class	Classification	200	75	63	37.5	26.5	19	13.2	9.5	6.7	4.75	2.36	1.18	0.6	0.425
TP111	Pedaric Mesonatric Brown Sodosol	0.4	6																							
			7.5	8.6	1,220	8.24	Very saline	21	19.5	Strongly sodic	2	Slakes – some dispersion	100	100	100	100	100	100	100	100	100	98.6	96.4	93.6	87.5	80.6
			7																							
			7																							
TP116	Pedaric Subnatric Brown Sodosol	0.2	6	6.2	660	5.00	Moderately saline																			
			7																							
			8																							
			8																							
TP124	Pedaric Subnatric Brown Sodosol	0.2	5																							
			5.5	6.9	52	0.9	Non-saline																			
			7																							
			7																							
			8																							
TP131	Pedaric Subnatric Brown Sodosol	0.2	6																							
			7																							
			7																							


Soil Type
Soil Type Area (ha)
BVC 695
MPBS 2,513
PBDC 1,181
Orthic Tenosols 206
Soil Sampling Location – January 2012
Soil Sampling Location – May 2012
Project Boundary
Study Area
Disturbance Footprint
Soil Type
Mottled & Pedaric Brown Sodosol Complex (Soil Type 1)
Pedaric Brown Dermosol Complex (Soil Type 2)
Brown Vertosol Complex (Soil Type 3)
Orthic Tenosols (Soil Type 4)
TP102
TP103
TP104
TP105
TP106
TP107
TP108
TP109
TP110
TP111
TP112
TP113
TP114
TP115
TP116
TP117
TP118
TP119
TP120
TP121
TP122
TP123
TP124
TP125
TP126
TP127
TP128
TP129
TP130
TP131
TPA1
TPA2
TPA3
TPA4
TPA6
TPA8
TPA9
0
0.5
1
2
Kilometers
ENVIRONMENTAL EARTH SCIENCES
THE KNOW AND THE HOW
Title: Soil Types within the Study Area
Location: Drayton South
Client: Hansen Bailey
Job number: 612019
Proj Man: JH
Source: Environmental Earth Sciences
Drawn by: PF
Date: June 2012
Figure 4

5.5 Heavy metals analysis

From the soil profile exposures collected, several were selected to test for the presence of heavy metals. The results for the analyses are presented in Table 11. The results have been compared against the Ecological Investigation Levels (EILs) presented in the 1999 National Environmental Protection Measure.

TABLE 11 HEAVY METALS RESULTS

Sample	Depth	As	Cd	Mg	Mn	Mo	Pb	Se	V
		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
TP102	0.9-1.0	4.0	<0.5	1,890	**1,050**	<1	20	<0.1	10
TP103	0.2-0.3	3.5	<0.5	2,010	**760**	<1	16	<0.1	10
TP106	0.2-0.3	4.0	<0.5	1,970	**530**	<1	17	<0.1	11
TP107	0.3-0.4	5.0	<0.5	3,560	390	<1	31	<0.1	7
TP110	0.2-0.4	5.0	<0.5	4,530	**710**	<1	16	<0.1	9
TP112	0.0-0.1	4.0	<0.5	2,120	**900**	<1	12	<0.1	23
TP115	0.3-0.4	5.5	<0.5	4,000	**570**	<1	18	<0.1	10
TP122	0.2-0.3	3.5	<0.5	1,560	125	<1	11	<0.5	5
TP128	0.0-0.1	3.0	<0.5	1,230	460	<1	15	<0.1	10
BLANK		<0.5	<0.5	<10	<0.5	<1	<0.5	<0.1	<1
NEPM EILs		**20**	**3**		**500**		**600**		**50**

Notes:
1. Figures in bold exceed the adopted criteria

Based upon comparison with the adopted criteria, concentrations of arsenic, cadmium, lead and vanadium are within acceptable concentrations for maintaining ecological health.

There was no criteria available for magnesium, molybdenum and selenium, however, all concentrations for molybdenum and selenium were below the laboratory detection limits and are therefore not considered to be elevated.

Magnesium is the central atom in the chlorophyll molecule and is therefore actively involved in plant photosynthesis. It also aids in phosphate metabolism, plant respiration, protein synthesis and activation of many enzyme systems in plants. Magnesium is an essential plant nutrient and while deficiency is rare it can occur in plants growing in leached soils with a low cation exchange capacity. Based upon the experience of the project team the concentration ranges presented in Table 11 appear acceptable (dependent upon interaction with cation exchange capacity of the subject soils).

A number of soil samples held concentrations of manganese which exceeded the adopted criteria (TP102, TP103, TP106, TP110, TP112 and TP115). Total manganese content in soil is varied across Australia and has been reported to be in the range of 4-3800 mg/kg (CSIRO, 1983), which corresponds to the levels measured on site. Manganese toxicity while uncommon has been identified in naturally acidic soils in southern NSW and soils which have been acidified with fertiliser applications (Peverill et al., 1999).

Divalent manganese in the soil solution is the most available and toxic to plants and only dominants at low soil pH (pH<4.5) and anaerobic conditions such as in waterlogged soils. At slightly acidic to neutral conditions and aerated soil, manganese predominates as

manganese oxide, which is not soluble and is unavailable to plants. Toxicity of manganese in soil is therefore determined by the soil and plant factors. As such deriving an EIL on total manganese soil concentrations to diagnose toxicity is not reliable. Mobile forms and plant available manganese are generally in concentrations far less than total concentrations and it has been reported that 65 mg/kg of plant available manganese can cause toxicity issues (Hazelton and Murphy 2007). The concentrations listed in Table 11 are total concentrations and have no relationship to this level.

While the manganese levels are above the adopted EILs they are naturally derived and should not be a concern while the soil has a pH above 4.5 and is in an aerobic (not waterlogged) state. If the soil pH was to fall below 4.5, the degree of manganese toxicity will depend on the availability and concentrations of other nutrients and elements.

6 LAND ASSESSMENT

Section 6 describes and assesses the regional rural land capability and agricultural suitability in the study area.

6.1 Land capability

6.1.1 Methodology

The land capability assessment was conducted in accordance with the NSW Office of Environment and Heritage (OEH) rural land capability assessment system, *The Land and Soil Capability Assessment Scheme: Second Approximation* (2012), which supersedes S*ystems Used to Classify Rural Lands in New South Wales* (Cunningham *et. al.,* 1988). The new scheme provides a prescriptive methodology for assessing land capability across NSW through the identification and ranking of potential hazards and limitations, including:

- water erosion, including sheet, rill and gully erosion;
- wind erosion;
- soil structure decline;
- soil acidification;
- salinity;
- waterlogging;
- shallow soils and rockiness; and
- mass movement.

The eight land capability classes as defined under *The Land and Soil Capability Assessment Scheme: Second Approximation* are outlined in Table 12.

TABLE 12 LAND CAPABILITY CLASSES

Land Class	Land Definition
Land capable of a wide variety of landuses (cropping, grazing, horticulture, forestry, nature conservation)	
Class I	Extremely high capability land: Land has no limitations. No special land management practices required. Land capable of all rural land uses and land management practices
Class II	Very high capability land: Land has slight limitations. These can be managed by readily available, easily implemented management practices. Land is capable of most land uses and land management practices, including intensive cropping with cultivation.
Class III	High capability land: Land has moderate limitations and is capable of sustaining high-impact land uses, such as cropping with cultivation, using more intensive, readily available and widely accepted management practices. However, careful management of limitations is required for cropping and intensive grazing to avoid land and environmental degradation
Land capable of a variety of land uses (cropping with restricted cultivation, pasture cropping, grazing, some horticulture, forestry, nature conservation)	
Class IV	Moderate capability land: Land has moderate to high limitations for high-impact land uses. Will restrict land management options for regular high-impact land uses such as cropping, high intensity grazing and horticulture. These limitations can only be managed by specialised management practices with a high level of knowledge, expertise, inputs, investment and technology
Class V	Moderate-low capability land: Land has high limitations for high-impact land uses. Will largely restrict land use to grazing, some horticulture (orchards), forestry and nature conservation. The limitations need to be carefully managed to prevent long-term degradation
Land capable for a limited set of land uses (grazing, forestry and nature conservation, some horticulture)	
Class VI	Low capability land: Land has very high limitations for high-impact land uses. Land use restricted to low-impact land uses such as grazing, forestry and nature conservation. Careful management of limitations is required to prevent severe land and environmental degradation
Land generally incapable of agricultural land use (selective forestry and nature conservation)	
Class VII	Very low capability land: Land has severe limitations that restrict most land uses and generally cannot be overcome. On-site and off-site impacts of land management practices can be extremely severe if limitations not managed. There should be minimal disturbance of native vegetation
Class VIII	Extremely low capability land: Limitations are so severe that the land is incapable of sustaining any land use apart from nature conservation. There should be no disturbance of native vegetation

Note:
2. Source: NSW Office of Environment and Heritage (2012)

6.1.2 Results

The results of the detailed land capability assessment within the study area in relation to the established criteria are presented in Appendix D of this report. A summary of the results are described below.

The existing condition of the land within the study area reflects the predominant agricultural land use, beef cattle grazing. No improvements have been made to the land.

The local topography within the study area consists of low rolling to undulating hills with elevations ranging from 110 m AHD to 260 m AHD. Variations in slope strongly correlate with soil thickness. The soil profile within the study area is typically greater than 1 m in thickness. As the angle of the slope increases the soil profile becomes shallow.

The topsoil within the study area is largely non-saline and non-sodic in nature and contains aggregates that exhibit a degree of soil stability. The prevalence of plant roots and lack of mottling is indicative of the effective infiltration and aeration of the topsoil and suitability for vegetation establishment. In comparison, the subsoil is generally saline, sodic, dispersive and has a tendency to slake when exposed to moisture. Such characteristics are evident through the presence of surface erosion, including gully and rill formations and slumping.

Based on the characteristics of the soil and landscape, the key constraining factors limiting the land capability within the study area relates to slope, salinity, acidity and soil structure decline (dispersivity).

The pre-mining and post-mining rural land capability classification of the study area is illustrated in Figures 5 and 6. A comparison of the pre and post-mining rural land capability classification is provided in Table 13.

TABLE 13 COMPARISON OF PRE AND POST-MINING RURAL LAND CAPABILITY CLASSES

Class	Pre-mining		Post-mining	
	ha	%	ha	%
Class I	0.0	0.0	0.0	0.0
Class II	0.0	0.0	0.0	0.0
Class III	0.0	0.0	0.0	0.0
Class IV	420	9.1	409	8.9
Class V	565	12.3	413	9.0
Class VI	1,749	38.1	1,892	41.2
Class VII	1,863	40.5	1,811	39.4
Class VIII	0.0	0.0	72	1.6
Total	**4,597**	**100.0**	**4,597**	**100**

Pre-mining

Class I

Based upon the survey of land capability, there are no zones of Class I land within the study area.

Class II

Based upon the survey of land capability, there are no zones of Class II land within the study area.

Class III

Based upon the survey of land capability, there are no zones of Class III land within the study area.

Class IV

Class IV land present in the study area consists predominantly of soil type 3 with some areas of soil type 1 and soil type 2 centralised around the Saddlers Creek floodplain. The classification indicates that the land is suited to livestock grazing with only occasional cultivation.

Class V

Class V land present in the study area consists of soil types 1, 2 and 3 and is situated on or close to the Saddlers Creek floodplain. Class V land is only suited to livestock grazing with only occasional cultivation. In these areas, intensive soil conservation measures are required to ensure the ongoing integrity of the solum.

Class VI

Class VI land present in the study area consists of soil types 1, 2, 3 and 4 and is generally associated with gradual to moderate slopes. Class VI land is only suited to livestock grazing and is the lowest quality of grazing land. In these areas, structural soil conservation works are required to ensure maintenance of ground cover. Soils are generally constrained by slope, salinity, shallow topsoil (i.e. less than 0.1 m) and sodicity within Sodosols (soil type 1) and some sodic and acid-sodic Dermosols (soil type 2).

Class VII

Class VII land present in the study area consists of soil types 1, 2, 3 and 4 and is generally associated with moderate to steep often vegetated slopes. Class VII land is considered unsuitable for cultivation and grazing and is often best protected with green timber to minimise erosion risk. Land is generally classed as VII because of its slope, general terrain, existing soil erosion and poor drainage.

Class VIII Land

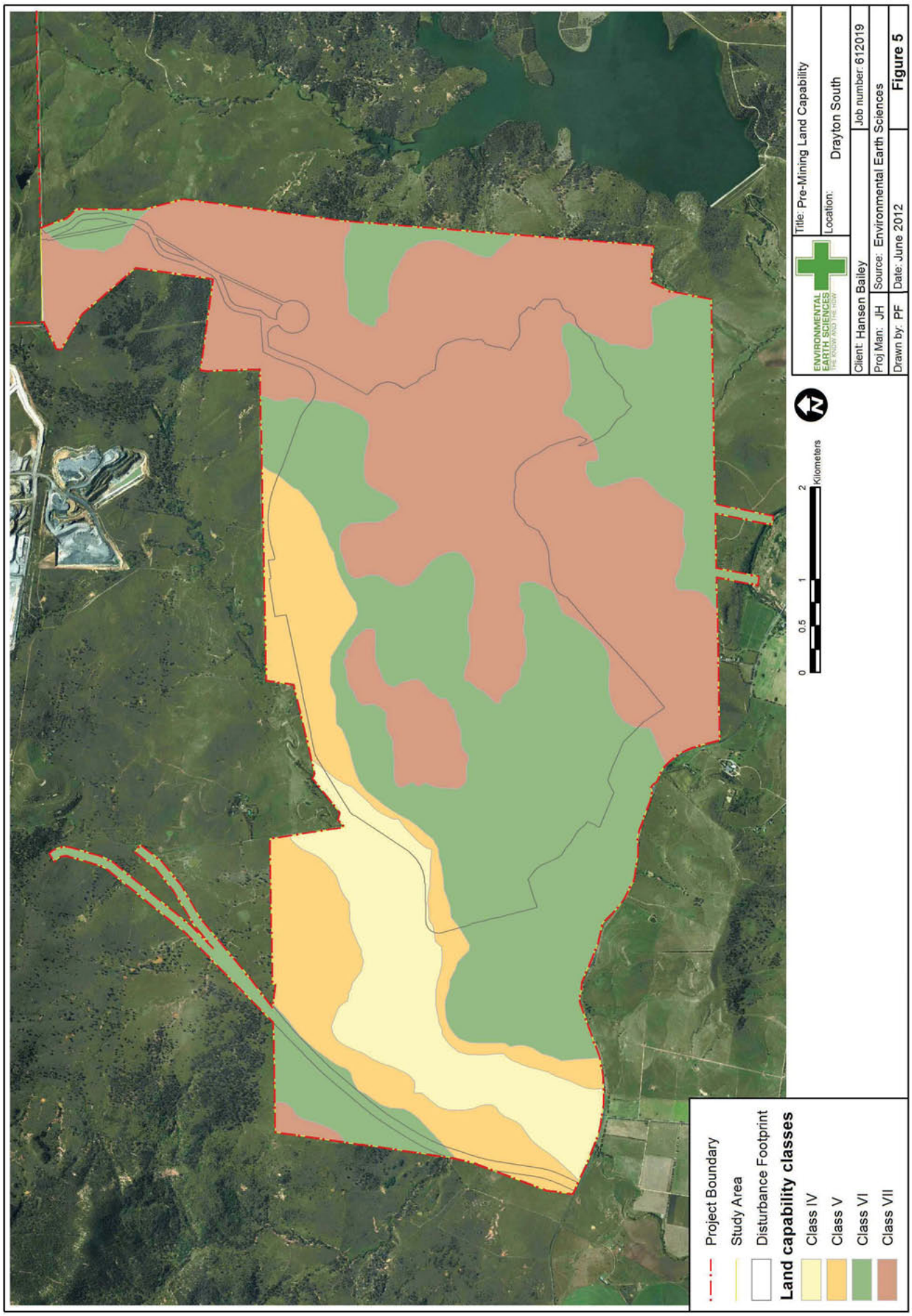
Based upon the survey of land capability, there are no zones of Class VIII land within the study area.

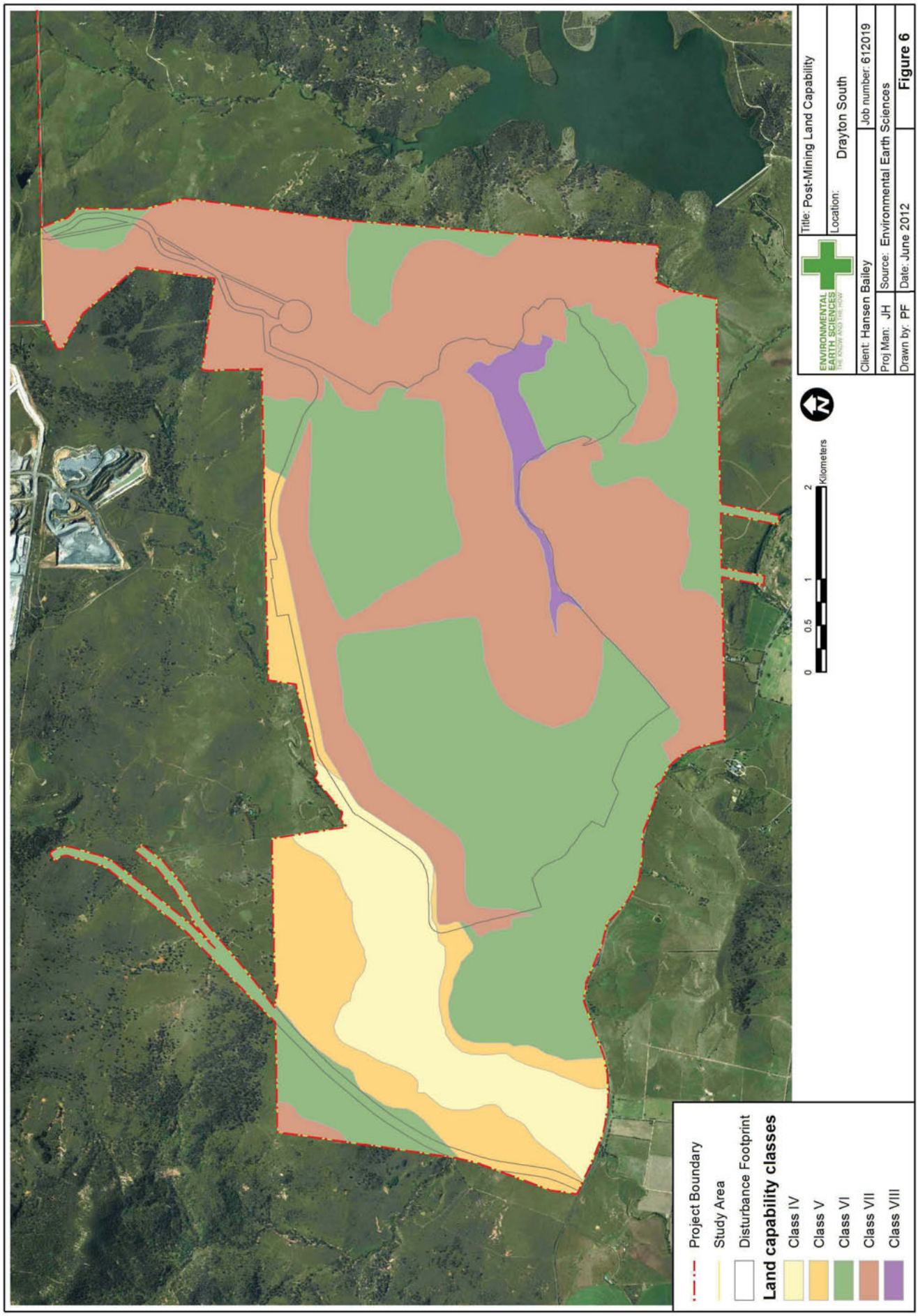
Post-mining

Impacts to the land as a result of the Project will be within the Drayton South disturbance footprint. The majority of batters on the post-mining landform consist of slopes between 15 and 20% and will be covered in low to moderate quality topdressing. These factors should result in a land capability class of VII. Steeper sections will have a land capability class of VIII while flatter slopes (<10%) will result in Class VI land following rehabilitation.

Post mining, land within the Drayton South disturbance footprint will no longer be available for the purposes outlined in *The Land and Soil Capability Assessment Scheme: Second Approximation*. Instead, the affected land will be rehabilitated to establish Narrabeen Footslopes Slaty Box Woodland and Central Hunter Box-Ironbark Woodland communities. This area will be reserved in perpetuity as an onsite offset for the Project. The onsite component of the biodiversity offset package is discussed further in the EA ecology impact assessment (Cumberland Ecology, 2012) (see Appendix J of the EA).

Areas within the study area which lie outside the disturbance footprint will retain the same pre-mining class. Based upon this assessment of land capability classes, this land will continue to be suitable for livestock grazing, which is considered to be a component of the final land use goal for the study area.


Project Boundary
Study Area
Disturbance Footprint
Land capability classes
Class IV
Class V
Class VI
Class VII
0
0.5
1
2
Kilometers
ENVIRONMENTAL EARTH SCIENCES
THE KNOW AND THE HOW
Title: Pre-Mining Land Capability
Location: Drayton South
Client: Hansen Bailey
Job number: 612019
Proj Man: JH
Source: Environmental Earth Sciences
Drawn by: PF
Date: June 2012
Figure 5


Project Boundary
Study Area
Disturbance Footprint
Land capability classes
Class IV
Class V
Class VI
Class VII
Class VIII
0
0.5
1
2
Kilometers
ENVIRONMENTAL EARTH SCIENCES
THE KNOW AND THE HOW
Title: Post-Mining Land Capability
Location: Drayton South
Client: Hansen Bailey
Job number: 612019
Proj Man: JH
Source: Environmental Earth Sciences
Drawn by: PF
Date: June 2012
Figure 6

6.2 Agricultural suitability

6.2.1 Methodology

The *Agricultural Land Classification* (NSW Agriculture, 2002) is an alternative system, which assesses land suitability against a specific type of agricultural production. The system consists of five classes, which have been designed to assess land on the basis of increasing suitability and potential for agricultural production. Furthermore, agricultural suitability considers industry specific factors that may influence potential production (i.e. the same piece of land may be classed differently depending upon the selected land use).

The main soil properties and other landform characteristics considered significant for the agricultural land suitability assessment are topsoil texture, topsoil pH, solum depth, external and internal drainage, topsoil stoniness and slope as well as biological and physical factors such as bioturbation, elevation, aspect, rainfall and temperature.

The agricultural suitability classes as defined by the *Agricultural Land Classification* (NSW Agriculture, 2002) are outlined in Table 14.

TABLE 14 AGRICULTURAL SUITABILITY CLASSES

Class	Description	Management Options
1	Arable land suitable for intensive cultivation where constraints to sustained high levels of agricultural production are minor or absent.	Arable land suitable for intensive cultivation where constraints to sustainable high levels of agricultural production are minor or absent.
2	Arable land suitable for regular cultivation for crops but not suited to continuous cultivation. It has a moderate to high suitability for agriculture but edaphic (soil factors) or environmental constraints reduce the overall level of production and may reduce the cropping phase to a rotation with sown pastures.	Arable land suitable for regular cultivation for crops but not suited to continuous cultivation
3	Grazing land or land well suited to pasture improvement. It may be cultivated or cropped in rotation with pasture. The overall production level is moderate because of edaphic or environmental constraints. Erosion hazard, soil structural breakdown or other factors including climate may limit the capacity for cultivation and soil conservation or drainage works may be required.	Grazing land or land well suited to pasture improvement. It may be cultivated or cropped in rotation with pasture.
4	Land suitable for grazing but not cultivation. Agriculture is based on native pastures or improved pastures based on minimum tillage techniques. Production may be seasonally high but the overall production level is low as a result of major environmental constraints.	Land suitable for grazing but not for cultivation. Agriculture is based on native or improved pastures established using minimum tillage.
5	Land unsuitable for agriculture or at best only light grazing. Agricultural production is low or zero as a result of severe constraints, including economic factors, which preclude land improvement.	Land unsuitable for agriculture or at best suited only to light grazing.

6.2.2 Results

A comparison of the pre and post-mining agricultural land suitability classification is provided in Table 15. The pre-mining and post-mining agricultural suitability classification within the study area is shown in Figures 7 and 8.

TABLE 15 COMPARISON OF PRE AND POST-MINING AGRICULTURAL LAND SUITABILITY CLASSES

Land Class	Pre-mining		Post-mining	
	Ha	%	ha	%
Class 1	0.0	0.0	0.0	0.0
Class 2	0.0	0.0	0.0	0.0
Class 3	1,028	22.4	775	16.9
Class 4	2,917	63.5	2,791	60.7
Class 5	652	14.2	1,031	22.4
Total	**4,597**	**100**	**4,597**	**100.0**

The agricultural domains and pre-mining and post-mining land use practices associated with the study area are described further in the agricultural impact statement (SBA, 2012) (Appendix R of the EA).

Pre-mining

Class 1

Based upon the survey of agricultural land suitability, there are no zones of Class 1 land within the study area.

Class 2

Based upon the survey of agricultural land suitability, there are no zones of Class 2 land within the study area.

Class 3

Class 3 land within the study area is situated predominantly on soil type 2 and 3, with the majority of the class overlaying soil type 3. This class indicates that the land is moderately productive and well suited to grazing or to crop cultivation with a pasture rotation.

Class 4

Class 4 land within the study area is situated predominately on soil types 1 and 2 with occasional occurrences on soil type 3. This land class indicates that the land is only marginally suitable for grazing and not suitable for cultivation. Grazing productivity is low to very low and pastures are based predominantly on native or improved pastures established using minimum tillage.

Class 5

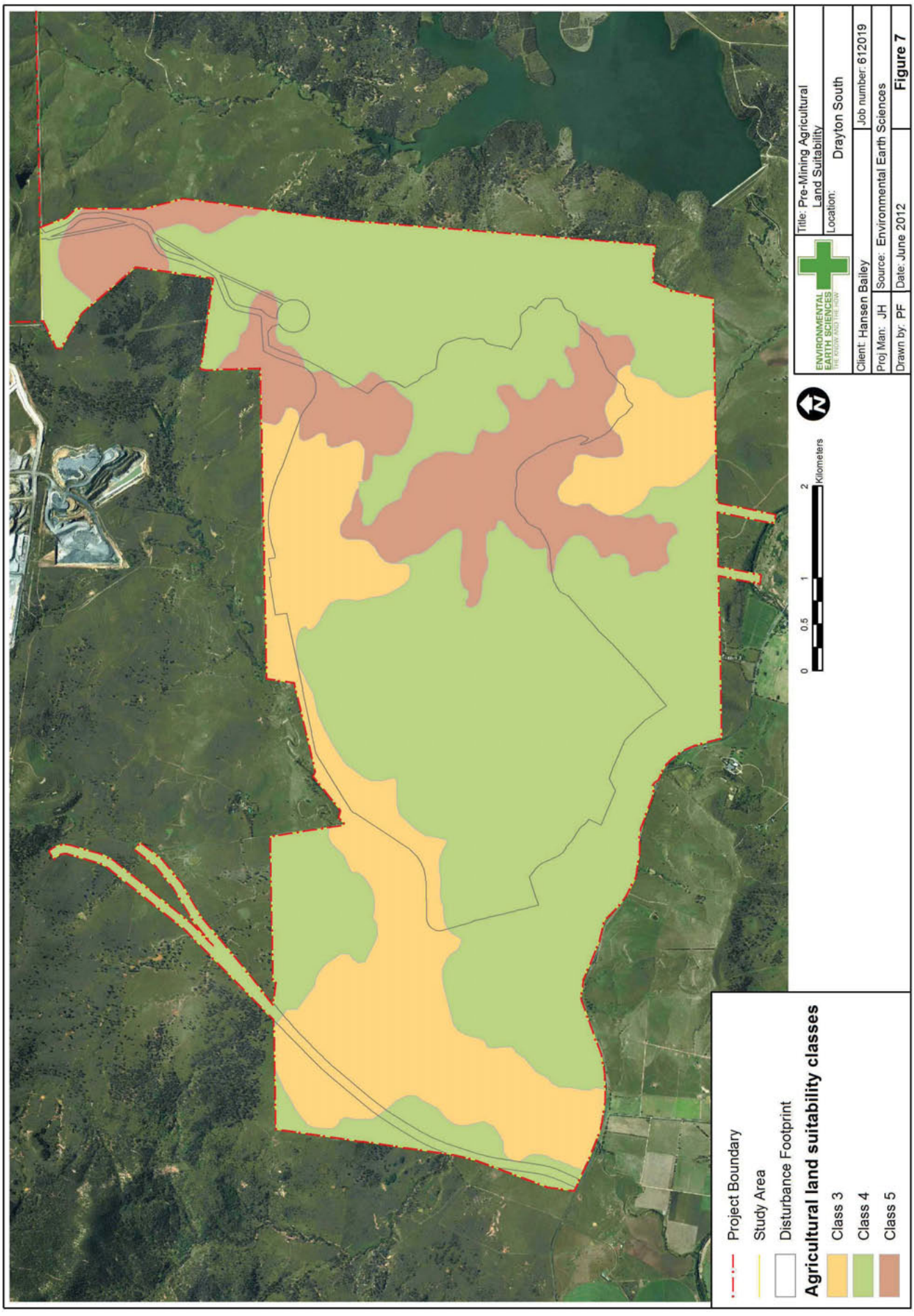
Class 5 land within the study area is situated on soil types 1 and 2 and to a lesser extent on soil type 3. Class 5 lands are unsuitable for agriculture or at best suited only to light grazing.

Post-mining

Impacts to the land as a result of the Project will be within the Drayton South disturbance footprint. The majority of batters on the post-mining landform consist of slopes on between 15 and 20% and will be covered in low to moderate quality topdressing. These factors should result in an agricultural suitability class of 5. The flatter slopes (<10%) will result in Class 4 land following rehabilitation.

Post mining, land within the Drayton South disturbance footprint will no longer be available for purposes outlined in the *Agricultural Land Classification* (NSW Agriculture, 2002). Instead, the affected land will be rehabilitated to establish Narrabeen Footslopes Slaty Box Woodland and Central Hunter Box-Ironbark Woodland communities. This area will be reserved in perpetuity as an onsite biodiversity offset for the Project. The onsite component of the biodiversity offset package is discussed further in the EA ecology impact assessment (Cumberland Ecology, 2012) (see Appendix J of the EA).

Areas outside the disturbance footprint will retain the same pre-mining class. Based upon this assessment of agricultural suitability classes, this land will continue to be suitable for livestock grazing, which is considered to be a component of the final land use goal for the study area. The post-mining agricultural land use practices associated with the study area are described further in the agricultural impact statement (SBA, 2012) (Appendix R of the EA).


Project Boundary
Study Area
Disturbance Footprint
Agricultural land suitability classes
Class 3
Class 4
Class 5
0
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Kilometers
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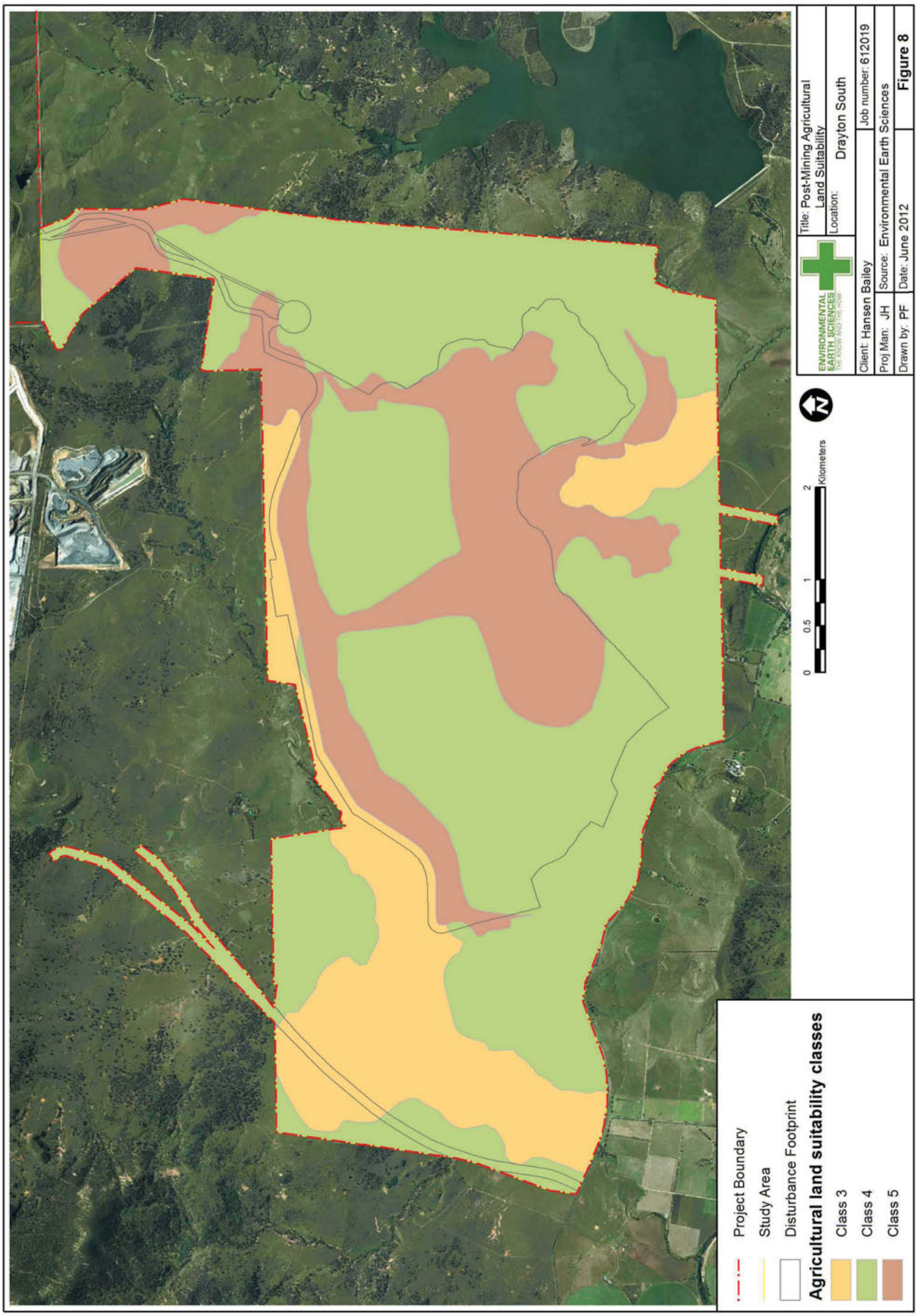
ENVIRONMENTAL EARTH SCIENCES
THE KNOW AND THE HOW
Title: Pre-Mining Agricultural Land Suitability
Location: Drayton South
Client: Hansen Bailey
Job number: 612019
Proj Man: JH
Source: Environmental Earth Sciences
Drawn by: PF
Date: June 2012
Figure 7


Project Boundary
Study Area
Disturbance Footprint
Agricultural land suitability classes
Class 3
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ENVIRONMENTAL EARTH SCIENCES
THE KNOW AND THE HOW
Title: Post-Mining Agricultural Land Suitability
Location: Drayton South
Client: Hansen Bailey
Job number: 612019
Proj Man: JH
Source: Environmental Earth Sciences
Drawn by: PF
Date: June 2012
Figure 8

6.3 Biophysical Strategic Agricultural Land

As outlined in Section 2, the SRLUP maps and prescribes criteria for BSAL. The study area has been assessed against the mapping and criteria outlined in the SRLUP and validated during the field survey to gain an appreciation of the extent and likely impact of the Project on potential BSAL.

In accordance with the mapping illustrated in the SRLUP, the Drayton South disturbance footprint is not situated on areas of BSAL. Furthermore, Table 16 validates that the study area, which includes the Drayton South disturbance footprint, does not trigger the relevant set of criteria required to represent BSAL. As such the Project will not impact BSAL.

TABLE 16 BIOPHYSICAL STRATEGIC AGRICULTURAL LAND CRITERIA

Criteria	Validation
Land that falls under soil fertility classes 'high' or 'moderately high' under the Draft Inherent General Fertility of NSW (OEH), and	The Drayton South disturbance footprint is situated on land identified as soil fertility class 'moderately low' and 'moderate' as mapped by the *Draft Inherent Soil Fertility of NSW Map* (OEH). The criterion is not triggered.
Land capability classes I, II or III under the Land and Soil Capability Mapping of NSW (OEH), and	The Drayton South disturbance footprint is situated on land identified as land capability Class IV, V, VI and VII as verified by this soil and land capability impact assessment. The criterion is not triggered.
Reliable water of suitable quality, characterised by having rainfall of 350mm or more per annum (9 out of 10 years); or Properties within 150m of a regulated river, or unregulated rivers where there are flows for at least 95% of the time (i.e. the 95th percentile flow of each month of the year is greater than zero) or 5th order and higher rivers; or Groundwater aquifers (excluding miscellaneous alluvial aquifers, also known as small storage aquifers) which have a yield rate greater than 5L/s and total dissolved solids of less than 1,500mg/L	As confirmed by the surface water impact assessment (WRM, 2012) (Appendix M of the EA) and groundwater impact assessment (AGE, 2012) (Appendix N of the EA): • The Drayton South disturbance footprint receives 350mm or more rainfall per annum (9 out of 10 years); • The land within the Drayton South disturbance footprint is further than 150m from the Hunter River, which is a regulated river; • The land within the Drayton South disturbance footprint is within 150m of Saddlers Creek, which is an unregulated watercourse, however, does not flow at least 95% of the time; and • The land within the Drayton South disturbance footprint does not overlie significant groundwater aquifers, such as that of the Hunter River. The criterion is triggered by the available rainfall only and does not meet the other criterion.
or	
Land that falls under soil fertility classes 'moderate' under the Draft Inherent General Fertility of NSW (OEH), and	The Drayton South disturbance footprint is situated on land identified as soil fertility class 'moderately low' and 'moderate' as mapped by the *Draft Inherent Soil Fertility of NSW Map* (OEH). The criterion is triggered.
Land capability classes I or II under the Land and Soil Capability Mapping of NSW (OEH), and	The Drayton South disturbance footprint is situated on land identified as land capability Class IV, V, VI and VII as verified by this soil and land capability impact assessment. The criterion is not triggered.
Reliable water of suitable quality, characterised by	As confirmed by the surface water impact assessment

Criteria	Validation
having rainfall of 350mm or more per annum (9 out of 10 years); or Properties within 150m of a regulated river, or unregulated rivers where there are flows for at least 95% of the time (i.e. the 95th percentile flow of each month of the year is greater than zero) or 5th order and higher rivers; or Groundwater aquifers (excluding miscellaneous alluvial aquifers, also known as small storage aquifers) which have a yield rate greater than 5L/s and total dissolved solids of less than 1,500mg/L	(WRM, 2012) (Appendix M of the EA) and groundwater impact assessment (AGE, 2012) (Appendix N of the EA): • The Drayton South disturbance footprint receives 350mm or more rainfall per annum (9 out of 10 years); • The land within the Drayton South disturbance footprint is further than 150m from the Hunter River, which is a regulated river; • The land within the Drayton South disturbance footprint is within 150m of Saddlers Creek, which is an unregulated watercourse, however, does not flow at least 95% of the time; and • The land within the Drayton South disturbance footprint does not overlie significant groundwater aquifers, such as that of the Hunter River. The criterion is triggered by the available rainfall only and does not meet the other criterion.

7 SOIL MANAGEMENT

Section 7 identifies measures for successful rehabilitation of the study area following completion of mining activities.

7.1 Topsoil stripping methodology

Determination of suitable soil to conserve for later use in mine rehabilitation has been conducted in accordance with Elliot and Veness (1981). This methodology is presented in further detail in Appendix A. The approach remains a benchmark for land resource assessment in the Australian mining industry, particularly in the Hunter Valley region. The approach involves the assessment of soils based on their physical and chemical parameters. The key parameters are presented in Table 17.

TABLE 17 TOPDRESSING SUITABILITY CRITERIA

Parameter	Desirable Criteria
Structure Grade	>30% peds
Coherence	Coherent (wet and dry)
Mottling	Absent
Macrostructure	>10cm
Force to Disrupt Peds	≤3 force
Texture	Finer than a fine sandy loam
Gravel and Sand Content	<60%
pH	4.5 to 8.4
Salinity	<1.5 dS/m
Sodic Limit	6 ESP

7.2 Topsoil stripping depths and volume

Laboratory soil analytical results (Appendix B) were used with reference to field (Appendix C) and desktop observations to determine the depth of soil material suitable for recovery and reuse as topdressing material as part of the rehabilitation of the Drayton South disturbance footprint. Structural and textural properties of the subsoils, along with soil dispersivity, sodicity, pH and the presence of gravels and cobbles are considered the most significant limiting factors affecting the suitability of a soil for reuse. Table 18 presents the recommended stripping depth for each soil type.

TABLE 18 RECOMMENDED STRIPPING DEPTHS WITHIN THE STUDY AREA

Soil Type	Common Soil Name	Recommended Stripping Depth (m)	Study Area (ha)	Volume (m^3)
1	Mottled and Pedaric Brown Sodosol Complex	0.20	2,513	5,026,000
2	Pedaric Brown Dermosol Complex	0.25	1,174	2,935,000
3	Brown Vertosol Complex	0.30	712	2,136,000
4	Orthic Tenosols	0.20	198	396,000
Total Volume				10,493,000
Total Volume (10% handling loss allowance)				9,443,700

Allowing for a 10% handling loss, approximately 9,443,700 m^3 of suitable topdressing is considered to be present within the study area. The majority of topsoil disturbance will result from excavation within the Drayton South disturbance footprint (Table 19 and 20).

7.3 Topsoil balance

The topsoil balance for this assessment is based upon the following assumptions:

- topsoil (i.e. the A horizon) will comprise of the topdressing material for rehabilitation works. It is considered that subsoils are only suitable for intermediate capping layers overlying overburden;
- a 10% handling loss for topdressing material; and
- topsoil will be applied on final landforms at depths stated in Table 20.

The final post-rehabilitation landform design for the Project has been used to calculate the area and volume of soil required to rehabilitate all disturbed areas and thus determine the potential for topdressing deficit or surplus during rehabilitation.

TABLE 19 TOPSOIL BALANCE – DISTURBANCE AREA

Soil Type	Common Soil Name	Recommended Stripping Depth (m)	Drayton South Disturbance Footprint (ha)	Volume (m^3)	Volume (10% loss) (m^3)
1	Mottled and Pedaric Brown Sodosol Complex	0.20	1,124	2,248,000	2,023,200
2	Pedaric Brown Dermosol Complex	0.25	450	1,125,000	1,012,500
3	Brown Vertosol Complex	0.30	122	366,000	329,400
4	Orthic Tenosols	0.20	206	412,000	370,800
Total Disturbance Footprint			**1,902**		
Total Volume				**4,151,000**	
Total Volume (10% Handling Loss Allowance)				**3,735,900**	

Note: The disturbance area includes pits as well as associated infrastructure such as mine facilities, roads, etc.

TABLE 20 TOPSOIL BALANCE – VOLUME REQUIRED

Soil Land Capability Class	Recommended Spreading Depth	Drayton South Disturbance Footprint (ha)	Volume Required (m^3)
IV	0.20	17	34,000
V	0.20	53	106,000
VI	0.20	1,080	2,160,000
VII	0.15	683	1,024,500
VIII	0.15	69	103,500
Total Area (ha)		**1,902**	
Total Volume (m^3)			**3,428,000**

Notes:
1. Note that the disturbance area includes pits as well as associated infrastructure such as mine facilities, roads, etc.

The topsoil balance shown in Table 19 and Table 20 indicates that approximately 3,735,900 m^3 of material from the Drayton South disturbance footprint is available for reuse at the rehabilitation stage. As a result, the Project retains a topdressing surplus of 307,900 m^3.

8 STRIPPING AND TOPDRESSING MANAGEMENT

In areas where topsoil (and subsoil) stripping and transportation is required we recommend the following general topsoil handling techniques in order to prevent or minimise soil deterioration:

- when stripping, the depths presented in Table 18 are adhered to (subject to further field observations made during works);
- during stripping all excavated material should be maintained in a slightly moist condition to minimise dust generation during dry periods. Stripping activities should not be carried out during excessively dry or wet periods;
- where applicable, place stripped material directly onto the stockpiles of reshaped overburden and spread the topsoil immediately (dependent upon mining timetables, availability of equipment and favourable weather conditions). This is to ensure that excessive stockpiling of stripped material and reduction in suitability for beneficial reuse is avoided;
- where applicable, preferential less aggressive soil handling procedures are to be employed to minimise the effects of compression and erosion. Examples of these procedures include grading of stockpiles and construction of windrows and minimisation of excessive stockpiling;
- the surface of all temporary stockpiles should be maintained in as coarse a structure as possible for the purpose of promoting infiltration, reducing erosion risk and ensuring that sub-surface aerobic conditions are maintained;
- all stockpiles and stockpiling areas should be clearly identified to ensure that mixing of different soil types does not occur;
- stockpiles should be erected to a maximum height of 3 m and free draining. Clayey soils (which comprise the majority of the soil types encountered to date on the study area) should be maintained in lower stockpiles for shorter periods of time than coarser textured sandy and gravelly soils;
- due to the sodic nature of many of the soils within the study area, where applicable in long term topsoil stockpiles, mulch is to be blended into the material for the purpose of enhancing the breakdown of vegetation material and minimising dust generation and soil erosion. Where it is considered viable, incorporating organic matter should be carried out as an integral part of maintaining and improving the suitability of soil for the end land use;
- all long-term stockpiles (greater than 6 months) need to be seeded and fertilised as soon as possible to promote vegetation growth and stabilise the stockpile slopes. For the purpose of these works it is recommended that a rapid-growing, sterile annual pasture species should provide sufficient cover while minimising the potential for the emergence of weed species. If there is difficulty in establishing vegetative cover a watering and (where economically viable) fertilising program should be initiated until vegetation is established; and
- weed infestations should be inspected and controlled during the management of soil stockpiles.

