DRAYTON SOUTH



Soil and Land Capability Impact Assessment



REPORT NO.

612019

SOIL AND LAND CAPABILITY IMPACT ASSESSMENT, DRAYTON SOUTH COAL PROJECT

ENVIRONMENTAL EARTH SCIENCES NSW REPORT TO HANSEN BAILEY OCTOBER 2012 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.



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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).

Month		ily Temp C)	Mean Rainfall	Mean Rain		Relative dity (%)		Wind (km/hr)
	Min	Max	(mm)	Days (>1mm)	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
Мау	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

TADLE I AVERAGE CLIWATIC STATISTICS DI DUW FRUW 1004 TO 2011	TABLE 1	AVERAGE CLIMATIC STATISTICS BY BOM FROM 1884 TO 2011
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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 km² (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.



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	-	-

TABLE 2 VEGETATION COMMUNITIES WITHIN THE STUDY AREA

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.

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)

TABLE 3 SOIL PROFILE DESCRIPTION PARAMETERS

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.







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.

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		

TABLE 4SOIL SAMPLES SELECTED FOR LABORATORY ANALYSIS

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 5ANALYTICAL RATIONALE

Test	Application	Justification
рН	Nutrient availability, nutrient fixation, toxicities (AI, 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 6SOIL TYPES

Soil Type	ASC Soil Name	Project Soil Name	Area (%)	Area (ha)
1a	Pedaric Subnatric Brown Sodosol			
1b	Pedaric Mesonatric Brown Sodosol	Mottled and Pedaric Brown Sodosol	E4 7	0.540
1c	Pedaric Hypernatric Brown Sodosol	Complex	54.7	2,513
1d	Mottled Subnatric Brown Sodosol			
2a	Pedaric Brown Dermosol			
2b	Pedaric Sodic Brown Dermosol	Pedaric Brown Dermosol Complex	25.5	1,174
2c	Pedaric Acid Sodic Brown Dermosol			
3a	Massive Brown Vertosol		45.5	740
3b	Epipedal Brown Vertosol	Brown Vertosol Complex	15.5	712
4a	Orthic Tenosol			
4b	Bleached Orthic Tenosol	Orthic Tenosols	4.3	198
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).



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	Emerso	Emerson Aggregate Test			₫.	article (size Dis	tributio	Particle Size Distribution (% passing through sieve mm)	issing t	hrough	sieve r	(mr		
		ш			mg/kg	dS/m		MEQ%	MEQ%		Class	Classification	200	75	63	37.5 2	26.5 1	19 13.2	2 9.5	5 6.7	4.75	2.36	1.18	0.6	0.425
	Dodario		9	7.5	250	1.68	Non-saline						100	100	100	100	100 10	100 100	00 100	0 100	100	100	98.6	97.2	96
TP103	Hypernatric Brown Sodosol	0.3	~ ~					20.5	37.1	Strongly sodic	-	Slakes – complete dispersion	100	100	100	100 1	100 10	100 98.	9 97	9.76 97.5	5 97.2	96.2	94.8	93.5	92.6
			ဆထ															-							
			5.5 6																						
TP104	Pedaric Subnatric Brown Sodosol	0.4		7.7	29	1.12	Non-saline	20.7	5.6	Non-sodic	4	Slakes – no dispersion (carbonate or gypsum present)	100	100	100	100	100 10	100 100	00 100	100	100	100	99.8	98.7	96.9
			с – –																						
TP107	Pedaric Subnatric Brown	0.1	1 Q C	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 10	100 100	100	100	100	100	98.7	97.4	96.1
	SOGOSOI		~ 8													+		+	+						
			∞ α												+	+	+	+							
			5.5	6.4	51	0.638	3 Non-saline																		
TP108	Pedaric Hypernatric Brown	0.2	2	8.5	1,020	6.64	Moderately saline	18.2	26.1	Strongly sodic	-	Slakes – complete dispersion	100	100	100	100 1	100 10	100 100	66	8	98.5	97.4	95.9	94.6	93.4
	Sodosol		∞ ∞ ∝										100	100	100	100 1	100 94	94.2 94.2	92.	9 92.8	3 91.8	89.6	87.3	85.3	84.5
			8	8.5	52	1.44	Non-saline																		
ТР110	Pedaric Subnatric Brown Sodosol	0.1	∞ ∞					19.1	6.3	Marginally sodic to sodic	4	Slakes – No dispersion (carbonate or gypsum present)	100	100	100	100	100 10	100 100	97	.5 94.9	91.9	86.5	79.6	71.9	68.2
	-										2	Slakes – some dispersion	100	100	100	100	100 10	100 10	100 100	0 100	100	100	98.5	95.1	91.3
TP114	Nuottled Subnatric Brown Sodosol	0.1		9.1	1,150	8.55	Very saline	21	6. 8.	Strongly sodic	4	Slakes – No dispersion (carbonate or gypsum present)	100	100	100	100	100 10	100 100	00 100	66	6.09.7	99.2	98.8	97.8	96.8
			5	0	7		Noo coilco col						100	100	100	100	100	100 100	66	8	1 98.1	96.5	95.2	93.5	92.1
TP115	Subnatric Brown Sodosol	0.4	റെ	8.7	570	4.72		20.3	14.5	Strongly sodic	-	Slakes – complete dispersion	100	100	100	100 1	100 10	100 10	100 100	0 100	100	100	99.1	67	94.9
TD117			_																_						

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	0.425	98.2		87.5			93.7	85.7		86.1		92.9	94.8	95.6	84.2	96.5	
	9.0	98.6		93.5			96.3	88.5		95.5		95.5	95.5	97.8	85.8	98.1	
Ê	1.18	99.2		98.3			98.9	92.8		99.1		97.6	96.5	99.6	88.4	99.3	
ieve m	2.36	99.6		99.8			100	96.6		99.7		98.1	97.8	100	91.1	100	
ngh si	4.75	99.8		100			100	98.5		6.66		99.3	98.5	100	98.4	100	
ng thro	6.7	99.9		100			100	99.2		100		99.8	98.9	100	100	100	
passi	9.5	100		100			100	99.8		100		100	99.5	100	100	100	
tion (%	13.2	100		100			100	100		100		100	100	100	100	100	
Particle Size Distribution (% passing through sieve mm)	19	100		100			100	100		100		100	100	100	100	100	
Size D	26.5	100		100			100	100		100		100	100	100	100	100	
article	37.5	100		100			100	100		100		100	100	100	100	100	
<u>a</u>	63	100		100			100	100		100		100	100	100	100	100	
	75	100		100			100	100		100		100	100	100	100	100	
	200	100		100			100	100		100		100	100	100	100	100	
Emerson Aggregate Test	Classification			Slakes – No dispersion (carbonate or gypsum present)			Slakes – No dispersion (carbonate or gypsum present)			Slakes – No dispersion (carbonate or gypsum present)			Slakes-some dispersion		Slakes – No dispersion (carbonate or gypsum present)		
Emerso	Class			4			4			4			2		4		
Soil Sodicity				Non-sodic			Marginally sodic to sodic	Marginally sodic to sodic		Non-sodic					Strongly sodic		
Exchangeable Sodium Percentage	MEQ%			ë.			8	8.6		2.7					23.2		
Cation Exchange Capacitv	MEQ%			15.7			24.1	24.4		20.2					26.7		
Soil Salinity Class		Non-saline		Non-saline	Non-saline	a solution and a solu	Moderately saline		Non-saline			Non-saline		Non-saline		Non-saline	Moderately saline
ECe	dS/m	1.14		1.36	0.81	0	2.82		1.2			1.7		1.89		0.72	2.16
Chloride	mg/kg	68		100	22	ç	230		65			110		66		30	170
Lab PH		7.8		8.6	6.2	C	8.5		7.2			8.3		6.8		7.8	7.5
Field pH		6 7 7.5	7 6.5	6 7 5	5.5 5.5 6 6 7 7 7	6.5 7	~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~	œ	6	~ ~ ~	، ص ه	9 0 1	~ ∞	9 9	2 2	0 / 0	6 6
A Horizon Thickness	٤			0.3	0.1		0.3			0.1		0.1			0.1	0.1	0.1
ASC Inferred Classification		Subnatric Brown Sodosol		Pedaric Subnatric Brown Sodosol	Pedaric Subnatric Brown Sodosol		Pedaric Subnatric Brown Sodosol			Pedaric Subnatric Brown Sodosol		Pedaric Mesonatric Brown	Sodosol		Pedaric Mesonatric Brown Sodosol	Pedaric Subnatric Brown	Pedaric Mesonatric Brown
Sample Location				TP118	TP120		ТР121			TP122		TP123			TP125	TP126	ТР127

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	sification	Classification Thickness pH	Field pH	Lab pH	Chloride	ECe	Salinity Class	Exchange Capacity	Percentage	Soil Sodicity	Emers	Emerson Aggregate Test				Particle Size Distribution (% passing through sieve mm)	Size D	istribut	ion (%	passir	ig throi	ugh sie	eve mm	(1		
		E			mg/kg	dS/m		MEQ%	MEQ%		Class	Classification 200	200	75	63	37.5	26.5	19 1	3.2	9.5	6.7 4.75 2.36 1.18 0.6	4.75 2	2.36	1.18		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	98.8	98.3
			œ									(100	100	100	100	100	100	100	100	100 5	99.7 5	98.6	96.8	94.4	93.4
			7																							
- (Mottled		6.5	7.0	24	0.595	0.595 Non-saline	16.3	3.5	Non-sodic	80	No slaking – does not swell	100	100	100 100	100	100	100 100	100	100	100	100	100	97.8 92.5	92.5	87.6
TP130	Drawn	0.1	œ																							
	Sodosol		(0	Slakes –														
			9								2	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 midslopes 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).



Exercise Monorational behavioral beh	TABLE 8		RIC BROW	N DE	RMO	sol co	MPLE	PEDARIC BROWN DERMOSOL COMPLEX ANALYTICAL SUMMARY	ICAL SUM	IMARY																
$ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \$	Sample Location			Field pH		Chloride			Cation Exchange Capacity	Exchangeable Sodium Percentage	Soil Sodicity	Emerse	on Aggregate Test				Particle	Size Di	istribut	ion (%	oassinç	through	gh sieve	(mm a		
Beatric Brown Demosion Beatric Brown Beatric Brown Beatric Brown Beatric Brow Beatric Brown Bea			E			mg/kg	dS/m		MEQ%	MEQ%		Class	Classification		75	63		26.5								
Peteriction 0 1 0 1 0 1 0 1 0 1 0 0 0				9																						
Pedatro Boundation 7				£																						
Pedato Bound 0.3 Tables-No 0.3 States-No 0 10 <t< td=""><td></td><td></td><td></td><td>2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>				2																						
Pedatic Brown 0.1 0 0.2 0.4 Non-alline 0 0 0 0<	TP102	Pedaric Brown Dermosol	0.3	7	8.2	37	0.88	Non-saline	17.2	1.7	Non-sodic	4	Slakes – No dispersion (carbonate or gypsum present)													
Pedatic brown 0-1 6 6. 6. 7. 0.4 1				5																						
Demosol 0 6 1 </td <td>TD105</td> <td>Pedaric Brown</td> <td>·</td> <td>9</td> <td>6.5</td> <td>42</td> <td>0.48</td> <td>Non-saline</td> <td></td>	TD105	Pedaric Brown	·	9	6.5	42	0.48	Non-saline																		
		Dermosol	0	9																						
E I				9																						
Pedatricoli 0.1 1.10 1.36 Non-salite 19.9 8.5 Marginally sodic 2 Slakes- sodic 100				2																						
Demosol 7 N </td <td>TP113</td> <td>Pedaric Sodic Brown</td> <td>0.1</td> <td>9</td> <td>8.1</td> <td>110</td> <td>1.36</td> <td>Non-saline</td> <td>19.9</td> <td>8.5</td> <td>Marginally sodic to sodic</td> <td>2</td> <td>Slakes – some dispersion</td> <td>100</td> <td></td>	TP113	Pedaric Sodic Brown	0.1	9	8.1	110	1.36	Non-saline	19.9	8.5	Marginally sodic to sodic	2	Slakes – some dispersion	100												
7 0 1 0		Dermosol		7																						
Betaint: Solic Pedantic Solic Brown C 46 7.1 Non-saline 11.1 Non-saline 11.3 No.slating- 10 100 <				7																						
Pedatrcsolic Brown 0.3 7 46 1.17 Non-saline 11.9 0.5 Non-saline 10 100 1				œ																						
Dermosol 7 8.8 18 0.9 Non-saline A 7 8.8 18 0.9 Non-saline A A 7 7.5 8 18 0.9 Non-saline A 8 7 7.5 1 1 A A 8 7 5 4.8 1,420 7.35 Moderately 20.0 13.0 9 5.5 4.8 1,420 7.35 Saline A 13.0 6 5.6 660 3.78 Saline 20.0 13.0	TP128	Pedaric Sodic Brown	0.3	9	7.5	46	1.17	Non-saline	11.9	0.5	Non-sodic	80	No slaking – does not swell													
7 7 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.420 7.35 Moderately Moderately 20.0 13.0 <		Dermosol		~ ~	8.8	18	0.9	Non-saline																_	_	
7.5 7.5 7.5 7.5 7.5 7.5 7.5 7.5 7.5 7.5 7.5 7.5 7.5 7.35 Moderately Moderately 7.0 7.3.5 8.6 7.3.5 8.6 7.3.5 8.6 7.3.5 8.6 7.3.5 8.6 7.3.5 8.6 7.3.5 8.6 8.6 7.3.5 8.6				7																						
Redaric Acid 8 7 9 <t< td=""><td></td><td></td><td></td><td>7.5</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>				7.5																						
Pedaric Acid Sodi Brown 7 5 4.8 1,420 7.35 Moderately Moderately 20.0 13.0 Dermosol 6 5.6 660 3.78 Moderately 20.0 13.0				ω																						
Sodi Brown 0.2 5 4.8 1,420 7.35 Moderately asline 13.0 Dermosol 6 5.6 660 3.78 Moderately saline 13.0		Pedaric Acid		2																		_				
Dermosol 5.5 4.8 1,420 7.35 Moderately saline 20.0 13.0 6 5.6 660 3.78 Moderately saline 20.0 13.0	TP129	Sodi Brown	0.2	2														+	+							
5.6 660 3.78		Dermosol		5.5	4.8	1,420	7.35	Moderately saline	20.0	13.0	Strongly sodic															
				9	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	SOL 0	OMP	ILEX AN	ALYTI	ICAL SUN	MARY	l			l														
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	Emerso	Emerson Aggregate Test				Particl	e Size I	Distribu	Particle Size Distribution (% passing through sieve mm)	o passii	o thro	ugh si	eve mr	(L		
		E			mg/kg	dS/m		MEQ%	MEQ%		Class	Classification 200	200	75	63	37.5	26.5	19	13.2	9.5	6.7	4.75	2.36	1.18	0.6	0.425
			5																							
	Epipedal		5.5	7.2	38	0.72	Non-saline																			
TP106	Brown	0.1	9																							
	Vertosol		7																							
			œ																							
			5	6.2	200	1.20	Non-saline																			
			7																							
			7																							
TP109	Massive Brown Vertosol	0.1	00	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
			œ																							
	Macchine		9	6.0	160	1.955	Non-saline						100	100	100	100	100	100	100	100	100	100	100	99.9	99.4	99.0
TD110	DIASSIVE	0	6.5																							
71121		0	œ																							
	V GI (090]		8																							
			5.5	6.5	160	1.68	Non-saline																			
	Massive		7																							
TP119	Brown	0.2	9																							
	Vertosol		8																							
			8																			-				

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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).



	25		9														
	0.425		80.6														
	0.6		87.5														
(mr	1.18		93.6														
sieve I	2.36		96.4														
rough	4.75		98.6														
sing th	6.7		100														
% pas	9.5		100														
ution (13.2		100														
Particle Size Distribution (% passing through sieve mm)	19		100														
e Size	26.5		100														
Particlo	37.5		100														
-	63		100														
	75		100														
	200		100														
Emerson Aggregate Test	Classification		Slakes – some dispersion														
Emersor	Class		7														
Soil Sodicity			Strongly sodic														
Exchangeable Sodium Percentage	MEQ%		19.5														
Cation Exchange Capacity	MEQ%		21														
Soil Salinity Class			Very saline			Moderately saline					Non-saline						
ECe	dS/m		8.24			5.00					0.9						
Chloride	mg/kg		1,220			660					52						
Lab pH			8.6			6.2					6.9						
Field pH		9	7.5	7	7	9	7	œ	8	5	5.5	7	7	œ	9	7	7
A Horizon Thickness	E		0.4				0.2					0.2				¢ 0	4.0
ASC Inferred Classification			Pedaric Mesonatric Brown	Sodosol		Pedaric	Dubriatric	Sodocol	Inennon	0,1000	C-throttin	Brown	Sodocol	000000	Pedaric	Subnatric	Brown Sodosol
Sample Location			TP111				TP116					TP124				TD131	2




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.

Comula	Danth	As	Cd	Mg	Mn	Мо	Pb	Se	V
Sample	Depth	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
NEPN	I EILs	20	3		500		600		50

TABLE 11 HEAVY METALS RESULTS

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 *Systems 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 cap	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 cap	able 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 gene	erally 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-min		nining	g 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.



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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.

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. 4 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.

TABLE 14 AGRICULTURAL SUITABILITY CLASSES



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

S	SUITABILITY CLASSES					
Land Class	Pre-n	nining	Post-r	nining		
	На	%	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).







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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.

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 <i>Draft Inherent Soil</i> <i>Fertility of NSW Map</i> (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	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
having rainfall of 350mm or more per annum (9 out of 10 years); or	350mm or more rainfall per annum (9 out of 10 years);
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	• The land within the Drayton South disturbance footprint is further than 150m from the Hunter River, which is a regulated river;
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	• 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
and total dissolved solids of less than 1,500mg/L	• 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 <i>Draft Inherent Soil Fertility of NSW Map</i> (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

TABLE 16 BIOPHYSICAL STRATEGIC AGRICULTURAL LAND CRITERIA



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Criteria	Validation
having rainfall of 350mm or more per annum (9 out of 10 years); or	(WRM, 2012) (Appendix M of the EA) and groundwater impact assessment (AGE, 2012) (Appendix N of the
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	 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
Groundwater aquifers (excluding miscellaneous alluvial aquifers, also known as small storage	footprint is further than 150m from the Hunter River, which is a regulated river;
aquifers) which have a yield rate greater than 5L/s and total dissolved solids of less than 1,500mg/L	• 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%	
рН	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.

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 Volum	10,493,000			
Total Volum	9,443,700			

 TABLE 18
 RECOMMENDED STRIPPING DEPTHS WITHIN THE STUDY AREA



Allowing for a 10% handling loss, approximately 9,443,700 m³ 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 E	Disturbance Footprint	1,902			
Total V	/olume	4,15 [,]	1,000		
Total V	Total Volume (10% Handling Loss Allowance)				5,900

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)			
Total Volume (I	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 $3,735,900 \text{ m}^3$ 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 $307,900 \text{ m}^3$.



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.



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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;
- 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;
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- 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 A₂ 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.

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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.

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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.

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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.

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APPENDIX A FIELD TOPDRESSING ASSESSMENT PROCEDURE



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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 1EC_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



S Y D N E Y A N A L Y T I C A L L A B O R A T O R I E S

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Office: PO BOX 48 ERMINGTON NSW 2115

Laboratory: 1/4 ABBOTT ROAD SEVEN HILLS NSW 2147 Telephone: (02) 9838 8903 Fax: (02) 9838 8919 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



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



S Y D N E Y A N A L Y T I C A L L A B O R A T O R I E S

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ANALYTICAL REPORT

JOB NO: SAL23479B CLIENT ORDER: 111029

SAMPLES	CEC	Ex.Na	Ex.K	Ex.Ca	Ex.Mg
	MEQ%	MEQ%	MEQ%	MEQ%	MEQ%
<pre>1 TP102/0.9-1.0 2 TP103/0.5-0.6 3 TP104/0.6-0.8 4 TP107/0.3-0.4 5 TP108/0.6-0.8 6 TP109/0.7-0.8 7 TP110/0.8-1.0 8 TP111/0.4-0.5 9 TP113/0.2-0.3 10 TP114/0.6-0.8 11 TP115/0.8-1.0 12 TP118/0.5-0.7 13 TP121/0.9-1.0 14 TP121/1.7-1.8 15 TP122/0.6-0.7 16 TP125/0.6-0.8 17 TP127/0.5-0.6 18 TP128/0-0.1 19 TP129/0.9-1.0 20 TP130/0.1-0.2</pre>	17.2 20.5 20.7 22.9 18.2 23.1 19.1 21.0 20.3 15.7 24.1 24.4 20.2 26.7 27.0 11.9 20.0 15.3	0.29 7.6 0.53 1.95 4.75 4.70 1.20 4.10 1.70 2.90 2.95 0.52 1.95 2.10 0.54 6.2 4.25 0.06 2.60 0.57	$\begin{array}{c} 0.30\\ 0.21\\ 0.09\\ 0.27\\ 0.29\\ 0.21\\ 0.46\\ 0.42\\ 0.42\\ 0.36\\ 0.57\\ 0.16\\ 0.30\\ 1.20\\ 0.15\\ 0.46\\ 1.50\\ 0.33\\ 0.07 \end{array}$	11.0 2.40 14.6 12.8 4.20 7.2 10.4 6.5 8.1 7.2 7.9 9.1 10.9 11.0 16.3 8.7 10.5 8.4 8.7 9.3	6.9 11.3 7.3 9.4 10.1 12.1 7.9 11.6 11.2 11.6 10.2 6.7 12.7 12.5 3.75 13.4 13.4 13.4 2.35 9.7 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



S Y D N E Y A N A L Y T I C A L L A B O R A T O R I E S

Page 3 of 6

ANALYTICAL REPORT

JOB NO: SAL23479B CLIENT ORDER: 111029

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


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ANALYTICAL REPORT

JOB NO: SAL23479B CLIENT ORDER: 111029

	SAMPLES	Sol.Mg MEQ%	Sol.Mn MEQ%	Sol.Al MEQ%
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 9 20 DUP 20	TP102/0.9-1.0 TP103/0.5-0.6 TP104/0.6-0.8 TP107/0.3-0.4 TP108/0.6-0.8 TP109/0.7-0.8 TP110/0.8-1.0 TP111/0.4-0.5 TP113/0.2-0.3 TP114/0.6-0.8 TP115/0.8-1.0 TP118/0.5-0.7 TP121/0.9-1.0 TP121/1.7-1.8 TP122/0.6-0.7 TP122/0.6-0.8 TP122/0.5-0.6 TP128/0-0.1 TP128/0-0.1 TP129/0.9-1.0 TP130/0.1-0.2 LICATES: TP130/0.1-0.2	$\begin{array}{c} 0.34\\ 0.32\\ 0.25\\ 0.68\\ 0.40\\ 0.31\\ 0.50\\ 0.27\\ 1.60\\ 0.29\\ 0.93\\ 0.57\\ 0.67\\ 0.49\\ 0.14\\ 0.60\\ 0.78\\ 0.50\\ 0.38\\ 0.47\\ 0.50\\ \end{array}$	<0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01	<0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01
	od Code aration	0.01 87 ₽5	0.01 S7 P5	0.01 S7 P5

RESULTS ON DRY BASIS



Page 5 of 6

LABORATORY DUPLICATE REPORT

JOB NO: SAL23479B CLIENT ORDER: 111029

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



Page 6 of 6

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





Fax Cover Sheet

Date:		
JOB NO:		
PAGES:	(including this page)	
TO:		
COMPANY:		
FAX NO:		
FROM:		
SUBJECT:		
daug #	Pete, sorry for the confising COC the a re Please find some missing so ky and a NEW COC.	other imples
If ther know.	- are any other issues, just let	no
Tha	Josh BRAY	



Glaeba (02) Pty Ltd trading as Environmental Earth Sciences NSW Unit 4, 2 George Place, Artarmon, NSW. 2064 PO Box 380, North Sydney, NSW. 2059 P. 61 2 9922 1777 F. 61 2 9922 1010 E. eesnsw@eesi.biz www.environmentalearthsciences.com



