



Central Queensland Coal Project

Appendix 3 – Land, Soil and Geochemistry

Central Queensland Coal

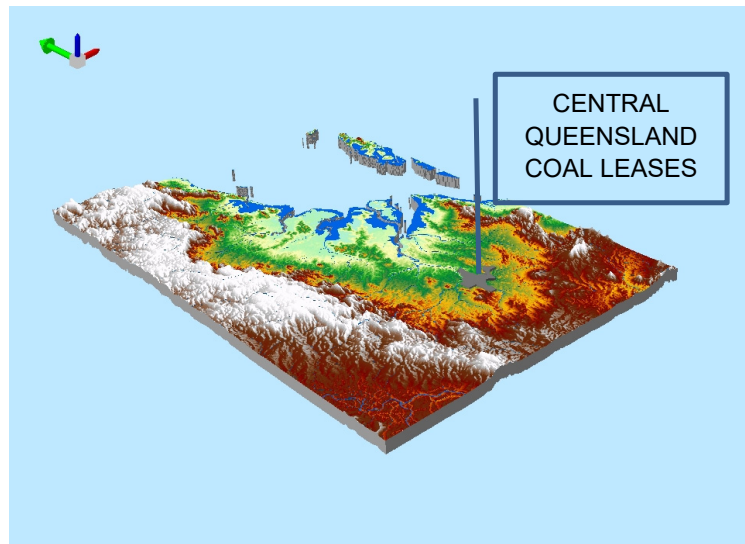
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October 2020

Horizon Soil Survey & Evaluation

Soil and Land Suitability Assessment CQC Project

ML 80187 & ML 700022



Prepared for

CENTRAL QUEENSLAND COAL



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Horizon Soil Survey & Evaluation

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Horizon Soil Survey & Evaluation

Summary

This agricultural land capability and soil suitability assessment was applied to planned disturbed areas on ML80187 and ML700022, Ogmoo, in Central Queensland Coal's (CQC) proposed coal mine development comprising mine, haul road and a train loadout facility by a consortium of Central Queensland Coal Proprietary Limited and Fairway Coal Pty Ltd. The scope of work addressed these project plan elements on MC23, MC493, MC496, MC230 and SP164785. Properties of native soils affecting their suitability as growth media in mine rehabilitation need to be described to support pre-stripping and stockpile management plans for progressive rehabilitation.

The survey and assessment methods addressed the guidelines and legislation protecting agricultural land in Queensland, technical guidelines for assessment of pre-mining land suitability and post-mining land use potential, growth media management and management of saline or sodic spoil material. Field survey work conducted between the 8 and the 18 May 2012 by Dr Ian Hollingsworth (CPSS3) was augmented with soil survey reporting by CDM Smith for the supplementary environmental impact study in 2018.

Current land use is improved and native pasture production for cattle grazing. Soil properties over the improved pastureland are generally consistent with good quality agricultural land — Class A, B and C on regional land capability mapping. Verification in the field survey after an initial review of cropping history between January 1999 and December 2010 from satellite imagery identified that areas on the SCL trigger mapping were ponded pastures and there was no cropping activity in the project area during this period. Based on the evidence in this report no part of the subject area qualified as strategic cropping land under Queensland guidelines.

Areas of good quality agricultural land in the Project Area were revised from 1009 Ha (in 1:250,000 scale from regional mapping) to **336** Ha in 1:25,000 scale site mapping in this survey. The disturbed area associated with the mining activity covers approximately **1285** Ha of C2 class agricultural land, suitable for extensive dryland grazing of native or improved pastures.

We estimated 1.4M m³ of topsoil material is suited for use as primary growth media to re-establish vegetation on rehabilitated mine land. Low soil fertility, particularly available phosphorous, is a limitation to topsoil fertility. Subsoil sodicity below 0.2 to 0.3 m is a general constraint to topsoil stripping depth. Erosion control and revegetation plans will need to consider the relatively high risk of erosion by wind and water associated with primary growth media material. We estimated 6.3M m³ of subsoil material is suited for use as secondary growth media that can be placed on overburden. The secondary media estimate is based on the root zone depth below the topsoil stripping depths identified from soil profile descriptions. Sodicity, salinity and dispersive behaviour of this material constrains its use at the land surface as a growth media. Its use as a primary growth medium could be considered following gypsum and fertiliser amendment, and the addition of organic matter. Ideally the secondary growth media would be reinstated below the primary growth media in the rehabilitation program.

Potential erosion rates and the scale of disturbance warrant development of site soil media stripping and coordinated erosion and sediment control plans that incorporate operational plans for disturbance, construction stockpile development and progressive rehabilitation. Implementing controls that reduce the erosion hazard to less than 150 T/Ha/y significantly reduces the level of specification needed for acceptable sediment control from Type 1 engineered sediment control basins to Type 2 and Type 3 controls such as vegetated buffers, berms and sediment filter fences and rock filter dams (IECA, 2008) in the rehabilitated waste rock landform.

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Maps

Map 1 Central Queensland Coal Soil Map Units

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Appendices

Appendix A: Soil Profile Descriptions

Appendix B: Site Photographs

Appendix C: Laboratory Report

Report: Soil and Land Suitability CQC Project**Location: Central Queensland Coal Project, Ogmore****Queensland Local Authority: Livingston Shire Council**

Proponent: CENTRAL QUEENSLAND COAL and FAIRWAY COAL

1. Introduction

1.1 Background

The Project on ML 80187 and ML 700022 is located within the Livingstone Shire Council (LSC) Local Government Area (LGA) 130 km northwest of Rockhampton in the Styx Coal Basin in Central Queensland. The survey is located in the Central Queensland Coast Mitigation Sub-zone in respect of strategic cropping land constraints (**Figure 1**).

The investigation was commissioned in an email dated 12 December 2019 by Mr Nui Harris, Managing Director CQC. The objectives were to provide soil mapping in relation to soils and soil boundaries

- identification of land (soil) suitability class
- description of soil map units
- key soil management requirements of the soils and subsoils – general limitations and management requirements from the point of view of mine rehabilitation.

Consideration of strategic cropping land and good quality agricultural land capability values affecting approval for open cut mining land use; and soil suitability assessment as a growth medium for mining rehabilitation was required from a site-based assessment at appropriate survey intensity and map scale for mine planning following Queensland environmental guidelines.

Investigation of land suitability, soil growth media and overburden assessments undertaken in 2012 for the Styx Coal South Project EMP (Styx Coal & Fairway Coal, May 2012) are combined in this report with a subsequent study by CDM Smith (CDM, 2018) for the Supplementary Environmental Impact Statement (SEIS) to support planning for progressive mine rehabilitation.

1.2 The Project

The Project comprises the Central Queensland Coal (CQC) mine where mining and processing activities will occur along with a train loadout facility (TLF). Central Queensland Coal Proprietary Limited (CQC) and Fairway Coal Proprietary Limited (Fairway Coal) (the joint Proponents), propose to develop the Central Queensland Coal Project (the Project). As Central Queensland Coal is the senior proponent, Central Queensland Coal is referred to throughout. The Project is in the Livingstone Shire Council Local Government Area near Ogmore, 130 km northwest of Rockhampton, in the Styx Coal Basin in Central Queensland. The Project will operate for approximately 19 years until the current reserve is depleted, and rehabilitation and mine closure activities are successfully completed.

The Project will be located within Mining Lease ML80187 and ML700022, which are adjacent to Mineral Development Licence (MDL) 468 and Exploration Permit for Coal (EPC) 1029, both of which are held by the Proponent. The Project consists of two open cut operations that will be mined using a truck and shovel methodology. The ROM coal will ramp up to approximately 2 MTPA during Stage 1 (2019 – 2022), where coal will be crushed, screened and washed to SSCC grade with an estimated 80% yield.

Stage 2 of the Project (2023 - 2037) will include further processing of up to an additional 4 MTPA ROM coal within another CHPP to SSCC and up to 4 MTPA of HGTC with an estimated 95% yield. At full 10 MTPA production two CHPPs, one servicing Open Cut 1 and the other servicing Open Cut 2, will be in operation.

Rehabilitation works will occur progressively through mine operation, with final rehabilitation and mine closure activities occurring post closure. A new TLF (Train Loading Facility) will be developed to connect into the existing Queensland Rail North Coast Rail Line. This connection will allow the product coal to be transported to the established coal loading infrastructure at the Dalrymple Bay Coal Terminal (DBCT). Access to the Project will be via the Bruce Highway.

Mining infrastructure details for soil assessment were extracted from data supplied by CQC, with the project general arrangement shown on **Figure 2**. The proposed operations are expected to disturb 1367 ha across pits, roads, dams and stockpile areas (**Table 1**).

Table 1 Project infrastructure disturbed areas (Mine Plan 190923)

ID	Description	Area (Ha)
1	Dams and Drains	196
2	Haul Roads	35
3	MIA and CHPPs	40
4	Pits	760
5	Spoil / Waste Rock Stockpiles	214
6	Train Loadout Facilities	30
7	Roads	27
8	Utilities	15
9	Other / Ancillary	50
TOTAL AREA		1367

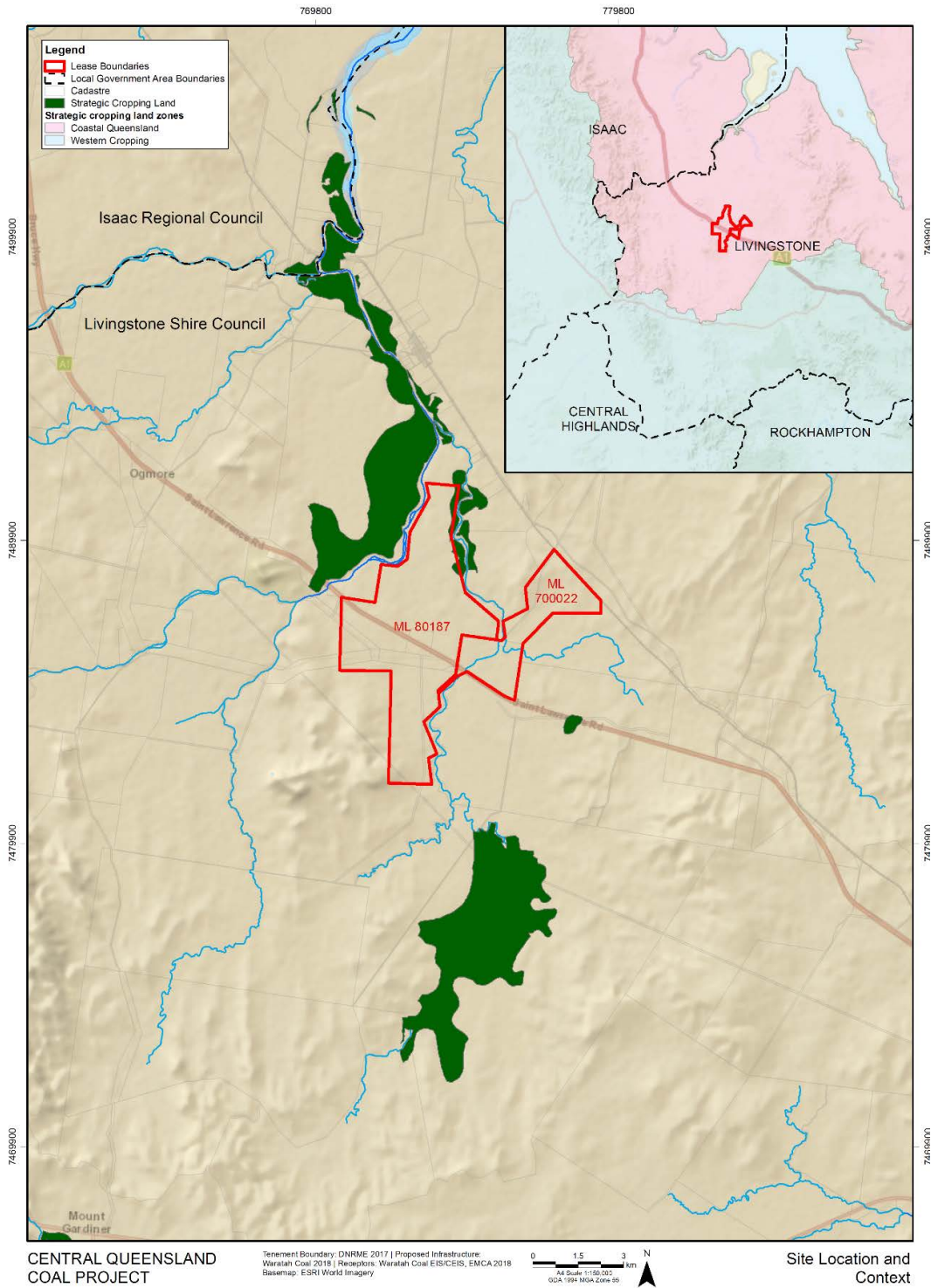


Figure 1 Location map, showing MLs, Local Council Areas & Central Queensland Coast SCL mitigation zone

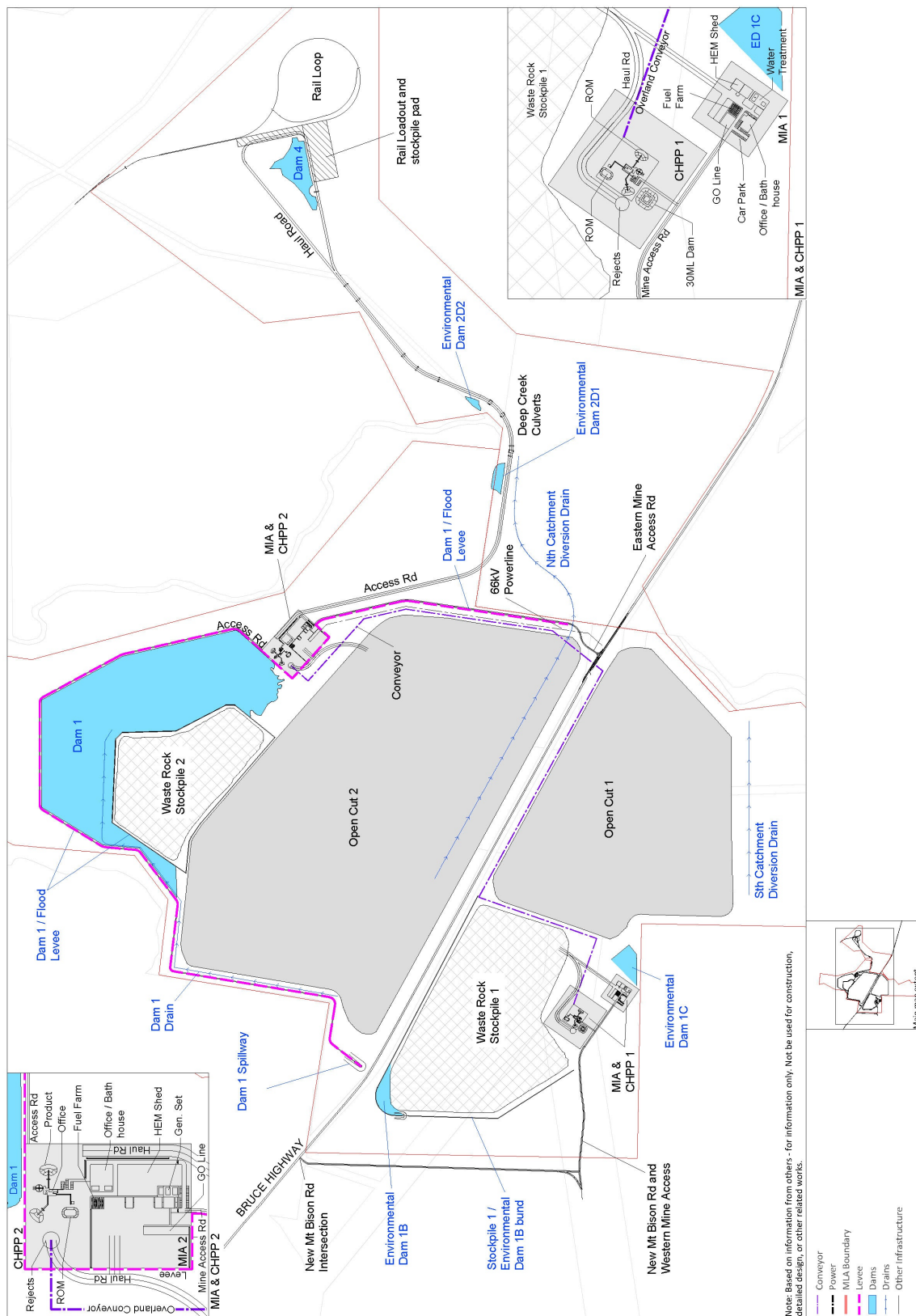


Figure 2 General arrangement Plan (CQC 2020)

2. Site Description

2.1 Climate, Geology, Landform and Soils

Summary rainfall statistics over the climate normal period (thirty years from 1 January 1961 to 31 December 1990) for Strathmuir Bureau of Meteorology monitoring station No. 33189 (Lat. 22.71 S; Lon. 149.73 E, elevation 40 m) is shown in **Table 2**. The rainfall environment is seasonal with approximately 75% of the rainfall falling in summer.

Table 2 Summary rainfall statistics over 41 years for Strathmuir (BoM station no. 33189)

Stat.	J	F	M	A	M	J	J	A	S	O	N	D	Ann
Avg	125	107	90.6	34.7	49.7	30.3	29.3	22.7	15.6	37.1	77.9	122	743
Min.	0.0	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	304
5%	8.2	6.2	4.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.0	384
10%	17.0	15.8	13.1	4.6	0.0	0.0	0.0	0.0	0.0	0.0	7.6	27.0	476
Med.	97.2	77.6	64.2	22.6	20.9	24.0	15.4	9.9	9.1	26.0	66.1	107	682
90%	245	226	204	79.9	120	58.2	88.6	59.2	35.9	96.7	154	247	1124
95%	280	293	248	127	173	60.7	102	92.9	48.2	106	187	330	1262
Max	557	468	312	142	223	198	120	133	75.2	119	259	396	1344

Tooloombah and Deep Creeks (**Figure 3**) carry seasonal flow through the project area and join to form the Styx River, which discharges via extensive mudflats into Broad Sound where there are marine reserves. The Styx River has a tidal range of up to 9 m. No acid sulfate soil risk is identified within the project area.

The distribution of sedimentary, intrusive and extrusive volcanic rock types is shown on **Figure 3**. Intrusive and extrusive volcanic rocks form rugged hills in the west. The general dip of the Styx Coal measures sequence is to the east. The strata of the basin, referred to as the Styx Coal Measures, consist of Quartzose, calcareous, lithic and pebbly sandstones, pebbly conglomerate, siltstone, carbonaceous shale and coal. The measures were mainly deposited in freshwater, deltaic to paludal environments, with occasional marine incursions. Quaternary alluvium overlies the Styx Coal Measures.

Low hills define the catchment boundaries to the west and south project area. Tooloombah and Deep Creeks arise in the volcanic hills to the west and are undercut streams with narrow floodplains incised through extensive, relict alluvial terraces in the project area. Fans of colluvium radiate from the hills in the west and south.

The project area is wholly contained in the Styx Basin – a small Early Cretaceous intra-cratonic sag basin covering 300 km² onshore and offshore over 500 km². It is part of an older feature, the Strathmuir Synclinorium, which contains the Permian Bowen Basin strata. The Styx Basin plunges to the north-northwest, with an elongate shape bounded by the half-graben fault to the east and onlapping the Permian Back Greek Group to the west.

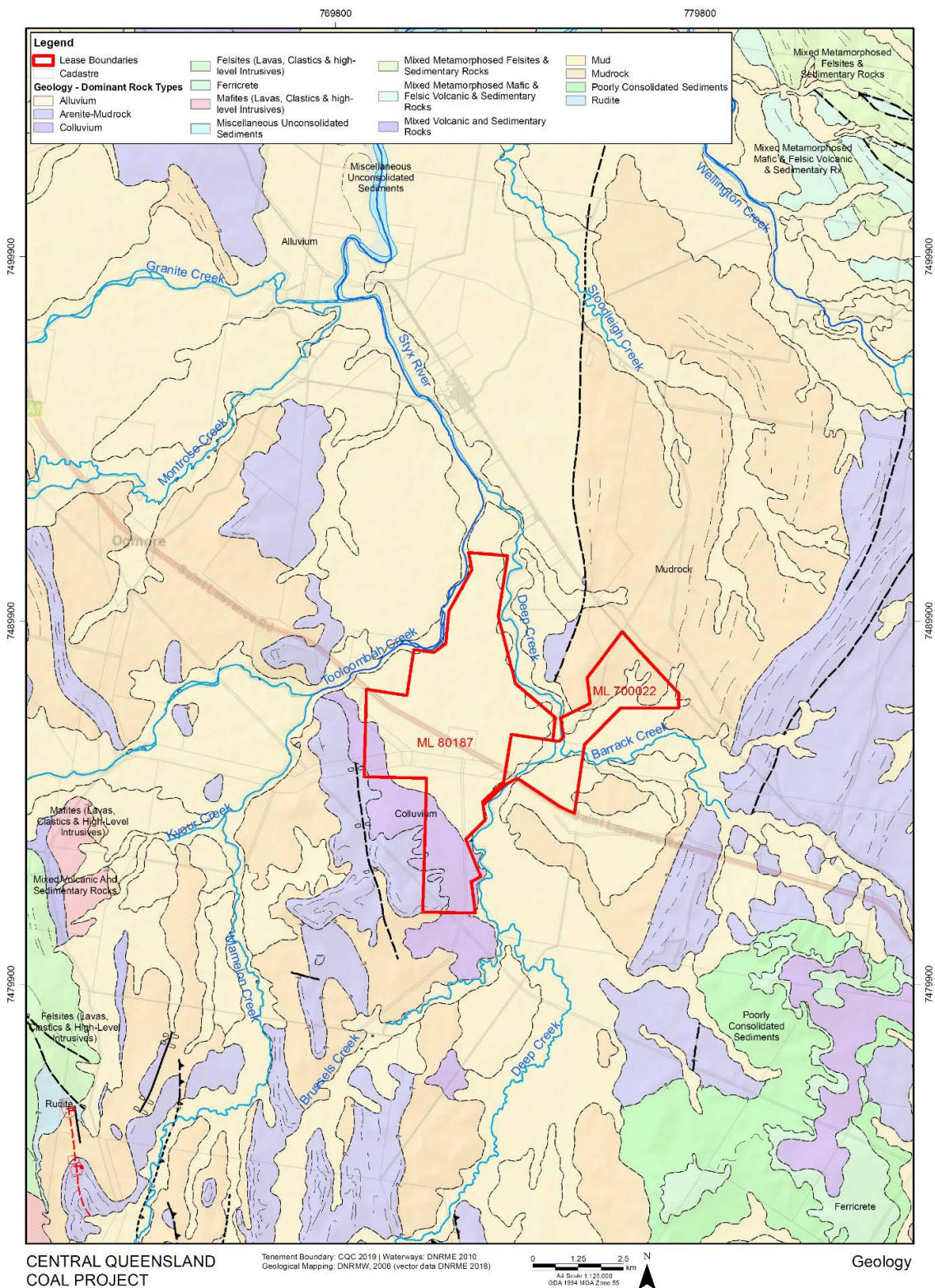


Figure 3 Regional geology and drainage

The land systems across the lease area were mapped at 1:250 000 scale in the Capricornia Coast St Lawrence-Marlborough Area land systems survey (DPI, 1995), with the minimum mapped area approximately 10 km². Tooloomba (Tb), Styx (Sx), Plainview (Pv), Woodstock (Ws), Torilla (TI) and Somerby (So) land systems, described in **Table 3**, were mapped within lease areas. Blackwater (BI), and Artillery (Ar) land systems, described in **Table 3**, were mapped within 300 m of lease areas. Good quality agricultural land (GQAL) and strategic cropping land (SCL) assessments initially refer to this land systems mapping, which this site investigation then reviewed.

Table 3 Land Systems in and adjacent to the lease area

Land System	Landform and geology	Major Soils	Remnant Native Vegetation
Plateaus, Sedimentary Rocks, Eucalypt Woodland			
Ws – <i>Woodstock</i> (309 ha) Class C2	Dissected low plateaus gently dipping sedimentary rocks	Red, massive, gradational loams and clay loams	Eucalypt woodland (narrow-leaved ironbark, pink bloodwood, wattles)
Hills, Sedimentary Rocks, Eucalypt Open Forest and Woodland			
Rd – <i>Rosewood</i> (54 ha) Class C2	Rolling low hills and rises sedimentary rocks	Bleached sandy and loamy surface, brown and grey, sodic duplex soils	Rosewood open forest with narrow-leaved ironbark; Queensland peppermint
Undulating rises and plains, Sedimentary Rocks Eucalypt woodland			
TI – <i>Torilla</i> (54 ha) Class C2	Undulating rises and low hills deeply weathered sedimentary and metamorphic rocks	Red, structured gradational clay loams and uniform clays	Eucalypt woodland (narrow-leaved ironbark, pink bloodwood)
Tb – <i>Tooloomba</i> (305 ha) Class C2	Gently undulating plains and rises sedimentary rocks	Bleached sandy and loamy surface, brown and grey, sodic duplex soils	Eucalypt woodland (narrow-leaved ironbark, Queensland peppermint)
Undulating rises and plains, Unconsolidated sediments, Brigalow scrub			
BI – <i>Blackwater</i> Class A	Level to gently undulating plains and rises on cracking clay sediments; melonhole microrelief	Grey, brown and black cracking clays	Brigalow scrub
So – <i>Somerby</i> (692 ha) Class C1	Level to gently undulating plains and rises on cracking clay sediments melonhole microrelief	Grey and brown, strongly sodic cracking clay and duplex soils	Brigalow scrub
Undulating rises and plains, Eucalypt woodland			
Pv – <i>Plainview</i> (1,626 ha) Class C2	<i>Gently undulating to level plains on unconsolidated fine and medium textured sediments</i>	<i>Black and grey, strongly sodic duplex soils; bleached loamy and clay loamy surface, brown and grey, sodic duplex soils</i>	<i>Eucalypt woodland (poplar box, narrow-leaved ironbark)</i>
Ar – <i>Artillery</i> Class C2	Undulating low hills, rises and fans on fine grained sedimentary rocks	Bleached sandy and loamy, brown and grey, alkaline sodic duplex soils on fine grained sedimentary rocks;	Eucalypt woodland.
Floodplains and Local Alluvial Plains, Gradational Soils			
Sx – <i>Styx</i> (31 ha) Class A	Narrow floodplains along the Styx river and Wellington Creek	Brown, massive fine sandy loams	Eucalypt woodland (blue gum, Moreton Bay ash)

Plainview soils are the most extensive (2141 ha, Class C2), being a poorly mapped complex of Black and grey, strongly sodic cracking clays; bleached loamy and clay loamy surface, brown and grey, alkaline sodic duplex soils. Somerby (869 ha, Class C1) grey and brown strongly sodic cracking clays are the next most extensive land system across the general mine area shown on **Figure 2**, then Tooloomba bleached sandy and loamy, brown and grey sodic duplex soils (500 Ha, Class C2), Woodstock red, massive, gradational loams and clay loams (444 Ha, Class C2), Styx brown, massive fine sandy loams (132 Ha, Class A), Torilla red, structured gradational clay loams and uniform clays (119 Ha, Class C2), Blackwater Grey, brown and black cracking clay soils (8 Ha, Class A) and Artillery brown and grey sodic duplex soils (3 Ha, Class C2).

2.2 Land Use

The existing Livingston Shire planning scheme applies to the project area. Land use from the Queensland Government digital land use map (2017 baseline) across the project area is depicted on **Figure 4**. Extensive dryland cattle grazing of natural and cleared vegetation is the predominant land use in the project area and across the local authority area. Subordinate land uses include nature conservation, production forestry, dryland cropping, quarrying and minimal use areas in rugged hills to the west. Wetland and nature conservation areas fringe the coastline. Ogmoo is the local service centre.

2.3 Land Capability

Agricultural land classification in the regional authority planning guidelines identify:

- Class C, pastureland, suitable for improved or native pastures due to limitations which preclude continuous cultivation for crop production as Good Quality Agricultural Land (GQAL).
- Class A, crop land, suitable for current and potential crops with nil, or moderate, limitations to production with brigalow and eucalypt woodlands on duplex and alluvial soils in seasonally inundated (floodplain) areas as Strategic Cropping Land (SCL).

SCL and GQAL trigger mapping based on regional land systems mapping (DPI, 1995) was identified with Class A agricultural land within the alluvial plains of Tooloomba Creek and the Styx River. The areas of GQAL and SCL associated with areas of land disturbed by general mine operations (**Figure 2**) that potentially trigger a site investigation on ML 80187 and ML 700022 are summarised in **Table 4**.

Table 4 Summary Land capability trigger mapping for disturbed areas on ML 80187 & ML 700022

<i>Land Class</i>	<i>Area (Ha)</i>	<i>Land Capability</i>	<i>Soils</i>
A (SCL, GQAL)	3	SCL - crop land that is suitable for current and potential crops with nil to moderate limitations.	Styx land system - deep, black and grey cracking clays and loams, Vertosols, Tenosols
C1	445	GQAL - land suitable for improved pastures	Somerby land system - Deep, moderately sodic duplex soils, with vertic subsoils, Sodosols
C2	919	Land suitable for native pastures	Plainview, Tooloomba, Torilla and Woodstock land systems - Deep, strongly sodic duplex soils, and shallow rocky red and yellow earths, Kandosols and Tenosols

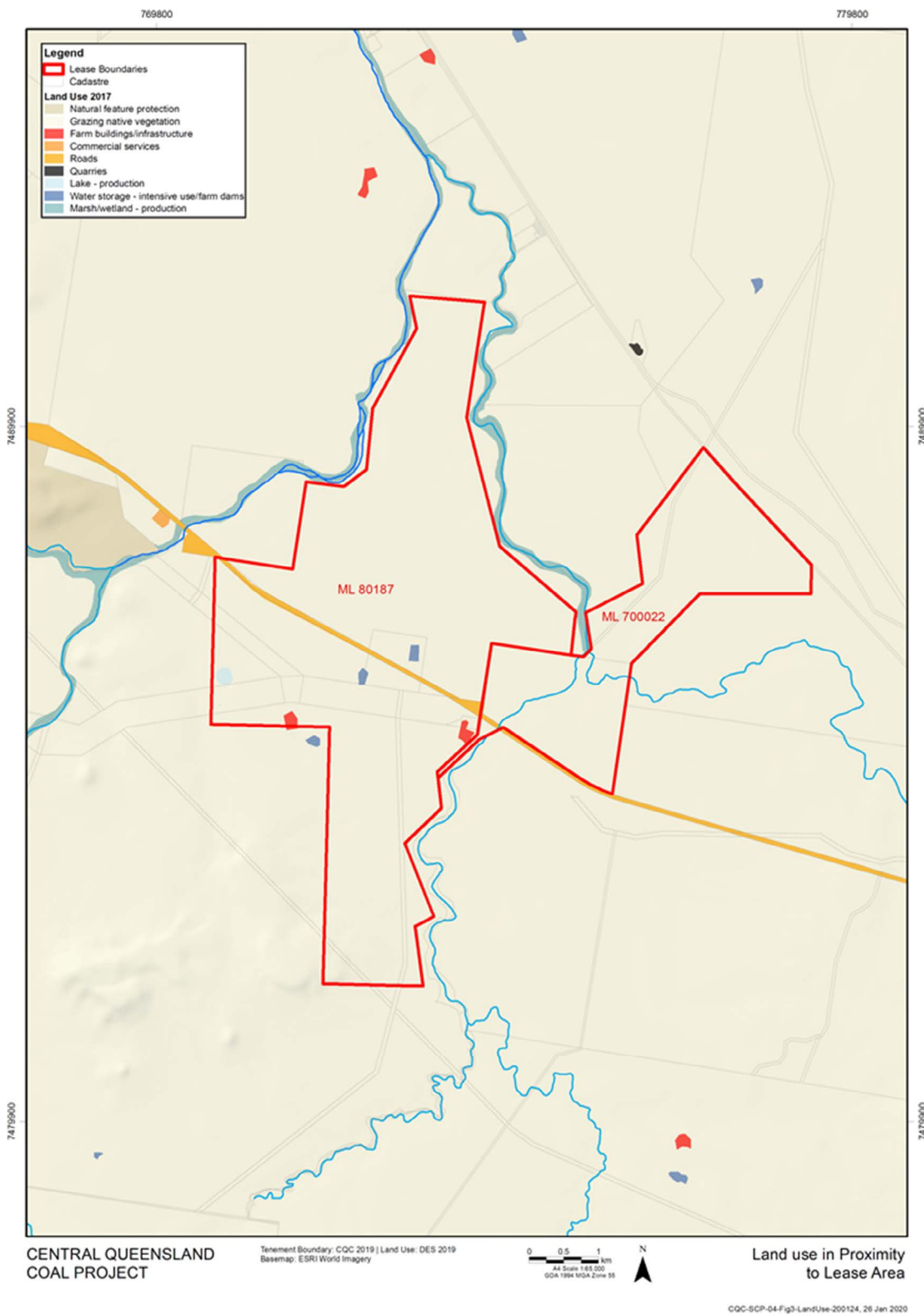


Figure 4 Existing land use

3. Methods

3.1 Land units

Land units were defined and mapped that comprised unique combinations of geology, landform pattern and element and vegetation type by digitising boundaries at 1:10,000 scale in ArcMap 10.7 on an overlay of basemap coverages including:

- land systems
- regional geological mapping (St Lawrence 1:250,000 scale)
- Marlborough 1:100,000 scale geological mapping
- 5m contours and slope derived from 1 second hydrologically corrected DEM
- Gamma-radiometric filtered potassium signal.

The land system mapping did not accurately discriminate between Vertosol soils formed on sediments deposited by Granite, Montrose and Tooloomba Creeks and derived from volcanic uplands to the west, and Sodosol soils derived from long valley deposits of the Styx River and Deep Creek. Three alluvial systems with different base levels are clustered around elevations at 25 m, 35 m and 55 m AHD indicated on **Figure 5**. These alluvial landform patterns were associated with alluvial and floodplains of the Styx River and Deep Creek; the terrace plains of Tooloomba Creeks; and a headwater terrace plain of Tooloomba creek to the south west of the lease area.

Consequently, the boundary between Plainview and Blackwater land systems was revised from our field observations and the concept of the Plainview land system was refined to colluvial and alluvial material derived from basalt capped highland to the east and deposited by relatively steep Granite, Montrose and Tooloomba Creeks. The Somerby and Styx land systems were associated with the long valley deposits of Deep Creek and the Styx River, varying in age and base level. This was a refinement of the land systems mapping based on detailed observations and interpretation of clay versus fine sandy loam A horizons using gamma-radiometric mapping (National Radiometric Mapping version 2).

There is a pattern of texture contrast soils with thin fine sandy loam topsoils over sodic, shrink-swell clay subsoils (Sodosols), and uniform shrink-swell clay soils (Vertosols) on the terrace plains and alluvial plains respectively. We found Vertosols were generally distributed on the alluvial and terrace plain of Tooloomba Creek on the western side of the study area associated with the Blackwater and Somerby land systems. However, Sodosols are associated with these land systems to the east of Tooloomba Creek. This reflects differences in alluvial parent materials between Tooloomba Creek, which drains basalt capped ranges to the west, and Deep Creek draining sedimentary and metamorphic geology to the south and east.

The Project area covers part of the alluvial plain between these two creeks, which is a mixture of materials delivered by both systems. Filtered potassium gamma radiometric mapping available from AUSGEO was used to refine the land unit boundaries where Sodosols and Vertosols overlap in the Project area. The potassium signal derives from the near surface and is higher for clay than for sand and loam and was used to pick out the Vertosols where the land system mapping was unreliable.

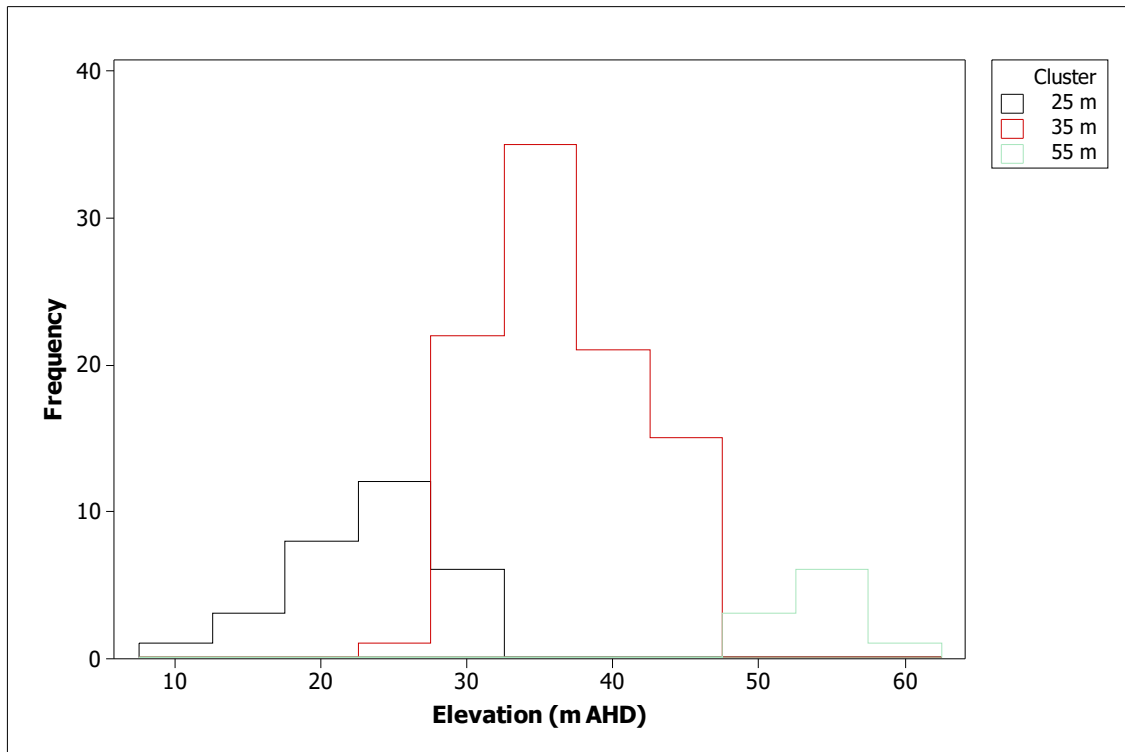


Figure 5 Histogram of site elevations indicating drainage system base levels.

3.2 Soil description & Sampling

Soil mapping and description followed Australian guidelines for land resource assessment (McDonald et al., 2009). Soil profiles were described initially from reconnaissance survey auger holes to 1.5m or refusal to develop a soil map key. Then detailed soil descriptions and sampling was made from test pits excavated to two metres at selected sites that were considered central to, and typical of, each map unit. Mapping was confirmed from check and exclusion sites that were described from land surface observation and field soil properties to 0.3m depth. Soil morphology, classification, sampling, field and laboratory test results were stored in the NatSoil database, a Microsoft access database compliant with Australian soil and land survey guidelines. Site location, map information and soil classification codes from the Australian Soil Classification (ASC) were stored in the observations table in the database.

The survey made 145 soil observations, 54 with full profile descriptions and laboratory analysis and 105 check and exclusion sites. The number of full profile descriptions and sites with laboratory data exceeded the survey guidelines 33% compared with 25% guideline). The sampling plan outline is provided in **Table 5**.

The distribution and type of soil survey sites (detailed descriptions, reference sites with laboratory analyses, check sites) across the CQC Project area are shown on **Map 1**. Most of the sites surveyed in undisturbed areas within the mining leases were check sites used to formulate and verify mapping boundaries. Some of the detailed profile descriptions in undisturbed areas reflect the previous mine plan

Table 5 Sampling plan

Parameter	QQAL/SCL map validation
Minimum map unit area	0.2 ha
Mapping scale	1:25,000
Site intensity	1/20ha
Exclusion	2/excluded unit
Check	2/map unit
Detailed description	2/map unit
Sampled for analysis	1/map unit
Sampling plan	0-100 mm - N,P,K,OC, pH, EC; 200-300 mm - pH, EC, CEC, exch. Cations; 500-600 mm - pH, EC, CEC, exch. Cations; 800-900 mm - pH, EC, CEC, exch. Cations; 1100-1200 mm - pH, EC, CEC, exch. Cations

Standard methods for laboratory soil analysis were followed at a NATA accredited laboratory (ALS Brisbane), listed in **Table 7**.

Table 6 Laboratory analytes

Preparation and Analyses:	Method Code	No. samples
Preparation		
sieving to remove >2mm fraction		25
air dry water content		
1:5 soil:water extraction		25
Major Nutrients		
Total Kjeldahl N	7A3	8
Bicarbonate (Colwell) P	9B1	8
Bicarbonate (Colwell)K	18A1	8
CaPO ₄ Extractable S	10B3	8
Micronutrients		
DTPA extr. Fe, Cu, Zn, Mn and B)	12A1	8
Organic Carbon		
Walkley Black (dichromate oxidation)	6A1	8
General parameters		
pH, plus EC (1:5) -	4C3,3A1	25
Cl (1:5 extract)	5A1	25
Exchangeable cations		
Ca, Mg, K, Na and CEC	15A1,15A2#	8
ESP	15N1	

15A1 Ammonium chloride extractant buffered to pH 7 without pre-treatment where EC<0.3 dS/m; 15A2 where EC>0.3 dS/m.

3.3 Land Capability Assessment

Strategic cropping land identified in the CQC Project area from SCL trigger mapping (Figure 1) was checked against the DILGP (2017) / *Regional Planning Interests Regulation 2014* (Qld) criteria, with land excluded as potential SCL where it is remnant vegetation or has no history of cropping between 1 January 1999 and 31 December 2010.

Three hectares of SCL land was identified from regional 1:250,000 scale trigger mapping within the mine plan footprint shown on **Figure 2**.

The CQC Project area's overall suitability ranking for each soil type was then determined according to the *Guidelines for Agricultural Land Evaluation in Queensland* (DSITI & DNRM, 2015; DSITIA & DNRM, 2013) and translated into Agricultural Land Classes. Lastly, these land classes were compared to the local shire planning document to determine what was classed as Good Quality Agricultural Land (GQAL) for the specific region.

Areas of potential SCL land were validated in the field survey. The SCL validation referred to zonal criteria and assessment guidelines (DILGP, 2017), which are framed to meet the requirements of the *Regional Planning Interests Act 2014*. The eight zonal SCL assessment criteria used to validate the SCL trigger mapping were (based on Central Queensland zone requirements from DILGP, 2017):

- i. **Criterion 1** - Slope is less than or equal to 5 per cent.
- ii. **Criterion 2** - The average density of rocks greater than 60 mm diameter in the soil surface is less than or equal to 20 per cent.
- iii. **Criterion 3** - The average density of gilgai microrelief of greater than 500 mm depth is less than 50 per cent of the land surface.
- iv. **Criterion 4** - The soil depth is greater than or equal to 600 mm.
- v. **Criterion 5** - The site has favourable drainage.
- vi. **Criterion 6** - For non-rigid soils, the soil pH at 300 mm and 600 mm soil depth must be greater than pH 5.0. For rigid soils, the soil pH at 300 mm and 600 mm soil depth must be within the range of pH 5.1 to pH 8.9, inclusive
- vii. **Criterion 7** - Soil at 600 mm depth or shallower has an EC_{1.5} of 0.56dS/m or less
- viii. **Criterion 8** - The soil water storage of the soil is 75 mm or greater to a soil depth or soil physico-chemical limitation of up to 1000 mm.

The field survey included validation of SCL in the trigger map areas in the CQC Project area. Slope was measured in percent from a detailed digital elevation model (DEM) and confirmed in the field using a handheld clinometer. Slope was the first criterion for excluding an observation site from SCL. Rockiness refers to the presence of unattached coarse rock fragments and rock outcrops at the soil surface. Rockiness was assessed visually on current soil conditions, irrespective of whether management actions have improved land suitability. Gilgai microrelief is a natural soil feature associated with non-rigid, cracking clay soils and is assessed according to accepted standards for field survey (NCST 2009). Soil types with gilgai microrelief were described for land units in the CQC Project area.

Soil profile inspections verified soil depth. Soil depth is the depth from the surface to the base of the soil profile — either C horizon or a physical barrier, including bedrock, weathered rock, hard pans and

continuous gravel layers. Soil wetness caused by poor drainage occurring in valley floors and swamps can severely reduce crop productivity. Soil wetness is identified with redoximorphic features, including gley colours, mottles and segregations, from soil morphological descriptions. Soil pH measures the alkalinity or acidity of the soil, which was measured in the field with an indicator kit and in the laboratory on 1:5 soil:water suspension. Soil salinity refers to the concentration of soluble salts present in a soil. Salinity degrades soil structure and limits root development and the ability of plants to extract water and nutrients from the soil.

Soil water storage refers to the amount of water that can be stored in a soil and be available for plant use. Soil water storage was estimated in the field based on the soil texture look up table (DILGP, 2017) which lists the average estimated amount of water expected to be stored in each 100mm increment of soil. Further to this, Plant Available Water Capacity (PAWC) was calculated using laboratory analysis on sites that qualified as SCL on all other zonal criteria. The combination of different limitations was recorded and the most severe limitation determined the overall land capability ranking for specific soil types and map units.

3.4 Agricultural Land Classes

Land capability limitations were determined from each soil map unit profile observation in the project soils database, based regional guidelines for the Central Queensland Coast (DSITIA & DNRM, 2013). Agricultural land class was determined the most limiting soil factor according to the assessment scheme.

The agricultural land class (ALC) assessment accorded with the *Guidelines for Agricultural Land Evaluation in Queensland* (DSITI & DNRM, 2015; DSITIA & DNRM, 2013). The ALC assessment is reported using a four class system (A to D) with Class A being the best quality agricultural land and Class D being non-agricultural land (**Table 7**). The agricultural land class system is related to the land suitability assessment system in Queensland, with the five-class land suitability ranking system translated into a four-class agricultural land class system. The correlation between these systems is shown in **Table 7**. Class C of the agricultural land class system is further divided into three sub-classes of C1, C2 and C3. Class A, Class B and Class C1 land is GQAL in the Livingstone Shire Council planning scheme. Class C2 is not GQAL in the scheme.

Table 7 Regional land systems suitability ranking and agricultural land class correlation

LS Class	LS Description (DME, 1995)	ALC	Pastoral Management and Typical Vegetative Cover	
1	High quality land with few or minor limitations	C1	Good quality grazing and/or highly suitable for pasture improvement	Brigalow vegetation; appropriate for fattening beef cattle; good grazing on sown pastures and can withstand ground disturbance.
2	Land with minor limitations			Brigalow vegetation and/or transitional vegetation to Poplar Box vegetation communities.
3	Moderate limitations to sustaining its use	C2	Moderate quality grazing and/or moderately suitable for pasture improvement.	Eucalypt woodland, Poplar Box, narrow-leaved Eucalyptus, gum-top woodlands; low-moderate PAWC and low-moderate fertility; good grazing on native pastures without ground disturbance; appropriate for beef cattle breeders.
4	Marginal land requiring major inputs to sustain the use	C3	Low quality grazing, grazing of native pastures with limited suitability for pasture improvement.	Tea-tree vegetation; usually characterised by steep country or mangrove flats.
5	Unsuitable due to extreme limitations.	D	Not suitable	Unsuitable due to extreme limitations.

4. Soil Properties and Mapping

Soil properties in soil map units were described from 145 soil profiles across mining leases, disturbed areas and adjacent land systems. The spread of reference sites with profile descriptions and soil chemistry, detailed soil profiles and check or exclusion sites described from land surface observations is summarised in **Table 8**. Survey intensity focussed on soil map units 3, 4 and 5, which were the most extensive soil map units in the mining disturbed area. Analytical effort was applied to mapping soil unit 4 and soil unit 5 which have differing land capabilities that were not accurately delineated in the land systems mapping (DPI, 1995).

Table 8 Soil survey mapping coverage

<i>Soil map unit</i>	<i>Area*</i>	<i>Reference sites</i>	<i>Detailed profile descriptions</i>	<i>Check and exclusion sites</i>	<i>Survey intensity (Ha/site)</i>	<i>Proportion of mining disturbed area (%)</i>
1	1038	3	0	2	208	2
2	28	5	0	2	4	2
3	197	0	0	3	66	11
4	335	14	8	18	8	11
5	2618	20	16	57	28	44
TOTAL	4216	42	26	77	29	

*soil map extent clipped to 300m buffer around mining leases

4.1 Soil map unit 1 — Red and Brown Gravelly Earths (Kandosols), soils on rises

CONCEPT: Earthy, red and brown gradational profiles with gradual texture increase in the subsoil f
 Ferric-Sodic Dystrophic Brown Kandosol Thick Very gravelly Sandy Loamy Deep; Ferric Dystrophic Red Kandosol Medium Moderately gravelly Clay-loamy Clayey Deep
 Bleached-Sodic Dystrophic Brown Kandosol Thin Moderately gravelly Clay-loamy Clayey Shallow
 DETAILED DESCRIPTION: Reference sites SS01, SS07 and SS04 in Appendix A.

SURFACE PROPERTIES: Infertile soils formed on deep weathered sedimentary and metamorphic rocks on hillslopes & rises, slope <5%, 26<36% gravel throughout

EFFECTIVE ROOT DEPTH	<1 m	PAWC	<50 mm		
LAND CAPABILITY	SCL	CAPABILITY	SUITABILITY	AG LAND CLASS	GOAL
	NO	I	S1	B	YES
LIMITATIONS	BICARB P, PAWC, WATER EROSION				

RANGE IN CHARACTERISTICS

Depth cm	Morphology	pH	EC dS/m	ESP (%)	Chloride mg/kg	Bicarb P mg/kg	Erosion risk
0	A1 LS-SL	5.3	0.02	2	<10	<5	DI=3 K=0.03
10							
20							
30	B1 SL-LC	5.69	0.6		<10		DI=3 K=0.03
40							
50							
60	B3 SL-SCL	5.6-6.6	0.03	4-6	<10		
70							
80							
90							
100							
110							
150						6	

4.2 Soil map unit 2 — Non-gravelly Rudosols, flood plain soils

CONCEPT: Alluvial Soils with minimal profile development associated with overbank flow sediments on Tooloomba and Deep Creek narrow floodplains.
 Basic Grey-Orthic Tenosol Medium Non-gravelly Silty Silty Moderately deep; Stratic Rudosol Non-gravelly Loamy Shallow; Basic Fluvic Clastic Rudosol Non-gravelly Clayey Shallow
 Reference sites 007, 008, 011, SS05 in Appendix A.

DETAILED DESCRIPTION:

SURFACE PROPERTIES: River flats and terraces, cleared for pasture, no rocks, no microrelief, imperfectly drained, slope <1%

EFFECTIVE ROOT DEPTH	1.5 m	PAWC	75<100 mm		
LAND CAPABILITY	SCL	CAPABILITY	SUITABILITY	AG LAND CLASS	GOAL
	NO	I	S1	B	YES
LIMITATIONS	DRAINAGE, WATER EROSION, PAWC				

RANGE IN CHARACTERISTICS

Depth cm	Morphology	pH	EC dS/m	ESP (%)	Chloride mg/kg	Bicarb P mg/kg	Erosion risk
0	dark grey						
10	A1 SL-SCL	5.8	0.6		20-30	31-67	DI=3
20							K=0.03
30		7.2	0.6		<10		
40							
50	B2w	7.9	0.6		10	2	DI=3
60	SL-MHC						K=0.03
70	C						
80	SL-MC						
90	dark	6.4	0.6		50		
100	yellowish						
110	brown						
150		7.3	0.6	0-1	40	6	

4.3 Soil map unit 3 — Gravelly Rudosols & Tenosols, flood plain soils

CONCEPT: Alluvial Soils with minimal profile development associated with channel sediments on Tooloomba and Deep Creek narrow floodplains. Basic Grey-Orthic Tenosol Medium Non-gravelly Silty Silty Moderately deep; Stratic Rudosol Gravelly Loamy Shallow; Basic Fluvic Clastic Rudosol Gravelly Clayey Shallow

DETAILED DESCRIPTION: Exclusion sites 060, 115, 126, 080 in Appendix A.

SURFACE PROPERTIES: River flats and channels, cleared for pasture and uncleared riparian areas, rocky, no microrelief, poor to imperfectly drained, 10-20% surface coarse fragments, slope <5%

EFFECTIVE ROOT DEPTH	<0.5 m	PAWC	<50 mm		
LAND CAPABILITY	SCL	CAPABILITY	SUITABILITY	AG LAND CLASS	GOAL
	NO	I	S1	D	NO

LIMITATIONS ROCK, PAWC, PH, DRAINAGE, WATER EROSION, WIND EROSION

RANGE IN CHARACTERISTICS

Depth cm	Morphology	Gravel %	pH	EC dS/m	ESP (%)	Chloride mg/kg	Bicarb P mg/kg	Erosion risk
0	dark grey							
10	A1 SL-FSCL	50-90	6-7.5	0.6				DI=3
20	A2 FSL	50-90	6-8.5					K=0.03
30	B21 LC	50-90	6-8.5	0.6				
40	B22 MC	50-90	6-9					
50	grey brown		6-9	0.6				DI=3
60	C1 SL-LC	50-90	6-9					K=0.03
70								
80								
90			6-9	0.6				
100								
110	R							
150			9	0.6				

4.4 Soil map unit 4 — Sodic Vertosols, alluvial plain soils

CONCEPT: Uniform textured cracking clay soils with shrink-swell properties on terrace plains and alluvial plains of Tooloomba Creek and the Styx River.
 Endohypersodic Crusty Brown & Grey Vertosols Non-gravelly Fine Medium fine Moderately deep; Episodic Crusty Brown Vertosol Gravelly Fine Medium fine Moderately deep; Endohypersodic Epipedal Grey Vertosol Non-gravelly Fine Medium fine Moderately deep; Endohypersodic Crusty Brown Vertosol Non-gravelly Fine Medium fine Moderately deep

DETAILED DESCRIPTION: Reference sites 001, 002, 020, 041, 042, 048, 052, 066, 067, 113 in Appendix A

SURFACE: Terraces, cleared for pasture, gravelly, melonhole gilgai microrelief, imperfectly drained, slope <1%

PROPERTIES: EFFECTIVE ROOT DEPTH 0.8 m PAWC 75<100 mm

LAND CAPABILITY	SQL	CAPABILITY	SUITABILITY	AG. LAND CLASS	GQAL
	NO	V	2	C1	YES
LIMITATIONS BICARB P, PAWC, GILGAI, EC, pH, DRAINAGE, WATER EROSION					

RANGE IN CHARACTERISTICS

Depth cm	Morphology	pH	EC dS/m	ESP %	Chloride mg/kg	Bicarb P mg/kg	Erosion risk
0	A1						
10	LMC	6.5-8.1	0.03-0.04	2.6-10	20-40	<2	DI=2
20	dark grey						K=0.02
30	A3 MC	6.9-8.8	0.03-0.7		190		
40							
50	B2ss MHC	7.5-8.2	0.03-0.91	16.4-22.5	310-1680		DI=2
60	greyish	brown					K=0.02
70	B3 MHC	7.6-8.5	0.03-1.3		2580		
80							
90	brown						
100							
110	C1 MHC	8.1-8.5	0.03-1.4	29	2890		
150							

4.5 Soil map unit 5 — Sodosols, alluvial terrace soils

CONCEPT: Sodic soils with contrasting topsoil and subsoil texture on terrace plains and undulating rises of Deep Creek.
 Vertic Hypernatric Grey and Brown Sodosols Medium Gravelly Clay-loamy Clayey Moderately deep

DETAILED DESCRIPTION: Reference sites 14, 22, 26, 28, 29; 31, 35, 36, 49, 56; 65, SS02; SS03; SS06; SS08, SS09; SS10, SS11 in Appendix A

SURFACE: Terraces, cleared for pasture, gravelly, crabhole gilgai microrelief,

PROPERTIES: imperfectly to poorly drained, slope <1%

EFFECTIVE ROOT DEPTH: 0.5 m PAWC: 50<75 mm

LAND CAPABILITY	SQL	CAPABILITY	SUITABILITY	AG. LAND CLASS	GQUAL
	NO	VI	4	C2	NO
LIMITATIONS PAWC, ESP, EC, pH, WIND & WATER EROSION, DRAINAGE					

RANGE IN CHARACTERISTICS

Depth cm	Morphology	pH	EC dS/m	ESP %	Chloride mg/kg	Bicarb P mg/kg	Erosion risk
0	A1 SL-FSCL						
10	Dark grey	5.8-7.3	0.1-0.7	0-10	<10-90	<2-89	DI=2
20	to black						K=0.02
30	A2e FSL	6.9-8.8	0.1-0.7		60-860		
40							
50	B2ss	8-9.3	0.2-0.9	11-32	20-1130		DI=1
60	MHC-HC						K=0.04
70	yellowish	brown					
80	to greyish	brown					
90	grey	6.4-9.3	0.1-1.1		120-1520		
100	C1						
110	LMC-MC	7.3-9.5	0.4-1.1	19-41	360-1680		
150	R						

4.6 Soil Mapping

Representative soil types of the 3 soil map units in the CQC Project area were cross referenced with relevant land systems as identified in Lands of the St Laurence Region, Queensland (DPI, 1995). Soil map units described in **Table 9** are mapped on **Map 1 Central Queensland Coal Soil Map Units**. Areas of good quality agricultural land in the Project Area were revised from 1,009 Ha (in 1:250,000 scale from regional mapping) to **336** Ha in 1:25,000 scale site mapping in this survey. Approximately **1,285** Ha of C2 class agricultural land, suitable for extensive dryland grazing of native or improved pastures is mapped within the disturbance footprint.

Table 9 Land unit descriptions including land system associations

Unit ID	Map unit Description	Australian Soil Classification
1	<i>Woodstock, Ws</i> Dissected low plateaus on gently dipping sedimentary rocks; red and brown, massive, gradational loams and clay loams supporting Eucalypt woodland (narrow-leaved ironbark, pink bloodwood, wattles) footslope	C2; Ferric-Sodic Dystrophic Brown Kandosol Thick Very gravelly Sandy Loamy Deep
1	<i>Torilla, Tl</i> Undulating rises and low hills on deeply weathered sedimentary and metamorphic rocks; Red, gradational clay loams and uniform clays supporting Eucalypt woodland (narrow-leaved ironbark, pink bloodwood) hillslope	C2; Ferric Dystrophic Red Kandosol Medium Moderately gravelly Clay-loamy Clayey Deep
1	<i>Tooloomba, Tb</i> Gently undulating plains and rises on sedimentary rocks; Bleached sandy and loamy surface, over brown and grey, alkaline sodic clay subsoils supporting Eucalypt woodland (narrow-leaved ironbark, Queensland peppermint) hillslope	C2; Ferric Dystrophic Red Kandosol Medium Moderately gravelly Clay-loamy Clayey Deep
2	<i>Styx, Sx</i> Narrow floodplains along the Styx river; brown massive loams supporting Eucalypt woodland (blue gum, Moreton Bay ash) alluvial plain	A; Alluvial Soils Non-gravelly Deep (Tenosols, Rudosols, Vertosols) Sandy Loam to Clay textures
3	valley flat	D; Alluvial Soils Gravelly Shallow (Tenosols, Rudosols, Vertosols) Sandy Loam to Clay textures
4	<i>Blackwater, Bl</i> Level to gently undulating alluvial plains and rises on clay sediments with melonhole microrelief; grey and brown cracking clay soils supporting Brigalow woodland. alluvial plain	C1; Brown and Grey Sodic Vertosols Non-gravelly Medium Clay over Medium Heavy Clay; C1
4	<i>Somerby, So</i> Level to gently undulating terrace plains and rises on cracking clay sediments with melonhole microrelief; grey and brown, strongly sodic soils supporting Brigalow woodland. alluvial terrace plain	C1; Brown and Grey Sodic Vertosols Non-gravelly Medium Clay over Medium Heavy Clay
5	<i>Plainview, Pv</i> Gently undulating to level terrace plains on sediments; black and grey, strongly sodic bleached loamy and clay loamy surface, over brown and grey, alkaline sodic subsoils. terrace plain	C2; Vertic Mesonatric Grey Sodosols Medium Non-gravelly Clay-loamy Clayey Moderately deep

4.7 Land Capability

Land capability limitations for each soil map unit are shown in **Table 10**. Climate, frost limitation (Cf) ranking of 1, ie., frost free or occasional light frost applied across the project area. All of the project land is above 20 m elevation and is free from drainage water hazard from acid sulfate soils (Dp).

Table 10 Land capability limitations for soil map units

<i>Limitations</i>	<i>Soil Map Unit</i>				
	1	2	3	4	5
E-Water	3	1	1	1	2
F-Flooding	0	3	2	1	1
M- Soil water	6	2	6	4	5
Pa – Soil adhesiveness	1	2	1	3	3
Pd – Soil depth	2	1	2	2	3
Pm – Narrow soil moisture range	1	0	0	1	2
Ps – Surface condition	1	0	0	4	2
Rockiness – R	4	1	4	3	4
Salinity - Sa	0	0	0	1	1
Microrelief - Tm	0	2	1	2	1
Wetness – W2	6H	4M	4M	3S	3V
Land Class	C4	C2	C4	C2	C3

4.8 Strategic Cropping Land Assessment

Map unit size and density of different types of observation sites (analysed, detailed, check, exclusion) followed the guidance on SCL assessment applicable for the Coastal Zone (DILGP, 2017). Strategic cropping land assessment was made for polygons in the regional 250,000 scale SCL trigger mapping where they intersected with CQC mining leases (ML 80187, ML 700022) and the 1367 Ha area of mining disturbance within the lease areas (shown in the general mine layout Figure 2). Sites, site density and compliance with SCL assessment guidance for SCL trigger map polygons that intersect with lease areas, and planned mining disturbance within the lease areas, is documented in **Table 11**.

Table 11 Site numbers and compliance with SCL guidance for detailed survey

SCL trigger map polygon ID	Soil Map Unit	ASC suborder	Area (Ha)	Site type	Site ID	Sites	Guideline
4579		Rudosols	64	Analysed*	022	1	3
				Detailed			3
				Check	125, 126	2	≥2
				Exclusion			3
3736		Rudosols	36	Analysed*	SS05	1	3
				Detailed			3
				Check	127, 131	2	≥2
				Exclusion			128, 129, 130
TOTAL			100			12	
SITE DENSITY						9 Ha/site	12

*The analysed sites substitute for detailed sites.

Site SS05, which was classified as a Dermosol and analysed for the SEIS report (CDM, 2019) site for SCL trigger mapping polygon 3736, was reclassified as a Rudosol from the site description and texture results. The site is at the top of the stream bank on Deep Creek. The abrupt texture change between the A and the B horizon is not characteristic of a Dermosol. The abrupt textural change is characteristic of a change in depositional environment. The textures, from laboratory analysis, are silty clay loams throughout. The gravel throughout (>10%) and high silt (>10%) is characteristic of sedimentation close to the water course alternating with channel deposits as the stream migrates. Site SS05 was reclassified

as a Clastic Fluvic Basic Rudosol; Gravelly, Clay loamy, Shallow. The B2 horizon was renamed a D horizon to reflect a change in depositional environment instead of pedological horizon development.

The land unit mapping, on a 1:10,000 orthophoto base map, identified that the boundary of SCL trigger mapping polygon 3736 did not accurately follow the boundary between the narrow floodplain of Deep Creek in the Styx Land System (land capability A) and included an area of alluvial terrace associated with the adjoining Somerby Land System and soil map unit 5 (Vertic Hypernatric Grey and Brown Sodosols, C2 land capability). The mapping error can be seen in **Figure 6(b)** where the SCL mapping polygon 3736 extends further into the mine lease and the mine disturbed area (hatched pattern) than soil map unit 2 (Alluvial Soils, land capability A) associated with the Deep Creek floodplain. Check sites 128, 129 and 130 verify the boundary between the alluvial system and the terrace comprising Sodosols with lower land capability. The area of class A land extending into the mine disturbance area is reduced from 3 Ha in the SCL trigger mapping based on land systems to 0.8 Ha based on soil map units in the land units for the site shown on in **Figure 6 (b)**.

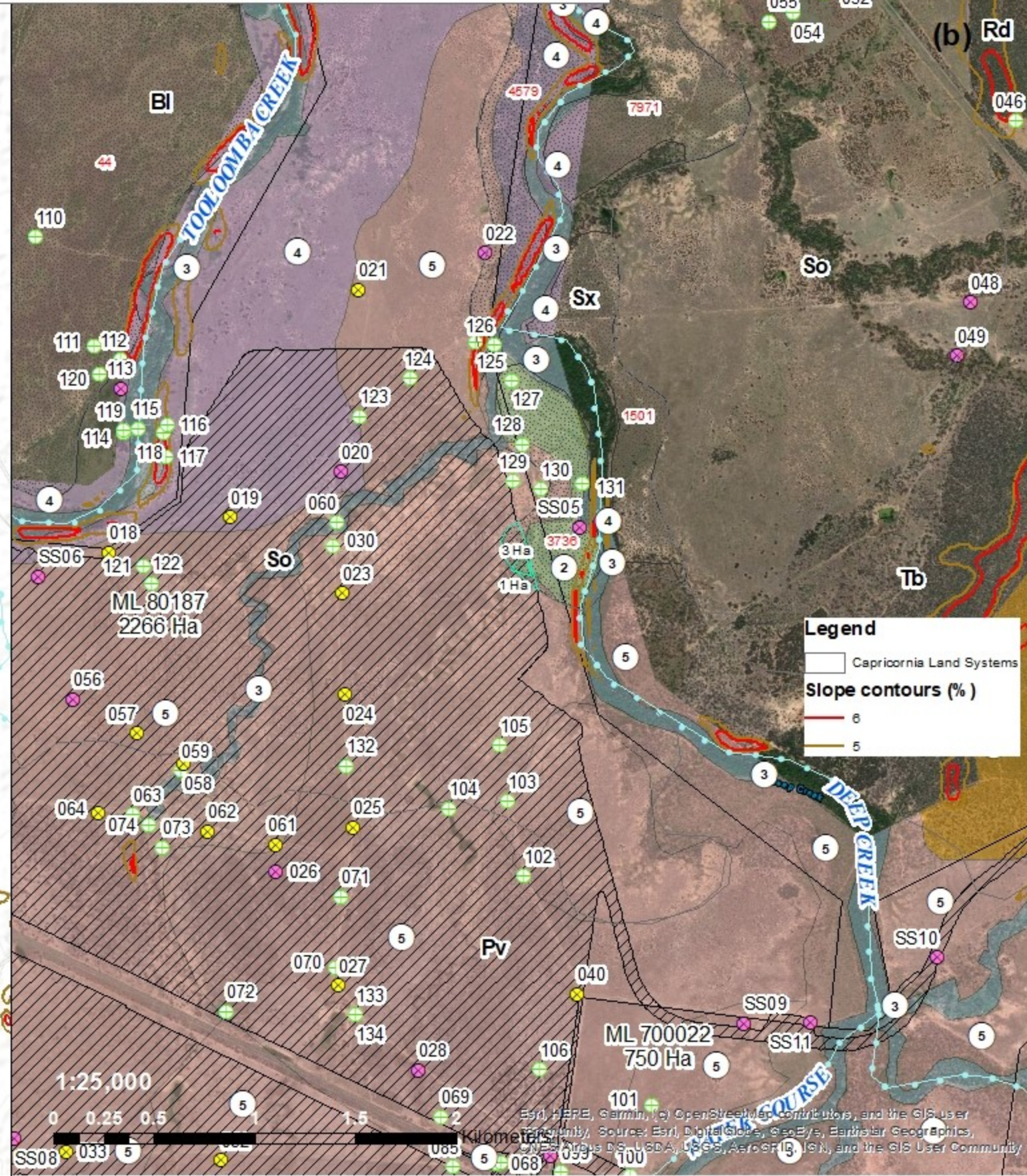
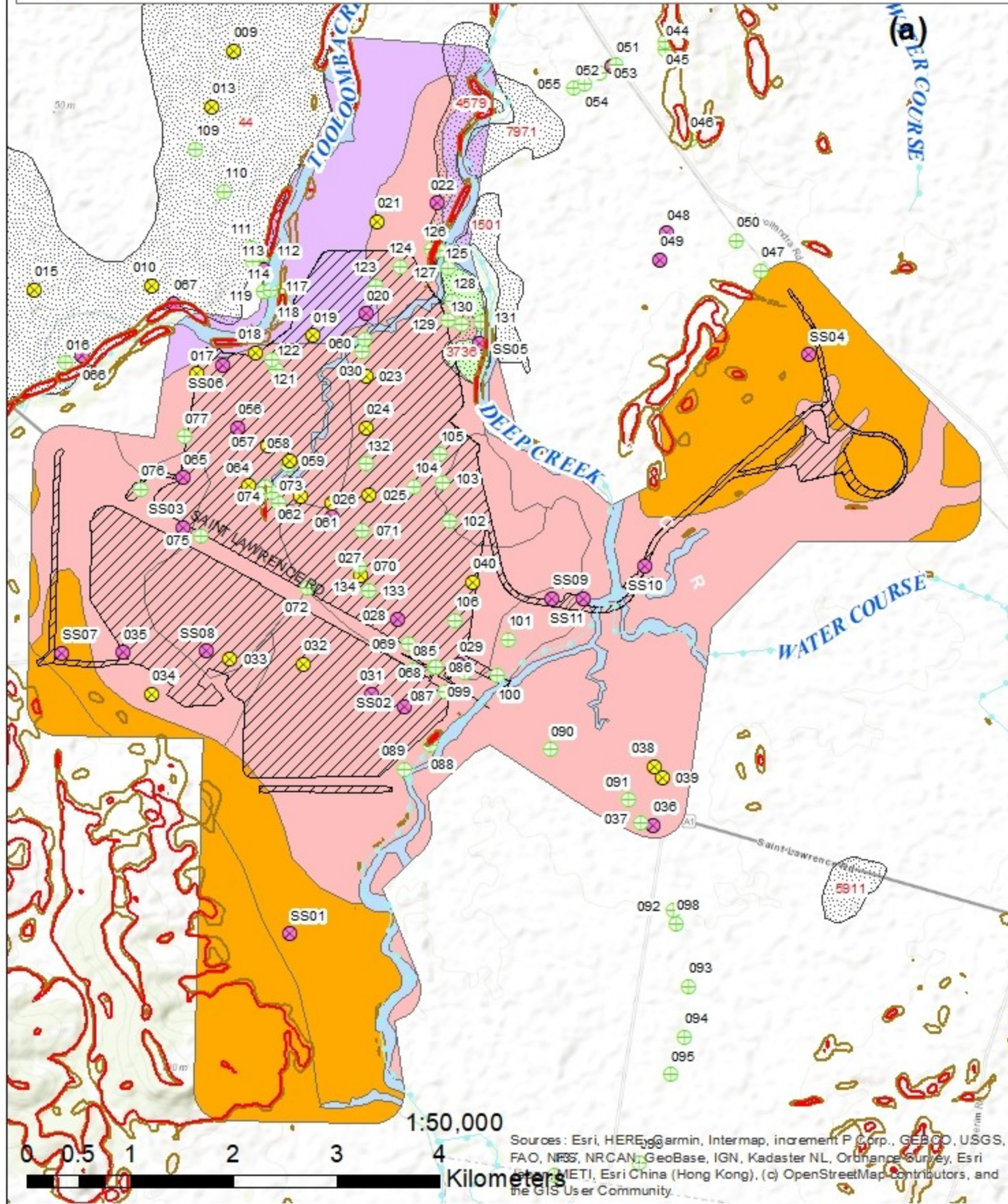
Analysed site 022 at the boundary between SCL trigger mapping polygon 4579 and soil map unit 6 is classified as a Sodosol and is part of the alluvial terrace Somerby land system. The orthophoto pattern on **Figure 6 (b)** shows a similar inaccurate boundary between the alluvial soils on the Deep Creek floodplain and the terrace plain as for polygon 3736 mentioned above. Exclusions aren't investigated for this SCL polygon, which doesn't impinge on the mining disturbance area. The check sites 125 (Sodosol) and 126 (Rudosol) verify the boundary between the alluvial soils and the terrace soils for polygon 4579.

Table 12 Analysed site SS05 compliance against SCL criteria 6, 7, 8

<i>Parameter</i>	<i>Units</i>	<i>Threshold</i>	<i>Map unit 2 (Rudosol)</i>					
Site ID			SS05					
Soil			Rigid					
Upper layer interval	Mm		0	100	200	500	800	1100
Lower layer interval	Mm		100	200	300	600	900	1200
pH _{1:5}			6.8	6.7	6.6	6.6	6.7	6.7
EC _{1:5+}	dS/m		0.016	0.012	0.009	0.006	0.006	0.005
Sand	%		50	48	54	53	56	54
Silt	%		16	13	11	15	10	11
Clay	%		20	23	20	22	20	21
Soil texture			SCL	SCL	SCL	SCL	SCL	SCL
Gravel (>2mm)	%		14	16	15	10	14	13
Look-up table SWS	mm/100mm		6	6	6	6	6	6
*SWS gravel corrected			5	5	5	5	5	5
Effective rooting depth	mm		1000					
Total SWS	mm	≥75	50					
Criterion 6 compliance			OK					
Criterion 7 compliance			OK					
Criterion 8 compliance			Non-compliant					

*SWS from lookup table x (100-gravel %/100)

Figure 6 Strategic cropping land assessment (a) lease areas; (b) mine plan disturbed area



- Slope contours (%)**
- 6
 - 5
- Contour**
- 6
 - 5
- Drainage**
- Drainage
- Reference site**
- Reference site
- Soil map units**
- 1;C2;Red and Brown Gravelly Earths (Kandosols) Sandy Loam Topsoil over Clay Loam Subsoil

- Detailed site
- Check site
- Disturbance Area
- SCL mapping

- 2;A;Alluvial Soils Non-gravelly (Tenosols, Rudosols, Vertisols) Sandy Loam to Clay textures
 - 3;D;Alluvial Soils Gravelly Shallow (Tenosols, Rudosols) Sand, Gravel Loam
 - 4;C1;Brown and Grey Sodic Vertosols Non-gravelly Medium Clay over Medium Heavy Clay
 - 5;C2;Vertic Hypernatic Grey and Brown Sodosols Gravelly Clay-loamy Clayey
- Author: Ian Hollingsworth
 Document Name: J000081_SOILS_20200422002_SCL
 Coordinate System: GCS GDA 1994
- HORIZON ENVIRONMENTAL SOIL SUREY & EVALUATION
 WWW.HORIZONESSE.COM
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5. Soil Management Plans

5.1 Soil Stripping and Management

A rehabilitation objective is to progressively rehabilitate the mine area to a condition consistent with the pre-existing land capability, i.e. Agricultural Land Class C2. Stockpiled soil media stripped from the disturbed mine footprint will be needed to achieve this. Topsoil (primary media) and subsoil (secondary media) stripping depths were calculated in ArcMap from mapped soil properties, topsoil and subsoil depths, within the area disturbed by mine infrastructure.

The CQC disturbance activities will require immediate reuse, progressive rehabilitation and long-term storage. As such stripped and salvaged soil will need to be re-used within a short period of time (less than three months) or stored longer term in stockpiles whilst the mine is in operation. A soil management plan is required throughout the life of the CQC Project, including construction, operation, rehabilitation and decommissioning to manage topsoil and subsoil within the lease boundary to support mine area rehabilitation activities. The objectives include:

1. ensuring that statutory requirements and corporate standards are met
2. managing operational activities in such a way as to minimise loss of topsoil through erosion and poor management
3. protecting stockpiles from weed infestation, and
4. optimising re-use of soil from disturbed areas through the construction of appropriately designed stockpiles that hold viable topsoil material prior to its use in rehabilitation.

To satisfy objective 1, this management plan promotes the stripping and stockpiling of available topsoil (primary media) and subsoil (secondary media) identified for use in rehabilitation. The stripping and stockpiling operations need to be managed to minimise the risk of erosion and sedimentation, associated with vegetation clearance and roading. Annual audit of stockpiles is needed to verify implementation of the topsoil management plan. More regular visual site inspection by environmental personnel or the Open Cut Examiner (OCE) are needed to identify and treat erosion and sedimentation incidents associated with topsoil stripping.

The maximum recommended stripping depths of *primary media* and *secondary media* are shown in **Table 13**. Subsoil sodicity and chloride content was a constraint to suitability for subsoil stripping and reuse. The volume of primary media (topsoil) available across the CQC Project area was estimated at 1.6 M cubic metres and secondary media (subsoil) at 7.0 M cubic metres. When a handling loss of 10% is allowed, volumes are reduced to 1.4 M cubic metres and 6.3 M cubic metres, primary media and secondary media respectively.

We estimated 1.4M m³ of topsoil material is suited for use as primary growth media to re-establish vegetation on rehabilitated mine land. Low soil fertility, particularly available phosphorous, is a limitation to topsoil fertility. Subsoil sodicity below 0.2 to 0.3 m is a general constraint to topsoil stripping depth. Erosion control and revegetation plans will need to consider the relatively high risk of erosion by wind and water associated with primary growth media material.

We estimated 6.3M m³ of subsoil material is suited for use as secondary growth media that can be placed on overburden. The secondary media estimate is based on the root zone depth below the topsoil stripping depths identified from soil profile descriptions. Sodicity, salinity and dispersive behaviour of this material constrains its use at the land surface as a growth media. Its use as a primary growth medium could be considered following gypsum and fertiliser amendment, and the addition of organic matter. Ideally the secondary growth media would be reinstated below the primary growth media in the rehabilitation program.

Recommended soil stripping depths for primary and secondary media are identified on **Map 2 Soil Stripping Depths**. Stockpile areas are located approximately at least 50 m from drainage and in open grassland not requiring clearing and sized approximately to accommodate estimated volumes of material in stockpiles less than 2m high.

Table 13 Growth media stripping depths

<i>SOIL MAP UNIT</i>	<i>TOPSOIL DEPTH (m)</i>	<i>SUBSOIL DEPTH (m)</i>	<i>LAND CLASS</i>	<i>AREA (m²)</i>	<i>SUBSOIL VOLUME (m³)</i>	<i>TOPSOIL VOLUME (m³)</i>
Alluvial Soils Gravelly sandy alluvial soils (Rudosols)						
UNITS 2, 3	0.3	1.0	A,D	205,029	205,029	61,509
Earthy Soils – Kandosols Gravelly red and brown earths sandy to loamy over clay loam						
UNIT 1	0.3	0.6	C2	366,517	219,910	109,955
Sodic Texture-contrast Soils – Sodosols Gravelly grey and brown texture contrast soil clay loam over highly sodic cracking clay subsoil (Sodosol)						
UNIT 5	0.1	0.5	C2	12,549,063	6,274,532	1,254,906
Cracking Clay Soils – Vertosols Non-gravelly grey and brown cracking clays with highly sodic subsoils (Vertosols)						
UNIT 4	0.3	0.5	C1	610,101	305,050	183,030
TOTAL					7.0M m³	1.6M m³

5.2 Erosion and Sediment Control

Soil loss estimates were computed to enable effective erosion and sediment control measures to be put in place during project development and to aid mitigation measures designed to reduce the erosion potential in post-mining landforms. These are likely to be low relief above grade landforms with flat crests approximately 300 m length, 2° (3.5%) gradient, and gently to moderately inclined slopes of length 100 m and 10° (17.6%) gradient.

Soil loss (A) was computed using the Revised Universal Soil Loss Equation (RUSLE) in IECA best practice guidelines (IECA, 2008) for representative soil types (**Section 4**). The RUSLE is a factor model used to estimate the long-term annual soil loss by water erosion. The equation models five factors: rainfall erosivity (R), soil erodibility (K), slope length/gradient (LS), erosion control practice (P) and ground cover/management factor (C). Soil erodibility was quantified using the soil erodibility factor (K factors from IECA Table E4). Soil texture is the principle component affecting K; however, other factors such as soil dispersibility also contribute to the soil's inherent soil erodibility. Soils that have the highest erodibility are those which have weak bonds between soil particles and contain an abundance of easily transportable soil particles. Tabulated K-factor values were increased by 20% for dispersible soil materials, following recommended practice (IECA, 2008).

Potential soil loss was computed for the recommended primary and secondary media stripping depths (Section 5.1) applied to slopes and flats of a conceptual waste rock landform comprising flats (3.5%) and slopes (17.6%) for representative soil types. Estimated soil loss rates for primary and secondary soil media are summarised in **Table 14** and **Table 15**. The erosion rates of bare soil comprising primary media were 167 tonnes/ha/yr on flat land and 698 tonnes/Ha/yr on sloping land. Secondary media erosion rates of 167 to 335 tonnes/ Ha /yr and 698 to 1397 tonnes/ Ha /yr were calculated for flats and sloping landforms respectively. These potential erosion rates and the scale of disturbance warrant development of site-specific erosion and sediment control plans that incorporate annual mine plans for disturbance, construction and stockpile development.

Vegetative covers of 80% and soil stabilizers can reduce soil loss rates by up to 85%. The sodicity of the secondary media predisposes it to dispersion and water erosion, increasing the estimated erosion rates by 20% for bare soil. Treatment of stockpiled material with gypsum in the erosion management plans will flocculate the exposed soil and ameliorate the dispersive properties. Application rates of 5 T/Ha/yr are sufficient to have a seasonal beneficial effect. Implementing erosion controls that reduce the erosion hazard to less than 150 T/Ha/y reduces the level of specification needed to meet sediment control standards from Type 1 engineered sediment basins to Type 2 and Type 3 sediment controls such as vegetated buffers, berms, sediment filter fences and rock filter dams in the rehabilitated mine landform (IECA, 2008).

Wind erosion could remove material from overburden dumps during the mining process. Management practices such as watering, use of dust control agents, and reducing truck movements can limit the impact of wind erosion on highly exposed stockpiles during windy periods. Additionally, mine planning considerations for minimising exposed surfaces and timely rehabilitation activities will protect primary and secondary media stockpiles from wind erosion.

Table 14 Primary Media RUSLE Results

Factor	Representative Soil Types	
	SODIC DUPLEX SOILS	SODIC VERTOSOLS
R	5750	5750
K	0.02	0.02
LS - flat	1.82	1.82
LS - slope	7.59	7.59
P	0.8	0.8
C (bare)	1.0	1.0
C revegetated	0.03	0.03
A - Bare soil (flats) = (T/ Ha /yr)	167	167
Revegetated soil (flats) = (T/Ha/yr)	<10	<10
A - Bare soil (slopes) = (T/ Ha /yr)	698	698
A - Revegetated soil (slopes) = (T/ Ha /yr)	21	21

Table 15 Secondary Media RUSLE Results

Factor	Representative Soil Types	
	SODIC DUPLEX SOILS	SODIC VERTOSOLS
R	5750	5750
K	0.04	0.02
LS - flat	1.82	1.82
LS - slope	7.59	7.59
P	0.8	0.8
C (bare)	1.0	1.0
C revegetated	0.03	0.03
A - Bare soil (flats) = (T/ Ha /yr)	335	167
Revegetated soil (flats) = (tonne/ Ha /yr)	10	<10
A - Bare soil (slopes) = (T/ Ha /yr)	1397	698
A - Revegetated soil (slopes) = (T/ Ha /yr)	42	21

6. References

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- McDonald, R.C., Isbell, R.F., Speight, J.G., Walker, J., Hopkins, M.S., 2009. Australian soil and land survey field handbook., 3rd edition, Australian soil and land survey field handbook. CSIRO Publishing. <https://doi.org/10.1071/9780643097117>
- NCST, 2009. Australian Soil and Land Survey Field Handbook Third Edition. The National Committee on Soil and Terrain. CSIRO Publishing. Collingwood, Victoria

7. Limitations

Horizon Environmental Soil Survey and Evaluation (HESSE) has prepared this report in accordance with HESSE's proposal dated 12 December 2019 and CQC Purchase Order 27/2019 from Mr Nui Harris of Central Queensland Coal (CQC) on 12 December 2019. The report is provided for the exclusive use of CQC for this project only and for the purpose(s) described in the report. It should not be used for other projects. In preparing this report HESSE has necessarily relied upon information provided by the client and/or their agents.

The results provided in the report are indicative of the sub-surface conditions only at the specific sampling or testing locations, and then only to the depths investigated and at the time the work was carried out. Sub-surface conditions can change abruptly due to variable geological processes and also as a result of anthropogenic influences. Such changes may occur after HESSE's field testing has been completed.

HESSE's advice is based upon the conditions encountered during this investigation. The accuracy of the advice provided by HESSE in this report may be limited by undetected variations in ground conditions between sampling locations. The advice may also be limited by budget constraints imposed by others or by site accessibility.

This report must be read in conjunction with all of the attached notes and should be kept in its entirety without separation of individual pages or sections. HESSE cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion given in this report.

8. Glossary

<i>Abbreviation/Term</i>	<i>Description</i>
ATP	Authority To Prospect
ACARP	Australian Coal Association Research Program
ADWG	Australian Drinking Water Guidelines
AHD	Australian Height Datum
ALS	Australian Laboratory Services
AMD	Acid Mine Drainage
ANC	Acid neutralising capacity
ANZECC	Australia and New Zealand Environment Conservation Council
ASS	Acid Sulfate Soils
AUSRIVAS	Australian River Assessment System
CCL	Capricornia Coastal Lands
CHPP	coal handling and preparation plant
CLR	Contaminated Land Register
CMWMP	Coal and Mining Waste Management Plan
CSG	Coal Seam Gas
DEEDI	Department of Employment, Economic Development and Innovation
DEHP	Department of Environment and Heritage Protection

<i>Abbreviation/Term</i>	<i>Description</i>
DERM	(former) Department of Environment and Resource Management
DNRM	Department of Natural Resources and Mines
DTMR	Department of Transport and Main Roads
EA	Environmental authority
EC	Electrical conductivity
EIS	Environmental Impact Statement
EM	Plan Environmental Management Plan (mining lease)
EMR	Environmental Management Register
EPC	Exploration Permit for Coal
EPC 1029	Exploration Permit for Coal
EPM	Exploration Permit Mineral
ESA	Environmentally Sensitive Areas
EV	Environmental Value
GBR	Great Barrier Reef
GMU	Groundwater Management Unit
GQAL	Good Quality Agricultural Land
IRC	Isaac Regional Council
JORC	Joint Ore Reserves Committee
Mbgl	Meters below ground level

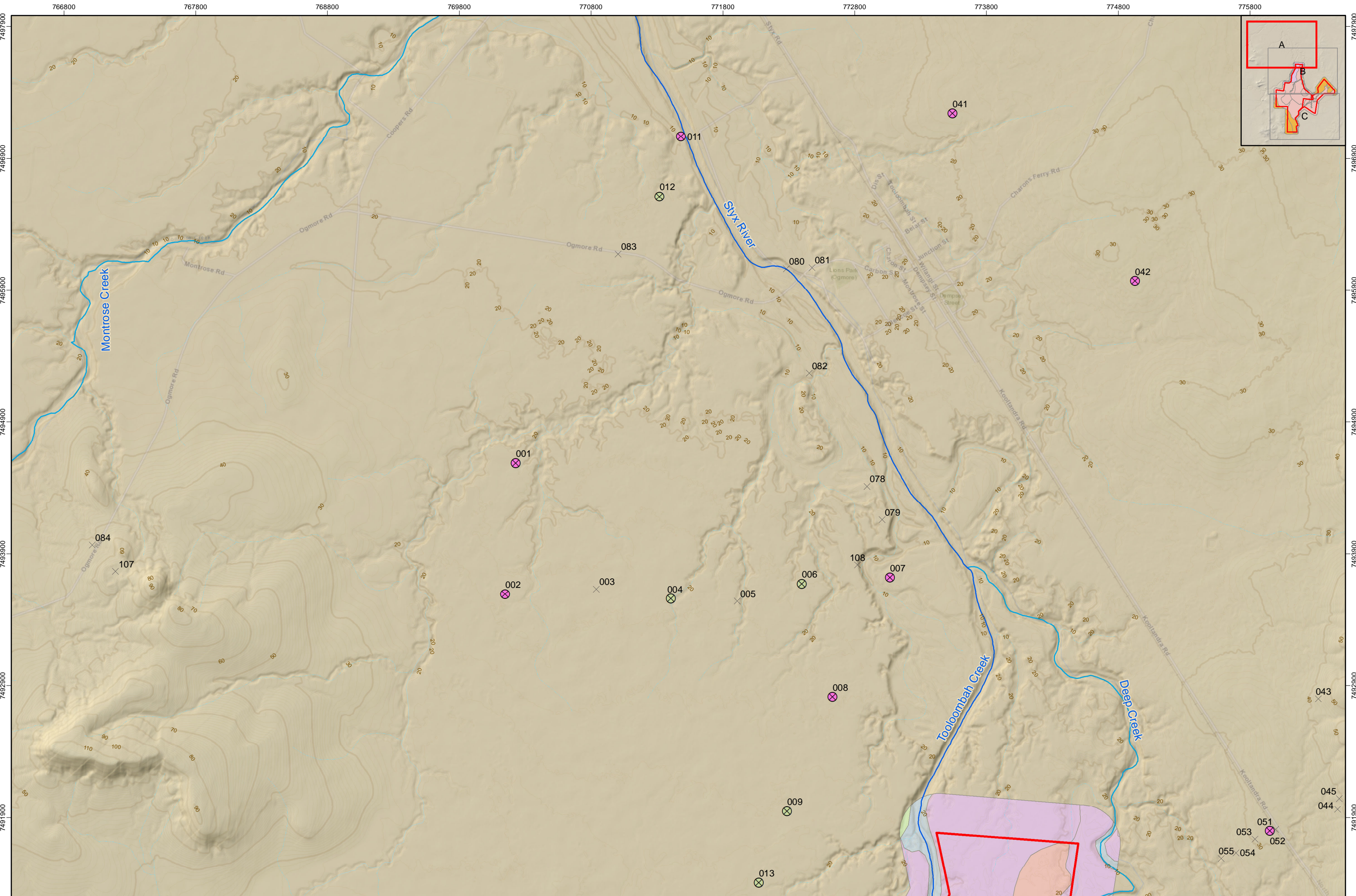
<i>Abbreviation/Term</i>	<i>Description</i>
MDL	Mineral development licence
MIA	Mine Industrial Area
ML	Mining lease – refers to the proposed ML the subject of this application
Mtpa	Mega (1 million) tonnes (109 kg) per annum
NAF	Non-Acid Forming
NAPP	Net acid producing potential
NRM	Natural Resource Management
PAF	Potentially Acid Forming
PCA	Potentially Contaminating Activity
PM	Particulate Matter
Project Site	The site on which project activities will be undertaken. For the purpose of the
QR	Queensland Rail
QRN	Queensland Rail (QR)
QWQG	National Queensland Water Quality Guidelines (DERM, 2009b)
RE	Regional Ecosystem
REMP	Receiving Environment Monitoring Program
ROM	Run-of-mine
RRC	Rockhampton Regional Council

<i>Abbreviation/Term</i>	<i>Description</i>
SCL	Strategic Cropping Land
SEWPAC	Commonwealth Department of Sustainability, Environment, Water, Population and Communities
SPA	Sustainable Planning Act 2009
TDS	Total Dissolved Salts
The Project	The Styx Coal South project
TLO	Train Load Out
TSF	Tailing Storage Facility
TSP	Total Suspended Particulates

Maps

Map 1 Central Queensland Coal Soil Map Units

Map 2 Soil Stripping Depths and Indicative Soil Stockpile Locations



CENTRAL QUEENSLAND COAL PROJECT

Sources:
 ML Boundary, Infrastructure: CQC 2020
 Soil Boundaries, monitoring sites: HESSE 2020
 Contours: DNRME 2009
 Waterways: DNRME 2010
 Basemaps: ESRI World Street Map, GA 2011, 2015

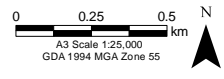
- Legend**
- Mining Lease Boundaries
 - Drain
 - Infrastructure
 - Disturbance Area
 - 1m Contours
 - 10m Contours
 - Rail

- Soil Monitoring Sites**
- ⊗ Reference Site
 - ⊗ Detailed Site
 - ⊗ Check Site

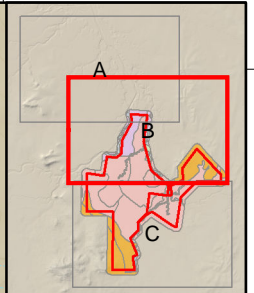
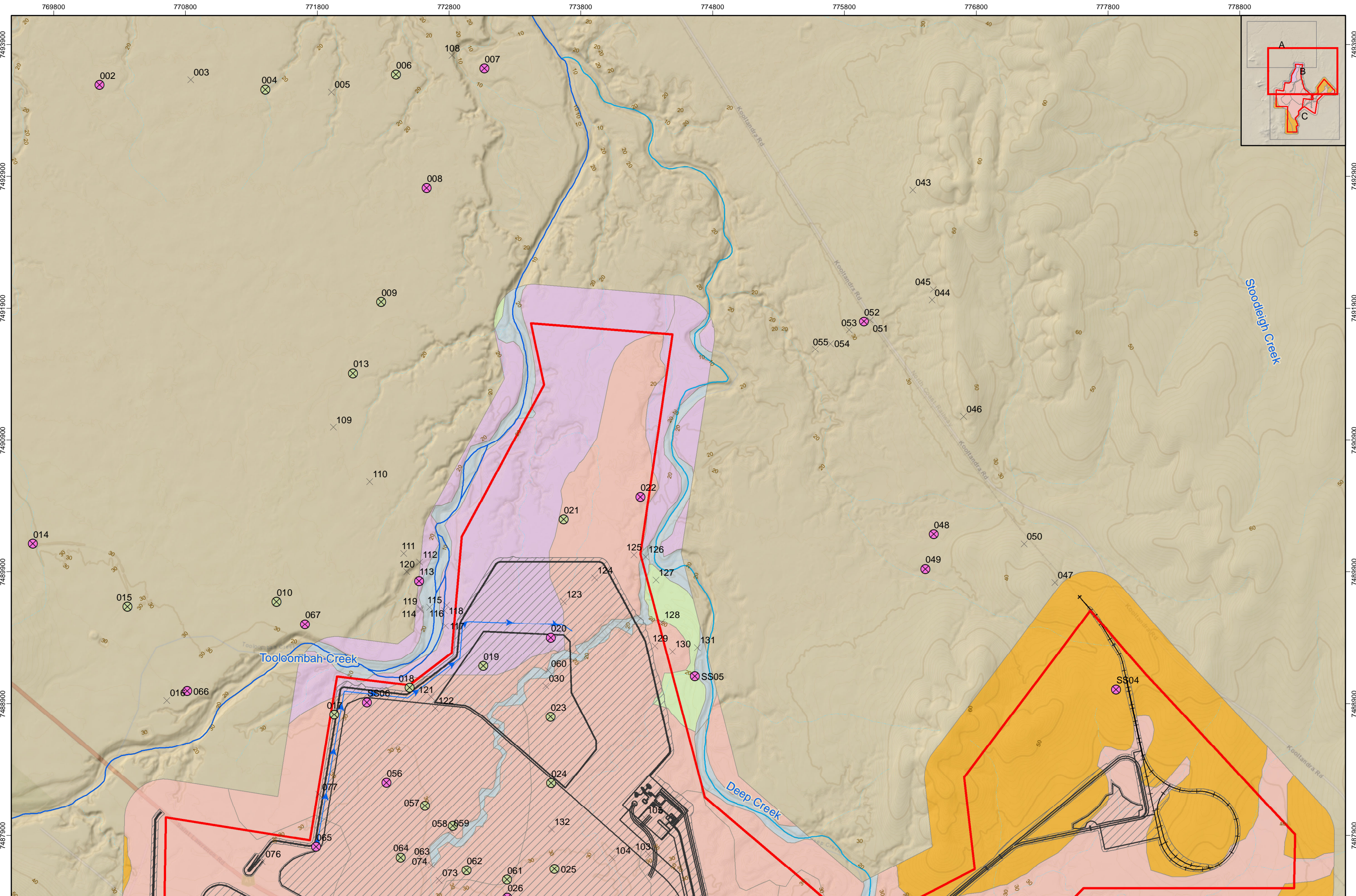
- Soil Map Units**
- (1) Class C2 - Red and Brown Gravelly Earths (Kandosols) Sandy Loam Topsoil over Clay Loam Subsoil

- (2) Class A - Alluvial Soils Non-gravelly (Tenosols, Rudosols, Vertisols) Sandy Loam to Clay textures
- (3) Class D - Alluvial Soils Gravelly Shallow (Tenosols, Rudosols) Sand, Gravel Loam

- (4) Class C1 - Brown and Grey Sodic Vertisols Non-gravelly Medium Clay over Medium Heavy Clay
- (5) Class C2 - Vertic Hypermatic Grey and Brown Sodosols Gravelly Clay-loamy Clayey



MAP 1: Soil Map Units A, page 1 of 3



CENTRAL QUEENSLAND COAL PROJECT

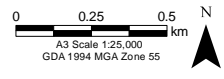
Sources:
 ML Boundary, Infrastructure: CQC 2020
 Soil Boundaries, monitoring sites: HESSE 2020
 Contours: DNRME 2009
 Waterways: DNRME 2010
 Basemaps: ESRI World Street Map, GA 2011, 2015

Legend
 Mining Lease Boundaries
 1m Contours
 10m Contours
 Disturbance Area

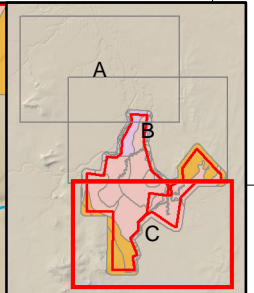
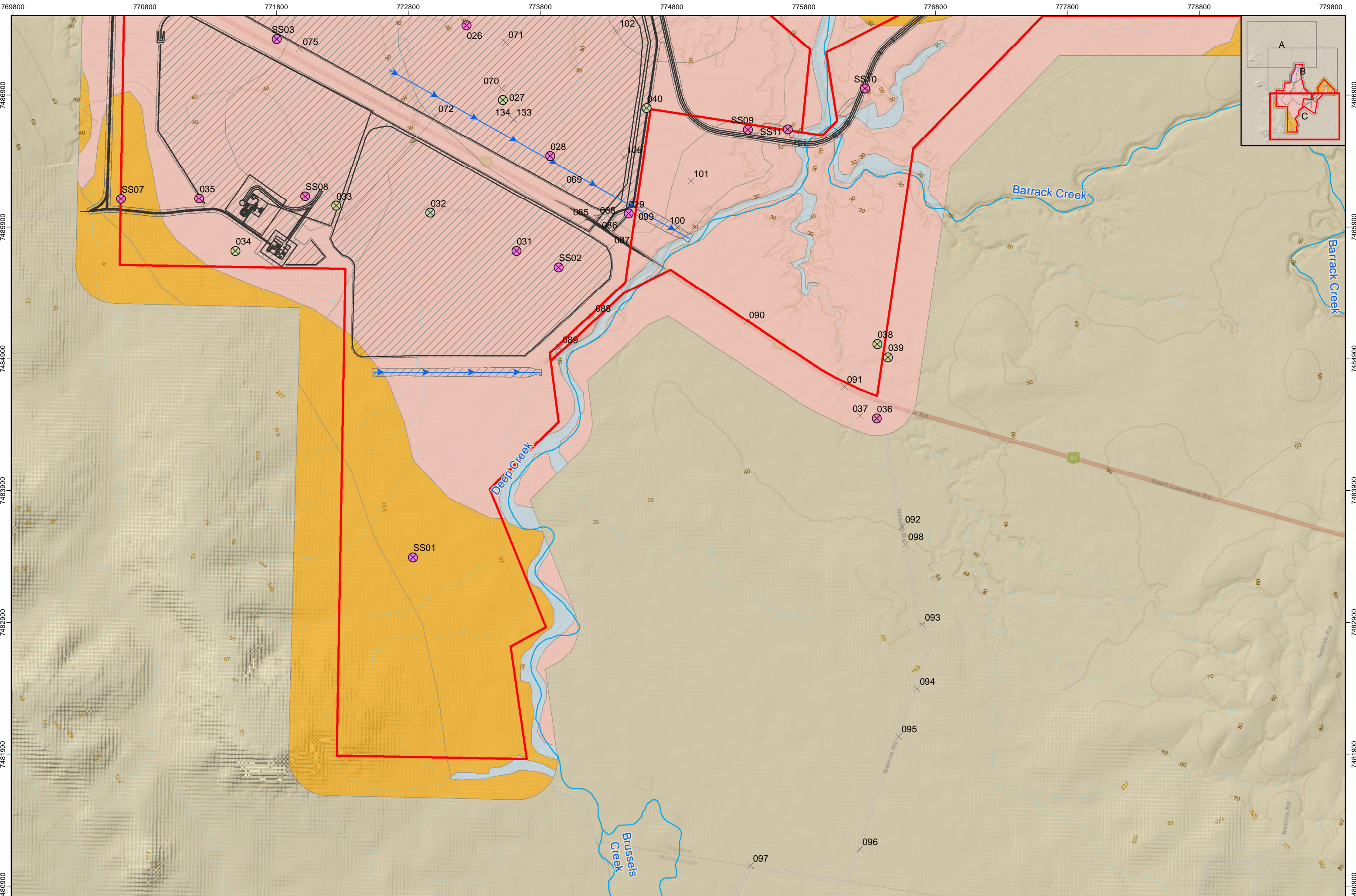
Infrastructure
 Drain
 Infrastructure
 Rail

Soil Monitoring Sites
 Reference Site
 Detailed Site
 Check Site

Soil Map Units
 (1) Class C2 - Red and Brown Gravelly Earths (Kandosols) Sandy Loam Topsoil over Clay Loam Subsoil
 (2) Class A - Alluvial Soils Non-gravelly (Tenosols, Rudosols, Vertisols) Sandy Loam to Clay textures
 (3) Class D - Alluvial Soils Gravelly Shallow (Tenosols, Rudosols) Sand, Gravel Loam
 (4) Class C1 - Brown and Grey Sodic Vertosols Non-gravelly Medium Clay over Medium Heavy Clay
 (5) Class C2 - Vertic Hypersodic Grey and Brown Sodosols Gravelly Clay-loamy Clayey



MAP 1: Soil Map Units B, page 2 of 3



CENTRAL QUEENSLAND COAL PROJECT

Sources:
 ML Boundary, Infrastructure: CQC 2020
 Soil Boundaries, monitoring sites: HESSE 2020
 Contours: DNRME 2009
 Waterways: DNRME 2010
 Basemaps: ESRI World Street Map, GA 2011, 2015

Legend
 Mining Lease Boundaries
 1m Contours
 10m Contours
 Disturbance Area

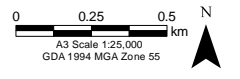
Infrastructure
 Drain
 Infrastructure
 Rail

Soil Monitoring Sites
 Reference Site
 Detailed Site
 Check Site

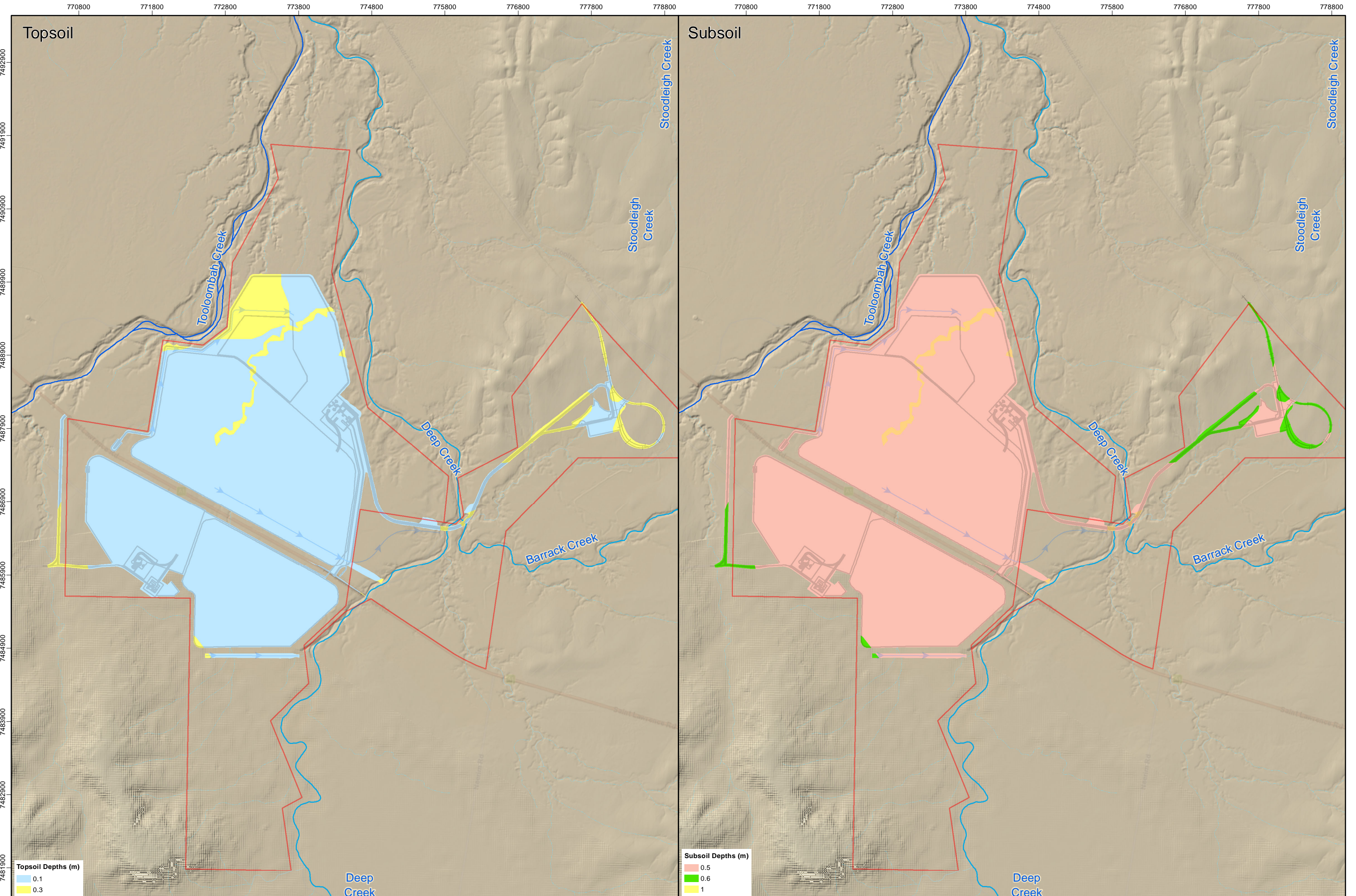
Soil Map Units
 (1) Class C2 - Red and Brown Gravelly Earths (Kandosols) Sandy Loam Topsoil over Clay Loam Subsoil

(2) Class A - Alluvial Soils Non-gravelly (Tenosols, Rudosols, Vertisols) Sandy Loam to Clay textures
 (3) Class D - Alluvial Soils Gravelly Shallow (Tenosols, Rudosols) Sand, Gravel Loam

(4) Class C1 - Brown and Grey Sodic Vertisols Non-gravelly Medium Clay over Medium Heavy Clay
 (5) Class C2 - Vertic Hypersodic Grey and Brown Sodosols Gravelly Clay-loamy Clayey



MAP 1: Soil Map Units C, page 3 of 3



Topsoil

Subsoil

Topsoil Depths (m)

- 0.1
- 0.3

Subsoil Depths (m)

- 0.5
- 0.6
- 1

CENTRAL QUEENSLAND COAL PROJECT

Sources:
 ML Boundary, Infrastructure: CQC 2020
 Soil Boundaries, monitoring sites: HESSE 2020
 Contours: DNRME 2009
 Waterways: DNRME 2010
 Basemaps: ESRI World Street Map, GA 2011, 2015

Legend

- Mining Lease Boundaries
- Watercourses (by Stream Order)**
- 1 - 2
- 3
- 4 - 5
- 6 - 7
- 8 - 9

0 0.45 0.9 km
 A3 Scale 1:45,000
 GDA 1994 MGA Zone 55

MAP 2: Soil Stripping Depths

Appendix A

Soil Profile Descriptions

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 001 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Bar H - improved pasture, Melon hole microrelief, photo
 1,2,3
Date Desc.: 08/05/12 **Elevation:** 21 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7494590 AMG zone: 55 **Runoff:** No runoff
Easting/Lat.: 770230 Datum: GDA94 **Drainage:** Imperfectly drained

Geology

Exposure Type: Soil pit **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qa **Substrate Material:** Soil pit, 1 m deep, Fragmental, Bedded, Porous,
 , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat **Relief:** 5 metres
Elem. Type: Terrace plain **Slope Category:** Level
Slope: 0.5 % **Aspect:** 100 degrees

Surface Soil Condition Cracking

Erosion: No sheet erosion (sheet) No rill erosion (rill) No
 gully erosion (gully) **Microrelief:** Melonhole gilgai Vert.(m) 1 Horiz.(m) 20

Soil Classification

Australian Soil Classification: **Mapping Unit:** So
 Endohypersodic Epipedal Grey Vertosol Non-gravelly Fine Medium **Principal Profile Form:** Ug5.25
 fine Moderately deep **Great Soil Group:** Grey clay
ASC Confidence: **Land Class:** **Land Class:** C1
 All necessary analytical data are available.