Ongoing monitoring of the stockpiles should be carried out for the life of the Project and records of observations should be kept as well as any corrective action required and undertaken. An inventory of available soil should be maintained to ensure adequate topsoil materials are available for planned rehabilitation activities.

8.1 Topsoil re-spreading and seedbed preparation

Where technically feasible, all stripped topsoil materials should be re-spread directly onto reshaped areas with no prior stockpiling and storage. Where topsoil resources allow, topsoil should be spread to a general depth of at least 100 mm on regraded spoil. Upon being spread, topsoil should be treated with fertiliser and seeded simultaneously to minimise the risk of opportunistic colonisation by weed species. The rapid growth of vegetation cover over the exposed topsoil will also substantially minimise the risk of dust generation and water and wind erosion.

Light contour ripping should be carried out on topsoiled areas following spreading for the purpose of ensuring optimum establishment and growth of vegetation. All ripping should be conducted along the contour when the soil is moist (immediately prior to sowing of seed stock). Scarifying of the topsoil should be carried out prior to or during sowing to increase infiltration and minimise runoff generation.

8.2 Erosion and sediment control

The construction of contour furrows and contour banks at intervals down slopes is considered to be an effective means of management of surface flow across disturbed areas. The purpose of these erosion and sediment control structures is to divide long sections of slope into shorter sections and thus reducing runoff flow velocity and depth and also the potential for soil erosion to occur. The number, proximity and size of bank and furrow structures is heavily dependent upon slope. Sections of increased slope require banks and furrows to be constructed more closely together than sections of low slope.

As already stated, contour ripping on disturbed areas should be undertaken for the purpose of erosion protection and preparation of the soil for planting and revegetation activities.

Graded banks can also be used to minimise erosion and sediment generation. The banks are constructed away from the true contour at a gradient of between 0.5% and 1% to drain water away from one part of a slope to another (e.g. a watercourse or dam).

All water that has flowed off disturbed areas should be disposed downslope through engineered waterways and sediment control dams designed to remove sediment from the water column prior to runoff entering natural water bodies. Such techniques are presented in detail in the *Managing Urban Stormwater: Soils and Construction* (Volume 2E – Mines and Quarries) (DECC, 2008).

9 LIMITATIONS

This report has been prepared by Environmental Earth Sciences NSW ABN 109 404 006 in response to and subject to the following limitations:

1. The specific instructions received from Hansen Bailey Environmental Consultants;
2. The specific scope of works set out in PO111017_V2 issued by Environmental Earth Sciences NSW for and on behalf of Hansen Bailey Environmental Consultants, which is included in Section 1 of this report;
3. May not be relied upon by any third party not named in this report for any purpose except with the prior written consent of Environmental Earth Sciences NSW (which consent may or may not be given at the discretion of Environmental Earth Sciences NSW);
4. This report comprises the formal report, documentation sections, tables, figures and appendices as referred to in the index to this report and must not be released to any third party or copied in part without all the material included in this report for any reason;
5. The report only relates to the study area referred to in Section 3 and illustrated in Figure 2;
6. The report relates to the study area as at the date of the report as conditions may change thereafter due to natural processes and/or site activities;
7. No warranty or guarantee is made in regard to any other use than as specified in the scope of works and only applies to the depth tested and reported in this report;
8. Fill, soil, groundwater and rock to the depth tested within the study area may be fit for the use specified in this report. Unless it is expressly stated in this report, the fill, soil and/or rock may not be suitable for classification as clean fill if deposited off site; and
9. Our General Limitations set out at the back of the body of this report.

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GLOSSARY OF TERMS

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

Alluvial describes material deposited by, or in transit in, flowing water.

Apedal describes a soil in which none of the soil material occurs in the form of peds or soil aggregates in the moist state.

Cation Exchange Capacity (CEC) maximum positive charge required to balance the negative charge on colloids (clays and other charged particles). The units are milli-equivalents per 100 grams of material or centimoles of charge per kilogram of exchanger.

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

Cobble rock fragment, rounded or abraded between 64 and 256 mm in diameter. Cobbles are larger than gravel and smaller than boulders.

Colluvial unconsolidated soil and rock material moved down-slope by gravity.

Cutans are the modification of the soil texture, or structure, at natural surfaces in soil materials due to illuviation. Cutans are oriented deposits which can be comprised of any of the component substances of the parent soil material. Cutans may include clay skins or coatings of silica, sesquioxide, manganese, ferromanganese, soil organic matter or carbonate. Clay skins are also called argillans, and soil horizons with sufficient clay illuviation are termed argillic horizons.

Dispersion process by which species in solution mix with a second solution, thus reducing in concentration. In particular, relates to the reduction in concentration resulting from the movement of flowing groundwater.

Electrolytic conductivity (EC) measure of the extent to which water conducts an electrical current and is related to the total concentration and relative proportions of the dissolved ionised substances within the water, and the temperature at which the determination is made.

Ephemeral stream a stream that flows only during periods of precipitation and briefly thereafter, or during periods of elevated water-table levels when the stream is in direct hydraulic connection with the underlying unconfined aquifer (i.e. receives base-flow).

Gradient rate of inclination of a slope. The degree of deviation from the horizontal; also refers to pressure.

Groundwater water held in the pores of an aquifer.

Gully erosion displacement of soil by running water that forms clearly defined, narrow channels that generally carry water only during or after heavy rain.
Horizon individual soil layer, based on texture and colour, which differs from those above and below.

Infiltration passage of water, under the influence of gravity, from the land surface into the subsurface.

Lithic containing large amounts of fragments derived from previously formed rocks.

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

Massive refers to the condition of the soil layer in which the layer appears to be as a coherent or solid mass which is largely devoid of peds.

Mottled masses, blobs or blotches of sub-dominant, varying colours in the soil matrix.

Organics chemical compounds comprising atoms of carbon, hydrogen and others (commonly oxygen, nitrogen, phosphorous, sulfur). Opposite is inorganic, referring to chemical species not containing carbon.

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

Pedal describes a soil in which some or all of the soil material occurs in the form of peds in the moist state.

Permeability property of porous medium relating to its ability to transmit or conduct liquid (usually water) under the influence of a driving force. Also refereed to as hydraulic conductivity.

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

Plastic soil material which is in a condition that allows it to undergo permanent deformation without appreciable volume change or elastic rebound, and without rupture.

Podzolic a term applied to acid soils with strong texture contrast between loamy topsoils and clayey subsoils.

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

Representative Sample assumed not to be significantly different than the population of samples available. In many investigations samples are often collected to represent the worst case situation.

Shale fine-grained sedimentary rock formed by the compaction of silt, clay, or sand that accumulates in deltas and on lake and ocean bottoms. It is the most abundant of all sedimentary rocks.

Sheet erosion removal of surface material from a wide area of gently sloping or graded land by broad continuous sheets of running water rather than by streams.

Sodic term given to soil with a level of exchangeable sodium cations greater than 10-15% of the soil's cation exchange capacity (CEC), or soluble sodium cations greater than 10-15 times the square root of soluble calcium and magnesium cations. These terms are known as exchangeable sodium percentage (ESP) and sodium adsorption ratio (SAR) respectively.

Solod/Solodic soil with strong gradational texture contrast between mildly leached, slightly alkaline loamy pale topsoil and alkaline clay subsoil with coarse blocky or columnar structure. Have bleached A_2 horizons and alkaline B and C horizons.

Solonchak soils dominated by salt accumulation, which have a powdery structure and polygonal cracking and slaking of the surface.

Stratigraphy vertical sequence of geological units.

Subsidence the downward settling of material with little horizontal movement.

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

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

Topsoil part of the soil profile, typically the A1 horizon, containing material which is usually darker, more fertile and better structured than the underlying layers.

ENVIRONMENTAL EARTH SCIENCES GENERAL LIMITATIONS

Scope of services
The work presented in this report is Environmental Earth Sciences response to the specific scope of works requested by, planned with and approved by the client. It cannot be relied on by any other third party for any purpose except with our prior written consent. Client may distribute this report to other parties and in doing so warrants that the report is suitable for the purpose it was intended for. However, any party wishing to rely on this report should contact us to determine the suitability of this report for their specific purpose.

Data should not be separated from the report
A report is provided inclusive of all documentation sections, limitations, tables, figures and appendices and should not be provided or copied in part without all supporting documentation for any reason, because misinterpretation may occur.

Subsurface conditions change
Understanding an environmental study will reduce exposure to the risk of the presence of contaminated soil and or groundwater. However, contaminants may be present in areas that were not investigated, or may migrate to other areas. Analysis cannot cover every type of contaminant that could possibly be present. When combined with field observations, field measurements and professional judgement, this approach increases the probability of identifying contaminated soil and or groundwater. Under no circumstances can it be considered that these findings represent the actual condition of the site at all points.

Environmental studies identify actual sub-surface conditions only at those points where samples are taken, when they are taken. Actual conditions between sampling locations differ from those inferred because no professional, no matter how qualified, and no sub-surface exploration program, no matter how comprehensive, can reveal what is hidden below the ground surface. The actual interface between materials may be far more gradual or abrupt than an assessment indicates. Actual conditions in areas not sampled may differ from that predicted. Nothing can be done to prevent the unanticipated. However, steps can be taken to help minimize the impact. For this reason, site owners should retain our services.

Problems with interpretation by others
Advice and interpretation is provided on the basis that subsequent work will be undertaken by Environmental Earth Sciences NSW. This will identify variances, maintain consistency in how data is interpreted, conduct additional tests that may be necessary and recommend solutions to problems encountered on site. Other parties may misinterpret our work and we cannot be responsible for how the information in this report is used. If further data is collected or comes to light we reserve the right to alter their conclusions.

Obtain regulatory approval
The investigation and remediation of contaminated sites is a field in which legislation and interpretation of legislation is changing rapidly. Our interpretation of the investigation findings should not be taken to be that of any other party. When approval from a statutory authority is required for a project, that approval should be directly sought by the client.

Limit of liability
This study has been carried out to a particular scope of works at a specified site and should not be used for any other purpose. This report is provided on the condition that Environmental Earth Sciences NSW disclaims all liability to any person or entity other than the client in respect of anything done or omitted to be done and of the consequence of

anything done or omitted to be done by any such person in reliance, whether in whole or in part, on the contents of this report. Furthermore, Environmental Earth Sciences NSW disclaims all liability in respect of anything done or omitted to be done and of the consequence of anything done or omitted to be done by the client, or any such person in reliance, whether in whole or any part of the contents of this report of all matters not stated in the brief outlined in Environmental Earth Sciences NSW's proposal number and according to Environmental Earth Sciences general terms and conditions and special terms and conditions for contaminated sites.

To the maximum extent permitted by law, we exclude all liability of whatever nature, whether in contract, tort or otherwise, for the acts, omissions or default, whether negligent or otherwise for any loss or damage whatsoever that may arise in any way in connection with the supply of services. Under circumstances where liability cannot be excluded, such liability is limited to the value of the purchased service.

APPENDIX A FIELD TOPDRESSING ASSESSMENT PROCEDURE

A.1 Field assessment procedure for topdressing materials

The field assessment procedure for topdressing materials is based upon Elliot and Veness (1981), *Selection of Topdressing Material for Rehabilitation of Disturbed Areas in the Hunter Valley.* The paper is specifically written for the assessment of the behaviour of soil material used in the rehabilitation of coal mine overburden in the Hunter Valley and describes the basic procedure for the recognition of suitable topdressing materials.

The different factors to be addressed in assessing topdressing materials are as follows:

A.1.1 Structure

Structure in soils relates to the ability of water to move through a soil and the need for soil to have adequate structure grade to allow adequate water infiltration for the germination of plants. Factors such as the presence and coarseness of peds, pore space and general soil structure are important in making this assessment.

A.1.2 Cohesiveness of soils

Surface soils should be crumbly and those crumbs should be of sufficient size as not to blow away but small enough to allow good germination of seed. They should also be sufficiently non-sticky when moist to maintain their individuality from other crumbs when disturbed. Therefore soil material with higher grades of structure (i.e. pedal soils) are to be considered suitable for topdressing.

Less pedal soils can be assessed through their cohesiveness and their ability to maintain their structure grade. Structureless and non-cohesive soils are not considered suitable for revegetation.

A.1.3 Mottling of soils

Mottling in soils is a good indicator of poor drainage conditions. Poor drainage unfavourably impacts upon soil infiltration rates, available moisture and air porosity for roots. Therefore a degree of mottling indicates soils which are unsuitable for use in revegetation.

A.1.4 Macrostructure

Macrostructure refers to the orderliness of the arrangement of peds in the soil. The size of macrostructure units is an indication of the tendency of a soil horizon to form a massive structure when wet. It is an indication of void space being reduced during wet conditions and thus such soils would be undesirable as topdressing.

A key point for this is that peds in better drained soils tend towards smaller size than those in poorly drained soils.

A.1.5 Ped strength

When peds are difficult to disrupt or break up, the soil material is generally considered to be unsuitable for topdressing.

A.1.6 Soil texture

As a general rule it is considered that sandy soils with a texture equal to or coarser than a sandy loam, with low available water are poorly suited to plant growth in the Hunter Valley. However, the literature indicates that there may be extenuating circumstances to the effectiveness of sandy soils as topdressing. These include reliable climate, favourable topography and good moisture relations in the underlying layers.

As a general rule heavier textured soils with a relatively high available water capacity can be considered suitable for topdressing.

A.1.7 Gravel and sand content in topdressing

According to the literature, if the combined amount of gravel and sand in a soil exceeds 60 percent there may be a degree of retardation in plant growth. This is because an excess of granular material reduces moisture holding capacity.

A.1.8 pH and salt content

Any assessment of soil suitability should review pH and salt content in the soil. Values of pH should be between the limits of 4.5 and 8.45, or preferably between 5.5 and 7.5. Electrical conductivity should be assessed against the soil salinity classes presented in Appendix 1 of the Department of Land and Water Conservation (DLWC) (2002), Site Investigations for Urban Salinity. These are presented in the following table.

TABLE 1 EC_E VALUES OF SOIL SALINITY CLASSES

Class	EC_e (dS/m)	Comments
Non-saline	<2	Salinity effect mostly negligible
Slightly saline	2-4	Yields of very sensitive crops may be affected
Moderately saline	4-8	Yield of many crops affected
Very saline	8-16	Only tolerant crops yield satisfactorily
Highly saline	>16	Only a few very tolerant crops yield satisfactorily

Note:
1. Source: DLWC (2002), Site Investigations for Urban Salinity

A.1.9 Soil colour

In the Hunter Valley, soil colour has proved a valuable indicator of soil dispersivity. As a general rule, where red and yellow soils occur in toposequence (adjacent soils that show differing profile characteristics reflecting the influence of local topography), the red soils will be the more stable with respect to soil conservation structures and cultivation. Research has found that soils as red as or redder than 7.5YR on the Munsell Colour Chart are generally suitable with respect to aggregate stability and to erodibility. Soil more yellow than 7.5YR has a higher likelihood of being unsuitable as a topdressing due to the above factors.

A.1.10 Cutans

A uniform distribution of cutans indicates uniform and deep wetting. A discontinuous distribution of cutans indicates restrictions to permeability

APPENDIX B LABORATORY TRANSCRIPTS AND CHAIN OF CUSTODY FORMS

SYDNEY ANALYTICAL LABORATORIES

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Laboratory:
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SEVEN HILLS NSW 2147
Telephone: (02) 9838 8903
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A.C.N. 003 614 695
A.B.N. 81 829 182 852
NATA No: 1884

ANALYTICAL REPORT for:

ENVIRONMENTAL & EARTH SCIENCES

PO BOX 380
NORTH SYDNEY 2059

ATTN: JOHN HILLIARD

JOB NO: SAL23479B

CLIENT ORDER: 111029

DATE RECEIVED: 28/04/11

DATE COMPLETED: 06/05/11

TYPE OF SAMPLES: SOILS

NO OF SAMPLES: 20

NATA This document is issued in accordance with NATA's accreditation requirements. Accredited for compliance with ISO/IEC 17025

.....
Issued on 10/05/11
For Lance Smith
(Chief Chemist)

SYDNEY ANALYTICAL LABORATORIES

ANALYTICAL REPORT

JOB NO: SAL23479B
CLIENT ORDER: 111029

	SAMPLES	CEC MEQ%	Ex.Na MEQ%	Ex.K MEQ%	Ex.Ca MEQ%	Ex.Mg MEQ%
1	TP102/0.9-1.0	17.2	0.29	0.30	11.0	6.9
2	TP103/0.5-0.6	20.5	7.6	0.21	2.40	11.3
3	TP104/0.6-0.8	20.7	0.53	0.09	14.6	7.3
4	TP107/0.3-0.4	22.9	1.95	0.27	12.8	9.4
5	TP108/0.6-0.8	18.2	4.75	0.29	4.20	10.1
6	TP109/0.7-0.8	23.1	4.70	0.21	7.2	12.1
7	TP110/0.8-1.0	19.1	1.20	0.46	10.4	7.9
8	TP111/0.4-0.5	21.0	4.10	0.42	6.5	11.6
9	TP113/0.2-0.3	19.9	1.70	0.40	8.1	11.2
10	TP114/0.6-0.8	21.0	2.90	0.42	7.2	11.6
11	TP115/0.8-1.0	20.3	2.95	0.36	7.9	10.2
12	TP118/0.5-0.7	15.7	0.52	0.57	9.1	6.7
13	TP121/0.9-1.0	24.1	1.95	0.16	10.9	12.7
14	TP121/1.7-1.8	24.4	2.10	0.30	11.0	12.5
15	TP122/0.6-0.7	20.2	0.54	1.20	16.3	3.75
16	TP125/0.6-0.8	26.7	6.2	0.15	8.7	13.4
17	TP127/0.5-0.6	27.0	4.25	0.46	10.5	13.4
18	TP128/0-0.1	11.9	0.06	1.50	8.4	2.35
19	TP129/0.9-1.0	20.0	2.60	0.33	8.7	9.7
20	TP130/0.1-0.2	16.3	0.57	0.07	9.3	7.2
DUPLICATES:						
20	TP130/0.1-0.2	16.2	0.60	0.09	9.2	7.2
MDL		0.1	0.01	0.01	0.01	0.01
Method Code		S7	S7	S7	S7	S7
Preparation		P5	P5	P5	P5	P5

SYDNEY ANALYTICAL LABORATORIES

ANALYTICAL REPORT

JOB NO: SAL23479B
CLIENT ORDER: 111029

	SAMPLES	Ex.Mn MEQ%	Ex.Al MEQ%	Sol.Na MEQ%	Sol.K MEQ%	Sol.Ca MEQ%
1	TP102/0.9-1.0	0.03	<0.1	0.12	0.03	2.10
2	TP103/0.5-0.6	<0.01	<0.1	7.3	0.02	1.45
3	TP104/0.6-0.8	0.03	<0.1	0.04	<0.01	0.47
4	TP107/0.3-0.4	0.01	<0.1	0.98	0.03	0.82
5	TP108/0.6-0.8	<0.01	<0.1	3.75	0.02	0.19
6	TP109/0.7-0.8	<0.01	<0.1	3.30	0.02	0.21
7	TP110/0.8-1.0	<0.01	<0.1	1.10	0.01	0.86
8	TP111/0.4-0.5	<0.01	<0.1	4.10	0.03	0.14
9	TP113/0.2-0.3	0.02	<0.1	0.65	0.07	1.05
10	TP114/0.6-0.8	<0.01	<0.1	4.30	0.03	0.13
11	TP115/0.8-1.0	0.01	<0.1	2.65	0.04	0.67
12	TP118/0.5-0.7	<0.01	<0.1	0.35	0.06	4.10
13	TP121/0.9-1.0	<0.01	<0.1	1.20	0.02	0.75
14	TP121/1.7-1.8	<0.01	<0.1	1.25	0.01	1.50
15	TP122/0.6-0.7	<0.01	<0.1	0.12	0.04	4.70
16	TP125/0.6-0.8	<0.01	<0.1	5.3	0.02	0.48
17	TP127/0.5-0.6	<0.01	<0.1	5.0	0.04	0.97
18	TP128/0-0.1	0.08	<0.1	<0.01	0.39	3.20
19	TP129/0.9-1.0	<0.01	<0.1	4.20	0.01	0.31
20	TP130/0.1-0.2	0.04	<0.1	0.23	0.04	0.65
DUPLICATES:						
20	TP130/0.1-0.2	0.03	<0.1	0.26	0.05	0.64
MDL		0.01	0.1	0.01	0.01	0.01
Method Code		S7	S7	S7	S7	S7
Preparation		P5	P5	P5	P5	P5

SYDNEY ANALYTICAL LABORATORIES

ANALYTICAL REPORT

JOB NO: SAL23479B
CLIENT ORDER: 111029

	SAMPLES	Sol.Mg MEQ%	Sol.Mn MEQ%	Sol.Al MEQ%
1	TP102/0.9-1.0	0.34	<0.01	<0.01
2	TP103/0.5-0.6	0.32	<0.01	<0.01
3	TP104/0.6-0.8	0.25	<0.01	<0.01
4	TP107/0.3-0.4	0.68	<0.01	<0.01
5	TP108/0.6-0.8	0.40	<0.01	<0.01
6	TP109/0.7-0.8	0.31	<0.01	<0.01
7	TP110/0.8-1.0	0.50	<0.01	<0.01
8	TP111/0.4-0.5	0.27	<0.01	<0.01
9	TP113/0.2-0.3	1.60	<0.01	<0.01
10	TP114/0.6-0.8	0.29	<0.01	<0.01
11	TP115/0.8-1.0	0.93	<0.01	<0.01
12	TP118/0.5-0.7	0.57	<0.01	<0.01
13	TP121/0.9-1.0	0.67	<0.01	<0.01
14	TP121/1.7-1.8	0.49	<0.01	<0.01
15	TP122/0.6-0.7	0.14	<0.01	<0.01
16	TP125/0.6-0.8	0.60	<0.01	<0.01
17	TP127/0.5-0.6	0.78	<0.01	<0.01
18	TP128/0-0.1	0.50	<0.01	<0.01
19	TP129/0.9-1.0	0.38	<0.01	<0.01
20	TP130/0.1-0.2	0.47	<0.01	<0.01
DUPLICATES:				
20	TP130/0.1-0.2	0.50	<0.01	<0.01
MDL		0.01	0.01	0.01
Method Code		S7	S7	S7
Preparation		P5	P5	P5

RESULTS ON DRY BASIS

SYDNEY ANALYTICAL LABORATORIES

LABORATORY DUPLICATE REPORT

JOB NO: SAL23479B
CLIENT ORDER: 111029

Sample Number	Analyte	Units	MDL	Sample Result	Duplicate Result	%RPD
TP130/0.1-0.2	CEC	MEQ%	0.1	16.3	16.2	1
TP130/0.1-0.2	Exchanged Na	MEQ%	0.01	0.57	0.60	5
TP130/0.1-0.2	Exchanged K	MEQ%	0.01	0.07	0.09	25
TP130/0.1-0.2	Exchanged Ca	MEQ%	0.01	9.3	9.2	1
TP130/0.1-0.2	Exchanged Mg	MEQ%	0.01	7.2	7.2	0
TP130/0.1-0.2	Exchanged Mn	MEQ%	0.01	0.04	0.03	25
TP130/0.1-0.2	Exchanged Al	MEQ%	0.1	<0.1	<0.1	0
TP130/0.1-0.2	Soluble Na	MEQ%	0.01	0.23	0.26	12
TP130/0.1-0.2	Soluble K	MEQ%	0.01	0.04	0.05	20
TP130/0.1-0.2	Soluble Ca	MEQ%	0.01	0.65	0.64	2
TP130/0.1-0.2	Soluble Mg	MEQ%	0.01	0.47	0.50	6
TP130/0.1-0.2	Soluble Mn	MEQ%	0.01	<0.01	<0.01	0
TP130/0.1-0.2	Soluble Al	MEQ%	0.01	<0.01	<0.01	0

Acceptance criteria:

RPD <50% for low level (<20xMDL)
RPD <30% for medium level (20-100xMDL)
RPD <15% for high level (>100xMDL)
No limit applies at <2xMDL

MDL = Method Detection Limit

All results are within the acceptance criteria

SYDNEY ANALYTICAL LABORATORIES

ANALYTICAL REPORT

JOB NO: SAL23479B
CLIENT ORDER: 111029

METHODS OF PREPARATION AND ANALYSIS

The tests contained in this report have been carried out on the samples as received by the laboratory.

P5 Sample dried, split and crushed to -150um

S7 Cation Exchange Capacity & Exchangeable/Soluble Cations Determined by Silver Thiourea Method CEC-1

ENVIRONMENTAL EARTH SCIENCES
THE KNOW AND THE HOW

Fax Cover Sheet

Date:

JOB NO:

PAGES: (including this page)

TO:

COMPANY:

FAX NO:

FROM:

SUBJECT:

COMMENTS:

Hi Pete,

Really sorry for the confusing COC the other day. ~~Here~~ Please find some missing samples in the esky and a NEW COC.

If there are any other issues, just let me know.

Thanks,

Josh BRAY.

Glaeba (02) Pty Ltd trading as Environmental Earth Sciences NSW
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CHAIN OF CUSTODY - INORGANIC ANALYSIS REQUE

ENVIRONMENTAL EARTH SCIENCES THE KNOW AND THE HOW

Job #: 111029 Site Location: Jerry's Plains Sampler: JB

Date: 27-Apr-11 Laboratory: SAL jhilliard@eesi.biz

Sample ID	pH	Sample Description: SOIL	WATER	SEDIMENT	Analysis Required: Electrical Conductivity	Chloride		CEC AND EXCHANGEABLES		Heavy Metals**			ANTICIPATED RESULTS/ TURNAROUND TIME
TP102 (0.9-1.0)	X	X			X	X		X		X			
TP103 (0.2-0.3)	X	X			X	X				X			
TP118 (0.2-0.3)	X	X			X	X		X					
TP104 (0.6-0.8)	X	X			X	X		X					
TP105 (0.3-0.5)	X	X			X	X							
TP106 (0.2-0.3)	X	X			X	X				X			
TP107 (0.3-0.4)	X	X			X	X		X		X			
TP108 (0-0.1)	X	X			X	X							
TP108 (0.6-0.8)	X	X			X	X		X					
TP109 (0-0.1)	X	X			X	X							
TP109 (0.7-0.8)	X	X			X	X		X					
TP110 (0.2-0.4)	X	X			X	X				X			
TP123 (1.4-1.6)	X	X			X	X							
TP111 (0.4-0.5)	X	X			X	X		X					
TP112 (0-0.1)	X	X			X	X				X			
TP113 (0.2-0.3)	X	X			X	X		X					
TP114 (0.4-0.6)	X	X			X	X		X					
TP115 (0.3-0.4)	X	X			X	X				X			
TP115 (0.8-1.0)	X	X			X	X		X					
TP116 (0.0-0.2)	X	X			X	X							
TOTAL	20	20			20	20		10		7			

Turn Around: NORMAL / 3 DAYS / 48 HRS / 24 HRS 1 of 3

Comments: **Heavy metals to analyse: As, Cd, Mg, Mn, Mo, Pb, Se, V

	Time	Date
Left EES Site:		
Transported By:		
Received Lab:	P. Young (SAC)	28/4/11
Fax Results Rec'd		
Typed Results Rec'd		

We can be contacted on:
Phone: (02) 9922 1777
Fax: (02) 9922 1010
Email: eesnsw@eesi.biz

P.T.O.

PROJECT FORMS/QF34 Chain of Custody_Inorganics 19 August 2009 Version 6 Page 1 of 1

ENVIRONMENTAL EARTH SCIENCES THE KNOW AND THE HOW

SYDNEY ANALYTICAL LABORATORIES

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Telephone: (02) 9838 8903
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A.C.N. 003 614 695
A.B.N. 81 829 182 852
NATA No: 1884

ANALYTICAL REPORT for:

ENVIRONMENTAL & EARTH SCIENCES

PO BOX 380
NORTH SYDNEY 2059

ATTN: JOHN HILLIARD

JOB NO: SAL23479

CLIENT ORDER: 111029

DATE RECEIVED: 28/04/11

DATE COMPLETED: 05/05/11

TYPE OF SAMPLES: SOILS

NO OF SAMPLES: 37

NATA This document is issued in accordance with NATA's accreditation requirements. Accredited for compliance with ISO/IEC 17025

LG Wyman
Issued on 10/05/11
FOR Lance Smith
(Chief Chemist)

SYDNEY ANALYTICAL LABORATORIES

ANALYTICAL REPORT

JOB NO: SAL23479
CLIENT ORDER: 111029

	SAMPLES	pH 1:5	COND. uS/cm	Cl mg/kg	As mg/kg	Cd mg/kg
1	TP102/0.9-1.0	8.2	110	37	4.0	<0.5
2	TP103/0.2-0.3	7.5	240	250	3.5	<0.5
3	TP104/0.6-0.8	7.7	80	29		
4	TP105/0.3-0.5	6.5	60	42		
5	TP106/0.2-0.3	7.2	90	38	4.0	<0.5
6	TP107/0.3-0.4	8.5	290	73	5.0	<0.5
7	TP108/0-0.1	6.4	75	51		
8	TP108/0.6-0.8	8.5	830	1020		
9	TP109/0-0.1	6.2	200	200		
10	TP109/0.7-0.8	8.4	870	950		
11	TP110/0.2-0.4	8.5	240	52	5.0	<0.5
12	TP111/0.4-0.5	8.6	1030	1220		
13	TP112/0-0.1	6.0	230	160	4.0	<0.5
14	TP113/0.2-0.3	8.1	170	110		
15	TP114/0.6-0.8	9.1	950	1150		
16	TP115/0.3-0.4	8.0	190	110	5.5	<0.5
17	TP115/0.8-1.0	8.7	590	570		
18	TP116/0-0.2	6.2	500	660		
19	TP117/0-0.2	6.7	160	120		
20	TP117/0.4-0.5	7.8	190	68		
21	TP118/0.5-0.7	8.6	170	100		
22	TP119/0-0.2	6.5	210	160		
23	TP120/0-0.1	6.0	90	55		
24	TP121/0.4-0.5	7.3	130	30		
25	TP121/0.9-1.0	8.5	470	230		
26	TP122/0.2-0.3	7.2	150	65	3.5	<0.5
27	TP123/0.4-0.5	8.3	200	110		
28	TP124/0.2-0.4	6.9	100	52		
29	TP125/0-0.1	6.8	210	66		
30	TP126/0.4-0.5	7.8	90	30		
31	TP127/0.1-0.2	7.5	360	170		
32	TP127/0.5-0.6	8.5	1300	1380		
33	TP128/0-0.1	7.5	130	46	3.0	<0.5
34	TP128/0.4-0.5	8.8	100	18		
35	TP129/0.9-1.0	4.8	1050	1420		
36	TP129/1.4-1.6	5.6	540	660		
37	TP130/0.1-0.2	7.0	85	24		
	BLANK	6.8	<10	<5	<0.5	<0.5
DUPLICATES:						
19	TP117/0-0.2	6.8	160	120		
MDL		0.1	10	5	0.5	0.5
Method Code		WA1	WA2	WA4	M7	M1
Preparation		P5	P5	P5	P3	P3

SYDNEY ANALYTICAL LABORATORIES

ANALYTICAL REPORT

JOB NO: SAL23479
CLIENT ORDER: 111029

SAMPLES	pH 1:5	COND. uS/cm	Cl mg/kg	As mg/kg	Cd mg/kg
AGAL-10				17	9.0
MDL	0.1	10	5	0.5	0.5
Method Code	WA1	WA2	WA4	M7	M1
Preparation	P5	P5	P5	P3	P3

SYDNEY ANALYTICAL LABORATORIES

ANALYTICAL REPORT

JOB NO: SAL23479
CLIENT ORDER: 111029

	SAMPLES	Mg mg/kg	Mn mg/kg	Mo mg/kg	Pb mg/kg	Se mg/kg
1	TP102/0.9-1.0	1890	1050	<1	20	<0.1
2	TP103/0.2-0.3	2010	760	<1	16	<0.1
5	TP106/0.2-0.3	1970	530	<1	17	<0.1
6	TP107/0.3-0.4	3560	390	<1	31	<0.1
11	TP110/0.2-0.4	4530	710	<1	16	<0.1
13	TP112/0-0.1	2120	900	<1	12	<0.1
16	TP115/0.3-0.4	4000	570	<1	18	<0.1
26	TP122/0.2-0.3	1560	125	<1	11	<0.5
33	TP128/0-0.1	1230	460	<1	15	<0.1
	BLANK	<10	<0.5	<1	<0.5	<0.1
	AGAL-10		220	8	38	10
MDL		10	0.5	1	0.5	0.1
Method Code		M1	M1	M4	M1	M2
Preparation		P3	P3	P3	P3	P3

SYDNEY ANALYTICAL LABORATORIES

ANALYTICAL REPORT

JOB NO: SAL23479
CLIENT ORDER: 111029

	SAMPLES	V mg/kg
1	TP102/0.9-1.0	10
2	TP103/0.2-0.3	10
5	TP106/0.2-0.3	11
6	TP107/0.3-0.4	7
11	TP110/0.2-0.4	9
13	TP112/0-0.1	23
16	TP115/0.3-0.4	10
26	TP122/0.2-0.3	5
33	TP128/0-0.1	10
	BLANK	<1
	AGAL-10	26
	MDL	1
	Method Code	M4
	Preparation	P3

RESULTS ON DRY BASIS

SYDNEY ANALYTICAL LABORATORIES

LABORATORY DUPLICATE REPORT

JOB NO: SAL23479
CLIENT ORDER: 111029

Sample Number	Analyte	Units	MDL	Sample Result	Duplicate Result	%RPD
TP117/0-0.2	pH		0.1	6.7	6.8	1
TP117/0-0.2	Conductivity	uS/cm	10	160	160	0
TP117/0-0.2	Chloride	mg/kg	5	120	120	0

Acceptance criteria:

RPD <50% for low level (<20xMDL)
RPD <30% for medium level (20-100xMDL)
RPD <15% for high level (>100xMDL)
No limit applies at <2xMDL

MDL = Method Detection Limit

All results are within the acceptance criteria

SYDNEY ANALYTICAL LABORATORIES

CERTIFIED REFERENCE MATERIAL

JOB NO: SAL23479
CLIENT ORDER: 111029

CRM Number	Analyte	Units	CRM Result	Certified Value	%Recovery	Acceptance Criteria %
AGAL-10	Arsenic	mg/kg	17	17.2	99	80-125
AGAL-10	Cadmium	mg/kg	9.0	9.3	97	80-120
AGAL-10	Manganese	mg/kg	220	241	91	85-110
AGAL-10	Molybdenum	mg/kg	8	8.6	93	70-130
AGAL-10	Lead	mg/kg	38	40.4	94	85-115
AGAL-10	Selenium	mg/kg	10	11.0	91	70-130
AGAL-10	Vanadium	mg/kg	26	25.3	103	70-130

All results are within the acceptance criteria

Note: The hot acid digest does not always determine 'total' metals. Refractory elements such as Iron and Aluminium and some base metals (particularly Chromium) show lower recoveries depending on their form within the sample matrix. Silicates and oxides are normally less soluble than elements in metallic or salt forms. The acceptance criteria for this reference material is based on histories of analyte recoveries using the nitric acid based digestion procedures.

SYDNEY ANALYTICAL LABORATORIES

ANALYTICAL REPORT

JOB NO: SAL23479
CLIENT ORDER: 111029

METHODS OF PREPARATION AND ANALYSIS

The tests contained in this report have been carried out on the samples as received by the laboratory.

P5	Sample dried, split and crushed to -150um
P3	Sample dried, jaw crushed and sieved at 1mm
WA1	pH - 1:5 soil/water extract Determined by APHA 4500B
WA2	Conductivity - 1:5 soil/water extract Determined by APHA 2510B
WA4	Chloride - 1:5 soil/water extract Determined by APHA 4110B
M7	Hydride Element - Digestion Method 7061 (HNO_3/H_2SO_4) Element determined by APHA 3114B (Hydride Generation AAS)
M1	Base Metal - Digestion Method 3050 (HNO_3/H_2O_2) Element determined by APHA 3111B (Flame AAS)
M4	Refractory Element - Digestion Method 3050 (HNO_3/H_2O_2) Element determined by APHA 3111D (Flame AAS)
M2	Selenium - Digestion Method 7741 (HNO_3/H_2SO_4) Determined by APHA 3114B (Hydride Generation AAS)

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GHD GEOTECHNICS

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Tel: (02) 9462 4860
Fax:(02) 9462 4710

Material Test Report

Report No: SYD116924
Issue No: 1

Client: Environmental Earth Sciences
7 - 9 George St
Artarmon NSW 2064

Project: 2120510

NATA 679

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D.P Brooke (Sydney Laboratory Manager)

Date of Issue: 27/05/2011

Sample Details

Sample ID	SYD11-9440
Client Sample ID	
Date Sampled	27/04/2011
Specification	26.5 Max
Location	
Sampled By	
Boring No.	TP130
Depth	1.4 to 1.6m
Soil Description	CLAY: red & grey

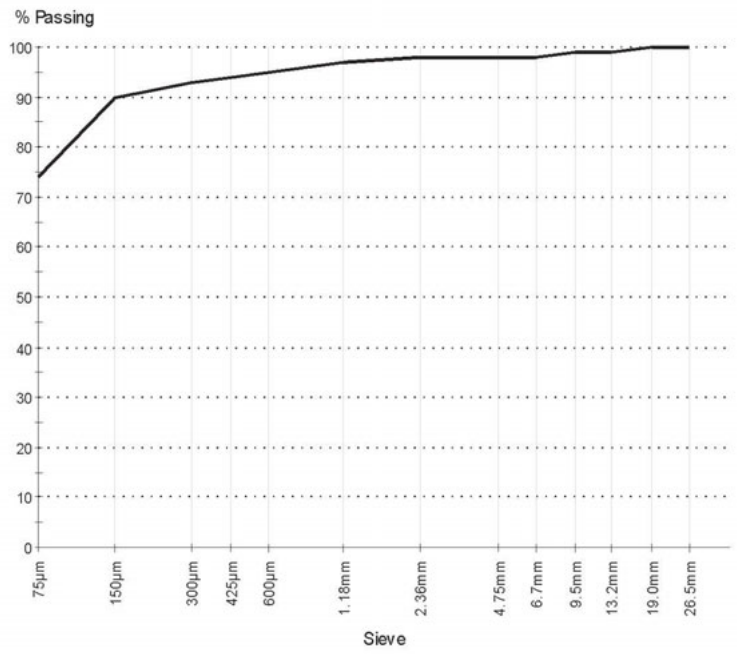
Other Test Results

Description	Method	Result	Limits
Emerson Class Number	AS 1289.3.8.1	2	
Soil Description		CLAY	
Type of Water		Distilled	
Temperature of Water (°C)		21	

Particle Size Distribution

Method: AS 1289.3.6.1
Drying by: Oven

Note: Sample Washed



Sieve Size	% Passing	Limits
26.5mm	100	
19.0mm	100	
13.2mm	99	
9.5mm	99	
6.7mm	98	
4.75mm	98	
2.36mm	98	
1.18mm	97	
600µm	95	
425µm	94	
300µm	93	
150µm	90	
75µm	74	

Comments

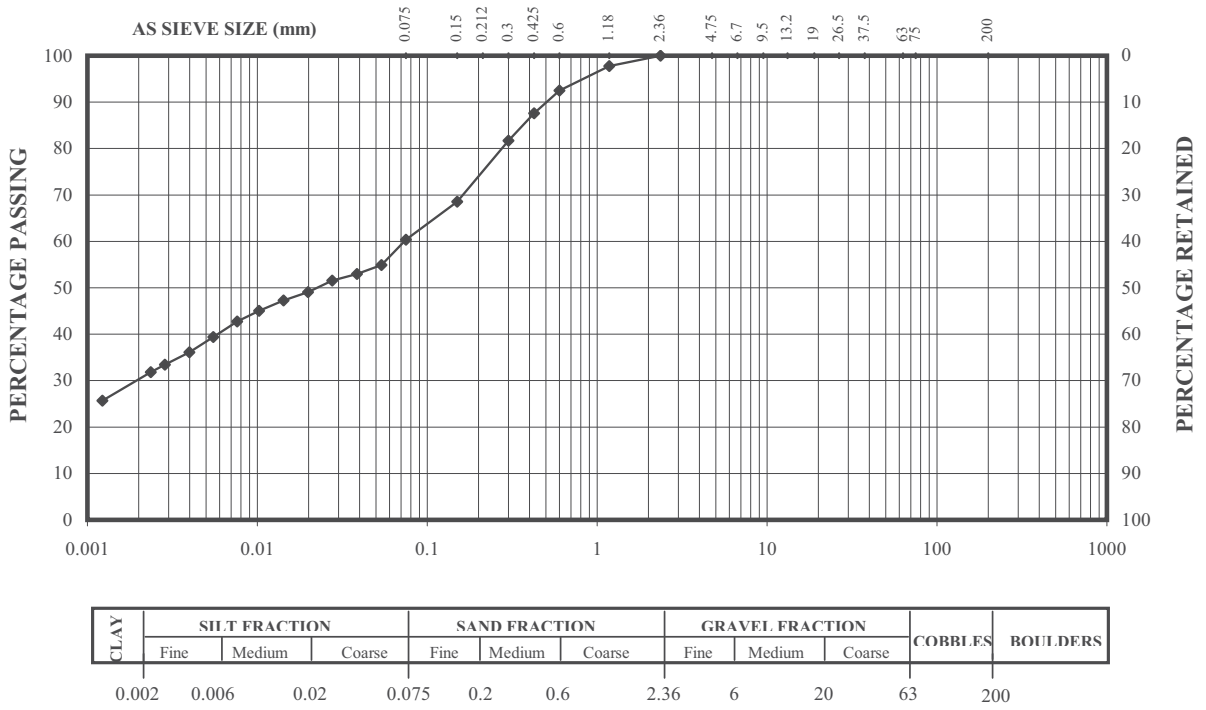
N/A

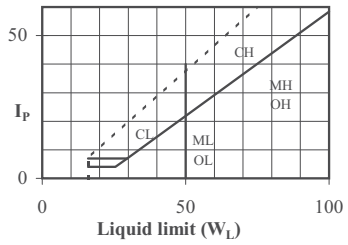
SOIL CLASSIFICATION REPORT

Trial Hole:	TP130
Depth (m):	0.1 - 0.2m
Sample No:	SYD11-9430

Client: Environmental Earth Sciences
Project: 111029
Location: Jerry's Plains

Client Sample No.: -
Sample History: Supplied by client





TEST METHODS
Classification AS1726 A2 Particle size AS1289.3.6.3

OTHER TESTS
AS1289.3.5.1.