CHAIN OF CUSTODY - INORGANIC ANALYSIS REQUE

lob #: <u>111</u> Date: <u>27-Ap</u>		_	Site Location: Laboratory:			Jerry's Plains Sample SAL			npler		JB jhilliard@eesi.biz			
					-	_	0/12				-		jimilaru(weesi.biz	
Sample ID	Hd		MATER MATER	SEDIMENT		Chloride		CEC AND EXCHANGEABLES	Ana	Heavy Metals**	equir	ed	ANTICIPATED RESULTS/ TURNAROUND TIME	
TP102 (0.9-1.0)	x	х			х	x		х		х				
TP103 (0.2-0.3)	x	х			х	x				х		1	ν,	
TP118 (0.2-0.3)	х	х			х	х		х						
TP104 (0.6-0.8)	х	х			х	x		х						
TP105 (0.3-0.5)	x	х			x	x								
TP106 (0.2-0.3)	х	х			х	x				х				
TP107 (0.3-0.4)	х	x			х	х		х		х				
TP108 (0-0.1)	х	x			х	х								
TP108 (0.6-0.8)	x	x			х	х		х						
TP109 (0-0.1)	х	х			х	х								
TP109 (0.7-0.8)	х	х			x	х		х						
TP110 (0.2-0.4)	х	х			x	х				х				
ГР123 (1.4-1.6)	x	х			x	x							²	
TP111 (0.4-0.5)	x	х			х	х		x						
FP112 (0-0.1)	x	x			х	х				х			20	
FP113 (0.2-0.3)	х	x			х	х		х						
TP114 (0.4-0.6)	x	х			х	х		х						
P115 (0.3-0.4)	х	х			х	х				х				
P115 (0.8-1.0)	х	x			х	х		х						
P116 (0.0-0.2)	х	х			х	х								
TOTAL	20	20			20	20		10		7				
urn Around:	NOR	MAL /	3 DA	YS/	48 HR	s/	24 HRS			1		of	3	
comments:							Cd, Mg,	Mn, I	Mo, P		V			
				×										
				1								_		
		Time					Date							
eft EES Site:														
ransported By:				0			,	A	W	e ca	n be	cor	ntacted on:	
Received Lab:		P.	\sim	26	SAC	}	28/4	11		Pho	one:	(02) 9	922 1777	~
ax Results Rec'	d		0)			(Fa	ix: (0	2) 99	22 1010	P,7
yped Results Re	ec'd					_				Ema	il: ee	snsw	@eesi.biz	
OJECT FORMS/QF	34 Chain	of Custo	dv Inc	organic	s			10	August	2009 \			Page 1 of 1	

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S Y D N E Y A N A L Y T I C A L L A B O R A T O R I E S

Office: PO BOX 48 ERMINGTON NSW 2115

Laboratory: 1/4 ABBOTT ROAD SEVEN HILLS NSW 2147 Telephone: (02) 9838 8903 Fax: (02) 9838 8919 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



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



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ANALYTICAL REPORT

JOB NO: SAL23479 CLIENT ORDER: 111029

SAMPLES	рН 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 23 TP120/0-0.1	6.5 6.0	210	160		
23 TP120/0-0.1 24 TP121/0.4-0.5	7.3	90	55		
24 IPI21/0.4=0.5 25 TP121/0.9=1.0	8.5	130 470	30 230		
26 TP122/0.2-0.3	7.2	150	65	3.5	<0.5
27 TP123/0.4-0.5	8.3	200	110	5.5	<0.5
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



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ANALYTICAL REPORT

JOB NO: SAL23479 CLIENT ORDER: 111029

SAMPLES	рН	COND.	Cl	As	Cd
	1:5	uS/cm	mg/kg	mg/kg	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



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



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ANALYTICAL REPORT

JOB NO: SAL23479 CLIENT ORDER: 111029

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

MIDL	1
Method Code	M4
Preparation	P3

RESULTS ON DRY BASIS



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LABORATORY DUPLICATE REPORT

JOB NO: SAL23479 CLIENT ORDER: 111029

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



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CERTIFIED REFERENCE MATERIAL

JOB NO: SAL23479 CLIENT ORDER: 111029

CRM Analyte Number	Units	CRM Result	Certified Value	%Recovery	Acceptance Criteria %
AGAL-10ArsenicAGAL-10CadmiumAGAL-10ManganeseAGAL-10MolybdenumAGAL-10LeadAGAL-10SeleniumAGAL-10Vanadium	mg/kg	17	17.2	99	80-125
	mg/kg	9.0	9.3	97	80-120
	mg/kg	220	241	91	85-110
	mg/kg	8	8.6	93	70-130
	mg/kg	38	40.4	94	85-115
	mg/kg	10	11.0	91	70-130
	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.



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S Y D N E Y A N A L Y T I C A L L A B O R A T O R I E S

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 (HNO3/H2SO4)
- Element determined by APHA 3114B (Hydride Generation AAS) M1 Base Metal - Digestion Method 3050 (HNO3/H2O2)
- Element determined by APHA 3111B (Flame AAS)
- M4 Refractory Element Digestion Method 3050 (HNO3/H2O2) Element determined by APHA 3111D (Flame AAS)
- M2 Selenium Digestion Method 7741 (HNO3/H2SO4)
 - Determined by APHA 3114B (Hydride Generation AAS)





Form No: 18909.s, Report No: SYD116924

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Hansen Bailey

















APPENDIX C GEOLOGICAL SOIL SAMPLE LOGS



LOCATIO	ON: Jerrys Plains	JOB No. 111029		TE	ST	PI	ΓL	OG	: TP102	LOGGED BY:
EASTIN	G: 292837.85	DRILL TYPE: Backhoe								J. Bray
L	NG: 6412134.92	DATE STARTED: 20/04/2011		CL	IEN	IT:		ŀ	Hansen & Bailey	APPROVED:
ELEVAT	ION:	DATE FINISHED: 20/04/2011								J. Hilliard
	Sample	Groundwater			SAN	/IPL	ES		PA	GE #: 1/1
	Disturbed	Water Strike	U						ГA	GL #. 1/1
etres	Moisture	_ Standing Water Level	LO					ē		
L me	M=Moist D=Dry S=Saturated		E E		Ire	(ple	(md	Lev		
Depth (metres)	STRATIGRAPHY		GRAPHIC LOG	Type	Moisture	pH (field)	PID (ppm)	Water Level	COMMENTS	
0	(A1): Firm, dark yellowish bi LOAM with very fine black g \pedality.	ravel and roots, weak			D	6			Clear, smooth boundary	
-	(A2): Soft, slightly lighter bro 2-10mm polyhedral peds wi moderate pedality.	own CLAY LOAM with th fine grey sand (<1%),			м	5				
	(B1): Firm, dark yellowish bi	own (10YR4/4) LIGHT							Gradual, smooth boundary	
.5	MEDIUM CLAY with weather appearing as coarse sand in Moderate pedality with 5-30	n profile.			D	7				
-									Cradual amosth houndary	
-	(B2): Very firm brown LIGH brown mottles with coarse g	CLAY with grey and dark							Gradual, smooth boundary	
	gravel (<5%). Moderate peo	ality.			D	7				
1-						[′]				
-										
1.5-									Gradual, smooth boundary	
-										
-										
-	(B2): Very firm, strong brow with white and orange coars	n (7.5YR4/6) LIGHT CLAY								
	cobbles in profile, strong pe	dality.			D					
-										
2-	End of Hole @ 2.0 metres (refusal bedrock).	* / / /							
									ENVIRONMENTAL EARTH SCIENCES THE KNOW AND THE HOW	
L									178 A.S	
ENVIRONM EARTH SCI										

LOCATIO	ON: Jerrys Plains	JOB No. 111029		TE	ST	P۱٦	ΓLO	ЭG	: TP103	LOGGED BY:
EASTING	G: 291786.05	DRILL TYPE: Backhoe								J. Bray
NORTHI	NG: 6409874.24	DATE STARTED: 20/04/2011		CL	IEN	IT:		ŀ	Hansen & Bailey	APPROVED:
ELEVAT	ION:	DATE FINISHED: 20/04/2011								J. Hilliard
			1							
	Sample	Groundwater			SAN	/IPL	ES		PA	GE #: 1/1
	Disturbed	Water Strike	U							02 //. 1/1
etres	Moisture	_ Standing Water Level	LO					<u> </u>		
(me	M=Moist D=Dry S=Saturated		HC		e	(ple	(mq	Lev		
Depth (metres)			GRAPHIC LOG	e	Moisture	pH (Field)	PID (ppm)	Water Level	COMMENTS	
De	STRATIGRAPHY		Ъ.	Type	Σ	Нd	1	Ň		
0-										
-	(A1): Soft to firm, brown-dar LOAM with roots holding so	k brown (7.5YR4/4) CLAY I very well. Weak pedality.			Μ	6				
-	(A2/B1): Firm, dark yellowis	h brown (10YR4/6) LIGHT							Clear, smooth boundary Leaching evident	
-	MEDIUM CLAY with minor r becoming slightly darker.	oots. Weak pedality.								
-	-becoming signity darker.				D	7				
	(B1): Firm, red/brown LIGH	CLAY with minor roots and		_						
-	fine black gravel (<5%) with	moderate pedality.							Clear, irregular boundary	
.5-					D	8				
-										
-										
_										
-									Gradual, smooth boundary	
-										
	(B2): Firm to stiff, yellowish	red (5YR4/6) MEDIUM			D	8				
1-	CLAY with white mottles and Moderate pedality with 2-10	d yellow and grey sand. mm polyhedral peds.								
-										
_										
-										
-										
_										
-										
- 1.5—									Gradual, smooth boundary	
- 1.5	(B2): Firm, strong brown (7.	5YR4/6) MEDIUM CLAY							Graddal, Smooth Doundary	
-	with white mottles and slight of sand grains. Moderate pe									
-	polyhedral peds.									
-										
-										
					D	8				
-	End of Hole @ 1.9 metres (r	efusal bedrock).								
2-										
									ENVIRONMENTAL	
									THE KNOW AND THE HOW	



LOCATI	ION: Jerrys Plains	JOB No. 111029		TE	ST	P۱	ΓLO	ЭG	: TP104	LOGGED BY:
EASTIN	IG: 299747.74	DRILL TYPE: Backhoe								J. Bray
NORTHI	ING: 6408904.14	DATE STARTED: 20/04/201	1	CL	IEN	IT:		ŀ	Hansen & Bailey	APPROVED:
ELEVAT	TION:	DATE FINISHED: 20/04/201	1							J. Hilliard
	Sample	Groundwater Water Strike			SAN	/PL	ES		PA	GE #: 1/1
Depth (metres)	Undisturbed Moisture M=Moist D=Dry S=Saturated	✓ Valei Stine ✓ Standing Water Level	L GRAPHIC LOG		e	ld)	m)	-evel		
Depth (STRATIGRAPHY		GRAPH	Type	Moisture	pH (Field)	PID (ppm)	Water Level	COMMENTS	
0	(A1): Soft, very dark brown with roots (20%). Weak pec polyhedral peds.	(10YR2/2) LIGHT CLAY ality with 5-15mm			D	5.5				
	(A2): Soft to firm, dark yello CLAY LOAM with roots (<5 Weak to moderate pedality	%) and dark brown mottles	5.		м	6				
.5- - - - - -	(B2): Dense, yellowish brow dark brown mottles (<5%) a Apedal.	vn (10YR5/6) SAND with ind very minor roots (<2%)			D	7				
- 1 - - -	(C): Medium dense very da SAND with white mottle. Ap	rk greyish brown (2.5Y3/2) edal.			D	7			Weathered sandstone	
- - - 1.5-	(C): Dense, very dark greyis Apedal.	sh brown (2.5Y3/2) SAND.							Weathered sandstone	
-	End of Hole @ 1.6 metres (sandstone).	refusal on weathered			D	7				
2-										
									ENVIRONMENTAL EARTH SCIENCES THE KNOW AND THE HOW	

LOCATIO	DN: Jerrys Plains	JOB No. 111029		TE	ST	PI	ΓLO	ЭG	: TP105	LOGGED BY:
EASTING	EASTING: 293654.81 DRILL TYPE: Backhoe NORTHING: 6410241.81 DATE STARTED: 20/04/2011									J. Bray
NORTHI	NG: 6410241.81	DATE STARTED: 20/04/2011		CL	IEN	IT:		ŀ	lansen & Bailey	APPROVED:
ELEVATI	ION:	DATE FINISHED: 20/04/2011								J. Hilliard
	Carrala	Groundwater								
	Sample				SAN	/IPL	ES		PA	GE #: 1/1
\widehat{a}	Disturbed Undisturbed	Water Strike	U							
etres	Moisture	_ Standing Water Level	LO					e		
u)	M=Moist D=Dry S=Saturated		HOH		e	(ple	(md	Lev		
Depth (metres)			GRAPHIC LOG	e	Moisture	pH (Field)	PID (ppm)	Water Level	COMMENTS	
De	STRATIGRAPHY		GF	Type	Σ	Нd	ШЦ	Wa		
0-	(A1): Soft, brown, CLAY LO	AM with roots Weak	////							
-	pedality.	AW WITTOOLS. WEak			DM	5				
									Clear, smooth boundary	
-	(B2): Very firm, orange/brow									
	white mottles and roots, sto	ng pedality.								
-					D	6				
-										
.5-									Gradual, smooth boundary	
	(B2): Stiff, red/brown MEDIL grey sandstone gravel and f	JM CLAY with weathered							craada, chicoar courtairy	
-	grey sandstone graver and r	ine sand. Moderate pedanty			D					
						6				
-										
	(C): Medium dense, grey/red	d SAND. Apedal.			D	6			Diffuse, wavy boundary	
									Weathered sandstone	
-										
1-	End of Hole @ 1.0 metres (r	efusal bedrock).			-					
-										
-										
-										
-										
1.5-										
-										
-										
-										
2-										
									ENVIRONMENTAL	
									EARTH SCIENCES	



LOCATIO	DN: Jerrys Plains	JOB No. 111029		TE	ST	PI	ΓL(OG	: TP106	LOGGED BY:
EASTING	G: 294376.69	DRILL TYPE: Backhoe								J. Bray
NORTHI	NG: 6412371.83	DATE STARTED: 20/04/2011		CL	IEN	IT:		ŀ	Hansen & Bailey	APPROVED:
ELEVATI	ION:	DATE FINISHED: 20/04/2011								J. Hilliard
	Sample	Groundwater			SAN	ЛРL	ES		PA	GE #: 1/1
	Disturbed	Water Strike	U							02 //. 1/1
Depth (metres)			GRAPHIC LOG							
(me	Moisture M=Moist D=Dry S=Saturated		∣₽		e	(pla	(mqq)	Leve		
oth	-		API	Ð	Moisture	(Field)	dd) (Water Level	COMMENTS	
Del	STRATIGRAPHY		GR B	Type	Moi	Hq	PID	Wa		
0-	(A1): Coff dort brown (7 E)		////							
-	(A1): Soft, dark brown (7.5Y roots, moderate pedality wit	h 10-20mm polyhedral peds			M	5				
				_					Water leaching evident	
-	(B2): Firm, strong brown (7. light brown mottles and root	5YR4/6) LIGHT CLAY with								
	horizontal craking (<1cm) ex	xtending to surface			D	5.5				
	(decrease in width with heig 10-30mm polyhedral peds.	ht). Strong pedality with		_						
									Clear, smooth boundary	
	(B2): Stiff, strong brown (7.5 CLAY with fine black gravel	/coarse sand (<5%),								
.5-	moderate pedality with 10-2	0mm polyhedral peds.			D	6				
-										
				_					Gradual, smooth boundary	
-	(B2): Soft, brown (7.5YR4/4 red/brown mottles and yello) CLAY LOAM, sandy with w/orange weathered			D	7			,	
-	sandstone gravel, strong pe	dality with 10-50mm								
	polyhedral peds.									
'-										
-										
-										
-										
1.5-										
-										
-	(B2): Firm, brown (10YR4/3) I IGHT CLAY with light	////							
	brown mottles in profile. Mo	derate pedality with 5-20mm			D	8				
	polyhedral peds.		V//							
			///							
2-	End of Hole @ 2.0 metres (refusal bedrock).	* / / /						,	
										-
									ENVIRONMENTAL EARTH SCIENCES	
									THE KNOW AND THE HOW	
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LOCATIO	DN: Jerrys Plains	JOB No. 111029		TE	ST	PI	T LO	ЭG	: TP107	LOGGED BY:
EASTING	G: 294423.62	DRILL TYPE: Backhoe								J. Bray
NORTHI	NG: 6409492.57	DATE STARTED: 20/04/2011		CL	IEN	IT:		ŀ	Hansen & Bailey	APPROVED:
ELEVATI	ON:	DATE FINISHED: 20/04/2011		1						J. Hilliard
		÷								
	Sample	Groundwater			SAN	/IPL	ES			GE #: 1/1
	Disturbed	Water Strike	(1)						ra I	GE #. 1/1
res)	Undisturbed		Ŏ					_		
net	Moisture					(p	Ê	eve		
th (r	M=Moist D=Dry S=Saturated		- PH		ture	Fiel	Idd)	er L	COMMENTS	
Depth (metres)	STRATIGRAPHY		GRAPHIC LOG	Type	Moisture	pH (Field)	PID (ppm)	Water Level	COMMENTO	
			<u> </u>		~		-	-		
0-	(A1): Soft, very dark brown (10YR2/2) SILTY CLAY			м	5.5				
-	LOAM with roots. Weakly per polyhedral peds.	edal with 5-20mm							Clear, smooth boundary	
-	polyneulai peus.									
	(B1): Firm, dark brown, LIGH	HT CLAY with roots, purple,								
	red and white sand grains a	nd large sandstone cobbles		_						
-	in profile. Moderate pedality				DM	6				
-										
.5-										
-	(B2): Stiff, very dark greyish	brown (10VR3/1) HEAV/V							Abrupt, wavy boundary	
-	CLAY with sand (<10%), roo	ots. Strong pedality with								
	10-50mm polyhedral peds.				D	7				
-						·				
-										
-										
				_					Abrupt, smooth boundary	
· -	(B2): Stiff, light grey (10YR7	(2) MEDIUM CLAY with			D	8			norupt, oneon boundary	
-	gravel likely to be quartz. St 5-10mm polyhedral peds an	d orange mottling.								
		0 0								
-										
	(C): Stiff, yellow (2.5YR7/8)	CLAYEY SAND with brown			D	8				
1.5-	mottles. Weak pedality with					ľ				
-	(C): Firm to stiff, very pale b CLAY with black/dark brown	rown (10YR7/3) LIGHT								
					D	8				
						0				
-	End of pit at 1.7m (refusal of	n very stiff CLAY).								
-										
_										
2-										
										-
									ENVIRONMENTAL EARTH SCIENCES	
									THE KNOW AND THE HOW	
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LOCATIO	ON: Jerrys Plains	JOB No. 111029		TE	ST	P۱	T L(OG	: TP108	LOGGED BY:
EASTIN	G: 295131.50	DRILL TYPE: Backhoe								J. Bray
NORTHI	ING: 6410203.16	DATE STARTED: 20/04/2011		CL	IEN	IT:		ŀ	Hansen & Bailey	APPROVED:
ELEVAT	TON:	DATE FINISHED: 20/04/2011								J. Hilliard
	Sample	Groundwater								
	Disturbed	✓ Water Strike			SAN	/IPL T	ES		PA	GE #: 1/1
s)	Undisturbed	✓ Standing Water Level	g							
etre	Moisture	<u></u>						kel		
ц Ц	M=Moist D=Dry S=Saturated		H		iure	-ield	ppm	r Le	COMMENTO	
Depth (metres)	STRATIGRAPHY		GRAPHIC LOG	Type	Moisture	pH (Field)	PID (ppm)	Water Level	COMMENTS	
-0 	(A1): Soft, dark yellowish br roots, weak pedality with 5- fine subangular sandstone of (A2/B1): Soft to firm, dark br CLAY with dark brown mottl pedality with 20-50mm polyl	I0mm polyhedral peds, with gravel/ rown (10YR4/4) LIGHT es and coarse sand. Strong nedral peds			м	5.5			Leached layer	
-	(B2): Very firm, yellowish br CLAY with sub-angular ped pedality with 5-30mm polyhe	s and roots. Moderate			DM	6				
.5-	(B2): Very firm, brown, LIGF	T MEDIUM CLAY, moderat	e ///						Very abrupt, smooth boundary	
-	pedality.				D	7				
	(B2): Firm, orange/brown, C	AY LOAM sandy with							Abrupt, smooth boundary	
	black mottles. Moderate per	Jality.			D	8				
- - 1.5-	(B2): Firm, light yellowish br with weathered ironstone gr with 10-20mm polyhedral pe peds.	avels. Moderate pedality			D	8				
-	-				D	8				
-	(B3): Soft, orange, SANDY mottles.					0			Weathered sandstone	
	End of pit at 1.8 metres (refised and stone).	usal on weathered								
-	-									
2-										
									ENVIRONMENTAL EARTH SCIENCES THE KNOW AND THE HOW	
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LOCATIO	ON: Jerrys Plains	JOB No. 111029		TE	ST	PI	ΓL(OG	: TP109	LOGGED BY:
EASTIN	G: 295458.66	DRILL TYPE: Backhoe								J. Bray
NORTHI	NG: 6411517.57	DATE STARTED: 20/04/2011		CL	IEN	IT:		ŀ	Hansen & Bailey	APPROVED:
ELEVAT	ION:	DATE FINISHED: 20/04/2011								J. Hilliard
									1	
	Sample	Groundwater			SAN	/IPL	ES			
	Disturbed	▼ Water Strike	(1)							GE #: 1/1
res)	Undisturbed		ŏ					_		
neti	Moisture					(p	Ê	eve		
th (r	M=Moist D=Dry S=Saturated		HA		sture	Fiel	Idd)	er L	COMMENTS	
Depth (metres)	STRATIGRAPHY		GRAPHIC LOG	Type	Moisture	pH (Field)	PID (ppm)	Water Level	COMMENTO	
<u> </u>			0		2		<u> </u>	-		
0-	(A1): Stiff, brown-dark brown	n (10YR4/3) CLAY LOAM	///		DM	5				
-	with roots.					ľ			Clear, smooth boundaries through	out
-	(B1): Firm to stiff, brown-dar	rk brown (10YR4/3) LIGHT								
-	CLAY with minor fine white/	red/black sand, vertical			D	7				
	craking (0.5 - 1cm). Strong p subangular, blocky peds and	pedality with 20-50mm								
-	Subaligulai, blocky peus ali	u 5-zomin polyneural peus.								
-	(B2): Firm, dark yellowish br	rown (10YR3/4) LIGHT								
.5-	CLAY with sub-rounded and	dark brown mottles gravel.			М	7				
	Moderate pedality with 5-40	mm polyhedral peds.								
-	(B2): Stiff, orange/brown ME	DILIM CLAY with and								
-	coarse white/yellow sand (5	%). Strong pedality with								
	polyhedral peds.				D	8				
-						ľ				
-										
-										
1-										
'-										
-										
-										
-										
-										
-										
1.5-										
	(B2): Firm, brown-dark brow	n (7.5YR4/4) SILTY CLAY								
-	LOAM with red mottles and entering profile. Moderate p	edality with 10-30mm								
-	polyhedral peds.	, , , , , , , , , ,								
-										
-					DM	8				
	End of pit at 1.9m (target de	pth).			-				I	
2-										
									ENVIRONMENTAL	
									THE KNOW AND THE HOW	



LOCATIO	DN: Jerrys Plains	JOB No. 111029		BC	RE	HC	DLE	LC	DG: TP110	LOGGED BY:
EASTING	G: 295774.05	DRILL TYPE: Backhoe								J. Bray
NORTHI	NG: 6411373.59	DATE STARTED: 19/4/2011		CL	IEN	IT:		ŀ	lansen & Bailey	APPROVED:
ELEVAT	ION:	DATE FINISHED: 19/04/2011								J. Hilliard
	Sample	Groundwater			SAN	/PI	FS			
	Disturbed	▼ Water Strike							PAG	GE #: 1/1
(se	Undisturbed	Standing Water Level	0 0							
letre	Moisture						(Ve		
L (L	M=Moist D=Dry S=Saturated		Ē		are	(Field)	mdc	Ľ		
Depth (metres)	STRATIGRAPHY		GRAPHIC LOG	Type	Moisture	H H	PID (ppm)	Water Level	COMMENTS	
			U	Ē	Σ	Ηd	٩	3		
0-	(A1): Firm, dark reddish bro	wn (5YR3/3) CLAY LOAM			м	7				
	with roots and minor gravel,	weak pedality.				7				
-										
-	(B1): Stiff, dark brown (7.5Y	(R3/4) MEDIUM CLAY with								
	weathered sandstone "nodu pedality.	iles" or gravel, moderate			D	8				
-	pedanty.									
.5-										
-				1						
-				1						
-										
	(B2): Firm, light brown LIGH	IT CLAY with dark grey								
-	sub-angular coarse sand/fin occasional cobbles, modera	e poorly graded gravel with te pedality.			D	8				
-	,,									
1-										
-										
-]						
-]						
-]						
1.5-										
]						
-	(B2): Firm to stiff, light grey with yellow/orange mottles.	(10YR7/1) LIGHT CLAY								
-	with yellow/orange motiles.			1						
-										
					MD	8				
2-	End of Hole @ 2.0 metrics /	torgot donth)	V///							
	End of Hole @ 2.0 metres (larget depth).								
									THE KNOW AND THE HOW	

LOCATIO	DN: Jerrys Plains	JOB No. 111029		TE	ST	P۱٦	ΓL(ЭG	: TP111	LOGGED BY:
EASTING	G: 296128.54	DRILL TYPE: Backhoe								J. Bray
NORTHI	NG: 6410935.83	DATE STARTED: 19/4/2011		CL	IEN	IT:		ŀ	lansen & Bailey	APPROVED:
ELEVAT	ION:	DATE FINISHED: 19/04/2011								J. Hilliard
	Sample	Groundwater			SAN	/IPL	ES		PA	GE #: 1/1
	Disturbed Undisturbed	Water Strike	U							02 /// . / .
etres	Moisture	_ Standing Water Level	LO LO					e		
) m	M=Moist D=Dry S=Saturated		1 H		le	eld)	bm	Lev		
Depth (metres)			GRAPHIC LOG	Type	Moisture	pH (Field)	PID (ppm)	Water Level	COMMENTS	
ă	STRATIGRAPHY		Ū	Τ	ž	占	Ē	\geq		
0 - -	(A1): Soft, dark brown (10YF minor roots. Weak pedality.	R3/3) CLAY LOAM with			DM	6				
-										
-	(A2): Soft, yellowish brown (Apedal.	10YR5/8) CLAYEY SAND.								
-	(B2): Soft brown (10YR5/3)	LOAMY SAND, with very			D				Coarse cobbles in profile, similar ir	colour to
-	fine quartz sand and fine su Weak pedality with 5-10mm	brounded quartz gravel.			DM	7.5			layer @ 0.3 metres	
.5-	weak pedanty with o Tohini	polynourur pous.								
-										
-										
_	(B2): Firm red/brown LIGHT	CLAY. Moderate pedality.			М	7			Gradual, smooth boundary	
-										
-										
1-										
_										
-										
	(B2): Firm, yellowish brown	(10YR5/4) CLAY LOAM,							Gradual, smooth boundary	
-	sandy with "intrusions" of groups few sandstone boulders and	ey soft sandy CLAY and a angular gravels and fine								
-	grained sand. Moderate ped	ality.			DM	7				
-										
1.5-									Test pit located half way down gen Boulders in profile suggest colluvia	
									boulders in profile suggest colluvia	Tianuloitti
-										
-										
-									Operator note harder ground	
-										
2-	End of Hole @1.9 (target de	pth)	1777		1					
		. ,								
									ENVIRONMENTAL EARTH SCIENCES	
									THE KNOW AND THE HOW	
									19B.	