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation: Low Strata - Tussock grass, 0.26-0.5m, Closed or dense. *Species includes - Chloris gayana
 Tall Strata - Tree, 3.01-6m, Isolated plants. *Species includes - Acacia harpophylla

Surface Coarse 2-10%, medium gravelly, 6-20mm, rounded, Ferricrete

Profile

- 1A11 0 - 0.1 m Very dark grey (10YR3/1-Moist); Mottles, 7.5YR44, 2-10% , 0-5mm, Distinct; Fine sandy clay loam; Moderate grade of structure, 20-50 mm, Subangular blocky; Rough-ped fabric; Medium, (5 - 10) mm crack; Few (<1 per 0.01m2) macropores, Moderately moist; Weak consistence; Moderately plastic; Subplastic; Moderately sticky; Field pH 5.5 (Raupach); Common, fine (1-2mm) roots; Diffuse, Smooth change to -
- 1A12 0.1 - 0.3 m Dark greyish brown (10YR4/2-Moist); , 0-0% ; Medium clay; Rough-ped fabric; Medium, (5 - 10) mm crack; Many (>5 per 100mm2) macropores, Moderately moist; Very firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; Very few (0 - 2 %), Manganiferous, Fine (0 - 2 mm), Concretions; Field pH 6.5 (Raupach); Many, fine (1-2mm) roots; Diffuse, Smooth change to -
- 1B1ss 0.3 - 0.6 m Greyish brown (10YR5/2-Moist); , 0-0% ; Light medium clay; Rough-ped fabric; Medium, (5 - 10) mm crack; Common (1-5 per 100mm2) macropores, Moderately moist; Strong consistence; Moderately plastic; Normal plasticity; Moderately sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Very few (0 - 2 %), Ferromanganiferous, Fine (0 - 2 mm), Concretions; Field pH 7.5 (Raupach); Few, medium (2-5mm) roots; Diffuse, Smooth change to -
- 1B2 0.6 - 0.9 m Brown (10YR5/3-Moist); , 0-0% ; Clay loam; Earthy fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) macropores, Moderately moist; Strong consistence; Slightly plastic; Normal plasticity; Slightly sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 8 (Raupach); Few, fine (1-2mm) roots; Clear, Smooth change to -
- 1C1 0.9 - 1.5 m Brown (10YR5/3-Moist); , 0-0% ; Clay loam; Earthy fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) macropores, Moderately moist; Very strong consistence; Slightly plastic; Normal plasticity; Slightly sticky; Soil matrix is Slightly calcareous; Field pH 8.5 (Raupach);

Morphological Notes

1A11 rusty root mottles

Observation Notes

Horizon Soil Survey & Evaluation

Appendix A

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 001 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Detailed site, samples 1-5

Site Notes

Melon hole microrelief, cleared brigalow woodland, REFERENCE SITE, samples 1-5; Typic Hapluster

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 001 **Observation** 1
Agency Name: Horizon Soil Survey (NT)

Laboratory Test Results:

Depth cm	pH	1:5 EC Ca dS/m	Exchangeable Mg	Cations K	Na	CEC Cmol (+)/kg	ESP %	Cl mg/kg	
0 - 0.1	6.6A	45A	8.3*	2.8	0.5	0.1	11.6*	0.86	20*
0.2 - 0.3	7.6A	54A	20*						
0.5 - 0.6	7.2A	113A	6.2*	7.2	0.2	1.2	14.8*	8.11	70*
0.8 - 0.9	8.1A	208A	170*						
1.1 - 1.2	8.4A	254A	2.2*	3.8	<0.1	1.1	7.2*	15.28	200*

Depth cm	Organic C %	Total N mg/kg	Avail. P mg/kg	Total K mg/kg	Extr. S mg/kg	Cu	Fe	Trace Elements Mn Zn mg/kg		B
0 - 0.1	0.8D	1740E	161J	290	6*	3.67	216	140	5.8	<0.2
0.2 - 0.3										
0.5 - 0.6	280E	<2J	340	11*						
0.8 - 0.9										
1.1 - 1.2	160E	<2J	<200							

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 002 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth
Date Desc.: 08/05/12
Map Ref.: GPS S.A. Off
Northing/Long.: 7493595 AMG zone: 55
Easting/Lat.: 770150 Datum: GDA94
Locality: Bar H, photo 4,5,6
Elevation: 24 metres
Rainfall: 756
Runoff: Very slow
Drainage: Imperfectly drained

Geology

Exposure Type: Soil pit
Geol. Ref.: Qpa
 , Alluvium
Conf. Sub. is Parent. Mat.: Almost certain or certain
Substrate Material: Soil pit, 1 m deep, Fragmental, Bedded, Porous,

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3%
Pattern Type: Terraced land (alluvial)

Morph. Type: Flat
Elem. Type: Terrace plain
Slope: 0.5 %
Relief: 5 metres
Slope Category: Level
Aspect: 100 degrees

Surface Soil Condition Cracking

Erosion:

Soil Classification

Microrelief: Melonhole gilgai Vert.(m) 1 Horiz.(m) 20

Australian Soil Classification:

Endohypersodic Epipedal Grey Vertosol Non-gravelly Fine Medium
 fine Moderately deep
Mapping Unit: So
Principal Profile Form: Ug5.25
Great Soil Group: Grey clay

ASC Confidence:

All necessary analytical data are available.

Land Class: Land Class: C1

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation: Low Strata - Tussock grass, 0.26-0.5m, Closed or dense. *Species includes - Chloris gayana

Tall Strata - Tree, 3.01-6m, Isolated plants. *Species includes - Acacia harpophylla

Surface Coarse No surface coarse fragments

Profile

1A11 0 - 0.1 m Very dark grey (10YR3/1-Moist); Mottles, 7.5YR44, 2-10% , 0-5mm, Distinct; Clay loam; Strong grade of structure, 10-20 mm, Subangular blocky; ; ; ; Rough-ped fabric; Coarse, (10 - 20) mm crack; Common (1-5 per 0.01m2) Medium (2-5mm) macropores, Moist; Weak consistence; Moderately plastic; Normal plasticity; Moderately sticky; Field pH 8 (Raupach); Abundant, fine (1-2mm) roots; Diffuse, Smooth change to -

1A3 0.1 - 0.3 m Dark greyish brown (10YR4/2-Moist); ; Medium clay; Moderate grade of structure, 20-50 mm, Lenticular; ; Rough-ped fabric; Medium, (5 - 10) mm crack; Few (<1 per 0.01m2) Medium (2-5mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; Soil matrix is Slightly calcareous; Field pH 8 (Raupach); Many, fine (1-2mm) roots; Diffuse, Smooth change to -

1B2tss 0.3 - 0.6 m Greyish brown (10YR5/2-Moist); ; Medium heavy clay; Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Many (>5 per 100mm2) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; Soil matrix is Slightly calcareous; Field pH 8.5 (Raupach); Common, fine (1-2mm) roots; Diffuse, Smooth change to -

1B3 0.6 - 0.9 m Brown (10YR5/3-Moist); ; Heavy clay; Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Many (>5 per 100mm2) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; Soil matrix is Slightly calcareous; Field pH 8.5 (Raupach); Common, fine (1-2mm) roots; Clear, Smooth change to -

1C1 0.9 - 1.5 m Brown (10YR5/3-Moist); ; Heavy clay; Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Many (>5 per 100mm2) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; Field pH 8.5 (Raupach); Few, fine (1-2mm) roots;

Morphological Notes

1B2tss ant nest at 500 mm

Observation Notes

Detailed site, samples 6-10

Horizon Soil Survey & Evaluation

Appendix A

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 002 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Notes

cleared brigalow woodland, REFERENCE SITE, samples 6-10

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 002 **Observation** 1
Agency Name: Horizon Soil Survey (NT)

Laboratory Test Results:

Depth cm	pH	1:5 EC Ca dS/m	Exchangeable Mg	Cations K	Na	CEC Cmol (+)/kg	ESP %	Cl mg/kg
0 - 0.1	8.6A	237A27.2*	10.9	0.7	0.5	39.4*	1.27	60*
0.2 - 0.3	8.9A	525A400*						
0.5 - 0.6	8.9A	881A5.5*	5.6	0.1	1.6	12.8*	12.50	1010*
0.8 - 0.9	8.7A	1270A1600*						
1.1 - 1.2	8.7A	1340A3*	5.6	<1	2.4	11.2*	21.43	1710*

Depth cm	Organic C %	Total N mg/kg	Avail. P mg/kg	Total K mg/kg	Extr. S mg/kg	Cu	Fe	Trace Elements Mn Zn mg/kg		B
0 - 0.1	0.5A	1080E	10J	230	8*	2	50.7	25.5	<1	<0.2
0.2 - 0.3										
0.5 - 0.6	490E	<2J	<200	76*						
0.8 - 0.9										
1.1 - 1.2	310E	<2J	240	163*						

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 003 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth
Date Desc.: 08/05/12
Map Ref.: GPS S.A. Off
Northing/Long.: 7493634 AMG zone: 55
Easting/Lat.: 770840 Datum: GDA94
Locality: Bar H, photo 7,8,9
Elevation: 27 metres
Rainfall: 756
Runoff: Very slow
Drainage: Imperfectly drained

Geology

Exposure Type: Soil pit
Geol. Ref.: Qpa
 , Alluvium
Conf. Sub. is Parent. Mat.: Almost certain or certain
Substrate Material: Soil pit, 1 m deep, Fragmental, Bedded, Porous,

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3%
Pattern Type: Terraced land (alluvial)

Morph. Type: Flat
Elem. Type: Terrace plain
Slope: 0.5 %
Relief: 5 metres
Slope Category: Level
Aspect: 100 degrees

Surface Soil Condition

Cracking

Erosion:

Soil Classification

Microrelief: Melonhole gilgai Vert.(m) 1 Horiz.(m) 20

Australian Soil Classification:

Endohypersodic Epipedal Grey Vertosol Non-gravelly Fine Medium
 fine Moderately deep

Mapping Unit:

So

Principal Profile Form:

Ug5.25

Great Soil Group:

Grey clay

ASC Confidence:

No analytical data are available but confidence is fair.

Land Class:

Land Class: C1

Site

Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Acacia harpophylla

Surface Coarse

No surface coarse fragments

Profile

- 1A11 0 - 0.1 m Very dark grey (2.5Y3/1-Moist); Mottles, 7.5YR44, 10-20% , 0-5mm, Faint; Clay loam; Moderate grade of structure, 10-20 mm, Subangular blocky; ; ; Rough-ped fabric; Medium, (5 - 10) mm crack; Few (<1 per 0.01m²) Medium (2-5mm) macropores, Moist; Weak consistence; Moderately plastic; Normal plasticity; Moderately sticky; Field pH 8 (Raupach); Common, coarse (>5mm) roots; Diffuse, Wavy change to -
- 1B21k 0.1 - 0.5 m Greyish brown (2.5Y5/2-Moist); , 0-0% ; Light medium clay; Moderate grade of structure, 20-50 mm, Lenticular; Rough-ped fabric; Medium, (5 - 10) mm crack; Many (>5 per 100mm²) Medium (2-5mm) macropores, Moist; Weak consistence; Moderately plastic; Normal plasticity; Moderately sticky; Very few (0 - 2 %), Calcareous, Fine (0 - 2 mm), Nodules; Field pH 8.5 (Raupach); Common, medium (2-5mm) roots; Diffuse, Irregular change to -
- 1B22kss 0.5 - 0.6 m Greyish brown (2.5Y5/3-Moist); , 0-0% ; Heavy clay; Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm²) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Subplastic; Very sticky; Few (2 - 10 %), Ferromanganiferous, Fine (0 - 2 mm), Concretions; Soil matrix is Moderately calcareous; Field pH 8.5 (Raupach); Diffuse, Irregular change to -
- 1B3 0.6 - 0.9 m Light olive brown (2.5Y5/4-Moist); , 0-0% ; Heavy clay; Weak grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm²) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Very few (0 - 2 %), Ferromanganiferous, Fine (0 - 2 mm), Concretions; Soil matrix is Slightly calcareous; Field pH 9 (Raupach);
- 1C1 0.9 - 1.2 m Light olive brown (2.5Y5/4-Moist); , 0-0% ; Heavy clay; Weak grade of structure, 20-50 mm, Lenticular; Earthy fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm²) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; Soil matrix is Slightly calcareous; Field pH 9 (Raupach);

Morphological Notes

1A11 rusty root mottles

Observation Notes

Check site, not sampled, photos 7-9 not sampled, similar to site 002, cleared belah & brigalow woodland, grey cracking clay, melonhole microrelief, DETAILED SITE

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 004 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth
Date Desc.: 08/05/12
Map Ref.: GPS S.A. Off
Northing/Long.: 7493560 AMG zone: 55
Easting/Lat.: 771408 Datum: GDA94
Locality: Bar H, photo 10-12
Elevation: 26 metres
Rainfall: 756
Runoff: Very slow
Drainage: Imperfectly drained

Geology

Exposure Type: Soil pit
Geol. Ref.: Qpa
 , Alluvium
Conf. Sub. is Parent. Mat.: Almost certain or certain
Substrate Material: Soil pit, 1 m deep, Fragmental, Bedded, Porous,

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3%
Pattern Type: Terraced land (alluvial)

Morph. Type: Flat
Elem. Type: Terrace plain
Slope: 0.5 %
Relief: 5 metres
Slope Category: Level
Aspect: 100 degrees

Surface Soil Condition

Surface crust

Erosion:

Soil Classification

Microrelief: Melonhole gilgai Vert.(m) 1 Horiz.(m) 20

Australian Soil Classification:

Endohypersodic Epipedal Grey Vertosol Non-gravelly Fine Medium
 fine Moderately deep
Mapping Unit: So
Principal Profile Form: Ug5.25
Great Soil Group: Grey clay

ASC Confidence:

Analytical data are incomplete but reasonable confidence.

Land Class: **Land Class:** C1

Site

Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Acacia harpophylla, Casuarina cristata

Surface Coarse

No surface coarse fragments

Profile

- 1A11 0 - 0.1 m Very dark grey (10YR3/1-Moist); , 0-0% ; Clay loam; Strong grade of structure, 10-20 mm, Subangular blocky; ; Rough-ped fabric; Coarse, (10 - 20) mm crack; Common (1-5 per 0.01m2) Medium (2-5mm) macropores, Moderately moist; Weak consistence; Moderately plastic; Subplastic; Moderately sticky; Field pH 7.5 (Raupach); Abundant, fine (1-2mm) roots; Diffuse, Smooth change to -
- 1B1 0.1 - 0.3 m Dark greyish brown (10YR4/2-Moist); , 0-0% ; Light clay; Moderate grade of structure, 20-50 mm, Subangular blocky; Moderate grade of structure, 20-50 mm, Lenticular; Rough-ped fabric; Medium, (5 - 10) mm crack; Many (>5 per 100mm2) Medium (2-5mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; Few cutans, <10% of ped faces or walls coated, distinct; Soil matrix is Moderately calcareous; Field pH 8 (Raupach); Many, fine (1-2mm) roots; Diffuse, Wavy change to -
- 1B2kss 0.3 - 0.6 m Brown (10YR4/3-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm2) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Soil matrix is Slightly calcareous; Field pH 9 (Raupach); Few, fine (1-2mm) roots; Diffuse, Irregular change to -
- 1B3ss 0.6 - 0.9 m Brown (10YR4/3-Moist); , 0-0% ; Heavy clay; Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Medium, (5 - 10) mm crack; Common (1-5 per 100mm2) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Soil matrix is Moderately calcareous; Field pH 9 (Raupach); Few, fine (1-2mm) roots;
- 1C1 0.9 - 1.2 m Brown (10YR4/3-Moist); , 0-0% ; Heavy clay; Weak grade of structure, 20-50 mm, Lenticular; Rough-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Few cutans, <10% of ped faces or walls coated, distinct; Soil matrix is Slightly calcareous; Field pH 9 (Raupach);

Morphological Notes

Observation Notes

Horizon Soil Survey & Evaluation

Appendix A

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 004 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Detailed site, samples 11-15

Site Notes

samples 11-15; cleared brigalow belah woodland, brown cracking clay, melonhole microrelief, REFERENCE SITE

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 004 **Observation** 1
Agency Name: Horizon Soil Survey (NT)

Laboratory Test Results:

Depth cm	pH	1:5 EC Exchangeable Cations			Na	CEC Cmol (+)/kg	ESP %	Cl mg/kg
		Ca dS/m	Mg	K				
0 - 0.1	7.5A	166A20.4*	8.8	0.8	0.1	30.1*	0.33	50*
0.2 - 0.3	8.9A	363A190*						
0.5 - 0.6	8.9A	797A880*						
0.8 - 0.9	8.8A	1200A1560*						
1.1 - 1.2	8.6A	1660A2390*						

Depth cm	Organic C %	Total N mg/kg	Avail. P mg/kg	Total K mg/kg	Extr. S mg/kg	Cu	Fe	Trace Elements		
								Mn mg/kg	Zn mg/kg	B
0 - 0.1	1.2A	2050E	52J	380	8*	3.51	116	84.7	1.77	<0.2
0.2 - 0.3										
0.5 - 0.6										
0.8 - 0.9										
1.1 - 1.2										

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 005 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth
Date Desc.: 08/05/12
Map Ref.: GPS S.A. Off
Northing/Long.: 7493541 AMG zone: 55
Easting/Lat.: 771909 Datum: GDA94

Locality: Melonhole microrelief, Bar H, photo 13,14,15
Elevation: 25 metres
Rainfall: 756
Runoff: Very slow
Drainage: Imperfectly drained

Geology

Exposure Type: Soil pit
Geol. Ref.: Qpa
 , Alluvium

Conf. Sub. is Parent. Mat.: Almost certain or certain
Substrate Material: Soil pit, 1 m deep, Fragmental, Bedded, Porous,

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3%
Pattern Type: Terraced land (alluvial)

Morph. Type: Flat
Elem. Type: Terrace plain
Slope: 0.5 %

Relief: 5 metres
Slope Category: Level
Aspect: 100 degrees

Surface Soil Condition Surface crust

Erosion:

Soil Classification

Microrelief: Melonhole gilgai Vert.(m) 1 Horiz.(m) 20

Australian Soil Classification:

Endohypersodic Epipedal Grey Vertosol Non-gravelly Fine Medium
 fine Moderately deep

Mapping Unit: So
Principal Profile Form: Ug5.25
Great Soil Group: Grey clay

ASC Confidence:

No analytical data are available but confidence is fair.

Land Class: **Land Class:** C1

Site

Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Acacia harpophylla, Casuarina cristata

Surface Coarse No surface coarse fragments

Profile

- 1A1 0 - 0.1 m Very dark grey (10YR3/1-Moist); , 0-0% ; Clay loam; Strong grade of structure, 10-20 mm, Subangular blocky; ; Rough-ped fabric; Coarse, (10 - 20) mm crack; Common (1-5 per 0.01m2) Medium (2-5mm) macropores, Moist; Weak consistence; Moderately plastic; Normal plasticity; Moderately sticky; Field pH 7.5 (Raupach); Many, fine (1-2mm) roots; Clear, Wavy change to -
- 1B1 0.1 - 0.3 m Very dark greyish brown (10YR3/2-Moist); , 0-0% ; Light clay; Strong grade of structure, 10-20 mm, Lenticular; Rough-ped fabric; Coarse, (10 - 20) mm crack; Few (<1 per 0.01m2) Medium (2-5mm) macropores, Moist; Weak consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 8 (Raupach); Many, fine (1-2mm) roots; Diffuse, Irregular change to -
- 1B2kss 0.3 - 0.5 m Dark greyish brown (2.5Y4/2-Moist); , 0-0% ; Medium clay; Strong grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Medium, (5 - 10) mm crack; crack; Many (>5 per 100mm2) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Soil matrix is Slightly calcareous; Field pH 9 (Raupach); Common, fine (1-2mm) roots; Diffuse, Irregular change to -
- 1B3kss 0.5 - 0.9 m Dark greyish brown (2.5Y4/3-Moist); , 0-0% ; Medium heavy clay; Strong grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Many (>5 per 100mm2) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; Many cutans, >50% of ped faces or walls coated, distinct; Soil matrix is Slightly calcareous; Field pH 9 (Raupach); Common, fine (1-2mm) roots;
- 1C1 0.9 - 1.2 m Olive brown (2.5Y4/4-Moist); , 0-0% ; Medium heavy clay; Strong grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 9 (Raupach);

Morphological Notes

Observation Notes

Check site, similar to site 002, not sampled

Site Notes cleared brigalow woodland, brown cracking clay, melonhole microrelief, DETAILED SITE

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 006 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Bar H, photo 16,17,18
Date Desc.: 08/05/12 **Elevation:** 24 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7493673 AMG zone: 55 **Runoff:** Very slow
Easting/Lat.: 772399 Datum: GDA94 **Drainage:** Imperfectly drained

Geology

ExposureType: Soil pit **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Soil pit, 1 m deep, Fragmental, Bedded, Porous,
 , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat **Relief:** 5 metres
Elem. Type: Terrace plain **Slope Category:** Level
Slope: 0.5 % **Aspect:** 100 degrees

Surface Soil Condition Self-mulching

Erosion:

Soil Classification **Microrelief:** Melonhole gilgai Vert.(m) 1 Horiz.(m) 20

Australian Soil Classification: Endohypersodic Epipedal Grey Vertosol Non-gravelly Fine Medium **Mapping Unit:** So
 fine Moderately deep **Principal Profile Form:** Ug5.25
ASC Confidence: **Great Soil Group:** Grey clay

Analytical data are incomplete but reasonable confidence. **Land Class:** **Land Class:** C1

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation: Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Acacia harpophylla, Casuarina cristata

Surface Coarse No surface coarse fragments

Profile

- 1A11 0 - 0.1 m Very dark grey (10YR3/1-Moist); , 0-0% ; Clay loam; Strong grade of structure, 10-20 mm, Subangular blocky; Rough-ped fabric; Coarse, (10 - 20) mm crack; Common (1-5 per 0.01m2) Medium (2-5mm) macropores, Moist; Weak consistence; Moderately plastic; Normal plasticity; Moderately sticky; Field pH 7.5 (Raupach); Many, fine (1-2mm) roots; Clear, Tongued change to -
- 1A12 0.1 - 0.3 m Very dark greyish brown (10YR3/2-Moist); , 0-0% ; Silty clay loam; Strong grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Coarse, (10 - 20) mm crack; Few (<1 per 0.01m2) Medium (2-5mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Moderately sticky; Many cutans, >50% of ped faces or walls coated, distinct; Soil matrix is Slightly calcareous; Field pH 8 (Raupach); Many, fine (1-2mm) roots; Diffuse, Irregular change to -
- 1B2kss 0.3 - 0.5 m Dark greyish brown (2.5Y4/2-Moist); , 0-0% ; Medium clay; Strong grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Medium, (5 - 10) mm crack; Many (>5 per 100mm2) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; Many cutans, >50% of ped faces or walls coated, distinct; Soil matrix is Slightly calcareous; Field pH 9 (Raupach); Common, fine (1-2mm) roots; Diffuse, Irregular change to -
- 1B3ss 0.5 - 0.9 m Dark greyish brown (2.5Y4/3-Moist); , 0-0% ; Medium heavy clay; Strong grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Many (>5 per 100mm2) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; Many cutans, >50% of ped faces or walls coated, distinct; Soil matrix is Slightly calcareous; Field pH 9 (Raupach); Few, very fine (0-1mm) roots; Diffuse, Wavy change to -
- 1C1 0.9 - 1.2 m Olive brown (2.5Y4/4-Moist); , 0-0% ; Medium heavy clay; Strong grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Many cutans, >50% of ped faces or walls coated, distinct; Soil matrix is Slightly calcareous; Field pH 9 (Raupach);

Observation Notes

Check site, not sampled

Site Notes

cleared brigalow woodland, brown cracking clay, melonhole microrelief, similar to site 005, DETAILED SITE

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 007 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth
Date Desc.: 08/05/12
Map Ref.: GPS S.A. Off
Northing/Long.: 7493721 AMG zone: 55
Easting/Lat.: 773070 Datum: GDA94
Locality: Bar H, photo 28-30
Elevation: 19 metres
Rainfall: 756
Runoff: Very slow
Drainage: Moderately well drained

Geology

Exposure Type: Soil pit
Geol. Ref.: Qa
 , Alluvium
Conf. Sub. is Parent. Mat.: Almost certain or certain
Substrate Material: Soil pit, 1 m deep, Fragmental, Bedded, Porous,

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3%
Pattern Type: Flood plain

Morph. Type: Flat
Elem. Type: Backplain
Slope: 0.5 %
Relief: 5 metres
Slope Category: Level
Aspect: 100 degrees

Surface Soil Condition

Firm

Erosion:

Soil Classification

microrelief

Microrelief: Zero or no Vert.(m) Horiz.(m)

Australian Soil Classification:

Basic Grey-Orthic Tenosol Medium Non-gravelly Silty Silty
 Moderately deep **Great Soil Group:**

Mapping Unit: Sx
Principal Profile Form: Um5.52
 Alluvial soil

ASC Confidence:

All necessary analytical data are available.

Land Class: **Land Class:** A

Site

Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 20.01-35m, Isolated plants. *Species includes - Eucalyptus species

Surface Coarse

No surface coarse fragments

Profile

1A11 0 - 0.1 m Dark grey (10YR4/1-Moist); , 0-0% ; Silty loam; Strong grade of structure, 10-20 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moderately moist; Weak consistence; Slightly plastic; Normal plasticity; Slightly sticky; Field pH 6.5 (Raupach); Many, fine (1-2mm) roots; Diffuse, Wavy change to -

1A12 0.1 - 0.3 m Dark greyish brown (10YR4/2-Moist); , 0-0% ; Silty loam; Strong grade of structure, 10-20 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moderately moist; Firm consistence; Slightly plastic; Normal plasticity; Slightly sticky; Field pH 7 (Raupach); Many, fine (1-2mm) roots; Diffuse, Wavy change to -

1B2w 0.3 - 0.6 m Dark yellowish brown (10YR4/4-Moist); , 0-0% ; Silty loam; Moderate grade of structure, 10-20 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moderately moist; Firm consistence; Slightly plastic; Normal plasticity; Slightly sticky; Field pH 7.5 (Raupach); Common, fine (1-2mm) roots; Diffuse, Wavy change to -

1C1 0.6 - 0.9 m Dark yellowish brown (10YR4/4-Moist); , 0-0% ; Silty loam; Moderate grade of structure, 10-20 mm, Subangular blocky; Earthy fabric; Fine, (0 - 5) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moderately moist; Firm consistence; Slightly plastic; Normal plasticity; Slightly sticky; Field pH 7.5 (Raupach); Common, fine (1-2mm) roots; Diffuse, Tongued change to -

1C2 0.9 - 1.2 m Dark yellowish brown (10YR4/4-Moist); , 0-0% ; Silty loam; Weak grade of structure, 10-20 mm, Subangular blocky; Earthy fabric; Fine, (0 - 5) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moderately moist; Firm consistence; Slightly plastic; Normal plasticity; Slightly sticky; Field pH 7.5 (Raupach); Common, fine (1-2mm) roots;

Morphological Notes

Observation Notes

Detailed site, samples 16-20

Site Notes

river flat cleared mixed woodland, silt loam, samples 16-20, REFERENCE SITE

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 007 **Observation** 1
Agency Name: Horizon Soil Survey (NT)

Laboratory Test Results:

Depth cm	pH	1:5 EC Ca dS/m	Exchangeable Mg	Cations K	Na	CEC Cmol (+)/kg	ESP %	Cl mg/kg
0 - 0.1	6.8A	62A	10.7*	2.5	1.5	<0.1	14.7*	20*
0.2 - 0.3	7.7A	55A						30*
0.5 - 0.6	8.2A	46A	10.6*	2.2	0.2	<0.1	13*	20*
0.8 - 0.9	8.1A	77A						40*
1.1 - 1.2	7.7A	128A	10.1*	2.5	0.2	<0.1	12.8*	80*

Depth cm	Organic C %	Total N mg/kg	Avail. P mg/kg	Total K mg/kg	Extr. S mg/kg	Cu	Fe	Trace Elements Mn Zn mg/kg		B
0 - 0.1	1A	1960E	120J	880	6*	3.03	196	102	4.21	<0.2
0.2 - 0.3										
0.5 - 0.6	480E	22J	<200	3*						
0.8 - 0.9										
1.1 - 1.2	470E	21J	<200	30*						

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 008 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Bar H, photo 22-24
Date Desc.: 08/05/12 **Elevation:** 22 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7492815 AMG zone: 55 **Runoff:** Very slow
Easting/Lat.: 772632 Datum: GDA94 **Drainage:** Imperfectly drained

Geology

Exposure Type: Soil pit **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Soil pit, 1 m deep ,Fragmental, Bedded, Porous,
, Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat **Relief:** 5 metres
Elem. Type: Terrace plain **Slope Category:** Level
Slope: 0.5 % **Aspect:** 100 degrees

Surface Soil Condition Firm

Erosion:

Soil Classification **Microrelief:** Zero or no Vert.(m) Horiz.(m)
microrelief

Australian Soil Classification:

Basic Grey-Orthic Tenosol Medium Non-gravelly Silty Silty
Moderately deep **Great Soil Group:**

Mapping Unit: Bl
Principal Profile Form: Um5.52
Alluvial soil

ASC Confidence:

All necessary analytical data are available.

Land Class: **Land Class:** A

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 20.01-35m, Isolated plants. *Species includes - Eucalyptus species

Surface Coarse No surface coarse fragments

Profile

1A11 0 - 0.1 m Very dark grey (10YR3/1-Moist); , 0-0% ; Silty loam; Moderate grade of structure, 10-20 mm, Subangular blocky; Moderate grade of structure, 10-20 mm, Subangular blocky; Weak grade of structure, 50-100 mm, Subangular blocky; Rough-ped fabric; Medium, (5 - 10) mm crack; Few (<1 per 0.01m2) Fine (1-2mm) macropores, Moderately moist; Firm consistence; Slightly plastic; Normal plasticity; Slightly sticky; Field pH 5.5 (Raupach); Abundant, medium (2-5mm) roots; Diffuse, Wavy change to -

1A12 0.1 - 0.3 m Very dark grey (10YR3/1-Moist); , 0-0% ; Silty loam; Weak grade of structure, 50-100 mm, Prismatic; Rough-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 0.01m2) Fine (1-2mm) macropores, Moderately moist; Firm consistence; Slightly plastic; Normal plasticity; Slightly sticky; Field pH 5.5 (Raupach); Abundant, medium (2-5mm) roots; Diffuse, Wavy change to -

1B2t 0.3 - 0.6 m Very dark greyish brown (10YR3/2-Moist); , 0-0% ; Silty clay loam; Weak grade of structure, 50-100 mm, Subangular blocky; Earthy fabric; Fine, (0 - 5) mm crack; Many (>5 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Slightly plastic; Normal plasticity; Slightly sticky; Soil matrix is Slightly calcareous; Field pH 8 (Raupach); Many, fine (1-2mm) roots; Diffuse, Wavy change to -

1B3 0.6 - 0.9 m Very dark greyish brown (10YR3/2-Moist); , 0-0% ; Silty clay loam; Weak grade of structure, 50-100 mm, Subangular blocky; Earthy fabric; Fine, (0 - 5) mm crack; Many (>5 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Slightly plastic; Normal plasticity; Slightly sticky; Field pH 8 (Raupach); Few, fine (1-2mm) roots; Diffuse, Wavy change to -

1C1 0.9 - 1.2 m Dark brown (10YR3/3-Moist); , 0-0% ; Silty clay loam; Weak grade of structure, 50-100 mm, Subangular blocky; Earthy fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Slightly plastic; Normal plasticity; Slightly sticky; Field pH 8 (Raupach); Few, fine (1-2mm) roots;

Morphological Notes

Observation Notes

Detailed site, samples 21-25

Horizon Soil Survey & Evaluation

Appendix A

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 008 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Notes

cleared brigalow woodland, grey cracking clay, melonhole microrelief, samples 21-25, REFERENCE SITE

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 008 **Observation** 1
Agency Name: Horizon Soil Survey (NT)

Laboratory Test Results:

Depth Cm	pH	1:5 EC Exchangeable Cations		K	Na	CEC	ESP	Cl	
		Ca	Mg						Cmol (+)/kg
0 - 0.1	5.8A	64A	4.6*	1.4	0.9	<0.1	6.9*	30*	
0.2 - 0.3	7.2A	32A						<10*	
0.5 - 0.6	7.9A	70A	12.9*	8.8	0.2	<1	22.9*	10*	
0.8 - 0.9	6.4A	190A						50*	
1.1 - 1.2	7.3A	143A	9.2*	7.6	0.2	1.3	18.2*	7.14	40*

Depth cm	Organic C %	Total N mg/kg	Avail. P mg/kg	Total K mg/kg	Extr. S mg/kg	Trace Elements				B
						Cu	Fe	Mn	Zn	
0 - 0.1	0.8A	1860E	41J	560	8*	1.86	210	225	9.74	<0.2
0.2 - 0.3										
0.5 - 0.6		540E	2J	<200	3*					
0.8 - 0.9										
1.1 - 1.2		270E	6J	<200	54*					

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 009 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth
Date Desc.: 08/05/12
Map Ref.: GPS S.A. Off
Northing/Long.: 7491948 AMG zone: 55
Easting/Lat.: 772287 Datum: GDA94
Locality: Bar H, photos 29-31
Elevation: 26 metres
Rainfall: 756
Runoff: Very slow
Drainage: Imperfectly drained

Geology

Exposure Type: Soil pit
Geol. Ref.: Qpa
 , Alluvium
Conf. Sub. is Parent. Mat.: Almost certain or certain
Substrate Material: Soil pit, 1 m deep, Fragmental, Bedded, Porous,

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3%
Pattern Type: Terraced land (alluvial)

Morph. Type: Flat
Elem. Type: Terrace plain
Slope: 0.5 %
Relief: 5 metres
Slope Category: Level
Aspect: 100 degrees

Surface Soil Condition Surface crust

Erosion:

Soil Classification

Microrelief: Melonhole gilgai Vert.(m) 1 Horiz.(m) 20

Australian Soil Classification:

Endohypersodic Epipedal Grey Vertosol Non-gravelly Fine Medium
 fine Moderately deep

Mapping Unit: BI
Principal Profile Form: Ug5.25
Great Soil Group: Grey clay

ASC Confidence:

Analytical data are incomplete but reasonable confidence.

Land Class: **Land Class:** A

Site

Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Acacia harpophylla

Surface Coarse

No surface coarse fragments

Profile

- 1A1 0 - 0.1 m Very dark grey (2.5Y3/1-Moist); , 0-0% ; Clay loam; Strong grade of structure, 10-20 mm, Subangular blocky; Rough-ped fabric; Very coarse, (20 - 50) mm crack; Common (1-5 per 0.01m2) Medium (2-5mm) macropores, Moist; Weak consistence; Very plastic; Normal plasticity; Moderately sticky; Field pH 8 (Raupach); Many, fine (1-2mm) roots; Diffuse, Wavy change to -
- 1B1 0.1 - 0.3 m Very dark grey (2.5Y3/1-Moist); , 0-0% ; Light medium clay; Moderate grade of structure, 20-50 mm, Subangular blocky; Rough-ped fabric; Very coarse, (20 - 50) mm crack; Common (1-5 per 0.01m2) Medium (2-5mm) macropores, Moist; Weak consistence; Very plastic; Normal plasticity; Very sticky; Soil matrix is Slightly calcareous; Field pH 8.5 (Raupach); Many, fine (1-2mm) roots; Diffuse, Irregular change to -
- 1B2kss 0.3 - 0.6 m Very dark greyish brown (2.5Y3/2-Moist); , 0-0% ; Heavy clay; Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Coarse, (10 - 20) mm crack; Few (<1 per 0.01m2) Medium (2-5mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; Soil matrix is Slightly calcareous; Field pH 8.5 (Raupach); Common, fine (1-2mm) roots; Diffuse, Irregular change to -
- 1B3kss 0.6 - 0.9 m Greyish brown (2.5Y5/3-Moist); , 0-0% ; Heavy clay; Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Coarse, (10 - 20) mm crack; Many (>5 per 100mm2) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; Soil matrix is Slightly calcareous; Field pH 9 (Raupach); Few, coarse (>5mm) roots; Diffuse, Irregular change to -
- 1C1k 0.9 - 1.2 m Light olive brown (2.5Y5/4-Moist); , 0-0% ; Heavy clay; Moderate grade of structure, 20-50 mm, Lenticular; Earthy fabric; Medium, (5 - 10) mm crack; Many (>5 per 100mm2) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Moderately sticky; Soil matrix is Slightly calcareous; Field pH 9 (Raupach); Few, coarse (>5mm) roots;

Morphological Notes

Observation Notes

Check site, flat on undulating terrace plain, not sampled

Site Notes

cleared brigalow woodland, grey cracking clay, melonhole microrelief, DETAILED SITE

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 010 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth 008 **Locality:** Bar H, photos 43,44, same as site
Date Desc.: 08/05/12 **Elevation:** 35 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7489673 AMG zone: 55 **Runoff:** Slow
Easting/Lat.: 771493 Datum: GDA94 **Drainage:** Poorly drained

Geology

Exposure Type: Auger boring **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Auger boring, 1 m deep, Fragmental, Bedded,
 Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Lower-slope **Relief:** 5 metres
Elem. Type: **Slope Category:** Level
Slope: 0 % **Aspect:** 100 degrees

Surface Soil Condition Firm

Erosion:

Soil Classification **Microrelief:** Crabhole gilgai Vert.(m) 1 Horiz.(m) 5

Australian Soil Classification: Endohypersodic Epipedal Grey Vertosol Non-gravelly Fine Medium **Mapping Unit:** Bl
 fine Moderately deep **Principal Profile Form:** Ug5.25
ASC Confidence: Analytical data are incomplete but reasonable confidence. **Great Soil Group:** Grey clay

Land Class: **Land Class:** A

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 3.01-6m, Isolated plants. *Species includes - Acacia harpophylla

Surface Coarse No surface coarse fragments

Profile

1A11 0 - 0.1 m Very dark grey (10YR3/1-Moist); , 0-0% ; Silty loam; Moderate grade of structure, 10-20 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 0.01m2) Fine (1-2mm) macropores, Moderately moist; Firm consistence; Slightly plastic; Normal plasticity; Slightly sticky; Field pH 5.5 (Raupach); Abundant, fine (1-2mm) roots; Clear, Smooth change to -

1A12 0.1 - 0.3 m Very dark grey (10YR3/1-Moist); , 0-0% ; Silty loam; Moderate grade of structure, 10-20 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Slightly plastic; Normal plasticity; Slightly sticky; Field pH 6.5 (Raupach); Abundant, fine (1-2mm) roots; Clear, Smooth change to -

1B2kss 0.3 - 0.6 m Very dark greyish brown (10YR3/2-Moist); Mottles, 2-10% , 0-5mm, Distinct; Silty clay loam; Weak grade of structure, 50-100 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 0.01m2) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Soil matrix is Slightly calcareous; Field pH 8 (Raupach); Many, very fine (0-1mm) roots; Diffuse, Wavy change to -

1B3kss 0.6 - 0.9 m Very dark greyish brown (10YR3/2-Moist); , 0-0% ; Silty clay loam; Weak grade of structure, 50-100 mm, Lenticular; Earthy fabric; Fine, (0 - 5) mm crack; Many (>5 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Soil matrix is Slightly calcareous; Field pH 6.5 (Raupach); Many, very fine (0-1mm) roots; Diffuse, Irregular change to -

1C1 0.9 - 1.2 m Dark brown (10YR3/3-Moist); , 0-0% ; Weak grade of structure, 50-100 mm, Lenticular; Earthy fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Soil matrix is Slightly calcareous; Field pH 6.5 (Raupach); Few, medium (2-5mm) roots;

Morphological Notes

Observation Notes

exclusion site, not sampled

Horizon Soil Survey & Evaluation

Appendix A

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 010 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Notes

melonhole microrelief, cleared brigalow woodland, brown clay, EXCLUSION SITE

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 011 **Observation** 1
Agency Name: Horizon Soil Survey (NT)

Laboratory Test Results:

Depth cm	pH	1:5 EC Ca dS/m	Exchangeable Mg	Cations K	Na	CEC Cmol (+)/kg	ESP %	Cl mg/kg
0 - 0.1	8.4A	121A27.6*	1.8	0.4	<0.1	29.8*	10*	
0.1 - 0.3	8.6A	99A <10*						
0.5 - 0.6	8.6A	92A 14.4*	1.3	0.3	<0.1	16*	<10*	
0.8 - 0.9	8.8A	93A <10*						
1.1 - 1.2	8.8A	98A 23.2*	1.4	0.3	<0.1	24.9*	<10*	

Depth cm	Organic C %	Total N mg/kg	Avail. P mg/kg	Total K mg/kg	Extr. S mg/kg	Cu	Fe	Trace Elements Mn Zn mg/kg		B
0 - 0.1	0.8A	1670E	25J	300	6*	<1	28	28.4	1.55	<0.2
0.1 - 0.3										
0.5 - 0.6	420E	5J	<200	<3*						
0.8 - 0.9										
1.1 - 1.2	380E	6J	300	4*						

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 011 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Bar H, photos 48-50
Date Desc.: 09/05/12 **Elevation:** 19 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7497068 AMG zone: 55 **Runoff:** Very slow
Easting/Lat.: 771484 Datum: GDA94 **Drainage:** Moderately well drained

Geology

Exposure Type: Soil pit **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qa **Substrate Material:** Soil pit, 1 m deep, Fragmental, Bedded, Porous,
, Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Lower-slope **Relief:** 5 metres
Elem. Type: Slope Category: Level
Slope: 0 % **Aspect:** 80 degrees

Surface Soil Condition Soft

Erosion:

Soil Classification **Microrelief:** Zero or no Vert.(m) Horiz.(m)
microrelief

Australian Soil Classification:

Stratic Rudosol Non-gravelly Loamy Shallow

ASC Confidence: Great **Soil Group:**
All necessary analytical data are available.

Mapping Unit: Sx

Principal Profile Form: Um5.52

Alluvial soil

Land Class: **Land Class:** A

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 20.01-35m, Isolated plants. *Species includes - Eucalyptus species

Surface Coarse

No surface coarse fragments

Profile

1A11 0 - 0.1 m Very dark grey (7.5YR3/1-Moist); , 0-0% ; Sandy loam; Strong grade of structure, 2-5 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moist; Loose consistence; Slightly plastic; Normal plasticity; Slightly sticky; Field pH 8 (Raupach); Abundant, fine (1-2mm) roots; Diffuse, Smooth change to -

1A12 0.1 - 0.5 m Dark brown (7.5YR3/2-Moist); , 0-0% ; Sandy loam; Moderate grade of structure, 2-5 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moist; Very weak consistence; Slightly plastic; Normal plasticity; Slightly sticky; Field pH 8 (Raupach); Abundant, fine (1-2mm) roots; Diffuse, Smooth change to -

1C1 0.5 - 0.8 m Dark brown (7.5YR3/3-Moist); , 0-0% ; Sandy loam; Weak grade of structure, 5-10 mm, Subangular blocky; Weak grade of structure, 5-10 mm, Subangular blocky; Earthy fabric; Fine, (0 - 5) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moist; Weak consistence; Slightly plastic; Normal plasticity; Slightly sticky; Field pH 8 (Raupach); Many, fine (1-2mm) roots; Diffuse, Smooth change to -

1C2 0.8 - 1.1 m Dark brown (7.5YR3/3-Moist); , 0-0% ; Sandy loam; Weak grade of structure, 5-10 mm, Subangular blocky; Earthy fabric; Fine, (0 - 5) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Slightly plastic; Normal plasticity; Slightly sticky; Field pH 8 (Raupach); Common, fine (1-2mm) roots; Diffuse, Smooth change to -

1C3 1.1 - 1.2 m Dark brown (7.5YR3/3-Moist); , 0-0% ; Massive grade of structure; Fine, (0 - 5) mm crack; Few (<1 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Slightly plastic; Normal plasticity; Slightly sticky; Field pH 8 (Raupach); Common, fine (1-2mm) roots;

Morphological Notes

Observation Notes

Detailed site, deep river loam on scroll plain, samples 26-30

Site Notes

deep river loam, stream channels, bank and levee on flood plain, samples 26-309, REFERENCE SITE

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 012 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Bar H, photos 51-53
Date Desc.: 09/05/12 **Elevation:** 20 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7496613 AMG zone: 55 **Runoff:** Slow
Easting/Lat.: 771321 Datum: GDA94 **Drainage:** Poorly drained

Geology

Exposure Type: Soil pit **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Soil pit, 1 m deep, Fragmental, Bedded, Porous,
 , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Lower-slope **Relief:** 5 metres
Elem. Type: Slope Category: Level
Slope: 0 % **Aspect:** 45 degrees

Surface Soil Condition Surface crust

Erosion: Active, Minor (gully)

Soil Classification

Microrelief: Melonhole gilgai Vert.(m) 1 Horiz.(m) 5

Australian Soil Classification:

Endohypersodic Epipedal Grey Vertosol Non-gravelly Fine Medium **Mapping Unit:** So
 fine Moderately deep **Principal Profile Form:** Ug5.25
Great Soil Group: Brown clay

ASC Confidence:

Analytical data are incomplete but reasonable confidence. **Land Class:** Land Class: C1

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Acacia harpophylla

Surface Coarse

No surface coarse fragments

Profile

1A1 0 - 0.1 m Dark grey (2.5Y4/1-Moist); , 0-0% ; Light clay; Strong grade of structure, 10-20 mm, Subangular blocky; Rough-ped fabric; Coarse, (10 - 20) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moist; Loose consistence; Moderately plastic; Normal plasticity; Moderately sticky; , , , ; Field pH 6.5 (Raupach); Abundant, fine (1-2mm) roots; Diffuse, Wavy change to -

1B1 0.1 - 0.2 m Dark grey (2.5Y4/1-Moist); , 0-0% ; Light clay; Strong grade of structure, 10-20 mm, Subangular blocky; Rough-ped fabric; Coarse, (10 - 20) mm crack; Few (<1 per 0.01m2) Fine (1-2mm) macropores, Moist; Weak consistence; Moderately plastic; Normal plasticity; Moderately sticky; Field pH 7 (Raupach); Many, fine (1-2mm) roots; Diffuse, Wavy change to -

1B2ss 0.2 - 0.3 m Dark greyish brown (2.5Y4/3-Moist); , 0-0% ; Light medium clay; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Coarse, (10 - 20) mm crack; Many (>5 per 100mm2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; Field pH 8 (Raupach); Many, very fine (0-1mm) roots; Diffuse, Wavy change to -

1B2kss 0.3 - 0.6 m Dark greyish brown (2.5Y4/3-Moist); , 0-0% ; Medium clay; Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Medium, (5 - 10) mm crack; Common (1-5 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; Very few (0 - 2 %), Calcareous, Medium (2 - 6 mm), Nodules; Soil matrix is Slightly calcareous; Field pH 8.5 (Raupach); Common, very fine (0-1mm) roots; Diffuse, Wavy change to -

1B3ss 0.6 - 0.9 m Olive brown (2.5Y4/4-Moist); , 0-0% ; Heavy clay; Weak grade of structure, 20-50 mm, Lenticular; Earthy fabric; Medium, (5 - 10) mm crack; Common (1-5 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; Soil matrix is Slightly calcareous; Field pH 9 (Raupach); Common, very fine (0-1mm) roots; Diffuse, Wavy change to -

1C5s 0.9 - 1.2 m Olive brown (2.5Y4/4-Moist); , 0-0% ; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; Soil matrix is Slightly calcareous; Field pH 9 (Raupach); Few, very fine (0-1mm) roots;

Morphological Notes

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 012 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Observation Notes

Check site, not sampled

Site Notes

melonhole microrelief, cleared brigalow woodland, not sampled, brown clay, DETAILED SITE

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 013 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Bar H, no photo
Date Desc.: 09/05/12 **Elevation:** 28 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7491406 AMG zone: 55 **Runoff:** Slow
Easting/Lat.: 772073 Datum: GDA94 **Drainage:** Poorly drained

Geology

Exposure Type: Existing vertical exposure **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Existing vertical exposure, 1 m deep, Fragmental, Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Lower-slope **Relief:** 5 metres
Elem. Type: **Slope Category:** Level
Slope: 0 % **Aspect:** 100 degrees

Surface Soil Condition Surface crust

Erosion:

Soil Classification

Microrelief: Melonhole gilgai Vert.(m) 1 Horiz.(m) 10

Australian Soil Classification:

Endohypersodic Epipedal Grey Vertosol Non-gravelly Fine Medium **Mapping Unit:** Bl
 fine Moderately deep **Principal Profile Form:** Ug5.25
Great Soil Group: Grey clay

ASC Confidence:

Analytical data are incomplete but reasonable confidence. **Land Class:** **Land Class:** C1

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Acacia harpophylla

Surface Coarse No surface coarse fragments

Profile

1A1 0 - 0.1 m Dark grey (2.5Y4/1-Moist); , 0-0% ; Light clay; Strong grade of structure, 10-20 mm, Subangular blocky; Rough-ped fabric; Medium, (5 - 10) mm crack; Common (1-5 per 0.01m2) Medium (2-5mm) macropores, Moist; Weak consistence; Moderately plastic; Normal plasticity; Moderately sticky; Field pH 6.5 (Raupach); Abundant, fine (1-2mm) roots; Diffuse, Wavy change to -

1B1 0.1 - 0.2 m Dark grey (2.5Y4/1-Moist); , 0-0% ; Light clay; Strong grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Medium, (5 - 10) mm crack; Few (<1 per 0.01m2) Fine (1-2mm) macropores, Moist; Weak consistence; Moderately plastic; Normal plasticity; Moderately sticky; Many cutans, >50% of ped faces or walls coated, distinct; Field pH 7 (Raupach); Many, fine (1-2mm) roots; Diffuse, Wavy change to -

1B2ss 0.2 - 0.3 m Dark greyish brown (2.5Y4/3-Moist); , 0-0% ; Light medium clay; Strong grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Medium, (5 - 10) mm crack; Many (>5 per 100mm2) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Moderately sticky; Many cutans, >50% of ped faces or walls coated, distinct; Field pH 8 (Raupach); Many, very fine (0-1mm) roots; Diffuse, Wavy change to -

1B2kss 0.3 - 0.6 m Dark greyish brown (2.5Y4/3-Moist); , 0-0% ; Medium clay; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Soil matrix is Slightly calcareous; Field pH 8.5 (Raupach); Common, very fine (0-1mm) roots; Diffuse, Wavy change to -

1B3ss 0.6 - 0.9 m Olive brown (2.5Y4/4-Moist); , 0-0% ; Heavy clay; Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Soil matrix is Slightly calcareous; Field pH 9 (Raupach); Common, very fine (0-1mm) roots; Gradual, Wavy change to -

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 013 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

1C1ss 0.9 - 1.2 m Olive brown (2.5Y4/4-Moist); , 0-0% ; Weak grade of structure, 20-50 mm, Lenticular; Earthy fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm²) Very fine (0.075-1mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; Few cutans, <10% of ped faces or walls coated, distinct; Soil matrix is Slightly calcareous; Field pH 9 (Raupach);

Morphological Notes

Observation Notes

Check site, not sampled

Site Notes

samples 6-10, cleared brigalow woodland, brown clay, not sampled, similar to site 0012, REFERENCE SITE

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 014 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Mamelon, photos 54-56
Date Desc.: 09/05/12 **Elevation:** 37 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7490114 AMG zone: 55 **Runoff:** Slow
Easting/Lat.: 769645 Datum: GDA94 **Drainage:** Imperfectly drained

Geology

Exposure Type: Soil pit **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Kx **Substrate Material:** Soil pit, 1 m deep, Fragmental, Bedded, Porous,
 , Coal

Land Form

Rel/Slope Class: Undulating low hills 30-90m 3-10% **Pattern Type:** Hills

Morph. Type: Lower-slope **Relief:** 31 metres
Elem. Type: Footslope **Slope Category:** Gently inclined
Slope: 0.5 % **Aspect:** 20 degrees

Surface Soil Condition Firm

Erosion:

Soil Classification

Microrelief:

Australian Soil Classification:

Magnesian Mottled-Hypematrix Brown Sodosol Thick Slightly
 gravelly Sandy Clayey Moderately deep

Mapping Unit:

Tb
 Db4.42
 Yellow podzolic

ASC Confidence: soil

All necessary analytical data are available.

Land Class:

Land Class: C2

Site No effective disturbance other than grazing by hoofed animals

Vegetation:

Tall Strata - Tree, 6.01-12m, Mid-dense. *Species includes - Melaleuca species

Surface Coarse

0-2%, cobbly, 60-200mm, subrounded, Shale

Profile

1A11 0 - 0.1 m Very dark grey (10YR3/1-Moist); , 0-0% ; Loamy fine sand; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Many (>5 per 100mm²) Fine (1-2mm) macropores, Moderately moist; Very weak consistence; Non-plastic; Non-sticky; Field pH 6 (Raupach); Many, fine (1-2mm) roots; Clear, Smooth change to -

1A12 0.1 - 0.3 m Greyish brown (10YR5/2-Moist); , 0-0% ; Loamy fine sand; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 0.01m²) Fine (1-2mm) macropores, Moist; Very weak consistence; Non-plastic; Non-sticky; Field pH 6 (Raupach); Many, fine (1-2mm) roots; Clear, Smooth change to -

1A2e 0.3 - 0.5 m Light grey (10YR7/1-Moist); , 0-0% ; Loamy fine sand; Single grain grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Few (<1 per 0.01m²) Fine (1-2mm) macropores, Moist; Firm consistence; Non-plastic; Non-sticky; Field pH 6 (Raupach); Many, coarse (>5mm) roots; Abrupt, Tongued change to -

1B2t 0.5 - 0.7 m Yellowish brown (10YR5/6-Moist); Mottles, 10YR62, 10-20% , 5-15mm, Distinct; Light clay; Moderate grade of structure, 20-50 mm, Prismatic; Rough-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm²) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Moderately plastic; Normal plasticity; Slightly sticky; Many (20 - 50 %), Ferromanganiferous, Medium (2 -6 mm), Concretions; Ferricrete, Uncemented, Discontinuous, Concretionary; Field pH 6 (Raupach); Clear, Smooth change to -

1B3 0.7 - 0.9 m Light brownish grey (10YR6/2-Moist); Mottles, 10YR56, 10-20% , 30-mm, Faint; Light clay; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm²) Fine (1-2mm) macropores, Moist; Very firm consistence; Moderately plastic; Normal plasticity; Slightly sticky; Field pH 8.5 (Raupach); Gradual, Wavy change to -

1C1 0.9 - 1.5 m Light brownish grey (10YR6/2-Moist); Mottles, 10YR56, 10-20% , 30-mm, Faint; Massive grade of structure; Earthy fabric; Few (<1 per 100mm²) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Moderately plastic; Normal plasticity; Slightly sticky; Field pH 8.5 (Raupach);

Morphological Notes

Horizon Soil Survey & Evaluation

Appendix A

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 014 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

1A2e bleached, rusty root mottles

Observation Notes

Detailed site, samples 31-35

Site Notes

ironbark woodland, native grassland on sedimentary, samples 31-35, REFERENCE SITE, Albic Glossic Natraqualfs

Laboratory Test Results:

Depth cm	pH	1:5 EC dS/m	Exchangeable Ca	Cations Mg	K	CEC Na Cmol (+)/kg	ESP %	Cl mg/kg
0 - 0.1	6.1A	60A	1.2*	0.7	0.1	<0.1	2*	50*
0.1 - 0.3	6.4A	33A						30*
0.5 - 0.6	7.1A	275A	<0.1*	2.7	<0.1	1.4	4.2*	33.33
0.8 - 0.9	8A	258A260*						
1.1 - 1.2	8.1A	320A	<0.1*	1.5	<0.1	1.1	2.7*	40.74

Depth cm	Organic C %	Total N mg/kg	Avail. P mg/kg	Total K mg/kg	Extr. S mg/kg	Cu	Fe	Trace Elements Mn Zn mg/kg		B
0 - 0.1	0.5A	860E	2J	740	5*	<1	199	70.2	<1	<0.2
0.1 - 0.3										
0.5 - 0.6	200E	<2J	<200	19*						
0.8 - 0.9										
1.1 - 1.2	120E	<2J	220	5*						

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 015 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** melonhole microrelief, Bar H, photo 57
Date Desc.: 09/05/12 **Elevation:** 41 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7489637 AMG zone: 55 **Runoff:** No runoff
Easting/Lat.: 770363 Datum: GDA94 **Drainage:** Very poorly drained

Geology

Exposure Type: Auger boring **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Auger boring, 1 m deep, Fragmental, Bedded,
 Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat **Relief:** 5 metres
Elem. Type: Swamp **Slope Category:** Level
Slope: 0.5 % **Aspect:** 45 degrees

Surface Soil Condition Poached

Erosion:

Soil Classification

Microrelief: Melonhole gilgai Vert.(m) 1 Horiz.(m) 10

Australian Soil Classification: Endohypersodic Epipedal Grey Vertosol Non-gravelly Fine Medium
 fine Moderately deep **Mapping Unit:** BI
Principal Profile Form: Ug5.25
Great Soil Group: Grey clay

ASC Confidence: Analytical data are incomplete but reasonable confidence. **Land Class:** Land Class: A

Site: Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Surface Coarse: No surface coarse fragments

Profile

1A11 0 - 0.1 m Very dark greyish brown (10YR3/2-Moist); Mottles, 7.5YR44, 10-20% , 0-5mm, Distinct; Clay loam, fine sandy; Moderate grade of structure, 20-50 mm, Subangular blocky; Rough-ped fabric; Coarse, (10 - 20) mm crack; Many (>5 per 100mm²) Medium (2-5mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; Very few (0 - 2 %), Ferromanganiferous, Fine (0 - 2 mm), Concretions; Field pH 8 (Raupach); Many, medium (2-5mm) roots; Gradual, Wavy change to -

1A1g 0.1 - 0.3 m Very dark grey (10YR3/1-Moist); Mottles, 7.5YR44, 10-20% , 0-5mm, Distinct; Clay loam, fine sandy; Moderate grade of structure, 20-50 mm, Lenticular; Rough-ped fabric; Medium, (5 - 10) mm crack; Common (1-5 per 100mm²) Fine (1-2mm) macropores, Wet; Firm consistence; Very plastic; Normal plasticity; Very sticky; Common (10 - 20 %), Ferromanganiferous, Fine (0 - 2 mm), Concretions; Field pH 8 (Raupach); Common, medium (2-5mm) roots; Gradual, Wavy change to -

1B2g 0.3 - 0.5 m Dark grey (10YR4/1-Moist); , 0-0% ; Light medium clay; Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm²) Very fine (0.075-1mm) macropores, Wet; Firm consistence; Very plastic; Normal plasticity; Very sticky; Common (10 - 20 %), Ferromanganiferous, Fine (0 - 2 mm), Concretions; Soil matrix is Slightly calcareous; Field pH 8 (Raupach); Few, fine (1-2mm) roots; Gradual, Wavy change to -

1C 0.5 - 1.5 m Brown (10YR4/3-Moist); , 0-0% ; Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; Very few (0 - 2 %), Ferromanganiferous, Fine (0 - 2 mm), Concretions; Soil matrix is Slightly calcareous; Field pH 8.5 (Raupach);

Morphological Notes

Observation Notes

Check site, not sampled

Site Notes

melonhole microrelief, cleared brigalow woodland, Para grass ponded pasture, brown clay; EXCLUSION SITE

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 016 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Bar H, photo 58
Date Desc.: 09/05/12 **Elevation:** 44 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7488925 AMG zone: 55 **Runoff:** Slow
Easting/Lat.: 770659 Datum: GDA94 **Drainage:** Imperfectly drained

Geology

Exposure Type: Auger boring **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qa **Substrate Material:** Auger boring, 1 m deep, Fragmental, Bedded,
 Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat **Relief:** 5 metres
Elem. Type: Terrace plain **Slope Category:** Level
Slope: 0.5 % **Aspect:** 20 degrees

Surface Soil Condition Cracking

Erosion: Minor (sheet) Stable, Moderate (gully)

Soil Classification

Microrelief: Normal gilgai Vert.(m) 0.3 Horiz.(m) 10

Australian Soil Classification:

Bleached-Vertic Eutrophic Grey Chromosol Medium Non-gravelly
 Clay-loamy Clayey Moderately deep

Mapping Unit: B1
Principal Profile Form: Dy3.83
Great Soil Group: Grey-brown

ASC Confidence: podzolic soil

No analytical data are available but confidence is fair.

Land Class: **Land Class:** C1

Site: Complete clearing. Pasture, native or improved, cultivated at some stage

Vegetation:

Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Acacia harpophylla

Surface Coarse

No surface coarse fragments

Profile

1A11 0 - 0.1 m Very dark grey (10YR3/1-Moist); , 0-0% ; Clay loam; Strong grade of structure, 10-20 mm, Subangular blocky; Rough-ped fabric; Medium, (5 - 10) mm crack; Common (1-5 per 0.01m2) Medium (2-5mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Moderately sticky; Field pH 7 (Raupach); Abundant, fine (1-2mm) roots; Gradual, Wavy change to -

1A12 0.1 - 0.3 m Very dark grey (10YR3/1-Moist); , 0-0% ; Clay loam; Strong grade of structure, 10-20 mm, Subangular blocky; Rough-ped fabric; Medium, (5 - 10) mm crack; Common (1-5 per 0.01m2) Medium (2-5mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Field pH 7.5 (Raupach); Many, fine (1-2mm) roots; Gradual, Wavy change to -

1B2kss 0.3 - 0.5 m Dark greyish brown (10YR4/2-Moist); , 0-0% ; Light medium clay; Moderate grade of structure, 20-50 mm, Lenticular; Rough-ped fabric; Medium, (5 - 10) mm crack; Many (>5 per 100mm2) Medium (2-5mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; Few (2 - 10 %), Manganiferous, Fine (0 - 2 mm), Concretions; Soil matrix is Slightly calcareous; Field pH 8.5 (Raupach); Common, very fine (0-1mm) roots; Gradual, Wavy change to -

1C1k 0.5 - 0.9 m Brown (10YR4/3-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Many (>5 per 100mm2) Medium (2-5mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Moderately sticky; Soil matrix is Slightly calcareous; Field pH 8.5 (Raupach); Common, very fine (0-1mm) roots; Gradual, Wavy change to -

1C2 0.9 - 1.5 m Brown (10YR4/3-Moist); , 0-0% ; Medium clay; Moderate grade of structure, 50-100 mm, Lenticular; Rough-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Moderately sticky; Soil matrix is Slightly calcareous; Field pH 9 (Raupach); Common, very fine (0-1mm) roots;

Morphological Notes

Observation Notes

Check site, not sampled

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 016 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Notes

crabhole microrelief, cleared ironbark woodland, native grassland, machinery shed for cultivation equipment, EXCLUSION SITE

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 017 **Observation** 1
Agency Name: Horizon Soil Survey (NT)

Laboratory Test Results:

Depth cm	pH	1:5 ECExchangeable Cations			Na	CEC Cmol (+)/kg	ESP %	Cl mg/kg
		Ca dS/m	Mg	K				
0 - 0.1	7.8A	68A	20*					
0.1 - 0.3	8.6A	209A	20*					
0.5 - 0.6	9.2A	530A	340*					
0.8 - 0.9	9.3A	931A	980*					
1.1 - 1.2	9.3A	1050A	1210*					

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 017 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Mamelon, photo 58-60
Date Desc.: 09/05/12 **Elevation:** 31 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7488817 AMG zone: 55 **Runoff:** Very slow
Easting/Lat.: 771931 Datum: GDA94 **Drainage:** Poorly drained

Geology

Exposure Type: Soil pit **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Soil pit, 1 m deep, <0.06mm mm, Fragmental,
 Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat **Relief:** 5 metres
Elem. Type: Terrace plain **Slope Category:** Level
Slope: 0.5 % **Aspect:** 30 degrees

Surface Soil Condition

Erosion: Partial, Minor scalding (scald) Partial, Minor (sheet)
 Partial, Moderate (rill) Partial, Moderate (gully) **Microrelief:** Melonhole gilgai Vert.(m) 1
 Horiz.(m) 10

Soil Classification

Australian Soil Classification: Vertic Mesonatric Grey Sodosol Medium Non-gravelly Clay-loamy
 Clayey Moderately deep **Mapping Unit:** Pv
Principal Profile Form: Dy2.33
Great Soil Group: Grey-brown
ASC Confidence: podzolic soil
 Analytical data are incomplete but reasonable confidence. **Land Class:** Land Class: C1

Site: Complete clearing. Pasture, native or improved, but never cultivated

Vegetation: Tall Strata - Tree, 3.01-6m, Isolated plants. *Species includes - Acacia harpophylla

Surface Coarse: No surface coarse fragments

Profile

1A11 0 - 0.1 m Very dark grey (10YR3/1-Moist); , 0-0% ; Clay loam; Strong grade of structure, 10-20 mm, Subangular blocky; Rough-ped fabric; Coarse, (10 - 20) mm crack; Common (1-5 per 0.01m2) Coarse (>5mm) macropores, Moist; Very firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; Field pH 8 (Raupach); Abundant, fine (1-2mm) roots; Gradual, Wavy change to -

1A12 0.1 - 0.3 m Very dark grey (10YR3/1-Moist); , 0-0% ; Clay loam; Strong grade of structure, 10-20 mm, Subangular blocky; Rough-ped fabric; Coarse, (10 - 20) mm crack; Common (1-5 per 0.01m2) Coarse (>5mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Field pH 7.5 (Raupach); Many, fine (1-2mm) roots; Clear, Wavy change to -

1B2kss 0.3 - 0.5 m Dark greyish brown (10YR4/2-Moist); , 0-0% ; Light medium clay; Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Medium, (5 - 10) mm crack; Few (<1 per 0.01m2) Medium (2-5mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Few (2 - 10 %), Manganiferous, Fine (0 - 2 mm), Concretions; Soil matrix is Slightly calcareous; Field pH 8.5 (Raupach); Few, fine (1-2mm) roots; Gradual, Wavy change to -

1B3kss 0.5 - 0.9 m Brown (10YR4/3-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Many (>5 per 100mm2) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Soil matrix is Slightly calcareous; Field pH 8.5 (Raupach); Few, fine (1-2mm) roots; Gradual, Wavy change to -

1C5s 0.9 - 1.5 m Brown (10YR4/3-Moist); , 0-0% ; Medium clay; Moderate grade of structure, 50-100 mm, Lenticular; Rough-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Moderately sticky; Few cutans, <10% of ped faces or walls coated, distinct; Field pH 9 (Raupach);

Morphological Notes

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 017 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Observation Notes

Detailed site, on the edge of the cracking clay unit, samples 36-40

Site Notes

cleared brigalow woodland, grey cracking clay, melonhole microrelief; REFERENCE SITE, samples 36-40

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 017 **Observation** 1
Agency Name: Horizon Soil Survey (NT)

Laboratory Test Results:

Depth	pH	1:5 EC	Exchangeable Cations		CEC	ESP	Cl
cm		Ca	Mg	K	Na		
		dS/m				%	mg/kg
0 - 0.1	7.8A	68A	20*				
0.1 - 0.3	8.6A	209A	20*				
0.5 - 0.6	9.2A	530A	340*				
0.8 - 0.9	9.3A	931A	980*				
1.1 - 1.2	9.3A	1050A	1210*				

2

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 018 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Mamelon, photo 61-63
Date Desc.: 09/05/12 **Elevation:** 35 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7489023 AMG zone: 55 **Runoff:** Slow
Easting/Lat.: 772503 Datum: GDA94 **Drainage:** Poorly drained

Geology

Exposure Type: Soil pit **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Soil pit, 1 m deep, <0.06mm mm, Fragmental,
 Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Undulating low hills 30-90m 3-10% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Lower-slope **Relief:** 31 metres
Elem. Type: Footslope **Slope Category:** Very gently sloped
Slope: 0.5 % **Aspect:** 200 degrees

Surface Soil Condition

Erosion: Partial, Minor scalding (scald) Stable, Minor (sheet) Firm
 Stable, Minor (rill) Stable, Moderate (gully) Active, Microrelief: Zero or no Vert.(m) Horiz.(m)
 Present (stbank) microrelief Horiz.(m)

Soil Classification

Australian Soil Classification: Vertic Mesonatric Grey Sodosol Medium Non-gravelly Clay-loamy
 Clayey Moderately deep **Mapping Unit:** Pv
Principal Profile Form: Dy2.43
Great Soil Group: Grey-brown
ASC Confidence: podzolic soil
 Analytical data are incomplete but reasonable confidence. **Land Class:** **Land Class:** C1

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation: Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Acacia harpophylla

Surface Coarse No surface coarse fragments

Profile

- 1A1 0 - 0.1 m Dark grey (10YR4/1-Moist); , 0-0% ; Loamy sand; Strong grade of structure, 10-20 mm, Subangular blocky; Rough-ped fabric; Coarse, (10 - 20) mm crack; Common (1-5 per 0.01m2) Medium (2-5mm) macropores, Moderately moist; Very firm consistence; Slightly plastic; Normal plasticity; Slightly sticky; Field pH 6 (Raupach); Abundant, fine (1-2mm) roots; Clear, Smooth change to -
- 1A2e 0.1 - 0.3 m Light grey (10YR7/1-Moist); , 0-0% ; Fine sandy loam; Single grain grade of structure; Earthy fabric; Coarse, (10 - 20) mm crack; Many (>5 per 100mm2) Medium (2-5mm) macropores, Moderately moist; Weak consistence; Slightly plastic; Normal plasticity; Slightly sticky; Common (10 - 20 %), Ferromanganiferous, Fine (0 - 2 mm), Concretions; Field pH 6.5 (Raupach); Many, fine (1-2mm) roots; Clear, Smooth change to -
- 1B21ss 0.3 - 0.5 m Dark grey (10YR4/1-Moist); , 0-0% ; Light medium clay; Moderate grade of structure, 10-20 mm, Prismatic; Rough-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Moderately sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 6 (Raupach); Few, fine (1-2mm) roots; Gradual, Smooth change to -
- 1B22ss 0.5 - 1 m Very dark grey (10YR3/1-Moist); , 0-0% ; Medium heavy clay; Massive grade of structure; Rough-ped fabric; Medium, (5 - 10) mm crack; Common (1-5 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Moderately sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 7.5 (Raupach); Few, fine (1-2mm) roots; Abrupt, Smooth change to -
- 2C 1 - 1.5 m Dark grey (10YR4/1-Moist); , 0-0% ; Medium clay; Single grain grade of structure; Earthy fabric; Coarse, (10 - 20) mm crack; Few (<1 per 0.01m2) Very fine (0.075-1mm) macropores, Moist; Weak consistence; Non-plastic; Non-sticky; Field pH 6 (Raupach);

Morphological Notes

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 018 **Observation ID:** 1

Agency Name: Horizon Soil Survey (NT)

1A2e bleached, rusty root mottles
1B22ss Clay substrate

Observation Notes

Detailed site, on the edge of the cracking clay unit, samples 41-45

Site Notes

cleared brigalow woodland, grey cracking clay, melonhole microrelief, REFERENCE SITE, samples 41-45

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY

Project Code: J000019 Site ID: 018 Observation 1

Agency Name: Horizon Soil Survey (NT)

Laboratory Test Results:

Depth	pH	1:5 EC	Exchangeable Cations		CEC	ESP	Cl
cm		Ca	Mg	K	Na	%	mg/kg
		dS/m			Cmol (+)/kg		
0 - 0.1	6.3A	53A	20*				
0.1 - 0.3	6.8A	27A	10*				
0.5 - 0.6	7.1A	167A	120*				
0.8 - 0.9	7.4A	397A	380*				
1.1 - 1.2	7.6A	23A	10*				

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 019 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth	Locality: Mamelon, photo 64-66
Date Desc.: 10/05/12	Elevation: 35 metres
Map Ref.: GPS S.A. Off	Rainfall: 756
Northing/Long.: 7489188 AMG zone: 55	Runoff: Very slow
Easting/Lat.: 773062 Datum: GDA94	Drainage: Very poorly drained

Geology

Exposure Type: Soil pit	Conf. Sub. is Parent. Mat.: Almost certain or certain
Geol. Ref.: Qpa	Substrate Material: Soil pit, 1 m deep, <0.06mm mm, Fragmental,
Bedded, Porous, , Alluvium	

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat	Relief: 5 metres
Elem. Type: Terrace plain	Slope Category: Level
Slope: 0 %	Aspect: 250 degrees

Surface Soil Condition Surface crust

Erosion: Stable, Minor scalding (scald) Stable, Minor (sheet)
Microrelief: Melonhole gilgai Vert.(m) 1 Horiz.(m) 10

Soil Classification

Australian Soil Classification: Endohypersodic Epipedal Grey Vertosol Non-gravelly Fine Medium fine Moderately deep	Mapping Unit: So
ASC Confidence: Analytical data are incomplete but reasonable confidence.	Principal Profile Form: Ug5.25
	Great Soil Group: Grey clay
	Land Class: Land Class: C1

Site: Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Acacia harpophylla

Surface Coarse No surface coarse fragments

Profile

1A11	0 - 0.1 m	Very dark grey (2.5Y3/1-Moist); , 0-0% ; Clay loam; Moderate grade of structure, 10-20 mm, Subangular blocky; Rough-ped fabric; Very coarse, (20 - 50) mm crack; Common (1-5 per 0.01m2) Medium (2-5mm) macropores, Moderately moist; Very firm consistence; Slightly plastic; Normal plasticity; Moderately sticky; Field pH 6.5 (Raupach); Many, fine (1-2mm) roots; Gradual, Wavy change to -
1A12	0.1 - 0.3 m	Very dark greyish brown (2.5Y3/2-Moist); , 0-0% ; Clay loam; Moderate grade of structure, 10-20 mm, Subangular blocky; Rough-ped fabric; Coarse, (10 - 20) mm crack; Common (1-5 per 0.01m2) Medium (2-5mm) macropores, Moderately moist; Very firm consistence; Slightly plastic; Normal plasticity; Moderately sticky; Field pH 7 (Raupach); Many, fine (1-2mm) roots; Gradual, Wavy change to -
1B1k	0.3 - 0.5 m	Dark greyish brown (2.5Y4/2-Moist); , 0-0% ; Light clay; Moderate grade of structure, 20-50 mm, Lenticular; Rough-ped fabric; Coarse, (10 - 20) mm crack; Few (<1 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; Few cutans, <10% of ped faces or walls coated, distinct; Soil matrix is Slightly calcareous; Field pH 8.5 (Raupach); Common, fine (1-2mm) roots; Gradual, Irregular change to -
1B3k	0.5 - 0.9 m	Dark greyish brown (2.5Y4/2-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 50-100 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Many (>5 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Soil matrix is Slightly calcareous; Field pH 8.5 (Raupach); Few, fine (1-2mm) roots; Gradual, Irregular change to -
1C	0.9 - 1.5 m	Dark greyish brown (2.5Y4/2-Moist); , 0-0% ; Medium clay; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm2) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; Field pH 9 (Raupach);

Morphological Notes

Observation Notes

Detailed site, samples 46-50

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 019 **Observation:** 1
Agency Name: Horizon Soil Survey (NT)

Laboratory Test Results:

Depth	pH	1:5 EC	Exchangeable Cations	CEC	ESP	Cl		
cm		Ca	Mg	K	Na	Cmol (+)/kg	%	mg/kg
	dS/m							
0 - 0.1	6.6A	41A	<10*					
0.1 - 0.3	8.3A	58A	10*					
0.5 - 0.6	9A	169A	80*					
0.8 - 0.9	9.2A	665A	630*					
1.1 - 1.2	9A	864A	1130*					

Depth	Organic C	Total N	Avail. P	Total K	Extr. S	Cu	Fe	Trace Elements	B
cm	%	mg/kg	mg/kg	mg/kg	mg/kg			Mn	Zn
								mg/kg	
0 - 0.1									
0.1 - 0.3									
0.5 - 0.6									
0.8 - 0.9									
1.1 - 1.2									

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 020 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Mamelon, photo 67-69
Date Desc.: 10/05/12 **Elevation:** 35 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7489402 AMG zone: 55 **Runoff:** Very slow
Easting/Lat.: 773575 Datum: GDA94 **Drainage:** Very poorly drained

Geology

Exposure Type: Soil pit **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Soil pit, 1 m deep, <0.06mm mm, Fragmental, Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat **Relief:** 5 metres
Elem. Type: Terrace plain **Slope Category:** Level
Slope: 0 % **Aspect:** 270 degrees

Surface Soil Condition Firm

Erosion: Stable, Minor (sheet) Stable, Minor (gully)

Soil Classification **Microrelief:** Normal gilgai Vert.(m) 0.2 Horiz.(m) 5

Australian Soil Classification: Endohypersodic Epipedal Grey Vertosol Non-gravelly Fine Medium **Mapping Unit:** So
 fine Moderately deep **Principal Profile Form:** Ug5.25
Great Soil Group: Grey clay

ASC Confidence: All necessary analytical data are available. **Land Class:** Land Class: C1

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation: Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Acacia harpophylla

Surface Coarse No surface coarse fragments

Profile

- 1A11 0 - 0.1 m Very dark grey (2.5Y3/1-Moist); Mottles, 7.5YR44, 10-20% , 0-5mm, Distinct; Clay loam; Strong grade of structure, 10-20 mm, Subangular blocky; Rough-ped fabric; Very coarse, (20 - 50) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moderately moist; Very firm consistence; Moderately plastic; Normal plasticity; Slightly sticky; Field pH 6.5 (Raupach); Many, fine (1-2mm) roots; Diffuse, Wavy change to -
- 1A12 0.1 - 0.3 m Dark grey (2.5Y4/1-Moist); , 0-0% ; Clay loam; Moderate grade of structure, 10-20 mm, Subangular blocky; Rough-ped fabric; Very coarse, (20 - 50) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moderately moist; Very firm consistence; Moderately plastic; Normal plasticity; Slightly sticky; Field pH 7 (Raupach); Many, fine (1-2mm) roots; Diffuse, Wavy change to -
- 1B2kss 0.3 - 0.5 m Dark greyish brown (2.5Y4/2-Moist); , 0-0% ; Light clay; Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Coarse, (10 - 20) mm crack; Few (<1 per 0.01m2) Very fine (0.075-1mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Moderately sticky; Soil matrix is Slightly calcareous; Field pH 8.5 (Raupach); Common, fine (1-2mm) roots; Diffuse, Irregular change to -
- 1B3ss 0.5 - 0.9 m Dark greyish brown (2.5Y4/2-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Coarse, (10 - 20) mm crack; Many (>5 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; Field pH 9 (Raupach); Common, fine (1-2mm) roots; Diffuse, Irregular change to -
- 1Css 0.9 - 1.5 m Dark greyish brown (2.5Y4/2-Moist); , 0-0% ; Medium clay; Massive grade of structure; Earthy fabric; Medium, (5 - 10) mm crack; Common (1-5 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; Field pH 9 (Raupach);

Morphological Notes

1A11 rusty root mottles

Observation Notes

Horizon Soil Survey & Evaluation

Appendix A

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
 Project Code: J000019 Site ID: 020 Observation 1
 Agency Name: Horizon Soil Survey (NT)

Laboratory Test Results:

Depth cm	pH	1:5 EC Ca dS/m	Exchangeable Mg	Cations K	Na	CEC Cmol (+)/kg	ESP %	Cl mg/kg
0 - 0.1	6.8A	45A	9.9*	2.9	0.4	<0.1	13.3*	20*
0.1 - 0.3	8.9A	59A	10*					
0.5 - 0.6	9.1A	203A	7.8*	9.1	0.1	3.6	20.6*	17.48
0.8 - 0.9	9.4A	916A	1040*					
1.1 - 1.2	9.1A	1200A	7.4*	8.4	0.2	3.9	19.8*	19.70

Depth cm	Organic C %	Total N mg/kg	Avail. P mg/kg	Total K mg/kg	Extr. S mg/kg	Cu	Fe	Trace Elements Mn Zn mg/kg		B
0 - 0.1	0.9D	2190E	48J	360	5*	2.29	194	82.3	1.76	<0.2
0.1 - 0.3										
0.5 - 0.6	450E	<2J	490	5*						
0.8 - 0.9										
1.1 - 1.2	290E	15J	<200	68*						

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 021 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Mamelon, photo 70-72
Date Desc.: 10/05/12 **Elevation:** 30 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7490298 AMG zone: 55 **Runoff:** Very slow
Easting/Lat.: 773672 Datum: GDA94 **Drainage:** Poorly drained

Geology

Exposure Type: Soil pit **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Soil pit, 1 m deep, <0.06mm mm, Fragmental,
 Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat **Relief:** 5 metres
Elem. Type: Swamp **Slope Category:** Level
Slope: 0 % **Aspect:** 300 degrees

Surface Soil Condition

Erosion: Stable, Moderate (sheet) Stable, Moderate (rill)
 Partial, Moderate (gully) **Microrelief:** Normal gilgai Vert.(m) 0.1 Horiz.(m) 3

Soil Classification

Australian Soil Classification: Vertic Mesonatric Grey Sodosol Medium Non-gravelly Clay-loamy
 Clayey Moderately deep **Mapping Unit:** Pv
Principal Profile Form: Dy2.33
Great Soil Group: Grey-brown
ASC Confidence: podzolic soil **Land Class:** **Land Class:** C1
 Analytical data are incomplete but reasonable confidence.

Site: Complete clearing. Pasture, native or improved, but never cultivated

Vegetation: Tall Strata - Tree, 6.01-12m, Closed or dense. *Species includes - Acacia harpophylla

Surface Coarse: No surface coarse fragments

Profile

1A11 0 - 0.1 m Very dark grey (2.5Y3/1-Moist); , 0-0% ; Clay loam; Strong grade of structure, 10-20 mm, Subangular blocky; Rough-ped fabric; Very coarse, (20 - 50) mm crack; Few (<1 per 0.01m2) Medium (2-5mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Moderately sticky; Field pH 6.5 (Raupach); Many, fine (1-2mm) roots; Diffuse, Wavy change to -

1A2 0.1 - 0.2 m Very dark grey (2.5Y3/1-Moist); , 0-0% ; Clay loam; Strong grade of structure, 10-20 mm, Subangular blocky; Rough-ped fabric; Very coarse, (20 - 50) mm crack; Few (<1 per 0.01m2) Medium (2-5mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Moderately sticky; Field pH 6.5 (Raupach); Many, fine (1-2mm) roots; Clear, Wavy change to -

1B2kss 0.2 - 0.3 m Dark grey (2.5Y4/1-Moist); , 0-0% ; Light medium clay; Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Medium, (5 - 10) mm crack; Few (<1 per 0.01m2) Medium (2-5mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; Soil matrix is Slightly calcareous; Field pH 8 (Raupach); Common, fine (1-2mm) roots; Diffuse, Irregular change to -

1B3kss 0.3 - 0.5 m Dark grey (2.5Y4/1-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Medium, (5 - 10) mm crack; Common (1-5 per 100mm2) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; Soil matrix is Slightly calcareous; Field pH 8 (Raupach); Common, very fine (0-1mm) roots; Diffuse, Irregular change to -

1D1ss 0.5 - 0.6 m Dark grey (2.5Y4/1-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 50-100 mm, Lenticular; Smooth-ped fabric; Medium, (5 - 10) mm crack; Common (1-5 per 100mm2) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Moderately sticky; Field pH 6.5 (Raupach); Common, very fine (0-1mm) roots; Diffuse, Irregular change to -

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 021 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

1D2 0.6 - 1.5 m Greyish brown (2.5Y5/2-Moist); Mottles, 2.5YR4/1, 10-20% , 5-15mm, Distinct; Medium heavy clay; Moderate grade of structure, 50-100 mm, Lenticular; Smooth-ped fabric; Medium, (5 - 10) mm crack; Common (1-5 per 100mm²) Fine (1-2mm) macropores, Moist; Firm consistence; Slightly plastic; Normal plasticity; Slightly sticky; Field pH 6.5 (Raupach); Common, very fine (0-1mm) roots;

Morphological Notes

Observation Notes

Detailed site, within modified So boundary based on K, Th radiometric mapping, samples 56-60

Site Notes

cleared brigalow woodland, grey cracking clay, melonhole microrelief, REFERENCE SITE, samples 56-60

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 021 **Observation** 1
Agency Name: Horizon Soil Survey (NT)

Laboratory Test Results:

Depth cm	pH	1:5 EC Exchangeable Cations			Na	CEC Cmol (+)/kg	ESP %	Cl mg/kg
		Ca µS/m	Mg	K				
0 - 0.1	6.6A	49A					20*	
0.1 - 0.3	8.8A	248A					90*	
0.5 - 0.6	7.8A	449A					490*	
0.8 - 0.9	5.7A	826A					1190*	
1.1 - 1.2	5.8A	881A1380*						

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 022 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth	Locality: photo 73-75
Date Desc.: 10/05/12	Elevation: 32 metres
Map Ref.: GPS S.A. Off	Rainfall: 756
Northing/Long.: 7490471 AMG zone: 55	Runoff: Very slow
Easting/Lat.: 774255 Datum: GDA94	Drainage: Poorly drained

Geology

Exposure Type: Soil pit	Conf. Sub. is Parent. Mat.: No Data
Geol. Ref.: Qpa	Substrate Material: Fragmental, Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3%	Pattern Type: Terraced land (alluvial)
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Morph. Type: Flat	Relief: 5 metres
Elem. Type: Terrace flat	Slope Category: Level
Slope: 0.5 %	Aspect: 100 degrees

Surface Soil Condition

Erosion:

Soil Classification

Microrelief:

Australian Soil Classification:

Vertic Mesonatric Grey Sodosol Medium Non-gravelly Clay-loamy
 Clayey Moderately deep

Mapping Unit:

Pv
 Principal Profile Form: Dy2.33
 Great Soil Group: Grey-brown

ASC Confidence: podzolic soil

All necessary analytical data are available.

Land Class:

Land Class: C2

Profile

1A1	0 - 0.1 m	Very dark grey (2.5Y3/1-Moist); Mottles, 7.5YR44, 10-20% , 0-5mm, Distinct; Fine sandy clay loam; Moist; Moderately plastic; Normal plasticity; Moderately sticky; Field pH 5.5 (Raupach); Clear, Smooth change to -
1A2e	0.1 - 0.2 m	Light grey (2.5Y7/1-Moist); ; Fine sandy clay loam; Moist; Moderately plastic; Normal plasticity; Moderately sticky; Field pH 7.5 (Raupach); Clear, Smooth change to -
1B21	0.2 - 0.5 m	Very dark greyish brown (2.5Y3/2-Moist); ; Light clay; Moist; Very plastic; Normal plasticity; Very sticky; Field pH 7.5 (Raupach); Abrupt, Smooth change to -
1B22	0.5 - 0.8 m	Dark greyish brown (2.5Y4/2-Moist); ; Medium heavy clay; Moist; Very plastic; Normal plasticity; Very sticky; Field pH 6.5 (Raupach); Clear, Smooth change to -
1C	0.8 - 1.5 m	Dark greyish brown (2.5Y4/3-Moist); Mottles, 2.5YR41, 10-20% , 5-15mm, Distinct; Medium heavy clay; Moist; Very plastic; Normal plasticity; Very sticky; Common (10 - 20 %), Manganiferous, Fine (0 - 2 mm), Concretions; Field pH 7 (Raupach); Clear, Smooth change to -

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Detailed site, samples 61-65

Site Notes

Mamelon, cleared woodland, brown cracking clay, melonhole microrelief, DETAILED SITE

Horizon Soil Survey & Evaluation

Appendix A

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
 Project Code: J000019 Site ID: 022 Observation 1
 Agency Name: Horizon Soil Survey (NT)

Laboratory Test Results:

Depth cm	pH	1:5 EC µS/m	Ca	Exchangeable Mg	Cations K	Na	CEC Cmol (+)/kg	ESP %	Cl mg/kg
0 - 0.1	7.4A	47A	6.5*	2.4	0.4	0.2	9.4*	2.13	20*
0.1 - 0.3	8.2A	146A							130*
0.5 - 0.6	7.8A	711A	3.4*	6.4	0.1	2.8	12.7*	22.05	940*
0.8 - 0.9	5.9A	1140A							1520*
1.1 - 1.2	7.1A	1140A	1.4*	6.3	0.2	3.7	11.5*	32.17	1680*

Depth cm	Organic C %	Total N mg/kg	Avail. P mg/kg	Total K mg/kg	Extr. S mg/kg	Cu	Fe	Trace Elements Mn Zn mg/kg		B
0 - 0.1	0.5D	1100E	89J	930	3*	2.4	128	78.6	1.55	<0.2
0.1 - 0.3										
0.5 - 0.6	600E	7J		<200	47*					
0.8 - 0.9										
1.1 - 1.2	380E	10J		<200	144*					

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 023 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Mamelon, photos 76-78
Date Desc.: 10/05/12 **Elevation:** 39 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7488800 AMG zone: 55 **Runoff:** Very slow
Easting/Lat.: 773572 Datum: GDA94 **Drainage:** Poorly drained

Geology

Exposure Type: Soil pit **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Soil pit, 1 m deep, Fragmental, Bedded, Porous,
, Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat **Relief:** 5 metres
Elem. Type: Terrace flat **Slope Category:** Level
Slope: 0.5 % **Aspect:** 280 degrees

Surface Soil Condition

Hardsetting

Erosion: Partial, Moderate scalding (scald) Partial, Moderate
(sheet) **Microrelief:** Melonhole gilgai **Vert.(m)** 1 **Horiz.(m)** 20

Soil Classification

Australian Soil Classification: Vertic Mesonatric Grey Sodosol Medium Non-gravelly Clay-loamy
Clayey Moderately deep **Mapping Unit:** Pv
Principal Profile Form: Dy2.33
Great Soil Group: Grey-brown
ASC Confidence: podzolic soil
Analytical data are incomplete but reasonable confidence. **Land Class:** **Land Class:** C1

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Acacia harpophylla

Surface Coarse No surface coarse fragments

Profile

- 1A1 0 - 0.1 m Very dark grey (2.5Y3/1-Moist); , 0-0% ; Clay loam; Moderate grade of structure, 2-5 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 0.01m²) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 6.5 (Raupach); Many, fine (1-2mm) roots; Clear, Smooth change to -
- 1A2 0.1 - 0.3 m Dark grey (2.5Y4/1-Moist); , 0-0% ; Clay loam; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Many (>5 per 100mm²) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Moderately sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 6.5 (Raupach); Common, fine (1-2mm) roots; Clear, Wavy change to -
- 1B21ss 0.3 - 0.5 m Dark greyish brown (2.5Y4/2-Moist); , 0-0% ; Light medium clay; Moderate grade of structure, 5-10 mm, Polyhedral; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm²) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 7.5 (Raupach); Common, fine (1-2mm) roots; Diffuse, Wavy change to -
- 1B22kss 0.5 - 0.7 m Dark greyish brown (10YR4/2-Moist); , 0-0% ; Heavy clay; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm²) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Very few (0 - 2 %), Calcareous, Medium (2 -6 mm), Nodules; Field pH 9 (Raupach); Few, fine (1-2mm) roots; Diffuse, Wavy change to -
- 1C1 0.7 - 0.9 m Dark yellowish brown (10YR4/4-Moist); , 0-0% ; Heavy clay; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm²) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Few (2 - 10 %), Calcareous, Medium (2 -6 mm), Nodules; Field pH 9 (Raupach); Diffuse, Wavy change to -
- 1C2 0.9 - 1.5 m Dark yellowish brown (10YR4/4-Moist); Mottles, 2.5YR4/1, 10-20% , 5-15mm, Distinct; Heavy clay;

Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm²) Very fine (0.075-1mm) macropores; Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common (10 - 20 %), Manganiferous, Fine (0 - 2 mm), Concretions; Field pH 8.5 (Raupach); Diffuse, Wavy change to -

Morphological Notes

Observation Notes

Detailed site, samples 66-70

Site Notes

Cleared woodland, melonhole microrelief, DETAILED SITE; Leptic Torreritic Natrustalf

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY

Project Code: J000019 Site ID: 023 Observation 1

Agency Name: Horizon Soil Survey (NT)

Laboratory Test Results:

Depth cm	pH	1:5 ECExchangeable Cations				CEC Cmol (+)/kg	ESP %	Cl mg/kg
		Ca dS/m	Mg	K	Na			
0 - 0.1	6.5A	61A	20*					
0.1 - 0.3	8.9A	238A	30*					
0.5 - 0.6	9.3A	580A	400*					
0.8 - 0.9	9.2A	1010A	1160*					
1.1 - 1.2	9.3A	1080A	1350*					

Horizon Soil Survey & Evaluation

Appendix A

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 024 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Mamelon, photos 79-81
Date Desc.: 10/05/12 **Elevation:** 34 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7488299 AMG zone: 55 **Runoff:** Very slow
Easting/Lat.: 773576 Datum: GDA94 **Drainage:** Poorly drained

Geology

Exposure Type: Soil pit **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Soil pit, 1 m deep, Fragmental, Bedded, Porous,
, Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat **Relief:** 5 metres
Elem. Type: Terrace flat **Slope Category:** Level
Slope: 0.5 % **Aspect:** 90 degrees

Surface Soil Condition Hardsetting

Erosion: Stable, Minor scalding (scald) Stable, Minor (sheet)
Microrelief: Melonhole gilgai Vert.(m) 0.5 Horiz.(m) 20

Soil Classification

Australian Soil Classification: **Mapping Unit:** Pv
Vertic Mesonatric Brown Sodosol Medium Non-gravelly Clay-loamy **Principal Profile Form:** Dy2.33
Clayey Moderately deep **Great Soil Group:** Grey-brown
ASC Confidence: podzolic soil
Analytical data are incomplete but reasonable confidence. **Land Class:** **Land Class:** C1

Site: Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Acacia harpophylla

Surface Coarse: No surface coarse fragments

Profile

1A1 0 - 0.1 m Very dark grey (2.5Y3/1-Moist); ; Clay loam; Moist; Moderately plastic; Normal plasticity; Moderately sticky; Field pH 6 (Raupach); Clear, Smooth change to -

1A2e 0.1 - 0.3 m Dark grey (2.5Y4/1-Moist); ; Clay loam; Moist; Very plastic; Normal plasticity; Moderately sticky; Field pH 6.5 (Raupach); Clear, Smooth change to -

1B21 0.3 - 0.5 m Dark greyish brown (2.5Y4/2-Moist); ; Light medium clay; Moist; Very plastic; Normal plasticity; Very sticky; Field pH 7.5 (Raupach); Diffuse, Wavy change to -

1B22 0.5 - 0.7 m Dark greyish brown (10YR4/2-Moist); ; Heavy clay; Moist; Very plastic; Normal plasticity; Very sticky; Field pH 8 (Raupach); Diffuse, Wavy change to -

1C1 0.7 - 0.9 m Dark yellowish brown (10YR4/4-Moist); ; Heavy clay; Moist; Very plastic; Normal plasticity; Very sticky; Field pH 8.5 (Raupach); Diffuse, Wavy change to -

1C2 0.9 - 1.5 m Dark yellowish brown (10YR4/4-Moist); ; Heavy clay; Moist; Very plastic; Normal plasticity; Very sticky; Common (10 - 20 %), Manganiferous, Fine (0 - 2 mm), Concretions; Field pH 8.5 (Raupach); Diffuse, Wavy change to -

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Detailed site, samples 71-75

Site Notes

cleared woodland, brown cracking clay, melonhole microrelief, DETAILED SITE

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 024 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 024 **Observation** 1
Agency Name: Horizon Soil Survey (NT)

Laboratory Test Results:

Depth	pH	1:5 EC	Exchangeable Cations		CEC	ESP	CI
cm		Ca	Mg	K	Na	%	mg/kg
		dS/m			Cmol (+)/kg		
0 - 0.1	6.7A	42A	20*				
0.1 - 0.3	8.4A	128A	80*				
0.5 - 0.6	8.6A	416A	480*				
0.8 - 0.9	9.2A	935A	1140*				
1.1 - 1.2	8.6A	911A	1260*				

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 025 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth
Date Desc.: 10/05/12
Map Ref.: GPS S.A. Off
Northing/Long.: 7487645 AMG zone: 55
Easting/Lat.: 773602 Datum: GDA94

Locality: Mamelon, photos 82-85
Elevation: 34 metres
Rainfall: 756
Runoff: Very slow
Drainage: Poorly drained

Geology

Exposure Type: Soil pit
Geol. Ref.: Qpa
 , Alluvium

Conf. Sub. is Parent. Mat.: Almost certain or certain
Substrate Material: Soil pit, 1 m deep, Fragmental, Bedded, Porous,

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3%
Pattern Type: Terraced land (alluvial)

Morph. Type: Flat
Elem. Type: Terrace flat
Slope: 0.5 %

Relief: 5 metres
Slope Category: Level
Aspect: 300 degrees

Surface Soil Condition

Hardsetting

Erosion: Partial, Minor scalding (scald) Partial, Minor (sheet)
Microrelief: Melonhole gilgai
 Vert.(m) 0.5 Horiz.(m) 20

Soil Classification

Australian Soil Classification: Vertic Mesonatric Grey Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep
Mapping Unit: Pv
Principal Profile Form: Dy2.43
Great Soil Group: Grey-brown

ASC Confidence: podzolic soil
 Analytical data are incomplete but reasonable confidence.