GRADING
$C_u = D_{60} / D_{10}$ = not determinable
$C_c = D_{30}^2 / (D_{10} \times D_{60})$ = not determinable

PARTICLE DENSITY 2.71 (assumed)

PRE-TREATMENT HYDROMETER N/A

TEST CONDITION Washed sieve with dispersing agent

GROUP SYMBOL:

SOIL NAME: Sandy CLAY: black
Emerson Class AS1289.3.8.1 - Class No 8 (distilled water temp = 21°C)

REMARKS:

INDEX PROPERTIES (%)
Liquid Limit = N/A Plastic Limit = N/A
Plasticity Index = N/A Linear Shrinkage % = Not determined

Atterberg Limits (History/preparation)

Liquid Limit (type of test)

Linear Shrinkage (mould size)

Tested by:	MT
Date tested:	12.5.11
Checked by:	DB
Date checked:	25/05/2011

Approved Signatory:
D. Brooke
27/05/2011

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JOB No.	2120510
REPORT No.	SYD116911

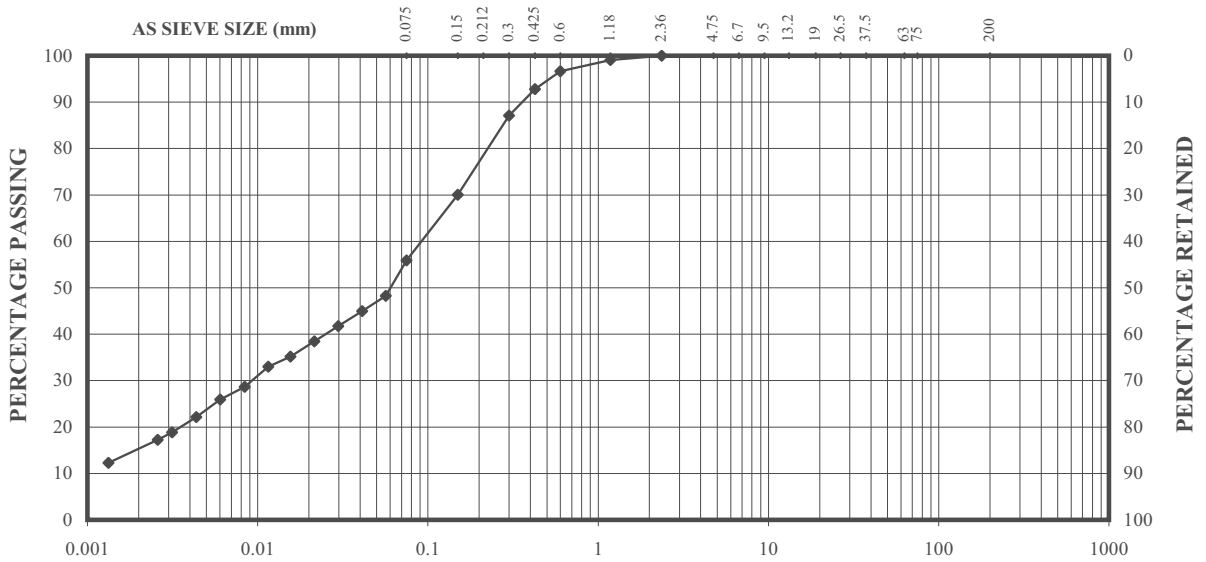
Ref: Document F9.1.16 issue 1.2

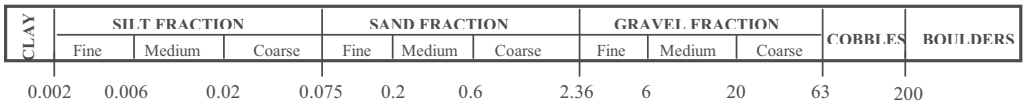
SOIL CLASSIFICATION REPORT

Trial Hole:	TP128
Depth (m):	0.0 - 0.1m
Sample No:	SYD11-9428

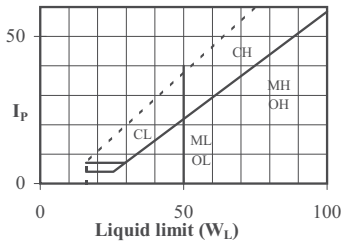
Client: Environmental Earth Sciences
Project: 111029
Location: Jerry's Plains

Client Sample No.: -
Sample History: Supplied by client





PARTICLE SIZE (mm)



TEST METHODS
Classification AS1726 A2 Particle size AS1289.3.6.3

OTHER TESTS
AS1289.3.5.1.

GRADING
$C_u = D_{60} / D_{10}$ = not determinable
$C_c = D_{30}^2 / (D_{10} \times D_{60})$ = not determinable

PARTICLE DENSITY 2.66 (measured)

PRE-TREATMENT HYDROMETER N/A

TEST CONDITION Washed sieve with dispersing agent

GROUP SYMBOL:

SOIL NAME: Sandy SILT: dark brown
Emerson Class AS1289.3.8.1 - Class No 8 (distilled water temp = 21°C)

REMARKS:

INDEX PROPERTIES (%)
Liquid Limit = N/A Plastic Limit = N/A
Plasticity Index = N/A Linear Shrinkage % = Not determined

Atterberg Limits (History/preparation)

Liquid Limit (type of test)

Linear Shrinkage (mould size)

Tested by:	MT
Date tested:	9.5.11
Checked by:	DB
Date checked:	25/05/2011

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Approved Signatory:
D. Brooke
27/05/2011

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JOB No.	**2120510**
REPORT No.	**SYD116909**

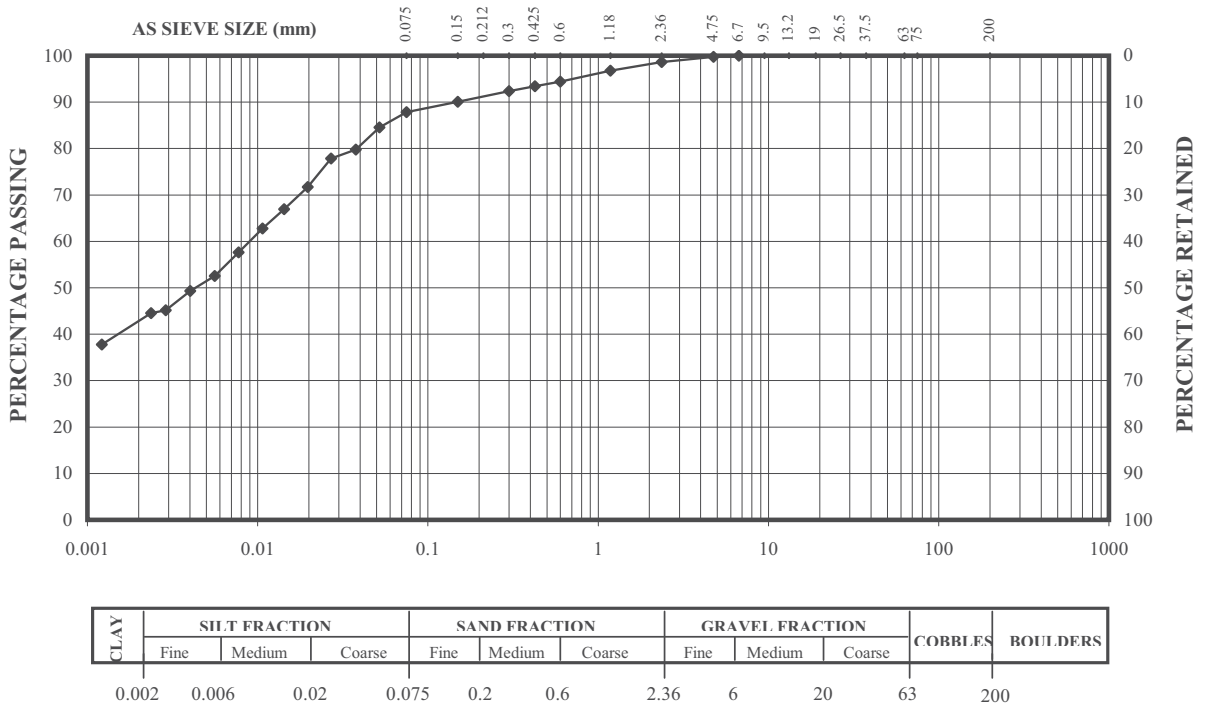
Ref: Document F9.1.16 issue 1.2

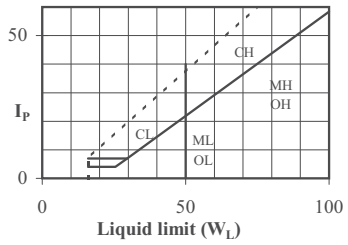
SOIL CLASSIFICATION REPORT

Trial Hole:	TP127
Depth (m):	1.5 - 1.6m
Sample No:	SYD11-9427

Client: Environmental Earth Sciences
Project: 111029
Location: Jerry's Plains

Client Sample No.: -
Sample History: Supplied by client





TEST METHODS
Classification AS1726 A2 Particle size AS1289.3.6.3

OTHER TESTS
AS1289.3.5.1.

GRADING
$C_u = D_{60} / D_{10}$ = not determinable
$C_c = D_{30}^2 / (D_{10} \times D_{60})$ = not determinable

PARTICLE DENSITY 2.71 (assumed)

PRE-TREATMENT HYDROMETER N/A

TEST CONDITION Washed sieve with dispersing agent

GROUP SYMBOL:

SOIL NAME: CLAY: dark red and brown

REMARKS:

INDEX PROPERTIES (%)
Liquid Limit = N/A Plastic Limit = N/A
Plasticity Index = N/A Linear Shrinkage % = Not determined

Atterberg Limits (History/preparation)

Liquid Limit (type of test)

Linear Shrinkage (mould size)

Tested by:	MT
Date tested:	24.5.11
Checked by:	DB
Date checked:	25/05/2011

Approved Signatory:
D. Brooke
27/05/2011

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JOB No.	2120510
REPORT No.	SYD116908

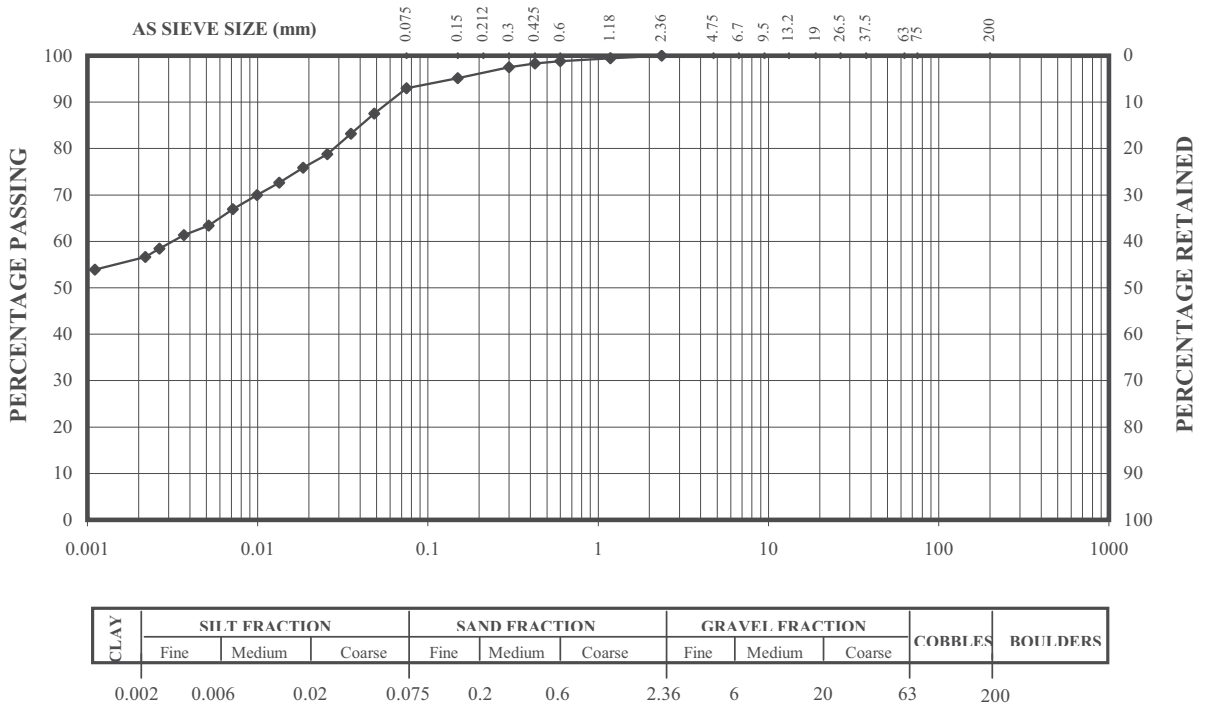
Ref: Document F9.1.16 issue 1.2

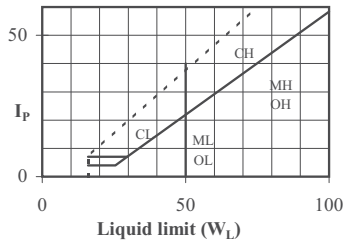
SOIL CLASSIFICATION REPORT

Trial Hole:	TP127
Depth (m):	0.5 - 0.6m
Sample No:	SYD11-9426

Client: Environmental Earth Sciences
Project: 111029
Location: Jerry's Plains

Client Sample No.: -
Sample History: Supplied by client





TEST METHODS
Classification AS1726 A2 Particle size AS1289.3.6.3

OTHER TESTS
AS1289.3.5.1.

GRADING
$C_u = D_{60} / D_{10}$ = not determinable
$C_c = D_{30}^2 / (D_{10} \times D_{60})$ = not determinable

PARTICLE DENSITY 2.71 (assumed)

PRE-TREATMENT HYDROMETER N/A

TEST CONDITION Washed sieve with dispersing agent

GROUP SYMBOL:

SOIL NAME: CLAY: dark red and brown
Emerson Class AS1289.3.8.1 - Class No 4 (distilled water temp = 21°C)

REMARKS:

INDEX PROPERTIES (%)
Liquid Limit = N/A Plastic Limit = N/A
Plasticity Index = N/A Linear Shrinkage % = Not determined

Atterberg Limits (History/preparation)

Liquid Limit (type of test)

Linear Shrinkage (mould size)

Tested by:	MT
Date tested:	17.5.11
Checked by:	DB
Date checked:	25/05/2011

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JOB No.	**2120510**
REPORT No.	**SYD116907**

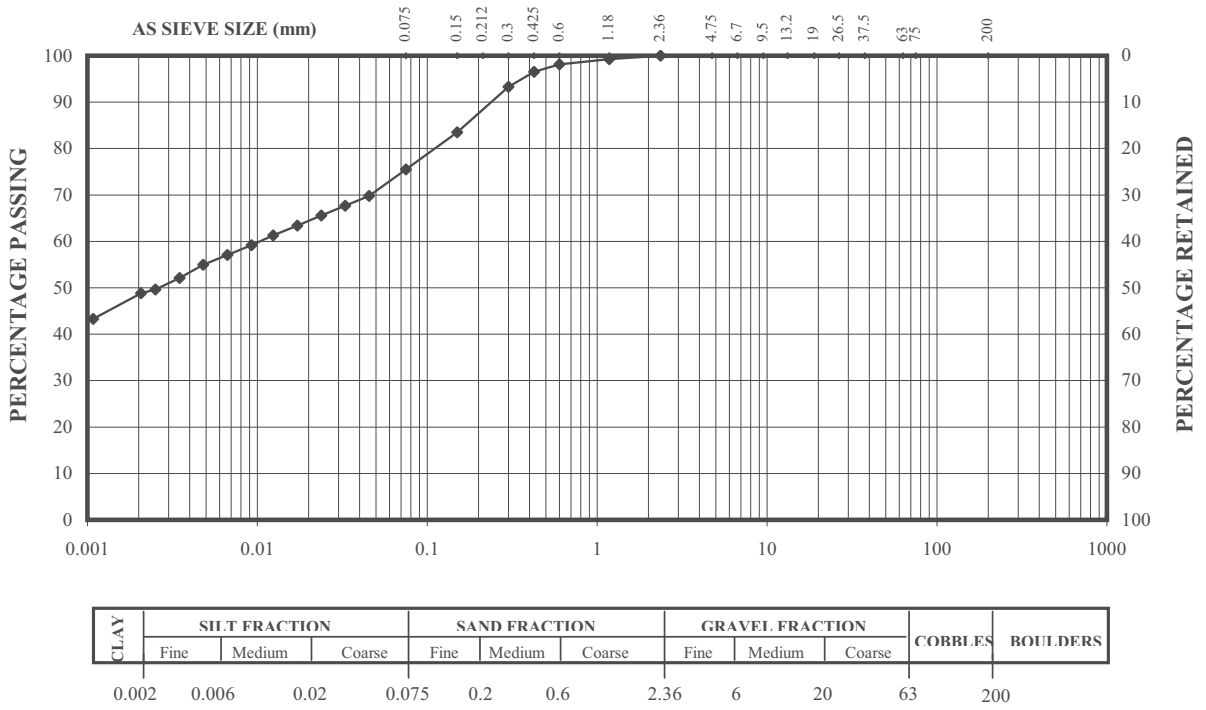
Ref: Document F9.1.16 issue 1.2

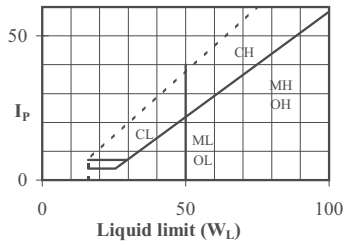
SOIL CLASSIFICATION REPORT

Trial Hole:	TP126
Depth (m):	0.4 - 0.5m
Sample No:	SYD11-9425

Client: Environmental Earth Sciences
Project: 111029
Location: Jerry's Plains

Client Sample No.: -
Sample History: Supplied by client





TEST METHODS
Classification AS1726 A2 Particle size AS1289.3.6.3

OTHER TESTS
AS1289.3.5.1.

GRADING
$C_u = D_{60} / D_{10}$ = not determinable
$C_c = D_{30}^2 / (D_{10} \times D_{60})$ = not determinable

PARTICLE DENSITY 2.69 (measured)

PRE-TREATMENT HYDROMETER N/A

TEST CONDITION Washed sieve with dispersing agent

GROUP SYMBOL:

SOIL NAME: CLAY: mottled dark red and brown with Sand

REMARKS:

INDEX PROPERTIES (%)
Liquid Limit = N/A Plastic Limit = N/A
Plasticity Index = N/A Linear Shrinkage % = Not determined

Atterberg Limits (History/preparation)

Liquid Limit (type of test)

Linear Shrinkage (mould size)

Tested by:	MT
Date tested:	9.5.11
Checked by:	DB
Date checked:	25/05/2011

GHD GEOTECHNICS
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Approved Signatory:
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27/05/2011

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JOB No.	2120510
REPORT No.	SYD116906

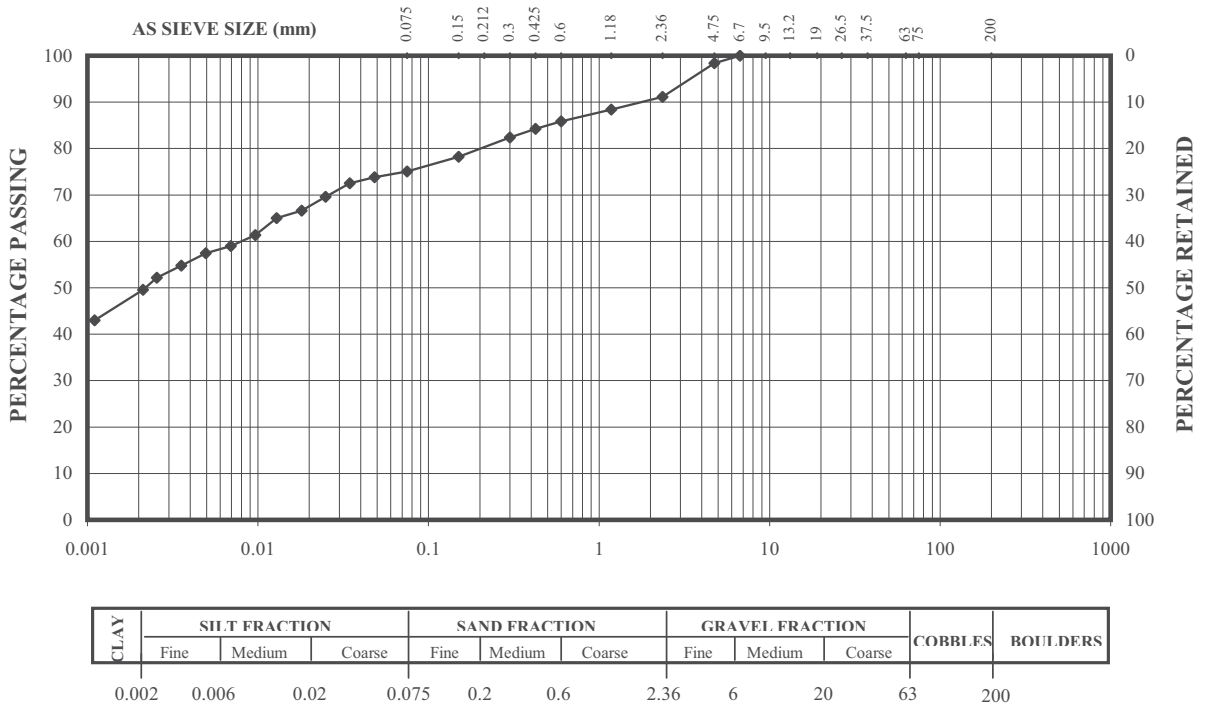
Ref: Document F9.1.16 issue 1.2

SOIL CLASSIFICATION REPORT

Trial Hole:	TP125
Depth (m):	0.6 - 0.8m
Sample No:	SYD11-9424

Client: Environmental Earth Sciences
Project: 111029
Location: Jerry's Plains

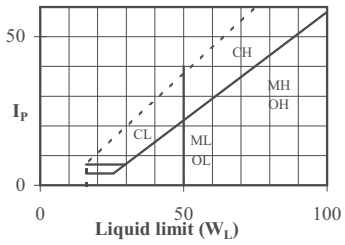
Client Sample No.: -
Sample History: Supplied by client



TEST METHODS
Classification AS1726 A2 Particle size AS1289.3.6.3

OTHER TESTS
AS1289.3.5.1.

GRADING
$C_u = D_{60} / D_{10}$ = not determinable
$C_c = D_{30}^2 / (D_{10} \times D_{60})$ = not determinable



PARTICLE DENSITY 2.84 (measured)

PRE-TREATMENT HYDROMETER N/A

TEST CONDITION Washed sieve with dispersing agent

GROUP SYMBOL:

SOIL NAME: CLAY: brown with Sand
Emerson Class AS1289.3.8.1 - Class No 4 (distilled water temp = 21°C)

REMARKS:

INDEX PROPERTIES (%)
Liquid Limit = N/A Plastic Limit = N/A
Plasticity Index = N/A Linear Shrinkage % = Not determined

Atterberg Limits (History/preparation)

Liquid Limit (type of test)

Linear Shrinkage (mould size)

Tested by:	MT
Date tested:	17.5.11
Checked by:	DB
Date checked:	25/05/2011

GHD GEOTECHNICS
57 Herbert St, Artarmon NSW, 2064
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Approved Signatory:
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27/05/2011

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JOB No.	**2120510**
REPORT No.	**SYD116905**

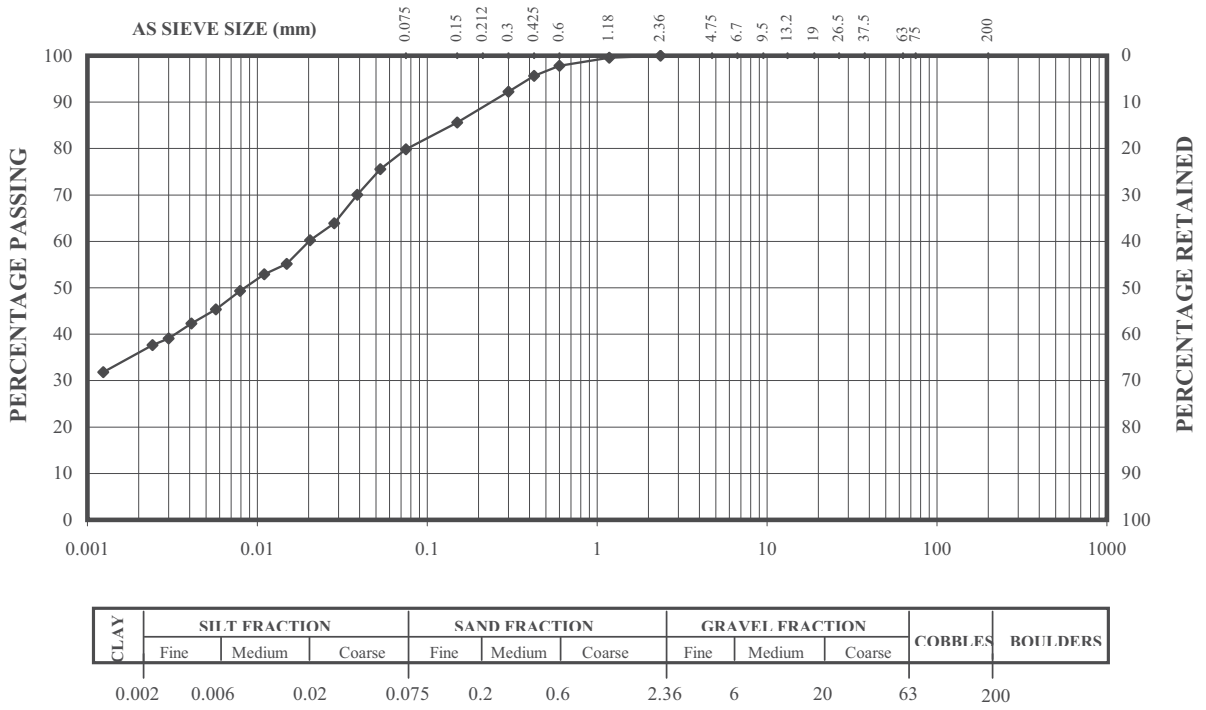
Ref: Document F9.1.16 issue 1.2

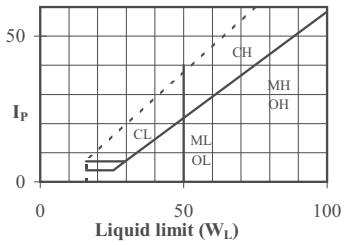
SOIL CLASSIFICATION REPORT

Trial Hole:	TP125
Depth (m):	0.0 - 0.1m
Sample No:	SYD11-9423

Client: Environmental Earth Sciences
Project: 111029
Location: Jerry's Plains

Client Sample No.: -
Sample History: Supplied by client





TEST METHODS
Classification AS1726 A2 Particle size AS1289.3.6.3

OTHER TESTS
AS1289.3.5.1.

GRADING
$C_u = D_{60} / D_{10}$ = not determinable
$C_c = D_{30}^2 / (D_{10} \times D_{60})$ = not determinable

PARTICLE DENSITY 2.71 (assumed)

PRE-TREATMENT HYDROMETER N/A

TEST CONDITION Washed sieve with dispersing agent

GROUP SYMBOL:

SOIL NAME: CALY: dark brown with Sand

REMARKS:

INDEX PROPERTIES (%)
Liquid Limit = N/A Plastic Limit = N/A
Plasticity Index = N/A Linear Shrinkage % = Not determined

Atterberg Limits (History/preparation)

Liquid Limit (type of test)

Linear Shrinkage (mould size)

Tested by:	MT
Date tested:	12.5.11
Checked by:	DB
Date checked:	25/05/2011

Approved Signatory:
D. Brooke
27/05/2011

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JOB No.	2120510
REPORT No.	SYD116904

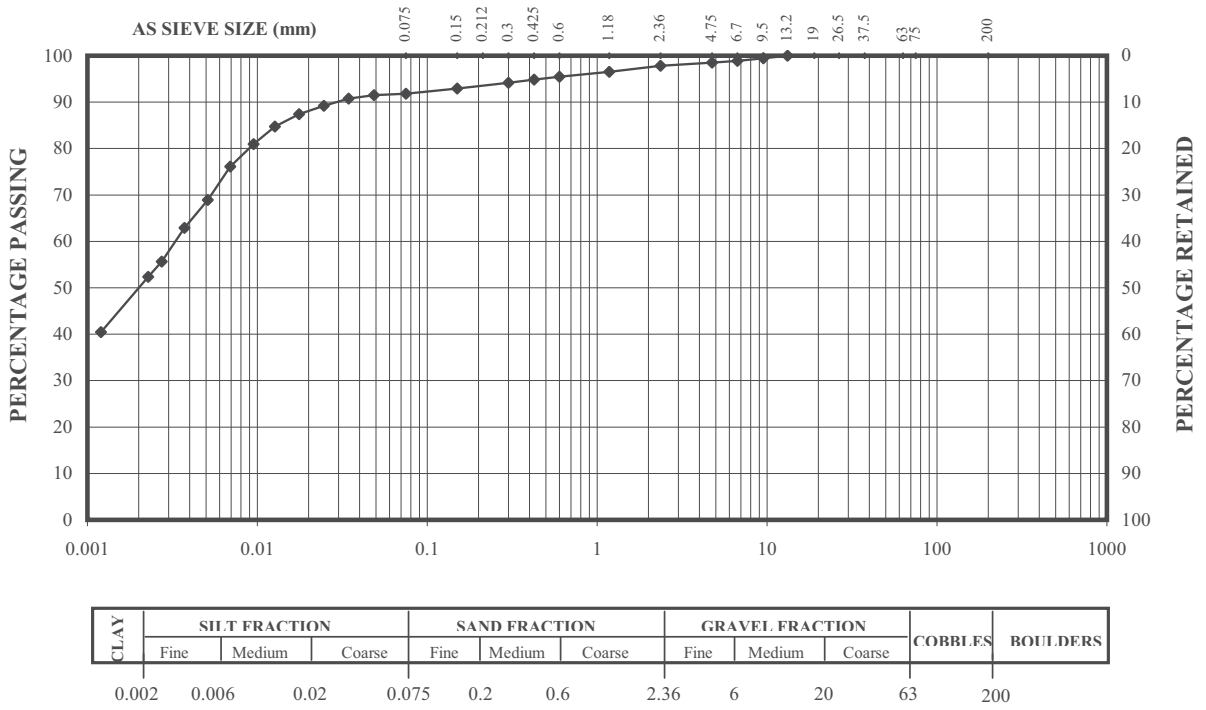
Ref: Document F9.1.16 issue 1.2

SOIL CLASSIFICATION REPORT

Trial Hole:	TP123
Depth (m):	1.4 - 1.6m
Sample No:	SYD11-9422

Client: Environmental Earth Sciences
Project: 111029
Location: Jerry's Plains

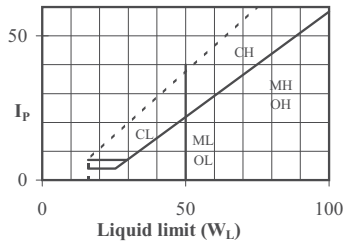
Client Sample No.: -
Sample History: Supplied by client



TEST METHODS
Classification AS1726 A2 Particle size AS1289.3.6.3

OTHER TESTS
AS1289.3.5.1.

GRADING
$C_u = D_{60} / D_{10}$ = not determinable
$C_c = D_{30}^2 / (D_{10} \times D_{60})$ = not determinable



PARTICLE DENSITY 2.7 (measured)

PRE-TREATMENT HYDROMETER N/A

TEST CONDITION Washed sieve with dispersing agent

GROUP SYMBOL:

SOIL NAME: CLAY: mottled orange and grey with trace Sand
Emerson Class AS1289.3.8.1 - Class No 2 (distilled water temp = 21°C)

REMARKS:

INDEX PROPERTIES (%)
Liquid Limit = N/A Plastic Limit = N/A
Plasticity Index = N/A Linear Shrinkage % = Not determined

Atterberg Limits (History/preparation)

Liquid Limit (type of test)

Linear Shrinkage (mould size)

Tested by:	MT
Date tested:	24.5.11
Checked by:	DB
Date checked:	25/05/2011

Approved Signatory:
D. Brooke
27/05/2011

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JOB No.	**2120510**
REPORT No.	**SYD116903**

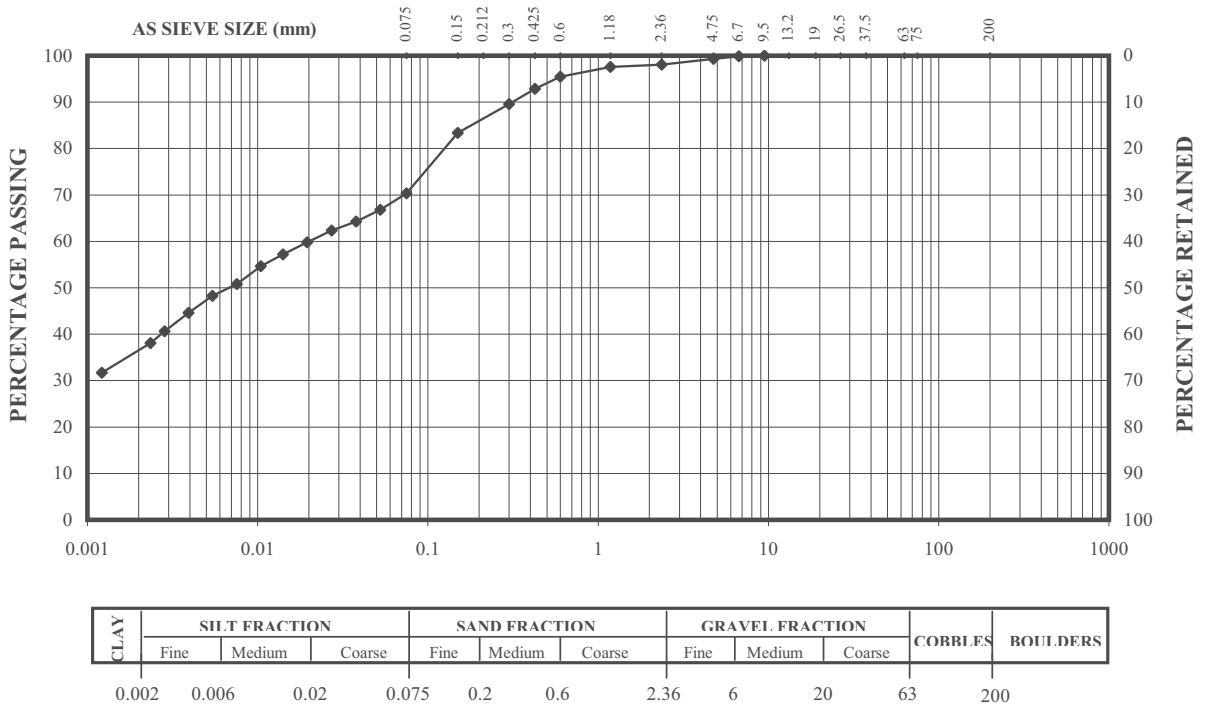
Ref: Document F9.1.16 issue 1.2

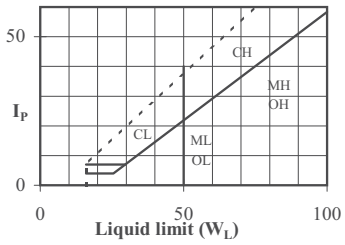
SOIL CLASSIFICATION REPORT

Trial Hole:	TP123
Depth (m):	0.4 - 0.5m
Sample No:	SYD11-9421

Client: Environmental Earth Sciences
Project: 111029
Location: Jerry's Plains

Client Sample No.: -
Sample History: Supplied by client





TEST METHODS
Classification AS1726 A2 Particle size AS1289.3.6.3

OTHER TESTS
AS1289.3.5.1.

GRADING
$C_u = D_{60} / D_{10}$ = not determinable
$C_c = D_{30}^2 / (D_{10} \times D_{60})$ = not determinable

PARTICLE DENSITY 2.71 (measured)

PRE-TREATMENT HYDROMETER N/A

TEST CONDITION Washed sieve with dispersing agent

GROUP SYMBOL:

SOIL NAME: CLAY: brown with Sand

REMARKS:

INDEX PROPERTIES (%)
Liquid Limit = N/A Plastic Limit = N/A
Plasticity Index = N/A Linear Shrinkage % = Not determined

Atterberg Limits (History/preparation)

Liquid Limit (type of test)

Linear Shrinkage (mould size)

Tested by:	MT
Date tested:	20.5.11
Checked by:	DB
Date checked:	25/05/2011

Approved Signatory:
D. Brooke
27/05/2011

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JOB No.	**2120510**
REPORT No.	**SYD116902**

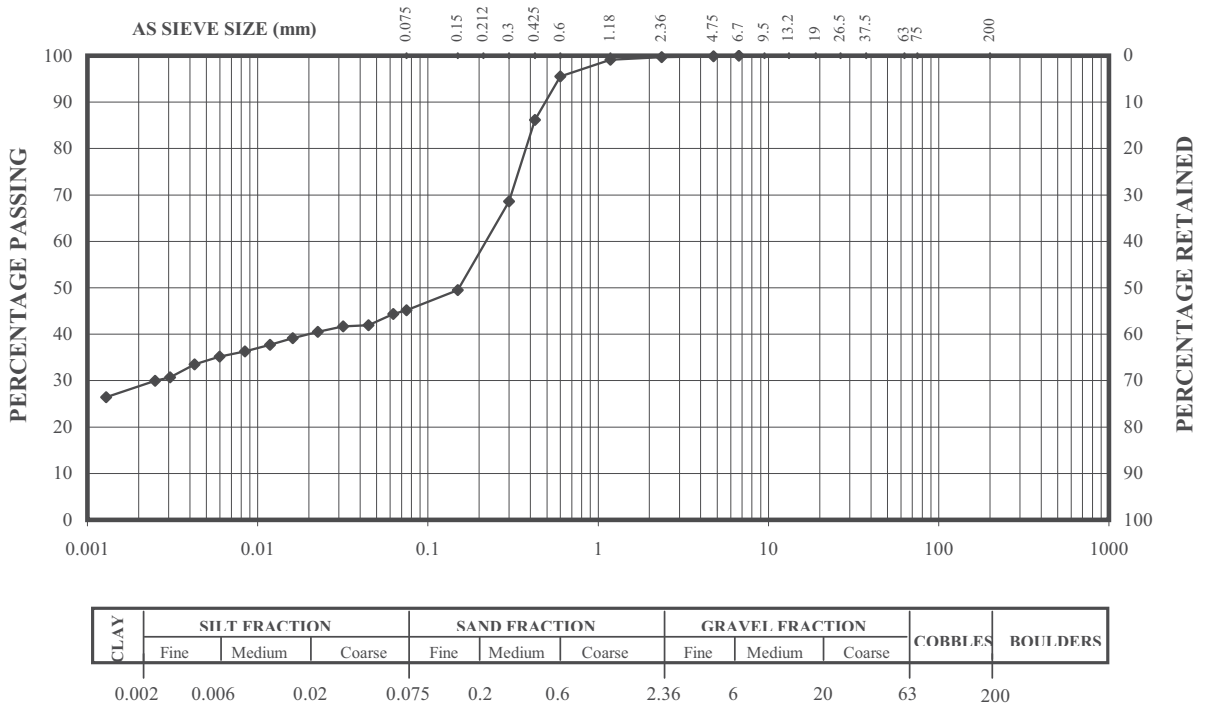
Ref: Document F9.1.16 issue 1.2

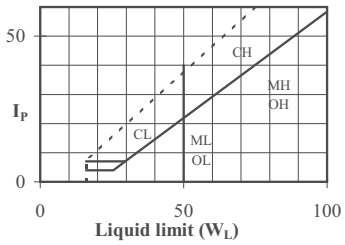
SOIL CLASSIFICATION REPORT

Trial Hole:	TP122
Depth (m):	0.6 - 0.7m
Sample No:	SYD11-9420

Client: Environmental Earth Sciences
Project: 111029
Location: Jerry's Plains

Client Sample No.: -
Sample History: Supplied by client





TEST METHODS
Classification AS1726 A2 Particle size AS1289.3.6.3

OTHER TESTS
AS1289.3.5.1.

GRADING
$C_u = D_{60} / D_{10}$ = not determinable
$C_c = D_{30}^2 / (D_{10} \times D_{60})$ = not determinable

PARTICLE DENSITY 2.69 (measured)

PRE-TREATMENT HYDROMETER N/A

TEST CONDITION Washed sieve with dispersing agent

GROUP SYMBOL:

SOIL NAME: Clayey SAND: brown with mottled orange and yellow
Emerson Class AS1289.3.8.1 - Class No 4 (distilled water temp = 21°C)

REMARKS:

INDEX PROPERTIES (%)
Liquid Limit = N/A Plastic Limit = N/A
Plasticity Index = N/A Linear Shrinkage % = Not determined

Atterberg Limits (History/preparation)

Liquid Limit (type of test)

Linear Shrinkage (mould size)

Tested by:	MT
Date tested:	20.5.11
Checked by:	DB
Date checked:	25/05/2011

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JOB No.	**2120510**
REPORT No.	**SYD116901**

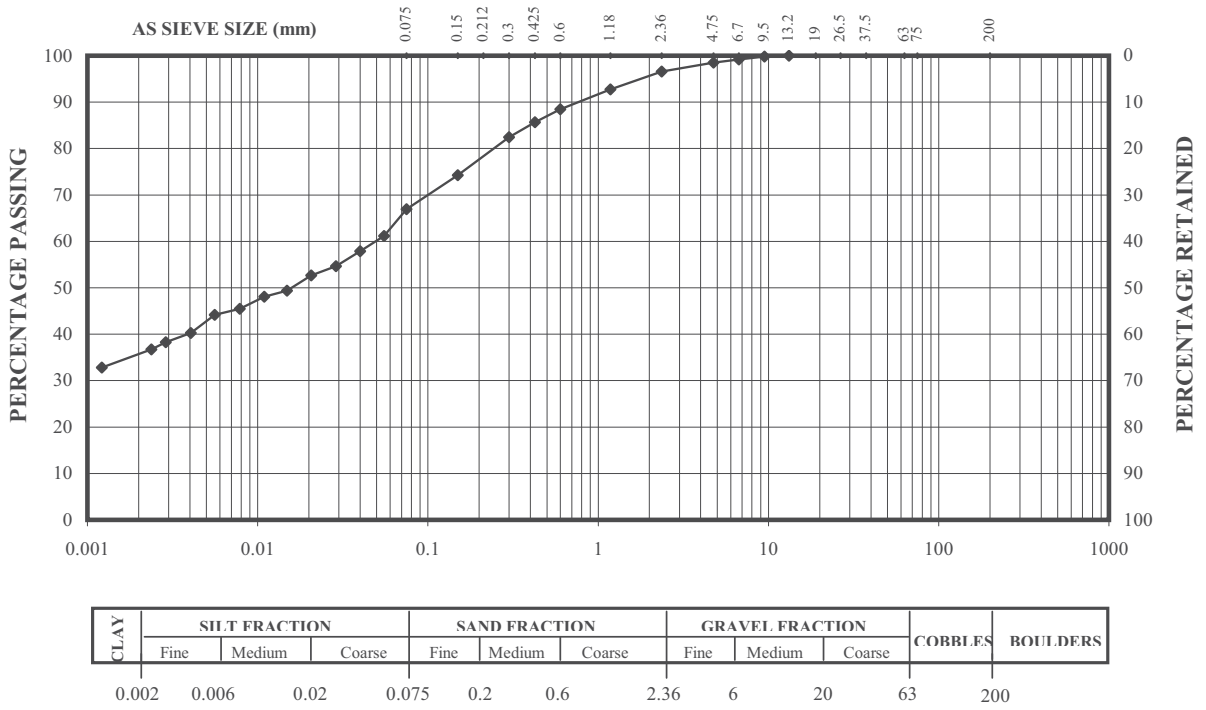
Ref: Document F9.1.16 issue 1.2

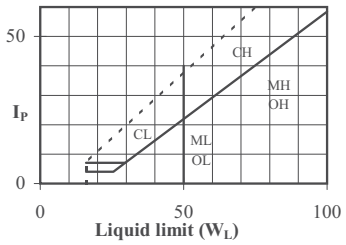
SOIL CLASSIFICATION REPORT

Trial Hole:	TP121
Depth (m):	1.7 - 1.8m
Sample No:	SYD11-9419

Client: Environmental Earth Sciences
Project: 111029
Location: Jerry's Plains

Client Sample No.: -
Sample History: Supplied by client





TEST METHODS
Classification AS1726 A2 Particle size AS1289.3.6.3

OTHER TESTS
AS1289.3.5.1.

GRADING
$C_u = D_{60} / D_{10}$ = not determinable
$C_c = D_{30}^2 / (D_{10} \times D_{60})$ = not determinable

PARTICLE DENSITY 2.71 (assumed)

PRE-TREATMENT HYDROMETER N/A

TEST CONDITION Washed sieve with dispersing agent

GROUP SYMBOL:

SOIL NAME: CLAY: dark red and dark brown, with Sand

REMARKS:

INDEX PROPERTIES (%)
Liquid Limit = N/A Plastic Limit = N/A
Plasticity Index = N/A Linear Shrinkage % = Not determined

Atterberg Limits (History/preparation)

Liquid Limit (type of test)

Linear Shrinkage (mould size)

Tested by:	MT
Date tested:	17.5.11
Checked by:	DB
Date checked:	25/05/2011

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JOB No.	2120510
REPORT No.	SYD116900

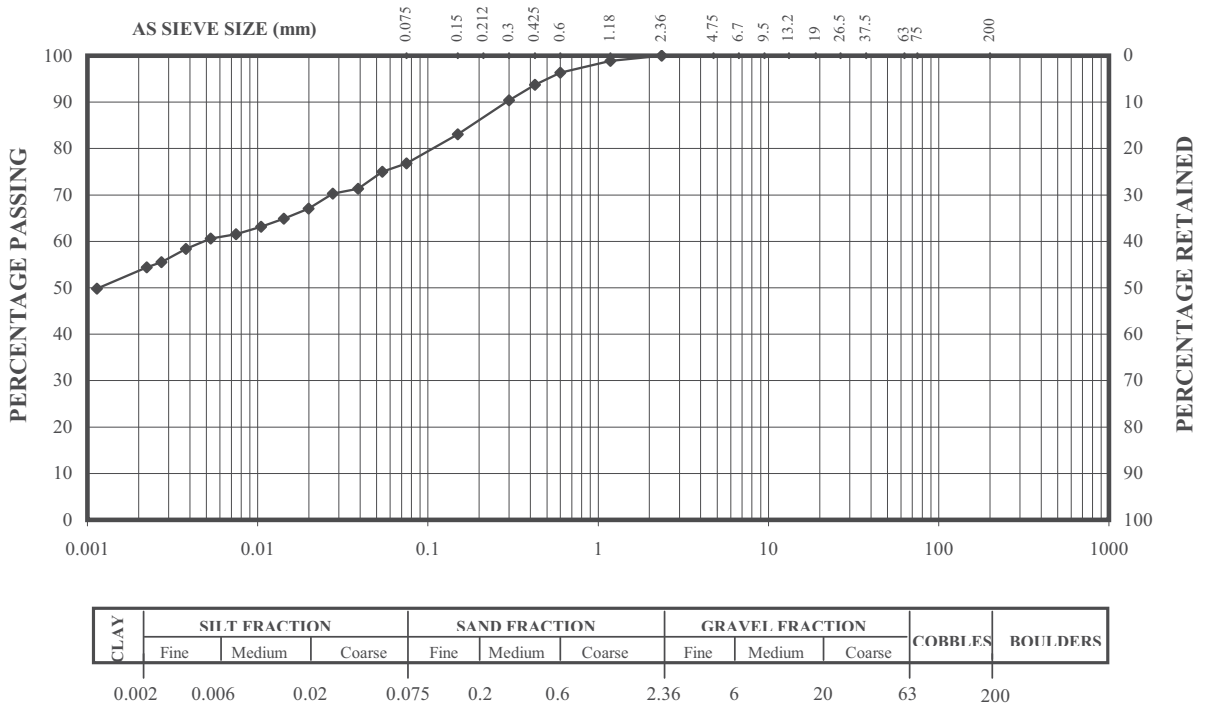
Ref: Document F9.1.16 issue 1.2

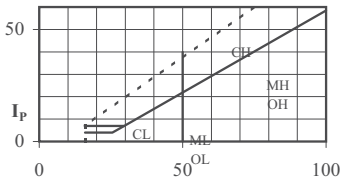
SOIL CLASSIFICATION REPORT

Trial Hole:	TP121
Depth (m):	0.9 - 1.0m
Sample No:	SYD11-9418

Client: Environmental Earth Sciences
Project: 111029
Location: Jerry's Plains

Client Sample No.: -
Sample History: Supplied by client





TEST METHODS
Classification AS1726 A2 Particle size AS1289.3.6.3

OTHER TESTS
AS1289.3.5.1.