LOCATIO	DN: Jerrys Plains	JOB No. 111029		TE	ST	PI	ΓLO	ЭG	: TP112	LOGGED BY:
EASTING	G: 296324.95	DRILL TYPE: Backhoe								J. Bray
NORTHI	NG: 6412192.51	DATE STARTED: 19/4/2011		CL	IEN	IT:		ŀ	Hansen & Bailey	APPROVED:
ELEVAT	ION:	DATE FINISHED: 19/04/2011								J. Hilliard
	Sample	Groundwater			SAN	/IPL	ES			
	Disturbed	Water Strike								GE #: 1/1
Depth (metres)	Undisturbed		GRAPHIC LOG					_		
met	Moisture		l L L		l o	(pl	(n	eve-		
oth (M=Moist D=Dry S=Saturated		APF	Ð	Moisture	pH (Field)	(mqq)	Water Level	COMMENTS	
Dep	STRATIGRAPHY		GR	Type	Moi	Hd	PID	Wa		
0-										
-	(A1): Soft, dark brown CLA Weak pedality.	CLOAM with minor roots.			MS	6				
				_						
-	(B2): Stiff, very dark brown								Boundary based on colour and moi	
	CLAY with vertical and diag	onal cracks (<1cm)							Cracks extend to surface but decre with height, likely due to surface co	
-									from livestock grazing	
-					D	6.5				
.5-										
-										
	(B2): Firm, dark yellowish b	rown (10YR3/6) CLAY							Wavy distinct boundary	
-	LOAM sandy with weathere sandstone cobbles in profile	d red/yellow/black (red colour dominating).								
	Moderate pedality.	(
-										
-	Weathered sandstone in pro	ofile that has "laminar"			D	8				
1-	layers.									
-										
-	Becoming less red in colour									
-										
-										
1.5-										
-										
-	(B2): Very firm red LIGHT M	EDIUM CLAY with							Diffuse boundary	
	sandstone becoming slightly grains apparent. Moderate	grey with white quartz							Becoming very hard to excavate	
-	grains apparent. Moderate p	Jedanty.								
-					D	8				
2-										
-	End of Hole @ 2.0 metres (target depth)								
									ENVIRONMENTAL	
									THE KNOW AND THE HOW	

ENVIRONMENTAL EARTH SCIENCES

LOCATIO	DN: Jerrys Plains	JOB No. 111029		TE	ST	PI	ΓLO	ЭG	: TP113	LOGGED BY:
EASTING	G: 296493.63	DRILL TYPE: Backhoe								J. Bray
NORTHI	NG: 6409783.38	DATE STARTED: 20/04/2011		CL	IEN	IT:		ŀ	lansen & Bailey	APPROVED:
ELEVAT	ION:	DATE FINISHED: 20/04/2011								J. Hilliard
	Sample	Groundwater			SAN	ЛРL	ES		PA	GE #: 1/1
	Disturbed Undisturbed	Water Strike	U							
etres	Moisture	_ Standing Water Level	LO					e		
) m	M=Moist D=Dry S=Saturated		HIC		le	eld)	bm	Lev		
Depth (metres)			GRAPHIC LOG	Type	Moisture	pH (Field)	PID (ppm)	Water Level	COMMENTS	
ă	STRATIGRAPHY		Ū	T	ž	q	Ē	Š		
0-	(A1): Soft, dark brown (7.5Y pedality with 2-5mm polyhed	R3/4) SILTY LOAM. Weak			М	5				
-	pedanty with 2-offin polynee								Clear, smooth boundary	
-										
-	(B2): Firm, red/brown SILTY pedality with subangular ped	LIGHT CLAY. Moderate			D	6				
-										
- .5-									Gradual, smooth boundary	
	(B2): Firm, yellowish brown sandy. Moderate pedality wi	(10YR5/6) CLAY LOAM,							Graddal, shiodir boundary	
-	peds.	in 10-30mm polyneurai								
					D	7				
-										
-	(B2): Dense, yellowish brow	n (10YR5/6) SAND. Weak							Diffuse, smooth boundary	
-	pedality with 5-10mm polyhe	edral peds.							Weathered sandstone	
-										
1-										
-					D	7				
-										
-										
-		<u> </u>		_					Gradual, irregular boundary	
-	(C): Weathered yellow/brow SANDSTONE.	n fine grained								
1.5-			· · · · · · · · · · · · · · · · · · ·		D	8				
-	End of Hole @ 1.6 metres (r	ofucal hadrock)								
-		eiusai beulock).								
_										
-										
-										
2-										
									ENVIRONMENTAL EARTH SCIENCES	
									THE KNOW AND THE HOW	
l									0C - 13	



NORTHING: 6408907.03 DATE STARTED: 20/04/2011 CLIENT: Hansen & Bailey APPR ELEVATION: DATE FINISHED: 20/04/2011 J. H Sample Groundwater SAMPLES	OCATIC	DN: Jerrys Plains	JOB No. 111029		TE	ST	PI٦	ΓL(OG	: TP114	LOGGED BY:
ELEVATION: DATE FINISHED: 2004/2011 SAMPLES PAGE #: Sample Groundwater Water Strike 90 Utdistured Image: Sample in the strike in the strik	ASTINC	G: 296915.95	DRILL TYPE: Backhoe								J. Bray
Sample Groundwater Water Strike Valer Strike Webisture Standing Water Level O MetMoist D=Dry S=Saturated Standing Water Level O STRATIGRAPHY STRATIGRAPHY COMMENTS 0 (41): Soft, dark brown (10YR3/3) SILTY LOAM with roots D D 0 (41): Soft, dark brown (10YR3/3) SILTY LOAM with roots D D 0 (40): Soft, dark brown (10YR5/6) MEDIUM CLAY with dark brown mottles/veins and very fine roots D D 0 (62): Firm, yellow/brown SANDY LOAM with black motiles/nodules. Weak pedality, with 2-storm D D (62): Firm, light olive/brown (2.5Y5/6) LIGHT CLAY. Some light brown and black motting and trace of file and. Weak to moderate pedality with 5-10mm DM DM Diffuse, smooth boundary 1.5 (B3/C): Soft, brownish yellow (10YR6/6) SANDY CLAY LOAM, weak pedality with 10-20mm polyhedral peds. M D Diffuse, smooth boundary	IORTHI	NG: 6408907.03	DATE STARTED: 20/04/2011		CL	IEN	IT:		ŀ	Hansen & Bailey	APPROVED:
Image: Second	LEVATI	ION:	DATE FINISHED: 20/04/2011								J. Hilliard
Image: Second		Sample	Groundwater			SAN	/PL	ES			
0 (A1): Soft, dark brown (10YR3/3) SILTY LOAM with rosk (20%). Weak pedality with 2-5mm rounded peds and fine subangular sandstone gravel. DM DM Clear, smooth boundary (B1): Very firm, yellowish brown (10YR5/6) MEDIUM CLAY with dark brown mottles/veins and very fine roots. DM D D Clear, smooth boundary (B2): Firm, yellow/brown LIGHT CLAY with black veins approximately 10cm long and 2cm wide, large horizontal and vertical cracks (> 1cm) D D D Gradual, irregular boundary (B2): Firm, light olive/brown SANDY LOAM with black mottles/nodules. Weak pedality. DM DM DM DM DIffuse, smooth boundary (B2): Firm, light olive/brown SANDY LOAM with black mottles/nodules. Weak pedality. DM DM DM DM DIffuse, smooth boundary (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 DM DM Diffuse, smooth boundary 1 (B3/C): Soft, brownish yellow (10YR6/6) SANDY CLAY LOAM, weak pedality with 10-20mm polyhedral peds. DM DM Diffuse, smooth boundary 1 End of Hole @ 1.9 metres (target depth). End of Hole @ 1.9 metres (target depth). DM Diffuse, smooth boundary		Disturbed	▼ Water Strike							PA	GE #: 1/1
0 (A1): Soft, dark brown (10YR3/3) SILTY LOAM with rots (20%). Weak pedality with 2-5mm rounded peds and fine subangular sandstone gravel. DM DM Clear, smooth boundary (B1): Very firm, yellow/brown LIGHT CLAY with black veins approximately 10cm long and 2cm wide, large horizontal and vertical cracks (> 1cm) D D Clear, smooth boundary .5 (B2): Firm, yellow/brown SANDY LOAM with black veins approximately 10cm long and 2cm wide, large horizontal and vertical cracks (> 1cm) DM D Gradual, irregular boundary .6 (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 DM DM Diffuse, smooth boundary 1 (B3/C): Soft, brownish yellow (10YR6/6) SANDY CLAY LOAM, weak pedality with 10-20mm polyhedral peds. DM DM Diffuse, smooth boundary 1 End of Hole @ 1.9 metres (target depth). End of Hole @ 1.9 metres (target depth). DM Diffuse, smooth boundary	es)	Undisturbed	Standing Water Level	00							
0 (A1): Soft, dark brown (10YR3/3) SILTY LOAM with rots (20%). Weak pedality with 2-5mm rounded peds and fine subangular sandstone gravel. DM DM Clear, smooth boundary (B1): Very firm, yellow/brown LIGHT CLAY with black veins approximately 10cm long and 2cm wide, large horizontal and vertical cracks (> 1cm) D D Clear, smooth boundary (B2): Soft, yellow/brown SANDY LOAM with black weins approximately 10cm long and 2cm wide, large horizontal and vertical cracks (> 1cm) DM D Gradual, irregular boundary (B2): Soft, yellow/brown SANDY LOAM with black motiles/notubes. Weak pedality. DM DM DM DIffuse, smooth boundary (B2): Soft, yellow/brown SANDY LOAM with black motiles/notubes. Weak pedality. DM DM DM DIffuse, smooth boundary (B2): Soft, vellow/brown GANDY LOAM with black motiling and trace of fine sand. Weak to moderate pedality with 5-10mm DM DM Diffuse, smooth boundary 1 (B3/C): Soft, brownish yellow (10YR6/6) SANDY CLAY LOAM, weak pedality with 10-20mm polyhedral peds. DM DM Diffuse, smooth boundary 1 End of Hole @ 1.9 metres (target depth). End of Hole @ 1.9 metres (target depth). DM Diffuse, smooth boundary	netr	Moisture						(L	svel		
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(A1): Soft, dark brown (10YR3/3) SILTY LOAM with roots (20%). Weak pedality with 2-5mm rounded peds and fine subangular sandstone gravel. DM 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 (B2): Firm, yellow/brown LIGHT CLAY with black veins approximately 10cm long and 2cm wide, large horizontal and vertical cracks (> 1cm) D Gradual, irregular boundary (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. DM Diffuse, smooth boundary 1 (B3/C): Soft, brownish yellow (10YR6/6) SANDY CLAY LOAM, weak pedality with 10-20mm polyhedral peds. DM Diffuse, smooth boundary 1 End of Hole @ 1.9 metres (target depth). DM Diffuse, smooth boundary	Dept	STRATIGRAPHY		GRA	Type	Mois	pH (F	PID (Wate	COMMENTS	
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(B1): Very firm, yellow/brown tottles/veins and very fine p cLar, smooth boundary (B2): Firm, yellow/brown LIGHT CLAY with black veins approximately 10cm long and 2cm wide, large p p horizontal and vertical cracks (> 1cm) p p (B2): Soft, yellow/brown SANDY LOAM with black weins approximately 10cm long and 2cm wide, large horizontal and vertical cracks (> 1cm) p p (B2): Soft, yellow/brown SANDY LOAM with black mottles/nodules. Weak pedality. DM Gradual, irregular boundary (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. DM Diffuse, smooth boundary 1 (B3/C): Soft, brownish yellow (10YR6/6) SANDY CLAY LOAM, weak pedality with 10-20mm polyhedral peds. DM Diffuse, smooth boundary 1 End of Hole @ 1.9 metres (target depth). DM Diffuse, smooth boundary	-	roots (20%). Weak pedality	with 2-5mm rounded peds			DM					
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(B2): Soft, yellow/brown SANDY LOAM with black mottles/nodules. Weak pedality. (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 (B3/C): Soft, brownish yellow (10YR6/6) SANDY CLAY LOAM, weak pedality with 10-20mm polyhedral peds. End of Hole @ 1.9 metres (target depth).				\mathbb{Z}	_					Gradual, irregular boundary	
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(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. 1.5 (B3/C): Soft, brownish yellow (10YR6/6) SANDY CLAY LOAM, weak pedality with 10-20mm polyhedral peds. End of Hole @ 1.9 metres (target depth).	_									Diffuse smooth boundary	
and. Weak to moderate pedality with 5-10mm polyhedral peds. 1.5 (B3/C): Soft, brownish yellow (10YR6/6) SANDY CLAY LOAM, weak pedality with 10-20mm polyhedral peds. End of Hole @ 1.9 metres (target depth).	-	(B2): Firm, light olive/brown	(2.5Y5/6) LIGHT CLAY.]						
1.5 (B3/C): Soft, brownish yellow (10YR6/6) SANDY CLAY LOAM, weak pedality with 10-20mm polyhedral peds. End of Hole @ 1.9 metres (target depth).	-	sand. Weak to moderate pe	dality with 5-10mm								
1.5 (B3/C): Soft, brownish yellow (10YR6/6) SANDY CLAY LOAM, weak pedality with 10-20mm polyhedral peds. End of Hole @ 1.9 metres (target depth).	-	polyhedral peds.	,								
1.5 (B3/C): Soft, brownish yellow (10YR6/6) SANDY CLAY LOAM, weak pedality with 10-20mm polyhedral peds. End of Hole @ 1.9 metres (target depth).	1-										
 (B3/C): Soft, brownish yellow (10YR6/6) SANDY CLAY LOAM, weak pedality with 10-20mm polyhedral peds. End of Hole @ 1.9 metres (target depth). 	-					м					
 (B3/C): Soft, brownish yellow (10YR6/6) SANDY CLAY LOAM, weak pedality with 10-20mm polyhedral peds. End of Hole @ 1.9 metres (target depth). 	-										
 (B3/C): Soft, brownish yellow (10YR6/6) SANDY CLAY LOAM, weak pedality with 10-20mm polyhedral peds. End of Hole @ 1.9 metres (target depth). 	-										
 (B3/C): Soft, brownish yellow (10YR6/6) SANDY CLAY LOAM, weak pedality with 10-20mm polyhedral peds. End of Hole @ 1.9 metres (target depth). 											
 (B3/C): Soft, brownish yellow (10YR6/6) SANDY CLAY LOAM, weak pedality with 10-20mm polyhedral peds. End of Hole @ 1.9 metres (target depth). 	-										
 (B3/C): Soft, brownish yellow (10YR6/6) SANDY CLAY LOAM, weak pedality with 10-20mm polyhedral peds. End of Hole @ 1.9 metres (target depth). 	-]						
 (B3/C): Soft, brownish yellow (10YR6/6) SANDY CLAY LOAM, weak pedality with 10-20mm polyhedral peds. End of Hole @ 1.9 metres (target depth). 	15_										
(B3/C): Soft, brownish yellow (10YR6/6) SANDY CLAY LOAM, weak pedality with 10-20mm polyhedral peds. End of Hole @ 1.9 metres (target depth).											
LOAM, weak pedality with 10-20mm polyhedral peds.	-	(B3/C): Soft brownish vello								Diffuse, smooth boundary	
End of Hole @ 1.9 metres (target depth).	-	LOAM, weak pedality with 1	0-20mm polyhedral peds.								
	-										
	_										
2-	-	End of Hole @ 1.9 metres (target depth).								
	2-										
ENVIRONMENTAL ENDINGES											
EARTH SCIENCES											=1
RONMENTAL THE SCIENCES	RONME										

G: 297389.36 NG: 6410443.76	DRILL TYPE: Backhoe								
NG: 6410443.76									J. Bray
NORTHING: 6410443.76 DATE STARTED: 19/4/2011 CLIENT: Hansen & Bailey ELEVATION: DATE FINISHED: 19/04/2011							ŀ	Hansen & Bailey	APPROVED:
ION:	DATE FINISHED: 19/04/2011								J. Hilliard
Sample	Groundwater			SAN	/IPL	ES	1	PA	GE #: 1/1
		ŋ							
		CLO					le		
M=Moist D=Dry S=Saturated		HIC		are	ield	mdc	Le		
STRATIGRAPHY		RAF	/pe	oisti			/atei	COMMENTS	
		G	ŕ	Σ	þ	₽.	\$		
black sand, weak pedality w peds. (A2/B1): Firm, dark yellowish CLAY with large tree roots a	ith 5-10mm polyhedral // ו brown (10YR4/4) MEDIUM nd black nodules of			DM D	5			Diffuse boundaries throughout	
(B2): Dense, very pale brow occasional cobble sized piec Apedal.	n (10YR7/3) SAND with ses of degrading charcoal.								
(B2): Firm yellowish red (5Y) with trace of fine sand. Stror polyhedral peds.	R4/6) LIGHT MEDIUM CLA ng pedality with 10-50mm			D	9			Operator notes very stiff soil.	
				D	7			Located on 1st terrace of floodplair	1.
End of Hole @ 1.8 metres (t	arget depth).								
I								ENVIRONMENTAL EARTH SCIENCES THE KNOW AND THE HOW	
	Disturbed Undisturbed Moisture M=Moist D=Dry S=Saturated STRATIGRAPHY (A1): Soft, dark brown (7.5Y black sand, weak pedality w peds. (A2/B1): Firm, dark yellowish CLAY with large tree roots a charcoal (5%). Strong pedal peds. (B2): Dense, very pale brow occasional cobble sized piec Apedal. (B2): Firm yellowish red (5Y with trace of fine sand. Stror polyhedral peds.	■ Disturbed ■ Undisturbed Moisture Standing Water Level Moist D=Dry S=Saturated Standing Water Level STRATIGRAPHY (A1): Soft, dark brown (7.5YR3/4) LOAM and minor fine black sand, weak pedality with 5-10mm polyhedral peds. (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. (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	Image: Disturbed Undisturbed Moisture M=Moist D=Dry S=Saturated Image: Water Strike Image: Standing Water Level Image: Standing Water Level (A1): Soft, dark brown (7.5YR3/4) LOAM and minor fine black sand, weak pedality with 5-10mm polyhedral peds. Image: Rev Prime Polyhedral	■ Disturbed Undisturbed Moisture M=Moist D=Dry S=Saturated ▼ Water Strike ▼ Standing Water Level 000000000000000000000000000000000000	Disturbed ✓ Water Strike OUN ✓ Standing Water Level OUN Moist D=Dry S=Saturated ✓ Standing Water Level Image: Construct of the standard minor fine black sand, weak pedality with 5-10mm polyhedral peds. Image: Construct of the standard minor fine black sand, weak pedality with 5-10mm polyhedral peds. Image: Construct of the standard minor fine black sand, weak pedality with 5-10mm polyhedral peds. Image: Construct of the standard minor fine black sand, weak pedality with 20-50mm polyhedral peds. Image: Construct of the standard minor fine black sandard minor fine peds. Image: Construct of the standard minor fine peds. </td <td>Disturbed ✓ Water Strike OD and in Woisture ✓ Standing Water Level OD addition STRATIGRAPHY (A1): Soft, dark brown (7.5YR3/4) LOAM and minor fine plack sand, weak pedality with 5-10mm polyhedral peds. DM 5 (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. DM 6 (B2): Dense, very pale brown (10YR7/3) SAND with occasional cobble sized pieces of degrading charcoal. Apedal. D 6 (B2): Firm yellowish red (5YR4/6) LIGHT MEDIUM CLAY with 10-50mm polyhedral peds. D 9 (B2/B3): Stiff, strong brown (7.5YR4/6) MEDIUM CLAY. D 7</td> <td>Disturbed ▼ Water Strike Undisturbed Standing Water Level MoistUre and good MoistUre and good STRATIGRAPHY and good (A1): Soft, dark brown (7.5YR3/4) LOAM and minor fine and good black sand, weak pedality with 5-10mm polyhedral DM peds. and good (A2/B1): Firm, dark yellowish brown (10YR4/4) MEDIUN DM (A2/B1): Firm, dark yellowish brown (10YR7/3) SAND with occasional cobble sized pieces of degrading charcoal. Apedal. D (B2): Dense, very pale brown (10YR7/3) SAND with occasional cobble sized pieces of degrading charcoal. Apedal. D (B2): Firm yellowish red (5YR4/6) LIGHT MEDIUM CLAY D (B2): Stiff, strong brown (7.5YR4/6) MEDIUM CLAY. D (B2/B3): Stiff, strong brown (7.5YR4/6) MEDIUM CLAY. D</td> <td>Disturbed Water Strike Standing Water Level and gradient Standing Water Level and gradient and gradient (a) gradient (b) gradient (c) gradient<td>Disturbed Image: Commentation of the property of</td></td>	Disturbed ✓ Water Strike OD and in Woisture ✓ Standing Water Level OD addition STRATIGRAPHY (A1): Soft, dark brown (7.5YR3/4) LOAM and minor fine plack sand, weak pedality with 5-10mm polyhedral peds. DM 5 (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. DM 6 (B2): Dense, very pale brown (10YR7/3) SAND with occasional cobble sized pieces of degrading charcoal. Apedal. D 6 (B2): Firm yellowish red (5YR4/6) LIGHT MEDIUM CLAY with 10-50mm polyhedral peds. D 9 (B2/B3): Stiff, strong brown (7.5YR4/6) MEDIUM CLAY. D 7	Disturbed ▼ Water Strike Undisturbed Standing Water Level MoistUre and good MoistUre and good STRATIGRAPHY and good (A1): Soft, dark brown (7.5YR3/4) LOAM and minor fine and good black sand, weak pedality with 5-10mm polyhedral DM peds. and good (A2/B1): Firm, dark yellowish brown (10YR4/4) MEDIUN DM (A2/B1): Firm, dark yellowish brown (10YR7/3) SAND with occasional cobble sized pieces of degrading charcoal. Apedal. D (B2): Dense, very pale brown (10YR7/3) SAND with occasional cobble sized pieces of degrading charcoal. Apedal. D (B2): Firm yellowish red (5YR4/6) LIGHT MEDIUM CLAY D (B2): Stiff, strong brown (7.5YR4/6) MEDIUM CLAY. D (B2/B3): Stiff, strong brown (7.5YR4/6) MEDIUM CLAY. D	Disturbed Water Strike Standing Water Level and gradient Standing Water Level and gradient and gradient (a) gradient (b) gradient (c) gradient<td>Disturbed Image: Commentation of the property of</td>	Disturbed Image: Commentation of the property of