Land Class: **Land Class:** C2

Site: Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Eucalyptus crebra

Surface Coarse: 0-2%, medium gravelly, 6-20mm, subrounded, Conglomerate

Profile

- 1A1 0 - 0.1 m Black (2.5Y2/2-Moist); , 0-0% ; Fine sandy loam; Moderate grade of structure, 2-5 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 8.5 (Raupach); Many, fine (1-2mm) roots; Clear, Smooth change to -
- 1A2e 0.1 - 0.2 m Light grey (2.5Y7/1-Moist); Mottles, 10YR44, 2-10% , 0-5mm, Distinct; Fine sandy loam; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Few (<1 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Moderately sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common (10 - 20 %), Ferromanganiferous, Medium (2 -6 mm), Concretions; Field pH 8.5 (Raupach); Common, fine (1-2mm) roots; Clear, Smooth change to -
- 1B2ss 0.2 - 0.3 m Dark greyish brown (2.5Y4/2-Moist); Mottles, 10YR44, 2-10% , 5-15mm, Distinct; Medium heavy clay; Moderate grade of structure, 10-20 mm, Polyhedral; Moderate grade of structure, 10-20 mm, Lenticular; Medium, (5 - 10) mm crack; Common (1-5 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 7 (Raupach); Common, fine (1-2mm) roots; Abrupt, Wavy change to -
- 2B2kss 0.3 - 0.5 m Dark greyish brown (2.5Y4/3-Moist); , 0-0% ; Heavy clay; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Few (2 - 10 %), Calcareous, Medium (2 -6 mm), Nodules; Field pH 8.5 (Raupach); Few, fine (1-2mm) roots; Diffuse, Wavy change to -

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 025 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

2B3k 0.5 - 0.8 m Dark greyish brown (2.5Y4/4-Moist); , 0-0% ; Heavy clay; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Very fine (0.075-1mm)

macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Very few (0 - 2 %), Calcareous, Medium (2 -6 mm), Nodules; Field pH 8.5 (Raupach); Few, fine (1-2mm) roots; Diffuse, Wavy change to -

2C2 0.8 - 1.5 m Dark greyish brown (2.5Y4/4-Moist); , 0-0% ; Heavy clay; Moderate grade of structure, 10-20 mm, Lenticular; Rough-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm²) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Soil matrix is Slightly calcareous; Field pH 9 (Raupach); Diffuse, Wavy change to -

Morphological Notes

1A2e bleached, rusty root mottles
 2B2kss Buried soil horizon
 2B3k Buried soil horizon
 2C2 Buried soil horizon

Observation Notes

Detailed site, samples 76-80

Site Notes

cleared woodland, brown cracking clay, melonhole microrelief

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 Site ID: 025 Observation 1
Agency Name: Horizon Soil Survey (NT)

Laboratory Test Results:

Depth	pH	1:5 ECE	Exchangeable	Cations		CEC	ESP	CI
cm		Ca	Mg	K	Na	Cmol (+)/kg	%	mg/kg
	dS/m							
0 - 0.1	6.8A	94A	70*					
0.1 - 0.3	7.3A	91A	70*					
0.5 - 0.6	8.3A	813A	230*					
0.8 - 0.9	9.2A	813A	970*					
1.1 - 1.2	9.1A	905A	1120*					

2

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 026 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Mamelon, photos 86-88
Date Desc.: 10/05/12 **Elevation:** 31 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7487430 AMG zone: 55 **Runoff:** Very slow
Easting/Lat.: 773244 Datum: GDA94 **Drainage:** Poorly drained

Geology

Exposure Type: Soil pit **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Soil pit, 1 m deep, Fragmental, Bedded, Porous, Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat **Relief:** 5 metres
Elem. Type: Terrace flat **Slope Category:** Level
Slope: 0.5 % **Aspect:** 250 degrees

Surface Soil Condition

Hardsetting
Erosion: Partial, Minor scalding (scald) Partial, Minor (sheet)
Microrelief: Crabhole gilgai Vert.(m) 0.3 Horiz.(m) 10

Soil Classification

Australian Soil Classification: Vertic Mesonatric Grey Sodosol Medium Non-gravelly Clay-loamy
 Clayey Moderately deep
ASC Confidence: podzolic soil
 All necessary analytical data are available.
Mapping Unit: Pv
Principal Profile Form: Dy2.43
Great Soil Group: Grey-brown
Land Class: Land Class: C2

Site: Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 12.01-20m, Isolated plants. *Species includes - Eucalyptus crebra

Surface Coarse 0-2%, medium gravelly, 6-20mm, subrounded, Conglomerate

Profile

- 1A1 0 - 0.1 m Black (2.5Y4/2-Moist); , 0-0% ; Fine sandy loam; Moderate grade of structure, 2-5 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Many (>5 per 100mm²) Medium (2-5mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 6.5 (Raupach); Many, fine (1-2mm) roots; Clear, Smooth change to -
- 1A2e 0.1 - 0.2 m Light grey (2.5Y7/1-Moist); Mottles, 10YR44, 2-10% , 0-5mm, Distinct; Fine sandy loam; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Few (<1 per 0.01m²) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 6.5 (Raupach); Common, fine (1-2mm) roots; Clear, Smooth change to -
- 1B2ss 0.2 - 0.3 m Dark greyish brown (2.5Y4/2-Moist); Mottles, 10YR44, 2-10% , 5-15mm, Distinct; Medium heavy clay; Moderate grade of structure, 5-10 mm, Polyhedral; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm²) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Common cutans, 10-50% of ped faces or walls coated, distinct; Common (10 - 20 %), Manganiferous, Medium (2 -6 mm), Concretions; Field pH 7.5 (Raupach); Common, fine (1-2mm) roots; Diffuse, Wavy change to -
- 1B3ss 0.3 - 0.5 m Dark greyish brown (2.5Y4/3-Moist); , 0-0% ; Heavy clay; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm²) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 7.5 (Raupach); Few, fine (1-2mm) roots; Diffuse, Wavy change to -
- 1C1 0.5 - 0.8 m Dark greyish brown (2.5Y4/4-Moist); , 0-0% ; Heavy clay; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm²) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 8.5 (Raupach); Few, fine (1-2mm) roots; Diffuse, Wavy change to -

1C2 0.8 - 1.5 m Dark greyish brown (2.5Y4/4-Moist); Mottles, 2.5YR41, 10-20% , 5-15mm, Distinct; Heavy clay; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm²) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 8.5 (Raupach); Diffuse, Wavy change to -

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Detailed site, samples 81-85

Site Notes

cleared woodland, brown cracking clay, melonhole microrelief

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY

Project Code: J000019 Site ID: 026 Observation 1

Agency Name: Horizon Soil Survey (NT)

Laboratory Test Results:

Depth	pH	1:5 EC	Ca	Exchangeable Mg	Cations K	Na	CEC	ESP	Cl
cm		dS/m				Cmol (+)/kg		%	mg/kg
0 - 0.1	6.2A	31A	2.9*	2.2	0.4	<0.1	5.5*		20*
0.2 - 0.3	6.9A	47A							20*
0.5 - 0.6	8A	201A	3.1*	9.9	0.1	2.6	15.8*	16.46	170*
0.8 - 0.9	9.3A	567A							450*
1.1 - 1.2	9.5A	560A	23.1*	8.2	0.1	1.3	32.8*	3.96	

Depth	Organic C	Total N	Avail. P	Total K	Extr. S	Cu	Fe	Trace Elements		B
cm	%	mg/kg	mg/kg	mg/kg	mg/kg			Mn	Zn	
								mg/kg		
0 - 0.1	0.6D	1020E	10J	560	4*	1.08	206	80.1	1.19	<0.2
0.2 - 0.3										
0.5 - 0.6	440E	<2J	<200	6*						
0.8 - 0.9										
1.1 - 1.2	270E	16J	<200	9*						

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 027 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth
Date Desc.: 10/05/12
Map Ref.: GPS S.A. Off
Northing/Long.: 7486865 AMG zone: 55
Easting/Lat.: 773519 Datum: GDA94

Locality: Mamelon, photos 89-91
Elevation: 37 metres
Rainfall: 756
Runoff: Slow
Drainage: Imperfectly drained

Geology

Exposure Type: Soil pit
Geol. Ref.: Qpa
 , Alluvium

Conf. Sub. is Parent. Mat.: Almost certain or certain
Substrate Material: Soil pit, 1 m deep, Fragmental, Bedded, Porous,

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3%
Pattern Type: Terraced land (alluvial)

Morph. Type: Flat
Elem. Type: Terrace flat
Slope: 0.5 %

Relief: 5 metres
Slope Category: Level
Aspect: 10 degrees

Surface Soil Condition Hardsetting

Erosion: Stable, Minor scalding (scald) Stable, Minor (sheet)
Microrelief:

Soil Classification

Australian Soil Classification:
 Vertic Mesonatric Grey Sodosol Medium Non-gravelly Clay-loamy
 Clayey Moderately deep
ASC Confidence: podzolic soil
 Analytical data are incomplete but reasonable confidence.

Mapping Unit: Pv
Principal Profile Form: Dy2.43
Great Soil Group: Grey-brown

Land Class: **Land Class:** C2

Site

Vegetation:

Tall Strata - Tree, 12.01-20m, Isolated plants. *Species includes - Eucalyptus crebra

Surface Coarse 2-10%, medium gravelly, 6-20mm, subrounded, Conglomerate

Profile

- 1A1 0 - 0.1 m Dark grey (10YR4/1-Moist); , 0-0% ; Fine sandy loam; Moderate grade of structure, 2-5 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 5.5 (Raupach); Many, fine (1-2mm) roots; Clear, Smooth change to -
- 1A2e 0.1 - 0.3 m Light grey (10YR7/1-Moist); Mottles, 10YR44, 2-10% , 0-5mm, Distinct; Silty loam; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 6 (Raupach); Common, fine (1-2mm) roots; Clear, Wavy change to -
- 1B21ss 0.3 - 0.5 m Dark yellowish brown (10YR4/4-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 5-10 mm, Polyhedral; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Common cutans, 10-50% of ped faces or walls coated, distinct; Common (10 - 20 %), Manganiferous, Medium (2 -6 mm), Concretions; Field pH 6 (Raupach); Few, fine (1-2mm) roots; Diffuse, Wavy change to -
- 1B22ss 0.5 - 0.8 m Dark yellowish brown (10YR4/4-Moist); , 0-0% ; Medium clay; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated; Common (10 - 20 %), Manganiferous, Medium (2 -6 mm), Concretions; Field pH 7.5 (Raupach); Few, fine (1-2mm) roots; Diffuse, Wavy change to -
- 1C1 0.8 - 1.1 m Dark yellowish brown (10YR4/6-Moist); , 0-0% ; Medium clay; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated; Common (10 - 20 %), Manganiferous, Medium (2 -6 mm), Concretions; Field pH 8.5 (Raupach); Diffuse, Wavy change to -

1C2 1.1 - 1.5 m Dark yellowish brown (10YR4/6-Moist); , 0-0% ; Medium clay; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Common (10 - 20 %), Manganiferous, Medium (2 -6 mm), Concretions; Field pH 9 (Raupach); Diffuse, Wavy change to -

Morphological Notes

1A2e rusty root mottles

Observation Notes

Detailed site, samples 86-90

Site Notes

cleared woodland, brown cracking clay, crabhole microrelief

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY

Project Code: J000019 Site ID: 027 Observation 1

Agency Name: Horizon Soil Survey (NT)

Laboratory Test Results:

Depth	pH	1:5 EC	Exchangeable Cations			CEC	ESP	Cl
cm		Ca dS/m	Mg	K	Na	Cmol (+)/kg	%	mg/kg
0 - 0.1	6.4A	28A	2.5*	2.4	0.4	<0.1	10*	
0.2 - 0.3	6.6A	25A	<10*					
0.5 - 0.6	8A	122A	70*					
0.8 - 0.9	8.7A	285A	280*					
1.1 - 1.2	9.3A	727A	670*					

Depth	Organic C	Total N	Avail. P	Total K	Extr. S	Cu	Fe	Trace Elements		B
cm	%	mg/kg	mg/kg	mg/kg	mg/kg			Mn	Zn	
								mg/kg		
0 - 0.1	<0.5D	1060E	24J	<200	7*	1.34	177	136	<1	<0.2
0.2 - 0.3										
0.5 - 0.6										
0.8 - 0.9										
1.1 - 1.2										

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 028 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth
Date Desc.: 10/05/12
Map Ref.: GPS S.A. Off
Northing/Long.: 7486440 AMG zone: 55
Easting/Lat.: 773878 Datum: GDA94

Locality: Mamelon, photos 92-94
Elevation: 36 metres
Rainfall: 756
Runoff: Very slow
Drainage: Imperfectly drained

Geology

Exposure Type: Soil pit
Geol. Ref.: Qpa
 , Alluvium

Conf. Sub. is Parent. Mat.: Almost certain or certain
Substrate Material: Soil pit, 1 m deep, Fragmental, Bedded, Porous,

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3%
Pattern Type: Terraced land (alluvial)

Morph. Type: Flat
Elem. Type: Terrace flat
Slope: 0.5 %

Relief: 5 metres
Slope Category: Level
Aspect: 20 degrees

Surface Soil Condition

Hardsetting

Erosion: Stable, Minor scalding (scald) Stable, Moderate
 (sheet) **Microrelief:** Crabhole gilgai Vert.(m) 0.1 Horiz.(m) 5

Soil Classification

Australian Soil Classification: Vertic Subnatric Brown Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep
Mapping Unit: Pv
Principal Profile Form: Dy2.42
Great Soil Group: Grey-brown

ASC Confidence: podzolic soil
 All necessary analytical data are available.

Land Class: **Land Class:** C2

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Eucalyptus crebra

Surface Coarse 0-2%, medium gravelly, 6-20mm, subrounded, Conglomerate

Profile

- 1A1 0 - 0.1 m Very dark grey (7.5YR3/1-Moist); , 0-0% ; Fine sandy loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Many (>5 per 100mm²) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 6.5 (Raupach); Many, fine (1-2mm) roots; Clear, Smooth change to -
- 1A2e 0.1 - 0.4 m Pinkish grey (7.5YR4/6-Moist); Mottles, 7.5YR44, 10-20% , 0-5mm, Distinct; Fine sandy loam; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm²) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Moderately sticky; 0-2%, fine gravelly, 2-6mm, rounded, coarse fragments; Few (2 - 10 %), Ferromanganiferous, Fine (0 - 2 mm), Concretions; Field pH 6.5 (Raupach); Common, fine (1-2mm) roots; Clear, Wavy change to -
- 1B21ss 0.4 - 0.5 m Dark yellowish brown (10YR4/6-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 5-10 mm, Polyhedral; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm²) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 6.5 (Raupach); Few, fine (1-2mm) roots; Diffuse, Wavy change to -
- 1B22ss 0.5 - 0.7 m Dark yellowish brown (10YR4/6-Moist); , 0-0% ; Medium clay; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm²) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 6.5 (Raupach); Few, very fine (0-1mm) roots; Diffuse, Wavy change to -
- 1C1 0.7 - 0.9 m Dark yellowish brown (10YR4/6-Moist); , 0-0% ; Medium clay; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm²) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 6.5 (Raupach); Diffuse, Wavy change to -

1C2 0.9 - 1.5 m Strong brown (7.5YR4/6-Moist); , 0-0% ; Medium clay; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Few cutans, <10% of ped faces or walls coated, distinct; Field pH 6.5 (Raupach); Diffuse, Wavy change to -

Morphological Notes

1A2e bleached, rusty root mottles
 1B21ss permeability barrier in the top of the B Horizon

Observation Notes

Detailed site, samples 91-95

Site Notes

cleared woodland, brown cracking clay, crabhole microrelief

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 028 **Observation** 1
Agency Name: Horizon Soil Survey (NT)

Laboratory Test Results:

Depth cm	pH	1:5 EC dS/m	Exchangeable Ca	Cations Mg	K	CEC Na Cmol (+)/kg	ESP %	Cl mg/kg
0 - 0.1	6.3A	65A	3.6*	1.4	0.4	<0.1	5.4*	50*
0.2 - 0.3	6.4A	19A						<10*
0.5 - 0.6	6.6A	57A	2.8*	7.3	0.2	1.3	11.6*	11.21
0.8 - 0.9	7A	155A						140*
1.1 - 1.2	6.7A	513A	1.6*	4.4	0.1	1.9	4.6*	41.30

Depth cm	Organic C %	Total N mg/kg	Avail. P mg/kg	Total K mg/kg	Extr. S mg/kg	Cu	Fe	Trace Elements Mn Zn mg/kg		B
0 - 0.1	0.8D	1350E	20J	400	5*	<1	163	231	2.01	<0.2
0.2 - 0.3										
0.5 - 0.6		580E	4J	240	15*					
0.8 - 0.9										
1.1 - 1.2		380E	10J	<200	32*					

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 029 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Mamelon, photos 93-95
Date Desc.: 10/05/12 **Elevation:** 40 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7486004 AMG zone: 55 **Runoff:** Slow
Easting/Lat.: 774473 Datum: GDA94 **Drainage:** Poorly drained

Geology

Exposure Type: Soil pit **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Soil pit, 1 m deep, Fragmental, Bedded, Porous, Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat **Relief:** 5 metres
Elem. Type: Terrace plain **Slope Category:** Level
Slope: 0.5 % **Aspect:** 120 degrees

Surface Soil Condition Hardsetting

Erosion: Stable, Minor scalding (scald) Stable, Moderate (sheet) **Microrelief:** Crabhole gilgai **Vert.(m)** 0.2 **Horiz.(m)** 10

Soil Classification

Australian Soil Classification: Vertic Mesonatric Grey Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep
Mapping Unit: Pv
Principal Profile Form: Dy2.33
Great Soil Group: Grey-brown
ASC Confidence: podzolic soil
 All necessary analytical data are available. **Land Class:** **Land Class:** C2

Site: Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Eucalyptus crebra

Surface Coarse: No surface coarse fragments

Profile

1A1 0 - 0.1 m Dark grey (10YR4/1-Moist); , 0-0% ; Fine sandy loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 2- 10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 5.5 (Raupach); Many, fine (1-2mm) roots; Clear, Smooth change to -

1A2e 0.1 - 0.3 m Greyish brown (10YR7/2-Moist); Mottles, 10YR44, 2-10% , 0-5mm, Distinct; Clay loam, sandy; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Few (<1 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 6 (Raupach); Common, fine (1-2mm) roots; Clear, Wavy change to -

1B2ss 0.3 - 0.5 m Dark greyish brown (10YR4/2-Moist); , 0-0% ; Light medium clay; Moderate grade of structure, 10-20 mm, Polyhedral; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 7.5 (Raupach); Few, fine (1-2mm) roots; Diffuse, Wavy change to -

1B3kss 0.5 - 0.8 m Brown (10YR4/3-Moist); , 0-0% ; Light medium clay; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Very few (0 - 2 %), Calcareous, Medium (2 -6 mm), Nodules; Field pH 8.5 (Raupach); Few, fine (1-2mm) roots; Diffuse, Wavy change to -

1C1 0.8 - 1 m Brown (10YR4/3-Moist); , 0-0% ; Light medium clay; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of

ped faces or walls coated, distinct; Soil matrix is Slightly calcareous; Field pH 8.5 (Raupach); Diffuse,
Wavy change to -

1C2 1 - 1.5 m Dark yellowish brown (10YR4/7-Moist); , 0-0% ; Medium clay; Moderate grade of structure, 10-20
mm,

Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm2) Very fine (0.075-1mm)
macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 0-2%, medium
gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10- 50% of
ped faces or walls coated, distinct; Common (10 - 20 %), Manganiferous, Medium (2 -6 mm),
Concretions; Soil matrix is Slightly calcareous; Field pH 8.5 (Raupach); Diffuse, Wavy change to -

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Detailed site, samples 96-100

Site Notes

grey cracking clay, ironbark woodland, native grassland, crabhole microrelief

Laboratory Test Results:

Depth cm	pH	1:5 EC dS/m	Exchangeable Cations				CEC Cmol (+)/kg	ESP %	Cl mg/kg	
			Ca	Mg	K	Na				
0 - 0.1	6A	80A	2*	1.8	0.7	0.2	4.6*	4.35	70*	
0.2 - 0.3	6.5A	132A							70*	
0.5 - 0.6	8.4A	231A	5*	5	<0.1	3.6	16.8*	21.43	150*	
0.8 - 0.9	9.5A	663A							480*	
1.1 - 1.2	9A	928A		3.7*	5.6	0.1	2.5	12*	20.83	1120*

Depth cm	Organic C %	Total N mg/kg	Avail. P mg/kg	Total K mg/kg	Extr. S mg/kg	Trace Elements				
						Cu	Fe	Mn mg/kg	Zn mg/kg	B
0 - 0.1	0.6D	980E	21J	700	10*	<1	174	163	1.2	<0.2
0.2 - 0.3										
0.5 - 0.6	620E	2J		<200	28*					
0.8 - 0.9										
1.1 - 1.2	340E	<2J		<200	74*					

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 030 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth
Date Desc.: 10/05/12
Map Ref.: GPS S.A. Off
Northing/Long.: 7489035 AMG zone: 55
Easting/Lat.: 773535 Datum: GDA94

Locality: Mamelon, photos 96-100
Elevation: 32 metres
Rainfall: 756
Runoff: Moderately rapid
Drainage: Imperfectly drained

Geology

Exposure Type: Soil pit
Geol. Ref.: Qpa
 Porous, , Alluvium

Conf. Sub. is Parent. Mat.: Almost certain or certain
Substrate Material: Outcrop, 1 m deep, Fragmental, Bedded,

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3%
Pattern Type: Terraced land (alluvial)

Morph. Type: Simple-slope
Elem. Type: Terrace plain
Slope: 1 %

Relief: 5 metres
Slope Category: Very gently sloped
Aspect: 0 degrees

Surface Soil Condition

Hardsetting

Erosion: Active, Moderate scalding (scald) Active, Moderate (sheet) Active, Moderate (gully) Active, Present
Microrelief: Melonhole gilgai Vert.(m) 0.5
 Horiz.(m) 10
 (stbank) Vert.(m) Horiz.(m) 10

Soil Classification

Australian Soil Classification: Vertic Mesonatric Grey Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep
Mapping Unit: Pv
Principal Profile Form: Dy2.43
Great Soil Group: Grey-brown

ASC Confidence: podzolic soil
 No analytical data are available but confidence is fair.

Land Class: Land Class: C1

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation: Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Acacia harpophylla

Surface Coarse 2-10%, medium gravelly, 6-20mm, subrounded, Conglomerate

Profile

1A1 0 - 0.1 m Dark grey (10YR4/1-Moist); , 0-0% ; Clay loam; Moderate grade of structure, 2-5 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Many (>5 per 0.01m²) Fine (1-2mm) macropores, Moist; Moderately plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 5.5 (Raupach); Clear, Smooth change to -

1A3 0.1 - 0.3 m Greyish brown (10YR5/2-Moist); , 0-0% ; Clay loam; Moderate grade of structure, 5-10 mm, Angular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Many (>5 per 100mm²) Fine (1-2mm) macropores, Moist; Very plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 6 (Raupach); Diffuse, Wavy change to -

1B21 0.3 - 0.5 m Dark greyish brown (10YR4/2-Moist); , 0-0% ; Light medium clay; Moderate grade of structure, 5-10 mm, Angular blocky; Smooth-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm²) Fine (1-2mm) macropores, Moist; Very plastic; Normal plasticity; Very sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 7.5 (Raupach); Diffuse, Wavy change to -

1B22ss 0.5 - 0.7 m Brown (10YR4/3-Moist); , 0-0% ; Heavy clay; Moderate grade of structure, 5-10 mm, Angular blocky; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm²) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Few (2 - 10 %), Calcareous, Medium (2 -6 mm), Nodules; Field pH 8.5 (Raupach); Diffuse, Wavy change to -

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 030 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

1C1 0.7 - 0.9 m Brown (10YR4/3-Moist); , 0-0% ; Heavy clay; Moderate grade of structure, 5-10 mm,
Angular lumpy;

Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm²) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Few (2 - 10 %), Calcareous, Medium (2 -6 mm), Nodules; Field pH 9 (Raupach); Diffuse, Wavy change to -

1C2 0.9 - 1.5 m Dark yellowish brown (10YR4/7-Moist); , 0-0% ; Heavy clay; Moderate grade of structure, 5-10 mm, Angular blocky; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm²) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 9 (Raupach); Diffuse, Wavy change to -

Morphological Notes

Observation Notes

Check site, not sampled

Site Notes

cleared brigalow woodland, brown cracking clay, melonhole microrelief, CHECK SITE

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 031 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth	Locality: Brussels, photos 101-104
Date Desc.: 11/05/12	Elevation: 37 metres
Map Ref.: GPS S.A. Off	Rainfall: 756
Northing/Long.: 7485720 AMG zone: 55	Runoff: Slow
Easting/Lat.: 773623 Datum: GDA94	Drainage: Imperfectly drained

Geology

Exposure Type: Soil pit	Conf. Sub. is Parent. Mat.: Almost certain or certain
Geol. Ref.: Qpa	Substrate Material: Soil pit, 1 m deep, Fragmental, Bedded, Porous, Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat	Relief: 5 metres
Elem. Type: Terrace plain	Slope Category: Level
Slope: 0.5 %	Aspect: 10 degrees

Surface Soil Condition Hardsetting

Erosion: Stable, Minor scalding (scald) Stable, Minor (sheet) **Microrelief:** Crabhole gilgai Vert.(m) 0.2 Horiz.(m) 10

Soil Classification

Australian Soil Classification: Vertic Hypermatric Brown Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep	Mapping Unit: Pv
ASC Confidence: All necessary analytical data are available.	Principal Profile Form: Dy2.43
	Great Soil Group: Grey-brown podzolic soil
	Land Class: Land Class: C2

Site: Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Eucalyptus crebra
 2-10%, medium gravelly, 6-20mm, subrounded, Conglomerate

Surface Coarse

Profile

1A1 0 - 0.1 m	Grey (10YR5/1-Moist); , 0-0% ; Fine sandy clay loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 6 (Raupach); Many, fine (1-2mm) roots; Clear, Smooth change to -
1A2e 0.1 - 0.2 m	Very dark grey (10YR7/2-Moist); Mottles, 7.5YR44, 10-20% , 0-5mm, Distinct; Fine sandy loam; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Few (<1 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 6 (Raupach); Common, fine (1-2mm) roots; Clear, Smooth change to -
1B21ss 0.2 - 0.4 m	Brown (10YR4/3-Moist); , 0-0% ; Sandy light clay; Moderate grade of structure, 5-10 mm, Polyhedral; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 6 (Raupach); Common, fine (1-2mm) roots; Diffuse, Wavy change to -
1B22ss 0.4 - 0.6 m	Brown (7.5YR4/3-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 8 (Raupach); Few, fine (1-2mm) roots; Diffuse, Wavy change to -
1B3ss 0.6 - 0.9 m	Brown (7.5YR4/3-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 8 (Raupach); Few, fine (1-2mm) roots; Diffuse, Wavy change to -
1C2 1 - 1.5 m	Brown (7.5YR4/3-Moist); , 0-0% ; Medium clay; Moderate grade of structure, 10-20 mm, Lenticular;

Smooth-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm²) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Common (10 - 20 %), Ferromanganiferous, Medium (2 -6 mm), Concretions; Field pH 7 (Raupach); Diffuse, Wavy change to -

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Detailed site, ponded pasture site, samples 101-105

Site Notes

brown cracking clay, ironbark woodland, native grassland, crabhole microrelief

Laboratory Test Results:

Depth cm	pH	1:5 EC dS/m	Ca	Exchangeable Cations Mg	K	Na Cmol (+)/kg	CEC Cmol (+)/kg	ESP %	Cl mg/kg
0 - 0.1	5.6A	76A	2.3*	1.6	0.4	<0.1	4.3*		70*
0.2 - 0.3	6.6A	146A							110*
0.5 - 0.6	8.1A	810A	2.3*	5	<0.1	3.3	10.7*	30.84	1060*
0.8 - 0.9	8.4A	948A							1310*
1.1 - 1.2	8.3A	989A	2.4*	5.1	1	3.4	11*	30.91	1370*

Depth cm	Organic C %	Total N mg/kg	Avail. P mg/kg	Total K mg/kg	Extr. S mg/kg	Cu	Fe	Trace Elements Mn Zn mg/kg		B
0 - 0.1	1.2D	1680E	18J	280	6*	1.01	441	142	2.6	<0.2
0.2 - 0.3										
0.5 - 0.6		50E	<2J	<200	77*					
0.8 - 0.9										
1.1 - 1.2		470E	<2J	<200	72*					

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 032 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth
Date Desc.: 11/05/12
Map Ref.: GPS S.A. Off
Northing/Long.: 7486010 AMG zone: 55
Easting/Lat.: 772968 Datum: GDA94

Locality: Brussels, photos 105-107
Elevation: 41 metres
Rainfall: 756
Runoff: Slow
Drainage: Poorly drained

Geology

Exposure Type: Soil pit
Geol. Ref.: Qpa

Conf. Sub. is Parent. Mat.: Almost certain or certain
Substrate Material: Soil pit, 1 m deep, Fragmental, Bedded, Porous, Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat
Elem. Type: Terrace plain
Slope: 0.5 %

Relief: 5 metres
Slope Category: Level
Aspect: 10 degrees

Surface Soil Condition

Hardsetting, Cracking

Erosion: Partial, Moderate scalding (scald) Partial, Moderate (sheet) Partial, Moderate (gully) **Microrelief:** Crabhole gilgai Vert.(m) 0.2 Horiz.(m) 10

Soil Classification

Australian Soil Classification: Vertic Hypematrix Grey Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep
Mapping Unit: Pv
Principal Profile Form: Dy2.43
Great Soil Group: Grey-brown podzolic soil
ASC Confidence: Analytical data are incomplete but reasonable confidence. **Land Class:** C2

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Eucalyptus crebra
 2-10%, medium gravelly, 6-20mm, rounded, Ferricrete

Surface Coarse

Profile

1A1	0 - 0.1 m	Very dark grey (2.5Y3/1-Moist); , 0-0% ; Fine sandy clay loam; Moderate grade of structure, 10-20 mm, Subangular blocky; Rough-ped fabric; Medium, (5 - 10) mm crack; Many (>5 per 100mm ²) Medium (2-5mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 5.5 (Raupach); Many, fine (1-2mm) roots; Clear, Smooth change to -
1A2e	0.1 - 0.2 m	Light grey (2.5Y7/1-Moist); Mottles, 10YR44, 2-10% , 0-5mm, Distinct; Fine sandy loam; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm ²) Fine (1-2mm) macropores, Moist; Weak consistence; Very plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 7 (Raupach); Common, fine (1-2mm) roots; Clear, Smooth change to -
1B21ss	0.2 - 0.3 m	Dark greyish brown (2.5Y4/2-Moist); , 0-0% ; Sandy light clay; Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm ²) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Common (10 - 20 %), Manganiferous, Medium (2 -6 mm), Concretions; Field pH 7.5 (Raupach); Few, fine (1-2mm) roots; Diffuse, Wavy change to -
1B22ss	0.3 - 0.5 m	Greyish brown (2.5Y5/3-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm ²) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Few (2 - 10 %), Manganiferous, Medium (2 -6 mm), Concretions; Field pH 7.5 (Raupach); Few, fine (1-2mm) roots; Diffuse, Wavy change to -
1B3ss	0.5 - 0.8 m	Greyish brown (2.5Y5/3-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm ²) Medium (2-5mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Few (2 - 10 %), Manganiferous, Medium (2 -6 mm), Concretions; Field pH 8 (Raupach); Few, fine (1-2mm) roots; Diffuse, Wavy change to -
1C1	0.8 - 1.1 m	Greyish brown (2.5Y5/3-Moist); , 0-0% ; Medium clay; Moderate grade of structure, 20-50 mm,

Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm²) Medium (2-5mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Few cutans, <10% of ped faces or walls coated, distinct; Soil matrix is Slightly calcareous; Field pH 9 (Raupach); Diffuse, Wavy change to -

1C2 1.1 - 1.5 m Greyish brown (2.5Y5/3-Moist); , 0-0% ; Medium clay; Rough-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm²) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Few cutans, <10% of ped faces or walls coated, distinct; Soil matrix is Slightly calcareous; Field pH 9 (Raupach); Diffuse, Wavy change to -

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Detailed site, samples 106-110

Site Notes

grey cracking clay, cleared poplar box and melaleuca woodland, native grassland, crabhole microrelief

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 032 **Observation** 1
Agency Name: Horizon Soil Survey (NT)

Laboratory Test Results:

Depth	pH	1:5 EC	Exchangeable Cations			CEC	ESP	CI
cm		dS/m	Ca	Mg	K	Na	%	mg/kg
						Cmol (+)/kg		
0 - 0.1	6A	98A						100*
0.2 - 0.3	7.4A	136A						110*
0.5 - 0.6	8.2A	591A						690*
0.8 - 0.9	8.4A	890A						1160*
1.1 - 1.2	8.4A	958A						1280*

Depth	Organic C	Total N	Avail. P	Total K	Extr. S	Trace Elements				
cm	%	mg/kg	mg/kg	mg/kg	mg/kg	Cu	Fe	Mn	Zn	B
						mg/kg				
0 - 0.1										
0.2 - 0.3										
0.5 - 0.6										
0.8 - 0.9										
1.1 - 1.2										

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 033 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth
Date Desc.: 11/05/12
Map Ref.: GPS S.A. Off
Northing/Long.: 7486062 AMG zone: 55
Easting/Lat.: 772255 Datum: GDA94
Locality: Mamelon, photos 108-110
Elevation: 45 metres
Rainfall: 756
Runoff: Slow
Drainage: Imperfectly drained

Geology

Exposure Type: Soil pit
Geol. Ref.: Qpa
Conf. Sub. is Parent. Mat.: Almost certain or certain
Substrate Material: Soil pit, 1 m deep, Fragmental, Bedded, Porous, Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3%
Pattern Type: Terraced land (alluvial)

Morph. Type: Flat
Elem. Type: Terrace plain
Slope: 0.5 %
Relief: 5 metres
Slope Category: Level
Aspect: 10 degrees

Surface Soil Condition Surface crust

Erosion: Partial, Moderate scalding (scald) Partial, Moderate (sheet)
Microrelief: Crabhole gilgai Vert.(m) 0.1 Horiz.(m) 5

Soil Classification

Australian Soil Classification: Vertic Subnatric Grey Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep
Mapping Unit: Pv
Principal Profile Form: Dy2.33
Great Soil Group: Grey-brown podzolic soil
ASC Confidence: Analytical data are incomplete but reasonable confidence.
Land Class: Land Class: C2

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Eucalyptus crebra
 2-10%, cobbly, 60-200mm, rounded, Conglomerate

Surface Coarse

Profile

1A1 0 - 0.1 m Dusky red (2.5Y3/1-Moist); , 0-0% ; Fine sandy clay loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Medium, (5 - 10) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; Field pH 5.5 (Raupach); Many, fine (1-2mm) roots; Clear, Smooth change to -

1A2 0.1 - 0.3 m Weak red (2.5Y4/1-Moist); , 0-0% ; Fine sandy loam; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Few (<1 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Moderately sticky; Few (2 - 10 %), Ferromanganiferous, Coarse (6 - 20 mm), Concretions; Field pH 6.5 (Raupach); Common, fine (1-2mm) roots; Clear, Wavy change to -

1B1 0.3 - 0.5 m Weak red (2.5Y4/2-Moist); , 0-0% ; Fine sandy clay loam; Moderate grade of structure, 2-5 mm, Polyhedral; Rough-ped fabric; Fine, (0 - 5) mm crack; Many (>5 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Common (10 - 20 %), , , ; Field pH 7 (Raupach); Common, fine (1-2mm) roots; Diffuse, Wavy change to -

1B2ss 0.5 - 0.8 m Reddish brown (2.5Y4/4-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 5-10 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Common (10 - 20 %), Manganiferous, Medium (2 - 6 mm), Concretions; Soil matrix is Slightly calcareous; Field pH 8.5 (Raupach); Few, fine (1-2mm) roots; Diffuse, Wavy change to -

1C 0.8 - 1.5 m Reddish brown (2.5Y4/4-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Common (10 - 20 %), Manganiferous, Medium (2 - 6 mm), Concretions; Soil matrix is Slightly calcareous; Field pH 9 (Raupach); Few, fine (1-2mm) roots; Diffuse, Wavy change to -

Morphological Notes

Horizon Soil Survey & Evaluation

Appendix A

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 033 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Observation Notes

Detailed site, samples 111-115

Site Notes

brown cracking clay, cleared poplar box and melaleuca woodland, native grassland, crabhole microrelief, rounded river cobbles on surface

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 033 **Observation** 1
Agency Name: Horizon Soil Survey (NT)

Laboratory Test Results:

Depth cm	pH	1:5 EC dS/m	Exchangeable Cations				CEC Cmol (+)/kg	ESP %	Cl mg/kg
			Ca	Mg	K	Na			
0 - 0.1	7.2A	38A						20*	
0.2 - 0.3	7.2A	276A						310*	
0.5 - 0.6	8A	892A						1320*	
0.8 - 0.9	8.4A	1420A						2200*	
1.1 - 1.2	8.2A	1360A						2130*	

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 034 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth
Date Desc.: 11/05/12
Map Ref.: GPS S.A. Off
Northing/Long.: 7485719 AMG zone: 55
Easting/Lat.: 771491 Datum: GDA94
Locality: Mamelon, photos 111-113
Elevation: 57 metres
Rainfall: 756
Runoff: Moderately rapid
Drainage: Imperfectly drained

Geology

Exposure Type: Soil pit
Geol. Ref.: Qpa
Conf. Sub. is Parent. Mat.: Almost certain or certain
Substrate Material: Soil pit, 1 m deep, Fragmental, Bedded, Porous, Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3%
Pattern Type: Terraced land (alluvial)

Morph. Type: Crest
Elem. Type: Terrace plain
Slope: 1 %
Relief: 5 metres
Slope Category: Very gently sloped
Aspect: 60 degrees

Surface Soil Condition

Erosion: Stable, Minor scalding (scald) Stable, Minor (sheet)
 No gully erosion (gully) **Microrelief:** Crabhole gilgai Vert.(m) 0.1 Horiz.(m) 5

Soil Classification

Australian Soil Classification: Vertic Mesonatric Brown Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep
Mapping Unit: Pv
Principal Profile Form: Dy2.43
Great Soil Group: Grey-brown podzolic soil
ASC Confidence: Analytical data are incomplete but reasonable confidence.
Land Class: Land Class: C2

Site: Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 12.01-20m, Isolated plants. *Species includes - Eucalyptus crebra
 0-2%, medium gravelly, 6-20mm, rounded, Ferricrete

Surface Coarse

Profile

1A11	0 - 0.1 m	Dark grey (10YR4/1-Moist); , 0-0% ; Fine sandy clay loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Medium, (5 - 10) mm crack; Many (>5 per 100mm ²) Medium (2-5mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; Field pH 6 (Raupach); Many, fine (1-2mm) roots; Clear, Smooth change to -
1A2e	0.1 - 0.3 m	Light grey (10YR7/2-Moist); Mottles, 7.5YR4/4, 10-20% , 0-5mm, Distinct; Fine sandy loam; Massive grade of structure; Earthy fabric; Medium, (5 - 10) mm crack; Common (1-5 per 100mm ²) Fine (1-2mm) macropores, Moist; Weak consistence; Very plastic; Normal plasticity; Moderately sticky; Common (10 - 20 %), Ferromanganiferous, Coarse (6 - 20 mm), Concretions; Field pH 6 (Raupach); Common, fine (1-2mm) roots; Clear, Smooth change to -
1B2ss	0.3 - 0.5 m	Brown (10YR4/3-Moist); Mottles, 10YR4/1, 0-2% , 5-15mm, Faint; Fine sandy clay loam; Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm ²) Very fine (0.075-1mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Common (10 - 20 %), Manganiferous, Coarse (6 - 20 mm), Concretions; Field pH 7.5 (Raupach); Few, fine (1-2mm) roots; Diffuse, Wavy change to -
1B3ss	0.5 - 0.8 m	Dark greyish brown (10YR4/2-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm ²) Very fine (0.075-1mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Common (10 - 20 %), Manganiferous, Coarse (6 - 20 mm), Concretions; Field pH 8.5 (Raupach); Few, fine (1-2mm) roots; Diffuse, Wavy change to -
1C1	0.8 - 1.1 m	Brown (10YR4/3-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Medium, (5 - 10) mm crack; Common (1-5 per 100mm ²) Very fine (0.075-1mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Many (20 - 50 %), Manganiferous, Coarse (6 - 20 mm), Concretions; Field pH 8.5 (Raupach); Diffuse, Wavy change to -
1C2	1.1 - 1.5 m	Brown (10YR4/3-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm ²) Very fine (0.075-1mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped

faces or walls coated, distinct; Field pH 8.5 (Raupach); Diffuse, Wavy change to -

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Detailed site, samples 116-120

Site Notes

brown cracking clay, ironbark woodland, native grassland, crabhole microrelief

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY

Project Code: J000019 Site ID: 034 Observation 1

Agency Name: Horizon Soil Survey (NT)

Laboratory Test Results:

Depth cm	pH	1:5 EC dS/m	Exchangeable Cations				CEC Cmol (+)/kg	ESP %	Cl mg/kg
			Ca	Mg	K	Na			
0 - 0.1	5.9A	35A						20*	
0.2 - 0.3	6.4A	19A						<10*	
0.5 - 0.6	8A	133A						80*	
0.8 - 0.9	8.7A	347A						330*	
1.1 - 1.2	8.6A	1360A						1710*	

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 035 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth
Date Desc.: 11/05/12
Map Ref.: GPS S.A. Off
Northing/Long.: 7486119 AMG zone: 55
Easting/Lat.: 771215 Datum: GDA94

Locality: Mamelon, photos 114-116
Elevation: 56 metres
Rainfall: 756
Runoff: Slow
Drainage: Imperfectly drained

Geology

Exposure Type: Soil pit
Geol. Ref.: Kx

Conf. Sub. is Parent. Mat.: Almost certain or certain
Substrate Material: Soil pit, 1 m deep, Fragmental, Bedded, Porous, Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Crest
Elem. Type: Terrace plain
Slope: 0.5 %

Relief: 5 metres
Slope Category: Level
Aspect: 80 degrees

Surface Soil Condition

Hardsetting, Hardsetting

Erosion: Stable, Minor scalding (scald) Stable, Minor (sheet)
Microrelief: Crabhole gilgai Vert.(m) 0.1 Horiz.(m) 10

Soil Classification

Australian Soil Classification: Vertic Mesonatric Brown Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep
Mapping Unit: Pv
Principal Profile Form: Dy2.43
Great Soil Group: Grey-brown podzolic soil
ASC Confidence: All necessary analytical data are available.
Land Class: C2

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 12.01-20m, Isolated plants. *Species includes - Eucalyptus crebra
 0-2%, coarse gravelly, 20-60mm, subrounded, Basalt

Surface Coarse

Profile

1A1	0 - 0.1 m	Dark grey (10YR4/1-Moist); , 0-0% ; Fine sandy loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Medium, (5 - 10) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 6 (Raupach); Abundant, fine (1-2mm) roots; Clear, Smooth change to -
1A2	0.1 - 0.3 m	Dark grey (10YR4/1-Moist); Mottles, 10YR44, 2-10% , 5-15mm, Distinct; Fine sandy loam; Weak grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Medium, (5 - 10) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Moderately sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Few (2 - 10 %), Ferromanganiferous, Coarse (6 - 20 mm), Concretions; Field pH 6 (Raupach); Many, fine (1-2mm) roots; Diffuse, Wavy change to -
1A2e	0.3 - 0.4 m	Light grey (10YR7/2-Moist); ; Sandy light clay; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Few (<1 per 0.01m2) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Few (2 - 10 %), Manganiferous, Coarse (6 - 20 mm), Concretions; Field pH 6.5 (Raupach); Many, fine (1-2mm) roots; Clear, Wavy change to -
1B2ss	0.4 - 0.6 m	Yellowish brown (10YR5/4-Moist); ; Medium heavy clay; Moderate grade of structure, 5-10 mm, Polyhedral; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Common cutans, 10-50% of ped faces or walls coated, distinct; Few (2 - 10 %), Manganiferous, Coarse (6 - 20 mm), Concretions; Field pH 6.5 (Raupach); Common, fine (1-2mm) roots; Diffuse, Wavy change to -
1B3ss	0.6 - 0.8 m	Yellowish brown (10YR5/6-Moist); ; Medium heavy clay; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Few (2 - 10 %), Manganiferous, Coarse (6 - 20 mm), Concretions; Field pH 7.5 (Raupach); Common, fine (1-2mm) roots; Diffuse, Wavy change to -
1C1	0.8 - 1.1 m	Yellowish brown (10YR5/6-Moist); Mottles, 2.5YR41, 10-20% , 5-15mm, Distinct; Light medium clay;

Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm²) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Few (2 - 10 %), Manganiferous, Coarse (6 - 20 mm), Concretions; Field pH 9 (Raupach); Diffuse, Wavy change to -

1C2 1.1 - 1.5 m Yellowish brown (10YR5/6-Moist); ; Light medium clay; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm²) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Few (2 - 10 %), Manganiferous, Coarse (6 - 20 mm), Concretions; Field pH 9 (Raupach); Diffuse, Wavy change to -

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Detailed site, samples 120-125

Site Notes

brown cracking clay, tall ironbark woodland, native grassland, crabhole microrelief

Laboratory Test Results:

Depth cm	pH	1:5 EC dS/m	Ca	Exchangeable Mg	Cations K	Na	CEC Cmol (+)/kg	ESP %	Cl mg/kg
0 - 0.1	5.8A	22A	0.9*	1.1	0.1	<0.1	2.1*		<10*
0.2 - 0.3	6.7A	19A							<10*
0.5 - 0.6	7.1A	48A	0.3*	7.6	<0.1	1.5	9.4*	15.96	20*
0.8 - 0.9	8.2A	187A							120*
1.1 - 1.2	9.3A	454A	1.4*	5.2	<0.1	1.6	8.3*	19.28	360*

Depth cm	Organic C %	Total N mg/kg	Avail. P mg/kg	Total K mg/kg	Extr. S mg/kg	Cu	Fe	Trace Elements Mn Zn mg/kg	B
0 - 0.1	<0.5D	530E	<2J	<200	8*	<1	112	145	<1
0.2 - 0.3									
0.5 - 0.6		240E	<2J	<200	13*				
0.8 - 0.9									
1.1 - 1.2		90E	<2J	<200	10*				

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 036 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth	Locality: crabhole microrelief, ; Brussels, photos 117-119
Date Desc.: 11/05/12	Elevation: 43 metres
Map Ref.: GPS S.A. Off	Rainfall: 756
Northing/Long.: 7484450 AMG zone: 55	Runoff: Slow
Easting/Lat.: 776355 Datum: GDA94	Drainage: Poorly drained

Geology

Exposure Type: Soil pit	Conf. Sub. is Parent. Mat.: Almost certain or certain
Geol. Ref.: Qpa	Substrate Material: Soil pit, 1 m deep, Fragmental, Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat	Relief: 5 metres
Elem. Type: Terrace plain	Slope Category: Level
Slope: 0.5 %	Aspect: 80 degrees

Surface Soil Condition Surface crust, Hardsetting

Erosion: Active, Moderate scalding (scald) Active, Moderate (sheet) Active, Moderate (gully) Active, Present	Microrelief: Crabhole gilgai Vert.(m) 0.1
Horiz.(m) 5	Vert.(m) Horiz.(m) 5
(stbank)	

Soil Classification

Australian Soil Classification: Vertic Hypemetric Brown Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep	Mapping Unit: Pv
ASC Confidence: All necessary analytical data are available.	Principal Profile Form: Dy2.43
	Great Soil Group: Grey-brown podzolic soil
	Land Class: Land Class: C2

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation: Tall Strata - Tree, 3.01-6m, Very sparse. *Species includes - Melaleuca viridiflora

Surface Coarse 10-20%, , rounded, Ferricrete

Profile

1A1	0 - 0.1 m	Very dark grey (10YR3/1-Moist); , 0-0% ; Fine sandy loam; Moderate grade of structure, 10-20 mm, Subangular blocky; Earthy fabric; Medium, (5 - 10) mm crack; Many (>5 per 100mm2) Medium (2-5mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, rounded, dispersed, Ferricrete, coarse fragments; Field pH 6.5 (Raupach); Common, fine (1-2mm) roots; Clear, Smooth change to -
1A2	0.1 - 0.2 m	Dark grey (10YR4/1-Moist); , 0-0% ; Fine sandy loam; Moderate grade of structure, 10-20 mm, Subangular blocky; Smooth-ped fabric; Medium, (5 - 10) mm crack; Common (1-5 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, rounded, Ferricrete, coarse fragments; Field pH 6.5 (Raupach); Few, fine (1-2mm) roots; Diffuse, Wavy change to -
1B1	0.2 - 0.5 m	Dark grey (10YR4/1-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Few cutans, <10% of ped faces or walls coated, distinct; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 8 (Raupach); Few, fine (1-2mm) roots; Diffuse, Wavy change to -
1B2ss	0.5 - 0.8 m	Dark greyish brown (10YR4/2-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Strong consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Very few (0 - 2 %), Manganiferous, Medium (2 -6 mm), Concretions; Field pH 9 (Raupach); Diffuse, Wavy change to -
1B3ss	0.8 - 1.1 m	Dark greyish brown (10YR4/2-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Strong consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Few (2 - 10 %), Manganiferous, Medium (2 -6 mm), Concretions; Field pH 9 (Raupach); Diffuse, Wavy change to -
1C1	1.1 - 1.5 m	Dark greyish brown (10YR4/2-Moist); Mottles, 10YR44, 10-20% , 5-15mm, Distinct; Light medium clay; Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1

per 100mm²) Fine (1-2mm) macropores, Moist; Strong consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Few (2 - 10 %), Manganiferous, Medium (2 -6 mm), Concretions; Field pH 9 (Raupach); Diffuse, Wavy change to -

Morphological Notes

1A1 eroded surface

Observation Notes

Detailed site, samples 126-130

Site Notes

brown cracking clay, cleared poplar box and melaleuca woodland, native grassland, eroded surface

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY

Project Code: J000019 Site ID: 036 Observation 1

Agency Name: Horizon Soil Survey (NT)

Laboratory Test Results:

Depth cm	pH	1:5 EC dS/m	Ca	Exchangeable Mg	Cations K	Na	CEC Cmol (+)/kg	ESP %	Cl mg/kg
0 - 0.1	7A	78A	2.7*	2.2	<0.1	0.5	5.6*	8.93	60*
0.2 - 0.3	8.1A	689A							860*
0.5 - 0.6	8.6A	886A	3.4*	7.3	<0.1	4.9	15.7*	31.21	1130*
0.8 - 0.9	8.6A	662A							860*
1.1 - 1.2	8.4A	682A	1.4*	3.4	<0.1	2.4	7.3*	32.88	890*

Depth cm	Organic C %	Total N mg/kg	Avail. P mg/kg	Total K mg/kg	Extr. S mg/kg	Cu	Fe	Trace Elements Mn Zn mg/kg		B
0 - 0.1	0.5D	730E	<2J	<200	3*	<1	14	65.8	<1	<0.2
0.2 - 0.3										
0.5 - 0.6		390E	<2J	<200	47*					
0.8 - 0.9										
1.1 - 1.2		220E	<2J	<200	18*					

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 037 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth	Locality: crabhole microrelief; Brussels, photos 120-123
Date Desc.: 11/05/12	Elevation: 40 metres
Map Ref.: GPS S.A. Off	Rainfall: 756
Northing/Long.: 7484468 AMG zone: 55	Runoff: Moderately rapid
Easting/Lat.: 776228 Datum: GDA94	Drainage: Imperfectly drained

Geology

Exposure Type: Existing vertical exposure	Conf. Sub. is Parent. Mat.: Almost certain or certain
Geol. Ref.: Qpa	Substrate Material: Existing vertical exposure, 1 m deep, Fragmental, Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat	Relief: 5 metres
Elem. Type: Terrace plain	Slope Category: Level
Slope: 0.5 %	Aspect: 200 degrees

Surface Soil Condition Hardsetting

Erosion: Active, Moderate scalding (scald) Active, Severe
(sheet) Active, Severe (gully) **Microrelief:** Crabhole gilgai Vert.(m) 0.1 Horiz.(m) 5

Soil Classification

Australian Soil Classification: Vertic Hypematrix Brown Sodosol Medium Gravelly Loamy Clayey Moderately deep	Mapping Unit: Pv Principal Profile Form: Dy2.43 Great Soil Group: Grey-brown podzolic soil
ASC Confidence: No analytical data are available but confidence is fair.	Land Class: Land Class: C2

Site: Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 6.01-12m, Sparse. *Species includes - Melaleuca viridiflora

Surface Coarse

subangular, Quartz 2-10%, medium gravelly, 6-20mm, subangular, Ferricrete; 2-10%, medium gravelly, 6-20mm,

Profile

1A1	0 - 0.1 m	Very dark grey (10YR3/1-Moist); , 0-0% ; Fine sandy loam; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; crack; Common (1-5 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, rounded, dispersed, Ferricrete, coarse fragments; Few (2 - 10 %), Ferruginous, Medium (2 -6 mm), Nodules; Field pH 6.5 (Raupach); Common, fine (1-2mm) roots; Clear, Smooth change to -
1A2	0.1 - 0.2 m	Dark grey (10YR4/1-Moist); , 0-0% ; Medium heavy clay; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, subangular, dispersed, Quartz, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Few (2 - 10 %), Ferruginous, Medium (2 -6 mm), Nodules; Field pH 6.5 (Raupach); Few, fine (1-2mm) roots; Diffuse, Wavy change to -
1B1	0.2 - 0.5 m	Dark grey (10YR4/1-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Common (10 - 20 %), Calcareous, Medium (2 -6 mm), Nodules; Field pH 8 (Raupach); Few, fine (1-2mm) roots; Diffuse, Wavy change to -
1B2	0.5 - 0.8 m	Dark greyish brown (10YR4/2-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Common (10 - 20 %), Calcareous, Coarse (6 - 20 mm), Nodules; Field pH 9 (Raupach); Diffuse, Wavy change to -
1B3	0.8 - 1.1 m	Dark greyish brown (10YR4/2-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Few (2 - 10 %), Calcareous, Medium (2 -6 mm), Nodules; Field pH 9 (Raupach); Diffuse, Wavy change to -

1C1 1.1 - 1.5 m Dark greyish brown (10YR4/2-Moist); , 0-0% ; Light medium clay; Moderate grade of structure, 50-100 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm²) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Field pH 9 (Raupach); Diffuse, Wavy change to -

Morphological Notes

1A1 eroded surface

Observation Notes

Check site, not sampled, gully wall

Site Notes

brown cracking clay, cleared poplar box and melaleuca woodland, native grassland, eroded surface, CHECK SITE

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 038 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Brussels, photos 124-126; crabhole microrelief
Date Desc.: 11/05/12 **Elevation:** 37 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7485014 AMG zone: 55 **Runoff:** Very slow
Easting/Lat.: 776359 Datum: GDA94 **Drainage:** Poorly drained

Geology

Exposure Type: Soil pit **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Pb **Substrate Material:** Soil pit, 1 m deep, Fragmental, Bedded, Porous, Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat **Relief:** 5 metres
Elem. Type: Swamp **Slope Category:** Level
Slope: 0.5 % **Aspect:** 100 degrees

Surface Soil Condition Hardsetting, Cracking

Erosion: Partial, Moderate scalding (scald) Partial, Moderate (sheet) No gully erosion (gully) **Microrelief:** Crabhole gilgai Vert.(m) 0.2 Horiz.(m) 3

Soil Classification

Australian Soil Classification: Vertic Subnatric Grey Sodosol Medium Non-gravelly Clay-loamy
Mapping Unit: Pv
Principal Profile Form: Dy2.42
Great Soil Group: Grey-brown podzolic soil
ASC Confidence: Analytical data are incomplete but reasonable confidence. **Land Class:** C2

Site: Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Eucalyptus platyphylla, Melaleuca viridiflora

Surface Coarse

No surface coarse fragments

Profile

1A2e	0 - 0.1 m	Grey (2.5Y6/1-Moist); , 0-0% ; Fine sandy loam; Massive grade of structure; Earthy fabric; Medium, (5 - 10) mm crack; Many (>5 per 100mm ²) Fine (1-2mm) macropores, Moist; Very firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; Field pH 5 (Raupach); Common, fine (1-2mm) roots; Clear, Smooth change to -
1B21	0.1 - 0.3 m	Dark grey (2.5Y4/1-Moist); , 0-0% ; Heavy clay; Moderate grade of structure, 5-10 mm, Subangular blocky; Smooth-ped fabric; Medium, (5 - 10) mm crack; Common (1-5 per 100mm ²) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Moderately sticky; Few cutans, <10% of ped faces or walls coated, distinct; Very few (0 - 2 %), Ferromanganiferous, Medium (2 -6 mm), Concretions; Field pH 6 (Raupach); Few, fine (1-2mm) roots; Diffuse, Wavy change to -
1B22ss	0.3 - 0.5 m	Dark grey (2.5Y4/1-Moist); , 0-0% ; Heavy clay; Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm ²) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Few (2 - 10 %), Ferromanganiferous, Medium (2 -6 mm), Concretions; Field pH 6 (Raupach); Few, fine (1-2mm) roots; Diffuse, Wavy change to -
1B33ss	0.5 - 0.8 m	Dark grey (2.5Y4/1-Moist); , 0-0% ; Heavy clay; Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm ²) Very fine (0.075-1mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 6 (Raupach); Few, fine (1-2mm) roots; Diffuse, Wavy change to -
1C1	0.8 - 1.1 m	Dark grey (2.5Y4/1-Moist); , 0-0% ; Heavy clay; Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm ²) Very fine (0.075-1mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 5.5 (Raupach); Common, fine (1-2mm) roots; Diffuse, Wavy change to -
1C1	1.1 - 1.5 m	Dark grey (2.5Y4/1-Moist); , 0-0% ; Heavy clay; Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm ²) Very fine (0.075-1mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; Field pH 5 (Raupach); Diffuse, Wavy

change to -

Morphological Notes

1A2e bleached, rusty root mottles
1B21 gleyed

Observation Notes

Detailed site, samples 131-135

Site Notes

brown cracking clay, cleared poplar box and melaleuca woodland, native grassland

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY

Project Code: J000019 Site ID: 038 Observation 1

Agency Name: Horizon Soil Survey (NT)

Laboratory Test Results:

Depth	pH	1:5 EC	Exchangeable Cations				CEC	ESP	Cl
cm		dS/m	Ca	Mg	K	Na	Cmol (+)/kg	%	mg/kg
0 - 0.1	6.1A	81A							60*
0.2 - 0.3	6.2A	291A							320*
0.5 - 0.6	6.6A	750A							1060*
0.8 - 0.9	5.8A	947A							1400*
1.1 - 1.2	5.6A	901A							1280*

Depth	Organic C	Total N	Avail. P	Total K	Extr. S	Cu	Fe	Trace Elements		
cm	%	mg/kg	mg/kg	mg/kg	mg/kg			Mn	Zn	B
								mg/kg		
0 - 0.1										
0.2 - 0.3										
0.5 - 0.6										
0.8 - 0.9										
1.1 - 1.2										

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 039 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth	Locality: Brussels, photos 127-130, crabhole microrelief
Date Desc.: 11/05/12	Elevation: 32 metres
Map Ref.: GPS S.A. Off	Rainfall: 756
Northing/Long.: 7484912 AMG zone: 55	Runoff: Slow
Easting/Lat.: 776440 Datum: GDA94	Drainage: Poorly drained

Geology

ExposureType: Existing vertical exposure	Conf. Sub. is Parent. Mat.: Almost certain or certain
Geol. Ref.: Pb	Substrate Material: Existing vertical exposure, 1 m deep, Fragmental, Bedded, Porous, ,

Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat	Relief: 5 metres
Elem. Type: Flood-out	Slope Category: Level
Slope: 0.5 %	Aspect: 100 degrees

Surface Soil Condition Hardsetting, Cracking

Erosion: Active, Moderate scalding (scald) Active, Moderate (sheet) Active, Moderate (gully) Active, Present	Microrelief: Crabhole gilgai Vert.(m) 0.2
Horiz.(m) 3	Vert.(m) Horiz.(m) 3
(stbank)	

Soil Classification

Australian Soil Classification: Vertic Subnatric Grey Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep	Mapping Unit: Pv
ASC Confidence: Analytical data are incomplete but reasonable confidence.	Principal Profile Form: Dy2.33
	Great Soil Group: Grey-brown podzolic soil
	Land Class: Land Class: C2

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation: Tall Strata - Tree, 12.01-20m, Isolated clumps. *Species includes - Eucalyptus platyphylla, Eucalyptus polycarpa, Melaleuca viridiflora

Surface Coarse 2-10%, medium gravelly, 6-20mm, rounded tabular, Ferricrete

Profile

1A1 0 - 0.1 m	Grey (2.5Y5/1-Moist); , 0-0% ; Fine sandy loam; Massive grade of structure; Earthy fabric; Medium, (5 - 10) mm crack; Many (>5 per 100mm2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Ferricrete, coarse fragments; Field pH 5 (Raupach); Many, coarse (>5mm) roots; Clear, Smooth change to -
1A2 0.1 - 0.3 m	Dark grey (2.5Y4/1-Moist); , 0-0% ; Heavy clay; Moderate grade of structure, 20-50 mm, Subangular blocky; Rough-ped fabric; Medium, (5 - 10) mm crack; Many (>5 per 100mm2) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, rounded tabular, dispersed, Ferricrete, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 6 (Raupach); Many, fine (1-2mm) roots; Diffuse, Wavy change to -
1B1 0.3 - 0.4 m	Dark grey (2.5Y4/1-Moist); , 0-0% ; Heavy clay; Moderate grade of structure, 5-10 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm2) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; 2-10%, medium gravelly, 6-20mm, rounded platy, dispersed, Ferricrete, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 6 (Raupach); Common, fine (1-2mm) roots; Diffuse, Wavy change to -
1B2ss 0.4 - 0.6 m	Dark grey (2.5Y4/1-Moist); , 0-0% ; Heavy clay; Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 039 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

1B3ss	0.6 - 0.8 m	Dark grey (2.5Y4/1-Moist); , 0-0% ; Heavy clay; Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 5.5 (Raupach); Few, fine (1-2mm) roots; Diffuse, Wavy change to -
1C1	0.8 - 1.1 m	Dark grey (2.5Y4/1-Moist); , 0-0% ; Heavy clay; Moderate grade of structure, 20-50 mm, Lenticular; Rough-ped fabric; Fine, (0 - 5) mm crack; Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 5 (Raupach); Diffuse, Wavy change to -
1C1	1.1 - 1.5 m	; Heavy clay; Moderate grade of structure, 20-50 mm, Lenticular; Rough-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; Few cutans, <10% of ped faces or walls coated, distinct; Field pH 5 (Raupach); Diffuse, Wavy change to -

Morphological Notes

Observation Notes

Check site, not sampled, creek bank

Site Notes

brown cracking clay, cleared poplar box and melaleuca woodland, native grassland, CHECK SITE

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 040 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth	Locality: Mamelon, photos 131
Date Desc.: 11/05/12	Elevation: 33 metres
Map Ref.: GPS S.A. Off	Rainfall: 756
Northing/Long.: 7486803 AMG zone: 55	Runoff: Very slow
Easting/Lat.: 774610 Datum: GDA94	Drainage: Very poorly drained

Geology

ExposureType: Soil pit	Conf. Sub. is Parent. Mat.: No Data
Geol. Ref.: Qpa	Substrate Material: Fragmental, Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3%	Pattern Type: Terraced land (alluvial)
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Morph. Type: Flat	Relief: 5 metres
Elem. Type: Terrace plain	Slope Category: Level
Slope: 0.5 %	Aspect: 149 degrees

Surface Soil Condition

Erosion:

Soil Classification

Microrelief:

Australian Soil Classification: Vertic Subnatric Brown Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep	Mapping Unit: Pv
ASC Confidence: Analytical data are incomplete but reasonable confidence.	Principal Profile Form: Dy2.33
	Great Soil Group: Grey-brown podzolic soil
	Land Class: Land Class: C2

Site

Vegetation:

Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Acacia harpophylla

Surface Coarse

Profile

1A1	0 - 0.1 m	Grey (2.5Y5/1-Moist); ; Fine sandy clay loam; Moist; Moderately plastic; Normal plasticity; Moderately sticky; Field pH 6 (Raupach); Clear, Smooth change to -
1A2	0.1 - 0.3 m	Dark greyish brown (2.5Y4/3-Moist); ; Medium heavy clay; Moist; Very plastic; Normal plasticity; Moderately sticky; Field pH 6 (Raupach); Diffuse, Wavy change to -
1B1	0.3 - 0.4 m	Dark greyish brown (2.5Y4/3-Moist); ; Medium heavy clay; Moist; Very plastic; Normal plasticity; Very sticky; Few (2 - 10 %), Manganiferous, Coarse (6 - 20 mm), Concretions; Field pH 6 (Raupach); Diffuse, Wavy change to -
1B2	0.4 - 0.6 m	Dark greyish brown (2.5Y4/2-Moist); ; Medium heavy clay; Moist; Very plastic; Normal plasticity; Very sticky; Few (2 - 10 %), Manganiferous, Coarse (6 - 20 mm), Concretions; Field pH 6 (Raupach); Diffuse, Wavy change to -
1B3	0.6 - 0.8 m	Dark greyish brown (2.5Y4/2-Moist); ; Medium clay; Moist; Very plastic; Normal plasticity; Very sticky; Few (2 - 10 %), Manganiferous, Coarse (6 - 20 mm), Concretions; Field pH 7.5 (Raupach); Diffuse, Wavy change to -
1C1	0.8 - 1.1 m	Dark greyish brown (2.5Y4/2-Moist); ; Medium clay; Moist; Very plastic; Normal plasticity; Very sticky; Field pH 8 (Raupach); Diffuse, Wavy change to -
1C1	1.1 - 1.5 m	Dark greyish brown (2.5Y4/2-Moist); ; Medium clay; Moist; Very plastic; Normal plasticity; Very sticky; Field pH 8.5 (Raupach); Diffuse, Wavy change to -

Morphological Notes

Observation Notes

Detailed site, samples 136-140

Site Notes

brown cracking clay, ironbark woodland, native grassland, crabhole microrelief

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 040 **Observation** 1
Agency Name: Horizon Soil Survey (NT)

Laboratory Test Results:

Depth	pH	1:5 EC	Exchangeable Cations				CEC	ESP	Cl
cm		dS/m	Ca	Mg	K	Na	Cmol (+)/kg	%	mg/kg
0 - 0.1	6.5A	74A							30*
0.2 - 0.3	7.4A	100A							60*
0.5 - 0.6	7.3A	449A							520*
0.8 - 0.9	8.3A	609A							720*
1.1 - 1.2	8.4A	597A							700*

Depth	Organic C	Total N	Avail. P	Total K	Extr. S	Cu	Fe	Trace Elements		B
cm	%	mg/kg	mg/kg	mg/kg	mg/kg			Mn	Zn	
								mg/kg		
0 - 0.1										
0.2 - 0.3										
0.5 - 0.6										
0.8 - 0.9										
1.1 - 1.2										

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 041 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Corona - good quality pasture; photos 132-133
Date Desc.: 12/05/12 **Elevation:** 32 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7497244 AMG zone: 55 **Runoff:** Slow
Easting/Lat.: 773544 Datum: GDA94 **Drainage:** Imperfectly drained

Geology

Exposure Type: Soil pit **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Soil pit, 1 m deep, Fragmental, Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat **Relief:** 5 metres
Elem. Type: Terrace plain **Slope Category:** Level
Slope: 0.5 % **Aspect:** 200 degrees

Surface Soil Condition Cracking

Erosion: No scalding (scald) Not apparent (sheet) No gully erosion (gully) **Microrelief:** Melonhole gilgai Vert.(m) 1 Horiz.(m) 20

Soil Classification

Australian Soil Classification: Endohypersodic Crusty Brown Vertosol Non-gravelly Fine Medium **Mapping Unit:** So
 fine Very fine Moderately deep **Principal Profile Form:** Ug5.25
ASC Confidence: All necessary analytical data are available. **Great Soil Group:** Brown clay
Land Class: Land Class: C1

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Acacia harpophylla

Surface Coarse

No surface coarse fragments

Profile

1A1	0 - 0.1 m	Very dark grey (2.5Y3/1-Moist); , 0-0% ; Light medium clay; Moderate grade of structure, 10-20 mm, Subangular blocky; Rough-ped fabric; Very coarse, (20 - 50) mm crack; Common (1-5 per 0.01m2) Medium (2-5mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; Field pH 7 (Raupach); Many, medium (2-5mm) roots; Clear, Smooth change to -
1A2	0.1 - 0.3 m	Dark greyish brown (2.5Y4/3-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Coarse, (10 - 20) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Moderately sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 8.5 (Raupach); Many, fine (1-2mm) roots; Diffuse, Wavy change to -
1B21	0.3 - 0.4 m	Dark greyish brown (2.5Y4/3-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Coarse, (10 - 20) mm crack; Common (1-5 per 100mm2) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 8.5 (Raupach); Common, fine (1-2mm) roots; Diffuse, Wavy change to -
1B22	0.4 - 0.6 m	Dark greyish brown (2.5Y4/2-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Medium, (5 - 10) mm crack; Common (1-5 per 100mm2) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 8.5 (Raupach); Common, fine (1-2mm) roots; Diffuse, Wavy change to -
1B3	0.6 - 0.8 m	Dark greyish brown (2.5Y4/2-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Medium, (5 - 10) mm crack; Few (<1 per 100mm2) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 7 (Raupach); Few, fine (1-2mm) roots; Diffuse, Wavy change to -

1C1	0.8 - 1.1 m	Dark greyish brown (2.5Y4/2-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 7 (Raupach); FewDiffuse, Wavy change to -
1C2	1.1 - 1.5 m	, 0-0% ; Medium heavy clay; Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Few, fine (1-2mm) roots; Diffuse, Wavy change to -

Observation Notes

Detailed site, samples 141-142

Site Notes

melonhole microrelief, cleared brigalow woodland, good improved pasture, brown clay

Laboratory Test Results:

Depth cm	pH	1:5 EC dS/m	Ca	Exchangeable Mg	Cations K	Na	CEC Cmol (+)/kg	ESP %	Cl mg/kg
0 - 0.1	8A	183A	18.5*	10.6	0.6	0.3	30*	1.00	20*
0.5 - 0.6	9.1A	981A	9.4*	7.4	<0.1	2.7	19.6*	13.78	1070*

Depth cm	Organic C %	Total N mg/kg	Avail. P mg/kg	Total K mg/kg	Extr. S mg/kg	Cu	Fe	Trace Elements Mn Zn mg/kg		B
0 - 0.1	<1.1D	1690E	<2J	<200	5*	2.29	59.6	57.6	1.41	<0.2
0.5 - 0.6		450E	<2J		21*					

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 042 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth	Locality: Corona - good quality pasture; photos 134-136
Date Desc.: 12/05/12	Elevation: 34 metres
Map Ref.: GPS S.A. Off	Rainfall: 756
Northing/Long.: 7495972 AMG zone: 55	Runoff: Slow
Easting/Lat.: 774928 Datum: GDA94	Drainage: Imperfectly drained

Geology

ExposureType: Soil pit	Conf. Sub. is Parent. Mat.: Almost certain or certain
Geol. Ref.: Qpa	Substrate Material: Soil pit, 1 m deep, Fragmental, Bedded, Porous,
	, Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat	Relief: 5 metres
Elem. Type: Terrace plain	Slope Category: Level
Slope: 0.5 %	Aspect: 200 degrees

Surface Soil Condition Surface crust

Erosion: No scalding (scald) No sheet erosion (sheet) No stream bank erosion (stbank) **Microrelief:** Melonhole gilgai Vert.(m) 1 Horiz.(m) 20

Soil Classification

Australian Soil Classification: Endohypersodic Crusty Brown Vertosol Non-gravelly Fine Medium fine Very fine Moderately deep	Mapping Unit: So
ASC Confidence: All necessary analytical data are available.	Principal Profile Form: Ug5.25
	Great Soil Group: Brown clay
	Land Class: Land Class: C1

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Acacia harpophylla

Surface Coarse

No surface coarse fragments

Profile

1A1	0 - 0.2 m	Very dark grey (2.5Y3/1-Moist); , 0-0% ; Light medium clay; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Coarse, (10 - 20) mm crack; Many (>5 per 0.01m2) Medium (2-5mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; Field pH 6.5 (Raupach); Abundant, medium (2-5mm) roots; Clear, Smooth change to -
1A3	0.2 - 0.3 m	Olive brown (2.5Y3/3-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Coarse, (10 - 20) mm crack; Many (>5 per 100mm2) Medium (2-5mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Moderately sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 7.5 (Raupach); Abundant, medium (2-5mm) roots; Diffuse, Wavy change to -
1B1ss	0.3 - 0.6 m	Dark greyish brown (2.5Y4/3-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Medium, (5 - 10) mm crack; Many (>5 per 100mm2) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 9 (Raupach); Few, fine (1-2mm) roots; Diffuse, Wavy change to -
1C1	0.6 - 0.9 m	Dark greyish brown (2.5Y4/3-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Medium, (5 - 10) mm crack; Few (<1 per 100mm2) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 9 (Raupach); Few, fine (1-2mm) roots; Diffuse, Wavy change to -
1C2	0.9 - 1.5 m	Dark greyish brown (2.5Y4/3-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 9 (Raupach); Few, fine (1-2mm) roots; Diffuse, Wavy change to -

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 042 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Observation Notes

Detailed site, samples 143-144

Site Notes

melonhole microrelief, cleared brigalow woodland, good improved pasture, brown clay; Typic Haplustert

Laboratory Test Results:

Depth cm	pH	1:5 EC dS/m	Ca	Exchangeable Mg	Cations K	Na	CEC Cmol (+)/kg	ESP %	Cl mg/kg
0 - 0.1	7.2A	85A	13.4*	6.9	0.5	<0.1	20.9*		40*
0.5 - 0.6	9A	364A	7*	15.6	<0.1	4.4	27.1*	16.24	310*

Depth cm	Organic C %	Total N mg/kg	Avail. P mg/kg	Total K mg/kg	Extr. S mg/kg	Cu	Fe	Trace Elements Mn Zn mg/kg		B
0 - 0.1	1.5D	2930E	<2J	<200	8*	1.17	62.2	115	1.82	<0.2
0.5 - 0.6		370E	<2J	1020	9*					

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 043 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Corona - good quality pasture; photos 137-140
Date Desc.: 12/05/12 **Elevation:** 50 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7492800 AMG zone: 55 **Runoff:** Moderately rapid
Easting/Lat.: 776318 Datum: GDA94 **Drainage:** Imperfectly drained

Geology

Exposure Type: Soil pit **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Auger boring, 1 m deep, Fragmental,
 Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Simple-slope **Relief:** 5 metres
Elem. Type: Terrace plain **Slope Category:** Level
Slope: 2 % **Aspect:** 200 degrees

Surface Soil Condition Hardsetting

Erosion: Active, Moderate (sheet) Active, Moderate (gully)

Soil Classification **Micorelief:** Melonhole gilgai Vert.(m) 1 Horiz.(m) 20

Australian Soil Classification: **Mapping Unit:** Rd
 Vertic Subnatric Brown Sodosol Medium Slightly gravelly Clay- **Principal Profile Form:** Dy2.42
 loamy Clayey Moderately deep **Great Soil Group:** Grey-brown
ASC Confidence: podzolic soil
 No analytical data are available but confidence is fair. **Land Class:** **Land Class:** C2

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation: Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Acacia harpophylla

Surface Coarse No surface coarse fragments

Profile

1A1 0 - 0.1 m Very dark grey (2.5Y3/1-Moist); , 0-0% ; Sandy clay loam; Moist; Moderately plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Shale, coarse fragments; Field pH 6.5 (Raupach); Abundant, fine (1-2mm) roots; Clear, Smooth change to -

1A2e 0.1 - 0.2 m Light grey (2.5Y7/1-Moist); Mottles, 10YR44, 2-10% , 0-5mm, Distinct; Sandy loam; Moist; Very plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Shale, coarse fragments; Common (10 - 20 %), Ferromanganiferous, Medium (2 -6 mm), Concretions; Field pH 6.5 (Raupach); Common, fine (1-2mm) roots; Clear, Smooth change to -

1B21ss 0.2 - 0.3 m Very dark greyish brown (2.5Y3/2-Moist); ; Medium heavy clay; Moist; Very plastic; Normal plasticity; Very sticky; Common (10 - 20 %), Ferromanganiferous, Medium (2 -6 mm), Concretions; Field pH 6.5 (Raupach); Common, fine (1-2mm) roots; Diffuse, Wavy change to -

1B22ss 0.3 - 0.5 m Dark greyish brown (2.5Y4/3-Moist); ; Medium heavy clay; Moist; Very plastic; Normal plasticity; Very sticky; Field pH 6.5 (Raupach); Few, fine (1-2mm) roots; Diffuse, Wavy change to -

1C1 0.5 - 0.9 m Dark greyish brown (2.5Y4/3-Moist); ; Medium heavy clay; Moist; Very plastic; Normal plasticity; Very sticky; Field pH 6.5 (Raupach); Diffuse, Wavy change to -

1C2 0.9 - 1.5 m Dark greyish brown (2.5Y4/3-Moist); , 0-0% ; Medium heavy clay; Moist; Very plastic; Normal plasticity; Very sticky; Field pH 6.5 (Raupach); Diffuse, Wavy change to -

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Check site, not sampled; on the boundary between So and Rd (ridge)

Site Notes melonhole micorelief, cleared brigalow woodland, good improved pasture, brown clay; on the boundary with Permian sedimentary rocks

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 044 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Corona, photos 141-143
Date Desc.: 12/05/12 **Elevation:** 47 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7491963 AMG zone: 55 **Runoff:** Moderately rapid
Easting/Lat.: 776464 Datum: GDA94 **Drainage:** Imperfectly drained

Geology

Exposure Type: Soil pit **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Soil pit, 1 m deep, Fragmental, Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Simple-slope **Relief:** 5 metres
Elem. Type: Terrace plain **Slope Category:** Level
Slope: 2% **Aspect:** 200 degrees

Surface Soil Condition Hardsetting

Erosion: Active, Moderate (sheet) Active, Moderate (gully)

Soil Classification

Micorelief: Melonhole gilgai Vert.(m) 1 Horiz.(m) 20

Australian Soil Classification:

Vertic Subnatric Brown Sodosol Medium Slightly gravelly Clay-loamy Clayey Moderately deep

Mapping Unit: Rd

Principal Profile Form: Dy2.42

Great Soil Group: Grey-brown podzolic soil

ASC Confidence:

No analytical data are available but confidence is fair.

Land Class: Land Class: C2

Site

Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Acacia harpophylla

Surface Coarse

2-10%, medium gravelly, 6-20mm, subrounded, Shale

Profile

1A1 0 - 0.1 m Dark grey (10YR4/1-Moist); , 0-0% ; Sandy clay loam; Moderate grade of structure, 2-5 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Shale, coarse fragments; Field pH 6.5 (Raupach); Many, fine (1-2mm) roots; Clear, Smooth change to -

1A2e 0.1 - 0.2 m Light grey (10YR7/2-Moist); , 0-0% ; Sandy loam; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Few (<1 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Shale, coarse fragments; Field pH 6.5 (Raupach); Common, fine (1-2mm) roots; Clear, Wavy change to -

1B21ss 0.2 - 0.4 m Brown (10YR4/3-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 5-10 mm, Polyhedral; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Shale, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 6.5 (Raupach); Few, fine (1-2mm) roots; Diffuse, Wavy change to -

1B22ss 0.4 - 0.6 m Brown (10YR4/3-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Shale, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 6.5 (Raupach); Few, fine (1-2mm) roots; Diffuse, Wavy change to -

1C1 0.6 - 0.9 m Brown (10YR4/3-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Shale, coarse fragments; Common cutans, 10-50% of ped faces or walls coated,

distinct; Field pH 6.5 (Raupach); Few, fine (1-2mm) roots; Diffuse, Wavy change to -

1C2 0.9 - 1.5 m , 0-0% ; Medium heavy clay; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm²) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Shale, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 6.5 (Raupach); Few, fine (1-2mm) roots; Diffuse, Wavy change to -

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Check site, not sampled; on the boundary between So and Rd (ridge)

Site Notes

melonhole microrelief, cleared brigalow woodland, good improved pasture, brown clay; on the boundary with Permian sedimentary rocks

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 045 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Corona, gravelly clay loam; photos 144-148
Date Desc.: 12/05/12 **Elevation:** 44 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7492044 AMG zone: 55 **Runoff:** Rapid
Easting/Lat.: 776476 Datum: GDA94 **Drainage:** Moderately well drained

Geology

Exposure Type: Existing vertical exposure **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Pb **Substrate Material:** Existing vertical exposure, 1 m deep, Fragmental, Bedded, Porous, ,
Mudstone

Land Form

Rel/Slope Class: Undulating low hills 30-90m 3-10% **Pattern Type:** Hills

Morph. Type: Lower-slope **Relief:** 31 metres
Elem. Type: Footslope **Slope Category:** Gently inclined
Slope: 5% **Aspect:** 200 degrees

Surface Soil Condition Hardsetting

Erosion: Active, Moderate (sheet) Active, Moderate (gully)

Soil Classification **Microrelief:** Zero or no microrelief **Vert.(m)** **Horiz.(m)**

Australian Soil Classification: Mesotrophic Subnatric Brown Sodosol Medium Gravelly Loamy
Clay-loamy Moderately deep
ASC Confidence: No analytical data are available but confidence is fair.
Mapping Unit: Rd
Principal Profile Form: Dy2.42
Great Soil Group: Grey-brown podzolic soil
Land Class: Land Class: C2

Site Limited clearing, for example selective logging

Vegetation: Tall Strata - Tree, 6.01-12m, Mid-dense. *Species includes - Eucalyptus crebra, Acacia rhodoxylon
20-50%, medium gravelly, 6-20mm, rounded tabular, Shale

Surface Coarse

Profile

1A1	0 - 0.1 m	Dark grey (10YR4/1-Moist); , 0-0% ; Sandy loam; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Many (>5 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 10-20%, medium gravelly, 6-20mm, rounded platy, stratified, Shale, coarse fragments; Field pH 6 (Raupach); Common, fine (1-2mm) roots; Diffuse, Wavy change to -
1A2e	0.1 - 0.2 m	Light grey (10YR7/2-Moist); , 0-0% ; Sandy loam; Single grain grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Many (>5 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Moderately sticky; 10-20%, medium gravelly, 6-20mm, rounded platy, stratified, Shale, coarse fragments; Field pH 6 (Raupach); Common, fine (1-2mm) roots; Clear, Smooth change to -
1B2	0.2 - 0.4 m	Brown (10YR4/3-Moist); , 0-0% ; Sandy clay loam; Moderate grade of structure, 10-20 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 10-20%, coarse gravelly, 20-60mm, rounded tabular, stratified, Sand, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 6 (Raupach); Common, fine (1-2mm) roots; Diffuse, Wavy change to -
1C	0.4 - 0.6 m	, 0-0% ; Sandy clay loam; Weak grade of structure, 10-20 mm, Subangular blocky; Earthy fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 50-90%, stony, 200-600mm, subangular platy, stratified, Shale, coarse fragments; Field pH 6.5 (Raupach); Few, fine (1-2mm) roots; Diffuse, Wavy change to -

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Check site, not sampled, base of ridge in sedimentary geology

Site Notes

rosewood and ironbark woodland, gravelly clay loam

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 046 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth	Locality: Bar H, photos 149-151
Date Desc.: 12/05/12	Elevation: 45 metres
Map Ref.: GPS S.A. Off	Rainfall: 756
Northing/Long.: 7491080 AMG zone: 55	Runoff: Rapid
Easting/Lat.: 776704 Datum: GDA94	Drainage: Moderately well drained

Geology

ExposureType: Existing vertical exposure	Conf. Sub. is Parent. Mat.: Almost certain or certain
Geol. Ref.: Pb	Substrate Material: Existing vertical exposure, 0.5 m eep, Fragmental, Bedded, Porous, mudstone

Land Form

Rel/Slope Class: Undulating low hills 30-90m 3-10% **Pattern Type:** Hills

Morph. Type: Lower-slope	Relief: 31 metres
Elem. Type: Foothlope	Slope Category: Moderately inclined
Slope: 10 %	Aspect: 200 degrees

Surface Soil Condition Hardsetting

Erosion: Active, Moderate (sheet) Active, Present (mass) Active, Moderate (gully)	Microrelief: Zero or no microrelief	Vert.(m)	Horiz.(m)
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Soil Classification

Australian Soil Classification: Mesotrophic Subnatic Brown Sodosol Medium Gravelly Loamy Clay-loamy Moderately deep	Mapping Unit: Rd
ASC Confidence: No analytical data are available but confidence is fair.	Principal Profile Form: Dy2.42
	Great Soil Group: Grey-brown podzolic soil
	Land Class: C2

Site Limited clearing, for example selective logging

Vegetation: Tall Strata - Tree, 6.01-12m, Mid-dense. *Species includes - Acacia rhodoxylon

Surface Coarse 90-100%, cobbly, 60-200mm, rounded tabular, Shale

Profile

1A1	0 - 0.1 m	Dark grey (10YR4/1-Moist); , 0-0% ; Sandy loam; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 50-90%, coarse gravelly, 20-60mm, subrounded platy, stratified, Shale, coarse fragments; Field pH 6 (Raupach); Common, medium (2-5mm) roots; Diffuse, Wavy change to -
1A3j	0.1 - 0.2 m	Light grey (10YR7/2-Moist); , 0-0% ; Sandy loam; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Moderately sticky; 20-50%, medium gravelly, 6-20mm, subangular tabular, dispersed, Shale, coarse fragments; Field pH 6 (Raupach); Common, medium (2-5mm) roots; Diffuse, Wavy change to -
1Bw	0.2 - 0.4 m	Brown (10YR4/3-Moist); , 0-0% ; Sandy loam; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm2) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; 10-20%, medium gravelly, 6-20mm, subangular tabular, dispersed, Shale, coarse fragments; Field pH 6.5 (Raupach); Common, medium (2-5mm) roots; Diffuse, Wavy change to -
1C 5	0.4 - 0.6 m	, 0-0% ; Sandy clay loam; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm2) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; 20-50%, stony, 200-600mm, angular tabular, undisturbed, Shale, coarse fragments; Field pH 6.5 (Raupach); Few, medium (2-5mm) roots; Diffuse, Wavy change to -

Morphological Notes

Observation Notes

Check site, not sampled

Site Notes rosewood and ironbark woodland, gravelly clay loam, gravel pit

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 047 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth	Locality: Strathmuir, photos 152-154
Date Desc.: 12/05/12	Elevation: 44 metres
Map Ref.: GPS S.A. Off	Rainfall: 756
Northing/Long.: 7489821 AMG zone: 55	Runoff: Rapid
Easting/Lat.: 777397 Datum: GDA94	Drainage: Imperfectly drained

Geology

Exposure Type: Existing vertical exposure	Conf. Sub. is Parent. Mat.: Almost certain or certain
Geol. Ref.: Pb	Substrate Material: Existing vertical exposure, 0.5 m deep, Fragmental, Bedded, Porous, ,

Mudstone

Land Form

Rel/Slope Class: Undulating rises 9-30m 3-10%	Pattern Type: Rises
Morph. Type: Lower-slope	Relief: 15 metres
Elem. Type:	Slope Category: Gently inclined
Slope: 5 %	Aspect: 300 degrees

Surface Soil Condition Hardsetting

Erosion: Active, Moderate (sheet) Active, Moderate (gully)

Soil Classification	Microrelief: Zero or no microrelief	Vert.(m)	Horiz.(m)
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Australian Soil Classification:

Mesotrophic Mesonatric Brown Sodosol Medium Gravelly Loamy Clay-loamy Moderately deep

ASC Confidence:

No analytical data are available but confidence is fair.

Mapping Unit: Tb
Principal Profile Form: Dy2.43
Great Soil Group: Grey-brown podzolic soil
Land Class: C2

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 12.01-20m, Isolated plants. *Species includes - Eucalyptus crebra

Surface Coarse

50-90%, coarse gravelly, 20-60mm, subrounded, Shale

Profile

1A1	0 - 0.1 m	Dark grey (10YR4/1-Moist); , 0-0% ; Sandy loam; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Many (>5 per 100mm2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 50-90%, coarse gravelly, 20-60mm, subrounded, stratified, Shale, coarse fragments; Field pH 6 (Raupach); Many, medium (2-5mm) roots; Diffuse, Wavy change to -
1A2e	0.1 - 0.2 m	Light grey (10YR7/2-Moist); , 0-0% ; Sandy loam; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Moderately sticky; 20-50%, medium gravelly, 6-20mm, subrounded, dispersed, Shale, coarse fragments; Field pH 6 (Raupach); Common, medium (2-5mm) roots; Clear, Wavy change to -
1Bw	0.2 - 0.4 m	Brown (10YR4/3-Moist); , 0-0% ; Sandy loam; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 10-20%, medium gravelly, 6-20mm, subrounded, dispersed, Shale, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 8.5 (Raupach); Common, medium (2-5mm) roots; Diffuse, Wavy change to -
1C	0.4 - 0.6 m	, 0-0% ; Sandy clay loam; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; 20-50%, stony, 200-600mm, rounded tabular, undisturbed, Shale, coarse fragments; Few cutans, <10% of ped faces or walls coated, faint; Field pH 8 (Raupach); Few, fine (1-2mm) roots; Diffuse, Wavy change to -

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Check site, not sampled

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 047 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Notes

cleared ironbark woodland, gravelly eroded clay loam

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 048 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth
Date Desc.: 12/05/12
Map Ref.: GPS S.A. Off
Northing/Long.: 7490186 AMG zone: 55
Easting/Lat.: 776479 Datum: GDA94

Locality: Strathmuir, photos 155-157
Elevation: 33 metres
Rainfall: 756
Runoff: Slow
Drainage: Poorly drained

Geology

Exposure Type: Soil pit
Geol. Ref.: Qa
Conf. Sub. is Parent. Mat.: Almost certain or certain
Substrate Material: Soil pit, 1 m deep, Fragmental, Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat
Elem. Type: Terrace plain
Slope: 0.5 %

Relief: 5 metres
Slope Category: Level
Aspect: 0 degrees

Surface Soil Condition Surface crust

Erosion: Stable, Minor (sheet)

Soil Classification

Australian Soil Classification: Endohypersodic Crusty Grey Vertosol Non-gravelly Fine Medium
 fine Moderately deep
ASC Confidence: All necessary analytical data are available.

Microrelief: Melonhole gilgai Vert.(m) 1 Horiz.(m) 20
Mapping Unit: So
Principal Profile Form: Ug5.25
Great Soil Group: Grey clay
Land Class: Land Class: C1

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Acacia harpophylla
 0-2%, medium gravelly, 6-20mm, subrounded, Chert

Surface Coarse

Profile

1A1	0 - 0.2 m	Very dark grey (10YR3/1-Moist); , 0-0% ; Fine sandy clay loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Medium, (5 - 10) mm crack; Few (<1 per 0.01m ²) Medium (2-5mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 6.5 (Raupach); Abundant, fine (1-2mm) roots; Clear, Smooth change to -
1B11	0.2 - 0.4 m	Dark grey (10YR4/1-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 5-10 mm, Lenticular; Smooth-ped fabric; Medium, (5 - 10) mm crack; Many (>5 per 100mm ²) Medium (2-5mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Very few (0 - 2 %), Ferromanganiferous, Fine (0 - 2 mm), Concretions; Field pH 7.5 (Raupach); Many, fine (1-2mm) roots; Diffuse, Wavy change to -
1B12	0.4 - 0.8 m	Dark grey (10YR4/1-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Medium, (5 - 10) mm crack; Common (1-5 per 100mm ²) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Few (2 - 10 %), Calcareous, Medium (2 -6 mm), Nodules; Field pH 8.5 (Raupach); Few, fine (1-2mm) roots; Diffuse, Wavy change to -
1C1	0.8 - 1.1 m	Dark grey (10YR4/1-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm ²) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 8.5 (Raupach); Diffuse, Wavy change to -

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 048 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

1C2 1.1 - 1.5 m Dark grey (10YR4/1-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 10-20%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 8.5 (Raupach); Diffuse, Wavy change to -

Morphological Notes

Observation Notes

Detailed site, samples 143-144

Site Notes

cleared brigalow woodland, grey cracking clay, melonhole microrelief

Laboratory Test Results:

Depth cm	pH	1:5 EC dS/m	Exchangeable Cations				CEC Cmol (+)/kg	ESP %	CI mg/kg
			Ca	Mg	K	Na			
0 - 0.1	6.6A	107A	8.5*	11.6	0.2	1.2	21.5*	5.58	70*
0.5 - 0.6	7.5A	640A	5.2*	14.1	0.2	3.7	23.2*	15.95	870*

Depth cm	Organic C %	Total N mg/kg	Avail. P mg/kg	Total K mg/kg	Extr. S mg/kg	Cu	Fe	Trace Elements		B
								Mn mg/kg	Zn mg/kg	
0 - 0.1	0.6D	1160E	<2J	<200	5*	1.68	101	59.9	<1	<0.2
0.5 - 0.6		460E	<2J	<200	9*					

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 049 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth	Locality: Reference site; Strathmuir, photos 158-160
Date Desc.: 12/05/12	Elevation: 34 metres
Map Ref.: GPS S.A. Off	Rainfall: 756
Northing/Long.: 7489923 AMG zone: 55	Runoff: Moderately rapid
Easting/Lat.: 776415 Datum: GDA94	Drainage: Imperfectly drained

Geology

Exposure Type: Soil pit	Conf. Sub. is Parent. Mat.: No Data
Geol. Ref.: Kx	Substrate Material: Fragmental, Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Undulating rises 9-30m 3-10%	Pattern Type: Rises
Morph. Type: Simple-slope	Relief: 2 metres
Elem. Type:	Slope Category: Very gently sloped
Slope: 1 %	Aspect: 180 degrees

Surface Soil Condition Surface crust

Erosion: Active, Minor (sheet) Active, Minor (gully)

Soil Classification

Microrelief: Zero or no microrelief	Vert.(m)	Horiz.(m)
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Australian Soil Classification:

Vertic Mesonatric Brown Sodosol Medium Slightly gravelly Clay-loamy Clayey Moderately deep

ASC Confidence:

All necessary analytical data are available.