GRADING
$C_u = D_{60} / D_{10}$ = not determinable
$C_c = D_{30}^2 / (D_{10} \times D_{60})$ = not determinable

PARTICLE DENSITY 2.78 (measured)

PRE-TREATMENT HYDROMETER N/A

TEST CONDITION Washed sieve with dispersing agent

GROUP SYMBOL:

SOIL NAME: CLAY: dark red and dark brown, with Sand
Emerson Class AS1289.3.8.1 - Class No 4 (distilled water temp = 21°C)

REMARKS:

INDEX PROPERTIES (%)
Liquid Limit = N/A Plastic Limit = N/A
Plasticity Index = N/A Linear Shrinkage % = Not determined

Atterberg Limits (History/preparation)

Liquid Limit (type of test)

Linear Shrinkage (mould size)

Tested by:	MT
Date tested:	20.5.11
Checked by:	DB
Date checked:	25/05/2011

Approved Signatory:
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27/05/2011

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JOB No.	**2120510**
REPORT No.	**SYD116899**

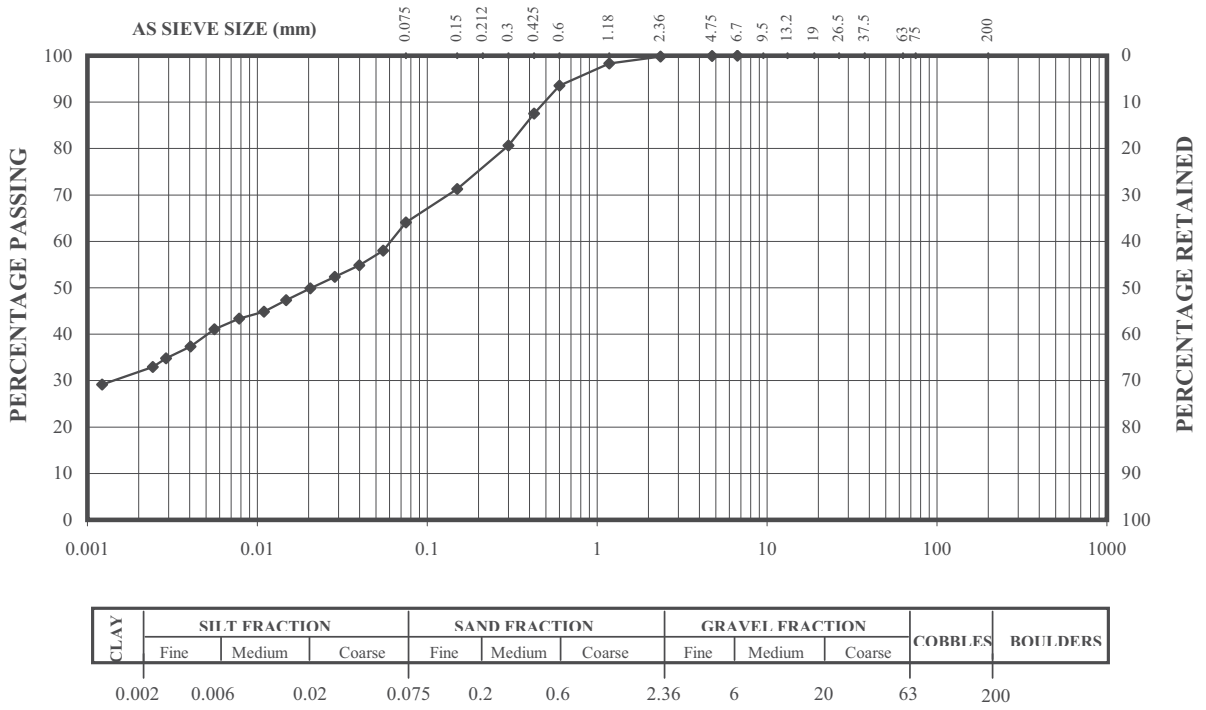
Ref: Document F9.1.16 issue 1.2

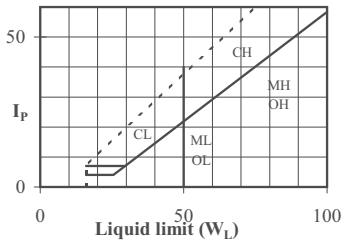
SOIL CLASSIFICATION REPORT

Trial Hole:	TP118
Depth (m):	0.5 - 0.7m
Sample No:	SYD11-9417

Client: Environmental Earth Sciences
Project: 111029
Location: Jerry's Plains

Client Sample No.: -
Sample History: Supplied by client





TEST METHODS
Classification AS1726 A2 Particle size AS1289.3.6.3

OTHER TESTS
AS1289.3.5.1.

GRADING
$C_u = D_{60} / D_{10}$ = not determinable
$C_c = D_{30}^2 / (D_{10} \times D_{60})$ = not determinable

PARTICLE DENSITY 2.71 (assumed)

PRE-TREATMENT HYDROMETER N/A

TEST CONDITION Washed sieve with dispersing agent

GROUP SYMBOL:

SOIL NAME: Sandy CLAY: brown
Emerson Class AS1289.3.8.1 - Class No 4 (distilled water temp = 21°C)

REMARKS:

INDEX PROPERTIES (%)
Liquid Limit = N/A Plastic Limit = N/A
Plasticity Index = N/A Linear Shrinkage % = Not determined

Atterberg Limits (History/preparation)

Liquid Limit (type of test)

Linear Shrinkage (mould size)

Tested by:	MT
Date tested:	9.5.11
Checked by:	DB
Date checked:	25/05/2011

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JOB No.	2120510
REPORT No.	SYD116898

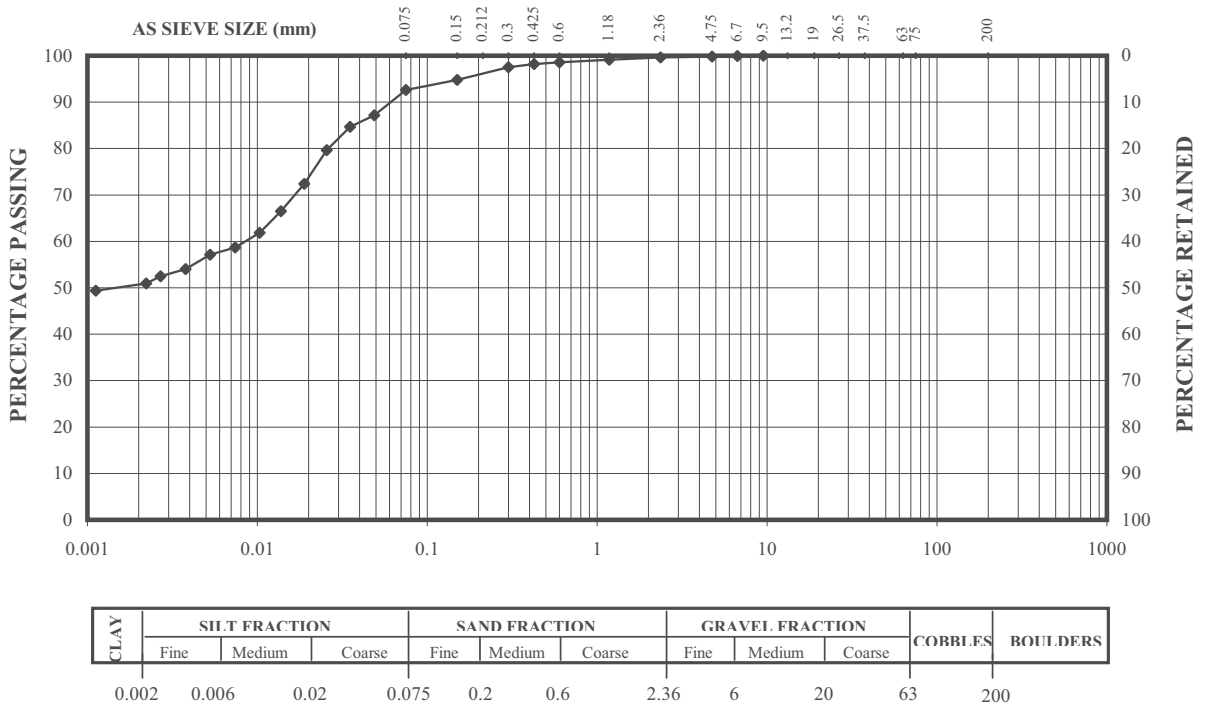
Ref: Document F9.1.16 issue 1.2

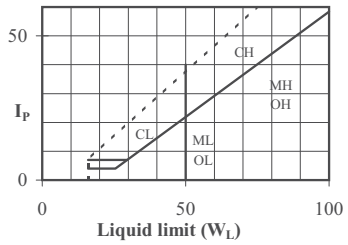
SOIL CLASSIFICATION REPORT

Trial Hole:	TP117
Depth (m):	0.6 - 0.8m
Sample No:	SYD11-9416

Client: Environmental Earth Sciences
Project: 111029
Location: Jerry's Plains

Client Sample No.: -
Sample History: Supplied by client





TEST METHODS
Classification AS1726 A2 Particle size AS1289.3.6.3

OTHER TESTS
AS1289.3.5.1.

GRADING
$C_u = D_{60} / D_{10}$ = not determinable
$C_c = D_{30}^2 / (D_{10} \times D_{60})$ = not determinable

PARTICLE DENSITY 2.81 (measured)

PRE-TREATMENT HYDROMETER N/A

TEST CONDITION Washed sieve with dispersing agent

GROUP SYMBOL:

SOIL NAME: CLAY: light brown and light grey

REMARKS:

INDEX PROPERTIES (%)
Liquid Limit = N/A Plastic Limit = N/A
Plasticity Index = N/A Linear Shrinkage % = Not determined

Atterberg Limits (History/preparation)

Liquid Limit (type of test)

Linear Shrinkage (mould size)

Tested by:	MT
Date tested:	20.5.11
Checked by:	DB
Date checked:	25/05/2011

Approved Signatory:
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26/05/2011

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JOB No.	**2120510**
REPORT No.	**SYD116897**

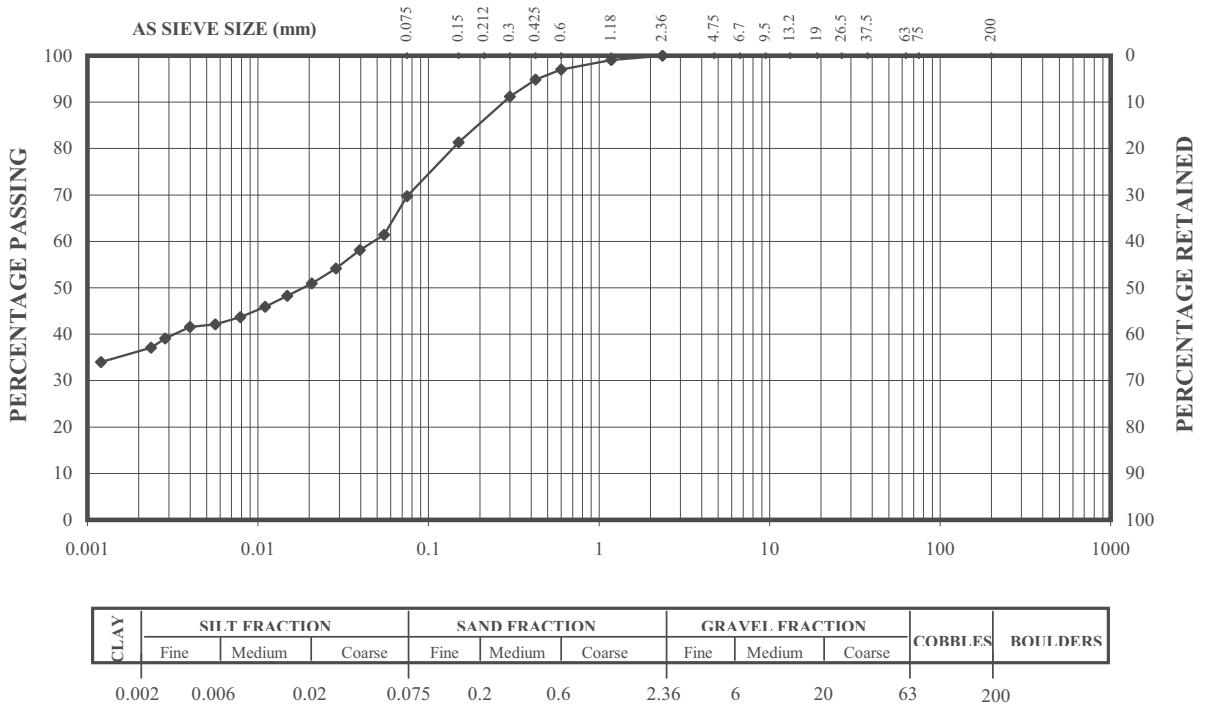
Ref: Document F9.1.16 issue 1.2

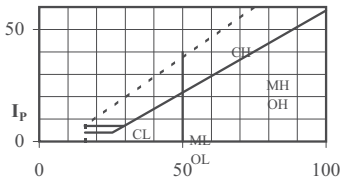
SOIL CLASSIFICATION REPORT

Trial Hole:	TP115
Depth (m):	0.8 - 1.0m
Sample No:	SYD11-9415

Client: Environmental Earth Sciences
Project: 111029
Location: Jerry's Plains

Client Sample No.: -
Sample History: Supplied by client





TEST METHODS
Classification AS1726 A2 Particle size AS1289.3.6.3

OTHER TESTS
AS1289.3.5.1.

GRADING
$C_u = D_{60} / D_{10}$ = not determinable
$C_c = D_{30}^2 / (D_{10} \times D_{60})$ = not determinable

PARTICLE DENSITY 2.71 (assumed)

PRE-TREATMENT HYDROMETER N/A

TEST CONDITION Washed sieve with dispersing agent

GROUP SYMBOL:

SOIL NAME: Sandy CLAY: brown
Emerson Class AS1289.3.8.1 - Class No 1 (distilled water temp = 21°C)

REMARKS:

INDEX PROPERTIES (%)
Liquid Limit = N/A Plastic Limit = N/A
Plasticity Index = N/A Linear Shrinkage % = Not determined

Atterberg Limits (History/preparation)

Liquid Limit (type of test)

Linear Shrinkage (mould size)

Tested by:	MT
Date tested:	17.5.11
Checked by:	DB
Date checked:	25/05/2011

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JOB No.	2120510
REPORT No.	SYD116896

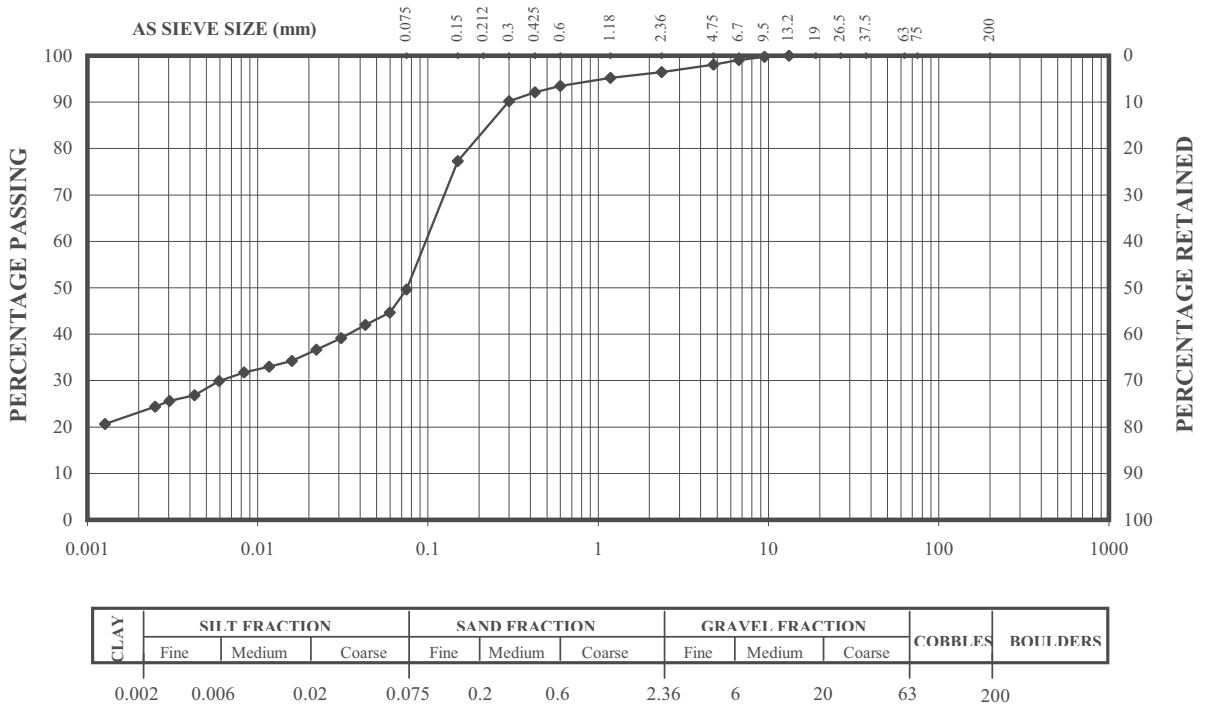
Ref: Document F9.1.16 issue 1.2

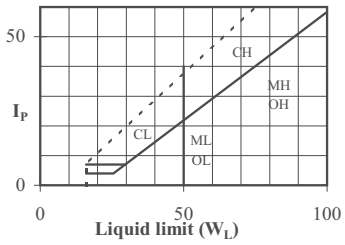
SOIL CLASSIFICATION REPORT

Trial Hole:	TP114
Depth (m):	1.0 - 1.2m
Sample No:	SYD11-9414

Client: Environmental Earth Sciences
Project: 111029
Location: Jerry's Plains

Client Sample No.: -
Sample History: Supplied by client





TEST METHODS
Classification AS1726 A2 Particle size AS1289.3.6.3

OTHER TESTS
AS1289.3.5.1.

GRADING
$C_u = D_{60} / D_{10}$ = not determinable
$C_c = D_{30}^2 / (D_{10} \times D_{60})$ = not determinable

PARTICLE DENSITY 2.71 (measured)

PRE-TREATMENT HYDROMETER N/A

TEST CONDITION Washed sieve with dispersing agent

GROUP SYMBOL:

SOIL NAME: CLayey SAND: light brown

REMARKS:

INDEX PROPERTIES (%)
Liquid Limit = N/A Plastic Limit = N/A
Plasticity Index = N/A Linear Shrinkage % = Not determined

Atterberg Limits (History/preparation)

Liquid Limit (type of test)

Linear Shrinkage (mould size)

Tested by:	MT
Date tested:	12.5.11
Checked by:	DB
Date checked:	25/05/2011

Approved Signatory:
D. Brooke
26/05/2011

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JOB No.	**2120510**
REPORT No.	**SYD116895**

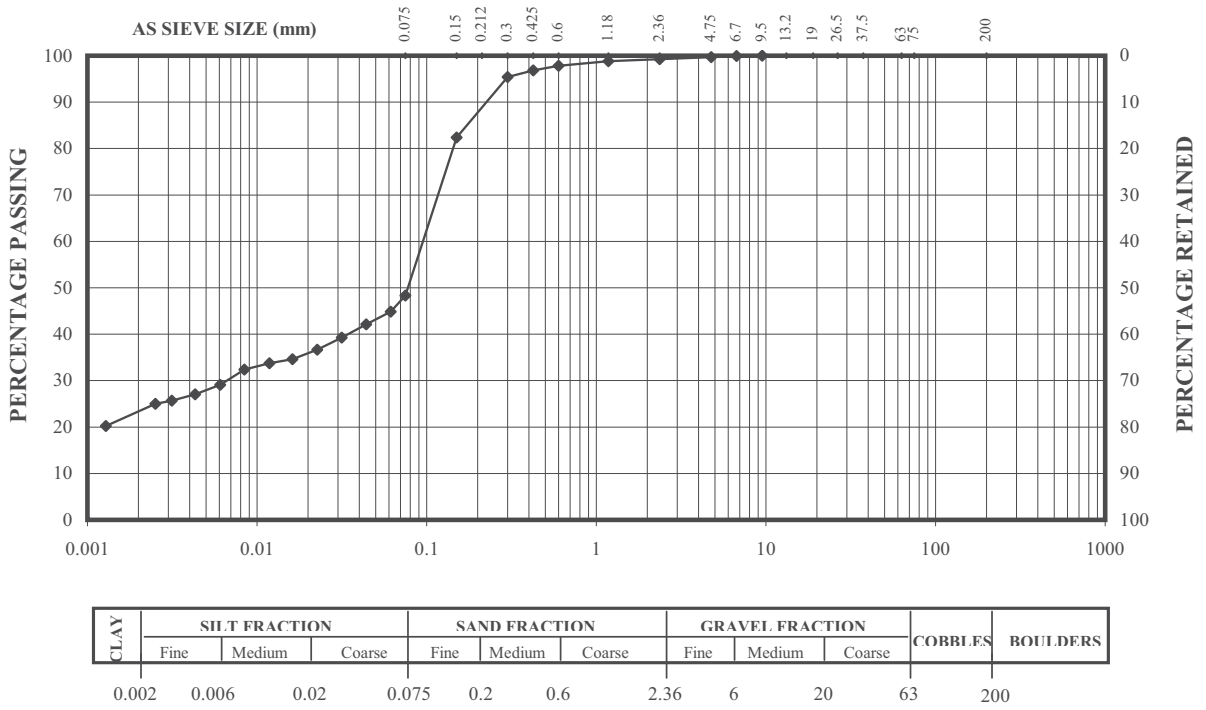
Ref: Document F9.1.16 issue 1.2

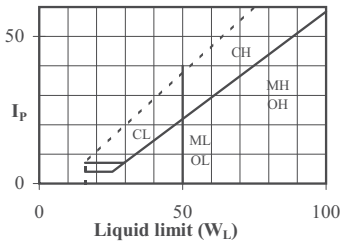
SOIL CLASSIFICATION REPORT

Trial Hole:	TP114
Depth (m):	0.6 - 0.8m
Sample No:	SYD11-9429

Client: Environmental Earth Sciences
Project: 111029
Location: Jerry's Plains

Client Sample No.: -
Sample History: Supplied by client





TEST METHODS
Classification AS1726 A2 Particle size AS1289.3.6.3

OTHER TESTS
AS1289.3.5.1.

GRADING
$C_u = D_{60} / D_{10}$ = not determinable
$C_c = D_{30}^2 / (D_{10} \times D_{60})$ = not determinable

PARTICLE DENSITY 2.71 (assumed)

PRE-TREATMENT HYDROMETER N/A

TEST CONDITION Washed sieve with dispersing agent

GROUP SYMBOL:

SOIL NAME: Clayey SAND: light brown
Emerson Class AS1289.3.8.1 - Class No 4 (distilled water temp = 21°C)

REMARKS:

INDEX PROPERTIES (%)
Liquid Limit = N/A Plastic Limit = N/A
Plasticity Index = N/A Linear Shrinkage % = Not determined

Atterberg Limits (History/preparation)

Liquid Limit (type of test)

Linear Shrinkage (mould size)

Tested by:	MT
Date tested:	12.5.11
Checked by:	DB
Date checked:	25/05/2011

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JOB No.	2120510
REPORT No.	SYD116910

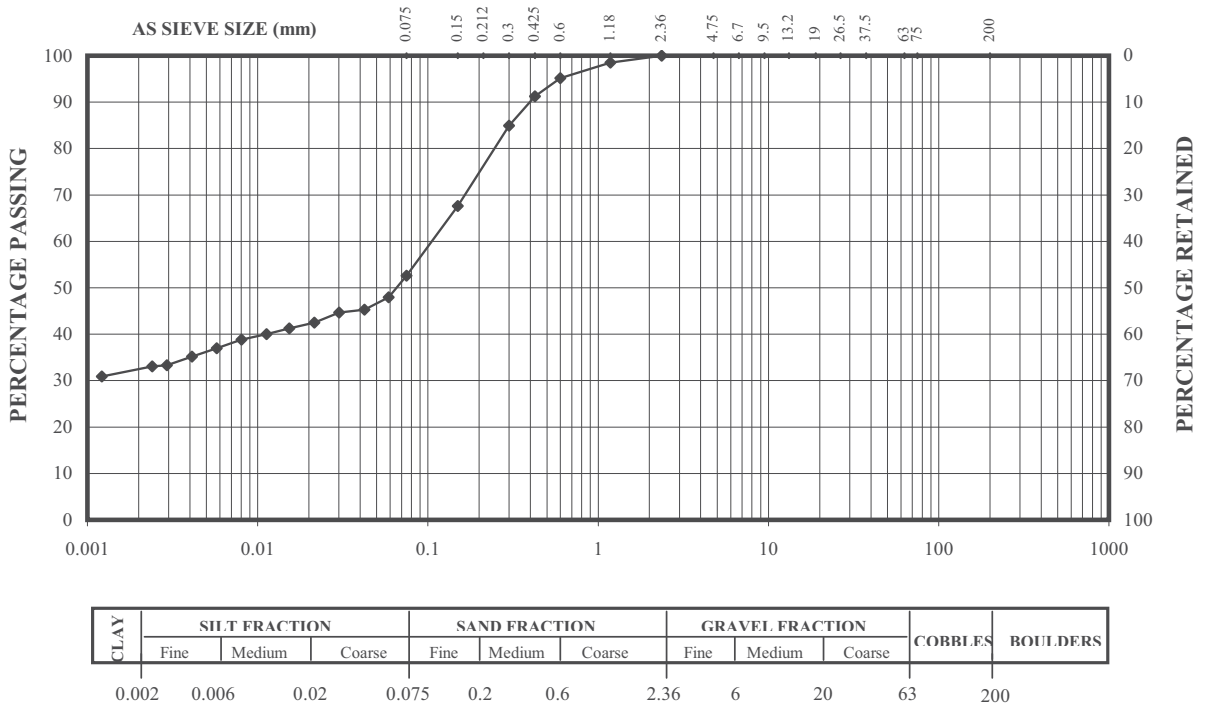
Ref: Document F9.1.16 issue 1.2

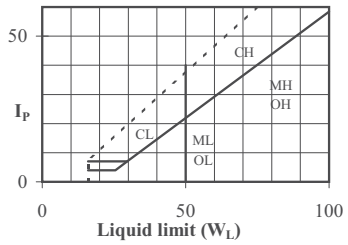
SOIL CLASSIFICATION REPORT

Trial Hole:	TP114
Depth (m):	0.4 - 0.6m
Sample No:	SYD11-9413

Client: Environmental Earth Sciences
Project: 111029
Location: Jerry's Plains

Client Sample No.: -
Sample History: Supplied by client





TEST METHODS
Classification AS1726 A2 Particle size AS1289.3.6.3

OTHER TESTS
AS1289.3.5.1.

GRADING
$C_u = D_{60} / D_{10}$ = not determinable
$C_c = D_{30}^2 / (D_{10} \times D_{60})$ = not determinable

PARTICLE DENSITY 2.68 (measured)

PRE-TREATMENT HYDROMETER N/A

TEST CONDITION Washed sieve with dispersing agent

GROUP SYMBOL:

SOIL NAME: Sandy CLAY: dark brown, dark red and light brown
Emerson Class AS1289.3.8.1 - Class 2 (distilled water temp = 21°C)

REMARKS:

INDEX PROPERTIES (%)
Liquid Limit = N/A Plastic Limit = N/A
Plasticity Index = N/A Linear Shrinkage % = Not determined

Atterberg Limits (History/preparation)

Liquid Limit (type of test)

Linear Shrinkage (mould size)

Tested by:	MT
Date tested:	9.5.11
Checked by:	DB
Date checked:	25/05/2011

Approved Signatory:
D. Brooke
26/05/2011

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JOB No.	**2120510**
REPORT No.	**SYD116894**

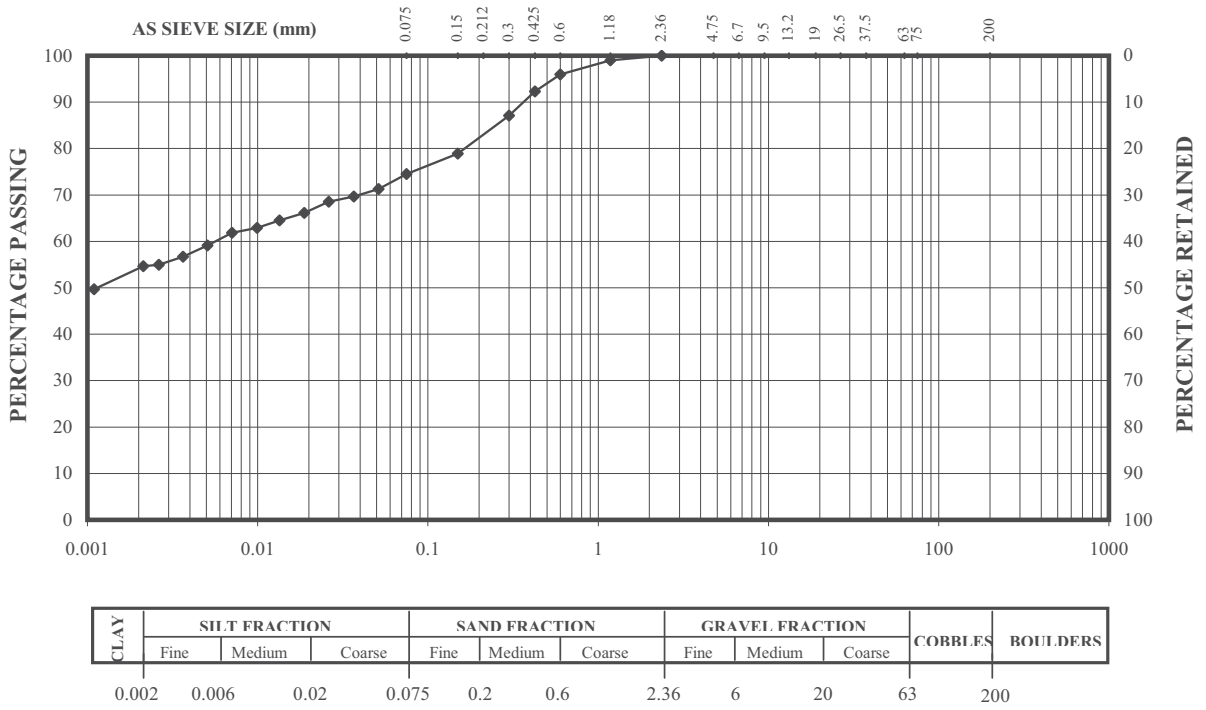
Ref: Document F9.1.16 issue 1.2

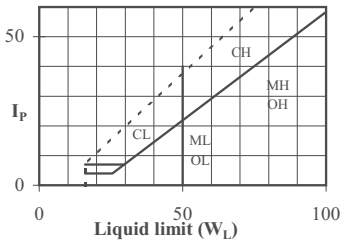
SOIL CLASSIFICATION REPORT

Trial Hole:	TP113
Depth (m):	0.2 - 0.3m
Sample No:	SYD11-9412

Client: Environmental Earth Sciences
Project: 111029
Location: Jerry's Plains

Client Sample No.: -
Sample History: Supplied by client





TEST METHODS
Classification AS1726 A2 Particle size AS1289.3.6.3

OTHER TESTS
AS1289.3.5.1.

GRADING
$C_u = D_{60} / D_{10}$ = not determinable
$C_c = D_{30}^2 / (D_{10} \times D_{60})$ = not determinable

PARTICLE DENSITY 2.75 (measured)

PRE-TREATMENT HYDROMETER N/A

TEST CONDITION Washed sieve with dispersing agent

GROUP SYMBOL:

SOIL NAME: CLAY: dark brown and dark red, with Sand
Emerson Class AS1289.3.8.1 - Class No 2 (Distilled water temp = 21°C)

REMARKS:

INDEX PROPERTIES (%)
Liquid Limit = N/A Plastic Limit = N/A
Plasticity Index = N/A Linear Shrinkage % = Not determined

Atterberg Limits (History/preparation)

Liquid Limit (type of test)

Linear Shrinkage (mould size)

Tested by:	MT
Date tested:	12.5.11
Checked by:	DB
Date checked:	25/05/2011

GHD GEOTECHNICS
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Tel: (02) 9462 4700 Fax: (02) 9462 4710
GEOTECHNICAL TESTING SERVICES

Approved Signatory:
D. Brooke
26/05/2011

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Laboratory Accreditation Number: 679

JOB No.	2120510
REPORT No.	SYD116893

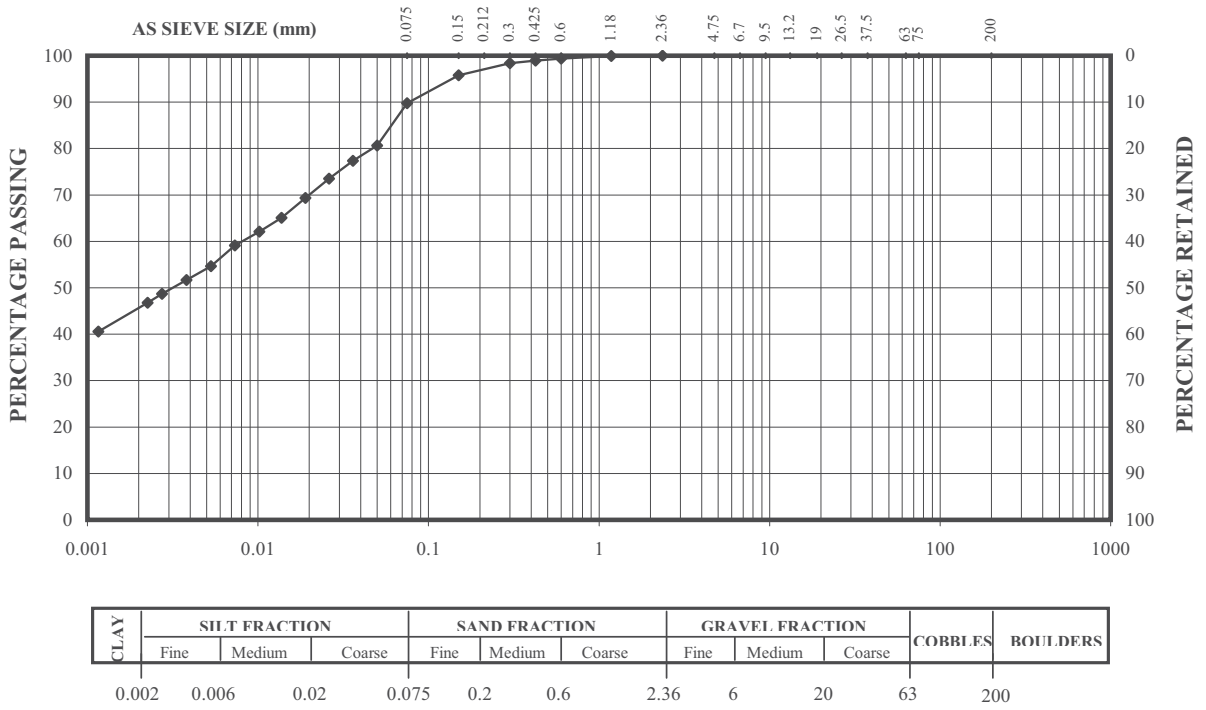
Ref: Document F9.1.16 issue 1.2

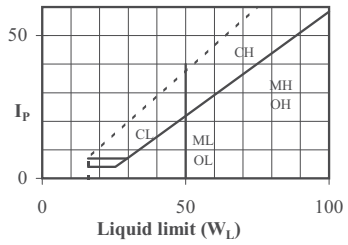
SOIL CLASSIFICATION REPORT

Trial Hole:	TP112
Depth (m):	0.0 - 0.1m
Sample No:	SYD11-9411

Client: Environmental Earth Sciences
Project: 111029
Location: Jerry's Plains

Client Sample No.: -
Sample History: Supplied by client





TEST METHODS
Classification AS1726 A2 Particle size AS1289.3.6.3

OTHER TESTS
AS1289.3.5.1.

GRADING
$C_u = D_{60} / D_{10}$ = not determinable
$C_c = D_{30}^2 / (D_{10} \times D_{60})$ = not determinable

PARTICLE DENSITY 2.79 (measured)

PRE-TREATMENT HYDROMETER N/A

TEST CONDITION Washed sieve with dispersing agent

GROUP SYMBOL:

SOIL NAME: CLAY: dark brown

REMARKS:

INDEX PROPERTIES (%)
Liquid Limit = N/A Plastic Limit = N/A
Plasticity Index = N/A Linear Shrinkage % = Not determined

Atterberg Limits (History/preparation)

Liquid Limit (type of test)

Linear Shrinkage (mould size)

Tested by:	MT
Date tested:	12.5.11
Checked by:	DB
Date checked:	25/05/2011

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JOB No.	**2120510**
REPORT No.	**SYD116892**

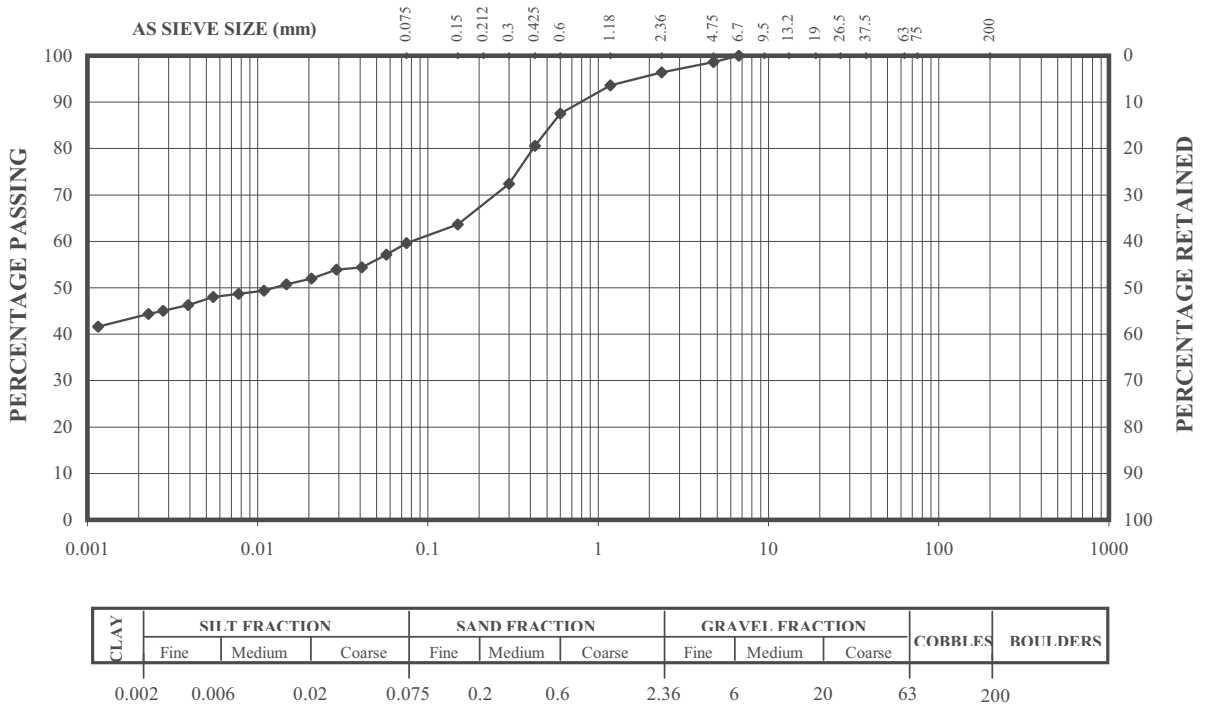
Ref: Document F9.1.16 issue 1.2

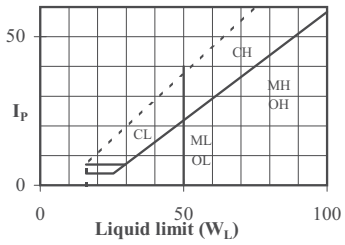
SOIL CLASSIFICATION REPORT

Trial Hole:	TP111
Depth (m):	0.4 - 0.5m
Sample No:	SYD11-9410

Client: Environmental Earth Sciences
Project: 111029
Location: Jerry's Plains

Client Sample No.: -
Sample History: Supplied by client





TEST METHODS
Classification AS1726 A2 Particle size AS1289.3.6.3

OTHER TESTS
AS1289.3.5.1.

GRADING
$C_u = D_{60} / D_{10}$ = not determinable
$C_c = D_{30}^2 / (D_{10} \times D_{60})$ = not determinable

PARTICLE DENSITY 2.72 (measured)

PRE-TREATMENT HYDROMETER N/A

TEST CONDITION Washed sieve with dispersing agent

GROUP SYMBOL:

SOIL NAME: Sandy CLAY: dark red
Emerson Class AS1289.3.8.1 - Class No 2 (distilled water temp = 21°C)

REMARKS:

INDEX PROPERTIES (%)
Liquid Limit = N/A Plastic Limit = N/A
Plasticity Index = N/A Linear Shrinkage % = Not determined

Atterberg Limits (History/preparation)

Liquid Limit (type of test)

Linear Shrinkage (mould size)

Tested by:	MT
Date tested:	20.5.11
Checked by:	DB
Date checked:	25/05/2011

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JOB No.	2120510
REPORT No.	SYD116891

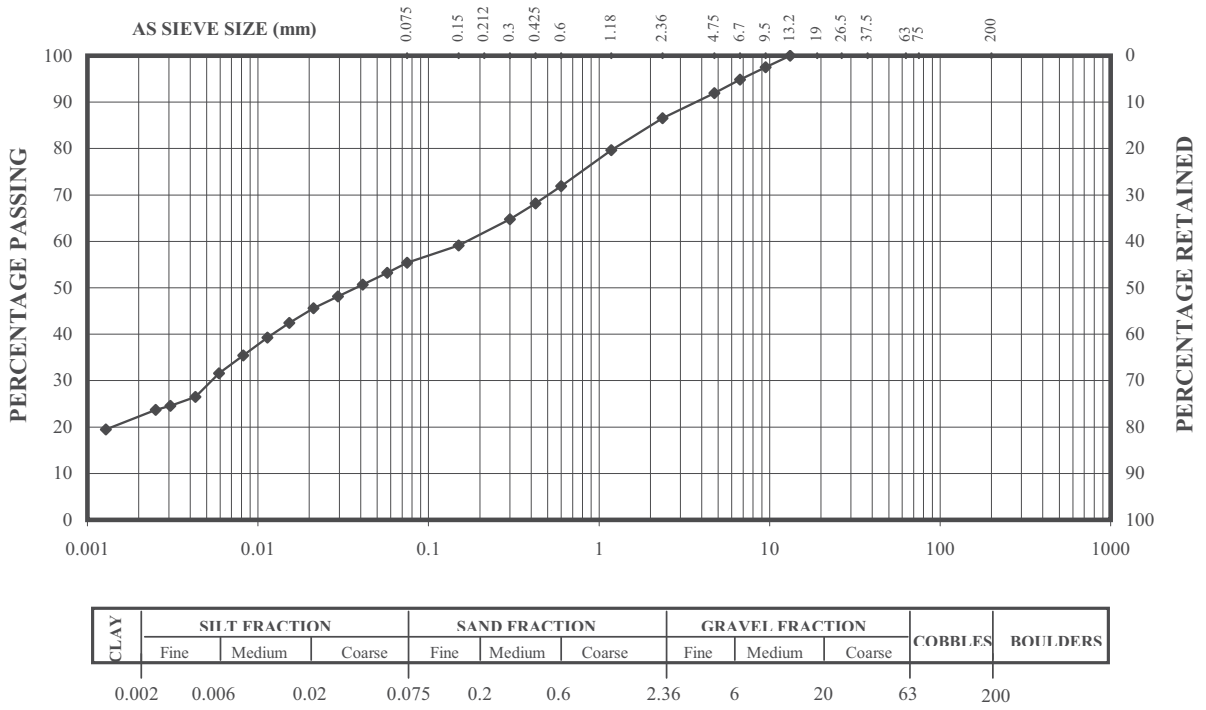
Ref: Document F9.1.16 issue 1.2

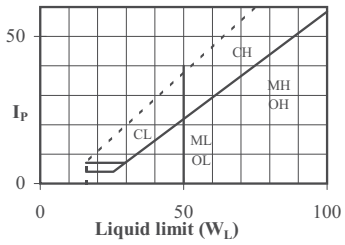
SOIL CLASSIFICATION REPORT

Trial Hole:	TP110
Depth (m):	0.8 - 1.0m
Sample No:	SYD11-9409

Client: Environmental Earth Sciences
Project: 111029
Location: Jerry's Plains

Client Sample No.: -
Sample History: Supplied by client





TEST METHODS
Classification AS1726 A2 Particle size AS1289.3.6.3

OTHER TESTS
AS1289.3.5.1.