LOCATIO	DN: Jerrys Plains	JOB No. 111029		TE	ST	P۱	ΓL(OG	: TP116	LOGGED BY:
EASTING	G: 297284.12	DRILL TYPE: Backhoe								J. Bray
NORTHI	NG: 6411757.49	DATE STARTED: 19/4/2011		CL	IEN	IT:		ŀ	Hansen & Bailey	APPROVED:
ELEVAT	ION:	DATE FINISHED: 19/04/2011								J. Hilliard
	Comple	Groundwater								
	Sample Disturbed	Water Strike			SAN	/IPL	ES		PA	GE #: 1/1
<u>(</u>	Undisturbed		U							
etres	Moisture	_ Standing Water Level	LC LC					ē		
me (M=Moist D=Dry S=Saturated		HIO		e	(Field)	(mqq)	Lev		
Depth (metres)			GRAPHIC LOG	e	Moisture	Fie	d) (b)	Water Level	COMMENTS	
De	STRATIGRAPHY		GF	Type	Mo	Hd	PID (Na		
0-			////							
-	(A1): Very soft, very dark gr CLAY LOAM with trace of fi	ne sand; with roots,								
	becoming slightly red. Weal				D	6				
-									Clear, wavy boundary	
-	(B2): Firm, dark yellowish b LOAM, sandy with minor roo	own (10YR4/6) CLAY								
	with subangular peds.									
-										
-										
.5-					D	7				
									Abrupt, smooth boundary	
-	(B3, C): Dense, white SANE pressure. Apedal.), that crumbles under thuml	P						Very hard to excavate	
-	pressure. Apeual.								Weathered sandstone	
-										
-										
1_	(C): Very dense, strong brow	wn (7.5YR4/6) SAND.		_						
	Apedal.								Weathered sandstone	
-					D	8				
-										
-										
-										
1.5-										
-										
						8				
-										
-										
2-	End of Hole @ 2.0 metres (arget depth)	nga si		L	L	L	L	1	
									ENVIRONMENTAL	
									THE KNOW AND THE HOW	_
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LOCATI	ON: Jerrys Plains	JOB No. 111029		TE	ST	P۱٦	ΓLO	ЭG	: TP117	LOGGED BY:
EASTIN	G: 298251.54	DRILL TYPE: Backhoe								J. Bray
NORTHI	NG: 6412366.42	DATE STARTED: 19/4/2011		CL	IEN	IT:		ŀ	Hansen & Bailey	APPROVED:
ELEVAT	ION:	DATE FINISHED: 19/04/2011								J. Hilliard
	1	-		· · · ·					I	<u>.</u>
	Sample Disturbed	Groundwater Vater Strike	(7)		SAN	/IPL	ES		- PA	GE #: 1/1
Depth (metres)	Moisture M=Moist D=Dry S=Saturated	_ Standing Water Level	GRAPHIC LOG		ure	ield)	PID (ppm)	Water Level		
Deptl	STRATIGRAPHY		GRA	Type	Moisture	pH (Field)	PID (Wate	COMMENTS	
0 - -	(A1): Firm, very dark greyish LOAM with roots, becoming	brown (10YR3/2) CLAY slightly red. Weak pedality.			DM	6				
-	(B1): Firm, brown LIGHT CL nodules. Moderate pedality.				D	6			Clear, smooth boundary	
-	(B2): Firm, very dark greyish CLAY with dark brown mottl	n brown (10YR3/2) LIGHT es.			D	7				
.5	(B2): Stiff, dark yellowish bro CLAY with white weathered and grey mottling. Moderate	sandstone gravel in profile							Abrupt, smooth boundary Very hard to excavate	
	5-20mm polyhedral peds.				D	7.5				
- - - - - -										
- - - 1.5 - - - -	grading to orange CLAY									
	(B3): Firm, brownish yellow with grey mottles and dark g Moderate pedality with 5-20	rey sandstone in profile.			D	7.5				
2-	End of Hole @ 2.0 metres (t	arget depth)				•		•		
	<u> </u>								ENVIRONMENTAL EARTH SCIENCES THE KNOW AND THE HOW	
									EARTH SCIENCES	



LOCATIO	ON: Jerrys Plains	JOB No. 111029		TE	ST	PI	ΓL(OG	: TP118	LOGGED BY:
EASTIN	G: 298442.13	DRILL TYPE: Backhoe								J. Bray
NORTHI	ING: 6411757.04	DATE STARTED: 19/4/2011		CL	IEN	IT:		ŀ	Hansen & Bailey	APPROVED:
ELEVAT	ION:	DATE FINISHED: 19/04/2011								J. Hilliard
	Sample	Groundwater			SAN	ЛРL	ES			•
	Disturbed	Vater Strike							PA	GE #: 1/1
es)	Undisturbed	Standing Water Level	00							
netr	Moisture						(L	evel		
L L	M=Moist D=Dry S=Saturated		H		ture	Lie C	(ppr	er L	COMMENTS	
Depth (metres)	STRATIGRAPHY		GRAPHIC LOG	Type	Moisture	pH (Field)	PID (ppm)	Water Level	COMMENTS	
0	(A1): Soft, olive brown (2.5Y fine sand and roots. Weak p \polyhedral peds.	(4/4) SANDY LOAM with bedality with 2-10mm			DM	7			Gradual, smooth boundary	
-	(A2): Soft, dark brown (10Y) roots with subangular peds.	R3/3) SILTY CLAY with			DM	6.5			About create boundary	
-	(B2): Firm, strong brown (7. black mottles. Moderate peo polyhedral peds.	5YR4/6) HEAVY CLAY with lality with 10-30mm			DM	6			Abrupt, smooth boundary	
.5-	(B2): Firm, light brown/yello pedality.	w LIGHT CLAY. Moderate			D	7			Gradual, smooth boundary	
									Very hard to excavate	
-										
1	- - -									
-	(B3/C): Stiff, brownish yellov	w (10YR6/6) CLAYEY							Gradual smooth boundary	
-	SAND which crumbles unde	r thumb pressure. Apedal.							Weathered sandstone	
-	-				D	7.5			Encountered old borehole in corner	of test pit
-	End of Hole @ 1.4 metres (refusal on large boulder).	<u>radiationalis</u>							
1.5-	-									
-										
-										
	-									
-	-									
2-										
									ENVIRONMENTAL EARTH SCIENCES THE KNOW AND THE HOW	
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VVIRONME										

LOCATIO	DN: Jerrys Plains	JOB No. 111029		TE	ST	P۱٦	ΓL(ЭG	: TP119	LOGGED BY:
EASTING	G: 298232.30	DRILL TYPE: Backhoe								J. Bray
NORTHI	NG: 6410866.76	DATE STARTED: 19/4/2011		CL	IEN	IT:		ŀ	Hansen & Bailey	APPROVED:
ELEVATI	ION:	DATE FINISHED: 19/04/2011								J. Hilliard
	Sample	Groundwater			SAN	/IPL	ES		PA	GE #: 1/1
	Disturbed Undisturbed	Water Strike	U							02 //. 1/1
etres	Moisture	_ Standing Water Level	LO LO					<u> </u>		
u€	M=Moist D=Dry S=Saturated		HO H		e	(ple	(mq	Lev		
Depth (metres)			GRAPHIC LOG	Type	Moisture	pH (Field)	PID (ppm)	Water Level	COMMENTS	
D	STRATIGRAPHY		9 D	Tyl	ž	Hd	ЫЦ	Ň		
0 - - - - - -	 (A1): Firm, dark brown (7.5Y minor dark red mottling. Weat (B2): Stiff, dark brown (10YF vertical cracking (up to 1cm) 5-50mm polyhedral peds. 	ak pedality. R3/3) MEDIUM CLAY,			M D	5.5 7			Clear, smooth boundary Cracks extend to the surface but de with height, likely due to surface co from livestock grazing	
	(B2): LIGHT CLAY with grey	mottles. Weak pedality wit	h///		м	6			Abrupt, wavy boundary	
.5-	5-10mm polyhedral peds.				IVI	0			Very abrupt, smooth boundary	
- - - - - -	(B2): Very stiff, light olive broken HEAVY CLAY with white we Strong pedality with 2-10mm	athered rock in profile.			DM	8				
- - - - - - - - - - - - - - - - - - -	(C): Profile dominated by gre with small (5cm) bands/layer mottling.	ey weathered SANDSTONE rs of orange/dark brown			D	8			Clear, smooth boundary	
2-	End of Hole @ 1.9 metres (t	arget depth).								
									ENVIRONMENTAL EARTH SCIENCES THE KNOW AND THE HOW	I



LOCATIO	DN: Jerrys Plains	JOB No. 111029		TE	ST	P۱٦	ΓLC)G	: TP120	LOGGED BY:
EASTING	G: 298568.48	DRILL TYPE: Backhoe								J. Bray
NORTHI	NG: 6408992.70	DATE STARTED: 20/04/2011		CL	IEN	IT:		ŀ	Hansen & Bailey	APPROVED:
ELEVATI	ON:	DATE FINISHED: 20/04/2011		1					-	J. Hilliard
									1	
	Sample	Groundwater			SAN	/IPL	ES			
	Disturbed	▼ Water Strike							PAG	GE #: 1/1
es)	Undisturbed		0							
Jetr	Moisture		CL			(F)	ĉ	evel		
u u	M=Moist D=Dry S=Saturated		L H		nre	ielo	(mqq)	rLe		
Depth (metres)	STRATIGRAPHY		GRAPHIC LOG	Type	Moisture	pH (Field)	PID (Water Level	COMMENTS	
			U	ŕ	Σ	þ	₽.	\$		
0-	(A1): Soft, dark brown (7.5Y	(R3/4) I OAM with loam and								
	roots. Weak pedality with 5-	10mm polyhedral peds.			D	5.5				
									Clear, smooth boundary	
-	(B1): Stiff, reddish brown (5								Possible leaching in A2 layer	
	roots (<5%). Strong pedality	/.								
	(B2): Stiff, dark orange/brow				М	6				
	pedality.									
-										
.5-	(B2): Firm, orange/grey CLA	Y LOAM. sandy. Moderate							Diffuse, smooth boundary	
	pedality.	,, ,		_						
-										
-					D	7				
-										
-										
-										
1-	(B2): Firm, strong brown (7.	5YR5/6) MEDIUM CLAY								
	with fine sandstone gravels.	Moderate pedality with			D	7				
	5-20mm polyhedral peds.					ľ				
-										
	(D2). Ore dire a te une etherned		· · · · · · · ·						Diffuse, smooth boundary	
-	(B3): Grading to weathered	grey/orange SANDSTONE.								
1.5-			· · · · · · · · · ·		D	7				
			· · · · · · · · · ·			<i>'</i>				
-										
-			· · · · · · · · · · · ·							
-										
2										
2	End of Hole @ 2.0 metres (target depth).								
									THE KNOW AND THE HOW	

LOCATIO	DN: Jerrys Plains	JOB No. 111029		TE	ST	PI	ΓLO	ЭG	: TP121	LOGGED BY:
EASTIN	G: 300216.47	DRILL TYPE: Backhoe		1						J. Bray
NORTHI	NG: 6408766.48	DATE STARTED: 20/04/2011		CL	IEN	IT:		ŀ	Hansen & Bailey	APPROVED:
ELEVAT	ION:	DATE FINISHED: 20/04/2011		1						J. Hilliard
									1	
	Sample	Groundwater			SAN	ЛРL	ES			OF # 1 /1
	Disturbed	Water Strike	(7)						ГА 	GE #: 1/1
res)	Undisturbed		ŏ					_		
met	Moisture		l □		0	p	Э Ш	eve		
th (M=Moist D=Dry S=Saturated		AP+	0	sture	Eiel	dd)	er L	COMMENTS	
Depth (metres)	STRATIGRAPHY		GRAPHIC LOG	Type	Moisture	pH (Field)	PID (ppm)	Water Level	o o miliziti o	
0-				'				-		
- 0	(A1): Soft, very dark brown ((7.5YR3/2) SILTY LOAM			DM	6.5				
-	with roots. Weak pedality wi peds.	th 10-30mm polyhedral								
-	pouo.								Clear, smooth boundary	
	(A1): Firm, dark brown (7.5)	(R3/4) LIGHT CLAY (slightl	у///		D	7				
-	lighter than surrounding laye 10-30mm polyhedral peds.	ers). Moderate pedality with	HA			·			Clear, smooth boundary	
-	(B2): Stiff, very dark greyish	brown (10YR3/2) LIGHT							Cracks extend to the surface but do with height, likely due to surface co	
-	MEDIUM CLAY with vertical	cracks >1cm.			D	7			from livestock grazing	mpaction
.5-						'			Gradual, smooth boundary	
-	(B2): Stiff brown MEDIUM C occasional white mottles and	LAY with black and								
-	Strong pedality.									
-										
-										
-										
					D	8				
1-						ľ			Diffuse, smooth boundary	
-										
-										
-										
-										
-										
	(B2): Stiff, dark brown (7.5Y	R3/4) MEDIUM CLAY with								
1.5-	white mottles derived from v Moderate pedality with 5-20	vhite weathered sandstone. mm polyhedral peds								
-	Moderate pedanty with 5-20	min polyneural peus.								
-										
-					D	8				
	End of Hole @ 1.8 metres (r	refusal on very stiff CLAY).			1	I	L	I	<u> </u>	
	_	. ,								
-										
2-										
									ENVIRONMENTAL	
									EARTH SCIENCES	
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LOCATI	ON: Jerrys Plains	JOB No. 111029		TE	ST	PI	T L(OG	: TP122	LOGGED BY:
EASTIN	G: 300179.82	DRILL TYPE: Backhoe								J. Bray
NORTHI	ING: 6409828.35	DATE STARTED: 20/04/2011		CL	IEN	IT:		ŀ	Hansen & Bailey	APPROVED:
ELEVAT	TON:	DATE FINISHED: 20/04/2011								J. Hilliard
	Sample Disturbed	Groundwater			SAN	ЛРL	.ES		PA	GE #: 1/1
Depth (metres)	Undisturbed Moisture M=Moist D=Dry S=Saturated	✓ Standing Water Level	GRAPHIC LOG		ure	ield)	(mdd	Water Level		
Depth	STRATIGRAPHY		GRAI	Type	Moisture	pH (Field)	PID (ppm)	Wate	COMMENTS	
0	(A1): Soft, very dark greyish LOAM with roots.	brown (10YR3/2) SANDY			DM	7			Clear, smooth boundary	
	(B1): Firm, dark brown (7.5) with minor roots and modera peds.	(R3/4) CLAY LOAM, sandy ate pedality with subrounded			D	6				
.5	(B2): Stiff, yellow/brown ME red mottles and fine sand. S	DIUM CLAY with grey and trong pedality.			D	8			Clear, smooth boundary	
	White sandstone coarse gra	vel in profile.							Gradual, smooth boundary	
	(B3): Dense, light, yellowish SAND with yellow mottling.	brown (2.5Y6/4) LOAMY			D	8			Weathered sandstone	
1.5— - - - - -	End of Hole @ 1.8 metres (t	araet denth)				0				
2-		, , , , , , , , , , , , , , , , , , ,								
	I								ENVIRONMENTAL EARTH SCIENCES THE KNOW AND THE HOW	

LOCATIO	DN: Jerrys Plains	JOB No. 111029		TE	ST	PI	T L(OG	: TP123	LOGGED BY:
EASTING	G: 299421.84	DRILL TYPE: Backhoe								J. Bray
NORTHI	NG: 6410822.90	DATE STARTED: 19/4/2011		CL	IEN	IT:		ŀ	Hansen & Bailey	APPROVED:
ELEVAT	ION:	DATE FINISHED: 19/04/2011								J. Hilliard
	Sample Disturbed	Groundwater ▼ Water Strike			SAN	/PL	ES	1	PA	GE #: 1/1
s)	Undisturbed	✓ Standing Water Level	ŋ							
etre	Moisture							vel		
m) (M=Moist D=Dry S=Saturated		HC		nre	ield	- mdc	r Le		
Depth (metres)	STRATIGRAPHY		GRAPHIC LOG	Type	Moisture	pH (Field)	PID (ppm)	Water Level	COMMENTS	
0-	(A1): Soft, dark brown (7.5Y	R3/2) CLAY LOAM with								
	roots (5%). Weak pedality w subrounded peds.	ith 2-5mm polyhedral and			M	6				
-	(B1): Firm, yellowish brown	(5YR4/6)								
	MEDIUM CLAY. Moderate p				М	6			Abrupt, smooth boundary	
-	polyhedral peds. (B2): Soft, brown SANDY C	AV with fine cand (derived							Gradual, smooth boundary	
-	from white weathered rock in	nclusions), with black								
	charcoal nodules.				DM	6				
.5-	(B2): Firm yellowish brown (10YR5/4) LIGHT CLAY with							Clear, smooth boundary	
-	trace of fine sand and grey r sandstone gravels. Weak pe	nottles and fine subangular		_						
-	polyhedral peds.	edality with 2-5mm								
-					DM	7				
_										
-										
1-										
-										
-										
-										
-	(B2): Soft, yellowish brown (Gradual, smooth boundary	
-	Weak pedality.	TUTRO/O) SANDT LOAM.								
1.5-					DM	8				
-										
-										
-										
2-	End of Hole @ 2.0 metres (t	arget depth).	V///		L			L		
	2	,								
									ENVIRONMENTAL EARTH SCIENCES THE KNOW AND THE HOW	
									THE KIND WE HOW	



LOCATIO	ON: Jerrys Plains	JOB No. 111029		TE	ST	PI	ΓL(OG	: TP124	LOGGED B
EASTING	G: 299898.83	DRILL TYPE: Backhoe								J. Bray
NORTHI	NG: 6411936.30	DATE STARTED: 19/4/2011		CL	IEN	IT:		ŀ	Hansen & Bailey	APPROVED
ELEVATI	ION:	DATE FINISHED: 19/04/2011								J. Hilliard
	Sample	Groundwater			C A A	ЛРL				
	Disturbed	_ Water Strike			SAN	/IPL	E9		PA	GE #: 1/1
(si	Undisturbed	Standing Water Level	b							
letre	Moisture		CL					vel		
h (n	M=Moist D=Dry S=Saturated		H		Inre	ield	ppn	r Le		
Depth (metres)	STRATIGRAPHY	•	GRAPHIC LOG	Type	Moisture	pH (Field)	PID (ppm)	Water Level	COMMENTS	
0-										
-	(A1): Soft, dark yellowish b SAND with roots and fine g	rown (7.5YR3/6) LOAMY rained sand								
_					DM	5				
_	(B1): Firm, yellowish brown								Clear, wavy boundary	
-						5.5				
						5.5				
-	-									
.5-	• •								Clear, wavy boundary	
-	(B2): Firm, light yellowish b CLAY LOAM with very fine	rown (2.5YR6/4) SILTY guartz sand (<10%).							···· , · · , · · · · · ,	
_										
-	-				DM	7				
_	-								Cradual amonth houndary	
]	(B2): Firm, yellowish brown	(10YR5/4) SANDY CLAY							Gradual, smooth boundary	
-	LOAM, some grey mottling. 10-20mm polyhedral peds.	inoderate pedality with								
1-										
· -	-									
-	-				DM	7				
]										
_	-									
	•									
-	(B3/C): Dense yellow/light	arey SAND with bands of							Gradual, smooth boundary	
- 1.5—	darker grey mottling. Apeda	al.							Weathered sandstone	
1.5	-								Weathered Sandstone	
-	-									
					D	8				
_	-									
-	End of Hole @ 1.8 metres ((target depth).								
2-	-									
]										
									ENVIRONMENTAL	
									THE KNOW AND THE HOW	

LOCATIO	DN: Jerrys Plains	JOB No. 111029		TE	ST	P۱	T L(OG	: TP125	LOGGED BY:
EASTING	G: 299268.11	DRILL TYPE: Backhoe								J. Bray
NORTHI	NG: 6412538.82	DATE STARTED: 19/4/2011		CL	IEN	IT:		ŀ	Hansen & Bailey	APPROVED:
ELEVAT	ION:	DATE FINISHED: 19/04/2011								J. Hilliard
		• 							Ι	
	Sample	Groundwater			SAN	/IPL	ES			GE #: 1/1
	Disturbed	Vater Strike	0							02 #. 1/1
res	Undisturbed		l õ					_		
met	Moisture		Q Q		0	(p	Ω.	eve		
th (M=Moist D=Dry S=Saturated		GRAPHIC LOG	۵.	sture	Lie Lie	dd)	er L	COMMENTS	
Depth (metres)	STRATIGRAPHY		GR	Type	Moisture	pH (Field)	PID (ppm)	Water Level		
0-										
	(A1): Soft, brown SILTY CL/ pedality.	AY LOAM with roots, weak			DM	6				
-	(B1): Stiff, dark brown MEDI	UM CLAY with verv fine							Gradual, smooth boundaries throug	ghout
	ironstone gravel. Strong peo	lality.			D	6				
-	(B1): Stiff, dark brown (7.5Y minor vertical and diagonal	R3/2) HEAVY CLAY with								
-	pedality.				DM	7				
-										
.5-	(B2): Firm, brown/dark red L	IGHT MEDIUM CLAY with								
	black mottles with white wea	athered sandstone in		_						
-	profile. Moderate pedality.									
-					D	7				
-										
-										
- 1-	Minor red ironstone with qua	artz cand (<10%) optoring								
	profile.	anz sanu (< 10%) entening								
-										
-	(B2): Very stiff, yellowish bro									
	CLAY with black nodules (p	ossibly manganese) and								
	coarse ironstone sand (<5%). Strong pedality.								
1.5-										
-										
-										
-										
					D	5				
-										
2-	End of Hole @ 2.0 metres (t	arget depth).	<u> </u>		1	L	I	I	1	
	C (0 1 /								
									ENVIRONMENTAL	
									THE KNOW AND THE HOW	-