Mapping Unit:

Tb

Principal Profile Form:

Dy2.43

Great Soil Group:

Grey-brown podzolic soil

Land Class:

Land Class: C2

Site

Limited clearing, for example selective logging

Vegetation:

Tall Strata - Tree, 12.01-20m, Mid-dense. *Species includes - Eucalyptus crebra, Eucalyptus platyphylla

Surface Coarse

10-20%, medium gravelly, 6-20mm, subrounded, Conglomerate

Profile

1A1	0 - 0.1 m	Dark greyish brown (10YR4/2-Moist); , 0-0% ; Fine sandy clay loam; Moderate grade of structure, 2-5 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Many (>5 per 100mm ²) Very fine (0.075-1mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 6.5 (Raupach); Many, fine (1-2mm) roots; Clear, Smooth change to -
1B11	0.1 - 0.4 m	Dark greyish brown (10YR4/2-Moist); , 0-0% ; Heavy clay; Moderate grade of structure, 2-5 mm, Lenticular; Rough-ped fabric; Medium, (5 - 10) mm crack; Many (>5 per 100mm ²) Medium (2-5mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Soil matrix is Slightly calcareous; Field pH 7.5 (Raupach); Many, fine (1-2mm) roots; Diffuse, Wavy change to -
1B12	0.4 - 0.6 m	Dark greyish brown (10YR4/2-Moist); , 0-0% ; Heavy clay; Weak grade of structure, 5-10 mm, Subangular blocky; Earthy fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm ²) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Few cutans, <10% of ped faces or walls coated, distinct; Soil matrix is Slightly calcareous; Field pH 8.5 (Raupach); Few, medium (2-5mm) roots; Diffuse, Wavy change to -
1C1	0.6 - 0.9 m	Dark yellowish brown (10YR4/6-Moist); , 0-0% ; Medium heavy clay; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm ²) Fine (1-2mm) macropores, Moist; Strong consistence; Very plastic; Normal plasticity; Very sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 8.5 (Raupach); Few, medium (2-5mm) roots; Diffuse, Wavy change to -
1R1	0.9 - 1.5 m	Rock

Morphological Notes

1A1	bleached surface
1B11	thin layer of expansive clay; perhaps deposited over the underlying conglomerate in this profile

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 050 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Strathmuir, photos 161-162
Date Desc.: 12/05/12 **Elevation:** 41 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7490113 AMG zone: 55 **Runoff:** Rapid
Easting/Lat.: 777163 Datum: GDA94 **Drainage:** Moderately well drained

Geology

Exposure Type: Existing vertical exposure **Conf. Sub. is Parent. Mat.:** Probable
Geol. Ref.: Pb **Substrate Material:** Existing vertical exposure, 1 m deep, Fragmental, Bedded, Porous, ,
Mudstone

Land Form

Rel/Slope Class: Undulating rises 9-30m 3-10% **Pattern Type:** Rises
Morph. Type: Simple-slope **Relief:** 15 metres
Elem. Type: **Slope Category:** Gently inclined
Slope: 3 % **Aspect:** 45 degrees

Surface Soil Condition Hardsetting

Erosion: Active, Moderate (sheet) Active, Moderate (gully)
Active, Present (stbank) **Microrelief:** Zero or no microrelief Vert.(m) Horiz.(m)

Soil Classification

Australian Soil Classification: Mesotrophic Subnatic Brown Sodosol Medium Gravelly Clay-loamy
Dy2.43 **Mapping Unit:** Tb
Principal Profile Form:
Clayey Moderately deep **Great Soil Group:** Grey-brown podzolic soil
ASC Confidence: No analytical data are available but confidence is fair. **Land Class:** Land Class: C2

Site Limited clearing, for example selective logging

Vegetation: Tall Strata - Tree, 6.01-12m, Sparse. *Species includes - Eucalyptus crebra
Surface Coarse 20-50%, medium gravelly, 6-20mm, subrounded, Conglomerate

Profile

1A1	0 - 0.1 m	Dark greyish brown (10YR4/2-Moist); , 0-0% ; Fine sandy clay loam; Massive grade of structure; Fine, (0 - 5) mm crack; Many (>5 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 10-20%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 6 (Raupach); Common, medium (2-5mm) roots; Clear, Smooth change to -
1B11	0.1 - 0.4 m	Dark greyish brown (10YR4/2-Moist); , 0-0% ; ; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Many (>5 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Moderately sticky; 10-20%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 6 (Raupach); Common, fine (1-2mm) roots; Diffuse, Wavy change to -
1B12	0.4 - 0.6 m	Dark yellowish brown (10YR4/6-Moist); , 0-0% ; Light clay; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 10-20%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 8 (Raupach); Few, fine (1-2mm) roots; Diffuse, Wavy change to -
1C1	0.6 - 0.9 m	, 0-0% ; ; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Strong consistence; Very plastic; Normal plasticity; Very sticky; 20-50%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 8.5 (Raupach); Few, fine (1-2mm) roots; Diffuse, Wavy change to -
1R2	0.9 - 1.5 m	Rock

Morphological Notes

Observation Notes

Check site, not sampled

Site Notes

tall ironbark woodland, in weathered (ferruginised) substrate, CHECK SITE

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 051 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Oakdean, photos 162-164
Date Desc.: 12/05/12 **Elevation:** 37 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7491810 AMG zone: 55 **Runoff:** Slow
Easting/Lat.: 775994 Datum: GDA94 **Drainage:** Poorly drained

Geology

ExposureType: Auger boring **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Auger boring, 0.9 m deep, Fragmental,
 Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat **Relief:** 5 metres
Elem. Type: Terrace plain **Slope Category:** Level
Slope: 0.5 % **Aspect:** 270 degrees

Surface Soil Condition

Cracking
Erosion: No scalding (scald) Not apparent (sheet) No rill
 erosion (rill) No gully erosion (gully) **Microrelief:** Melonhole gilgai Vert.(m) 1 Horiz.(m) 20

Soil Classification

Australian Soil Classification: Endohypersodic Crusty Grey Vertosol Non-gravelly Fine Medium
 fine Moderately deep **Mapping Unit:** So
ASC Confidence: No analytical data are available but confidence is fair. **Principal Profile Form:** Ug5.25
Land Class: Land Class: C1

Site: Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Acacia harpophylla

Surface Coarse

0-2%, medium gravelly, 6-20mm, subrounded, Conglomerate

Profile

1A11	0 - 0.1 m	Dark grey (10YR4/1-Moist); , 0-0% ; Clay loam; Strong grade of structure, 2-5 mm, Subangular blocky; Rough-ped fabric; Medium, (5 - 10) mm crack; Many (>5 per 0.01m2) Medium (2-5mm) macropores, Moist; Weak consistence; Very plastic; Normal plasticity; Moderately sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 6.5 (Raupach); Many, fine (1-2mm) roots; Diffuse, Wavy change to -
1A12	0.1 - 0.2 m	Dark greyish brown (10YR4/2-Moist); , 0-0% ; Clay loam; Strong grade of structure, 10-20 mm, Subangular blocky; Rough-ped fabric; Medium, (5 - 10) mm crack; Common (1-5 per 0.01m2) Medium (2-5mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Moderately sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 6.5 (Raupach); Many, fine (1-2mm) roots; Diffuse, Wavy change to -
1B11kss	0.2 - 0.3 m	Greyish brown (10YR5/2-Moist); , 0-0% ; Light medium clay; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Medium, (5 - 10) mm crack; Common (1-5 per 0.01m2) Medium (2-5mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Soil matrix is Slightly calcareous; Field pH 8.5 (Raupach); Common, fine (1-2mm) roots; Diffuse, Irregular change to -
1B12kss	0.3 - 0.5 m	Brown (10YR5/3-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Medium, (5 - 10) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Soil matrix is Slightly calcareous; Field pH 8.5 (Raupach); Few, fine (1-2mm) roots; Diffuse, Irregular change to -
1D1ss	0.5 - 0.6 m	Brown (10YR5/3-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Medium, (5 - 10) mm crack; Common (1-5 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly,

6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 9 (Raupach); Diffuse, Irregular change to -

1D2 0.6 - 1.5 m Yellowish brown (10YR5/4-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm²) Fine (1-2mm) macropores, Moist; Very firm consistence; Slightly plastic; Normal plasticity; Slightly sticky; 10-20%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 9 (Raupach);

Morphological Notes

Observation Notes

Check site, not sampled

Site Notes

melonhole microrelief, cleared brigalow woodland, improved pasture, brown clay

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 052 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Oakdean, photos 165,166, melonhole microrelief,
Date Desc.: 12/05/12 **Elevation:** 36 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7491799 AMG zone: 55 **Runoff:** Slow
Easting/Lat.: 775950 Datum: GDA94 **Drainage:** Poorly drained

Geology

Exposure Type: Auger boring **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Auger boring, 0.7 m deep, Fragmental,
 Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat **Relief:** 5 metres
Elem. Type: Terrace plain **Slope Category:** Level
Slope: 0.5 % **Aspect:** 270 degrees

Surface Soil Condition

Erosion: No scalding (scald) No sheet erosion (sheet) No
 stream bank erosion (stbank) **Microrelief:** Melonhole gilgai Vert.(m) 1 Horiz.(m) 20

Soil Classification

Australian Soil Classification: Endohypersodic Crusty Grey Vertosol Non-gravelly Fine Medium
 fine Moderately deep **Mapping Unit:** So
ASC Confidence: All necessary analytical data are available. **Principal Profile Form:** Ug5.25
Land Class: Land Class: C1

Site: Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 6.01-12m, Isolated clumps. *Species includes - Acacia harpophylla

Surface Coarse

0-2%, medium gravelly, 6-20mm, subrounded, Conglomerate

Profile

1A11 0 - 0.1 m Grey (10YR5/1-Moist); , 0-0% ; Clay loam; Strong grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Coarse, (10 - 20) mm crack; Many (>5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Moderately sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 8.5 (Raupach); Abundant, fine (1-2mm) roots; Diffuse, Wavy change to -

1A12 0.1 - 0.2 m Greyish brown (10YR5/2-Moist); , 0-0% ; Clay loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Medium, (5 - 10) mm crack; Many (>5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 8 (Raupach); Abundant, fine (1-2mm) roots; Diffuse, Wavy change to -

1B11kss 0.2 - 0.3 m Brown (10YR5/3-Moist); , 0-0% ; Light medium clay; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Medium, (5 - 10) mm crack; Many (>5 per 100mm2) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Soil matrix is Slightly calcareous; Field pH 7.5 (Raupach); Many, fine (1-2mm) roots; Diffuse, Irregular change to -

1B12kss 0.3 - 0.5 m Brown (10YR5/3-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 5-10 mm, Lenticular; Smooth-ped fabric; Medium, (5 - 10) mm crack; Many (>5 per 100mm2) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Soil matrix is Slightly calcareous; Field pH 8.5 (Raupach); Common, fine (1-2mm) roots; Diffuse, Irregular change to -

1D1ss 0.5 - 0.6 m Yellowish brown (10YR5/4-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 5-10 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm2) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 8.5 (Raupach);

Few,

fine (1-2mm) roots; Diffuse, Irregular change to -

1D2 0.6 - 1.5 m Yellowish brown (10YR5/4-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Slightly plastic; Normal plasticity; Slightly sticky; 10-20%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 8.5 (Raupach);

Morphological Notes

Observation Notes

Detailed site, samples 147-151

Site Notes

cleared brigalow woodland, improved pasture, brown clay

Laboratory Test Results:

Depth cm	pH	1:5 EC dS/m	Ca	Exchangeable Mg	Cations K	Na Cmol (+)/kg	CEC	ESP %	CI mg/kg
0 - 0.1	8.1A	32A	11.8*	9.7	0.4	0.6	22.4*	2.68	20*
0.2 - 0.3	7.4A	189A							190*
0.5 - 0.6	5.2A	910A	2.9*	9.6	0.2	3.7	16.4*	22.56	1680*
0.6 - 0.9	4.8A	1300A							2580*
1.1 - 1.2	4.8A	1390A	1.2*	8	0.2	3.9	13.3*	29.32	2890*

Depth cm	Organic C %	Total N mg/kg	Avail. P mg/kg	Total K mg/kg	Extr. S mg/kg	Cu	Fe	Trace Elements Mn Zn mg/kg		B
0 - 0.1	0.9D	2500E	24J	300	9*	2.15	203	215	3.16	<0.2
0.2 - 0.3										
0.5 - 0.6		610E	<2J	320	46*					
0.2 - 0.9										
1.1 - 1.2		410E	<2J	230	9*					

Project Name: STYX SOUTH COAL PROJECT SOIL

AND LAND CAPABILITY

Project Code: J000019 Site ID: 053 Observation ID: 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth Locality: Oakdean, photos 167, 168
Date Desc.: 12/05/12 Elevation: 30 metres
Map Ref.: GPS S.A. Off Rainfall: 756
Northing/Long.: 7491736 AMG zone: 55 Runoff: Slow
Easting/Lat.: 775836 Datum: GDA94 Drainage: Poorly drained

Geology

Exposure Type: Auger boring Conf. Sub. is Parent. Mat.: No Data
Geol. Ref.: Qpa Substrate Material: Fragmental, Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% Pattern Type: Terraced land (alluvial)

Morph. Type: Flat Relief: 5 metres
Elem. Type: Terrace plain Slope Category: Level
Slope: 0.5 % Aspect: 270 degrees

Surface Soil Condition Cracking

Erosion:

Soil Classification

Microrelief: Melonhole gilgai Vert.(m) 1 Horiz.(m) 20

Australian Soil Classification:

Endohypersodic Crusty Grey Vertosol Non-gravelly Fine Medium
fine Moderately deep

Mapping Unit: So

Principal Profile Form: Ug5.25

Great Soil Group: Grey clay

ASC Confidence:

No analytical data are available but confidence is fair.

Land Class:

Land Class: C1

Site

Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 6.01-12m, Isolated clumps. *Species includes - Acacia harpophylla

Surface Coarse

2-10%, medium gravelly, 6-20mm, subrounded, Conglomerate

Profile

1A1	0 - 0.1 m	Greyish brown (10YR5/2-Moist); , 0-0% ; Fine sandy clay loam; Strong grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Coarse, (10 - 20) mm crack; Many (>5 per 0.01m ²) Medium (2-5mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 7 (Raupach); Abundant, fine (1-2mm) roots; Clear, Smooth change to -
1A2e	0.1 - 0.2 m	Light grey (10YR7/1-Moist); , 0-0% ; Fine sandy clay loam; Strong grade of structure, 10-20 mm, Subangular blocky; Rough-ped fabric; Coarse, (10 - 20) mm crack; Common (1-5 per 100mm ²) Fine (1-2mm) macropores, Moist; Very firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 7 (Raupach); Many, fine (1-2mm) roots; Clear, Smooth change to -
1B1	0.2 - 0.5 m	Brown (10YR5/3-Moist); , 0-0% ; Light clay; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Medium, (5 - 10) mm crack; Common (1-5 per 100mm ²) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 8 (Raupach); Common, fine (1-2mm) roots; Diffuse, Wavy change to -
1B2	0.5 - 0.8 m	Yellowish brown (10YR5/4-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 5-10 mm, Lenticular; Smooth-ped fabric; Medium, (5 - 10) mm crack; Common (1-5 per 100mm ²) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 9 (Raupach); Few, fine (1-2mm) roots; Diffuse, Wavy change to -
1C	0.8 - 1.5 m	Yellowish brown (10YR5/4-Moist); , 0-0% ; Medium heavy clay; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 10-20%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 9 (Raupach); Diffuse, Wavy change to -

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Check site, not sampled

Site Notes

melonhole microrelief, cleared brigalow woodland, improved pasture, brown clay

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 054 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth	Locality: Oakdean, photos 169, 170, melonhole gilgai
Date Desc.: 12/05/12	Elevation: 28 metres
Map Ref.: GPS S.A. Off	Rainfall: 756
Northing/Long.: 7491633 AMG zone: 55	Runoff: Moderately rapid
Easting/Lat.: 775693 Datum: GDA94	Drainage: Imperfectly drained

Geology

Exposure Type: Soil pit	Conf. Sub. is Parent. Mat.: Almost certain or certain
Geol. Ref.: Qpa	Substrate Material: Auger boring, 1 m deep, Fragmental, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Simple-slope	Relief: 5 metres
Elem. Type: Terrace plain	Slope Category: Very gently sloped
Slope: 2 %	Aspect: 270 degrees

Surface Soil Condition Cracking

Erosion: Active, Severe (sheet) Active, Severe (gully)

Soil Classification

Micrelief: Melonhole gilgai Vert.(m) 1 Horiz.(m) 20

Australian Soil Classification:

Endohypersodic Crusty Grey Vertosol Non-gravelly Fine Medium
 fine Moderately deep

Mapping Unit: So
Principal Profile Form: Ug5.25
Great Soil Group: Grey clay

ASC Confidence:

No analytical data are available but confidence is fair.

Land Class: Land Class: C1

Site

Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Acacia harpophylla
 10-20%, medium gravelly, 6-20mm, subrounded, conglomerate

Surface Coarse

Profile

1A1	0 - 0.1 m	Greyish brown (10YR5/2-Moist); , 0-0% ; Fine sandy clay loam; Strong grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Medium, (5 - 10) mm crack; Many (>5 per 0.01m2) Medium (2-5mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 10-20%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 7.5 (Raupach); Abundant, fine (1-2mm) roots; Clear, Smooth change to -
1A2e	0.1 - 0.2 m	Light grey (10YR7/1-Moist); , 0-0% ; Fine sandy clay loam; Moderate grade of structure, 2-5 mm, Subangular blocky; Rough-ped fabric; Medium, (5 - 10) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 10-20%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 7 (Raupach); Many, fine (1-2mm) roots; Clear, Smooth change to -
1B21	0.2 - 0.5 m	Brown (10YR5/3-Moist); , 0-0% ; Light clay; Moderate grade of structure, 5-10 mm, Lenticular; Smooth-ped fabric; Medium, (5 - 10) mm crack; Common (1-5 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 10-20%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 9 (Raupach); Common, fine (1-2mm) roots; Diffuse, Wavy change to -
1B22	0.5 - 0.8 m	; Medium heavy clay; Moist; Very plastic; Normal plasticity; Very sticky; Diffuse, Wavy change to -
1C	0.8 - 1.5 m	; Medium heavy clay; Moist; Very plastic; Normal plasticity; Very sticky; Diffuse, Wavy change to -

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Check site, not sampled

Site Notes

terrace slope, cleared brigalow woodland, improved pasture, brown clay

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 055 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth	Locality: Oakdean, photos 171, 172
Date Desc.: 12/05/12	Elevation: 23 metres
Map Ref.: GPS S.A. Off	Rainfall: 756
Northing/Long.: 7491590 AMG zone: 55	Runoff: Moderately rapid
Easting/Lat.: 775580 Datum: GDA94	Drainage: Imperfectly drained

Geology

ExposureType: Soil pit	Conf. Sub. is Parent. Mat.: No Data
Geol. Ref.: Qa	Substrate Material: Fragmental, Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3%	Pattern Type: Terraced land (alluvial)
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Morph. Type: Simple-slope	Relief: 5 metres
Elem. Type: Terrace plain	Slope Category: Gently inclined
Slope: 3 %	Aspect: 270 degrees

Surface Soil Condition

Erosion: Active, Severe (sheet) Active, Severe (gully)

Soil Classification

Microrelief:

Australian Soil Classification: Episodic Crusty Brown Vertosol Gravelly Fine Medium fine Moderately deep	Mapping Unit: So
ASC Confidence: No analytical data are available but confidence is fair.	Principal Profile Form: Ug5.25
	Great Soil Group: Brown clay
	Land Class: Land Class: C1

Site

Vegetation:

Surface Coarse

Profile

1A1	0 - 0.1 m	; Fine sandy clay loam; Moist; Moderately plastic; Normal plasticity; Moderately sticky; Diffuse, Wavy change to -
1A2e	0.1 - 0.2 m	; Fine sandy clay loam; Moist; Moderately plastic; Normal plasticity; Moderately sticky; Clear, Smooth change to -
1A1	0.2 - 0.5 m	; Light clay; Moist; Very plastic; Normal plasticity; Very sticky; Diffuse, Wavy change to -
1B2	0.5 - 0.8 m	; Medium heavy clay; Moist; Very plastic; Normal plasticity; Very sticky; Diffuse, Wavy change to -
1C	0.8 - 1.5 m	; Medium heavy clay; Moist; Very plastic; Normal plasticity; Very sticky; Diffuse, Wavy change to -

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Check site, not sampled

Site Notes

terrace slope, cleared brigalow woodland, improved pasture, brown clay

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 056 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Crabhole microrelief, Mamelon, photos 191-193
Date Desc.: 14/05/12 **Elevation:** 40 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7488300 AMG zone: 55 **Runoff:** Very slow
Easting/Lat.: 772328 Datum: GDA94 **Drainage:** Poorly drained

Geology

Exposure Type: Soil pit **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Soil pit, 1 m deep, Fragmental, Bedded,
 Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat **Relief:** 5 metres
Elem. Type: Terrace plain **Slope Category:** Level
Slope: 0.5 % **Aspect:** 300 degrees

Surface Soil Condition Hardsetting

Erosion: Stable, Minor (sheet)

Soil Classification

Microrelief: Crabhole gilgai Vert.(m) 0.2 Horiz.(m) 10

Australian Soil Classification:

Vertic Subnatric Brown Sodosol Medium Gravelly Clay-loamy
 Clayey Moderately deep

Mapping Unit: Pv

Principal Profile Form: Dy2.43

Great Soil Group: Grey-brown
 podzolic soil

ASC Confidence:

All necessary analytical data are available.

Land Class: Land Class: C1

Site

Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Acacia harpophylla

Surface Coarse

2-10%, cobbly, 60-200mm, subrounded, Conglomerate

Profile

1A1 0 - 0.1 m Dark grey (10YR4/1-Moist); , 0-0% ; Fine sandy clay loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Medium, (5 - 10) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Ferricrete, coarse fragments; Field pH 6.5 (Raupach); Many, fine (1-2mm) roots; Diffuse, Wavy change to -

1A2e 0.1 - 0.2 m Light grey (10YR7/1-Moist); Mottles, 10YR44, 2-10% , 0-5mm, Distinct; Fine sandy loam; Weak grade of structure, 5-10 mm, Subangular blocky; Earthy fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Ferricrete, coarse fragments; Common (10 - 20 %), Ferromanganiferous, Medium (2 -6 mm), Concretions; Field pH 6.5 (Raupach); Common, fine (1-2mm) roots; Clear, Smooth change to -

1B2 0.2 - 0.4 m Brown (10YR4/3-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 5-10 mm, Lenticular; Rough-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Common (10 - 20 %), Ferromanganiferous, Medium (2 -6 mm), Concretions; Field pH 7.5 (Raupach); Few, fine (1-2mm) roots; Diffuse, Wavy change to -

1B2ss 0.4 - 0.6 m Dark yellowish brown (10YR4/4-Moist); , 0-0% ; Medium clay; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 8.5 (Raupach); Few, fine (1-2mm) roots; Diffuse, Wavy change to -

1C1 0.6 - 0.9 m Dark yellowish brown (10YR4/4-Moist); ; Sandy clay; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 8.5 (Raupach); Diffuse, Wavy change to -

1C2 0.9 - 1.5 m Dark yellowish brown (10YR4/4-Moist); , 0-0% ; Sandy clay; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Few (<1 per 100mm²) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Few cutans, <10% of ped faces or walls coated, distinct; Diffuse, Wavy change to -

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Flat on undulating plain, detailed site, samples 147-151

Site Notes

brown cracking clay, cleared brigalow woodland, native grassland

Laboratory Test Results:

Depth cm	pH	1:5 EC µS/m	Ca	Exchangeable Mg	Cations K	Na Cmol (+)/kg	CEC	ESP %	Cl mg/kg
0 - 0.1	7.3A	140A	5.8*	1.3	0.4	<0.1	7.6*		100*
0.2 - 0.3	8.8A	144A							60*
0.5 - 0.6	9.3A	391A	1*	5.5	<0.1	3	9.6*	31.25	290*
0.8 - 0.9	8.9A	903A							1080*
1.1 - 1.2	8.5A	1050A							1360*

Depth cm	Organic C %	Total N mg/kg	Avail. P mg/kg	Total K mg/kg	Extr. S mg/kg	Cu	Fe	Trace Elements Mn Zn mg/kg		B
0 - 0.1	0.7D	1160E	<2J	<200	13*	<1	73.5	56.2	<1	<0.2
0.2 - 0.3										
0.5 - 0.6		270E	<2J	<200	20*					
0.8 - 0.9										
1.1 - 1.2										

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 057 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Mamelon, photos 194-196
Date Desc.: 14/05/12 **Elevation:** 39 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7488126 AMG zone: 55 **Runoff:** Very slow
Easting/Lat.: 772620 Datum: GDA94 **Drainage:** Poorly drained

Geology

Exposure Type: Soil pit **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Soil pit, 1 m deep, Fragmental, Bedded,
 Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat **Relief:** 5 metres
Elem. Type: Terrace plain **Slope Category:** Level
Slope: 0.5 % **Aspect:** 100 degrees

Surface Soil Condition

Hardsetting
Erosion: Stable, Minor (sheet)

Soil Classification

Micorelief: Crabhole gilgai **Vert.(m)** 0.2 **Horiz.(m)** 10
Australian Soil Classification: Mesotrophic Subnatric Brown Sodosol Medium Gravelly Clay-loamy
Mapping Unit: Pv **Principal** **Profile** **Form:**
 Dy2.43
Great Soil Group: Grey-brown podzolic soil
ASC Confidence: Analytical data are incomplete but reasonable confidence. **Land Class:** Land Class: C1

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation: Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Acacia harpophylla
 2-10%, cobbly, 60-200mm, subrounded, Conglomerate

Surface Coarse

Profile

1A1	0 - 0.1 m	Dark grey (10YR4/1-Moist); , 0-0% ; Fine sandy clay loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 6.5 (Raupach); Many, fine (1-2mm) roots; Diffuse, Wavy change to -
1A2e	0.1 - 0.2 m	Light grey (10YR7/1-Moist); Mottles, 10YR44, 2-10% , 0-5mm, Distinct; Fine sandy loam; Weak grade of structure, 5-10 mm, Subangular blocky; Earthy fabric; Fine, (0 - 5) mm crack; Few (<1 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common (10 - 20 %), Ferromanganiferous, Medium (2 -6 mm), Concretions; Field pH 6.5 (Raupach); Common, fine (1-2mm) roots; Clear, Smooth change to -
1B21	0.2 - 0.4 m	Brown (10YR4/3-Moist); ; Medium heavy clay; Moderate grade of structure, 20-50 mm, Lenticular; Rough-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Common (10 - 20 %), Ferromanganiferous, Medium (2 -6 mm), Concretions; Field pH 7 (Raupach); Few, fine (1-2mm) roots; Diffuse, Wavy change to -
1B22	0.4 - 0.6 m	Dark yellowish brown (10YR4/4-Moist); ; Medium clay; Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 7.5 (Raupach); Diffuse, Wavy change to -
1C1	0.6 - 0.9 m	Dark yellowish brown (10YR4/4-Moist); ; Light clay; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 8.5 (Raupach); Diffuse, Wavy change to -

1C2 0.9 - 1.5 m Dark yellowish brown (10YR4/4-Moist); ; Light clay; Moderate grade of structure, 20-50 mm, Lenticular; Fine, (0 - 5) mm crack; Few (<1 per 100mm²) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 7.5 (Raupach); Diffuse, Wavy change to -

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Flat on undulating plain, detailed site, samples 152-156

Site Notes

melonhole microrelief, brown cracking clay, cleared brigalow woodland, native grassland

Laboratory Test Results:

Depth cm	pH	1:5 EC dS/m	Exchangeable Cations				CEC Cmol (+)/kg	ESP %	Cl mg/kg
			Ca	Mg	K	Na			
0 - 0.1	6.9A	34A						20*	
0.2 - 0.3	8.1A	239A						160*	
0.5 - 0.6	8.8A	709A						810*	
0.8 - 0.9	8.5A	818A							
1.1 - 1.2	8.1A	799A						1130*	

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 058 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Mamelon, photos 197-199
Date Desc.: 14/05/12 **Elevation:** 35 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7487973 AMG zone: 55 **Runoff:** Slow
Easting/Lat.: 772832 Datum: GDA94 **Drainage:** Poorly drained

Geology

Exposure Type: Auger boring **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Soil pit, 1 m deep, Fragmental, Bedded,
 Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat **Relief:** 5 metres
Elem. Type: Terrace plain **Slope Category:** Level
Slope: 0.5 % **Aspect:** 100 degrees

Surface Soil Condition Hardsetting

Erosion: Partial, Severe (sheet) Active, Present (stbank)

Soil Classification **Micorelief:** Normal gilgai Vert.(m) 0.3 Horiz.(m) 5

Australian Soil Classification: Vertic Subnatric Brown Sodosol Medium Slightly gravelly Clay-loamy Clayey Moderately deep **Mapping Unit:** Pv
Principal Profile Form: Dy2.43
Great Soil Group: Grey-brown podzolic soil
ASC Confidence: Analytical data are incomplete but reasonable confidence. **Land Class:** C2

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation: Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Acacia harpophylla
 2-10%, coarse gravelly, 20-60mm, subrounded, Ferricrete

Surface Coarse

Profile

1A1	0 - 0.1 m	Dark greyish brown (10YR4/2-Moist); , 0-0% ; Fine sandy clay loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Ferricrete, coarse fragments; Field pH 7.5 (Raupach); Many, fine (1-2mm) roots; Diffuse, Wavy change to -
1A3	0.1 - 0.2 m	Dark greyish brown (10YR4/2-Moist); , 0-0% ; Fine sandy loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; Field pH 7.5 (Raupach); Common, fine (1-2mm) roots; Diffuse, Wavy change to -
1B21	0.2 - 0.4 m	Brown (10YR4/3-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 5-10 mm, Lenticular; Rough-ped fabric; Fine, (0 - 5) mm crack; Many (>5 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 7.5 (Raupach); Common, fine (1-2mm) roots; Diffuse, Wavy change to -
1B22	0.4 - 0.6 m	Dark yellowish brown (10YR4/4-Moist); , 0-0% ; Medium clay; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Many cutans, >50% of ped faces or walls coated, distinct; Field pH 7.5 (Raupach); Common, fine (1-2mm) roots; Diffuse, Wavy change to -
1C1	0.6 - 0.9 m	Dark yellowish brown (10YR4/4-Moist); , 0-0% ; Light clay; Moderate grade of structure, 5-10 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 7.5 (Raupach); Few, fine (1-2mm) roots; Diffuse, Wavy change to -
1C2	0.9 - 1.5 m	Dark yellowish brown (10YR4/4-Moist); , 0-0% ; Light clay; Moderate grade of structure, 10-20 mm,

Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm²) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Common (10 - 20 %), Manganiferous, Medium (2 -6 mm), Concretions; Field pH 7.5 (Raupach); Diffuse, Wavy change to -

Morphological Notes

Observation Notes

Flat on undulating plain, detailed site, samples 157-161

Site Notes

melonhole microrelief, brown cracking clay, cleared brigalow woodland, native grassland

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY

Project Code: J000019 Site ID: 058 Observation 1

Agency Name: Horizon Soil Survey (NT)

Laboratory Test Results:

Depth cm	pH	1:5 EC dS/m	Exchangeable Cations				CEC Cmol (+)/kg	ESP %	CI mg/kg
			Ca	Mg	K	Na			
0 - 0.1	8.1A	178A						90*	
0.2 - 0.3	8.4A	641A						880*	
0.5 - 0.6	8.3A	936A						1410*	
0.8 - 0.9	8A	954A						1500*	
1.1 - 1.2	8A	700A						1380*	

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 059 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth	Locality: Mamelon, photos 200-201
Date Desc.: 14/05/12	Elevation: 36 metres
Map Ref.: GPS S.A. Off	Rainfall: 756
Northing/Long.: 7487938 AMG zone: 55	Runoff: Very slow
Easting/Lat.: 772814 Datum: GDA94	Drainage: Very poorly drained

Geology

Exposure Type: Auger boring	Conf. Sub. is Parent. Mat.: Almost certain or certain
Geol. Ref.: Qpa	Substrate Material: Existing vertical exposure, 1 m deep, Fragmental, Bedded, Porous, Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Open depression (vale)	Relief: 5 metres
Elem. Type: Drainage depression	Slope Category: Level
Slope: 0.5 %	Aspect: 100 degrees

Surface Soil Condition Hardsetting

Erosion: Active, Present (stbank)

Soil Classification

Microrelief: Normal gilgai Vert.(m) 0.3 Horiz.(m) 10

Australian Soil Classification:

Vertic Subnatric Brown Sodosol Medium Slightly gravelly Clay-loamy Clayey Moderately deep

Mapping Unit: Pv
Principal Profile Form: Dy2.43
Great Soil Group: Grey-brown podzolic soil

ASC Confidence:

No analytical data are available but confidence is fair.

Land Class: Land Class: C2

Site

Limited clearing, for example selective logging

Vegetation:

Tall Strata - Tree, 6.01-12m, Mid-dense. *Species includes - Acacia harpophylla

Surface Coarse

2-10%, coarse gravelly, 20-60mm, subrounded, Conglomerate

Profile

1A1	0 - 0.1 m	Greyish brown (10YR5/2-Moist); , 0-0% ; Fine sandy clay loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 10-20%, medium gravelly, 6-20mm, rounded, dispersed, Conglomerate, coarse fragments; Field pH 6 (Raupach); Many, fine (1-2mm) roots; Diffuse, Wavy change to -
1A3	0.1 - 0.2 m	Light grey (10YR7/1-Moist); , 0-0% ; Fine sandy loam; Weak grade of structure, 5-10 mm, Subangular blocky; Earthy fabric; Fine, (0 - 5) mm crack; Few (<1 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 10-20%, medium gravelly, 6-20mm, rounded, dispersed, Ferricrete, coarse fragments; Field pH 7.5 (Raupach); Common, fine (1-2mm) roots; Diffuse, Wavy change to -
1B21	0.2 - 0.4 m	Yellowish brown (10YR5/4-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Medium, (5 - 10) mm crack; Many (>5 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 2-10%, medium gravelly, 6-20mm, rounded, dispersed, Ferricrete, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 7.5 (Raupach); Common, fine (1-2mm) roots; Diffuse, Wavy change to -
1B22	0.4 - 0.6 m	Yellowish brown (10YR5/4-Moist); , 0-0% ; Medium clay; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Medium, (5 - 10) mm crack; Few (<1 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 2-10%, medium gravelly, 6-20mm, rounded, dispersed, Ferricrete, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 8 (Raupach); Few, fine (1-2mm) roots; Diffuse, Wavy change to -
1C1	0.6 - 0.9 m	Brown (10YR5/3-Moist); , 0-0% ; Light clay; Moist; Very plastic; Normal plasticity; Very sticky; 2-10%, medium gravelly, 6-20mm, rounded, dispersed, Ferricrete, coarse fragments; Few, medium (2-5mm) roots; Diffuse, Wavy change to -

1C2 0.9 - 1.5 m , 0-0% ; Light clay; Moist; Very plastic; Normal plasticity; Very sticky; 2-10%, medium gravelly, 6-20mm, rounded, dispersed, Ferricrete, coarse fragments; Diffuse, Wavy change to -

Morphological Notes

Observation Notes

Drainage depression on undulating plain, check site, not sampled

Site Notes

melonhole microrelief, brown cracking clay, cleared brigalow woodland, native grassland

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 060 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth	Locality: Mamelon, photos 202-203
Date Desc.: 14/05/12	Elevation: 28 metres
Map Ref.: GPS S.A. Off	Rainfall: 756
Northing/Long.: 7489151 AMG zone: 55	Runoff: Slow
Easting/Lat.: 773553 Datum: GDA94	Drainage: Poorly drained

Geology

Exposure Type: Existing vertical exposure	Conf. Sub. is Parent. Mat.: Almost certain or certain
Geol. Ref.: Qpa	Substrate Material: Existing vertical exposure, 1 m deep, Fragmental, Bedded, Porous,

Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Open depression (vale)	Relief: 5 metres
Elem. Type: Drainage depression	Slope Category: Level
Slope: 0.5 %	Aspect: 160 degrees

Surface Soil Condition

Erosion: Active, Moderate scalding (scald) Active, Severe (sheet) Active, Severe (gully) Active, Present (stbank)	Microrelief: Crabhole gilgai	Vert.(m) 0.2
Horiz.(m) 10	Vert.(m)	Horiz.(m) 10

Soil Classification

Australian Soil Classification: Vertic Subnatric Brown Sodosol Medium Slightly gravelly Clay-loamy Clayey Moderately deep	Mapping Unit: Pv
ASC Confidence: No analytical data are available but confidence is fair.	Principal Profile Form: Dy2.43
	Great Soil Group: Grey-brown podzolic soil
	Land Class: Land Class: D

Site: Complete clearing. Pasture, native or improved, but never cultivated

Vegetation: Tall Strata - Tree, 12.01-20m, Isolated plants. *Species includes - Acacia harpophylla

Surface Coarse: 2-10%, medium gravelly, 6-20mm, subrounded, Conglomerate

Profile

1A1	0 - 0.1 m	Greyish brown (10YR5/2-Moist); , 0-0% ; Fine sandy clay loam; Moderate grade of structure, 2-5 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Many (>5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 7.5 (Raupach); Abundant, fine (1-2mm) roots; Diffuse, Wavy change to -
1A2e	0.1 - 0.2 m	Light grey (10YR7/1-Moist); Mottles, 10YR54, 2-10% , 0-5mm, Distinct; Fine sandy loam; Weak grade of structure, 2-5 mm, Subangular blocky; Earthy fabric; Fine, (0 - 5) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 8.5 (Raupach); Many, fine (1-2mm) roots; Clear, Wavy change to -
1B21	0.2 - 0.4 m	Yellowish brown (10YR5/4-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 10-20 mm, Lenticular; Rough-ped fabric; Medium, (5 - 10) mm crack; Common (1-5 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Few (2 - 10 %), Calcareous, Medium (2 -6 mm), Nodules; Soil matrix is Slightly calcareous; Field pH 8.5 (Raupach); Few, fine (1-2mm) roots; Diffuse, Wavy change to -
1B22	0.4 - 0.6 m	Yellowish brown (10YR5/4-Moist); , 0-0% ; Medium clay; Moderate grade of structure, 2-5 mm, Lenticular; Smooth-ped fabric; Medium, (5 - 10) mm crack; Few (<1 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; Few (2 - 10 %), Calcareous, Medium (2 -6 mm), Nodules; Soil matrix is Slightly calcareous; Field pH 9 (Raupach); Few, fine (1-2mm) roots; Diffuse, Wavy change to -

1C1 0.6 - 0.9 m Brown (10YR5/3-Moist); , 0-0% ; Light clay; Moderate grade of structure, 5-10 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm²) Very fine (0.075-1mm) macropores, Moist; Very plastic; Normal plasticity; Very sticky; Diffuse, Wavy change to -

1C2 0.9 - 1.5 m ; Light clay; Moist; Very plastic; Normal plasticity; Very sticky; Diffuse, Wavy change to -

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Drainage depression on undulating plain, check site not sampled; similar to site 030
melonhole microrelief, brown cracking clay, cleared brigalow woodland, native grassland

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 061 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth
Date Desc.: 14/05/12
Map Ref.: GPS S.A. Off
Northing/Long.: 7487565 AMG zone: 55
Easting/Lat.: 773241 Datum: GDA94

Locality: Mamelon, photos 204-206, melonhole microrelief
Elevation: 36 metres
Rainfall: 756
Runoff: Slow
Drainage: Poorly drained

Geology

Exposure Type: Soil pit
Geol. Ref.: Qpa
Conf. Sub. is Parent. Mat.: Almost certain or certain
Substrate Material: Soil pit, 1 m deep, Fragmental, Bedded, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat
Elem. Type: Terrace plain
Slope: 0.5 %

Relief: 5 metres
Slope Category: Level
Aspect: 270 degrees

Surface Soil Condition Hardsetting

Erosion: Active, Minor (sheet) Active, Minor (rill)

Soil Classification

Australian Soil Classification: Vertic Subnatric Brown Sodosol Medium Slightly gravelly Clay-loamy Clayey Moderately deep
ASC Confidence: Analytical data are incomplete but reasonable confidence.

Microrelief: Melonhole gilgai Vert.(m) 1 Horiz.(m) 20
Mapping Unit: Pv
Principal Profile Form: Dy2.43
Great Soil Group: Grey-brown podzolic soil
Land Class: C2

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Acacia harpophylla

Surface Coarse

No surface coarse fragments

Profile

1A1 0 - 0.1 m Dark grey (2.5Y4/1-Moist); , 0-0% ; Fine sandy clay loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; Field pH 6.5 (Raupach); Many, fine (1-2mm) roots; Diffuse, Wavy change to -

1A2e 0.1 - 0.2 m Grey (2.5Y6/1-Moist); Mottles, 7.5YR4/4, 10-20% , 0-5mm, Distinct; Fine sandy clay loam; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; Field pH 6.5 (Raupach); Common, fine (1-2mm) roots; Clear, Wavy change to -

1B21 0.2 - 0.4 m Dark greyish brown (2.5Y4/2-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 5-10 mm, Lenticular; Smooth-ped fabric; Medium, (5 - 10) mm crack; Few (<1 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 8 (Raupach); Few, fine (1-2mm) roots; Clear, Wavy change to -

1B22 0.4 - 0.6 m Dark greyish brown (2.5Y4/3-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 5-10 mm, Lenticular; Smooth-ped fabric; Medium, (5 - 10) mm crack; Common (1-5 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Soil matrix is Slightly calcareous; Field pH 8 (Raupach); Few, fine (1-2mm) roots; Diffuse, Wavy change to -

1C1 0.6 - 1 m Dark greyish brown (2.5Y4/3-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Medium, (5 - 10) mm crack; Common (1-5 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Common (10 - 20 %), Manganiferous, Medium (2 -6 mm), Concretions; Field pH 6 (Raupach); Diffuse, Wavy change to -

1C2 1 - 1.5 m Dark greyish brown (2.5Y4/3-Moist); , 0-0% ; Medium heavy clay; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm2) Very fine (0.075-1mm) macropores, Moist;

Very firm consistence; Very plastic; Normal plasticity; Very sticky; Common (10 - 20 %), Manganiferous, Medium (2 -6 mm), Concretions; Field pH 6 (Raupach); Diffuse, Wavy change to -

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Flat on undulating plain, detailed site, samples 162-166

Site Notes

melonhole microrelief, brown cracking clay, cleared brigalow woodland, native grassland

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY

Project Code: J000019 Site ID: 061 Observation 1

Agency Name: Horizon Soil Survey (NT)

Laboratory Test Results:

Depth	pH	1:5 EC	Exchangeable Cations				CEC	ESP	CI
cm		dS/m	Ca	Mg	K	Na	Cmol (+)/kg	%	mg/kg
0 - 0.1	6.2A	81A							50*
0.2 - 0.3	7A	149A							100*
0.5 - 0.6	8A	525A							670*
0.8 - 0.9	8A	683A							1120*
1.1 - 1.2	7.6A	697A							910*

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 062 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Mamelon, photos 207-209, melonhole microrelief
Date Desc.: 14/05/12 **Elevation:** 32 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7487636 AMG zone: 55 **Runoff:** Very slow
Easting/Lat.: 772934 Datum: GDA94 **Drainage:** Very poorly drained

Geology

Exposure Type: Soil pit **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Soil pit, 1 m deep, Fragmental, Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat **Relief:** 5 metres
Elem. Type: Swamp **Slope Category:** Level
Slope: 0.5 % **Aspect:** 90 degrees

Surface Soil Condition Hardsetting

Erosion: Active, Minor scalding (scald) Active, Minor (sheet) **Microrelief:** Melonhole gilgai Vert.(m) 1 Horiz.(m) 20

Soil Classification

Australian Soil Classification: Vertic Subnatric Brown Sodosol Medium Slightly gravelly Clay-loamy Clayey Moderately deep **Mapping Unit:** Pv
Principal Profile Form: Dy2.43
Great Soil Group: Grey-brown podzolic soil
ASC Confidence: Analytical data are incomplete but reasonable confidence. **Land Class:** Land Class: C2

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Hakea arborescens, Acacia harpophylla
 10-20%, medium gravelly, 6-20mm, subrounded, Conglomerate

Surface Coarse

Profile

1A1	0 - 0.1 m	Dark grey (10YR4/1-Moist); , 0-0% ; Fine sandy loam; Moderate grade of structure, 2-5 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Few (<1 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 10-20%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 6 (Raupach); Many, fine (1-2mm) roots; Diffuse, Wavy change to -
1A2e	0.1 - 0.3 m	Light grey (10YR7/1-Moist); Mottles, 7.5YR44, 10-20% , 0-5mm, Distinct; Fine sandy loam; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common (10 - 20 %), Ferromanganiferous, Medium (2 -6 mm), Concretions; Field pH 6.5 (Raupach); Common, fine (1-2mm) roots; Abrupt, Smooth change to -
1B21	0.3 - 0.4 m	Brown (10YR4/3-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 5-10 mm, Polyhedral; Rough-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 7.5 (Raupach); Few, very fine (0-1mm) roots; Diffuse, Wavy change to -
1B22	0.4 - 0.6 m	Dark yellowish brown (10YR4/4-Moist); , 0-0% ; Medium clay; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 7.5 (Raupach); Diffuse, Wavy change to -

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 062 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

- 1B3 0.6 - 0.8 m Dark yellowish brown (10YR4/4-Moist); , 0-0% ; Medium clay; Moderate grade of structure, 2-5 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 7.5 (Raupach); Diffuse, Wavy change to -
- 1C1 0.8 - 1.1 m Dark yellowish brown (10YR4/4-Moist); , 0-0% ; Medium clay; Moderate grade of structure, 5-10 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 7.5 (Raupach); Diffuse, Wavy change to -
- 1C2 1.1 - 1.5 m , 0-0% ; Medium clay; Moderate grade of structure, 5-10 mm, Lenticular; Earthy fabric; Few (<1 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Few cutans, <10% of ped faces or walls coated, faint; Field pH 7.5 (Raupach); Diffuse, Wavy change to -

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Swamp on undulating plain, detailed site, samples 167-171

Site Notes

melonhole microrelief, brown cracking clay, cleared brigalow woodland, native grassland

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 062 **Observation** 1
Agency Name: Horizon Soil Survey (NT)

Laboratory Test Results:

Depth	pH	1:5 EC	Exchangeable Cations	CEC	ESP	CI
cm		dS/m	Ca Mg K Na	cmol (+)/kg	%	mg/kg
0 - 0.1	6A	36A				30*
0.2 - 0.3	8.1A	254A				240*
0.5 - 0.6	7.7A	555A				660*
0.8 - 0.9	7.9A	769A				980*
1.1 - 1.2	8A	691A				910*

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 063 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth	Locality: Mamelon, photos 210-212
Date Desc.: 14/05/12	Elevation: 23 metres
Map Ref.: GPS S.A. Off	Rainfall: 756
Northing/Long.: 7487726 AMG zone: 55	Runoff: Slow
Easting/Lat.: 772594 Datum: GDA94	Drainage: Poorly drained

Geology

Exposure Type: Existing vertical exposure	Conf. Sub. is Parent. Mat.: Almost certain or certain
Geol. Ref.: Qpa	Substrate Material: Existing vertical exposure, 1 m deep, Fragmental, Bedded, Porous,

Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Open depression (vale)	Relief: 5 metres
Elem. Type: Drainage depression	Slope Category: Level
Slope: 2 %	Aspect: 100 degrees

Surface Soil Condition Hardsetting

Erosion: Active, Severe (sheet) Active, Severe (gully)

Soil Classification

Microrelief: Melonhole gilgai Vert.(m) Horiz.(m)

Australian Soil Classification:

Vertic Subnatic Brown Sodosol Medium Slightly gravelly Clay-loamy Clayey Moderately deep

Mapping Unit: Pv
Principal Profile Form: Dy2.43
Great Soil Group: Grey-brown podzolic soil
Land Class: C2

ASC Confidence:

No analytical data are available but confidence is fair.

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Eucalyptus crebra

Surface Coarse

10-20%, medium gravelly, 6-20mm, subrounded, Conglomerate

Profile

1A1	0 - 0.1 m	Dark grey (10YR4/1-Moist); , 0-0% ; Fine sandy loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Many (>5 per 100mm2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 10-20%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 7 (Raupach); Many, fine (1-2mm) roots; Diffuse, Wavy change to -
1A2e	0.1 - 0.3 m	Light grey (10YR7/1-Moist); Mottles, 7.5YR44, 10-20% , 0-5mm, Distinct; Fine sandy loam; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 10-20%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common (10 - 20 %), Ferromanganiferous, Medium (2 -6 mm), Concretions; Field pH 7.5 (Raupach); Common, fine (1-2mm) roots; Abrupt, Smooth change to -
1B21	0.3 - 0.4 m	Brown (10YR4/3-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 5-10 mm, Polyhedral; Rough-ped fabric; Medium, (5 - 10) mm crack; Few (<1 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 10-20%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 8 (Raupach); Few, very fine (0-1mm) roots; Diffuse, Wavy change to -
1B22	0.4 - 0.6 m	Dark yellowish brown (10YR4/4-Moist); , 0-0% ; Medium clay; Moderate grade of structure, 5-10 mm, Lenticular; Smooth-ped fabric; Medium, (5 - 10) mm crack; Few (<1 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 10-20%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 8 (Raupach); Few, very fine (0-1mm) roots; Diffuse, Wavy change to -

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 063 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

1C1 0.6 - 0.8 m Dark yellowish brown (10YR4/4-Moist); , 0-0% ; Medium clay; Moderate grade of structure, 2-5 mm, Lenticular; Smooth-ped fabric; Medium, (5 - 10) mm crack; Few (<1 per 100mm²) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 10-20%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Diffuse, Wavy change to -

1C2 0.8 - 1.5 m Dark yellowish brown (10YR4/4-Moist); , 0-0% ; Medium clay; Moist; Very plastic; Normal plasticity; Very sticky; 10-20%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Diffuse, Wavy change to -

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Drainage depression on undulating plain, ncheck site not sampled

Site Notes

drainage line on terrace, eroded brown cracking clay, cleared brigalow woodland, native grassland

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 064 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Mamelon, photos 313-214
Date Desc.: 14/05/12 **Elevation:** 33 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7487733 AMG zone: 55 **Runoff:** Slow
Easting/Lat.: 772436 Datum: GDA94 **Drainage:** Imperfectly drained

Geology

Exposure Type: Soil pit **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Soil pit, 1 m deep, Fragmental, Bedded,
 Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat **Relief:** 5 metres
Elem. Type: Terrace plain **Slope Category:** Level
Slope: 0.5 % **Aspect:** 90 degrees

Surface Soil Condition Hardsetting

Erosion:

Soil Classification

Microrelief: Crabhole gilgai Vert.(m) 0.2 Horiz.(m) 20

Australian Soil Classification:

Vertic Subnatric Brown Sodosol Medium Slightly gravelly Clay-loamy Clayey Moderately deep

Mapping Unit: Pv
Principal Profile Form: Dy2.43
Great Soil Group: Grey-brown podzolic soil

ASC Confidence:

Analytical data are incomplete but reasonable confidence.

Land Class: Land Class: C2

Site Limited clearing, for example selective logging

Vegetation:

Tall Strata - Tree, 6.01-12m, Sparse. *Species includes - Eucalyptus crebra

Surface Coarse

0-2%, medium gravelly, 6-20mm, subrounded, Ferricrete

Profile

1A1	0 - 0.1 m	Dark grey (2.5Y4/1-Moist); , 0-0% ; Fine sandy loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; Field pH 6 (Raupach); Many, fine (1-2mm) roots; Diffuse, Wavy change to -
1A2e	0.1 - 0.3 m	Light grey (2.5Y7/1-Moist); Mottles, 10YR44, 2-10% , 0-5mm, Distinct; Fine sandy loam; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Few (<1 per 0.01m2) Fine (1-2mm) macropores, Moist; Weak consistence; Moderately plastic; Normal plasticity; Moderately sticky; Common (10 - 20 %), Ferromanganiferous, Medium (2 -6 mm), Concretions; Field pH 6 (Raupach); Common, fine (1-2mm) roots; Clear, Wavy change to -
1B1	0.3 - 0.4 m	Dark greyish brown (2.5Y4/2-Moist); Mottles, 7.5YR44, 10-20% , 0-5mm, Distinct; Medium heavy clay; Moderate grade of structure, 5-10 mm, Polyhedral; Rough-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Few (2 - 10 %), Ferromanganiferous, Medium (2 -6 mm), Concretions; Field pH 7.5 (Raupach); Common, fine (1-2mm) roots; Diffuse, Wavy change to -
1B2	0.4 - 0.6 m	Dark greyish brown (2.5Y4/2-Moist); Mottles, 7.5YR44, 10-20% , 5-15mm, Distinct; Medium clay; Moderate grade of structure, 5-10 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Soil matrix is Slightly calcareous; Field pH 8.5 (Raupach); Few, fine (1-2mm) roots; Diffuse, Wavy change to -
1C1	0.6 - 0.8 m	Dark greyish brown (2.5Y4/2-Moist); , 0-0% ; Medium clay; Moderate grade of structure, 5-10 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Soil matrix is Slightly calcareous; Field pH 8.5 (Raupach); Few, fine (1-2mm) roots; Diffuse, Wavy change to -

1C2 0.8 - 1.5 m Dark greyish brown (2.5Y4/2-Moist); , 0-0% ; Medium clay; Moderate grade of structure, 5-10 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 7.5 (Raupach); Diffuse, Wavy change to -

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Flat on undulating plain, detailed site, samples 172-176

Site Notes

brown cracking clay, cleared ironbark woodland, native grassland

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 Site ID: 064 Observation 1
Agency Name: Horizon Soil Survey (NT)

Laboratory Test Results:

Depth	pH	1:5 EC	Exchangeable Cations				CEC	ESP	CI
cm		dS/m	Ca	Mg	K	Na	Cmol (+)/kg	%	mg/kg
0 - 0.1	6A	23A							10*
0.2 - 0.3	6.6A	28A							10*
0.5 - 0.6	5.6A	308A							360*
0.8 - 0.9	5.2A	565A							840*
1.1 - 1.2	5.6A	375A							500*

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 065 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Bar H, photos 215-217
Date Desc.: 14/05/12 **Elevation:** 35 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7487816 AMG zone: 55 **Runoff:** Slow
Easting/Lat.: 771794 Datum: GDA94 **Drainage:** Imperfectly drained

Geology

Exposure Type: Soil pit **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Soil pit, 1 m deep, Fragmental, Bedded,
 Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat **Relief:** 5 metres
Elem. Type: Terrace plain **Slope Category:** Level
Slope: 0.5 % **Aspect:** 300 degrees

Surface Soil Condition Hardsetting

Erosion:

Soil Classification **Microrelief:** Crabhole gilgai Vert.(m) 0.2 Horiz.(m) 10

Australian Soil Classification:

Vertic Hypernatric Brown Sodosol Medium Slightly gravelly Clay-loamy Clayey Moderately deep
Mapping Unit: Pv
Principal Profile Form: Dy2.43
Great Soil Group: Grey-brown podzolic soil
ASC Confidence: All necessary analytical data are available. **Land Class:** C2

Site Limited clearing, for example selective logging

Vegetation:

Tall Strata - Tree, 12.01-20m, Sparse. *Species includes - Eucalyptus crebra
 0-2%, medium gravelly, 6-20mm, subrounded, Conglomerate

Surface Coarse

Profile

1A1 0 - 0.1 m Dark grey (10YR4/1-Moist); , 0-0% ; Fine sandy loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Many (>5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 6.5 (Raupach); Many, fine (1-2mm) roots; Diffuse, Wavy change to -

1A2e 0.1 - 0.2 m Light brownish grey (10YR6/2-Moist); Mottles, 10YR44, 2-10% , 0-5mm, Distinct; Fine sandy loam; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 2-10%, fine gravelly, 2-6mm, subrounded, dispersed, Conglomerate, coarse fragments; Few (2 - 10 %), Ferromanganiferous, Medium (2 -6 mm), Concretions; Field pH 6.5 (Raupach); Many, fine (1-2mm) roots; Clear, Wavy change to -

1B1 0.2 - 0.3 m Dark greyish brown (10YR4/2-Moist); Mottles, 7.5YR44, 10-20% , 0-5mm, Distinct; Medium heavy clay; Moderate grade of structure, 5-10 mm, Polyhedral; Rough-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Common (10 - 20 %), Ferromanganiferous, Medium (2 -6 mm), Concretions; Field pH 6.6 (Raupach); Common, fine (1-2mm) roots; Diffuse, Wavy change to -

1B21 0.3 - 0.6 m Brown (10YR4/3-Moist); , 0-0% ; Medium clay; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 10-20%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 7.5 (Raupach); Common, fine (1-2mm) roots; Diffuse, Wavy change to -

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 065 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

1B22	0.6 - 0.9 m	Brown (10YR4/3-Moist); , 0-0% ; Medium clay; Moderate grade of structure, 5-10 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 10-20%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 8 (Raupach); Few, fine (1-2mm) roots; Diffuse, Wavy change to -
1C1	0.9 - 1.1 m	Brown (10YR4/3-Moist); , 0-0% ; Medium clay; Moderate grade of structure, 5-10 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 10-20%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 7 (Raupach); Few, fine (1-2mm) roots; Diffuse, Wavy change to -
1C2	1.1 - 1.5 m	Brown (10YR4/3-Moist); , 0-0% ; Medium clay; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 10-20%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 7 (Raupach); Diffuse, Wavy change to -

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Flat on undulating plain, cleared ironbark woodland, detailed site, samples 177-181

Site Notes

melonhole microrelief, cleared brigalow woodland, cultivated land

Laboratory Test Results:

Depth cm	pH	1:5 EC dS/m	Ca	Exchangeable Mg	Cations K	Na	CEC Cmol (+)/kg	ESP %	Cl mg/kg
0 - 0.1	6A	95A	2*	3	<1	0.6	5.6*	10.71	90*
0.2 - 0.3	6.7A	92A							60*
0.5 - 0.6	7.7A	585A	1.7*	6.3	<0.1	3.8	11.8*	32.20	740*
0.8 - 0.9	8.4A	685A							950*
1.1 - 1.2	9.2A	688A	3.6*	5.7	<0.1	2.1	11.5*	18.26	860*

Depth cm	Organic C %	Total N mg/kg	Avail. P mg/kg	Total K mg/kg	Extr. S mg/kg	Cu	Fe	Trace Elements Mn Zn mg/kg		B
0 - 0.1	0.5D	750E	<2J	<200	6*	1.67	145	182	<1	<0.2
0.2 - 0.3			<2J	<200	25*					
0.5 - 0.6										
0.8 - 0.9										
1.1 - 1.2			<2J	<200	19*					

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 066 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Mamelon, photos 218-220
Date Desc.: 14/05/12 **Elevation:** 35 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7488996 AMG zone: 55 **Runoff:** Moderately rapid
Easting/Lat.: 770815 Datum: GDA94 **Drainage:** Moderately well drained

Geology

Exposure Type: Soil pit **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Soil pit, 1 m deep, Fragmental, Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat **Relief:** 5 metres
Elem. Type: Terrace plain **Slope Category:** Level
Slope: 0.5 % **Aspect:** 100 degrees

Surface Soil Condition Hardsetting

Erosion:

Soil Classification

Microrelief: Normal gilgai Vert.(m) 0.2 Horiz.(m) 10

Australian Soil Classification:

Bleached-Vertic Eutrophic Brown Chromosol Medium Non-gravelly
 Clay-loamy Clayey Moderately deep

Mapping Unit: BI
Principal Profile Form: Dy3.83
Great Soil Group: Grey-brown podzolic soil
Land Class: Land Class: A

ASC Confidence:
 All necessary analytical data are available.

Site Complete clearing. Pasture, native or improved, cultivated at some stage

Vegetation:

Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Acacia harpophylla

Surface Coarse

No surface coarse fragments

Profile

1A1 0 - 0.1 m Dark greyish brown (10YR4/1-Moist); , 0-0% ; Fine sandy loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; Field pH 6 (Raupach); Abundant, fine (1-2mm) roots; Diffuse, Wavy change to -

1A2e 0.1 - 0.2 m Light brownish grey (10YR6/2-Moist); Mottles, 10YR44, 2-10% , 0-5mm, Faint; Fine sandy loam; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; Few (2 - 10 %), Ferromanganiferous, Fine (0 - 2 mm), Concretions; Field pH 6.5 (Raupach); Common, fine (1-2mm) roots; Clear, Wavy change to -

1B21ss 0.2 - 0.3 m Dark greyish brown (10YR4/2-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 5-10 mm, Polyhedral; Rough-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm2) Fine (1-2mm) macropores, Moist; Strong consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Few (2 - 10 %), Ferromanganiferous, Medium (2 -6 mm), Concretions; Cultivation pan, Uncemented, Continuous, Massive; Field pH 7 (Raupach); Common, fine (1-2mm) roots; Diffuse, Wavy change to -

1B22ss 0.3 - 0.5 m Brown (10YR4/3-Moist); , 0-0% ; Medium clay; Moderate grade of structure, 5-10 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm2) Fine (1-2mm) macropores, Moist; Strong consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Soil matrix is Slightly calcareous; Field pH 8.5 (Raupach); Common, fine (1-2mm) roots; Diffuse, Wavy change to -

1B3 0.5 - 0.8 m Brown (10YR4/3-Moist); , 0-0% ; Medium clay; Moderate grade of structure, 5-10 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm2) Fine (1-2mm) macropores, Moist; Strong consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Few (2 - 10 %), Calcareous, Fine (0 - 2 mm), Soft segregations; Field pH 8 (Raupach); Common, fine (1-2mm) roots; Diffuse, Wavy change to -

1C1	0.8 - 1.1 m	Dark yellowish brown (10YR4/4-Moist); , 0-0% ; Medium clay; Moderate grade of structure, 5-10 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm2) Fine (1-2mm) macropores, Moist; Strong consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Few (2 - 10 %), Calcareous, Medium (2 -6 mm), Soft segregations; Field pH 8 (Raupach); Common, fine (1-2mm) roots; Diffuse, Wavy change to -
1C2	1.1 - 1.5 m	Dark yellowish brown (10YR4/4-Moist); , 0-0% ; Medium clay; Moderate grade of structure, 5-10 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm2) Fine (1-2mm) macropores, Moist; Strong consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 8 (Raupach); Common, fine (1-2mm) roots; Diffuse,

Morphological Notes

Observation Notes

Flat on undulating plain, cultivated land, detailed site, samples 182-186

Site Notes

brown cracking clay, cleared for cropping, normal microrelief, keyed out as a vertosol, although there is a thin A horizon, because it doesn't fit into Sodosol and the vertic properties are well developed

Laboratory Test Results:

Depth cm	pH	1:5 EC dS/m	Ca	Exchangeable Mg	Cations K	Na Cmol (+)/kg	CEC	ESP %	Cl mg/kg
0 - 0.1	6A	50A	5.3*	1.4	0.4	<0.1	7.2*		20*
0.2 - 0.3	7.7A	43A							<10*
0.5 - 0.6	8.2A	88A	12.3*	6.5	0.1	0.5	19.4*	2.58	30*
0.8 - 0.9	8.1A	118A							70*
1.1 - 1.2	7.9A	101A	7.9*	5.2	0.2	0.5	13.8*	3.62	100*

Depth cm	Organic C %	Total N mg/kg	Avail. P mg/kg	Total K mg/kg	Extr. S mg/kg	Cu	Fe	Trace Elements Mn Zn mg/kg		B
0 - 0.1	0.8D	1980E	35J	410	8*	2.32	245	238	3.74	<0.2
0.2 - 0.3										
0.5 - 0.6		420E	<2J	<200	10*					
0.8 - 0.9										
1.1 - 1.2		310E	<2J	<200	7*					

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 067 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Bar H, photos 221-223, melonhole microrelief
Date Desc.: 14/05/12 **Elevation:** 32 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7489503 AMG zone: 55 **Runoff:** Slow
Easting/Lat.: 771709 Datum: GDA94 **Drainage:** Moderately well drained

Geology

Exposure Type: Soil pit **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Soil pit, 1 m deep, Fragmental, Bedded,
 Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat **Relief:** 5 metres
Elem. Type: Terrace plain **Slope Category:** Level
Slope: 0.5 % **Aspect:** 180 degrees

Surface Soil Condition Surface crust

Erosion: Stable, Minor (sheet)

Soil Classification

Microrelief: Normal gilgai Vert.(m) 0.3 Horiz.(m) 5

Australian Soil Classification:

Haplic Crusty Grey Vertosol Non-gravelly Fine Medium fine
 Moderately deep

Mapping Unit: BI
Principal Profile Form: Ug5.25
Great Soil Group: Brown clay

ASC Confidence:

All necessary analytical data are available.

Land Class: Land Class: A

Site

Complete clearing. Pasture, native or improved, cultivated at some stage

Vegetation:

Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Acacia harpophylla

Surface Coarse

No surface coarse fragments

Profile

1A1	0 - 0.1 m	Brown (7.5YR4/3-Moist); , 0-0% ; Fine sandy clay loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Medium, (5 - 10) mm crack; Many (>5 per 0.01m ²) Medium (2-5mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; Field pH 7.5 (Raupach); Abundant, fine (1-2mm) roots; Clear, Wavy change to -
1B1	0.1 - 0.3 m	Dark grey (7.5YR4/1-Moist); , 0-0% ; Medium clay; Moderate grade of structure, 5-10 mm, Lenticular; Smooth-ped fabric; Medium, (5 - 10) mm crack; Many (>5 per 100mm ²) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Cultivation pan, Uncemented, Continuous, Massive; Field pH 7.5 (Raupach); Many, fine (1-2mm) roots; Diffuse, Wavy change to -
1B21ss	0.3 - 0.5 m	Dark grey (7.5YR4/1-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Medium, (5 - 10) mm crack; Common (1-5 per 100mm ²) Fine (1-2mm) macropores, Moist; Strong consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 7.5 (Raupach); Many, fine (1-2mm) roots; Diffuse, Wavy change to -
1B22ss	0.5 - 0.8 m	Dark grey (7.5YR4/1-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Medium, (5 - 10) mm crack; Common (1-5 per 100mm ²) Fine (1-2mm) macropores, Moist; Strong consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 7.5 (Raupach); Common, fine (1-2mm) roots; Diffuse, Wavy change to -
1B3ss	0.8 - 1.1 m	Dark grey (7.5YR4/1-Moist); , 0-0% ; Medium clay; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Medium, (5 - 10) mm crack; Common (1-5 per 100mm ²) Fine (1-2mm) macropores, Moist; Strong consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 7.5 (Raupach); Common, fine (1-2mm) roots; Diffuse, Wavy change to -

1C1 1.1 - 1.5 m Dark grey (7.5YR4/1-Moist); , 0-0% ; Medium clay; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Medium, (5 - 10) mm crack; Common (1-5 per 100mm²) Fine (1-2mm) macropores, Moist; Strong consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 7.5 (Raupach); Common, fine (1-2mm) roots; Diffuse, Wavy change to -

Morphological Notes

Observation Notes

Flat on undulating plain, cultivated land, detailed site, samples 187-191

Site Notes

cleared brigalow woodland, cultivated land, keyed out as a vertosol, although there is a thin A horizon, because it doesn't fit into Sodosol and the vertic properties are well developed

Laboratory Test Results:

Depth cm	pH	1:5 EC dS/m	Ca	Exchangeable Mg	Cations K	Na	CEC Cmol (+)/kg	ESP %	Cl mg/kg
0 - 0.1	6.5A	44A	10.4*	2.1	0.4	<0.1	12.9*		20*
0.2 - 0.3	6.9A	32A	12.9*	2.2	0.2	<0.1	15.4*		<10*
0.5 - 0.6	7.5A	27A	15.8*	5.1	0.2	<0.1	21.1*		<10*
0.8 - 0.9	7.6A	20A							<10*
1.1 - 1.2	8.1A	32A	13.5*	8.3	0.2	0.2	22.2*	0.90	<10*

Depth cm	Organic C %	Total N mg/kg	Avail. P mg/kg	Total K mg/kg	Extr. S mg/kg	Cu	Fe	Trace Elements Mn Zn mg/kg		B
0 - 0.1	0.5D	1840E	31J	1050	6*	3	203	159	3.23	<0.2
0.2 - 0.3	0.5D	1290E	3J	<200	4*	2.39	92.6	86.8	1.77	<0.2
0.5 - 0.6		480E	<2J	460	2*					
0.8 - 0.9										
1.1 - 1.2		350E	<2J	<200	2*					

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 068 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Mamelon, photo 224
Date Desc.: 15/05/12 **Elevation:** 41 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7485973 AMG zone: 55 **Runoff:** Slow
Easting/Lat.: 774231 Datum: GDA94 **Drainage:** Imperfectly drained

Geology

Exposure Type: Auger boring **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Auger boring, 1 m deep, Fragmental,
 Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat **Relief:** 5 metres
Elem. Type: Terrace plain **Slope Category:** Level
Slope: 0.5 % **Aspect:** 270 degrees

Surface Soil Condition Hardsetting

Erosion: Active, Minor scalding (scald) Active, Minor (sheet)
Microrelief: Crabhole gilgai Vert.(m) 0.2 Horiz.(m) 10

Soil Classification

Australian Soil Classification: Vertic Mesonatric Brown Sodosol Medium Non-gravelly Clay-loamy
 Clayey Moderately deep **Mapping Unit:** Pv
Principal Profile Form: Dy2.43
Great Soil Group: Grey-brown podzolic soil
ASC Confidence: No analytical data are available but confidence is fair. **Land Class:** Land Class: C2

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation: Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Acacia harpophylla, Hakea arborescens

Surface Coarse No surface coarse fragments

Profile

1A1 0 - 0.1 m Dark grey (10YR4/1-Moist); , 0-0% ; Fine sandy loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; Field pH 7 (Raupach); Many, fine (1-2mm) roots; Clear, Smooth change to -

1A2e 0.1 - 0.3 m Greyish brown (10YR5/2-Moist); Mottles, 10YR44, 2-10% , 0-5mm, Distinct; Clay loam, sandy; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Few (<1 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, dispersed, Conglomerate, coarse fragments; Few (2 - 10 %), Ferromanganiferous, Medium (2 -6 mm), Concretions; Field pH 7 (Raupach); Few, fine (1-2mm) roots; Clear, Wavy change to -

1B2n 0.3 - m , 0-0% ; Moderate grade of structure, 5-10 mm, Polyhedral; Rough-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 8 (Raupach); Few, fine (1-2mm) roots;

Morphological Notes

1A1 ochric epipedon
 1A2e bleached, rusty root mottles
 1B2n argillic, natric

Observation Notes

Flat on undulating plain, check site

Site Notes

mixed woodland - Eucalypt (ironbark), Hakea, native pasture

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 069 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Mamelon, photo 225
Date Desc.: 15/05/12 **Elevation:** 36 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7486206 AMG zone: 55 **Runoff:** Very slow
Easting/Lat.: 773977 Datum: GDA94 **Drainage:** Poorly drained

Geology

ExposureType: Auger boring **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Auger boring, 1 m deep, Fragmental,
 Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat **Relief:** 5 metres
Elem. Type: Terrace plain **Slope Category:** Level
Slope: 0.5 % **Aspect:** 300 degrees

Surface Soil Condition Hardsetting

Erosion: Active, Minor scalding (scald) Active, Moderate (sheet) **Microrelief:** Crabhole gilgai Vert.(m) 0.2 Horiz.(m) 5

Soil Classification

Australian Soil Classification: Vertic Mesonatric Brown Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep
Mapping Unit: Pv
Principal Profile Form: Dy2.43
Great Soil Group: Grey-brown podzolic soil
ASC Confidence: No analytical data are available but confidence is fair. **Land Class:** Land Class: C2

Site: Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Eucalyptus populnea, Eucalyptus crebra
 2-10%, medium gravelly, 6-20mm, subrounded, Conglomerate

Surface Coarse

Profile

1A1	0 - 0.1 m	Dark grey (10YR4/1-Moist); 0-0% ; Fine sandy loam; Moderate grade of structure, 2-5 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moist; Very firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 6 (Raupach); Many, fine (1-2mm) roots; Clear, Smooth change to -
1A2e	0.1 - 0.3 m	Greyish brown (10YR5/2-Moist); Mottles, 10YR44, 2-10%, 5-15mm, Distinct; Clay loam, sandy; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Many (>5 per 100mm2) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Few (2 - 10 %), Ferromanganiferous, Medium (2 -6 mm), Concretions; Field pH 7 (Raupach); Common, fine (1-2mm) roots; Clear, Wavy change to -
1B2n	0.3 - m	Dark yellowish brown (10YR3/4-Moist); ; Moderate grade of structure, 5-10 mm, Polyhedral; Rough-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Fine (1-2mm) macropores, Very firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 8 (Raupach); Few, fine (1-2mm) roots;

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Flat on undulating plain, check site

Site Notes

cleared poplar box woodland, check site

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 070 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Mamelon, photo 226
Date Desc.: 15/05/12 **Elevation:** 30 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7486953 AMG zone: 55 **Runoff:** Slow
Easting/Lat.: 773508 Datum: GDA94 **Drainage:** Imperfectly drained

Geology

Exposure Type: Auger boring **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Auger boring, 1 m deep, Fragmental,
 Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat **Relief:** 5 metres
Elem. Type: Terrace plain **Slope Category:** Level
Slope: 0.5 % **Aspect:** 300 degrees

Surface Soil Condition Hardsetting

Erosion: Active, Minor scalding (scald) Active, Moderate (sheet) **Microrelief:** Crabhole gilgai Vert.(m) 0.2 Horiz.(m) 5

Soil Classification

Australian Soil Classification: Vertic Mesonatric Grey Sodosol Medium Non-gravelly Clay-loamy
 Clayey Moderately deep **Mapping Unit:** Pv
ASC Confidence: No analytical data are available but confidence is fair. **Principal Profile Form:** Dy2.43
Land Class: Land Class: C2 **Great Soil Group:** Grey-brown podzolic soil

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation: Tall Strata - Tree, 12.01-20m, Isolated plants. *Species includes - Eucalyptus crebra, Eucalyptus populnea

Surface Coarse No surface coarse fragments

Profile

1A1 0 - 0.1 m Dark grey (10YR4/1-Moist); , 0-0% ; Fine sandy loam; Moderate grade of structure, 2-5 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; Field pH 6.5 (Raupach); Many, fine (1-2mm) roots; Clear, Smooth change to -

1A2e 0.1 - 0.3 m Light grey (10YR7/1-Moist); Mottles, 10YR44, 2-10% , 0-5mm, Distinct; Fine sandy clay loam; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Many (>5 per 100mm2) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Moderately sticky; Few (2 - 10 %), Ferromanganiferous, Fine (0 - 2 mm), Concretions; Field pH 6 (Raupach); Common, fine (1-2mm) roots; Clear, Wavy change to -

1B2n 0.3 - m Greyish brown (2.5Y5/2-Moist); ; Moderate grade of structure, 5-10 mm, Polyhedral; Rough-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Fine (1-2mm) macropores, Very firm consistence; Common cutans, 10-50% of ped faces or walls coated, distinct; Common cutans, 10-50% of ped faces or walls coated, distinct; Few (2 - 10 %), Ferromanganiferous, Medium (2 -6 mm), Concretions; Field pH 7.5 (Raupach); Few, fine (1-2mm) roots;

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Flat on undulating plain, check site

Site Notes

cleared, native grassland, brigalow, poplar box

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 071 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth
Date Desc.: 15/05/12
Map Ref.: GPS S.A. Off
Northing/Long.: 7487304 AMG zone: 55
Easting/Lat.: 773536 Datum: GDA94

Locality: melon hole gilgai microrelief, Mamelon, photo 227
Elevation: 38 metres
Rainfall: 756
Runoff: No runoff
Drainage: Imperfectly drained

Geology

Exposure Type: Auger boring
Geol. Ref.: Qpa
Bedded,

Conf. Sub. is Parent. Mat.: Almost certain or certain
Substrate Material: Auger boring, 1 m deep, Fragmental, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat
Elem. Type: Terrace plain
Slope: 0.5 %

Relief: 5 metres
Slope Category: Level
Aspect: 180 degrees

Surface Soil Condition Surface crust

Erosion:

Soil Classification

Australian Soil Classification: Vertic Mesonatric Grey Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep
ASC Confidence: No analytical data are available but confidence is fair.

Microrelief: Melonhole gilgai Vert.(m) 1 Horiz.(m) 20
Mapping Unit: Pv
Principal Profile Form: Dy2.43
Great Soil Group: Grey-brown podzolic soil
Land Class: Land Class: C2

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Acacia harpophylla
 2-10%, medium gravelly, 6-20mm, subrounded platy, Conglomerate

Surface Coarse

Profile

1A1 0 - 0.1 m Black (2.5Y4/2-Moist); , 0-0% ; Fine sandy loam; Moderate grade of structure, 2-5 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; Field pH 6 (Raupach); Abundant, fine (1-2mm) roots; Clear, Smooth change to -

1A2e 0.1 - 0.2 m Light grey (2.5Y7/1-Moist); Mottles, 10YR44, 2-10% , 0-5mm, Distinct; Fine sandy loam; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Few (<1 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Few (2 - 10 %), Ferromanganiferous, Fine (0 - 2 mm), Concretions; Field pH 7 (Raupach); Common, fine (1-2mm) roots; Clear, Smooth change to -

1B2n 0.2 - m Dark greyish brown (2.5Y4/3-Moist); , 0-0% ; Moderate grade of structure, 5-10 mm, Polyhedral; Rough-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Very fine (0.075-1mm) macropores, Very firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Common cutans, 10-50% of ped faces or walls coated, distinct; Few (2 - 10 %), Ferromanganiferous, Fine (0 - 2 mm), Concretions; Soil matrix is Slightly calcareous; Field pH 8.5 (Raupach); Few, fine (1-2mm) roots;

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Flat on undulating plain, check site

Site Notes

melon hole gilgai microrelief, grey clay, cleared brigalow woodland, tall native grassland

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 072 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Mamelon, photo 228
Date Desc.: 15/05/12 **Elevation:** 38 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7486744 AMG zone: 55 **Runoff:** Very slow
Easting/Lat.: 773005 Datum: GDA94 **Drainage:** Imperfectly drained

Geology

ExposureType: Auger boring **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Auger boring, 1 m deep, Fragmental,
 Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat **Relief:** 5 metres
Elem. Type: Terrace plain **Slope Category:** Level
Slope: 0.5 % **Aspect:** 270 degrees

Surface Soil Condition Hardsetting

Erosion: Partial, Minor scalding (scald) Partial, Minor (sheet)
Microrelief: Crabhole gilgai Vert.(m) 0.1 Horiz.(m) 10

Soil Classification

Australian Soil Classification: Vertic Hypernatric Brown Sodosol Medium Slightly gravelly Clay-loamy Clayey Moderately deep
Mapping Unit: Pv
Principal Profile Form: Dy2.43
Great Soil Group: Grey-brown podzolic soil
ASC Confidence: No analytical data are available but confidence is fair. **Land Class:** Land Class: C2

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation: Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Eucalyptus crebra

Surface Coarse No surface coarse fragments

Profile

1A1 0 - 0.1 m Dark grey (10YR4/1-Moist); , 0-0% ; Fine sandy loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Many (>5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; Field pH 6.5 (Raupach); Abundant, fine (1-2mm) roots; Diffuse, Smooth change to -

1A2e 0.1 - 0.4 m Light grey (10YR7/2-Moist); Mottles, 10YR44, 2-10% , 0-5mm, Distinct; Fine sandy loam; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Few (<1 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Moderately sticky; Few (2 - 10 %), Ferromanganiferous, Fine (0 - 2 mm), Concretions; Field pH 7 (Raupach); Common, fine (1-2mm) roots; Clear, Wavy change to -

1B21n 0.4 - m , 0-0% ; Medium heavy clay; Moderate grade of structure, 5-10 mm, Polyhedral; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Common cutans, 10-50% of ped faces or walls coated, distinct; Soil matrix is Slightly calcareous; Field pH 8 (Raupach); Few, fine (1-2mm) roots;

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Flat on undulating plain, check site

Site Notes

cleared eucalypt woodland (ironbark, poplar box), tall native grass and sedge)

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 073 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Mamelon, photo 229
Date Desc.: 15/05/12 **Elevation:** 36 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7487560 AMG zone: 55 **Runoff:** Slow
Easting/Lat.: 772726 Datum: GDA94 **Drainage:** Imperfectly drained

Geology

Exposure Type: Auger boring **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Auger boring, 1 m deep, Fragmental,
 Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat **Relief:** 5 metres
Elem. Type: Terrace plain **Slope Category:** Level
Slope: 0.5 % **Aspect:** 300 degrees

Surface Soil Condition Hardsetting

Erosion: Stable, Moderate (sheet)

Soil Classification

Microrelief: Crabhole gilgai Vert.(m) 0.1 Horiz.(m) 10

Australian Soil Classification:

Vertic Subnatric Brown Sodosol Medium Slightly gravelly Clay-loamy Clayey Moderately deep

Mapping Unit: Pv

Principal Profile Form: Dy2.43

Great Soil Group: Grey-brown podzolic soil

ASC Confidence:

No analytical data are available but confidence is fair.

Land Class: Land Class: C2

Site

Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Eucalyptus crebra

Surface Coarse

2-10%, medium gravelly, 6-20mm, subrounded, Conglomerate

Profile

1A1 0 - 0.1 m Dark grey (10YR4/1-Moist); , 0-0% ; Fine sandy loam; Moderate grade of structure, 2-5 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 6 (Raupach); Abundant, fine (1-2mm) roots; Clear, Smooth change to -

1A2e 0.1 - 0.2 m Light grey (10YR7/1-Moist); ; Fine sandy loam; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Few (<1 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Moderately sticky; 0-2%, coarse gravelly, 20-60mm, subrounded, stratified, Conglomerate, coarse fragments; Few (2 - 10 %), Ferromanganiferous, Fine (0 - 2 mm), Concretions; Field pH 6.5 (Raupach); Common, fine (1-2mm) roots; Clear, Smooth change to -

1B2n 0.2 - m Brown (10YR4/3-Moist); ; Moderate grade of structure, 2-5 mm, Polyhedral; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Fine (1-2mm) macropores, Very firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 8 (Raupach); Few, very fine (0-1mm) roots;

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Flat on undulating plain, check site

Site Notes

cleared mixed woodland, tall native grass, fine sandy loam over brown clay

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 074 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth
Date Desc.: 15/05/12
Map Ref.: GPS S.A. Off
Northing/Long.: 7487675 AMG zone: 55
Easting/Lat.: 772666 Datum: GDA94

Locality: Mamelon, photo 230-231
Elevation: 39 metres
Rainfall: 756
Runoff: Slow
Drainage: Imperfectly drained

Geology

Exposure Type: Auger boring
Geol. Ref.: Qpa
Bedded,

Conf. Sub. is Parent. Mat.: Almost certain or certain
Substrate Material: Auger boring, 1 m deep, Fragmental, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Open depression (vale)
Elem. Type: Stream channel
Slope: 0.5 %

Relief: 5 metres
Slope Category: Level
Aspect: 90 degrees

Surface Soil Condition Hardsetting

Erosion: Active, Present (stbank)

Soil Classification

Australian Soil Classification: Vertic Subnatric Brown Sodosol Medium Slightly gravelly Clay-loamy Clayey Moderately deep
ASC Confidence: No analytical data are available but confidence is fair.

Microrelief: Crabhole gilgai **Vert.(m)** 0.1 **Horiz.(m)** 10
Mapping Unit: Pv
Principal Profile Form: Dy2.43
Great Soil Group: Grey-brown podzolic soil
Land Class: C2

Site Limited clearing, for example selective logging

Vegetation:

Tall Strata - Tree, 12.01-20m, Mid-dense. *Species includes - Eucalyptus crebra, Eucalyptus melanophloia
 2-10%, coarse gravelly, 20-60mm, subrounded, Conglomerate

Surface Coarse

Profile

1A1 0 - 0.1 m Dark grey (2.5Y4/1-Moist); , 0-0% ; Fine sandy loam; Moderate grade of structure, 2-5 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 2-10%, coarse gravelly, 20-60mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 6 (Raupach); Many, fine (1-2mm) roots; Diffuse, Wavy change to -

1A2 0.1 - 0.3 m Light grey (2.5Y7/1-Moist); , 0-0% ; Fine sandy loam; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Many (>5 per 100mm2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 6.5 (Raupach); Common, fine (1-2mm) roots; Clear, Wavy change to -

1B2n 0.3 - m Dark yellowish brown (10YR4/4-Moist); , 0-0% ; Moderate grade of structure, 5-10 mm, Lenticular; Moderate grade of structure, 2-5 mm, Polyhedral; Rough-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Fine (1-2mm) macropores, Very firm consistence; Very plastic; Normal plasticity; Very sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Few cutans, <10% of ped faces or walls coated, distinct; Field pH 7.5 (Raupach); Few, fine (1-2mm) roots;

Morphological Notes

Observation Notes

Drainage line on undulating plain, check site

Site Notes

sandy clay, tall mixed woodland, river gums, acacia and ironbark. Eroded, dispersive soil

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 075 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth
Date Desc.: 15/05/12
Map Ref.: GPS S.A. Off
Northing/Long.: 7487252 AMG zone: 55
Easting/Lat.: 771976 Datum: GDA94

Locality: Mamelon, photo 232-233
Elevation: 47 metres
Rainfall: 756
Runoff: Slow
Drainage: Imperfectly drained

Geology

Exposure Type: Auger boring
Geol. Ref.: Qpa
Bedded,

Conf. Sub. is Parent. Mat.: Almost certain or certain
Substrate Material: Auger boring, 1 m deep, Fragmental, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat
Elem. Type: Terrace plain
Slope: 0.5 %

Relief: 5 metres
Slope Category: Level
Aspect: 0 degrees

Surface Soil Condition Hardsetting

Erosion: Stable, Minor (sheet)

Soil Classification

Australian Soil Classification: Vertic Subnatric Grey Sodosol Medium Non-gravelly Clay-loamy
 Clayey Moderately deep
ASC Confidence: No analytical data are available but confidence is fair.

Microrelief: Crabhole gilgai Vert.(m) 0.1 Horiz.(m) 10
Mapping Unit: Pv
Principal Profile Form: Dy2.43
Great Soil Group: Grey-brown podzolic soil
Land Class: C2

Site Extensive clearing, for example poisoning, ringbarking

Vegetation:

Tall Strata - Tree, 12.01-20m, Sparse. *Species includes - Eucalyptus crebra, Eucalyptus populnea, Hakea arborescens

Surface Coarse No surface coarse fragments

Profile

1A1	0 - 0.1 m	Very dark grey (2.5Y3/1-Moist); , 0-0% ; Fine sandy loam; Moderate grade of structure, 2-5 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; Field pH 6 (Raupach); Many, fine (1-2mm) roots; Clear, Smooth change to -
1A2e	0.1 - 0.4 m	Light brownish grey (10YR6/2-Moist); Mottles, 10YR44, 0-2% , 0-5mm, Distinct; Fine sandy loam; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Moderately sticky; Very few (0 - 2 %), Ferromanganiferous, Fine (0 - 2 mm), Concretions; Field pH 8 (Raupach); Common, fine (1-2mm) roots; Clear, Wavy change to -
1B2n	0.4 - m	Olive brown (2.5Y4/4-Moist); , 0-0% ; Moderate grade of structure, 5-10 mm, Polyhedral; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Fine (1-2mm) macropores, Very firm consistence; Very plastic; Normal plasticity; Very sticky; Few cutans, <10% of ped faces or walls coated, distinct; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 8.5 (Raupach); Few, very fine (0-1mm) roots;

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Flat on undulating plain, check site

Site Notes

tall mixed woodland, ironbark, hakea, poplar box, fine sandy loam over brown clay

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 076 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Mamelon, photo 234
Date Desc.: 15/05/12 **Elevation:** 32 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7487704 AMG zone: 55 **Runoff:** No runoff
Eastng/Lat.: 771384 Datum: GDA94 **Drainage:** Imperfectly drained

Geology

ExposureType: Auger boring **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Auger boring, 1 m deep, Fragmental,
 Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat **Relief:** 5 metres
Elem. Type: Drainage depression **Slope Category:** Level
Slope: 0 % **Aspect:** 270 degrees

Surface Soil Condition Hardsetting

Erosion: Stable, Minor (sheet)

Soil Classification

Microrelief: Melonhole gilgai Vert.(m) 1 Horiz.(m) 20

Australian Soil Classification:

Vertic Hypernatric Brown Sodosol Medium Slightly gravelly Clay-loamy Clayey Moderately deep

Mapping Unit: Pv
Principal Profile Form: Dy2.43
Great Soil Group: Grey-brown podzolic soil

ASC Confidence:

No analytical data are available but confidence is fair.

Land Class: Land Class: C2

Site

Limited clearing, for example selective logging

Vegetation:

Tall Strata - Tree, 6.01-12m, Sparse. *Species includes - Eucalyptus crebra, Eucalyptus platyphylla

Surface Coarse

No surface coarse fragments

Profile

1A1 0 - 0.1 m Dark grey (10YR4/1-Moist); , 0-0% ; Fine sandy loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; Field pH 6.5 (Raupach); Abundant, fine (1-2mm) roots; Clear, Smooth change to -

1A2e 0.1 - 0.4 m Light brownish grey (10YR6/2-Moist); Mottles, 10YR44, 10-20% , 0-5mm, Distinct; Fine sandy loam; Massive grade of structure; Sandy (grains prominent) fabric; Fine, (0 - 5) mm crack; Few (<1 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Moderately sticky; Few (2 - 10 %), Ferromanganiferous, Fine (0 - 2 mm), Concretions; Field pH 7.5 (Raupach); Common, fine (1-2mm) roots; Clear, Wavy change to -

1B2n 0.4 - m Dark greyish brown (10YR4/2-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 5-10 mm, Subangular blocky; Moderate grade of structure, 2-5 mm, Polyhedral; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Common cutans, 10-50% of ped faces or walls coated, distinct; Soil matrix is Slightly calcareous; Field pH 8 (Raupach); Few, fine (1-2mm) roots;

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Flat on undulating plain, check site

Site Notes

mixed woodland, with sedge ground cover in a drainage depression

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 077 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Mamelon, photo 236
Date Desc.: 15/05/12 **Elevation:** 34 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7488213 AMG zone: 55 **Runoff:** No runoff
Easting/Lat.: 771813 Datum: GDA94 **Drainage:** Imperfectly drained

Geology

Exposure Type: Auger boring **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Auger boring, 1 m deep, Fragmental,
 Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat **Relief:** 5 metres
Elem. Type: Terrace plain **Slope Category:** Level
Slope: 0.5 % **Aspect:** No Data

Surface Soil Condition Surface crust

Erosion: Stable, Minor (sheet)

Soil Classification

Microrelief: Melonhole gilgai Vert.(m) 1 Horiz.(m) 10

Australian Soil Classification:

Vertic Subnatric Brown Sodosol Medium Gravelly Clay-loamy
 Clayey Moderately deep

Mapping Unit:

Pv
Principal Profile Form: Dy2.43
Great Soil Group: Grey-brown
 podzolic soil

ASC Confidence:

No analytical data are available but confidence is fair.

Land Class: Land Class: C1

Site

Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 3.01-6m, Isolated plants. *Species includes - Acacia harpophylla

Surface Coarse

No surface coarse fragments

Profile

1A1 0 - 0.1 m Dark grey (10YR4/1-Moist); , 0-0% ; Fine sandy clay loam; Moderate grade of structure, 2-5 mm, Subangular blocky; Rough-ped fabric; Medium, (5 - 10) mm crack; Medium, (5 - 10) mm crack; Medium, (5 - 10) mm crack; Few (<1 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; Field pH 6.5 (Raupach); Abundant, fine (1-2mm) roots; Diffuse, Wavy change to -

1A2e 0.1 - 0.2 m Light grey (10YR7/1-Moist); , 0-0% ; Fine sandy loam; Massive grade of structure; Earthy fabric; Common (1-5 per 100mm2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; Field pH 6.5 (Raupach); Many, fine (1-2mm) roots; Clear, Smooth change to -

1B21 0.2 - 0.4 m Brown (10YR4/3-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 5-10 mm, Polyhedral; Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Few (<1 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Common cutans, 10-50% of ped faces or walls coated, distinct; Few (2 - 10 %), Calcareous, Fine (0 - 2 mm), Soft segregations; Soil matrix is Slightly calcareous; Field pH 8.5 (Raupach); Common, fine (1-2mm) roots; Diffuse, Wavy change to -

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Flat on undulating plain, melonhole gilgai, check site

Site Notes

cleared brigalow, cracking grey clay, melonhole microrelief 20 m, 0.5 m deep

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 078 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Mamelon, photo 227
Date Desc.: 16/05/12 **Elevation:** 28 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7494412 AMG zone: 55 **Runoff:** Very slow
Easting/Lat.: 772893 Datum: GDA94 **Drainage:** Imperfectly drained

Geology

ExposureType: No Data **Conf. Sub. is Parent. Mat.:** No Data
Geol. Ref.: Qa **Substrate Material:** Fragmental, Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat **Relief:** 5 metres
Elem. Type: Terrace plain **Slope Category:** Level
Slope: 0.5 % **Aspect:** No Data

Surface Soil Condition Surface crust

Erosion:

Soil Classification **Microrelief:** Melonhole gilgai Vert.(m) 1 Horiz.(m) 20

Australian Soil Classification: Endohypersodic Epipedal Grey Vertosol Non-gravelly Fine Medium **Mapping Unit:** So
 fine Moderately deep Moderately deep **Principal Profile Form:** Ug5.25
ASC Confidence: **Great Soil Group:** Grey clay

No analytical data are available but confidence is fair. **Land Class:** **Land Class:** A

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Acacia harpophylla

Surface Coarse

No surface coarse fragments

Profile

1A11 0 - 0.1 m Dark grey (10YR4/1-Moist); , 0-0% ; Clay loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Medium, (5 - 10) mm crack; Many (>5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; Field pH 7 (Raupach); Abundant, fine (1-2mm) roots; Clear, Tongued change to -

1A12 0.1 - 0.3 m Dark greyish brown (10YR4/2-Moist); , 0-0% ; Silty clay loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Medium, (5 - 10) mm crack; Few (<1 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Moderately sticky; Soil matrix is Slightly calcareous; Field pH 7.5 (Raupach); Many, fine (1-2mm) roots; Diffuse, Irregular change to -

1B2kss 0.3 - 0.5 m Dark greyish brown (10YR4/2-Moist); , 0-0% ; Medium clay; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Medium, (5 - 10) mm crack; Few (<1 per 0.01m2) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Soil matrix is Slightly calcareous; Field pH 8 (Raupach); Many, fine (1-2mm) roots; Diffuse, Irregular change to -

Morphological Notes

Observation Notes

Flat on undulating plain, check site

Site Notes

cleared brigalow, cracking grey clay,

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 079 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** melonhole microrelief ,Mamelon, photo 228
Date Desc.: 16/05/12 **Elevation:** 28 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7494161 AMG zone: 55 **Runoff:** Very slow
Easting/Lat.: 773007 Datum: GDA94 **Drainage:** Imperfectly drained

Geology

Exposure Type: Auger boring **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qa **Substrate Material:** Auger boring, 1 m deep, Fragmental,
 Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat **Relief:** 5 metres
Elem. Type: Terrace plain **Slope Category:** Level
Slope: 0.5 % **Aspect:** 300 degrees

Surface Soil Condition Surface crust

Erosion: Stable, Minor (sheet)

Soil Classification

Microrelief: Melonhole gilgai Vert.(m) 1 Horiz.(m) 10

Australian Soil Classification: Endohypersodic Epipedal Grey Vertosol Non-gravelly Fine Medium
 fine Moderately deep Moderately deep **Mapping Unit:** So
Principal Profile Form: Ug5.25
Great Soil Group: Grey clay

ASC Confidence:

No analytical data are available but confidence is fair.

Land Class: Land Class: A

Site

Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Acacia harpophylla

Surface Coarse

No surface coarse fragments

Profile

1A11 0 - 0.1 m Dark grey (10YR4/1-Moist); , 0-0% ; Clay loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Medium, (5 - 10) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; Field pH 7 (Raupach); Abundant, fine (1-2mm) roots; Clear, Tongued change to -

1A12 0.1 - 0.3 m Dark greyish brown (10YR4/2-Moist); , 0-0% ; Silty clay loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Medium, (5 - 10) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Moderately sticky; Soil matrix is Slightly calcareous; Field pH 7.5 (Raupach); Many, fine (1-2mm) roots; Diffuse, Irregular change to -

1B2kss 0.3 - 0.5 m Dark greyish brown (10YR4/2-Moist); , 0-0% ; Medium clay; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Soil matrix is Slightly calcareous; Field pH 8 (Raupach); Many, fine (1-2mm) roots; Diffuse, Irregular change to -

Morphological Notes

Observation Notes

Flat on undulating plain, check site

Site Notes

clearerd brigalow woodland, cracking grey clay,

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 080 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth	Locality: Mamelon, photo 229
Date Desc.: 16/05/12	Elevation: 15 metres
Map Ref.: GPS S.A. Off	Rainfall: 756
Northing/Long.: 7496063 AMG zone: 55	Runoff: Moderately rapid
Easting/Lat.: 772281 Datum: GDA94	Drainage: Moderately well drained

Geology

ExposureType: No Data	Conf. Sub. is Parent. Mat.: No Data
Geol. Ref.: Qa	Substrate Material: Fragmental, Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Open depression (vale)	Relief: 5 metres
Elem. Type: Valley flat	Slope Category: Level
Slope: 0.5 %	Aspect: 300 degrees

Surface Soil Condition

Erosion:

Soil Classification

Microrelief:

Australian Soil Classification: Lutic Rudosol Non-gravelly Loamy Shallow	Mapping Unit: Sx
ASC Confidence: No analytical data are available but confidence is fair.	Principal Profile Form: Um5.52
	Great Soil Group: Alluvial soil
	Land Class: Land Class: A

Site

Vegetation:

Surface Coarse

Profile

1A11	0 - 0.1 m	Very dark grey (7.5YR3/1-Moist); ; Sandy loam; Moist; Slightly plastic; Normal plasticity; Slightly sticky; Diffuse, Smooth change to -
1A12	0.1 - 0.5 m	Dark brown (7.5YR3/2-Moist); ; Sandy loam; Moist; Slightly plastic; Normal plasticity; Slightly sticky; Diffuse, Smooth change to -
1C1	0.5 - 0.8 m	Dark brown (7.5YR3/3-Moist); ; Sandy loam; Moist; Slightly plastic; Normal plasticity; Slightly sticky; Diffuse, Smooth change to -

Morphological Notes

Observation Notes

Check site, on valley flat on undulating floodplain, not sampled

Site Notes

Styx River, deep sandy clay loam

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 081 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Mamelon, photo 230
Date Desc.: 16/05/12 **Elevation:** 22 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7496073 AMG zone: 55 **Runoff:** Slow
Easting/Lat.: 772476 Datum: GDA94 **Drainage:** Imperfectly drained

Geology

Exposure Type: Existing vertical exposure **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qa **Substrate Material:** Existing vertical exposure, 0.5 m deep, Fragmental, Bedded, Porous, ,

Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat **Relief:** 5 metres
Elem. Type: Terrace flat **Slope Category:** Level
Slope: 0.5 % **Aspect:** 45 degrees

Surface Soil Condition Hardsetting

Erosion: Active, Severe (sheet) Active, Present (stbank)

Soil Classification

Microrelief: Zero or no microrelief Vert.(m) Horiz.(m)

Australian Soil Classification:

Basic Grey-Orthic Tenosol Medium Non-gravelly Silty Silty
 Moderately deep

Mapping Unit:

So
Principal Profile Form: Um5.52
Great Soil Group: Alluvial soil

ASC Confidence:

No analytical data are available but confidence is fair.

Land Class:

Land Class: A

Site

Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Acacia harpophylla

Surface Coarse

10-20%, medium gravelly, 6-20mm, subrounded, Conglomerate

Profile

1A11 0 - 0.1 m Dark grey (2.5Y4/1-Moist); ; Sandy loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 0.01m²) Fine (1-2mm) macropores, Moist; Firm consistence; Slightly plastic; Normal plasticity; Slightly sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 6.5 (Raupach); Many, fine (1-2mm) roots; Diffuse, Smooth change to -

1A12 0.1 - 0.5 m Dark grey (2.5Y4/1-Moist); , 0-0% ; Sandy loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm²) Fine (1-2mm) macropores, Moist; Firm consistence; Slightly plastic; Normal plasticity; Slightly sticky; 10-20%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 7 (Raupach); Common, fine (1-2mm) roots; Diffuse, Smooth change to -

1C1 0.5 - 0.8 m Dark greyish brown (2.5Y4/3-Moist); , 0-0% ; Sandy loam; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm²) Fine (1-2mm) macropores, Moist; Very firm consistence; Slightly plastic; Normal plasticity; Slightly sticky; 10-20%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 8.5 (Raupach); Few, fine (1-2mm) roots; Diffuse, Smooth change to -

Morphological Notes

Observation Notes

Check site, on valley flat on undulating floodplain, not sampled

Site Notes

brown clay cleared brigalow, melon hole micro relief, 20 by 0.5 m

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 082 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth
Date Desc.: 16/05/12
Map Ref.: GPS S.A. Off
Northing/Long.: 7495271 AMG zone: 55
Easting/Lat.: 772455 Datum: GDA94

Locality: melon hole micro relief, Mamelon, photo 231
Elevation: 11 metres
Rainfall: 756
Runoff: Moderately rapid
Drainage: Imperfectly drained

Geology

ExposureType: Auger boring
Geol. Ref.: Qa
Conf. Sub. is Parent. Mat.: Almost certain or certain
Substrate Material: Auger boring, 1 m deep, Fragmental, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat
Elem. Type: Terrace plain
Slope: 0.5 %

Relief: 5 metres
Slope Category: Level
Aspect: 90 degrees

Surface Soil Condition Cracking

Erosion: Stable, Minor (sheet)

Soil Classification

Australian Soil Classification: Haplic Epipedal Grey Vertosol Non-gravelly Fine Medium fine
 Moderately deep
ASC Confidence: No analytical data are available but confidence is fair.