GRADING
$C_u = D_{60} / D_{10}$ = not determinable
$C_c = D_{30}^2 / (D_{10} \times D_{60})$ = not determinable

PARTICLE DENSITY 2.71 (assumed)

PRE-TREATMENT HYDROMETER N/A

TEST CONDITION Washed sieve with dispersing agent

GROUP SYMBOL:

SOIL NAME: Sandy CLAY: light brown some gravel
Emerson Class AS1289.3.8.1 - Class No 4 (distilled water temp = 21°C)

REMARKS:

INDEX PROPERTIES (%)
Liquid Limit = N/A Plastic Limit = N/A
Plasticity Index = N/A Linear Shrinkage % = Not determined

Atterberg Limits (History/preparation)

Liquid Limit (type of test)

Linear Shrinkage (mould size)

Tested by:	MT
Date tested:	17.5.11
Checked by:	DB
Date checked:	25/05/2011

Approved Signatory:
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JOB No.	**2120510**
REPORT No.	**SYD116980**

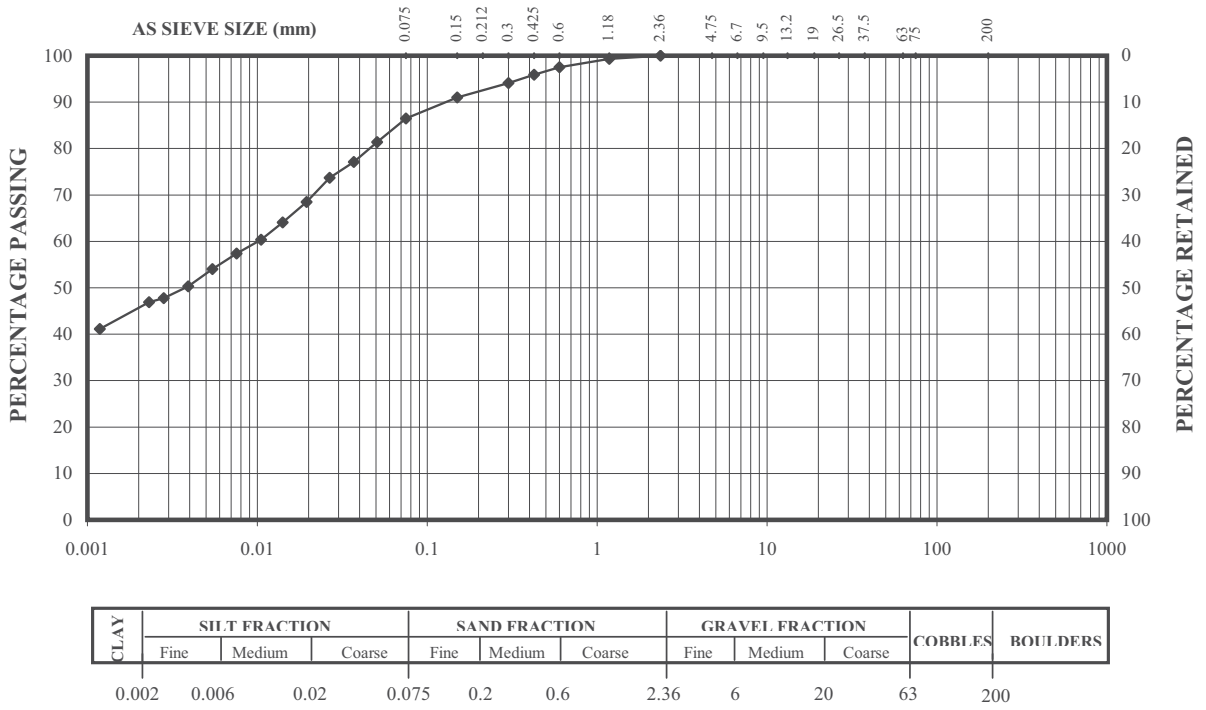
Ref: Document F9.1.16 issue 1.2

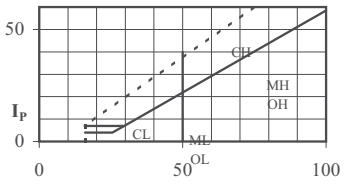
SOIL CLASSIFICATION REPORT

Trial Hole:	TP109
Depth (m):	0.7 - 0.8m
Sample No:	SYD11-9408

Client: Environmental Earth Sciences
Project: 111029
Location: Jerry's Plains

Client Sample No.: -
Sample History: Supplied by client





TEST METHODS
Classification AS1726 A2 Particle size AS1289.3.6.3

OTHER TESTS
AS1289.3.5.1.

GRADING
$C_u = D_{60} / D_{10}$ = not determinable
$C_c = D_{30}^2 / (D_{10} \times D_{60})$ = not determinable

PARTICLE DENSITY 2.71 (measured)

PRE-TREATMENT HYDROMETER N/A

TEST CONDITION Washed sieve with dispersing agent

GROUP SYMBOL:

SOIL NAME: CLAY: dark red and dark brown
Emerson Class AS1289.3.8.1 - Class No 4 (distilled water temp = 21°C)

REMARKS:

INDEX PROPERTIES (%)
Liquid Limit = N/A Plastic Limit = N/A
Plasticity Index = N/A Linear Shrinkage % = Not determined

Atterberg Limits (History/preparation)

Liquid Limit (type of test)

Linear Shrinkage (mould size)

Tested by:	MT
Date tested:	12.5.11
Checked by:	DB
Date checked:	25/05/2011

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JOB No.	2120510
REPORT No.	SYD116889

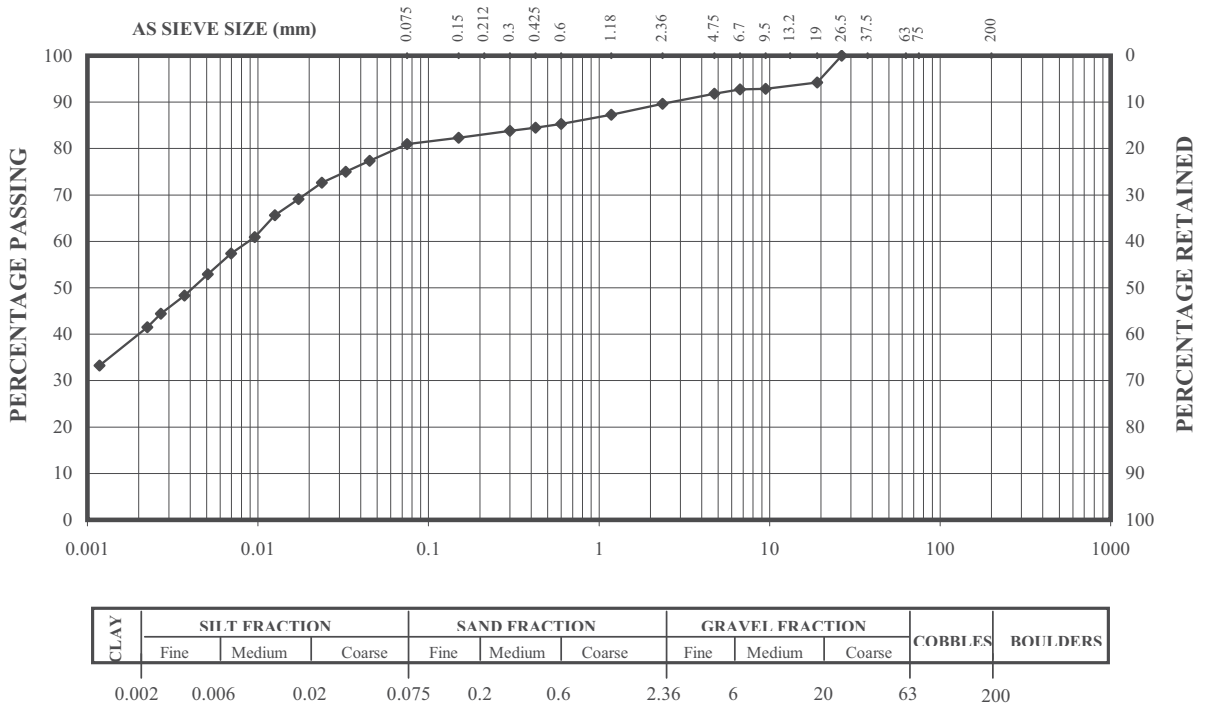
Ref: Document F9.1.16 issue 1.2

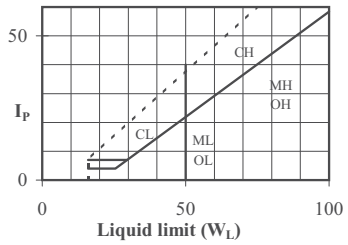
SOIL CLASSIFICATION REPORT

Trial Hole:	TP108
Depth (m):	1.4 - 1.5m
Sample No:	SYD11-9406

Client: Environmental Earth Sciences
Project: 111029
Location: Jerry's Plains

Client Sample No.: -
Sample History: Supplied by client





TEST METHODS
Classification AS1726 A2 Particle size AS1289.3.6.3

OTHER TESTS
AS1289.3.5.1.

GRADING
$C_u = D_{60} / D_{10}$ = not determinable
$C_c = D_{30}^2 / (D_{10} \times D_{60})$ = not determinable

PARTICLE DENSITY 2.71 (assumed)

PRE-TREATMENT HYDROMETER N/A

TEST CONDITION Washed sieve with dispersing agent

GROUP SYMBOL:

SOIL NAME: CLAY: layered grey,orange,brown and black with sand trace gravel

REMARKS:

INDEX PROPERTIES (%)
Liquid Limit = N/A Plastic Limit = N/A
Plasticity Index = N/A Linear Shrinkage % = Not determined

Atterberg Limits (History/preparation)

Liquid Limit (type of test)

Linear Shrinkage (mould size)

Tested by:	MT
Date tested:	12.5.11
Checked by:	DB
Date checked:	25/05/2011

Approved Signatory:
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26/05/2011

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JOB No.	**2120510**
REPORT No.	**SYD116887**

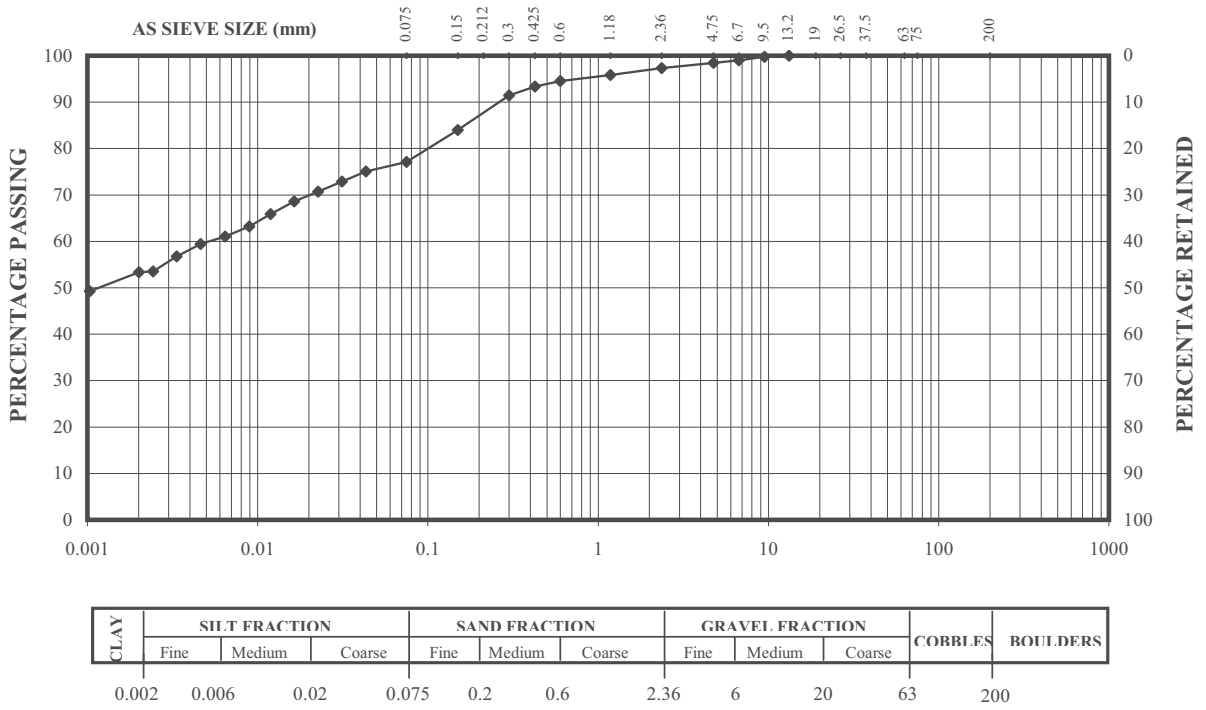
Ref: Document F9.1.16 issue 1.2

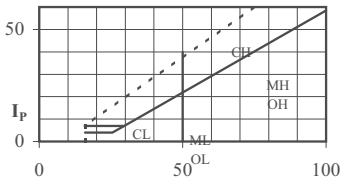
SOIL CLASSIFICATION REPORT

Trial Hole:	TP108
Depth (m):	0.6 - 0.8m
Sample No:	SYD11-9407

Client: Environmental Earth Sciences
Project: 111029
Location: Jerry's Plains

Client Sample No.: -
Sample History: Supplied by client





TEST METHODS
Classification AS1726 A2 Particle size AS1289.3.6.3

OTHER TESTS
AS1289.3.5.1.

GRADING
$C_u = D_{60} / D_{10}$ = not determinable
$C_c = D_{30}^2 / (D_{10} \times D_{60})$ = not determinable

PARTICLE DENSITY 2.71 (assumed)

PRE-TREATMENT HYDROMETER N/A

TEST CONDITION Washed sieve with dispersing agent

GROUP SYMBOL:

SOIL NAME: CLAY: brown
Emerson Class AS1289.3.8.1 - Class No 1 (distilled water temp = 21°C)

REMARKS:

INDEX PROPERTIES (%)
Liquid Limit = N/A Plastic Limit = N/A
Plasticity Index = N/A Linear Shrinkage % = Not determined

Atterberg Limits (History/preparation)

Liquid Limit (type of test)

Linear Shrinkage (mould size)

Tested by:	MT
Date tested:	5/09/2011
Checked by:	DB
Date checked:	25/05/2011

Approved Signatory:
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26/05/2011

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JOB No.	2120510
REPORT No.	SYD116888

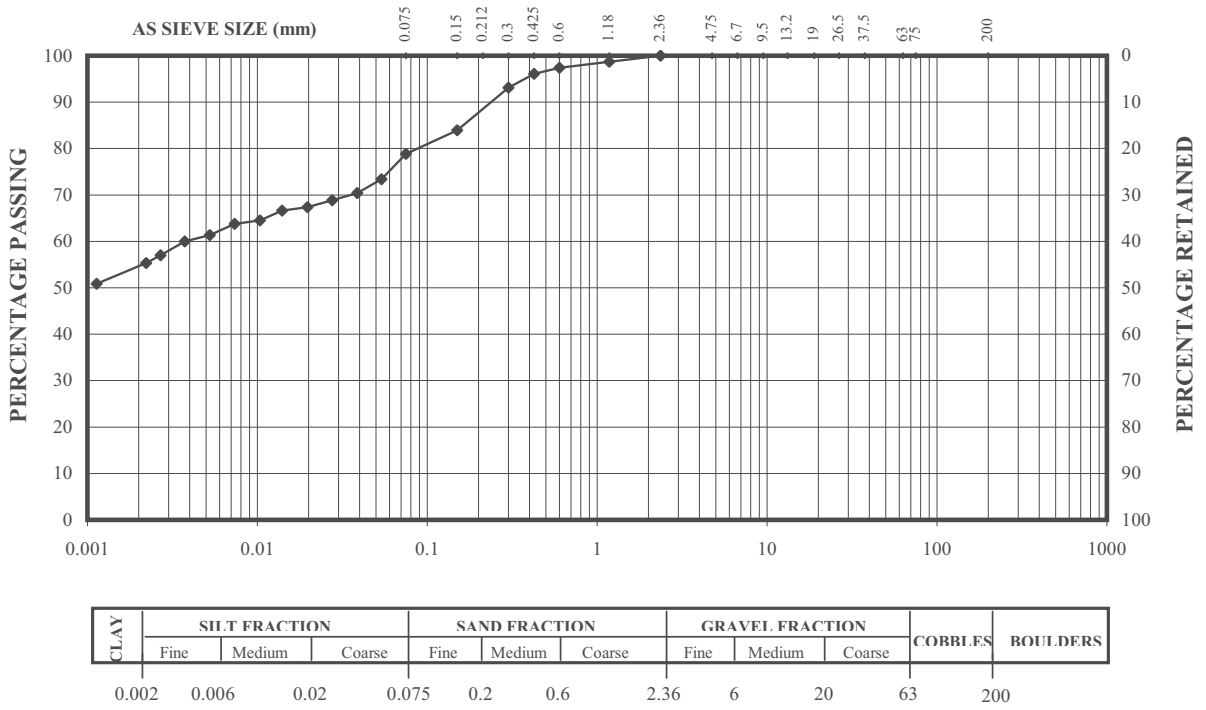
Ref: Document F9.1.16 issue 1.2

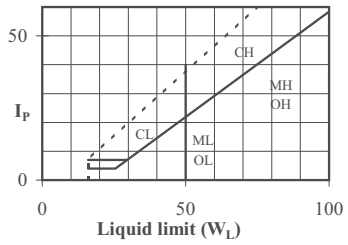
SOIL CLASSIFICATION REPORT

Trial Hole:	TP107
Depth (m):	0.3 - 0.4m
Sample No:	SYD11-9405

Client: Environmental Earth Sciences
Project: 111029
Location: Jerry's Plains

Client Sample No.: -
Sample History: Supplied by client





TEST METHODS
Classification AS1726 A2 Particle size AS1289.3.6.3

OTHER TESTS
AS1289.3.5.1.

GRADING
$C_u = D_{60} / D_{10}$ = not determinable
$C_c = D_{30}^2 / (D_{10} \times D_{60})$ = not determinable

PARTICLE DENSITY 2.71 (measured)

PRE-TREATMENT HYDROMETER N/A

TEST CONDITION Washed sieve with dispersing agent

GROUP SYMBOL:

SOIL NAME: CLAY: dark brown, with Sand
Emerson Class AS1289.3.8.1 - Class No 4 (distilled water temp = 21°C)

REMARKS:

INDEX PROPERTIES (%)
Liquid Limit = N/A Plastic Limit = N/A
Plasticity Index = N/A Linear Shrinkage % = Not determined

Atterberg Limits (History/preparation)

Liquid Limit (type of test)

Linear Shrinkage (mould size)

Tested by:	MT
Date tested:	17.5.11
Checked by:	DB
Date checked:	25/05/2011

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JOB No.	**2120510**
REPORT No.	**SYD116886**

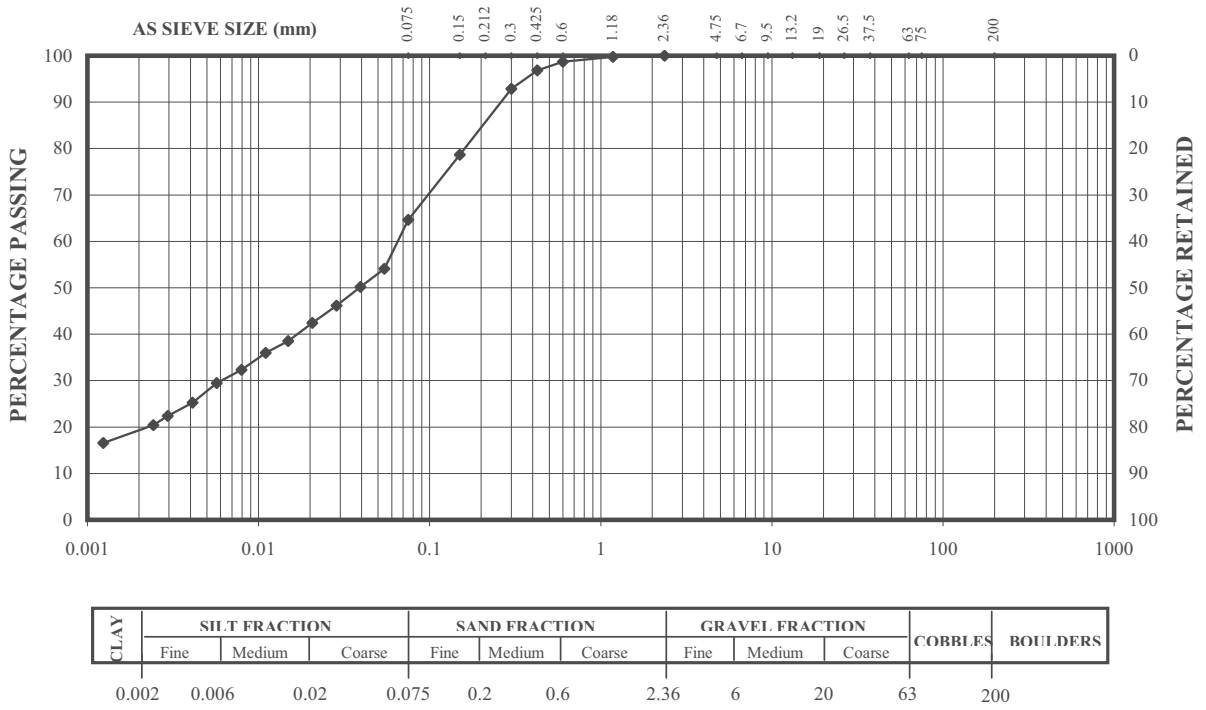
Ref: Document F9.1.16 issue 1.2

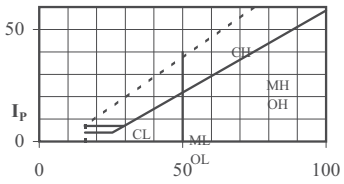
SOIL CLASSIFICATION REPORT

Trial Hole:	TP104
Depth (m):	0.6 - 0.8m
Sample No:	SYD11-9404

Client: Environmental Earth Sciences
Project: 111029
Location: Jerry's Plains

Client Sample No.: -
Sample History: Supplied by client





TEST METHODS
Classification AS1726 A2 Particle size AS1289.3.6.3

OTHER TESTS
AS1289.3.5.1.

GRADING
$C_u = D_{60} / D_{10}$ = not determinable
$C_c = D_{30}^2 / (D_{10} \times D_{60})$ = not determinable

PARTICLE DENSITY 2.89 (measured)

PRE-TREATMENT HYDROMETER N/A

TEST CONDITION Washed sieve with dispersing agent

GROUP SYMBOL:

SOIL NAME: Sandy CLAY: dark brown
Emerson Class AS1289.3.8.1 - Class 4 (distilled water temp = 21°C)

REMARKS:

INDEX PROPERTIES (%)
Liquid Limit = N/A Plastic Limit = N/A
Plasticity Index = N/A Linear Shrinkage % = Not determined

Atterberg Limits (History/preparation)

Liquid Limit (type of test)

Linear Shrinkage (mould size)

Tested by:	MT
Date tested:	5/09/2011
Checked by:	DB
Date checked:	25/05/2011

Approved Signatory:
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26/05/2011

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JOB No.	2120510
REPORT No.	SYD116885

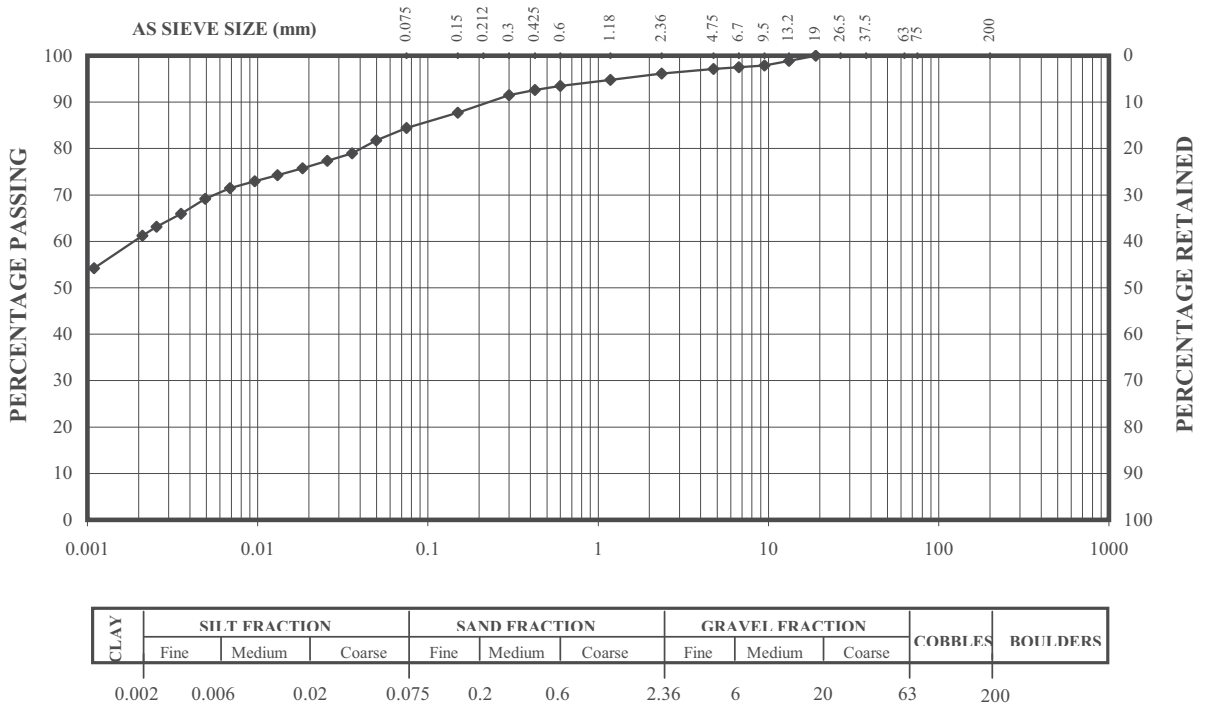
Ref: Document F9.1.16 issue 1.2

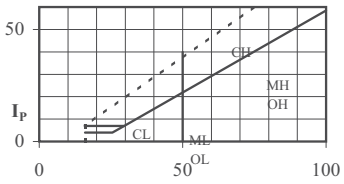
SOIL CLASSIFICATION REPORT

Trial Hole:	TP103
Depth (m):	0.5 - 0.6m
Sample No:	SYD11-9403

Client: Environmental Earth Sciences
Project: 111029
Location: Jerry's Plains

Client Sample No.: -
Sample History: Supplied by client





TEST METHODS
Classification AS1726 A2 Particle size AS1289.3.6.3

OTHER TESTS
AS1289.3.5.1.

GRADING
$C_u = D_{60} / D_{10}$ = not determinable
$C_c = D_{30}^2 / (D_{10} \times D_{60})$ = not determinable

PARTICLE DENSITY 2.75 (measured)

PRE-TREATMENT HYDROMETER N/A

TEST CONDITION Washed sieve with dispersing agent

GROUP SYMBOL:

SOIL NAME: CLAY: red brown
Emerson Class AS1289.3.8.1 - Class 1 (distilled water temp = 21°C)

REMARKS:

INDEX PROPERTIES (%)
Liquid Limit = N/A Plastic Limit = N/A
Plasticity Index = N/A Linear Shrinkage % = Not determined

Atterberg Limits (History/preparation)

Liquid Limit (type of test)

Linear Shrinkage (mould size)

Tested by:	MT
Date tested:	24.5.11
Checked by:	DB
Date checked:	25/05/2011

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JOB No.	**2120510**
REPORT No.	**SYD6884**

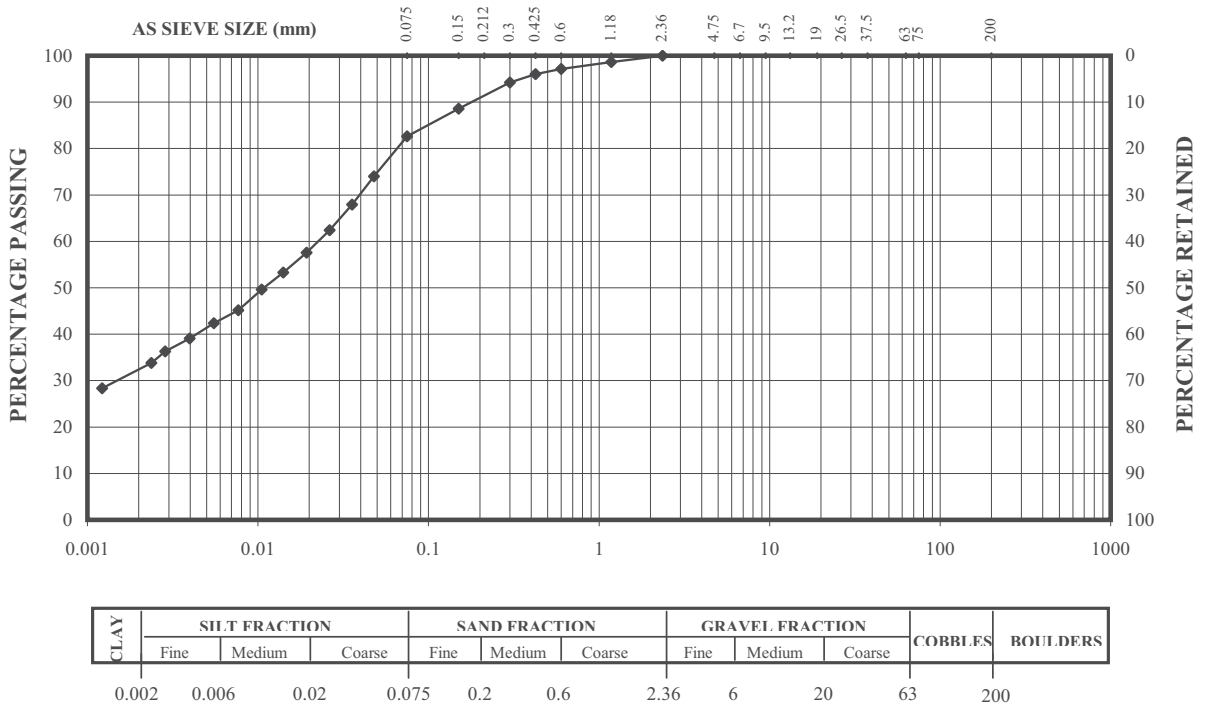
Ref: Document F9.1.16 issue 1.2

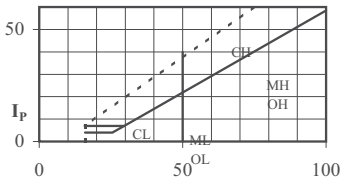
SOIL CLASSIFICATION REPORT

Trial Hole:	TP103
Depth (m):	0.2 - 0.3m
Sample No:	SYD11-9402

Client: Environmental Earth Sciences
Project: 111029
Location: Jerry's Plains

Client Sample No.: -
Sample History: Supplied by client





TEST METHODS
Classification AS1726 A2 Particle size AS1289.3.6.3

OTHER TESTS
AS1289.3.5.1.

GRADING
$C_u = D_{60} / D_{10}$ = not determinable
$C_c = D_{30}^2 / (D_{10} \times D_{60})$ = not determinable

PARTICLE DENSITY 2.71 (assumed)

PRE-TREATMENT HYDROMETER N/A

TEST CONDITION Washed sieve with dispersing agent

GROUP SYMBOL:

SOIL NAME: CLAY: dark brown and dark red

REMARKS:

INDEX PROPERTIES (%)
Liquid Limit = N/A Plastic Limit = N/A
Plasticity Index = N/A Linear Shrinkage % = Not determined

Atterberg Limits (History/preparation)

Liquid Limit (type of test)

Linear Shrinkage (mould size)

Tested by:	MT
Date tested:	17.5.11
Checked by:	DB
Date checked:	25/05/2011

Approved Signatory:
D. Brooke
26/05/2011

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JOB No.	2120510
REPORT No.	SYD116883

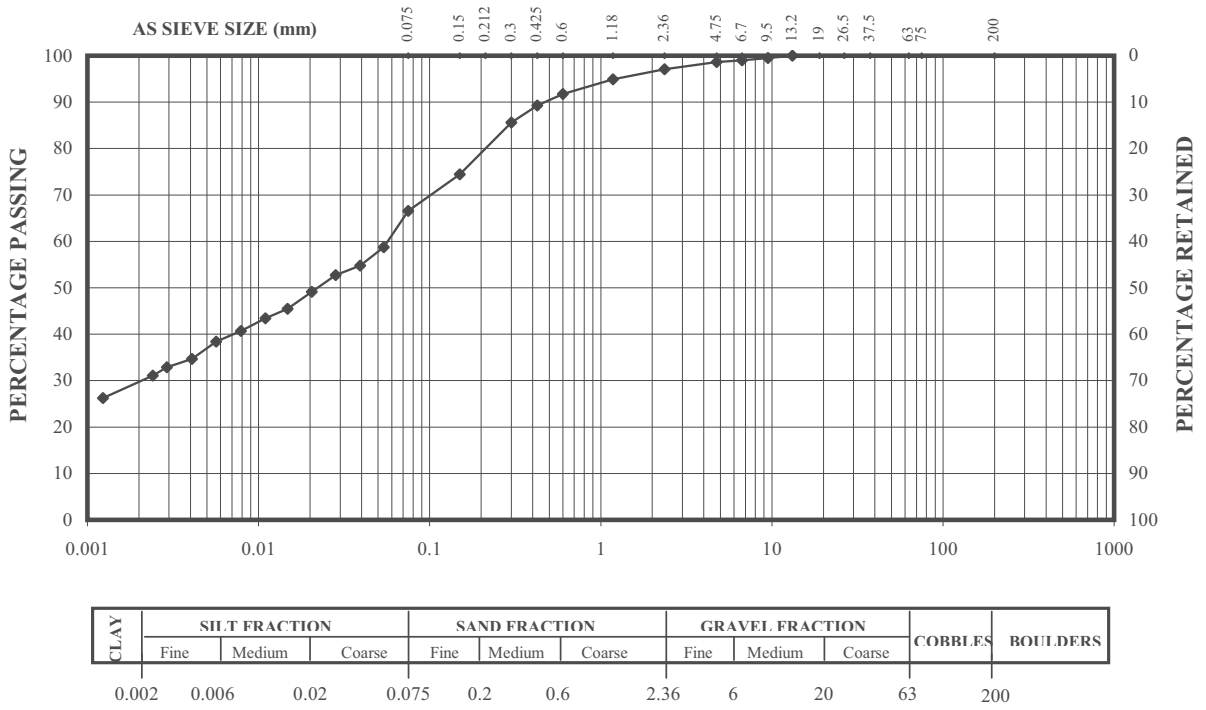
Ref: Document F9.1.16 issue 1.2

SOIL CLASSIFICATION REPORT

Trial Hole:	TP102
Depth (m):	0.9 - 1.0m
Sample No:	SYD11-9401

Client: Environmental Earth Sciences
Project: 111029
Location: Jerry's Plains

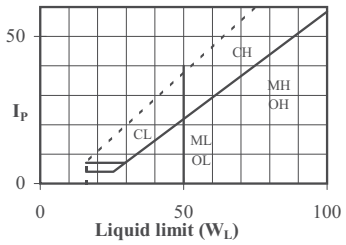
Client Sample No.: -
Sample History: Supplied by client



TEST METHODS
Classification AS1726 A2 Particle size AS1289.3.6.3

OTHER TESTS
AS1289.3.5.1.

GRADING
$C_u = D_{60} / D_{10}$ = not determinable
$C_c = D_{30}^2 / (D_{10} \times D_{60})$ = not determinable



PARTICLE DENSITY 2.7 (measured)

PRE-TREATMENT HYDROMETER N/A

TEST CONDITION Washed sieve with dispersing agent

GROUP SYMBOL:

SOIL NAME: CLAY: brown, trace Sand
Emerson Class No AS1289.3.8.1 - Class 4 (distilled water temp 21°C)

REMARKS:

INDEX PROPERTIES (%)
Liquid Limit = N/A Plastic Limit = N/A
Plasticity Index = N/A Linear Shrinkage % = Not determined

Atterberg Limits (History/preparation)

Liquid Limit (type of test)

Linear Shrinkage (mould size)

Tested by:	MT
Date tested:	17.5.11
Checked by:	DB
Date checked:	25/05/2011

Approved Signatory:
D. Brooke
26/05/2011

GHD GEOTECHNICS
57 Herbert St, Artarmon NSW, 2064
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GEOTECHNICAL TESTING SERVICES

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Accredited for compliance with ISO/IEC 17025
Laboratory Accreditation Number: 679

JOB No.	**2120510**
REPORT No.	**SYD116882**

Ref: Document F9.1.16 issue 1.2

APPENDIX C GEOLOGICAL SOIL SAMPLE LOGS

LOCATION: Jerrys Plains	JOB No. 111029	TEST PIT LOG: TP102	LOGGED BY: J. Bray
EASTING: 292837.85	DRILL TYPE: Backhoe		
NORTHING: 6412134.92	DATE STARTED: 20/04/2011	CLIENT: Hansen & Bailey	APPROVED: J. Hilliard
ELEVATION:	DATE FINISHED: 20/04/2011		

Sample: Disturbed / Undisturbed
Moisture: M=Moist D=Dry S=Saturated
Groundwater: Water Strike / Standing Water Level

PAGE #: 1/1

Depth (metres)	STRATIGRAPHY	GRAPHIC LOG	SAMPLES Type	Moisture	pH (field)	PID (ppm)	Water Level	COMMENTS
0	(A1): Firm, dark yellowish brown (10YR4/4) CLAY LOAM with very fine black gravel and roots, weak pedality.			D	6			Clear, smooth boundary
	(A2): Soft, slightly lighter brown CLAY LOAM with 2-10mm polyhedral peds with fine grey sand (<1%), moderate pedality.			M	5			Gradual, smooth boundary
.5	(B1): Firm, dark yellowish brown (10YR4/4) LIGHT MEDIUM CLAY with weathered orange sandstone appearing as coarse sand in profile. Moderate pedality with 5-30mm polyhedral peds.			D	7			Gradual, smooth boundary
1	(B2): Very firm brown LIGHT CLAY with grey and dark brown mottles with coarse grey and black rounded gravel (<5%). Moderate pedality.			D	7			Gradual, smooth boundary
1.5	(B2): Very firm, strong brown (7.5YR4/6) LIGHT CLAY with white and orange coarse sandstone gravel and cobbles in profile, strong pedality.			D				
2	End of Hole @ 2.0 metres (refusal bedrock).							

ENVIRONMENTAL EARTH SCIENCES THE KNOW AND THE HOW

LOCATION: Jerrys Plains	JOB No. 111029	TEST PIT LOG: TP103		LOGGED BY: J. Bray
EASTING: 291786.05	DRILL TYPE: Backhoe			
NORTHING: 6409874.24	DATE STARTED: 20/04/2011	CLIENT: Hansen & Bailey		APPROVED: J. Hilliard
ELEVATION:	DATE FINISHED: 20/04/2011			

Sample: Disturbed / Undisturbed
Moisture: M=Moist D=Dry S=Saturated
Groundwater: Water Strike / Standing Water Level

PAGE #: 1 / 1

Depth (metres)	STRATIGRAPHY	GRAPHIC LOG	SAMPLES Type	Moisture	pH (Field)	PID (ppm)	Water Level	COMMENTS
0	(A1): Soft to firm, brown-dark brown (7.5YR4/4) CLAY LOAM with roots holding soil very well. Weak pedality.			M	6			Clear, smooth boundary Leaching evident
	(A2/B1): Firm, dark yellowish brown (10YR4/6) LIGHT MEDIUM CLAY with minor roots. Weak pedality. becoming slightly darker.			D	7			
	(B1): Firm, red/brown LIGHT CLAY with minor roots and fine black gravel (<5%) with moderate pedality.							Clear, irregular boundary
.5				D	8			
								Gradual, smooth boundary
1	(B2): Firm to stiff, yellowish red (5YR4/6) MEDIUM CLAY with white mottles and yellow and grey sand. Moderate pedality with 2-10mm polyhedral peds.			D	8			
1.5	(B2): Firm, strong brown (7.5YR4/6) MEDIUM CLAY with white mottles and slight increases in size and no. of sand grains. Moderate pedality with 10-30mm polyhedral peds.							Gradual, smooth boundary
				D	8			
2	End of Hole @ 1.9 metres (refusal bedrock).							

ENVIRONMENTAL EARTH SCIENCES
THE KNOW AND THE HOW

LOCATION:	Jerrys Plains	JOB No. 111029	TEST PIT LOG:	TP104	LOGGED BY: J. Bray
EASTING:	299747.74	DRILL TYPE: Backhoe			
NORTHING:	6408904.14	DATE STARTED: 20/04/2011	CLIENT:	Hansen & Bailey	APPROVED: J. Hilliard
ELEVATION:		DATE FINISHED: 20/04/2011			

Sample: Disturbed / Undisturbed
Moisture: M=Moist D=Dry S=Saturated
Groundwater: Water Strike / Standing Water Level

PAGE #: 1/1

Depth (metres)	STRATIGRAPHY	GRAPHIC LOG	SAMPLES Type	Moisture	pH (Field)	PID (ppm)	Water Level	COMMENTS
0	(A1): Soft, very dark brown (10YR2/2) LIGHT CLAY with roots (20%). Weak pedality with 5-15mm polyhedral peds.			D	5.5			
	(A2): Soft to firm, dark yellowish brown (10YR3/4) CLAY LOAM with roots (<5%) and dark brown mottles. Weak to moderate pedality with 5-15mm rounded peds.			M	6			
.5	(B2): Dense, yellowish brown (10YR5/6) SAND with dark brown mottles (<5%) and very minor roots (<2%). Apedal.			D	7			
1	(C): Medium dense very dark greyish brown (2.5Y3/2) SAND with white mottle. Apedal.			D	7			Weathered sandstone
	(C): Dense, very dark greyish brown (2.5Y3/2) SAND. Apedal.							Weathered sandstone
1.5				D	7			
	End of Hole @ 1.6 metres (refusal on weathered sandstone).							
2								

ENVIRONMENTAL EARTH SCIENCES THE KNOW AND THE HOW

LOCATION: Jerrys Plains	JOB No. 111029	TEST PIT LOG: TP105		LOGGED BY: J. Bray
EASTING: 293654.81	DRILL TYPE: Backhoe			
NORTHING: 6410241.81	DATE STARTED: 20/04/2011	CLIENT: Hansen & Bailey		APPROVED: J. Hilliard
ELEVATION:	DATE FINISHED: 20/04/2011			

Sample: Disturbed / Undisturbed
Moisture: M=Moist D=Dry S=Saturated
Groundwater: Water Strike / Standing Water Level

PAGE #: 1 / 1

Depth (metres)	STRATIGRAPHY	GRAPHIC LOG	SAMPLES Type	Moisture	pH (Field)	PID (ppm)	Water Level	COMMENTS
0	(A1): Soft, brown, CLAY LOAM with roots. Weak pedality.			DM	5			Clear, smooth boundary
	(B2): Very firm, orange/brown MEDIUM CLAY with white motttles and roots, stong pedality.			D	6			
.5	(B2): Stiff, red/brown MEDIUM CLAY with weathered grey sandstone gravel and fine sand. Moderate pedality			D	6			Gradual, smooth boundary
	(C): Medium dense, grey/red SAND. Apedal.			D	6			Diffuse, wavy boundary Weathered sandstone
1	End of Hole @ 1.0 metres (refusal bedrock).							
1.5								
2								

ENVIRONMENTAL EARTH SCIENCES THE KNOW AND THE HOW

LOCATION: Jerrys Plains	JOB No. 111029	TEST PIT LOG: TP106		LOGGED BY: J. Bray
EASTING: 294376.69	DRILL TYPE: Backhoe			
NORTHING: 6412371.83	DATE STARTED: 20/04/2011	CLIENT: Hansen & Bailey		APPROVED: J. Hilliard
ELEVATION:	DATE FINISHED: 20/04/2011			

Sample: Disturbed / Undisturbed
Moisture: M=Moist D=Dry S=Saturated
Groundwater: Water Strike / Standing Water Level

PAGE #: 1/1

Depth (metres)	STRATIGRAPHY	GRAPHIC LOG	SAMPLES Type	Moisture	pH (Field)	PID (ppm)	Water Level	COMMENTS
0	(A1): Soft, dark brown (7.5YR3/4) CLAY LOAM with roots, moderate pedality with 10-20mm polyhedral peds			M	5			Water leaching evident
	(B2): Firm, strong brown (7.5YR4/6) LIGHT CLAY with light brown mottles and roots, vertical and some horizontal craking (<1cm) extending to surface (decrease in width with height). Strong pedality with 10-30mm polyhedral peds.			D	5.5			Clear, smooth boundary
.5	(B2): Stiff, strong brown (7.5YR4/6) MEDIUM HEAVY CLAY with fine black gravel/coarse sand (<5%), moderate pedality with 10-20mm polyhedral peds.			D	6			Gradual, smooth boundary
1	(B2): Soft, brown (7.5YR4/4) CLAY LOAM, sandy with red/brown mottles and yellow/orange weathered sandstone gravel, strong pedality with 10-50mm polyhedral peds.			D	7			
1.5	(B2): Firm, brown (10YR4/3) LIGHT CLAY with light brown mottles in profile. Moderate pedality with 5-20mm polyhedral peds.			D	8			
2	End of Hole @ 2.0 metres (refusal bedrock).							