LOCATION: Jerrys Plains		JOB No. 111029		TEST PIT LOG: TP126						LOGGED BY:		
EASTING: 301463.72		DRILL TYPE: Backhoe								J. Bray		
NORTHING: 6410551.03		DATE STARTED: 20/04/2011		CLIENT:				ŀ	Hansen & Bailey	APPROVED:		
ELEVATION:		DATE FINISHED: 20/04/2011	DATE FINISHED: 20/04/2011							J. Hilliard		
Sample		Groundwater			SAMPLES							
Depth (metres)	Disturbed	▼ Water Strike							PA	PAGE #: 1/1		
	Undisturbed	_ Standing Water Level	GRAPHIC LOG									
	Moisture					(F)	Ē	evel				
	M=Moist D=Dry S=Saturated		HU		ture	Field	(ppr	er L	COMMENTS			
Depi	STRATIGRAPHY			Type	Moisture	pH (Field)	PID (ppm)	Water Level	COMMENTS			
0-	(A1): Soft, very dark greyish LOAM with roots and minor	brown (10YR3/2) SILTY			DM	7						
-	(A2): Soft, dark brown (10YR3/3) SANDY LOAM with											
_	roots. Strong pedality with 1	0-50mm polyhedral peds.			D	6			Evidence of water leaching			
-	-											
_	(B2): Firm red/brown LIGHT								Clear boundary			
_	mottles, and minor coarse s cracks (<0.5cm). Moderate											
-	peds.	pedality with Subarigular										
.5-												
-	-			1								
-	-			1					De ete de la companya ent			
_	(B2): Very stiff, dark yellowi							Roots no longer present				
-	MEDIUM CLAY with grey m pedality with 10-20mm poly	ottles and roots. Strong hedral peds.										
-					D	8						
_												
1—	-											
-	Becoming slightly darker in colour											
_	Becoming slightly darker in colour			1								
-	End of Hole @ 1.2 metres (bucket refusing on very stiff	[///									
_	clay).	<u>.</u>										
-	-											
-												
1.5-												
-	-											
-												
_												
-	-											
_												
-												
-	-											
2-												
	1											
									ENVIRONMENTAL			
									THE KNOW AND THE HOW			
IVIRONME RTH SCIE												

LOCATION: Jerrys Plains JOB No. 111029				TEST PIT LOG: TP127 LOGGED BY:						
EASTING: 301546.47 DRILL TYPE: Backhoe				1						J. Bray
		DATE STARTED: 20/04/2011		CL	CLIENT: Hansen & Bailey				Hansen & Bailey	APPROVED:
		DATE FINISHED: 20/04/2011		1					J. Hill	
Sample Groundwater				SAMPLES						
	Disturbed	▼ Water Strike							PAG	GE #: 1/1
Depth (metres)	Undisturbed	Standing Water Level	g			eld)	(md			
	Moisture	<u> </u>	LC LC		lre			vel /		
	M=Moist D=Dry S=Saturated		GRAPHIC LOG					Le		
pth				e	Moisture	pH (Field)	PID (ppm)	Water Level	COMMENTS	
ă	STRATIGRAPHY		5	Type						
0-				_						
-	(A1): Firm, very dark brown ((10YR2/2) LOAM with			D	7			Clear, smooth boundary	
-	roots. Weak pedality with 5-10mm polyhedral peds. (B1): Very stiff, very dark brown (7.5YR3/2) MEDIUM		11						Cracks extend to the surface but de	crease
	HEAVY CLAY with slightly lightly light	HEAVY CLAY with slightly lighter mottles, vertical			D	6			with height, likely due to surface co	mpaction
_	cracking (<1cm). Strong pedality with 20-50mm polyhedral peds.								from livestock grazing	
-	(B2): Stiff, very dark greyish	brown (10YR3/2) MEDILIM			D	6			Clear, smooth boundary Cracking to 0.5m Very little root activity beyond 0.5m	
-	HEAVY CLAY with small roc	ts and occasional red								
-	sandstone sand (<1%), verti	cal cracking (between 0.5							Very Intie root activity beyond 0.5m	
.5-	peds.	and 1.5cm). Strong pedality with 15-30mm polyhedral								
-	(B2): Very firm, red/brown M	EDIUM CLAY with orange			D	7				
-	and red mottles to 0.6m. Stro	ong pedality.							Abrupt, smooth boundary	
-										
-										
1-										
-	Becoming browner (B2): Stiff, strong brown (7.5YR4/6) MEDIUM CLAY witl									
-									Diffuse, smooth boundary	
	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 (ta	arget depth).								
2-										
ENVIRONMENTAL										
									THE KNOW AND THE HOW	



LOCATION: Jerrys Plains JOB No. 111029			TEST PIT LOG: TP128 LOGGED BY:							
EASTING: 300562.48 DF		DRILL TYPE: Backhoe								J. Bray
NORTHING: 6412696.32		DATE STARTED: 20/04/2011	DATE STARTED: 20/04/2011		IEN	IT:		ŀ	Hansen & Bailey	APPROVED:
ELEVATION:		DATE FINISHED: 20/04/2011	DATE FINISHED: 20/04/2011							J. Hilliard
	Sample	Groundwater			SAN	SAMPLES			PA	GE #: 1/1
Depth (metres)	Disturbed	Water Strike	U						02 //. 1/1	
		_ Standing Water Level	LO L		Moisture	pH (Field)	PID (ppm)	<u>_</u>		
	Moisture M=Moist D=Dry S=Saturated		GRAPHIC LOG	be				Lev	COMMENTS	
pth			AP					Water Level		
De	STRATIGRAPHY		ß	Type				M		
0-	(A1): Soft, CLAY LOAM, wit	h roots (10%) Weak	////							
	pedality with polyhedral ped	S.			DM	6				
	(A2): Firm, brown-dark brown (7.5YR4/4) CLAY LOAM								Clear, smooth boundary	
-										
	with roots (<2%) and sub-ro	unded peds.			D	7			Clear, smooth boundary	
-	(B2): Soft, brownish yellow (LOAM, with fine gravel. Mod	(10YR6/6) SANDY CLAY							Clear, Shiotir Doundary	
-	10-20mm polyhedral peds.	Organic matter noted.				-				
.5-					DM				Gradual, smooth boundary	
-	(B2): Soft yellow/light brown coarse sandstone gravel. W	Ilow/light brown CLAY LOAM with very								
-		our poduity.								
-										
-	Coarse gravel to 0.9m									
-										
1-										
-										
	(B2): Very coarse orange G	AVEL with small							Diffuse, smooth boundary	
-	sandstone cobbles. Apedal.									
-										
1.5-					D	7				
-										
-										
-										
-										
2-										
End of Hole @ 2.0 metres (target depth).										
									ENVIRONMENTAL	
									EARTH SCIENCES	
LOCATIO	DN: Jerrys Plains	JOB No. 111029		TE	ST	P۱٦	ΓLC	CG	: TP129	LOGGED BY:
---	--	---	-------------	------	-------------	--------------------	-----------	-------------	--	-------------
EASTING	G: 302006.96	DRILL TYPE: Backhoe								J. Bray
NORTHI	NG: 6414192.7	DATE STARTED: 20/04/2011		CL	IEN	IT:		ŀ	Hansen & Bailey	APPROVED:
ELEVAT	ON:	DATE FINISHED: 20/04/2011								J. Hilliard
	Sample	Groundwater			SAN	/IPL	ES		PA	GE #: 1/1
	Disturbed Undisturbed	Water Strike	U							,
etres	Moisture	_ Standing Water Level	LO					e		
ů,	M=Moist D=Dry S=Saturated		¥		le	eld)	, md	Lev		
Depth (metres)			GRAPHIC LOG	Type	Moisture	pH (Field)	PID (ppm)	Water Level	COMMENTS	
ă	STRATIGRAPHY		Ū	Ţ	ž	q	Ē	Š		
- - - - - - - - - - - - - - - - - - -	MEDIUM CLAY with roots (5 ironstone gravel (<1%). Stro polyhedral peds. (A1): Very stiff, very dark bro HEAVY CLAY. Moderate pe polyhedral peds. (B1): Stiff, dark brown (10YF dark grey mottles, angular p black sand. Strong pedality v peds. (B2): Stiff, dark brown (7.5YI Moderate pedality with 5-200 polyhedral peds. (B2): Grading to firm, strong CLAY with grey and brown r ironstone gravel.	ng pedality with 5-20mm wwn (10YR2/2) MEDIUM dality with 5-20mm R3/3) HEAVY CLAY with eds, roots (<5%) and fine with 10-50mm polyhedral R3/4) HEAVY CLAY. mm brown (7.5YR4/6) HEAVY			D D D	8 7 5 5.5			Clear, smooth boundary Clear, smooth boundary Abrupt, smooth boundary Abrupt, smooth boundary	
- - - - - - - - - - - - - - - - - - -	(B2): Firm grey LIGHT CLAY siltstone that increases in co pedality.	ntent with depth. Moderate			D	6				
	End of Hole @ 2.0 metres (t	arget depth).								
									ENVIRONMENTAL EARTH SCIENCES THE KNOW AND THE HOW	



IJ

LOCATIO	ON: Jerrys Plains	JOB No. 111029		TE	ST	P۱	ΓL(OG	: TP130	LOGGED BY:
EASTING	G: 301949.72	DRILL TYPE: Backhoe								J. Bray
NORTHI	NG: 6414689.32	DATE STARTED: 20/04/2011		CL	IEN	IT:		ŀ	Hansen & Bailey	APPROVED:
ELEVAT	ION:	DATE FINISHED: 20/04/2011								J. Hilliard
	Sample	Groundwater	1		~ ^ ^ ^	401				
	Disturbed	Water Strike			SAN	ЛРL I	ES		PA	GE #: 1/1
s)	Undisturbed	✓ Standing Water Level	ß							
etre	Moisture							Vel		
m) (M=Moist D=Dry S=Saturated		H		nre	ield	bpm	rLe		
Depth (metres)	STRATIGRAPHY		GRAPHIC LOG	Type	Moisture	pH (Field)	PID (ppm)	Water Level	COMMENTS	
0-	(A1): Soft, very dark brown				ДМ	7				
-	with sub-rounded peds and (B1): Very firm, very dark gr									
-	with roots (<5%) and fine inc fine cracking. Moderate peo	onstone gravel (<5%) and			D	6.5			Clear, wavy boundary	
-	(B2): Very firm, dark brown	(10YR3/3) LIGHT CLAY			D	8			Clear, smooth boundary	
-	with minor red mottles,black	motiles and minor sand.								
.5-									Gradual, smooth boundary	
-	Black charcoal layer at 0.6n	٦.								
-										
-										
-										
1	(B2): Firm, dark brown (10Y) with pink/grey sandstone co	bbles and some black/dark							Clear, wavy boundary	
-	brown mottles. Moderate pe polyhedral peds.	edality with 5-20mm								
_					DM	6				
-										
- 1.5—										
-										
-										
_	(B2): Dark brown (10YR3/3) becoming red in colour. Mo	SANDY LOAM and cobble	•//		DM	8				
-	polyhedral peds.		P////							
-	End of Hole @ 1.8 metres (target depth).								
- 2-										
2										
	1									
									ENVIRONMENTAL EARTH SCIENCES	
									THE KNOW AND THE HOW	
VIRONME										

LOCATIO	DN: Jerrys Plains	JOB No. 111029		TE	ST	PI٦	ΓLO	ЭG	: TP131	LOGGED BY:
EASTING	G: 300622.12	DRILL TYPE: Backhoe								J. Bray
	NG: 6410111.27	DATE STARTED: 20/04/2011		CL	IEN	IT:		ŀ	Hansen & Bailey	APPROVED:
ELEVAT	ION:	DATE FINISHED: 20/04/2011								J. Hilliard
	Sample	Groundwater			SAN	1PL	ES		PA	GE #: 1/1
	Disturbed	Vater Strike	(7)							02 #. 1/1
tres	Undisturbed	_ Standing Water Level	ĽÕ					-		
(me	Moisture M=Moist D=Dry S=Saturated		₽		e	(pl	(m	-eve		
Depth (metres)			GRAPHIC LOG	e	Moisture	pH (Field)	PID (ppm)	Water Level	COMMENTS	
De	STRATIGRAPHY		GR GR	Type	Mo	Ηd	ЫП	Wa		
0-	(A1): Soft, very dark brown	(10YR2/2) SILTY LOAM	777							
	with yellow mottles and root	s. Weak pedality with								
-	10-30mm polyhedral peds.				DM	6			Clear, smooth boundary	
-	(B2): Medium dense, dark b	rown (10YR3/3) I OAMY								
	SAND with dark brown mott	les. Moderate pedality with								
-	5-20mm polyhedral peds.									
-						7				
.5-					D	1			Clear, smooth boundary	
-	(C): Weathered grey SANDS	STONE.								
					D	7				
-										
-										
-										
- 1-										
-	End of Hole @ 1.0 metres (I	efusal in bedrock).								
-										
-										
-										
-										
1.5-										
-										
-										
-										
2-										
									ENVIRONMENTAL	
									THE KNOW AND THE HOW	-





LOCATION: Jerry's Plains, NSW							Tes	t Pit L					Logged by:
SURFACE ELEVATION:	JO	B NUMBER: 612	019				1		Т	PA 1			Daniel Robinson
GROUNDWATER: none	-	TUM:					PRO	JEC.	T:				Proj. Manager:
DRILL METHOD: Back hoe	DA	TE DRILLED: 02	2/05/20	12					DRAY	TON	SOUTI	H	Nicole Cheung
				SAMF	PLES			PID	/FID	р	н		
STRATIGRAPHY	GRAPHIC LOG	Depth metres	Disturbed	Undisturbed	Lost	Duplicate	Moisture Content	Background	Reading	pH - soil	pH - water		Comments
A1: Firm, 10YR3/2, LIGHT MEDIUM CLAY, moderately pedal, angular/blocky peds, plant roots noted B2.1: Firm, 10YR3/2, LIGHT MEDIUM CLAY, moderately pedal, cracked to <1cm diameter, blocky angular peds Grading lighter							D M/D			6.0 8.5 8.5		Gradu	al boundary al boundary al boundary
EOH at 1.4m /	P	- 1.40											
		- 1.50 - 1.60 - 1.70 - 1.80 - 2.00 - 2.00 - 2.10 - 2.20 - 2.30 - 2.20 - 2.30 - 3.00 - 3.30 - 3.30											





LOCATION: Jerry's Plains, NSW							Tes	t Pit l		PA 2			Logged by: Daniel Robinson
SURFACE ELEVATION: GROUNDWATER: none		B NUMBER: 612 TUM:	2019				00/			FA Z			
DRILL METHOD: Back hoe		TE DRILLED: 02	2/05/20	12			PRO	DJEC	I: DRAY		SUIUS	ч	Proj. Manager: Nicole Cheung
Stale method. Datk not			_,						DIVA I	1011	5501		
				SAM	PLES		Ŧ	PID	/FID	р	н		
	g	S		-			Moisture Content	-					
STRATIGRAPHY	IC L	metro	bed	urbe		ate	Le C	juno.	g	-	ater		Comments
	GRAPHIC LOG	Depth metres	Disturbed	Undisturbed	Lost	Duplicate	oistu	Background	Reading	pH - soil	pH - water		
	5	ő	ö	5	Ľ	ă	ž	ä	Å	흐	ЪЧ		
A1: Loose, 7.5YR4/4, CLAYEY SAND, apedal, fine	1	_ —0.10											
grained sand, plant roots noted		_ —0.20					M/D			5.5			
	~	0.30										Clear	houndar.
B2:	17	_										Clear	boundary
Firm, 7.5YR5/6, SANDY CLAY, moderately pedal, polyhedral peds, subangular	1	0.40 											
medium/coarse grained sand	11	—0.50 -											
	1 j	—0.60 —			I		M/D			5.5			
	1	0.70 											
Becoming lighter	1 j	—0.80											
	1 j	0.90											
<u></u>	1.13											Gradu	al boundary
C: Weathered SANDSTONE, large pieces coarse		- —1.10											
grains		_ 1.20											
	-	_ —1.30											
	- 33333	_ 1.40											
		_					D			6.0			
		— 1.50 —											
		—1.60 -											
		—1.70 —											
		—1.80 _											
		—1.90											
EOH at 2.0m		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											





LOCATION: Jerry's Plains, NSW							Test	t Pit L					Logged by:
SURFACE ELEVATION:	-	3 NUMBER: 612	2019]		Т	PA 3			Daniel Robinson
GROUNDWATER: none	DAT	ГUМ:					PRC	JEC.	Г:				Proj. Manager:
DRILL METHOD: Back hoe	DAT	TE DRILLED: 02	2/05/20	12					DRAY	TON	SOUTI	1	Nicole Cheung
				SAM	PLES			PID	/FID	р	н		
STRATIGRAPHY	GRAPHIC LOG	Depth metres	Disturbed	Undisturbed	Lost	Duplicate	Moisture Content	Background	Reading	pH - soil	pH - water		Comments
A1: Firm, 10YR5/4, LIGHT MEDIUM CLAY, moderately pedal, polyhedral peds, plant roots noted 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		-0.10 -0.20 -0.30 -0.40 -0.50 -0.60 -0.70					M/D			7.0 9.0	_		al boundary ng to 0.8m
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		-0.80 					M/D			8.5			al boundary
C: Weathered SHALE		- 1.30 - 1.40 - 1.50 1.60 1.70 1.80 1.90 2.00					M/D			8.0		Gradu	al boundary
EOH at 2.0m		-2.00 -2.10 -2.20 -2.30 -2.40 -2.50 -2.60 -2.70 -2.80 -3.10 -3.20 -3.30											





LOCATION: Jerry's Plains, NSW							Tes	t Pit L					Logged by:
SURFACE ELEVATION:	-	B NUMBER: 612	2019							PA 4			Daniel Robinson
GROUNDWATER: none	-	TUM:					PRC	DJEC.					Proj. Manager:
DRILL METHOD: Back hoe	DA	TE DRILLED: 02	2/05/20)12					DRAY	TON	SOUT	Н	Nicole Cheung
				SAM	PLES		t	PID	/FID	р	н		
	g	s					Moisture Content	-					
STRATIGRAPHY	lic L	netr	ed	urbe		ate	re C	uno	g	=	ater		Comments
	GRAPHIC LOG	Depth metres	Disturbed	Undisturbed	Lost	Duplicate	istur	Background	Reading	pH - soil	pH - water		
	5	De	ö	'n	Lo	Du	Mo	Ba	Re	Hd	Hď		
A1: Firm, 7.5YR3/2, LIGHT CLAY, moderately pedal,	2	_ —0.10					M/D			5.5			
polyhedral peds, minor subrounded quartz	1											Gradu	al boundary
gravel <0.2cm, plant roots noted	H	-					D			6.5			ned appearance
A2: Soft, 7.5YR4/4, SANDY CLAY, weakly pedal,	1D	—0.30 -										Clear I	boundary
subrounded coarse sand grains	1	—0.40 —											
B2: Very firm, 7.5YR4/6, SANDY CLAY, moderately	1	—0.50 -											
pedal, angular/columnar peds, coarse subrounded sand grains, black inclusions	H	0.60											
present	11	—0.70											
	1)	0.80											
	14	0.90								- 0			
	1)	_ 1.00					M/D			5.0			
	H	- —1.10											
	1	_ —1.20											
	L.	_ —1.30											
Increasing in black inclusions, metallic sheen, minor grey mottles appearing	1)	_ 1.40					M/D			5.0			
	1	_ 1.50					111/0			0.0			
	1	1.60											
	1	_											
	14	— 1.70 -											
	1.	—1.80 -											
	17	—1.90 -											
EOH at 2.0m		2.00											
/		2.10											
		2.20											
		_ 2.30											
		_ 2.40											
		_ 2.50											
		_ 2.60											
		2.70											
		2.80											
		2.90											
		_											
		-3.10											
		3.20 _											
		3.30 _											
		3.40											





LOCATION: Jerry's Plains, NSW							Tes	t Pit l	_og:				Logged by:
SURFACE ELEVATION:	JO	B NUMBER: 612	2019				1		-	PA 6			Daniel Robinson
GROUNDWATER: none	-	TUM:					PRC	JEC	T:				Proj. Manager:
DRILL METHOD: Back hoe	DA	TE DRILLED: 02	2/05/20	12					DRAY	TON	SOUT	н	Nicole Cheung
							· · · · · ·						-
				SAMI	PLES		t.	PID	/FID	р	Н		
	g	ŵ					Moisture Content						
STRATIGRAPHY	U U	letre	g	rbec		e	မိုင်	ounc	_	_	ter		Comments
	GRAPHIC LOG	Depth metres	Disturbed	Undisturbed	÷	Duplicate	stur	Background	dinç	soi	pH - water		
	GR/	Dep	Dist	Und	Lost	Dup	Moi	Bac	Reading	pH - soil	- Hq		
A1:	2												
Firm, 7.5YR3/2,CLAY LOAM, weakly pedal,	2	—0.10					D			6.0			
polyhedral granular peds, 5% quartz grains, plant roots noted	X	_ 0.20			l								al boundary
A2:	2	2			1					8.0			ned appearance. Soapy feel
10YR5/3, LIGHT CLAY, weakly pedal, angular	Æ	—0.30 —										Clear	boundary
\peds /	2	-0.40			1		D			8.0			
B2.1: Firm, 7.5YR3/2, LIGHT MEDIUM CLAY,		0.50										Gradu	al boundary
Firm, 7.5YR3/2, LIGHT MEDIUM CLAY, lenticular peds, slickensides present, some		_ —0.60					M/D						
\ organic matter, quartz gravel <0.5cm,		-					101/12						
subrounded gravel to 2cm, plant roots		—0.70 —											
B2.2: Firm, 10YR5/4, LIGHT MEDIUM CLAY, crumbly		—0.80											
angular peds, moderately pedal, minor black		_ 0.90											
inclusions, slickensides present		_ —1.00											
		— 1.00 —					M/D			8.5			
		—1.10											
		1.20											
		_ —1.30											
		-											
		—1.40 _											
B2.3:	-	—1.50										Gradu	al boundary
Stiff, MEDIUM CLAY, moderately pedal, blocky		_ 1.60											
angular peds, grey mottles, black round		_ 1.70					M/D			8.5			
inclusions (Mn), 5% red banding <1cm		-											
		—1.80											
		_1.90											
EOH at 2.0m	1	_											
		2.10 											
		-2.20											
		_ 2.40											
		_											
		2.50											
		2.60											
		_ 2.70											
		_											
		—2.80 —											
		—2.90											
		3.00											
		_ 3.10											
		_											
		3.20											
		_3.30											
		3.40											
		3.20 3.30 3.40											





LOCATION: Jerry's Plains, NSW							Tes	t Pit L		PA 8			Logged by:
SURFACE ELEVATION:	_	B NUMBER: 612	2019					2152		rA 0			Daniel Robinson
GROUNDWATER: none	_	TUM:	0/05/20	12			PRO	OJEC.			SUIT	u	Proj. Manager:
DRILL METHOD: Back hoe	DA		2/03/20	14					UKAT	IUN	SOUT		Nicole Cheung
				SAM	PLES		ţ	PID	/FID	р	Н		
	g	ŝ		_			nten	_					
STRATIGRAPHY	L C	netre	ed	urbed		te	e Co	ouno	6	-	ter		Comments
	GRAPHIC LOG	Depth metres	Disturbed	Undisturbed	st	Duplicate	Moisture Content	Background	Reading	pH - soil	pH - water		
	6	De	Dis	'n	Lost	Du	м	Ba	Re	Нq	РН		
B2: Firm, 5YR4/6, LIGHT MEDIUM CLAY,	2	_ 0.10											
moderately pedal, polyhedral/lenticular peds,	8	1											
slickensides present, plant roots noted, angular gravel	2	—0.20 —			1		M/D			8.0			
Becoming lighter	2	—0.30											
C:		_0.40										Clear b	ooundary
Yellow/pinkish white weathered SANDSTONE		_ 0.50											
		_ 0.60											
		-											
		—0.80 —											
		0.90											
		—1.00											
		- 											
		_ —1.30											
		-											
		— 1.40 —											
EOH at 1.5m		- 1.50											
		1.60											
		1.70											
		_ 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											