Microrelief: Melonhole gilgai Vert.(m) 1 Horiz.(m) 20
Mapping Unit: Sx
Principal Profile Form: Ug5.24
Great Soil Group: Grey clay
Land Class: Land Class: A

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Acacia harpophylla

Surface Coarse

No surface coarse fragments

Profile

1A11 0 - 0.1 m Very dark grey (10YR3/1-Moist); , 0-0% ; Clay loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Medium, (5 - 10) mm crack; Common (1-5 per 0.01m²) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; Field pH 6.5 (Raupach); Abundant, fine (1-2mm) roots; Clear, Tongued change to -

1A12 0.1 - 0.3 m Dark greyish brown (10YR4/2-Moist); , 0-0% ; Silty clay loam; Moderate grade of structure, 10-20 mm, Subangular blocky; Rough-ped fabric; Medium, (5 - 10) mm crack; Few (<1 per 0.01m²) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Moderately sticky; Soil matrix is Slightly calcareous; Field pH 7 (Raupach); Many, fine (1-2mm) roots; Diffuse, Irregular change to -

1B2kss 0.3 - 0.5 m Greyish brown (10YR5/2-Moist); , 0-0% ; Medium clay; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Medium, (5 - 10) mm crack; Common (1-5 per 100mm²) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Soil matrix is Slightly calcareous; Field pH 8.5 (Raupach); Common, fine (1-2mm) roots; Diffuse, Irregular change to -

Morphological Notes

Observation Notes

Check site, on stream bank of undulating floodplain, not sampled

Site Notes

cleared forest, improved pasture, river backswamps and terrace flats, grey cracking clay

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 083 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth
Date Desc.: 16/05/12
Map Ref.: GPS S.A. Off
Northing/Long.: 7496176 AMG zone: 55
Easting/Lat.: 771005 Datum: GDA94

Locality: Mamelon, photo 242
Elevation: 25 metres
Rainfall: 756
Runoff: No runoff
Drainage: Imperfectly drained

Geology

Exposure Type: Auger boring
Geol. Ref.: Qpa
Bedded,

Conf. Sub. is Parent. Mat.: Almost certain or certain
Substrate Material: Auger boring, 1 m deep, Fragmental, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat
Elem. Type: Terrace plain
Slope: 0.5 %

Relief: 5 metres
Slope Category: Level
Aspect: 0 degrees

Surface Soil Condition Surface crust

Erosion: Partial, Moderate (sheet)

Soil Classification

Australian Soil Classification: Endohypersodic Epipedal Grey Vertosol Non-gravelly Fine Medium fine Moderately deep
ASC Confidence: No analytical data are available but confidence is fair.

Microrelief: Melonhole gilgai Vert.(m) 1 Horiz.(m) 20
Mapping Unit: So
Principal Profile Form: Ug5.25
Great Soil Group: Brown clay
Land Class: Land Class: C1

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Acacia harpophylla
 2-10%, medium gravelly, 6-20mm, subrounded, Conglomerate

Surface Coarse

Profile

1A11	0 - 0.1 m	Dark grey (2.5Y4/1-Moist); , 0-0% ; Clay loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Medium, (5 - 10) mm crack; Many (>5 per 0.01m2) Medium (2-5mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 7 (Raupach); Abundant, fine (1-2mm) roots; Diffuse, Wavy change to -
1A12	0.1 - 0.2 m	Dark grey (2.5Y4/1-Moist); , 0-0% ; Clay loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Medium, (5 - 10) mm crack; Few (<1 per 0.01m2) Medium (2-5mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 7.5 (Raupach); Many, fine (1-2mm) roots; Diffuse, Wavy change to -
1B2ss	0.2 - 0.3 m	Dark greyish brown (2.5Y4/3-Moist); , 0-0% ; Light clay; Moderate grade of structure, 5-10 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 8.5 (Raupach); Few, fine (1-2mm) roots; Diffuse, Wavy change to -

Morphological Notes

Observation Notes

Flat on undulating plain, check site

Site Notes

cleared brigalow woodland, grey cracking clay

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 084 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth	Locality: Mamelon, photo 243
Date Desc.: 16/05/12	Elevation: 51 metres
Map Ref.: GPS S.A. Off	Rainfall: 756
Northing/Long.: 7493967 AMG zone: 55	Runoff: Moderately rapid
Easting/Lat.: 767015 Datum: GDA94	Drainage: Imperfectly drained

Geology

ExposureType: No Data	Conf. Sub. is Parent. Mat.: No Data
Geol. Ref.: Pb	Substrate Material: Fragmental, Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Undulating low hills 30-90m 3-10% **Pattern Type:** Hills

Morph. Type: Upper-slope	Relief: 31 metres
Elem. Type: Foothlope	Slope Category: Gently inclined
Slope: 3 %	Aspect: 270 degrees

Surface Soil Condition

Erosion:

Soil Classification

Microrelief:

Australian Soil Classification: Vertic Mesonatric Brown Sodosol Medium Gravelly Clay-loamy Clayey Moderately deep	Mapping Unit: Tb
ASC Confidence: No analytical data are available but confidence is fair.	Principal Profile Form: Dy2.43
	Great Soil Group: Grey-brown podzolic soil
	Land Class: Land Class: C2

Site

Vegetation:

Surface Coarse

Profile

1A1 0 - 0.1 m	Dark greyish brown (10YR4/2-Moist); ; Fine sandy clay loam; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm2) Fine (1-2mm) macropores, Dry; Very firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; Clear, Smooth change to -
1A2e 0.1 - 0.2 m	Light brownish grey (10YR6/2-Moist); ; Fine sandy loam; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm2) Fine (1-2mm) macropores, Dry; Very firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; Few (2 - 10 %), Ferruginous, Coarse (6 - 20 mm), Nodules; Clear, Smooth change to -
1B21 0.2 - 0.5 m	Dark yellowish brown (10YR4/4-Moist); , 0-0% ; Light clay; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Very fine (0.075-1mm) macropores, Dry; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 20-50%, coarse gravelly, 20-60mm, rounded, dispersed, Colluvium, coarse fragments; Diffuse, Wavy change to -

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Eroded slope on low rise

Site Notes

cleared ironbark woodland, gully erosion 1.5 m, gravelly brown clay

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 085 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Mamelon, photo 244
Date Desc.: 16/05/12 **Elevation:** 40 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7485957 AMG zone: 55 **Runoff:** Very slow
Easting/Lat.: 774027 Datum: GDA94 **Drainage:** Imperfectly drained

Geology

Exposure Type: Auger boring **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Auger boring, 1 m deep, Fragmental,
 Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat **Relief:** 5 metres
Elem. Type: Terrace plain **Slope Category:** Level
Slope: 0.5 % **Aspect:** 0 degrees

Surface Soil Condition Hardsetting

Erosion: Active, Minor scalding (scald) Active, Moderate
 (sheet) Active, Moderate (gully) **Microrelief:** Crabhole gilgai Vert.(m) 0.1 Horiz.(m) 10

Soil Classification

Australian Soil Classification: Vertic Hypernatric Grey Sodosol Medium Non-gravelly Clay-loamy
 Clayey Moderately deep **Mapping Unit:** Pv
ASC Confidence: No analytical data are available but confidence is fair. **Principal Profile Form:** Dy2.43
Land Class: Land Class: C2 **Great Soil Group:** Grey-brown podzolic soil

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation: Tall Strata - Tree, 12.01-20m, Isolated plants. *Species includes - Eucalyptus crebra

Surface Coarse 2-10%, medium gravelly, 6-20mm, rounded, Conglomerate

Profile

1A1	0 - 0.1 m	Very dark grey (2.5Y3/1-Moist); , 0-0% ; Fine sandy clay loam; Moderate grade of structure, 2-5 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 5.5 (Raupach); Many, fine (1-2mm) roots; Clear, Smooth change to -
1A2e	0.1 - 0.2 m	Light grey (2.5Y7/1-Moist); Mottles, 10YR44, 10-20% , 5-15mm, Distinct; Fine sandy clay loam; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Few (2 - 10 %), Ferromanganiferous, Fine (0 - 2 mm), Concretions; Field pH 7 (Raupach); Common, fine (1-2mm) roots; Clear, Smooth change to -
1B1	0.2 - 0.3 m	Olive brown (2.5Y4/4-Moist); ; Moderate grade of structure, 2-5 mm, Polyhedral; Moderate grade of structure, 5-10 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Very fine (0.075-1mm) macropores, Very firm consistence; Very plastic; Normal plasticity; Very sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 7.5 (Raupach); Few, very fine (0-1mm) roots; Gradual, Wavy change to -

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Flat on undulating plain, check site

Site Notes

cleared ironbark woodland, high plain, gravelly brown clay with native grass

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 086 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Mamelon, photo 225
Date Desc.: 15/05/12 **Elevation:** 46 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7485975 AMG zone: 55 **Runoff:** Very slow
Easting/Lat.: 774247 Datum: GDA94 **Drainage:** Imperfectly drained

Geology

Exposure Type: Auger boring **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Auger boring, 1 m deep, Fragmental,
 Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat **Relief:** 5 metres
Elem. Type: Terrace plain **Slope Category:** Level
Slope: 0.5 % **Aspect:** 270 degrees

Surface Soil Condition Hardsetting

Erosion: Active, Minor scalding (scald) Active, Moderate (sheet) **Microrelief:** Normal gilgai Vert.(m) 0.3 Horiz.(m) 5

Soil Classification

Australian Soil Classification: Vertic Hypernatric Grey Sodosol Medium Non-gravelly Clay-loamy
 Clayey Moderately deep **Mapping Unit:** Pv
ASC Confidence: No analytical data are available but confidence is fair. **Principal Profile Form:** Dy2.43
Land Class: Land Class: C2 **Great Soil Group:** Grey-brown podzolic soil

Site Extensive clearing, for example poisoning, ringbarking

Vegetation: Tall Strata - Tree, 12.01-20m, Very sparse. *Species includes - Eucalyptus crebra

Surface Coarse 0-2%, medium gravelly, 6-20mm, subrounded, Conglomerate

Profile

1A1	0 - 0.1 m	Very dark grey (2.5Y3/1-Moist); , 0-0% ; Fine sandy clay loam; Moderate grade of structure, 2-5 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 0.01m ²) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 5.5 (Raupach); Many, fine (1-2mm) roots; Clear, Smooth change to -
1A2e	0.1 - 0.2 m	Light grey (2.5Y7/1-Moist); Mottles, 10YR44, 2-10% , 0-5mm, Distinct; Fine sandy clay loam; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Many (>5 per 100mm ²) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Few (2 - 10 %), Ferromanganiferous, Fine (0 - 2 mm), Concretions; Field pH 7 (Raupach); Common, fine (1-2mm) roots; Clear, Smooth change to -
1B2n	0.2 - m	Olive brown (2.5Y4/4-Moist); , 0-0% ; Moderate grade of structure, 5-10 mm, Subangular blocky; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm ²) Very fine (0.075-1mm) macropores, Very firm consistence; Moderately plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 7.5 (Raupach); Few, very fine (0-1mm) roots;

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Flat on undulating plain, check site

Site Notes

mixed woodland - Eucalypt (ironbark), Hakea, native pasture

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 087 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth	Locality: Mamelon, photo 245
Date Desc.: 16/05/12	Elevation: 42 metres
Map Ref.: GPS S.A. Off	Rainfall: 756
Northing/Long.: 7485747 AMG zone: 55	Runoff: Very slow
Easting/Lat.: 774342 Datum: GDA94	Drainage: Imperfectly drained

Geology

ExposureType: No Data	Conf. Sub. is Parent. Mat.: No Data
Geol. Ref.: Qpa	Substrate Material: Fragmental, Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat	Relief: 5 metres
Elem. Type: Terrace plain	Slope Category: Level
Slope: 0.5 %	Aspect: 90 degrees

Surface Soil Condition

Erosion:

Soil Classification

Microrelief:

Australian Soil Classification: Vertic Hypernatric Grey Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep	Mapping Unit: Pv
ASC Confidence: No analytical data are available but confidence is fair.	Principal Profile Form: Dy2.43
	Great Soil Group: Grey-brown podzolic soil
	Land Class: Land Class: C2

Site

Vegetation:

Surface Coarse

Profile

1A1	0 - 0.1 m	Very dark grey (2.5Y3/1-Moist); ; Fine sandy clay loam; Moist; Moderately plastic; Normal plasticity; Moderately sticky; Clear, Smooth change to -
1A2e	0.1 - 0.2 m	Light grey (2.5Y7/1-Moist); ; Fine sandy clay loam; Moist; Moderately plastic; Normal plasticity; Moderately sticky; Clear, Smooth change to -
1B2kss	0.2 - 0.5 m	; Medium clay; Moist; Very plastic; Normal plasticity; Very sticky; Soil matrix is Slightly calcareous; Diffuse, Irregular change to -

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Flat on undulating plain, check site

Site Notes

ironbark woodland on brown gravelly clay, native grassland,

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 088 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Mamelon, photo 246
Date Desc.: 16/05/12 **Elevation:** 44 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7485227 AMG zone: 55 **Runoff:** Slow
Easting/Lat.: 774197 Datum: GDA94 **Drainage:** Imperfectly drained

Geology

Exposure Type: Auger boring **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qa **Substrate Material:** Auger boring, 1 m deep, Fragmental,
 Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat **Relief:** 5 metres
Elem. Type: Terrace plain **Slope Category:** Level
Slope: 0.5 % **Aspect:** 90 degrees

Surface Soil Condition Hardsetting

Erosion: Active, Moderate scalding (scald) Active, Moderate (sheet) **Microrelief:** Crabhole gilgai Vert.(m) 0.2 Horiz.(m) 10

Soil Classification

Australian Soil Classification: Vertic Hypernatric Grey Sodosol Medium Non-gravelly Clay-loamy
 Clayey Moderately deep **Mapping Unit:** Pv
ASC Confidence: No analytical data are available but confidence is fair. **Principal Profile Form:** Dy2.43
Land Class: Land Class: C2 **Great Soil Group:** Grey-brown podzolic soil

Site Extensive clearing, for example poisoning, ringbarking

Vegetation: Tall Strata - Tree, 12.01-20m, Isolated plants. *Species includes - Eucalyptus crebra

Surface Coarse 2-10%, medium gravelly, 6-20mm, subrounded, Conglomerate

Profile

1A1	0 - 0.1 m	Very dark grey (2.5Y3/1-Moist); , 0-0% ; Fine sandy clay loam; Moderate grade of structure, 2-5 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 7 (Raupach); Many, fine (1-2mm) roots; Clear, Smooth change to -
1A2e	0.1 - 0.2 m	Light grey (2.5Y7/1-Moist); Mottles, 10YR44, 2-10% , 0-5mm, Distinct; Fine sandy clay loam; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Few (<1 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Few (2 - 10 %), Ferromanganiferous, Fine (0 - 2 mm), Concretions; Field pH 7.5 (Raupach); Common, fine (1-2mm) roots; Clear, Smooth change to -
1B2n	0.2 - m	Olive brown (2.5Y4/4-Moist); , 0-0% ; Moderate grade of structure, 2-5 mm, Polyhedral; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Fine (1-2mm) macropores, Very firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 8 (Raupach); Few, fine (1-2mm) roots;

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Flat on floodplain, check site

Site Notes

cleared ironbark woodland, native grassland

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 089 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Mamelon, photo 247
Date Desc.: 16/05/12 **Elevation:** 44 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7484989 AMG zone: 55 **Runoff:** Slow
Easting/Lat.: 773947 Datum: GDA94 **Drainage:** Imperfectly drained

Geology

Exposure Type: Auger boring **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qa **Substrate Material:** Auger boring, 1 m deep, Fragmental,
 Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat **Relief:** 5 metres
Elem. Type: Terrace plain **Slope Category:** Level
Slope: 0.5 % **Aspect:** 120 degrees

Surface Soil Condition Hardsetting

Erosion:

Soil Classification **Microrelief:** Crabhole gilgai Vert.(m) 0.2 Horiz.(m) 10

Australian Soil Classification:

Vertic Hypernatric Grey Sodosol Medium Non-gravelly Clay-loamy **Mapping Unit:** Pv
 Clayey Moderately deep **Principal Profile Form:** Dy2.43
ASC Confidence: podzolic soil
 No analytical data are available but confidence is fair. **Land Class:** Land Class: C2

Site Extensive clearing, for example poisoning, ringbarking

Vegetation:

Tall Strata - Tree, 12.01-20m, Isolated plants. *Species includes - Eucalyptus crebra

Surface Coarse

0-2%, medium gravelly, 6-20mm, subrounded, Conglomerate

Profile

1A1 0 - 0.1 m Very dark grey (2.5Y3/1-Moist); , 0-0% ; Fine sandy clay loam; Moderate grade of structure, 2-5 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 5.5 (Raupach); Many, fine (1-2mm) roots; Clear, Smooth change to -

1A2e 0.1 - 0.2 m Light grey (2.5Y7/1-Moist); Mottles, 10YR44, 2-10% , 0-5mm, Distinct; Fine sandy clay loam; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Few (<1 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Few (2 - 10 %), Ferromanganiferous, Fine (0 - 2 mm), Concretions; Field pH 7 (Raupach); Common, fine (1-2mm) roots; Clear, Smooth change to -

1B2n 0.2 - m Olive brown (2.5Y4/4-Moist); , 0-0% ; Moderate grade of structure, 2-5 mm, Polyhedral; Moderate grade of structure, 5-10 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Fine (1-2mm) macropores, Very firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 8 (Raupach); Few, fine (1-2mm) roots;

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Flat on floodplain, check site

Site Notes

cleared ironbark woodland

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 090 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Mamelon, photo 248
Date Desc.: 16/05/12 **Elevation:** 44 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7485179 AMG zone: 55 **Runoff:** Slow
Easting/Lat.: 775364 Datum: GDA94 **Drainage:** Imperfectly drained

Geology

Exposure Type: Auger boring **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Auger boring, 2 m deep, Fragmental,
 Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat **Relief:** 5 metres
Elem. Type: Terrace plain **Slope Category:** Level
Slope: 0.5 % **Aspect:** 90 degrees

Surface Soil Condition Hardsetting

Erosion: Stable, Minor (sheet)

Soil Classification

Australian Soil Classification: Vertic Hypernatric Grey Sodosol Medium Non-gravelly Clay-loamy
 Clayey Moderately deep
ASC Confidence: No analytical data are available but confidence is fair.
Microrelief: Crabhole gilgai Vert.(m) 0.2 Horiz.(m) 10
Mapping Unit: Pv
Principal Profile Form: Dy2.43
Great Soil Group: Grey-brown podzolic soil
Land Class: Land Class: C2

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Eucalyptus crebra

Surface Coarse

2-10%, medium gravelly, 6-20mm, subrounded, Conglomerate

Profile

1A1 0 - 0.1 m Dark greyish brown (10YR4/2-Moist); , 0-0% ; Fine sandy loam; Moderate grade of structure, 2-5 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 6.5 (Raupach); Many, fine (1-2mm) roots; Clear, Smooth change to -

1A2e 0.1 - 0.3 m Light brownish grey (10YR6/2-Moist); Mottles, 10YR44, 2-10% , 0-5mm, Distinct; Clay loam, sandy; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Many (>5 per 100mm2) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Few (2 - 10 %), Ferromanganiferous, Fine (0 - 2 mm), Concretions; Field pH 6 (Raupach); Common, fine (1-2mm) roots; Clear, Wavy change to -

1B2n 0.3 - m Brown (10YR4/3-Moist); , 0-0% ; Moderate grade of structure, 5-10 mm, Polyhedral; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Fine (1-2mm) macropores, Very firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Common cutans, 10-50% of ped faces or walls coated, distinct; Very few (0 - 2 %), Ferromanganiferous, Fine (0 - 2 mm), Concretions; Field pH 8 (Raupach); Few, fine (1-2mm) roots;

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Flat on undulating plain, check site

Site Notes

cleared ironbark woodland, native grassland

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 091 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth	Locality: Mamelon, photo 249
Date Desc.: 16/05/12	Elevation: 45 metres
Map Ref.: GPS S.A. Off	Rainfall: 756
Northing/Long.: 7484690 AMG zone: 55	Runoff: Moderately rapid
Easting/Lat.: 776108 Datum: GDA94	Drainage: Imperfectly drained

Geology

ExposureType: Existing vertical exposure	Conf. Sub. is Parent. Mat.: Almost certain or certain
Geol. Ref.: Qpa	Substrate Material: Existing vertical exposure, 1 m deep, Fragmental, Bedded, Porous,

Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Open depression (vale)	Relief: 5 metres
Elem. Type: Drainage depression	Slope Category: Gently inclined
Slope: 2 %	Aspect: 0 degrees

Surface Soil Condition Hardsetting

Erosion: Active, Severe scalding (scald) Active, Moderate (sheet) Active, Moderate (rill) Active, Severe (gully) Horiz.(m) 10	Microrelief: Crabhole gilgai Vert.(m) 0.2
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Soil Classification

Australian Soil Classification: Vertic Hypernatric Grey Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep	Mapping Unit: Pv
ASC Confidence: No analytical data are available but confidence is fair.	Principal Profile Form: Dy2.43
	Great Soil Group: Grey-brown podzolic soil
	Land Class: Land Class: C2

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 12.01-20m, Isolated plants. *Species includes - Eucalyptus crebra, Eucalyptus populnea

Surface Coarse

10-20%, medium gravelly, 6-20mm, subrounded, Conglomerate

Profile

1A1	0 - 0.1 m	Very dark grey (10YR3/1-Moist); , 0-0% ; Fine sandy loam; Moderate grade of structure, 2-5 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 0.01m ²) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; Field pH 7 (Raupach); Many, fine (1-2mm) roots; Clear, Smooth change to -
1A2e	0.1 - 0.2 m	Grey (10YR6/1-Moist); Mottles, 10YR4.4, 2-10% , 0-5mm, Distinct; Medium heavy clay; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm ²) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Moderately sticky; Few (2 - 10 %), Ferromanganiferous, Fine (0 - 2 mm), Concretions; Field pH 8 (Raupach); Common, fine (1-2mm) roots; Clear, Wavy change to -
1B2n	0.2 - m	Yellowish brown (10YR5/4-Moist); ; Moderate grade of structure, 5-10 mm, Polyhedral; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm ²) Very fine (0.075-1mm) macropores, Very firm consistence; Very plastic; Normal plasticity; Very sticky; 10-20%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Common cutans, 10-50% of ped faces or walls coated, distinct; Few (2 - 10 %), Calcareous, Medium (2 -6 mm), Nodules; Soil matrix is Slightly calcareous; Field pH 8.5 (Raupach); Few, fine (1-2mm) roots;

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Flat on undulating plain, check site

Site Notes

cleared ironbark woodland, native pasture, severe active gully erosion

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 092 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Mamelon, photo 250
Date Desc.: 16/05/12 **Elevation:** 43 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7483627 AMG zone: 55 **Runoff:** Slow
Easting/Lat.: 776547 Datum: GDA94 **Drainage:** Imperfectly drained

Geology

Exposure Type: Auger boring **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Auger boring, 1 m deep, Fragmental,
 Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat **Relief:** 5 metres
Elem. Type: Terrace plain **Slope Category:** Gently inclined
Slope: 1% **Aspect:** 90 degrees

Surface Soil Condition Hardsetting

Erosion: Stable, Moderate (sheet)

Soil Classification

Microrelief: Crabhole gilgai Vert.(m) 0.1 Horiz.(m) 10

Australian Soil Classification:

Vertic Hypernatric Grey Sodosol Medium Non-gravelly Clay-loamy
 Clayey Moderately deep

Mapping Unit: Pv
Principal Profile Form: Dy2.43
Great Soil Group: Grey-brown
 podzolic soil

ASC Confidence:

No analytical data are available but confidence is fair.

Land Class: Land Class: C2

Site

Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 12.01-20m, Isolated plants. *Species includes - Eucalyptus crebra

Surface Coarse

10-20%, coarse gravelly, 20-60mm, subrounded, Conglomerate

Profile

1A1 0 - 0.1 m Dark greyish brown (10YR4/2-Moist); , 0-0% ; Fine sandy clay loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 7 (Raupach); Many, fine (1-2mm) roots; Clear, Smooth change to -

1A2e 0.1 - 0.2 m Light brownish grey (10YR6/2-Moist); , 0-0% ; Fine sandy clay loam; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 7.5 (Raupach); Common, fine (1-2mm) roots; Clear, Smooth change to -

1B2kss 0.2 - 0.5 m Dark yellowish brown (10YR4/4-Moist); , 0-0% ; Medium clay; Moderate grade of structure, 2-5 mm, Polyhedral; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 10-20%, coarse gravelly, 20-60mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Common cutans, 10-50% of ped faces or walls coated, distinct; Few (2 - 10 %), Calcareous, Medium (2 -6 mm), Nodules; Soil matrix is Slightly calcareous; Field pH 8 (Raupach); Few, fine (1-2mm) roots; Diffuse, Irregular change to -

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Flat on undulating plain, check site

Site Notes

cleared ironbark woodland, native pasture, gravelly brown clay

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 093 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth
Date Desc.: 16/05/12
Map Ref.: GPS S.A. Off
Northing/Long.: 7482884 AMG zone: 55
Easting/Lat.: 776697 Datum: GDA94

Locality: Mamelon, photo 251
Elevation: 54 metres
Rainfall: 756
Runoff: Moderately rapid
Drainage: Moderately well drained

Geology

Exposure Type: Auger boring
Geol. Ref.: Tb
Bedded,

Conf. Sub. is Parent. Mat.: Almost certain or certain
Substrate Material: Auger boring, 0.3 m deep, Fragmental, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Lava plain

Morph. Type: Crest
Elem. Type: Terrace plain
Slope: 1 %

Relief: 5 metres
Slope Category: Gently inclined
Aspect: 90 degrees

Surface Soil Condition Firm

Erosion: Active, Severe (sheet)

Soil Classification

Microrelief: Zero or no microrelief
Vert.(m) **Horiz.(m)**

Australian Soil Classification:

Vertic Subnatric Brown Sodosol Thin Gravelly Clay-loamy Clayey Shallow

ASC Confidence:

No analytical data are available but confidence is fair.

Mapping Unit: Tb
Principal Profile Form: Dy2.22
Great Soil Group: Grey-brown podzolic soil
Land Class: C2

Site

Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 12.01-20m, Isolated plants. *Species includes - Eucalyptus crebra

Surface Coarse

20-50%, coarse gravelly, 20-60mm, rounded tabular, Basalt

Profile

1A1 0 - 0.1 m Dark greyish brown (10YR4/2-Moist); ; Fine sandy clay loam; Moderate grade of structure, 2-5 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 0.01m2) Very fine (0.075-1mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; Clear, Smooth change to -

1A3 0.1 - 0.3 m Light brownish grey (10YR6/2-Moist); ; Clay loam, sandy; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Few (<1 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Moderately sticky; Diffuse, Wavy change to -

1R 0.3 - m Rock

Morphological Notes

1R Rock

Observation Notes

Crest on undulating plain, check site

Site Notes

cleared ironbark woodland, native grassland, basalt rock outcropping on crests of undulating plain, shallow over basalt

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 094 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Normal gilgai, Brussels, photos 252 & 253
Date Desc.: 16/05/12 **Elevation:** 56 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7482398 AMG zone: 55 **Runoff:** Moderately rapid
Easting/Lat.: 776658 Datum: GDA94 **Drainage:** Moderately well drained

Geology

Exposure Type: Auger boring **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Tb **Substrate Material:** Auger boring, 1 m deep, Fragmental,
 Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Lava plain

Morph. Type: Crest **Relief:** 5 metres
Elem. Type: Terrace plain **Slope Category:** Gently inclined
Slope: 1% **Aspect:** 90 degrees

Surface Soil Condition Hardsetting

Erosion: Stable, Moderate (sheet)

Soil Classification

Microrelief: Normal gilgai Vert.(m) 0.5 Horiz.(m) 10

Australian Soil Classification:

Vertic Subnatric Brown Sodosol Thin Gravelly Clay-loamy Clayey
 Moderately deep

Mapping Unit: Tb
Principal Profile Form: Dy2.43
Great Soil Group: Grey-brown
 podzolic soil

ASC Confidence:

No analytical data are available but confidence is fair.

Land Class: Land Class: C2

Site

Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 12.01-20m, Isolated plants. *Species includes - Eucalyptus crebra

Surface Coarse

tabular, Basalt

2-10%, cobbly, 60-200mm, subrounded, Quartz; 10-20%, cobbly, 60-200mm, subrounded

Profile

1A1 0 - 0.1 m Dark greyish brown (10YR4/2-Moist); , 0-0% ; Fine sandy clay loam; Moderate grade of structure, 2-5 mm, Subangular blocky; Rough-ped fabric; Medium, (5 - 10) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 10-20%, coarse gravelly, 20-60mm, subrounded, dispersed, Quartz, coarse fragments; Field pH 6 (Raupach); Many, fine (1-2mm) roots; Clear, Smooth change to -

1A2e 0.1 - 0.2 m Light brownish grey (10YR6/2-Moist); Mottles, 10YR44, 2-10% , 0-5mm, Distinct; Fine sandy clay loam; Massive grade of structure; Earthy fabric; Medium, (5 - 10) mm crack; Few (<1 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 10-20%, cobbly, 60-200mm, subrounded, dispersed, Quartz, coarse fragments; Field pH 7 (Raupach); Common, fine (1-2mm) roots; Clear, Smooth change to -

1B2kss 0.2 - 0.5 m Dark yellowish brown (10YR4/4-Moist); , 0-0% ; Medium clay; Moderate grade of structure, 5-10 mm, Polyhedral; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 20-50%, cobbly, 60-200mm, subrounded, dispersed, Basalt, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Common cutans, 10-50% of ped faces or walls coated, distinct; Soil matrix is Slightly calcareous; Field pH 8 (Raupach); Common, fine (1-2mm) roots; Diffuse, Irregular change to -

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Flat on undulating plain, check site

Site Notes

cleared ironbark woodland, basalt plain, heavy brown gravelly clay, some mainly quartz river cobbles

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 095 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Mamelon, photo 254
Date Desc.: 16/05/12 **Elevation:** 53 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7482036 AMG zone: 55 **Runoff:** Very slow
Easting/Lat.: 776520 Datum: GDA94 **Drainage:** Imperfectly drained

Geology

Exposure Type: Auger boring **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qa **Substrate Material:** Auger boring, 1 m deep, Fragmental,
 Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat **Relief:** 5 metres
Elem. Type: Terrace plain **Slope Category:** Level
Slope: 0.5 % **Aspect:** 180 degrees

Surface Soil Condition Hardsetting

Erosion: Stable, Moderate (sheet)

Soil Classification

Australian Soil Classification: Vertic Subnatric Brown Sodosol Thin Gravelly Clay-loamy Clayey
 Moderately deep
ASC Confidence: No analytical data are available but confidence is fair.
Microrelief: Crabhole gilgai Vert.(m) 0.3 Horiz.(m) 5
Mapping Unit: Pv
Principal Profile Form: Dy2.43
Great Soil Group: Grey-brown podzolic soil
Land Class: Land Class: C2

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 12.01-20m, Isolated plants. *Species includes - Eucalyptus crebra
 2-10%, coarse gravelly, 20-60mm, subrounded, Conglomerate

Surface Coarse

Profile

1A1 0 - 0.1 m Dark greyish brown (10YR4/2-Moist); , 0-0% ; Fine sandy clay loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Medium, (5 - 10) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 7 (Raupach); Abundant, fine (1-2mm) roots; Clear, Smooth change to -

1A2e 0.1 - 0.2 m Light brownish grey (10YR6/2-Moist); Mottles, 10YR44, 2-10% , 0-5mm, Distinct; Fine sandy clay loam; Massive grade of structure; Earthy fabric; Medium, (5 - 10) mm crack; Few (<1 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 10-20%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Few (2 - 10 %), Ferromanganiferous, Fine (0 - 2 mm), Concretions; Field pH 7.5 (Raupach); Common, fine (1-2mm) roots; Clear, Smooth change to -

1B2kss 0.2 - 0.5 m , 0-0% ; Medium clay; Moderate grade of structure, 2-5 mm, Polyhedral; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Rough-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Soil matrix is Slightly calcareous; Field pH 8 (Raupach); Common, fine (1-2mm) roots; Diffuse, Irregular change to -

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Flat on floodplain, check site

Site Notes

cleared ironbark woodland, brown cracking clay, crabhole microrelief

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 096 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Mamelon, photo 255
Date Desc.: 16/05/12 **Elevation:** 55 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7481181 AMG zone: 55 **Runoff:** Very slow
Easting/Lat.: 776224 Datum: GDA94 **Drainage:** Imperfectly drained

Geology

Exposure Type: Auger boring **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qa **Substrate Material:** Auger boring, 1 m deep, Fragmental,
 Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat **Relief:** 5 metres
Elem. Type: Terrace plain **Slope Category:** Level
Slope: 0 % **Aspect:** 180 degrees

Surface Soil Condition Hardsetting

Erosion: Stable, Moderate (sheet)

Soil Classification

Australian Soil Classification: Vertic Subnatric Brown Sodosol Thin Gravelly Clay-loamy Clayey
 Moderately deep
ASC Confidence: No analytical data are available but confidence is fair.
Microrelief: Crabhole gilgai Vert.(m) 0.3 Horiz.(m) 5
Mapping Unit: Pv
Principal Profile Form: Dy2.43
Great Soil Group: Grey-brown podzolic soil
Land Class: Land Class: C2

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 12.01-20m, Isolated plants. *Species includes - Eucalyptus crebra

Surface Coarse

10-20%, coarse gravelly, 20-60mm, subrounded, Conglomerate

Profile

1A1 0 - 0.1 m Dark greyish brown (10YR4/2-Moist); ; Fine sandy clay loam; Moderate grade of structure, 2-5 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 7 (Raupach); Abundant, fine (1-2mm) roots; Clear, Smooth change to -

1A2e 0.1 - 0.2 m Light brownish grey (10YR6/2-Moist); Mottles, 10YR44, 2-10% , 0-5mm, Distinct; Fine sandy clay loam; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Few (<1 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 10-20%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Few (2 - 10 %), Ferromanganiferous, Fine (0 - 2 mm), Concretions; Field pH 8 (Raupach); Many, fine (1-2mm) roots; Clear, Smooth change to -

1B2kss 0.2 - 0.5 m , 0-0% ; Medium clay; Moderate grade of structure, 2-5 mm, Polyhedral; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Common cutans, 10-50% of ped faces or walls coated, distinct; Few (2 - 10 %), Calcareous, Medium (2 -6 mm), Nodules; Soil matrix is Slightly calcareous; Field pH 8.5 (Raupach); Common, fine (1-2mm) roots; Diffuse, Irregular change to -

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Flat on floodplain, check site

Site Notes

cleared ironbark woodland; brown cracking clay, crabhole microrelief

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 097 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth
Date Desc.: 16/05/12
Map Ref.: GPS S.A. Off
Northing/Long.: 7481056 AMG zone: 55
Easting/Lat.: 775394 Datum: GDA94

Locality: Brussels, photo 256
Elevation: 52 metres
Rainfall: 756
Runoff: Very slow
Drainage: Imperfectly drained

Geology

Exposure Type: Auger boring
Geol. Ref.: Qa
Bedded,

Conf. Sub. is Parent. Mat.: Almost certain or certain
Substrate Material: Auger boring, 1 m deep, Fragmental, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat
Elem. Type: Terrace plain
Slope: 0.5 %

Relief: 5 metres
Slope Category: Level
Aspect: 200 degrees

Surface Soil Condition Surface crust

Erosion: Stable, Moderate (sheet)

Soil Classification

Australian Soil Classification: Vertic Subnatric Brown Sodosol Thin Gravelly Clay-loamy Clayey Moderately deep
ASC Confidence: No analytical data are available but confidence is fair.

Microrelief: Crabhole gilgai Vert.(m) 0.5 Horiz.(m) 5
Mapping Unit: Pv
Principal Profile Form: Dy2.43
Great Soil Group: Grey-brown podzolic soil
Land Class: Land Class: C2

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Acacia harpophylla

Surface Coarse

10-20%, cobbly, 60-200mm, subrounded, Conglomerate

Profile

1A1 0 - 0.1 m Dark greyish brown (10YR4/2-Moist); , 0-0% ; Fine sandy clay loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Medium, (5 - 10) mm crack; Common (1-5 per 0.01m²) Medium (2-5mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 10-20%, coarse gravelly, 20-60mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 7 (Raupach); Abundant, fine (1-2mm) roots; Clear, Smooth change to -

1A3 0.1 - 0.2 m Dark greyish brown (10YR4/2-Moist); , 0-0% ; Light clay; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Medium, (5 - 10) mm crack; Common (1-5 per 100mm²) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 10-20%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 7.5 (Raupach); Many, fine (1-2mm) roots; Clear, Smooth change to -

1B2kss 0.2 - 0.5 m Yellowish brown (10YR5/4-Moist); , 0-0% ; Medium clay; Moderate grade of structure, 5-10 mm, Lenticular; Smooth-ped fabric; Medium, (5 - 10) mm crack; Many (>5 per 100mm²) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 2-10%, coarse gravelly, 20-60mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Very few (0 - 2 %), Calcareous, Medium (2 -6 mm), Nodules; Soil matrix is Slightly calcareous; Field pH 8 (Raupach); Common, fine (1-2mm) roots; Diffuse, Irregular change to -

Morphological Notes

1A3 bleached

Observation Notes

Flat on floodplain, check site

Site Notes

cleared ironbark woodland; brown gravelly cracking clay, crabhole microrelief

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 098 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth
Date Desc.: 16/05/12
Map Ref.: GPS S.A. Off
Northing/Long.: 7483495 AMG zone: 55
Easting/Lat.: 776571 Datum: GDA94

Locality: Mamelon, photo 257
Elevation: 46 metres
Rainfall: 756
Runoff: Slow
Drainage: Imperfectly drained

Geology

ExposureType: Auger boring
Geol. Ref.: Qpa
Bedded,

Conf. Sub. is Parent. Mat.: Almost certain or certain
Substrate Material: Auger boring, 2 m deep, Fragmental, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Simple-slope
Elem. Type: Terrace plain
Slope: 1 %

Relief: 5 metres
Slope Category: Gently inclined
Aspect: 270 degrees

Surface Soil Condition Hardsetting

Erosion: Partial, Moderate scalding (scald) Partial, Moderate (sheet)
Microrelief: Crabhole gilgai Vert.(m) 0.3 Horiz.(m) 10

Soil Classification

Australian Soil Classification: Vertic Hypernatric Grey Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep
ASC Confidence: No analytical data are available but confidence is fair.

Mapping Unit: Pv
Principal Profile Form: Dy2.43
Great Soil Group: Grey-brown podzolic soil
Land Class: Land Class: C2

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 12.01-20m, Isolated plants. *Species includes - Eucalyptus crebra

Surface Coarse

10-20%, coarse gravelly, 20-60mm, subrounded, Conglomerate

Profile

1A1 0 - 0.1 m Dark greyish brown (10YR4/2-Moist); , 0-0% ; Fine sandy clay loam; Moderate grade of structure, 2-5 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 10-20%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 7 (Raupach); Abundant, fine (1-2mm) roots; Clear, Smooth change to -

1A2e 0.1 - 0.2 m Light brownish grey (10YR6/2-Moist); Mottles, 10YR44, 10-20% , 0-5mm, Distinct; Fine sandy clay loam; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Many (>5 per 100mm2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 10-20%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Few (2 - 10 %), Ferromanganiferous, Fine (0 - 2 mm), Concretions; Field pH 7.5 (Raupach); Common, fine (1-2mm) roots; Clear, Smooth change to -

1B2kss 0.2 - 0.5 m ; Medium clay; Moderate grade of structure, 2-5 mm, Polyhedral; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 2-10%, coarse gravelly, 20-60mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Common cutans, 10-50% of ped faces or walls coated, distinct; Soil matrix is Slightly calcareous; Field pH 8 (Raupach); Few, fine (1-2mm) roots; Diffuse, Irregular change to -

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Flat on undulating plain, check site

Site Notes

cleared ironbark woodland, gravelly brown clay, crabhole microrelief

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 099 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth
Date Desc.: 16/05/12
Map Ref.: GPS S.A. Off
Northing/Long.: 7485924 AMG zone: 55
Easting/Lat.: 774524 Datum: GDA94

Locality: Mamelon, photo 258
Elevation: 41 metres
Rainfall: 756
Runoff: Slow
Drainage: Imperfectly drained

Geology

ExposureType: Auger boring
Geol. Ref.: Qpa
Bedded,

Conf. Sub. is Parent. Mat.: Almost certain or certain
Substrate Material: Auger boring, 1 m deep, Fragmental, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat
Elem. Type: Terrace plain
Slope: 0.5 %

Relief: 5 metres
Slope Category: Level
Aspect: 120 degrees

Surface Soil Condition Hardsetting

Erosion: Partial, Moderate scalding (scald) Partial, Moderate (sheet)
Microrelief: Crabhole gilgai Vert.(m) 0.3 Horiz.(m) 10

Soil Classification

Australian Soil Classification: Vertic Mesonatric Grey Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep
ASC Confidence: No analytical data are available but confidence is fair.

Mapping Unit: Pv
Principal Profile Form: Dy2.43
Great Soil Group: Grey-brown podzolic soil
Land Class: Land Class: C2

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 12.01-20m, Isolated plants. *Species includes - Eucalyptus crebra

Surface Coarse

No surface coarse fragments

Profile

1A1 0 - 0.1 m Dark grey (10YR4/1-Moist); , 0-0% ; Fine sandy clay loam; Moderate grade of structure, 2-5 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; Field pH 6.5 (Raupach); Abundant, fine (1-2mm) roots; Clear, Smooth change to -

1A2e 0.1 - 0.2 m Greyish brown (10YR5/2-Moist); Mottles, 10YR44, 10-20% , 0-5mm, Distinct; Fine sandy clay loam; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 10-20%, medium gravelly, 6-20mm, rounded, dispersed, Ironstone, coarse fragments; Very few (0 - 2 %), Ferromanganiferous, Fine (0 - 2 mm), Concretions; Field pH 6.5 (Raupach); Common, fine (1-2mm) roots; Clear, Smooth change to -

1B2kss 0.2 - 0.5 m ; Medium clay; Moderate grade of structure, 2-5 mm, Polyhedral; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 10-20%, medium gravelly, 6-20mm, rounded, dispersed, Ironstone, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Common cutans, 10-50% of ped faces or walls coated, distinct; Few (2 - 10 %), Calcareous, Medium (2 -6 mm), Nodules; Soil matrix is Slightly calcareous; Field pH 8.5 (Raupach); Few, very fine (0-1mm) roots; Diffuse, Irregular change to -

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Flat on undulating plain, check site

Site Notes

cleared ironbark woodland, native pasture, brown cracking clay, crabhole microrelief

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 100 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Mamelon, photos 259 & 260
Date Desc.: 16/05/12 **Elevation:** 40 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7485897 AMG zone: 55 **Runoff:** Moderately rapid
Easting/Lat.: 774839 Datum: GDA94 **Drainage:** Imperfectly drained

Geology

ExposureType: Auger boring **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Existing vertical exposure, 1 m deep, Fragmental, Bedded, Porous, ,

Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Simple-slope **Relief:** 5 metres
Elem. Type: Terrace plain **Slope Category:** Gently inclined
Slope: 2% **Aspect:** 90 degrees

Surface Soil Condition Firm

Erosion: Active, Moderate scalding (scald) Active, Moderate (sheet) Active, Moderate (gully) Active, Present
Microrelief: Crabhole gilgai Vert.(m) 0.1
 Horiz.(m) 10
 (stbank) Vert.(m) Horiz.(m) 10

Soil Classification

Australian Soil Classification: Vertic Hypernatric Grey Sodosol Medium Gravelly Clay-loamy
 Clayey Moderately deep
ASC Confidence: No analytical data are available but confidence is fair.
Mapping Unit: Pv
Principal Profile Form: Dy2.43
Great Soil Group: Grey-brown podzolic soil
Land Class: Land Class: C2

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation: Tall Strata - Tree, 12.01-20m, Isolated plants. *Species includes - Eucalyptus crebra

Surface Coarse 2-10%, medium gravelly, 6-20mm, rounded, Ferricrete

Profile

1A1 0 - 0.1 m Dark grey (10YR4/1-Moist); , 0-0% ; Fine sandy clay loam; Moist; Moderately plastic; Normal plasticity; Moderately sticky; Clear, Smooth change to -
 1A2e 0.1 - 0.2 m Greyish brown (10YR5/2-Moist); Mottles, 10YR44, 2-10% , 0-5mm, Distinct; Fine sandy clay loam; Moist; Moderately plastic; Normal plasticity; Moderately sticky; Clear, Smooth change to -
 1B2kss 0.2 - 0.5 m Dark yellowish brown (10YR4/4-Moist); , 0-0% ; Medium clay; Moist; Very plastic; Normal plasticity; Very sticky; Soil matrix is Slightly calcareous; Diffuse, Irregular change to -

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Flat on undulating plain, check site

Site Notes

cleared ironbark woodland, brown gravelly cracking clay, crabhole microrelief

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 101 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Mamelon, photo 261
Date Desc.: 16/05/12 **Elevation:** 39 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7486249 AMG zone: 55 **Runoff:** Very slow
Easting/Lat.: 774943 Datum: GDA94 **Drainage:** Imperfectly drained

Geology

Exposure Type: Auger boring **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Auger boring, 1 m deep, Fragmental,
 Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat **Relief:** 5 metres
Elem. Type: Terrace plain **Slope Category:** Level
Slope: 0.5 % **Aspect:** 0 degrees

Surface Soil Condition Surface crust

Erosion: Partial, Moderate scalding (scald) Partial, Moderate
 (sheet) **Microrelief:** Melonhole gilgai Vert.(m) 1 Horiz.(m) 20

Soil Classification

Australian Soil Classification: Vertic Hypernatric Grey Sodosol Medium Gravelly Clay-loamy
 Clayey Moderately deep **Mapping Unit:** Pv
ASC Confidence: No analytical data are available but confidence is fair. **Principal Profile Form:** Dy2.43
Land Class: Land Class: C2 **Great Soil Group:** Grey-brown podzolic soil

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation: Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Acacia harpophylla

Surface Coarse No surface coarse fragments

Profile

1A1 0 - 0.1 m Dark grey (10YR4/1-Moist); , 0-0% ; Fine sandy clay loam; Moderate grade of structure, 2-5 mm, Subangular blocky; Rough-ped fabric; Medium, (5 - 10) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 6 (Raupach); Many, fine (1-2mm) roots; Clear, Smooth change to -

1A2e 0.1 - 0.2 m Greyish brown (10YR5/2-Moist); Mottles, 10YR44, 2-10% , 5-15mm, Distinct; Fine sandy clay loam; Massive grade of structure; Earthy fabric; Medium, (5 - 10) mm crack; Few (<1 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; Few (2 - 10 %), Ferromanganiferous, Fine (0 - 2 mm), Concretions; Field pH 7 (Raupach); Common, fine (1-2mm) roots; Clear, Smooth change to -

1B2kss 0.2 - 0.5 m Dark yellowish brown (10YR4/4-Moist); , 0-0% ; Medium clay; Moderate grade of structure, 5-10 mm, Angular blocky; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Medium, (5 - 10) mm crack; Few (<1 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Common cutans, 10-50% of ped faces or walls coated, distinct; Few (2 - 10 %), Calcareous, Medium (2 -6 mm), Nodules; Soil matrix is Slightly calcareous; Field pH 8.5 (Raupach); Few, fine (1-2mm) roots; Diffuse, Irregular change to -

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Flat on undulating plain, check site

Site Notes

cleared brigalow woodland, melonhole microrelief, brown cracking clay

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 102 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth
Date Desc.: 16/05/12
Map Ref.: GPS S.A. Off
Northing/Long.: 7487391 AMG zone: 55
Easting/Lat.: 774379 Datum: GDA94

Locality: Mamelon, photos 262, 263
Elevation: 31 metres
Rainfall: 756
Runoff: Very slow
Drainage: Imperfectly drained

Geology

Exposure Type: Auger boring
Geol. Ref.: Qpa
Bedded,

Conf. Sub. is Parent. Mat.: Probable
Substrate Material: Auger boring, 1 m deep, Fragmental, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat
Elem. Type: Drainage depression
Slope: 0 %

Relief: 5 metres
Slope Category: Level
Aspect: 90 degrees

Surface Soil Condition Cracking

Erosion:

Soil Classification

Australian Soil Classification: Vertic Hypernatric Grey Sodosol Medium Gravelly Clay-loamy Clayey Moderately deep
ASC Confidence: No analytical data are available but confidence is fair.

Microrelief: Melonhole gilgai Vert.(m) 1 Horiz.(m) 20
Mapping Unit: Pv
Principal Profile Form: Dy2.43
Great Soil Group: Grey-brown podzolic soil
Land Class: Land Class: C2

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Acacia harpophylla
 2-10%, medium gravelly, 6-20mm, subrounded, Conglomerate

Surface Coarse

Profile

1A1 0 - 0.1 m Grey (2.5Y5/1-Moist); , 0-0% ; Fine sandy loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Medium, (5 - 10) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; Field pH 7 (Raupach); Many, fine (1-2mm) roots; Clear, Smooth change to -

1A2e 0.1 - 0.2 m Dark greyish brown (2.5Y4/3-Moist); Mottles, 10YR44, 2-10% , 0-5mm, Distinct; Fine sandy loam; Massive grade of structure; Earthy fabric; Medium, (5 - 10) mm crack; Few (<1 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Moderately sticky; Few (2 - 10 %), Ferromanganiferous, Fine (0 - 2 mm), Concretions; Field pH 7.5 (Raupach); Common, fine (1-2mm) roots; Clear, Smooth change to -

1B2 0.2 - 0.3 m Dark greyish brown (2.5Y4/3-Moist); ; Medium heavy clay; Moderate grade of structure, 10-20 mm, Polyhedral; Smooth-ped fabric; Medium, (5 - 10) mm crack; Common (1-5 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 8.5 (Raupach); FewDiffuse, Wavy change to -

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Flat on undulating plain, check site

Site Notes

cleared woodland, brown cracking clay, melonhole microrelief

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 103 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth
Date Desc.: 16/05/12
Map Ref.: GPS S.A. Off
Northing/Long.: 7487760 AMG zone: 55
Easting/Lat.: 774311 Datum: GDA94

Locality: Mamelon, photo 264
Elevation: 35 metres
Rainfall: 756
Runoff: Very slow
Drainage: Imperfectly drained

Geology

Exposure Type: Auger boring
Geol. Ref.: Qpa
Bedded,

Conf. Sub. is Parent. Mat.: Almost certain or certain
Substrate Material: Auger boring, 1 m deep, Fragmental, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat
Elem. Type: Terrace plain
Slope: 0.5 %

Relief: 5 metres
Slope Category: Level
Aspect: 200 degrees

Surface Soil Condition Cracking

Erosion: Partial, Moderate (sheet) Partial, Moderate (rill)

Soil Classification

Australian Soil Classification: Vertic Hypernatric Grey Sodosol Medium Gravelly Clay-loamy
 Clayey Moderately deep
ASC Confidence: No analytical data are available but confidence is fair.

Microrelief: Melonhole gilgai Vert.(m) 1 Horiz.(m) 20
Mapping Unit: Pv
Principal Profile Form: Dy2.43
Great Soil Group: Grey-brown podzolic soil
Land Class: Land Class: C2

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Acacia harpophylla

Surface Coarse

No surface coarse fragments

Profile

1A1 0 - 0.1 m Very dark grey (2.5Y3/1-Moist); , 0-0% ; Fine sandy clay loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Medium, (5 - 10) mm crack; Few (<1 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; Field pH 6.5 (Raupach); Many, fine (1-2mm) roots; Clear, Smooth change to -

1A2e 0.1 - 0.2 m Dark grey (2.5Y4/1-Moist); Mottles, 10YR44, 2-10% , 0-5mm, Distinct; Fine sandy clay loam; Massive grade of structure; Earthy fabric; Medium, (5 - 10) mm crack; Many (>5 per 100mm2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; Few (2 - 10 %), Ferromanganiferous, Fine (0 - 2 mm), Concretions; Field pH 7.5 (Raupach); Common, fine (1-2mm) roots; Clear, Smooth change to -

1B2kss 0.2 - 0.5 m Dark greyish brown (2.5Y4/2-Moist); ; Medium clay; Moderate grade of structure, 10-20 mm, Polyhedral; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Common cutans, 10-50% of ped faces or walls coated, distinct; Few (2 - 10 %), Calcareous, Fine (0 - 2 mm), Nodules; Soil matrix is Slightly calcareous; Field pH 8.5 (Raupach); Few, very fine (0-1mm) roots; Diffuse, Irregular change to -

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Flat on undulating plain, check site

Site Notes

cleared woodland, brown cracking clay, melonhole microrelief

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 104 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth
Date Desc.: 16/05/12
Map Ref.: GPS S.A. Off
Northing/Long.: 7487730 AMG zone: 55
Easting/Lat.: 774039 Datum: GDA94

Locality: Mamelon, photo 265
Elevation: 32 metres
Rainfall: 756
Runoff: Very slow
Drainage: Poorly drained

Geology

Exposure Type: Auger boring
Geol. Ref.: Qpa
Bedded,

Conf. Sub. is Parent. Mat.: Almost certain or certain
Substrate Material: Auger boring, 1 m deep, Fragmental, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Closed Depression
Elem. Type: Drainage depression
Slope: 0 %

Relief: 5 metres
Slope Category: Level
Aspect: 200 degrees

Surface Soil Condition Cracking

Erosion:

Soil Classification

Australian Soil Classification: Vertic Mesonatric Grey Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep
ASC Confidence: No analytical data are available but confidence is fair.

Microrelief: Melonhole gilgai Vert.(m) 1 Horiz.(m) 20
Mapping Unit: Pv
Principal Profile Form: Dy2.43
Great Soil Group: Grey-brown podzolic soil
Land Class: Land Class: C2

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Acacia harpophylla
 0-2%, cobbly, 60-200mm, subrounded, Conglomerate

Surface Coarse

Profile

1A1 0 - 0.1 m Black (2.5Y2/2-Moist); , 0-0% ; Clay loam; Moderate grade of structure, 2-5 mm, Subangular blocky; Rough-ped fabric; Medium, (5 - 10) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 0-2%, coarse gravelly, 20-60mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 6.5 (Raupach); Many, fine (1-2mm) roots; Clear, Smooth change to -

1A2e 0.1 - 0.3 m Light grey (2.5Y7/1-Moist); Mottles, 10YR44, 2-10% , 0-5mm, Distinct; Clay loam; Massive grade of structure; Earthy fabric; Medium, (5 - 10) mm crack; Few (<1 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Moderately sticky; Few (2 - 10 %), Ferromanganiferous, Fine (0 - 2 mm), Concretions; Field pH 7.5 (Raupach); Common, fine (1-2mm) roots; Clear, Smooth change to -

1B21 0.3 - 0.5 m , 0-0% ; Light medium clay; Moderate grade of structure, 5-10 mm, Polyhedral; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Medium, (5 - 10) mm crack; Few (<1 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Few cutans, <10% of ped faces or walls coated, distinct; Common cutans, 10-50% of ped faces or walls coated, distinct; Few (2 - 10 %), Calcareous, Medium (2 -6 mm), Nodules; Field pH 8 (Raupach); Few, fine (1-2mm) roots; Diffuse, Wavy change to -

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Drainage depression on undulating plain, check site

Site Notes

cleared woodland, brown cracking clay, melonhole microrelief

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 105 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Mamelon, melonhole microrelief, photo 266
Date Desc.: 16/05/12 **Elevation:** 31 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7488038 AMG zone: 55 **Runoff:** Very slow
Easting/Lat.: 774282 Datum: GDA94 **Drainage:** Imperfectly drained

Geology

ExposureType: Soil pit **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Auger boring, 1 m deep, Fragmental,
 Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Open depression (vale) **Relief:** 5 metres
Elem. Type: Drainage depression **Slope Category:** Level
Slope: 0.5 % **Aspect:** 270 degrees

Surface Soil Condition Cracking

Erosion: Partial, Minor scalding (scald) Partial, Minor (sheet)
Microrelief: Melonhole gilgai Vert.(m) 1 Horiz.(m) 20

Soil Classification

Australian Soil Classification: Vertic Mesonatric Grey Sodosol Medium Non-gravelly Clay-loamy
 Clayey Moderately deep **Mapping Unit:** Pv
ASC Confidence: No analytical data are available but confidence is fair. **Principal Profile Form:** Dy2.43
Land Class: C1 **Great Soil Group:** Grey-brown podzolic soil

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation: Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Acacia harpophylla

Surface Coarse No surface coarse fragments

Profile

1A1 0 - 0.1 m Grey (2.5Y5/1-Moist); , 0-0% ; Clay loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Coarse, (10 - 20) mm crack; Common (1-5 per 0.01m²) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; Field pH 7 (Raupach); Abundant, fine (1-2mm) roots; Clear, Smooth change to -

1A2e 0.1 - 0.3 m Mottles, 10YR44, 2-10% , 0-5mm, Distinct; Clay loam; Massive grade of structure; Earthy fabric; Medium, (5 - 10) mm crack; Few (<1 per 0.01m²) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Moderately sticky; Few (2 - 10 %), Ferromanganiferous, Fine (0 - 2 mm), Concretions; Field pH 7 (Raupach); Many, fine (1-2mm) roots; Clear, Smooth change to -

1B21 0.3 - 0.5 m Dark greyish brown (2.5Y4/3-Moist); , 0-0% ; Light medium clay; Moderate grade of structure, 5-10 mm, Polyhedral; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm²) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 8 (Raupach); Common, very fine (0-1mm) roots; Diffuse, Wavy change to -

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Drainage depression on undulating plain, check site

Site Notes

cleared brigalow woodland, grey cracking clay, melonhole microrelief

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 106 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Mamelon, photo 267
Date Desc.: 16/05/12 **Elevation:** 37 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7486432 AMG zone: 55 **Runoff:** Very slow
Easting/Lat.: 774435 Datum: GDA94 **Drainage:** Imperfectly drained

Geology

ExposureType: Soil pit **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Auger boring, 1 m deep, Fragmental,
 Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat **Relief:** 5 metres
Elem. Type: Terrace plain **Slope Category:** Level
Slope: 0.5 % **Aspect:** 300 degrees

Surface Soil Condition Hardsetting

Erosion: Partial, Moderate scalding (scald) Partial, Moderate
 (sheet) **Microrelief:** Crabhole gilgai Vert.(m) 0.2 Horiz.(m) 10

Soil Classification

Australian Soil Classification: Vertic Subnatric Grey Sodosol Medium Non-gravelly Clay-loamy
 Clayey Moderately deep **Mapping Unit:** Pv
ASC Confidence: No analytical data are available but confidence is fair. **Principal Profile Form:** Dy2.42
Land Class: Land Class: C2 **Great Soil Group:** Grey-brown podzolic soil

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation: Tall Strata - Tree, 12.01-20m, Isolated plants. *Species includes - Eucalyptus crebra

Surface Coarse 0-2%, coarse gravelly, 20-60mm, subrounded, Conglomerate

Profile

1A1 0 - 0.1 m Very dark grey (7.5YR3/1-Moist); , 0-0% ; Fine sandy clay loam; Moderate grade of structure, 2-5 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 0-2%, coarse gravelly, 20-60mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 6.5 (Raupach); Many, fine (1-2mm) roots; Clear, Smooth change to -

1A2e 0.1 - 0.2 m Strong brown (7.5YR4/6-Moist); Mottles, 10YR44, 2-10% , 0-5mm, Distinct; Fine sandy clay loam; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Many (>5 per 100mm2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 2-10%, cobbly, 60-200mm, subrounded, dispersed, Conglomerate, coarse fragments; Few (2 - 10 %), Ferromanganiferous, Fine (0 - 2 mm), Concretions; Field pH 6.5 (Raupach); Common, fine (1-2mm) roots; Clear, Smooth change to -

1B2kss 0.2 - 0.5 m , 0-0% ; Medium clay; Moderate grade of structure, 5-10 mm, Polyhedral; Moderate grade of structure, 5-10 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 6.5 (Raupach); Few, fine (1-2mm) roots; Diffuse, Irregular change to -

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Check site, not sampled

Site Notes

brown cracking clay, ironbark woodland, native grassland, crabhole microrelief

Horizon Soil Survey & Evaluation

Appendix A

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 107 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth
Date Desc.: 17/05/12
Map Ref.: GPS S.A. Off
Northing/Long.: 7493768 AMG zone: 55
Easting/Lat.: 767192 Datum: GDA94
Locality: Ogmore, photo 268
Elevation: 61 metres
Rainfall: 756
Runoff: Moderately rapid
Drainage: Moderately well drained

Geology

Exposure Type: Soil pit
Geol. Ref.: Kx
Conf. Sub. is Parent. Mat.: Almost certain or certain
Substrate Material: Existing vertical exposure, 0.5 m deep, Fragmental, Bedded, Porous, ,

Alluvium

Land Form

Rel/Slope Class: Undulating low hills 30-90m 3-10% **Pattern Type:** Hills

Morph. Type: Simple-slope
Elem. Type: Bench
Slope: 5 %
Relief: 31 metres
Slope Category: Gently inclined
Aspect: 270 degrees

Surface Soil Condition Self-mulching

Erosion: Active, Moderate (sheet) Active, Moderate (rill)

Soil Classification **Microrelief:** Zero or no microrelief
Vert.(m) Horiz.(m)

Australian Soil Classification: Haplic Self-Mulching Brown Vertosol Very gravelly Fine Fine
Shallow
Mapping Unit: Ws
Principal Profile Form: Ug5.32
Great Soil Group: Brown earth
ASC Confidence: No analytical data are available but confidence is fair.
Land Class: **Land Class:** C2

Site Limited clearing, for example selective logging

Vegetation:

Tall Strata - Tree, 6.01-12m, Mid-dense. *Species includes - Acacia rhodoxylon, Eucalyptus melanophloia
50-90%, coarse gravelly, 20-60mm, subangular tabular, Basalt

Surface Coarse

Profile

1A1 0 - 0.1 m Brown (7.5YR4/2-Moist); , 0-0% ; Fine sandy clay loam; Moderate grade of structure, 5-10 mm, Prismatic; Rough-ped fabric; Medium, (5 - 10) mm crack; Common (1-5 per 0.01m2) Medium (2-5mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 90-100%, coarse gravelly, 20-60mm, subangular tabular, dispersed, Basalt, coarse fragments; Field pH 6 (Raupach); Many, fine (1-2mm) roots; Clear, Smooth change to -

1A3 0.1 - 0.3 m Brown (7.5YR4/3-Moist); , 0-0% ; Clay loam, sandy; Moderate grade of structure, 2-5 mm, Subangular blocky; Rough-ped fabric; Coarse, (10 - 20) mm crack; Few (<1 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Moderately sticky; 90-100%, coarse gravelly, 20-60mm, subangular tabular, dispersed, Basalt, coarse fragments; Field pH 7.5 (Raupach); Many, fine (1-2mm) roots; Sharp, Smooth change to -

1R 0.3 - m Rock

Morphological Notes

1A3 basalt

Observation Notes

Basalt flow, gravel quarry. Check site, not sampled

Site Notes

basalt terraced slope, gravel pit

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 108 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth
Date Desc.: 17/05/12
Map Ref.: GPS S.A. Off
Northing/Long.: 7493817 AMG zone: 55
Easting/Lat.: 772822 Datum: GDA94

Locality: Bar H, photos 269-270
Elevation: 30 metres
Rainfall: 756
Runoff: Slow
Drainage: Imperfectly drained

Geology

Exposure Type: Auger boring
Geol. Ref.: Qpa
Bedded,

Conf. Sub. is Parent. Mat.: Almost certain or certain
Substrate Material: Auger boring, 1 m deep, Fragmental, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat
Elem. Type: Terrace plain
Slope: 0.5 %

Relief: 5 metres
Slope Category: Level
Aspect: 90 degrees

Surface Soil Condition Surface crust

Erosion: Stable, Minor scalding (scald)

Soil Classification

Australian Soil Classification: Endohypersodic Epipedal Brown Vertosol Non-gravelly Fine Medium fine Moderately deep
ASC Confidence: No analytical data are available but confidence is fair.

Microrelief: Melonhole gilgai Vert.(m) 1 Horiz.(m) 20
Mapping Unit: Bl
Principal Profile Form: Ug5.25
Great Soil Group: Brown clay
Land Class: Land Class: C1

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Acacia harpophylla

Surface Coarse

No surface coarse fragments

Profile

1A11 0 - 0.1 m Very dark grey (10YR3/1-Moist); , 0-0% ; Clay loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Coarse, (10 - 20) mm crack; Many (>5 per 0.01m2) Medium (2-5mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; Field pH 7.5 (Raupach); Abundant, fine (1-2mm) roots; Clear, Tongued change to -

1A12 0.1 - 0.3 m Very dark greyish brown (10YR3/2-Moist); , 0-0% ; Silty clay loam; Moderate grade of structure, 5-10 mm, Polyhedral; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Medium, (5 - 10) mm crack; Common (1-5 per 0.01m2) Coarse (>5mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Moderately sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Soil matrix is Slightly calcareous; Field pH 8 (Raupach); Many, fine (1-2mm) roots; Diffuse, Irregular change to -

1B2kss 0.3 - 0.5 m , 0-0% ; Medium clay; Moderate grade of structure, 5-10 mm, Polyhedral; Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Medium, (5 - 10) mm crack; Common (1-5 per 0.01m2) Medium (2-5mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Few (2 - 10 %), Calcareous, Medium (2 - 6 mm), Nodules; Soil matrix is Slightly calcareous; Field pH 9 (Raupach); Common, fine (1-2mm) roots; Diffuse, Irregular change to -

Morphological Notes

Observation Notes

Check site, flat on edge of undulating terrace plain, not sampled

Site Notes

melonhole microrelief, cleared brigalow woodland, improved pasture, brown clay

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 109 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Bar H, photos 271, melonhole microrelief
Date Desc.: 17/05/12 **Elevation:** 35 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7490999 AMG zone: 55 **Runoff:** Slow
Easting/Lat.: 771922 Datum: GDA94 **Drainage:** Imperfectly drained

Geology

ExposureType: Auger boring **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Auger boring, 1 m deep, Fragmental,
 Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat **Relief:** 5 metres
Elem. Type: Terrace plain **Slope Category:** Level
Slope: 0.5 % **Aspect:** 100 degrees

Surface Soil Condition Surface crust, Cracking

Erosion: Partial, Minor scalding (scald) Partial, Minor (sheet) **Microrelief:** Melonhole gilgai Vert.(m) 1 Horiz.(m) 20

Soil Classification

Australian Soil Classification: Endohypersodic Epipedal Grey Vertosol Non-gravelly Fine Medium fine Moderately deep
Mapping Unit: Bl
Principal Profile Form: Ug5.25
Great Soil Group: Grey clay
ASC Confidence: No analytical data are available but confidence is fair. **Land Class:** Land Class: A

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation: Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Acacia harpophylla

Surface Coarse No surface coarse fragments

Profile

1A11 0 - 0.1 m Dark grey (2.5Y4/1-Moist); , 0-0% ; Clay loam; Moderate grade of structure, 2-5 mm, Subangular blocky; Rough-ped fabric; Coarse, (10 - 20) mm crack; Many (>5 per 0.01m2) Medium (2-5mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 7 (Raupach); Abundant, fine (1-2mm) roots; Clear, Tongued change to -

1A12 0.1 - 0.3 m Dark grey (2.5Y4/1-Moist); , 0-0% ; Silty clay loam; Moderate grade of structure, 5-10 mm, Polyhedral; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Medium, (5 - 10) mm crack; Common (1-5 per 0.01m2) Medium (2-5mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Moderately sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Soil matrix is Slightly calcareous; Field pH 8 (Raupach); Many, fine (1-2mm) roots; Diffuse, Irregular change to -

1B2kss 0.3 - 0.5 m Dark greyish brown (2.5Y4/3-Moist); , 0-0% ; Medium clay; Moderate grade of structure, 5-10 mm, Polyhedral; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Medium, (5 - 10) mm crack; Few (<1 per 0.01m2) Medium (2-5mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Few (2 - 10 %), Calcareous, Medium (2 -6 mm), Nodules; Soil matrix is Slightly calcareous; Field pH 9 (Raupach); Few, fine (1-2mm) roots; Diffuse, Irregular change to -

Morphological Notes

Observation Notes

Check site, flat on edge of undulating terrace plain, not sampled

Site Notes

melonhole microrelief, cleared brigalow woodland, improved pasture, brown clay

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 110 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Bar H, photos 272
Date Desc.: 17/05/12 **Elevation:** 35 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7490585 AMG zone: 55 **Runoff:** Slow
Easting/Lat.: 772199 Datum: GDA94 **Drainage:** Imperfectly drained

Geology

Exposure Type: Auger boring **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Auger boring, 1 m deep, Fragmental,
 Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat **Relief:** 5 metres
Elem. Type: Terrace plain **Slope Category:** Level
Slope: 0.5 % **Aspect:** 100 degrees

Surface Soil Condition Surface crust

Erosion: Stable, Minor scalding (scald) Stable, Minor (sheet) **Microrelief:** Melonhole gilgai Vert.(m) 0.5 Horiz.(m) 20

Soil Classification

Australian Soil Classification: Endohypersodic Epipedal Brown Vertosol Non-gravelly Fine
 Medium fine Moderately deep **Mapping Unit:** B1
ASC Confidence: No analytical data are available but confidence is fair. **Principal Profile Form:** Ug5.25
Land Class: **Land Class:** A

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation: Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Acacia harpophylla

Surface Coarse No surface coarse fragments

Profile

1A11 0 - 0.1 m Dark grey (2.5Y4/1-Moist); , 0-0% ; Clay loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Coarse, (10 - 20) mm crack; Common (1-5 per 0.01m2) Medium (2-5mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; Field pH 7 (Raupach); Abundant, fine (1-2mm) roots; Clear, Wavy change to -

1A12 0.1 - 0.3 m Dark grey (2.5Y4/1-Moist); , 0-0% ; Light clay; Moderate grade of structure, 10-20 mm, Polyhedral; Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Medium, (5 - 10) mm crack; Few (<1 per 0.01m2) Medium (2-5mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 8 (Raupach); Many, fine (1-2mm) roots; Diffuse, Irregular change to -

1B2tss 0.3 - 0.5 m Dark greyish brown (2.5Y4/3-Moist); , 0-0% ; Medium clay; Moderate grade of structure, 5-10 mm, Polyhedral; Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Medium, (5 - 10) mm crack; Few (<1 per 0.01m2) Medium (2-5mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Soil matrix is Slightly calcareous; Field pH 8.5 (Raupach); Few, fine (1-2mm) roots; Diffuse, Irregular change to -

Morphological Notes

Observation Notes

Check site, flat on edge of undulating terrace plain, not sampled

Site Notes

melonhole microrelief, cleared brigalow woodland, improved pasture, brown clay

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 111 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Bar H, photos 273-274
Date Desc.: 17/05/12 **Elevation:** 36 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7490041 AMG zone: 55 **Runoff:** Slow
Easting/Lat.: 772456 Datum: GDA94 **Drainage:** Imperfectly drained

Geology

Exposure Type: Auger boring **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Auger boring, 1 m deep, Fragmental,
 Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat **Relief:** 5 metres
Elem. Type: Terrace plain **Slope Category:** Level
Slope: 0.5 % **Aspect:** 100 degrees

Surface Soil Condition Surface crust

Erosion: Stable, Minor scalding (scald) Stable, Minor (sheet) **Microrelief:** Melonhole gilgai Vert.(m) 1 Horiz.(m) 20

Soil Classification

Australian Soil Classification: Endohypersodic Epipedal Grey Vertosol Non-gravelly Fine Medium fine Moderately deep
Mapping Unit: B1
Principal Profile Form: Ug5.25
Great Soil Group: Grey clay
ASC Confidence: No analytical data are available but confidence is fair. **Land Class:** Land Class: A

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Acacia harpophylla

Surface Coarse

No surface coarse fragments

Profile

1A11 0 - 0.1 m Dark grey (2.5Y4/1-Moist); , 0-0% ; Clay loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Medium, (5 - 10) mm crack; Common (1-5 per 0.01m2) Medium (2-5mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; Field pH 7 (Raupach); Abundant, fine (1-2mm) roots; Clear, Wavy change to -

1A12 0.1 - 0.3 m Dark greyish brown (2.5Y4/2-Moist); , 0-0% ; Light clay; Moderate grade of structure, 5-10 mm, Platy; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Medium, (5 - 10) mm crack; Common (1-5 per 100mm2) Medium (2-5mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Very few (0 - 2 %), Calcareous, Medium (2 -6 mm), Nodules; Field pH 8 (Raupach); Common, fine (1-2mm) roots; Diffuse, Irregular change to -

1B2kss 0.3 - 0.5 m Dark greyish brown (2.5Y4/3-Moist); , 0-0% ; Medium clay; Moderate grade of structure, 5-10 mm, Polyhedral; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Medium, (5 - 10) mm crack; Few (<1 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Common (10 - 20 %), Calcareous, Medium (2 -6 mm), Nodules; Soil matrix is Slightly calcareous; Field pH 8.5 (Raupach); Few, fine (1-2mm) roots; Diffuse, Irregular change to -

Morphological Notes

Observation Notes

Check site, flat on edge of undulating terrace plain, not sampled

Site Notes

melonhole microrelief, cleared brigalow woodland, improved pasture, brown clay

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 112 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Bar H, photos 275
Date Desc.: 17/05/12 **Elevation:** 25 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7489974 AMG zone: 55 **Runoff:** Rapid
Easting/Lat.: 772578 Datum: GDA94 **Drainage:** Imperfectly drained

Geology

Exposure Type: Auger boring **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Existing vertical exposure, 1 m deep, Fragmental, Bedded, Porous, ,

Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Simple-slope **Relief:** 15 metres
Elem. Type: Scarp **Slope Category:** Gently inclined
Slope: 15 % **Aspect:** 100 degrees

Surface Soil Condition Surface crust

Erosion: Partial, Moderate scalding (scald) Partial, Moderate (sheet) Partial, Present (mass) Active, Severe (gully) **Microrelief:** Zero or no Vert.(m) Horiz.(m) microrelief

Soil Classification

Australian Soil Classification: Endohypersodic Epipedal Grey Vertosol Non-gravelly Fine Medium **Mapping Unit:** Bl
 fine Moderately deep **Principal Profile Form:** Ug5.25
ASC Confidence: No analytical data are available but confidence is fair. **Great Soil Group:** Brown clay
Land Class: **Land Class:** C1

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation: Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Acacia harpophylla

Surface Coarse No surface coarse fragments

Profile

1A11 0 - 0.1 m Dark greyish brown (2.5Y4/3-Moist); , 0-0% ; Clay loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Medium, (5 - 10) mm crack; Common (1-5 per 0.01m²) Medium (2-5mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; Field pH 7 (Raupach); Abundant, fine (1-2mm) roots; Clear, Wavy change to -

1A12 0.1 - 0.3 m Strong brown (7.5YR4/6-Moist); , 0-0% ; Light clay; Moderate grade of structure, 5-10 mm, Polyhedral; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Many (>5 per 100mm²) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Very few (0 - 2 %), Calcareous, Medium (2 -6 mm), Nodules; Field pH 8.5 (Raupach); Common, fine (1-2mm) roots; Diffuse, Irregular change to -

1B2kss 0.3 - 0.5 m , 0-0% ; Medium clay; Moderate grade of structure, 5-10 mm, Polyhedral; Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Medium, (5 - 10) mm crack; Few (<1 per 100mm²) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Common (10 - 20 %), Calcareous, Medium (2 -6 mm), Nodules; Soil matrix is Slightly calcareous; Field pH 8.5 (Raupach); Few, fine (1-2mm) roots; Diffuse, Irregular change to -

Morphological Notes

Observation Notes

Check site, scarp slope below undulating terrace plain, not sampled

Site Notes

scarp below terrace plain, cleared brigalow woodland, grey clay

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 113 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Bar H, photos 276
Date Desc.: 17/05/12 **Elevation:** 21 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7489832 AMG zone: 55 **Runoff:** Slow
Easting/Lat.: 772576 Datum: GDA94 **Drainage:** Imperfectly drained

Geology

Exposure Type: Auger boring **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qa **Substrate Material:** Auger boring, 1 m deep, Fragmental,
 Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Flood plain

Morph. Type: Flat **Relief:** 5 metres
Elem. Type: Backplain **Slope Category:** Level
Slope: 0.5 % **Aspect:** 100 degrees

Surface Soil Condition Surface crust

Erosion: Stable, Minor scalding (scald) Stable, Minor (sheet) **Microrelief:** Melonhole gilgai Vert.(m) 0.5 Horiz.(m) 20

Soil Classification

Australian Soil Classification: Endohypersodic Epipedal Grey Vertosol Non-gravelly Fine Medium **Mapping Unit:** So
 fine Moderately deep **Principal Profile Form:** Ug5.25
ASC Confidence: All necessary analytical data are available. **Great Soil Group:** Grey clay
Land Class: Land Class: C1

Site: Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Acacia harpophylla

Surface Coarse

No surface coarse fragments

Profile

1A1 0 - 0.1 m Dark grey (2.5Y4/1-Moist); , 0-0% ; Fine sandy clay loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Medium, (5 - 10) mm crack; Few (<1 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; Field pH 7 (Raupach); Abundant, fine (1-2mm) roots; Clear, Smooth change to -

1A2e 0.1 - 0.2 m Dark greyish brown (2.5Y4/2-Moist); , 0-0% ; Fine sandy clay loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Medium, (5 - 10) mm crack; Few (<1 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 7.5 (Raupach); Many, fine (1-2mm) roots; Clear, Smooth change to -

1B2kss 0.2 - 0.5 m , 0-0% ; Medium clay; Moderate grade of structure, 5-10 mm, Polyhedral; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Medium, (5 - 10) mm crack; Many (>5 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Few (2 - 10 %), Calcareous, Medium (2 -6 mm), Nodules; Soil matrix is Slightly calcareous; Field pH 8 (Raupach); Common, fine (1-2mm) roots; Diffuse, Irregular change to -

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Check site, floodplain below undulating terrace plain, not sampled

Site Notes

floodplain below terrace plain, cleared mixed woodland, grey clay

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 114 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth	Locality: Bar H, photos 277
Date Desc.: 17/05/12	Elevation: 19 metres
Map Ref.: GPS S.A. Off	Rainfall: 756
Northing/Long.: 7489612 AMG zone: 55	Runoff: Moderately rapid
Easting/Lat.: 772583 Datum: GDA94	Drainage: Moderately well drained

Geology

ExposureType: Auger boring	Conf. Sub. is Parent. Mat.: No Data
Geol. Ref.: Qa	Substrate Material: Fragmental, Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Flood plain

Morph. Type: Flat	Relief: 5 metres
Elem. Type: Flood-out	Slope Category: Level
Slope: 0.5 %	Aspect: 100 degrees

Surface Soil Condition

Erosion: Active, Moderate (sheet) Active, Severe (gully)
Active, (stbank) **Microrelief:**

Soil Classification

Australian Soil Classification: Lutic Rudosol Non-gravelly Loamy Shallow	Mapping Unit: Sx
ASC Confidence: No analytical data are available but confidence is fair.	Principal Profile Form: Um5.52
	Great Soil Group: Alluvial soil
	Land Class: Land Class: C1

Site

Vegetation:

Surface Coarse

Profile

1A11	0 - 0.1 m	Very dark grey (10YR3/1-Moist); ; Sandy loam; Moist; Slightly plastic; Normal plasticity; Slightly sticky; Diffuse, Smooth change to -
1A12	0.1 - 0.5 m	Very dark greyish brown (10YR3/2-Moist); ; Sandy loam; Moist; Slightly plastic; Normal plasticity; Slightly sticky; Diffuse, Smooth change to -
1C1	0.5 - 0.8 m	; Sandy loam; Moist; Slightly plastic; Normal plasticity; Slightly sticky; Diffuse, Smooth change to -

Morphological Notes

Observation Notes

Check site, floodplain below undulating terrace plain, not sampled

Site Notes

floodplain below terrace plain, tall river gum woodland, silt loam

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 115 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth	Locality: Bar H, photos 278
Date Desc.: 17/05/12	Elevation: 14 metres
Map Ref.: GPS S.A. Off	Rainfall: 756
Northing/Long.: 7489632 AMG zone: 55	Runoff: Moderately rapid
Easting/Lat.: 772653 Datum: GDA94	Drainage: Moderately well drained

Geology

ExposureType: Auger boring	Conf. Sub. is Parent. Mat.: Almost certain or certain
Geol. Ref.: Qa	Substrate Material: Existing vertical exposure, 0.25 m deep, Fragmental, Bedded, Porous,

Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Flood plain

Morph. Type: Open depression (vale)	Relief: 5 metres
Elem. Type: Stream channel	Slope Category: Level
Slope: 0.5 %	Aspect: 90 degrees

Surface Soil Condition Firm

Erosion: Active, Moderate (gully) Active, Present (stbank)

Soil Classification **Microrelief:** Contour trench Vert.(m) Horiz.(m)

Australian Soil Classification: Basic Fluvic Clastic Rudosol Very gravelly Sandy Very shallow	Mapping Unit: Sx
	Principal Profile Form: Uc1.22
	Great Soil Group: Alluvial soil

ASC Confidence: No analytical data are available but confidence is fair. **Land Class:** Land Class: C1

Site No effective disturbance other than grazing by hoofed animals

Vegetation: Tall Strata - Tree, 12.01-20m, Mid-dense. *Species includes - Casuarina cunninghamiana

Surface Coarse 90-100%, stony, 200-600mm, subrounded, Shale

Profile

1A11 0 - 0.1 m Very dark grey (10YR3/1-Moist); , 0-0% ; Sandy loam; Single grain grade of structure; Sandy (grains prominent) fabric; Many (>5 per 0.01m2) Fine (1-2mm) macropores, Moist; Loose consistence; Slightly plastic; Normal plasticity; Slightly sticky; 90-100%, stony, 200-600mm, subrounded, stratified, Shale, coarse fragments; Field pH 6 (Raupach); Diffuse, Smooth change to -

1A12 0.1 - 0.5 m Very dark greyish brown (10YR3/2-Moist); , 0-0% ; Sandy loam; Single grain grade of structure; Sandy (grains prominent) fabric; Many (>5 per 0.01m2) Fine (1-2mm) macropores, Moist; Loose consistence; Slightly plastic; Normal plasticity; Slightly sticky; 50-90%, stony, 200-600mm, subrounded, dispersed, Shale, coarse fragments; Field pH 6 (Raupach); Diffuse, Smooth change to -

1R 0.5 - m Rock

Morphological Notes

Observation Notes

Check site, floodplain below undulating terrace plain, not sampled

Site Notes

floodplain below terrace plain, tall river gum woodland, silt loam

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 116 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth	Locality: Bar H, photos 279
Date Desc.: 17/05/12	Elevation: 19 metres
Map Ref.: GPS S.A. Off	Rainfall: 756
Northing/Long.: 7489646 AMG zone: 55	Runoff: Moderately rapid
Easting/Lat.: 772783 Datum: GDA94	Drainage: Moderately well drained

Geology

ExposureType: Auger boring	Conf. Sub. is Parent. Mat.: No Data
Geol. Ref.: Qa	Substrate Material: Fragmental, Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Flood plain

Morph. Type: Flat	Relief: 5 metres
Elem. Type: Flood-out	Slope Category: Level
Slope: 0.5 %	Aspect: 270 degrees

Surface Soil Condition

Erosion: Active, Moderate (sheet) Active, Moderate (gully)
Active, (stbank) **Microrelief:**

Soil Classification

Australian Soil Classification: Lutic Rudosol Non-gravelly Loamy Shallow	Mapping Unit: Sx
ASC Confidence: No analytical data are available but confidence is fair.	Principal Profile Form: Um5.52
	Great Soil Group: Alluvial soil
	Land Class: Land Class: C1

Site

Vegetation:

Tall Strata - Tree, 20.01-35m, Isolated plants. *Species includes - Eucalyptus tereticornis

Surface Coarse

Profile

1A11	0 - 0.1 m	Dark grey (2.5Y4/1-Moist); , 0-0% ; Clay loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Many (>5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; Field pH 6.5 (Raupach); Many, fine (1-2mm) roots; Clear, Wavy change to -
1A12	0.1 - 0.3 m	Dark greyish brown (2.5Y4/2-Moist); , 0-0% ; Light clay; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; Field pH 7 (Raupach); Many, fine (1-2mm) roots; Diffuse, Irregular change to -
1B2	0.3 - 0.5 m	, 0-0% ; Medium clay; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Medium, (5 - 10) mm crack; Few (<1 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; 0-2%, medium gravelly, 6-20mm, subrounded, stratified, Shale, coarse fragments; Field pH 7.5 (Raupach); Common, fine (1-2mm) roots; Diffuse, Irregular change to -

Morphological Notes

Observation Notes

Check site, floodplain below undulating terrace plain, not sampled

Site Notes

floodplain below terrace plain, tall river gum woodland, silt loam

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 117 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth	Locality: Bar H, photos 280-282
Date Desc.: 17/05/12	Elevation: 30 metres
Map Ref.: GPS S.A. Off	Rainfall: 756
Northing/Long.: 7489489 AMG zone: 55	Runoff: Moderately rapid
Easting/Lat.: 772774 Datum: GDA94	Drainage: Moderately well drained

Geology

ExposureType: Auger boring	Conf. Sub. is Parent. Mat.: No Data
Geol. Ref.: Qpa	Substrate Material: Fragmental, Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Upper-slope	Relief: 15 metres
Elem. Type: Scarp	Slope Category: Very gently sloped
Slope: 2 %	Aspect: 270 degrees

Surface Soil Condition

Erosion: Active, Moderate (sheet) Active, Moderate (gully)

Soil Classification

Microrelief:

Australian Soil Classification: Endohypersodic Crusty Brown Vertosol Non-gravelly Fine Medium fine Moderately deep	Mapping Unit: So Principal Profile Form: Ug5.25 Great Soil Group: Brown clay
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ASC Confidence:

No analytical data are available but confidence is fair.

Land Class: Land Class: C1

Site

Vegetation:

Surface Coarse

Profile

1A1 0 - 0.1 m	Very dark grey (10YR3/1-Moist); ; Fine sandy clay loam; Moist; Moderately plastic; Normal plasticity; Moderately sticky; Clear, Smooth change to -
1A2e 0.1 - 0.2 m	Very dark greyish brown (10YR3/2-Moist); ; Fine sandy clay loam; Moist; Moderately plastic; Normal plasticity; Moderately sticky; Clear, Smooth change to -
1B2kss 0.2 - 0.5 m	; Medium clay; Moist; Very plastic; Normal plasticity; Very sticky; Soil matrix is Slightly calcareous; Diffuse, Irregular change to -

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Check site, above scarp on undulating terrace plain, not sampled

Site Notes

scarp at edge of terrace plain, cleared brigalow and bottle tree woodland, grey clay

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 118 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Bar H, photos 283
Date Desc.: 17/05/12 **Elevation:** 27 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7489606 AMG zone: 55 **Runoff:** Moderately rapid
Easting/Lat.: 772766 Datum: GDA94 **Drainage:** Imperfectly drained

Geology

Exposure Type: Auger boring **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qa **Substrate Material:** Auger boring, 1 m deep, Fragmental,
 Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Lower-slope **Relief:** 15 metres
Elem. Type: Scarp **Slope Category:** Gently inclined
Slope: 5 % **Aspect:** 270 degrees

Surface Soil Condition Surface crust

Erosion: Stable, Moderate (sheet) Stable, Severe (gully)

Soil Classification

Australian Soil Classification: Endohypersodic Crusty Brown Vertosol Non-gravelly Fine Medium
 fine Shallow **Mapping Unit:** So
Principal Profile Form: Ug5.22
Great Soil Group: Brown clay

ASC Confidence:

No analytical data are available but confidence is fair.

Land Class: Land Class: C1

Site

Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 12.01-20m, Isolated plants. *Species includes - Eucalyptus tereticornis

Surface Coarse

Profile

1A1	0 - 0.1 m	Very dark grey (10YR3/1-Moist); , 0-0% ; Fine sandy clay loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Medium, (5 - 10) mm crack; Many (>5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; Field pH 7 (Raupach); Many, fine (1-2mm) roots; Clear, Smooth change to -
1A3	0.1 - 0.2 m	Light grey (2.5Y7/1-Moist); Mottles, 10YR44, 2-10% , 5-15mm, Distinct; Light medium clay; Massive grade of structure; Earthy fabric; Medium, (5 - 10) mm crack; Few (<1 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; Field pH 7.5 (Raupach); Common, fine (1-2mm) roots; Clear, Smooth change to -
1B2kss	0.2 - 0.5 m	; Medium clay; Moderate grade of structure, 10-20 mm, Lenticular; Moderate grade of structure, 5-10 mm, Polyhedral; Smooth-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Common cutans, 10-50% of ped faces or walls coated, distinct; Few (2 - 10 %), Calcareous, Medium (2 -6 mm), Nodules; Soil matrix is Slightly calcareous; Field pH 8.5 (Raupach); Few, fine (1-2mm) roots; Diffuse, Irregular change to -

Morphological Notes

1A3 bleached

Observation Notes

Check site, below scarp on undulating terrace plain, not sampled

Site Notes

bottom of scarp at edge of flood plain, cleared brigalow and bottle tree woodland, grey clay

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 119 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Bar H, photo 284
Date Desc.: 17/05/12 **Elevation:** 31 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7489623 AMG zone: 55 **Runoff:** Slow
Easting/Lat.: 772582 Datum: GDA94 **Drainage:** Moderately well drained

Geology

ExposureType: Auger boring **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qa **Substrate Material:** Auger boring, 1 m deep, Fragmental,
 Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating rises 9-30m 1-3% **Pattern Type:** Flood plain

Morph. Type: Simple-slope **Relief:** 15 metres
Elem. Type: Flood-out **Slope Category:** Gently inclined
Slope: 5 % **Aspect:** 90 degrees

Surface Soil Condition Surface crust

Erosion: Active, Moderate (sheet) Active, Severe (gully)
 Active, (stbank) **Microrelief:** Normal gilgai Vert.(m) 0.5 Horiz.(m) 10

Soil Classification

Australian Soil Classification: Endohypersodic Crusty Brown Vertosol Non-gravelly Fine Medium **Mapping Unit:** So
 fine Moderately deep **Principal Profile Form:** Ug5.25
ASC Confidence: No analytical data are available but confidence is fair. **Great Soil Group:** Brown clay
Land Class: Land Class: C1

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 12.01-20m, Isolated plants. *Species includes - Eucalyptus camaldulensis

Surface Coarse

No surface coarse fragments

Profile

1A11 0 - 0.1 m Very dark grey (10YR3/1-Moist); , 0-0% ; Sandy clay loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Slightly plastic; Normal plasticity; Slightly sticky; 2-10%, coarse fragments; Field pH 7 (Raupach); Many, fine (1-2mm) roots; Diffuse, Smooth change to -

1A12 0.1 - 0.5 m Very dark grey (10YR3/1-Moist); , 0-0% ; Light medium clay; Moderate grade of structure, 5-10 mm, Lenticular; Rough-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm2) Fine (1-2mm) macropores, Moist; Firm consistence; Slightly plastic; Normal plasticity; Slightly sticky; 2-10%, medium gravelly, 6-20mm, rounded, Ferricrete, coarse fragments; Field pH 7.5 (Raupach); Common, fine (1-2mm) roots; Diffuse, Smooth change to -

1C1 0.5 - 0.8 m Light grey (2.5Y7/1-Moist); , 0-0% ; Medium heavy clay; Moderate grade of structure, 5-10 mm, Lenticular; Rough-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm2) Fine (1-2mm) macropores, Moist; Firm consistence; Slightly plastic; Normal plasticity; Slightly sticky; 2-10%, medium gravelly, 6-20mm, rounded, Ferricrete, coarse fragments; Field pH 8 (Raupach); Few, fine (1-2mm) roots; Diffuse, Smooth change to -

Morphological Notes

Observation Notes

Check site, below scarp on undulating terrace plain, not sampled

Site Notes

floodplain below terrace plain, cleared mixed woodland, gravelly brown clay, EXCLUSION SITE

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 120 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth	Locality: Bar H, photo 285
Date Desc.: 17/05/12	Elevation: 30 metres
Map Ref.: GPS S.A. Off	Rainfall: 756
Northing/Long.: 7489902 AMG zone: 55	Runoff: Slow
Easting/Lat.: 772479 Datum: GDA94	Drainage: Poorly drained

Geology

ExposureType: Auger boring	Conf. Sub. is Parent. Mat.: Almost certain or certain
Geol. Ref.: Qpa	Substrate Material: Existing vertical exposure, 1 m deep, Fragmental, Bedded, Porous,

Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat	Relief: 5 metres
Elem. Type: Terrace plain	Slope Category: Level
Slope: 0.5 %	Aspect: 100 degrees

Surface Soil Condition Cracking

Erosion: Active, Minor (sheet) Active, Minor (gully)

Soil Classification

Microrelief: Melonhole gilgai Vert.(m) 0.5 Horiz.(m) 10

Australian Soil Classification:

Endohypersodic Crusty Grey Vertosol Non-gravelly Fine Medium
fine Moderately deep

Mapping Unit:

BI
Principal Profile Form: Ug5.25
Great Soil Group: Grey clay

ASC Confidence:

No analytical data are available but confidence is fair.