ENVIRONMENTAL EARTH SCIENCES THE KNOW AND THE HOW

LOCATION: Jerrys Plains	JOB No. 111029	TEST PIT LOG: TP107		LOGGED BY: J. Bray
EASTING: 294423.62	DRILL TYPE: Backhoe			
NORTHING: 6409492.57	DATE STARTED: 20/04/2011	CLIENT: Hansen & Bailey		APPROVED: J. Hilliard
ELEVATION:	DATE FINISHED: 20/04/2011			

Sample: Disturbed / Undisturbed
Moisture: M=Moist D=Dry S=Saturated
Groundwater: Water Strike / Standing Water Level

PAGE #: 1 / 1

Depth (metres)	STRATIGRAPHY	GRAPHIC LOG	SAMPLES Type	Moisture	pH (Field)	PID (ppm)	Water Level	COMMENTS
0	(A1): Soft, very dark brown (10YR2/2) SILTY CLAY LOAM with roots. Weakly pedal with 5-20mm polyhedral peds.			M	5.5			Clear, smooth boundary
.5	(B1): Firm, dark brown, LIGHT CLAY with roots, purple, red and white sand grains and large sandstone cobbles in profile. Moderate pedality.			DM	6			
	(B2): Stiff, very dark greyish brown (10YR3/1) HEAVY CLAY with sand (<10%), roots. Strong pedality with 10-50mm polyhedral peds.			D	7			Abrupt, wavy boundary
1	(B2): Stiff, light grey (10YR7/2) MEDIUM CLAY with gravel likely to be quartz. Strongly pedal with with 5-10mm polyhedral peds and orange mottling.			D	8			Abrupt, smooth boundary
	(C): Stiff, yellow (2.5YR7/8) CLAYEY SAND with brown mottles. Weak pedality with 5-10mm polyhedral peds.			D	8			
1.5	(C): Firm to stiff, very pale brown (10YR7/3) LIGHT CLAY with black/dark brown mottles.			D	8			
	End of pit at 1.7m (refusal on very stiff CLAY).							
2								

ENVIRONMENTAL EARTH SCIENCES THE KNOW AND THE HOW

LOCATION: Jerrys Plains	JOB No. 111029	TEST PIT LOG: TP108		LOGGED BY: J. Bray
EASTING: 295131.50	DRILL TYPE: Backhoe			
NORTHING: 6410203.16	DATE STARTED: 20/04/2011	CLIENT: Hansen & Bailey		APPROVED: J. Hilliard
ELEVATION:	DATE FINISHED: 20/04/2011			

Sample: Disturbed / Undisturbed
Moisture: M=Moist D=Dry S=Saturated
Groundwater: Water Strike / Standing Water Level

PAGE #: 1/1

Depth (metres)	STRATIGRAPHY	GRAPHIC LOG	SAMPLES Type	Moisture	pH (Field)	PID (ppm)	Water Level	COMMENTS
0	(A1): Soft, dark yellowish brown (10YR3/4) LOAM with roots, weak pedality with 5-10mm polyhedral peds, with fine subangular sandstone gravel.			M	5.5			Leached layer
	(A2/B1): Soft to firm, dark brown (10YR4/4) LIGHT CLAY with dark brown mottles and coarse sand. Strong pedality with 20-50mm polyhedral peds.							
	(B2): Very firm, yellowish brown (10YR5/4) MEDIUM CLAY with sub-angular peds and roots. Moderate pedality with 5-30mm polyhedral peds.			DM	6			
.5	(B2): Very firm, brown, LIGHT MEDIUM CLAY, moderate pedality.			D	7			Very abrupt, smooth boundary
1	(B2): Firm, orange/brown, CLAY LOAM, sandy with black mottles. Moderate pedality.			D	8			Abrupt, smooth boundary
	(B2): Firm, light yellowish brown (2.5Y 6/4) LIGHT CLAY with weathered ironstone gravels. Moderate pedality with 10-20mm polyhedral peds and 2-5mm thick platy peds.			D	8			
1.5				D	8			
	(B3): Soft, orange, SANDY CLAY LOAM with white mottles.							Weathered sandstone
	End of pit at 1.8 metres (refusal on weathered sandstone).							
2								

ENVIRONMENTAL EARTH SCIENCES
THE KNOW AND THE HOW

LOCATION: Jerrys Plains	JOB No. 111029	TEST PIT LOG: TP109		LOGGED BY: J. Bray
EASTING: 295458.66	DRILL TYPE: Backhoe			
NORTHING: 6411517.57	DATE STARTED: 20/04/2011	CLIENT: Hansen & Bailey		APPROVED: J. Hilliard
ELEVATION:	DATE FINISHED: 20/04/2011			

Sample: Disturbed / Undisturbed
Moisture: M=Moist D=Dry S=Saturated
Groundwater: Water Strike / Standing Water Level

PAGE #: 1 / 1

Depth (metres)	STRATIGRAPHY	GRAPHIC LOG	SAMPLES Type	Moisture	pH (Field)	PID (ppm)	Water Level	COMMENTS
0	(A1): Stiff, brown-dark brown (10YR4/3) CLAY LOAM with roots.			DM	5			Clear, smooth boundaries throughout
	(B1): Firm to stiff, brown-dark brown (10YR4/3) LIGHT CLAY with minor fine white/red/black sand, vertical craking (0.5 - 1cm). Strong pedality with 20-50mm subangular, blocky peds and 5-20mm polyhedral peds.			D	7			
.5	(B2): Firm, dark yellowish brown (10YR3/4) LIGHT CLAY with sub-rounded and dark brown mottles gravel. Moderate pedality with 5-40mm polyhedral peds.			M	7			
	(B2): Stiff, orange/brown MEDIUM CLAY with and coarse white/yellow sand (5%). Strong pedality with polyhedral peds.			D	8			
1								
1.5	(B2): Firm, brown-dark brown (7.5YR4/4) SILTY CLAY LOAM with red mottles and white weathered sandstone entering profile. Moderate pedality with 10-30mm polyhedral peds.			DM	8			
	End of pit at 1.9m (target depth).							
2								

ENVIRONMENTAL EARTH SCIENCES THE KNOW AND THE HOW

LOCATION: Jerrys Plains	JOB No. 111029	BOREHOLE LOG: TP110	LOGGED BY: J. Bray
EASTING: 295774.05	DRILL TYPE: Backhoe		
NORTHING: 6411373.59	DATE STARTED: 19/4/2011	CLIENT: Hansen & Bailey	APPROVED: J. Hilliard
ELEVATION:	DATE FINISHED: 19/04/2011		

Sample: Disturbed / Undisturbed
Moisture: M=Moist D=Dry S=Saturated
Groundwater: Water Strike / Standing Water Level

PAGE #: 1/1

Depth (metres)	STRATIGRAPHY	GRAPHIC LOG	SAMPLES Type	Moisture	pH (Field)	PID (ppm)	Water Level	COMMENTS
0	(A1): Firm, dark reddish brown (5YR3/3) CLAY LOAM with roots and minor gravel, weak pedality.			M	7			
.5	(B1): Stiff, dark brown (7.5YR3/4) MEDIUM CLAY with weathered sandstone "nodules" or gravel, moderate pedality.			D	8			
1	(B2): Firm, light brown LIGHT CLAY with dark grey sub-angular coarse sand/fine poorly graded gravel with occasional cobbles, moderate pedality.			D	8			
1.5	(B2): Firm to stiff, light grey (10YR7/1) LIGHT CLAY with yellow/orange mottles.			MD	8			
2	End of Hole @ 2.0 metres (target depth).							

ENVIRONMENTAL EARTH SCIENCES THE KNOW AND THE HOW

LOCATION: Jerrys Plains	JOB No. 111029	TEST PIT LOG: TP111		LOGGED BY: J. Bray
EASTING: 296128.54	DRILL TYPE: Backhoe			
NORTHING: 6410935.83	DATE STARTED: 19/4/2011	CLIENT: Hansen & Bailey		APPROVED: J. Hilliard
ELEVATION:	DATE FINISHED: 19/04/2011			

Sample: Disturbed; Undisturbed
Moisture: M=Moist D=Dry S=Saturated
Groundwater: Water Strike; Standing Water Level

PAGE #: 1 / 1

Depth (metres)	STRATIGRAPHY	GRAPHIC LOG	SAMPLES Type	Moisture	pH (Field)	PID (ppm)	Water Level	COMMENTS
0	(A1): Soft, dark brown (10YR3/3) CLAY LOAM with minor roots. Weak pedality.			DM	6			
	(A2): Soft, yellowish brown (10YR5/8) CLAYEY SAND. Apedal.			D				
	(B2): Soft brown (10YR5/3) LOAMY SAND, with very fine quartz sand and fine subrounded quartz gravel. Weak pedality with 5-10mm polyhedral peds.			DM	7.5			Coarse cobbles in profile, similar in colour to layer @ 0.3 metres
.5								Gradual, smooth boundary
	(B2): Firm red/brown LIGHT CLAY. Moderate pedality.			M	7			
1								Gradual, smooth boundary
	(B2): Firm, yellowish brown (10YR5/4) CLAY LOAM, sandy with "intrusions" of grey soft sandy CLAY and a few sandstone boulders and angular gravels and fine grained sand. Moderate pedality.			DM	7			
1.5								Test pit located half way down gentle slope. Boulders in profile suggest colluvial landform
								Operator note harder ground
2	End of Hole @1.9 (target depth)							

ENVIRONMENTAL EARTH SCIENCES THE KNOW AND THE HOW

LOCATION:	Jerrys Plains	JOB No. 111029	TEST PIT LOG:	TP112	LOGGED BY:
EASTING:	296324.95	DRILL TYPE: Backhoe			J. Bray
NORTHING:	6412192.51	DATE STARTED: 19/4/2011	CLIENT:	Hansen & Bailey	APPROVED:
ELEVATION:		DATE FINISHED: 19/04/2011			J. Hilliard

Sample: Disturbed / Undisturbed
Moisture: M=Moist D=Dry S=Saturated
Groundwater: Water Strike / Standing Water Level

PAGE #: 1/1

Depth (metres)	STRATIGRAPHY	GRAPHIC LOG	SAMPLES Type	Moisture	pH (Field)	PID (ppm)	Water Level	COMMENTS
0	(A1): Soft, dark brown CLAY LOAM with minor roots. Weak pedality.			MS	6			
.5	(B2): Stiff, very dark brown (7.5YR3/2) MEDIUM HEAVY CLAY with vertical and diagonal cracks (<1cm)			D	6.5			Boundary based on colour and moisture content Cracks extend to surface but decrease in width with height, likely due to surface compaction from livestock grazing
1	(B2): Firm, dark yellowish brown (10YR3/6) CLAY LOAM sandy with weathered red/yellow/black sandstone cobbles in profile (red colour dominating). Moderate pedality. Weathered sandstone in profile that has "laminar" layers.			D	8			Wavy distinct boundary
1.5	Becoming less red in colour. (B2): Very firm red LIGHT MEDIUM CLAY with sandstone becoming slightly grey with white quartz grains apparent. Moderate pedality.			D	8			Diffuse boundary Becoming very hard to excavate
2	End of Hole @ 2.0 metres (target depth)							

ENVIRONMENTAL EARTH SCIENCES
THE KNOW AND THE HOW

LOCATION: Jerrys Plains	JOB No. 111029	TEST PIT LOG: TP113		LOGGED BY: J. Bray
EASTING: 296493.63	DRILL TYPE: Backhoe			
NORTHING: 6409783.38	DATE STARTED: 20/04/2011	CLIENT: Hansen & Bailey		APPROVED: J. Hilliard
ELEVATION:	DATE FINISHED: 20/04/2011			

Sample: Disturbed / Undisturbed
Moisture: M=Moist D=Dry S=Saturated
Groundwater: Water Strike / Standing Water Level

PAGE #: 1 / 1

Depth (metres)	STRATIGRAPHY	GRAPHIC LOG	SAMPLES Type	Moisture	pH (Field)	PID (ppm)	Water Level	COMMENTS
0	(A1): Soft, dark brown (7.5YR3/4) SILTY LOAM. Weak pedality with 2-5mm polyhedral peds.			M	5			Clear, smooth boundary
	(B2): Firm, red/brown SILTY LIGHT CLAY. Moderate pedality with subangular peds.			D	6			Gradual, smooth boundary
.5	(B2): Firm, yellowish brown (10YR5/6) CLAY LOAM, sandy. Moderate pedality with 10-30mm polyhedral peds.			D	7			Diffuse, smooth boundary
	(B2): Dense, yellowish brown (10YR5/6) SAND. Weak pedality with 5-10mm polyhedral peds.			D	7			Weathered sandstone
1	(C): Weathered yellow/brown fine grained SANDSTONE.			D	8			Gradual, irregular boundary
1.5	End of Hole @ 1.6 metres (refusal bedrock).							
2								

ENVIRONMENTAL EARTH SCIENCES
THE KNOW AND THE HOW

LOCATION: Jerrys Plains	JOB No. 111029	TEST PIT LOG: TP114		LOGGED BY: J. Bray
EASTING: 296915.95	DRILL TYPE: Backhoe			
NORTHING: 6408907.03	DATE STARTED: 20/04/2011	CLIENT: Hansen & Bailey		APPROVED: J. Hilliard
ELEVATION:	DATE FINISHED: 20/04/2011			

Sample: Disturbed / Undisturbed
Moisture: M=Moist D=Dry S=Saturated
Groundwater: Water Strike / Standing Water Level

PAGE #: 1/1

Depth (metres)	STRATIGRAPHY	GRAPHIC LOG	SAMPLES Type	Moisture	pH (Field)	PID (ppm)	Water Level	COMMENTS
0	(A1): Soft, dark brown (10YR3/3) SILTY LOAM with roots (20%). Weak pedality with 2-5mm rounded peds and fine subangular sandstone gravel.			DM				Clear, smooth boundary
	(B1): Very firm, yellowish brown (10YR5/6) MEDIUM CLAY with dark brown mottles/veins and very fine roots			D				Clear, smooth boundary
.5	(B2): Firm, yellow/brown LIGHT CLAY with black veins approximately 10cm long and 2cm wide, large horizontal and vertical cracks (> 1cm)			D				
	(B2): Soft, yellow/brown SANDY LOAM with black mottles/nodules. Weak pedality.			DM				Gradual, irregular boundary
1	(B2): Firm, light olive/brown (2.5Y5/6) LIGHT CLAY. Some light brown and black mottling and trace of fine sand. Weak to moderate pedality with 5-10mm polyhedral peds.			M				Diffuse, smooth boundary
1.5	(B3/C): Soft, brownish yellow (10YR6/6) SANDY CLAY LOAM, weak pedality with 10-20mm polyhedral peds.			DM				Diffuse, smooth boundary
2	End of Hole @ 1.9 metres (target depth).							

ENVIRONMENTAL EARTH SCIENCES THE KNOW AND THE HOW

LOCATION: Jerrys Plains	JOB No. 111029	TEST PIT LOG: TP115		LOGGED BY: J. Bray
EASTING: 297389.36	DRILL TYPE: Backhoe			
NORTHING: 6410443.76	DATE STARTED: 19/4/2011	CLIENT: Hansen & Bailey		APPROVED: J. Hilliard
ELEVATION:	DATE FINISHED: 19/04/2011			

Sample: Disturbed / Undisturbed
Moisture: M=Moist D=Dry S=Saturated
Groundwater: Water Strike / Standing Water Level

PAGE #: 1 / 1

Depth (metres)	STRATIGRAPHY	GRAPHIC LOG	SAMPLES Type	Moisture	pH (Field)	PID (ppm)	Water Level	COMMENTS
0	(A1): Soft, dark brown (7.5YR3/4) LOAM and minor fine black sand, weak pedality with 5-10mm polyhedral peds.		■	DM	5			Diffuse boundaries throughout
	(A2/B1): Firm, dark yellowish brown (10YR4/4) MEDIUM CLAY with large tree roots and black nodules of charcoal (5%). Strong pedality with 20-50mm polyhedra peds.		■	D	6			
.5	(B2): Dense, very pale brown (10YR7/3) SAND with occasional cobble sized pieces of degrading charcoal. Apedal.							
	(B2): Firm yellowish red (5YR4/6) LIGHT MEDIUM CLAY with trace of fine sand. Strong pedality with 10-50mm polyhedral peds.		■	D	9			Operator notes very stiff soil.
1								
1.5	(B2/B3): Stiff, strong brown (7.5YR4/6) MEDIUM CLAY.		■	D	7			Located on 1st terrace of floodplain.
	End of Hole @ 1.8 metres (target depth).							
2								

ENVIRONMENTAL EARTH SCIENCES THE KNOW AND THE HOW

LOCATION: Jerrys Plains	JOB No. 111029	TEST PIT LOG: TP116		LOGGED BY: J. Bray
EASTING: 297284.12	DRILL TYPE: Backhoe			
NORTHING: 6411757.49	DATE STARTED: 19/4/2011	CLIENT: Hansen & Bailey		APPROVED: J. Hilliard
ELEVATION:	DATE FINISHED: 19/04/2011			

Sample: Disturbed; Undisturbed
Moisture: M=Moist D=Dry S=Saturated
Groundwater: Water Strike; Standing Water Level

PAGE #: 1/1

Depth (metres)	STRATIGRAPHY	GRAPHIC LOG	SAMPLES Type	Moisture	pH (Field)	PID (ppm)	Water Level	COMMENTS
0	(A1): Very soft, very dark greyish brown (10YR3/2) CLAY LOAM with trace of fine sand; with roots, becoming slightly red. Weak pedality.			D	6			
	(B2): Firm, dark yellowish brown (10YR4/6) CLAY LOAM, sandy with minor roots and moderate pedality with subangular peds.							Clear, wavy boundary
.5				D	7			
	(B3, C): Dense, white SAND, that crumbles under thumb pressure. Apedal.							Abrupt, smooth boundary Very hard to excavate Weathered sandstone
1	(C): Very dense, strong brown (7.5YR4/6) SAND. Apedal.			D	8			Weathered sandstone
1.5				D	8			
2	End of Hole @ 2.0 metres (target depth)							

ENVIRONMENTAL EARTH SCIENCES THE KNOW AND THE HOW

LOCATION: Jerrys Plains	JOB No. 111029	TEST PIT LOG: TP117		LOGGED BY: J. Bray
EASTING: 298251.54	DRILL TYPE: Backhoe			
NORTHING: 6412366.42	DATE STARTED: 19/4/2011	CLIENT: Hansen & Bailey		APPROVED: J. Hilliard
ELEVATION:	DATE FINISHED: 19/04/2011			

Sample: Disturbed / Undisturbed
Moisture: M=Moist D=Dry S=Saturated
Groundwater: Water Strike / Standing Water Level

PAGE #: 1 / 1

Depth (metres)	STRATIGRAPHY	GRAPHIC LOG	SAMPLES Type	Moisture	pH (Field)	PID (ppm)	Water Level	COMMENTS
0	(A1): Firm, very dark greyish brown (10YR3/2) CLAY LOAM with roots, becoming slightly red. Weak pedality.			DM	6			
	(B1): Firm, brown LIGHT CLAY with black charcoal nodules. Moderate pedality.			D	6			Clear, smooth boundary
	(B2): Firm, very dark greyish brown (10YR3/2) LIGHT CLAY with dark brown mottles.			D	7			
.5	(B2): Stiff, dark yellowish brown (10YR4/4) HEAVY CLAY with white weathered sandstone gravel in profile and grey mottling. Moderate pedality with 5-20mm polyhedral peds.			D	7.5			Abrupt, smooth boundary Very hard to excavate
1	grading to orange CLAY							
1.5	(B3): Firm, brownish yellow (10YR6/6) LIGHT CLAY with grey mottles and dark grey sandstone in profile. Moderate pedality with 5-20mm polyhedral peds.			D	7.5			
2	End of Hole @ 2.0 metres (target depth)							

ENVIRONMENTAL EARTH SCIENCES THE KNOW AND THE HOW

LOCATION:	Jerrys Plains	JOB No.	111029	TEST PIT LOG: TP118	LOGGED BY: J. Bray
EASTING:	298442.13	DRILL TYPE:	Backhoe		
NORTHING:	6411757.04	DATE STARTED:	19/4/2011	CLIENT: Hansen & Bailey	APPROVED: J. Hilliard
ELEVATION:		DATE FINISHED:	19/04/2011		

Sample: Disturbed; Undisturbed
Moisture: M=Moist D=Dry S=Saturated
Groundwater: Water Strike; Standing Water Level

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Depth (metres)	STRATIGRAPHY	GRAPHIC LOG	SAMPLES Type	Moisture	pH (Field)	PID (ppm)	Water Level	COMMENTS
0	(A1): Soft, olive brown (2.5Y4/4) SANDY LOAM with fine sand and roots. Weak pedality with 2-10mm polyhedral peds.			DM	7			Gradual, smooth boundary
	(A2): Soft, dark brown (10YR3/3) SILTY CLAY with roots with subangular peds.			DM	6.5			Abrupt, smooth boundary
	(B2): Firm, strong brown (7.5YR4/6) HEAVY CLAY with black mottles. Moderate pedality with 10-30mm polyhedral peds.			DM	6			
.5	(B2): Firm, light brown/yellow LIGHT CLAY. Moderate pedality.			D	7			Gradual, smooth boundary Very hard to excavate
1	(B3/C): Stiff, brownish yellow (10YR6/6) CLAYEY SAND which crumbles under thumb pressure. Apedal.			D	7.5			Gradual smooth boundary Weathered sandstone Encountered old borehole in corner of test pit
	End of Hole @ 1.4 metres (refusal on large boulder).							
1.5								
2								

ENVIRONMENTAL EARTH SCIENCES THE KNOW AND THE HOW

LOCATION: Jerrys Plains	JOB No. 111029	TEST PIT LOG: TP119	LOGGED BY: J. Bray
EASTING: 298232.30	DRILL TYPE: Backhoe		
NORTHING: 6410866.76	DATE STARTED: 19/4/2011	CLIENT: Hansen & Bailey	APPROVED: J. Hilliard
ELEVATION:	DATE FINISHED: 19/04/2011		

Sample: Disturbed / Undisturbed
Moisture: M=Moist D=Dry S=Saturated
Groundwater: Water Strike / Standing Water Level

PAGE #: 1 / 1

Depth (metres)	STRATIGRAPHY	GRAPHIC LOG	SAMPLES Type	Moisture	pH (Field)	PID (ppm)	Water Level	COMMENTS
0	(A1): Firm, dark brown (7.5YR3/2) CLAY LOAM with minor dark red mottling. Weak pedality.			M	5.5			
	(B2): Stiff, dark brown (10YR3/3) MEDIUM CLAY, vertical cracking (up to 1cm). Strong pedality with 5-50mm polyhedral peds.			D	7			Clear, smooth boundary Cracks extend to the surface but decrease with height, likely due to surface compaction from livestock grazing
	(B2): LIGHT CLAY with grey mottles. Weak pedality with 5-10mm polyhedral peds.			M	6			Abrupt, wavy boundary
.5	(B2): Very stiff, light olive brown (2.5Y5/4) MEDIUM HEAVY CLAY with white weathered rock in profile. Strong pedality with 2-10mm thick platy peds.			DM	8			Very abrupt, smooth boundary
1	(C): Profile dominated by grey weathered SANDSTONE with small (5cm) bands/layers of orange/dark brown mottling.							Clear, smooth boundary
1.5				D	8			
2	End of Hole @ 1.9 metres (target depth).							

ENVIRONMENTAL EARTH SCIENCES
THE KNOW AND THE HOW

LOCATION: Jerrys Plains	JOB No. 111029	TEST PIT LOG: TP120		LOGGED BY: J. Bray
EASTING: 298568.48	DRILL TYPE: Backhoe			
NORTHING: 6408992.70	DATE STARTED: 20/04/2011	CLIENT: Hansen & Bailey		APPROVED: J. Hilliard
ELEVATION:	DATE FINISHED: 20/04/2011			

Sample: Disturbed; Undisturbed
Moisture: M=Moist D=Dry S=Saturated
Groundwater: Water Strike; Standing Water Level

PAGE #: 1/1

Depth (metres)	STRATIGRAPHY	GRAPHIC LOG	SAMPLES Type	Moisture	pH (Field)	PID (ppm)	Water Level	COMMENTS
0	(A1): Soft, dark brown (7.5YR3/4) LOAM with loam and roots. Weak pedality with 5-10mm polyhedral peds.			D	5.5			Clear, smooth boundary Possible leaching in A2 layer
	(B1): Stiff, reddish brown (5YR4/4) MEDIUM CLAY with roots (<5%). Strong pedality.							
	(B2): Stiff, dark orange/brown MEDIUM CLAY. Strong pedality.			M	6			
.5	(B2): Firm, orange/grey CLAY LOAM, sandy. Moderate pedality.			D	7			Diffuse, smooth boundary
1	(B2): Firm, strong brown (7.5YR5/6) MEDIUM CLAY with fine sandstone gravels. Moderate pedality with 5-20mm polyhedral peds.			D	7			
	(B3): Grading to weathered grey/orange SANDSTONE.							Diffuse, smooth boundary
1.5				D	7			
2	End of Hole @ 2.0 metres (target depth).							

ENVIRONMENTAL EARTH SCIENCES THE KNOW AND THE HOW

LOCATION: Jerrys Plains	JOB No. 111029	TEST PIT LOG: TP121		LOGGED BY: J. Bray
EASTING: 300216.47	DRILL TYPE: Backhoe			
NORTHING: 6408766.48	DATE STARTED: 20/04/2011	CLIENT: Hansen & Bailey		APPROVED: J. Hilliard
ELEVATION:	DATE FINISHED: 20/04/2011			

Sample: Disturbed / Undisturbed
Moisture: M=Moist D=Dry S=Saturated
Groundwater: Water Strike / Standing Water Level

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Depth (metres)	STRATIGRAPHY	GRAPHIC LOG	SAMPLES Type	Moisture	pH (Field)	PID (ppm)	Water Level	COMMENTS
0	(A1): Soft, very dark brown (7.5YR3/2) SILTY LOAM with roots. Weak pedality with 10-30mm polyhedral peds.			DM	6.5			Clear, smooth boundary
	(A1): Firm, dark brown (7.5YR3/4) LIGHT CLAY (slightly lighter than surrounding layers). Moderate pedality with 10-30mm polyhedral peds.			D	7			Clear, smooth boundary
	(B2): Stiff, very dark greyish brown (10YR3/2) LIGHT MEDIUM CLAY with vertical cracks >1cm.			D	7			Cracks extend to the surface but decrease with height, likely due to surface compaction from livestock grazing
.5	(B2): Stiff brown MEDIUM CLAY with black and occasional white mottles and white sandstone gravels. Strong pedality.							Gradual, smooth boundary
1				D	8			Diffuse, smooth boundary
1.5	(B2): Stiff, dark brown (7.5YR3/4) MEDIUM CLAY with white mottles derived from white weathered sandstone. Moderate pedality with 5-20mm polyhedral peds.			D	8			
2	End of Hole @ 1.8 metres (refusal on very stiff CLAY).							

ENVIRONMENTAL EARTH SCIENCES THE KNOW AND THE HOW

LOCATION: Jerrys Plains	JOB No. 111029	TEST PIT LOG: TP122	LOGGED BY: J. Bray
EASTING: 300179.82	DRILL TYPE: Backhoe		
NORTHING: 6409828.35	DATE STARTED: 20/04/2011	CLIENT: Hansen & Bailey	APPROVED: J. Hilliard
ELEVATION:	DATE FINISHED: 20/04/2011		

Sample: Disturbed / Undisturbed
Moisture: M=Moist D=Dry S=Saturated
Groundwater: Water Strike / Standing Water Level

PAGE #: 1/1

Depth (metres)	STRATIGRAPHY	GRAPHIC LOG	SAMPLES Type	Moisture	pH (Field)	PID (ppm)	Water Level	COMMENTS
0	(A1): Soft, very dark greyish brown (10YR3/2) SANDY LOAM with roots.			DM	7			Clear, smooth boundary
	(B1): Firm, dark brown (7.5YR3/4) CLAY LOAM, sandy with minor roots and moderate pedality with subrounded peds.			D	6			
.5	(B2): Stiff, yellow/brown MEDIUM CLAY with grey and red mottles and fine sand. Strong pedality.			D	8			Clear, smooth boundary
	White sandstone coarse gravel in profile.							
1	(B3): Dense, light, yellowish brown (2.5Y6/4) LOAMY SAND with yellow mottling.							Gradual, smooth boundary Weathered sandstone
1.5				D	8			
	End of Hole @ 1.8 metres (target depth).							
2								

ENVIRONMENTAL EARTH SCIENCES THE KNOW AND THE HOW

LOCATION: Jerrys Plains	JOB No. 111029	TEST PIT LOG: TP123		LOGGED BY: J. Bray
EASTING: 299421.84	DRILL TYPE: Backhoe			
NORTHING: 6410822.90	DATE STARTED: 19/4/2011	CLIENT: Hansen & Bailey		APPROVED: J. Hilliard
ELEVATION:	DATE FINISHED: 19/04/2011			

Sample: Disturbed / Undisturbed
Moisture: M=Moist D=Dry S=Saturated
Groundwater: Water Strike / Standing Water Level

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Depth (metres)	STRATIGRAPHY	GRAPHIC LOG	SAMPLES Type	Moisture	pH (Field)	PID (ppm)	Water Level	COMMENTS
0	(A1): Soft, dark brown (7.5YR3/2) CLAY LOAM with roots (5%). Weak pedality with 2-5mm polyhedral and subrounded peds.			M	6			
	(B1): Firm, yellowish brown (5YR4/6) MEDIUM CLAY. Moderate pedality with 2-7mm polyhedral peds.			M	6			Abrupt, smooth boundary
	(B2): Soft, brown SANDY CLAY with fine sand (derived from white weathered rock inclusions), with black charcoal nodules.			DM	6			Gradual, smooth boundary
.5	(B2): Firm yellowish brown (10YR5/4) LIGHT CLAY with trace of fine sand and grey mottles and fine subangular sandstone gravels. Weak pedality with 2-5mm polyhedral peds.			DM	7			Clear, smooth boundary
1								
	(B2): Soft, yellowish brown (10YR5/8) SANDY LOAM. Weak pedality.			DM	8			Gradual, smooth boundary
1.5								
2	End of Hole @ 2.0 metres (target depth).							

ENVIRONMENTAL EARTH SCIENCES THE KNOW AND THE HOW

LOCATION:	Jerrys Plains	JOB No.	111029	TEST PIT LOG: TP124	LOGGED BY: J. Bray
EASTING:	299898.83	DRILL TYPE:	Backhoe		
NORTHING:	6411936.30	DATE STARTED:	19/4/2011	CLIENT: Hansen & Bailey	APPROVED: J. Hilliard
ELEVATION:		DATE FINISHED:	19/04/2011		

Sample: Disturbed; Undisturbed
Moisture: M=Moist D=Dry S=Saturated
Groundwater: Water Strike; Standing Water Level

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Depth (metres)	STRATIGRAPHY	GRAPHIC LOG	SAMPLES Type	Moisture	pH (Field)	PID (ppm)	Water Level	COMMENTS
0	(A1): Soft, dark yellowish brown (7.5YR3/6) LOAMY SAND with roots and fine grained sand			DM	5			
	(B1): Firm, yellowish brown (10YR5/6) LOAM			M	5.5			Clear, wavy boundary
.5	(B2): Firm, light yellowish brown (2.5YR6/4) SILTY CLAY LOAM with very fine quartz sand (<10%).			DM	7			Clear, wavy boundary
	(B2): Firm, yellowish brown (10YR5/4) SANDY CLAY LOAM, some grey mottling. Moderate pedality with 10-20mm polyhedral peds.			DM	7			Gradual, smooth boundary
1.5	(B3/C): Dense yellow/light grey SAND, with bands of darker grey mottling. Apedal.			D	8			Gradual, smooth boundary Weathered sandstone
2	End of Hole @ 1.8 metres (target depth).							

ENVIRONMENTAL EARTH SCIENCES THE KNOW AND THE HOW

LOCATION: Jerrys Plains	JOB No. 111029	TEST PIT LOG: TP125	LOGGED BY: J. Bray
EASTING: 299268.11	DRILL TYPE: Backhoe		
NORTHING: 6412538.82	DATE STARTED: 19/4/2011	CLIENT: Hansen & Bailey	APPROVED: J. Hilliard
ELEVATION:	DATE FINISHED: 19/04/2011		

Sample: Disturbed / Undisturbed
Moisture: M=Moist D=Dry S=Saturated
Groundwater: Water Strike / Standing Water Level

PAGE #: 1 / 1

Depth (metres)	STRATIGRAPHY	GRAPHIC LOG	SAMPLES Type	Moisture	pH (Field)	PID (ppm)	Water Level	COMMENTS
0	(A1): Soft, brown SILTY CLAY LOAM with roots, weak pedality.			DM	6			Gradual, smooth boundaries throughout
	(B1): Stiff, dark brown MEDIUM CLAY with very fine ironstone gravel. Strong pedality.			D	6			
	(B1): Stiff, dark brown (7.5YR3/2) HEAVY CLAY with minor vertical and diagonal cracks (<0.5 cm). Strong pedality.			DM	7			
.5	(B2): Firm, brown/dark red LIGHT MEDIUM CLAY with black mottles with white weathered sandstone in profile. Moderate pedality.			D	7			
1	Minor red ironstone with quartz sand (<10%) entering profile.							
1.5	(B2): Very stiff, yellowish brown (10YR5/6) HEAVY CLAY with black nodules (possibly manganese) and coarse ironstone sand (<5%). Strong pedality.			D	5			
2	End of Hole @ 2.0 metres (target depth).							

ENVIRONMENTAL EARTH SCIENCES
THE KNOW AND THE HOW

LOCATION: Jerrys Plains	JOB No. 111029	TEST PIT LOG: TP126		LOGGED BY: J. Bray
EASTING: 301463.72	DRILL TYPE: Backhoe			
NORTHING: 6410551.03	DATE STARTED: 20/04/2011	CLIENT: Hansen & Bailey		APPROVED: J. Hilliard
ELEVATION:	DATE FINISHED: 20/04/2011			

Sample: Disturbed / Undisturbed
Moisture: M=Moist D=Dry S=Saturated
Groundwater: Water Strike / Standing Water Level

PAGE #: 1/1

Depth (metres)	STRATIGRAPHY	GRAPHIC LOG	SAMPLES Type	Moisture	pH (Field)	PID (ppm)	Water Level	COMMENTS
0	(A1): Soft, very dark greyish brown (10YR3/2) SILTY LOAM with roots and minor cracks.			DM	7			
	(A2): Soft, dark brown (10YR3/3) SANDY LOAM with roots. Strong pedality with 10-50mm polyhedral peds.			D	6			Evidence of water leaching
.5	(B2): Firm red/brown LIGHT MEDIUM CLAY with grey mottles, and minor coarse sand, roots. Fine vertical cracks (<0.5cm). Moderate pedality with subangular peds.			D	7			Clear boundary
1	(B2): Very stiff, dark yellowish brown (10YR3/4) MEDIUM CLAY with grey mottles and roots. Strong pedality with 10-20mm polyhedral peds. Becoming slightly darker in colour			D	8			Roots no longer present
1.5	End of Hole @ 1.2 metres (bucket refusing on very stiff clay).							
2								

ENVIRONMENTAL EARTH SCIENCES THE KNOW AND THE HOW

LOCATION: Jerrys Plains	JOB No. 111029	TEST PIT LOG: TP127		LOGGED BY: J. Bray
EASTING: 301546.47	DRILL TYPE: Backhoe			
NORTHING: 6411268.18	DATE STARTED: 20/04/2011	CLIENT: Hansen & Bailey		APPROVED: J. Hilliard
ELEVATION:	DATE FINISHED: 20/04/2011			

Sample: Disturbed / Undisturbed
Moisture: M=Moist D=Dry S=Saturated
Groundwater: Water Strike / Standing Water Level

PAGE #: 1 / 1

Depth (metres)	STRATIGRAPHY	GRAPHIC LOG	SAMPLES Type	Moisture	pH (Field)	PID (ppm)	Water Level	COMMENTS
0	(A1): Firm, very dark brown (10YR2/2) LOAM with roots. Weak pedality with 5-10mm polyhedral peds.			D	7			Clear, smooth boundary
	(B1): Very stiff, very dark brown (7.5YR3/2) MEDIUM HEAVY CLAY with slightly lighter mottles, vertical cracking (<1cm). Strong pedality with 20-50mm polyhedral peds.			D	6			Cracks extend to the surface but decrease with height, likely due to surface compaction from livestock grazing
	(B2): Stiff, very dark greyish brown (10YR3/2) MEDIUM HEAVY CLAY with small roots and occasional red sandstone sand (<1%), vertical cracking (between 0.5 and 1.5cm). Strong pedality with 15-30mm polyhedral peds.			D	6			Clear, smooth boundary Cracking to 0.5m Very little root activity beyond 0.5m
.5	(B2): Very firm, red/brown MEDIUM CLAY with orange and red mottles to 0.6m. Strong pedality.			D	7			Abrupt, smooth boundary
1	Becoming browner							Diffuse, smooth boundary
	(B2): Stiff, strong brown (7.5YR4/6) MEDIUM CLAY with grey mottles and weathered brown/grey/red siltstone. Strong pedality with 5-30mm polyhedral peds.							
1.5				D	8			
	End of Hole @ 1.9 metres (target depth).							
2								

ENVIRONMENTAL EARTH SCIENCES THE KNOW AND THE HOW

LOCATION: Jerrys Plains	JOB No. 111029	TEST PIT LOG: TP128		LOGGED BY: J. Bray
EASTING: 300562.48	DRILL TYPE: Backhoe			
NORTHING: 6412696.32	DATE STARTED: 20/04/2011	CLIENT: Hansen & Bailey		APPROVED: J. Hilliard
ELEVATION:	DATE FINISHED: 20/04/2011			

Sample: Disturbed; Undisturbed
Moisture: M=Moist D=Dry S=Saturated
Groundwater: Water Strike; Standing Water Level

PAGE #: 1/1

Depth (metres)	STRATIGRAPHY	GRAPHIC LOG	SAMPLES Type	Moisture	pH (Field)	PID (ppm)	Water Level	COMMENTS
0	(A1): Soft, CLAY LOAM, with roots (10%). Weak pedality with polyhedral peds.			DM	6			Clear, smooth boundary
	(A2): Firm, brown-dark brown (7.5YR4/4) CLAY LOAM with roots (<2%) and sub-rounded peds.			D	7			Clear, smooth boundary
	(B2): Soft, brownish yellow (10YR6/6) SANDY CLAY LOAM, with fine gravel. Moderate pedality with 10-20mm polyhedral peds. Organic matter noted.			DM	7			Gradual, smooth boundary
.5	(B2): Soft yellow/light brown CLAY LOAM with very coarse sandstone gravel. Weak pedality.							
	Coarse gravel to 0.9m							
1								
	(B2): Very coarse orange GRAVEL with small sandstone cobbles. Apedal.							Diffuse, smooth boundary
1.5				D	7			
2	End of Hole @ 2.0 metres (target depth).							

ENVIRONMENTAL EARTH SCIENCES THE KNOW AND THE HOW

LOCATION: Jerrys Plains	JOB No. 111029	TEST PIT LOG: TP129		LOGGED BY: J. Bray
EASTING: 302006.96	DRILL TYPE: Backhoe			
NORTHING: 6414192.7	DATE STARTED: 20/04/2011	CLIENT: Hansen & Bailey		APPROVED: J. Hilliard
ELEVATION:	DATE FINISHED: 20/04/2011			

Sample: Disturbed / Undisturbed
Moisture: M=Moist D=Dry S=Saturated
Groundwater: Water Strike / Standing Water Level

PAGE #: 1 / 1

Depth (metres)	STRATIGRAPHY	GRAPHIC LOG	SAMPLES Type	Moisture	pH (Field)	PID (ppm)	Water Level	COMMENTS
0	(A1): Firm to stiff, very dark greyish brown (10YR3/2) MEDIUM CLAY with roots (5%) and occasional ironstone gravel (<1%). Strong pedality with 5-20mm polyhedral peds.			D	7.5			
				D	8			Clear, smooth boundary
	(A1): Very stiff, very dark brown (10YR2/2) MEDIUM HEAVY CLAY. Moderate pedality with 5-20mm polyhedral peds.							Clear, smooth boundary
	(B1): Stiff, dark brown (10YR3/3) HEAVY CLAY with dark grey mottles, angular peds, roots (<5%) and fine black sand. Strong pedality with 10-50mm polyhedral peds.			D	7			
.5								Abrupt, smooth boundary
	(B2): Stiff, dark brown (7.5YR3/4) HEAVY CLAY. Moderate pedality with 5-20mm polyhedral peds.			D	5			
	(B2): Grading to firm, strong brown (7.5YR4/6) HEAVY CLAY with grey and brown mottles and coarse red ironstone gravel.			DM	5.5			
1								Abrupt, smooth boundary
	(B2): Firm grey LIGHT CLAY with weathered grey/red siltstone that increases in content with depth. Moderate pedality.							
1.5				D	6			
2	End of Hole @ 2.0 metres (target depth).							

ENVIRONMENTAL EARTH SCIENCES THE KNOW AND THE HOW

LOCATION: Jerrys Plains	JOB No. 111029	TEST PIT LOG: TP130		LOGGED BY: J. Bray
EASTING: 301949.72	DRILL TYPE: Backhoe			
NORTHING: 6414689.32	DATE STARTED: 20/04/2011	CLIENT: Hansen & Bailey		APPROVED: J. Hilliard
ELEVATION:	DATE FINISHED: 20/04/2011			

Sample: Disturbed / Undisturbed
Moisture: M=Moist D=Dry S=Saturated
Groundwater: Water Strike / Standing Water Level

PAGE #: 1/1

Depth (metres)	STRATIGRAPHY	GRAPHIC LOG	SAMPLES Type	Moisture	pH (Field)	PID (ppm)	Water Level	COMMENTS
0	(A1): Soft, very dark brown (10YR2/2) CLAY LOAM with sub-rounded peds and roots.			DM	7			
	(B1): Very firm, very dark grey/black MEDIUM CLAY with roots (<5%) and fine ironstone gravel (<5%) and fine cracking. Moderate pedality.			D	6.5			Clear, wavy boundary
	(B2): Very firm, dark brown (10YR3/3) LIGHT CLAY with minor red mottles,black mottles and minor sand.			D	8			Clear, smooth boundary
.5	Black charcoal layer at 0.6m.							Gradual, smooth boundary
1	(B2): Firm, dark brown (10YR3/3) CLAY LOAM, sandy with pink/grey sandstone cobbles and some black/dark brown mottles. Moderate pedality with 5-20mm polyhedral peds.			DM	6			Clear, wavy boundary
1.5	(B2): Dark brown (10YR3/3) SANDY LOAM and cobbles becoming red in colour. Moderate pedality with 10-30mm polyhedral peds.			DM	8			
	End of Hole @ 1.8 metres (target depth).							
2								

ENVIRONMENTAL EARTH SCIENCES THE KNOW AND THE HOW

LOCATION: Jerrys Plains	JOB No. 111029	TEST PIT LOG: TP131		LOGGED BY: J. Bray
EASTING: 300622.12	DRILL TYPE: Backhoe			
NORTHING: 6410111.27	DATE STARTED: 20/04/2011	CLIENT: Hansen & Bailey		APPROVED: J. Hilliard
ELEVATION:	DATE FINISHED: 20/04/2011			

Sample: Disturbed / Undisturbed
Moisture: M=Moist D=Dry S=Saturated
Groundwater: Water Strike / Standing Water Level

PAGE #: 1 / 1

Depth (metres)	STRATIGRAPHY	GRAPHIC LOG	SAMPLES Type	Moisture	pH (Field)	PID (ppm)	Water Level	COMMENTS
0	(A1): Soft, very dark brown (10YR2/2) SILTY LOAM with yellow mottles and roots. Weak pedality with 10-30mm polyhedral peds.			DM	6			Clear, smooth boundary
	(B2): Medium dense, dark brown (10YR3/3) LOAMY SAND with dark brown mottles. Moderate pedality with 5-20mm polyhedral peds.			D	7			
.5	(C): Weathered grey SANDSTONE.			D	7			Clear, smooth boundary
1	End of Hole @ 1.0 metres (refusal in bedrock).							
1.5								
2								

ENVIRONMENTAL EARTH SCIENCES THE KNOW AND THE HOW

Test Pit Log

LOCATION: Jerry's Plains, NSW		**Test Pit Log:** TPA 1	**Logged by:** Daniel Robinson
SURFACE ELEVATION: ---	**JOB NUMBER: 612019**		
GROUNDWATER: none	**DATUM: ---**	**PROJECT:** DRAYTON SOUTH	**Proj. Manager:** Nicole Cheung
DRILL METHOD: Back hoe	**DATE DRILLED: 02/05/2012**		

STRATIGRAPHY	GRAPHIC LOG	Depth metres	SAMPLES				Moisture Content	PID/FID		pH		Comments
			Disturbed	Undisturbed	Lost	Duplicate		Background	Reading	pH - soil	pH - water	
A1: Firm, 10YR3/2, LIGHT MEDIUM CLAY, moderately pedal, angular/blocky peds, plant roots noted		0.10										
		0.20		■			D			6.0		Gradual boundary
B2.1: Firm, 10YR3/2, LIGHT MEDIUM CLAY, moderately pedal, cracked to <1cm diameter, blocky angular peds Grading lighter		0.30										
		0.40										Gradual boundary
B2.2: Very firm, 10YR4/4, MEDIUM CLAY, moderately pedal, subrounded quartz gravel, lenticular peds, slickensides present		0.50										
		0.60										
		0.70										
		0.80		■			M/D			8.5		
		0.90										
		1.00										Gradual boundary
B2.3: Very firm, 7.5YR3/4, MEDIUM CLAY, weakly pedal, polyhedral peds, subangular gravel, fine grains		1.10										
		1.20										
		1.30		■			M/D			8.5		
		1.40										
EOH at 1.4m		1.50										
		1.60										
		1.70										
		1.80										
		1.90										
		2.00										
		2.10										
		2.20										
		2.30										
		2.40										
		2.50										
		2.60										
		2.70										
		2.80										
		2.90										
		3.00										
		3.10										
		3.20										
		3.30										
		3.40										

NOTE: This bore log is for environmental purposes only and is not intended to provide geotechnical information.