LOCATION: Jerry's Plains, NSW							Tes	t Pit L					Logged by:
SURFACE ELEVATION:	-	B NUMBER: 612	019							'PA 9			Daniel Robinson
GROUNDWATER: none	-	TUM:	105100	40			PRO	OJEC.			00UT	u	Proj. Manager:
DRILL METHOD: Back hoe	DA	TE DRILLED: 02	:/05/20	12					URAY	IUN	SOUT	п	Nicole Cheung
				SAM	PLES		ţ	PID	/FID	р	н		
	g	w					Moisture Content						
STRATIGRAPHY	U C C	letre	þ	rbed		ē	°Co	pund	_		er		Comments
	GRAPHIC LOG	Depth metres	Disturbed	Undisturbed	ţ	Duplicate	stur	Background	Reading	pH - soil	pH - water		
	GR	Dep	Dist	Dnc	Lost	Dup	Moi	Bac	Rea	Hd	Hd		
A1:		_ 0.10					D			5.5			
Soft, 10YR3/4, SANDY LOAM, weakly pedal, polyhedral peds , bioturbation, plant roots noted		—0.10 —								0.0			
A2:		0.20		_								Gradu	al boundary
7.5YR5/4, CLAYEY SAND, weakly pedal,	, er	—0.30					M/D			5.0		A2 ligh	nter than A1
polyhedral peds, medium quartz grains	×,	_ 0.40										Clear I	boundary
B2: Firm, 5YR4/6, SANDY CLAY, neatly pedal,	17	_ —0.50											
blocky peds, coarse sand grains	11	0.60					M/D			4.5			
	H	-											
	1)	—0.70 —											
	G,	0.80 _											
	14	—0.90											
	1)	1.00											
	Ŋ	- 											
	Ľ,	_ —1.20											
	1 je	-											
	11	—1.30 -											
	11	—1.40 —											
	11	—1.50											
	L,	—1.60											
	G,												
	1	_ —1.80											
	11	_ 1.90											
	1 j	-											
Black inclusions	11	—2.00 —											
	11	2.10											
	11	-2.20											
	Ľ,												
	L)	_ 2.40											
	11	_ —2.50											
	11	_										Oraci	al have done.
B2.3:	17	—2.60 -					M/D			5.5		Gradu	al boundary
Firm, 2Y5/4, SANDY CLAY, grey mottles	11	—2.70 —								0.0			
	17	-2.80											
	I)	2.90											
	1)	_ 3.00											
	11	_ —3.10											
	11						M/D			6.0			
EOH at 3.2m	\wedge	_											
		—3.30 —											
		3.40											





APPENDIX D LAND CAPABILITY MAPPING RATIONALE



| | |

 |
 | | | La | nd capable of a w | vide variety of la
 | nduses (cropping | t, grazing, hortici | alture, forestry, | nature conservat
 | tion) | | |
 | | | Land capable | r of a variety of I
grazing, sor | and uses (croppin
ne horticulture, f
 | ng with restricted
orestry, nature o | cultivation, past
onservation) | ture cropping, | | |
|--|---
--
--
--
--
---|--|--
--	--	--	--
---	---	---	--
--	---	---	---
--	--	--	---
	Extremely h	igh capability lans suired. Land capa	

 | d: Land has no lin
able of all rural lar
 | vitations. No spec
ed uses and land n | cial land managem
nanagement pract | nent practices
tices | | bility land: Land
lemented manag
management prac
 | | | |
 | High capabili
uses, such as o
management | ty land: Land has n
ropping with culti
practices. Howev
intensive graz | noderate limitati
vation, using mor
ir, careful manag
ng to avoid land | ons and is capable
e intensive, readi
ement of limitati
and environment
 | e of sustaining his
ly available and v
ons is required fo
al degradation | gh-impact land
videly accepted
r cropping and | restrict land ma
grazing and | nagement option
horticulture. The | s for regular high
se limitations car
 | o high limitations
-impact land use
n only be manage
opertise, inputs, in | s such as croppin
d by specialised r | g, high intensity
management | Additional | |
| LSC Class | Loams, clay
loams or clays
(all with
>13%clays) | Slope <1% that
are shorter than
500 m in length

 | Soil Sodicity/
Dispersivity
 | 1
Salinity Hazard | Soil
Acidification
Hazard | Wind Erodibility
Class | Loams, clay
loams or clays
(all with
>13%clays) | Gradual slope 2
<3% that are
shorter than
500 m in length
 | Soil Sodicity/
Dispersivity | 2
Salinity Hazard | Soil
Acidification
Hazard | Wind
Erodibility
Class
 | Loams, clay
loams or clays
(all with
>13%clays) | Slope 3-<10%
that are longer
than 500 m in
length | Soil Sodicity/
Dispersivity | 3
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
 | 6
Salinity Hazard | Soil
Acidification
Hazard | Wind
Eredibility Class | Additional
Comments | Land Capability |
| MOTTLED | >13% clay in B
horizon so
meets criteria | SE slope of 3%
(Fail)

 | COMPLEX
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 8
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
bexture
buffering
capacity pH
(water) of 7.5
(Class 2) | Rainfall around
800mm par
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) | >13% clay in 8
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
dispension)
(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 par
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) | >13% clay in 8
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 sodi
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)
 | >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
820mm 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
besture
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 8
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
beture
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) | >13% clay in 8
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
20% (Fail)

 | Marginally sodis
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)
 | >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 par
year, low wind
erosive power
(Low wind
erodibility class) | >13% clay in 8
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
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 par
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) | >13% clay in 8
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%
(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)
Mean annual | 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
bexture
buffering
capacity pH
(water) of 8.0
8.7 (Class 1) | Rainfall around
800mm par
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) | >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)
Mean annual | 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) | rainfall around
800mm high
texture
buffering
capacity pH
(water) of 6.7 -
7.8 (Class 2)
Mean annual | 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
bixture
buffering
capacity pH
(water) of 6.7
7.8 (Class 2)
Mean annual | 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)
 | rainfall around
800mm high
texture
buffering
capacity pH
(water) of 6.7
-
7.8 (Class 2)
Mean annual | Rainfall around
820mm per
year, low wind
erosive power
(Low wind
erodibility class) | >13% clay in 8
horizon so
exceeds criteria | NNW slope of
15% (Pass) | Field indication
of soil
dispersion
 | Moderate
recharge and
discharge
potential low
salt store (Class
2) | rainfall around
800mm high
bexture
buffering
capacity pH
(water) of 6.7
7.8 (Class 2)
Mean annual | 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) | rainfall around
800mm very
high texture
buffering
capacity pH
(water) of 8.6 | 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
dispension)
(Class 3) | Moderate
recharge and
discharge
potential low
salt store (Class | rainfall around
800mm very
high texture
buffering
capacity pH | Rainfall around
800mm per
year, low wind
erosive power
(Low wind
erodibility
 | >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
 | rainfall around
800mm very
high texture
buffering
capacity pH
(water) of 8.6 | Rainfall around
800mm per
year, low wind
erosive power
(Low wind | >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 | rainfall around
800mm very
high texture
buffering
capacity pH | Rainfall around
800mm per
year, low wind
erosive power
(Low wind
erodibility class) | Large cobbles
and
outcropping
rock so reduced
capability | 7 |
| | |

 |
 | | (Class 1) | | |
 | | 2) | (water) of 8.6
(Class 1) | class)
 | | | | 2)
 | (Class 1) | erodibility class) | - | |
 | 2) | (water) of 8.6
(Class 1) | troutonty camp | | |
| LSC Class | Moderate-low o | f a variety of land
some h
capability land: La
lazing, some hortic
meed to be car