Land Class: **Land Class:** C1

Site

Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Acacia harpophylla

Surface Coarse

No surface coarse fragments

Profile

1A11	0 - 0.1 m	Very dark grey (10YR3/1-Moist); , 0-0% ; Clay loam; Moderate grade of structure, 2-5 mm, Subangular blocky; Rough-ped fabric; Medium, (5 - 10) mm crack; Many (>5 per 100mm2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; Field pH 7 (Raupach); Many, fine (1-2mm) roots; Clear, Wavy change to -
1A12	0.1 - 0.3 m	Dark greyish brown (10YR4/2-Moist); , 0-0% ; Light clay; Moderate grade of structure, 5-10 mm, Lenticular; Rough-ped fabric; Medium, (5 - 10) mm crack; Common (1-5 per 100mm2) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; Field pH 7.5 (Raupach); Common, fine (1-2mm) roots; Diffuse, Irregular change to -
1B2ss	0.3 - 0.5 m	Dark yellowish brown (10YR4/4-Moist); , 0-0% ; Medium clay; Moderate grade of structure, 2-5 mm, Lenticular; Rough-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm2) Fine (1-2mm) macropores, Moist; Firm consistence; Very plastic; Normal plasticity; Very sticky; Very few (0 - 2 %), Calcareous, Medium (2 -6 mm), Nodules; Soil matrix is Slightly calcareous; Field pH 8 (Raupach); Few, fine (1-2mm) roots; Diffuse, Irregular change to -

Morphological Notes

Observation Notes

Check site, flat on edge of undulating terrace plain, not sampled

Site Notes

melonhole microrelief, cleared brigalow woodland, improved pasture, brown clay

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 121 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Mamelon, photo 286
Date Desc.: 17/05/12 **Elevation:** 36 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7488951 AMG zone: 55 **Runoff:** Moderately rapid
Easting/Lat.: 772666 Datum: GDA94 **Drainage:** Imperfectly drained

Geology

ExposureType: Auger boring **Conf. Sub. is Parent. Mat.:** No Data
Geol. Ref.: Qpa **Substrate Material:** Fragmental, Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Simple-slope **Relief:** 5 metres
Elem. Type: Stream channel **Slope Category:** Very gently sloped
Slope: 2 % **Aspect:** 350 degrees

Surface Soil Condition Cracking

Erosion: Active, Moderate (sheet) Active, Severe (gully)

Soil Classification **Microrelief:** Melonhole gilgai Vert.(m) 1 Horiz.(m) 20

Australian Soil Classification: Endohypersodic Crusty Brown Vertosol Non-gravelly Fine Medium **Mapping Unit:** So
 fine Moderately deep **Principal Profile Form:** Ug5.25
ASC Confidence: **Great Soil Group:** Brown clay

No analytical data are available but confidence is fair. **Land Class:** **Land Class:** C1

Site

Vegetation:

Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Acacia harpophylla

Surface Coarse

No surface coarse fragments

Profile

1A1 0 - 0.1 m Very dark grey (10YR3/1-Moist); , 0-0% ; Fine sandy clay loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Medium, (5 - 10) mm crack; Common (1-5 per 0.01m2) Medium (2-5mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; Field pH 7 (Raupach); Abundant, fine (1-2mm) roots; Clear, Smooth change to -

1A3 0.1 - 0.2 m Light grey (2.5Y7/1-Moist); , 0-0% ; Fine sandy clay loam; Moderate grade of structure, 5-10 mm, Lenticular; Smooth-ped fabric; Medium, (5 - 10) mm crack; Few (<1 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; Few cutans, <10% of ped faces or walls coated, distinct; Field pH 7.5 (Raupach); Many, fine (1-2mm) roots; Clear, Smooth change to -

1B2kss 0.2 - 0.5 m , 0-0% ; Medium clay; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Medium, (5 - 10) mm crack; Many (>5 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Very few (0 - 2 %), Calcareous, Medium (2 -6 mm), Nodules; Soil matrix is Slightly calcareous; Field pH 8.5 (Raupach); Common, fine (1-2mm) roots; Diffuse, Irregular change to -

Morphological Notes

1A3 bleached

Observation Notes

Check site, slope on drainage line on undulating terrace plain, not sampled

Site Notes

cleared brigalow woodland, melonhole microrelief, brown cracking clay

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 122 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Mamelon, photo 287
Date Desc.: 17/05/12 **Elevation:** 37 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7488866 AMG zone: 55 **Runoff:** Slow
Easting/Lat.: 772696 Datum: GDA94 **Drainage:** Poorly drained

Geology

Exposure Type: Auger boring **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Auger boring, 1 m deep, Fragmental,
 Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat **Relief:** 5 metres
Elem. Type: Terrace plain **Slope Category:** Level
Slope: 0.5 % **Aspect:** 0 degrees

Surface Soil Condition Surface crust

Erosion: Active, Moderate (sheet) Active, Moderate (gully)

Soil Classification **Micorelief:** Melonhole gilgai Vert.(m) 1 Horiz.(m) 10

Australian Soil Classification:

Vertic Subnatric Grey Sodosol Medium Non-gravelly Clay-loamy **Mapping Unit:** Pv
 Clayey Moderately deep **Principal Profile Form:** Dy2.43
ASC Confidence: podzolic soil
 No analytical data are available but confidence is fair. **Land Class:** Land Class: C1

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation: Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Acacia harpophylla
 2-10%, medium gravelly, 6-20mm, subrounded, Conglomerate

Surface Coarse

Profile

1A1 0 - 0.1 m Very dark grey (10YR3/1-Moist); , 0-0% ; Fine sandy clay loam; Moderate grade of structure, 2-5 mm, Subangular blocky; Rough-ped fabric; Medium, (5 - 10) mm crack; Many (>5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 7 (Raupach); Abundant, fine (1-2mm) roots; Clear, Smooth change to -

1A2e 0.1 - 0.2 m Light grey (2.5Y7/1-Moist); Mottles, 10YR44, 2-10% , 0-5mm, Distinct; Fine sandy clay loam; Massive grade of structure; Earthy fabric; Medium, (5 - 10) mm crack; Few (<1 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Few (2 - 10 %), Ferromanganiferous, Fine (0 - 2 mm), Concretions; Field pH 7.5 (Raupach); Many, fine (1-2mm) roots; Clear, Smooth change to -

1B2kss 0.2 - 0.5 m ; Medium clay; Moderate grade of structure, 5-10 mm, Polyhedral; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Common cutans, 10-50% of ped faces or walls coated, distinct; Few (2 - 10 %), Calcareous, Medium (2 -6 mm), Nodules; Soil matrix is Slightly calcareous; Field pH 8.5 (Raupach); Few, fine (1-2mm) roots; Diffuse, Irregular change to -

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Check site, slope on drainage line on undulating terrace plain, not sampled

Site Notes cleared brigalow woodland, melonhole micorelief, brown cracking clay

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 123 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Mamelon, photo 288
Date Desc.: 17/05/12 **Elevation:** 32 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7489674 AMG zone: 55 **Runoff:** Slow
Easting/Lat.: 773668 Datum: GDA94 **Drainage:** Poorly drained

Geology

Exposure Type: Auger boring **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Auger boring, 1 m deep, Bedded, Porous, Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat **Relief:** 5 metres
Elem. Type: Terrace plain **Slope Category:** Level
Slope: 0.5 % **Aspect:** 150 degrees

Surface Soil Condition Hardsetting

Erosion: Stable, Moderate scalding (scald) Stable, Moderate (sheet) **Microrelief:** Crabhole gilgai Vert.(m) 0.3 Horiz.(m) 10

Soil Classification

Australian Soil Classification: Vertic Subnatric Grey Sodosol Medium Non-gravelly Clay-loamy
Clayey Moderately deep **Mapping Unit:** Pv
Principal Profile Form: Dy2.43
Great Soil Group: Grey-brown podzolic soil
ASC Confidence: No analytical data are available but confidence is fair. **Land Class:** C1

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Acacia harpophylla

Surface Coarse

0-2%, medium gravelly, 6-20mm, subrounded platy, Conglomerate

Profile

1A11 0 - 0.1 m Very dark grey (10YR3/1-Moist); , 0-0% ; Clay loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Medium, (5 - 10) mm crack; Many (>5 per 0.01m2) Fine (1-2mm) macropores, Moderately moist; Firm consistence; Moderately plastic; Normal plasticity; Slightly sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 8 (Raupach); Abundant, fine (1-2mm) roots; Diffuse, Wavy change to -

1A12 0.1 - 0.3 m Light grey (2.5Y7/1-Moist); Mottles, 10YR44, 2-10% , 0-5mm, Distinct; Clay loam; Massive grade of structure; Earthy fabric; Medium, (5 - 10) mm crack; Few (<1 per 0.01m2) Fine (1-2mm) macropores, Moderately moist; Firm consistence; Moderately plastic; Normal plasticity; Slightly sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Few (2 - 10 %), Ferromanganiferous, Fine (0 - 2 mm), Concretions; Field pH 8.5 (Raupach); Common, fine (1-2mm) roots; Diffuse, Wavy change to -

1B2kss 0.3 - 0.5 m ; Light clay; Moderate grade of structure, 5-10 mm, Polyhedral; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Moderately sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Common cutans, 10-50% of ped faces or walls coated, distinct; Soil matrix is Slightly calcareous; Field pH 9 (Raupach); Few, fine (1-2mm) roots; Diffuse, Irregular change to -

Morphological Notes

1A11 rusty root mottles

Observation Notes

Check site, flat on undulating terrace plain, not sampled

Site Notes

cleared brigalow woodland, crabhole microrelief, brown cracking clay

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 124 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Mamelon, photo 289
Date Desc.: 17/05/12 **Elevation:** 35 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7489856 AMG zone: 55 **Runoff:** Slow
Easting/Lat.: 773904 Datum: GDA94 **Drainage:** Poorly drained

Geology

Exposure Type: Auger boring **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Auger boring, 1 m deep, Fragmental,
 Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat **Relief:** 5 metres
Elem. Type: Terrace plain **Slope Category:** Level
Slope: 0.5 % **Aspect:** 150 degrees

Surface Soil Condition Hardsetting

Erosion: Stable, Minor scalding (scald) Stable, Minor (sheet) **Microrelief:** Melonhole gilgai Vert.(m) 1 Horiz.(m) 20

Soil Classification

Australian Soil Classification: Vertic Subnatric Grey Sodosol Very thick Non-gravelly Clay-loamy
 Clayey Moderately deep **Mapping Unit:** Pv
ASC Confidence: No analytical data are available but confidence is fair. **Principal Profile Form:** Dy2.43
Land Class: C1 **Great Soil Group:** Grey-brown podzolic soil

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation: Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Acacia harpophylla

Surface Coarse 2-10%, medium gravelly, 6-20mm, subrounded, Conglomerate

Profile

1A11 0 - 0.1 m Very dark grey (10YR3/1-Moist); , 0-0% ; Clay loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Medium, (5 - 10) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moderately moist; Firm consistence; Moderately plastic; Normal plasticity; Slightly sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 6.5 (Raupach); Abundant, fine (1-2mm) roots; Diffuse, Wavy change to -

1A2e 0.1 - 0.3 m Light grey (2.5Y7/1-Moist); Mottles, 10R44, 2-10% , 0-5mm, Distinct; Clay loam; Massive grade of structure; Earthy fabric; Medium, (5 - 10) mm crack; Many (>5 per 100mm2) Fine (1-2mm) macropores, Moderately moist; Firm consistence; Moderately plastic; Normal plasticity; Slightly sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Few (2 - 10 %), Ferromanganiferous, Fine (0 - 2 mm), Concretions; Field pH 8 (Raupach); Common, fine (1-2mm) roots; Clear, Wavy change to -

1B2kss 0.3 - 0.5 m ; Light clay; Moderate grade of structure, 10-20 mm, Lenticular; Moderate grade of structure, 5-10 mm, Polyhedral; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Moderately sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Common cutans, 10-50% of ped faces or walls coated, distinct; Few (2 - 10 %), Calcareous, Medium (2 -6 mm), Nodules; Soil matrix is Slightly calcareous; Field pH 8.5 (Raupach); Few, fine (1-2mm) roots; Diffuse, Irregular change to -

Morphological Notes

1A11 rusty root mottles
 1A2e bleached, rusty root mottles

Observation Notes

Check site, flat on undulating terrace plain, not sampled

Site Notes cleared brigalow woodland, melonhole microrelief, brown cracking clay

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 125 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Mamelon, photo 290
Date Desc.: 17/05/12 **Elevation:** 27 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7490031 AMG zone: 55 **Runoff:** Slow
Easting/Lat.: 774204 Datum: GDA94 **Drainage:** Poorly drained

Geology

Exposure Type: Auger boring **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Auger boring, 1 m deep, Fragmental,
 Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat **Relief:** 5 metres
Elem. Type: Terrace plain **Slope Category:** Very gently sloped
Slope: 1 % **Aspect:** 100 degrees

Surface Soil Condition Hardsetting

Erosion: Stable, Minor scalding (scald) Active, Moderate
 (sheet) Active, Moderate (gully) **Microrelief:** Melonhole gilgai Vert.(m) 0.5 Horiz.(m) 20

Soil Classification

Australian Soil Classification: Vertic Subnatric Grey Sodosol Very thick Non-gravelly Clay-loamy
 Clayey Moderately deep **Mapping Unit:** Pv
ASC Confidence: No analytical data are available but confidence is fair. **Principal Profile Form:** Dy2.43
Land Class: C1 **Great Soil Group:** Grey-brown podzolic soil

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation: Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Acacia harpophylla
Surface Coarse 2-10%, medium gravelly, 6-20mm, subrounded, Conglomerate

Profile

1A11 0 - 0.1 m Very dark grey (10YR3/1-Moist); , 0-0% ; Clay loam; Moderately moist; Moderately plastic; Normal plasticity; Slightly sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 7 (Raupach); Abundant, fine (1-2mm) roots; Diffuse, Wavy change to -

1A2e 0.1 - 0.3 m Light grey (2.5Y7/1-Moist); Mottles, 10YR44, 2-10% , 0-5mm, Distinct; Clay loam; Moderately moist; Moderately plastic; Normal plasticity; Slightly sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 8 (Raupach); Common, fine (1-2mm) roots; Clear, Wavy change to -

1B2kss 0.3 - 0.5 m Dark greyish brown (2.5Y4/2-Moist); ; Light clay; Moist; Very plastic; Normal plasticity; Moderately sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Soil matrix is Slightly calcareous; Field pH 8.5 (Raupach); Few, fine (1-2mm) roots; Diffuse, Irregular change to -

Morphological Notes

1A11 rusty root mottles
 1A2e bleached, rusty root mottles

Observation Notes

Check site, above scarp on undulating terrace plain, not sampled

Site Notes

cleared mixed woodland, melonhole microrelief, brown cracking clay

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 126 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth	Locality: Mamelon, photo 291
Date Desc.: 17/05/12	Elevation: 28 metres
Map Ref.: GPS S.A. Off	Rainfall: 756
Northing/Long.: 7490015 AMG zone: 55	Runoff: Moderately rapid
Easting/Lat.: 774292 Datum: GDA94	Drainage: Moderately well drained

Geology

Exposure Type: Auger boring	Conf. Sub. is Parent. Mat.: Almost certain or certain
Geol. Ref.: Qa	Substrate Material: Existing vertical exposure, 0.5 m deep, Fragmental, Bedded, Porous, Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Flood plain

Morph. Type: Simple-slope	Relief: 15 metres
Elem. Type: Channel bench	Slope Category: Gently inclined
Slope: 5 %	Aspect: 100 degrees

Surface Soil Condition Soft

Erosion: Active, Moderate (gully) Active, Present (stbank)

Soil Classification **Microrelief:** Zero or no microrelief **Vert.(m)** **Horiz.(m)**

Australian Soil Classification:

Stratic Rudosol Non-gravelly Loamy Shallow

ASC Confidence:

No analytical data are available but confidence is fair.

Mapping Unit: Sx

Principal Profile Form: Um5.52

Great Soil Group: Alluvial soil

Land Class: **Land Class:** D

Site No effective disturbance other than grazing by hoofed animals

Vegetation:

Tall Strata - Tree, 12.01-20m, Mid-dense. *Species includes - Eucalyptus tereticornis

Surface Coarse

No surface coarse fragments

Profile

1A11	0 - 0.1 m	Very dark grey (7.5YR3/1-Moist); , 0-0% ; Sandy loam; Moderate grade of structure, 2-5 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Many (>5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Slightly plastic; Normal plasticity; Slightly sticky; Field pH 7.5 (Raupach); Abundant, fine (1-2mm) roots; Diffuse, Smooth change to -
1A12	0.1 - 0.5 m	Strong brown (7.5YR4/6-Moist); , 0-0% ; Sandy loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Slightly plastic; Normal plasticity; Slightly sticky; Field pH 8 (Raupach); Many, fine (1-2mm) roots; Diffuse, Smooth change to -
1C1	0.5 - 0.8 m	, 0-0% ; Sandy loam; Single grain grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Slightly plastic; Normal plasticity; Slightly sticky; 2-10%, coarse gravelly, 20-60mm, rounded, stratified, Conglomerate, coarse fragments; Field pH 8 (Raupach); Common, fine (1-2mm) roots; Diffuse, Smooth change to -

Morphological Notes

Observation Notes

Check site, below scarp adjacent stream channel on floodplain, not sampled

Site Notes

below scarp on flood plain, cleared mixed woodland, brown silt loam

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 127 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Mamelon, photo 292
Date Desc.: 17/05/12 **Elevation:** 28 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7489840 AMG zone: 55 **Runoff:** Slow
Easting/Lat.: 774370 Datum: GDA94 **Drainage:** Poorly drained

Geology

Exposure Type: Auger boring **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qa **Substrate Material:** Auger boring, 0.5 m deep, Fragmental,
 Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Flood plain

Morph. Type: Flat **Relief:** 5 metres
Elem. Type: Flood-out **Slope Category:** Level
Slope: 0.5 % **Aspect:** 270 degrees

Surface Soil Condition Surface crust

Erosion: Active, Moderate (sheet) Active, (stbank)

Soil Classification **Microrelief:** Other Vert.(m) 30 Horiz.(m) 1

Australian Soil Classification:

Basic Fluvic Clastic Rudosol Non-gravelly Clayey Shallow

Mapping Unit: Sx

Principal Profile Form: Um5.5

ASC Confidence:

No analytical data are available but confidence is fair.

Great Soil Group: Grey clay

Land Class: Land Class: A

Site

Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 12.01-20m, Isolated plants. *Species includes - Eucalyptus tereticornis

Surface Coarse

0-2%, coarse gravelly, 20-60mm, subrounded, Conglomerate

Profile

1A1 0 - 0.1 m Very dark grey (7.5YR3/1-Moist); , 0-0% ; Fine sandy clay loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Medium, (5 - 10) mm crack; Few (<1 per 0.01m2) Medium (2-5mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 2-10%, coarse gravelly, 20-60mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 7 (Raupach); Abundant, fine (1-2mm) roots; Clear, Smooth change to -

1A2 0.1 - 0.2 m Strong brown (7.5YR4/6-Moist); , 0-0% ; Fine sandy clay loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Smooth-ped fabric; Medium, (5 - 10) mm crack; Many (>5 per 100mm2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 2-10%, coarse gravelly, 20-60mm, subrounded, dispersed, Conglomerate, coarse fragments; Few cutans, <10% of ped faces or walls coated, faint; Field pH 7.5 (Raupach); Many, fine (1-2mm) roots; Clear, Smooth change to -

1B2kss 0.2 - 0.5 m , 0-0% ; Medium clay; Massive grade of structure; Smooth-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 50-90%, stony, 200-600mm, subrounded, stratified, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Few (2 - 10 %), Calcareous, Medium (2 -6 mm), Nodules; Soil matrix is Slightly calcareous; Field pH 8 (Raupach); Common, fine (1-2mm) roots; Diffuse, Irregular change to -

Morphological Notes

1A2 bleached

Observation Notes

Check site, floodplain below undulating terrace plain, not sampled

Site Notes

below scarp on flood plain, cleared mixed woodland, grey clay

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 128 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Mamelon, photo 293
Date Desc.: 17/05/12 **Elevation:** 31 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7489520 AMG zone: 55 **Runoff:** Moderately rapid
Easting/Lat.: 774412 Datum: GDA94 **Drainage:** Poorly drained

Geology

Exposure Type: Auger boring **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Auger boring, 1 m deep, Fragmental,
 Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Flood plain

Morph. Type: Simple-slope **Relief:** 15 metres
Elem. Type: Drainage depression **Slope Category:** Very gently sloped
Slope: 3 % **Aspect:** 180 degrees

Surface Soil Condition Poached

Erosion: Active, Moderate (sheet) Active, Moderate (gully)

Soil Classification **Microrelief:** Crabhole gilgai Vert.(m) 0.5 Horiz.(m) 10

Australian Soil Classification:

Basic Fluvic Clastic Rudosol Non-gravelly Clayey Shallow

Mapping Unit: Sx

Principal Profile Form: Ug5.5

ASC Confidence:

No analytical data are available but confidence is fair.

Great Soil Group: Grey clay

Land Class: Land Class: A

Site

Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 12.01-20m, Isolated plants. *Species includes - Eucalyptus camaldulensis

Surface Coarse

No surface coarse fragments

Profile

1A1 0 - 0.1 m Very dark grey (10YR3/1-Moist); , 0-0% ; Fine sandy clay loam; Moderate grade of structure, 2-5 mm, Subangular blocky; Rough-ped fabric; Medium, (5 - 10) mm crack; Many (>5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 7 (Raupach); Abundant, fine (1-2mm) roots; Clear, Smooth change to -

1A2e 0.1 - 0.2 m Light grey (2.5Y7/1-Moist); Mottles, 10YR44, 10-20% , 0-5mm, Distinct; Fine sandy clay loam; Massive grade of structure; Earthy fabric; Medium, (5 - 10) mm crack; Many (>5 per 100mm2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 2-10%, coarse gravelly, 20-60mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 7.5 (Raupach); Many, fine (1-2mm) roots; Clear, Smooth change to -

1B2kss 0.2 - 0.5 m Dark yellowish brown (10YR4/4-Moist); , 0-0% ; Medium clay; Moderate grade of structure, 5-10 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 50-90%, cobbly, 60-200mm, subrounded, stratified, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Few (2 - 10 %), Calcareous, Medium (2 -6 mm), Nodules; Soil matrix is Slightly calcareous; Field pH 8.5 (Raupach); Common, fine (1-2mm) roots; Diffuse, Irregular change to -

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Check site, scarp below undulating terrace plain, not sampled

Site Notes

below scarp on flood plain, cleared mixed woodland, brown fine sandy loam

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 129 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Mamelon, photo 294
Date Desc.: 17/05/12 **Elevation:** 39 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7489340 AMG zone: 55 **Runoff:** Slow
Easting/Lat.: 774363 Datum: GDA94 **Drainage:** Poorly drained

Geology

ExposureType: Auger boring **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Existing vertical exposure, 1 m deep, Fragmental, Bedded, Porous, ,

Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat **Relief:** 5 metres
Elem. Type: Terrace plain **Slope Category:** Very gently sloped
Slope: 1% **Aspect:** 90 degrees

Surface Soil Condition Hardsetting

Erosion: Partial, Moderate scalding (scald) Active, Moderate (sheet) Active, Moderate (gully) **Microrelief:** Melonhole gilgai Vert.(m) 0.5 Horiz.(m) 20

Soil Classification

Australian Soil Classification: Vertic Mesonatric Brown Sodosol Medium Non-gravelly Clay-loamy **Mapping Unit:** Pv
 Clayey Moderately deep **Principal Profile Form:** Dy2.33
ASC Confidence: No analytical data are available but confidence is fair. **Great Soil Group:** Grey-brown podzolic soil
Land Class: Land Class: C1

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation: Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Acacia harpophylla

Surface Coarse No surface coarse fragments

Profile

1A1	0 - 0.1 m	Very dark grey (10YR3/1-Moist); ; 0-0% ; Fine sandy clay loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 0.01m2) Fine (1-2mm) macropores, Moist; Very firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; Field pH 6.5 (Raupach); Abundant, fine (1-2mm) roots; Clear, Smooth change to -
1A1	0 - 0.1 m	Very dark grey (10YR3/1-Moist); ; 0-0% ; Fine sandy clay loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; Field pH 6.5 (Raupach); Abundant, fine (1-2mm) roots; Clear, Smooth change to -
1A1	0 - 0.1 m	Very dark grey (10YR3/1-Moist); ; 0-0% ; Fine sandy clay loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; Field pH 6.5 (Raupach); Abundant, fine (1-2mm) roots; Clear, Smooth change to -
1A2e	0.1 - 0.2 m	Light grey (2.5Y7/1-Moist); Mottles, 10YR44, 2-10% , 0-5mm, Distinct; Fine sandy clay loam; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Many (>5 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Moderately plastic; Normal plasticity; Moderately sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Few cutans, <10% of ped faces or walls coated, distinct; Few (2 - 10 %), Ferromanganiferous, Fine (0 - 2 mm), Concretions; Field pH 7.5 (Raupach); Common, fine (1-2mm) roots; Clear, Smooth change to -
1B2kss	0.2 - 0.5 m	Dark yellowish brown (10YR4/4-Moist); ; Medium clay; Moderate grade of structure, 5-10 mm, Polyhedral; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Very plastic; Normal plasticity; Very sticky; Soil matrix is Slightly calcareous; Field pH 8.5 (Raupach); Few, fine (1-2mm) roots; Diffuse, Irregular change to -

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Check site, above scarp on undulating terrace plain, not sampled

Site Notes

cleared brigalow woodland, melonhole microrelief, brown cracking clay

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 130 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Mamelon, photo 295
Date Desc.: 17/05/12 **Elevation:** 25 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7489298 AMG zone: 55 **Runoff:** Slow
Easting/Lat.: 774495 Datum: GDA94 **Drainage:** Poorly drained

Geology

ExposureType: Auger boring **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Auger boring, 1 m deep, Fragmental,
 Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat **Relief:** 5 metres
Elem. Type: Terrace plain **Slope Category:** Level
Slope: 0.5 % **Aspect:** 350 degrees

Surface Soil Condition Hardsetting

Erosion: Partial, Moderate scalding (scald) Active, Moderate (sheet) Active, Moderate (gully) **Microrelief:** Melonhole gilgai Vert.(m) 0.5 Horiz.(m) 20

Soil Classification

Australian Soil Classification: Vertic Mesonatric Brown Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep
Mapping Unit: Pv
Principal Profile Form: Dy2.33
Great Soil Group: Grey-brown podzolic soil
ASC Confidence: No analytical data are available but confidence is fair. **Land Class:** Land Class: C1

Site Extensive clearing, for example poisoning, ringbarking

Vegetation: Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Acacia harpophylla

Surface Coarse No surface coarse fragments

Profile

1A1 0 - 0.1 m Very dark grey (10YR3/1-Moist); , 0-0% ; Fine sandy clay loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Many (>5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; Field pH 7 (Raupach); Many, fine (1-2mm) roots; Clear, Smooth change to -

1A2e 0.1 - 0.2 m Light grey (2.5Y7/1-Moist); Mottles, 10YR44, 2-10% , 0-5mm, Distinct; Fine sandy clay loam; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; Field pH 8 (Raupach); Common, fine (1-2mm) roots; Clear, Smooth change to -

1B2kss 0.2 - 0.5 m Dark yellowish brown (10YR4/4-Moist); , 0-0% ; Medium clay; Moderate grade of structure, 5-10 mm, Polyhedral; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Medium, (5 - 10) mm crack; Common (1-5 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Few cutans, <10% of ped faces or walls coated, distinct; Few (2 - 10 %), Calcareous, Medium (2 -6 mm), Nodules; Soil matrix is Slightly calcareous; Field pH 8.5 (Raupach); Few, fine (1-2mm) roots; Diffuse, Irregular change to -

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Check site, above scarp on undulating terrace plain, not sampled

Site Notes

cleared brigalow woodland, melonhole microrelief, brown cracking clay

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 131 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth	Locality: Mamelon, photo 296
Date Desc.: 17/05/12	Elevation: 34 metres
Map Ref.: GPS S.A. Off	Rainfall: 756
Northing/Long.: 7489327 AMG zone: 55	Runoff: Slow
Easting/Lat.: 774684 Datum: GDA94	Drainage: Moderately well drained

Geology

ExposureType: Auger boring	Conf. Sub. is Parent. Mat.: No Data
Geol. Ref.: Qa	Substrate Material: Fragmental, Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Flood plain

Morph. Type: Flat	Relief: 5 metres
Elem. Type: Flood-out	Slope Category: Level
Slope: 0.5 %	Aspect: 90 degrees

Surface Soil Condition

Erosion: Active, (stbank)

Soil Classification

Microrelief:

Australian Soil Classification: Basic Fluvic Clastic Rudosol Non-gravelly Clayey Shallow	Mapping Unit: Sx
ASC Confidence: No analytical data are available but confidence is fair.	Principal Profile Form: Um5.5
	Great Soil Group: Grey clay
	Land Class: Land Class: A

Site

Vegetation:

Surface Coarse

Profile

1A11	0 - 0.1 m	Very dark grey (7.5YR3/1-Moist); ; Sandy loam; Moist; Slightly plastic; Normal plasticity; Slightly sticky; Diffuse, Smooth change to -
1A12	0.1 - 0.5 m	Strong brown (7.5YR4/6-Moist); ; Sandy loam; Moist; Slightly plastic; Normal plasticity; Slightly sticky; Diffuse, Smooth change to -
1C1	0.5 - 0.8 m	Strong brown (7.5YR4/6-Moist); ; Sandy loam; Moist; Slightly plastic; Normal plasticity; Slightly sticky; Diffuse, Smooth change to -

Morphological Notes

Observation Notes

Check site, on valley flat on undulating floodplain, not sampled

Site Notes

cleared mixed woodland,brown fine sandy clay loam

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 132 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth
Date Desc.: 17/05/12
Map Ref.: GPS S.A. Off
Northing/Long.: 7487948 AMG zone: 55
Easting/Lat.: 773577 Datum: GDA94

Locality: Mamelon, photo 297
Elevation: 41 metres
Rainfall: 756
Runoff: Slow
Drainage: Poorly drained

Geology

ExposureType: Auger boring
Geol. Ref.: Qpa
Bedded,

Conf. Sub. is Parent. Mat.: Almost certain or certain
Substrate Material: Auger boring, 1 m deep, Fragmental, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat
Elem. Type: Terrace plain
Slope: 0.5 %

Relief: 5 metres
Slope Category: Level
Aspect: 90 degrees

Surface Soil Condition Hardsetting

Erosion: Stable, Minor scalding (scald) Stable, Minor (sheet)
Microrelief: Melonhole gilgai Vert.(m) Horiz.(m)

Soil Classification

Australian Soil Classification: Vertic Mesonatric Brown Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep
ASC Confidence: No analytical data are available but confidence is fair.

Mapping Unit: Pv
Principal Profile Form: Dy2.33
Great Soil Group: Grey-brown podzolic soil
Land Class: Land Class: C1

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Acacia harpophylla

Surface Coarse

0-2%, coarse gravelly, 20-60mm, subrounded, Conglomerate

Profile

1A11	0 - 0.1 m	Very dark grey (10YR3/1-Moist); , 0-0% ; Sandy loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Medium, (5 - 10) mm crack; Many (>5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Slightly plastic; Normal plasticity; Slightly sticky; 0-2%, coarse gravelly, 20-60mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 7 (Raupach); Many, fine (1-2mm) roots; Diffuse, Smooth change to -
1A2e	0.1 - 0.5 m	Light grey (2.5Y7/1-Moist); Mottles, 10YR44, 2-10% , 0-5mm, Distinct; Sandy loam; Massive grade of structure; Earthy fabric; Medium, (5 - 10) mm crack; Many (>5 per 100mm2) Fine (1-2mm) macropores, Moist; Firm consistence; Slightly plastic; Normal plasticity; Slightly sticky; 2-10%, coarse gravelly, 20-60mm, subrounded, dispersed, Conglomerate, coarse fragments; Common (10 - 20 %), Ferromanganiferous, Fine (0 - 2 mm), Concretions; Field pH 8 (Raupach); Common, fine (1-2mm) roots; Clear, Smooth change to -
1B2kss	0.5 - 0.8 m	Dark yellowish brown (10YR4/4-Moist); ; Sandy loam; Moderate grade of structure, 5-10 mm, Polyhedral; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Fine (1-2mm) macropores, Moist; Very firm consistence; Slightly plastic; Normal plasticity; Slightly sticky; 0-2%, cobbly, 60-200mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Common cutans, 10-50% of ped faces or walls coated, distinct; Few (2 - 10 %), Calcareous, Medium (2 -6 mm), Nodules; Soil matrix is Slightly calcareous; Field pH 8.5 (Raupach); FewDiffuse, Smooth change to -

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Check site, flat on undulating terrace plain, not sampled

Site Notes

cleared brigalow woodland, melonhole microrelief, brown cracking clay

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 133 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Mamelon, photo 298
Date Desc.: 17/05/12 **Elevation:** 40 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7486717 AMG zone: 55 **Runoff:** Slow
Easting/Lat.: 773596 Datum: GDA94 **Drainage:** Poorly drained

Geology

Exposure Type: Auger boring **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Auger boring, 1 m deep, Fragmental,
 Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat **Relief:** 5 metres
Elem. Type: Terrace plain **Slope Category:** Level
Slope: 0.5 % **Aspect:** 120 degrees

Surface Soil Condition Hardsetting

Erosion: Partial, Moderate scalding (scald) Partial, Moderate
 (sheet) **Microrelief:** Crabhole gilgai Vert.(m) 0.2 Horiz.(m) 10

Soil Classification

Australian Soil Classification: Vertic Mesonatric Brown Sodosol Medium Non-gravelly Clay-loamy
 Clayey Moderately deep **Mapping Unit:** Pv
ASC Confidence: No analytical data are available but confidence is fair. **Principal Profile Form:** Dy2.33
Land Class: Land Class: C2 **Great Soil Group:** Grey-brown podzolic soil

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Eucalyptus crebra, Melaleuca viridiflora
 2-10%, medium gravelly, 6-20mm, subrounded platy, Conglomerate

Surface Coarse

Profile

1A1 0 - 0.1 m Very dark grey (10YR3/1-Moist); , 0-0% ; Fine sandy clay loam; Moderate grade of structure, 2-5 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 0.01m²) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 7 (Raupach); Abundant, fine (1-2mm) roots; Clear, Smooth change to -

1A2e 0.1 - 0.2 m Light grey (2.5Y7/1-Moist); Mottles, 7.5YR4/4, 10-20% , 0-5mm, Distinct; Fine sandy clay loam; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Many (>5 per 100mm²) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Few (2 - 10 %), Ferromanganiferous, Fine (0 - 2 mm), Concretions; Field pH 7.5 (Raupach); Common, fine (1-2mm) roots; Clear, Smooth change to -

1B2kss 0.2 - 0.5 m Dark yellowish brown (10YR4/4-Moist); ; Medium clay; Moderate grade of structure, 5-10 mm, Polyhedral; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm²) Fine (1-2mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Common cutans, 10-50% of ped faces or walls coated, distinct; Very few (0 - 2 %), Calcareous, Medium (2 -6 mm), Nodules; Soil matrix is Slightly calcareous; Field pH 8.5 (Raupach); FewDiffuse, Irregular change to -

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Check site, flat on undulating terrace plain, not sampled

Site Notes

cleared ironbark woodland, brown cracking clay, crabhole microrelief

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** 134 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: I. Hollingsworth **Locality:** Mamelon, photo 299
Date Desc.: 17/05/12 **Elevation:** 40 metres
Map Ref.: GPS S.A. Off **Rainfall:** 756
Northing/Long.: 7486717 AMG zone: 55 **Runoff:** Slow
Easting/Lat.: 773596 Datum: GDA94 **Drainage:** Poorly drained

Geology

Exposure Type: Auger boring **Conf. Sub. is Parent. Mat.:** No Data
Geol. Ref.: Qpa **Substrate Material:** Fragmental, Bedded, Porous, , Alluvium

Land Form

Rel/Slope Class: Gently undulating plains <9m 1-3% **Pattern Type:** Terraced land (alluvial)

Morph. Type: Flat **Relief:** 5 metres
Elem. Type: Terrace plain **Slope Category:** Level
Slope: 0.5 % **Aspect:** 100 degrees

Surface Soil Condition Hardsetting

Erosion:

Soil Classification **Microrelief:** Crabhole gilgai Vert.(m) 0.2 Horiz.(m) 10

Australian Soil Classification: Vertic Mesonatric Brown Sodosol Medium Non-gravelly Clay-loamy **Mapping Unit:** Pv
 Clayey Moderately deep **Principal Profile Form:** Dy2.33
ASC Confidence: No analytical data are available but confidence is fair. **Great Soil Group:** Grey-brown podzolic soil
Land Class: C2

Site Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Eucalyptus crebra

Surface Coarse

2-10%, coarse gravelly, 20-60mm, subrounded, Conglomerate

Profile

1A1 0 - 0.1 m Dark grey (10YR4/1-Moist); , 0-0% ; Fine sandy clay loam; Moderate grade of structure, 2-5 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Field pH 6.6 (Raupach); Many, fine (1-2mm) roots; Clear, Smooth change to -

1A2e 0.1 - 0.2 m Light grey (10YR7/1-Moist); Mottles, 7.5YR44, 10-20% , 0-5mm, Distinct; Fine sandy clay loam; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Many (>5 per 100mm2) Fine (1-2mm) macropores, Moist; Firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 10-20%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Few (2 - 10 %), Ferromanganiferous, Fine (0 - 2 mm), Concretions; Field pH 7 (Raupach); Common, fine (1-2mm) roots; Clear, Smooth change to -

1B2kss 0.2 - 0.5 m Dark yellowish brown (10YR4/4-Moist); , 0-0% ; Medium clay; Moderate grade of structure, 5-10 mm, Polyhedral; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm2) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Very plastic; Normal plasticity; Very sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Conglomerate, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Common cutans, 10-50% of ped faces or walls coated, distinct; Few (2 - 10 %), Calcareous, Medium (2 - 6 mm), Nodules; Soil matrix is Slightly calcareous; Field pH 8.5 (Raupach); Few, fine (1-2mm) roots; Diffuse, Irregular change to -

Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Check site, flat on undulating terrace plain, not sampled

Site Notes

cleared ironbark woodland, brown cracking clay, crabhole microrelief, highly pulverulent surface

Project Name: CENTRAL QUEENSLAND COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** SS01 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: **Locality:** MAP UNIT 1 ON Ws LAND SYSTEM, Detailed site, footslope on rise, CDM SMITH SITE, MISS CLASSIFIED

Date Desc.: 06/05/17 **Elevation:** 49 metres
Map Ref.: GPS **Rainfall:** 756
Northing/Long.: 7483395 AMG zone: 55 **Runoff:** Slow
Easting/Lat.: 772837 Datum: GDA94 **Drainage:** Moderately well drained

Geology

ExposureType: Auger boring **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: QrKx **Substrate Material:** Auger boring, 2 m deep, Porous, , Colluvium

Land Form

Rel/Slope Class: Undulating low hills 30-90m 3-10% **Pattern Type:** Low hills
Morph. Type: Lower-slope **Relief:** 30 metres
Elem. Type: Footslope **Slope Category:** Gently inclined
Slope: 2.7 % **Aspect:** No Data

Surface Soil Condition (dry): Soft

Erosion: Stable, Stable,

Soil Classification

Australian Soil Classification: Ferric-Sodic Dystrophic Brown Kandosol Thick Very gravelly Sandy Loamy Deep
Mapping Unit: 1
Principal Profile Form: N/A
ASC Confidence: All necessary analytical data are available.
Great Soil Group: N/A

Site Disturbance: Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Tall Strata - Tree, 3.01-6m, Isolated plants. *Species includes - Eucalyptus crebra, Melaleuca species

Surface Coarse Fragments: 10-20%, coarse gravelly, 20-60mm, subrounded, Ironstone

Profile Morphology

1A11 0 - 0.1 m Dark brown (10YR3/3-Moist); (10YR3/4-Moist); , 0-0% ; Loamy fine sand; Single grain grade of structure; Sandy (grains prominent) fabric; Many (>5 per 0.01m²) Fine (1-2mm) macropores, Moist; Loose consistence; Non-plastic; Non-sticky; 20-50%, medium gravelly, 6-20mm, subrounded, dispersed, Ferricrete, coarse fragments; Field pH 5.3 (pH meter); Many, fine (1-2mm) roots; Clear, Smooth change to -

1A12 0.1 - 0.2 m Dark yellowish brown (10YR3/4-Moist); , 0-0% ; Sandy loam; Single grain grade of structure; Sandy (grains prominent) fabric; Many (>5 per 100mm²) Fine (1-2mm) macropores, Moist; Very weak consistence; Non-plastic; Non-sticky; 20-50%, medium gravelly, 6-20mm, subrounded, dispersed, Ferricrete, coarse fragments; Field pH 5.4 (pH meter); Many, fine (1-2mm) roots; Gradual, Smooth change to -

1A3 0.2 - 0.3 m Dark yellowish brown (10YR4/4-Moist); , 0-0% ; Sandy loam; Weak grade of structure; Earthy fabric; Common (1-5 per 100mm²) Fine (1-2mm) macropores, Moist; Weak consistence; Non-plastic; Non-sticky; 20-50%, medium gravelly, 6-20mm, subrounded, dispersed, Ferricrete, coarse fragments; Field pH 5.5 (pH meter); Common, fine (1-2mm) roots; Gradual, Smooth change to -

1B3 0.3 - 0.6 m Dark yellowish brown (10YR4/6-Moist); , 0-0% ; Sandy loam; Weak grade of structure; Earthy fabric; Common (1-5 per 100mm²) Fine (1-2mm) macropores, Moist; Firm consistence; Non-plastic; Non-sticky; 20-50%, medium gravelly, 6-20mm, subrounded, dispersed, Ferricrete, coarse fragments; Very few (0 - 2 %), Ferruginous, Fine (0 - 2 mm), Nodules; Field pH 5.5 (pH meter); Few, fine (1-2mm) roots; Gradual, Smooth change to -

1C1 0.6 - 0.9 m Yellowish brown (10YR5/6-Moist); , 0-0% ; Sandy loam (Heavy); Weak grade of structure; Earthy fabric; Common (1-5 per 100mm²) Fine (1-2mm) macropores, Moist; Firm consistence; Non-plastic; Non-sticky; 50-90%, coarse gravelly, 20-60mm, subrounded, dispersed, Ferricrete, coarse fragments; Common (10 - 20 %), Ferruginous, Medium (2 -6 mm), Nodules; Field pH 5.6 (pH meter); Few, fine (1-2mm) roots; Gradual, Smooth change to -

1C2 0.9 - 1.2 m Yellowish brown (10YR5/6-Moist); , 0-0% ; Sandy loam; Weak grade of structure; Earthy fabric; Common (1-5 per 100mm²) Fine (1-2mm) macropores, Moist; Firm consistence; Non-plastic; Non-sticky; 50-90%, coarse gravelly, 20-60mm, subrounded, dispersed, Ferricrete, coarse fragments; Very few (0 - 2 %), Ferruginous, Medium (2 -6 mm), Fragments; Field pH 5.6 (pH meter); Gradual, Smooth change to -

Morphological Notes

Observation Notes

Project Name: CENTRAL QUEENSLAND COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** SS01 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Notes

SOIL MAP UNIT 1, Woodstock land system, cleared, gravelly yellow earth, Kandosol

Project Name: CENTRAL QUEENSLAND COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 Site ID: SS01 Observation ID: 1
Agency Name: Horizon Soil Survey (NT)

Laboratory Analyses Completed for this profile

12A1_CU	DTPA - extractable copper, zinc, manganese and iron
12A1_FE	DTPA - extractable copper, zinc, manganese and iron
12A1_MN	DTPA - extractable copper, zinc, manganese and iron
12C2	Calcium chloride extractable boron - ICPAES
15D3_CA	Exchangeable bases (Ca ²⁺ ,Mg ²⁺ ,Na ⁺ ,K ⁺) - 1M ammonium acetate at pH 7.0, rapid method with no pretreatment for soluble salts
15D3_K	Exchangeable bases - 1M ammonium acetate at pH 7.0, rapid method with no pretreatment for soluble salts
15D3_MG	Exchangeable bases - 1M ammonium acetate at pH 7.0, rapid method with no pretreatment for soluble salts
15D3_NA	Exchangeable bases - 1M ammonium acetate at pH 7.0, rapid method with no pretreatment for soluble salts
15G1	Exchange acidity (hydrogen and aluminium) by 1M potassium chloride
15J1	Effective CEC
15N1	Exchangeable sodium percentage (ESP)
3A1	EC of 1:5 soil/water extract
4A1	pH of 1:5 soil/water suspension
4B2	pH of 1:5 soil/0.01M calcium chloride extract - following Method 4A1
5A2	Chloride - 1:5 soil/water extract, automated colour
6_DC	Organic carbon (%) - Dry combustion
7A2	Total nitrogen - semimicro Kjeldahl , automated colour
9B2	Bicarbonate-extractable phosphorus - automated colour
P10_GRAV	Gravel (%)
P10_HYD_C	Clay (%) - Hydrometer Method
P10_HYD_CS	Coarse Sand (%) - Hydrometer Method
P10_HYD_FS	Fine Sand (%) - Hydrometer Method
P10_HYD_Z	Silt (%) - Hydrometer Method

Project Name: CENTRAL QUEENSLAND COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** SS02 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: **Locality:** Pv, Detailed site
Date Desc.: 06/06/19 **Elevation:** 50 metres
Map Ref.: 1:25000 **Rainfall:** 756
Northing/Long.: 7485595 AMG zone: 55 **Runoff:** Very slow
Easting/Lat.: 773943 Datum: GDA94 **Drainage:** Imperfectly drained

Geology

ExposureType: Auger boring **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Auger boring, 2 m deep, Porous, , Alluvium

Land Form

Rel/Slope Class: Level plain <9m <1% **Pattern Type:** Terrace (alluvial)
Morph. Type: No Data **Relief:** 3 metres
Elem. Type: Terrace plain **Slope Category:** Level
Slope: 0.3 % **Aspect:** No Data

Surface Soil Condition (dry): Hardsetting

Erosion: Stable, Stable, Minor (sheet) Stable, Minor (rill)

Soil Classification

Australian Soil Classification: **Mapping Unit:** 5
Vertic Mesonatric Brown Sodosol Thick Slightly gravelly **Principal Profile Form:** N/A
Loamy Clayey Deep
ASC Confidence: **Great Soil Group:** N/A
All necessary analytical data are available.

Site Disturbance: Complete clearing. Pasture, native or improved, but never cultivated

Vegetation: Low Strata - Tussock grass, 0.26-0.5m, Mid-dense. *Species includes - Aristida species

Tall Strata - Tree, 6.01-12m, Isolated clumps. *Species includes - Eucalyptus populnea, Grevillea striata, Ac

Surface Coarse Fragments: 10-20%, medium gravelly, 6-20mm, subrounded, Ferricrete

Profile Morphology

1A1 0 - 0.1 m Brownish yellow (10YR6/6-Moist); , 0-0% ; Fine sandy loam; Massive grade of structure; Earthy fabric; Many (>5 per 100mm²) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Non-plastic; Non-sticky; 10-20%, medium gravelly, 6-20mm, subangular, dispersed, Ferricrete, coarse fragments; Field pH 6.2 (pH meter); Many, fine (1-2mm) roots; Clear, Smooth change to -

1A2e 0.1 - 0.3 m Yellowish brown (10YR5/4-Moist); Mottles, 10YR56, 2-10% , 0-5mm, Distinct; Sandy loam; Massive grade of structure; Earthy fabric; Many (>5 per 100mm²) Fine (1-2mm) macropores, Moist; Firm consistence; Non-plastic; Non-sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Ferricrete, coarse fragments; Few (2 - 10 %), Ferruginous, Fine (0 - 2 mm), Root linings; Field pH 6 (pH meter); Common, fine (1-2mm) roots; Abrupt, Smooth change to -

1B2n 0.3 - 0.5 m Yellowish brown (10YR5/6-Moist); , 0-0% ; Medium clay; Strong grade of structure, 10-20 mm, Angular blocky; Rough-ped fabric; Few (<1 per 100mm²) Very fine (0.075-1mm) macropores, Moist; Strong consistence; Moderately plastic; Normal plasticity; Moderately sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Ferricrete, coarse fragments; Many cutans, >50% of ped faces or walls coated, distinct; Few (2 - 10 %), Ferruginous, Fine (0 - 2 mm), Concretions; Field pH 6.1 (pH meter); Few, fine (1-2mm) roots; Clear, Smooth change to -

1B3n 0.5 - 0.8 m Dark yellowish brown (10YR4/6-Moist); , 0-0% ; Light medium clay; Strong grade of structure, 10-20 mm, Angular blocky; Rough-ped fabric; Few (<1 per 100mm²) Very fine (0.075-1mm) macropores, Moist; Strong consistence; Moderately plastic; Normal plasticity; Moderately sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Ferricrete, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 7.6 (pH meter); Gradual, Smooth change to -

1C1 0.8 - 0.9 m Dark yellowish brown (10YR4/6-Moist); , 0-0% ; Clay loam, sandy; Weak grade of structure, 50-100 mm, Prismatic; Earthy fabric; Few (<1 per 100mm²) Very fine (0.075-1mm) macropores, Moist; Strong consistence; Slightly plastic; Normal plasticity; Moderately sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Ferricrete, coarse fragments; Few cutans, <10% of ped faces or walls coated, faint; Field pH 8 (pH meter); Gradual, Smooth change to -

1C2 0.9 - 1.2 m , 0-0% ; Clay loam, sandy; Weak grade of structure, 50-100 mm, Prismatic; Earthy fabric; Few (<1 per 100mm²) Very fine (0.075-1mm) macropores, Moist; Strong consistence; Slightly plastic; Normal plasticity; Moderately sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Ferricrete, coarse fragments; Few cutans, <10% of ped faces or walls coated, faint; Field pH 8 (pH meter); Gradual, Smooth change to -

Morphological Notes

1A2e BLEACHED A2
1B2n DRAINAGE LIMITATION IN TOP OF B HORIZON, PORESE BLOCKED WITH CLAY SKINS

Project Name: CENTRAL QUEENSLAND COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** SS02 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

1B3n BOTTOM OF ROOT ZONE AT ABOUT 0.5M
1C1 PARENT MATERIAL,, CHLORIDE AND SODICITY BULGE BELOW ROOT ZONE
1C2 PARENT MATERIAL,, CHLORIDE AND SODICITY BULGE BELOW ROOT ZONE

Observation Notes

Pv, Detailed site, ROOT DEPTH 0.5 M

Site Notes

cleared ironbark woodland, brown cracking clay, crabhole microrelief

Project Name: CENTRAL QUEENSLAND COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 Site ID: SS02 Observation ID: 1
Agency Name: Horizon Soil Survey (NT)

Laboratory Analyses Completed for this profile

12A1_CU	DTPA - extractable copper, zinc, manganese and iron
12A1_FE	DTPA - extractable copper, zinc, manganese and iron
12A1_MN	DTPA - extractable copper, zinc, manganese and iron
12A1_ZN	DTPA - extractable copper, zinc, manganese and iron
12C2	Calcium chloride extractable boron - ICPAES
15D3_CA	Exchangeable bases (Ca ²⁺ ,Mg ²⁺ ,Na ⁺ ,K ⁺) - 1M ammonium acetate at pH 7.0, rapid method with no pretreatment for soluble salts
15D3_K	Exchangeable bases - 1M ammonium acetate at pH 7.0, rapid method with no pretreatment for soluble salts
15D3_MG	Exchangeable bases - 1M ammonium acetate at pH 7.0, rapid method with no pretreatment for soluble salts
15D3_NA	Exchangeable bases - 1M ammonium acetate at pH 7.0, rapid method with no pretreatment for soluble salts
15J1	Effective CEC
15N1	Exchangeable sodium percentage (ESP)
3A1	EC of 1:5 soil/water extract
4A1	pH of 1:5 soil/water suspension
5A2	Chloride - 1:5 soil/water extract, automated colour
6_DC	Organic carbon (%) - Dry combustion
7A2	Total nitrogen - semimicro Kjeldahl , automated colour
9B2	Bicarbonate-extractable phosphorus - automated colour
P10_GRAV	Gravel (%)
P10_HYD_C	Clay (%) - Hydrometer Method
P10_HYD_CS	Coarse Sand (%) - Hydrometer Method
P10_HYD_FS	Fine Sand (%) - Hydrometer Method
P10_HYD_Z	Silt (%) - Hydrometer Method

Project Name: CENTRAL QUEENSLAND COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** SS03 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: **Locality:** MAP UNIT 5, Pv, Detailed site
Date Desc.: 06/06/19 **Elevation:** 39 metres
Map Ref.: 1:25000 **Rainfall:** 756
Northing/Long.: 7487330 AMG zone: 55 **Runoff:** Slow
Easting/Lat.: 771804 Datum: GDA94 **Drainage:** Imperfectly drained

Geology

ExposureType: Auger boring **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Auger boring, 1.2 m deep, Porous, , Alluvium

Land Form

Rel/Slope Class: No Data **Pattern Type:** No Data
Morph. Type: No Data **Relief:** No Data
Elem. Type: Terrace plain **Slope Category:** Level
Slope: 1.2 % **Aspect:** No Data

Surface Soil Condition (dry): Hardsetting

Erosion: Stable, Minor or present (wind); Partial, Minor
(sheet) Partial, Minor (rill)

Soil Classification

Australian Soil Classification: **Mapping Unit:** 5
Vertic Mesonatric Brown Sodosol Medium Moderately gravelly **Principal Profile Form:** N/A
Clay-loamy Clayey Deep
ASC Confidence: **Great Soil Group:** N/A
All necessary analytical data are available.

Site Disturbance: Complete clearing. Pasture, native or improved, but never cultivated

Vegetation: Low Strata - Tussock grass, 0.26-0.5m, Sparse. *Species includes - Aristida species

Tall Strata - Tree, 6.01-12m, Isolated clumps. *Species includes - Eucalyptus populnea, Eucalyptus crebra

Surface Coarse Fragments: 20-50%, medium gravelly, 6-20mm, subrounded, Ferricrete

Profile Morphology

1A1 0 - 0.2 m Brownish yellow (10YR6/6-Moist); , 0-0% ; Fine sandy loam; Massive grade of structure; Earthy fabric; Fine, (0 - 5) mm crack; Medium, (5 - 10) mm crack; Common (1-5 per 100mm²) Fine (1-2mm) macropores, Moist; Very firm consistence; Non-plastic; Non-sticky; 20-50%, medium gravelly, 6-20mm, subrounded, dispersed, Ferricrete, coarse fragments; Field pH 6.3 (pH meter); Many, fine (1-2mm) roots; Clear, Smooth change to -

1A2e 0.2 - 0.3 m Yellowish brown (10YR5/4-Moist); Mottles, 2-10% , 0-5mm, Distinct; Fine sandy loam; Massive grade of structure; Earthy fabric; Common (1-5 per 100mm²) Fine (1-2mm) macropores, Moist; Firm consistence; Slightly plastic; Slightly sticky; 20-50%, medium gravelly, 6-20mm, subrounded, dispersed, Ferricrete, coarse fragments; Common (10 - 20 %), Ferruginous-organic, Fine (0 - 2 mm), Root linings; Field pH 6.5 (pH meter); Common, fine (1-2mm) roots; Abrupt, Smooth change to -

1B2n 0.3 - 0.5 m Yellowish brown (10YR5/6-Moist); Mottles, 2-10% , 0-5mm, Distinct; Medium clay; Strong grade of structure, 10-20 mm, Angular blocky; Rough-ped fabric; Few (<1 per 100mm²) Very fine (0.075-1mm) macropores, Moist; Strong consistence; Moderately plastic; Normal plasticity; Very sticky; 10-20%, medium gravelly, 6-20mm, subrounded, dispersed, Ferricrete, coarse fragments; Many cutans, >50% of ped faces or walls coated, distinct; Common (10 - 20 %), Ferruginous, Medium (2 -6 mm), Concretions; Field pH 7 (pH meter); Few, fine (1-2mm) roots; Clear, Smooth change to -

1B3n 0.5 - 0.6 m Dark yellowish brown (10YR4/6-Moist); , 0-0% ; Clay loam, sandy; Strong grade of structure, 10-20 mm, Angular blocky; Rough-ped fabric; Few (<1 per 100mm²) Very fine (0.075-1mm) macropores, Moist; Strong consistence; Moderately plastic; Normal plasticity; Moderately sticky; 10-20%, medium gravelly, 6-20mm, subrounded, dispersed, Ferricrete, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Few (2 - 10 %), Ferruginous, Medium (2 -6 mm), Concretions; Field pH 8.3 (pH meter); Gradual, Smooth change to -

1C1 0.6 - 0.9 m Dark yellowish brown (10YR4/6-Moist); , 0-0% ; Clay loam, sandy; Moderate grade of structure, 20-50 mm, Prismatic; Rough-ped fabric; Few (<1 per 100mm²) Very fine (0.075-1mm) macropores, Moist; Strong consistence; Moderately plastic; Normal plasticity; Moderately sticky; 10-20%, medium gravelly, 6-20mm, subrounded, dispersed, Ferricrete, coarse fragments; Few cutans, <10% of ped faces or walls coated, distinct; Very few (0 - 2 %), Ferruginous, Medium (2 - 6 mm), Concretions; Field pH 9.1 (pH meter); Gradual, Smooth change to -

Project Name: CENTRAL QUEENSLAND COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** SS03 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

1C2 0.9 - 1.2 m Dark yellowish brown (10YR4/6-Moist); , 0-0% ; Clay loam, sandy; Moderate grade of structure, 50-100 mm, Prismatic; Rough-ped fabric; Few (<1 per 100mm²) Fine (1-2mm) macropores, Moist; Strong consistence; Slightly plastic; Normal plasticity; Slightly sticky; 10-20%, medium gravelly, 6-20mm, subrounded, dispersed, Ferricrete, coarse fragments; Few cutans, <10% of ped faces or walls coated, faint; Very few (0 - 2 %), Ferruginous, Fine (0 - 2 mm), Concretions; Field pH 9.1 (pH meter); Gradual, Smooth change to -

Morphological Notes

1A1 HARDSETTING A HORIZON; PULVERULENT
1A2e BLEACHED A2;
1B2n SODIC B2; DRAIANGE LIMITATION WITH CLOGGED PORES
1B3n LOWER B HORIZON BEYOND ROOT ZONE
1C1 SODIC PARENT MATERIAL
1C2 SODIC PARENT MATERIAL

Observation Notes

MAP UNIT 5, Pv, Detailed site, PULVERULENT SURFACE

Site Notes

CLEARED POPLAR BOX AND NARROW LEAF IRONBARD WOODLAND

Project Name: CENTRAL QUEENSLAND COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 Site ID: SS03 Observation ID: 1
Agency Name: Horizon Soil Survey (NT)

Laboratory Analyses Completed for this profile

12A1_CU	DTPA - extractable copper, zinc, manganese and iron
12A1_FE	DTPA - extractable copper, zinc, manganese and iron
12A1_MN	DTPA - extractable copper, zinc, manganese and iron
12A1_ZN	DTPA - extractable copper, zinc, manganese and iron
12C2	Calcium chloride extractable boron - ICPAES
15D3_CA	Exchangeable bases (Ca ²⁺ ,Mg ²⁺ ,Na ⁺ ,K ⁺) - 1M ammonium acetate at pH 7.0, rapid method with no pretreatment for soluble salts
15D3_K	Exchangeable bases - 1M ammonium acetate at pH 7.0, rapid method with no pretreatment for soluble salts
15D3_MG	Exchangeable bases - 1M ammonium acetate at pH 7.0, rapid method with no pretreatment for soluble salts
15D3_NA	Exchangeable bases - 1M ammonium acetate at pH 7.0, rapid method with no pretreatment for soluble salts
15J1	Effective CEC
15N1	Exchangeable sodium percentage (ESP)
3A1	EC of 1:5 soil/water extract
4A1	pH of 1:5 soil/water suspension
5A2	Chloride - 1:5 soil/water extract, automated colour
6_DC	Organic carbon (%) - Dry combustion
7A2	Total nitrogen - semimicro Kjeldahl , automated colour
9B2	Bicarbonate-extractable phosphorus - automated colour
P10_GRAV	Gravel (%)
P10_HYD_C	Clay (%) - Hydrometer Method
P10_HYD_CS	Coarse Sand (%) - Hydrometer Method
P10_HYD_FS	Fine Sand (%) - Hydrometer Method
P10_HYD_Z	Silt (%) - Hydrometer Method

Project Name: CENTRAL QUEENSLAND COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** SS04 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: **Locality:** MAP UNIT 1 ON Tb LAND SYSTEM, Detailed site
Date Desc.: 05/05/17 **Elevation:** 50 metres
Map Ref.: 1:25000 **Rainfall:** 756
Northing/Long.: 7489007 AMG zone: 55 **Runoff:** Slow
Easting/Lat.: 777863 Datum: GDA94 **Drainage:** Poorly drained

Geology

ExposureType: Auger boring **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Pb **Substrate Material:** Auger boring, 0.5 m deep, Porous, Shale

Land Form

Rel/Slope Class: Level plain <9m <1% **Pattern Type:** Terrace (alluvial)
Morph. Type: Flat **Relief:** 9 metres
Elem. Type: Terrace plain **Slope Category:** Level
Slope: 1.1 % **Aspect:** No Data

Surface Soil Condition (dry): Hardsetting

Erosion: Stable, No scalding (scald) No sheet erosion (sheet) No wave erosion (wave) Stable, Minor (rill)

Soil Classification

Australian Soil Classification: Bleached-Sodic Dystrophic Brown Kandosol Thin Moderately gravelly Clay-loamy Clayey Shallow
Mapping Unit: 1
Principal Profile Form: N/A
ASC Confidence: All necessary analytical data are available.
Great Soil Group: N/A

Site Disturbance: Complete clearing. Pasture, native or improved, but never cultivated

Vegetation: Low Strata - Tussock grass, 0.26-0.5m, Sparse. *Species includes - Aristida species
Tall Strata - Tree, 3.01-6m, Isolated plants. *Species includes - Eucalyptus crebra

Surface Coarse Fragments: 20-50%, medium gravelly, 6-20mm, rounded platy, Shale

Profile Morphology

1A1 0 - 0.1 m Light brownish grey (10YR6/2-Moist); , 0-0% ; Fine sandy clay loam; Moderate grade of structure, 10-20 mm, Subangular blocky; Rough-ped fabric; Many (>5 per 100mm²) Fine (1-2mm) macropores, Dry; Very firm consistence; Slightly plastic; Normal plasticity; Moderately sticky; 20-50%, medium gravelly, 6-20mm, subrounded, dispersed, Shale, coarse fragments; Field pH 7 (pH meter); Many, fine (1-2mm) roots; Gradual, Smooth change to -

1B1 0.1 - 0.2 m Light brownish grey (10YR6/2-Moist); , 0-0% ; Light medium clay; Weak grade of structure, 10-20 mm, Subangular blocky; Rough-ped fabric; Common (1-5 per 100mm²) Very fine (0.075-1mm) macropores, Dry; Very firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 20-50%, medium gravelly, 6-20mm, subrounded, dispersed, Shale, coarse fragments; Few (2 - 10 %), Ferruginous, Medium (2 -6 mm), Concretions; Field pH 7.6 (pH meter); Common, fine (1-2mm) roots; Gradual, Smooth change to -

1B3n 0.2 - 0.3 m Brown (10YR5/3-Moist); , 0-0% ; Fine sandy clay loam; Massive grade of structure; Earthy fabric; Few (<1 per 100mm²) Fine (1-2mm) macropores, Dry; Strong consistence; Slightly plastic; Normal plasticity; Slightly sticky; 20-50%, medium gravelly, 6-20mm, subrounded, dispersed, Shale, coarse fragments; Few (2 - 10 %), Ferruginous, Medium (2 -6 mm), Concretions; Field pH 8.2 (pH meter); Few, fine (1-2mm) roots; Gradual, Smooth change to -

1C1n 0.3 - 0.5 m Yellowish brown (10YR5/4-Moist); Mottles, 10-20% , 0-5mm, Distinct; Fine sandy loam; Massive grade of structure; Earthy fabric; Few (<1 per 100mm²) Very fine (0.075-1mm) macropores, Dry; Strong consistence; Non-plastic; Non-sticky; 20-50%, medium gravelly, 6-20mm, subrounded, dispersed, Shale, coarse fragments; Few (2 - 10 %), Ferruginous, Medium (2 -6 mm), Concretions; Field pH 9.5 (pH meter); Gradual, Smooth change to -

Morphological Notes

1A1 STRUCTURAL A HORIZON
1B1 GRADATIONAL B HORIZON
1B3n TRANSITIONAL B HORIZON
1C1n C OVER ROCK

Observation Notes

MAP UNIT 1 ON Tb LAND SYSTEM, Detailed site, 0.5M TO ROCK

Site Notes

CLEARED EUCALYPT WOODLAND; ROCK AT 0.5 M

Project Name: CENTRAL QUEENSLAND COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 Site ID: SS04 Observation ID: 1
Agency Name: Horizon Soil Survey (NT)

Laboratory Analyses Completed for this profile

12A1_CU	DTPA - extractable copper, zinc, manganese and iron
12A1_FE	DTPA - extractable copper, zinc, manganese and iron
12A1_MN	DTPA - extractable copper, zinc, manganese and iron
12A1_ZN	DTPA - extractable copper, zinc, manganese and iron
12C2	Calcium chloride extractable boron - ICPAES
15D3_CA	Exchangeable bases (Ca ²⁺ ,Mg ²⁺ ,Na ⁺ ,K ⁺) - 1M ammonium acetate at pH 7.0, rapid method with no pretreatment for soluble salts
15D3_K	Exchangeable bases - 1M ammonium acetate at pH 7.0, rapid method with no pretreatment for soluble salts
15D3_MG	Exchangeable bases - 1M ammonium acetate at pH 7.0, rapid method with no pretreatment for soluble salts
15D3_NA	Exchangeable bases - 1M ammonium acetate at pH 7.0, rapid method with no pretreatment for soluble salts
15J1	Effective CEC
15N1	Exchangeable sodium percentage (ESP)
3A1	EC of 1:5 soil/water extract
4A1	pH of 1:5 soil/water suspension
5A2	Chloride - 1:5 soil/water extract, automated colour
6_DC	Organic carbon (%) - Dry combustion
7A2	Total nitrogen - semimicro Kjeldahl , automated colour
9B2	Bicarbonate-extractable phosphorus - automated colour
P10_GRAV	Gravel (%)
P10_HYD_C	Clay (%) - Hydrometer Method
P10_HYD_CS	Coarse Sand (%) - Hydrometer Method
P10_HYD_FS	Fine Sand (%) - Hydrometer Method
P10_HYD_Z	Silt (%) - Hydrometer Method

Project Name: CENTRAL QUEENSLAND COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** SS05 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: **Locality:** MAP UNIT 2, SCL TRIGGER MAPPING LAND
CAPABILITY CLASS A, Sx, Detailed site
Date Desc.: 06/06/19 **Elevation:** 29 metres
Map Ref.: 1:25000 **Rainfall:** 756
Northing/Long.: 7489109 AMG zone: 55 **Runoff:** Very slow
Easting/Lat.: 774667 Datum: GDA94 **Drainage:** Imperfectly drained

Geology

ExposureType: Auger boring **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qa **Substrate Material:** Auger boring, 1 m deep, Porous, , Alluvium

Land Form

Rel/Slope Class: No Data **Pattern Type:** No Data
Morph. Type: Flat **Relief:** No Data
Elem. Type: Terrace plain **Slope Category:** Very gently sloped
Slope: 1.8 % **Aspect:** No Data

Surface Soil Condition (dry): Firm

Erosion: Stable, Moderate (sheet) Stable, Minor (rill)

Soil Classification

Australian Soil Classification: **Mapping Unit:** 2
Basic Fluvic Clastic Rudosol Gravelly Clay-loamy Shallow **Principal Profile Form:** N/A
ASC Confidence: **Great Soil Group:** N/A
All necessary analytical data are available.

Site Disturbance: Complete clearing. Pasture, native or improved, but never cultivated

Vegetation: Low Strata - Tussock grass, 0.51-1m, Closed or dense. *Species includes - Chloris gayana
Tall Strata - Tree, 12.01-20m, Isolated plants. *Species includes - Eucalyptus camaldulensis

Surface Coarse Fragments: 10-20%, medium gravelly, 6-20mm, rounded, Shale

Profile Morphology

1A11 0 - 0.1 m Light brownish grey (10YR6/2-Moist); , 0-0% ; Sandy clay loam; Strong grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Many (>5 per 100mm²) Fine (1-2mm) macropores, Moist; Firm consistence; Slightly plastic; Normal plasticity; Slightly sticky; 10-20%, medium gravelly, 6-20mm, rounded, dispersed, Shale, coarse fragments; Field pH 6.8 (pH meter); Abundant, fine (1-2mm) roots; Clear, Smooth change to -

1A12 0.1 - 0.2 m Light brownish grey (10YR6/2-Moist); , 0-0% ; Sandy clay loam; Strong grade of structure, 10-20 mm, Subangular blocky; Rough-ped fabric; Medium, (5 - 10) mm crack; Many (>5 per 100mm²) Fine (1-2mm) macropores, Moist; Firm consistence; Slightly plastic; Normal plasticity; Slightly sticky; 10-20%, coarse gravelly, 20-60mm, rounded, dispersed, Shale, coarse fragments; Field pH 6.7 (pH meter); Abundant, fine (1-2mm) roots; Clear, Smooth change to -

2A11 0.2 - 0.3 m Brown (10YR5/3-Moist); Mottles, 10-20% , 0-5mm, Distinct; Sandy clay loam; Strong grade of structure, 10-20 mm, Subangular blocky; Rough-ped fabric; Medium, (5 - 10) mm crack; Many (>5 per 100mm²) Fine (1-2mm) macropores, Moist; Firm consistence; Slightly plastic; Normal plasticity; Slightly sticky; 10-20%, cobbly, 60-200mm, rounded, dispersed, Shale, coarse fragments; Common (10 - 20 %), Ferruginous, Fine (0 - 2 mm), Root linings; Field pH 6.6 (pH meter); Abundant, fine (1-2mm) roots; Clear, Smooth change to -

2B12 0.3 - 0.6 m Dark yellowish brown (10YR3/4-Moist); , 0-0% ; Sandy clay loam; Moderate grade of structure, 10-20 mm, Subangular blocky; Rough-ped fabric; Many (>5 per 100mm²) Fine (1-2mm) macropores, Moist; Firm consistence; Slightly plastic; Normal plasticity; Slightly sticky; 20-50%, cobbly, 60-200mm, rounded, dispersed, Shale, coarse fragments; Common (10 - 20 %), Ferruginous, Fine (0 - 2 mm), Root linings; Field pH 6.6 (pH meter); Many, fine (1-2mm) roots; Clear, Smooth change to -

1C1 0.6 - 0.9 m Dark yellowish brown (10YR3/4-Moist); , 0-0% ; Sandy clay loam; Weak grade of structure, 20-50 mm, Subangular blocky; Earthy fabric; Few (<1 per 100mm²) Fine (1-2mm) macropores, Moist; Firm consistence; Slightly plastic; Normal plasticity; Slightly sticky; 10-20%, cobbly, 60-200mm, rounded, dispersed, Shale, coarse fragments; Field pH 6.7 (pH meter); Common, fine (1-2mm) roots; Clear, Smooth change to -

1C2 0.9 - 1.2 m Dark yellowish brown (10YR3/4-Moist); , 0-0% ; Sandy clay loam; Massive grade of structure; Earthy fabric; Few (<1 per 100mm²) Fine (1-2mm) macropores, Moist; Firm consistence; Non-plastic; Non-sticky; 10-20%, cobbly, 60-200mm, rounded, dispersed, Shale, coarse fragments; Field pH 6.7 (pH meter); Few, fine (1-2mm) roots; Gradual, Smooth change to -

Morphological Notes

1A11 AGGRADED
1A12 AGGRADED

Project Name: CENTRAL QUEENSLAND COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** SS05 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

2A11 BURIED A HORIZON
2B12 ALLUVIUM
1C1 ALLUVIUM

Observation Notes

MAP UNIT 2 ON Sx LAND SYSTEM, SCL TRIGGER MAPPING LAND CAPABILITY CLASS A, Sx, Detailed site

Site Notes

ACTIVELY AGGRADED ALLUVIAL FLAT ON STYX RIVER

Project Name: CENTRAL QUEENSLAND COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 Site ID: SS05 Observation ID: 1
Agency Name: Horizon Soil Survey (NT)

Laboratory Analyses Completed for this profile

12A1_CU	DTPA - extractable copper, zinc, manganese and iron
12A1_FE	DTPA - extractable copper, zinc, manganese and iron
12A1_MN	DTPA - extractable copper, zinc, manganese and iron
12A1_ZN	DTPA - extractable copper, zinc, manganese and iron
12C2	Calcium chloride extractable boron - ICPAES
15D3_CA	Exchangeable bases (Ca ²⁺ ,Mg ²⁺ ,Na ⁺ ,K ⁺) - 1M ammonium acetate at pH 7.0, rapid method with no pretreatment for soluble salts
15D3_K	Exchangeable bases - 1M ammonium acetate at pH 7.0, rapid method with no pretreatment for soluble salts
15D3_MG	Exchangeable bases - 1M ammonium acetate at pH 7.0, rapid method with no pretreatment for soluble salts
15D3_NA	Exchangeable bases - 1M ammonium acetate at pH 7.0, rapid method with no pretreatment for soluble salts
15J1	Effective CEC
15N1	Exchangeable sodium percentage (ESP)
3A1	EC of 1:5 soil/water extract
4A1	pH of 1:5 soil/water suspension
5A2	Chloride - 1:5 soil/water extract, automated colour
6_DC	Organic carbon (%) - Dry combustion
7A2	Total nitrogen - semimicro Kjeldahl , automated colour
9B2	Bicarbonate-extractable phosphorus - automated colour
P10_GRAV	Gravel (%)
P10_HYD_C	Clay (%) - Hydrometer Method
P10_HYD_CS	Coarse Sand (%) - Hydrometer Method
P10_HYD_FS	Fine Sand (%) - Hydrometer Method
P10_HYD_Z	Silt (%) - Hydrometer Method

Project Name: CENTRAL QUEENSLAND COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** SS06 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: **Locality:** MAP UNIT 5, LAND SYSTEM So, Detailed sit
Date Desc.: 05/05/17 **Elevation:** 30 metres
Map Ref.: 1:25000 **Rainfall:** 756
Northing/Long.: 7488909 AMG zone: 55 **Runoff:** Very slow
Easting/Lat.: 772179 Datum: GDA94 **Drainage:** Imperfectly drained

Geology

ExposureType: Auger boring **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Auger boring, 0.5 m deep, Porous, , Alluvium

Land Form

Rel/Slope Class: No Data **Pattern Type:** No Data
Morph. Type: Flat **Relief:** No Data
Elem. Type: Terrace plain **Slope Category:** Level
Slope: 1.4 % **Aspect:** No Data

Surface Soil Condition (dry): Cracking

Erosion: Active, Minor scalding (scald)

Soil Classification

Australian Soil Classification: **Mapping Unit:** 5
Vertic Hypernatric Grey Sodosol Medium Slightly gravelly Clay- **Principal Profile Form:** N/A
loamy Clayey Moderately deep
ASC Confidence: **Great Soil Group:** N/A
All necessary analytical data are available.

Site Disturbance: Complete clearing. Pasture, native or improved, but never cultivated

Vegetation: Low Strata - Tussock grass, 0.51-1m, Closed or dense. *Species includes - Chloris gayana
Tall Strata - Tree, 3.01-6m, Isolated clumps. *Species includes - Acacia harpophylla

Surface Coarse Fragments: 2-10%, medium gravelly, 6-20mm, rounded, Ferricrete

Profile Morphology

1A1 0 - 0.2 m Pale brown (10YR6/3-Moist); , 0-0% ; Fine sandy clay loam; Strong grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Fine, (0 - 5) mm crack; Many (>5 per 100mm²) Very fine (0.075-1mm) macropores, Moist; Firm consistence; Slightly plastic; Normal plasticity; Slightly sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Ferricrete, coarse fragments; Very few (0 - 2 %), Ferruginous, Medium (2 -6 mm), Concretions; Field pH 7.5 (pH meter); Many, fine (1-2mm) roots; Gradual, Smooth change to -

1A2 0.2 - 0.3 m Yellowish brown (10YR5/4-Moist); Mottles, 10-20% , 0-5mm, Distinct; Fine sandy clay loam; Weak grade of structure, 10-20 mm, Subangular blocky; Rough-ped fabric; Common (1-5 per 100mm²) Fine (1-2mm) macropores, Moist; Firm consistence; Slightly plastic; Normal plasticity; Slightly sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Ferricrete, coarse fragments; Common (10 - 20 %), Ferruginous, Fine (0 - 2 mm), Root linings; Field pH 7.9 (pH meter); Common, fine (1-2mm) roots; Abrupt, Smooth change to -

1B21n 0.3 - 0.6 m Brown (10YR4/3-Moist); , 0-0% ; Light medium clay; Strong grade of structure, 20-50 mm, Prismatic; Smooth-ped fabric; Few (<1 per 100mm²) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Ferricrete, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Few (2 - 10 %), Ferruginous, Medium (2 -6 mm), Concretions; Field pH 9 (pH meter); Few, fine (1-2mm) roots; Clear, Smooth change to -

1B22n 0.6 - 0.8 m Brown (10YR4/3-Moist); , 0-0% ; Light medium clay; Strong grade of structure, 50-100 mm, Lenticular; Smooth-ped fabric; Few (<1 per 100mm²) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 10-20%, medium gravelly, 6-20mm, subrounded, dispersed, Ferricrete, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 9.3 (pH meter); Clear, Smooth change to -

2B21 0.8 - 0.9 m Brown (10YR4/3-Moist); , 0-0% ; Medium clay; Strong grade of structure, 50-100 mm, Polyhedral; Smooth-ped fabric; Few (<1 per 100mm²) Very fine (0.075-1mm) macropores, Moist; Strong consistence; Moderately plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Ferricrete, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 9.1 (pH meter); Gradual, Smooth change to -

1B22 0.9 - 1.2 m Brown (10YR4/3-Moist); , 0-0% ; Medium clay; Smooth-ped fabric; Few (<1 per 100mm²) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Moderately plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Ferricrete, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 9.2 (pH meter); Gradual, Smooth change to -

Morphological Notes

1A1 STRUCTURED A

Project Name: CENTRAL QUEENSLAND COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** SS06 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

1A2	ELUVIATED HORIZON
1B21n	SODIC B
1B22n	VERTIC SODIC
2B21	INCREASED CLAY MAYBE BURIED STRATA
1B22	INCREASED CLAY MAYBE BURIED STRATA

Observation Notes

MAP UNIT 5, LAND SYSTEM So, Detailed site

Site Notes

CRACKING GREY CLAY, MELONHOLE GILGAI

Project Name: CENTRAL QUEENSLAND COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 Site ID: SS06 Observation ID: 1
Agency Name: Horizon Soil Survey (NT)

Laboratory Analyses Completed for this profile

12A1_CU	DTPA - extractable copper, zinc, manganese and iron
12A1_FE	DTPA - extractable copper, zinc, manganese and iron
12A1_MN	DTPA - extractable copper, zinc, manganese and iron
12A1_ZN	DTPA - extractable copper, zinc, manganese and iron
12C2	Calcium chloride extractable boron - ICPAES
15D3_CA	Exchangeable bases (Ca ²⁺ ,Mg ²⁺ ,Na ⁺ ,K ⁺) - 1M ammonium acetate at pH 7.0, rapid method with no pretreatment for soluble salts
15D3_K	Exchangeable bases - 1M ammonium acetate at pH 7.0, rapid method with no pretreatment for soluble salts
15D3_MG	Exchangeable bases - 1M ammonium acetate at pH 7.0, rapid method with no pretreatment for soluble salts
15D3_NA	Exchangeable bases - 1M ammonium acetate at pH 7.0, rapid method with no pretreatment for soluble salts
15J1	Effective CEC
15N1	Exchangeable sodium percentage (ESP)
3A1	EC of 1:5 soil/water extract
4A1	pH of 1:5 soil/water suspension
5A2	Chloride - 1:5 soil/water extract, automated colour
6_DC	Organic carbon (%) - Dry combustion
7A2	Total nitrogen - semimicro Kjeldahl , automated colour
9B2	Bicarbonate-extractable phosphorus - automated colour
P10_GRAV	Gravel (%)
P10_HYD_C	Clay (%) - Hydrometer Method
P10_HYD_CS	Coarse Sand (%) - Hydrometer Method
P10_HYD_FS	Fine Sand (%) - Hydrometer Method
P10_HYD_Z	Silt (%) - Hydrometer Method

Project Name: CENTRAL QUEENSLAND COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** SS07 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: **Locality:** MAP UNIT 1 ON TI LAND SYSTEM, Detailed site
Date Desc.: 06/06/19 **Elevation:** 50 metres
Map Ref.: 1:25000 **Rainfall:** 756
Northing/Long.: 7486115 AMG zone: 55 **Runoff:** Moderately rapid
Easting/Lat.: 770623 Datum: GDA94 **Drainage:** Well drained

Geology

ExposureType: Auger boring **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Kx **Substrate Material:** Outcrop, 3 m deep, Porous, , Sandstone

Land Form

Rel/Slope Class: Undulating low hills 30-90m 3-10% **Pattern Type:** No Data
Morph. Type: Lower-slope **Relief:** 30 metres
Elem. Type: Hillslope **Slope Category:** Gently inclined
Slope: 2 % **Aspect:** No Data

Surface Soil Condition (dry): Soft

Erosion: Active, Moderate (wind); Active, Moderate (sheet)

Soil Classification

Australian Soil Classification: **Mapping Unit:** 1
Ferric Dystrophic Red Kandosol Medium Moderately gravelly Clay-loamy Clayey Deep **Principal Profile Form:** N/A
ASC Confidence: **Great Soil Group:** N/A
All necessary analytical data are available.

Site Disturbance: Extensive clearing, for example poisoning, ringbarking

Vegetation: Low Strata - Tussock grass, 0.51-1m, Sparse. *Species includes - Themeda australis, Aristida species
Tall Strata - Tree, 3.01-6m, Sparse. *Species includes - Eucalyptus platyphylla, Eucalyptus intermedia

Surface Coarse Fragments: 20-50%, medium gravelly, 6-20mm, subangular tabular, Ferricrete

Profile Morphology

1A11 0 - 0.1 m Light brownish grey (10YR6/2-Moist); , 0-0% ; Clay loam, sandy; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Many (>5 per 100mm²) Very fine (0.075-1mm) macropores, Dry; Firm consistence; Non-plastic; Non-sticky; 20-50%, coarse gravelly, 20-60mm, subrounded, dispersed, Ferricrete, coarse fragments; Field pH 6.3 (pH meter); Many, fine (1-2mm) roots; Gradual, Smooth change to -

1A12 0.1 - 0.2 m Light brownish grey (10YR6/2-Moist); , 0-0% ; Sandy clay loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Many (>5 per 100mm²) Fine (1-2mm) macropores, Dry; Firm consistence; Non-plastic; Non-sticky; 20-50%, coarse gravelly, 20-60mm, subrounded, dispersed, Ferricrete, coarse fragments; Field pH 7.2 (pH meter); Many, fine (1-2mm) roots; Gradual, Smooth change to -

1A3 0.2 - 0.3 m Brownish yellow (10YR6/6-Moist); , 0-0% ; Sandy clay loam; Moderate grade of structure, 20-50 mm, Subangular blocky; Rough-ped fabric; Many (>5 per 100mm²) Fine (1-2mm) macropores, Moderately moist; Firm consistence; Non-plastic; Non-sticky; 20-50%, cobbly, 60-200mm, subrounded, dispersed, Ferricrete, coarse fragments; Field pH 7.3 (pH meter); Common, fine (1-2mm) roots; Gradual, Smooth change to -

1B1 0.3 - 0.6 m Greyish brown (10YR5/2-Moist); , 0-0% ; Sandy clay loam; Weak grade of structure, 20-50 mm, Subangular blocky; Earthy fabric; Many (>5 per 100mm²) Fine (1-2mm) macropores, Moderately moist; Firm consistence; Non-plastic; Non-sticky; 20-50%, coarse gravelly, 20-60mm, subrounded, dispersed, Ferricrete, coarse fragments; Field pH 7.4 (pH meter); Common, fine (1-2mm) roots; Gradual, Smooth change to -

1B21 0.6 - 0.9 m Greyish brown (10YR5/2-Moist); , 0-0% ; Clay loam, sandy; Massive grade of structure; Earthy fabric; Many (>5 per 100mm²) Fine (1-2mm) macropores, Moderately moist; Strong consistence; Non-plastic; Non-sticky; 20-50%, coarse gravelly, 20-60mm, subrounded, dispersed, Ferricrete, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 8.4 (pH meter); Few, fine (1-2mm) roots; Gradual, Smooth change to -

1B22 0.9 - 1.2 m , 0-0% ; Clay loam, sandy; Massive grade of structure, 10-20 mm, Subangular blocky; Earthy fabric; Many (>5 per 100mm²) Fine (1-2mm) macropores, Moderately moist; Very firm consistence; Non-plastic; Non-sticky; 20-50%, coarse gravelly, 20-60mm, subrounded, dispersed, Ferricrete, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 8.5 (pH meter); Gradual, Smooth change to -

Morphological Notes

1A11 ORGANIC MATTER ACCUMULATION
1A12 LOWER TEXTURE CLASS

Project Name: CENTRAL QUEENSLAND COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 Site ID: SS07 Observation ID: 1
Agency Name: Horizon Soil Survey (NT)

Laboratory Analyses Completed for this profile

12A1_CU	DTPA - extractable copper, zinc, manganese and iron
12A1_FE	DTPA - extractable copper, zinc, manganese and iron
12A1_MN	DTPA - extractable copper, zinc, manganese and iron
12A1_ZN	DTPA - extractable copper, zinc, manganese and iron
12C2	Calcium chloride extractable boron - ICPAES
15D3_CA	Exchangeable bases (Ca ²⁺ ,Mg ²⁺ ,Na ⁺ ,K ⁺) - 1M ammonium acetate at pH 7.0, rapid method with no pretreatment for soluble salts
15D3_K	Exchangeable bases - 1M ammonium acetate at pH 7.0, rapid method with no pretreatment for soluble salts
15D3_MG	Exchangeable bases - 1M ammonium acetate at pH 7.0, rapid method with no pretreatment for soluble salts
15D3_NA	Exchangeable bases - 1M ammonium acetate at pH 7.0, rapid method with no pretreatment for soluble salts
15G1	Exchange acidity (hydrogen and aluminium) by 1M potassium chloride
15J1	Effective CEC
15N1	Exchangeable sodium percentage (ESP)
3A1	EC of 1:5 soil/water extract
4A1	pH of 1:5 soil/water suspension
5A2	Chloride - 1:5 soil/water extract, automated colour
6_DC	Organic carbon (%) - Dry combustion
9B2	Bicarbonate-extractable phosphorus - automated colour
P10_GRAV	Gravel (%)
P10_HYD_C	Clay (%) - Hydrometer Method
P10_HYD_CS	Coarse Sand (%) - Hydrometer Method
P10_HYD_FS	Fine Sand (%) - Hydrometer Method
P10_HYD_Z	Silt (%) - Hydrometer Method

Project Name: CENTRAL QUEENSLAND COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** SS08 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: **Locality:** MAP UNIT 5 ON Pv LAND SYSTEM, Detailed site
Date Desc.: 06/06/19 **Elevation:** 42 metres
Map Ref.: 1:25000 **Rainfall:** 756
Northing/Long.: 7486135 AMG zone: 55 **Runoff:** Slow
Easting/Lat.: 772020 Datum: GDA94 **Drainage:** Imperfectly drained

Geology

ExposureType: Auger boring **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Auger boring, 1 m deep,Porous, , Alluvium

Land Form

Rel/Slope Class: Level plain <9m <1% **Pattern Type:** Terrace (alluvial)
Morph. Type: Flat **Relief:** 9 metres
Elem. Type: Terrace plain **Slope Category:** Level
Slope: 1.4 % **Aspect:** No Data

Surface Soil Condition (dry): Hardsetting

Erosion:

Soil Classification

Australian Soil Classification: **Mapping Unit:** 5
Vertic Mottled-Mesonatric Grey Sodosol Medium Moderately **Principal Profile Form:** N/A
gravelly Clay-loamy Clayey Deep
ASC Confidence: **Great Soil Group:** N/A
All necessary analytical data are available.

Site Disturbance: Complete clearing. Pasture, native or improved, but never cultivated

Vegetation:

Surface Coarse Fragments: 20-50%, medium gravelly, 6-20mm, subrounded, Ferricrete

Profile Morphology

1A1 0 - 0.1 m Light brownish grey (10YR6/2-Moist); Mottles, 10-20% , 0-5mm, Distinct; Fine sandy clay loam; Weak grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm²) Very fine (0.075-1mm) macropores, Moist; Very firm consistence; Slightly plastic; Normal plasticity; Slightly sticky; 20-50%, fine gravelly, 2-6mm, subrounded, dispersed, Ferricrete, coarse fragments; Few (2 - 10 %), Ferruginous, Fine (0 - 2 mm), Root linings; , , , ; Field pH 6.3 (pH meter); Common, very fine (0-1mm) roots; Abrupt, Smooth change to -

1B21n 0.2 - 0.5 m Brown (10YR5/3-Moist); Mottles, 10-20% , 5-15mm, Distinct; Medium clay; Strong grade of structure, 5-10 mm, Polyhedral; Rough-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm²) Very fine (0.075-1mm) macropores, Moist; Strong consistence; Moderately plastic; Normal plasticity; Moderately sticky; 10-20%, fine gravelly, 2-6mm, subrounded, dispersed, Ferricrete, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Common (10 - 20 %), Ferruginous, Medium (2 -6 mm), Concretions; Field pH 7.2 (pH meter); Few, very fine (0-1mm) roots; Clear, Smooth change to -

1B22n 0.5 - 0.6 m Yellowish brown (10YR5/4-Moist); (/Moist); , 0-0% ; Medium clay; Strong grade of structure, 20-50 mm, Polyhedral; Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Medium, (5 - 10) mm crack; Moist; Strong consistence; Moderately plastic; Normal plasticity; Moderately sticky; 10-20%, fine gravelly, 2-6mm, subrounded, dispersed, Ferricrete, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Few (2 - 10 %), Ferruginous, Medium (2 -6 mm), Concretions; Field pH 7.3 (pH meter); Few, medium (2-5mm) roots; Clear, Smooth change to -

2B3n 0.6 - 0.8 m Yellowish brown (10YR5/4-Moist); , 0-0% ; Light clay; Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Medium, (5 - 10) mm crack; Moist; Strong consistence; Slightly plastic; Normal plasticity; Slightly sticky; 20-50%, fine gravelly, 2-6mm, subrounded, dispersed, Ferricrete, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 7.4 (pH meter); Few, fine (1-2mm) roots; Clear, Smooth change to -

2C1 0.8 - 0.9 m Yellowish brown (10YR5/4-Moist); , 0-0% ; Light clay; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Moist; Strong consistence; Slightly plastic; Normal plasticity; Slightly sticky; 20-50%, fine gravelly, 2-6mm, subrounded, dispersed, Ferricrete, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 8.4 (pH meter); Clear, Smooth change to -

2C2 0.9 - 1.2 m Yellowish brown (10YR5/4-Moist); , 0-0% ; Light clay; Moderate grade of structure, 10-20 mm, Polyhedral; Rough-ped fabric; Fine, (0 - 5) mm crack; Moist; Strong consistence; Moderately plastic; Normal plasticity; Moderately sticky; 10-20%, fine gravelly, 2-6mm, subrounded, dispersed, Ferricrete, coarse fragments; Field pH 8.5 (pH meter); Gradual, Smooth change to -

Morphological Notes

1A1 FINE SANDY LOAM A HORIZON OVER VERTIC CLAY SUBSOIL

Project Name: CENTRAL QUEENSLAND COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 Site ID: SS08 Observation ID: 1
Agency Name: Horizon Soil Survey (NT)

Laboratory Analyses Completed for this profile

12A1_CU	DTPA - extractable copper, zinc, manganese and iron
12A1_FE	DTPA - extractable copper, zinc, manganese and iron
12A1_MN	DTPA - extractable copper, zinc, manganese and iron
12A1_ZN	DTPA - extractable copper, zinc, manganese and iron
12C2	Calcium chloride extractable boron - ICPAES
15D3_CA	Exchangeable bases (Ca ²⁺ ,Mg ²⁺ ,Na ⁺ ,K ⁺) - 1M ammonium acetate at pH 7.0, rapid method with no pretreatment for soluble salts
15D3_K	Exchangeable bases - 1M ammonium acetate at pH 7.0, rapid method with no pretreatment for soluble salts
15D3_MG	Exchangeable bases - 1M ammonium acetate at pH 7.0, rapid method with no pretreatment for soluble salts
15D3_NA	Exchangeable bases - 1M ammonium acetate at pH 7.0, rapid method with no pretreatment for soluble salts
15J1	Effective CEC
15N1	Exchangeable sodium percentage (ESP)
3A1	EC of 1:5 soil/water extract
4A1	pH of 1:5 soil/water suspension
5A2	Chloride - 1:5 soil/water extract, automated colour
6_DC	Organic carbon (%) - Dry combustion
7A2	Total nitrogen - semimicro Kjeldahl , automated colour
9B2	Bicarbonate-extractable phosphorus - automated colour
P10_GRAV	Gravel (%)
P10_HYD_C	Clay (%) - Hydrometer Method
P10_HYD_CS	Coarse Sand (%) - Hydrometer Method
P10_HYD_FS	Fine Sand (%) - Hydrometer Method
P10_HYD_Z	Silt (%) - Hydrometer Method

Project Name: CENTRAL QUEENSLAND COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** SS09 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: **Locality:** MAP UNIT 5 ON LAND SYSTEM Pv, Detailed site
Date Desc.: 06/06/19 **Elevation:** 31 metres
Map Ref.: 1:25000 **Rainfall:** 756
Northing/Long.: 7486642 AMG zone: 55 **Runoff:** Slow
Easting/Lat.: 775377 Datum: GDA94 **Drainage:** Imperfectly drained

Geology

ExposureType: Auger boring **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Auger boring, 1 m deep, Porous, , Alluvium

Land Form

Rel/Slope Class: Level plain <9m <1% **Pattern Type:** Terrace (alluvial)
Morph. Type: Flat **Relief:** 9 metres
Elem. Type: Terrace plain **Slope Category:** Level
Slope: 0.6 % **Aspect:** No Data

Surface Soil Condition (dry): Hardsetting

Erosion: Active, Moderate scalding (scald) Active,
Moderate (sheet) Active, Moderate (rill) Active,
Moderate (gully)

Soil Classification

Australian Soil Classification: **Mapping Unit:** 5
Vertic Hypernatric Brown Sodosol Medium Moderately gravelly **Principal Profile Form:** N/A
Clay-loamy Clayey Deep
ASC Confidence: **Great Soil Group:** N/A
All necessary analytical data are available.

Site Disturbance: Complete clearing. Pasture, native or improved, but never cultivated

Vegetation: Low Strata - Tussock grass, 0.26-0.5m, Sparse. *Species includes - Aristida species
Tall Strata - Tree, 3.01-6m, Isolated plants. *Species includes - Eucalyptus populnea

Surface Coarse Fragments: 10-20%, medium gravelly, 6-20mm, subrounded, Ironstone

Profile Morphology

1A1 0 - 0.1 m Mottles, 2-10% , 0-5mm, Distinct; Fine sandy clay loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Many (>5 per 0.01m²) Very fine (0.075-1mm) macropores, Dry; Very firm consistence; Slightly plastic; Normal plasticity; Slightly sticky; 10-20%, fine gravelly, 2-6mm, subrounded, dispersed, Ironstone, coarse fragments; Few (2 - 10 %), Ferruginous, Fine (0 - 2 mm), Root linings; Field pH 6.4 (pH meter); Common, fine (1-2mm) roots; Abrupt, Smooth change to -

1B21n 0.2 - 0.5 m Light brownish grey (10YR6/2-Moist); Mottles, 2-10% , 0-5mm, Distinct; Medium clay; Moderate grade of structure, 10-20 mm, Polyhedral; Rough-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm²) Very fine (0.075-1mm) macropores, Dry; Strong consistence; Moderately plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Ironstone, coarse fragments; Many cutans, >50% of ped faces or walls coated, distinct; Common (10 - 20 %), Ferruginous, Fine (0 - 2 mm), Concretions; Field pH 7.3 (pH meter); Few, fine (1-2mm) roots; Clear, Smooth change to -

1B22n 0.5 - 0.6 m Brown (10YR5/3-Moist); , 0-0% ; Medium clay; Moderate grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 100mm²) Fine (1-2mm) macropores, Dry; Strong consistence; Moderately plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Ironstone, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Few (2 - 10 %), Ferruginous, Fine (0 - 2 mm), Concretions; Field pH 8 (pH meter); Clear, Smooth change to -

2B3n 0.6 - 0.8 m Yellowish brown (10YR5/4-Moist); , 0-0% ; Light clay; Moderate grade of structure, 20-50 mm, Lenticular; Smooth-ped fabric; Few (<1 per 100mm²) Very fine (0.075-1mm) macropores, Moderately moist; Very strong consistence; Moderately plastic; Normal plasticity; Moderately sticky; 2-10%, medium gravelly, 6-20mm, subrounded, dispersed, Ironstone, coarse fragments; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 8.9 (pH meter); Clear, Smooth change to -

2C1 0.8 - 0.9 m Yellowish brown (10YR5/4-Moist); , 0-0% ; Light clay; Moderate grade of structure, 20-50 mm, Polyhedral; Rough-ped fabric; Few (<1 per 100mm²) Very fine (0.075-1mm) macropores, Moderately moist; Very strong consistence; Moderately plastic; Normal plasticity; Moderately sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Clear, Smooth change to -

2C2 0.9 - 1.2 m Yellowish brown (10YR5/4-Moist); , 0-0% ; Light clay; Moderate grade of structure, 20-50 mm, Polyhedral; Rough-ped fabric; Few (<1 per 100mm²) Very fine (0.075-1mm) macropores, Moderately moist; Moderately plastic; Normal plasticity; Moderately sticky; Gradual, Smooth change to -

Morphological Notes

Project Name: CENTRAL QUEENSLAND COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 Site ID: SS09 Observation ID: 1
Agency Name: Horizon Soil Survey (NT)

Laboratory Analyses Completed for this profile

12A1_CU	DTPA - extractable copper, zinc, manganese and iron
12A1_FE	DTPA - extractable copper, zinc, manganese and iron
12A1_MN	DTPA - extractable copper, zinc, manganese and iron
12A1_ZN	DTPA - extractable copper, zinc, manganese and iron
12C2	Calcium chloride extractable boron - ICPAES
15D3_CA	Exchangeable bases (Ca ²⁺ ,Mg ²⁺ ,Na ⁺ ,K ⁺) - 1M ammonium acetate at pH 7.0, rapid method with no pretreatment for soluble salts
15D3_K	Exchangeable bases - 1M ammonium acetate at pH 7.0, rapid method with no pretreatment for soluble salts
15D3_MG	Exchangeable bases - 1M ammonium acetate at pH 7.0, rapid method with no pretreatment for soluble salts
15D3_NA	Exchangeable bases - 1M ammonium acetate at pH 7.0, rapid method with no pretreatment for soluble salts
15J1	Effective CEC
15N1	Exchangeable sodium percentage (ESP)
3A1	EC of 1:5 soil/water extract
4A1	pH of 1:5 soil/water suspension
5A2	Chloride - 1:5 soil/water extract, automated colour
6_DC	Organic carbon (%) - Dry combustion
7A2	Total nitrogen - semimicro Kjeldahl , automated colour
9B2	Bicarbonate-extractable phosphorus - automated colour
P10_GRAV	Gravel (%)
P10_HYD_C	Clay (%) - Hydrometer Method
P10_HYD_CS	Coarse Sand (%) - Hydrometer Method
P10_HYD_FS	Fine Sand (%) - Hydrometer Method
P10_HYD_Z	Silt (%) - Hydrometer Method

Project Name: CENTRAL QUEENSLAND COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** SS10 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By: **Locality:** MAP UNIT 5 ON LAND SYSTEM Pv, Detailed site
Date Desc.: 06/06/19 **Elevation:** 35 metres
Map Ref.: 1:25000 **Rainfall:** 756
Northing/Long.: 7486953 AMG zone: 55 **Runoff:** Slow
Easting/Lat.: 776267 Datum: GDA94 **Drainage:** Imperfectly drained

Geology

ExposureType: Auger boring **Conf. Sub. is Parent. Mat.:** Almost certain or certain
Geol. Ref.: Qpa **Substrate Material:** Auger boring, 1 m deep, Porous, , Alluvium

Land Form

Rel/Slope Class: Level plain <9m <1% **Pattern Type:** Terrace (alluvial)
Morph. Type: Flat **Relief:** 9 metres
Elem. Type: Terrace plain **Slope Category:** Level
Slope: 0.5 % **Aspect:** No Data

Surface Soil Condition (dry): Hardsetting

Erosion: Stable, Minor or present (wind); Partial, Minor scalding (scald) Partial, Moderate (sheet) Partial, Moderate (rill) Partial, Moderate (gully)

Soil Classification

Australian Soil Classification: **Mapping Unit:** 5
Vertic Hypernatric Brown Sodosol Medium Moderately gravelly Clay-loamy Clayey Deep **Principal Profile Form:** N/A
ASC Confidence: **Great Soil Group:** N/A
All necessary analytical data are available.

Site Disturbance: Complete clearing. Pasture, native or improved, but never cultivated

Vegetation: Low Strata - Tussock grass, 0.26-0.5m, Mid-dense. *Species includes - Aristida species
Tall Strata - Tree, 3.01-6m, Isolated plants. *Species includes - Eucalyptus crebra, Eucalyptus populnea

Surface Coarse Fragments: 20-50%, medium gravelly, 6-20mm, subrounded, Ironstone

Profile Morphology

1A1 0 - 0.1 m , 0-0% ; Fine sandy clay loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 0.01m²) Fine (1-2mm) macropores, Moist; Very firm consistence; Slightly plastic; Normal plasticity; Slightly sticky; 10-20%, medium gravelly, 6-20mm, subrounded, dispersed, Ironstone, coarse fragments; Field pH 6.6 (pH meter); Common, fine (1-2mm) roots; Gradual, Smooth change to -

1A2e 0.1 - 0.2 m Mottles, 10-20% , 0-5mm, Distinct; Fine sandy clay loam; Weak grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Many (>5 per 100mm²) Fine (1-2mm) macropores, Moist; Very firm consistence; Slightly plastic; Normal plasticity; Slightly sticky; 10-20%, medium gravelly, 6-20mm, subrounded, dispersed, Ironstone, coarse fragments; Common (10 - 20 %), Ferruginous, Fine (0 - 2 mm), Root linings; Field pH 7.4 (pH meter); Common, fine (1-2mm) roots; Gradual, Smooth change to -

1B2n 0.2 - 0.3 m Mottles, 10-20% , 0-5mm, Distinct; Medium clay; Strong grade of structure, 10-20 mm, Polyhedral; Rough-ped fabric; Fine, (0 - 5) mm crack; Few (<1 per 100mm²) Very fine (0.075-1mm) macropores, Moist; Strong consistence; Moderately plastic; Normal plasticity; Moderately sticky; 10-20%, medium gravelly, 6-20mm, subrounded, dispersed, Ironstone, coarse fragments; Many cutans, >50% of ped faces or walls coated, distinct; Common (10 - 20 %), Ferruginous, Medium (2 -6 mm), Concretions; Field pH 7.7 (pH meter); Few, fine (1-2mm) roots; Gradual, Smooth change to -

2B3n 0.3 - 0.6 m , 0-0% ; Medium clay; Strong grade of structure, 10-20 mm, Lenticular; Smooth-ped fabric; Few (<1 per 100mm²) Very fine (0.075-1mm) macropores, Moist; Strong consistence; Moderately plastic; Normal plasticity; Moderately sticky; 10-20%, medium gravelly, 6-20mm, subrounded, dispersed, Ironstone, coarse fragments; Many cutans, >50% of ped faces or walls coated, distinct; Very few (0 - 2 %), Ferruginous, Medium (2 -6 mm), Concretions; Field pH 8.7 (pH meter); Gradual, Smooth change to -

2C1 0.6 - 0.9 m , 0-0% ; Light medium clay; Weak grade of structure, 20-50 mm, Polyhedral; Rough-ped fabric; Moist; Strong consistence; Moderately plastic; Normal plasticity; Moderately sticky; 0-2%, medium gravelly, 6-20mm, subrounded, dispersed, Ironstone, coarse fragments; Few cutans, <10% of ped faces or walls coated, distinct; Field pH 9.4 (pH meter); Gradual, Smooth change to -

Morphological Notes

2B3n BURIED B HORIZON

Observation Notes

MAP UNIT 5 ON LAND SYSTEM Pv, Detailed site

Project Name: CENTRAL QUEENSLAND COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 Site ID: SS10 Observation ID: 1
Agency Name: Horizon Soil Survey (NT)

Laboratory Analyses Completed for this profile

12A1_CU	DTPA - extractable copper, zinc, manganese and iron
12A1_FE	DTPA - extractable copper, zinc, manganese and iron
12A1_MN	DTPA - extractable copper, zinc, manganese and iron
12A1_ZN	DTPA - extractable copper, zinc, manganese and iron
12C2	Calcium chloride extractable boron - ICPAES
15D3_CA	Exchangeable bases (Ca ²⁺ ,Mg ²⁺ ,Na ⁺ ,K ⁺) - 1M ammonium acetate at pH 7.0, rapid method with no pretreatment for soluble salts
15D3_K	Exchangeable bases - 1M ammonium acetate at pH 7.0, rapid method with no pretreatment for soluble salts
15D3_MG	Exchangeable bases - 1M ammonium acetate at pH 7.0, rapid method with no pretreatment for soluble salts
15D3_NA	Exchangeable bases - 1M ammonium acetate at pH 7.0, rapid method with no pretreatment for soluble salts
15J1	Effective CEC
15N1	Exchangeable sodium percentage (ESP)
3A1	EC of 1:5 soil/water extract
4A1	pH of 1:5 soil/water suspension
5A2	Chloride - 1:5 soil/water extract, automated colour
7A2	Total nitrogen - semimicro Kjeldahl , automated colour
9B2	Bicarbonate-extractable phosphorus - automated colour

Project Name: CENTRAL QUEENSLAND COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 **Site ID:** SS11 **Observation ID:** 1
Agency Name: Horizon Soil Survey (NT)

Site Information

Desc. By:		Locality:	MAP UNIT 5 ON LANDSYSTEM Pv, Detailed site
Date Desc.:	06/06/19	Elevation:	29 metres
Map Ref.:	1:25000	Rainfall:	756
Northing/Long.:	7486643 AMG zone: 55	Runoff:	Slow
Easting/Lat.:	775681 Datum: GDA94	Drainage:	Imperfectly drained

Geology

ExposureType:	Auger boring	Conf. Sub. is Parent. Mat.:	Almost certain or certain
Geol. Ref.:	Qa	Substrate Material:	Auger boring, 1 m deep,Porous, , Alluvium

Land Form

Rel/Slope Class:	Level plain <9m <1%	Pattern Type:	Terrace (alluvial)
Morph. Type:	Flat	Relief:	9 metres
Elem. Type:	Terrace plain	Slope Category:	Level
Slope:	0.7 %	Aspect:	No Data

Surface Soil Condition (dry): Hardsetting

Erosion: Active, Minor or present (wind); Active, Moderate scalding (scald) Partial, Moderate (sheet) Partial, Moderate (rill) Partial, Minor (gully)

Soil Classification

Australian Soil Classification:		Mapping Unit:	5
Vertic Mesonatric Brown Sodosol Medium Non-gravelly Loamy Clay-loamy Deep		Principal Profile Form:	N/A
ASC Confidence:		Great Soil Group:	N/A

All necessary analytical data are available.