Test Pit Log

LOCATION: Jerry's Plains, NSW		**Test Pit Log:** TPA 2	**Logged by:** Daniel Robinson
SURFACE ELEVATION: ---	**JOB NUMBER: 612019**		
GROUNDWATER: none	**DATUM: ---**	**PROJECT:** DRAYTON SOUTH	**Proj. Manager:** Nicole Cheung
DRILL METHOD: Back hoe	**DATE DRILLED: 02/05/2012**		

STRATIGRAPHY	GRAPHIC LOG	Depth metres	SAMPLES: Disturbed	SAMPLES: Undisturbed	SAMPLES: Lost	SAMPLES: Duplicate	Moisture Content	PID/FID: Background	PID/FID: Reading	pH: pH - soil	pH: pH - water	Comments
A1: Loose, 7.5YR4/4, CLAYEY SAND, apedal, fine grained sand, plant roots noted		0.10										
		0.20		■			M/D			5.5		
		0.30										Clear boundary
B2: Firm, 7.5YR5/6, SANDY CLAY, moderately pedal, polyhedral peds, subangular medium/coarse grained sand		0.40										
		0.50										
		0.60		■			M/D			5.5		
		0.70										
Becoming lighter		0.80										
		0.90										
		1.00										Gradual boundary
C: Weathered SANDSTONE, large pieces coarse grains		1.10										
		1.20										
		1.30										
		1.40		■			D			6.0		
		1.50										
		1.60										
		1.70										
		1.80										
		1.90										
		2.00										
EOH at 2.0m		2.10										
		2.20										
		2.30										
		2.40										
		2.50										
		2.60										
		2.70										
		2.80										
		2.90										
		3.00										
		3.10										
		3.20										
		3.30										
		3.40										

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Test Pit Log

LOCATION: Jerry's Plains, NSW		**Test Pit Log:** TPA 3	**Logged by:** Daniel Robinson
SURFACE ELEVATION: ---	**JOB NUMBER: 612019**		
GROUNDWATER: none	**DATUM: ---**	**PROJECT:** DRAYTON SOUTH	**Proj. Manager:** Nicole Cheung
DRILL METHOD: Back hoe	**DATE DRILLED: 02/05/2012**		

STRATIGRAPHY	GRAPHIC LOG	Depth metres	SAMPLES: Disturbed	SAMPLES: Undisturbed	SAMPLES: Lost	SAMPLES: Duplicate	Moisture Content	PID/FID: Background	PID/FID: Reading	pH: pH - soil	pH: pH - water	Comments
A1: Firm,10YR5/4, LIGHT MEDIUM CLAY, moderately pedal, polyhedral peds, plant roots noted		0.10		■			M/D			7.0		
		0.20										Gradual boundary
B1: Very firm, 7.5YR3/4, LIGHT MEDIUM CLAY, moderately pedal, lenticular peds, slickensides, subangular gravel (Fe Stone x Quartz, <0.3cm), white grainy inclusions to 0.7cm diameter		0.30										
		0.40										
		0.50		■			M/D			9.0		
		0.60										Cracking to 0.8m
		0.70										
		0.80										Gradual boundary
B2: Very firm, 10YR6/6, LIGHT MEDIUM CLAY, moderately pedal, angular peds, white platy inclusions, 0.5cm thick, 10cm long, red banding with angular gravel		0.90										
		1.00		■			M/D			8.5		
		1.10										
		1.20										
		1.30										Gradual boundary
C: Weathered SHALE		1.40		■			M/D			8.0		
		1.50										
		1.60										
		1.70										
		1.80										
		1.90										
		2.00										
EOH at 2.0m		2.10										
		2.20										
		2.30										
		2.40										
		2.50										
		2.60										
		2.70										
		2.80										
		2.90										
		3.00										
		3.10										
		3.20										
		3.30										
		3.40										

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Test Pit Log

LOCATION: Jerry's Plains, NSW		**Test Pit Log:** TPA 4	**Logged by:** Daniel Robinson
SURFACE ELEVATION: ---	**JOB NUMBER: 612019**		
GROUNDWATER: none	**DATUM: ---**	**PROJECT:** DRAYTON SOUTH	**Proj. Manager:** Nicole Cheung
DRILL METHOD: Back hoe	**DATE DRILLED: 02/05/2012**		

STRATIGRAPHY	GRAPHIC LOG	Depth metres	SAMPLES: Disturbed	SAMPLES: Undisturbed	SAMPLES: Lost	SAMPLES: Duplicate	Moisture Content	PID/FID: Background	PID/FID: Reading	pH: pH - soil	pH: pH - water	Comments
A1: Firm, 7.5YR3/2, LIGHT CLAY, moderately pedal, polyhedral peds, minor subrounded quartz gravel <0.2cm, plant roots noted		0.10		■			M/D			5.5		Gradual boundary
		0.20		■			D			6.5		Bleached appearance
A2: Soft, 7.5YR4/4, SANDY CLAY, weakly pedal, subrounded coarse sand grains		0.30										Clear boundary
		0.40										
B2: Very firm, 7.5YR4/6, SANDY CLAY, moderately pedal, angular/columnar peds, coarse subrounded sand grains, black inclusions present		0.50										
		0.60										
		0.70										
		0.80										
		0.90		■			M/D			5.0		
		1.00										
		1.10										
		1.20										
		1.30										
Increasing in black inclusions, metallic sheen, minor grey mottles appearing		1.40		■			M/D			5.0		
		1.50										
		1.60										
		1.70										
		1.80										
		1.90										
		2.00										
EOH at 2.0m		2.10										
		2.20										
		2.30										
		2.40										
		2.50										
		2.60										
		2.70										
		2.80										
		2.90										
		3.00										
		3.10										
		3.20										
		3.30										
		3.40										

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Test Pit Log

LOCATION: Jerry's Plains, NSW		Test Pit Log: TPA 6	Logged by: Daniel Robinson
SURFACE ELEVATION: ---	JOB NUMBER: 612019		
GROUNDWATER: none	DATUM: ---	PROJECT: DRAYTON SOUTH	Proj. Manager: Nicole Cheung
DRILL METHOD: Back hoe	DATE DRILLED: 02/05/2012		

STRATIGRAPHY	GRAPHIC LOG	Depth metres	SAMPLES: Disturbed	SAMPLES: Undisturbed	SAMPLES: Lost	SAMPLES: Duplicate	Moisture Content	PID/FID: Background	PID/FID: Reading	pH: pH - soil	pH: pH - water	Comments
A1: Firm, 7.5YR3/2,CLAY LOAM, weakly pedal, polyhedral granular peds, 5% quartz grains, plant roots noted		0.10		■			D			6.0		Gradual boundary
		0.20		■						8.0		Bleached appearance. Soapy feel
A2: 10YR5/3, LIGHT CLAY, weakly pedal, angular peds		0.30										Clear boundary
		0.40		■			D			8.0		
B2.1: Firm, 7.5YR3/2, LIGHT MEDIUM CLAY, lenticular peds, slickensides present, some organic matter, quartz gravel <0.5cm, subrounded gravel to 2cm, plant roots		0.50										Gradual boundary
		0.60					M/D					
		0.70										
B2.2: Firm, 10YR5/4, LIGHT MEDIUM CLAY, crumbly angular peds, moderately pedal, minor black inclusions, slickensides present		0.80										
		0.90										
		1.00		■			M/D			8.5		
		1.10										
		1.20										
		1.30										
		1.40										
		1.50										Gradual boundary
B2.3: Stiff, MEDIUM CLAY, moderately pedal, blocky angular peds, grey mottles, black round inclusions (Mn), 5% red banding <1cm		1.60										
		1.70		■			M/D			8.5		
		1.80										
		1.90										
		2.00										
EOH at 2.0m		2.10										
		2.20										
		2.30										
		2.40										
		2.50										
		2.60										
		2.70										
		2.80										
		2.90										
		3.00										
		3.10										
		3.20										
		3.30										
		3.40										

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Test Pit Log

LOCATION: Jerry's Plains, NSW		**Test Pit Log:** TPA 8	**Logged by:** Daniel Robinson
SURFACE ELEVATION: ---	**JOB NUMBER: 612019**		
GROUNDWATER: none	**DATUM: ---**	**PROJECT:** DRAYTON SOUTH	**Proj. Manager:** Nicole Cheung
DRILL METHOD: Back hoe	**DATE DRILLED: 02/05/2012**		

STRATIGRAPHY	GRAPHIC LOG	Depth metres	SAMPLES: Disturbed	SAMPLES: Undisturbed	SAMPLES: Lost	SAMPLES: Duplicate	Moisture Content	PID/FID: Background	PID/FID: Reading	pH: pH - soil	pH: pH - water	Comments
B2: Firm, 5YR4/6, LIGHT MEDIUM CLAY, moderately pedal, polyhedral/lenticular peds, slickensides present, plant roots noted, angular gravel Becoming lighter		0.10 0.20 0.30 0.40		■			M/D			8.0		
C: Yellow/pinkish white weathered SANDSTONE		0.50 0.60 0.70 0.80 0.90 1.00 1.10 1.20 1.30 1.40 1.50										Clear boundary
EOH at 1.5m		1.60 1.70 1.80 1.90 2.00 2.10 2.20 2.30 2.40 2.50 2.60 2.70 2.80 2.90 3.00 3.10 3.20 3.30 3.40										

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Test Pit Log

LOCATION: Jerry's Plains, NSW		**Test Pit Log:** TPA 9	**Logged by:** Daniel Robinson
SURFACE ELEVATION: ---	**JOB NUMBER: 612019**		
GROUNDWATER: none	**DATUM: ---**	**PROJECT:** DRAYTON SOUTH	**Proj. Manager:** Nicole Cheung
DRILL METHOD: Back hoe	**DATE DRILLED: 02/05/2012**		

STRATIGRAPHY	GRAPHIC LOG	Depth metres	SAMPLES: Disturbed	SAMPLES: Undisturbed	SAMPLES: Lost	SAMPLES: Duplicate	Moisture Content	PID/FID: Background	PID/FID: Reading	pH: pH - soil	pH: pH - water	Comments
A1: Soft, 10YR3/4, SANDY LOAM, weakly pedal, polyhedral peds , bioturbation, plant roots noted		0.10		■			D			5.5		
		0.20										Gradual boundary
A2: 7.5YR5/4, CLAYEY SAND, weakly pedal, polyhedral peds, medium quartz grains		0.30		■			M/D			5.0		A2 lighter than A1
		0.40										Clear boundary
B2: Firm, 5YR4/6, SANDY CLAY, neatly pedal, blocky peds, coarse sand grains		0.50		■			M/D			4.5		
		0.60										
		0.70										
		0.80										
		0.90										
		1.00										
		1.10										
		1.20										
		1.30										
		1.40										
		1.50										
		1.60										
		1.70										
		1.80										
		1.90										
Black inclusions		2.00										
		2.10										
		2.20										
		2.30										
		2.40										
		2.50										
		2.60										Gradual boundary
B2.3: Firm, 2Y5/4, SANDY CLAY, grey mottles		2.70		■			M/D			5.5		
		2.80										
		2.90										
		3.00										
		3.10		■			M/D			6.0		
EOH at 3.2m		3.20										
		3.30										
		3.40										

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APPENDIX D LAND CAPABILITY MAPPING RATIONALE

LSC Class	Land capable of a wide variety of landuses (cropping, grazing, horticulture, forestry, nature conservation)											
	Extremely high capability land: Land has no limitations. No special land management practices required. Land capable of all rural land uses and land management practices						**Very high capability land:** Land has slight limitations. These can be managed by readily available, easily implemented management practices. Land is capable of most land uses and land management practices, including intensive cropping with cultivation.					
LSC Class	1						2					
	Loams, clay loams or clays (all with >13%clays)	Slope <1% that are shorter than 500 m in length	Soil Sodicity/ Dispersivity	Salinity Hazard	Soil Acidification Hazard	Wind Erodibility Class	Loams, clay loams or clays (all with >13%clays)	Gradual slope 1-<3% that are shorter than 500 m in length	Soil Sodicity/ Dispersivity	Salinity Hazard	Soil Acidification Hazard	Wind Erodibility Class
MOTTLED AND PEDARIC BROWN SODOSOL COMPLEX												
TP103	>13% clay in B horizon so meets criteria	SE slope of 3% (Fail)	Strongly sodic. EAT of 1 (slakes - complete dispersion) (Class 5)	High recharge and discharge potential low salt store (Class 3)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 7.5 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so meets criteria	SE slope of 3% (Pass)	Strongly sodic. EAT of 1 (slakes - complete dispersion) (Class 5)	High recharge and discharge potential low salt store (Class 3)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 7.5 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP104	>13% clay in B horizon so meets criteria	SSE slope of 40% (Fail)	Non-sodic. EAT of 4 (slakes - no dispersion) (Class 3)	Moderate recharge and discharge potential low salt store (Class 1)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 7.7 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so meets criteria	SSE slope of 40% (Fail)	Non-sodic. EAT of 4 (slakes - no dispersion) (Class 3)	Moderate recharge and discharge potential low salt store (Class 1)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 7.7 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP107	>13% clay in B horizon so meets criteria	NW slope of 25% (Fail)	Marginally sodic to sodic. EAT of 4 (slakes - no dispersion) (Class 6)	Moderate recharge and discharge potential moderate salt store (Class 5)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 8.5 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so meets criteria	NW slope of 25% (Fail)	Marginally sodic to sodic. EAT of 4 (slakes - no dispersion) (Class 6)	Moderate recharge and discharge potential moderate salt store (Class 5)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 8.5 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP108	>13% clay in B horizon so meets criteria	NE slope of 15% (Fail)	Strongly sodic. EAT of 1 (slakes - complete dispersion) (Class 7)	Moderate recharge and discharge potential moderate salt store (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity pH of 6.4 - 8.5 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so meets criteria	NE slope of 15% (Fail)	Strongly sodic. EAT of 1 (slakes - complete dispersion) (Class 7)	Moderate recharge and discharge potential moderate salt store (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity pH of 6.4 - 8.5 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP110	>13% clay in B horizon so meets criteria	NNW slope of 10% (Fail)	Marginally sodic to sodic. EAT of 4 (slakes - no dispersion) (Class 6)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 8.5 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so meets criteria	NNW slope of 10% (Fail)	Marginally sodic to sodic. EAT of 4 (slakes - no dispersion) (Class 6)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 8.5 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP114	>13% clay in B horizon so meets criteria	WSW slope of 18% (Fail)	Strongly sodic. EAT of 2 (slakes - some dispersion) (Class 7)	Moderate recharge and discharge potential high salt store (Class 6)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 9.1 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so meets criteria	WSW slope of 18% (Fail)	Strongly sodic. EAT of 2 (slakes - some dispersion) (Class 7)	Moderate recharge and discharge potential high salt store (Class 6)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 9.1 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP115	>13% clay in B horizon so meets criteria	SW slope of 3% (Fail)	Strongly sodic. EAT of 1 (slakes - complete dispersion) (Class 7)	Moderate recharge and discharge potential moderate salt store (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 8.0 - 8.7 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so meets criteria	SW slope of 3% (Pass)	Strongly sodic. EAT of 1 (slakes - complete dispersion) (Class 7)	Moderate recharge and discharge potential moderate salt store (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 8.0 - 8.7 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP117	>13% clay in B horizon so meets criteria	NNW slope of 15% (Fail)	Field indication of soil dispersion	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 6.7 - 7.8 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so meets criteria	NNW slope of 15% (Fail)	Field indication of soil dispersion	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 6.7 - 7.8 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP118	>13% clay in B horizon so meets criteria	NW slope of 25% (Fail)	Non-sodic. EAT of 4 (slakes - no dispersion) (Class 3)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 8.6 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so meets criteria	NW slope of 25% (Fail)	Non-sodic. EAT of 4 (slakes - no dispersion) (Class 3)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 8.6 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)

LSC Class	Land capable of a wide variety of landuses (cropping, grazing, horticulture, forestry, nature conservation)						Land capable of a variety of land uses (cropping with restricted cultivation, pasture cropping, grazing, some horticulture, forestry, nature conservation)						Additional Comments	Land Capability
	High capability land: Land has moderate limitations and is capable of sustaining high-impact land uses, such as cropping with cultivation, using more intensive, readily available and widely accepted management practices. However, careful management of limitations is required for cropping and intensive grazing to avoid land and environmental degradation						**Moderate capability land:** Land has moderate to high limitations for high-impact land uses. Will restrict land management options for regular high-impact land uses such as cropping, high intensity grazing and horticulture. These limitations can only be managed by specialised management practices with a high level of knowledge, expertise, inputs, investment and technology							
LSC Class	3						4							
	Loams, clay loams or clays (all with >13%clays)	Slope 3-<10% that are longer than 500 m in length	Soil Sodicity/ Dispersivity	Salinity Hazard	Soil Acidification Hazard	Wind Erodibility Class	Fine sandy loams or sandy loams (all with 6-13% clay); also includes organic peats	Slope 10-<20%	Soil Sodicity/ Dispersivity	Salinity Hazard	Soil Acidification Hazard	Wind Erodibility Class		
MOTTLED AND PEDARIC BROWN SODOSOL COMPLEX														
TP103	>13% clay in B horizon so meets criteria	SE slope of 3% (Pass)	Strongly sodic. EAT of 1 (slakes - complete dispersion) (Class 5)	High recharge and discharge potential low salt store (Class 3)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 7.5 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	SE slope of 3% (Pass)	Strongly sodic. EAT of 1 (slakes - complete dispersion) (Class 5)	High recharge and discharge potential low salt store (Class 3)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 7.5 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)		5
TP104	>13% clay in B horizon so meets criteria	SSE slope of 40% (Fail)	Non-sodic. EAT of 4 (slakes - no dispersion) (Class 3)	Moderate recharge and discharge potential low salt store (Class 1)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 7.7 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	SSE slope of 40% (Fail)	Non-sodic. EAT of 4 (slakes - no dispersion) (Class 3)	Moderate recharge and discharge potential low salt store (Class 1)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 7.7 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)		7
TP107	>13% clay in B horizon so meets criteria	NW slope of 25% (Fail)	Marginally sodic to sodic. EAT of 4 (slakes - no dispersion) (Class 6)	Moderate recharge and discharge potential moderate salt store (Class 5)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 8.5 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	NW slope of 25% (Fail)	Marginally sodic to sodic. EAT of 4 (slakes - no dispersion) (Class 6)	Moderate recharge and discharge potential moderate salt store (Class 5)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 8.5 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	Some rill erosion noted nearby	6
TP108	>13% clay in B horizon so meets criteria	NE slope of 15% (Fail)	Strongly sodic. EAT of 1 (slakes - complete dispersion) (Class 7)	Moderate recharge and discharge potential moderate salt store (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity pH of 6.4 - 8.5 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	NE slope of 15% (Pass)	Strongly sodic. EAT of 1 (slakes - complete dispersion) (Class 7)	Moderate recharge and discharge potential moderate salt store (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity pH of 6.4 - 8.5 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)		7
TP110	>13% clay in B horizon so meets criteria	NNW slope of 10% (Pass)	Marginally sodic to sodic. EAT of 4 (slakes - no dispersion) (Class 6)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 8.5 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	NNW slope of 10% (Pass)	Marginally sodic to sodic. EAT of 4 (slakes - no dispersion) (Class 6)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 8.5 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)		6
TP114	>13% clay in B horizon so meets criteria	WSW slope of 18% (Fail)	Strongly sodic. EAT of 2 (slakes - some dispersion) (Class 7)	Moderate recharge and discharge potential high salt store (Class 6)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 9.1 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	WSW slope of 18% (Pass)	Strongly sodic. EAT of 2 (slakes - some dispersion) (Class 7)	Moderate recharge and discharge potential high salt store (Class 6)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 9.1 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	Rock outcropping to north and east of location	7
TP115	>13% clay in B horizon so meets criteria	SW slope of 3% (Pass)	Strongly sodic. EAT of 1 (slakes - complete dispersion) (Class 7)	Moderate recharge and discharge potential moderate salt store (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 8.0 - 8.7 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	SW slope of 3% (Pass)	Strongly sodic. EAT of 1 (slakes - complete dispersion) (Class 7)	Moderate recharge and discharge potential moderate salt store (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 8.0 - 8.7 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)		7
TP117	>13% clay in B horizon so meets criteria	NNW slope of 15% (Fail)	Field indication of soil dispersion	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 6.7 - 7.8 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	NNW slope of 15% (Pass)	Field indication of soil dispersion	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 6.7 - 7.8 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	Minor sheet erosion noted around location	5
TP118	>13% clay in B horizon so meets criteria	NW slope of 25% (Fail)	Non-sodic. EAT of 4 (slakes - no dispersion) (Class 3)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 8.6 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	NW slope of 25% (Fail)	Non-sodic. EAT of 4 (slakes - no dispersion) (Class 3)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 8.6 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	Large cobbles and outcropping rock so reduced capability	7

LSC Class	Land capable of a variety of land uses (cropping with restricted cultivation, pasture cropping, grazing some horticulture, forestry, nature conservation)						Land capable for a limited set of land uses (grazing, forestry and nature conservation, some horticulture)					
	Moderate-low capability land: Land has high limitations for high-impact land uses. Will largely restrict land use to grazing, some horticulture (orchards), forestry and nature conservation. The limitations need to be carefully managed to prevent long-term degradation						**Low capability land:** Land has very high limitations for high-impact land uses. Land use restricted to low-impact land uses such as grazing, forestry and nature conservation. Careful management of limitations is required to prevent severe land and environmental degradation					
LSC Class	5						6					
	Fine sandy loams or sandy loams (all with 6-13% clay); also includes organic peats	Slope 10-<20%	Soil Sodicity/ Dispersivity	Salinity Hazard	Soil Acidification Hazard	Wind Erodibility Class	Fine sandy loams or sandy loams (all with 6-13% clay); also includes organic peats	Slope 20-<33%	Soil Sodicity/ Dispersivity	Salinity Hazard	Soil Acidification Hazard	Wind Erodibility Class
MOTTLED AND PEDARIC BROWN SODOSOL COMPLEX												
TP103	>13% clay in B horizon so exceeds criteria	SE slope of 3% (Pass)	Strongly sodic. EAT of 1 (slakes - complete dispersion) (Class 5)	High recharge and discharge potential low salt store (Class 3)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 7.5 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	SE slope of 3% (Pass)	Strongly sodic. EAT of 1 (slakes - complete dispersion) (Class 5)	High recharge and discharge potential low salt store (Class 3)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 7.5 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP104	>13% clay in B horizon so exceeds criteria	SSE slope of 40% (Fail)	Non-sodic. EAT of 4 (slakes - no dispersion) (Class 3)	Moderate recharge and discharge potential low salt store (Class 1)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 7.7 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	SSE slope of 40% (Fail)	Non-sodic. EAT of 4 (slakes - no dispersion) (Class 3)	Moderate recharge and discharge potential low salt store (Class 1)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 7.7 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP107	>13% clay in B horizon so exceeds criteria	NW slope of 25% (Fail)	Marginally sodic to sodic. EAT of 4 (slakes - no dispersion) (Class 6)	Moderate recharge and discharge potential moderate salt store (Class 5)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 8.5 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	NW slope of 25% (Pass)	Marginally sodic to sodic. EAT of 4 (slakes - no dispersion) (Class 6)	Moderate recharge and discharge potential moderate salt store (Class 5)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 8.5 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP108	>13% clay in B horizon so exceeds criteria	NE slope of 15% (Pass)	Strongly sodic. EAT of 1 (slakes - complete dispersion) (Class 7)	Moderate recharge and discharge potential moderate salt store (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity pH of 6.4 - 8.5 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	NE slope of 15% (Pass)	Strongly sodic. EAT of 1 (slakes - complete dispersion) (Class 7)	Moderate recharge and discharge potential moderate salt store (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity pH of 6.4 - 8.5 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP110	>13% clay in B horizon so exceeds criteria	NNW slope of 10% (Pass)	Marginally sodic to sodic. EAT of 4 (slakes - no dispersion) (Class 6)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 8.5 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	NNW slope of 10% (Pass)	Marginally sodic to sodic. EAT of 4 (slakes - no dispersion) (Class 6)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 8.5 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP114	>13% clay in B horizon so exceeds criteria	WSW slope of 18% (Pass)	Strongly sodic. EAT of 2 (slakes - some dispersion) (Class 7)	Moderate recharge and discharge potential high salt store (Class 6)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 9.1 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	WSW slope of 18% (Pass)	Strongly sodic. EAT of 2 (slakes - some dispersion) (Class 7)	Moderate recharge and discharge potential high salt store (Class 6)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 9.1 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP115	>13% clay in B horizon so exceeds criteria	SW slope of 3% (Pass)	Strongly sodic. EAT of 1 (slakes - complete dispersion) (Class 7)	Moderate recharge and discharge potential moderate salt store (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 8.0 - 8.7 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	SW slope of 3% (Pass)	Strongly sodic. EAT of 1 (slakes - complete dispersion) (Class 7)	Moderate recharge and discharge potential moderate salt store (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 8.0 - 8.7 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP117	>13% clay in B horizon so exceeds criteria	NNW slope of 15% (Pass)	Field indication of soil dispersion	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 6.7 - 7.8 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	NNW slope of 15% (Pass)	Field indication of soil dispersion	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 6.7 - 7.8 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP118	>13% clay in B horizon so exceeds criteria	NW slope of 25% (Fail)	Non-sodic. EAT of 4 (slakes - no dispersion) (Class 3)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 8.6 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	NW slope of 25% (Pass)	Non-sodic. EAT of 4 (slakes - no dispersion) (Class 3)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 8.6 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)

LSC Class	Land generally incapable of agricultural land use (selective forestry and nature conservation)												Additional Comments	Land Capability
	Very low capability land: Land has severe limitations that restrict most land uses and generally cannot be overcome. On-site and off-site impacts of land management practices can be extremely severe if limitations not managed. There should be minimal disturbance of native vegetation						**Extremely low capability land:** Limitations are so severe that the land is incapable of sustaining any land use apart from nature conservation. There should be no disturbance of native vegetation							
LSC Class	7						8							
	Loamy sands or loose sands (all with <6% clay)	Slopes 33-<50%	Soil Sodicity/ Dispersivity	Salinity Hazard	Soil Acidification Hazard	Wind Erodibility Class	Loamy sands or loose sands (all with <6% clay)	Precipitous slopes of >50% and cliffs	Soil Sodicity/ Dispersivity	Salinity Hazard	Soil Acidification Hazard	Wind Erodibility Class		
MOTTLED AND PEDARIC BROWN SODOSOL COMPLEX														
TP103	>13% clay in B horizon so exceeds criteria	SE slope of 3% (Pass)	Strongly sodic. EAT of 1 (slakes - complete dispersion) (Class 5)	High recharge and discharge potential low salt store (Class 3)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 7.5 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	SE slope of 3% (Pass)	Strongly sodic. EAT of 1 (slakes - complete dispersion) (Class 5)	High recharge and discharge potential low salt store (Class 3)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 7.5 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)		5
TP104	>13% clay in B horizon so exceeds criteria	SSE slope of 40% (Pass)	Non-sodic. EAT of 4 (slakes - no dispersion) (Class 3)	Moderate recharge and discharge potential low salt store (Class 1)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 7.7 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	SSE slope of 40% (Pass)	Non-sodic. EAT of 4 (slakes - no dispersion) (Class 3)	Moderate recharge and discharge potential low salt store (Class 1)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 7.7 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)		7
TP107	>13% clay in B horizon so exceeds criteria	NW slope of 25% (Pass)	Marginally sodic to sodic. EAT of 4 (slakes - no dispersion) (Class 6)	Moderate recharge and discharge potential moderate salt store (Class 5)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 8.5 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	NW slope of 25% (Pass)	Marginally sodic to sodic. EAT of 4 (slakes - no dispersion) (Class 6)	Moderate recharge and discharge potential moderate salt store (Class 5)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 8.5 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	Some rill erosion noted nearby	6
TP108	>13% clay in B horizon so exceeds criteria	NE slope of 15% (Pass)	Strongly sodic. EAT of 1 (slakes - complete dispersion) (Class 7)	Moderate recharge and discharge potential moderate salt store (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity pH of 6.4 - 8.5 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	NE slope of 15% (Pass)	Strongly sodic. EAT of 1 (slakes - complete dispersion) (Class 7)	Moderate recharge and discharge potential moderate salt store (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity pH of 6.4 - 8.5 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)		7
TP110	>13% clay in B horizon so exceeds criteria	NNW slope of 10% (Pass)	Marginally sodic to sodic. EAT of 4 (slakes - no dispersion) (Class 6)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 8.5 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	NNW slope of 10% (Pass)	Marginally sodic to sodic. EAT of 4 (slakes - no dispersion) (Class 6)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 8.5 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)		6
TP114	>13% clay in B horizon so exceeds criteria	WSW slope of 18% (Pass)	Strongly sodic. EAT of 2 (slakes - some dispersion) (Class 7)	Moderate recharge and discharge potential high salt store (Class 6)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 9.1 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	WSW slope of 18% (Pass)	Strongly sodic. EAT of 2 (slakes - some dispersion) (Class 7)	Moderate recharge and discharge potential high salt store (Class 6)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 9.1 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	Rock outcropping to north and east of location	7
TP115	>13% clay in B horizon so exceeds criteria	SW slope of 3% (Pass)	Strongly sodic. EAT of 1 (slakes - complete dispersion) (Class 7)	Moderate recharge and discharge potential moderate salt store (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 8.0 - 8.7 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	SW slope of 3% (Pass)	Strongly sodic. EAT of 1 (slakes - complete dispersion) (Class 7)	Moderate recharge and discharge potential moderate salt store (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 8.0 - 8.7 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)		7
TP117	>13% clay in B horizon so exceeds criteria	NNW slope of 15% (Pass)	Field indication of soil dispersion	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 6.7 - 7.8 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	NNW slope of 15% (Pass)	Field indication of soil dispersion	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 6.7 - 7.8 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	Minor sheet erosion noted around location	5
TP118	>13% clay in B horizon so exceeds criteria	NW slope of 25% (Pass)	Non-sodic. EAT of 4 (slakes - no dispersion) (Class 3)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 8.6 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	NW slope of 25% (Pass)	Non-sodic. EAT of 4 (slakes - no dispersion) (Class 3)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 8.6 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	Large cobbles and outcropping rock so reduced capability	7

LSC Class	Land capable of a wide variety of landuses (cropping, grazing, horticulture, forestry, nature conservation)											
	Extremely high capability land: Land has no limitations. No special land management practices required. Land capable of all rural land uses and land management practices						**Very high capability land:** Land has slight limitations. These can be managed by readily available, easily implemented management practices. Land is capable of most land uses and land management practices, including intensive cropping with cultivation.					
LSC Class	1						2					
	Loams, clay loams or clays (all with >13%clays)	Slope <1% that are shorter than 500 m in length	Soil Sodicity/ Dispersivity	Salinity Hazard	Soil Acidification Hazard	Wind Erodibility Class	Loams, clay loams or clays (all with >13%clays)	Gradual slope 1-<3% that are shorter than 500 m in length	Soil Sodicity/ Dispersivity	Salinity Hazard	Soil Acidification Hazard	Wind Erodibility Class
MOTTLED AND PEDARIC BROWN SODOSOL COMPLEX												
TP120	>13% clay in B horizon so meets criteria	W slope of 28% (Fail)		Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 6.0 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so meets criteria	W slope of 28% (Fail)		Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 6.0 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP121	>13% clay in B horizon so meets criteria	W slope of 23% (Fail)	Marginally sodic to sodic. EAT of 4 (slakes - no dispersion) (Class 6)	Moderate recharge and discharge potential moderate salt store (Class 5)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 7.3 - 8.5 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so meets criteria	W slope of 23% (Fail)	Marginally sodic to sodic. EAT of 4 (slakes - no dispersion) (Class 6)	Moderate recharge and discharge potential moderate salt store (Class 5)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 7.3 - 8.5 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP122	>13% clay in B horizon so meets criteria	SW slope of 43% (Fail)	Non-sodic. EAT of 4 (slakes - no dispersion) (Class 3)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 7.2 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so meets criteria	SW slope of 43% (Fail)	Non-sodic. EAT of 4 (slakes - no dispersion) (Class 3)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 7.2 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP123	>13% clay in B horizon so meets criteria	SE slope of 33% (Fail)	EAT of 2 (slakes - some dispersion) (Class 6)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 8.3 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so meets criteria	SE slope of 33% (Fail)	EAT of 2 (slakes - some dispersion) (Class 6)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 8.3 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP125	>13% clay in B horizon so meets criteria	W slope of 13% (Fail)	Strongly sodic. EAT of 4 (slakes - no dispersion) (Class 6)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 6.8 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so meets criteria	W slope of 13% (Fail)	Strongly sodic. EAT of 4 (slakes - no dispersion) (Class 6)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 6.8 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP126	>13% clay in B horizon so meets criteria	NE slope of 25% (Fail)		Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 7.8 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so meets criteria	NE slope of 25% (Fail)		Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 7.8 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP127	>13% clay in B horizon so meets criteria	NE slope of 20% (Fail)	Strongly sodic. EAT of 4 (slakes - no dispersion) (Class 6)	Moderate recharge and discharge potential high salt store (Class 6)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 7.5 - 8.5 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so meets criteria	NE slope of 20% (Fail)	Strongly sodic. EAT of 4 (slakes - no dispersion) (Class 6)	Moderate recharge and discharge potential high salt store (Class 6)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 7.5 - 8.5 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP130	>13% clay in B horizon so meets criteria	SW slope of 30% (Fail)	EAT of 2 (slakes - some dispersion) (Class 6)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 7.0 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so meets criteria	SW slope of 30% (Fail)	EAT of 2 (slakes - some dispersion) (Class 6)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 7.0 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TPA2	>13% clay in B horizon so meets criteria	SW slope of 10% (Fail)	Field indication of soil dispersion	High recharge and discharge potential (Class 3)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 5.5 - 6.0 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so meets criteria	SW slope of 10% (Fail)	Field indication of soil dispersion	High recharge and discharge potential (Class 3)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 5.5 - 6.0 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)

LSC Class	Land capable of a wide variety of landuses (cropping, grazing, horticulture, forestry, nature conservation)						Land capable of a variety of land uses (cropping with restricted cultivation, pasture cropping, grazing, some horticulture, forestry, nature conservation)						Additional Comments	Land Capability
	High capability land: Land has moderate limitations and is capable of sustaining high-impact land uses, such as cropping with cultivation, using more intensive, readily available and widely accepted management practices. However, careful management of limitations is required for cropping and intensive grazing to avoid land and environmental degradation						**Moderate capability land:** Land has moderate to high limitations for high-impact land uses. Will restrict land management options for regular high-impact land uses such as cropping, high intensity grazing and horticulture. These limitations can only be managed by specialised management practices with a high level of knowledge, expertise, inputs, investment and technology							
LSC Class	3						4							
	Loams, clay loams or clays (all with >13%clays)	Slope 3-<10% that are longer than 500 m in length	Soil Sodicity/ Dispersivity	Salinity Hazard	Soil Acidification Hazard	Wind Erodibility Class	Fine sandy loams or sandy loams (all with 6-13% clay); also includes organic peats	Slope 10-<20%	Soil Sodicity/ Dispersivity	Salinity Hazard	Soil Acidification Hazard	Wind Erodibility Class		
MOTTLED AND PEDARIC BROWN SODOSOL COMPLEX														
TP120	>13% clay in B horizon so meets criteria	W slope of 28% (Fail)		Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 6.0 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	W slope of 28% (Fail)		Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 6.0 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	Gully and sheet erosion encountered on slopes around location	7
TP121	>13% clay in B horizon so meets criteria	W slope of 23% (Fail)	Marginally sodic to sodic. EAT of 4 (slakes - no dispersion) (Class 6)	Moderate recharge and discharge potential moderate salt store (Class 5)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 7.3 - 8.5 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	W slope of 23% (Fail)	Marginally sodic to sodic. EAT of 4 (slakes - no dispersion) (Class 6)	Moderate recharge and discharge potential moderate salt store (Class 5)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 7.3 - 8.5 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	Minor rill erosion noted around location	6
TP122	>13% clay in B horizon so meets criteria	SW slope of 43% (Fail)	Non-sodic. EAT of 4 (slakes - no dispersion) (Class 3)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 7.2 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	SW slope of 43% (Fail)	Non-sodic. EAT of 4 (slakes - no dispersion) (Class 3)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 7.2 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)		7
TP123	>13% clay in B horizon so meets criteria	SE slope of 33% (Fail)	EAT of 2 (slakes - some dispersion) (Class 6)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 8.3 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	SE slope of 33% (Fail)	EAT of 2 (slakes - some dispersion) (Class 6)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 8.3 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	Sheet erosion encountered around location	7
TP125	>13% clay in B horizon so meets criteria	W slope of 13% (Fail)	Strongly sodic. EAT of 4 (slakes - no dispersion) (Class 6)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 6.8 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	W slope of 13% (Pass)	Strongly sodic. EAT of 4 (slakes - no dispersion) (Class 6)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 6.8 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	Minor rill erosion encountered at and around location	6
TP126	>13% clay in B horizon so meets criteria	NE slope of 25% (Fail)		Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 7.8 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	NE slope of 25% (Fail)		Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 7.8 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	Heavily vegetated with no evidence of recent grazing	6
TP127	>13% clay in B horizon so meets criteria	NE slope of 20% (Fail)	Strongly sodic. EAT of 4 (slakes - no dispersion) (Class 6)	Moderate recharge and discharge potential high salt store (Class 6)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 7.5 - 8.5 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	NE slope of 20% (Pass)	Strongly sodic. EAT of 4 (slakes - no dispersion) (Class 6)	Moderate recharge and discharge potential high salt store (Class 6)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 7.5 - 8.5 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)		6
TP130	>13% clay in B horizon so meets criteria	SW slope of 30% (Fail)	EAT of 2 (slakes - some dispersion) (Class 6)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 7.0 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	SW slope of 30% (Fail)	EAT of 2 (slakes - some dispersion) (Class 6)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 7.0 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	Gully and sheet erosion encountered to north of location	6
TPA2	>13% clay in B horizon so meets criteria	SW slope of 10% (Pass)	Field indication of soil dispersion	High recharge and discharge potential (Class 3)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 5.5 - 6.0 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	SW slope of 10% (Pass)	Field indication of soil dispersion	High recharge and discharge potential (Class 3)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 5.5 - 6.0 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)		5

LSC Class	Land capable of a variety of land uses (cropping with restricted cultivation, pasture cropping, grazing, some horticulture, forestry, nature conservation)						Land capable for a limited set of land uses (grazing, forestry and nature conservation, some horticulture)					
	Moderate-low capability land: Land has high limitations for high-impact land uses. Will largely restrict land use to grazing, some horticulture (orchards), forestry and nature conservation. The limitations need to be carefully managed to prevent long-term degradation						**Low capability land:** Land has very high limitations for high-impact land uses. Land use restricted to low-impact land uses such as grazing, forestry and nature conservation. Careful management of limitations is required to prevent severe land and environmental degradation					
LSC Class	5						6					
	Fine sandy loams or sandy loams (all with 6-13% clay); also includes organic peats	Slope 10-<20%	Soil Sodicity/ Dispersivity	Salinity Hazard	Soil Acidification Hazard	Wind Erodibility Class	Fine sandy loams or sandy loams (all with 6-13% clay); also includes organic peats	Slope 20-<33%	Soil Sodicity/ Dispersivity	Salinity Hazard	Soil Acidification Hazard	Wind Erodibility Class
MOTTLED AND PEDARIC BROWN SODOSOL COMPLEX												
TP120	>13% clay in B horizon so exceeds criteria	W slope of 28% (Fail)		Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 6.0 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	W slope of 28% (Pass)		Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 6.0 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP121	>13% clay in B horizon so exceeds criteria	W slope of 23% (Fail)	Marginally sodic to sodic. EAT of 4 (slakes - no dispersion) (Class 6)	Moderate recharge and discharge potential moderate salt store (Class 5)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 7.3 - 8.5 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	W slope of 23% (Pass)	Marginally sodic to sodic. EAT of 4 (slakes - no dispersion) (Class 6)	Moderate recharge and discharge potential moderate salt store (Class 5)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 7.3 - 8.5 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP122	>13% clay in B horizon so exceeds criteria	SW slope of 43% (Fail)	Non-sodic. EAT of 4 (slakes - no dispersion) (Class 3)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 7.2 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	SW slope of 43% (Fail)	Non-sodic. EAT of 4 (slakes - no dispersion) (Class 3)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 7.2 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP123	>13% clay in B horizon so exceeds criteria	SE slope of 33% (Fail)	EAT of 2 (slakes - some dispersion) (Class 6)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 8.3 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	SE slope of 33% (Pass)	EAT of 2 (slakes - some dispersion) (Class 6)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 8.3 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP125	>13% clay in B horizon so exceeds criteria	W slope of 13% (Pass)	Strongly sodic. EAT of 4 (slakes - no dispersion) (Class 6)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 6.8 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	W slope of 13% (Pass)	Strongly sodic. EAT of 4 (slakes - no dispersion) (Class 6)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 6.8 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP126	>13% clay in B horizon so exceeds criteria	NE slope of 25% (Fail)		Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 7.8 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	NE slope of 25% (Pass)		Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 7.8 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP127	>13% clay in B horizon so exceeds criteria	NE slope of 20% (Pass)	Strongly sodic. EAT of 4 (slakes - no dispersion) (Class 6)	Moderate recharge and discharge potential high salt store (Class 6)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 7.5 - 8.5 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	NE slope of 20% (Pass)	Strongly sodic. EAT of 4 (slakes - no dispersion) (Class 6)	Moderate recharge and discharge potential high salt store (Class 6)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 7.5 - 8.5 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP130	>13% clay in B horizon so exceeds criteria	SW slope of 30% (Fail)	EAT of 2 (slakes - some dispersion) (Class 6)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 7.0 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	SW slope of 30% (Fail)	EAT of 2 (slakes - some dispersion) (Class 6)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 7.0 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TPA2	>13% clay in B horizon so exceeds criteria	SW slope of 10% (Pass)	Field indication of soil dispersion	High recharge and discharge potential (Class 3)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 5.5 - 6.0 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	SW slope of 10% (Pass)	Field indication of soil dispersion	High recharge and discharge potential (Class 3)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 5.5 - 6.0 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)