 | horticulture, fore
and has high limit
 | stry, nature conse
ations for high-im | tivation, pasture
ervation)
pact land uses. W | cropping, grazing
Vill largely restrict
The limitations | Low capability
to low-impact la
limita | e for a limited ser
land: Land has w
ind uses such as p
ations is required
 | hortics
ary high limitatio | azing, forestry a
ulture)
ns for high-impa | (Class 1)
nd nature conse
tt land uses. Lan | rvation, some
 | Very low capabi
be overcome.
limitati | lity land: Land has
On-site and off-sit
ons not managed | severe limitation
e impacts of land
There should be | Land general
 | (Class 1)
ly incapable of a
ost land uses and | erodibility class)
gricultural land u
generally cannot
remely severe if
getation | Extremely low | capability land: L | imitations are so
 | 2)
severe that the la
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LSC Class	Loams, clay loams or clays (all with >13%clays)	Slope <1% that are shorter than 500 m in length	Soil Sodicity/ Dispersivity	1 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	2 Salinity Hazard	Soil Acidification Hazard	Wind Ecodibility Class	Loams, clay Ioams or clays (all with >13%clays)	Slope 3-<10% that are longer than 500 m in length	Soil Sodicity/ Dispersivity	l 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%	Soll Sodicity/ Dispersivity	4 Salinity Hazard	Soil Acidification Hazard	Wind Erodibility Class	Additional Comments	Land Capability
MOTTLED AND	>13% clay in B horizon so meets criteria	W slope of 28% (Fail)	PLEX	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 par 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 besture buffering capacity pH (water) of 6.0 (Class 2)	Rainfall around 800mm per year, low wind erosive power (Low wind erodbility class)	>13% clay in B horizon so meets oriteria	W slope of 28% (Fail)		Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfall around 800mm high texture buffering (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 (Cless 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% clay in 8 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, Jow wind erosive power (Low wind erodbility 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 toxture 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 par 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 par 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 enosive 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	E 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 par 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 besture buffering capacity pH (water) of 8.3 (Class 1)	Rainfall around 800mm per year, 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 enosive 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 bexture 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 8 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 par year, low wind erosilve power (Low wind erodibility class)	>13% clay in 8 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) Mean annual	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 tixxture buffering capacity pH (water) of 7.8 (Class 2) Mean annual	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class) Rainfall around	>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 besture buffering capacity pH (water) of 7.8 (Class 2) Mean annual	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) Mean annual	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)	rainfall around 800mm high bexture buffering capacity pH (water) of 7.8 (Class 2) Mean annual	Rainfall around 800mm per year, low wind erosive power (Low wind erodbility class)	Heavily vegetated with no evidence of recent grazing	6
19127	>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)	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) Rainfall around	>13% clay in 8 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 teature buffering (water) of 7.5 - 8.5 (Class 1) Mean annual	Rainfall around 800mm par 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)	rainfall around 800mm very high texture buffering capacity pH (water) of 7.5 - 8.5 (Class 1) Mean annual	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)	rainfall around 800mm very high texture buffering capacity pH (water) of 7.5 - 8.5 (Class 1) Mean annual	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)	rainfall around 800mm high texture buffering capacity pH (water) of 7.0 (Class 2) Mean annual	Rainfall around 800m per year, low wind erosive power (Low wind erodibility class) Rainfall around	>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)	rainfall ar ound 800mm high texture buffering capacity pH (water) of 7.0 (Class 2) Mean annual	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 - seme dispersion) (Class 6)	Moderate recharge and discharge potential low salt store (Class 2)	rainfall around 800mm high texture buffering capacity pH (water) of 7.0 (Class 2) Mean annual rainfall around	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)	rainfall around 800mm high bexture buffering capacity pH (water) of 7.0 (Class 2) Mean annual rainfall around	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% (Fail)	Field indication of soil dispersion	High recharge and discharge potential (Class 3)	rainfall around 800mm high betture buffering capacity field pH of 5.5 - 6.0 (Class 2) d cultivation, past	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)	rainfall around 800mm high texture buffering capacity field pt of 5.5 - 6.0 (Class 2)	Rainfall around 800mm per year, low wind erodibility class) erodibility class)	>13% clay in B horizon so meets criteria	SW slope of 10% (Pass)	Field indication of soil dispension	High recharge and discharge potential (Class 3)	800mm high teature 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)	rainfall around 800mm high beture 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	Moderate-lo	ow capability lan	t: Land has high li	mitations for hiel	d cultivation, past conservation) h-impact land user y and nature cons org-term degradat	s. Will larsely	Low capability la	nd: Land has very	high limitations I	razing, forestry an sulture) for high-impact lan re conservation. C d and environmer 6	nd uses. Land us	e restricted to low	Very low capabi be overcome. (limitati	ity land: Land has in-site and off-sit ins not managed	severe limitation impacts of land There should be		st land uses and e	renerally cannot	Extremely low	capability land: I	Limitations are so	o severe that the li re should be no di 8	and is incapable o sturbance of nati	of sustaining any we vegetation	Additional Comments	Land Capability
MOTTLED AND	loams or sandy loams (all with 6-13% clay); also includes organic peats PEDARIC BROW	Y Slope 10-<20%	Soil Sodicity/ Dispersivity PLEX	Salinity Hazard	Soil Acidification Hazard	Wind Erodibility Class	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	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 diffs	Soil Sodicity/ Dispersivity	Salinity Hazard	Soil Acidification Hazard	Wind Erodibility Class		
TP120	>13% clay in B horizon so exceeds criteria	W slope of 28% (Fail)		Moderate recharge and	Mean annual rainfall around	Rainfall around 800mm per	>13% clay in B			Moderate	Mean annual											1				
TP121	>13% clay in B horizon so exceeds criteria			discharge potential low salt store (Class 2)	800mm high texture buffering capacity pH (water) of 6.0 (Class 2)	erosive power (Low wind erodibility class)	horizon so exceeds criteria	W slope of 28% (Pass)		recharge and discharge potential low salt store (Class 2)	rainfall around 800mm high besture 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 8 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
		W slope of 23% (Fail)	Marginally sodic to sodic. EAT of 4 (slakes - no dispersion) (Class 6)	potential low salt store (Class	tooture bufforing capacity pH (water) of 6.0 (Class 2) Mean annual rainfall around S00mm very high tooture bufforing capacity pH (water) of 7.3 - 8.5 (Class 1)	eredibility class) Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	horizon so exceeds criteria >13% clay in B horizon so exceeds criteria		Marginally sodic to sodic. EAT of 4 (slakes - no dispersion) (Class 6)	salt store (Class	800mm high texture buffering capacity pH (water) of 6.0	800mm per year, low wind erosive power (Low wind	>13% clay in 8 horizen so exceeds criteria >13% clay in 8 horizen so exceeds criteria		Marginally sodic to sodic. EAT of 4 (slakes - no dispersion) (Class 6)	recharge and discharge potential low salt store (Class	800mm high texture buffering capacity pH (water) of 6.0	800mm per year, low wind	horizon so		Marginally sodie to sodie. EAT of 4 (slakes - no dispersion) (Class 6)	recharge and discharge potential low salt store (Class	rainfall around 800mm high texture buffering capacity pH (water) of 6.0	800mm per year, low wind erosive power (Low wind erodibility	erosion encountered on slopes around	7
TP122	>13% clay in B horizon so exceeds criteria		Marginally sodic to sodic. EAT of 4 (jalass - no dispersion) (Class 6) Non-sodic. EAT of 4 (jalakas - no dispersion) (Class 3)	potential low salt store (Class 2) Moderate recharge and discharge potential moderate salt	tecture buffering capabily pH (warer) of 6.0 (class 2) Mean annual rainfall around 300mm wey high tecture buffering capabily pH (warer) of 7.2 capabily pH (ware of 7.2 (class 3)	erodibility class) 800mm part year, low wind erodibility class) Rainfall arcurd 800mm par year, low wind erodibility class)		(Pass) W slope of 23% (Pass)	4 (slakes - no	potential low salt store (Class 2) Moderate recharge and discharge potential moderate sit store (Class S) Moderate recharge and discharge potential low salt store (Class 2)	BOCmm high testure capacity pH (water) of 6.0 (Class 2) (Class 2) Mean annual antifall around BOCmm very high testure buffering capacity pH (water) of 7.2 & 5 (Class 3) Mean annual BOCmm very high testure buffering capacity pH (water) of 7.2 capacity pH	800mm par year, low wind erosive power (Low wind erodibility class) Rainfall around 800mm par year, low wind	horizon so exceeds criteria	(Pass)	4 (slakes - no	recharge and discharge potential low- salt store (Class 2) Moderate recharge and discharge potential moderate salt store (Class 5) Moderate recharge and discharge potential low- salt store (Class 2)	BODmm Nigh Desture beforing capacity pH (water) of 6.0 (Class 2) Mean annual rainfall around BDOmm very high texture buffering capacity pH (water) of 3.3 - 8.5 (Class 1)	800mm per year, low wind receive power (term wind ereditility class) Rainfall around 800mm per year, low wind ereditility class) Rainfall around 800mm per year, low wind ereditility class) Rainfall around ereditility class) (Low wind ereditility class)	>13% clay in 8 borizon so	(Pass)	no dispersion)	recharge and discharge potential low salt store (Class 2) Moderate recharge and discharge potential moderate salt	rainfall around 200mm high boffering capacity pH (water) of 6.0 (Class 2) Meian annual 200mm wery high toxture boffering capacity pH (water) of 7.3 - 3.5 (Class 1) Meian annual 200mm wery high toxture boffering capacity pH (water) of 7.2 3.5 (Class 1)	800mm per year, low wind ensive power (Low wind erodibility class) Rainfall around 800mm per year, low wind ensive power (Low wind erotibility	erosion encountered on slopes around location	6
TP122 TP123		a (Fail) SW slope of 4355 (Fail)	4 (slakes - no dispersion) (Class 6) Non-sodic. EAT of 4 (slakes - no dispersion)	potential low salt store (Class 2) Moderate rechange and dischange potential moderate salt store (Class 5) Moderate rechange and dischange potential low salt store (Class	tocture ballering capably pH (water) of Los 2) Mata annual 302mm very high tocture and annual and annual capably pH (water) of 7.3- 8.5 (Class 3) Mean annual capably pH (water) of 7.3- 8.5 (Class 3) Mean annual capably pH (water) of 7.3- (Class 3) Mean annual capably pH (water) of 7.3- (Class 3) Mean annual capably pH (water) of 7.3- (Class 3)	erodibility class) Raisfall around 800mm per year, low wind erodibility class) Rainfall around 800mm per year, low wind erodibility class) Rainfall around 800mm per year, low wind erodibility class) Rainfall around 800mm per year, low wind erodibility class)	>13% clay in 8 horizon so exceeds criteria >13% clay in 8 horizon so	(Pass) W slope of 23% (Pass) SW slope of 43%	4 (slakes - no dispersion) (Class 6) Non-sodic. EAT of 4 (slakes - no dispersion)	potential low salt store (Class 2) Moderate recharge and discharge potential moderate salt store (Class 5) Moderate recharge and	BOOmen high testure capacity pH (water) of 6.0 (Class 2) Maan annual axiafall around BOOmen very high testure ball around capacity pH (water) of 7.3 & 5.5 (Class 1) Maan annual axiafall around BOOmen very high testure balfering capacity pH (water) of 7.2 (Class 1) Maan annual axiafall around BOOmen very high testure balfering capacity pH (water) of 7.3 BOOmen very high testure balfering capacity pH	800mm per year, low wind erosilve power (Low wind erodbility class) Rainfall around 800mm per year, low wind erosilve power (Low wind erodbility class) Rainfall around 800mm per year, low wind erosilve power (Low wind erosilve power (Low wind erosilve power (Low wind erosilve power (Low wind erosilve power (Low wind erosilve power (Low wind) erosilve power (Low wind)	horizon so exceeds criteria >13% clay in 8 horizon so exceeds criteria >13% clay in 8	(Pass) W slope of 23% (Pass) SW slope of 43%	4 (slakes - no dispersion) (Class 6) Non-sodic. EAT of 4 (slakes - no dispersion)	recharge and discharge potential low saft store (Class 2) Moderate recharge and discharge potential moderate saft store (Class 5) Moderate recharge and discharge obtertial low	BODMIN high Dasture buffering capacity perform (Class 2) (Class 2) Mean annual rainfall around BODMIN wery high beature buffering copacity perform buffering copacity perform BODMIN wery high beature buffering copacity perform BODMIN wery high beature buffering copacity perform BODMIN wery high beature buffering copacity perform BODMIN wery high beature buffering b	800mm per year, low wind erosive power (Low wind erodibility class) Rainfall around 800mm per year, low wind erodibility class) Rainfall around 800mm per year, low wind	horizon so exceeds criteria >13% clay in B horizon so exceeds criteria >13% clay in B	(Pass) W slope of 23% (Pass) SW slope of 43%	- no dispersion) (Class 6) Non-sodic. EAT of 4 (slakes - no dispersion)	recharge and discharge potential low salt store (Class 2) Moderate recharge and discharge potential moderate salt store (Class 5) Moderate recharge and	rainfall arcound 300mm high befturne baffering (capacity ph) (water) of 6.00 (Class 2) Maan annual arainfall arcound 300mm wery high tenture baffering capacity ph (water) of 7.3 8.5 (Class 1) Maan annual 300mm wery baffering capacity ph (water) of 7.3 300mm wery baffering capacity ph (water) of 7.3 300mm wery baffering arainfall arcound a00mm high beature baffering contaction high beature baffering class 1)	820mm per year, low wind ensite power (Low wind erosibility class) 820mm per year, low wind ensite power (Low wind erosibility class) 840mm per year, 840mm per year, Inw wind erosibility class)	erosion encountered on slopes around location	7
	horizon so exceeds criteria >13% clay in B horizon so	a (Fail) SW slope of 43% (Fail) 5E slope of 33%	4 (slakes - no dispersion) (Class 6) Non-sodic. EAT of 4 (slakes - no dispersion) (Class 3) EAT of 2 (slakes - some dispersion)	potential low sait store (Class 2) Moder ste recharge and potential moderste sait store (Class 5) Moderste recharge and discharge potential low sait store (Class 2) Moderste recharge and discharge potential low sait store (Class 2) Moderste recharge and discharge potential low sait store (Class 2)	tentura banflering capabity phi CCLss 20 CCLss 20 CCLss 20 Kann annual rainfall around Night tenture banflering capabity phi (tot 20 cm 20 km 20	erodibility class) Rainfall arcond 800mm par yara, low wind erolika power (Low staft) class power class) Rainfall arcond 800mm par erolika power (Low staft) erolika power (Low staft) erolika power (Low staft) Rainfall arcond 800mm par yara, low wind erolika power (Low staft) class) Rainfall arcond 800mm par yara, low wind erolika power (Low staft) class)	>13% clay in 8 horizon so exceeds criteria >13% clay in 8 horizon so exceeds criteria >13% clay in 8 horizon so	(Pass) W slope of 23% (Pass) SW slope of 43% (Fast) SS slope of 33% (Pass)	4 (slakes - no dispersion) (Class 6) Non-sodic. EAT of 4 (slakes - no dispersion) (Class 3) EAT of 2 (slakes - some dispersion)	potential loss and rocks (Links 2) Medier ste rescharge and disklarge potential moderate all steretage and potential	BOOmen high texture beforing towardsy of 6.5 (Class 2) (Class 2) (800mm par ywar, fow wide erodlaffir class) 800mm par ywar, for widd 800mm par ywar, for widd erodlaffir class) 800mm par ywar, for widd 800mm par ywar, for widd	horizon so exceeds criteria >13% clay in 8 horizon so exceeds criteria >13% clay in 8 horizon so exceeds criteria	(Pass) W slope of 23% (Pass) SW slope of 43% (Pass)	4 (slakes - no dispersion) (Class 6) Non-sodic. EAT of 4 (slakes - no dispersion) (Class 3) EAT of 2 (slakes - scome dispersion)	recharge and discharge potential lower 2) Moderate recharge and discharge recharge and discharge preferete as store (Class S) Moderate recharge and discharge att store (Class 2) Moderate recharge and discharge att store (Class 2)	BOOMING AND A CARACTER AND A CARACTE	BOOmen per- year, low winds general (Enre wind Enre wind Rainfall around Bainfall around Bainfall around Boomen per- year, low wind enrollshilty class) Boomen per- year, low wind enrollshilty class) Rainfall around BOomen per- year, low wind enrollshilty class)	horizon so esceeds criteria >13% clay in 8 horizon so esceeds criteria >13% clay in 8 horizon so esceeds criteria	(Pass) W slope of 23% (Pass) SW slope of 43% (Pass)	- no dispersion) (Class 6) Non-sodic. EAT of 4 (slakes - no dispersion) (Class 3) EAT of 2 (slakes - some dispersion)	recharge and discharge potential foor saint 2 1 Moderate recharge and discharge potential there (Class 5) Moderate recharge and discharge all tittere (Class 2) Moderate recharge and discharge all tittere (Class 2) Moderate recharge and discharge all tittere (Class 2)	rainfall around Dörmm höjd Lecture Löpektig pår (svaret of 6.0 (Class 2) Menn annual Löpektig pår höjd hodine Döffering Höjd hodine Döffering Kostering Löpektig Döffering Capacity pår Capacity pår Löpektig Löpe	BDDmm per year, low wind eroble year (Low year) class) Class) Rainfall around BDDmm per year, low wind eroblebly wind eroblebly class) Rainfall around BDDmm per year, low wind eroblebly Rainfall around BDDmm per year, low wind eroblebly class) Rainfall around BDDmm per year, low wind eroblebly class) Rainfall around BDDmm per year, low wind eroblebly class)	eroian erocutered on slopes around location Minor rill eroian noted around location Sheet eroian	
TP123	horizon so exceeds criteria >13% clay in B horizon so exceeds criteria >13% clay in B	a (Fail) SW slope of a 4355 (Fail) SE slope of 33% (Fail)	4 (julass - no dispersion) (Class 6) (Class 6) (Class 6) (Class 3) (Class 3) (Class 3) (Class 3) (Class 3) (Class 6) Strongly sodic. EAT of 4 (julakes on o dispersion) (Class 6)	patenti du ten (Cass) 2) Molentera substrate (Cass) substrate (Cass) molentera 2) Molentera substrate substrate (Cass) 2) Molentera 2) Molentera substrate substr	Internet in the second	erodibility class) Raistfall around war, low wind erole power (Low wind erole power (Low wind erole power class) Raistfall around 800mm per erole bill class) Raistfall around 800mm per erole bill class) Raistfall around 800mm per erole billy class) Raistfall around 800mm per erole billy class) Raistfall around 800mm per erole power (Low wind erole power) (Low wind erole p	>13% clay in 8 horizon so exceeds orteria >13% clay in 8 horizon so exceeds orteria y13% clay in 8 horizon so exceeds orteria	(Pass) W slope of 23% (Pass) SW slope of 43% (Fast) SE slope of 33% (Pass)	4 (slakes - no dispersion) (Class 6) (Class 6) (Class 6) (Class 3) EAT of 2 (slakes - no dispersion) (Class 3) (Class 6) Strongly sodic. EAT of 4 (slakes EAT of 4 (slakes) (class 6)	potential focus 2) Moderate rechange ad potential moderate adf potential moderate adf tene (Cas 5) Moderate aff tene (Cas 5) Moderate aff tene (Cas 5) 2) Moderate aff tene (Cas 5) 2) Moderate 2) Moderate 2) Moderate 2) Moderate 2)	Bolom high target target aparty provide the second of the construction of the Construction (Construction) and the construction of the construction before the second of the second of the construction of the second of the construction of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the second of the	Boom put to avoid the second s	horizon so exceeds criteria >13% clay in 8 horizon so exceeds criteria >13% clay in 8 horizon so exceeds criteria >13% clay in 8 horizon so exceeds criteria	(Pass) W slope of 22% (Pass) SW slope of 43% (Pass) SE slope of 33% (Pass)	4 (slakes - no dispersion) (Class 6) (Class 6) (Class 6) (Class 3) (Class 3) (Class 3) (Class 3) (Class 6) Strongly sodic. EAT of 2 (slakes Strongly sodic.	mehang and skorege sko	Bittom high constraints of the second	Biolomp pare, Les and Charles, Les and L	horizoniso escendis criteria >13% clay in 8 horizoniso escendis criteria >13% clay in 8 horizoniso escendis criteria >13% clay in 8 horizoniso escendis criteria >13% clay in 8 horizoniso escendis criteria	(Pass) W slope of 23% (Pass) SW slope of 43% (Pass) SE slope of 43% (Pass) W slope of 13%	- no dispersion) (Class 6) Non-sodic. EAT of 4 (slabes - no dispersion) (Class 3) EAT of 2 (slabes - some dispersion) (Class 6) Strongly sodic. EAT of 4 (slabes - no dispersion)	nehatiya oficialiya of	nedial analysis and the second second second second second second second second second	Dictions preve and set and encoded and and and and been and an and an and and and and and been and an and and and and and and and been and and and and and and and and been and and and and and and and and been and and and and and and and and been and and and and and and and and been and and and and and and and and and been and and and and and and and and and been and and and and and and and and and an	ersion ersion encountered on slopes around bocation Minor rill ersion noted around location shout ersion encountered around location Minor rill ersion	7
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Soil and	Land Ca	pability I	Impact A	Assessment
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						L	and capable of a	wide variety of	f landuses (crop	ping, grazing, horti	culture, forestry,	nature conservat	ion)						Land capable of a	variety of land u	ses (cropping w	ith restricted cult try, nature conse	vation, pasture (cropping, grazing		
LSC Class	Extremely hig requ	gh capability lar uired. Land capa	d: Land has no li ible of all rural la	mitations. No spe nd uses and land	cial land manage management pra	ment practices actices		ability land: Lar ited manageme practices	vd has slight limi nt practices. La s, including inter	tations. These can nd is capable of mo nsive cropping with	be managed by r st land uses and I cultivation.	eadily available, and management	uses, such as ci	opping with cult practices. However	vation, using mo er, careful manas	ons and is capabl re intensive, read gement of limitati and environment	ily available and v ons is required fo	ridely accepted	restrict land man erazine and hortic	ability land: Land sagement options sulture. These lim	has moderate to for regular high itations can only	o high limitations : -impact land uses y be managed by s ise, inputs, investe	for high-impact la such as cropping pecialised manag	, high intensity rement practices	Additional Comments	Land Capability
PEDARIC BROW	Loams, clay loams or clays (all with >13%clays)	Slope <1% that are shorter than 500 m in length COMPLEX	Soil Sodicity/ Dispersivity	1 Salinity Hazard	Soil Acidification Hazard	Wind Erodibility Class	Loams, clay loams or clays (all with >13%clays)	Gradual slope 1-43% that are shorter than 500 m in length	Soil Sodicity/ Dispersivity	2 Salinity Hazard	Soil Acidification Hazard	Wind Erodibility Class	Loams, clay loams or clays (all with >13%clays)	Slope 3-<10% that are longer than 500 m in length	Soil Sodicity/ Dispersivity	3 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	4 Salinity Hazard	Soil Acidification Hazard	Wind Erodibility Class		
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 vary high texture buffering capacity pH (water) of 8.2 (Class 1)	Rainfall around 800mm par 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)	>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. EAI 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 par year, low wind erosive power (Low wind erosibility 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)	>13% clay in 8 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 basture buffering capacity pH (water) of 8.1 (Class 1)	Rainfall around 800mm par 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 rechange and dischange potential low salt store (Class 2)	Mean annual rainfall around 800mm high besture 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)	>13% clay in B horizon so exceeds criteria	NE slope of 20% (Pass)	Marginally sodic to sodic. EAT of 2 (slaker - some dispersion) (Class 6)	Moderate recharge and discharge potential low salt store (Class 2)	Mean annual rainfail around 800mm high bexture buffering capacity pH (water) of 8.1 (Class 1)	Rainfall around 800mm par 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 basture buffering capacity pH (water) of 7.5 - 8.8 (Class 2)	Rainfall around 800mm par 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 basture 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 erodbility class)	>13% clay in B horizon so exceeds criteria	NE slope of 45% (Fail)	Non-sodic. EA 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 bexture 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
TP120	>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 par 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 basture buffering capacity pH (water) of 4.8 - 5.6 (no class)	Rainfall around 800mm par 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)	>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
TPAB	>13% clay in B horizon so meets criteria	NNW slope of 25% (Fail)	Field indication of soil dispersion	Moderate recharge and discharge potential (Class	Mean annual rainfall around 800mm high texture buffering capacity field	Rainfall around 800mm per year, low wind erosive power (Low wind eroylibility	>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 becture buffering	Rainfall around 800mm per year, low wind erosive power (Low wind	>13% clay in 8 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	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility	>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	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)		6
				-1	pH of 8.0 (Class 2)	class)				- 31	capacity field ph of 8.0 (Class 2)	erodibēity class)				-,	of 8.0 (Class 2)	class)					pH of 8.0 (Class 2)	erodibeity dass)		
	Moderate-lo restrict land u	w capability lan use to grazing, so	d: Land has high me horticulture	ing with restricte forestry, nature limitations for hig (orchards), foresto naged to prevent l	(Class 2) d cultivation, par conservation) h-impact land use ty and nature con	sture cropping, es. Will largely rservation. The	Low capability	land: Land has v	eery high limitat	(grazing, forestry a riculture) ions for high-impac g and nature conse were land and envi	ind nature conse	use restricted to	cannot be over	come. On-site an	d off-site impact		Illy incapable of a it most land uses i ment practices ca	gricultural land i and generally n be extremely	use (selective fore Extremely low o land use apar			severe that the la				
LSC Class	Moderate-lo restrict land u	w capability lan use to grazing, so	d: Land has high me horticulture	limitations for hig (orchards), forest	(Class 2) d cultivation, par conservation) h-impact land use ty and nature con	sture cropping, es. Will largely rservation. The	Low capability	land: Land has v	eery high limitat	(grazing, forestry s ticulture)	ind nature conse	use restricted to	cannot be over	come. On-site an itations not man	d off-site impact	Land genera ations that restric s of land manage	Illy incapable of a it most land uses i ment practices ca	gricultural land i and generally n be extremely				severe that the la e should be no dis 8 Salinity Hazard			Additional Comments	Land Capability
	Moderate-lo restrict land u lim Fine sandy loams or sandy loams (all with 6-13% clay); also includes organic peats	w capability lan se to grazing, so itations need to Slope 10-<20%	d: Land has high me horticulture : be carefully man Soil Sodicity/	limitations for hig (orchards), forest naged to prevent l 5	(Class 2) d cultivation, par conservation) (h-impact land us ny and nature con ong-term degrada Soil	sture cropping, es. Will largely sservation. The lation	Low capability low-impact la limi Fine sandy loarns or sandy loarns (all with 6-13% clay); also includes	land: Land has v ind uses such as tations is requir	sery high limitat grazing, forestr ed to prevent se	(grazing, forestry a titedbure) ions for high-impac and nature conie were land and envi 6	and nature conse t land uses. Land vortion. Careful a rormental degrar Soll Acidification Hazard Mean annual rainfall around	use restricted to nanagement of lation	cannot be over severe if lim	come. On-site an itations not man	d off-site impact aged. There shou Soil Sodicity/	Land genera ations that restric s of land manage id be minimal dis 7	Illy incapable of a trenost land uses i ment practices ca turbance of native Soil Acidification	gricultural land i and generally be extremely e vegetation Wind	Extremely low o land use apar	apability land: Lis t from nature con	mitations are so servation. Then Soil Sodicity/	8	nd is incapable of turbance of nativ Soil Acidification	Fsustaining any e vegetation Wind	Additional Comments Moderate encoion encountered around location particularly along drainage channels	Land Capability
PEDARIC BROW	Moderate-lo restrict land u lim Fine sandy loams or sandy loams (all with 6-13% clay); also includes organic peats IN DERMOSOL O	w capability lan rise to grazing, so itations need to Slope 10-<20% COMPLEX E slope of 12%	d: Land has high me horticulture : be carefully man Soll Sodicity/ Dispersivity Non-sodic. EAT of 4 (slakes - no	limitations for hig (orchards), forests aged to prevent i 5 Salinity Hazard Hish recharge	(Class 2) d cuflivation, para conservation) h-impact land us y and nature composite Acidification Hazard National Mean annual Solin very high texture buffering capacity ph	sture cropping, as. Will targoly uservation. The ation Wind Erodbility Class Ø20nm per year, jow wind erotikie powe (Low wind erotikie powe	Low capability low-impact la imi Fine sandy loarns (all with 6-13% clay); also includes organic peats	land: Land has v ind uses such as tations is requir Slope 20-<33%	Soil Sodicity/ Dispersivity Non-sodic. EAT of 4 (slakes - no	(grazing, forestry a titedbure) ions for high-impac and nature conie were land and envi 6	Ind nature conse t land uses. Land rvation. Careful r rormental degrar Soll Acidification Hazard Mean annual	use restricted to nanagement of fation Wind Erodibility Class Rainfall around 800mm per year, low wind	cannot be over severe if lim Loamy sands or loose sands (all with <6% clay)	come. On-site an itations not man Slopes 33-<50%	d off-site impact aged. There shou Soil Sodicity/ Dispersivity Non-sodic. EAT of 4 (slakes - no	Land genera ations that restricts of land manage did be minimal dis 7 Salinity Hazard High recharge and dicharge	atly incapable of a t most land uses turbance of native Soil Acidification Hazand Mean annual annual annual annual annual annual	gricultural land in and generally in the extremely wegetation Wind Erodibility Class Rainfall around 800mm per year, low wind erosibie pozen [Low wind erosibie pozen [Low wind erodibility]	Extremely low of land use apar Loamy sands or loose sands (all with <6% day)	apability land: Lis t from nature con Precipitous slopes of >50% and cliffs E slope of 12%	mitations are so servation. There Soil Sodicity/ Dispensivity	8	nd is incapable or surbance of nativ Soil Acidification Hazand Mean annual acidifi around BüOmm very high texture buffering capacity pH (wetro) 62.5	Fsustaining any e vegetation Wind	Comments Moderate ercosion encountered around location particularly along drainage	Land Capability 6
PEDARIC BROV	Moderate-lo restrict land u lim Fine sandy loams of a sandy loams (all with 6 - 13% clay); also includes organic peats restriction of the sandy >>13% clay in B horizon so exceeds oriteria	w capability lan are to granty, so initiations need to Slope 10-420% COMPLEX E slope of 12% (Pass)	d: Land has high me horticulture : be carefully man Soll Sodicity/ Dispersivity Non-sodic. EAT of 4 (slakes - no	limitations for high circlendres for high circlendres, for constraints, for circlendres, for sensitive the sensitive of the s	(Class 2) d cuftivation, para conservation) - prepara land using y and nature con ong-term digradi Acidification Hazard Research and the second acidification Hazard Research and the second acidification Hazard Research and the second acidification Hazard Research and the second acidification Hazard Research and the second acidification high leature boffering calaction acidit around acidification Acidification (Class 3) Maan annual acidification a	sture cropping, as: Will appoly action The ation Evolution Boltom per year, low will we can perform class Reinfall around 800mm per year, low will evolution per year, low will aboltom per year, low will be aboltom per year be year be aboltom per year be aboltom per year be	Low capability low-impact la Imi Fine sandy Isams fail with 6-135 clay; also includes have includes parts of the sand sand horizon so exceeds criteria	land: Land has nd uses such as tations is requir Slope 20-4335 E slope of 12% (Pass)	Soil Sodicity/ Dispersivity Non-sodic. EAT of 4 (slakes - no	(grazing, Greestry v tristiker) and nature conse overe land and environ Salinity Mazard High recharge and dicharge potential low and store (Class 3) Moderate recharge and docterate	Indinature conse tend tous. Landon roomental degrad Addification Mean annual Reserved Mean annual Reserved (Class 1) Mean annual Reserved Class 1) Mean annual Reserved Rese	use nestricted to nanagement of lation Wind Erodibility Class Rainfall around 800mm per erosite power (Low wind erodibility class) Rainfall around 800mm per more transition	cannot be over severe if lim Learny sands or loose sands (all with <05 clay in 8 horizon so exceeds criteria >13% clay in 8 horizon so	Corms. On-site as a situations not man situations not man situations not man situations not man situations as a situation situation situation situation situation situation situation situation situations of situations and situations	d off-site impact aged. There shou Soil Sodicity/ Dispersivity Non-sodic. EAT of 4 (slakes - no	Land general ations that restricts of and managed to be minimal dis- z- Salieity Hazard High recharge and discharge potential low salt store (Class 3)	Ity incapable of a most land cuess most precision can be a series of mathe- sent precision can be a series of mathe- sent precision can be a series of mathe- sent can be a series of mathe- be a series of mathe- series of math-series of math-series of mathe- series of mathe- serie	gricultural land : and generally to be estremely weightation Wind Erodibility Class Rainfall around Stotmm per (Low wind erosibility class) Rainfall around Stotmm per (Low wind erosibility class) Rainfall around Stotmm per erosibility class)	Extremely low control land use aparticle and use aparticle and use aparticles and so files stands (all unless stands (all unless costs) clarge in B horizon so eaceeds orbenia so >13% clarge in B horizon so the stand so the source of the sou	Precipitiona slopes of 520% and cliffs E slope of 520% (Pass)	mitations are so servation. There Soil Sodicity/ Dispensivity	8 Salinity Hazard	nd is incapable or surbance of nativ Solil Actification Hazand Mean annual B00mm very high texture buffering capacity pt (class 3) Mean annual acidal around B00mm high buffering capacity pt boffering capacity pt	Fsustaining any weightation Wind Eredibility Class 800mm par (Low wind eredibility class) Rainfall around 800mm par (Low wind eredibility class)	Comments Moderate erosion encountered around location particularly along dramage channels Some evidence of slumping and surface ension	Land Capability 6 6 6
PEDARIC BROV TP102 TP105	Moderate-lo- restrictional of limm Fine sandy loams or sandy loams fail white 6-13% clay; abo includes a loa includes a loa includes a loa includes a loa includes a loa includes a loa includes > 13% clay in B horizon so exceeds oriteria > 13% clay in B	w capability lan set ograzing, set ograzing, set ograzing, set situations need to Slope 10-420% Slope 10-420% Slope of 12% (Pass) NWW slope of 30% (Fail)	di Lund han high me horticulture me be carefully man Soll Souliser Dispensivity Dispensivity (Class 3) (Class 3)	Imitations for high orchards, for order of the order of t	(class 2) d cofficientos, para conservitios) -> in-seguentos (conservitios) -> in-seguentos (conservitios) -> in-seguentos (conservitios) -> in-seguentos (conservitios) -> in-seguentos -> seguentos ->	stare cropping, set or complex, set of the complex of	Low capability loss-impact is imi Fine sandy loarns of andy in also includes organic peaks >13% clay in B horizon so exceeds criteria >13% clay in B	land: Land has such as trations is required Slope 20-3355 (Pass) NW slope of 12% (Pass)	Non-sodic Soll Sodichy/ Dispersivity Soll Sodichy/ Disp	(grazing, forestry i ticulature) for for high impact and nature comes over land and envire and discharge and discharge pertential law with the store (Class 3) Moderate store (Class 3)	Ind nature conse ind nature conse tend uses. Landrouxe sources Carolin consential degrain Seal Academic Carolina Consential Mean annual Sources Carolina Consential Mean annual Sources Carolina Consential Sources Carolina Consential Sources Consential Sou	use restricted to management of Jakon Wind Erodbility Class Rainfall around 800mm per verscher power (Low wind erodbility class) 800mm per var, forw wind erodbility class) 800mm per var, forw wind erodbility class) Rainfall around 800mm per var, forw wind erodbility class	cannot be over severe if lim Learny sands or loose sands (all with d55 clay) in 8 horizon so exceeds criteria >135% clay in 8 horizon so exceeds criteria	Corres. On-site as litations not man Slopes 33-450% E slopes of 12% (Pass) NW slope of 30% (Pass) NE slope of	d off-lite impact geed. There show Soil Sodicity/ Dispensivity Non-sodic: EAT of 4 (Jukas - no dispension) (Class 3) Marginally sodic to sodic: EAT of 2 (Jukas - Lon	Land general ations that restricts of land manage is of land manage of land in the monitorial due statistics of land manage and discharge and discharge and discharge potential store (Class 3) Moderate rescharge and 3) Moderate rescharge and 3)	thy incapable of a trimot land uses are interesting to the second second second second second second second Acidification Heard BOOm very high texture beforing capacity pith texture beforing capacity pith BOOm high second BOOm high second BOOm high second BOOm high second BOOm high second BOOm high second SoOm high SoOm high	gricultural land on and generally no be externelly to experiation Wind Endbliny Class Rainfall around BOOMT per year , (Low wind erosibility class) Rainfall around BOOMT per year , year, for wind around about the erosibility class) Rainfall around BOOMT per year , year, for wind erosibility class BOOMT per year , year, for wind erosibility class BOOMT per year , year, for wind erosibility	Extremely low or per lend use spare Loadiny sands or loose sands (all with <0% day) in B horizon so exceeds orberia <>12% day in B horizon so excee	Precipitous stops of 50% and cilits stops of 50% and cilits (Pass) NW stops of 30% (Pass) NE stops of 20%	milations are so servicion. There bippenivity Dispenivity (class 3) Marginally sofic to sodic. EAT of 2 (slakes - some	Salinity Hazard Figh recharge and discharge optimizations of Class 3) Moderate recharge and discharge potential low salt store (Class 1) Moderate recharge and solutions of the Class 1)	nd is incapable or hurbance of nativ soils Addiffication Hazand Maan annual aairdal around Bötterning capacity phi (suster) of 8.2 (Class 3) Aflean annual aairdal around Bötterning capacity phi (Solom Nayh) boffering capacity phi Solomen Nayh boffering capacity phi Solomen Nayh Bötterning capacity phi Solomen Nayh Bötterning Solomen Nayh Bötterning	sustaining any we vegetation tendibility Class fendibility Class Bainfall around S00mm per year, low wind erodbility class) Rainfall around 800mm per year, low wind erodbility class) Rainfall around 800mm per year, low wind	Comments Moderate erosion encountered around location particularly along dramage channels Some evidence of slumping and surface ension	Lund Capability
PEDABLE BROW TP102 TP105 TP113	Moderate-lo- restrict land und und land The sandy loarns (all with 6-13% object); abo includes organic pasts horizon so exceeds criteria >13% clay in 8 horizon so exceeds criteria >13% clay in 8 horizon so exceeds criteria	w capability lan test ograzing, as test ograzing, as izations need to Slope 10-20% COMPLEX E slope of 1255 (Pass) NVV slope of 30% (Pass) NV slope of 30% (Pass) NV slope of 30% (Pass) NV slope of 30% (Pass)	di Lund han high men horticulture men be carefully man Disperaivity Non-sodice. EAT of 4 (sisks - and dispersion) (Class 3)	Initiations for high orchards, foreign of the orchards, foreign orchards, foreign orchards, foreign of the orchards of the orc	(Class 2) (Class 2) Class 2) Clas	start crapping, start crapping, start,	Low capability loss-impact la Files sandy learns or sandy beams or sandy show the sandy show the sandy show the sandy horizon so exceeds criteria >13% day in B horizon so exceeds criteria >13% day in B horizon so exceeds criteria	land: Land has such as and cases such as and cases such as a lations is required to the second secon	Non-sodie (Likes-Longeral) (Class 6) Marginally (Class 6) Marginally (Class 6) (Class 6) (Class 6) (Class 6) (Class 6) (Class 6) (Class 6)	grazing, Grentry, T Grazing, Grentry, T Grazing, Grentry, T Salining Hasard Fight recharge and discharge and discharge store (Class 3) Molerate recharge and store (Class 3) Molerate recharge and store (Class 3)	and nature conse of anti-orea Long of Cardina Cardina Cardina Additionation Heard Mathematical Cardina additionation Boom way high testure boffering cardinal resource Software of Ea Class 3) Maan annual tainfal around Software of Ea Class 3) Maan annual tainfal around Software of Ea Class 3) Maan annual tainfal around Software of Ea Class 3) Maan annual cardina around Software of Ea Consensity Maan annual Class 3) Maan annual Class 3) Maan annual Class 3) Maan annual Software of Ea Consensity Maan annual Software of Ea Class 3) Maan annual Class 3) Maan annual Class 3) Maan annual Class 3) Maan annual	use restricted to riningenest of Mind Ecolobility Class Rainfull around 800mm per year, low with 800mm per	cannot be over accere of lim Learny seeds or lim hore service of lim hore service of lim horizon so exceeds criteria >13% clay in 8 horizon so exceeds criteria >13% klay in 8 horizon so exceeds criteria	come. On-site an italicon not man Shopes 33-<30% E slopes of 12% (Pass) NE slope of 20% (Pass)	d off-site impact gered. There shows Soil Sodicity/ Dispensivity Dispensivity (Class 3) (Class 3) (Class 3) (Class 6) (Class 6)	Land general actions that restricted of load messages of load messages of load messages of load messages and load load load load salt store (Class 3) Moderate cechange and dechange and store (Class 3) Moderate (Class 3)	and the second s	gerichhend land die gerichhend land die genrafsty wegtsteine Under statemet tendeling wegtsteine kannel ander statemet wegtsteine wegtsteine kannel ander statemet kannel ander	Estremuly lore or lond une again Learny sands or losses sands (all with dSK day) >13% clay in B horizon so enceeds offenia >13% clay in B horizon so enceeds offenia >13% clay in B horizon so enceeds offenia	Precipitous from nature con Precipitous and cliffs (Pass) NW slope of 22% (Pass) NW slope of 20% (Pass)	mitations are so servation. Then sold Soldicity/ Dispensivity of # (dates - no dispersion) (Class 3) Marginally solic to toolic. EXT of 2 (dates - dispersion) (Class 6) taxes () taxes ()	salinity Hazard Salinity Hazard r Sigh recharge and discharge potential low potential low potential low recharge and potential low sali store (Class 1) Moderate recharge and charge and potential low sali store (Class 1) Moderate recharge and potential low sali store (Class 1) Moderate recharge and 1) Moderate potential low sali store (Class 1) Moderate potential low sali store (Class 1) Moderate potential low sali store (Class 1) Moderate potential low sali store (Class 1) Moderate potential low potential low	nd is inceptible of a second of advances o	Sustaining any weeksion Bandal around a Bandal	Comments Moderate erosion encountered around location particularly along dramage channels Some evidence of slumping and surface ension	Lund Capability 6 6 7 7 7