Site Disturbance: Complete clearing. Pasture, native or improved, but never cultivated

Vegetation: Low Strata - Tussock grass, 0.26-0.5m, Sparse. *Species includes - Aristida species
Tall Strata - Tree, 3.01-6m, Isolated plants. *Species includes - Eucalyptus crebra

Surface Coarse Fragments: No surface coarse fragments

Profile Morphology

1A11	0 - 0.1 m	Light brownish grey (10YR6/2-Moist); , 0-0% ; Fine sandy loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Many (>5 per 100mm2) Fine (1-2mm) macropores, Dry; Very firm consistence; Non-plastic; Non-sticky; Field pH 6.1 (pH meter); Many, fine (1-2mm) roots; Clear, Smooth change to -
1A12	0.1 - 0.2 m	Light brownish grey (10YR6/2-Moist); , 0-0% ; Fine sandy loam; Moderate grade of structure, 5-10 mm, Subangular blocky; Rough-ped fabric; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, Dry; Very firm consistence; Non-plastic; Non-sticky; Field pH 6.3 (pH meter); Many, fine (1-2mm) roots; Clear, Smooth change to -
1A2e	0.2 - 0.3 m	Light grey (10YR7/2-Moist); Mottles, 2-10% , 0-5mm, Distinct; Fine sandy clay loam; Massive grade of structure; Earthy fabric; Common (1-5 per 100mm2) Fine (1-2mm) macropores, Dry; Very firm consistence; Slightly plastic; Normal plasticity; Slightly sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Common (10 - 20 %), Ferruginous, Fine (0 - 2 mm), Root linings; Field pH 6.6 (pH meter); Common, medium (2-5mm) roots; Abrupt, Smooth change to -
1B2n	0.3 - 0.6 m	Dark yellowish brown (10YR4/6-Moist); Mottles, 2-10% , 0-5mm, Distinct; Clay loam, fine sandy; Moderate grade of structure, 10-20 mm, Polyhedral; Rough-ped fabric; Few (<1 per 100mm2) Very fine (0.075-1mm) macropores, Moderately moist; Strong consistence; Slightly plastic; Normal plasticity; Moderately sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Common (10 - 20 %), Ferruginous, Medium (2 -6 mm), Concretions; Field pH 8 (pH meter); Few, medium (2-5mm) roots; Clear, Smooth change to -
2B2	0.6 - 0.9 m	Dark yellowish brown (10YR4/6-Moist); , 0-0% ; Fine sandy clay loam; Weak grade of structure, 10-20 mm, Prismatic; Rough-ped fabric; Few (<1 per 100mm2) Very fine (0.075-1mm) macropores, Moderately moist; Strong consistence; Moderately plastic; Normal plasticity; Moderately sticky; Common cutans, 10-50% of ped faces or walls coated, distinct; Field pH 8.6 (pH meter); Gradual, Smooth change to -

Morphological Notes

1A11	ORGANIC ACCUMULATION, ERODED
1A12	ORGANIC ACCUMULATION
1A2e	TOP OF B HORIZON
1B2n	BURIED HORIZON

Observation Notes

MAP UNIT 5 ON LANDSYSTEM Pv, Detailed site

Site Notes

Project Name: CENTRAL QUEENSLAND COAL PROJECT SOIL AND LAND CAPABILITY
Project Code: J000019 Site ID: SS11 Observation ID: 1
Agency Name: Horizon Soil Survey (NT)

Laboratory Analyses Completed for this profile

12A1_CU	DTPA - extractable copper, zinc, manganese and iron
12A1_FE	DTPA - extractable copper, zinc, manganese and iron
12A1_MN	DTPA - extractable copper, zinc, manganese and iron
12A1_ZN	DTPA - extractable copper, zinc, manganese and iron
12C2	Calcium chloride extractable boron - ICPAES
15D3_CA	Exchangeable bases (Ca ²⁺ ,Mg ²⁺ ,Na ⁺ ,K ⁺) - 1M ammonium acetate at pH 7.0, rapid method with no pretreatment for soluble salts
15D3_K	Exchangeable bases - 1M ammonium acetate at pH 7.0, rapid method with no pretreatment for soluble salts
15D3_MG	Exchangeable bases - 1M ammonium acetate at pH 7.0, rapid method with no pretreatment for soluble salts
15D3_NA	Exchangeable bases - 1M ammonium acetate at pH 7.0, rapid method with no pretreatment for soluble salts
15J1	Effective CEC
15N1	Exchangeable sodium percentage (ESP)
3A1	EC of 1:5 soil/water extract
4A1	pH of 1:5 soil/water suspension
5A2	Chloride - 1:5 soil/water extract, automated colour
6_DC	Organic carbon (%) - Dry combustion
7A2	Total nitrogen - semimicro Kjeldahl , automated colour
9B2	Bicarbonate-extractable phosphorus - automated colour
P10_GRAV	Gravel (%)
P10_HYD_C	Clay (%) - Hydrometer Method
P10_HYD_CS	Coarse Sand (%) - Hydrometer Method
P10_HYD_FS	Fine Sand (%) - Hydrometer Method
P10_HYD_Z	Silt (%) - Hydrometer Method

Appendix B

Site Photographs


Appendix B Site Photography



Plate 1 – Site 001 Endohypersodic Epipedal Grey Vertosol Non-gravelly Fine Medium fine Moderately deep



Plate 2 – Site 002, Endohypersodic Epipedal Grey Vertosol Non-gravelly Fine Medium fine Moderately deep

	Project No J000019	Appendix B - Site Photographs
	Date: 8 May 2012	Styx South Coal Project

Appendix B Site Photography



Plate 3 – Site 003, Endohypersodic Epipedal Grey Vertisol Non-gravelly Fine Medium fine Moderately deep

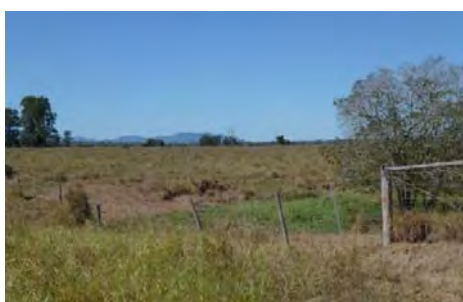



Plate 4 – **Site 004**, Endohypersodic Epipedal Grey Vertisol Non-gravelly Fine Medium fine Moderately deep

	Project No J000019	Appendix B - Site Photographs
	Date: 8 May 2012	Styx South Coal Project

Appendix B Site Photography



Plate 5 – Site 005, Endohypersodic Epipedal Grey Vertisol Non-gravelly Fine Medium fine Moderately deep

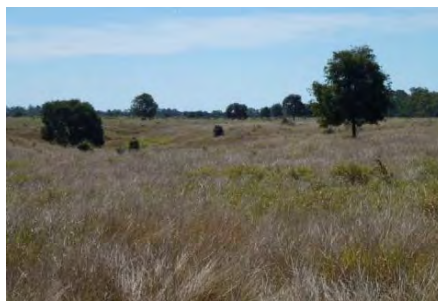



Plate 6 – Site 006, Endohypersodic Epipedal Grey Vertisol Non-gravelly Fine Medium fine Moderately deep

	Project No J000019	Appendix B - Site Photographs
	Date: 8 May 2012	Styx South Coal Project


Appendix B Site Photography



Plate 7 – Site 007, Basic Grey-Orthic Tenosol Medium Non-gravelly Silty Silty Moderately deep



Plate 8 – Site 007 scarp between terrace and floodplain

	Project No J000019	Appendix B - Site Photographs
	Date: 8 May 2012	Styx South Coal Project


Appendix B Site Photography



Plate 9 – **Site 008**, Basic Grey-Orthic Tenosol Medium Non-gravelly Silty Silty Moderately deep



Plate 10 – **Site 009**, Endohypersodic Epipedal Grey Vertosol Non-gravelly Fine Medium fine Moderately deep

	Project No J000019	Appendix B - Site Photographs
	Date: 8 May 2012	Styx South Coal Project


Appendix B Site Photography



Plate 11 – Site 010, Endohypersodic Epipedal Grey Vertisol Non-gravelly Fine Medium fine Moderately deep



Plate 12 – Site 011, Stratic Rudosol Non-gravelly Loamy Shallow

	Project No J000019	Appendix B - Site Photographs
	Date:8-9 May 2012	Styx South Coal Project


Appendix B Site Photography



Plate 13 – Site 012, Endohypersodic Epipedal Grey Vertisol Non-gravelly Fine Medium fine Moderately deep



Plate 14 – Site 014, Magnesian Mottled-Hypernatric Brown Sodosol Thick Slightly gravelly Sandy Clayey Moderately deep

	Project No J000019	Appendix B - Site Photographs
	Date: 9 May 2012	Styx South Coal Project


Appendix B Site Photography



Plate 15 – Site 016, Bleached-Vertic Eutrophic Grey Chromosol Medium Non-gravelly Clay-loamy Clayey Moderately deep



Plate 16 – Site 017, Vertic Mesonatric Grey Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep

	Project No J000019	Appendix B - Site Photographs
	Date:9 May 2012	Styx South Coal Project


Appendix B Site Photography



Plate 17 – Site 018, *Vertic Mesonatric Grey Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep*



Plate 18 – Site 019, *Endohypersodic Epipedal Grey Vertisol Non-gravelly Fine Medium fine Moderately deep*

	Project No J000019	Appendix B - Site Photographs
	Date:9-10 May 2012	Styx South Coal Project

Appendix B Site Photography

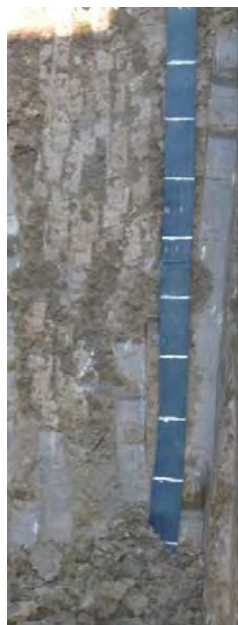



Plate 19 – Site 020, Endohypersodic Epipedal Grey Vertisol Non-gravelly Fine Medium fine Moderately deep




Plate 20 – Site 021, Vertic Mesonatric Grey Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep

	Project No J000019	Appendix B - Site Photographs
	Date: 10 May 2012	Styx South Coal Project

Appendix B Site Photography



	Project No J000019	Appendix B - Site Photographs
	Date: 10 May 2012	Styx South Coal Project


Appendix B Site Photography



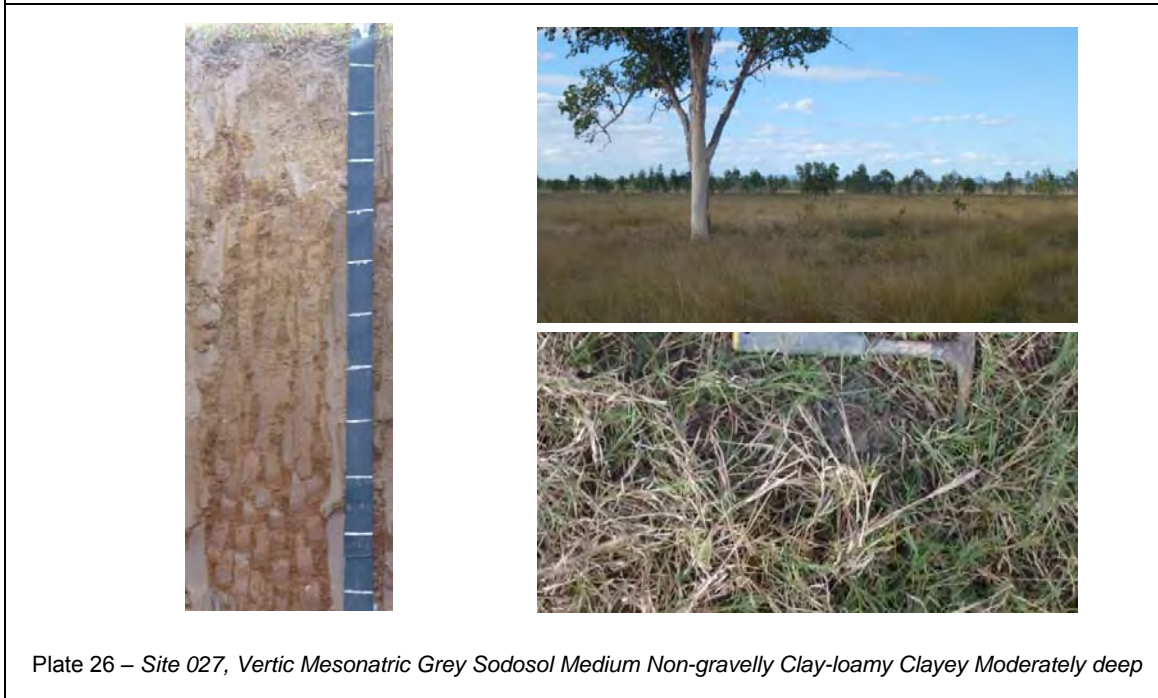
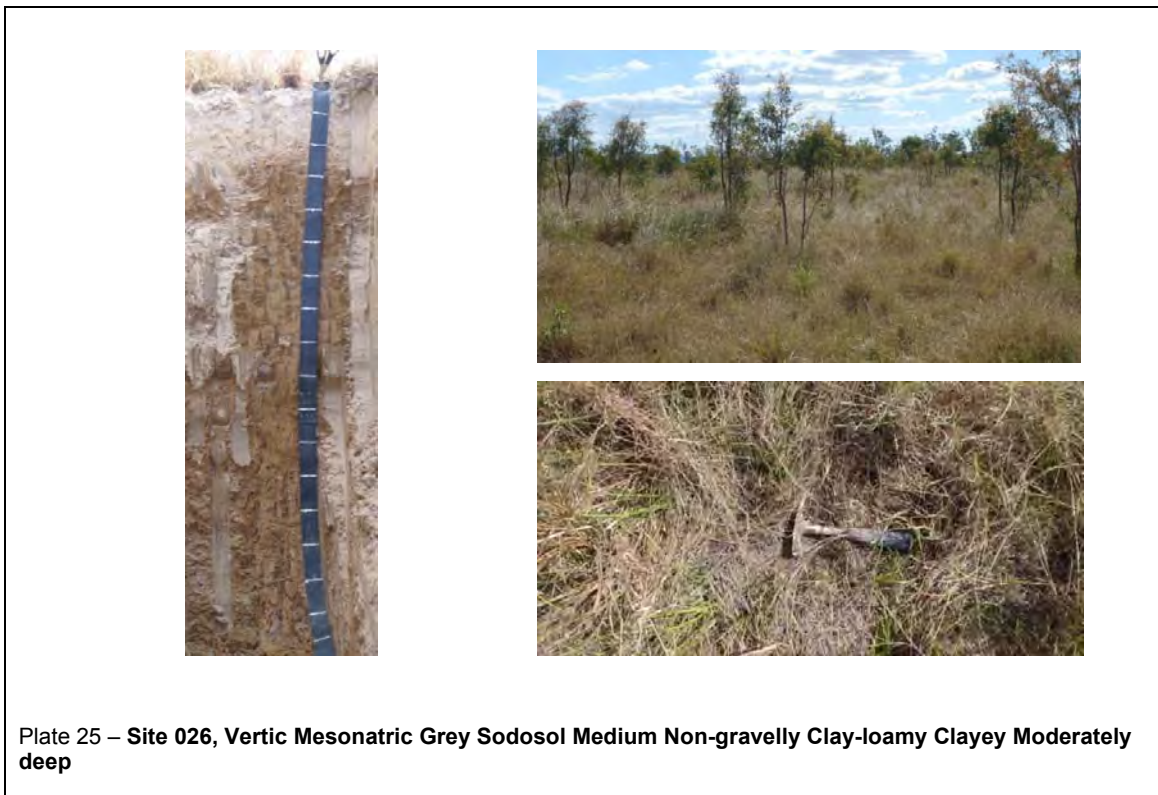
Plate 23 – Site 024, Vertic Mesonatric Brown Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep




Plate 24 – Site 025, Vertic Mesonatric Grey Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep

	Project No J000019	Appendix B - Site Photographs
	Date:10 May 2012	Styx South Coal Project

Appendix B Site Photography



	Project No J000019	Appendix B - Site Photographs
	Date: 10 May 2012	Styx South Coal Project


Appendix B Site Photography



Plate 27 – Site 028, Vertic Subnatric Grey Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep



Plate 28 – Site 029, Vertic Mesonatric Grey Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep

	Project No J000019	Appendix B - Site Photographs
	Date: 10 May 2012	Styx South Coal Project

Appendix B Site Photography



Plate 29 – Site 030, Vertic Mesonatric Grey Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep



Plate 30 – Site 031, Vertic Hypernatric Brown Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep



Project No J000019

Appendix B - Site Photographs

Date: 11 May 2012

Styx South Coal Project


Appendix B Site Photography



Plate 31 – Site 032, *Vertic Hypernatric Grey Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep*



Plate 32 – Site 033, *Vertic Subnatric Brown Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep*

	Project No J000019	Appendix B - Site Photographs
	Date: 11 May 2012	Styx South Coal Project


Appendix B Site Photography



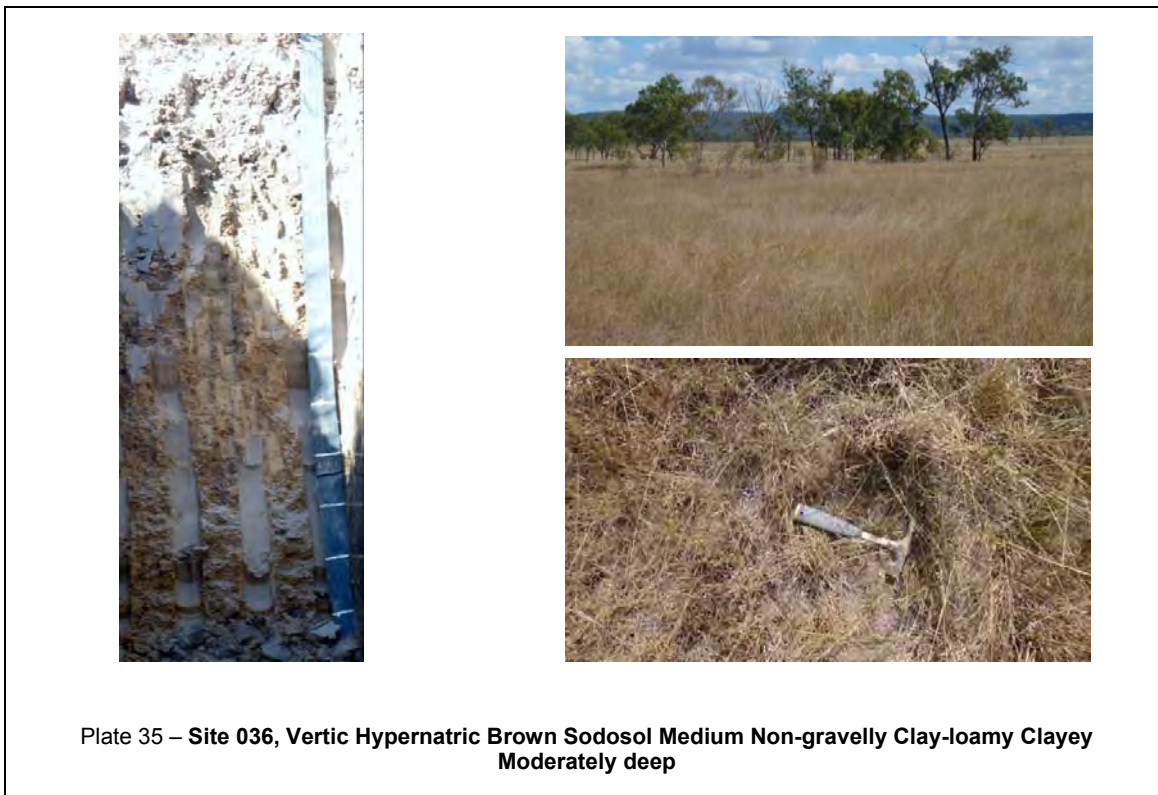
Plate 33 – Site 034, Vertic Mesonatric Brown Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep




Plate 34 – Site 035, Vertic Mesonatric Brown Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep

	Project No J000019	Appendix B - Site Photographs
	Date: 11 May 2012	Styx South Coal Project

Appendix B Site Photography



	Project No J000019	Appendix B - Site Photographs
	Date: 11 May 2012	Styx South Coal Project


Appendix B Site Photography



Plate 37 – Site 038, Vertic Subnatric Grey Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep



Plate 38 – Site 039, Vertic Subnatric Grey Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep

	Project No J000019	Appendix B - Site Photographs
	Date: 11 May 2012	Styx South Coal Project


Appendix B Site Photography



Plate 39 – Site 041, Endohypersodic Crusty Brown Vertosol Non-gravelly Fine Medium fine Very fine Moderately deep



Plate 40 – Site 042, Endohypersodic Crusty Brown Vertosol Non-gravelly Fine Medium fine Very fine Moderately deep

	Project No J000019	Appendix B - Site Photographs
	Date: 12 May 2012	Styx South Coal Project

Appendix B Site Photography



Plate 41 – Site 043, Vertic Subnatric Brown Sodosol Medium Slightly gravelly Clay-loamy Clayey Moderately deep

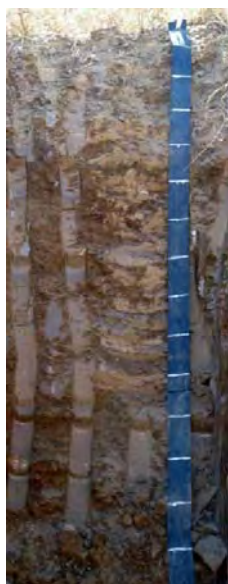


Plate 42 – Site 044, Vertic Subnatric Brown Sodosol Medium Slightly gravelly Clay-loamy Clayey Moderately deep



Project No J000019

Appendix B - Site Photographs

Date: 12 May 2012

Styx South Coal Project


Appendix B Site Photography



Plate 43 – Site 045, Mesotrophic Subnatric Brown Sodosol Medium Gravelly Loamy Clay-loamy Moderately deep



Plate 44 – Site 046, Mesotrophic Subnatric Brown Sodosol Medium Gravelly Loamy Clay-loamy Moderately deep

	Project No J000019	Appendix B - Site Photographs
	Date:12 May 2012	Styx South Coal Project

Appendix B Site Photography



Plate 45 – Site 047, Mesotrophic Mesonatric Brown Sodosol Medium Gravelly Loamy Clay-loamy Moderately deep

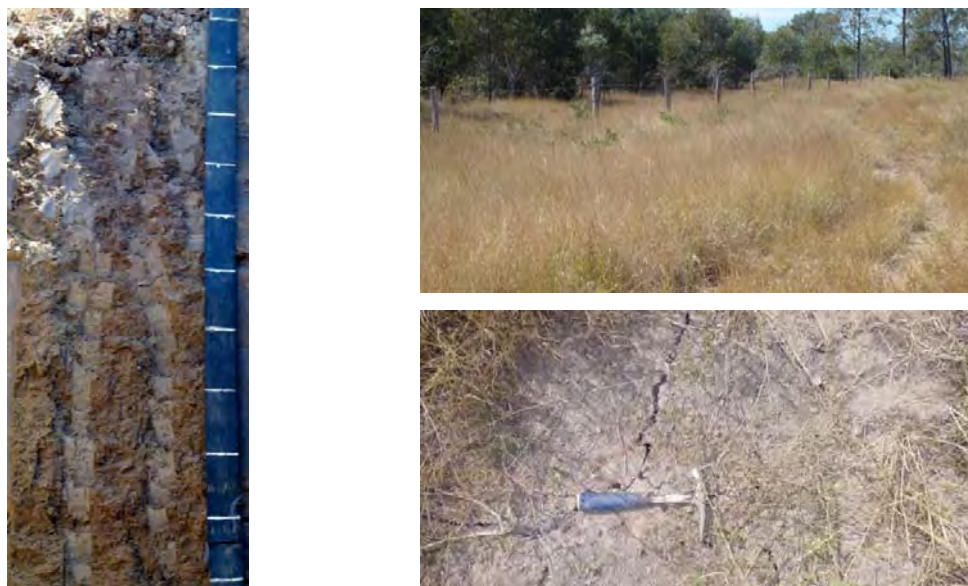



Plate 46 – Site 048, Endohypersodic Crusty Grey Vertosol Non-gravelly Fine Medium fine Moderately deep

	Project No J000019	Appendix B - Site Photographs
	Date:12 May 2012	Styx South Coal Project


Appendix B Site Photography



Plate 47 – Site 049, Vertic Mesonatric Brown Sodosol Medium Slightly gravelly Clay-loamy Clayey Moderately deep



Plate 48 – Site 050, Mesotrophic Subnatric Brown Sodosol Medium Gravelly Clay-loamy Clayey Moderately deep

	Project No J000019	Appendix B - Site Photographs
	Date:12 May 2012	Styx South Coal Project


Appendix B Site Photography



Plate 49 – Site 052, Endohypersodic Crusty Grey Vertosol Non-gravelly Fine Medium fine Moderately deep



Plate 50 – Site 053, Endohypersodic Crusty Grey Vertosol Non-gravelly Fine Medium fine Moderately deep

	Project No J000019	Appendix B - Site Photographs
	Date: 12 May 2012	Styx South Coal Project


Appendix B Site Photography



Plate 51 – Site 054, Endohypersodic Crusty Grey Vertosol Non-gravelly Fine Medium fine Moderately deep



Plate 52 – Site 055, Episodic Crusty Brown Vertosol Gravelly Fine Medium fine Moderately deep

	Project No J000019	Appendix B - Site Photographs
	Date: 12 May 2012	Styx South Coal Project


Appendix B Site Photography



Plate 53 – Site 056, Vertic Subnatric Brown Sodosol Medium Gravelly Clay-loamy Clayey Moderately deep



Plate 54 – Site 057, Mesotrophic Subnatric Brown Sodosol Medium Gravelly Clay-loamy Clayey Moderately deep

	Project No J000019	Appendix B - Site Photographs
	Date:14 May 2012	Styx South Coal Project

Appendix B Site Photography



Plate 55 – Site 058, Vertic Subnatric Brown Sodosol Medium Slightly gravelly Clayloamy Clayey Moderately deep



Plate 56 – Site 059, Vertic Subnatric Brown Sodosol Medium Slightly gravelly Clay-loamy Clayey Moderately deep



Project No J000019

Appendix B - Site Photographs

Date:14 May 2012

Styx South Coal Project


Appendix B Site Photography



Plate 57 – Site 060, Vertic Subnatric Brown Sodosol Medium Slightly gravelly Clay-loamy Clayey Moderately deep



Plate 58 – Site 061, Vertic Subnatric Brown Sodosol Medium Slightly gravelly Clay-loamy Clayey Moderately deep

	Project No J000019	Appendix B - Site Photographs
	Date: 14 May 2012	Styx South Coal Project


Appendix B Site Photography



Plate 59 – Site 062, Vertic Subnatric Brown Sodosol Medium Slightly gravelly Clay-loamy Clayey Moderately deep



Plate 60 – Site 063, Vertic Subnatric Brown Sodosol Medium Slightly gravelly Clay-loamy Clayey Moderately deep

	Project No J000019	Appendix B - Site Photographs
	Date: 14 May 2012	Styx South Coal Project


Appendix B Site Photography



Plate 61 – Site 064, *Vertic Subnatric Brown Sodosol Medium Slightly gravelly Clayloamy Clayey Moderately deep*



Plate 62 – Site 065, **Vertic Hypernatric Brown Sodosol Medium Slightly gravelly Clay-loamy Clayey Moderately deep**

	Project No J000019	Appendix B - Site Photographs
	Date: 14 May 2012	Styx South Coal Project


Appendix B Site Photography



Plate 63 – Site 066, Bleached-Vertic Eutrophic Brown Chromosol Medium Nongravelly Clay-loamy Clayey Moderately deep



Plate 64 – Site 067, Haplic Crusty Grey Vertosol Non-gravelly Fine Medium fine Moderately deep

	Project No J000019	Appendix B - Site Photographs
	Date: 14 May 2012	Styx South Coal Project


Appendix B Site Photography



Plate 65 – Site 068, Vertic Mesonatric Brown Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep



Plate 66 – Site 069, Vertic Mesonatric Brown Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep

	Project No J000019	Appendix B - Site Photographs
	Date:15 May 2012	Styx South Coal Project


Appendix B Site Photography



Plate 67 – Site 070, Vertic Mesonatric Grey Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep



Plate 68 – Site 071, Vertic Mesonatric Grey Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep

	Project No J000019	Appendix B - Site Photographs
	Date:15 May 2012	Styx South Coal Project


Appendix B Site Photography



Plate 69 – Site 072, Vertic Hypernatric Brown Sodosol Medium Slightly gravelly Clay-loamy Clayey Moderately deep



Plate 70 – Site 073, Vertic Subnatric Brown Sodosol Medium Slightly gravelly Clay-loamy Clayey Moderately deep

	Project No J000019	Appendix B - Site Photographs
	Date: 15 May 2012	Styx South Coal Project


Appendix B Site Photography



Plate 71 – Site 074, Vertic Subnatric Brown Sodosol Medium Slightly gravelly Clay-loamy Clayey Moderately deep



Plate 72 – Site 075, Vertic Subnatric Grey Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep

	Project No J000019	Appendix B - Site Photographs
	Date: 15 May 2012	Styx South Coal Project


Appendix B Site Photography



Plate 73 – Site 076, Vertic Hypenatric Brown Sodosol Medium Slightly gravelly Clay-loamy Clayey Moderately deep



Plate 74 – Site 077, Vertic Subnatric Brown Sodosol Medium Gravelly Clay-loamy Clayey Moderately deep

	Project No J000019	Appendix B - Site Photographs
	Date: 15 May 2012	Styx South Coal Project


Appendix B Site Photography



Plate 75 – Site 078, Endohypersodic Epipedal Grey Vertisol Non-gravelly Fine Medium fine Moderately deep Moderately deep



Plate 76 – Site 079, Endohypersodic Epipedal Grey Vertisol Non-gravelly Fine Medium fine Moderately deep Moderately deep

	Project No J000019	Appendix B - Site Photographs
	Date: 16 May 2012	Styx South Coal Project


Appendix B Site Photography



Plate 77 – Site 080, Litic Rudosol Non-gravelly Loamy Shallow



Plate 78 – Site 081, Basic Grey-Orthic Tenosol Medium Non-gravelly Silty Silty Moderately deep

	Project No J000019	Appendix B - Site Photographs
	Date:16 May 2012	Styx South Coal Project


Appendix B Site Photography



Plate 79 – Site 082, Haplic Epipedal Grey Vertosol Non-gravelly Fine Medium fine Moderately deep



Plate 80 – Site 083, Endohypersodic Epipedal Grey Vertosol Non-gravelly Fine Medium fine Moderately deep

	Project No J000019	Appendix B - Site Photographs
	Date:16 May 2012	Styx South Coal Project


Appendix B Site Photography



Plate 81 – Site 084, Vertic Mesonatric Brown Sodosol Medium Gravelly Clay-loamy Clayey Moderately deep



Plate 82 – Site 085, Vertic Hypernatric Grey Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep

	Project No J000019	Appendix B - Site Photographs
	Date:16 May 2012	Styx South Coal Project


Appendix B Site Photography



Plate 83 – Site 086, Vertic Hypermatric Grey Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep



Plate 84 – Site 088, Vertic Hypermatric Grey Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep

	Project No J000019	Appendix B - Site Photographs
	Date:16 May 2012	Styx South Coal Project


Appendix B Site Photography



Plate 85 – Site 089, Vertic Hypermatric Grey Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep



Plate 86 – Site 090, Vertic Hypermatric Grey Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep

	Project No J000019	Appendix B - Site Photographs
	Date:16 May 2012	Styx South Coal Project


Appendix B Site Photography



Plate 87 – Site 091, Vertic Hypermatric Grey Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep



Plate 88 – Site 092, Vertic Hypermatric Grey Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep

	Project No J000019	Appendix B - Site Photographs
	Date:16 May 2012	Styx South Coal Project


Appendix B Site Photography



Plate 89 – Site 093, Vertic Subnatric Brown Sodosol Thin Gravelly Clay-loamy Clayey Shallow



Plate 90 – Site 094, Vertic Subnatric Brown Sodosol Thin Gravelly Clay-loamy Clayey Moderately deep

	Project No J000019	Appendix B - Site Photographs
	Date: 16 May 2012	Styx South Coal Project


Appendix B Site Photography



Plate 91 – Site 095, Vertic Subnatric Brown Sodosol Thin Gravelly Clay-loamy Clayey Moderately deep



Plate 92 – Site 096, Vertic Subnatric Brown Sodosol Thin Gravelly Clay-loamy Clayey Moderately deep

	Project No J000019	Appendix B - Site Photographs
	Date:16 May 2012	Styx South Coal Project


Appendix B Site Photography



Plate 93 – Site 097, Vertic Subnatric Brown Sodosol Thin Gravelly Clay-loamy Clayey Moderately deep



Plate 94 – Site 098, Vertic Hypernatric Grey Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep

	Project No J000019	Appendix B - Site Photographs
	Date:16 May 2012	Styx South Coal Project


Appendix B Site Photography



Plate 95 – Site 099, Vertic Mesonatric Grey Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep



Plate 96 – Site 100, Vertic Hypernatric Grey Sodosol Medium Gravelly Clay-loamy Clayey Moderately deep

	Project No J000019	Appendix B - Site Photographs
	Date:16 May 2012	Styx South Coal Project


Appendix B Site Photography



Plate 97 – Site 101, Vertic Hypernatric Grey Sodosol Medium Gravelly Clay-loamy Clayey Moderately deep



Plate 98 – Site 102, Vertic Hypernatric Grey Sodosol Medium Gravelly Clay-loamy Clayey Moderately deep

	Project No J000019	Appendix B - Site Photographs
	Date: 16 May 2012	Styx South Coal Project


Appendix B Site Photography



Plate 99 – Site 103, Vertic Hypernatric Grey Sodosol Medium Gravelly Clay-loamy Clayey Moderately deep



Plate 100 – Site 104, Vertic Mesonatric Grey Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep

	Project No J000019	Appendix B - Site Photographs
	Date: 16 May 2012	Styx South Coal Project


Appendix B Site Photography



Plate 101 – Site 105, Vertic Mesonatric Grey Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep



Plate 102 – Site 106, Vertic Subnatric Grey Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep

	Project No J000019	Appendix B - Site Photographs
	Date:16 May 2012	Styx South Coal Project


Appendix B Site Photography



Plate 103 – Site 107, Haplic Self-Mulching Brown Vertosol Very gravelly Fine Fine Shallow



Plate 104 – Site 108, Endohypersodic Epipedal Brown Vertosol Non-gravelly Fine Medium fine Moderately deep

	Project No J000019	Appendix B - Site Photographs
	Date: 17 May 2012	Styx South Coal Project


Appendix B Site Photography



Plate 105 – Site 109, Endohypersodic Epipedal Grey Vertosol Non-gravelly Fine Medium fine Moderately deep



Plate 106 – Site 110, Endohypersodic Epipedal Brown Vertosol Non-gravelly Fine Medium fine Moderately deep

	Project No J000019	Appendix B - Site Photographs
	Date:17 May 2012	Styx South Coal Project


Appendix B Site Photography



Plate 107 – Site 111, Endohypersodic Epipedal Grey Vertisol Non-gravelly Fine Medium fine Moderately deep



Plate 108 – Site 112, Endohypersodic Epipedal Grey Vertisol Non-gravelly Fine Medium fine Moderately deep

	Project No J000019	Appendix B - Site Photographs
	Date:17 May 2012	Styx South Coal Project


Appendix B Site Photography



Plate 109 – Site 113, Endohypersodic Epipedal Grey Vertisol Non-gravelly FineMedium fine Moderately deep



Plate 110 – Site 114, Lutic Rudosol Non-gravelly Loamy Shallow

	Project No J000019	Appendix B - Site Photographs
	Date:17 May 2012	Styx South Coal Project

Appendix B Site Photography



Plate 111 – Site 115, Basic Fluvic Clastic Rudosol Very gravelly Sandy Very shallow



Plate 112 – Site 116, Lutic Rudosol Non-gravelly Loamy Shallow



Project No J000019

Appendix B - Site Photographs

Date:17 May 2012

Styx South Coal Project


Appendix B Site Photography



Plate 113 – Site 117, Endohypersodic Crusty Brown Vertisol Non-gravelly Fine Medium fine Moderately deep



Plate 114 – Site 118, Endohypersodic Crusty Brown Vertisol Non-gravelly Fine Medium fine Shallow

	Project No J000019	Appendix B - Site Photographs
	Date:17 May 2012	Styx South Coal Project

Appendix B Site Photography



Plate 115 – Site 119, Endohypersodic Crusty Brown Vertosol Non-gravelly Fine Medium fine Moderately deep



Plate 116 – Site 120, Endohypersodic Crusty Grey Vertosol Non-gravelly Fine Medium fine Moderately deep

	Project No J000019	Appendix B - Site Photographs
	Date:17 May 2012	Styx South Coal Project


Appendix B Site Photography



Plate 117 – Site 121, Endohypersodic Crusty Brown Vertisol Non-gravelly Fine Medium fine Moderately deep



Plate 118 – Site 122, Vertic Subnatric Grey Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep

	Project No J000019	Appendix B - Site Photographs
	Date: 17 May 2012	Styx South Coal Project


Appendix B Site Photography



Plate 119 – Site 123, Vertic Subnatric Grey Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep



Plate 120 – Site 124, Vertic Subnatric Grey Sodosol Very thick Non-gravelly Clay-loamy Clayey Moderately deep

	Project No J000019	Appendix B - Site Photographs
	Date: 17 May 2012	Styx South Coal Project


Appendix B Site Photography



Plate 121 – Site 125, Vertic Subnatric Grey Sodosol Very thick Non-gravelly Clay-loamy Clayey Moderately deep



Plate 122 – Site 126, Stratic Rudosol Non-gravelly Loamy Shallow

	Project No J000019	Appendix B - Site Photographs
	Date: 17 May 2012	Styx South Coal Project


Appendix B Site Photography



Plate 123 – Site 127, Basic Fluvic Clastic Rudosol Non-gravelly Clayey Shallow



Plate 124 – Site 128, Basic Fluvic Clastic Rudosol Non-gravelly Clayey Shallow

	Project No J000019	Appendix B - Site Photographs
	Date:17 May 2012	Styx South Coal Project


Appendix B Site Photography



Plate 125 – Site 129, Vertic Mesonatric Brown Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep



Plate 126 – Site 130, Vertic Mesonatric Brown Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep

	Project No J000019	Appendix B - Site Photographs
	Date: 17 May 2012	Styx South Coal Project


Appendix B Site Photography



Plate 127 – Site 131, Basic Fluvic Clastic Rudosol Non-gravelly Clayey Shallow



Plate 128 – Site 132, Vertic Mesonatric Brown Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep

	Project No J000019	Appendix B - Site Photographs
	Date: 17 May 2012	Styx South Coal Project


Appendix B Site Photography



Plate 129 – Site 133, Vertic Mesonatric Brown Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep



Plate 130 – Site 134, Vertic Mesonatric Brown Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep

	Project No J000019	Appendix B - Site Photographs
	Date: 17 May 2012	Styx South Coal Project

Appendix C

Laboratory Reporting

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: EB1213707	Page	: 1 of 35
Client	: HORIZON ENVIRONMENTAL, SOIL SURVEY & EVALUATION	Laboratory	: Environmental Division Brisbane
Contact	: DR IAN HOLLINGSWORTH	Contact	: Customer Services
Address	: 38 WITHERDEN STREET NAKARA NT 0810	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: ian.hollingsworth@horizonesse.com	E-mail	: Brisbane.Enviro.Services@alsglobal.com
Telephone	: ----	Telephone	: +61 7 3243 7222
Facsimile	: ----	Facsimile	: +61 7 3243 7218
Project	: J000019	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: ----	Date Samples Received	: 22-MAY-2012
C-O-C number	: ----	Issue Date	: 12-JUN-2012
Sampler	: Ian Hollingsworth	No. of samples received	: 198
Order number	: ----	No. of samples analysed	: 198
Quote number	: ED/016/12		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Interpretive Quality Control Report contains the following information:

- Analysis Holding Time Compliance
- Quality Control Parameter Frequency Compliance
- Brief Method Summaries
- Summary of Outliers



Analysis Holding Time Compliance

The following report summarises extraction / preparation and analysis times and compares with recommended holding times. Dates reported represent first date of extraction or analysis and precludes subsequent dilutions and reruns. Information is also provided re the sample container (preservative) from which the analysis aliquot was taken. Elapsed period to analysis represents number of days from sampling where no extraction / digestion is involved or period from extraction / digestion where this is present. For composite samples, sampling date is assumed to be that of the oldest sample contributing to the composite. Sample date for laboratory produced leachates is assumed as the completion date of the leaching process. Outliers for holding time are based on USEPA SW 846, APHA, AS and NEPM (1999). A listing of breaches is provided in the Summary of Outliers.

Holding times for leachate methods (excluding elutriates) vary according to the analytes being determined on the resulting solution. For non-volatile analytes, the holding time compliance assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These soil holding times are: Organics (14 days); Mercury (28 days) & other metals (180 days). A recorded breach therefore does not guarantee a breach for all non-volatile parameters.

Matrix: SOIL

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA002 : pH (Soils)							
Snap Lock Bag (EA002) SITE 001 DEPTH 0-100, SITE 001 DEPTH 500-600, SITE 001 DEPTH 1100-1200, SITE 002 DEPTH 200-300, SITE 002 DEPTH 800-900, SITE 004 DEPTH 0-100, SITE 004 DEPTH 500-600, SITE 004 DEPTH 1100-1200, SITE 007 DEPTH 200-300, SITE 007 DEPTH 800-900, SITE 008 DEPTH 0-100, SITE 008 DEPTH 500-600, SITE 008 DEPTH 1100-1200, 51SITE 020 DEPTH 0-100	08-MAY-2012	01-JUN-2012	15-MAY-2012	*	04-JUN-2012	01-JUN-2012	*
Snap Lock Bag (EA002) SITE 011 DEPTH 0-100, SITE 011 DEPTH 500-600, SITE 011 DEPTH 1100-1200, SITE 014 DEPTH 500-600, SITE 014 DEPTH 1100-1200, SITE 017 DEPTH 200-300, SITE 017 DEPTH 800-900, SITE 018 DEPTH 0-100, SITE 018 DEPTH 500-600, SITE 018 DEPTH 1100-1200, SITE 019 DEPTH 200-300, SITE 019 DEPTH 800-900, SITE 020 DEPTH 200-300, SITE 020 DEPTH 800-900, SITE 021 DEPTH 0-100, SITE 021 DEPTH 500-600, SITE 021 DEPTH 1100-1200	09-MAY-2012	01-JUN-2012	16-MAY-2012	*	04-JUN-2012	01-JUN-2012	*
Snap Lock Bag (EA002)							



Matrix: SOIL

Evaluation: ✘ = Holding time breach ; ✔ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA002 : pH (Soils) - Continued								
SITE 022 DEPTH 0-100, SITE 022 DEPTH 500-600, SITE 022 DEPTH 1100-1200, SITE 023 DEPTH 200-300, SITE 023 DEPTH 800-900, SITE 024 DEPTH 0-100, SITE 024 DEPTH 500-600, SITE 024 DEPTH 1100-1200, SITE 025 DEPTH 200-300, SITE 025 DEPTH 800-900,	SITE 022 DEPTH 200-300, SITE 022 DEPTH 800-900, SITE 023 DEPTH 0-100, SITE 023 DEPTH 500-600, SITE 023 DEPTH 1100-1200, SITE 024 DEPTH 200-300, SITE 024 DEPTH 800-900, SITE 025 DEPTH 0-100, SITE 025 DEPTH 500-600, SITE 025 DEPTH 1100-1200	10-MAY-2012	01-JUN-2012	17-MAY-2012	✘	04-JUN-2012	02-JUN-2012	✘
Snap Lock Bag (EA002) SITE 026 DEPTH 0-100, SITE 026 DEPTH 500-600, SITE 026 DEPTH 1100-1200, SITE 027 DEPTH 200-300, SITE 027 DEPTH 800-900, SITE 028 DEPTH 0-100, SITE 028 DEPTH 500-600, SITE 028 DEPTH 1100-1200, SITE 029 DEPTH 200-300, SITE 029 DEPTH 800-900,	SITE 026 DEPTH 200-300, SITE 026 DEPTH 800-900, SITE 027 DEPTH 0-100, SITE 027 DEPTH 500-600, SITE 027 DEPTH 1100-1200, SITE 028 DEPTH 200-300, SITE 028 DEPTH 800-900, SITE 029 DEPTH 0-100, SITE 029 DEPTH 500-600, SITE 029 DEPTH 1100-1200	10-MAY-2012	01-JUN-2012	17-MAY-2012	✘	05-JUN-2012	01-JUN-2012	✘
Snap Lock Bag (EA002) SITE 031 DEPTH 0-100, SITE 031 DEPTH 500-600, SITE 031 DEPTH 1100-1200, SITE 032 DEPTH 200-300, SITE 032 DEPTH 800-900, SITE 033 DEPTH 0-100, SITE 033 DEPTH 500-600, SITE 033 DEPTH 1100-1200, SITE 034 DEPTH 200-300, SITE 034 DEPTH 800-900, SITE 035 DEPTH 0-100, SITE 035 DEPTH 500-600, SITE 035 DEPTH 1100-1200, SITE 036 DEPTH 200-300, SITE 036 DEPTH 800-900, SITE 038 DEPTH 0-100, SITE 038 DEPTH 500-600, SITE 038 DEPTH 1100-1200, SITE 040 DEPTH 200-300, SITE 040 DEPTH 800-900,	SITE 031 DEPTH 200-300, SITE 031 DEPTH 800-900, SITE 032 DEPTH 0-100, SITE 032 DEPTH 500-600, SITE 032 DEPTH 1100-1200, SITE 033 DEPTH 200-300, SITE 033 DEPTH 800-900, SITE 034 DEPTH 0-100, SITE 034 DEPTH 500-600, SITE 034 DEPTH 1100-1200, SITE 035 DEPTH 200-300, SITE 035 DEPTH 800-900, SITE 036 DEPTH 0-100, SITE 036 DEPTH 500-600, SITE 036 DEPTH 1100-1200, SITE 038 DEPTH 200-300, SITE 038 DEPTH 800-900, SITE 040 DEPTH 0-100, SITE 040 DEPTH 500-600, SITE 040 DEPTH 1100-1200	11-MAY-2012	01-JUN-2012	18-MAY-2012	✘	05-JUN-2012	01-JUN-2012	✘
Snap Lock Bag (EA002) SITE 041 DEPTH 0-100, SITE 042 DEPTH 0-100, SITE 048 DEPTH 0-100, SITE 049 DEPTH 0-100,	SITE 041 DEPTH 500-600, SITE 042 DEPTH 500-600, SITE 048 DEPTH 500-600, SITE 049 DEPTH 500-600	12-MAY-2012	01-JUN-2012	19-MAY-2012	✘	05-JUN-2012	02-JUN-2012	✘
Snap Lock Bag (EA002)								



Matrix: **SOIL**

Evaluation: ✘ = Holding time breach ; ✔ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA002 : pH (Soils) - Continued								
SITE 065 DEPTH 500-600, SITE 065 DEPTH 1100-1200, SITE 066 DEPTH 200-300, SITE 066 DEPTH 800-900, SITE 067 DEPTH 0-100, SITE 067 DEPTH 500-600, SITE 067 DEPTH 1100-1200	SITE 065 DEPTH 800-900, SITE 066 DEPTH 0-100, SITE 066 DEPTH 500-600, SITE 066 DEPTH 1100-1200, SITE 067 DEPTH 200-300, SITE 067 DEPTH 800-900,	14-MAY-2012	01-JUN-2012	21-MAY-2012	✘	04-JUN-2012	02-JUN-2012	✘
Snap Lock Bag (EA002) SITE 056 DEPTH 0-100, SITE 056 DEPTH 500-600, SITE 056 DEPTH 1100-1200, SITE 057 DEPTH 200-300, SITE 057 DEPTH 800-900, SITE 058 DEPTH 0-100,	SITE 056 DEPTH 200-300, SITE 056 DEPTH 800-900, SITE 057 DEPTH 0-100, SITE 057 DEPTH 500-600, SITE 057 DEPTH 1100-1200, SITE 058 DEPTH 200-300	14-MAY-2012	01-JUN-2012	21-MAY-2012	✘	05-JUN-2012	02-JUN-2012	✘
Snap Lock Bag (EA002) SITE 058 DEPTH 500-600, SITE 058 DEPTH 1100-1200, SITE 061 DEPTH 200-300, SITE 061 DEPTH 800-900, SITE 062 DEPTH 0-100, SITE 062 DEPTH 500-600, SITE 062 DEPTH 1100-1200, SITE 064 DEPTH 200-300, SITE 064 DEPTH 800-900, SITE 065 DEPTH 0-100,	SITE 058 DEPTH 800-900, SITE 061 DEPTH 0-100, SITE 061 DEPTH 500-600, SITE 061 DEPTH 1100-1200, SITE 062 DEPTH 200-300, SITE 062 DEPTH 800-900, SITE 064 DEPTH 0-100, SITE 064 DEPTH 500-600, SITE 064 DEPTH 1100-1200, SITE 065 DEPTH 200-300	14-MAY-2012	05-JUN-2012	21-MAY-2012	✘	05-JUN-2012	05-JUN-2012	✔
Soil Glass Jar - Unpreserved (EA002) SITE 52 DEPTH 0-100, SITE 52 DEPTH 500-600, SITE 52 DEPTH 1100-1200	SITE 52 DEPTH 200-300, SITE 52 DEPTH 800-900,	12-MAY-2012	01-JUN-2012	19-MAY-2012	✘	04-JUN-2012	02-JUN-2012	✘



Matrix: SOIL

Evaluation: ✘ = Holding time breach ; ✔ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA010: Conductivity - Continued								
SITE 026 DEPTH 0-100, SITE 026 DEPTH 500-600, SITE 026 DEPTH 1100-1200, SITE 027 DEPTH 200-300, SITE 027 DEPTH 800-900, SITE 028 DEPTH 0-100, SITE 028 DEPTH 500-600, SITE 028 DEPTH 1100-1200, SITE 029 DEPTH 200-300, SITE 029 DEPTH 800-900,	SITE 026 DEPTH 200-300, SITE 026 DEPTH 800-900, SITE 027 DEPTH 0-100, SITE 027 DEPTH 500-600, SITE 027 DEPTH 1100-1200, SITE 028 DEPTH 200-300, SITE 028 DEPTH 800-900, SITE 029 DEPTH 0-100, SITE 029 DEPTH 500-600, SITE 029 DEPTH 1100-1200	10-MAY-2012	01-JUN-2012	17-MAY-2012	✘	05-JUN-2012	29-JUN-2012	✔
Snap Lock Bag (EA010) SITE 031 DEPTH 0-100, SITE 031 DEPTH 500-600, SITE 031 DEPTH 1100-1200, SITE 032 DEPTH 200-300, SITE 032 DEPTH 800-900, SITE 033 DEPTH 0-100, SITE 033 DEPTH 500-600, SITE 033 DEPTH 1100-1200, SITE 034 DEPTH 200-300, SITE 034 DEPTH 800-900, SITE 035 DEPTH 0-100, SITE 035 DEPTH 500-600, SITE 035 DEPTH 1100-1200, SITE 036 DEPTH 200-300, SITE 036 DEPTH 800-900, SITE 038 DEPTH 0-100, SITE 038 DEPTH 500-600, SITE 038 DEPTH 1100-1200, SITE 040 DEPTH 200-300, SITE 040 DEPTH 800-900,	SITE 031 DEPTH 200-300, SITE 031 DEPTH 800-900, SITE 032 DEPTH 0-100, SITE 032 DEPTH 500-600, SITE 032 DEPTH 1100-1200, SITE 033 DEPTH 200-300, SITE 033 DEPTH 800-900, SITE 034 DEPTH 0-100, SITE 034 DEPTH 500-600, SITE 034 DEPTH 1100-1200, SITE 035 DEPTH 200-300, SITE 035 DEPTH 800-900, SITE 036 DEPTH 0-100, SITE 036 DEPTH 500-600, SITE 036 DEPTH 1100-1200, SITE 038 DEPTH 200-300, SITE 038 DEPTH 800-900, SITE 040 DEPTH 0-100, SITE 040 DEPTH 500-600, SITE 040 DEPTH 1100-1200	11-MAY-2012	01-JUN-2012	18-MAY-2012	✘	05-JUN-2012	29-JUN-2012	✔
Snap Lock Bag (EA010) SITE 041 DEPTH 0-100, SITE 042 DEPTH 0-100, SITE 048 DEPTH 0-100, SITE 049 DEPTH 0-100,	SITE 041 DEPTH 500-600, SITE 042 DEPTH 500-600, SITE 048 DEPTH 500-600, SITE 049 DEPTH 500-600	12-MAY-2012	01-JUN-2012	19-MAY-2012	✘	05-JUN-2012	29-JUN-2012	✔
Snap Lock Bag (EA010) SITE 065 DEPTH 500-600, SITE 065 DEPTH 1100-1200, SITE 066 DEPTH 200-300, SITE 066 DEPTH 800-900, SITE 067 DEPTH 0-100, SITE 067 DEPTH 500-600, SITE 067 DEPTH 1100-1200	SITE 065 DEPTH 800-900, SITE 066 DEPTH 0-100, SITE 066 DEPTH 500-600, SITE 066 DEPTH 1100-1200, SITE 067 DEPTH 200-300, SITE 067 DEPTH 800-900,	14-MAY-2012	01-JUN-2012	21-MAY-2012	✘	04-JUN-2012	29-JUN-2012	✔
Snap Lock Bag (EA010)								



Matrix: **SOIL**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis				
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation		
EA010: Conductivity - Continued									
SITE 056 DEPTH 0-100, SITE 056 DEPTH 500-600, SITE 056 DEPTH 1100-1200, SITE 057 DEPTH 200-300, SITE 057 DEPTH 800-900, SITE 058 DEPTH 0-100, SITE 056 DEPTH 200-300, SITE 056 DEPTH 800-900, SITE 057 DEPTH 0-100, SITE 057 DEPTH 500-600, SITE 057 DEPTH 1100-1200, SITE 058 DEPTH 200-300	14-MAY-2012	01-JUN-2012	21-MAY-2012	✖	05-JUN-2012	29-JUN-2012	✔		
Snap Lock Bag (EA010) SITE 058 DEPTH 500-600, SITE 058 DEPTH 1100-1200, SITE 061 DEPTH 200-300, SITE 061 DEPTH 800-900, SITE 062 DEPTH 0-100, SITE 062 DEPTH 500-600, SITE 062 DEPTH 1100-1200, SITE 064 DEPTH 200-300, SITE 064 DEPTH 800-900, SITE 065 DEPTH 0-100, SITE 058 DEPTH 800-900, SITE 061 DEPTH 0-100, SITE 061 DEPTH 500-600, SITE 061 DEPTH 1100-1200, SITE 062 DEPTH 200-300, SITE 062 DEPTH 800-900, SITE 064 DEPTH 0-100, SITE 064 DEPTH 500-600, SITE 064 DEPTH 1100-1200, SITE 065 DEPTH 200-300	14-MAY-2012	05-JUN-2012	21-MAY-2012	✖	05-JUN-2012	03-JUL-2012	✔		
Soil Glass Jar - Unpreserved (EA010) SITE 52 DEPTH 0-100, SITE 52 DEPTH 500-600, SITE 52 DEPTH 1100-1200 SITE 52 DEPTH 200-300, SITE 52 DEPTH 800-900,	12-MAY-2012	01-JUN-2012	19-MAY-2012	✖	04-JUN-2012	29-JUN-2012	✔		



Matrix: **SOIL**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA055: Moisture Content - Continued								
SITE 056 DEPTH 0-100, SITE 056 DEPTH 500-600, SITE 056 DEPTH 1100-1200, SITE 057 DEPTH 200-300, SITE 057 DEPTH 800-900, SITE 058 DEPTH 0-100, SITE 058 DEPTH 500-600, SITE 058 DEPTH 1100-1200, SITE 061 DEPTH 200-300, SITE 061 DEPTH 800-900, SITE 062 DEPTH 0-100, SITE 062 DEPTH 500-600, SITE 062 DEPTH 1100-1200, SITE 064 DEPTH 200-300, SITE 064 DEPTH 800-900, SITE 065 DEPTH 0-100, SITE 065 DEPTH 500-600, SITE 065 DEPTH 1100-1200, SITE 066 DEPTH 200-300, SITE 066 DEPTH 800-900, SITE 067 DEPTH 0-100, SITE 067 DEPTH 500-600, SITE 067 DEPTH 1100-1200	SITE 056 DEPTH 200-300, SITE 056 DEPTH 800-900, SITE 057 DEPTH 0-100, SITE 057 DEPTH 500-600, SITE 057 DEPTH 1100-1200, SITE 058 DEPTH 200-300, SITE 058 DEPTH 800-900, SITE 061 DEPTH 0-100, SITE 061 DEPTH 500-600, SITE 061 DEPTH 1100-1200, SITE 062 DEPTH 200-300, SITE 062 DEPTH 800-900, SITE 064 DEPTH 0-100, SITE 064 DEPTH 500-600, SITE 064 DEPTH 1100-1200, SITE 065 DEPTH 200-300, SITE 065 DEPTH 800-900, SITE 066 DEPTH 0-100, SITE 066 DEPTH 500-600, SITE 066 DEPTH 1100-1200, SITE 067 DEPTH 200-300, SITE 067 DEPTH 800-900,	14-MAY-2012	----	----	----	24-MAY-2012	28-MAY-2012	✓
Soil Glass Jar - Unpreserved (EA055-103) SITE 52 DEPTH 0-100, SITE 52 DEPTH 500-600, SITE 52 DEPTH 1100-1200	SITE 52 DEPTH 200-300, SITE 52 DEPTH 800-900,	12-MAY-2012	----	----	----	29-MAY-2012	26-MAY-2012	*



Matrix: SOIL

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
ED008: Exchangeable Cations								
Soil Glass Jar - Unpreserved (ED008) SITE 001 DEPTH 0-100, SITE 001 DEPTH 1100-1200, SITE 002 DEPTH 500-600, SITE 004 DEPTH 0-100, SITE 007 DEPTH 500-600, SITE 008 DEPTH 0-100, SITE 008 DEPTH 1100-1200, 51SITE 020 DEPTH 0-100	SITE 001 DEPTH 500-600, SITE 002 DEPTH 0-100, SITE 002 DEPTH 1100-1200, SITE 007 DEPTH 0-100, SITE 007 DEPTH 1100-1200, SITE 008 DEPTH 500-600, SITE 014 DEPTH 0-100,	08-MAY-2012	01-JUN-2012	04-NOV-2012	✓	04-JUN-2012	04-NOV-2012	✓
Soil Glass Jar - Unpreserved (ED008) SITE 011 DEPTH 0-100, SITE 011 DEPTH 1100-1200, SITE 014 DEPTH 1100-1200, SITE 020 DEPTH 1100-1200	SITE 011 DEPTH 500-600, SITE 014 DEPTH 500-600, SITE 020 DEPTH 500-600,	09-MAY-2012	01-JUN-2012	05-NOV-2012	✓	04-JUN-2012	05-NOV-2012	✓
Soil Glass Jar - Unpreserved (ED008) SITE 022 DEPTH 0-100, SITE 022 DEPTH 1100-1200, SITE 026 DEPTH 500-600, SITE 027 DEPTH 0-100, SITE 028 DEPTH 500-600, SITE 029 DEPTH 0-100, SITE 029 DEPTH 1100-1200	SITE 022 DEPTH 500-600, SITE 026 DEPTH 0-100, SITE 026 DEPTH 1100-1200, SITE 028 DEPTH 0-100, SITE 028 DEPTH 1100-1200, SITE 029 DEPTH 500-600,	10-MAY-2012	01-JUN-2012	06-NOV-2012	✓	04-JUN-2012	06-NOV-2012	✓
Soil Glass Jar - Unpreserved (ED008) SITE 031 DEPTH 0-100, SITE 031 DEPTH 1100-1200, SITE 035 DEPTH 500-600, SITE 036 DEPTH 0-100, SITE 036 DEPTH 1100-1200	SITE 031 DEPTH 500-600, SITE 035 DEPTH 0-100, SITE 035 DEPTH 1100-1200, SITE 036 DEPTH 500-600,	11-MAY-2012	01-JUN-2012	07-NOV-2012	✓	04-JUN-2012	07-NOV-2012	✓
Soil Glass Jar - Unpreserved (ED008) SITE 041 DEPTH 0-100, SITE 042 DEPTH 0-100, SITE 048 DEPTH 0-100, SITE 049 DEPTH 0-100,	SITE 041 DEPTH 500-600, SITE 042 DEPTH 500-600, SITE 048 DEPTH 500-600, SITE 049 DEPTH 500-600	12-MAY-2012	01-JUN-2012	08-NOV-2012	✓	04-JUN-2012	08-NOV-2012	✓
Soil Glass Jar - Unpreserved (ED008) SITE 52 DEPTH 0-100, SITE 52 DEPTH 1100-1200	SITE 52 DEPTH 500-600,	12-MAY-2012	01-JUN-2012	08-NOV-2012	✓	05-JUN-2012	08-NOV-2012	✓
Soil Glass Jar - Unpreserved (ED008) SITE 056 DEPTH 0-100, SITE 065 DEPTH 0-100, SITE 065 DEPTH 1100-1200, SITE 066 DEPTH 500-600, SITE 067 DEPTH 0-100, SITE 067 DEPTH 500-600,	SITE 056 DEPTH 500-600, SITE 065 DEPTH 500-600, SITE 066 DEPTH 0-100, SITE 066 DEPTH 1100-1200, SITE 067 DEPTH 200-300, SITE 067 DEPTH 1100-1200	14-MAY-2012	01-JUN-2012	10-NOV-2012	✓	04-JUN-2012	10-NOV-2012	✓



Matrix: SOIL

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
ED021: Bicarbonate Extractable Potassium (Colwell)								
Soil Glass Jar - Unpreserved (ED021) SITE 001 DEPTH 0-100, SITE 001 DEPTH 1100-1200, SITE 002 DEPTH 500-600, SITE 004 DEPTH 0-100, SITE 007 DEPTH 500-600, SITE 008 DEPTH 0-100, SITE 008 DEPTH 1100-1200, 51SITE 020 DEPTH 0-100	SITE 001 DEPTH 500-600, SITE 002 DEPTH 0-100, SITE 002 DEPTH 1100-1200, SITE 007 DEPTH 0-100, SITE 007 DEPTH 1100-1200, SITE 008 DEPTH 500-600, SITE 014 DEPTH 0-100,	08-MAY-2012	01-JUN-2012	04-NOV-2012	✔	05-JUN-2012	04-NOV-2012	✔
Soil Glass Jar - Unpreserved (ED021) SITE 011 DEPTH 0-100, SITE 011 DEPTH 1100-1200, SITE 014 DEPTH 1100-1200, SITE 020 DEPTH 1100-1200	SITE 011 DEPTH 500-600, SITE 014 DEPTH 500-600, SITE 020 DEPTH 500-600,	09-MAY-2012	01-JUN-2012	05-NOV-2012	✔	05-JUN-2012	05-NOV-2012	✔
Soil Glass Jar - Unpreserved (ED021) SITE 022 DEPTH 0-100, SITE 022 DEPTH 1100-1200, SITE 026 DEPTH 500-600, SITE 027 DEPTH 0-100, SITE 028 DEPTH 500-600, SITE 029 DEPTH 0-100, SITE 029 DEPTH 1100-1200	SITE 022 DEPTH 500-600, SITE 026 DEPTH 0-100, SITE 026 DEPTH 1100-1200, SITE 028 DEPTH 0-100, SITE 028 DEPTH 1100-1200, SITE 029 DEPTH 500-600,	10-MAY-2012	01-JUN-2012	06-NOV-2012	✔	05-JUN-2012	06-NOV-2012	✔
Soil Glass Jar - Unpreserved (ED021) SITE 031 DEPTH 0-100, SITE 031 DEPTH 1100-1200, SITE 035 DEPTH 500-600, SITE 036 DEPTH 0-100, SITE 036 DEPTH 1100-1200	SITE 031 DEPTH 500-600, SITE 035 DEPTH 0-100, SITE 035 DEPTH 1100-1200, SITE 036 DEPTH 500-600,	11-MAY-2012	01-JUN-2012	07-NOV-2012	✔	05-JUN-2012	07-NOV-2012	✔
Soil Glass Jar - Unpreserved (ED021) SITE 041 DEPTH 0-100, SITE 042 DEPTH 0-100, SITE 048 DEPTH 0-100, SITE 049 DEPTH 0-100,	SITE 041 DEPTH 500-600, SITE 042 DEPTH 500-600, SITE 048 DEPTH 500-600, SITE 049 DEPTH 500-600	12-MAY-2012	01-JUN-2012	08-NOV-2012	✔	05-JUN-2012	08-NOV-2012	✔
Soil Glass Jar - Unpreserved (ED021) SITE 52 DEPTH 0-100, SITE 52 DEPTH 1100-1200	SITE 52 DEPTH 500-600,	12-MAY-2012	04-JUN-2012	08-NOV-2012	✔	05-JUN-2012	08-NOV-2012	✔
Soil Glass Jar - Unpreserved (ED021) SITE 056 DEPTH 0-100, SITE 065 DEPTH 0-100, SITE 065 DEPTH 1100-1200, SITE 066 DEPTH 500-600, SITE 067 DEPTH 0-100, SITE 067 DEPTH 500-600,	SITE 056 DEPTH 500-600, SITE 065 DEPTH 500-600, SITE 066 DEPTH 0-100, SITE 066 DEPTH 1100-1200, SITE 067 DEPTH 200-300, SITE 067 DEPTH 1100-1200	14-MAY-2012	01-JUN-2012	10-NOV-2012	✔	05-JUN-2012	10-NOV-2012	✔



Matrix: SOIL

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
ED044: Calcium Phosphate Extractable Sulfur								
Soil Glass Jar - Unpreserved (ED044) SITE 001 DEPTH 0-100, SITE 001 DEPTH 1100-1200, SITE 002 DEPTH 500-600, SITE 004 DEPTH 0-100, SITE 007 DEPTH 500-600, SITE 008 DEPTH 0-100, SITE 008 DEPTH 1100-1200, 51SITE 020 DEPTH 0-100	SITE 001 DEPTH 500-600, SITE 002 DEPTH 0-100, SITE 002 DEPTH 1100-1200, SITE 007 DEPTH 0-100, SITE 007 DEPTH 1100-1200, SITE 008 DEPTH 500-600, SITE 014 DEPTH 0-100,	08-MAY-2012	04-JUN-2012	04-NOV-2012	✓	07-JUN-2012	04-NOV-2012	✓
Soil Glass Jar - Unpreserved (ED044) SITE 011 DEPTH 0-100, SITE 011 DEPTH 1100-1200, SITE 014 DEPTH 1100-1200, SITE 020 DEPTH 1100-1200	SITE 011 DEPTH 500-600, SITE 014 DEPTH 500-600, SITE 020 DEPTH 500-600,	09-MAY-2012	04-JUN-2012	05-NOV-2012	✓	07-JUN-2012	05-NOV-2012	✓
Soil Glass Jar - Unpreserved (ED044) SITE 022 DEPTH 0-100, SITE 022 DEPTH 1100-1200, SITE 026 DEPTH 500-600, SITE 027 DEPTH 0-100, SITE 028 DEPTH 500-600, SITE 029 DEPTH 0-100, SITE 029 DEPTH 1100-1200	SITE 022 DEPTH 500-600, SITE 026 DEPTH 0-100, SITE 026 DEPTH 1100-1200, SITE 028 DEPTH 0-100, SITE 028 DEPTH 1100-1200, SITE 029 DEPTH 500-600,	10-MAY-2012	04-JUN-2012	06-NOV-2012	✓	07-JUN-2012	06-NOV-2012	✓
Soil Glass Jar - Unpreserved (ED044) SITE 035 DEPTH 1100-1200, SITE 036 DEPTH 500-600,	SITE 036 DEPTH 0-100, SITE 036 DEPTH 1100-1200	11-MAY-2012	04-JUN-2012	07-NOV-2012	✓	05-JUN-2012	07-NOV-2012	✓
Soil Glass Jar - Unpreserved (ED044) SITE 031 DEPTH 0-100, SITE 031 DEPTH 1100-1200, SITE 035 DEPTH 500-600	SITE 031 DEPTH 500-600, SITE 035 DEPTH 0-100,	11-MAY-2012	04-JUN-2012	07-NOV-2012	✓	07-JUN-2012	07-NOV-2012	✓
Soil Glass Jar - Unpreserved (ED044) SITE 041 DEPTH 0-100, SITE 042 DEPTH 0-100, SITE 048 DEPTH 0-100, SITE 049 DEPTH 0-100,	SITE 041 DEPTH 500-600, SITE 042 DEPTH 500-600, SITE 048 DEPTH 500-600, SITE 049 DEPTH 500-600	12-MAY-2012	04-JUN-2012	08-NOV-2012	✓	05-JUN-2012	08-NOV-2012	✓
Soil Glass Jar - Unpreserved (ED044) SITE 52 DEPTH 0-100, SITE 52 DEPTH 1100-1200	SITE 52 DEPTH 500-600,	12-MAY-2012	04-JUN-2012	08-NOV-2012	✓	07-JUN-2012	08-NOV-2012	✓
Soil Glass Jar - Unpreserved (ED044) SITE 056 DEPTH 0-100, SITE 065 DEPTH 0-100, SITE 065 DEPTH 1100-1200, SITE 066 DEPTH 500-600, SITE 067 DEPTH 0-100, SITE 067 DEPTH 500-600,	SITE 056 DEPTH 500-600, SITE 065 DEPTH 500-600, SITE 066 DEPTH 0-100, SITE 066 DEPTH 1100-1200, SITE 067 DEPTH 200-300, SITE 067 DEPTH 1100-1200	14-MAY-2012	04-JUN-2012	10-NOV-2012	✓	05-JUN-2012	10-NOV-2012	✓



Matrix: SOIL

Evaluation: ✘ = Holding time breach ; ✔ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
ED045G: Chloride Discrete analyser - Continued								
SITE 026 DEPTH 0-100, SITE 026 DEPTH 500-600, SITE 026 DEPTH 1100-1200, SITE 027 DEPTH 200-300, SITE 027 DEPTH 800-900, SITE 028 DEPTH 0-100, SITE 028 DEPTH 500-600, SITE 028 DEPTH 1100-1200, SITE 029 DEPTH 200-300, SITE 029 DEPTH 800-900,	SITE 026 DEPTH 200-300, SITE 026 DEPTH 800-900, SITE 027 DEPTH 0-100, SITE 027 DEPTH 500-600, SITE 027 DEPTH 1100-1200, SITE 028 DEPTH 200-300, SITE 028 DEPTH 800-900, SITE 029 DEPTH 0-100, SITE 029 DEPTH 500-600, SITE 029 DEPTH 1100-1200	10-MAY-2012	01-JUN-2012	17-MAY-2012	✘	05-JUN-2012	29-JUN-2012	✔
Snap Lock Bag (ED045G) SITE 031 DEPTH 0-100, SITE 031 DEPTH 500-600, SITE 031 DEPTH 1100-1200, SITE 032 DEPTH 200-300, SITE 032 DEPTH 800-900, SITE 033 DEPTH 0-100, SITE 033 DEPTH 500-600, SITE 033 DEPTH 1100-1200, SITE 034 DEPTH 200-300, SITE 034 DEPTH 800-900, SITE 035 DEPTH 0-100, SITE 035 DEPTH 500-600, SITE 035 DEPTH 1100-1200, SITE 036 DEPTH 200-300, SITE 036 DEPTH 800-900, SITE 038 DEPTH 0-100, SITE 038 DEPTH 500-600, SITE 038 DEPTH 1100-1200, SITE 040 DEPTH 200-300, SITE 040 DEPTH 800-900,	SITE 031 DEPTH 200-300, SITE 031 DEPTH 800-900, SITE 032 DEPTH 0-100, SITE 032 DEPTH 500-600, SITE 032 DEPTH 1100-1200, SITE 033 DEPTH 200-300, SITE 033 DEPTH 800-900, SITE 034 DEPTH 0-100, SITE 034 DEPTH 500-600, SITE 034 DEPTH 1100-1200, SITE 035 DEPTH 200-300, SITE 035 DEPTH 800-900, SITE 036 DEPTH 0-100, SITE 036 DEPTH 500-600, SITE 036 DEPTH 1100-1200, SITE 038 DEPTH 200-300, SITE 038 DEPTH 800-900, SITE 040 DEPTH 0-100, SITE 040 DEPTH 500-600, SITE 040 DEPTH 1100-1200	11-MAY-2012	01-JUN-2012	18-MAY-2012	✘	05-JUN-2012	29-JUN-2012	✔
Snap Lock Bag (ED045G) SITE 041 DEPTH 0-100, SITE 042 DEPTH 0-100, SITE 048 DEPTH 0-100, SITE 049 DEPTH 0-100,	SITE 041 DEPTH 500-600, SITE 042 DEPTH 500-600, SITE 048 DEPTH 500-600, SITE 049 DEPTH 500-600	12-MAY-2012	01-JUN-2012	19-MAY-2012	✘	05-JUN-2012	29-JUN-2012	✔
Snap Lock Bag (ED045G) SITE 065 DEPTH 500-600, SITE 065 DEPTH 1100-1200, SITE 066 DEPTH 200-300, SITE 066 DEPTH 800-900, SITE 067 DEPTH 0-100, SITE 067 DEPTH 500-600, SITE 067 DEPTH 1100-1200	SITE 065 DEPTH 800-900, SITE 066 DEPTH 0-100, SITE 066 DEPTH 500-600, SITE 066 DEPTH 1100-1200, SITE 067 DEPTH 200-300, SITE 067 DEPTH 800-900,	14-MAY-2012	01-JUN-2012	21-MAY-2012	✘	04-JUN-2012	29-JUN-2012	✔
Snap Lock Bag (ED045G)								



Matrix: **SOIL**

Evaluation: ✘ = Holding time breach ; ✔ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis				
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation		
ED045G: Chloride Discrete analyser - Continued									
SITE 056 DEPTH 0-100, SITE 056 DEPTH 500-600, SITE 056 DEPTH 1100-1200, SITE 057 DEPTH 200-300, SITE 057 DEPTH 800-900, SITE 058 DEPTH 0-100, SITE 056 DEPTH 200-300, SITE 056 DEPTH 800-900, SITE 057 DEPTH 0-100, SITE 057 DEPTH 500-600, SITE 057 DEPTH 1100-1200, SITE 058 DEPTH 200-300	14-MAY-2012	01-JUN-2012	21-MAY-2012	✘	05-JUN-2012	29-JUN-2012	✔		
Snap Lock Bag (ED045G) SITE 058 DEPTH 500-600, SITE 058 DEPTH 1100-1200, SITE 061 DEPTH 200-300, SITE 061 DEPTH 800-900, SITE 062 DEPTH 0-100, SITE 062 DEPTH 500-600, SITE 062 DEPTH 1100-1200, SITE 064 DEPTH 200-300, SITE 064 DEPTH 800-900, SITE 065 DEPTH 0-100, SITE 058 DEPTH 800-900, SITE 061 DEPTH 0-100, SITE 061 DEPTH 500-600, SITE 061 DEPTH 1100-1200, SITE 062 DEPTH 200-300, SITE 062 DEPTH 800-900, SITE 064 DEPTH 0-100, SITE 064 DEPTH 500-600, SITE 064 DEPTH 1100-1200, SITE 065 DEPTH 200-300	14-MAY-2012	05-JUN-2012	21-MAY-2012	✘	05-JUN-2012	03-JUL-2012	✔		
Soil Glass Jar - Unpreserved (ED045G) SITE 002 DEPTH 0-100, SITE 007 DEPTH 0-100, SITE 002 DEPTH 500-600, SITE 008 DEPTH 1100-1200	08-MAY-2012	01-JUN-2012	15-MAY-2012	✘	04-JUN-2012	29-JUN-2012	✔		
Soil Glass Jar - Unpreserved (ED045G) SITE 52 DEPTH 0-100, SITE 52 DEPTH 500-600, SITE 52 DEPTH 1100-1200 SITE 52 DEPTH 200-300, SITE 52 DEPTH 800-900,	12-MAY-2012	01-JUN-2012	19-MAY-2012	✘	04-JUN-2012	29-JUN-2012	✔		
ED091 : Calcium Chloride Extractable Boron									
Soil Glass Jar - Unpreserved (ED091) SITE 001 DEPTH 0-100, SITE 004 DEPTH 0-100, SITE 008 DEPTH 0-100, 51SITE 020 DEPTH 0-100 SITE 002 DEPTH 0-100, SITE 007 DEPTH 0-100, SITE 014 DEPTH 0-100,	08-MAY-2012	04-JUN-2012	04-NOV-2012	✔	05-JUN-2012	04-NOV-2012	✔		
Soil Glass Jar - Unpreserved (ED091) SITE 011 DEPTH 0-100	09-MAY-2012	04-JUN-2012	05-NOV-2012	✔	05-JUN-2012	05-NOV-2012	✔		
Soil Glass Jar - Unpreserved (ED091) SITE 022 DEPTH 0-100, SITE 027 DEPTH 0-100, SITE 029 DEPTH 0-100 SITE 026 DEPTH 0-100, SITE 028 DEPTH 0-100,	10-MAY-2012	04-JUN-2012	06-NOV-2012	✔	05-JUN-2012	06-NOV-2012	✔		
Soil Glass Jar - Unpreserved (ED091) SITE 031 DEPTH 0-100, SITE 036 DEPTH 0-100 SITE 035 DEPTH 0-100,	11-MAY-2012	04-JUN-2012	07-NOV-2012	✔	05-JUN-2012	07-NOV-2012	✔		
Soil Glass Jar - Unpreserved (ED091) SITE 041 DEPTH 0-100, SITE 048 DEPTH 0-100, SITE 52 DEPTH 0-100 SITE 042 DEPTH 0-100, SITE 049 DEPTH 0-100,	12-MAY-2012	04-JUN-2012	08-NOV-2012	✔	05-JUN-2012	08-NOV-2012	✔		
Soil Glass Jar - Unpreserved (ED091) SITE 056 DEPTH 0-100, SITE 066 DEPTH 0-100, SITE 067 DEPTH 200-300 SITE 065 DEPTH 0-100, SITE 067 DEPTH 0-100,	14-MAY-2012	04-JUN-2012	10-NOV-2012	✔	05-JUN-2012	10-NOV-2012	✔		



Matrix: SOIL

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
ED092: DTPA Extractable Metals								
Soil Glass Jar - Unpreserved (ED092) SITE 001 DEPTH 0-100, SITE 004 DEPTH 0-100, SITE 008 DEPTH 0-100, 51SITE 020 DEPTH 0-100	SITE 002 DEPTH 0-100, SITE 007 DEPTH 0-100, SITE 014 DEPTH 0-100,	08-MAY-2012	01-JUN-2012	04-NOV-2012	✔	04-JUN-2012	04-NOV-2012	✔
Soil Glass Jar - Unpreserved (ED092) SITE 011 DEPTH 0-100		09-MAY-2012	01-JUN-2012	05-NOV-2012	✔	04-JUN-2012	05-NOV-2012	✔
Soil Glass Jar - Unpreserved (ED092) SITE 022 DEPTH 0-100, SITE 027 DEPTH 0-100, SITE 029 DEPTH 0-100	SITE 026 DEPTH 0-100, SITE 028 DEPTH 0-100,	10-MAY-2012	01-JUN-2012	06-NOV-2012	✔	04-JUN-2012	06-NOV-2012	✔
Soil Glass Jar - Unpreserved (ED092) SITE 031 DEPTH 0-100, SITE 036 DEPTH 0-100	SITE 035 DEPTH 0-100,	11-MAY-2012	01-JUN-2012	07-NOV-2012	✔	04-JUN-2012	07-NOV-2012	✔
Soil Glass Jar - Unpreserved (ED092) SITE 041 DEPTH 0-100, SITE 048 DEPTH 0-100,	SITE 042 DEPTH 0-100, SITE 049 DEPTH 0-100	12-MAY-2012	01-JUN-2012	08-NOV-2012	✔	04-JUN-2012	08-NOV-2012	✔
Soil Glass Jar - Unpreserved (ED092) SITE 52 DEPTH 0-100		12-MAY-2012	04-JUN-2012	08-NOV-2012	✔	04-JUN-2012	08-NOV-2012	✔
Soil Glass Jar - Unpreserved (ED092) SITE 056 DEPTH 0-100, SITE 066 DEPTH 0-100, SITE 067 DEPTH 200-300	SITE 065 DEPTH 0-100, SITE 067 DEPTH 0-100,	14-MAY-2012	01-JUN-2012	10-NOV-2012	✔	04-JUN-2012	10-NOV-2012	✔



Matrix: SOIL

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Snap Lock Bag (EK061G) SITE 001 DEPTH 0-100, SITE 001 DEPTH 1100-1200, SITE 002 DEPTH 500-600, SITE 004 DEPTH 0-100, SITE 007 DEPTH 500-600, SITE 008 DEPTH 0-100, SITE 008 DEPTH 1100-1200, 51SITE 020 DEPTH 0-100	SITE 001 DEPTH 500-600, SITE 002 DEPTH 0-100, SITE 002 DEPTH 1100-1200, SITE 007 DEPTH 0-100, SITE 007 DEPTH 1100-1200, SITE 008 DEPTH 500-600, SITE 014 DEPTH 0-100,	08-MAY-2012	01-JUN-2012	04-NOV-2012	✓	04-JUN-2012	04-NOV-2012	✓
Snap Lock Bag (EK061G) SITE 011 DEPTH 0-100, SITE 011 DEPTH 1100-1200, SITE 014 DEPTH 1100-1200, SITE 020 DEPTH 1100-1200	SITE 011 DEPTH 500-600, SITE 014 DEPTH 500-600, SITE 020 DEPTH 500-600,	09-MAY-2012	01-JUN-2012	05-NOV-2012	✓	04-JUN-2012	05-NOV-2012	✓
Snap Lock Bag (EK061G) SITE 022 DEPTH 0-100, SITE 022 DEPTH 1100-1200, SITE 026 DEPTH 500-600, SITE 027 DEPTH 0-100, SITE 028 DEPTH 500-600, SITE 029 DEPTH 0-100, SITE 029 DEPTH 1100-1200	SITE 022 DEPTH 500-600, SITE 026 DEPTH 0-100, SITE 026 DEPTH 1100-1200, SITE 028 DEPTH 0-100, SITE 028 DEPTH 1100-1200, SITE 029 DEPTH 500-600,	10-MAY-2012	01-JUN-2012	06-NOV-2012	✓	04-JUN-2012	06-NOV-2012	✓
Snap Lock Bag (EK061G) SITE 031 DEPTH 0-100, SITE 031 DEPTH 1100-1200, SITE 035 DEPTH 500-600	SITE 031 DEPTH 500-600, SITE 035 DEPTH 0-100,	11-MAY-2012	01-JUN-2012	07-NOV-2012	✓	04-JUN-2012	07-NOV-2012	✓
Snap Lock Bag (EK061G) SITE 035 DEPTH 1100-1200, SITE 036 DEPTH 500-600,	SITE 036 DEPTH 0-100, SITE 036 DEPTH 1100-1200	11-MAY-2012	01-JUN-2012	07-NOV-2012	✓	05-JUN-2012	07-NOV-2012	✓
Snap Lock Bag (EK061G) SITE 041 DEPTH 0-100, SITE 042 DEPTH 0-100, SITE 048 DEPTH 0-100, SITE 049 DEPTH 0-100,	SITE 041 DEPTH 500-600, SITE 042 DEPTH 500-600, SITE 048 DEPTH 500-600, SITE 049 DEPTH 500-600	12-MAY-2012	01-JUN-2012	08-NOV-2012	✓	05-JUN-2012	08-NOV-2012	✓
Snap Lock Bag (EK061G) SITE 056 DEPTH 0-100, SITE 065 DEPTH 0-100, SITE 065 DEPTH 1100-1200, SITE 066 DEPTH 500-600, SITE 067 DEPTH 0-100, SITE 067 DEPTH 500-600,	SITE 056 DEPTH 500-600, SITE 065 DEPTH 500-600, SITE 066 DEPTH 0-100, SITE 066 DEPTH 1100-1200, SITE 067 DEPTH 200-300, SITE 067 DEPTH 1100-1200	14-MAY-2012	01-JUN-2012	10-NOV-2012	✓	05-JUN-2012	10-NOV-2012	✓
Soil Glass Jar - Unpreserved (EK061G) SITE 52 DEPTH 0-100, SITE 52 DEPTH 1100-1200	SITE 52 DEPTH 500-600,	12-MAY-2012	01-JUN-2012	08-NOV-2012	✓	02-JUN-2012	08-NOV-2012	✓



Matrix: SOIL

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EK080: Bicarbonate Extractable Phosphorus (Colwell)								
Soil Glass Jar - Unpreserved (EK080) SITE 001 DEPTH 0-100, SITE 001 DEPTH 1100-1200, SITE 002 DEPTH 500-600, SITE 004 DEPTH 0-100, SITE 007 DEPTH 500-600, SITE 008 DEPTH 0-100, SITE 008 DEPTH 1100-1200, 51SITE 020 DEPTH 0-100	SITE 001 DEPTH 500-600, SITE 002 DEPTH 0-100, SITE 002 DEPTH 1100-1200, SITE 007 DEPTH 0-100, SITE 007 DEPTH 1100-1200, SITE 008 DEPTH 500-600, SITE 014 DEPTH 0-100,	08-MAY-2012	----	----	----	01-JUN-2012	04-NOV-2012	✓
Soil Glass Jar - Unpreserved (EK080) SITE 011 DEPTH 0-100, SITE 011 DEPTH 1100-1200, SITE 014 DEPTH 1100-1200, SITE 020 DEPTH 1100-1200	SITE 011 DEPTH 500-600, SITE 014 DEPTH 500-600, SITE 020 DEPTH 500-600,	09-MAY-2012	----	----	----	01-JUN-2012	05-NOV-2012	✓
Soil Glass Jar - Unpreserved (EK080) SITE 022 DEPTH 0-100, SITE 022 DEPTH 1100-1200, SITE 026 DEPTH 500-600, SITE 027 DEPTH 0-100, SITE 028 DEPTH 500-600, SITE 029 DEPTH 0-100, SITE 029 DEPTH 1100-1200	SITE 022 DEPTH 500-600, SITE 026 DEPTH 0-100, SITE 026 DEPTH 1100-1200, SITE 028 DEPTH 0-100, SITE 028 DEPTH 1100-1200, SITE 029 DEPTH 500-600,	10-MAY-2012	----	----	----	01-JUN-2012	06-NOV-2012	✓
Soil Glass Jar - Unpreserved (EK080) SITE 031 DEPTH 0-100, SITE 031 DEPTH 1100-1200, SITE 035 DEPTH 500-600, SITE 036 DEPTH 0-100, SITE 036 DEPTH 1100-1200	SITE 031 DEPTH 500-600, SITE 035 DEPTH 0-100, SITE 035 DEPTH 1100-1200, SITE 036 DEPTH 500-600,	11-MAY-2012	----	----	----	01-JUN-2012	07-NOV-2012	✓
Soil Glass Jar - Unpreserved (EK080) SITE 041 DEPTH 0-100, SITE 042 DEPTH 0-100, SITE 048 DEPTH 0-100, SITE 049 DEPTH 0-100, SITE 52 DEPTH 0-100, SITE 52 DEPTH 1100-1200	SITE 041 DEPTH 500-600, SITE 042 DEPTH 500-600, SITE 048 DEPTH 500-600, SITE 049 DEPTH 500-600, SITE 52 DEPTH 500-600,	12-MAY-2012	----	----	----	01-JUN-2012	08-NOV-2012	✓
Soil Glass Jar - Unpreserved (EK080) SITE 056 DEPTH 0-100, SITE 065 DEPTH 0-100, SITE 065 DEPTH 1100-1200, SITE 066 DEPTH 500-600, SITE 067 DEPTH 0-100, SITE 067 DEPTH 500-600,	SITE 056 DEPTH 500-600, SITE 065 DEPTH 500-600, SITE 066 DEPTH 0-100, SITE 066 DEPTH 1100-1200, SITE 067 DEPTH 200-300, SITE 067 DEPTH 1100-1200	14-MAY-2012	----	----	----	01-JUN-2012	10-NOV-2012	✓



Matrix: SOIL

Evaluation: ✘ = Holding time breach ; ✔ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP004: Organic Matter								
Soil Glass Jar - Unpreserved (EP004) SITE 001 DEPTH 0-100, SITE 004 DEPTH 0-100, SITE 008 DEPTH 0-100, 51SITE 020 DEPTH 0-100	SITE 002 DEPTH 0-100, SITE 007 DEPTH 0-100, SITE 014 DEPTH 0-100,	08-MAY-2012	31-MAY-2012	15-MAY-2012	✘	04-JUN-2012	28-JUN-2012	✔
Soil Glass Jar - Unpreserved (EP004) SITE 011 DEPTH 0-100		09-MAY-2012	31-MAY-2012	16-MAY-2012	✘	04-JUN-2012	28-JUN-2012	✔
Soil Glass Jar - Unpreserved (EP004) SITE 022 DEPTH 0-100, SITE 027 DEPTH 0-100, SITE 029 DEPTH 0-100	SITE 026 DEPTH 0-100, SITE 028 DEPTH 0-100,	10-MAY-2012	31-MAY-2012	17-MAY-2012	✘	04-JUN-2012	28-JUN-2012	✔
Soil Glass Jar - Unpreserved (EP004) SITE 031 DEPTH 0-100, SITE 036 DEPTH 0-100	SITE 035 DEPTH 0-100,	11-MAY-2012	31-MAY-2012	18-MAY-2012	✘	04-JUN-2012	28-JUN-2012	✔
Soil Glass Jar - Unpreserved (EP004) SITE 52 DEPTH 0-100		12-MAY-2012	01-JUN-2012	19-MAY-2012	✘	06-JUN-2012	29-JUN-2012	✔
Soil Glass Jar - Unpreserved (EP004) SITE 041 DEPTH 0-100, SITE 048 DEPTH 0-100,	SITE 042 DEPTH 0-100, SITE 049 DEPTH 0-100	12-MAY-2012	31-MAY-2012	19-MAY-2012	✘	04-JUN-2012	28-JUN-2012	✔
Soil Glass Jar - Unpreserved (EP004) SITE 056 DEPTH 0-100, SITE 066 DEPTH 0-100, SITE 067 DEPTH 200-300	SITE 065 DEPTH 0-100, SITE 067 DEPTH 0-100,	14-MAY-2012	31-MAY-2012	21-MAY-2012	✘	04-JUN-2012	28-JUN-2012	✔



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(where) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: * = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Bicarbonate Extractable K (Colwell)	ED021	8	67	11.9	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Bicarbonate Extractable P (Colwell)	EK080	9	67	13.4	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Calcium Chloride Extractable Boron	ED091	4	26	15.4	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Calcium Phosphate Extractable Sulfur as S	ED044	8	67	11.9	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride Soluble By Discrete Analyser	ED045G	21	198	10.6	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
DTPA Extractable Metals	ED092	4	26	15.4	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Electrical Conductivity (1:5)	EA010	21	198	10.6	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Exchangeable Cations with pre-treatment	ED008	8	67	11.9	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Moisture Content	EA055-103	21	203	10.3	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Organic Matter	EP004	5	34	14.7	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
pH (1:5)	EA002	21	198	10.6	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TKN as N By Discrete Analyser	EK061G	8	67	11.9	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)							
Calcium Chloride Extractable Boron	ED091	3	26	11.5	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride Soluble By Discrete Analyser	ED045G	22	198	11.1	10.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
DTPA Extractable Metals	ED092	3	26	11.5	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Electrical Conductivity (1:5)	EA010	11	198	5.6	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Exchangeable Cations with pre-treatment	ED008	5	67	7.5	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Organic Matter	EP004	3	34	8.8	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
pH (1:5)	EA002	11	198	5.6	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TKN as N By Discrete Analyser	EK061G	5	67	7.5	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Bicarbonate Extractable K (Colwell)	ED021	5	67	7.5	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Bicarbonate Extractable P (Colwell)	EK080	5	67	7.5	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Calcium Chloride Extractable Boron	ED091	3	26	11.5	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Calcium Phosphate Extractable Sulfur as S	ED044	5	67	7.5	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Chloride Soluble By Discrete Analyser	ED045G	11	198	5.6	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
DTPA Extractable Metals	ED092	3	26	11.5	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Electrical Conductivity (1:5)	EA010	11	198	5.6	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Exchangeable Cations with pre-treatment	ED008	5	67	7.5	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Organic Matter	EP004	3	34	8.8	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
TKN as N By Discrete Analyser	EK061G	5	67	7.5	5.0	✓	NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
TKN as N By Discrete Analyser	EK061G	5	67	7.5	5.0	✓	ALS QCS3 requirement



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH (1:5)	EA002	SOIL	(APHA 21st ed., 4500H+) pH is determined on soil samples after a 1:5 soil/water leach. This method is compliant with NEPM (1999) Schedule B(3) (Method 103)
Electrical Conductivity (1:5)	EA010	SOIL	(APHA 21st ed., 2510) Conductivity is determined on soil samples using a 1:5 soil/water leach. This method is compliant with NEPM (1999) Schedule B(3) (Method 104)
Moisture Content	EA055-103	SOIL	A gravimetric procedure based on weight loss over a 12 hour drying period at 103-105 degrees C. This method is compliant with NEPM (2010 Draft) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Exchangeable Cations with pre-treatment	ED008	SOIL	Rayment & Higginson (1992) Method 15A2. Soluble salts are removed from the sample prior to analysis. Cations are exchanged from the sample by contact with Ammonium Chloride. They are then quantitated in the final solution by ICPAES and reported as meq/100g of original soil. This method is compliant with NEPM (1999) Schedule B(3) (Method 301)
Bicarbonate Extractable K (Colwell)	ED021	SOIL	Rayment & Higginson (1992) Method 18A1 Potassium is extracted from the soil using 0.5M NaHCO ₃ at a 1:100 soil:solution ratio and determined by ICP.
Calcium Phosphate Extractable Sulfur as S	ED044	SOIL	the sample is extracted with a calcium phosphate solution. The phosphate ion displaces the adsorbed sulfate while calcium ions depress the extraction of interfering S from soil organic matter. SO ₄ in the extract is determined by ICPAES and reported as dry weight in the original soil. This method is compliant with NEPM (1999) Schedule B(3) (Method 406)
Chloride Soluble By Discrete Analyser	ED045G	SOIL	The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA 21st edition 4500-Cl- E.
Calcium Chloride Extractable Boron	ED091	SOIL	Rayment & Higginson (1992) method 12C2. Soil is extracted with hot 0.01M CaCl ₂ solution at a 1:2 ratio. Extracts can be run on ICP.
DTPA Extractable Metals	ED092	SOIL	Rayment and Higginson 12A1
TKN as N By Discrete Analyser	EK061G	SOIL	APHA 21st ed., 4500-Norg-D Soil samples are digested using Kjeldahl digestion followed by determination by Discrete Analyser.
Bicarbonate Extractable P (Colwell)	EK080	SOIL	Rayment & Higginson (1992) Method 9B1 Phosphorus is extracted from the soil using 0.5M NaHCO ₃ at a 1:100 soil:solution ratio and determined by FIA.
Organic Matter	EP004	SOIL	AS1289.4.1.1 - 1997., Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM (1999) Schedule B(3) (Method 105)

Preparation Methods	Method	Matrix	Method Descriptions
Exchangeable Cations Preparation Method	ED007PR	SOIL	Rayment & Higginson (1992) method 15A1. A 1M NH ₄ Cl extraction by end over end tumbling at a ratio of 1:20. There is no pretreatment for soluble salts. Extracts can be run by ICP for cations.
Bicarbonate Extractable K (Colwell)	ED021PR	SOIL	Rayment & Higginson (1992) Method 18A1 Potassium is extracted from the soil using 0.5M NaHCO ₃ at a 1:100 soil:solution ratio and determined by ICP.
Calcium Phosphate Extraction for Sulphate as SO ₄ 2-	ED044PR	SOIL	The sample is extracted with a calcium phosphate solution. The phosphate ion displaces the adsorbed sulphate while calcium ions depress the extraction of interfering S from soil organic matter. SO ₄ in the extract is determined by ICPAES and reported as dry weight in the original soil. This method is compliant with NEPM (1999) Schedule B(3) (Method 406)
Hot Water CaCl ₂ Extraction for Boron	ED091PR	SOIL	Rayment & Higginson (1992) method 12C2. Soil is extracted with hot 0.01M CaCl ₂ solution at a 1:2 ratio. Extracts can be run on ICP.

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<i>Preparation Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
DTPA Extraction for Cu, Zn, Mn, Fe (2 hour leach)	ED092PR	SOIL	Rayment & Higginson (1992) Method 12A1 2 hour end over end tumbler extraction with 0.005M DTPA at a ratio of 1:2. Extracts can be run by ICP for metals.
TKN/TP Digestion	EK061/EK067	SOIL	APHA 21st ed., 4500 Norg- D; APHA 21st ed., 4500 P - H. Macro Kjeldahl digestion.
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of distilled water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.
Organic Matter	EP004-PR	SOIL	AS1289.4.1.1 - 1997., Dichromate oxidation method after Walkley and Black. This method is compliant with NEPM (1999) Schedule B(3) (Method 105)



Summary of Outliers

Outliers : Quality Control Samples

The following report highlights outliers flagged in the Quality Control (QC) Report. Surrogate recovery limits are static and based on USEPA SW846 or ALS-QWI/EN/38 (in the absence of specific USEPA limits). This report displays QC Outliers (breaches) only.

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Duplicate (DUP) RPDs							
ED045G: Chloride Discrete analyser	EB1213707-011	SITE 004 DEPTH 0-100	Chloride	16887-00-6	37.9 %	----	RPD exceeds DQO
Laboratory Control Spike (LCS) Recoveries							
EP004: Organic Matter	2751201-026	----	Total Organic Carbon	----	Not Determined	----	Standard recovery not determined, result less than LOR
EP004: Organic Matter	2759469-002	----	Total Organic Carbon	----	Not Determined	----	Standard recovery not determined, result less than LOR
EP004: Organic Matter	2751201-002	----	Total Organic Carbon	----	Not Determined	----	Standard recovery not determined, result less than LOR

- For all matrices, no Method Blank value outliers occur.
- For all matrices, no Matrix Spike outliers occur.

Regular Sample Surrogates

- For all regular sample matrices, no surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

This report displays Holding Time breaches only. Only the respective Extraction / Preparation and/or Analysis component is/are displayed.