LSC Class	Land generally incapable of agricultural land use (selective forestry and nature conservation)												Additional Comments	Land Capability
	Very low capability land: Land has severe limitations that restrict most land uses and generally cannot be overcome. On-site and off-site impacts of land management practices can be extremely severe if limitations not managed. There should be minimal disturbance of native vegetation						**Extremely low capability land:** Limitations are so severe that the land is incapable of sustaining any land use apart from nature conservation. There should be no disturbance of native vegetation							
LSC Class	7						8							
	Loamy sands or loose sands (all with <6% clay)	Slopes 33-<50%	Soil Sodicity/ Dispersivity	Salinity Hazard	Soil Acidification Hazard	Wind Erodibility Class	Loamy sands or loose sands (all with <6% clay)	Precipitous slopes of >50% and cliffs	Soil Sodicity/ Dispersivity	Salinity Hazard	Soil Acidification Hazard	Wind Erodibility Class		
MOTTLED AND PEDARIC BROWN SODOSOL COMPLEX														
TP120	>13% clay in B horizon so exceeds criteria	W slope of 28% (Pass)		Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 6.0 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	W slope of 28% (Pass)		Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 6.0 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	Gully and sheet erosion encountered on slopes around location	7
TP121	>13% clay in B horizon so exceeds criteria	W slope of 23% (Pass)	Marginally sodic to sodic. EAT of 4 (slakes - no dispersion) (Class 6)	Moderate recharge and discharge potential moderate salt store (Class 5)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 7.3 - 8.5 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	W slope of 23% (Pass)	Marginally sodic to sodic. EAT of 4 (slakes - no dispersion) (Class 6)	Moderate recharge and discharge potential moderate salt store (Class 5)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 7.3 - 8.5 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	Minor rill erosion noted around location	6
TP122	>13% clay in B horizon so exceeds criteria	SW slope of 43% (Pass)	Non-sodic. EAT of 4 (slakes - no dispersion) (Class 3)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 7.2 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	SW slope of 43% (Pass)	Non-sodic. EAT of 4 (slakes - no dispersion) (Class 3)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 7.2 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)		7
TP123	>13% clay in B horizon so exceeds criteria	SE slope of 33% (Pass)	EAT of 2 (slakes - some dispersion) (Class 6)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 8.3 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	SE slope of 33% (Pass)	EAT of 2 (slakes - some dispersion) (Class 6)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 8.3 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	Sheet erosion encountered around location	7
TP125	>13% clay in B horizon so exceeds criteria	W slope of 13% (Pass)	Strongly sodic. EAT of 4 (slakes - no dispersion) (Class 6)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 6.8 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	W slope of 13% (Pass)	Strongly sodic. EAT of 4 (slakes - no dispersion) (Class 6)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 6.8 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	Minor rill erosion encountered at and around location	6
TP126	>13% clay in B horizon so exceeds criteria	NE slope of 25% (Pass)		Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 7.8 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	NE slope of 25% (Pass)		Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 7.8 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	Heavily vegetated with no evidence of recent grazing	6
TP127	>13% clay in B horizon so exceeds criteria	NE slope of 20% (Pass)	Strongly sodic. EAT of 4 (slakes - no dispersion) (Class 6)	Moderate recharge and discharge potential high salt store (Class 6)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 7.5 - 8.5 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	NE slope of 20% (Pass)	Strongly sodic. EAT of 4 (slakes - no dispersion) (Class 6)	Moderate recharge and discharge potential high salt store (Class 6)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 7.5 - 8.5 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)		6
TP130	>13% clay in B horizon so exceeds criteria	SW slope of 30% (Fail)	EAT of 2 (slakes - some dispersion) (Class 6)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 7.0 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	SW slope of 35% (Pass)	EAT of 2 (slakes - some dispersion) (Class 6)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 7.0 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	Gully and sheet erosion encountered to north of location	6
TPA2	>13% clay in B horizon so exceeds criteria	SW slope of 10% (Pass)	Field indication of soil dispersion	High recharge and discharge potential (Class 3)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 5.5 - 6.0 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	SW slope of 10% (Pass)	Field indication of soil dispersion	High recharge and discharge potential (Class 3)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 5.5 - 6.0 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)		5

ENVIRONMENTAL EARTH SCIENCES
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	Land capable of a wide variety of landuses (cropping, grazing, horticulture, forestry, nature conservation)											
	Extremely high capability land: Land has no limitations. No special land management practices required. Land capable of all rural land uses and land management practices						**Very high capability land:** Land has slight limitations. These can be managed by readily available, easily implemented management practices. Land is capable of most land uses and land management practices, including intensive cropping with cultivation.					
LSC Class	1						2					
	Loams, clay loams or clays (all with >13%clays)	**Slope <1% that are shorter than 500 m in length**	**Soil Sodicity/ Dispersivity**	**Salinity Hazard**	**Soil Acidification Hazard**	**Wind Erodibility Class**	**Loams, clay loams or clays (all with >13%clays)**	**Gradual slope 1-<3% that are shorter than 500 m in length**	**Soil Sodicity/ Dispersivity**	**Salinity Hazard**	**Soil Acidification Hazard**	**Wind Erodibility Class**
PEDARIC BROWN DERMOSOL COMPLEX												
TP102	>13% clay in B horizon so meets criteria	E slope of 12% (Fail)	Non-sodic. EAT of 4 (slakes - no dispersion) (Class 3)	High recharge and discharge potential low salt store (Class 3)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 8.2 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so meets criteria	E slope of 12% (Fail)	Non-sodic. EAT of 4 (slakes - no dispersion) (Class 3)	High recharge and discharge potential low salt store (Class 3)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 8.2 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP105	>13% clay in B horizon so meets criteria	NW slope of 30% (Fail)		Moderate recharge and discharge potential low salt store (Class 1)	Mean annual rainfall around 800mm high texture buffering capacity pH of 6.5 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so meets criteria	NW slope of 30% (Fail)		Moderate recharge and discharge potential low salt store (Class 1)	Mean annual rainfall around 800mm high texture buffering capacity pH of 6.5 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP113	>13% clay in B horizon so meets criteria	NE slope of 20% (Fail)	Marginally sodic to sodic. EAT of 2 (slakes - some dispersion) (Class 6)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 8.1 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so meets criteria	NE slope of 20% (Fail)	Marginally sodic to sodic. EAT of 2 (slakes - some dispersion) (Class 6)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 8.1 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP128	>13% clay in B horizon so meets criteria	NE slope of 45% (Fail)	Non-sodic. EAT of 8 (no slaking - does not swell) (Class 1)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 7.5 - 8.8 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so meets criteria	NE slope of 45% (Fail)	Non-sodic. EAT of 8 (no slaking - does not swell) (Class 1)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 7.5 - 8.8 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP129	>13% clay in B horizon so meets criteria	SW slope of 15% (Fail)	Strongly sodic (Class 7)	Moderate recharge and discharge potential moderate salt store (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 4.8 - 5.6 (no class)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so meets criteria	SW slope of 15% (Fail)	Strongly sodic (Class 7)	Moderate recharge and discharge potential moderate salt store (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 4.8 - 5.6 (no class)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TPA8	>13% clay in B horizon so meets criteria	NNW slope of 25% (Fail)	Field indication of soil dispersion	Moderate recharge and discharge potential (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 8.0 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so meets criteria	NNW slope of 25% (Fail)	Field indication of soil dispersion	Moderate recharge and discharge potential (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 8.0 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)

	Land capable of a wide variety of landuses (cropping, grazing, horticulture, forestry, nature conservation)						Land capable of a variety of land uses (cropping with restricted cultivation, pasture cropping, grazing, some horticulture, forestry, nature conservation)						**Additional Comments**	**Land Capability**
	High capability land: Land has moderate limitations and is capable of sustaining high-impact land uses, such as cropping with cultivation, using more intensive, readily available and widely accepted management practices. However, careful management of limitations is required for cropping and intensive grazing to avoid land and environmental degradation						**Moderate capability land:** Land has moderate to high limitations for high-impact land uses. Will restrict land management options for regular high-impact land uses such as cropping, high intensity grazing and horticulture. These limitations can only be managed by specialised management practices with a high level of knowledge, expertise, inputs, investment and technology							
LSC Class	3						4							
	Loams, clay loams or clays (all with >13%clays)	**Slope 3-<10% that are longer than 500 m in length**	**Soil Sodicity/ Dispersivity**	**Salinity Hazard**	**Soil Acidification Hazard**	**Wind Erodibility Class**	**Fine sandy loams or sandy loams (all with 6-13% clay); also includes organic peats**	**Slope 10-<20%**	**Soil Sodicity/ Dispersivity**	**Salinity Hazard**	**Soil Acidification Hazard**	**Wind Erodibility Class**		
PEDARIC BROWN DERMOSOL COMPLEX														
TP102	>13% clay in B horizon so meets criteria	E slope of 12% (Fail)	Non-sodic. EAT of 4 (slakes - no dispersion) (Class 3)	High recharge and discharge potential low salt store (Class 3)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 8.2 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	E slope of 12% (Pass)	Non-sodic. EAT of 4 (slakes - no dispersion) (Class 3)	High recharge and discharge potential low salt store (Class 3)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 8.2 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	Moderate erosion encountered around location particularly along drainage channels	**6**
TP105	>13% clay in B horizon so meets criteria	NW slope of 30% (Fail)		Moderate recharge and discharge potential low salt store (Class 1)	Mean annual rainfall around 800mm high texture buffering capacity pH of 6.5 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	NW slope of 30% (Fail)		Moderate recharge and discharge potential low salt store (Class 1)	Mean annual rainfall around 800mm high texture buffering capacity pH of 6.5 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	Some evidence of slumping and surface erosion at location	**6**
TP113	>13% clay in B horizon so meets criteria	NE slope of 20% (Fail)	Marginally sodic to sodic. EAT of 2 (slakes - some dispersion) (Class 6)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 8.1 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	NE slope of 20% (Pass)	Marginally sodic to sodic. EAT of 2 (slakes - some dispersion) (Class 6)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 8.1 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)		**6**
TP128	>13% clay in B horizon so meets criteria	NE slope of 45% (Fail)	Non-sodic. EAT of 8 (no slaking - does not swell) (Class 1)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 7.5 - 8.8 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	NE slope of 45% (Fail)	Non-sodic. EAT of 8 (no slaking - does not swell) (Class 1)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 7.5 - 8.8 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)		**7**
TP129	>13% clay in B horizon so meets criteria	SW slope of 15% (Fail)	Strongly sodic (Class 7)	Moderate recharge and discharge potential moderate salt store (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 4.8 - 5.6 (no class)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	SW slope of 15% (Pass)	Strongly sodic (Class 7)	Moderate recharge and discharge potential moderate salt store (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 4.8 - 5.6 (no class)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)		**7**
TPA8	>13% clay in B horizon so meets criteria	NNW slope of 25% (Fail)	Field indication of soil dispersion	Moderate recharge and discharge potential (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 8.0 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	NNW slope of 25% (Fail)	Field indication of soil dispersion	Moderate recharge and discharge potential (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 8.0 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)		**6**

	Land capable of a variety of land uses (cropping with restricted cultivation, pasture cropping, grazing, some horticulture, forestry, nature conservation)						Land capable for a limited set of land uses (grazing, forestry and nature conservation, some horticulture)					
	Moderate-low capability land: Land has high limitations for high-impact land uses. Will largely restrict land use to grazing, some horticulture (orchards), forestry and nature conservation. The limitations need to be carefully managed to prevent long-term degradation						**Low capability land:** Land has very high limitations for high-impact land uses. Land use restricted to low-impact land uses such as grazing, forestry and nature conservation. Careful management of limitations is required to prevent severe land and environmental degradation					
LSC Class	5						6					
	Fine sandy loams or sandy loams (all with 6-13% clay); also includes organic peats	**Slope 10-<20%**	**Soil Sodicity/ Dispersivity**	**Salinity Hazard**	**Soil Acidification Hazard**	**Wind Erodibility Class**	**Fine sandy loams or sandy loams (all with 6-13% clay); also includes organic peats**	**Slope 20-<33%**	**Soil Sodicity/ Dispersivity**	**Salinity Hazard**	**Soil Acidification Hazard**	**Wind Erodibility Class**
PEDARIC BROWN DERMOSOL COMPLEX												
TP102	>13% clay in B horizon so exceeds criteria	E slope of 12% (Pass)	Non-sodic. EAT of 4 (slakes - no dispersion) (Class 3)	High recharge and discharge potential low salt store (Class 3)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 8.2 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	E slope of 12% (Pass)	Non-sodic. EAT of 4 (slakes - no dispersion) (Class 3)	High recharge and discharge potential low salt store (Class 3)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 8.2 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP105	>13% clay in B horizon so exceeds criteria	NW slope of 30% (Fail)		Moderate recharge and discharge potential low salt store (Class 1)	Mean annual rainfall around 800mm high texture buffering capacity pH of 6.5 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	NW slope of 30% (Pass)		Moderate recharge and discharge potential low salt store (Class 1)	Mean annual rainfall around 800mm high texture buffering capacity pH of 6.5 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP113	>13% clay in B horizon so exceeds criteria	NE slope of 20% (Pass)	Marginally sodic to sodic. EAT of 2 (slakes - some dispersion) (Class 6)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 8.1 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	NE slope of 20% (Pass)	Marginally sodic to sodic. EAT of 2 (slakes - some dispersion) (Class 6)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 8.1 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP128	>13% clay in B horizon so exceeds criteria	NE slope of 45% (Fail)	Non-sodic. EAT of 8 (no slaking - does not swell) (Class 1)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 7.5 - 8.8 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	NE slope of 45% (Fail)	Non-sodic. EAT of 8 (no slaking - does not swell) (Class 1)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 7.5 - 8.8 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP129	>13% clay in B horizon so exceeds criteria	SW slope of 15% (Pass)	Strongly sodic (Class 7)	Moderate recharge and discharge potential moderate salt store (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 4.8 - 5.6 (no class)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	SW slope of 15% (Pass)	Strongly sodic (Class 7)	Moderate recharge and discharge potential moderate salt store (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 4.8 - 5.6 (no class)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TPA8	>13% clay in B horizon so exceeds criteria	NNW slope of 25% (Fail)	Field indication of soil dispersion	Moderate recharge and discharge potential (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 8.0 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	NNW slope of 25% (Pass)	Field indication of soil dispersion	Moderate recharge and discharge potential (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 8.0 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)

	Land generally incapable of agricultural land use (selective forestry and nature conservation)												**Additional Comments**	**Land Capability**
	Very low capability land: Land has severe limitations that restrict most land uses and generally cannot be overcome. On-site and off-site impacts of land management practices can be extremely severe if limitations not managed. There should be minimal disturbance of native vegetation						**Extremely low capability land:** Limitations are so severe that the land is incapable of sustaining any land use apart from nature conservation. There should be no disturbance of native vegetation							
LSC Class	7						8							
	Loamy sands or loose sands (all with <6% clay)	**Slopes 33-<50%**	**Soil Sodicity/ Dispersivity**	**Salinity Hazard**	**Soil Acidification Hazard**	**Wind Erodibility Class**	**Loamy sands or loose sands (all with <6% clay)**	**Precipitous slopes of >50% and cliffs**	**Soil Sodicity/ Dispersivity**	**Salinity Hazard**	**Soil Acidification Hazard**	**Wind Erodibility Class**		
PEDARIC BROWN DERMOSOL COMPLEX														
TP102	>13% clay in B horizon so exceeds criteria	E slope of 12% (Pass)	Non-sodic. EAT of 4 (slakes - no dispersion) (Class 3)	High recharge and discharge potential low salt store (Class 3)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 8.2 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	E slope of 12% (Pass)	Non-sodic. EAT of 4 (slakes - no dispersion) (Class 3)	High recharge and discharge potential low salt store (Class 3)	Mean annual rainfall around 800mm very high texture buffering capacity pH (water) of 8.2 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	Moderate erosion encountered around location particularly along drainage channels	**6**
TP105	>13% clay in B horizon so exceeds criteria	NW slope of 30% (Pass)		Moderate recharge and discharge potential low salt store (Class 1)	Mean annual rainfall around 800mm high texture buffering capacity pH of 6.5 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	NW slope of 30% (Pass)		Moderate recharge and discharge potential low salt store (Class 1)	Mean annual rainfall around 800mm high texture buffering capacity pH of 6.5 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	Some evidence of slumping and surface erosion at location	**6**
TP113	>13% clay in B horizon so exceeds criteria	NE slope of 20% (Pass)	Marginally sodic to sodic. EAT of 2 (slakes - some dispersion) (Class 6)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 8.1 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	NE slope of 20% (Pass)	Marginally sodic to sodic. EAT of 2 (slakes - some dispersion) (Class 6)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 8.1 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)		**6**
TP128	>13% clay in B horizon so exceeds criteria	NE slope of 45% (Pass)	Non-sodic. EAT of 8 (no slaking - does not swell) (Class 1)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 7.5 - 8.8 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	NE slope of 45% (Pass)	Non-sodic. EAT of 8 (no slaking - does not swell) (Class 1)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 7.5 - 8.8 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)		**7**
TP129	>13% clay in B horizon so exceeds criteria	SW slope of 15% (Pass)	Strongly sodic (Class 7)	Moderate recharge and discharge potential moderate salt store (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 4.8 - 5.6 (no class)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	SW slope of 15% (Pass)	Strongly sodic (Class 7)	Moderate recharge and discharge potential moderate salt store (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 4.8 - 5.6 (no class)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)		**7**
TPA8	>13% clay in B horizon so exceeds criteria	NNW slope of 25% (Pass)	Field indication of soil dispersion	Moderate recharge and discharge potential (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 8.0 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	NNW slope of 25% (Pass)	Field indication of soil dispersion	Moderate recharge and discharge potential (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 8.0 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)		**6**

LSC Class	Land capable of a wide variety of landuses (cropping, grazing, horticulture, forestry, nature conservation)					
	Extremely high capability land: Land has no limitations. No special land management practices required. Land capable of all rural land uses and land management practices					
	1					
	Loams, clay loams or clays (all with >13%clays)	Slope <1% that are shorter than 500 m in length	Soil Sodicity/ Dispersivity	Salinity Hazard	Soil Acidification Hazard	Wind Erodibility Class
BROWN VERTOSOL COMPLEX						
TP106	>13% clay in B horizon so meets criteria	SW slope of 5% (Fail)	Field indication of soil dispersion	High recharge and discharge potential low salt store (Class 3)	Mean annual rainfall around 800mm high texture buffering capacity pH of 7.2 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP109	>13% clay in B horizon so meets criteria	SW slope of 4% (Fail)	Strongly sodic. EAT of 4 (slakes - no dispersion) (Class 6)	High recharge and discharge potential moderate salt store (Class 6)	Mean annual rainfall around 800mm very high texture buffering capacity pH of 6.2 - 8.4 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP112	>13% clay in B horizon so meets criteria	NW slope of 10% (Fail)	Field indication of soil dispersion	High recharge and discharge potential low salt store (Class 3)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 6.0 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP119	>13% clay in B horizon so meets criteria	NW slope of 23% (Fail)		Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 6.5 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TPA1	>13% clay in B horizon so meets criteria	NE slope of 8% (Fail)	Field indication of soil dispersion	High recharge and discharge potential (Class 3)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 6.0 - 8.5 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TPA3	>13% clay in B horizon so meets criteria	N slope of 15% (Fail)	Field indication of soil dispersion	High recharge and discharge potential (Class 3)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 7.0 - 9.0 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TPA4	>13% clay in B horizon so meets criteria	NNW slope of 3% (Fail)	Field indication of soil dispersion	Moderate recharge and discharge potential (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 5.0 - 6.5 (No Class)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TPA6	>13% clay in B horizon so meets criteria	NNW slope of 10% (Fail)	Field indication of soil dispersion	Moderate recharge and discharge potential (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 6.0 - 8.5 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TPA9	>13% clay in B horizon so meets criteria	NNW slope of 1% (Pass)	Field indication of soil dispersion	Moderate recharge and discharge potential (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 4.5 - 6.0 (No Class)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)

LSC Class	Land capable of a wide variety of landuses (cropping, grazing, horticulture, forestry, nature conservation)					
	Very high capability land: Land has slight limitations. These can be managed by readily available, easily implemented management practices. Land is capable of most land uses and land management practices, including intensive cropping with cultivation.					
	2					
	Loams, clay loams or clays (all with >13%clays)	Gradual slope 1-<3% that are shorter than 500 m in length	Soil Sodicity/ Dispersivity	Salinity Hazard	Soil Acidification Hazard	Wind Erodibility Class
BROWN VERTOSOL COMPLEX						
TP106	>13% clay in B horizon so meets criteria	SW slope of 5% (Fail)	Field indication of soil dispersion	High recharge and discharge potential low salt store (Class 3)	Mean annual rainfall around 800mm high texture buffering capacity pH of 7.2 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP109	>13% clay in B horizon so meets criteria	SW slope of 4% (Fail)	Strongly sodic. EAT of 4 (slakes - no dispersion) (Class 6)	High recharge and discharge potential moderate salt store (Class 6)	Mean annual rainfall around 800mm very high texture buffering capacity pH of 6.2 - 8.4 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP112	>13% clay in B horizon so meets criteria	NW slope of 10% (Fail)	Field indication of soil dispersion	High recharge and discharge potential low salt store (Class 3)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 6.0 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP119	>13% clay in B horizon so meets criteria	NW slope of 23% (Fail)		Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 6.5 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TPA1	>13% clay in B horizon so meets criteria	NE slope of 8% (Fail)	Field indication of soil dispersion	High recharge and discharge potential (Class 3)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 6.0 - 8.5 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TPA3	>13% clay in B horizon so meets criteria	N slope of 15% (Fail)	Field indication of soil dispersion	High recharge and discharge potential (Class 3)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 7.0 - 9.0 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TPA4	>13% clay in B horizon so meets criteria	NNW slope of 3% (Pass)	Field indication of soil dispersion	Moderate recharge and discharge potential (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 5.0 - 6.5 (No Class)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TPA6	>13% clay in B horizon so meets criteria	NNW slope of 10% (Fail)	Field indication of soil dispersion	Moderate recharge and discharge potential (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 6.0 - 8.5 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TPA9	>13% clay in B horizon so meets criteria	NNW slope of 1% (Pass)	Field indication of soil dispersion	Moderate recharge and discharge potential (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 4.5 - 6.0 (No Class)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)

LSC Class	Land capable of a wide variety of landuses (cropping, grazing, horticulture, forestry, nature conservation)					
	High capability land: Land has moderate limitations and is capable of sustaining high-impact land uses, such as cropping with cultivation, using more intensive, readily available and widely accepted management practices. However, careful management of limitations is required for cropping and intensive grazing to avoid land and environmental degradation					
	3					
	Loams, clay loams or clays (all with >13%clays)	Slope 3-<10% that are longer than 500 m in length	Soil Sodicity/ Dispersivity	Salinity Hazard	Soil Acidification Hazard	Wind Erodibility Class
BROWN VERTOSOL COMPLEX						
TP106	>13% clay in B horizon so meets criteria	SW slope of 5% (Pass)	Field indication of soil dispersion	High recharge and discharge potential low salt store (Class 3)	Mean annual rainfall around 800mm high texture buffering capacity pH of 7.2 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP109	>13% clay in B horizon so meets criteria	SW slope of 4% (Pass)	Strongly sodic. EAT of 4 (slakes - no dispersion) (Class 6)	High recharge and discharge potential moderate salt store (Class 6)	Mean annual rainfall around 800mm very high texture buffering capacity pH of 6.2 - 8.4 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP112	>13% clay in B horizon so meets criteria	NW slope of 10% (Pass)	Field indication of soil dispersion	High recharge and discharge potential low salt store (Class 3)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 6.0 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP119	>13% clay in B horizon so meets criteria	NW slope of 23% (Fail)		Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 6.5 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TPA1	>13% clay in B horizon so meets criteria	NE slope of 8% (Pass)	Field indication of soil dispersion	High recharge and discharge potential (Class 3)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 6.0 - 8.5 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TPA3	>13% clay in B horizon so meets criteria	N slope of 15% (Fail)	Field indication of soil dispersion	High recharge and discharge potential (Class 3)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 7.0 - 9.0 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TPA4	>13% clay in B horizon so meets criteria	NNW slope of 3% (Pass)	Field indication of soil dispersion	Moderate recharge and discharge potential (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 5.0 - 6.5 (No Class)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TPA6	>13% clay in B horizon so meets criteria	NNW slope of 10% (Pass)	Field indication of soil dispersion	Moderate recharge and discharge potential (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 6.0 - 8.5 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TPA9	>13% clay in B horizon so meets criteria	NNW slope of 1% (Pass)	Field indication of soil dispersion	Moderate recharge and discharge potential (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 4.5 - 6.0 (No Class)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)

LSC Class	Land capable of a variety of land uses (cropping with restricted cultivation, pasture cropping, grazing, some horticulture, forestry, nature conservation)						Additional Comments	Land Capability
	Moderate capability land: Land has moderate to high limitations for high-impact land uses. Will restrict land management options for regular high-impact land uses such as cropping, high intensity grazing and horticulture. These limitations can only be managed by specialised management practices with a high level of knowledge, expertise, inputs, investment and technology							
	4							
	Fine sandy loams or sandy loams (all with 6-13% clay); also includes organic peats	Slope 10-<20%	Soil Sodicity/ Dispersivity	Salinity Hazard	Soil Acidification Hazard	Wind Erodibility Class		
BROWN VERTOSOL COMPLEX								
TP106	>13% clay in B horizon so exceeds criteria	SW slope of 5% (Pass)	Field indication of soil dispersion	High recharge and discharge potential low salt store (Class 3)	Mean annual rainfall around 800mm high texture buffering capacity pH of 7.2 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)		5
TP109	>13% clay in B horizon so exceeds criteria	SW slope of 4% (Pass)	Strongly sodic. EAT of 4 (slakes - no dispersion) (Class 6)	High recharge and discharge potential moderate salt store (Class 6)	Mean annual rainfall around 800mm very high texture buffering capacity pH of 6.2 - 8.4 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)		6
TP112	>13% clay in B horizon so exceeds criteria	NW slope of 10% (Pass)	Field indication of soil dispersion	High recharge and discharge potential low salt store (Class 3)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 6.0 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)		5
TP119	>13% clay in B horizon so exceeds criteria	NW slope of 23% (Fail)		Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 6.5 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)		6
TPA1	>13% clay in B horizon so exceeds criteria	NE slope of 8% (Pass)	Field indication of soil dispersion	High recharge and discharge potential (Class 3)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 6.0 - 8.5 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)		5
TPA3	>13% clay in B horizon so exceeds criteria	N slope of 15% (Pass)	Field indication of soil dispersion	High recharge and discharge potential (Class 3)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 7.0 - 9.0 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)		5
TPA4	>13% clay in B horizon so exceeds criteria	NNW slope of 3% (Pass)	Field indication of soil dispersion	Moderate recharge and discharge potential (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 5.0 - 6.5 (No Class)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)		5
TPA6	>13% clay in B horizon so exceeds criteria	NNW slope of 10% (Pass)	Field indication of soil dispersion	Moderate recharge and discharge potential (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 6.0 - 8.5 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)		5
TPA9	>13% clay in B horizon so exceeds criteria	NNW slope of 1% (Pass)	Field indication of soil dispersion	Moderate recharge and discharge potential (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 4.5 - 6.0 (No Class)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)		5

LSC Class	Land capable of a variety of land uses (cropping with restricted cultivation, pasture cropping, grazing, some horticulture, forestry, nature conservation)					
	Moderate-low capability land: Land has high limitations for high-impact land uses. Will largely restrict land use to grazing, some horticulture (orchards), forestry and nature conservation. The limitations need to be carefully managed to prevent long-term degradation					
	5					
	Fine sandy loams or sandy loams (all with 6-13% clay); also includes organic peats	Slope 10-<20%	Soil Sodicity/ Dispersivity	Salinity Hazard	Soil Acidification Hazard	Wind Erodibility Class
BROWN VERTOSOL COMPLEX						
TP106	>13% clay in B horizon so exceeds criteria	SW slope of 5% (Pass)	Field indication of soil dispersion	High recharge and discharge potential low salt store (Class 3)	Mean annual rainfall around 800mm high texture buffering capacity pH of 7.2 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP109	>13% clay in B horizon so exceeds criteria	SW slope of 4% (Pass)	Strongly sodic. EAT of 4 (slakes - no dispersion) (Class 6)	High recharge and discharge potential moderate salt store (Class 6)	Mean annual rainfall around 800mm very high texture buffering capacity pH of 6.2 - 8.4 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP112	>13% clay in B horizon so exceeds criteria	NW slope of 10% (Pass)	Field indication of soil dispersion	High recharge and discharge potential low salt store (Class 3)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 6.0 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP119	>13% clay in B horizon so exceeds criteria	NW slope of 23% (Fail)		Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 6.5 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TPA1	>13% clay in B horizon so exceeds criteria	NE slope of 8% (Pass)	Field indication of soil dispersion	High recharge and discharge potential (Class 3)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 6.0 - 8.5 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TPA3	>13% clay in B horizon so exceeds criteria	N slope of 15% (Pass)	Field indication of soil dispersion	High recharge and discharge potential (Class 3)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 7.0 - 9.0 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TPA4	>13% clay in B horizon so exceeds criteria	NNW slope of 3% (Pass)	Field indication of soil dispersion	Moderate recharge and discharge potential (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 5.0 - 6.5 (No Class)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TPA6	>13% clay in B horizon so exceeds criteria	NNW slope of 10% (Pass)	Field indication of soil dispersion	Moderate recharge and discharge potential (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 6.0 - 8.5 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TPA9	>13% clay in B horizon so exceeds criteria	NNW slope of 1% (Pass)	Field indication of soil dispersion	Moderate recharge and discharge potential (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 4.5 - 6.0 (No Class)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)

LSC Class	Land capable for a limited set of land uses (grazing, forestry and nature conservation, some horticulture)					
	Low capability land: Land has very high limitations for high-impact land uses. Land use restricted to low-impact land uses such as grazing, forestry and nature conservation. Careful management of limitations is required to prevent severe land and environmental degradation					
	6					
	Fine sandy loams or sandy loams (all with 6-13% clay); also includes organic peats	Slope 20-<33%	Soil Sodicity/ Dispersivity	Salinity Hazard	Soil Acidification Hazard	Wind Erodibility Class
BROWN VERTOSOL COMPLEX						
TP106	>13% clay in B horizon so exceeds criteria	SW slope of 5% (Pass)	Field indication of soil dispersion	High recharge and discharge potential low salt store (Class 3)	Mean annual rainfall around 800mm high texture buffering capacity pH of 7.2 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP109	>13% clay in B horizon so exceeds criteria	SW slope of 4% (Pass)	Strongly sodic. EAT of 4 (slakes - no dispersion) (Class 6)	High recharge and discharge potential moderate salt store (Class 6)	Mean annual rainfall around 800mm very high texture buffering capacity pH of 6.2 - 8.4 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP112	>13% clay in B horizon so exceeds criteria	NW slope of 10% (Pass)	Field indication of soil dispersion	High recharge and discharge potential low salt store (Class 3)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 6.0 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP119	>13% clay in B horizon so exceeds criteria	NW slope of 23% (Pass)		Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 6.5 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TPA1	>13% clay in B horizon so exceeds criteria	NE slope of 8% (Pass)	Field indication of soil dispersion	High recharge and discharge potential (Class 3)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 6.0 - 8.5 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TPA3	>13% clay in B horizon so exceeds criteria	N slope of 15% (Pass)	Field indication of soil dispersion	High recharge and discharge potential (Class 3)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 7.0 - 9.0 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TPA4	>13% clay in B horizon so exceeds criteria	NNW slope of 3% (Pass)	Field indication of soil dispersion	Moderate recharge and discharge potential (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 5.0 - 6.5 (No Class)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TPA6	>13% clay in B horizon so exceeds criteria	NNW slope of 10% (Pass)	Field indication of soil dispersion	Moderate recharge and discharge potential (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 6.0 - 8.5 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TPA9	>13% clay in B horizon so exceeds criteria	NNW slope of 1% (Pass)	Field indication of soil dispersion	Moderate recharge and discharge potential (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 4.5 - 6.0 (No Class)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)

LSC Class	Land generally incapable of agricultural land use (selective forestry and nature conservation)					
	Very low capability land: Land has severe limitations that restrict most land uses and generally cannot be overcome. On-site and off-site impacts of land management practices can be extremely severe if limitations not managed. There should be minimal disturbance of native vegetation					
	7					
	Loamy sands or loose sands (all with <6% clay)	Slopes 33-<50%	Soil Sodicity/ Dispersivity	Salinity Hazard	Soil Acidification Hazard	Wind Erodibility Class
BROWN VERTOSOL COMPLEX						
TP106	>13% clay in B horizon so exceeds criteria	SW slope of 5% (Pass)	Field indication of soil dispersion	High recharge and discharge potential low salt store (Class 3)	Mean annual rainfall around 800mm high texture buffering capacity pH of 7.2 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP109	>13% clay in B horizon so exceeds criteria	SW slope of 4% (Pass)	Strongly sodic. EAT of 4 (slakes - no dispersion) (Class 6)	High recharge and discharge potential moderate salt store (Class 6)	Mean annual rainfall around 800mm very high texture buffering capacity pH of 6.2 - 8.4 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP112	>13% clay in B horizon so exceeds criteria	NW slope of 10% (Pass)	Field indication of soil dispersion	High recharge and discharge potential low salt store (Class 3)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 6.0 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP119	>13% clay in B horizon so exceeds criteria	NW slope of 23% (Pass)		Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 6.5 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TPA1	>13% clay in B horizon so exceeds criteria	NE slope of 8% (Pass)	Field indication of soil dispersion	High recharge and discharge potential (Class 3)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 6.0 - 8.5 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TPA3	>13% clay in B horizon so exceeds criteria	N slope of 15% (Pass)	Field indication of soil dispersion	High recharge and discharge potential (Class 3)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 7.0 - 9.0 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TPA4	>13% clay in B horizon so exceeds criteria	NNW slope of 3% (Pass)	Field indication of soil dispersion	Moderate recharge and discharge potential (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 5.0 - 6.5 (No Class)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TPA6	>13% clay in B horizon so exceeds criteria	NNW slope of 10% (Pass)	Field indication of soil dispersion	Moderate recharge and discharge potential (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 6.0 - 8.5 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TPA9	>13% clay in B horizon so exceeds criteria	NNW slope of 1% (Pass)	Field indication of soil dispersion	Moderate recharge and discharge potential (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 4.5 - 6.0 (No Class)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)

LSC Class	Land generally incapable of agricultural land use (selective forestry and nature conservation)						Additional Comments	Land Capability
	Extremely low capability land: Limitations are so severe that the land is incapable of sustaining any land use apart from nature conservation. There should be no disturbance of native vegetation							
	8							
	Loamy sands or loose sands (all with <6% clay)	Precipitous slopes of >50% and cliffs	Soil Sodicity/ Dispersivity	Salinity Hazard	Soil Acidification Hazard	Wind Erodibility Class		
BROWN VERTOSOL COMPLEX								
TP106	>13% clay in B horizon so exceeds criteria	SW slope of 5% (Pass)	Field indication of soil dispersion	High recharge and discharge potential low salt store (Class 3)	Mean annual rainfall around 800mm high texture buffering capacity pH of 7.2 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)		5
TP109	>13% clay in B horizon so exceeds criteria	SW slope of 4% (Pass)	Strongly sodic. EAT of 4 (slakes - no dispersion) (Class 6)	High recharge and discharge potential moderate salt store (Class 6)	Mean annual rainfall around 800mm very high texture buffering capacity pH of 6.2 - 8.4 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)		6
TP112	>13% clay in B horizon so exceeds criteria	NW slope of 10% (Pass)	Field indication of soil dispersion	High recharge and discharge potential low salt store (Class 3)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 6.0 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)		5
TP119	>13% clay in B horizon so exceeds criteria	NW slope of 23% (Pass)		Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 6.5 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)		6
TPA1	>13% clay in B horizon so exceeds criteria	NE slope of 8% (Pass)	Field indication of soil dispersion	High recharge and discharge potential (Class 3)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 6.0 - 8.5 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)		5
TPA3	>13% clay in B horizon so exceeds criteria	N slope of 15% (Pass)	Field indication of soil dispersion	High recharge and discharge potential (Class 3)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 7.0 - 9.0 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)		5
TPA4	>13% clay in B horizon so exceeds criteria	NNW slope of 3% (Pass)	Field indication of soil dispersion	Moderate recharge and discharge potential (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 5.0 - 6.5 (No Class)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)		5
TPA6	>13% clay in B horizon so exceeds criteria	NNW slope of 10% (Pass)	Field indication of soil dispersion	Moderate recharge and discharge potential (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 6.0 - 8.5 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)		5
TPA9	>13% clay in B horizon so exceeds criteria	NNW slope of 1% (Pass)	Field indication of soil dispersion	Moderate recharge and discharge potential (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 4.5 - 6.0 (No Class)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)		5

ENVIRONMENTAL EARTH SCIENCES
THE KNOW AND THE HOW

	Land capable of a wide variety of landuses (cropping, grazing, horticulture, forestry, nature conservation)											
	Extremely high capability land: Land has no limitations. No special land management practices required. Land capable of all rural land uses and land management practices						**Very high capability land:** Land has slight limitations. These can be managed by readily available, easily implemented management practices. Land is capable of most land uses and land management practices, including intensive cropping with cultivation.					
LSC Class	**1**						**2**					
	Loams, clay loams or clays (all with >13%clays)	**Slope <1% that are shorter than 500 m in length**	**Soil Sodicity/ Dispersivity**	**Salinity Hazard**	**Soil Acidification Hazard**	**Wind Erodibility Class**	**Loams, clay loams or clays (all with >13%clays)**	**Gradual slope 1-<3% that are shorter than 500 m in length**	**Soil Sodicity/ Dispersivity**	**Salinity Hazard**	**Soil Acidification Hazard**	**Wind Erodibility Class**
ORTHIC TENOSOLS												
TP111	>13% clay in B horizon so meets criteria	NNE slope of 23% (Fail)	Strongly sodic. EAT of 2 (slakes - some dispersion) (Class 7)	Moderate recharge and discharge potentialhigh salt store (Class 6)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 8.6 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so meets criteria	NNE slope of 23% (Fail)	Strongly sodic. EAT of 2 (slakes - some dispersion) (Class 7)	Moderate recharge and discharge potentialhigh salt store (Class 6)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 8.6 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP116	>13% clay in B horizon so meets criteria	N slope of 25% (Fail)	Field indication of heavy soil disperion	Moderate recharge and discharge potential moderate salt store (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 6.2 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so meets criteria	N slope of 25% (Fail)	Field indication of heavy soil disperion	Moderate recharge and discharge potential moderate salt store (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 6.2 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP124	>13% clay in B horizon so meets criteria	W slope of 30% (Fail)		Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 6.9 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so meets criteria	W slope of 30% (Fail)		Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 6.9 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP131	>13% clay in B horizon so meets criteria	NNE slope of 60% (Fail)		Moderate recharge and discharge potential (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 6.0 - 7.0 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so meets criteria	NNE slope of 60% (Fail)		Moderate recharge and discharge potential (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 6.0 - 7.0 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)

	Land capable of a wide variety of landuses (cropping, grazing, horticulture, forestry, nature conservation)						Land capable of a variety of land uses (cropping with restricted cultivation, pasture cropping, grazing, some horticulture, forestry, nature conservation)						**Additional Comments**	**Land Capability**
	High capability land: Land has moderate limitations and is capable of sustaining high-impact land uses, such as cropping with cultivation, using more intensive, readily available and widely accepted management practices. However, careful management of limitations is required for cropping and intensive grazing to avoid land and environmental degradation						**Moderate capability land:** Land has moderate to high limitations for high-impact land uses. Will restrict land management options for regular high-impact land uses such as cropping, high intensity grazing and horticulture. These limitations can only be managed by specialised management practices with a high level of knowledge, expertise, inputs, investment and technology							
LSC Class	**3**						**4**							
	Loams, clay loams or clays (all with >13%clays)	**Slope 3-<10% that are longer than 500 m in length**	**Soil Sodicity/ Dispersivity**	**Salinity Hazard**	**Soil Acidification Hazard**	**Wind Erodibility Class**	**Fine sandy loams or sandy loams (all with 6-13% clay); also includes organic peats**	**Slope 10-<20%**	**Soil Sodicity/ Dispersivity**	**Salinity Hazard**	**Soil Acidification Hazard**	**Wind Erodibility Class**		
ORTHIC TENOSOLS														
TP111	>13% clay in B horizon so meets criteria	NNE slope of 23% (Fail)	Strongly sodic. EAT of 2 (slakes - some dispersion) (Class 7)	Moderate recharge and discharge potentialhigh salt store (Class 6)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 8.6 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	NNE slope of 23% (Fail)	Strongly sodic. EAT of 2 (slakes - some dispersion) (Class 7)	Moderate recharge and discharge potentialhigh salt store (Class 6)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 8.6 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	Rock outcropping immediately upgradient from location	**7**
TP116	>13% clay in B horizon so meets criteria	N slope of 25% (Fail)	Field indication of heavy soil disperion	Moderate recharge and discharge potential moderate salt store (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 6.2 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	N slope of 25% (Fail)	Field indication of heavy soil disperion	Moderate recharge and discharge potential moderate salt store (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 6.2 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)		**7**
TP124	>13% clay in B horizon so meets criteria	W slope of 30% (Fail)		Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 6.9 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	W slope of 30% (Fail)		Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 6.9 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)		**6**
TP131	>13% clay in B horizon so meets criteria	NNE slope of 60% (Fail)		Moderate recharge and discharge potential (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 6.0 - 7.0 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	NNE slope of 60% (Fail)		Moderate recharge and discharge potential (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 6.0 - 7.0 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)		**8**

	Land capable of a variety of land uses (cropping with restricted cultivation, pasture cropping, grazing, some horticulture, forestry, nature conservation)						Land capable for a limited set of land uses (grazing, forestry and nature conservation, some horticulture)					
	Moderate-low capability land: Land has high limitations for high-impact land uses. Will largely restrict land use to grazing, some horticulture (orchards), forestry and nature conservation. The limitations need to be carefully managed to prevent long-term degradation						**Low capability land:** Land has very high limitations for high-impact land uses. Land use restricted to low-impact land uses such as grazing, forestry and nature conservation. Careful management of limitations is required to prevent severe land and environmental degradation					
LSC Class	**5**						**6**					
	Fine sandy loams or sandy loams (all with 6-13% clay); also includes organic peats	**Slope 10-<20%**	**Soil Sodicity/ Dispersivity**	**Salinity Hazard**	**Soil Acidification Hazard**	**Wind Erodibility Class**	**Fine sandy loams or sandy loams (all with 6-13% clay); also includes organic peats**	**Slope 20-<33%**	**Soil Sodicity/ Dispersivity**	**Salinity Hazard**	**Soil Acidification Hazard**	**Wind Erodibility Class**
ORTHIC TENOSOLS												
TP111	>13% clay in B horizon so exceeds criteria	NNE slope of 23% (Fail)	Strongly sodic. EAT of 2 (slakes - some dispersion) (Class 7)	Moderate recharge and discharge potentialhigh salt store (Class 6)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 8.6 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	NNE slope of 23% (Pass)	Strongly sodic. EAT of 2 (slakes - some dispersion) (Class 7)	Moderate recharge and discharge potentialhigh salt store (Class 6)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 8.6 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP116	>13% clay in B horizon so exceeds criteria	N slope of 25% (Fail)	Field indication of heavy soil disperion	Moderate recharge and discharge potential moderate salt store (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 6.2 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	N slope of 25% (Pass)	Field indication of heavy soil disperion	Moderate recharge and discharge potential moderate salt store (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 6.2 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP124	>13% clay in B horizon so exceeds criteria	W slope of 30% (Fail)		Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 6.9 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	W slope of 30% (Pass)		Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 6.9 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)
TP131	>13% clay in B horizon so exceeds criteria	NNE slope of 60% (Fail)		Moderate recharge and discharge potential (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 6.0 - 7.0 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	NNE slope of 60% (Fail)		Moderate recharge and discharge potential (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 6.0 - 7.0 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)

	Land generally incapable of agricultural land use (selective forestry and nature conservation)												**Additional Comments**	**Land Capability**
	Very low capability land: Land has severe limitations that restrict most land uses and generally cannot be overcome. On-site and off-site impacts of land management practices can be extremely severe if limitations not managed. There should be minimal disturbance of native vegetation						**Extremely low capability land:** Limitations are so severe that the land is incapable of sustaining any land use apart from nature conservation. There should be no disturbance of native vegetation							
LSC Class	**7**						**8**							
	Loamy sands or loose sands (all with <6% clay)	**Slopes 33-<50%**	**Soil Sodicity/ Dispersivity**	**Salinity Hazard**	**Soil Acidification Hazard**	**Wind Erodibility Class**	**Loamy sands or loose sands (all with <6% clay)**	**Precipitous slopes of >50% and cliffs**	**Soil Sodicity/ Dispersivity**	**Salinity Hazard**	**Soil Acidification Hazard**	**Wind Erodibility Class**		
ORTHIC TENOSOLS														
TP111	>13% clay in B horizon so exceeds criteria	NNE slope of 23% (Pass)	Strongly sodic. EAT of 2 (slakes - some dispersion) (Class 7)	Moderate recharge and discharge potentialhigh salt store (Class 6)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 8.6 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	NNE slope of 23% (Pass)	Strongly sodic. EAT of 2 (slakes - some dispersion) (Class 7)	Moderate recharge and discharge potentialhigh salt store (Class 6)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 8.6 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	Rock outcropping immediately upgradient from location	**7**
TP116	>13% clay in B horizon so exceeds criteria	N slope of 25% (Pass)	Field indication of heavy soil disperion	Moderate recharge and discharge potential moderate salt store (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 6.2 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	N slope of 25% (Pass)	Field indication of heavy soil disperion	Moderate recharge and discharge potential moderate salt store (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 6.2 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)		**7**
TP124	>13% clay in B horizon so exceeds criteria	W slope of 30% (Pass)		Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 6.9 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	W slope of 30% (Pass)		Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 6.9 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)		**6**
TP131	>13% clay in B horizon so exceeds criteria	NNE slope of 60% (Fail)		Moderate recharge and discharge potential (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 6.0 - 7.0 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in B horizon so exceeds criteria	NNE slope of 60% (Pass)		Moderate recharge and discharge potential (Class 5)	Mean annual rainfall around 800mm high texture buffering capacity field pH of 6.0 - 7.0 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)		**8**