| | Extremely hi
req | igh capability land
juired. Land capai | d: Land has no lim
ble of all rural lan | vitations. No speci
id uses and land m | ial land manager
 | ment practices | and capable of a
Very high capabi
implemented | |
 | g, grazing, horticu
ns. These can be r
capable of most la
ive cropping with | | |
 | y land: Land has r
ropping with culti
practices. Howev
intensive graz | noderate limitatic
vation, using mor
er, careful manag
ing to avoid land a | ons and is capable
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ement of limitati
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ly available and w
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 | d cultivation, pas
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s for high-impact
es such as croppin
ed by specialised
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management | | |
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LSC Class	Loams, clay loams or clays (all with >13%clays)	Slope <1% that are shorter than 500 m in length	Soil Sodicity/ Dispersivity
 | 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
 | 2
Salinity Hazard | Soil
Acidification
Hazard | Wind Erodibility
Class | Loams, clay
Joams 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
Eredibility
Class
 | Fine sandy
loams or sandy
loams (all with
6-13% clay);
also includes
organic peats | Slope 10-<20% | Soil Sodicity/
Dispersivity | 4
Salinity Hazard
 | Seil Acidification
Hazard | Wind
Erodibility
Class | Additional
Comments | Land Capability |
| BROWN VERTO:
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) | >13% clay in 8
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 par
year, low wind
erosive power
(Low wind
erodibility class) | >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)
 | >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% day 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 teature
buffering
capacity pH of
6.2 - 8.4 (Class
2)
 | Rainfall around
800mm per
year, low wind
erosive power
(Low wind
erodibility
class) | >13% clay in 8
horizon so
meets criteria | SW slope of 4%
(Fail) | Strengly 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 toxture
buffering
capacity pH of
6.2 - 8.4 (Clas
2) | Rainfall around
800mm per
year, low wind
erositive power
(Low wind
s erodibility class) | >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)
 | >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 toxture
buffering
capacity pH of
6.2 - 8.4 (Class
2) | Rainfall around
800mm par
year, low wind
erosive power
(Low wind
erodibility
class) | | 6 |
| 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) | >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) | I Rainfall around
800mm par
year, low wind
erosive power
(Low wind
erodibility class) | >13% clay in B
horizon so
meets criteria
 | NW slope of
20% (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)
 | >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% day 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) | >13% clay in 8
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) | >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)
 | >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% day 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) | >13% clay in 8
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 pl
of 6.0 - 8.5
(Class 2) | Rainfall around
820mm par
year, low wind
erosive power
H (Low wind
erodibility class) | >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 par
year, low wind
erosive power
(Low wind
erodibility
class)
 | >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 pt
of 6.0 - 8.5 (Class
2) | Rainfall around
800mm per
year, low wind
erosive power
(Low wind
erodibility
class) | | 5 |
| ТРАЗ | >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
besture
buffering
capacity field
pH of 7.0 - 9.0
(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 15%
(Fail) | Field indication
of soil
dispersion
 | High recharge
and discharge
potential (Class
3) | Mean annual
rainfall around
800mm high
besture
buffering
capacity field pl
of 7.0 - 9.0
(Class 2) | Rainfall around
800mm per
year, low wind
erosive power
H (Low wind
erodibility class) | >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
820mm per
year, low wind
erosive power
(Low wind
erodibility
class)
 | >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 pt
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
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
besture
buffering
capacity field
pH of 5.0 - 6.5
(No Class)
 | Rainfall around
800mm per
year, low wind
erosive power
(Low wind
erodibility
class) | >13% clay in 8
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 pl
of 5.0 - 6.5 (Ne
Class)
Mean annual | Rainfall around
800mm per
year, low wind
erosive power
H (Low wind
erodibility class) | >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)
Mean annual | Rainfall around
820mm per
year, low wind
erosive power
(Low wind
erodibility
class)
 | >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 pt
of 5.0 - 6.5 (No
Class)
Mean annual | Rainfall around
800mm par
year, low wind
erosive power
(Low wind
erodibility
class) | | 5 |
| TPA6 | >13% clay in B
horizon so
meets criteria | NNW slope of
10% (Fail) | Field indication
of soil
dispension | Moderate
recharge and
discharge
potential (Class
5) | Mean annual
rainfall around
800mm high
besture
buffering
capacity field
pH of 6.0 - 8.5
(Class 2)
Mean annual
 | Rainfall around
800mm per
year, low wind
erosive power
(Low wind
erodibility
class) | >13% clay in 8
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
testure
buffering
capacity field pl
of 6.0 - 8.5
(Class 2)
Mean annual | Rainfall around
800mm per
year, low wind
erosilve power
H (Low wind
erodibility class) | >13% clay in B
horizon so
meets criteria
 | NNW slope of
20% (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)
Mean annual | 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) | Field indication
of soil
dispersion | Moderate
recharge and
discharge
potential (Class
5)
 | Mean annual
rainfall around
800mm high
texture
buffering
capacity field pt
of 6.0 - 8.5 (Clas
2)
Mean annual | Rainfall around
800mm par
year, low wind
erosive power
(Low wind
erodibility
class) | | 5 |
| 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) | 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) | >13% clay in 8
horizon so
meets criteria | NNW slope of
1% (Pass) | Field indication
of soil
dispersion
 | Moderate
recharge and
discharge
potential (Class
5) | rainfall around
800mm high
texture
buffering
capacity field pl
of 4.5 - 6.0 (No
Class) | Rainfall around
800mm per
year, low wind
erosive power
(Low wind
erodibility class) | >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) | 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)
 | >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)
 | rainfall around
800mm high
texture
buffering
capacity field pt
of 4.5 - 6.0 (No
Class) | Rainfall around
800mm par
year, low wind
erosive power
(Low wind
erodibility
class) | | 5 | |
| | Land capabl | le of a variety of l | and uses (croppi | |
 | | | ele for a limited s |
 | | | |
 | | | | |
 | | | |
 | | | | |
| LSC Class | Moderate-lo
restrict land u
lim | ow capability land | t: Land has high li | forestry, nature co
imitations for high
orchards), forestry
aged to prevent lor
5 | onservation)
 | s. Will largely
ervation. The
tion | Low capability | land: Land has ve | hortic
 | razing, forestry as
culture)
ns for high-impact
and nature conser
ire land and envire
6 | Ind nature conser
land uses. Land
vation. Careful n
onmental degrad | vation, some
use restricted to
nanagement of
lation | Very low cap
cannot be over
severe if lim
 | sability land: Land
come. On-site an
itations not mana | l has severe limita
d off-site impacts
gged. There shoul | tions that restric | t most land uses a | and generally
 | Extremely low land use apa | capability land: | Limitations are so | o severe that the
tre should be no d
 | land is incapable of nati | of sustaining any
we vegetation | Additional
Comments | Land Capability |
| LSC Class
BROWN VERTO | Moderate-lo
restrict land c
lim
Fine sandy
loams or sandy
loams (all with
6-13% clay);
also includes
organic peats
IOL COMPLEX | ow capability land | t: Land has high li | forestry, nature co
imitations for high | onservation)
 | will largely
s. Will largely
tervation. The
tion
Wind
Erodibility
Class | Low capability | land: Land has ve | hortic
 | culture)
ns for high-impact | Ind uses. Land
vation. Careful n
onmental degrad
Soil
Acidification
Hazard | wation, some
use restricted to
nanagement of
lation
Wind Erodibilit;
Class | Very low cap
cannot be over
severe if lim
Loamy sands or
loose sands (all
with <6% clay)
 | sability land: Land
come. On-site an
itations not mani
Slopes 33-<50% | has severe limita
d off-site impacts
gged. There shoul
3
Soil Sodicity/
Dispersivity | tions that restric | t most land uses a | and generally
 | Extremely low | capability land: | Limitations are so | o severe that the
reshould be no d
8
Salinity Hazard
 | land is incapable
listurbance of nati
Soil Acidification
Hazard | of sustaining any
ve vegetation
Wind
Erodibility
Class | Additional
Comments | Land Capability |
| | Fine sandy
fine sandy
loams or sandy
loams (all with
6-13% clay);
also includes
organic peats | ow capability land
use to grazing, sor
sitations need to b | E: Land has high li
me horticulture (c
be carefully mana
Soil Sodicity/ | forestry, nature co
imitations for high | onservation)
impact land use
y and nature cons
ng-term degrada
Soil
Acidification
 | wind | Low capability
low-impact la
limi
Fine sandy
loams or sandy
loams (all with 6
13% clay); also | land: Land has w
ind uses such as g
tations is require | hortis
rry high limitation
razing, forestry a
d to prevent seve
Soil Sodicity/
 | culture)
ns for high-impact
end nature conser
ire land and envir
6 | soil
Acidification | wind Erodibility | cannot be over
severe if lim
 | come. On-site an itations not mana | d off-site impacts
ged. There shoul
3
Soil Sodicity/ | tions that restric
of land manager
d be minimal dist | t most land uses i
nent practices ca
turbance of native
Soil
Acidification | and generally
n be extremely
e vegetation
Wind
Eredibility
 | Extremely low
land use apa
Loarny sands or
loose sands (all | capability land:
et from nature c
Precipitous
slopes of >50% | Limitations are so
onservation. The
Soil Sodicity/ | ere should be no d
 | Soil Acidification | Wind
Erodibility | Additional
Comments | Land Capability |
| | Fine sandy
foams or sandy
loams (all with
6-13% clay):
also includes
organic peats
KOL COMPLEX | sw capability land
use to grazing, see
intations need to b
Slope 10-<20% | E: Land has high li
me horticulture (e
be carefully mana
Soil Sodicity/
Dispensivity
Field indication
of soil | forestry, nature co
imitations for high
pechardyl, forestry
god to prevent for
5
Salleity Hazard
High recharge
potential low
ualt store (Class | onservation)
-impact land use
and nature commen-
soll
Actification
Hazard
Mean annual
BOLINN in the
buffering
capacity ptri
Mean annual
BOLINN very
bythering
capacity ptri
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BOLINN very
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BOLINN very
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C2 - 24 Class
 | Wind
Eredibility
Class
Rainfall around
800mm per
year, low wind
ensive power
(Low wind
eredibility | Low capability
low-impact la
limi
Fine sandy
loams or sandy
loams or sandy
loams (all with 0
13% clay, lato
includes organic
peats
>13% clay in 8
horizon so | land: Land has w
nd uses such as g
tations is require
Slope 20-<33% | hortis rry high limitation razing, forestry a d to prevent seve Soil Sodicity/ Dispersivity Field indication of soil
 | si for high-impact
and nature conserver
i and and envire
6
Salinity Hazard
High recharge
and discharge
potential low | Soil
Acidification
Hazard
Mean annual
rainfall around
800mm high
Sesture
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Class
Rainfail around
800mm per
year, Jow wind
erosive power | Loamy sands or
loose sands (all
with <6% clay)
 | come. On-site an
itations not mani
Slopes 33-450% | d off-site impacts
ged. There shoul
3
Sell Sodicity/
Dispersivity
Field indication
of soil | tions that restric
of land manager
ld be minimal dist
Salinity Hazard
High recharge
and discharge
potential low. | most land uses are proclides careful so that uses are an articles careful so that uses are articles are are are articles are are are articles are are articles ar | and generally
n be extremely
e vegetation
Wind
Erodbility
Class
Rainfall around
800mm per
year, low wind
erosite pow wind
erosite pow | Extremely low
land use apa
Loarny sands or
loose sands (all
with <8% clay)
 | capability land:
et from nature c
Precipitous
slopes of >500
and cliffs | Limitations are so
onservation. The
Soil Sodicity/
Dispensivity | Salinity Hazard | Soil Acidication
Heard
Read annual
rainfall arcond
800mm high
texture
pullering
capacity pirio
7.2 (Class 2)
Mean annual
800mm very
high texture
buffering
capacity pirio
6.2 - 8.4 (Class
2)
 | Wind Wind Erodibility Class Rainfall around 800mm per year, low wind erosive power (Low wind erosive) power (Low wind erosive) power | Additional
Comments | Land Capability | | | | | | | | | | | | | | | | | | | | | | | | |
| | restrict land u
lim
Fine sandy
learns or sandy
learns (all with
6-13% clary);
also includes
organic peats
OC COMPLEX
>13% clary in 8
horizon so
exceeds orbenia | sw capability land
use to grazing, see
intations need to b
Slope 10-<20% | E: Land has high lin
me hortculture (e
e carefully mana
Soil Sodicity/
Dispensivity
Field indication
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EAT of 4 (ulater | Inferentry, nature co
imitations for high
pochardis, foresting
Sallinity Hazard
High recharge
and discharge
potential low
salt store (Class
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Califica | Wind Erodbility Class
Rainfall around
800mm per
year, low wind
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LSC Class		igh capability land puired. Land capai				ment practices	Very high capab	ility land: Land ha	s slight limitations actices. Land is ca including intensiv 2	. These can be n pable of most lar	nanaged by readi	ly available, easily	High capabilit uses, such as c	ropping with cult practices. However	moderate limitati ivation, using mo ver, careful manag ting to avoid land	re intensive, read rement of limitati	ily available and i ons is required fo	widely accepted	restrict land ma	pability land: Lan anagement option I horticulture. The	d has moderate t 15 for regular hig 15e limitations ca	h-impact land use n only be manag	conservation) is for high-impact l is such as croppin ed by specialised r investment and te	g, high intensity nanagement	Additional	Land Capability
	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	Loams, clay loams or clays (all with >13%clays)	Slope 3-<10% that are longer than 500 m in length	Sail 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	Commenta	
ORTHIC TENOS	>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 par year, 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 par 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 bexture buffering capacity pH (water) of 8.6 (Class 1)	Rainfall around 800mm per year, low wind erosive power (Low wind erodibility class)	>13% day 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 bexture 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 par 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)	>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 besture buffering capacity pH (water) of 6.2 (Class 2)	Rainfall around B00mm per year, low wind erosive power (Low wind erodibility class)	>13% day 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 botture 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 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 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 8 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)	>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 BDOmm per year, low wind erosive power (Low wind erodibility class)	>13% day in B horizon so exceeds criteria	NNE slope of 60% (Fail)		Moderate recharge and discharge potential (Class 5)	Mean annual rainfall around 800mm high botture 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 (proping with restricted calibration, patter cropping using, some horticitary, reserving, neuron exervision) Moderate-low capability land: Lend has high limitations for high-impact land uses. Will lergit restrict inde use to paraing, non-horticitary (orbat-ad) (prostry and nature comparation. This limitation seed to be carefully managed to prove to log-the end galaritism.																					1				
	Moderate-lo restrict land	grazing, sor ow capability land use to grazing, sor	ne horticulture, i I: Land has high li ne horticulture (r	initations for high	n-impact land us	rs. Will largely servation. The	Low capability	land: Land has ve ind uses such as g	t of land uses (gr hortics ry high limitations razing, forestry an I to prevent sever	ilture) i for high-impact d nature conserv	land uses. Land i	use restricted to anagement of	be overcome. I	Dn-site and off-si	is severe limitatio te impacts of land I. There should be	ns that restrict m	ost land uses and actices can be ext	tremely severe if	Extremely low	capability land: I	imitations are so	severe that the l	land is incapable o	f sustaining any re vegetation	Additional	
ISC Class	Moderate-Is restrict land lim Fine sandy loams or sandy loams (all with 6-13% clay): also inclues organic peats	grazing, sor ow capability land use to grazing, sor	ne horticulture, i I: Land has high li ne horticulture (r	initations for high	n-impact land us	rs. Will largely servation. The	Low capability	land: Land has ve ind uses such as g	hortics ry high limitations razing, forestry an	ilture) i for high-impact d nature conserv	land uses. Land i	use restricted to anagement of	be overcome. I	On-site and off-si ons not managed	te impacts of land	ns that restrict m	ost land uses and actices can be ext	generally cannot tremely severe if	Extremely low	capability land: I	imitations are so	severe that the re should be no d 8 Sellinity Hazard	land is incapable of isturbance of nati Soil Acidification Hazard	f sustaining any re vegetation Wind Erodibility Class	Additional Comments	Land Capabilit
DRTHIC TENDS	Moderate-Is restrict land lim Fine sandy loams or sandy loams (all with 6-13% clay): also inclues organic peats	grazing, sor ow capability land use to grazing, sor sitations need to b	ne horticulture, I I: Land has high li ne horticulture (o se carefully mana Soll Sodicity/	forestry, nature of mitations for high archards), forestr ged to prevent lo	onservation) - impact land us y and nature con ng-term degradi Soil Acidification	ss. Will largely servation. The ation	Low capability low-impact la limi	land: Land has ve ind uses such as g tations is required	hortics ry high limitations azing, forestry an to prevent sever 6 Soil Sodicity/	ilture) for high-impact d nature conserv e land and enviro	land uses. Land ation. Careful m mmental degrada Soil Acidification	use restricted to anagement of ation Wind	be overcome. I limitati	On-site and off-si ons not managed	te impacts of land I. There should be Soil Sodicity/	ns that restrict m management pro- e minimal disturb	ost land uses and actices can be ext ance of native ve Soil Acidification	generally cannot tremely severe if getation Wind Erodibility	Extremely low land use apa Loamy sands or loose sands fall	capability land: I rt from nature co Precipitous slopes of >50%	imitations are so nservation. The Soil Sodicity/	should be no d	soil Acidification	w vegetation	Additional Comments Rock outcropping immediately upgradient from location	Land Capabilit
ORTHIC TENOSI	Moderate-li- restrict land i lier Fine sandy loarns or sandy loarns (all with 6-13% clay); also includes organic peaks Sts	grazing, sor ow capablity land use to grazing, sor itations need to I Slope 10-<20%	ne horticulture, i E: Land has high il ne horticulture (o oc carefully manz Soill Sodicity/ Dispensivity Sitrongly socific. EAT of 2 (slakes some dispersion)	Ionisty, nature c mitations for high richards), foreistri ged to prevent lo Salinity Hazard Salinity Hazard discharge potentialhigh salt store (Cliss	nonservation) h-impact land usy and nature con- ng-term degrada Solil Acidification Hazard Mean annual Solorum high totture buffering capacity pH (water) of Sol	R. Will largely servation. The trion Wind Erodibility Class Rainfall around 800mm per year, low wind erosive power (Low wind	Low capability low-impact is limi Fine sandy loams or sandy loams or sandy loams of sandy also includes organic peats	land: Land has ve ind uses such as g tations is required Slope 20-<33%	hortics ry high limitations razing, forestry an to prevent sever 6 Soil Sodicity/ Dispensivity Strongly sodic. EAT of 2 (slabes - some dispersion)	Iture) for high-impact d nature conserve e land and enviro Salisity Hazard Moderate recharge and discharge poemialhigh	land uses. Land ution. Careful m remental degrada Soil Acidification Hazard Mean annual Softem hju totture buffering capacity pH (water) al Softem Softem Capacity pH (water) al Softem Softem Capacity pH (water) al Softem Softem Capacity pH (water) al Softem Soft	Use restricted to anagement of etion Wind Erodibility Class B30nm power year, low wind wrosive power (Low wind	be overcome. I limitati Loamy sands or loose sands (all with <0% clay) >13% clay in B horizon so	Desite and off-si ons not managed Slopes 33-<50%	te impacts of land . There should be Soil Sodicity/ Dispersivity Strongly sodic. EAT of 2 (slakes - some dispersion)	ns that restrict m management pro- minimal disturb 7 Sallnity Hazard Moderate recharge and discharge potentialhigh salt store (Class	soti land uses and actices can be ext actices can be ext actices can be ext active very solid Actidification Hazard Mean arroual active texture buffering capacity pH (weare) 48.6	generally cannot tremely severe if getation Wind Enodibility Class Rainfall around 800mm per year, low wind erosive power (Low wind	Extremely low land use apa Loarny sands or loose sands (all with <855 clay)	capability land: 1 int from nature co Precipitous slopes of >50% and cliffs	imitations are so nservation. Ther Soil Sodicity/ Dispersivity Strongly sodic. EAT of 2 (siakes some dispersion)	Salinity Hazard Moderate recharge and discharge potentialhigh salt store (Class	Soil Acidification Hazard Mean annual rainfall around 800mm high texture buffering capacity pH (water) of 8.6	Wind Erodibility Class Rainfall around 800mm per year, low wind erositye power (Low wind	Rock outcropping immediately upgradient from	Land Capability
ORTHIC TENOSI	Moderate-la restrict land i lie Fine sandy loarns of aandy loarns (all with 6-33% clay in 8 horizon so esceeds criteria >13% clay in 8 horizon so	grazing, sor ov capability lances us to grazing, cause to a slope 10-420% NNE slope of 23% (Fei) N slope of 25%	ne horticulture, i 1: Land has high il 1: ne horticulture (or or carefully meas Soil Sodicity/ Dispersivity Strongly sodic. Etro of 2 (slakes some dispersion) (Class 7) Field indication of heavy soil	minimum for high sector of the sector o	onservation) -impact land use -impact land use -impact land use -impact land use -impact land -ininfal around -ininfal around -inininfal around -ininfal around -inininfal around -ini	Kull targely servation. The evolution of the servation of the servati	Low capability low-impact is limit fine sandy loarns of sandy also includes erganit peats >13% clays is B horizon so exceeds orberia >13% clays is B horizon so	land: Land has ve and uses such as gatations is required Stope 20-33% NNE slope of 23% (Pass) N slope of 25%	hortics yr hyth Imitation: Ito prevent sever 6 Soll Sodicity/ Dispensity Strongly sodic. EAT of 2 (ukans- some dispension) (Class 7) Field indication of heavy soli	Iture) if the high-impact if the high-impact of a high-impact of a high-impact if a high-impact	Soil Action Careful A	use restricted to anagement of ation Wind Erodibility Class erodibility Class erodibility Class erodibility Class erodibility Class erodibility Class erodibility Class (Low wind Biofenn par year, Jow wind Biofenn par year, Jow wind Difference power (Low wind Erodibility Class)	be overcore. I limitati Loamy sands or loose sands (all with <6% clay) >13% clay in B horizon so exceeds or heria >13% clay in B	2x-size and off-of- ons not managere Silopes 33-450% 23% (Pass) N slope of 25%	to impacts of lands. . There should be Soil Sodicity/ Dispensivity Strongly sodic. EAT of 2 (slakes some dispension) (Class 7) Field indication of heavy soil	ns that restrict m imanagement pp minimal disturb 7 Salinity Hazard Moderata elsicharge and elsicharge potentialam salt store (Class 6) Moderate ercharge and discharge	Soil and uses and actions on the extension of the extensi	spenerally cannot generally cannot getation Wind Eredibility Class Rainfall around 800mm per ywar, fore wind eredibility class} Rainfall around 800mm per ywar, fore wind 800mm per ywar, fore wind 800mm per ywar, fore wind 800mm per ywar, fore wind 800mm per ywar, for wind 800mm per ywar 800mm per ywar 900mm per ywar 900mm per ywar 900mm per ywar 900mm per ywar 900mm per ywar 900mm per	Extremely low land use apa land land land land land land land lan	expanding lend: unt from nature co Precipitous slopes of >50% and cliffs	imitations are so nervation. There soli Sodicity/ Dispersivity Strongly sodic. EAT of 2 (slakes some dispersion) (Class 7) Field indication of heavy soil	should be not d Salinity Hazard Salinity Hazard Moderate recharge and discharge potentiality Moderate recharge and discharge potential moderate and	Soil Acidification Hazard Mean annual Romm high tecture buffering capacity ph (wate) (# 8.6 (clies 1) Mean annual Mean annual Mean annual Bothering capacity ph (wate) (6.5)	Wind Enodbillity Class Rainfall around 800mm per year, low wind erodbibloy class) Rainfall around 900m per year, low wind erodbibloy class)	Rock outcropping immediately upgradient from	Land Capability