Matrix: **SOIL**

Method Container / Client Sample ID(s)	Extraction / Preparation			Analysis			
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue	
EA002 : pH (Soils) Snap Lock Bag SITE 001 DEPTH 0-100, SITE 001 DEPTH 500-600, SITE 001 DEPTH 1100-1200, SITE 002 DEPTH 200-300, SITE 002 DEPTH 800-900, SITE 004 DEPTH 0-100, SITE 004 DEPTH 500-600, SITE 004 DEPTH 1100-1200, SITE 007 DEPTH 200-300, SITE 007 DEPTH 800-900, SITE 008 DEPTH 0-100, SITE 008 DEPTH 500-600, SITE 008 DEPTH 1100-1200, 51SITE 020 DEPTH 0-100	SITE 001 DEPTH 200-300, SITE 001 DEPTH 800-900, SITE 002 DEPTH 0-100, SITE 002 DEPTH 500-600, SITE 002 DEPTH 1100-1200, SITE 004 DEPTH 200-300, SITE 004 DEPTH 800-900, SITE 007 DEPTH 0-100, SITE 007 DEPTH 500-600, SITE 007 DEPTH 1100-1200, SITE 008 DEPTH 200-300, SITE 008 DEPTH 800-900, SITE 014 DEPTH 0-100,	01-JUN-2012	15-MAY-2012	17	04-JUN-2012	01-JUN-2012	3



Matrix: **SOIL**

Method Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA002 : pH (Soils) - Analysis Holding Time Compliance						
Snap Lock Bag SITE 011 DEPTH 0-100, SITE 011 DEPTH 500-600, SITE 011 DEPTH 1100-1200, SITE 014 DEPTH 500-600, SITE 014 DEPTH 1100-1200, SITE 017 DEPTH 200-300, SITE 017 DEPTH 800-900, SITE 018 DEPTH 0-100, SITE 018 DEPTH 500-600, SITE 018 DEPTH 1100-1200, SITE 019 DEPTH 200-300, SITE 019 DEPTH 800-900, SITE 020 DEPTH 200-300, SITE 020 DEPTH 800-900, SITE 021 DEPTH 0-100, SITE 021 DEPTH 500-600, SITE 021 DEPTH 1100-1200 SITE 011 DEPTH 200-300, SITE 011 DEPTH 800-900, SITE 014 DEPTH 200-300, SITE 014 DEPTH 800-900, SITE 017 DEPTH 0-100, SITE 017 DEPTH 500-600, SITE 017 DEPTH 1100-1200, SITE 018 DEPTH 200-300, SITE 018 DEPTH 800-900, SITE 019 DEPTH 0-100, SITE 019 DEPTH 500-600, SITE 019 DEPTH 1100-1200, SITE 020 DEPTH 500-600, SITE 020 DEPTH 1100-1200, SITE 021 DEPTH 200-300, SITE 021 DEPTH 800-900,	01-JUN-2012	16-MAY-2012	16	04-JUN-2012	01-JUN-2012	3
Snap Lock Bag SITE 022 DEPTH 0-100, SITE 022 DEPTH 500-600, SITE 022 DEPTH 1100-1200, SITE 023 DEPTH 200-300, SITE 023 DEPTH 800-900, SITE 024 DEPTH 0-100, SITE 024 DEPTH 500-600, SITE 024 DEPTH 1100-1200, SITE 025 DEPTH 200-300, SITE 025 DEPTH 800-900, SITE 022 DEPTH 200-300, SITE 022 DEPTH 800-900, SITE 023 DEPTH 0-100, SITE 023 DEPTH 500-600, SITE 023 DEPTH 1100-1200, SITE 024 DEPTH 200-300, SITE 024 DEPTH 800-900, SITE 025 DEPTH 0-100, SITE 025 DEPTH 500-600, SITE 025 DEPTH 1100-1200	01-JUN-2012	17-MAY-2012	15	04-JUN-2012	02-JUN-2012	2
Snap Lock Bag SITE 026 DEPTH 0-100, SITE 026 DEPTH 500-600, SITE 026 DEPTH 1100-1200, SITE 027 DEPTH 200-300, SITE 027 DEPTH 800-900, SITE 028 DEPTH 0-100, SITE 028 DEPTH 500-600, SITE 028 DEPTH 1100-1200, SITE 029 DEPTH 200-300, SITE 029 DEPTH 800-900, SITE 026 DEPTH 200-300, SITE 026 DEPTH 800-900, SITE 027 DEPTH 0-100, SITE 027 DEPTH 500-600, SITE 027 DEPTH 1100-1200, SITE 028 DEPTH 200-300, SITE 028 DEPTH 800-900, SITE 029 DEPTH 0-100, SITE 029 DEPTH 500-600, SITE 029 DEPTH 1100-1200	01-JUN-2012	17-MAY-2012	15	05-JUN-2012	01-JUN-2012	4



Matrix: **SOIL**

Method Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA002 : pH (Soils) - Analysis Holding Time Compliance						
Snap Lock Bag SITE 031 DEPTH 0-100, SITE 031 DEPTH 500-600, SITE 031 DEPTH 1100-1200, SITE 032 DEPTH 200-300, SITE 032 DEPTH 800-900, SITE 033 DEPTH 0-100, SITE 033 DEPTH 500-600, SITE 033 DEPTH 1100-1200, SITE 034 DEPTH 200-300, SITE 034 DEPTH 800-900, SITE 035 DEPTH 0-100, SITE 035 DEPTH 500-600, SITE 035 DEPTH 1100-1200, SITE 036 DEPTH 200-300, SITE 036 DEPTH 800-900, SITE 038 DEPTH 0-100, SITE 038 DEPTH 500-600, SITE 038 DEPTH 1100-1200, SITE 040 DEPTH 200-300, SITE 040 DEPTH 800-900, SITE 031 DEPTH 200-300, SITE 031 DEPTH 800-900, SITE 032 DEPTH 0-100, SITE 032 DEPTH 500-600, SITE 032 DEPTH 1100-1200, SITE 033 DEPTH 200-300, SITE 033 DEPTH 800-900, SITE 034 DEPTH 0-100, SITE 034 DEPTH 500-600, SITE 034 DEPTH 1100-1200, SITE 035 DEPTH 200-300, SITE 035 DEPTH 800-900, SITE 036 DEPTH 0-100, SITE 036 DEPTH 500-600, SITE 036 DEPTH 1100-1200, SITE 038 DEPTH 200-300, SITE 038 DEPTH 800-900, SITE 040 DEPTH 0-100, SITE 040 DEPTH 500-600, SITE 040 DEPTH 1100-1200	01-JUN-2012	18-MAY-2012	14	05-JUN-2012	01-JUN-2012	4
Snap Lock Bag SITE 041 DEPTH 0-100, SITE 042 DEPTH 0-100, SITE 048 DEPTH 0-100, SITE 049 DEPTH 0-100, SITE 041 DEPTH 500-600, SITE 042 DEPTH 500-600, SITE 048 DEPTH 500-600, SITE 049 DEPTH 500-600	01-JUN-2012	19-MAY-2012	13	05-JUN-2012	02-JUN-2012	3
Snap Lock Bag SITE 065 DEPTH 500-600, SITE 065 DEPTH 1100-1200, SITE 066 DEPTH 200-300, SITE 066 DEPTH 800-900, SITE 067 DEPTH 0-100, SITE 067 DEPTH 500-600, SITE 067 DEPTH 1100-1200, SITE 065 DEPTH 800-900, SITE 066 DEPTH 0-100, SITE 066 DEPTH 500-600, SITE 066 DEPTH 1100-1200, SITE 067 DEPTH 200-300, SITE 067 DEPTH 800-900	01-JUN-2012	21-MAY-2012	11	04-JUN-2012	02-JUN-2012	2
Snap Lock Bag SITE 056 DEPTH 0-100, SITE 056 DEPTH 500-600, SITE 056 DEPTH 1100-1200, SITE 057 DEPTH 200-300, SITE 057 DEPTH 800-900, SITE 058 DEPTH 0-100, SITE 056 DEPTH 200-300, SITE 056 DEPTH 800-900, SITE 057 DEPTH 0-100, SITE 057 DEPTH 500-600, SITE 057 DEPTH 1100-1200, SITE 058 DEPTH 200-300	01-JUN-2012	21-MAY-2012	11	05-JUN-2012	02-JUN-2012	3



Matrix: **SOIL**

Method Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA002 : pH (Soils) - Analysis Holding Time Compliance						
Snap Lock Bag SITE 058 DEPTH 500-600, SITE 058 DEPTH 1100-1200, SITE 061 DEPTH 200-300, SITE 061 DEPTH 800-900, SITE 062 DEPTH 0-100, SITE 062 DEPTH 500-600, SITE 062 DEPTH 1100-1200, SITE 064 DEPTH 200-300, SITE 064 DEPTH 800-900, SITE 065 DEPTH 0-100, SITE 058 DEPTH 800-900, SITE 061 DEPTH 0-100, SITE 061 DEPTH 500-600, SITE 061 DEPTH 1100-1200, SITE 062 DEPTH 200-300, SITE 062 DEPTH 800-900, SITE 064 DEPTH 0-100, SITE 064 DEPTH 500-600, SITE 064 DEPTH 1100-1200, SITE 065 DEPTH 200-300	05-JUN-2012	21-MAY-2012	15	----	----	----
Soil Glass Jar - Unpreserved SITE 52 DEPTH 0-100, SITE 52 DEPTH 500-600, SITE 52 DEPTH 1100-1200 SITE 52 DEPTH 200-300, SITE 52 DEPTH 800-900,	01-JUN-2012	19-MAY-2012	13	04-JUN-2012	02-JUN-2012	2
EA010: Conductivity						
Snap Lock Bag SITE 001 DEPTH 0-100, SITE 001 DEPTH 500-600, SITE 001 DEPTH 1100-1200, SITE 002 DEPTH 200-300, SITE 002 DEPTH 800-900, SITE 004 DEPTH 0-100, SITE 004 DEPTH 500-600, SITE 004 DEPTH 1100-1200, SITE 007 DEPTH 200-300, SITE 007 DEPTH 800-900, SITE 008 DEPTH 0-100, SITE 008 DEPTH 500-600, SITE 008 DEPTH 1100-1200, 51SITE 020 DEPTH 0-100 SITE 001 DEPTH 200-300, SITE 001 DEPTH 800-900, SITE 002 DEPTH 0-100, SITE 002 DEPTH 500-600, SITE 002 DEPTH 1100-1200, SITE 004 DEPTH 200-300, SITE 004 DEPTH 800-900, SITE 007 DEPTH 0-100, SITE 007 DEPTH 500-600, SITE 007 DEPTH 1100-1200, SITE 008 DEPTH 200-300, SITE 008 DEPTH 800-900, SITE 014 DEPTH 0-100,	01-JUN-2012	15-MAY-2012	17	----	----	----



Matrix: **SOIL**

Method Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA010: Conductivity - Analysis Holding Time Compliance						
Snap Lock Bag SITE 011 DEPTH 0-100, SITE 011 DEPTH 500-600, SITE 011 DEPTH 1100-1200, SITE 014 DEPTH 500-600, SITE 014 DEPTH 1100-1200, SITE 017 DEPTH 200-300, SITE 017 DEPTH 800-900, SITE 018 DEPTH 0-100, SITE 018 DEPTH 500-600, SITE 018 DEPTH 1100-1200, SITE 019 DEPTH 200-300, SITE 019 DEPTH 800-900, SITE 020 DEPTH 200-300, SITE 020 DEPTH 800-900, SITE 021 DEPTH 0-100, SITE 021 DEPTH 500-600, SITE 021 DEPTH 1100-1200 SITE 011 DEPTH 200-300, SITE 011 DEPTH 800-900, SITE 014 DEPTH 200-300, SITE 014 DEPTH 800-900, SITE 017 DEPTH 0-100, SITE 017 DEPTH 500-600, SITE 017 DEPTH 1100-1200, SITE 018 DEPTH 200-300, SITE 018 DEPTH 800-900, SITE 019 DEPTH 0-100, SITE 019 DEPTH 500-600, SITE 019 DEPTH 1100-1200, SITE 020 DEPTH 500-600, SITE 020 DEPTH 1100-1200, SITE 021 DEPTH 200-300, SITE 021 DEPTH 800-900,	01-JUN-2012	16-MAY-2012	16	----	----	----
Snap Lock Bag SITE 022 DEPTH 0-100, SITE 022 DEPTH 500-600, SITE 022 DEPTH 1100-1200, SITE 023 DEPTH 200-300, SITE 023 DEPTH 800-900, SITE 024 DEPTH 0-100, SITE 024 DEPTH 500-600, SITE 024 DEPTH 1100-1200, SITE 025 DEPTH 200-300, SITE 025 DEPTH 800-900, SITE 022 DEPTH 200-300, SITE 022 DEPTH 800-900, SITE 023 DEPTH 0-100, SITE 023 DEPTH 500-600, SITE 023 DEPTH 1100-1200, SITE 024 DEPTH 200-300, SITE 024 DEPTH 800-900, SITE 025 DEPTH 0-100, SITE 025 DEPTH 500-600, SITE 025 DEPTH 1100-1200	01-JUN-2012	17-MAY-2012	15	----	----	----
Snap Lock Bag SITE 026 DEPTH 0-100, SITE 026 DEPTH 500-600, SITE 026 DEPTH 1100-1200, SITE 027 DEPTH 200-300, SITE 027 DEPTH 800-900, SITE 028 DEPTH 0-100, SITE 028 DEPTH 500-600, SITE 028 DEPTH 1100-1200, SITE 029 DEPTH 200-300, SITE 029 DEPTH 800-900, SITE 026 DEPTH 200-300, SITE 026 DEPTH 800-900, SITE 027 DEPTH 0-100, SITE 027 DEPTH 500-600, SITE 027 DEPTH 1100-1200, SITE 028 DEPTH 200-300, SITE 028 DEPTH 800-900, SITE 029 DEPTH 0-100, SITE 029 DEPTH 500-600, SITE 029 DEPTH 1100-1200	01-JUN-2012	17-MAY-2012	15	----	----	----



Matrix: **SOIL**

Method Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA010: Conductivity - Analysis Holding Time Compliance						
Snap Lock Bag SITE 031 DEPTH 0-100, SITE 031 DEPTH 500-600, SITE 031 DEPTH 1100-1200, SITE 032 DEPTH 200-300, SITE 032 DEPTH 800-900, SITE 033 DEPTH 0-100, SITE 033 DEPTH 500-600, SITE 033 DEPTH 1100-1200, SITE 034 DEPTH 200-300, SITE 034 DEPTH 800-900, SITE 035 DEPTH 0-100, SITE 035 DEPTH 500-600, SITE 035 DEPTH 1100-1200, SITE 036 DEPTH 200-300, SITE 036 DEPTH 800-900, SITE 038 DEPTH 0-100, SITE 038 DEPTH 500-600, SITE 038 DEPTH 1100-1200, SITE 040 DEPTH 200-300, SITE 040 DEPTH 800-900, SITE 031 DEPTH 200-300, SITE 031 DEPTH 800-900, SITE 032 DEPTH 0-100, SITE 032 DEPTH 500-600, SITE 032 DEPTH 1100-1200, SITE 033 DEPTH 200-300, SITE 033 DEPTH 800-900, SITE 034 DEPTH 0-100, SITE 034 DEPTH 500-600, SITE 034 DEPTH 1100-1200, SITE 035 DEPTH 200-300, SITE 035 DEPTH 800-900, SITE 036 DEPTH 0-100, SITE 036 DEPTH 500-600, SITE 036 DEPTH 1100-1200, SITE 038 DEPTH 200-300, SITE 038 DEPTH 800-900, SITE 040 DEPTH 0-100, SITE 040 DEPTH 500-600, SITE 040 DEPTH 1100-1200	01-JUN-2012	18-MAY-2012	14	----	----	----
Snap Lock Bag SITE 041 DEPTH 0-100, SITE 042 DEPTH 0-100, SITE 048 DEPTH 0-100, SITE 049 DEPTH 0-100, SITE 041 DEPTH 500-600, SITE 042 DEPTH 500-600, SITE 048 DEPTH 500-600, SITE 049 DEPTH 500-600	01-JUN-2012	19-MAY-2012	13	----	----	----
Snap Lock Bag SITE 065 DEPTH 500-600, SITE 065 DEPTH 1100-1200, SITE 066 DEPTH 200-300, SITE 066 DEPTH 800-900, SITE 067 DEPTH 0-100, SITE 067 DEPTH 500-600, SITE 067 DEPTH 1100-1200, SITE 065 DEPTH 800-900, SITE 066 DEPTH 0-100, SITE 066 DEPTH 500-600, SITE 066 DEPTH 1100-1200, SITE 067 DEPTH 200-300, SITE 067 DEPTH 800-900	01-JUN-2012	21-MAY-2012	11	----	----	----
Snap Lock Bag SITE 056 DEPTH 0-100, SITE 056 DEPTH 500-600, SITE 056 DEPTH 1100-1200, SITE 057 DEPTH 200-300, SITE 057 DEPTH 800-900, SITE 058 DEPTH 0-100, SITE 056 DEPTH 200-300, SITE 056 DEPTH 800-900, SITE 057 DEPTH 0-100, SITE 057 DEPTH 500-600, SITE 057 DEPTH 1100-1200, SITE 058 DEPTH 200-300	01-JUN-2012	21-MAY-2012	11	----	----	----



Matrix: **SOIL**

Method Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA010: Conductivity - Analysis Holding Time Compliance						
Snap Lock Bag SITE 058 DEPTH 500-600, SITE 058 DEPTH 1100-1200, SITE 061 DEPTH 200-300, SITE 061 DEPTH 800-900, SITE 062 DEPTH 0-100, SITE 062 DEPTH 500-600, SITE 062 DEPTH 1100-1200, SITE 064 DEPTH 200-300, SITE 064 DEPTH 800-900, SITE 065 DEPTH 0-100, SITE 058 DEPTH 800-900, SITE 061 DEPTH 0-100, SITE 061 DEPTH 500-600, SITE 061 DEPTH 1100-1200, SITE 062 DEPTH 200-300, SITE 062 DEPTH 800-900, SITE 064 DEPTH 0-100, SITE 064 DEPTH 500-600, SITE 064 DEPTH 1100-1200, SITE 065 DEPTH 200-300	05-JUN-2012	21-MAY-2012	15	----	----	----
Soil Glass Jar - Unpreserved SITE 52 DEPTH 0-100, SITE 52 DEPTH 500-600, SITE 52 DEPTH 1100-1200 SITE 52 DEPTH 200-300, SITE 52 DEPTH 800-900,	01-JUN-2012	19-MAY-2012	13	----	----	----
EA055: Moisture Content						
Snap Lock Bag SITE 001 DEPTH 0-100, SITE 001 DEPTH 500-600, SITE 001 DEPTH 1100-1200, SITE 002 DEPTH 200-300, SITE 002 DEPTH 800-900, SITE 004 DEPTH 0-100, SITE 004 DEPTH 500-600, SITE 004 DEPTH 1100-1200, SITE 007 DEPTH 200-300, SITE 007 DEPTH 800-900, SITE 008 DEPTH 0-100, SITE 008 DEPTH 500-600, SITE 008 DEPTH 1100-1200, 51SITE 020 DEPTH 0-100 SITE 001 DEPTH 200-300, SITE 001 DEPTH 800-900, SITE 002 DEPTH 0-100, SITE 002 DEPTH 500-600, SITE 002 DEPTH 1100-1200, SITE 004 DEPTH 200-300, SITE 004 DEPTH 800-900, SITE 007 DEPTH 0-100, SITE 007 DEPTH 500-600, SITE 007 DEPTH 1100-1200, SITE 008 DEPTH 200-300, SITE 008 DEPTH 800-900, SITE 014 DEPTH 0-100,	----	----	----	24-MAY-2012	22-MAY-2012	2



Matrix: **SOIL**

Method Container / Client Sample ID(s)	Extraction / Preparation			Analysis			
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue	
EA055: Moisture Content - Analysis Holding Time Compliance							
Snap Lock Bag SITE 011 DEPTH 0-100, SITE 011 DEPTH 500-600, SITE 011 DEPTH 1100-1200, SITE 014 DEPTH 500-600, SITE 014 DEPTH 1100-1200, SITE 017 DEPTH 200-300, SITE 017 DEPTH 800-900, SITE 018 DEPTH 0-100, SITE 018 DEPTH 500-600, SITE 018 DEPTH 1100-1200, SITE 019 DEPTH 200-300, SITE 019 DEPTH 800-900, SITE 020 DEPTH 200-300, SITE 020 DEPTH 800-900, SITE 021 DEPTH 0-100, SITE 021 DEPTH 500-600, SITE 021 DEPTH 1100-1200	SITE 011 DEPTH 200-300, SITE 011 DEPTH 800-900, SITE 014 DEPTH 200-300, SITE 014 DEPTH 800-900, SITE 017 DEPTH 0-100, SITE 017 DEPTH 500-600, SITE 017 DEPTH 1100-1200, SITE 018 DEPTH 200-300, SITE 018 DEPTH 800-900, SITE 019 DEPTH 0-100, SITE 019 DEPTH 500-600, SITE 019 DEPTH 1100-1200, SITE 020 DEPTH 500-600, SITE 020 DEPTH 1100-1200, SITE 021 DEPTH 200-300, SITE 021 DEPTH 800-900,	----	----	----	24-MAY-2012	23-MAY-2012	1
Soil Glass Jar - Unpreserved SITE 52 DEPTH 0-100, SITE 52 DEPTH 500-600, SITE 52 DEPTH 1100-1200	SITE 52 DEPTH 200-300, SITE 52 DEPTH 800-900,	----	----	----	29-MAY-2012	26-MAY-2012	3
ED045G: Chloride Discrete analyser							
Snap Lock Bag SITE 001 DEPTH 0-100, SITE 001 DEPTH 500-600, SITE 001 DEPTH 1100-1200, SITE 002 DEPTH 800-900, SITE 004 DEPTH 0-100, SITE 004 DEPTH 500-600, SITE 004 DEPTH 1100-1200, SITE 007 DEPTH 500-600, SITE 007 DEPTH 1100-1200, SITE 008 DEPTH 200-300, SITE 008 DEPTH 800-900, 51SITE 020 DEPTH 0-100	SITE 001 DEPTH 200-300, SITE 001 DEPTH 800-900, SITE 002 DEPTH 200-300, SITE 002 DEPTH 1100-1200, SITE 004 DEPTH 200-300, SITE 004 DEPTH 800-900, SITE 007 DEPTH 200-300, SITE 007 DEPTH 800-900, SITE 008 DEPTH 0-100, SITE 008 DEPTH 500-600, SITE 014 DEPTH 0-100,	01-JUN-2012	15-MAY-2012	17	----	----	----



Matrix: **SOIL**

Method Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
ED045G: Chloride Discrete analyser - Analysis Holding Time Compliance						
Snap Lock Bag SITE 011 DEPTH 0-100, SITE 011 DEPTH 500-600, SITE 011 DEPTH 1100-1200, SITE 014 DEPTH 500-600, SITE 014 DEPTH 1100-1200, SITE 017 DEPTH 200-300, SITE 017 DEPTH 800-900, SITE 018 DEPTH 0-100, SITE 018 DEPTH 500-600, SITE 018 DEPTH 1100-1200, SITE 019 DEPTH 200-300, SITE 019 DEPTH 800-900, SITE 020 DEPTH 200-300, SITE 020 DEPTH 800-900, SITE 021 DEPTH 0-100, SITE 021 DEPTH 500-600, SITE 021 DEPTH 1100-1200 SITE 011 DEPTH 200-300, SITE 011 DEPTH 800-900, SITE 014 DEPTH 200-300, SITE 014 DEPTH 800-900, SITE 017 DEPTH 0-100, SITE 017 DEPTH 500-600, SITE 017 DEPTH 1100-1200, SITE 018 DEPTH 200-300, SITE 018 DEPTH 800-900, SITE 019 DEPTH 0-100, SITE 019 DEPTH 500-600, SITE 019 DEPTH 1100-1200, SITE 020 DEPTH 500-600, SITE 020 DEPTH 1100-1200, SITE 021 DEPTH 200-300, SITE 021 DEPTH 800-900,	01-JUN-2012	16-MAY-2012	16	----	----	----
Snap Lock Bag SITE 022 DEPTH 0-100, SITE 022 DEPTH 500-600, SITE 022 DEPTH 1100-1200, SITE 023 DEPTH 200-300, SITE 023 DEPTH 800-900, SITE 024 DEPTH 0-100, SITE 024 DEPTH 500-600, SITE 024 DEPTH 1100-1200, SITE 025 DEPTH 200-300, SITE 025 DEPTH 800-900, SITE 022 DEPTH 200-300, SITE 022 DEPTH 800-900, SITE 023 DEPTH 0-100, SITE 023 DEPTH 500-600, SITE 023 DEPTH 1100-1200, SITE 024 DEPTH 200-300, SITE 024 DEPTH 800-900, SITE 025 DEPTH 0-100, SITE 025 DEPTH 500-600, SITE 025 DEPTH 1100-1200	01-JUN-2012	17-MAY-2012	15	----	----	----
Snap Lock Bag SITE 026 DEPTH 0-100, SITE 026 DEPTH 500-600, SITE 026 DEPTH 1100-1200, SITE 027 DEPTH 200-300, SITE 027 DEPTH 800-900, SITE 028 DEPTH 0-100, SITE 028 DEPTH 500-600, SITE 028 DEPTH 1100-1200, SITE 029 DEPTH 200-300, SITE 029 DEPTH 800-900, SITE 026 DEPTH 200-300, SITE 026 DEPTH 800-900, SITE 027 DEPTH 0-100, SITE 027 DEPTH 500-600, SITE 027 DEPTH 1100-1200, SITE 028 DEPTH 200-300, SITE 028 DEPTH 800-900, SITE 029 DEPTH 0-100, SITE 029 DEPTH 500-600, SITE 029 DEPTH 1100-1200	01-JUN-2012	17-MAY-2012	15	----	----	----



Matrix: **SOIL**

Method Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
ED045G: Chloride Discrete analyser - Analysis Holding Time Compliance						
Snap Lock Bag SITE 031 DEPTH 0-100, SITE 031 DEPTH 500-600, SITE 031 DEPTH 1100-1200, SITE 032 DEPTH 200-300, SITE 032 DEPTH 800-900, SITE 033 DEPTH 0-100, SITE 033 DEPTH 500-600, SITE 033 DEPTH 1100-1200, SITE 034 DEPTH 200-300, SITE 034 DEPTH 800-900, SITE 035 DEPTH 0-100, SITE 035 DEPTH 500-600, SITE 035 DEPTH 1100-1200, SITE 036 DEPTH 200-300, SITE 036 DEPTH 800-900, SITE 038 DEPTH 0-100, SITE 038 DEPTH 500-600, SITE 038 DEPTH 1100-1200, SITE 040 DEPTH 200-300, SITE 040 DEPTH 800-900, SITE 031 DEPTH 200-300, SITE 031 DEPTH 800-900, SITE 032 DEPTH 0-100, SITE 032 DEPTH 500-600, SITE 032 DEPTH 1100-1200, SITE 033 DEPTH 200-300, SITE 033 DEPTH 800-900, SITE 034 DEPTH 0-100, SITE 034 DEPTH 500-600, SITE 034 DEPTH 1100-1200, SITE 035 DEPTH 200-300, SITE 035 DEPTH 800-900, SITE 036 DEPTH 0-100, SITE 036 DEPTH 500-600, SITE 036 DEPTH 1100-1200, SITE 038 DEPTH 200-300, SITE 038 DEPTH 800-900, SITE 040 DEPTH 0-100, SITE 040 DEPTH 500-600, SITE 040 DEPTH 1100-1200	01-JUN-2012	18-MAY-2012	14	----	----	----
Snap Lock Bag SITE 041 DEPTH 0-100, SITE 042 DEPTH 0-100, SITE 048 DEPTH 0-100, SITE 049 DEPTH 0-100, SITE 041 DEPTH 500-600, SITE 042 DEPTH 500-600, SITE 048 DEPTH 500-600, SITE 049 DEPTH 500-600	01-JUN-2012	19-MAY-2012	13	----	----	----
Snap Lock Bag SITE 065 DEPTH 500-600, SITE 065 DEPTH 1100-1200, SITE 066 DEPTH 200-300, SITE 066 DEPTH 800-900, SITE 067 DEPTH 0-100, SITE 067 DEPTH 500-600, SITE 067 DEPTH 1100-1200, SITE 065 DEPTH 800-900, SITE 066 DEPTH 0-100, SITE 066 DEPTH 500-600, SITE 066 DEPTH 1100-1200, SITE 067 DEPTH 200-300, SITE 067 DEPTH 800-900	01-JUN-2012	21-MAY-2012	11	----	----	----
Snap Lock Bag SITE 056 DEPTH 0-100, SITE 056 DEPTH 500-600, SITE 056 DEPTH 1100-1200, SITE 057 DEPTH 200-300, SITE 057 DEPTH 800-900, SITE 058 DEPTH 0-100, SITE 056 DEPTH 200-300, SITE 056 DEPTH 800-900, SITE 057 DEPTH 0-100, SITE 057 DEPTH 500-600, SITE 057 DEPTH 1100-1200, SITE 058 DEPTH 200-300	01-JUN-2012	21-MAY-2012	11	----	----	----



Matrix: **SOIL**

Method Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
ED045G: Chloride Discrete analyser - Analysis Holding Time Compliance						
Snap Lock Bag SITE 058 DEPTH 500-600, SITE 058 DEPTH 1100-1200, SITE 061 DEPTH 200-300, SITE 061 DEPTH 800-900, SITE 062 DEPTH 0-100, SITE 062 DEPTH 500-600, SITE 062 DEPTH 1100-1200, SITE 064 DEPTH 200-300, SITE 064 DEPTH 800-900, SITE 065 DEPTH 0-100, SITE 058 DEPTH 800-900, SITE 061 DEPTH 0-100, SITE 061 DEPTH 500-600, SITE 061 DEPTH 1100-1200, SITE 062 DEPTH 200-300, SITE 062 DEPTH 800-900, SITE 064 DEPTH 0-100, SITE 064 DEPTH 500-600, SITE 064 DEPTH 1100-1200, SITE 065 DEPTH 200-300	05-JUN-2012	21-MAY-2012	15	----	----	----
Soil Glass Jar - Unpreserved SITE 002 DEPTH 0-100, SITE 007 DEPTH 0-100, SITE 002 DEPTH 500-600, SITE 008 DEPTH 1100-1200	01-JUN-2012	15-MAY-2012	17	----	----	----
Soil Glass Jar - Unpreserved SITE 52 DEPTH 0-100, SITE 52 DEPTH 500-600, SITE 52 DEPTH 1100-1200 SITE 52 DEPTH 200-300, SITE 52 DEPTH 800-900,	01-JUN-2012	19-MAY-2012	13	----	----	----
EP004: Organic Matter						
Soil Glass Jar - Unpreserved SITE 001 DEPTH 0-100, SITE 004 DEPTH 0-100, SITE 008 DEPTH 0-100, 51SITE 020 DEPTH 0-100 SITE 002 DEPTH 0-100, SITE 007 DEPTH 0-100, SITE 014 DEPTH 0-100,	31-MAY-2012	15-MAY-2012	16	----	----	----
Soil Glass Jar - Unpreserved SITE 011 DEPTH 0-100	31-MAY-2012	16-MAY-2012	15	----	----	----
Soil Glass Jar - Unpreserved SITE 022 DEPTH 0-100, SITE 027 DEPTH 0-100, SITE 029 DEPTH 0-100 SITE 026 DEPTH 0-100, SITE 028 DEPTH 0-100,	31-MAY-2012	17-MAY-2012	14	----	----	----
Soil Glass Jar - Unpreserved SITE 031 DEPTH 0-100, SITE 036 DEPTH 0-100 SITE 035 DEPTH 0-100,	31-MAY-2012	18-MAY-2012	13	----	----	----
Soil Glass Jar - Unpreserved SITE 52 DEPTH 0-100	01-JUN-2012	19-MAY-2012	13	----	----	----
Soil Glass Jar - Unpreserved SITE 041 DEPTH 0-100, SITE 048 DEPTH 0-100, SITE 042 DEPTH 0-100, SITE 049 DEPTH 0-100	31-MAY-2012	19-MAY-2012	12	----	----	----
Soil Glass Jar - Unpreserved SITE 056 DEPTH 0-100, SITE 066 DEPTH 0-100, SITE 067 DEPTH 200-300 SITE 065 DEPTH 0-100, SITE 067 DEPTH 0-100,	31-MAY-2012	21-MAY-2012	10	----	----	----



Outliers : Frequency of Quality Control Samples

The following report highlights breaches in the Frequency of Quality Control Samples.

- **No Quality Control Sample Frequency Outliers exist.**
-

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: EB1213707	Page	: 1 of 44
Client	: HORIZON ENVIRONMENTAL, SOIL SURVEY & EVALUATION	Laboratory	: Environmental Division Brisbane
Contact	: DR IAN HOLLINGSWORTH	Contact	: Customer Services
Address	: 38 WITHERDEN STREET NAKARA NT 0810	Address	: 32 Shand Street Stafford QLD Australia 4053
E-mail	: ian.hollingsworth@horizonesse.com	E-mail	: Brisbane.Enviro.Services@alsglobal.com
Telephone	: ----	Telephone	: +61 7 3243 7222
Facsimile	: ----	Facsimile	: +61 7 3243 7218
Project	: J000019	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 22-MAY-2012
Sampler	: Ian Hollingsworth	Issue Date	: 12-JUN-2012
Site	: ----		
Quote number	: ED/016/12	No. of samples received	: 198
		No. of samples analysed	: 198

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Descriptive Results



NATA Accredited Laboratory 825

Accredited for compliance with
ISO/IEC 17025.

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Jonathon Angell	Inorganic Coordinator	Brisbane Inorganics
Matt Frost	Senior Organic Chemist	Brisbane Inorganics
Stephen Hislop	Senior Inorganic Chemist	Brisbane Inorganics



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

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

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

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

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

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

- **ED021 (Bicarbonate Extractable K) Particular samples required dilution prior to analysis due to matrix interferences. LOR values have been adjusted accordingly.**
- **ED045 (Chlorides by DA); Sample EB1213707 011 (SITE 004 DEPTH 0-100) shows poor duplicate results for Chlorides due to matrix interference. This was confirmed by visual inspection.**



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

Compound	CAS Number	LOR	Unit	SITE 001 DEPTH 0-100	SITE 001 DEPTH 200-300	SITE 001 DEPTH 500-600	SITE 001 DEPTH 800-900	SITE 001 DEPTH 1100-1200
				08-MAY-2012 15:00	08-MAY-2012 15:00	08-MAY-2012 15:00	08-MAY-2012 15:00	08-MAY-2012 15:00
				EB1213707-001	EB1213707-002	EB1213707-003	EB1213707-004	EB1213707-005
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	6.6	7.6	7.2	8.1	8.4
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	45	54	113	208	254
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	2.0	3.3	<1.0	1.5	<1.0
ED008: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	8.3	----	6.2	----	2.2
Exchangeable Magnesium	----	0.1	meq/100g	2.8	----	7.2	----	3.8
Exchangeable Potassium	----	0.1	meq/100g	0.5	----	0.2	----	<0.1
Exchangeable Sodium	----	0.1	meq/100g	0.1	----	1.2	----	1.1
Cation Exchange Capacity	----	0.1	meq/100g	11.6	----	14.8	----	7.2
ED021: Bicarbonate Extractable Potassium (Colwell)								
Bicarbonate Extractable K (Colwell)	----	10	mg/kg	290	----	340	----	<200
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	20	20	70	170	200
ED091 : Calcium Chloride Extractable Boron								
Boron	7440-42-8	0.2	mg/kg	<0.2	----	----	----	----
ED092: DTPA Extractable Metals								
Copper	7440-50-8	1.00	mg/kg	3.67	----	----	----	----
Iron	7439-89-6	1.00	mg/kg	216	----	----	----	----
Manganese	7439-96-5	1.00	mg/kg	140	----	----	----	----
Zinc	7440-66-6	1.00	mg/kg	5.80	----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	20	mg/kg	1740	----	280	----	160
EK080: Bicarbonate Extractable Phosphorus (Colwell)								
Bicarbonate Ext. P (Colwell)	----	2	mg/kg	161	----	<2	----	<2
EP004: Organic Matter								
Organic Matter	----	0.5	%	0.8	----	----	----	----
Total Organic Carbon	----	0.5	%	<0.5	----	----	----	----



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

Compound	CAS Number	LOR	Unit	SITE 002 DEPTH 0-100	SITE 002 DEPTH 200-300	SITE 002 DEPTH 500-600	SITE 002 DEPTH 800-900	SITE 002 DEPTH 1100-1200
				08-MAY-2012 15:00	08-MAY-2012 15:00	08-MAY-2012 15:00	08-MAY-2012 15:00	08-MAY-2012 15:00
				EB1213707-006	EB1213707-007	EB1213707-008	EB1213707-009	EB1213707-010
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	8.6	8.9	8.9	8.7	8.7
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	237	525	881	1270	1340
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	3.6	3.6	3.5	2.7	2.5
ED008: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	27.2	----	5.5	----	3.0
Exchangeable Magnesium	----	0.1	meq/100g	10.9	----	5.6	----	5.6
Exchangeable Potassium	----	0.1	meq/100g	0.7	----	0.1	----	<0.1
Exchangeable Sodium	----	0.1	meq/100g	0.5	----	1.6	----	2.4
Cation Exchange Capacity	----	0.1	meq/100g	39.4	----	12.8	----	11.2
ED021: Bicarbonate Extractable Potassium (Colwell)								
Bicarbonate Extractable K (Colwell)	----	10	mg/kg	230	----	<200	----	240
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	60	400	1010	1600	1710
ED091 : Calcium Chloride Extractable Boron								
Boron	7440-42-8	0.2	mg/kg	<0.2	----	----	----	----
ED092: DTPA Extractable Metals								
Copper	7440-50-8	1.00	mg/kg	2.00	----	----	----	----
Iron	7439-89-6	1.00	mg/kg	50.7	----	----	----	----
Manganese	7439-96-5	1.00	mg/kg	25.5	----	----	----	----
Zinc	7440-66-6	1.00	mg/kg	<1.00	----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	20	mg/kg	1080	----	490	----	310
EK080: Bicarbonate Extractable Phosphorus (Colwell)								
Bicarbonate Ext. P (Colwell)	----	2	mg/kg	10	----	<2	----	<2
EP004: Organic Matter								
Organic Matter	----	0.5	%	<0.5	----	----	----	----
Total Organic Carbon	----	0.5	%	<0.5	----	----	----	----



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

Compound	CAS Number	LOR	Unit	SITE 004 DEPTH 0-100	SITE 004 DEPTH 200-300	SITE 004 DEPTH 500-600	SITE 004 DEPTH 800-900	SITE 004 DEPTH 1100-1200
				08-MAY-2012 15:00	08-MAY-2012 15:00	08-MAY-2012 15:00	08-MAY-2012 15:00	08-MAY-2012 15:00
				EB1213707-011	EB1213707-012	EB1213707-013	EB1213707-014	EB1213707-015
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	7.5	8.9	8.9	8.8	8.6
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	166	363	797	1200	1660
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	3.9	3.5	3.1	2.3	3.4
ED008: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	20.4	----	----	----	----
Exchangeable Magnesium	----	0.1	meq/100g	8.8	----	----	----	----
Exchangeable Potassium	----	0.1	meq/100g	0.8	----	----	----	----
Exchangeable Sodium	----	0.1	meq/100g	0.1	----	----	----	----
Cation Exchange Capacity	----	0.1	meq/100g	30.1	----	----	----	----
ED021: Bicarbonate Extractable Potassium (Colwell)								
Bicarbonate Extractable K (Colwell)	----	10	mg/kg	380	----	----	----	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	50	190	880	1560	2390
ED091 : Calcium Chloride Extractable Boron								
Boron	7440-42-8	0.2	mg/kg	<0.2	----	----	----	----
ED092: DTPA Extractable Metals								
Copper	7440-50-8	1.00	mg/kg	3.51	----	----	----	----
Iron	7439-89-6	1.00	mg/kg	116	----	----	----	----
Manganese	7439-96-5	1.00	mg/kg	84.7	----	----	----	----
Zinc	7440-66-6	1.00	mg/kg	1.77	----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	20	mg/kg	2050	----	----	----	----
EK080: Bicarbonate Extractable Phosphorus (Colwell)								
Bicarbonate Ext. P (Colwell)	----	2	mg/kg	52	----	----	----	----
EP004: Organic Matter								
Organic Matter	----	0.5	%	1.2	----	----	----	----



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

Compound	CAS Number	LOR	Unit	SITE 007 DEPTH 0-100	SITE 007 DEPTH 200-300	SITE 007 DEPTH 500-600	SITE 007 DEPTH 800-900	SITE 007 DEPTH 1100-1200
				08-MAY-2012 15:00	08-MAY-2012 15:00	08-MAY-2012 15:00	08-MAY-2012 15:00	08-MAY-2012 15:00
				EB1213707-016	EB1213707-017	EB1213707-018	EB1213707-019	EB1213707-020
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	6.8	7.7	8.2	8.1	7.7
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	62	55	46	77	128
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	1.7	2.4	2.0	1.3	2.5
ED008: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	10.7	----	10.6	----	10.1
Exchangeable Magnesium	----	0.1	meq/100g	2.5	----	2.2	----	2.5
Exchangeable Potassium	----	0.1	meq/100g	1.5	----	0.2	----	0.2
Exchangeable Sodium	----	0.1	meq/100g	<0.1	----	<0.1	----	<0.1
Cation Exchange Capacity	----	0.1	meq/100g	14.7	----	13.0	----	12.8
ED021: Bicarbonate Extractable Potassium (Colwell)								
Bicarbonate Extractable K (Colwell)	----	10	mg/kg	880	----	<200	----	<200
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	20	30	20	40	80
ED091 : Calcium Chloride Extractable Boron								
Boron	7440-42-8	0.2	mg/kg	<0.2	----	----	----	----
ED092: DTPA Extractable Metals								
Copper	7440-50-8	1.00	mg/kg	3.03	----	----	----	----
Iron	7439-89-6	1.00	mg/kg	196	----	----	----	----
Manganese	7439-96-5	1.00	mg/kg	102	----	----	----	----
Zinc	7440-66-6	1.00	mg/kg	4.21	----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	20	mg/kg	1960	----	480	----	470
EK080: Bicarbonate Extractable Phosphorus (Colwell)								
Bicarbonate Ext. P (Colwell)	----	2	mg/kg	120	----	22	----	21
EP004: Organic Matter								
Organic Matter	----	0.5	%	1.0	----	----	----	----
Total Organic Carbon	----	0.5	%	0.6	----	----	----	----



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

Compound	CAS Number	LOR	Unit	SITE 008 DEPTH 0-100	SITE 008 DEPTH 200-300	SITE 008 DEPTH 500-600	SITE 008 DEPTH 800-900	SITE 008 DEPTH 1100-1200
				08-MAY-2012 15:00	08-MAY-2012 15:00	08-MAY-2012 15:00	08-MAY-2012 15:00	08-MAY-2012 15:00
				EB1213707-021	EB1213707-022	EB1213707-023	EB1213707-024	EB1213707-025
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	5.8	7.2	7.9	6.4	7.3
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	64	32	70	190	143
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	2.0	3.4	3.5	3.9	3.4
ED008: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	4.6	----	12.9	----	9.2
Exchangeable Magnesium	----	0.1	meq/100g	1.4	----	8.8	----	7.6
Exchangeable Potassium	----	0.1	meq/100g	0.9	----	0.2	----	0.2
Exchangeable Sodium	----	0.1	meq/100g	<0.1	----	1.0	----	1.3
Cation Exchange Capacity	----	0.1	meq/100g	6.9	----	22.9	----	18.2
ED021: Bicarbonate Extractable Potassium (Colwell)								
Bicarbonate Extractable K (Colwell)	----	10	mg/kg	560	----	<200	----	<200
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	30	<10	10	50	40
ED091 : Calcium Chloride Extractable Boron								
Boron	7440-42-8	0.2	mg/kg	<0.2	----	----	----	----
ED092: DTPA Extractable Metals								
Copper	7440-50-8	1.00	mg/kg	1.86	----	----	----	----
Iron	7439-89-6	1.00	mg/kg	210	----	----	----	----
Manganese	7439-96-5	1.00	mg/kg	225	----	----	----	----
Zinc	7440-66-6	1.00	mg/kg	9.74	----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	20	mg/kg	1860	----	540	----	270
EK080: Bicarbonate Extractable Phosphorus (Colwell)								
Bicarbonate Ext. P (Colwell)	----	2	mg/kg	41	----	2	----	6
EP004: Organic Matter								
Organic Matter	----	0.5	%	0.8	----	----	----	----
Total Organic Carbon	----	0.5	%	<0.5	----	----	----	----



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

Compound	CAS Number	LOR	Unit	SITE 011 DEPTH 0-100	SITE 011 DEPTH 200-300	SITE 011 DEPTH 500-600	SITE 011 DEPTH 800-900	SITE 011 DEPTH 1100-1200
				09-MAY-2012 15:00	09-MAY-2012 15:00	09-MAY-2012 15:00	09-MAY-2012 15:00	09-MAY-2012 15:00
				EB1213707-026	EB1213707-027	EB1213707-028	EB1213707-029	EB1213707-030
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	8.4	8.6	8.6	8.8	8.8
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	121	99	92	93	98
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	1.3	1.5	1.5	<1.0	<1.0
ED008: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	27.6	----	14.4	----	23.2
Exchangeable Magnesium	----	0.1	meq/100g	1.8	----	1.3	----	1.4
Exchangeable Potassium	----	0.1	meq/100g	0.4	----	0.3	----	0.3
Exchangeable Sodium	----	0.1	meq/100g	<0.1	----	<0.1	----	<0.1
Cation Exchange Capacity	----	0.1	meq/100g	29.8	----	16.0	----	24.9
ED021: Bicarbonate Extractable Potassium (Colwell)								
Bicarbonate Extractable K (Colwell)	----	10	mg/kg	300	----	<200	----	300
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	10	<10	<10	<10	<10
ED091 : Calcium Chloride Extractable Boron								
Boron	7440-42-8	0.2	mg/kg	<0.2	----	----	----	----
ED092: DTPA Extractable Metals								
Copper	7440-50-8	1.00	mg/kg	<1.00	----	----	----	----
Iron	7439-89-6	1.00	mg/kg	28.0	----	----	----	----
Manganese	7439-96-5	1.00	mg/kg	28.4	----	----	----	----
Zinc	7440-66-6	1.00	mg/kg	1.55	----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	20	mg/kg	1670	----	420	----	380
EK080: Bicarbonate Extractable Phosphorus (Colwell)								
Bicarbonate Ext. P (Colwell)	----	2	mg/kg	25	----	5	----	6
EP004: Organic Matter								
Organic Matter	----	0.5	%	0.8	----	----	----	----
Total Organic Carbon	----	0.5	%	<0.5	----	----	----	----



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

Compound	CAS Number	LOR	Unit	SITE 014 DEPTH 0-100	SITE 014 DEPTH 200-300	SITE 014 DEPTH 500-600	SITE 014 DEPTH 800-900	SITE 014 DEPTH 1100-1200
				08-MAY-2012 15:00	09-MAY-2012 15:00	09-MAY-2012 15:00	09-MAY-2012 15:00	09-MAY-2012 15:00
				EB1213707-031	EB1213707-032	EB1213707-033	EB1213707-034	EB1213707-035
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	6.1	6.4	7.1	8.0	8.1
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	60	33	275	258	320
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	2.4	<1.0	<1.0
ED008: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	1.2	----	<0.1	----	<0.1
Exchangeable Magnesium	----	0.1	meq/100g	0.7	----	2.7	----	1.5
Exchangeable Potassium	----	0.1	meq/100g	0.1	----	<0.1	----	<0.1
Exchangeable Sodium	----	0.1	meq/100g	<0.1	----	1.4	----	1.1
Cation Exchange Capacity	----	0.1	meq/100g	2.0	----	4.2	----	2.7
ED021: Bicarbonate Extractable Potassium (Colwell)								
Bicarbonate Extractable K (Colwell)	----	10	mg/kg	740	----	<200	----	220
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	50	30	280	260	280
ED091 : Calcium Chloride Extractable Boron								
Boron	7440-42-8	0.2	mg/kg	<0.2	----	----	----	----
ED092: DTPA Extractable Metals								
Copper	7440-50-8	1.00	mg/kg	<1.00	----	----	----	----
Iron	7439-89-6	1.00	mg/kg	199	----	----	----	----
Manganese	7439-96-5	1.00	mg/kg	70.2	----	----	----	----
Zinc	7440-66-6	1.00	mg/kg	<1.00	----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	20	mg/kg	860	----	200	----	120
EK080: Bicarbonate Extractable Phosphorus (Colwell)								
Bicarbonate Ext. P (Colwell)	----	2	mg/kg	2	----	<2	----	<2
EP004: Organic Matter								
Organic Matter	----	0.5	%	0.5	----	----	----	----
Total Organic Carbon	----	0.5	%	<0.5	----	----	----	----



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				SITE 017 DEPTH 0-100	SITE 017 DEPTH 200-300	SITE 017 DEPTH 500-600	SITE 017 DEPTH 800-900	SITE 017 DEPTH 1100-1200
				09-MAY-2012 15:00	09-MAY-2012 15:00	09-MAY-2012 15:00	09-MAY-2012 15:00	09-MAY-2012 15:00
Compound	CAS Number	LOR	Unit	EB1213707-036	EB1213707-037	EB1213707-038	EB1213707-039	EB1213707-040
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	7.8	8.6	9.2	9.3	9.3
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	68	209	530	931	1050
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	3.0	2.6	2.9	2.8	2.5
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	20	20	340	980	1210



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				SITE 018 DEPTH 0-100	SITE 018 DEPTH 200-300	SITE 018 DEPTH 500-600	SITE 018 DEPTH 800-900	SITE 018 DEPTH 1100-1200
				09-MAY-2012 15:00	09-MAY-2012 15:00	09-MAY-2012 15:00	09-MAY-2012 15:00	09-MAY-2012 15:00
Compound	CAS Number	LOR	Unit	EB1213707-041	EB1213707-042	EB1213707-043	EB1213707-044	EB1213707-045
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	6.3	6.8	7.1	7.4	7.6
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	53	27	167	397	23
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	2.7	2.3	<1.0
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	20	10	120	380	10



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				SITE 019 DEPTH 0-100	SITE 019 DEPTH 200-300	SITE 019 DEPTH 500-600	SITE 019 DEPTH 800-900	SITE 019 DEPTH 1100-1200
				09-MAY-2012 15:00	09-MAY-2012 15:00	09-MAY-2012 15:00	09-MAY-2012 15:00	09-MAY-2012 15:00
Compound	CAS Number	LOR	Unit	EB1213707-046	EB1213707-047	EB1213707-048	EB1213707-049	EB1213707-050
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	6.6	8.3	9.0	9.2	9.0
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	41	58	169	665	864
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	1.9	2.4	3.6	2.8	2.6
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	<10	10	80	630	1130



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				51SITE 020 DEPTH 0-100	SITE 020 DEPTH 200-300	SITE 020 DEPTH 500-600	SITE 020 DEPTH 800-900	SITE 020 DEPTH 1100-1200
				08-MAY-2012 15:00	09-MAY-2012 15:00	09-MAY-2012 15:00	09-MAY-2012 15:00	09-MAY-2012 15:00
Compound	CAS Number	LOR	Unit	EB1213707-051	EB1213707-052	EB1213707-053	EB1213707-054	EB1213707-055
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	6.8	8.2	9.1	9.4	9.1
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	45	59	203	916	1200
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	1.3	2.3	1.7	2.1	1.4
ED008: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	9.9	----	7.8	----	7.4
Exchangeable Magnesium	----	0.1	meq/100g	2.9	----	9.1	----	8.4
Exchangeable Potassium	----	0.1	meq/100g	0.4	----	0.1	----	0.2
Exchangeable Sodium	----	0.1	meq/100g	<0.1	----	3.6	----	3.9
Cation Exchange Capacity	----	0.1	meq/100g	13.3	----	20.6	----	19.8
ED021: Bicarbonate Extractable Potassium (Colwell)								
Bicarbonate Extractable K (Colwell)	----	10	mg/kg	360	----	490	----	<200
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	20	10	100	1040	1700
ED091 : Calcium Chloride Extractable Boron								
Boron	7440-42-8	0.2	mg/kg	<0.2	----	----	----	----
ED092: DTPA Extractable Metals								
Copper	7440-50-8	1.00	mg/kg	2.29	----	----	----	----
Iron	7439-89-6	1.00	mg/kg	194	----	----	----	----
Manganese	7439-96-5	1.00	mg/kg	82.3	----	----	----	----
Zinc	7440-66-6	1.00	mg/kg	1.76	----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	20	mg/kg	2190	----	450	----	290
EK080: Bicarbonate Extractable Phosphorus (Colwell)								
Bicarbonate Ext. P (Colwell)	----	2	mg/kg	48	----	<2	----	15
EP004: Organic Matter								
Organic Matter	----	0.5	%	0.9	----	----	----	----
Total Organic Carbon	----	0.5	%	0.5	----	----	----	----



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				SITE 021 DEPTH 0-100	SITE 021 DEPTH 200-300	SITE 021 DEPTH 500-600	SITE 021 DEPTH 800-900	SITE 021 DEPTH 1100-1200
				09-MAY-2012 15:00	09-MAY-2012 15:00	09-MAY-2012 15:00	09-MAY-2012 15:00	09-MAY-2012 15:00
Compound	CAS Number	LOR	Unit	EB1213707-056	EB1213707-057	EB1213707-058	EB1213707-059	EB1213707-060
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	6.6	8.8	7.8	5.7	5.8
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	49	248	449	826	881
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	3.3	3.4	2.5	3.6	2.7
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	20	90	490	1190	1380



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

Compound	CAS Number	LOR	Unit	SITE 022 DEPTH 0-100	SITE 022 DEPTH 200-300	SITE 022 DEPTH 500-600	SITE 022 DEPTH 800-900	SITE 022 DEPTH 1100-1200
				10-MAY-2012 15:00	10-MAY-2012 15:00	10-MAY-2012 15:00	10-MAY-2012 15:00	10-MAY-2012 15:00
				EB1213707-061	EB1213707-062	EB1213707-063	EB1213707-064	EB1213707-065
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	7.4	8.2	7.8	5.9	7.1
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	47	146	711	1140	1140
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	1.3	1.8	1.7	2.1	1.5
ED008: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	6.5	----	3.4	----	1.4
Exchangeable Magnesium	----	0.1	meq/100g	2.4	----	6.4	----	6.3
Exchangeable Potassium	----	0.1	meq/100g	0.4	----	0.1	----	0.2
Exchangeable Sodium	----	0.1	meq/100g	0.2	----	2.8	----	3.7
Cation Exchange Capacity	----	0.1	meq/100g	9.4	----	12.7	----	11.5
ED021: Bicarbonate Extractable Potassium (Colwell)								
Bicarbonate Extractable K (Colwell)	----	10	mg/kg	930	----	<200	----	<200
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	20	130	940	1520	1680
ED091 : Calcium Chloride Extractable Boron								
Boron	7440-42-8	0.2	mg/kg	<0.2	----	----	----	----
ED092: DTPA Extractable Metals								
Copper	7440-50-8	1.00	mg/kg	2.40	----	----	----	----
Iron	7439-89-6	1.00	mg/kg	128	----	----	----	----
Manganese	7439-96-5	1.00	mg/kg	78.6	----	----	----	----
Zinc	7440-66-6	1.00	mg/kg	1.55	----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	20	mg/kg	1100	----	600	----	380
EK080: Bicarbonate Extractable Phosphorus (Colwell)								
Bicarbonate Ext. P (Colwell)	----	2	mg/kg	89	----	7	----	10
EP004: Organic Matter								
Organic Matter	----	0.5	%	0.5	----	----	----	----
Total Organic Carbon	----	0.5	%	<0.5	----	----	----	----



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				SITE 023 DEPTH 0-100	SITE 023 DEPTH 200-300	SITE 023 DEPTH 500-600	SITE 023 DEPTH 800-900	SITE 023 DEPTH 1100-1200
				10-MAY-2012 15:00	10-MAY-2012 15:00	10-MAY-2012 15:00	10-MAY-2012 15:00	10-MAY-2012 15:00
Compound	CAS Number	LOR	Unit	EB1213707-066	EB1213707-067	EB1213707-068	EB1213707-069	EB1213707-070
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	6.5	8.9	9.3	9.2	9.3
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	61	238	580	1010	1080
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	1.8	2.7	1.9	1.8	2.2
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	20	30	400	1160	1350



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				SITE 024 DEPTH 0-100	SITE 024 DEPTH 200-300	SITE 024 DEPTH 500-600	SITE 024 DEPTH 800-900	SITE 024 DEPTH 1100-1200
				10-MAY-2012 15:00	10-MAY-2012 15:00	10-MAY-2012 15:00	10-MAY-2012 15:00	10-MAY-2012 15:00
Compound	CAS Number	LOR	Unit	EB1213707-071	EB1213707-072	EB1213707-073	EB1213707-074	EB1213707-075
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	6.7	8.4	8.6	9.2	8.6
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	42	128	416	935	911
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	1.3	2.6	1.3	1.4	1.4
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	20	80	480	1140	1260



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				SITE 025 DEPTH 0-100	SITE 025 DEPTH 200-300	SITE 025 DEPTH 500-600	SITE 025 DEPTH 800-900	SITE 025 DEPTH 1100-1200
				10-MAY-2012 15:00	10-MAY-2012 15:00	10-MAY-2012 15:00	10-MAY-2012 15:00	10-MAY-2012 15:00
Compound	CAS Number	LOR	Unit	EB1213707-076	EB1213707-077	EB1213707-078	EB1213707-079	EB1213707-080
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	6.8	7.3	8.3	9.2	9.1
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	94	91	233	813	905
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	1.6	1.5	2.4	1.4	1.4
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	70	70	230	970	1220



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				SITE 026 DEPTH 0-100	SITE 026 DEPTH 200-300	SITE 026 DEPTH 500-600	SITE 026 DEPTH 800-900	SITE 026 DEPTH 1100-1200
				10-MAY-2012 15:00	10-MAY-2012 15:00	10-MAY-2012 15:00	10-MAY-2012 15:00	10-MAY-2012 15:00
Compound	CAS Number	LOR	Unit	EB1213707-081	EB1213707-082	EB1213707-083	EB1213707-084	EB1213707-085
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	6.2	6.9	8.0	9.3	9.5
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	31	47	201	567	560
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	2.8	1.4	1.9	<1.0
ED008: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	2.9	----	3.1	----	23.1
Exchangeable Magnesium	----	0.1	meq/100g	2.2	----	9.9	----	8.2
Exchangeable Potassium	----	0.1	meq/100g	0.4	----	0.1	----	0.1
Exchangeable Sodium	----	0.1	meq/100g	<0.1	----	2.6	----	1.3
Cation Exchange Capacity	----	0.1	meq/100g	5.5	----	15.8	----	32.8
ED021: Bicarbonate Extractable Potassium (Colwell)								
Bicarbonate Extractable K (Colwell)	----	10	mg/kg	560	----	<200	----	<200
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	20	20	170	450	430
ED091 : Calcium Chloride Extractable Boron								
Boron	7440-42-8	0.2	mg/kg	<0.2	----	----	----	----
ED092: DTPA Extractable Metals								
Copper	7440-50-8	1.00	mg/kg	1.08	----	----	----	----
Iron	7439-89-6	1.00	mg/kg	206	----	----	----	----
Manganese	7439-96-5	1.00	mg/kg	80.1	----	----	----	----
Zinc	7440-66-6	1.00	mg/kg	1.19	----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	20	mg/kg	1020	----	440	----	270
EK080: Bicarbonate Extractable Phosphorus (Colwell)								
Bicarbonate Ext. P (Colwell)	----	2	mg/kg	10	----	<2	----	16
EP004: Organic Matter								
Organic Matter	----	0.5	%	0.6	----	----	----	----
Total Organic Carbon	----	0.5	%	<0.5	----	----	----	----



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

Compound	CAS Number	LOR	Unit	SITE 027 DEPTH 0-100	SITE 027 DEPTH 200-300	SITE 027 DEPTH 500-600	SITE 027 DEPTH 800-900	SITE 027 DEPTH 1100-1200
				10-MAY-2012 15:00	10-MAY-2012 15:00	10-MAY-2012 15:00	10-MAY-2012 15:00	10-MAY-2012 15:00
				EB1213707-086	EB1213707-087	EB1213707-088	EB1213707-089	EB1213707-090
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	6.4	6.6	8.0	8.7	9.3
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	28	25	122	285	727
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	1.0	1.4
ED008: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	2.5	----	----	----	----
Exchangeable Magnesium	----	0.1	meq/100g	2.4	----	----	----	----
Exchangeable Potassium	----	0.1	meq/100g	0.4	----	----	----	----
Exchangeable Sodium	----	0.1	meq/100g	<0.1	----	----	----	----
Cation Exchange Capacity	----	0.1	meq/100g	5.3	----	----	----	----
ED021: Bicarbonate Extractable Potassium (Colwell)								
Bicarbonate Extractable K (Colwell)	----	10	mg/kg	<200	----	----	----	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	10	<10	70	280	670
ED091 : Calcium Chloride Extractable Boron								
Boron	7440-42-8	0.2	mg/kg	<0.2	----	----	----	----
ED092: DTPA Extractable Metals								
Copper	7440-50-8	1.00	mg/kg	1.34	----	----	----	----
Iron	7439-89-6	1.00	mg/kg	177	----	----	----	----
Manganese	7439-96-5	1.00	mg/kg	136	----	----	----	----
Zinc	7440-66-6	1.00	mg/kg	<1.00	----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	20	mg/kg	1060	----	----	----	----
EK080: Bicarbonate Extractable Phosphorus (Colwell)								
Bicarbonate Ext. P (Colwell)	----	2	mg/kg	24	----	----	----	----
EP004: Organic Matter								
Organic Matter	----	0.5	%	<0.5	----	----	----	----
Total Organic Carbon	----	0.5	%	<0.5	----	----	----	----



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

Compound	CAS Number	LOR	Unit	SITE 028 DEPTH 0-100	SITE 028 DEPTH 200-300	SITE 028 DEPTH 500-600	SITE 028 DEPTH 800-900	SITE 028 DEPTH 1100-1200
				10-MAY-2012 15:00	10-MAY-2012 15:00	10-MAY-2012 15:00	10-MAY-2012 15:00	10-MAY-2012 15:00
				EB1213707-091	EB1213707-092	EB1213707-093	EB1213707-094	EB1213707-095
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	6.3	6.4	6.6	7.0	6.7
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	65	19	57	155	513
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	<1.0	<1.0	<1.0
ED008: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	3.6	----	2.8	----	1.6
Exchangeable Magnesium	----	0.1	meq/100g	1.4	----	7.3	----	4.4
Exchangeable Potassium	----	0.1	meq/100g	0.4	----	0.2	----	0.1
Exchangeable Sodium	----	0.1	meq/100g	<0.1	----	1.3	----	1.9
Cation Exchange Capacity	----	0.1	meq/100g	5.4	----	11.6	----	8.0
ED021: Bicarbonate Extractable Potassium (Colwell)								
Bicarbonate Extractable K (Colwell)	----	10	mg/kg	400	----	240	----	<200
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	50	<10	20	140	680
ED091 : Calcium Chloride Extractable Boron								
Boron	7440-42-8	0.2	mg/kg	<0.2	----	----	----	----
ED092: DTPA Extractable Metals								
Copper	7440-50-8	1.00	mg/kg	<1.00	----	----	----	----
Iron	7439-89-6	1.00	mg/kg	163	----	----	----	----
Manganese	7439-96-5	1.00	mg/kg	231	----	----	----	----
Zinc	7440-66-6	1.00	mg/kg	2.01	----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	20	mg/kg	1350	----	580	----	380
EK080: Bicarbonate Extractable Phosphorus (Colwell)								
Bicarbonate Ext. P (Colwell)	----	2	mg/kg	20	----	4	----	10
EP004: Organic Matter								
Organic Matter	----	0.5	%	0.8	----	----	----	----
Total Organic Carbon	----	0.5	%	<0.5	----	----	----	----



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

Compound	CAS Number	LOR	Unit	SITE 029 DEPTH 0-100	SITE 029 DEPTH 200-300	SITE 029 DEPTH 500-600	SITE 029 DEPTH 800-900	SITE 029 DEPTH 1100-1200
				10-MAY-2012 15:00	10-MAY-2012 15:00	10-MAY-2012 15:00	10-MAY-2012 15:00	10-MAY-2012 15:00
				EB1213707-096	EB1213707-097	EB1213707-098	EB1213707-099	EB1213707-100
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	6.0	6.5	8.4	9.5	9.0
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	80	132	231	663	928
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	1.2	<1.0	<1.0	<1.0
ED008: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	2.0	----	5.0	----	3.7
Exchangeable Magnesium	----	0.1	meq/100g	1.8	----	8.1	----	5.6
Exchangeable Potassium	----	0.1	meq/100g	0.7	----	<0.1	----	0.1
Exchangeable Sodium	----	0.1	meq/100g	0.2	----	3.6	----	2.5
Cation Exchange Capacity	----	0.1	meq/100g	4.6	----	16.8	----	12.0
ED021: Bicarbonate Extractable Potassium (Colwell)								
Bicarbonate Extractable K (Colwell)	----	10	mg/kg	700	----	<200	----	<200
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	70	70	150	480	1120
ED091 : Calcium Chloride Extractable Boron								
Boron	7440-42-8	0.2	mg/kg	<0.2	----	----	----	----
ED092: DTPA Extractable Metals								
Copper	7440-50-8	1.00	mg/kg	<1.00	----	----	----	----
Iron	7439-89-6	1.00	mg/kg	174	----	----	----	----
Manganese	7439-96-5	1.00	mg/kg	163	----	----	----	----
Zinc	7440-66-6	1.00	mg/kg	1.20	----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	20	mg/kg	980	----	620	----	340
EK080: Bicarbonate Extractable Phosphorus (Colwell)								
Bicarbonate Ext. P (Colwell)	----	2	mg/kg	21	----	2	----	<2
EP004: Organic Matter								
Organic Matter	----	0.5	%	0.6	----	----	----	----
Total Organic Carbon	----	0.5	%	<0.5	----	----	----	----



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				SITE 031 DEPTH 0-100	SITE 031 DEPTH 200-300	SITE 031 DEPTH 500-600	SITE 031 DEPTH 800-900	SITE 031 DEPTH 1100-1200
				11-MAY-2012 15:00	11-MAY-2012 15:00	11-MAY-2012 15:00	11-MAY-2012 15:00	11-MAY-2012 15:00
Compound	CAS Number	LOR	Unit	EB1213707-101	EB1213707-102	EB1213707-103	EB1213707-104	EB1213707-105
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	5.6	6.6	8.1	8.4	8.3
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	76	146	810	948	989
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	2.0	2.2	2.1	2.2
ED008: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	2.3	----	2.3	----	2.4
Exchangeable Magnesium	----	0.1	meq/100g	1.6	----	5.0	----	5.1
Exchangeable Potassium	----	0.1	meq/100g	0.4	----	<0.1	----	0.1
Exchangeable Sodium	----	0.1	meq/100g	<0.1	----	3.3	----	3.4
Cation Exchange Capacity	----	0.1	meq/100g	4.3	----	10.7	----	11.0
ED021: Bicarbonate Extractable Potassium (Colwell)								
Bicarbonate Extractable K (Colwell)	----	10	mg/kg	280	----	<200	----	<200
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	70	110	1060	1310	1370
ED091 : Calcium Chloride Extractable Boron								
Boron	7440-42-8	0.2	mg/kg	<0.2	----	----	----	----
ED092: DTPA Extractable Metals								
Copper	7440-50-8	1.00	mg/kg	1.01	----	----	----	----
Iron	7439-89-6	1.00	mg/kg	441	----	----	----	----
Manganese	7439-96-5	1.00	mg/kg	142	----	----	----	----
Zinc	7440-66-6	1.00	mg/kg	2.60	----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	20	mg/kg	1680	----	50	----	470
EK080: Bicarbonate Extractable Phosphorus (Colwell)								
Bicarbonate Ext. P (Colwell)	----	2	mg/kg	18	----	<2	----	<2
EP004: Organic Matter								
Organic Matter	----	0.5	%	1.2	----	----	----	----
Total Organic Carbon	----	0.5	%	0.7	----	----	----	----



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				SITE 032 DEPTH 0-100	SITE 032 DEPTH 200-300	SITE 032 DEPTH 500-600	SITE 032 DEPTH 800-900	SITE 032 DEPTH 1100-1200
				11-MAY-2012 15:00	11-MAY-2012 15:00	11-MAY-2012 15:00	11-MAY-2012 15:00	11-MAY-2012 15:00
Compound	CAS Number	LOR	Unit	EB1213707-106	EB1213707-107	EB1213707-108	EB1213707-109	EB1213707-110
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	6.0	7.4	8.2	8.4	8.4
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	98	136	591	890	958
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	1.6	2.0	2.5	2.7	2.8
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	100	110	690	1160	1280



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				SITE 033 DEPTH 0-100	SITE 033 DEPTH 200-300	SITE 033 DEPTH 500-600	SITE 033 DEPTH 800-900	SITE 033 DEPTH 1100-1200
				11-MAY-2012 15:00	11-MAY-2012 15:00	11-MAY-2012 15:00	11-MAY-2012 15:00	11-MAY-2012 15:00
Compound	CAS Number	LOR	Unit	EB1213707-111	EB1213707-112	EB1213707-113	EB1213707-114	EB1213707-115
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	6.5	7.2	8.0	8.4	8.2
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	38	276	892	1420	1360
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	1.8	2.0	2.8	3.7	3.8
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	20	310	1320	2200	2130



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				SITE 034 DEPTH 0-100	SITE 034 DEPTH 200-300	SITE 034 DEPTH 500-600	SITE 034 DEPTH 800-900	SITE 034 DEPTH 1100-1200
				11-MAY-2012 15:00	11-MAY-2012 15:00	11-MAY-2012 15:00	11-MAY-2012 15:00	11-MAY-2012 15:00
Compound	CAS Number	LOR	Unit	EB1213707-116	EB1213707-117	EB1213707-118	EB1213707-119	EB1213707-120
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	5.9	6.4	8.0	8.7	8.6
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	35	19	133	347	1360
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	<1.0	1.6	1.6	4.1
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	20	<10	80	330	1710



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				SITE 035 DEPTH 0-100	SITE 035 DEPTH 200-300	SITE 035 DEPTH 500-600	SITE 035 DEPTH 800-900	SITE 035 DEPTH 1100-1200
				11-MAY-2012 15:00	11-MAY-2012 15:00	11-MAY-2012 15:00	11-MAY-2012 15:00	11-MAY-2012 15:00
Compound	CAS Number	LOR	Unit	EB1213707-121	EB1213707-122	EB1213707-123	EB1213707-124	EB1213707-125
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	5.8	6.7	7.1	8.2	9.3
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	22	19	48	187	454
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	1.3	2.0	2.0	1.5
ED008: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	0.9	----	0.3	----	1.4
Exchangeable Magnesium	----	0.1	meq/100g	1.1	----	7.6	----	5.2
Exchangeable Potassium	----	0.1	meq/100g	0.1	----	<0.1	----	<0.1
Exchangeable Sodium	----	0.1	meq/100g	<0.1	----	1.5	----	1.6
Cation Exchange Capacity	----	0.1	meq/100g	2.1	----	9.4	----	8.3
ED021: Bicarbonate Extractable Potassium (Colwell)								
Bicarbonate Extractable K (Colwell)	----	10	mg/kg	<200	----	<200	----	<200
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	<10	<10	20	120	360
ED091 : Calcium Chloride Extractable Boron								
Boron	7440-42-8	0.2	mg/kg	<0.2	----	----	----	----
ED092: DTPA Extractable Metals								
Copper	7440-50-8	1.00	mg/kg	<1.00	----	----	----	----
Iron	7439-89-6	1.00	mg/kg	112	----	----	----	----
Manganese	7439-96-5	1.00	mg/kg	145	----	----	----	----
Zinc	7440-66-6	1.00	mg/kg	<1.00	----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	20	mg/kg	530	----	240	----	90
EK080: Bicarbonate Extractable Phosphorus (Colwell)								
Bicarbonate Ext. P (Colwell)	----	2	mg/kg	<2	----	<2	----	<2
EP004: Organic Matter								
Organic Matter	----	0.5	%	<0.5	----	----	----	----
Total Organic Carbon	----	0.5	%	<0.5	----	----	----	----



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

Compound	CAS Number	LOR	Unit	SITE 036 DEPTH 0-100	SITE 036 DEPTH 200-300	SITE 036 DEPTH 500-600	SITE 036 DEPTH 800-900	SITE 036 DEPTH 1100-1200
				11-MAY-2012 15:00	11-MAY-2012 15:00	11-MAY-2012 15:00	11-MAY-2012 15:00	11-MAY-2012 15:00
				EB1213707-126	EB1213707-127	EB1213707-128	EB1213707-129	EB1213707-130
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	7.0	8.1	8.6	8.6	8.4
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	78	689	886	662	682
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	<1.0	3.7	3.8	3.2	3.0
ED008: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	2.7	----	3.4	----	1.4
Exchangeable Magnesium	----	0.1	meq/100g	2.2	----	7.3	----	3.4
Exchangeable Potassium	----	0.1	meq/100g	<0.1	----	<0.1	----	<0.1
Exchangeable Sodium	----	0.1	meq/100g	0.5	----	4.9	----	2.4
Cation Exchange Capacity	----	0.1	meq/100g	5.6	----	15.7	----	7.3
ED021: Bicarbonate Extractable Potassium (Colwell)								
Bicarbonate Extractable K (Colwell)	----	10	mg/kg	<200	----	<200	----	<200
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	60	860	1130	860	890
ED091 : Calcium Chloride Extractable Boron								
Boron	7440-42-8	0.2	mg/kg	<0.2	----	----	----	----
ED092: DTPA Extractable Metals								
Copper	7440-50-8	1.00	mg/kg	<1.00	----	----	----	----
Iron	7439-89-6	1.00	mg/kg	114	----	----	----	----
Manganese	7439-96-5	1.00	mg/kg	65.8	----	----	----	----
Zinc	7440-66-6	1.00	mg/kg	<1.00	----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	20	mg/kg	730	----	390	----	220
EK080: Bicarbonate Extractable Phosphorus (Colwell)								
Bicarbonate Ext. P (Colwell)	----	2	mg/kg	<2	----	<2	----	<2
EP004: Organic Matter								
Organic Matter	----	0.5	%	0.5	----	----	----	----
Total Organic Carbon	----	0.5	%	<0.5	----	----	----	----



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				SITE 038 DEPTH 0-100	SITE 038 DEPTH 200-300	SITE 038 DEPTH 500-600	SITE 038 DEPTH 800-900	SITE 038 DEPTH 1100-1200
				11-MAY-2012 15:00	11-MAY-2012 15:00	11-MAY-2012 15:00	11-MAY-2012 15:00	11-MAY-2012 15:00
Compound	CAS Number	LOR	Unit	EB1213707-131	EB1213707-132	EB1213707-133	EB1213707-134	EB1213707-135
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	6.1	6.2	6.6	5.8	5.6
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	81	291	750	947	901
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	1.3	2.6	2.0	1.7	1.4
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	60	320	1060	1400	1280



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				SITE 040 DEPTH 0-100	SITE 040 DEPTH 200-300	SITE 040 DEPTH 500-600	SITE 040 DEPTH 800-900	SITE 040 DEPTH 1100-1200
				11-MAY-2012 15:00	11-MAY-2012 15:00	11-MAY-2012 15:00	11-MAY-2012 15:00	11-MAY-2012 15:00
Compound	CAS Number	LOR	Unit	EB1213707-136	EB1213707-137	EB1213707-138	EB1213707-139	EB1213707-140
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	6.5	7.4	7.3	8.3	8.4
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	74	100	449	609	597
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	1.2	2.0	<1.0	<1.0	<1.0
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	30	60	520	720	700



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				SITE 041 DEPTH 0-100	SITE 041 DEPTH 500-600	SITE 042 DEPTH 0-100	SITE 042 DEPTH 500-600	SITE 048 DEPTH 0-100
				12-MAY-2012 15:00	12-MAY-2012 15:00	12-MAY-2012 15:00	12-MAY-2012 15:00	12-MAY-2012 15:00
Compound	CAS Number	LOR	Unit	EB1213707-141	EB1213707-142	EB1213707-143	EB1213707-144	EB1213707-145
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	8.0	9.1	7.2	9.0	6.6
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	183	981	85	364	107
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	4.0	4.4	2.6	3.8	3.3
ED008: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	18.5	9.4	13.4	7.0	8.5
Exchangeable Magnesium	----	0.1	meq/100g	10.6	7.4	6.9	15.6	11.6
Exchangeable Potassium	----	0.1	meq/100g	0.6	<0.1	0.5	<0.1	0.2
Exchangeable Sodium	----	0.1	meq/100g	0.3	2.7	<0.1	4.4	1.2
Cation Exchange Capacity	----	0.1	meq/100g	30.0	19.6	20.9	27.1	21.5
ED021: Bicarbonate Extractable Potassium (Colwell)								
Bicarbonate Extractable K (Colwell)	----	10	mg/kg	<200	<200	<200	1020	<200
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	20	1070	40	310	70
ED091 : Calcium Chloride Extractable Boron								
Boron	7440-42-8	0.2	mg/kg	<0.2	----	<0.2	----	<0.2
ED092: DTPA Extractable Metals								
Copper	7440-50-8	1.00	mg/kg	2.29	----	1.17	----	1.68
Iron	7439-89-6	1.00	mg/kg	59.6	----	62.2	----	101
Manganese	7439-96-5	1.00	mg/kg	57.6	----	115	----	59.9
Zinc	7440-66-6	1.00	mg/kg	1.41	----	1.82	----	<1.00
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	20	mg/kg	1690	450	2930	370	1160
EK080: Bicarbonate Extractable Phosphorus (Colwell)								
Bicarbonate Ext. P (Colwell)	----	2	mg/kg	<2	<2	<2	<2	<2
EP004: Organic Matter								
Organic Matter	----	0.5	%	1.1	----	1.5	----	0.6
Total Organic Carbon	----	0.5	%	0.6	----	0.9	----	<0.5



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				SITE 048 DEPTH 500-600	SITE 049 DEPTH 0-100	SITE 049 DEPTH 500-600	SITE 056 DEPTH 0-100	SITE 056 DEPTH 200-300
				12-MAY-2012 15:00	12-MAY-2012 15:00	12-MAY-2012 15:00	14-MAY-2012 15:00	14-MAY-2012 15:00
				EB1213707-146	EB1213707-147	EB1213707-148	EB1213707-149	EB1213707-150
Compound	CAS Number	LOR	Unit					
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	7.5	7.1	9.2	7.3	8.8
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	640	215	613	140	144
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	3.3	2.6	3.1	1.0	2.3
ED008: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	5.2	5.0	7.5	5.8	----
Exchangeable Magnesium	----	0.1	meq/100g	14.1	10.5	11.8	1.3	----
Exchangeable Potassium	----	0.1	meq/100g	0.2	0.4	0.2	0.4	----
Exchangeable Sodium	----	0.1	meq/100g	3.7	1.6	4.1	<0.1	----
Cation Exchange Capacity	----	0.1	meq/100g	23.2	17.5	23.7	7.6	----
ED021: Bicarbonate Extractable Potassium (Colwell)								
Bicarbonate Extractable K (Colwell)	----	10	mg/kg	<200	<200	<200	1090	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	870	200	520	100	60
ED091 : Calcium Chloride Extractable Boron								
Boron	7440-42-8	0.2	mg/kg	----	<0.2	----	<0.2	----
ED092: DTPA Extractable Metals								
Copper	7440-50-8	1.00	mg/kg	----	2.01	----	<1.00	----
Iron	7439-89-6	1.00	mg/kg	----	81.2	----	73.5	----
Manganese	7439-96-5	1.00	mg/kg	----	35.7	----	56.2	----
Zinc	7440-66-6	1.00	mg/kg	----	<1.00	----	<1.00	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	20	mg/kg	460	1160	310	1160	----
EK080: Bicarbonate Extractable Phosphorus (Colwell)								
Bicarbonate Ext. P (Colwell)	----	2	mg/kg	<2	<2	<2	<2	----
EP004: Organic Matter								
Organic Matter	----	0.5	%	----	0.5	----	0.7	----
Total Organic Carbon	----	0.5	%	----	<0.5	----	<0.5	----



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				SITE 056 DEPTH 500-600	SITE 056 DEPTH 800-900	SITE 056 DEPTH 1100-1200	SITE 057 DEPTH 0-100	SITE 057 DEPTH 200-300
				14-MAY-2012 15:00	14-MAY-2012 15:00	14-MAY-2012 15:00	14-MAY-2012 15:00	14-MAY-2012 15:00
				EB1213707-151	EB1213707-152	EB1213707-153	EB1213707-154	EB1213707-155
Compound	CAS Number	LOR	Unit					
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	9.3	8.9	8.5	6.9	8.1
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	391	903	1050	34	239
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	2.4	2.8	3.1	1.3	3.8
ED008: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	1.0	----	----	----	----
Exchangeable Magnesium	----	0.1	meq/100g	5.5	----	----	----	----
Exchangeable Potassium	----	0.1	meq/100g	<0.1	----	----	----	----
Exchangeable Sodium	----	0.1	meq/100g	3.0	----	----	----	----
Cation Exchange Capacity	----	0.1	meq/100g	9.6	----	----	----	----
ED021: Bicarbonate Extractable Potassium (Colwell)								
Bicarbonate Extractable K (Colwell)	----	10	mg/kg	<200	----	----	----	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	290	1080	1360	20	160
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	20	mg/kg	270	----	----	----	----
EK080: Bicarbonate Extractable Phosphorus (Colwell)								
Bicarbonate Ext. P (Colwell)	----	2	mg/kg	<2	----	----	----	----



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				SITE 057 DEPTH 500-600	SITE 057 DEPTH 800-900	SITE 057 DEPTH 1100-1200	SITE 058 DEPTH 0-100	SITE 058 DEPTH 200-300
				14-MAY-2012 15:00	14-MAY-2012 15:00	14-MAY-2012 15:00	14-MAY-2012 15:00	14-MAY-2012 15:00
				EB1213707-156	EB1213707-157	EB1213707-158	EB1213707-159	EB1213707-160
Compound	CAS Number	LOR	Unit					
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	8.8	8.5	8.1	8.1	8.4
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	709	818	799	178	641
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	2.8	2.9	2.6	2.8	3.5
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	810	1130	1130	90	880



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				SITE 058 DEPTH 500-600	SITE 058 DEPTH 800-900	SITE 058 DEPTH 1100-1200	SITE 061 DEPTH 0-100	SITE 061 DEPTH 200-300
				14-MAY-2012 15:00	14-MAY-2012 15:00	14-MAY-2012 15:00	14-MAY-2012 15:00	14-MAY-2012 15:00
				EB1213707-161	EB1213707-162	EB1213707-163	EB1213707-164	EB1213707-165
Compound	CAS Number	LOR	Unit					
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	8.3	8.1	8.0	6.2	7.0
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	936	954	700	81	149
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	3.4	3.2	2.8	1.6	3.0
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	1410	1500	1380	50	100



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				SITE 061 DEPTH 500-600	SITE 061 DEPTH 800-900	SITE 061 DEPTH 1100-1200	SITE 062 DEPTH 0-100	SITE 062 DEPTH 200-300
				14-MAY-2012 15:00	14-MAY-2012 15:00	14-MAY-2012 15:00	14-MAY-2012 15:00	14-MAY-2012 15:00
				EB1213707-166	EB1213707-167	EB1213707-168	EB1213707-169	EB1213707-170
Compound	CAS Number	LOR	Unit					
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	8.0	8.0	7.6	6.0	8.1
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	525	683	697	36	254
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	3.7	3.1	3.1	1.4	2.4
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	670	1120	910	30	240



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				SITE 062 DEPTH 500-600	SITE 062 DEPTH 800-900	SITE 062 DEPTH 1100-1200	SITE 064 DEPTH 0-100	SITE 064 DEPTH 200-300
				14-MAY-2012 15:00	14-MAY-2012 15:00	14-MAY-2012 15:00	14-MAY-2012 15:00	14-MAY-2012 15:00
Compound	CAS Number	LOR	Unit	EB1213707-171	EB1213707-172	EB1213707-173	EB1213707-174	EB1213707-175
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	7.7	7.9	8.0	6.0	6.6
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	555	769	691	23	28
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	2.5	2.6	1.9	1.6	<1.0
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	660	980	910	10	10



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

Compound	CAS Number	LOR	Unit	SITE 064 DEPTH 500-600	SITE 064 DEPTH 800-900	SITE 064 DEPTH 1100-1200	SITE 065 DEPTH 0-100	SITE 065 DEPTH 200-300
				14-MAY-2012 15:00	14-MAY-2012 15:00	14-MAY-2012 15:00	14-MAY-2012 15:00	14-MAY-2012 15:00
				EB1213707-176	EB1213707-177	EB1213707-178	EB1213707-179	EB1213707-180
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	5.6	5.2	5.6	6.0	6.7
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	308	565	375	95	92
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	3.5	3.0	2.2	1.3	1.8
ED008: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	----	----	----	2.0	----
Exchangeable Magnesium	----	0.1	meq/100g	----	----	----	3.0	----
Exchangeable Potassium	----	0.1	meq/100g	----	----	----	<0.1	----
Exchangeable Sodium	----	0.1	meq/100g	----	----	----	0.6	----
Cation Exchange Capacity	----	0.1	meq/100g	----	----	----	5.6	----
ED021: Bicarbonate Extractable Potassium (Colwell)								
Bicarbonate Extractable K (Colwell)	----	10	mg/kg	----	----	----	<200	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	360	840	500	90	60
ED091 : Calcium Chloride Extractable Boron								
Boron	7440-42-8	0.2	mg/kg	----	----	----	<0.2	----
ED092: DTPA Extractable Metals								
Copper	7440-50-8	1.00	mg/kg	----	----	----	1.67	----
Iron	7439-89-6	1.00	mg/kg	----	----	----	145	----
Manganese	7439-96-5	1.00	mg/kg	----	----	----	182	----
Zinc	7440-66-6	1.00	mg/kg	----	----	----	<1.00	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	20	mg/kg	----	----	----	750	----
EK080: Bicarbonate Extractable Phosphorus (Colwell)								
Bicarbonate Ext. P (Colwell)	----	2	mg/kg	----	----	----	<2	----
EP004: Organic Matter								
Organic Matter	----	0.5	%	----	----	----	0.5	----
Total Organic Carbon	----	0.5	%	----	----	----	<0.5	----



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

Compound	CAS Number	LOR	Unit	SITE 065 DEPTH 500-600	SITE 065 DEPTH 800-900	SITE 065 DEPTH 1100-1200	SITE 066 DEPTH 0-100	SITE 066 DEPTH 200-300
				14-MAY-2012 15:00	14-MAY-2012 15:00	14-MAY-2012 15:00	14-MAY-2012 15:00	14-MAY-2012 15:00
				EB1213707-181	EB1213707-182	EB1213707-183	EB1213707-184	EB1213707-185
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	7.7	8.4	9.2	6.0	7.7
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	585	685	688	50	43
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	2.9	2.4	2.2	1.4	3.7
ED008: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	1.7	----	3.6	5.3	----
Exchangeable Magnesium	----	0.1	meq/100g	6.3	----	5.7	1.4	----
Exchangeable Potassium	----	0.1	meq/100g	<0.1	----	<0.1	0.4	----
Exchangeable Sodium	----	0.1	meq/100g	3.8	----	2.1	<0.1	----
Cation Exchange Capacity	----	0.1	meq/100g	11.8	----	11.5	7.2	----
ED021: Bicarbonate Extractable Potassium (Colwell)								
Bicarbonate Extractable K (Colwell)	----	10	mg/kg	<200	----	<200	410	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	740	950	860	20	<10
ED091 : Calcium Chloride Extractable Boron								
Boron	7440-42-8	0.2	mg/kg	----	----	----	<0.2	----
ED092: DTPA Extractable Metals								
Copper	7440-50-8	1.00	mg/kg	----	----	----	2.32	----
Iron	7439-89-6	1.00	mg/kg	----	----	----	245	----
Manganese	7439-96-5	1.00	mg/kg	----	----	----	238	----
Zinc	7440-66-6	1.00	mg/kg	----	----	----	3.74	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	20	mg/kg	390	----	160	1980	----
EK080: Bicarbonate Extractable Phosphorus (Colwell)								
Bicarbonate Ext. P (Colwell)	----	2	mg/kg	<2	----	<2	35	----
EP004: Organic Matter								
Organic Matter	----	0.5	%	----	----	----	0.8	----
Total Organic Carbon	----	0.5	%	----	----	----	<0.5	----



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

Compound	CAS Number	LOR	Unit	SITE 066 DEPTH 500-600	SITE 066 DEPTH 800-900	SITE 066 DEPTH 1100-1200	SITE 067 DEPTH 0-100	SITE 067 DEPTH 200-300
				14-MAY-2012 15:00	14-MAY-2012 15:00	14-MAY-2012 15:00	14-MAY-2012 15:00	14-MAY-2012 15:00
				EB1213707-186	EB1213707-187	EB1213707-188	EB1213707-189	EB1213707-190
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	8.2	8.1	7.9	6.5	6.9
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	88	118	101	44	32
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	2.7	2.4	1.9	1.7	1.2
ED008: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	12.3	----	7.9	10.4	12.9
Exchangeable Magnesium	----	0.1	meq/100g	6.5	----	5.2	2.1	2.2
Exchangeable Potassium	----	0.1	meq/100g	0.1	----	0.2	0.4	0.2
Exchangeable Sodium	----	0.1	meq/100g	0.5	----	0.5	<0.1	<0.1
Cation Exchange Capacity	----	0.1	meq/100g	19.4	----	13.8	12.9	15.4
ED021: Bicarbonate Extractable Potassium (Colwell)								
Bicarbonate Extractable K (Colwell)	----	10	mg/kg	<200	----	<200	1050	<200
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	30	70	100	20	<10
ED091 : Calcium Chloride Extractable Boron								
Boron	7440-42-8	0.2	mg/kg	----	----	----	<0.2	<0.2
ED092: DTPA Extractable Metals								
Copper	7440-50-8	1.00	mg/kg	----	----	----	3.00	2.39
Iron	7439-89-6	1.00	mg/kg	----	----	----	203	92.6
Manganese	7439-96-5	1.00	mg/kg	----	----	----	159	86.9
Zinc	7440-66-6	1.00	mg/kg	----	----	----	3.23	1.77
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	20	mg/kg	420	----	310	1840	1290
EK080: Bicarbonate Extractable Phosphorus (Colwell)								
Bicarbonate Ext. P (Colwell)	----	2	mg/kg	<2	----	<2	31	3
EP004: Organic Matter								
Organic Matter	----	0.5	%	----	----	----	0.7	0.5
Total Organic Carbon	----	0.5	%	----	----	----	<0.5	<0.5



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

Compound	CAS Number	LOR	Unit	SITE 067 DEPTH 500-600	SITE 067 DEPTH 800-90	SITE 067 DEPTH 1100-1200	SITE 52 DEPTH 0-100	SITE 52 DEPTH 200-300
				14-MAY-2012 15:00	14-MAY-2012 15:00	14-MAY-2012 15:00	12-MAY-2012 15:00	12-MAY-2012 15:00
				EB1213707-191	EB1213707-192	EB1213707-193	EB1213707-199	EB1213707-200
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	7.5	7.6	8.1	6.3	7.4
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	27	20	32	41	189
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	2.2	1.8	2.1	3.4	3.6
ED008: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	15.8	----	13.5	11.8	----
Exchangeable Magnesium	----	0.1	meq/100g	5.1	----	8.3	9.7	----
Exchangeable Potassium	----	0.1	meq/100g	0.2	----	0.2	0.4	----
Exchangeable Sodium	----	0.1	meq/100g	<0.1	----	0.2	0.6	----
Cation Exchange Capacity	----	0.1	meq/100g	21.1	----	22.2	22.4	----
ED021: Bicarbonate Extractable Potassium (Colwell)								
Bicarbonate Extractable K (Colwell)	----	10	mg/kg	460	----	<200	300	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	<10	<10	<10	20	190
ED091 : Calcium Chloride Extractable Boron								
Boron	7440-42-8	0.2	mg/kg	----	----	----	<0.2	----
ED092: DTPA Extractable Metals								
Copper	7440-50-8	1.00	mg/kg	----	----	----	2.15	----
Iron	7439-89-6	1.00	mg/kg	----	----	----	203	----
Manganese	7439-96-5	1.00	mg/kg	----	----	----	215	----
Zinc	7440-66-6	1.00	mg/kg	----	----	----	3.16	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	20	mg/kg	480	----	350	2500	----
EK080: Bicarbonate Extractable Phosphorus (Colwell)								
Bicarbonate Ext. P (Colwell)	----	2	mg/kg	<2	----	<2	24	----
EP004: Organic Matter								
Organic Matter	----	0.5	%	----	----	----	0.9	----
Total Organic Carbon	----	0.5	%	----	----	----	0.5	----



Analytical Results

Sub-Matrix: SOIL

Client sample ID

Client sampling date / time

				SITE 52 DEPTH 500-600	SITE 52 DEPTH 800-900	SITE 52 DEPTH 1100-1200	----	----
				12-MAY-2012 15:00	12-MAY-2012 15:00	12-MAY-2012 15:00	----	----
Compound	CAS Number	LOR	Unit	EB1213707-201	EB1213707-202	EB1213707-203	----	----
EA002 : pH (Soils)								
pH Value	----	0.1	pH Unit	5.2	4.8	4.8	----	----
EA010: Conductivity								
Electrical Conductivity @ 25°C	----	1	µS/cm	910	1300	1390	----	----
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	3.4	4.1	4.4	----	----
ED008: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	2.9	----	1.2	----	----
Exchangeable Magnesium	----	0.1	meq/100g	9.6	----	8.0	----	----
Exchangeable Potassium	----	0.1	meq/100g	0.2	----	0.2	----	----
Exchangeable Sodium	----	0.1	meq/100g	3.7	----	3.9	----	----
Cation Exchange Capacity	----	0.1	meq/100g	16.4	----	13.3	----	----
ED021: Bicarbonate Extractable Potassium (Colwell)								
Bicarbonate Extractable K (Colwell)	----	10	mg/kg	320	----	230	----	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	10	mg/kg	1680	2580	2890	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	20	mg/kg	610	----	410	----	----
EK080: Bicarbonate Extractable Phosphorus (Colwell)								
Bicarbonate Ext. P (Colwell)	----	2	mg/kg	<2	----	<2	----	----



Analytical Results

Descriptive Results

Sub-Matrix: **SOIL**

Method: Compound	Client sample ID - Client sampling date / time	Analytical Results
ED044: Calcium Phosphate Extractable Sulfur		
ED044: Sulfur as S	SITE 001 DEPTH 0-100 - 08-MAY-2012 15:00	6
ED044: Sulfur as S	SITE 001 DEPTH 500-600 - 08-MAY-2012 15:00	11
ED044: Sulfur as S	SITE 001 DEPTH 1100-1200 - 08-MAY-2012 15:00	57
ED044: Sulfur as S	SITE 002 DEPTH 0-100 - 08-MAY-2012 15:00	8
ED044: Sulfur as S	SITE 002 DEPTH 500-600 - 08-MAY-2012 15:00	76
ED044: Sulfur as S	SITE 002 DEPTH 1100-1200 - 08-MAY-2012 15:00	163
ED044: Sulfur as S	SITE 004 DEPTH 0-100 - 08-MAY-2012 15:00	8
ED044: Sulfur as S	SITE 007 DEPTH 0-100 - 08-MAY-2012 15:00	6
ED044: Sulfur as S	SITE 007 DEPTH 500-600 - 08-MAY-2012 15:00	3
ED044: Sulfur as S	SITE 007 DEPTH 1100-1200 - 08-MAY-2012 15:00	30
ED044: Sulfur as S	SITE 008 DEPTH 0-100 - 08-MAY-2012 15:00	8
ED044: Sulfur as S	SITE 008 DEPTH 500-600 - 08-MAY-2012 15:00	3
ED044: Sulfur as S	SITE 008 DEPTH 1100-1200 - 08-MAY-2012 15:00	54
ED044: Sulfur as S	SITE 011 DEPTH 0-100 - 09-MAY-2012 15:00	6
ED044: Sulfur as S	SITE 011 DEPTH 500-600 - 09-MAY-2012 15:00	3
ED044: Sulfur as S	SITE 011 DEPTH 1100-1200 - 09-MAY-2012 15:00	4
ED044: Sulfur as S	SITE 014 DEPTH 0-100 - 08-MAY-2012 15:00	5
ED044: Sulfur as S	SITE 014 DEPTH 500-600 - 09-MAY-2012 15:00	19
ED044: Sulfur as S	SITE 014 DEPTH 1100-1200 - 09-MAY-2012 15:00	5
ED044: Sulfur as S	51SITE 020 DEPTH 0-100 - 08-MAY-2012 15:00	5
ED044: Sulfur as S	SITE 020 DEPTH 500-600 - 09-MAY-2012 15:00	5
ED044: Sulfur as S	SITE 020 DEPTH 1100-1200 - 09-MAY-2012 15:00	68
ED044: Sulfur as S	SITE 022 DEPTH 0-100 - 10-MAY-2012 15:00	3
ED044: Sulfur as S	SITE 022 DEPTH 500-600 - 10-MAY-2012 15:00	47
ED044: Sulfur as S	SITE 022 DEPTH 1100-1200 - 10-MAY-2012 15:00	144
ED044: Sulfur as S	SITE 026 DEPTH 0-100 - 10-MAY-2012 15:00	4
ED044: Sulfur as S	SITE 026 DEPTH 500-600 - 10-MAY-2012 15:00	6
ED044: Sulfur as S	SITE 026 DEPTH 1100-1200 - 10-MAY-2012 15:00	9
ED044: Sulfur as S	SITE 027 DEPTH 0-100 - 10-MAY-2012 15:00	7
ED044: Sulfur as S	SITE 028 DEPTH 0-100 - 10-MAY-2012 15:00	5
ED044: Sulfur as S	SITE 028 DEPTH 500-600 - 10-MAY-2012 15:00	15
ED044: Sulfur as S	SITE 028 DEPTH 1100-1200 - 10-MAY-2012 15:00	32
ED044: Sulfur as S	SITE 029 DEPTH 0-100 - 10-MAY-2012 15:00	10
ED044: Sulfur as S	SITE 029 DEPTH 500-600 - 10-MAY-2012 15:00	28
ED044: Sulfur as S	SITE 029 DEPTH 1100-1200 - 10-MAY-2012 15:00	74
ED044: Sulfur as S	SITE 031 DEPTH 0-100 - 11-MAY-2012 15:00	6
ED044: Sulfur as S	SITE 031 DEPTH 500-600 - 11-MAY-2012 15:00	77
ED044: Sulfur as S	SITE 031 DEPTH 1100-1200 - 11-MAY-2012 15:00	72
ED044: Sulfur as S	SITE 035 DEPTH 0-100 - 11-MAY-2012 15:00	8



Sub-Matrix: SOIL

<i>Method: Compound</i>	<i>Client sample ID - Client sampling date / time</i>	<i>Analytical Results</i>
ED044: Sulfur as S	SITE 035 DEPTH 500-600 - 11-MAY-2012 15:00	13
ED044: Sulfur as S	SITE 035 DEPTH 1100-1200 - 11-MAY-2012 15:00	10
ED044: Sulfur as S	SITE 036 DEPTH 0-100 - 11-MAY-2012 15:00	3
ED044: Sulfur as S	SITE 036 DEPTH 500-600 - 11-MAY-2012 15:00	47
ED044: Sulfur as S	SITE 036 DEPTH 1100-1200 - 11-MAY-2012 15:00	18
ED044: Sulfur as S	SITE 041 DEPTH 0-100 - 12-MAY-2012 15:00	5
ED044: Sulfur as S	SITE 041 DEPTH 500-600 - 12-MAY-2012 15:00	21
ED044: Sulfur as S	SITE 042 DEPTH 0-100 - 12-MAY-2012 15:00	8
ED044: Sulfur as S	SITE 042 DEPTH 500-600 - 12-MAY-2012 15:00	9
ED044: Sulfur as S	SITE 048 DEPTH 0-100 - 12-MAY-2012 15:00	5
ED044: Sulfur as S	SITE 048 DEPTH 500-600 - 12-MAY-2012 15:00	9
ED044: Sulfur as S	SITE 049 DEPTH 0-100 - 12-MAY-2012 15:00	10
ED044: Sulfur as S	SITE 049 DEPTH 500-600 - 12-MAY-2012 15:00	31
ED044: Sulfur as S	SITE 056 DEPTH 0-100 - 14-MAY-2012 15:00	13
ED044: Sulfur as S	SITE 056 DEPTH 500-600 - 14-MAY-2012 15:00	20
ED044: Sulfur as S	SITE 065 DEPTH 0-100 - 14-MAY-2012 15:00	6
ED044: Sulfur as S	SITE 065 DEPTH 500-600 - 14-MAY-2012 15:00	25
ED044: Sulfur as S	SITE 065 DEPTH 1100-1200 - 14-MAY-2012 15:00	19
ED044: Sulfur as S	SITE 066 DEPTH 0-100 - 14-MAY-2012 15:00	8
ED044: Sulfur as S	SITE 066 DEPTH 500-600 - 14-MAY-2012 15:00	10
ED044: Sulfur as S	SITE 066 DEPTH 1100-1200 - 14-MAY-2012 15:00	7
ED044: Sulfur as S	SITE 067 DEPTH 0-100 - 14-MAY-2012 15:00	6
ED044: Sulfur as S	SITE 067 DEPTH 200-300 - 14-MAY-2012 15:00	4
ED044: Sulfur as S	SITE 067 DEPTH 500-600 - 14-MAY-2012 15:00	2
ED044: Sulfur as S	SITE 067 DEPTH 1100-1200 - 14-MAY-2012 15:00	2
ED044: Sulfur as S	SITE 52 DEPTH 0-100 - 12-MAY-2012 15:00	9
ED044: Sulfur as S	SITE 52 DEPTH 500-600 - 12-MAY-2012 15:00	46
ED044: Sulfur as S	SITE 52 DEPTH 1100-1200 - 12-MAY-2012 15:00	9